



**North Roads Operations Centre Expansion  
and Storm Water Management Pond  
RFTC-1868-24-TR88179**

PREPARED FOR:

York Region

PREPARED BY:



Issued for Tender Addendum No. 04  
July 18, 2025

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**1 GENERAL**

- 1.1. This document is issued prior to close of tenders to revise or provide clarification of the work described in the Bid Documents.
- 1.2. The revisions described by this addendum shall be carried out in accordance with the requirements of the Contract Documents.
- 1.3. The items included in this addendum shall become part of the work of the Contract.
- 1.4. This addendum consists of **542** pages, not including the cover page.

**2 ARCHITECTURAL**

**SPECIFICATIONS**

**2.1 Refer to Section 00 00 10 Table of Contents**

**Revise:** "Seals Page" to "00 01 07 Specifications Authentication"

**Add:** 10 14 10 Signage

**2.2 Refer to Section 00 01 07 Specifications Authentication**

**Add:** Section 00 01 07 Specifications Authentication in its entirety.

**2.3 Refer to Section 00 30 00 Information Documents**

**Revise:** date of Soil Characterization Report prepared by Engtec Consulting Inc.

**2.4 Refer to Section 01 50 00 - Temporary Facilities and Controls**

**Revise:** Dimensions of Room 1 and Room 3 under Item 2.2

**2.5 Refer to Section 07 61 00 – Sheet Metal Roofing**

**Delete:** Item 2.1

**Revise:** Item 2.3.1

**Add:** Item 3.3.3.1 and renumber remaining items

**2.6 Refer to Section 09 99 99 – Materials List**

**Add:** WT-2 Wall Tile, FT-1 Floor Tile, FT-2 Floor Tile

**2.7 Refer to Section 10 14 10 – Signage**

**Add:** Section 10 14 10 – Signage in its entirety.

**2.8 Refer to Section 10 99 99 – Washroom Accessories Schedule**

**Delete:** SB-1, SB-2

**Add:** SC-01, SCR-01

**DRAWINGS**

**2.9 Refer to Drawing A000**

**Delete:** C-15 Paving Sequencing Diagram

**Revise:** Issuance Title and Date

**2.10 Refer to Drawing A001**

**Delete:** note "- SMOKE DETECTOR WILL BE PROVIDED IN ELECTRICAL, TELECOM, STORAGE, AND JANITOR ROOM. HEAT DETECTOR WILL BE PROVIDED IN MECHANICAL ROOM."



**2.11 Refer to Drawing A015**

**Revise:** Floor Finish and Base from "EXIST." to "EC1" for Rooms 100, 100A, and 101.  
**Add:** GL5 and GL9 annotations

**2.12 Refer to Drawing A050**

**Revise:** note "McMinnows Pond" to "Stormwater Management Pond #1"  
**Revise:** note "Existing Gravel" to "Material Stockpile Area"

**2.13 Refer to Drawing A051**

**Revise:** note "McMinnows Pond" to "Stormwater Management Pond #1"  
**Revise:** note "Existing Gravel" to "Material Stockpile Area"  
**Revise:** note "CONTRACTOR TO RELOCATE EXISTING PRECAST GRAVITY SYSTEM AND STOCKPILED AGGREGATE MATERIALS CONTAINED WITHIN AS REQUIRED TO ACCOMMODATE EXPANSION OF STORMWATER MANAGEMENT POND #1. EXISTING PRECAST GRAVITY SYSTEM AND AGGREGATE MATERIALS TO MOVE PROJECT SOUTH UP TO 3m. RELOCATION TO BE COORDINATED WITH OWNER WITH MINIMUM 1 WEEK NOTICE."  
**Revise:** note "DEMOLISH EXIST. GENERATOR AND CONCRETE PAD. GENERATOR TO REMAIN OPERATIONAL THROUGH CONSTRUCTION UNTIL A NEW ONE IS COMMISSIONED. EXISTING GENERATOR TO BE RETURNED TO OWNER."  
**Add:** Existing underground utilities  
**Delete:** Existing flagpoles to be relocated

**2.14 Refer to Drawing A052**

**Add:** Existing underground utilities  
**Delete:** Existing flagpoles to be relocated

**2.15 Refer to Drawing A053**

**Revise:** note "McMinnows Pond" to "Stormwater Management Pond #1"  
**Revise:** note "Existing Gravel" to "Material Stockpile Area"  
**Revise:** note "CONTRACTOR TO RELOCATE EXISTING PRECAST GRAVITY SYSTEM AND STOCKPILED AGGREGATE MATERIALS CONTAINED WITHIN AS REQUIRED TO ACCOMMODATE EXPANSION OF STORMWATER MANAGEMENT POND #1. EXISTING PRECAST GRAVITY SYSTEM AND AGGREGATE MATERIALS TO MOVE PROJECT SOUTH UP TO 3m. RELOCATION TO BE COORDINATED WITH OWNER WITH MINIMUM 1 WEEK NOTICE."  
**Delete:** note "Relocated Berm Location" and associated linework  
**Revise:** BH tag for legibility  
**Revise:** New generator size  
**Add:** New bollard around new generator  
**Revise:** Parking spaces adjacent to new generator  
**Delete:** Relocated flagpoles

**2.16 Refer to Drawing A054**

**Revise:** note "EXTENT OF HEATED SLAB TO FOLLOW EXTENT OF PAVED WALKWAY" to "PROVISIONAL PRICING: GLYCOL SYSTEM HEATED SLAB TO FOLLOW EXTENT OF PAVED WALKWAY. BASE SCOPE: NO GLYCOL SYSTEM HEATED SLAB."  
**Revise:** Parking space dimension for legibility  
**Revise:** New generator size  
**Add:** New bollard around new generator  
**Revise:** Parking spaces adjacent to new generator  
**Delete:** Relocated flagpoles

**2.17 Refer to Drawing A056**

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**Add:** note "NEW POSTS AND GIRTS AT EXTERIOR WALLS BETWEEN GL-4 TO GL-5 TO BE COORDINATED WITH OPERATIONAL INTENTION OF EXISTING MECHANICAL AND IT ROOMS"

**2.18 Refer to Drawing A101**

**Add:** note "EXISTING EPOXY COATING IN EXIST. WASH BAY AND EXIST. GARAGE IS TO BE FULLY REMOVED. EXISTING SLAB TO BE PREPARED AND REPAIRED AS REQUIRED TO ACCEPT NEW EPOXY FLOOR FINISH ACCORDING TO MANUFACTURER'S REQUIREMENTS."

**Add:** note "EXIST. STRUCTURAL ELEMENTS TO BE WELL MAINTAINED AND PROTECTED DURING DEMOLITION WORK. REPAINT EXIST. STRUCTURAL ELEMENTS PT1, TYP."

**Add:** Enlarged kitchenette call out view tag

**Add:** note "CONTRACTOR TO SALVAGE ALL EXISTING WATER HEATERS, PRESSURE WASHER, AND WATER TREATMENT SKID AND RETURN THEM TO OWNER."

**2.19 Refer to Drawing A201**

**Revise:** Location of door 101.9

**Delete:** Four (4) bollards near door 101.9

**Add:** Partition type tags at Enclave (Room 10070)

**Revise:** Call out location of detail 7/A610

**Add:** Call out for detail 10/A610

**Add:** Call out for section 1/A501 tag

**Add:** note "SHIPS LADDER"

**Add:** note "DASHED LINE INDICATES EXTENT OF ROOF ACCESS HATCH OPENING ABOVE"

**Add:** P9 partition behind kitchenette in Lunch Room (10050)

**Add:** Call out for enlarged kitchenette plan 9/A901

**Add:** note "CONTRACTOR TO DEMOLISH EXISTING SLAB ON GRADE AS REQUIRED TO FACILITATE INSTALL OF NEW AREA DRAIN AND SANITARY DRAINAGE LINES, TYP. REFER TO STRUCTURAL AND MECHANICAL."

**Revise:** New generator size

**Add:** New bollard around new generator

**Revise:** Parking spaces adjacent to new generator

**2.20 Refer to Drawing A202**

**Add:** note "DEMOLISH ALL EXISTING ROOFTOP EQUIPMENT, INCLUDING MECHANICAL UNITS AND ROOF HATCH. ALL EXISTING ROOF CURBS AT EQUIPMENT ARE TO BE DEMOLISHED. ALL ROOF PENETRATIONS ARE TO BE REPAIRED TO MATCH ADJACENT ROOFING. ALL JOINTS ARE TO BE REPAIRED AND SEALED IN ACCORDANCE WITH ROOFING STANDARDS AND BEST PRACTICES."

**Add:** note "PATCH, REPAIR, AND MAKE GOOD AT ROOF OPENINGS RESULTING FROM REMOVAL OF EXISTING ROOFTOP EQUIPMENT, INCLUDING MECHANICAL UNITS AND ROOF HATCH, TYP."

**Add:** note "EXISTING ROOF HATCH IS TO BE DEMOLISHED, INCLUDING ALL ACCESSORIES AND ACCESS LADDERS. ROOF HATCH PENETRATIONS ARE TO BE REPAIRED TO MATCH ADJACENT ROOFING. ALL JOINTS ARE TO BE REPAIRED AND SEALED IN ACCORDANCE WITH ROOFING STANDARDS AND BEST PRACTICES."

**Revise:** Layout of access walkway and area of future PV field segments

**Add:** note "EXISTING ROOF ANCHORS AND LIFELINE BETWEEN GL-1 TO GL-5 TO REMAIN"

**Add:** R1 roof assembly tags

**Add:** Future PV Field Segments

**2.21 Refer to Drawing A301**

**Add:** Louvres

**Revise:** Extent of existing concrete upstand to remain

**Revise:** Extent of new generator

**2.22 Refer to Drawing A501**

**Delete:** Linework of elements beyond

**2.23 Refer to Drawing A602**

**Revise:** Roof assembly tags

**Revise:** Wall assembly

**2.24 Refer to Drawing A603A**

**Revise:** Roof assembly tag

**Revise:** Material hatches

**2.25 Refer to Drawing A604**

**Revise:** Roof assembly tags

**Add:** Wall assembly tag

**2.26 Refer to Drawing A605**

**Revise:** Roof assembly tag

**2.27 Refer to Drawing A610**

**Revise:** Location of detail 7/A610

**Add:** Detail 10/A610

**2.28 Refer to Drawing A611**

**Delete:** note "REFINISH EXISTING STANDING SEAM ROOF TO MATCH NEW ROOF"

**Add:** Typical Louvre Head and Sill Details

**2.29 Refer to Drawing A803**

**Add:** Wave Actuator tags

**Add:** Dimensions to locate Wave Actuators

**Add:** Concrete housekeeping pads in Mechanical (Room 103)

**Add:** Call out of detail 8/A901

**2.30 Refer to Drawing A851**

**Add:** Electrical potlights to Enlarged Reflected Ceiling Plan

**Add:** note "CONTRACTOR TO PROVIDE SHOWER CURTAIN ROD (SCR-01) C/W SHOWER CURTAIN AND CURTAIN HOOKS (SC-01), TYP."

**Add:** SCR-01 to Washroom Accessory Schedule

**2.31 Refer to Drawing A852**

**Add:** Wave Actuator tags

**Add:** Dimension for typical mounting height of Wave Actuators

**Add:** Floor Drain tags

**Add:** note "CONTRACTOR TO PROVIDE SHOWER CURTAIN ROD (SCR-01) C/W SHOWER CURTAIN AND CURTAIN HOOKS (SC-01), TYP."

**Add:** Dimension for lockers and benches

**Add:** Headrail bracing at top of toilet partitions

**Add:** SCR-01 to Washroom Accessory Schedule

**2.32 Refer to Drawing A901**

**Add:** Wall finish tags and reinforcement for millwork

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**Revise:** notes for locker and bench details  
**Add:** Detail 8/A901  
**Add:** Enlarged kitchenette plan 9A901

**3      STRUCTURAL**

3.1 Refer to attached Structural Addendum No. 04

**4      MECHANICAL**

4.1 Refer to attached Mechanical Addendum No. 04

**5      ELECTRICAL**

5.1 Refer to attached Electrical Addendum No. 04

**6      CIVIL**

6.1 Refer to attached Civil Addendum No. 04

**7      LANDSCAPE**

7.1 Refer to attached Landscape Addendum No. 04

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**8 ATTACHMENTS**

The following attachments are being issued with and form part of this addendum:

- 8.1 Specification Section 00 00 10 - Table of Contents - 7 Pages
- 8.2 Specification Section 00 01 07 - Specifications Authentication – 1 Page
- 8.3 Specification Section 00 30 00 – Information Documents – 2 Pages
- 8.4 Specification Section 01 50 00 - Temporary Facilities and Controls – 15 Pages
- 8.5 Specification Section 07 61 00 – Sheet Metal Roofing – 9 Pages
- 8.6 Specification Section 09 99 99 - Materials List – 1 Page
- 8.7 Specification Section 10 14 10 – Signage – 5 Pages
- 8.8 Specification Section 10 99 99 – Washroom Accessories Schedule – 2 Pages
- 8.9 Architectural Addendum No. 04 – 36 Pages
- 8.10 Structural Addendum No. 04 – 27 Pages
- 8.11 Mechanical Addendum No. 04 – 197 Pages
- 8.12 Electrical Addendum No. 04 - 49 Pages
- 8.13 Civil Addendum No. 04 - 16 Pages
- 8.14 Landscape Addendum No. 04 - 3 Pages
- 8.15 Geotechnical Investigation for Maintenance Building Expansion Road Operations Centre at 3525 Baseline Road, Sutton West, Ontario – 3 Pages
- 8.16 Roadwork Specifications - York Region - Oct 2024 – 163 Pages

**END OF ADDENDUM**

## **Division 0 – Bidding Documents**

00 00 10	Table of Contents
00 01 07	Specifications Authentication
00 30 00	Information Documents

## **Division 01 - General Requirements**

01 11 00	Summary of Work
01 14 00	Work Restrictions
01 21 00	Allowances
01 31 19	Project Meetings
01 32 33	Photographic Documentation
01 33 00	Submittal Procedures
01 33 01	LEED V4 Submittal List
01 35 00	Delegated Design
01 35 22	LEED NC V4 Checklist
01 35 29	Health and Safety Requirements
01 35 43	Environmental Procedures
01 41 00	Regulatory Requirements
01 45 00	Quality Control
01 50 00	Temporary Facilities and Controls
01 51 00	Temporary Utilities
01 52 00	Construction Facilities
01 56 00	Temporary Barriers and Enclosures
01 57 00	Erosion and Sedimentation Control
01 57 00a	Erosion and Sedimentation Control - Checklist
01 61 00	LEED Product Requirements
01 62 00	Product Options and Substitutions
01 62 10	Substitute Product Request Form
01 65 00	Owner Supplied Products
01 71 00	Examination and Preparation
01 74 11	Cleaning
01 74 19	Construction Waste Management
01 74 19a	W1 Proposed Receiving Facilities Form
01 74 19b	W2 Waste Tracking Worksheet
01 77 00	Closeout Procedures
01 78 00	Closeout Submittals
01 79 00	Demonstration and Training
01 81 13	General LEED Requirements
01 81 19	Indoor Air Quality
01 81 19a	IAQ 1 Low-Emitting Materials Form
01 81 19b	IAQ 2 Management Inspection Form
01 81 19c	IAQ 3 Photo Documentation Checklist
01 91 13	General Commissioning (Cx) Requirements
01 91 13.13	Commissioning (Cx) Plan
01 91 13.15	Commissioning Plan
01 91 13.16	General Commissioning Forms

## **Division 02 - Existing Conditions**

02 07 50	Cutting and Patching
02 20 10	Structural Alterations
02 41 13	Selective Site Demolition
02 41 13.13	Paving Removal
02 41 19	Demolition of Structure
02 50 00	Site Remediation
02 65 00	Underground Storage Tank Removal

## **Division 03 – Concrete**

03 10 00	Concrete Forming
03 20 00	Concrete Reinforcement
03 30 00	Cast-In-Place Concrete
03 30 00.09	Cast-In-Place Concrete Short Form
03 35 00	Concrete Finishing

## **Division 04 – Masonry**

04 22 00	Unit Masonry
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## **Division 05 - Metals**

05 12 00	Structural Steel
05 12 13	Architecturally-Exposed Structural Steel
05 31 00	Steel Deck
05 41 00	Structural Metal Stud Framing
05 50 00	Metal Fabrications
05 51 29	Metal Stairs and Ladders

## **Division 06 - Wood, Plastics and Composites**

06 10 00	Rough Carpentry
06 40 00	Architectural Woodwork
06 63 00	Fiberglass Reinforced Plastics (FRP)

## **Division 07 - Thermal and Moisture Protection**

07 05 20	Building Envelope Air Tightness
07 14 16	Cold Fluid Applied Waterproofing
07 21 13	Board Insulation
07 21 19	Foam-in-Place Insulation
07 21 29	Spray Applied Polyurethane Foam
07 27 13	Modified Bituminous Air and Vapour Barrier
07 27 19	Sheet Membrane Air and Vapour Barrier
07 42 00	Composite Metal Panels
07 42 13	Preformed Metal Cladding
07 42 43	Insulated Wall Panels

07 46 23	Wood Siding and Soffit
07 46 43	Composite Wood Siding and Soffit
07 52 00	Modified Bituminous Membrane Roofing
07 61 00	Sheet Metal Roofing
07 62 00	Sheet Metal Flashing and Trim
07 72 33	Roof Hatches
07 84 00	Firestopping and Smoke seals
07 92 00	Sealants

#### **Division 08 - Openings**

08 11 13	Steel Doors and Frames
08 11 16	Aluminum Doors and Frames
08 36 13	Sectional Metal Doors
08 44 13	Glazed Aluminum Curtain Walls
08 50 13	Aluminum Windows
08 71 00	Door Hardware
08 80 50	Glazing
08 87 53	Glazing Films

#### **Division 09 – Finishes**

09 21 16	Gypsum Board Assemblies
09 22 00	Non-Structural Metal Framing
09 30 13	Tiling
09 48 33	Acoustic Baffles
09 51 13	Acoustical Panel Ceilings
09 51 53	Direct-Attached Acoustical Ceilings
09 65 00	Resilient Flooring
09 67 23	Resinous Flooring
09 72 00	Vinyl Films
09 91 00	Painting
09 99 99	Materials List

#### **Division 10 – Specialties**

10 14 10	Signage
10 14 54	Traffic Signage
10 21 13	Toilet Compartments
10 22 23	Moveable Partition System
10 28 10	Toilet and Bath Accessories
10 51 13	Metal Lockers
10 99 99	Washroom Accessories Schedule

#### **Division 11 – Equipment**

11 24 31	Roof Fall Arrest
11 31 00	Appliances
11 51 23	Metal Shelving



## **Division 20 - Common Mechanical Work Sections**

20 01 10	Mechanical General Requirements
20 01 50	Mechanical Basic Materials And Methods
20 05 05	Mechanical Demolition
20 05 14	Mechanical Work in Existing Building
20 05 33	Electric Heat Tracing
20 05 48	Vibration Isolation
20 05 70	Motors, Motor Starters, Motor Control Centres, And Wiring
20 05 75	Variable Frequency Drives
20 05 95	Testing Adjusting And Balancing
20 07 13	Mechanical Ductwork Insulation
20 07 16	Mechanical Equipment Insulation
20 07 19	Mechanical Piping Insulation
20 08 10	Mechanical Commissioning

## **Division 21 - Fire Protection Sections**

21 20 10	Fire Extinguishers
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## **Division 22 - Plumbing and Drainage Sections**

22 11 10	Potable Water Piping And Pumping Systems
22 13 10	Sanitary And Storm Water Drainage And Vent Piping And Pumping Systems
22 15 13	Compressed Air Systems
22 30 10	Plumbing Equipment And Specialties
22 40 10	Plumbing Fixtures And Drains

## **Division 23 - HVAC Sections**

23 10 10	Fuel Systems
23 21 13	HVAC Piping Systems, Valves And Accessories
23 21 23	HVAC Pumps
23 23 10	Refrigerant Piping
23 25 10	HVAC Chemical Treatment Systems
23 30 10	HVAC Ductwork
23 33 10	Air Duct Accessories
23 35 10	Fans And Blowers
23 36 10	Air Grilles And Diffusers
23 37 10	Air Terminal Control Units
23 40 10	Air Filters
23 57 10	HVAC Heat Exchangers
23 72 10	Air To Air Recovery Systems
23 74 16	Packaged Rooftop Air-Conditioning Units
23 81 26	Split System Air Conditioning Units
23 81 29	Variable Refrigerant Flow Systems
23 81 43	Air Source Heat Pump Flow Systems
23 82 10	Terminal HVAC Equipment
23 83 15	Radiant Floor Heating and Snow Melting Systems

23 84 13 Humidifiers

## **Division 25 Building Automation System (BAS) And Controls Sections**

25 05 10 BAS General Requirements  
25 10 10 BAS Control Network  
25 30 10 BAS Instrumentation and Devices  
25 56 26 Integrated Lighting System Controls

## **Division 26 – Electrical**

26 05 00 Electrical General Requirements  
26 05 01 Shop Drawings, Product Data And Samples  
26 05 03 Electrical Systems Commissioning  
26 05 05 Basic Materials And Methods  
26 05 08 Firestopping  
26 05 10 Electrical Identification  
26 05 11 Testing And Coordination Study Of Distribution  
26 05 12 Arc Flash Hazard Study  
26 05 14 Work In Existing Building  
26 05 21 Wire And Cable Up To 600 Volts  
26 05 27 Grounding And Bonding  
26 05 29 Hangers And Supports  
26 05 31 Splitter Trough  
26 05 33 Raceways And Boxes  
26 09 23 Digital Metering System  
26 11 10 Electrical High Voltage Service  
26 12 16 Low Voltage Dry Type Transformers  
26 24 01 Service Entrance Lv Switchboard  
26 24 16 Panelboards  
26 27 26 Wiring Devices  
26 28 13 Fuses  
26 28 23 Safety Switches  
26 28 33 Quick Connect Switches  
26 29 01 AC Contactors  
26 32 13 Gas Generator (SU)  
26 36 23 Automatic Transfer Switches  
26 50 00 Lighting Luminaires  
26 80 00 Electric Vehicle Charger  
APPENDIX A YRND – Lighting Standard  
APPENDIX B YRND – Receptacle And Circuit Labelling Standard  
APPENDIX C YRND – Electrical Power Monitoring Standard  
APPENDIX D YRND – Electrical & ICAT Works Proposed Phasing  
APPENDIX E YRND – Proposed Phasing

## **Division 27 & 28 Information, Communications, Automation & Technology (ICAT)**

27 05 00 Communications General Requirements  
27 05 01 ICAT Shop Drawings, Product Data And Samples

27 05 26	Grounding And Bonding
27 05 29	hangers and supports
27 05 32	Firestopping
27 05 53	Identification
27 10 00	Testing And Documentation
27 11 16	Cabinets, Racks, Frames And Enclosures
27 11 19	Termination Blocks And Patch Panels
27 13 23	Optical Fiber Backbone Cabling
27 15 13	Copper Horizontal Cabling
27 15 43	Copper Jack Information Outlets And Connectors
27 15 45	Fiber Connectors, Adapters And Adapter Panels
27 15 49	Work Area Faceplate-Wall Plates And Surface Mount Boxes
27 16 15	Copper Patch Cords
27 16 17	Multimode Optical Fiber Cords And Pigtails
27 16 19	Singlemode Optical Fiber Cords And Pigtails
28 05 00	Security General Requirements
28 13 00	Security Systems
28 15 00	Intercom System
	APPENDIX A YRND – ITS Standards And Guidelines
	APPENDIX B YRND – Security System Specifications

#### **Division 31 – Earthworks**

31 05 16	Aggregates for Earthwork
31 23 00	Excavation and Fill
31 23 33.01	Excavating, Trenching and Backfilling

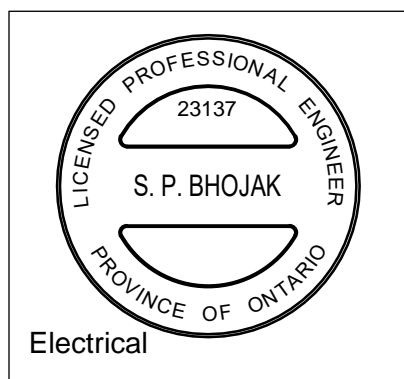
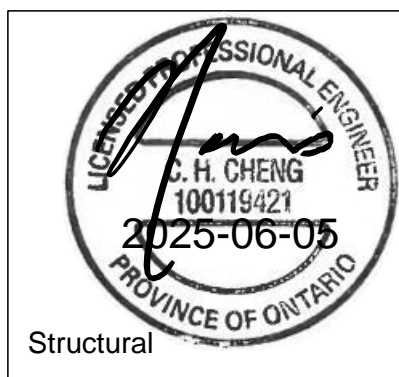
#### **Division 32 – Exterior Improvements**

32 01 00.01	Pavement Cleaning and Marking Removal
32 12 10	Marchall Immersion Test for Bitumen
32 12 13.16	Asphalt Tack Coats
32 12 16	Asphalt Paving
32 13 13	Concrete Paving, Sidewalks, Curbs, and Gutters
32 15 40	Crushed Stone Surfacing
32 17 23	Pavement Markings
32 31 13	Pavement Coatings
32 33 00	Site Furnishings
32 91 19.13	Topsoil Placement and Grading
32 92 19.16	Hydraulic Seeding
32 93 10	Trees, Shrubs and Ground Cover Planting

#### **Division 33 – Utilities**

33 05 16	Maintenance Holes and Catch Basin Structures
33 41 00	Storm Utility Drainage Piping
33 46 17	Subgrade Drainage Network

**END OF SECTION**



**Part 1 General**

**1.1 GENERAL REQUIREMENTS**

- .1 Read and conform to Division 01 requirements and documents referred to therein.

**1.2 REFERENCES**

- .1 Definitions
  - .1 Information Documents means information of any type and in any form, related to the Project and identified in this Section as such and do not include the Contract Documents.

**1.3 STATUS OF INFORMATION DOCUMENTS**

- .1 Information document, by their nature, cannot reveal all conditions that exist or can occur on the Site. Should conditions be found to vary substantially from the report immediately notify the Consultant in writing and await instruction.
- .2 The Contractor shall not be entitled to extra payment or extension of the Contract Time for Work which is required and which is reasonably inferable from the reports as being necessary.

**1.4 USE OF AND RELIANCE UPON INFORMATION DOCUMENTS**

- .1 Information Documents are made available by the Owner for the purpose of providing the Contractor with access to information available to Owner.
- .2 Information Documents shall not be considered a representation or warranty that information contained therein is accurate, complete or appropriate, and do not form a part of the Contract Documents.
- .3 Bidder shall interpret and draw its own conclusions about Information Documents and is encouraged to obtain specialist advice with respect thereto. Prime Consultant assumes no responsibility for such interpretations and conclusions.
- .4 Information contained in Information Documents may be time sensitive and dates shall be considered when interpreting Information Documents.
- .5 Bidder may rely upon the data contained in Information Documents, or parts thereof, which are specifically incorporated into Contract Documents by means of copying, transcribing or referencing, but shall draw his own conclusions from such data and shall not rely on opinions or interpretations contained therein.

**1.5 INFORMATION DOCUMENTS**

- .1 Information Documents, in whole or in part, consist of the following:
  - .1 Geotechnical Investigation for Modification of Ponds at 3525 Baseline Road, Sutton, Ontario dated December 6, 2024 prepared by Engtec Consulting Inc.
  - .2 Geotechnical Investigation for Maintenance Building Expansion at Roads Operations Centre at 3525 Baseline Road dated December 4, 2023 prepared by Engtec Consulting Inc.

- .3 Designated Substances and Hazardous Materials Survey dated November 20, 2020 prepared by ECHO Environmental Consulting Occupational Health
- .4 Designated Substances Survey dated July 12, 2024 prepared by LEAP Management Inc.
- .5 Stormwater Management Report dated July 26, 2024 prepared by Resilient Consulting Corporation.
- .6 LEED Energy Model Report dated May 23, 2025 prepared by MCW Consultants Ltd.
- .7 LEED v4 Overall Documentation Progress dated May 23, 2025 prepared by MCW Consultants Ltd.
- .8 Hydrogeological Assessment dated September 28, 2022 prepared by Harden Environmental Services Limited.
- .9 Hydro One Schedule B – Customer Obligations Letter, Design Services Demand Layout, and YorkNet underground fibre optic installation drawings.
- .10 Soil Characterization Report dated **March 11, 2025** prepared by Engtec Consulting Inc.
- .11 Soil Characterization Report: Stockpile Sampling and Delineation Samples dated April 4, 2025 prepared by Engtec Consulting Inc.
- .12 Assessment of Past Uses dated December 6, 2024 prepared by Engtec Consulting Inc.
- .13 Construction Dewatering Assessment dated November 21, 2024 prepared by Hydrogeology Consulting Services.
- .14 Summary of Salt-Impacted and Contaminated Soils dated April 14, 2025.
- .15 Soil Management Plan (SMP) - York Region North Road Operations Centre at 3525 Baseline Rd, Georgina, ON. dated April 7, 2025 prepared by Engtec Consulting Inc.
- .16 Property Services Branch Facilities Signage Guidelines dated April 24, 2023 prepared by York Region

**Part 2 Products**

**2.1 NOT USED**

**Part 3 Execution**

**3.1 NOT USED**

**END OF SECTION**

**Part 1        GENERAL**

- .1        Read and conform to Division 01 requirements and documents referred to therein.

**1.2        RELATED DOCUMENTS**

- .1        Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section. Coordinate work in this Section with Section 01 14 00 – Work Restrictions and Site Restrictions Plan.

**1.3        SUMMARY**

- .1        This Section includes requirements for temporary utilities, support facilities, and security and protection facilities for Project construction operations.
- .2        Contractor to maintain operation of garage, ensure fully operational when staff are moved out to temporary trailers.
- .3        Owners will have Contractors working on site in the 'Contractors trailers'. Relocation of the trailers to be coordinated with the owner and must be complete between April 30<sup>th</sup> and October 1<sup>st</sup> Contractors trailers to be fully operational in winter periods within the contract, October 1<sup>st</sup>- April 30<sup>th</sup>.
- .4        Access to be maintained to all on site buildings throughout construction. See Site Restrictions Appendix H
- .5        Staff are to be moved back in to building from temporary trailers upon substantial completion. Refer to Appendix E.
- .6        Contractor to provide temporary office trailers, temporary power, data, heating, cooling, and washroom facilities for staff
- .7        Existing garage to be fully operational during winter operations (from October 1 to April 30)
- .8        All work within the garage shall be coordinated with the Owner to maintain business continuity. No work to be planned in the garage area between October 1 to April 30
- .9        Refer to Section 20 05 15 Mechanical Work in Existing Buildings and 26 05 14 Working in Existing Facility for mechanical and electrical systems operational requirements in the existing garage during construction.
- .10      Related Sections:
  - .1        Section 01 10 00 - Summary for work restrictions and limitations on utility interruptions.
  - .2        Section 01 74 21 - Construction Waste Management and Disposal for provision of on-site construction waste and recycling facilities.
  - .3        Section 32 12 16 - Asphalt Paving for construction and maintenance of asphalt pavement for temporary roads and paved areas.

**1.4        DEFINITIONS**

- .1        Permanent Enclosure: As determined by Consultant, permanent or temporary roofing is complete, insulated, and weathertight; exterior walls are insulated and



weathertight; and all openings are closed with permanent construction or substantial temporary closures.

## **1.5            USE CHARGES**

- .1    General: Use charges for temporary construction facilities and services are not chargeable to the Owner or Contractor and shall be included in the Contract Sum for this Project. Allow other entities to use temporary services and facilities without cost, including, but not limited to, the following:

- .1    Owner's construction forces.
- .2    Occupants of Project.
- .3    Consultant.
- .4    Testing agencies.
- .5    Personnel of authorities having jurisdiction.

## **1.6            SUBMITTALS**

- .1    Site Plan: Show temporary facilities, utility hookups, staging areas, and parking areas for construction personnel.
- .2    Temporary Utility Reports: Submit reports of tests, inspections, meter readings, and similar procedures performed on temporary utilities.
- .3    Fire-Safety Program: Show compliance with requirements of NFPA 241 and authorities having jurisdiction. Indicate Contractor personnel responsible for management of fire-prevention program.
- .4    Implementation and Termination Schedule: Within fifteen (15) days of date established for submittal of Contractor's Construction Schedule, submit a schedule indicating implementation and termination of each temporary utility.
- .5    Moisture-Protection Plan: Describe procedures and controls for protecting materials and construction from water absorption and damage.
  - .1    Describe delivery, handling, and storage provisions for materials subject to water absorption or water damage.
  - .2    Indicate procedures for discarding water-damaged materials, protocols for mitigating water intrusion into completed Work, and replacing water-damaged Work.
  - .3    Indicate sequencing of work that requires water and describe plans for dealing with water from these operations. Show procedures for verifying that wet construction has dried sufficiently to permit installation of finish materials.
- .6    Dust- and HVAC-Control Plan: Submit coordination drawing and narrative that indicates the dust- and HVAC-control measures proposed for use, proposed locations, and proposed time frame for their operation. Identify further options if proposed measures are later determined to be inadequate. Include the following:
  - .1    Locations of dust-control partitions at each phase of work.
  - .2    HVAC system isolation schematic drawing.
  - .3    Location of proposed air-filtration system discharge.
  - .4    Waste handling procedures.

- .5 Other dust-control measures.

## **1.7 QUALITY ASSURANCE**

- .1 Standards: Comply with ANSI A10.6, NECA's "Temporary Electrical Facilities," and NFPA 241.
- .2 Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.
- .3 Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.
- .4 Accessible Temporary Egress: For addition and renovation work that affects egress from occupied portions of the facility.

## **1.8 PROJECT CONDITIONS**

- .1 Temporary Utilities: At earliest feasible time, when acceptable to Owner, change over from use of temporary service to use of permanent service.
  - .1 Temporary Use of Permanent Facilities: Installer of each permanent service shall assume responsibility for operation, maintenance, and protection of each permanent service during its use as a construction facility before Owner's acceptance, regardless of previously assigned responsibilities.
  - .2 Coordinate with each utility company for providing and terminating temporary utilities required during the construction contract time. The Owner makes no claims and shall not be held responsible for when permanent utilities will be available to the project site other than as described in these specifications and no later than the date of Substantial Completion. If conditions occur which require the Owner's involvement (obtaining easements or right-of-way), notify the Consultant and the Owner in a timely manner to allow for the procedures required to allow the permanent power to be brought to the site.
- .2 Conditions of Use: The following conditions apply to use of temporary services and facilities by all parties engaged in the Work:
  - .1 Keep temporary services and facilities clean and neat.
  - .2 Relocate temporary services and facilities as required by progress of the Work.

## **Part 2 PRODUCTS**

### **2.1 MATERIALS**

- .1 General: Provide new materials. Undamaged, previously used materials in serviceable condition may be used if approved by Consultant. Provide materials suitable for use intended.
- .2 Lumber and Plywood: Comply with requirements in Section 06 10 00.
- .3 Tarpaulins: Fire-resistive labeled with flame-spread rating of 15 or less.

.4 Water: Potable.

## 2.2 EQUIPMENT:

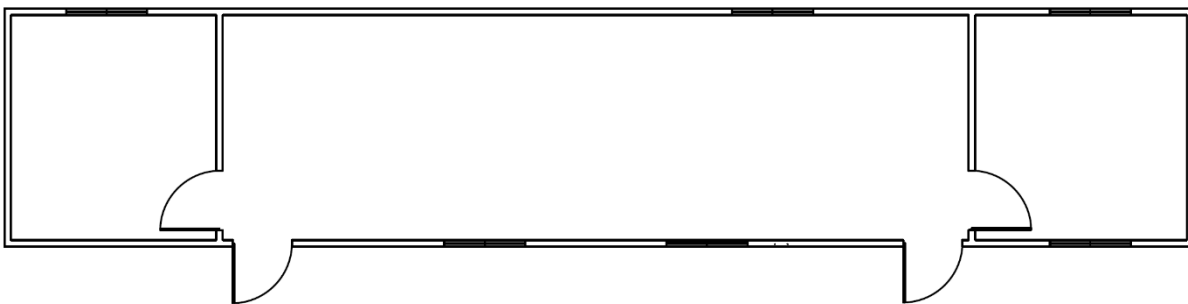
### 1: Field Offices:

All office furniture to be supplied and installed by the Region.

All other items, as described below, to be provided by the contractor.

Temporary mobile office to include Min. Qty of (3) three spaces separated by a solid partition, with doors leading into the main office space.

- (1) one room (min dimension to be 11'-0" Wx12'-0" D)  
to be outfitted with (3) three metal shelving units (to be supplied and installed by the Region and / or an installer specified by the Region).  
This room to be used as storage for outdoor clothing and gear and to be used as a temporary changing area for staff.
- (1) one room (min dimension to be 11'-0" Wx12'-0" D)  
To be outfitted with a 42" square or circular lunchroom table and (4) four chairs, (2) mobile tables for small appliances and a mini fridge (to be supplied and installed by the Region and / or an installer specified by the Region).  
This room to be used as private meeting space for confidential conversations, as well as a break room / lunch area for staff.
- (1) one room (min dimension to be 37'-0" Wx12'-0" D)  
To be used as office/ admin space.  
Will be outfitted with Teknion TOS panel system making up (8) eight benching style workstations

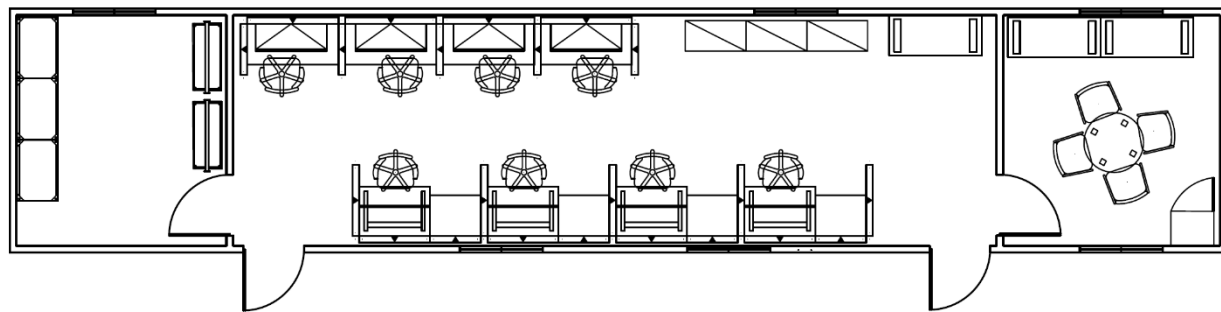


- Min. Qty of (3) three spaces separated by solid partitions  
Room 1: to be 48" W x 12'-0" D
- Room 2: to be 11'-0" Wx12'-0" D
- Room 3: to be 48" W x 12'-0" D

### .1 Number of Desk:

- Temporary mobile office to be outfitted with Region owned systems furniture.

- To be installed by the Region and / or an installer specified by the Region and certified to install Teknion TOS systems furniture.
- Office / Admin room to be outfitted with (8) eight benching style workstations complete with (8) eight task chairs:
  - (4) four workstations to be 72" W x 42" D
  - (4) four workstations to be 54" W x 42" D
  - Min of 4'-5" of space required as pathway between workstations.
  - Min of 3'-0" space required beside exit door before furniture can be installed



## 2: Power and Data Requirements:

### Power

- Approx. (16) Sixteen Duplex power outlets required.
- One Duplex power outlet required for each workstation.
- Each station requires 8T wiring system using a 1,2,3 circuit.
- All workstations to be powered using plug in base feed. Plug from electrical harness in panels directly inserted into duplex outlet.
- Workstations can also be hardwired into outlet if required

#### wiring system/receptacles

	Wiring System			
	8T	8K	7T	7K
Regular Ground Receptacles	1, 2, 3	1, 2	1, 2	1, 2, A, B
Isolated Ground Receptacles	5	5, 6	n/a	n/a

#### wiring system/related circuit

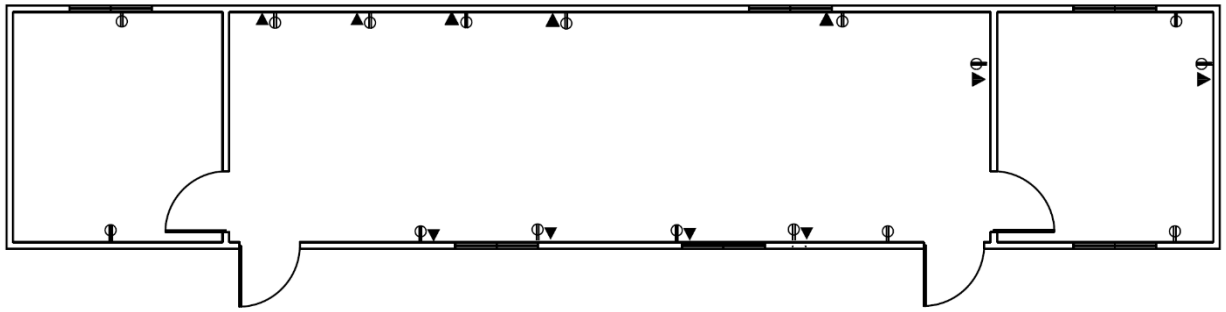
	Wiring System			
	8T	8K	7T	7K
Regular Circuit 1 Receptacle	✓	✓	✓	✓
Regular Circuit 2 Receptacle	✓	✓	✓	✓
Regular Circuit 3 Receptacle	✓		✓	
Isolated Circuit 5 IG Receptacle	✓	✓		
Isolated Circuit 6 IG Receptacle		✓		
Regular Circuit A Receptacle			✓	✓
Regular Circuit B Receptacle				✓

✓ Applicable

- one additional Duplex power outlet required for desktop Printer
- (6) six additional Duplex power outlet required as convenience outlets for vacuuming, charging
- Phones, tablets, and other equipment

#### Data

- Approx. (10) ten Data /ethernet ports required.
- One Data /ethernet port required for each workstation
- One Additional data port required for convenience
- Surge protectors to be provided by the contractor
- Contractor to provide a wall mounted 5RU shelf inside trailed to house temporary distribution equipment in the trailer



### 3: Lighting Specifications:

#### Windows

- Temporary mobile office to be outfitted with Min of (5) five large windows to be placed as follows:
- Min (1) one window in storage and change room (Room 1)
- Min (3) three windows in Main office / admin area Room (2)
- Min (1) one window in Meeting/ break room (Room 3)

#### Lighting

- Recommend installing one recessed light for every 4-5 square feet in a room.
- Room 1: storage and change room requires approx. 1,000-2,000 lumens, approx. (2-4) LED recessed lights
- Room 2: Main office / admin requires approx. 3,600 and 7,200 lumens approx. (10-12) LED recessed lights
- Room 3: Meeting/ break room requires approx. 1,000-2,000 lumens, approx. (2-4) LED recessed lights

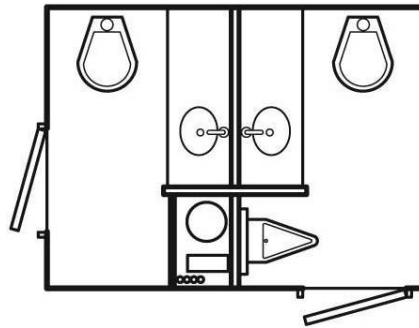
\*Please note: Final placement of supervisor desks to be determined by the mobile trailer that is delivered to site – Door, window and electrical outlet placement will determine the final layout. It is noted that supervisors should be placed near windows as they need to be able to view gate at all times.

### 4: Portable Washroom

- Washroom must have a minimum of (2) two Toilets c/w sink
- Washroom must include lighting, ventilation, HVAC – heating and cooling
- Must 1:1 ratio of sink to toilet stall
- Must have running water
- Regular service and cleaning to be included
- Must include off-site waste disposal
- Soap and water and/or anti-bacterial hand cleansers,

- Individual hand towels, air blowers or clean individual sections of continuous toweling,
- Trash cans for disposal of hand towels and feminine hygiene products.

\*Please note that there are no on-site water or waste facilities available



#### **5: Temperature Control:**

- The temporary mobile office and washroom must be equipped with climate control features, including heating for the winter months and cooling for the summer months, to ensure a comfortable working environment year-round in all parts/ rooms in the trailer
- Heating Equipment: Unless Owner authorizes use of permanent heating system, provide vented, self-contained, liquid-propane-gas or fuel-oil heaters with individual space thermostatic control.
- Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.
- Heating Units: Listed and labeled, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use for type of fuel being consumed

#### **6. Storage Solutions:**

- Temporary mobile office to be outfitted with Region owned systems furniture and storage units.
- To be installed by the Region and / or an installer specified by the Region and certified to install Teknion TOS systems furniture.

#### **7. Safety and Security:**

- The temporary mobile office and washrooms shall be in accordance with the Ontario Building Code requirements  
Ensure that the condition of the temporary mobile office unit and the temporary washroom unit is exemplary and free from any signs of wear or damage.

- Should the client express dissatisfaction with the condition of either unit upon delivery, it is the contractor's obligation to replace the unit to fulfill the client's requirements for satisfaction.
- Temporary mobile office to be outfitted with the following:
  - First aid kit
  - Mobile eye-wash station
  - Fire extinguishing : Hand carried, portable, UL rated. Provide class and extinguishing agent as indicated or a combination of extinguishers of NFPA-recommended classes for exposures.
    - Comply with NFPA 10 and NFPA 241 for classification, extinguishing agent, and size required by location and class of fire exposure.
  - Health and safety Board: to be posted in a conspicuous place and kept posted while work is being completed
    - Board must include the constructor's name and if the constructor carries on business in a different name, the business name;
    - Must include the address and telephone number of the constructor's head office or principal place of business in Ontario; and
    - Must include the address and telephone number of the nearest office of the Ministry
    - Must include the address and telephone number of nearest hospital
- PPE Mandatory: A worker shall wear such protective clothing and use such personal protective equipment or devices as are necessary to protect the worker against the hazards to which the worker may be exposed

#### **8. Accessibility:**

- Trailer must include stairs and a landing platform
- Stairs shall be securely fastened and supported wooden handrail on the open sides of each flight, and a guardrail on the open side of each landing.
- Stairs and landings shall be designed, constructed and maintained to support a live load of 4.8 kilonewtons per square meter without exceeding the allowable unit stresses for each material used.
- Ramps should be available if required at any time



### **9: Drinking-Water Fixtures:**

Provide drinking-water fountains or containerized, tap-dispenser, bottled-water drinking-water units, including paper cup supply.

## **Part 3       EXECUTION**

### **3.1       INSTALLATION, GENERAL**

- .1    Locate facilities where they will serve the Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required.
- .2    Provide each facility ready for use when needed to avoid delay. Maintain and modify as required. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities

### **3.2       TEMPORARY UTILITY INSTALLATION**

- .1    General: Engage appropriate local utility company to install temporary service or connect to existing service. Where utility company provides only part of the service, provide the remainder with matching, compatible materials and equipment. Comply with utility company recommendations.
  - .1    Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.
  - .2    Provide adequate capacity at each stage of construction. Before temporary utility is available, provide trucked-in services.
  - .3    Obtain easements to bring temporary utilities to the Project site where Owner's easements cannot be used for that purpose.
- .2    Sewers and Drainage: If sewers are available, provide temporary connections to remove effluent that can be discharged lawfully. If sewers are not available or cannot be used, provide drainage ditches, dry wells, stabilization ponds, and similar facilities. If neither sewers nor drainage facilities can be lawfully used for discharge of effluent, provide containers to remove and dispose of effluent off-site in a lawful manner.
  - .1    Filter out excessive soil, construction debris, chemicals, oils, and similar contaminants that might clog sewers or pollute waterways before discharge.
  - .2    Connect temporary sewers to municipal system as directed by sewer department officials.
  - .3    Maintain temporary sewers and drainage facilities in a clean, sanitary condition. After heavy use, restore normal conditions promptly.
- .3    Water Service: Install water service and distribution piping in sizes and pressures adequate for construction until permanent water service is in use. Sterilize temporary water piping before use.
  - .1    Provide rubber hoses as necessary to serve the Project site.

- .2 As soon as water is required at each level, extend service to form a temporary water- and fire-protection standpipe. Provide distribution piping. Space outlets so water can be reached with a 100-foot (30-m) hose. Provide one hose at each outlet.
- .3 Where installations below an outlet might be damaged by spillage or leakage, provide a drip pan of suitable size to minimize water damage. Drain accumulated water promptly from pans.
- .4 If water pressure is inadequate, provide pumps to supply a minimum static pressure suitable for construction needs. Provide pumps to supply a minimum of static pressure at highest point. Equip pumps with surge and storage tanks and automatic controls to supply water uniformly at reasonable pressures.
- .4 Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking-water fixtures. Comply with regulations and health codes for type, number, location, operation, and maintenance of fixtures and facilities.
  - .1 Disposable Supplies: Provide toilet tissue, paper towels, paper cups, and similar disposable materials for the facility. Maintain adequate supply. Provide covered waste containers for disposal of used material.
  - .2 Toilets: Install self-contained toilet units. Shield toilets to ensure privacy. Provide separate facilities for male and female personnel.
  - .3 Drinking-Water: Provide bottled-water, drinking-water units or drinking water fountains connected to permanent or temporary potable water source.
- .5 Heating and Cooling: Provide temporary heating and cooling required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment from that specified that will not have a harmful effect on completed installations or elements being installed.
  - .1 Maintain a minimum temperature of 50 deg F in permanently enclosed portions of building for normal construction activities, and 65 deg F for finishing activities and areas where finished Work has been installed.
  - .2 Provide measures and equipment to meet warranty requirements of interior woodwork and casework.
- .6 Ventilation and Humidity Control: Provide temporary ventilation required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of high humidity. Select equipment from that specified that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce ambient condition required and minimize energy consumption.
  - .1 Provide measures and equipment to meet warranty requirements of interior woodwork and casework.
- .7 Electric Power Service: Provide weatherproof, grounded electric power service and distribution system of sufficient size, capacity, and power characteristics during construction period. Include meters, transformers, overload-protected disconnecting means, automatic ground-fault interrupters, and main distribution switchgear.

- .1 Install electric power service underground, unless overhead service must be used.
- .2 Install power distribution wiring overhead and rise vertically where least exposed to damage.
- .8 Electric Distribution: Provide data lines to temporary trailers as required. Provide receptacle outlets adequate for connection of power tools and equipment.
  - .1 Provide waterproof connectors to connect separate lengths of electrical power cords if single lengths will not reach areas where construction activities are in progress. Do not exceed safe length-voltage ratio.
- .9 Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations and traffic conditions.
  - .1 Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.
  - .2 Install exterior-yard site lighting that will provide adequate illumination for construction operations, traffic conditions, and signage visibility when the Work is being performed.

### **3.3 SUPPORT FACILITIES INSTALLATION**

- .1 General: Comply with the following:
  - .1 Locate field offices, storage sheds, sanitary facilities, and other temporary construction and support facilities for easy access.
  - .2 Provide non-combustible construction for offices, shops, and sheds located within construction area or within 30 feet of building lines. Comply with NFPA 241.
  - .3 Maintain support facilities until near Substantial Completion. Remove before Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to Owner.
- .2 Temporary Roads and Areas: Construct and maintain temporary roads and areas adequate to support loads and to withstand exposure to traffic during construction period. Locate temporary roads and areas as indicated on Drawings. Maintain temporary roads for duration of construction period. Do not construct or utilize permanent roads for construction without written permission of Owner.
- .3 Dewatering Facilities and Drains: Comply with requirements in applicable Division 31 for temporary drainage and dewatering facilities and operations not directly associated with construction activities included in individual Sections. Where feasible, use same facilities. Maintain the Project site, excavations, and construction free of water.
  - .1 Dispose of rainwater in a lawful manner that will not result in flooding the Project or adjoining property nor endanger permanent Work or temporary facilities.
  - .2 Before connection and operation of permanent drainage piping system, provide temporary drainage where roofing or similar waterproof deck construction is completed.

- .3 Remove snow and ice as required to minimize accumulations.
- .4 Construction Waste Disposal and Recycling Facilities: Comply with the requirements specified in Section 01 74 19 - Construction Waste Management and Disposal. Open burning of construction waste is not permitted on the Project Site.
- .5 Common-Use Field Offices: Provide an insulated, weathertight, air-conditioned field office for use as a common facility by all personnel engaged in construction activities; of sufficient size to accommodate required office personnel and meetings of persons at the Project site. Keep offices clean and orderly.

### **3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION**

- .1 Environmental Protection: Provide protection, operate temporary facilities, and conduct construction in ways and by methods that comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects. Avoid using tools and equipment that produce harmful noise. Restrict use of noisemaking tools and equipment to hours that will minimize complaints from persons or firms near the Project site.
- .2 Stormwater Control: Provide earthen embankments and similar barriers in and around excavations and subgrade construction, sufficient to prevent flooding by runoff of stormwater from heavy rains. Finish grading must produce surface drainage adequate to prevent standing water or wet areas, and to ensure that all storm water flows to inlets or other points of discharge.
- .3 Barricades, Warning Signs, and Lights: Comply with standards and code requirements for erecting structurally adequate barricades. Paint with appropriate colors, graphics, and warning signs to inform personnel and public of possible hazard. Where appropriate and needed, provide lighting, including flashing red or amber lights.
- .4 Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weathertight enclosure for building exterior.
- .5 Where heating or cooling is needed and permanent enclosure is not complete, provide insulated temporary enclosures. Coordinate enclosure with ventilating and material drying or curing requirements to avoid dangerous conditions and effects.
- .6 Vertical Openings: Close openings of 25 sq. ft. or less with plywood or similar materials.
- .7 Horizontal Openings: Close openings in floor or roof decks and horizontal surfaces with load-bearing, wood-framed construction.
- .8 Install tarpaulins securely using fire-retardant-treated wood framing and other materials.
- .9 Where temporary wood or plywood enclosure exceeds 100 sq. ft. in area, use fire-retardant-treated material for framing and main sheathing.
- .10 Temporary Fire Protection: Until fire-protection needs are supplied by permanent facilities, install and maintain temporary fire-protection facilities of types needed

to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241.

- .1 Provide fire extinguishers, installed on walls on mounting brackets, visible and accessible from space being served, with sign mounted above.
  - .1 Other Locations: Class ABC dry-chemical extinguishers or a combination of extinguishers of NFPA-recommended classes for exposures.
  - .2 Locate fire extinguishers where convenient and effective for their intended purpose; provide not less than one extinguisher on each floor at or near each usable stairwell.
- .2 Store combustible materials in containers in fire-safe locations.
- .3 Maintain unobstructed access to fire extinguishers, fire hydrants, temporary fire-protection facilities, stairways, and other access routes for firefighting. Exterior access routes shall be in accordance with International Fire Code, Section 315.0. Prohibit smoking in hazardous fire-exposure areas.
- .4 Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition.
- .5 Permanent Fire Protection: At earliest feasible date in each area of the Project, complete installation of permanent fire-protection facility, including connected services, and place into operation and use. Instruct key personnel on use of facilities.
- .6 Develop and supervise an overall fire-prevention and first-aid fire-protection program for personnel at the Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.
- .7 Provide hoses for fire protection of sufficient length to reach construction areas. Hang hoses with a warning sign stating that hoses are for fire-protection purposes only and are not to be removed. Match hose size with outlet size and equip with suitable nozzles.

### **3.5 OPERATION, TERMINATION, AND REMOVAL**

- .1 Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.
- .2 Maintenance: Maintain facilities in good operating condition until removal. Protect from damage caused by freezing temperatures and similar elements.
- .3 Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.
- .4 Prevent water-filled piping from freezing. Maintain markers for underground lines. Protect from damage during excavation operations.
- .5 Temporary Facility Changeover: Except for using permanent fire protections as soon as available, do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.

- .6    Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.
  - .1    Materials and facilities that constitute temporary facilities are the property of Contractor. Owner reserves right to take possession of Project identification signs.
  - .2    Remove temporary paving not intended for or acceptable for integration into permanent paving. Where area is intended for landscape development, remove soil and aggregate fill that do not comply with requirements for fill or subsoil. Remove materials contaminated with road oil, asphalt and other petrochemical compounds, and other substances that might impair growth of plant materials or lawns. Repair or replace street paving, curbs, and sidewalks at temporary entrances, as required by authorities having jurisdiction.
- .7    At Project Substantial Performance, clean and renovate permanent facilities used during construction period. Comply with final cleaning requirements in Section 01 77 00 - Closeout Procedures.

**END OF SECTION**

**Part 1 General**

**1.1 SUMMARY**

- .1 Section Includes:
  - .1 Sheet metal materials.
  - .2 Prefinished steel sheet.
  - .3 Ice and water shield membrane.
  - .4 Insulation.
  - .5 Vapour retarder.
  - .6 Accessories: Underlay, ventilation and drainage mat, slip sheet, snap cap, sealant, cleats, fasteners, washers, flashing, roof curbs, and trim.
- .2 Related Sections:
  - .1 Section 01 35 00 – Delegated Design
  - .2 Section 06 10 00 – Rough Carpentry
  - .3 Section 07 21 13 – Board Insulation
  - .4 Section 07 42 13 – Preformed Metal Cladding
  - .5 Section 07 42 43 – Insulated Wall Panels
  - .6 Section 07 62 00 – Sheet Metal Flashing and Trim
  - .7 Section 07 92 00 - Sealants

**1.2 REFERENCES**

- .1 Reference Standards:
  - .1 American Society for Testing and Materials International (ASTM):
    - .1 ASTM A653/A653M-23, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
    - .2 ASTM A755/A755M-18, Standard Specification for Steel Sheet, Metallic Coated by the Hot-Dip Process and Prepainted by the Coil-Coating Process for Exterior Exposed Building Products.
    - .3 ASTM A792/A792M-23, Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot Dip Process.
    - .4 ASTM C303-21, Standard Test Method for Dimensions and Density of Preformed Block and Board-Type Thermal Insulation.
    - .5 ASTM D523-14(2018), Standard Test Method for Specular Gloss.
    - .6 ASTM D822-23, Standard Practice for Filtered Open-Flame Carbon-Arc Exposures of Paint and Related Coatings.
  - .2 Canadian General Standards Board (CGSB):
    - .1 CAN/CGSB 37.29M89, Rubber-Asphalt Sealing Compound (Withdrawn).
    - .2 CAN/CGSB 37.5-M89, Cutback Asphalt Plastic Cement (Withdrawn).
    - .3 CAN/CGSB 51.32-M77, Sheathing, Membrane, Breather Type (Withdrawn).
  - .3 Canada Green Building Council (CaGBC):



- .1 LEED Canada V4 – Building Design and Construction (BD+C).
- .4 Canadian Roofing Contractors Association (CRCA):
  - .1 CRCA Roofing Specifications Manual.
- .5 Canadian Standards Association (CSA Group):
  - .1 CSA A123.3-05(R2015), Asphalt Saturated Organic Roofing Felt (Reaffirmed 2010).
  - .2 CSA A123.5-16 (R2020), Asphalt Shingles Made from Glass Felt and Surfaced with Mineral Granules.
  - .3 CSA-A123.23-15 (2020), Product Specification for polymer-modified bitumen sheet, prefabricated and reinforced.
  - .4 CSA S136-16, North American Specification for the Design of Cold Formed Steel Structural Members.
- .6 National Research Council Canada (NRC)/Institute for Research in Construction (IRC) - Canadian Construction Materials Centre (CCMC):
  - .1 CCMC-2011, Registry of Product Assessments.
- .7 Ontario Industrial Roofing Contractors Association (OIRCA):
  - .1 OIRCA Guide Specification.
- .8 Sheet Metal and Air Conditioning Contractors' National Association (SMACNA):
  - .1 Architectural Sheet Metal Manual, 7th Edition, 2012.
- .9 Underwriters Laboratories' of Canada (ULC):
  - .1 ULC 102, Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies (ULC S102).
  - .2 ULC 114, Standard Method of Test for Determination of Non-Combustibility in Building Materials. (2018)
  - .3 ULC 702.2, Mineral Fibre Thermal Insulation for Buildings, Part 2: Application Guidelines. (ULC-S702.2-15)
  - .4 ULC 704.1, Standard for Thermal Insulation, Polyurethane and Polyisocyanurate Boards, Faced.

### 1.3 ACTION SUBMITTALS / INFORMATIONAL SUBMITTALS

- .1 Submit product data in accordance with Section 01 33 00 – Submittal Procedures:
  - .1 Submit Workplace Hazardous Materials Information System WHMIS SDS - Safety Data Sheets in accordance with WHMIS acceptable to Labour Canada, and Health and Welfare Canada.
  - .2 Submit product data sheets for roofing felts and insulation. Include:
    - .1 Product characteristics.
    - .2 Performance criteria.
    - .3 Limitations.
- .2 Submit shop drawings in accordance with Section 01 33 00 – Submittal Procedures:



- .1 Indicate arrangements of sheets and joints, types and locations of fasteners and special shapes and relationship of panels to structural frame.
- .2 Shop drawings to detail continuity of air, vapour and thermal barriers at changes in plane, at transitions between assemblies, and at penetrations.
- .3 Submit samples in accordance with Section 01 33 00 – Submittal Procedures:
  - .1 Submit duplicate 300 x 300 mm samples of each sheet metal material.
- .4 Submit proof of manufacturer's CCMC Listing and listing number to Consultant.
- .5 Manufacturer's Instructions: Provide to indicate special handling criteria, installation sequence and cleaning procedures.
- .6 LEED Submittals: provide LEED submittals in accordance with Section 01 61 01 – LEED Product Requirements.

#### **1.4 QUALITY ASSURANCE**

- .1 Installer Qualifications: Engage experienced installer with a minimum of five years experience who has completed systems similar in material, design, and extent to that indicated for Project and with record of successful performance. Installer to be a member of the Ontario Industrial Roofing Contractors Association (OIRCA).
- .2 Retain a professional engineer, registered in the province of the Work, to design fabrication and erection of the Work of this Section in accordance with applicable Building Code and Contract Documents requirements including, but not limited to, the following:
  - .1 Seal and signature to shop drawings and design submittals.
  - .2 Field review of installed components.
  - .3 Completion of Letters or Commitment and Compliance specified in Section 01 35 00 – Delegated Design.
- .3 Obtain each type of metal roofing system through one source from a single manufacturer.
- .4 Mock-Ups
  - .1 Submit mock-ups in accordance with Section 01 45 00 - Quality Control.
  - .2 Mock-up will be used:
    - .1 To judge workmanship, substrate preparation, operation of equipment and material application.
  - .3 Locate where directed.
  - .4 Allow 24 hours for inspection of mock-up by Consultant before proceeding with sheet metal flashing work.
  - .5 When accepted, mock-up will demonstrate minimum standard of quality required for this Work. Approved mock-up may remain as part of finished Work.

#### **1.5 DELIVERY, STORAGE, AND HANDLING**

- .1 Deliver and store materials in accordance with manufacturer's instructions.

- .2 Protect panels during transportation, unloading, storing, and erecting to prevent bending, warping, twisting, and surface damage.
- .3 Packaging Waste Management
  - .1 Separate and recycle waste materials in accordance with Section 01 74 19 – Construction Waste Management.

## 1.6 WARRANTY

- .1 Manufacturer's Warranty for Finishes: 20 years from date of Substantial Performance.

## Part 2 Products

### 2.1 MANUFACTURERS

- .1 Acceptable Manufacturers: Subject to compliance with requirements specified in this Section and as established by the Basis of Design Materials, manufacturers offering products that may be incorporated into the Work include the following:

- .1 Agway Metals Inc.
- .2 Behlen Industries.
- .3 Berridge Manufacturing Company.
- .4 Garland Canada Inc.
- .5 Vicwest Steel Inc.
- .6 Westform Metals.

### 2.2 PERFORMANCE / DESIGN CRITERIA

- .1 General: The complete roof cladding system shall meet the following performance/design criteria and maintain its intended appearance, remain wind and watertight, allow for expansion and contraction of metal components and transmit loads to the supporting structural back-up.
- .2 The design, and erection of a complete metal roof system is the responsibility of this subcontractor and are based on the performance criteria specified. The method assembly, reinforcing and anchorage is schematic and shows general intent only. Location and methods of providing same shall be this subcontractor's responsibility who shall design the assembly, reinforcing and anchorage to suit specific conditions in an acceptable manner complying with the requirements specified herein.
- .3 Provide flashing as shown and required to make the system wind and watertight, and still allow for thermal movement.
- .4 All fastenings shall be concealed where possible. Where exposed in finished surfaces, screw heads shall be neat and symmetrical, made completely watertight and capable of allowing expansion and contraction of metal roof cladding. Exposed fasteners shall be color-matched to finished metal cladding or stainless steel and as scheduled.
- .5 Thermal Movements and Wind Loads: The metal wall and associated flashing systems shall be so designed and constructed as to provide for such expansion and contraction of component materials as will be caused by an ambient

temperature range of -40°C to +60°C without causing harmful buckling, failure of joint seals, undue stress on fasteners or other detrimental effects.

- .6 Provide and/or make allowances for free noiseless vertical and horizontal thermal and wind loading movement, due to the contraction and expansion of any and all component parts.
- .7 Assembly and erection procedures shall take into account the ambient temperature range and wind pressure at the time of installation.
- .8 The system shall provide clear internal paths of drainage in order to drain any trapped moisture to the exterior, discharging moisture in a manner avoiding staining of architectural finishes, collecting in puddles, formation of unsafe icicles and dripping onto pedestrians.
- .9 Fasten panel assembly to building structure in a manner, which transmits all loads to the main structure without exceeding the capacity of any fastener.

## 2.3 SHEET METAL MATERIALS

- .4 Aluminum-zinc alloy coated steel sheet: to ASTM A792/A792M, commercial quality (CS), grade 275 with AZ150 galvalume coating and as follows: ~~Zinc coated steel sheet: to ASTM A653/A653M, commercial quality (CS), with Z275 galvanized coating and as follows:~~

- .1 Base Metal Thickness: 0.76 mm.
- .2 Finish: prefinished as specified below.
- .3 Profile: to match **TSR, Vicwest,**
  - .1 **Alternate material:**
    - .1 **SSR24, Behlen Industries. AR38, Agway Metals.**
    - .2 Ribbed, shallow vee in direction of standing seam.
    - .3 Seam Profile: Standing Seam.

## 2.4 PREFINISHED STEEL SHEET

- .1 Prefinished steel with factory applied polyvinylidene fluoride.
  - .1 Class: F1S.
  - .2 Colour: to match adjacent metal
  - .3 Specular gloss: 30 units +/-5 to ASTM D523.
  - .4 Coating thickness: not less than 22 micrometres.
  - .5 Resistance to accelerated weathering for chalk rating of eight, colour fade five units or less and erosion rate less than 20% to ASTM D822/D822M as follows:
    - .1 Outdoor exposure period 2500 hours.
    - .2 Humidity resistance exposure period 5000 hours.

## 2.5 ICE AND WATER SHIELD MEMBRANE

- .1 Waterproofing Underlayment: self adhering membrane for high temperature applications; rubberized asphalt will not flow up to temperatures as high as 116°C.
  - .1 Primer: as recommended by manufacturer.

- .2 Acceptable Materials:
  - .1 Ice and Water Shield HT, Grace Construction Products.
  - .2 Stormshield, IKO.
  - .3 Jiffy Seal Ice & Water Guard HT, Protecto Wrap.
  - .4 LapLock PSU (HT), Roofnado
  - .5 Lastobond Shield HT, Soprema.

## 2.6 INSULATION

- .1 Closed-cell polyisocyanurate foam core laminated to heavy non-asphaltic glass fibre reinforced facers; 1219 x 1219 mm, having square edges; conforming to ULC 704.1, Type 23, Class two or three, to a tolerance not exceeding 3 mm from nominal size in any dimension, and as follows:
  - .1 Overall thickness: as indicated to RSI required, achieved in a minimum of two layers, and with all joints offset 100 mm.
  - .2 Acceptable Materials:
    - .1 [ACFoam-II Polyiso Roof Insulation, Atlas Roof Insulation.](#)
    - .2 [HP-H Polyiso, Carlisle.](#)
    - .3 [H-Shield, Hunter Panels.](#)
    - .4 [IKOTerm, IKO.](#)
    - .5 [Sopra-ISO, Soprema.](#)

## 2.7 VAPOUR RETARDER

- .1 Self adhered vapour retarder: SBS rubberized asphalt membrane, self adhering vapour retarder, having a non-slip surface and UV resistant opaque surface.
  - .1 Acceptable Materials:
    - .1 Modified Vapour Protector, IKO.
    - .2 Soprapap'R, Soprema.
    - .3 Vapor-Bloc SA, Henry Company.

## 2.8 DECK COVERING

- .1 Glass Mat Faced Roof Boards: to ASTM C1177 for manufacturing and ASTM D3273 for mould resistance, standard, mould resistant, thickness as indicated.
  - .1 Surface Burning Characteristics: In accordance with CAN/ULC S102.
    - .1 Flame Spread: 0.
    - .2 Smoke Developed: 0.
  - .2 Long Edges: Square.
  - .3 Location: Where indicated on Drawings.
  - .4 Acceptable Materials:
    - .1 [GlasRoc Sheathing, CertainTeed.](#)
    - .2 [Securock Gypsum Fiber Roof Board, USG.](#)
    - .3 [DensDeck, Georgia Pacific.](#)
    - .4 [Dexcell Glass Mat Roof Board, National Gypsum.](#)

## **2.9 FABRICATION**

- .1 Fabricate all components of the system in the factory, ready for field installation.
- .2 Provide roof sheet and all accessories in longest practicable length to minimize field lapping of joints.

## **2.10 ACCESSORIES**

- .1 Provide components required for complete metal roofing system assembly including trim, copings, fasciae, corner units, ridge cap, ridge closures, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items; match material and finish of metal roofing system.
- .2 Isolation coating: alkali resistant bituminous paint.
- .3 Plastic cement: to CAN/CGSB-37.5.
- .4 Underlay: No.15 perforated asphalt felt to CSA A123.3.
- .5 Ventilation and Drainage Mat: sandwich structure, open core with nonwoven filter or membrane.
  - .1 Acceptable Materials:
    - .1 [3D, Bonar](#).
    - .2 Enkadrain, Colbond.
    - .3 [Air-Z, Rheinzinc](#).
- .6 Slip sheet: reinforced sisal paper or a heavy felt kraft paper.
- .7 Snap Cap:
  - .1 Provide 25 mm high snap caps for full length of the roof panel and retained by panel clips, fabricated from Z275 galvanized (zinc coated) sheet steel conforming to ASTM A653/A653M structural quality Grade 230 having a nominal core thickness 0.76 mm. Finish and colour to match roof sheet.
- .8 Sealant: Asbestos-free sealant, compatible with systems materials, recommended by system manufacturer and as indicated in Section 07 92 00 - Sealants.
- .9 Rubber-asphalt sealing compound: to CAN/CGSB-37.29.
- .10 Cleats: of same material, and temper as sheet metal, minimum 50 mm wide. Thickness same as sheet metal being secured.
- .11 Fasteners: concealed.
- .12 Washers: of same material as sheet metal, 1 mm thick with rubber packings.
- .13 Flashing, Roof Curbs, and Trim: Prefinished flashing materials to match roofing materials in accordance with Section 07 62 00 - Sheet Metal Flashing and Trim.
- .14 Touch-up paint: as recommended by sheet metal roofing manufacturer.

## **Part 3 Execution**

### **3.1 EXAMINATION**

- .1 Examine substrates to ensure proper attachment to framing.
- .2 Examine roof deck to verify deck is clean and smooth, free of depressions, waves or projections and within flatness tolerances required by metal roofing system manufacturer.
- .3 Verify roof opening, curbs, pipes, sleeves, ducts or vents through roof are solidly set, cant strips and reglets in place, and nailing strips located.
- .4 Verify deck is dry and free of snow or ice.

### **3.2 INSTALLATION**

- .1 Install metal roofing system in accordance with manufacturer's written instruction.
- .2 Use concealed fastenings except where approved by Consultant before installation.
- .3 Provide underlay under sheet metal roofing. Secure in place and lap joints 100 mm minimum.
- .4 Apply slip sheet over asphalt felt underlay to prevent bonding between sheet metal and felt. Secure with minimum anchorage and lap joints 50 mm minimum in direction of waterflow.
- .5 Install sheet metal roof panels using cleats spaced at 300 mm on centre.
- .6 Secure cleats with two fasteners each and cover with cleat tabs.
- .7 Stagger transverse seams in adjacent panels.
- .8 Flash roof penetrations with material matching roof panels, and make watertight.
- .9 Form seams in direction of water-flow and make watertight.

### **3.3 STANDING SEAM ROOFING**

- .1 Fold lower end of each pan under 20 mm.
  - .1 Slit fold 25 mm away from corner to form tab where pan turns up to make standing seam.
  - .2 Fold upper end of each pan over 50 mm.
  - .3 Hook 20 mm fold on lower end of upper pan into 50 mm fold on upper end of underlying pan.
- .2 Apply sheet metal roofing beginning at eaves. Loose lock pans to valley flashing and edge strips at eaves and gable rakes.
- .3 Finish standing seams 25 mm high on flat surfaces. Bend up one side edge 40 mm and other 45 mm.
  - .1 Set closure/closure strips in joint sealant material and apply sealant to mating surfaces prior to adding panel
  - .2 Make first fold 6 mm wide single fold and second fold 12 mm wide, providing locked portion of standing seam with 5 plies in thickness.
  - .3 Fold lower ends of seams at eaves over at 45 degrees angle.

- .4 Terminate standing seams at ridge and hips by turning down in tapered fold.
- .4 Form valleys of sheets not exceeding 3 m in length. Lap joints 150 mm in direction of flow.
  - .1 Extend valley sheet minimum 150 mm under roofing sheets.
  - .2 At valley line, double fold valley and roofing sheets and secure with cleats spaced 450 mm on centre.

### **3.4 ACCESSORY INSTALLATION**

- .1 Install accessories with positive anchorage to building and weather tight mounting and provide for thermal expansion. Coordinate installation with flashings and other components.
- .2 Install components required for a complete metal roofing system assembly including trim, copings, ridge closures, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items.
- .3 Install flashing and trim in accordance with performance requirements, manufacturer's written installation instructions, and SMACNA recommendations; provide concealed fasteners where possible, and set units true to line and level; install work with laps, joints, and seams that will be permanently watertight and weather resistant.
- .4 Install exposed flashing and trim that is without excessive oil canning, buckling, and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and to result in waterproof and weather-resistant performance.

### **3.5 CLEANING**

- .1 Remove temporary protective coverings and strippable films, if any, as metal roofing system are installed, unless otherwise indicated in manufacturer's written installation instructions.
- .2 Clean finished surfaces as recommended by metal roofing system manufacturer upon completion of metal roofing system installation; maintain in a clean condition during remainder of construction.
- .3 Replace metal roofing system components that become damaged or have deteriorated beyond successful repair by finish touch-up or similar minor repair procedures.
- .4 Remove all excess materials, debris and equipment at completion.
- .5 Clean all panels clean and free of all grime and dirt.

**END OF SECTION**

Finish Code	Material	Manufacturer & Product	Colour	Remarks
<b>Ceiling</b>				
C1	Acoustical Ceiling Panel	Manufacturer: Armstrong Collection: FELTWORKS Acoustical Ceiling Panels Colour: White	White	Applies to Offices, Changerooms, Meeting Room, Lunch Room
C2	Painted Exposed Structure	Painted PT2, Flat Finish	Dark Grey	Field, unless noted otherwise
C3	Acoustical Ceiling Blades	Manufacturer: Armstrong Collection: FELTWORKS Blades - HookOn Peaks and Valleys Colour: Cotton Pattern: 1	White	Applies to main corridor
C4	Acoustical Ceiling Tile	Manufacturer: Armstrong Collection: Dune, Square Lay-In Item #: 1850 Size: 610mm x 610mm x 15.9mm	White	Applies to Changerooms, First Aid Room, Universal W/C
C6	Gypsum Board	Painted PT1, Flat Finish	White	Applies to Vestibules
<b>Floor</b>				
EC1	Epoxy Coating	Manufacturer: Stonhard Collection: Stonshield HRI Colour: Driftwood	Medium Grey	Applies to Wash Bay, Equipment Room, Garage, Multipurpose Tool/ Parts Room, Sign Garage, Wrap up walls 150mm to form cove base
RB1	Rubber Wall base	Manufacturer: Tarkett Collection: Johnsonite Traditional Duracove Type: Thermoplastic Rubber 1/8" (type TP) c/w toe Colour: Burnt Umber B 63 Height: 4" (102mm)	Dark Grey	Applies to Changerooms, Janitor, Universal W/C, First Aid Room, Offices, Vestibules, Meeting Room, Lunch Room
RC1	Resinous Coating	Manufacturer: Stonhard Collection: Stonclad GS Colour: Pewter	Medium Grey	Applies to Tool Room, Electrical, Mechanical, IT Rooms; Wrap up walls 150mm to form cove base
VCT1	Vinyl Composite Tile	Manufacturer: Armstrong Collection: Standard Excelon Imperial Texture Colour: Soft Cool Grey	Light Grey	Applies to Offices, Vestibules, Meeting Room, Lunch Room, Corridors
VCT2	Vinyl Composite Tile	Manufacturer: Armstrong Collection: Standard Excelon Imperial Texture Colour: Sterling	Medium Grey	Applies to Changerooms, First Aid Room, Janitor, Universal W/C
<b>Walls &amp; Paint Finishes</b>				
PT1	Paint	Manufacturer: Benjamin Moore Colour: Chantilly Lace Product Code: 2121-70 Gloss Level: G3 - walls, G1 - ceilings	White	Field, Drywall ceilings, interior walls
PT2	Paint	Manufacturer: Benjamin Moore Colour: Wrought Iron Product Code: 2124-10 Gloss Level: G5	Dark Grey	Door frames and doors, and exposed structure, ducts, services, Interior Walls
PT3	Paint	Manufacturer: Benjamin Moore Colour: Mosaic Product Code: CC-874 Gloss Level: G5	Blue	Interior accent walls
WD1	Cedar Slat Wall		Cedar	Applies to Main Entrance Wall; Refer to Floor Plan and Details
WT1, FT1	Wall Tile, Floor Tile	Manufacturer: Division9 Collection: Industria Colour: Zinc Size: 2" x 2" (Mosaic) Grout: Mapei, 93 Warm Gray, epoxy	Light Grey	Changerooms, Universal W/C
WT2, FT2	Wall Tile, Floor Tile	Manufacturer: Division9 Collection: Industria Colour: Zinc Size: 12" x 24" (Matte) Grout: Mapei, 93 Warm Gray, epoxy	Light Grey	Changerooms, Universal W/C
<b>Millwork</b>				
SS1	Solid Surface	Distributor: Willis Manufacturer: Corian Colour: Everest Size: 20mm thick goods, 4" (102mm) high coved backsplash c/w plywood and steel support framing to suit	White	Lunch Room Counter and backsplash
PL1	Plastic Laminate	Manufacturer: Wilsonart Product: High Pressure Laminate Finish Colour: 8246 Abisko Oak	Oak	Lunch Room Cabinets
<b>Misc</b>				
TS1	Floor Transition Strip	Manufacturer: Schluter Profile: Schiene Finish: Brushed Stainless Steel	SS	Floor transition between VCT1 and VCT 2. Contractor to confirm depth needed for application.
TS2	Wall Transition Strip	Manufacturer: Schluter Profile: Rondec Finish: Brushed Stainless Steel	SS	All outside corners of wall tile, floor to ceiling. Refer to finish plans.
WF1	Window Film	Manufacturer: Decorative Films Product: SXD-1818 Dots Height: As noted on drawings	White	Applies to systems glass partitions at Shared Office, District Manager Office



**Part 1 General**

**1.1 SUMMARY**

- .1 Intent:
  - .1 Provide sign and base in strict accordance with York Region Facilities Signage Guidelines and details on Drawings.
- .2 This Section includes:
  - .1 Exterior Panel signs.
  - .2 Signage accessories.
- .3 Related Sections:
  - .1 See Division 26 Sections for electrical service and connections for illuminated characters and for access to remote transformers.

**1.2 REFERENCES**

- .1 Reference Standards:
  - .1 Aluminum Association (AA):
    - .1 AA DAF-45-2003 (R2009), Designation System for Aluminum Finishes
  - .2 American Society for Testing and Materials International (ASTM):
    - .1 ASTM B209/B209M-21a, Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
    - .2 ASTM B221-21, Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
  - .3 International Code Council (ICC):
    - .1 ICC A117.1-2017, Accessible and Usable Buildings and Facilities.
  - .4 National Association of Architectural Metal Manufacturers (NAAMM):
    - .1 NAAMM AMP 500-06, Metal Finishes Manual

**1.3 ADMINISTRATIVE REQUIREMENTS**

- .1 Coordination:
  - .1 For signs supported by or anchored to permanent construction, advise installers of anchorage devices about specific requirements for placement of anchorage devices and similar items to be used for attaching signs.
  - .2 Coordinate location of remote transformers with building construction. Ensure that transformers are accessible after completion of Work.

**1.4 INFORMATIONAL SUBMITTALS / ACTION SUBMITTALS**

- .1 Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of sign.
- .2 Shop Drawings: Include plans, elevations, and large-scale sections of typical members and other components. Show mounting methods, grounds, mounting heights, layout, spacing, reinforcement, accessories, and installation details.

- .1 Provide large-scale details of wording, lettering, and artwork.
- .2 Wiring Diagrams: For signs with illuminated characters.
- .3 Maintenance Data: For signage cleaning and maintenance requirements to include in maintenance manuals.

## **1.5 QUALITY ASSURANCE**

- .1 Installer Qualifications: An employer of workers trained and approved by signage manufacturer.
- .2 Source Limitations: Obtain each sign type through one source from a single manufacturer.
- .3 Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

## **1.6 SITE CONDITIONS**

- .1 Existing Conditions / Field Measurements: Where sizes of signs are determined by dimensions of surfaces on which they are installed, verify dimensions by field measurement before fabrication and indicate measurements on Shop Drawings.

## **Part 2 PRODUCTS**

### **2.1 MATERIALS**

- .1 Provide sign and base in strict accordance with York Region Facilities Signage Guidelines and details on Drawings.

### **2.2 PANEL SIGNS**

- .1 General: Provide panel signs that comply with requirements indicated for materials, thicknesses, finishes, colours, designs, shapes, sizes, and details of construction.
  - .1 Produce smooth panel sign surfaces constructed to remain flat under installed conditions within tolerance of plus or minus 1.5 mm measured diagonally.
- .2 Aluminum Sheet and Plate: ASTM B209/B209M, alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with not less than the strength and durability properties of 5005-H15.
- .3 PVC: Extruded, high-impact PVC plastic in white colour indicated.
- .4 Brackets: Fabricate brackets and fittings for bracket-mounted signs from extruded aluminum to suit panel sign construction and mounting conditions indicated. Factory-paint brackets in colour matching Consultant's sample as indicated on Drawings.

## **2.3 ACCESSORIES**

- .1 Mounting Methods: Weld and use concealed fasteners fabricated from materials that are not corrosive to sign material and mounting surface.
- .2 Concrete Base: as indicated on Drawings and in accordance with Structural specifications.
- .3 Anchors and Inserts: Provide nonferrous-metal or hot-dip galvanized anchors and inserts for exterior installations and elsewhere as required for corrosion resistance. Use toothed steel or lead expansion-bolt devices for drilled-in-place anchors. Furnish inserts, as required, to be set into concrete or masonry work.

## **2.4 FABRICATION**

- .1 General: Provide manufacturer's standard double-post, single-panel-type post and panel signs. The completed sign assembly shall consist of a message panel supported between 2 posts. Comply with requirements indicated for materials, thicknesses, finishes, colors, designs, shapes, sizes, and details of construction.
  - .1 Allow for thermal movement resulting from a maximum ambient temperature change (range) of 100 deg F (38 deg C). Design, fabricate, and install post and panel sign assemblies to prevent buckling, opening up of joints, and overstressing of welds and fasteners.
    - .1 Base design on actual surface temperatures of metals due to both solar heat gain and nighttime-sky heat loss.
  - .2 Welded Connections: Comply with AWS standards for recommended practices in shop welding. Provide welds behind finished surfaces without distortion or discoloration of exposed side. Clean exposed welded surfaces of welding flux and dress on exposed and contact surfaces.
  - .3 Mill joints to a tight, hairline fit. Form joints exposed to the weather to exclude water penetration.
  - .4 Preassemble signs in the shop to the greatest extent possible to minimize field assembly. Disassemble signs only as necessary for shipping and handling limitations. Clearly mark units for reassembly and installation, in a location not exposed to view after final assembly.
  - .5 Conceal fasteners if possible; otherwise, locate fasteners where they will be inconspicuous.
- .2 Posts: Fabricate posts to lengths required for mounting method indicated.
  - .1 Direct Burial: For permanent sign installation, provide posts 36 inches (900 mm) longer than height of sign to permit direct embedment in concrete foundations.
- .3 Panels: Form panels to required size and shape. Comply with requirements indicated for design, dimensions, finish, color, and details of construction.
  - .1 Increase metal thickness or reinforce with concealed stiffeners or backing materials as required to produce surfaces without distortion, buckles, warp, or other surface deformations.

- .2 Continuously weld joints and seams, unless other methods are indicated; grind, fill, and dress welds to produce smooth, flush, exposed surfaces with welds invisible after final finishing.

## **2.5 FINISHES, GENERAL**

- .1 Comply with NAAMM AMP 500 Metal Finishes Manual, for recommendations for applying and designating finishes.
- .2 Protect mechanical finishes on exposed surfaces from damage by applying strippable, temporary protective covering before shipping.
- .3 Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of range of approved Samples. Noticeable variations in same piece are not acceptable. Variations in appearance of other components are acceptable if they are within range of approved Samples and are assembled or installed to minimize contrast.

## **2.6 ALUMINUM FINISHES**

- .1 Baked-Enamel Finish: Manufacturer's standard baked enamel complying with paint manufacturer's written instructions for cleaning, conversion coating, and painting.
  - .1 Colour: as indicated on Drawings.

## **Part 3 EXECUTION**

### **3.1 EXAMINATION**

- .1 Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work.
- .2 Verify that items, including anchor inserts, and electrical power provided under other sections of Work are sized and located to accommodate signs.
- .3 Examine supporting members to ensure that surfaces are at elevations indicated or required to comply with authorities having jurisdiction and are free from dirt and other deleterious matter.
- .4 Proceed with installation only after unsatisfactory conditions have been corrected.

### **3.2 INSTALLATION**

- .1 General: Locate signs and accessories where indicated, using mounting methods of types described and in compliance with manufacturer's written instructions.
  - .1 Install signs level, plumb, and at heights indicated, with sign surfaces free from distortion and other defects in appearance.
  - .2 Mechanical Fasteners: Use nonremovable mechanical fasteners placed through predrilled holes. Attach signs with fasteners and anchors suitable

for secure attachment to substrate as recommended in writing by sign manufacturer.

- .2 Excavation: In firm, undisturbed or compacted soil, drill or (using a post-hole digger) hand-excavate holes for each post to the minimum diameter recommended by sign manufacturer, but at least 4 times the largest post cross-section.
- .3 Excavate hole depths approximately 3 inches (75 mm) lower than required post bottom, with bottom of posts set at least 36 inches (900 mm) below finished grade.
- .4 Cast-Metal Plaques: Mount plaques using standard fastening methods recommended in writing by manufacturer for type of wall surface indicated.
  - .1 Concealed Mounting: Mount plaques by inserting threaded studs into tapped lugs on back of plaque. Set in predrilled holes filled with quick-setting cement.
- .5 Illuminated Characters:
  - .1 Run wires into wall construction through conduit.
  - .2 Exposed-to-view wiring or conduit on wall face is not permitted.
  - .3 Engage a licensed electrician to connect wiring to power source.

### **3.3 CLEANING AND PROTECTION**

- .1 After installation, clean soiled sign surfaces according to manufacturer's written instructions. Protect signs from damage until acceptance by Owner.

**END OF SECTION**

Washroom	Material	Manufacturer & Product	Colour	Remarks
<b>Vanity</b>				
MR-01	Fixed Position Tilt Mirror	Manufacturer: Bobrick Product: B-293 2448; 6mm glass mirror secured to concealed wall hanger with theft-resistant mounting Size: 18" W x 36" H (46 x 91cm) Mounting height: Refer to drawings	S.S.	York Region Design Standard
SP-01	Soap Dispenser	Manufacturer: Swish Product: Proline Soap Dispenser #WHB1LDS Size: 4-3/5"W x 4-9/10"D x 10"H Finish: White Mounting height: Refer to drawings	White	York Region Design Standard
PD-02	Paper Towel Dispenser and Waste Bin	Manufacturer: Frost Product: Recessed - Frost 427-60A Size: 4' - 8.17" x 17.25" x 12.5" (142 x 44 x 61 cm) Mounting height: Refer to drawings	S.S.	York Region Design Standard
<b>Water Closet</b>				
BR-01	Backrest	Manufacturer: Frost Model: Toilet backrest, 1028 Finish: Stainless steel Size: 38.3cm L x 20.3cm D x 10.2cm H (15.1"L x 8"D x 4"H)	S.S.	
CH-01	Coat Hook	Manufacturer: Bobrick Product: Stainless steel clothes hook, B-233	S.S.	
GB-01	Grab Bar	Manufacturer: Frost Product: 1-1/4" diameter 90-degree grab bar, 1003-SP30"x30" Size: 30"L x 30"D x 3.25"H (76.2cm L x 76.2cm D x 8.3cm H) Finish: brushed stainless steel w/ peened grip Mounting height: Refer to drawings	S.S.	York Region Design Standard
GB-02	Grab Bar	Manufacturer: Frost Product: 1-1/4" diameter straight grab bar, 1001-SP24" Size: 24"L x 3"D x 3.25"H (61.0cm L x 7.6cm D x 8.3cm H) Finish: brushed stainless steel w/ peened grip Mounting height: Refer to drawings	S.S.	York Region Design Standard
SD-01	Sanitary Napkin Disposal	Manufacturer: N/A (Provided by York Region Facilities Operations and Maintenance Team) Product: N/A (Provided by York Region Facilities Operations and Maintenance Team) Size: Approximately 19" W x 6" H x 21" D Finish: stainless steel Mounting height: Refer to drawings	S.S.	Owner to supply, contractor to install
TD-01	Toilet Tissue Dispenser	Manufacturer: Swish Product: Tork 56TR #889 DISP T/T JUMBO SIDE/SIDE T22 Size: 19" x 12" x 5.5" (49 x 30 x 14 cm) Finish: Smoke (transparent dark grey)	Smoke (Transparent Dark Grey)	York Region Design Standard
TP-01	Toilet Partition	Manufacturer: Hadrian Product: Headrail braced Standard Series Colour: 609 Colonial Blue	Blue	
UD-01	Urinal Divider	Product: Screen Colour: 609 Colonial Blue Size: 1219mm tall wall mounted Mounting height: Refer to drawings	Blue	
<b>Shower</b>				
SGB-01	Grab Bar (L-Shaped)	Manufacturer: Frost Product: 30"x40" L-Shaped Grab Bar 1 -1/4" Diameter, 1003-SP Size: 40"L x 30"H (102cm L x 76cm H) Finish: brushed stainless steel w/ peened grip Mounting height: Refer to drawings	S.S.	York Region Design Standard
SGB-02	Grab Bar (Vertical)	Manufacturer: Frost Product: 1-1/4" diameter straight grab bar, 1001-SP36" Size: 36"L x 3"D x 3.25"H (91.4cm L x 7.6cm D x 8.3cm H) Finish: brushed stainless steel w/ peened grip Mounting height: Refer to drawings	S.S.	York Region Design Standard

Washroom	Material	Manufacturer & Product	Colour	Remarks
SGB-03	Grab Bar	Manufacturer: Frost Product: 1-1/4" diameter straight grab bar, 1001-SP24" Size: 24"L x 3"D x 3.25"H (61.0cm L x 7.6cm D x 8.3cm H) Finish: brushed stainless steel w/ peened grip Mounting height: Refer to drawings	S.S.	York Region Design Standard
SBE-01	Folding Bench	Manufacturer: Bobrick Product: B-518 folding shower seat with padded cushion, left-hand seat Size: 21-1/4" W x 32-7/8" L (54 x 83.5cm) Mounting height: Refer to drawings	S.S. with white padding	
<b>Locker</b>				
LO-01	Locker	Manufacturer: Hadrian Product: Emperor Corridor Locker Size: 15" x 18" x 60" Colours: 609 Colonial Blue Mounting: Locker pedestal	Blue	
LO-02	Locker	Manufacturer: Hadrian Product: Emperor Corridor Locker Size: 15" x 18" x 60" Colours: 510 Black Mounting: Locker pedestal	Black	
LO-03	Locker	Manufacturer: Hadrian Product: Emperor Corridor Locker Size: 15" x 18" x 60" Colours: 541 Extra White Mounting: Locker pedestal	White	
BN-01	Bench	Manufacturer: Robinson Steel Company Product: Hardwood Locker Room Bench Top Size: 20" deep x 1.25" thick; length as required per drawings Mounting: Locker pedestal	Mixed Hardwoods	
BN-02	Bench	Manufacturer: Global Industria Product: ADA Locker Room Bench Top, Hardwood Size: 142"W x 20"D x 1-1/4"Thick Mounting: Wall Mount Brackets For 20" Deep ADA Locker Bench Top, Black, Pair Mounting height: Refer to drawings	Hardwood	

# YORK REGION NORTH ROADS OPERATIONS CENTRE



PROJECT NO.: 6016

ISSUED FOR:

ADDENDUM 4

2025-07-18

## DRAWING LIST

### ARCHITECTURAL

A001 BUILDING CODE ANALYSIS  
A010 CONSTRUCTION NOTES & ASSEMBLY TYPES  
A015 DOOR & FRAME SCHEDULE  
A020 SITE SURVEY  
A050 KEY SITE PLAN  
A051 DEMOLITION SITE PLAN  
A052 ENLARGED DEMOLITION SITE PLAN  
A053 SITE PLAN  
A054 ENLARGED SITE PLAN  
A056 ENLARGED INTERIM SITE PLAN  
A057 GROUND SIGN DETAILS  
A101 DEMOLITION FLOOR PLANS  
A201 FLOOR PLAN  
A202 ROOF PLAN  
A301 ELEVATIONS  
A401 SECTIONS  
A501 SHIPS LADDER AND CATWALK DETAILS  
A601 WALL SECTIONS  
A602 WALL SECTIONS  
A603 WALL SECTIONS  
A603A WALL SECTIONS  
A604 DETAILS  
A605 DETAILS  
A606 DETAILS  
A607 DETAILS  
A608 DETAILS  
A609 DETAILS  
A610 DETAILS  
A611 DETAILS  
A701 REFLECTED CEILING PLAN & DETAILS  
A801 FINISHES PLAN  
A803 FURNITURE AND EQUIPMENT PLAN  
A851 ENLARGED FLOOR PLANS & REFLECTED CEILING PLAN & INTERIOR ELEVATIONS, DETAILS  
A852 ENLARGED FLOOR PLANS & REFLECTED CEILING PLAN & INTERIOR ELEVATIONS, DETAILS  
A901 MILLWORK SECTIONS

### STRUCTURAL

S000 COVER SHEET  
S001 GENERAL NOTES  
S002 GENERAL NOTES  
S003 GENERAL NOTES  
S004 GENERAL NOTES  
S005 DESIGN NOTES  
S010 TYPICAL DETAILS  
S011 TYPICAL DETAILS  
S012 TYPICAL DETAILS  
S013 TYPICAL DETAILS  
S014 TYPICAL DETAILS  
S015 TYPICAL DETAILS  
S016 TYPICAL DETAILS  
S050 LOADING PLANS  
S190 FOUNDATION PLAN  
S200 ROOF FRAMING PLAN  
S300 COLUMN SCHEDULE  
S400 FOUNDATION SECTIONS  
S401 FOUNDATION SECTIONS  
S420 FRAMING SECTIONS  
S421 FRAMING SECTIONS  
S422 FRAMING SECTIONS  
S500 ELEVATIONS  
S501 ELEVATIONS

### MECHANICAL

M0-00 MECHANICAL SYMBOL LEGEND, DRAWING LIST & GENERAL NOTES  
M0-01 SITE PLAN - MECHANICAL - DEMO  
M0-02 SITE PLAN - MECHANICAL - NEW WORK  
MD1-00 FOUNDATION - PLUMBING & DRAINAGE DEMOLITION PLAN  
MD1-01 LEVEL 1 - PLUMBING & DRAINAGE DEMOLITION PLAN  
MD1-02 LEVEL 2 - PLUMBING & DRAINAGE DEMOLITION PLAN  
MD2-01 LEVEL 1 - HVAC DEMOLITION PLAN  
MD2-02 LEVEL 2 - HVAC DEMOLITION PLAN  
MD2-03 EXISTING ROOF - HVAC DEMOLITION PLAN  
M1-00 FOUNDATION - PLUMBING & DRAINAGE PLAN  
M1-01 LEVEL 1 - PLUMBING & DRAINAGE PLAN  
M1-02 LEVEL 2 & LOW ROOF - PLUMBING & DRAINAGE PLAN  
M1-03 HIGH ROOF & SIGN GARAGE ROOF - PLUMBING & DRAINAGE PLAN  
M2-01 LEVEL 1 - HVAC PLAN  
M2-02 LEVEL 2 & LOW ROOF - HVAC PLAN  
M2-03 HIGH ROOF - HVAC PLAN  
M3-01 LEVEL 1 - FIRE PROTECTION PLAN  
M4-01 AIR DISTRIBUTION SCHEMATIC  
M4-02 HYDRONIC HEATING SCHEMATIC  
M4-03 DOMESTIC COLD & HOT WATER SCHEMATIC  
M4-04 SANITARY DRAINAGE SCHEMATIC  
M4-05 STORM WATER SCHEMATIC  
M4-06 GAS SCHEMATIC - DEMO & NEW  
M4-08 VRF SCHEMATIC  
M5-01 CONTROL DIAGRAMS 1  
M5-02 CONTROL DIAGRAMS 2  
M5-03 CONTROL DIAGRAMS 3  
M5-04 CONTROL DIAGRAMS 4  
M6-01 MECHANICAL DETAILS 1  
M6-02 MECHANICAL DETAILS 2  
M6-03 MECHANICAL DETAILS 3  
M6-04 MECHANICAL DETAILS 4  
M6-05 MECHANICAL DETAILS 5  
M6-06 MECHANICAL DETAILS 6  
ME-01 EQUIPMENT SCHEDULES #1  
ME-02 EQUIPMENT SCHEDULES #2  
ME-03 EQUIPMENT SCHEDULES #3

### ELECTRICAL

E0-01 ELECTRICAL & ICAT SYMBOL LEGEND, DRAWING LIST & GENERAL NOTES  
E0-11 SITE PLAN - ELECTRICAL & ICAT - DEMOLITION  
E0-21 SITE PLAN - ELECTRICAL & ICAT - NEW WORKS  
E0-22 SITE PLAN - PHOTOMETRIC CALCULATIONS - NEW WORKS  
E1-01 ELECTRICAL SINGLE LINE DIAGRAM - DEMOLITION  
E1-02A ELECTRICAL SINGLE LINE DIAGRAM - NEW WORKS - SHEET 1  
E1-02B ELECTRICAL SINGLE LINE DIAGRAM - NEW WORKS - SHEET 2  
E1-03 LIGHTING CONTROL SYSTEM RISER DIAGRAM  
E1-04 GROUNDING & BONDING SYSTEM SINGLE LINE DIAGRAM  
E1-05 COMMUNICATIONS SYSTEM SINGLE LINE DIAGRAM  
E1-06 SECURITY & TECHNOLOGY SYSTEMS SINGLE LINE DIAGRAM  
E2-01 GROUND FLOOR PLAN - ELECTRICAL & ICAT - DEMOLITION  
E3-01 GROUND FLOOR PLAN - LIGHTING  
E3-11 GROUND FLOOR PLAN - POWER  
E3-12 ROOF LEVEL PLAN - POWER  
E4-01 GROUND FLOOR PLAN - COMMUNICATIONS SYSTEMS  
E4-11 GROUND FLOOR PLAN - SECURITY SYSTEMS  
E5-01 PANEL SCHEDULES - SHEET 1  
E5-02 PANEL SCHEDULES - SHEET 2  
E6-01 ELECTRICAL DETAILS - SHEET 1  
E6-02 ELECTRICAL DETAILS - SHEET 2  
E6-03 ELECTRICAL DETAILS - SHEET 3  
E6-04 ELECTRICAL DETAILS - SHEET 4  
E7-01 ICAT DETAILS - SHEET 1  
E7-02 ICAT DETAILS - SHEET 2  
E7-03 ICAT DETAILS - SHEET 3

### CIVIL

ESC-01 EROSION AND SEDIMENT CONTROL PLAN  
ESC-02 ENVIRONMENTAL DETAILS  
C-01 REMOVAL PLAN  
C-02 GRADING PLAN  
C-03 SERVICING PLAN  
C-04 UP FLO FILTER DETAIL  
C-05 FIRE TANK DETAIL  
C-06 EQUIPMENT CONCRETE SLAB DETAIL  
C-07 SITE PLAN AND DRAINAGE AREA MAP  
C-08 BASELINE POND MODIFICATIONS  
C-09 MCMINNOWS POND MODIFICATIONS  
C-10 POND SECTIONS  
C-11 SWALE MODIFICATIONS  
C-12 BERM MODIFICATIONS  
C-13 CONSTRUCTION DETAIL  
C-14 POND DESIGN CROSS SECTION

### LANDSCAPE

LP01 LANDSCAPE PLAN  
LP02 LANDSCAPE PLAN ENLARGEMENT  
LD01 LANDSCAPE DETAILS



ENTUITIVE





## BUILDING CODE ANALYSIS

### INTRODUCTION:

YORK REGION NORTH ROADS OPERATIONS CENTRE IS LOCATED:

LEGAL DESCRIPTION: PART OF LOT 23 CONCESSION CONCESSION 5, PART 1 ON PLAN 65R-20334; SUTTON WEST

MUNICIPAL ADDRESS: 3525 BASELINE RD. SUTTON WEST, ON L0E 1R0

THE PROJECT IS AN ADDITION AND INTERIOR ALTERATION TO AN EXISTING BUILDING. THE SCOPE OF WORK INCLUDES DEMOLITION, BUILDING ENVELOPE RECLADDING, EXPANDING THE EXISTING GARAGE, ADDITION OF ADMINISTRATIVE SPACES, AND INTERIOR ALTERATION OF THE EXISTING GARAGE AND WASH BAY.

### APPENDIX A:

### TECHNICAL BUILDING CODE ANALYSIS

### 1.0 PROJECT DESCRIPTION

YORK REGION NORTH ROADS MAINTENANCE FACILITY CONSISTS OF ONE BUILDING ONE STOREY IN HEIGHT:

TOTAL GROSS FLOOR AREA: 1,676SM  
BUILDING AREA: 1,778SM  
BUILDING HEIGHT: 7.3M

### 2.0 APPLICABLE BUILDING CODE AND STANDARDS

THE APPLICABLE BUILDING CODE FOR THE PROJECT IS THE ONTARIO BUILDING CODE 2012, INCLUDING REGULATIONS UPDATES UP TO AND INCLUDING 76220.

COMPLIANCE  
THE FOLLOWING CODE ANALYSIS FOR THE PROJECT HAS BEEN REVIEWED UNDER THE CURRENT CODE. IT IS ASSUMED THAT THE BASE BUILDING WAS BUILT IN COMPLIANCE WITH THE APPLICABLE EDITION OF THE ONTARIO BUILDING CODE AT THE TIME OF CONSTRUCTION.

### APPLICATION OF THIS CODE

THIS CODE APPLIES TO:  
ALTERATION OF ANY BUILDING (1.1.1.1(i))

### 3.0 MAJOR USE AND OCCUPANCY

MAJOR OCCUPANCIES FOR THE PROJECT: GROUP F2, D

BUILDING HEIGHT AND AREA OF ENTIRE BUILDING SHOULD BE USED (3.2.2.5)

MAJOR OCCUPANCIES SHALL BE SEPARATED FROM ADJOINING MAJOR OCCUPANCIES BY FIRE SEPARATIONS HAVING A FIRE-RESISTANCE RATING CONFORMING TO TABLE 3.1.3.1:  
- BETWEEN GROUP D AND GROUP F2: NOT REQUIRED

### 4.0 BUILDING CLASSIFICATION AND CONSTRUCTION REQUIREMENTS

GROUP F2: 3.2.2.70. (UP TO 4 STOREYS, NOT SPRINKLERED)

BUILDING AREA: 1,500SM IF 1 STOREY IN HEIGHT FACING 1 STREET  
CONSTRUCTION: PERMITTED TO BE OF COMBUSTIBLE OR NONCOMBUSTIBLE FLOORS: FIRE SEPARATIONS WITH A FIRE-RESISTANCE RATING OF 45 MIN SUPPORTING STRUCTURE: LOADBEARING WALLS & COLUMNS HAVE A FIRE-RESISTANCE RATING OF NOT LESS THAN 45 MIN, OR BE OF NONCOMBUSTIBLE CONSTRUCTION.

### 5.0 COMPONENT FIRE SEPARATIONS:

THE EXISTING WALL BETWEEN THE PROPOSED OFFICE (GROUP D) AND PROPOSED REPAIR GARAGE EXPANSION (GROUP F2) EAST OF GRIDLINE E IS TO HAVE A 2H FIRE RESISTANCE RATING PER 3.3.5.5.(1)  
- PER 3.3.5.5.(1), A REPAIR GARAGE AND ANY ANCILLARY SPACES SERVING IT SHALL BE SEPARATED FROM OTHER OCCUPANCIES BY A FIRE RESISTANCE RATING OF NOT LESS THAN 2 HOURS.

THE EXISTING WALL BETWEEN THE PROPOSED OFFICE (GROUP D) AND PROPOSED REPAIR GARAGE EXPANSION (GROUP F2) NORTH OF GRIDLINE E IS TO HAVE A 2H FIRE RESISTANCE RATING PER 3.3.5.5.(1)  
- PER 3.3.5.5.(1), A REPAIR GARAGE AND ANY ANCILLARY SPACES SERVING IT SHALL BE SEPARATED FROM OTHER OCCUPANCIES BY A FIRE RESISTANCE RATING OF NOT LESS THAN 2 HOURS.

EXITS: 45 MIN FIRE SEPARATION (3.4.4.1 AND SUBSECTION 3.2.2)

CLOSURES: TO FOLLOW TABLE 3.1.8.4

### FUEL-FIRED EQUIPMENT SERVICE ROOM:

- FUEL-FIRED APPLIANCES SHALL BE INSTALLED IN SERVICE ROOMS SEPARATED FROM THE REMAINDER OF THE BUILDING BY FIRE SEPARATIONS HAVING A FIRE-RESISTANCE RATING NOT LESS THAN 1 HR (3.6.2.1.(1)).

### ELECTRICAL ROOMS:

- 1 HR (3.6.2.1.(6)) UNLESS OTHERWISE REQUIRED BY THE ELECTRICAL CODE.

OTHER SERVICE ROOMS: 1 HR (3.6.2.1.(7))

JANITOR ROOMS: 45 MIN FIRE SEPARATION (3.3.1.20.2)

PUBLIC CORRIDORS: NO FIRE SEPARATION REQUIRED (3.3.1.4.(3))

### FIRE BLOCKS:

- FIRE BLOCKS BETWEEN CONCEALED VERTICAL AND HORIZONTAL SPACES. (3.1.11.4)

### 6.0 EXITING AND MEANS OF EGRESS

- MAXIMUM DISTANCE BETWEEN EXITS SHALL BE 1/2 THE DIAGONAL DIMENSION OF A FLOOR AREA, BUT NEED NOT BE MORE THAN 9m FOR A FLOOR AREA HAVING A PUBLIC CORRIDOR OR ONE HALF THE MAXIMUM DIAGONAL DIMENSION OF THE FLOOR AREA, BUT NOT LESS THAN 9m FOR ALL OTHER FLOOR AREAS (3.4.2.3).

- PER 3.3.1.3.(8), EACH SUITE IN A FLOOR AREA MUST HAVE AN EXTERIOR EXIT DOORWAY.

- MAXIMUM TRAVEL DISTANCE TO AN EXIT: 30M PER 3.4.2.5.(1)(f)

- MINIMUM NUMBER OF EXITS REQUIRED: REQUIRED NOT LESS THAN 2 EXITS PER FLOOR AREA (3.4.2.1)

- MINIMUM WIDTH OF CORRIDORS: 1100mm (3.4.3.2.(7)(a))

- MINIMUM WIDTH OF DOORWAYS: 700mm (3.4.3.2.(7)(g))

- MINIMUM WIDTH OF BARRIER FREE DOORWAYS: CLEAR WIDTH 860mm (3.5.3.3.(1))

### HEADROOM CLEARANCE (3.4.3.5):

- EXITS: 2100mm

- DOORWAYS: 2030mm

- DOORWAYS WITH CLOSERS OR OTHER DEVICES: 1980mm

### 7.0 OCCUPANT LOADS

GROUP F2 (GARAGE): 1,081SM/ 46 = 24 PEOPLE

GROUP D (OFFICE): 597SM/ 9.3 = 65 PEOPLE

TOTAL: 89 PEOPLE FOR ENTIRE FACILITY

### 8.0 WASHROOM FIXTURE REQUIREMENTS

GROUP F2 (GARAGE): 24 PEOPLE/ 2 = 12 PEOPLE = 2/SEX (3.7.4.9)

GROUP D (OFFICE): 597SM/ 14 = 43 PEOPLE/ 2 = 22 PEOPLE = 2/SEX (3.7.4.7)

### 9.0 FIRE ALARM AND DETECTION SYSTEMS

THE REPAIR GARAGE DETECTION SYSTEM NOT REQUIRED PER 3.2.4.1

### 10.0 PROVISIONS FOR FIRE FIGHTING

### BUILDING ACCESS:

- DIRECT ACCESS FOR FIREFIGHTING SHALL BE PROVIDED FROM THE OUTDOORS TO EVERY STORY THAT IS NOT SPRINKLERED AND WHOSE FLOOR LEVEL IS LESS THAN 25m ABOVE GRADE, BY AT LEAST ONE UNOBSTRUCTED WINDOW OR ACCESS PANEL FOR EACH 15M OF WALL IN EACH WALL REQUIRED TO FACE A STREET BY SUBSECTION 3.2.2.

### ACCESS ROUTES:

- ACCESS ROUTES FOR FIRE DEPARTMENT VEHICLES SHALL BE PROVIDED TO THE BUILDING FACING HAVING A PRINCIPAL ENTRANCE AND TO EACH BUILDING FACE HAVING ACCESS OPENINGS FOR FIREFIGHTING AS REQUIRED BY ARTICLES 3.2.5.1 AND 3.2.5.2 (3.2.5.4)

- THE PRINCIPAL ENTRANCE SHALL BE LOCATED NOT LESS THAN 3m AND NOT MORE THAN 15m FROM THE CLOSEST PORTION OF THE ACCESS ROUTE REQUIRED FOR FIRE DEPARTMENT USE (3.2.5.5.1)

- THE ACCESS ROUTE SHALL ALLOW A FIRE DEPARTMENT PUMPER VEHICLE TO BE LOCATED ADJACENT TO THE HYDRANTS PER 3.2.5.5.2(A), AND PROVIDE AN UNOBSTRUCTED PATH OF TRAVEL OF NOT MORE THAN 45M FOR THE FIREFIGHTER FROM THE VEHICLE TO THE BUILDING (3.2.5.5.2(C))

- PER ARTICLE 3.2.5.6, THE PORTION OF THE ROADWAY PROVIDED AS A REQUIRED ACCESS ROUTE INCLUDES THE FOLLOWING:

- A CLEAR WIDTH NOT LESS THAN 6m (3.2.5.6.1(A))

- A CENTRELINE RADIUS NOT LESS THAN 12m (3.2.5.6.1(B))

- AN OVERHEAD CLEARANCE NOT LESS THAN 5m (3.2.5.6.1(C))

- A CHANGE OF GRADIENT NOT MORE THAN 1:12.5 OVER 15m MIN (3.2.5.6.1(D))

- DESIGNED TO SUPPORT THE EXPECTED LOADS IMPOSED BY FIREFIGHTING EQUIPMENT AND IS SURFACED WITH ASPHALT AND DESIGNED TO PERMIT ACCESSIBILITY UNDER ALL CLIMATIC CONDITIONS (3.2.5.6.1(E))

- HAVE A TURNAROUND FACILITIES FOR ANY DEAD-END PORTION OF THE ACCESS ROUTE MORE THAN 90m LONG (3.2.5.6.1(F))

- CONNECTED TO PUBLIC THOROUGHFARE (3.2.5.6.1(G))

### STANDPIPE SYSTEM:

- STANDPIPE SYSTEM NOT REQUIRED AS THE BUILDING AREA IS NOT LARGER THAN 2,000m<sup>2</sup> (3.2.9.1.)

### SPRINKLER SYSTEM:

- SPRINKLER SYSTEM IS NOT REQUIRED (3.2.2.70.)

### FIRE DEPARTMENT CONNECTION:

- THE FIRE DEPARTMENT CONNECTION FOR A STANDPIPE SYSTEM SHALL BE LOCATED SO THAT THE DISTANCE FROM THE FIRE DEPARTMENT CONNECTION TO A HYDRANT IS NOT MORE THAN 45m AND IS UNOBSTRUCTED (3.2.5.16.1)

### PORTABLE FIRE EXTINGUISHERS:

- PORTABLE FIRE EXTINGUISHERS SHALL BE PROVIDED AND INSTALLED IN CONFORMANCE WITH THE NATIONAL FIRE CODE 2020 (3.2.5.17)

### PROTECTION FROM FREEZING:

- EQUIPMENT FORMING PART OF A FIRE PROTECTION SYSTEM SHALL BE PROTECTED FROM FREEZING (3.2.5.18)

### 11.0 FLAME SPREAD RATINGS

- EXITS: MAX. 25 (TABLE 3.1.13.2)

- INTERIOR WALLS & CEILING FINISHES: MAX. 150 (3.1.13.2)

- CORRIDORS: MAX. 25 (3.1.13.6.(5))

### 12.0 FIRE-STOPPING AND PENETRATIONS THROUGH FIRE SEPARATIONS

- AS PER 3.1.9.1.7 - PIPING, TUBING, DUCTS, CHIMNEYS, OPTICAL FIBRE CABLES, ELECTRICAL WIRES AND CABLES, TOTALLY ENCLOSED NONCOMBUSTIBLE RACEWAYS, ELECTRICAL OUTLET BOXES, AND OTHER BUILDING SERVICES THAT PENETRATE FIRE SEPARATIONS SHALL BE SEALED BY A FIRE STOP SYSTEM THAT HAS A F RATING

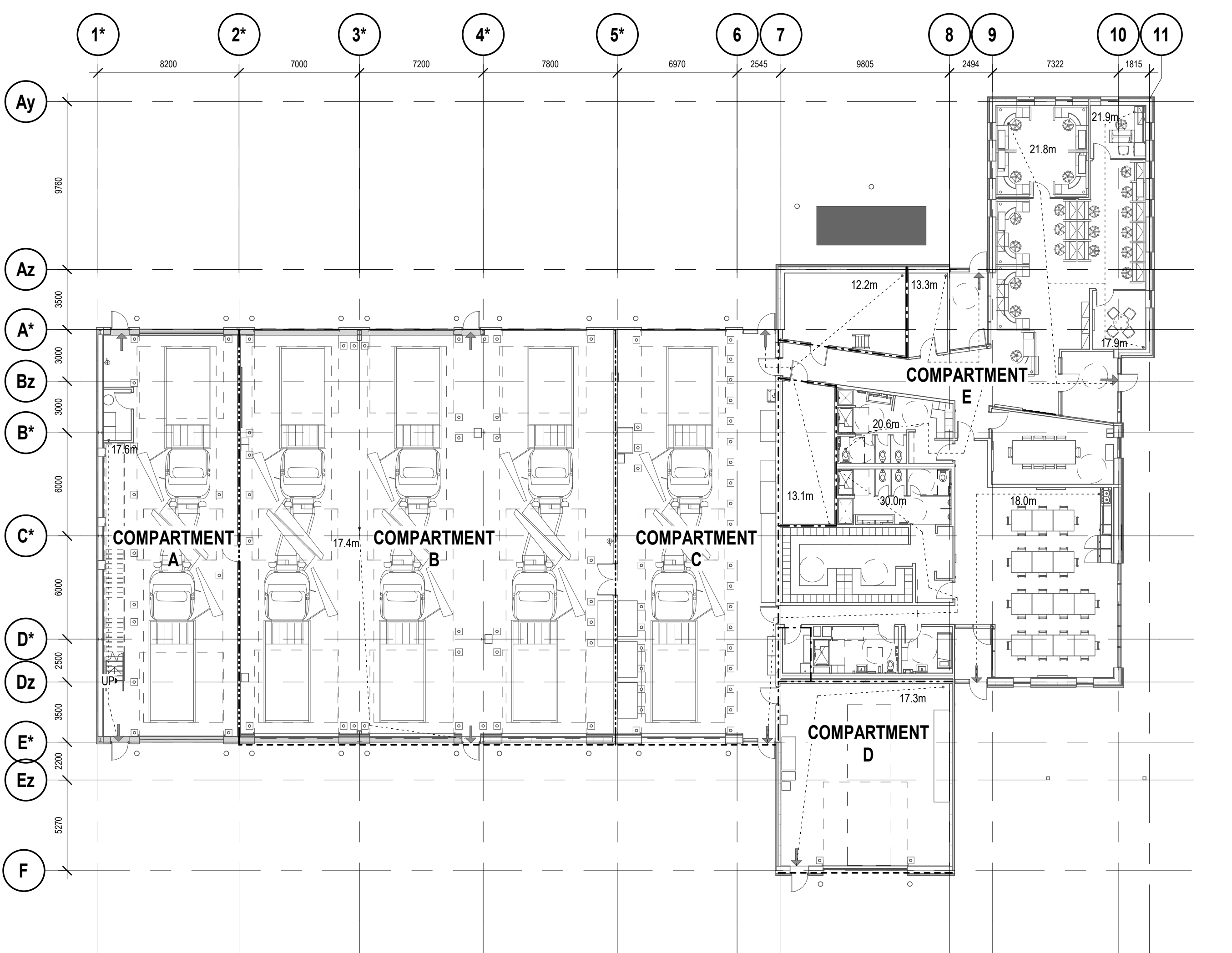
### 13.0 ADDITIONAL REQUIREMENTS

FLOW CONTROL, DRAINAGE FOR ROOF TO BE AS PER NATIONAL PLUMBING CODE 2015

### LIMITING DISTANCE CALCULATIONS (3.2.3.1.C.)

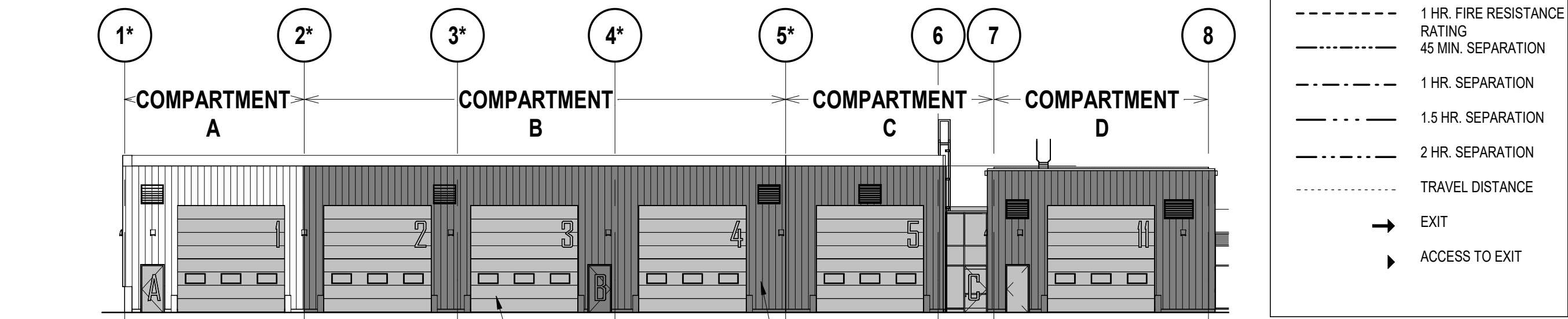
NOTE: THE REPAIR GARAGE HAS BEEN SPLIT INTO THREE COMPARTMENTS (COMPARTMENTS A, B, AND C) BASED ON LIMITING DISTANCE, AREA OF EXPOSED BUILDING FACE, AND % OF OPENINGS PERMITTED. % OF OPENINGS PROVIDED WOULD EXCEED % OF OPENINGS PERMITTED WITHOUT SPLITTING THE REPAIR GARAGE INTO COMPARTMENTS A, B, AND C BASED ON LIMITING DISTANCE AND AREA OF EXPOSED BUILDING FACE.

COMPARTMENT A	NORTH ELEVATION	SOUTH ELEVATION	EAST ELEVATION	WEST ELEVATION
LIMITING DISTANCE:	26.3M	12.8M	-	248.8M
AREA:	55.65M	55.65M	-	168.45M
AREA OF OPENINGS:	26.35M	26.35M	-	0SM
% OF OPENINGS PERMITTED:	100%	100%	-	100%
% OF OPENINGS PROVIDED:	47.3%	47.3%	-	0%
FIRE-RESISTANCE RATING REQUIRED:	-	-	-	-
NON-COMBUSTIBLE CONSTRUCTION REQUIRED:	NO	NO	NO	NO
NON-COMBUSTIBLE CLADDING REQUIRED:	NO	NO	NO	NO
COMPARTMENT B	NORTH ELEVATION	SOUTH ELEVATION	EAST ELEVATION	WEST ELEVATION
LIMITING DISTANCE:	26.3M	12.8M	-	-
AREA:	147.45M	147.45M	-	-
AREA OF OPENINGS:	74.25M	71.65M	-	-
% OF OPENINGS PERMITTED:	100%	48.7%	-	-
% OF OPENINGS PROVIDED:	50.3%	48.7%	-	-
FIRE-RESISTANCE RATING REQUIRED:	-	1HR	-	-
NON-COMBUSTIBLE CONSTRUCTION REQUIRED:	NO	NO	NO	NO
NON-COMBUSTIBLE CLADDING REQUIRED:	NO	YES	NO	NO
COMPARTMENT C	NORTH ELEVATION	SOUTH ELEVATION	EAST ELEVATION	WEST ELEVATION
LIMITING DISTANCE:	26.3M	12.8M	103.5M	-
AREA:	57.55M	57.55M	46.45M	-
AREA OF OPENINGS:	32.55M	38.45M	0SM	-
% OF OPENINGS PERMITTED:	100%	96%	100%	-
% OF OPENINGS PROVIDED:	55.5%	66.8%	0%	-
FIRE-RESISTANCE RATING REQUIRED:	-	1HR	-	-
NON-COMBUSTIBLE CONSTRUCTION REQUIRED:	NO	NO	NO	NO
NON-COMBUSTIBLE CLADDING REQUIRED:	NO	NO	NO	NO
COMPARTMENT D	NORTH ELEVATION	SOUTH ELEVATION	EAST ELEVATION	WEST ELEVATION
LIMITING DISTANCE:	35.8M	9.0M	93.2M	288.3M
AREA:	38.35M	67.65M	76.45M	49.35M
AREA OF OPENINGS:	0SM	26.55M	0SM	0SM
% OF OPENINGS PERMITTED:	100%	46%	100%	100%
% OF OPENINGS PROVIDED:	0%	38.9%	0%	0%
FIRE-RESISTANCE RATING REQUIRED:	-	1HR	-	-
NON-COMBUSTIBLE CONSTRUCTION REQUIRED:	NO	NO	NO	NO
NON-COMBUSTIBLE CLADDING REQUIRED:	NO	NO	NO	NO
COMPARTMENT E	NORTH ELEVATION	SOUTH ELEVATION	EAST ELEVATION	WEST ELEVATION
LIMITING DISTANCE:	18.9M	11.8M	51.3M	288.2M
AREA:	46.65M	42.65M	127.65M	51.05M
AREA OF OPENINGS:	16.35M	11.25M	49.35M	6.25M
% OF OPENINGS PERMITTED:	100%	100%	100%	100%
% OF OPENINGS PROVIDED:	34.8%	26.3%	38.6%	12.2%
FIRE-RESISTANCE RATING REQUIRED:	-	-	-	-
NON-COMBUSTIBLE CONSTRUCTION REQUIRED:	NO	NO	NO	NO
NON-COMBUSTIBLE CLADDING REQUIRED:	NO	NO	NO	NO



1 A001 LEVEL 01 BUILDING CODE FLOOR PLAN

Scale: 1 : 200



2 A001 BUILDING CODE SOUTH ELEVATION

Scale: 1 : 200

### FIRE RATING LEGEND:

- 1 HR. FIRE RESISTANCE RATING
- 45 MIN. SEPARATION
- 1 HR. SEPARATION
- 1.5 HR. SEPARATION
- 2 HR. SEPARATION
- TRAVEL DISTANCE
- EXIT
- ACCESS TO EXIT

<b>Name of Practice:</b> GEC Architecture 179 John St #403 Toronto, ON M5T 1X4																															
<b>Name of Project:</b> York Region North Roads Operations Centre																															
<b>Location:</b> 3525 Baseline Rd. Sutton West, ON L0E 1R0																															
<b>Date:</b> September 17, 2024																															
<b>Ontario Building Code Data Matrix</b> Part 3			<b>Building Code Reference 1</b>																												
3.00	Building Code Version:	O_Reg. 332/12	Last Amendment: O_Reg. 782/20																												
3.01	Project Type:	<input type="checkbox"/> New <input type="checkbox"/> Change of Use <input type="checkbox"/> Addition <input type="checkbox"/> Addition and renovation																													
3.02	Major Occupancy Classification:	Occupancy: _____ Use: _____ Group F2: Repair Garage (3.2.2.70) Group D: Office (3.2.2.56)																													
3.03	Superimposed Major Occupancies:	<input checked="" type="checkbox"/> No <input type="checkbox"/> Yes																													
3.04	Building Area (m <sup>2</sup> ):	<table border="1"> <thead> <tr> <th>Description:</th><th>Existing</th><th>New</th><th>Total</th></tr> </thead> <tbody> <tr> <td>Garage</td><td>725sm</td><td>356sm</td><td>1,081sm</td></tr> <tr> <td>Office</td><td>0</td><td>697sm</td><td>697sm</td></tr> <tr> <td></td><td>0</td><td>0</td><td>0</td></tr> <tr> <td></td><td>0</td><td>0</td><td>0</td></tr> <tr> <td></td><td>0</td><td>0</td><td>0</td></tr> <tr> <td><b>Total</b></td><td><b>725sm</b></td><td><b>1,053sm</b></td><td><b>1,778sm</b></td></tr> </tbody> </table>		Description:	Existing	New	Total	Garage	725sm	356sm	1,081sm	Office	0	697sm	697sm		0	0	0		0	0	0		0	0	0	<b>Total</b>	<b>725sm</b>	<b>1,053sm</b>	<b>1,778sm</b>
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3.05	Gross Area (m <sup>2</sup> ):	<table border="1"> <thead> <tr> <th>Description:</th><th>Existing</th><th>New</th><th>Total</th></tr> </thead> <tbody> <tr> <td>Garage</td><td>725sm</td><td>356sm</td><td>1,081sm</td></tr> <tr> <td>Office</td><td>0</td><td>697sm</td><td>697sm</td></tr> <tr> <td></td><td>0</td><td>0</td><td>0</td></tr> <tr> <td></td><td>0</td><td>0</td><td>0</td></tr> <tr> <td></td><td>0</td><td>0</td><td>0</td></tr> <tr> <td><b>Total</b></td><td><b>725sm</b></td><td><b>953sm</b></td><td><b>1,678sm</b></td></tr> </tbody> </table>	Description:	Existing	New	Total	Garage	725sm	356sm	1,081sm	Office	0	697sm	697sm		0	0	0		0	0	0		0	0	0	<b>Total</b>	<b>725sm</b>	<b>953sm</b>	<b>1,678sm</b>	A14.1.2
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<b>Total</b>	<b>725sm</b>	<b>953sm</b>	<b>1,678sm</b>																												
3.06	Mezzanine Area (m <sup>2</sup> ):	<table border="1"> <thead> <tr> <th>Description:</th><th>Existing</th><th>New</th><th>Total</th></tr> </thead> <tbody> <tr> <td>N/A</td><td>0</td><td>0</td><td>0</td></tr> <tr> <td></td><td>0</td><td>0</td><td>0</td></tr> <tr> <td></td><td>0</td><td>0</td><td>0</td></tr> <tr> <td></td><td>0</td><td>0</td><td>0</td></tr> <tr> <td></td><td>0</td><td>0</td><td>0</td></tr> <tr> <td><b>Total</b></td><td><b>0</b></td><td><b>0</b></td><td><b>0</b></td></tr> </tbody> </table>	Description:	Existing	New	Total	N/A	0	0	0		0	0	0		0	0	0		0	0	0		0	0	0	<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	3.2.1.1
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N/A	0	0	0																												
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	0	0	0																												
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>																												
3.07	Building Height:	1 Storeys above grade 8.1 (m) Above grade	A14.1.2 & 3.2.1.1																												
3.08	High Building:	<input checked="" type="checkbox"/> No <input type="checkbox"/> Yes	3.2.6																												
3.09	Number of Streets/Firefighter access:	1 street(s)	3.2.2.0 & 3.2.5																												
3.10	Building Classification (Risk and Occupancy):	3.2.2.70 Group/Div F2	3.2.2.20 - 83																												
3.11	Sprinkler System:	<input checked="" type="checkbox"/> Required <input type="checkbox"/> Not Required <input type="checkbox"/> Not required <input type="checkbox"/> Selected floor areas <input type="checkbox"/> In lieu of roof rating <input type="checkbox"/> Selected compartments <input type="checkbox"/> Basement <input type="checkbox"/> None	3.2.2.20 & 3.2.2.77																												
3.12	Standpipe System:	<input checked="" type="checkbox"/> Not required <input type="checkbox"/> Required	3.2.8																												
3.13	Fire Alarm System:	<input type="checkbox"/> Required <input checked="" type="checkbox"/> Not required <input type="checkbox"/> Single stage <input type="checkbox"/> Two stage <input type="checkbox"/> None	3.2.4																												
3.14	Water Service / Supply is Adequate:	<input type="checkbox"/> No <input checked="" type="checkbox"/> Yes																													
3.15	Construction Type:	Restriction: <input checked="" type="checkbox"/> Combustible permitted <input type="checkbox"/> Non-combustible required Actual: <input type="checkbox"/> Combustible <input checked="" type="checkbox"/> Non-combustible <input type="checkbox"/> Combination Heavy Timber Construction: <input checked="" type="checkbox"/> No <input type="checkbox"/> Yes	3.2.2.20 - 83 & 3.2.1.4																												

3.16	Importance Category:	<input type="checkbox"/> Low <input checked="" type="checkbox"/> Normal <input type="checkbox"/> High <input type="checkbox"/> Minor storage building <input type="checkbox"/> Explosive or hazardous substances <input type="checkbox"/> Post-disaster	4.1.2.1.(3) & 14.1.2.1.8																								
3.17	Seismic Hazard Index:	(Ic/Fa Sa (0.2)) = 0.16 Seismic design required for Table 4.1.8.1b, Items 6 to 21: (Ic/Fa Sa (0.2)) ≥ 0.35 or Post-disaster <input checked="" type="checkbox"/> No <input type="checkbox"/> Yes	4.1.2.1.(3) & 4.1.8.18.(2)																								
3.18	Occupant Load	<table><thead><tr><th>Floor Level/Area</th><th>Occupancy Type</th><th>Based On</th><th>Occupant Load (Persons)</th></tr></thead><tbody><tr><td>Group F2</td><td>F2</td><td>46sm/ps</td><td>24</td></tr><tr><td>Group D</td><td>D</td><td>9.3sm/ps</td><td>65</td></tr><tr><td></td><td></td><td></td><td>0</td></tr><tr><td></td><td></td><td></td><td>0</td></tr><tr><td></td><td></td><td></td><td>0</td></tr></tbody></table> <small>Insert additional rows as needed</small>	Floor Level/Area	Occupancy Type	Based On	Occupant Load (Persons)	Group F2	F2	46sm/ps	24	Group D	D	9.3sm/ps	65				0				0				0	3.1.17
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Group D	D	9.3sm/ps	65																								
			0																								
			0																								
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3.19	Barrier-free Design:	<input checked="" type="checkbox"/> Yes Explanation: New addition is barrier free. No significant change in floor elevation. <input type="checkbox"/> No	3.8																								
3.20	Hazardous Substances:	<input type="checkbox"/> Yes Explanation: No hazardous substances. <input checked="" type="checkbox"/> No	3.3.1.2 & 3.3.1.19																								
3.21	Required Fire Resistance Ratings	<table><thead><tr><th>Horizontal Assembly</th><th>Rating</th><th>Supporting Assembly (H)</th><th>Noncombustible in lieu of rating?</th></tr></thead><tbody><tr><td>Floors over basement</td><td>0</td><td>0</td><td><input type="checkbox"/> No <input checked="" type="checkbox"/> Yes N/A</td></tr><tr><td>Floors</td><td>3/4</td><td>3/4</td><td><input type="checkbox"/> No <input checked="" type="checkbox"/> Yes N/A</td></tr><tr><td>Mezzanine</td><td>0</td><td>0</td><td><input type="checkbox"/> No <input checked="" type="checkbox"/> Yes N/A</td></tr><tr><td>Roof</td><td>3/4</td><td>3/4</td><td><input type="checkbox"/> No <input checked="" type="checkbox"/> Yes N/A</td></tr></tbody></table>	Horizontal Assembly	Rating	Supporting Assembly (H)	Noncombustible in lieu of rating?	Floors over basement	0	0	<input type="checkbox"/> No <input checked="" type="checkbox"/> Yes N/A	Floors	3/4	3/4	<input type="checkbox"/> No <input checked="" type="checkbox"/> Yes N/A	Mezzanine	0	0	<input type="checkbox"/> No <input checked="" type="checkbox"/> Yes N/A	Roof	3/4	3/4	<input type="checkbox"/> No <input checked="" type="checkbox"/> Yes N/A	3.2.2.0 - 8.3 & 3.2.1.4				
Horizontal Assembly	Rating	Supporting Assembly (H)	Noncombustible in lieu of rating?																								
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## ABBREVIATIONS

A.D.	AREA DRAIN
A.F.F.	ABOVE FINISHED FLOOR
ALUM. OR AL.	ALUMINUM
ANCD.	ANGLED
ARCH.	ARCHITECTURAL
B.F.W.A.	BARRIER FREE WAVE ACTUATOR
C.B.	CATCH BASIN
C.G.	CORNER GUARD
C.J.	CONTROL JOINT
C.O.	CONCRETE OPENING
COL.	COLUMN
CONC.	CONCRETE
CONT.	CONTINUOUS
CONST.	CONSTRUCTION
C.P.T.	CARPET
NT.S.	NOT TO SCALE
D.F.	DRINKING FOUNTAIN
DM.	DIMENSION
DTL	DETAIL
DOOR	DOOR
DWG.	DRAWING
E.B.	EMERGENCY BUTTON
ELECT.	ELECTRICAL
EL. OR ELEV.	ELEVATION
ELVR.	ELEVATOR
EQ.	EQUAL
EQUIP.	EQUIPMENT
F.O.	FACE OF
F.O.C.	FACE OF CURB
FD	FLOOR DRAIN
HDR.	HARDWARE
H.W.C.	FIRE HOSE CABINET
F.E.C.	FIRE EXTINGUISHER CABINET
FIN. FLR.	FINISH FLOOR
F.R.R.	FIRE RESISTANCE RATING
H.	HEIGHT
H.B.	HOSE BIBB
HORIZ.	HORIZONTAL
H.M.	HOLLOW METAL
H.M.I.	HOLLOW METAL INSULATED
HP.	HIGH POINT
H.S.S.	HOLLOW STEEL SECTION
INSUL.	INSULATION
LP.	LOW POINT
MAX.	MAXIMUM
MATL.	MATERIAL
MECH.	MECHANICAL
MIN.	MINIMUM
MIRR.	MIRROR
M.O.	MASONRY OPENING
NA.	NOT APPLICABLE
N.I.C.	NOT IN CONTRACT
NO.	NUMBER
NT.S.	NOT TO SCALE
O.B.C.	ONTARIO BUILDING CODE
ON CENTRE	ON CENTRE
O.H.	OVERHEAD
O.W.S.J.	OPEN WEB STEEL JOIST
P.B.	PUSH BUTTON
P.LAM.	PLASTIC LAMINATE
P.S.	PRESSED STEEL
RD.	ROOF DRAIN
R.O.	ROUGH OPENING
REQD.	REQUIRED
REIN.F.	REINFORCED
RM.	ROOM
R.W.L.	RAIN WATER LEADER
S.B.S.	STYRENE BUTADIENE STYRENE
SIM.	SIMILAR
SPEC.	SPECIFICATION
SO.	SQUARE
S.S.	STAINLESS STEEL
STRUCT.	STRUCTURAL
T.G.	TEMPERED GLASS
T.O.F.	TOP OF
TYP.	TYPICAL
U.O.	UNLESS NOTED OTHERWISE
US.	UNDERSIDE
V.C.T.	VINYL COMPOSITION TILE
VERT.	VERTICAL
W.	WIDTH
W.A.	WAVE ACTUATOR TO OPEN
W.A.L.	WAVE ACTUATOR TO LOCK

## CONSTRUCTION NOTES

- DRAWINGS ARE NOT TO BE SCALED
- ALL DIMENSIONS ARE TO BE VERIFIED ON SITE.
- BRING ALL OMISSIONS AND DISCREPANCIES, INCLUDING DIMENSIONS, TO THE ATTENTION OF THE CONSULTANT PRIOR TO COMMENCEMENT OF ANY WORK.
- PROVIDE 19.1mm FIRE RATED PLYWOOD BACKING FOR TELEPHONES AND SURFACE MOUNTED ELECTRICAL PANELS UNLESS OTHERWISE NOTED.
- FULLY COORDINATE ALL ADDITIONAL SUPPORT REQUIRED FOR ANCHORAGE OF MECHANICAL EQUIPMENT OR DUCTS AND ELECTRICAL FIXTURES.
- ENSURE THAT WHEREVER A FIRE SEPARATION IS INDICATED ON THE DRAWINGS PER DIRECTION OF THE CONSTRUCTION NOTES, ALL COMPONENTS OF THE ASSEMBLY SHALL BE OF APPROVED MATERIALS, AND INSTALLATION/FABRICATION PROCEDURES ARE PER DIRECTION OF THE INDICATED UNDERWRITERS LABORATORIES OF CANADA LTD.' LATEST EDITION MANUAL AND OTHERWISE MEETING THE REQUIREMENTS OF THE ONTARIO BUILDING CODES. ALL FIRE SEPARATIONS MUST BE CONTINUOUS WITHIN THEIR EXTENT, AND ALL JOINTS TO BE SMOKE TIGHT.
- DIMENSIONS INDICATED ARE FROM EXTERIOR FACE OF SHEATHING, CONCRETE OR CONCRETE BLOCK AT EXTERIOR WALLS AND FACE OF STEEL STUDS, CONCRETE AND CONCRETE BLOCK AT INTERIOR PARTITIONS.
- OUTSIDE EDGE OF DOOR AND GLAZING FRAMES TO BE LOCATED 150mm AWAY FROM ADJACENT WALLS UNLESS OTHERWISE NOTED.
- MAINTAIN CONTINUITY OF ALL FIRE SEPARATIONS AND PENETRATIONS WITH APPROVED U.L.C. LISTED FIRE STOPPING SYSTEMS AND FIRE SEALANTS BOTH SIDES OF PARTITIONS.
- MAINTAIN CONTINUITY OF ALL PENETRATIONS WITH STRIPPING MEMBRANES SINGLE LAPPED TO EXTERIOR AND APPROVED SEALANTS COMPATIBLE WITH MEMBRANE PRODUCTS USED.
- ISOLATE ALL MECHANICAL, PIPES DUCTS AND EQUIPMENT FROM INTERIOR PARTITIONS TO AVOID ACOUSTIC NOISE TRANSFER.
- PROVIDE SOLID BLOCKING IN GYPSUM BOARD PARTITIONS FOR ATTACHMENT OF EQUIPMENT, FIXTURES, HANDRAILS, LADDERS etc.

## SYMBOL LEGEND

⊕	CENTERLINE MARK
⊕	PARTITION ASSEMBLY TYPE
⊕	EXTERIOR ASSEMBLY TYPE
⊕	ROOF ASSEMBLY TYPE
⊕	INTERIOR GLAZING TYPE
⊕	EXTERIOR GLAZING TYPE
⊕	CEILING REFERENCE
⊕	2440 - CEILING HEIGHT A.F.F. U.N.O.
⊕	ROOM NAME
⊕	ROOM NAME & NUMBER
⊕	ARCHITECTURAL DATUM
⊕	ELEVATION ON BUILDING
⊕	ELEVATIONS AND SECTIONS
⊕	BUILDING SECTION
⊕	1 - SECTION NUMBER
⊕	A101 - REFERENCE SHEET NUMBER
⊕	WALL SECTION OR SECTION DETAIL
⊕	1 - SECTION NUMBER
⊕	A101 - REFERENCE SHEET NUMBER
⊕	PLAN DETAIL
⊕	1 - DETAIL NUMBER
⊕	A101 - REFERENCE SHEET NUMBER
⊕	DETAIL REFERENCE
⊕	1 - DETAIL NUMBER
⊕	A101 - REFERENCE SHEET NUMBER
⊕	TITLE - DETAIL TITLE
⊕	ELEVATION SYMBOL
⊕	1 - DETAIL NUMBER
⊕	A101 - REFERENCE SHEET NUMBER
⊕	DOOR SYMBOL BY ROOM NUMBER
⊕	REFER TO DOOR SCHEDULE
⊕	EXISTING CONSTRUCTION
⊕	CONCRETE (SMALL SCALE)
⊕	CONCRETE (LARGE SCALE)
⊕	CONCRETE BLOCK
⊕	FIBREBOARD
⊕	GYPSUM BOARD/SHEATHING
⊕	PLYWOOD
⊕	RIGID OR SEMI RIGID INSULATION
⊕	BATT INSULATION
⊕	BACKFILL
⊕	GRAVEL

## ROOM FINISH SCHEDULE GENERAL NOTES

WHERE MULTIPLE FINISHES ARE INDICATED FOR A SURFACE:

- REFER TO REFLECTED CEILING PLAN FOR CEILING TYPE EXTENTS
- REFER TO INTERIOR ELEVATIONS AND DETAILS DRAWINGS FOR MATERIAL LOCATIONS
- REFER TO FLOOR FINISH PLANS FOR FLOOR TYPE EXTENTS
- REFER TO DOOR SCHEDULE FOR TYPE EXTENTS AND MATERIAL LOCATIONS

- ALL VERTICAL TILE GROUT LINES TO ALIGN FROM FLOOR TO CEILING
- ALL HORIZONTAL TILE GROUT LINES TO ALIGN ACROSS FULL EXTENT OF ROOM
- ALL WALL TILE GROUT LINES TO ALIGN WITH FLOOR TILE GROUT LINES UNLESS NOTED OTHERWISE
- FLOOR FINISH TRANSITIONS TO BE ON CENTER OF DOOR THRESHOLDS
- FLOOR FINISH TO EXTEND UNDER ALL VANITIES, PLUMBING FIXTURES, AND ACCESSORIES
- REFER TO SPECIFICATION SECTION (B) 99-59 MATERIALS LIST FOR FINISH CODES

## PAINT GLOSS LEVELS

- GLOSS LEVEL 1 MATTE FINISH (FLAT) - CEILINGS
- GLOSS LEVEL 3 EGGSHELL FINISH - WALLS
- GLOSS LEVEL 4 SATIN FINISH - EXTERIOR WALLS
- GLOSS LEVEL 5 TRADITIONAL SEMI-GLOSS FINISH - DOOR FRAMES AND DOORS, METAL FIXTURES

## EXTERIOR WALL ASSEMBLY NOTES:

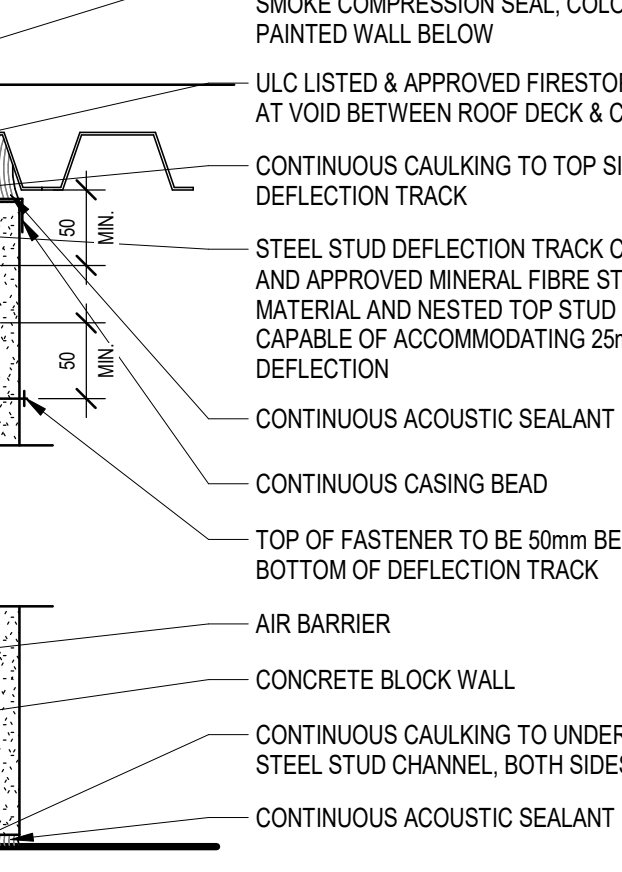
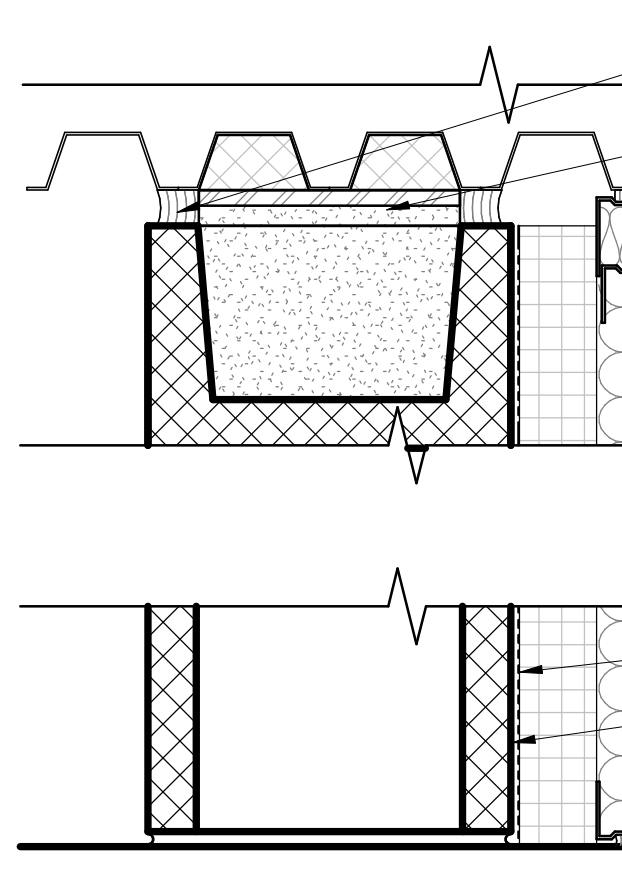
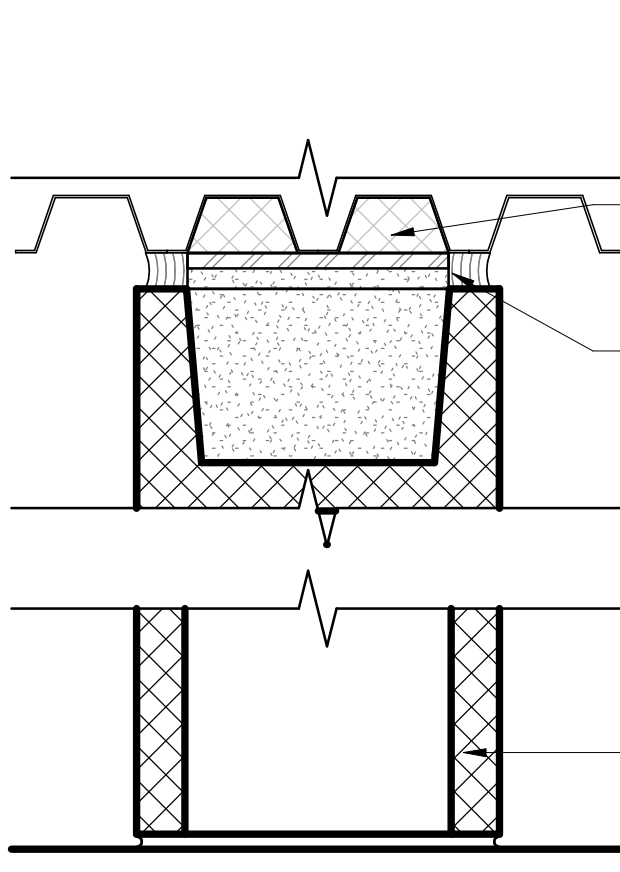
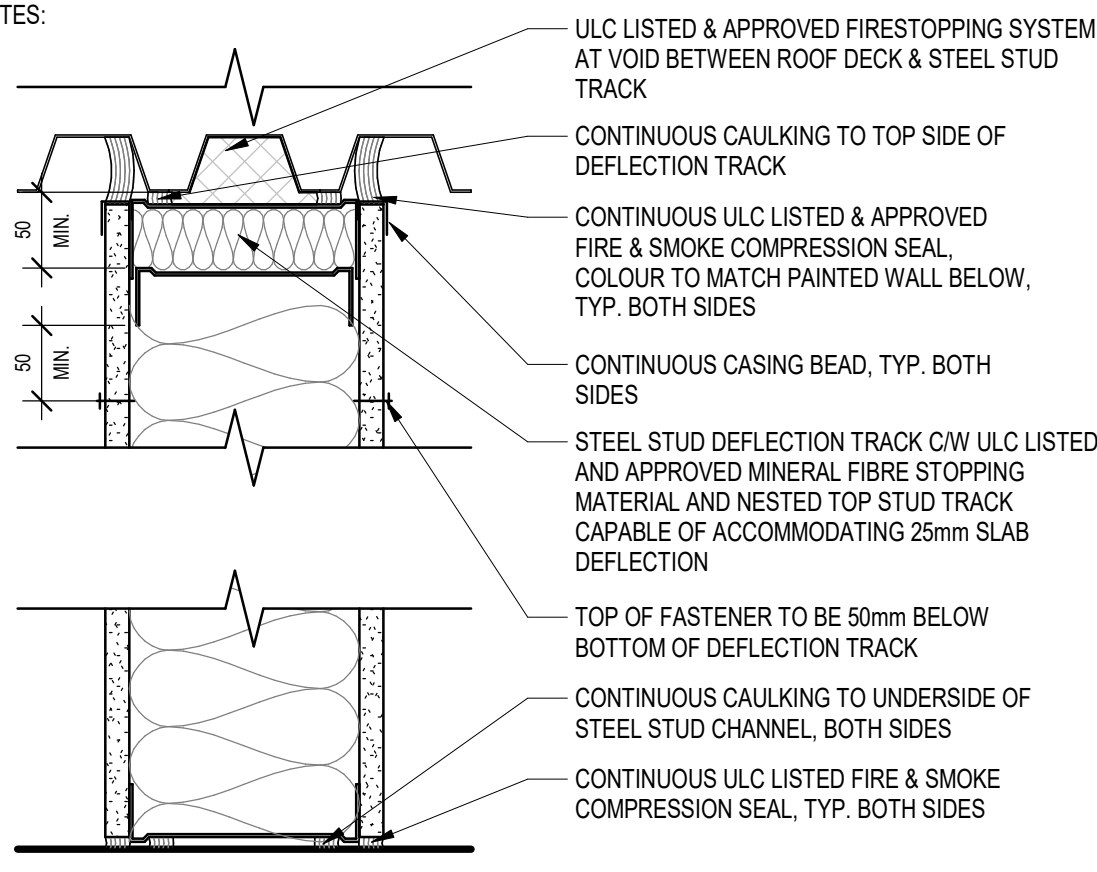
- THE FOLLOWING EXTERIOR WALL CONSTRUCTION TYPES INDICATE THE GENERAL ASSEMBLY CONSTRUCTION MATERIALS, REFER TO ADDITIONAL NOTES LISTED BELOW AND LARGE-SCALE DETAILS THAT INDICATE ADDITIONAL COMPONENT MATERIALS, ASSEMBLIES AND MEMBRANE VAPOUR BARRIER TRANSITIONS AND TIE-INS TO ADJACENT WALL, FLOOR AND ROOF ASSEMBLIES, INCLUDING TIE-INS IN CONNECTIONS AT WINDOW, DOOR, LOUVER AND SIMILAR OPENINGS.
- ALL STEEL STUDS TO BE ENGINEERED FOR LATERAL WIND LOADS BY STEEL STUD SUPPLIER.
- REFER TO BUILDING ENVELOPE DETAILS FOR ALUMINUM AND GLASS SPANDREL PANELS.
- EXTERIOR SHEATHING SHALL BE GLASS MAT FACED GYPSUM SHEATHING.
- PROVIDE DEFLECTION TRACK AT TOP OF ALL STEEL STUD FRAMED WALLS SUFFICIENT TO ACCOMMODATE MINIMUM 20mm VERTICAL DEFLECTION.
- PROVIDE 20mm OR 50mm DEFLECTION GAP AT TOP OF ALL CONCRETE BLOCK WALLS. REFER TO LARGE SCALE DETAILS

## ASSEMBLY - EXTERIOR WALL

TYPE	DESCRIPTION	FIRE RATING	COMMENTS
W1	INSULATED METAL PANEL (GARAGE) -102mm INSULATED METAL PANEL SYSTEM -HORIZONTAL STRUCTURAL SUB-GIRTS (EXISTING TO REMAIN, AS WELL AS ADDITIONAL LOCATIONS BETWEEN STRUCTURAL FRAMING) -STEEL STRUCTURE	-	MINIMUM EFFECTIVE USI = 0.133W/m2K (R-42.6)
W1A	INSULATED METAL PANEL (GARAGE) -102mm INSULATED METAL PANEL SYSTEM -HORIZONTAL STRUCTURAL SUB-GIRTS BETWEEN STRUCTURAL FRAMING -254mm STEEL STUDS @610mm O.C. -152mm STEEL STUDS @610mm O.C. -2 LAYERS 12.7mm TYPE-X GYPSUM BOARD (IMPACT RESISTANT) -102mm HORIZONTAL FURRING CHANNELS -31mm METAL LINER PANEL	1HR. REFER TO OBC 2012, SB-2, TABLE 2.3.4.A.	MINIMUM EFFECTIVE USI = 0.133W/m2K (R-42.6); SEE CODE PLAN FOR RATINGS; FIRE RATING ACHIEVED BY COLD-FORMED METAL STUDS AND GYPSUM BOARD
W1B	INSULATED METAL PANEL (WASH BAY) -102mm INSULATED METAL PANEL SYSTEM -HORIZONTAL STRUCTURAL SUB-GIRTS (EXISTING TO REMAIN, AS WELL AS ADDITIONAL LOCATIONS BETWEEN STRUCTURAL FRAMING) -STEEL STRUCTURE -FIBREGLASS REINFORCED PLASTIC PANEL	-	MINIMUM EFFECTIVE USI = 0.133W/m2K (R-42.6)
W2	CORRUGATED METAL PANEL (DARK GREY) -40mm PRE-FINISHED VERTICAL CORRUGATED METAL PANEL -63.5mm HORIZONTAL GIRTS, SPACING & GAUGE TO SUIT SPANS & WIND LOADS -25mm SUPPORT GIRTS -152mm INSULATED METAL PANEL SYSTEM -HORIZONTAL GIRTS, SPACING & GAUGE TO SUIT SPANS & WIND LOADS -254mm STEEL STUDS @610mm O.C. -2 LAYERS 12.7mm TYPE-X GYPSUM BOARD (IMPACT RESISTANT)	-	MINIMUM EFFECTIVE USI = 0.132W/m2K (R-43.0)
W2A	CORRUGATED METAL PANEL (DARK GREY) -40mm PRE-FINISHED VERTICAL CORRUGATED METAL PANEL -63.5mm HORIZONTAL GIRTS, SPACING & GAUGE TO SUIT SPANS & WIND LOADS -25mm CLADDING SUPPORT RAIL SYSTEM SET IN INSULATED METAL PANEL JOINT -152mm INSULATED METAL PANEL SYSTEM -HORIZONTAL GIRTS, SPACING & GAUGE TO SUIT SPANS & WIND LOADS -254mm STEEL STUDS @610mm O.C. -2 LAYERS 12.7mm TYPE-X GYPSUM BOARD (IMPACT RESISTANT)	1HR. REFER TO OBC 2012, SB-2, TABLE 2.3.4.A.	MINIMUM EFFECTIVE USI = 0.132W/m2K (R-43.0); SEE CODE PLAN FOR RATINGS; FIRE RATING ACHIEVED BY COLD-FORMED METAL STUDS AND GYPSUM BOARD
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W2C	CORRUGATED METAL PANEL (DARK GREY) -40mm PRE-FINISHED VERTICAL CORRUGATED METAL PANEL -63.5mm HORIZONTAL GIRTS, SPACING & GAUGE TO SUIT SPANS & WIND LOADS -25mm CLADDING SUPPORT RAIL SYSTEM SET IN INSULATED METAL PANEL JOINT -152mm INSULATED METAL PANEL SYSTEM -HORIZONTAL GIRTS, SPACING & GAUGE TO SUIT SPANS & WIND LOADS	-	MINIMUM EFFECTIVE USI = 0.132W/m2K (R-43.0)
W3	FAUX EXTERIOR WOOD SLAT WALL -25mm FAUX EXTERIOR WOOD SLAT C/W HIDDEN SIDING CLIPS -22mm HORIZONTAL METAL FURRING CHANNELS, SPACING AND GAUGE TO SUIT SPANS AND WIND LOADS -25mm CLADDING SUPPORT RAIL SYSTEM SET IN INSULATED METAL PANEL JOINT -152mm INSULATED METAL PANEL SYSTEM -HORIZONTAL GIRTS, SPACING & GAUGE TO SUIT SPANS & WIND LOADS	-	MINIMUM EFFECTIVE USI = 0.132W/m2K (R-43.0)
W4	COMPOSITE METAL PANEL WALL (BLACK) -51mm ALUMINUM COMPOSITE METAL PANEL C/W CLIP SYSTEM -63.5mm HORIZONTAL GIRTS, SPACING & GAUGE TO SUIT SPANS & WIND LOADS -25mm CLADDING SUPPORT RAIL SYSTEM SET IN INSULATED METAL PANEL JOINT -152mm INSULATED METAL PANEL SYSTEM -HORIZONTAL GIRTS, SPACING & GAUGE TO SUIT SPANS & WIND LOADS -203mm STEEL STUDS @400mm O.C. -64mm STEEL STUDS @400mm O.C. -15.9mm GYPSUM BOARD	-	MINIMUM EFFECTIVE USI = 0.132W/m2K (R-43.0)
W4A	COMPOSITE METAL PANEL WALL (DARK GREY) - EYEBROW -51mm ALUMINUM COMPOSITE METAL PANEL C/W CLIP SYSTEM -63.5mm HORIZONTAL GIRTS, SPACING & GAUGE TO SUIT SPANS & WIND LOADS -25mm CLADDING SUPPORT RAIL SYSTEM SET IN INSULATED METAL PANEL JOINT -152mm INSULATED METAL PANEL SYSTEM	-	MINIMUM EFFECTIVE USI = 0.132W/m2K (R-43.0)
W4C	COMPOSITE METAL PANEL WALL (BLACK) -51mm ALUMINUM COMPOSITE METAL PANEL C/W CLIP SYSTEM -63.5mm HORIZONTAL GIRTS, SPACING & GAUGE TO SUIT SPANS & WIND LOADS -25mm CLADDING SUPPORT RAIL SYSTEM SET IN INSULATED METAL PANEL JOINT -152mm INSULATED METAL PANEL SYSTEM	-	MINIMUM EFFECTIVE USI = 0.132W/m2K (R-43.0)
W5	ALUMINUM CURTAIN WALL SYSTEM -TRIPLE GLAZED SEALED UNITS -CLEAR ANODIZED ALUMINUM FRAME -19mm SNAP CAP -133mm BACK BODY	-	MINIMUM EFFECTIVE USI = 0.246W/m2K (R-23.1)

## PARTITION HEAD & BASE DETAILS:

NOTES:



## PARTITION ASSEMBLY NOTES:

- REFER TO PARTITION CONSTRUCTION TYPES, THE SEQUENTIAL ORDER OF MATERIAL COMPONENTS LISTED FOR EACH PARTITION TYPE CORRESPONDS DIRECTLY TO THE SIDE THAT EACH PARTITION IS REFERENCED FROM ON FLOOR PLANS WITH A PARTITION TYPE
- ALL PARTITIONS INDICATED TO BE CONSTRUCTED WITH A "FIRE SEPARATION" SHALL EXTEND FULL HEIGHT TO THE UNDERSIDE OF FLOOR OR ROOF DECK AND BE FIRE STOPPED WITH A U.L.C. APPROVED FIRE-STOPPING SYSTEM COMPLETE WITH FIRE SEALANT BOTH SIDES.
- ALL PENETRATIONS THROUGH PARTITIONS REQUIRED TO BE CONSTRUCTED AS A FIRE SEPARATION SHALL BE FIRE STOPPED WITH A U.L.C. LISTED FIRE-STOPPING MATERIAL C/W FIRE SEALANT BOTH SIDES.
- ALL INTERIOR STEEL STUD PARTITIONS THAT EXTEND FULL HEIGHT TO ROOF DECK ABOVE, SHALL BE CONSTRUCTED WITH A 50mm DEEP TOP DEFLECTION TRACK, STOP VERTICAL STUDS SHORT BY ± 15mm WHICH WILL ALLOW FOR 15mm VERTICAL DEFLECTION. AT PARTITIONS WITH A FIRE RESISTANCE RATING, A SECOND STUD TRACK IS TO BE SET INTO THE 50mm TOP TRACK WHICH WILL ALLOW FOR 15mm DEFLECTION. U.L.C. LISTED FIRE STOPPING MATERIAL SHALL BE PLACED BETWEEN THE DOUBLE TOP TRACKS, AND FIRE SEALANT APPLIED AT BOTH SIDES OF PARTITION TOP, BOTTOM AND TO DIFFERENT DEFLECTION TRACK MAY BE USED IN LIEU OF A DOUBLE TOP TRACKS, AND FIRE SEALANT APPLIED AT BOTH SIDES OF PARTITION TOP, BOTTOM AND TO DIFFERENT ADJACENT CONSTRUCTIONS. A SINGLE 50mm DEEP SLOTTED DEFLECTION TRACK MAY BE USED IN LIEU OF A DOUBLE TOP TRACK, STOP VERTICAL STUDS ±15mm BELOW THE UNDERSIDE OF SLAB, AND SPACE IS FILLED WITH FIRE RATED ACOUSTIC SEALANT MAINTAINING FIRE RATING (ON BOTH SIDES) AS REQUIRED BY ASSOCIATED PARTITION TYPES WHILE MAINTAINING THE INTEGRITY OF THE U.L.C. DESIGN.
- ALL PARTITIONS ARE TO BE FRAMED AROUND MECHANICAL AND ELECTRICAL SERVICES AS REQUIRED. STUD FRAMING OR FURRING CHANNELS SHALL NOT BE ATTACHED TO MECHANICAL DUCTWORK, TO AVOID ACOUSTIC VIBRATION NOISE TRANSFER.
- ALL FIRE RATED PARTITIONS DENOTED AS A U.L.C. DESIGN SHALL BE CONSTRUCTED IN STRICT ACCORDANCE WITH THE STANDARD OF CONSTRUCTION AND ACCEPTABLE MANUFACTURERS OF PARTICULAR MATERIALS INCLUDING FIRE RATED MATERIAL DESIGNATIONS UNDER MATERIAL "GUIDE NUMBERS" IN THE LATEST EDITION OF THE UNDERWRITERS LABORATORIES OF CANADA MANUAL. PARTITION CONSTRUCTION TYPES LISTED IN SB-3 OF THE OBC ARE NOT PERMITTED FOR FIRE RESISTANCE RATINGS, BUT ARE ACCEPTABLE FOR ACOUSTIC STC RATINGS LISTED.
- PROVIDE 25mm DEFLECTION JOINT AT TOP OF CONCRETE BLOCK WALLS, AT CONCRETE BLOCK WALLS WITH A FIRE RESISTANCE RATING, FILL DEFLECTION GAP WITH U.L.C. APPROVED FIRE STOPPING MATERIAL COMPLETE WITH FIRE SEALANT BOTH SIDES.
- REFER TO STRUCTURAL DOCUMENTS FOR CONCRETE BLOCK PARTITION REINFORCING, CORE FILLS, LITELS AND BOND BEAMS.
- WHERE GYPSUM BOARD MEETS ADJACENT MATERIALS, PROVIDE CONTINUOUS SEALED JOINT PERIMETER.
- ALL PENETRATIONS THROUGH PARTITIONS REQUIRED TO BE CONSTRUCTED AS AN ACOUSTIC SEPARATION SHALL BE SEALED WITH ACOUSTIC SEALANT BOTH SIDES.
- AT FIRE SEPARATIONS WITHOUT FIRE RESISTANCE RATINGS (SMOKE SEPARATIONS) PROVIDE CONTINUOUS SMOKE SEALANT AT FLOORS AND ROOF STRUCTURES TO DISMISSED ADJACENT TO DISMISSED CONSTRUCTION ASSEMBLIES.
- IN ACCORDANCE WITH THE OBC 2012, SB-2, AT CAST IN PLACE CONCRETE WALLS MAINTAIN APPLICABLE CONCRETE COVER OVER REINFORCING STEEL FOR FIRE SEPARATIONS WITH FIRE RESISTANCE RATING INDICATED ON FLOOR PLANS.
- IN ACCORDANCE WITH THE OBC 2012, SB-2, AT CONCRETE BLOCK WALLS, MASONRY UNITS SHALL BE SELECTED OF CONCRETE TYPE AND EQUIVALENT THICKNESS TO SUIT FIRE RESISTANCE RATING.

## ASSEMBLY - PARTITION

TYPE	DESCRIPTION	FIRE RATING	COMMENTS
E.P2	EXISTING GARAGE MASONRY WALL - 190mm CONCRETE BLOCK	45MIN. REFER TO OBC 2012, SB-2, TABLE 2.1.1.	EXISTING CONCRETE BLOCK WALL TO REMAIN. PROVIDE FIRE STOPPING AND FIRE SEALING AT ALL WALL, FLOOR, AND CEILING INTERFACES AND ALL PENETRATIONS TO MEET A 45-MINUTE FIRE RESISTANCE RATING. EXISTING THICKNESS AND CONSTRUCTION OF WALL TO BE VERIFIED AND CONFIRMED THROUGH ENGINEERING JUDGEMENT TO MEET A 45-MINUTE FIRE RESISTANCE RATING (BY GENERAL CONTRACTOR)
P1	1HR FIRE RATED ACOUSTIC PARTITION TO U/S STRUCTURAL DECK - 15.9mm TYPE 'X' GYPSUM BOARD - 152mm STEEL STUDS AT 610mm O.C. - C/W 152mm ACOUSTIC INSULATION - 15.9mm FIRE-RATED GYPSUM BOARD	1HR. REFER TO ULC DESIGN NO. U425	SEE CODE PLAN FOR RATINGS
P2	MASONRY WALL -240mm CONCRETE BLOCK	45MIN. REFER TO OBC 2012, SB-2, TABLE 2.1.1.	SEE CODE PLAN FOR RATINGS; FIRE RATING ACHIEVED BY TYPE AND SIZE OF CONCRETE BLOCK
P3	MASONRY WALL -240mm CONCRETE BLOCK	2HR. REFER TO OBC 2012, SB-2, TABLE 2.1.1.	SEE CODE PLAN FOR RATINGS; FIRE RATING ACHIEVED BY TYPE AND SIZE OF CONCRETE BLOCK
P4	MASONRY WALL -240mm CONCRETE BLOCK -AIR BARRIER -51mm CONTINUOUS SEMI-RIGID MINERAL WOOL INSULATION -62mm STEEL STUDS AT 400mm O.C. FILLED WITH BATT INSULATION -15.9mm FIRE-RATED GYPSUM BOARD	2HR. REFER TO OBC 2012, SB-2, TABLE 2.1.1.	MINIMUM EFFECTIVE USI = 0.281 W/m2K (R-20.2); SEE CODE PLAN FOR RATINGS; FIRE RATING ACHIEVED BY TYPE AND SIZE OF CONCRETE BLOCK
P5	PARTITION TO U/S STRUCTURAL DECK -15.9mm GYPSUM WALL BOARD -62mm STEEL STUDS AT 400mm O.C. -15.9mm GYPSUM WALL BOARD	-	WHERE TILE IS INDICATED ON THE DRAWINGS, REPLACE 15.9mm GYPSUM BOARD WITH 15.9mm TILE BACKER BOARD; PLYWOOD BACKING TO BE INCLUDED WHERE REQUIRED TO SUPPORT EQUIPMENT AND WHERE INDICATED ON FURNITURE AND EQUIPMENT PLAN
P7	CEDAR PANEL ACOUSTIC PARTITION TO U/S STRUCTURAL DECK -38mm CEDAR SLATS @ 73.5mm O.C. C/W HIDDEN FASTENERS - 15.9mm GYPSUM BOARD - 62mm STEEL STUDS AT 400mm O.C. - C/W 92mm ACOUSTIC INSULATION - 15.9mm GYPSUM BOARD	-	PLYWOOD BACKING TO BE INCLUDED WHERE REQUIRED TO SUPPORT EQUIPMENT AND WHERE INDICATED ON FURNITURE AND EQUIPMENT PLAN
P8	PARTITION TO U/S STRUCTURAL DECK - 15.9mm GYPSUM BOARD - 152mm STEEL STUDS AT 400mm O.C. - 15.9mm GYPSUM BOARD	-	WHERE TILE IS INDICATED ON THE DRAWINGS, REPLACE 15.9mm GYPSUM BOARD WITH 15.9mm TILE BACKER BOARD; PLYWOOD BACKING TO BE INCLUDED WHERE REQUIRED TO SUPPORT EQUIPMENT AND WHERE INDICATED ON FURNITURE AND EQUIPMENT PLAN
P9	PARTITION TO U/S STRUCTURAL DECK - 15.9mm GYPSUM WALL BOARD -62mm STEEL STUDS AT 400mm O.C.	-	WHERE TILE IS INDICATED ON THE DRAWINGS, REPLACE 15.9mm GYPSUM BOARD WITH 15.9mm TILE BACKER BOARD; PLYWOOD BACKING TO BE INCLUDED WHERE REQUIRED TO SUPPORT EQUIPMENT AND WHERE INDICATED ON FURNITURE AND EQUIPMENT PLAN
P10	PARTITION TO U/S STRUCTURAL DECK - 15.9mm GYPSUM BOARD - 203mm STEEL STUDS AT 400mm O.C. - 15.9mm GYPSUM BOARD	-	WHERE TILE IS INDICATED ON THE DRAWINGS, REPLACE 15.9mm GYPSUM BOARD WITH 15.9mm TILE BACKER BOARD; PLYWOOD BACKING TO BE INCLUDED WHERE REQUIRED TO SUPPORT EQUIPMENT AND WHERE INDICATED ON FURNITURE AND EQUIPMENT PLAN
P11	PARTITION -15.9mm GYPSUM WALL BOARD -62mm STEEL STUDS AT 400mm O.C. -15.9mm GYPSUM WALL BOARD	-	WHERE TILE IS INDICATED ON THE DRAWINGS, REPLACE 15.9mm GYPSUM BOARD WITH 15.9mm TILE BACKER BOARD; PLYWOOD BACKING TO BE INCLUDED WHERE REQUIRED TO SUPPORT EQUIPMENT AND WHERE INDICATED ON FURNITURE AND EQUIPMENT PLAN
P12	MASONRY WALL -240mm CONCRETE BLOCK -AIR BARRIER -51mm CONTINUOUS SEMI-RIGID MINERAL WOOL INSULATION -152mm STEEL STUDS AT 400mm O.C. FILLED WITH BATT INSULATION -152mm STEEL STUDS AT 400mm O.C. FILLED WITH BATT INSULATION -15.9mm FIRE-RATED GYPSUM BOARD	2HR. REFER TO OBC 2012, SB-2, TABLE 2.1.1.	MINIMUM EFFECTIVE USI = 0.281 W/m2K (R-20.2); SEE CODE PLAN FOR RATINGS; FIRE RATING ACHIEVED BY TYPE AND SIZE OF CONCRETE BLOCK
P13	PARTITION TO U/S STRUCTURAL DECK - 15.9mm GYPSUM BOARD - 152mm STEEL STUDS AT 400mm O.C. - 152mm STEEL STUDS AT 400mm O.C. - 15.9mm GYPSUM BOARD	-	WHERE TILE IS INDICATED ON THE DRAWINGS, REPLACE 15.9mm GYPSUM BOARD WITH 15.9mm TILE BACKER BOARD; PLYWOOD BACKING TO BE INCLUDED WHERE REQUIRED TO SUPPORT EQUIPMENT AND WHERE INDICATED ON FURNITURE AND EQUIPMENT PLAN
P14	PARTITION TO U/S STRUCTURAL DECK - 15.9mm TYPE 'X' GYPSUM BOARD - 203mm STEEL STUDS AT 610mm O.C. - 15.9mm FIRE-RATED GYPSUM BOARD	45MIN. REFER TO ULC DESIGN NO. U425	SEE CODE PLAN FOR RATINGS

## ASSEMBLY - CEILING

TYPE	DESCRIPTION	FIRE RATING	COMMENTS
C1	ACOUSTIC CEILING PANEL -25mm FELT ACOUSTIC CEILING PANEL	-	
C2	PAINTED EXPOSED STRUCTURE	-	PAINT ALL EXPOSED STRUCTURAL, MECHANICAL AND ELECTRICAL SYSTEMS, PT2
C3	ACOUSTIC CEILING BLADES -25mm PREFABRICATED FELT ACOUSTIC CEILING BLADES	-	
C4	ACOUSTIC CEILING TILE -15.9mm ACOUSTIC CEILING TILE -22mm FURRING CHANNELS	-	
C6	GYPSUM CEILING -15.9mm GYPSUM BOARD -STUD FRAMING AS REQUIRED	-	

## ASSEMBLY - SOFFIT

TYPE	DESCRIPTION	FIRE RATING	COMMENTS
S1	FAUX EXTERIOR WOOD SLAT SOFFIT -25mm FAUX EXTERIOR WOOD SLATS C/W HIDDEN SIDING CLIPS -22mm METAL FURRING CHANNELS, SPACING AND GAUGE TO SUIT SPANS AND WIND LOADS -25mm SUPPORT GIRTS	-	REFER TO 31A603 FOR VARIATION IN SUPPORT GIRT DEPTHS

## ASSEMBLY - FLOOR

TYPE	DESCRIPTION	FIRE RATING	COMMENTS
F1	TYPICAL SLAB ON GRADE -CONCRETE SLAB ON GRADE (REFER TO STRUCTURAL FOR THICKNESS) -AIR/VAPOUR BARRIER -254mm RIGID INSULATION -200mm GRANULAR A FILL, NATIVE SOILS	-	MINIMUM EFFECTIVE USI = 0.111 W/m2K (R-51.2)

## ROOF ASSEMBLY NOTES:

- ROOF CONSTRUCTION TYPES INDICATE THE GENERAL ASSEMBLY OF CONSTRUCTION MATERIALS, REFER TO SPECIFICATIONS AND ADDITIONAL LARGE-SCALE DETAILS THAT INDICATE ADDITIONAL COMPONENT MATERIALS, ASSEMBLIES AND MEMBRANE VAPOUR BARRIER TRANSITIONS AND TIE-INS TO ADJACENT EXTERIOR WALL VAPOUR BARRIERS.

## ASSEMBLY - ROOF

TYPE	DESCRIPTION	FIRE RATING	COMMENTS
EX	EXISTING ROOF -EXISTING STANDING SEAM ROOFING -STEEL STRUCTURE -EXISTING BAGGED INSULATION BETWEEN STRUCTURAL MEMBERS	-	
R1	STANDING SEAM ROOM (NEW GARAGE EXPANSION) -38mm STANDING SEAM MECHANICAL LOCK PANELS W/ GALVANIZED COATING -10mm DRAINAGE/VENTILATION MAT -VAPOUR/PERMEABLE UNDERLAYMENT MEMBRANE -12.7mm INSULATION COVER BOARD -2 LAYERS 50mm RIGID POLYISO INSULATION -SELF-ADHESIVE AIR/VAPOUR BARRIER MEMBRANE -12.7mm GYPSUM ROOF DECK SHEATHING BOARD -38mm METAL DECK -NEW STEEL STRUCTURE, SLOPED TO MATCH EXISTING GARAGE ROOF	-	MINIMUM EFFECTIVE USI = 0.229W/m2K (R-24.8)
R2	TYPICAL ROOF -2-PLY S.B.S. ROOF MEMBRANE -2 LAYERS 75mm RIGID POLYISO INSULATION -TAPERED POLYSTYRENE INSULATION, LOCATION AND THICKNESSES AS REQUIRED TO DRAIN -SELF-ADHESIVE AIR/VAPOUR BARRIER MEMBRANE -12.7mm GYPSUM ROOF DECK SHEATHING BOARD -38mm METAL DECK -STEEL STRUCTURE SLOPED FOR DRAINAGE	-	MINIMUM EFFECTIVE USI = 0.147W/m2K (R-38.7)
R3	CANOPY ROOF -2-PLY S.B.S. ROOF MEMBRANE -150mm RIGID POLYISO INSULATION -TAPERED POLYSTYRENE INSULATION, LOCATION AND THICKNESSES AS REQUIRED TO DRAIN -SELF-ADHESIVE AIR/VAPOUR BARRIER MEMBRANE -FOUR LAYERS OF 12.7mm GYPSUM ROOF DECK SHEATHING BOARD -38mm METAL DECK -STEEL STRUCTURE	-	



DOOR SCHEDULE														
DOOR NUMBER	ROOM NAME	WIDTH	HEIGHT	DOOR				FRAME			DETAIL	HARDWARE	FIRE RATING	COMMENTS
				TYPE	MATERIAL	FINISH	GLAZING	TYPE	MATERIAL	FINISH				
T.O. MAIN FLOOR SLAB														
100.1	WASH BAY	965	2135	D1	H.M.I	PT2	-	F1	P.S.F	PT2	3.4/A606	1	-	S.C.R. SURFACE APPLIED VINYL GRAPHIC
100.2	WASH BAY	965	2135	D1	H.M.I	PT2	-	F1	P.S.F	PT2	3.4/A606	1	-	S.C.R. SURFACE APPLIED VINYL GRAPHIC
100.3	WASH BAY	4877	4877	D6	O.H	PREFINISHED	-	-	-	-	6.9/A606	-	-	O.H DOOR WITH STANDARD HEADROOM TRACK, SURFACE APPLIED VINYL GRAPHIC
100.4	WASH BAY	4877	4877	D6	O.H	PREFINISHED	-	-	-	-	6.9/A606	-	-	O.H DOOR WITH STANDARD HEADROOM TRACK, SURFACE APPLIED VINYL GRAPHIC
100A.1	EQUIPMENT ROOM	965	2135	D1	H.M.	PT2	-	F1	P.S.F	PT2	H2/J2	3	-	-
101.1	GARAGE	4877	4877	D6	O.H	PREFINISHED	-	-	-	-	6.9/A606	-	-	O.H DOOR WITH STANDARD HEADROOM TRACK, SURFACE APPLIED VINYL GRAPHIC
101.2	GARAGE	4877	4877	D6	O.H	PREFINISHED	-	-	-	-	6.9/A606	-	-	O.H DOOR WITH STANDARD HEADROOM TRACK, SURFACE APPLIED VINYL GRAPHIC
101.3	GARAGE	4877	4877	D6	O.H	PREFINISHED	-	-	-	-	6.9/A606	-	-	O.H DOOR WITH STANDARD HEADROOM TRACK, SURFACE APPLIED VINYL GRAPHIC
101.4	GARAGE	4877	4877	D6	O.H	PREFINISHED	-	-	-	-	6.9/A606	-	-	O.H DOOR WITH STANDARD HEADROOM TRACK, SURFACE APPLIED VINYL GRAPHIC
101.5	GARAGE	4877	4877	D6	O.H	PREFINISHED	-	-	-	-	6.9/A606	-	-	O.H DOOR WITH STANDARD HEADROOM TRACK, SURFACE APPLIED VINYL GRAPHIC
101.6	GARAGE	4877	4877	D6	O.H	PREFINISHED	-	-	-	-	6.9/A606	-	-	O.H DOOR WITH STANDARD HEADROOM TRACK, SURFACE APPLIED VINYL GRAPHIC
101.7	GARAGE	965	2135	D1	H.M.I	PT2	-	F1	P.S.F	PT2	3.4/A606	1	45 MIN	S.C.R. SURFACE APPLIED VINYL GRAPHIC
101.8	GARAGE	965	2135	D1	H.M.I	PT2	-	F1	P.S.F	PT2	3.4/A606	1	-	S.C.R. SURFACE APPLIED VINYL GRAPHIC
101.9	MULTIPURPOSE TOOL / PARTS ROOM	1830	2135	D3	H.M	PT2	F.R.G	F1	P.S.F	PT2	H3/J3	4	45 MIN	S.C.R. SURFACE APPLIED VINYL GRAPHIC
101.10	MULTIPURPOSE TOOL / PARTS ROOM	4877	4877	D6	O.H	PREFINISHED	-	-	-	-	6.9/A606	-	-	O.H DOOR WITH STANDARD HEADROOM TRACK, SURFACE APPLIED VINYL GRAPHIC
101.11	MULTIPURPOSE TOOL / PARTS ROOM	4877	4877	D6	O.H	PREFINISHED	-	-	-	-	6.9/A606	-	-	O.H DOOR WITH STANDARD HEADROOM TRACK, SURFACE APPLIED VINYL GRAPHIC
101A.1	MULTIPURPOSE TOOL / PARTS ROOM	1016	2135	D5	-	-	L.G.	-	-	ANOD.	5.6/A607	5	-	S.C.R. SURFACE APPLIED VINYL GRAPHIC
101A.2	MULTIPURPOSE TOOL / PARTS ROOM	965	2135	D2	H.M	PT2	-	F1	P.S.F	PT2	H1/J1	6	1.5H	-
101A.3	MULTIPURPOSE TOOL / PARTS ROOM	1016	2135	D1	H.M	PT2	F.R.G	F2	P.S.F	PT2	H1/J1	7	1.5H	-
101A.4	MULTIPURPOSE TOOL / PARTS ROOM	1016	2135	D5	-	-	L.G.	-	-	ANOD.	5.6/A607	5	-	S.C.R. SURFACE APPLIED VINYL GRAPHIC
103.1	MECHANICAL	1016	2135	D1	H.M	PT2	-	F1	P.S.F	PT2	H2/J2	8	45 MIN	-
104.1	IT	965	2135	D1	H.M	PT2	-	F1	P.S.F	PT2	H2/J2	9	-	-
105.1	ELECTRICAL	1016	2135	D1	H.M	PT2	-	F1	P.S.F	PT2	H2/J2	8	45 MIN	-
106.1	FEMALE CHANGEROOM	965	2135	D1	H.M	PT2	-	F1	P.S.F	PT2	H2/J2	10	-	B.F.W.A
107.1	MALE CHANGEROOM	965	2135	D1	H.M	PT2	-	F1	P.S.F	PT2	H2/J2	10	-	B.F.W.A
108.1	JANITOR	965	2135	D1	H.M	PT2	-	F1	P.S.F	PT2	H2/J2	11	45 MIN	-
109.1		965	2135	D1	H.M	PT2	-	F1	P.S.F	PT2	H2/J2	12	-	B.F.W.A
110.1	FIRST AID ROOM	965	2135	D1	H.M	PT2	-	F1	P.S.F	PT2	H2/J2	13	-	-
111.1	MULTIPURPOSE TOOL / PARTS ROOM	965	2135	D1	H.M	PT2	-	F1	P.S.F	PT2	H1/J1	9	-	-
111.2	SIGN GARAGE	4877	4877	D6	O.H	PREFINISHED	-	-	-	-	5.8/A606	-	-	O.H DOOR WITH STANDARD HEADROOM TRACK, SURFACE APPLIED VINYL GRAPHIC
111.3	SIGN GARAGE	965	2135	D1	H.M.I	PT2	-	F1	P.S.F	PT2	3.4/A606	1	-	S.C.R
10010.1	SHARED OFFICE	1016	2135	DMNT	-	-	TG	-	ALUM.	PAINTED EBONY (SATIN)	-	14	-	GLASS PIVOT DOOR LEAF SINGLE WINDOW FILM REFER TO INTERIOR ELEVATIONS
10020.1	MANAGER'S OFFICE	1016	2135	DMNT	-	-	TG	-	ALUM.	PAINTED EBONY (SATIN)	J4	14	-	GLASS PIVOT DOOR LEAF SINGLE WINDOW FILM REFER TO INTERIOR ELEVATIONS
10030.1	MAIN VESTIBULE	1016	3040	D5	-	-	L.G.	-	-	ANOD.	5.6/A607	15	-	B.F.W.A. S.C.R
10030.2	MAIN VESTIBULE	1016	2135	D5	-	-	L.G.	-	-	ANOD.	5.6/A607	16	-	B.F.W.A
10040.1	MEETING ROOM	965	2135	D2	H.M	PT2	T.G	F1	P.S.F	PT2	H2/J2	17	-	-
10060.1	VESTIBULE	1016	2135	D5	-	-	L.G.	-	-	ANOD.	5.6/A607	15	-	B.F.W.A. S.C.R
10060.2	VESTIBULE	1016	2135	D5	-	-	L.G.	-	-	ANOD.	5.6/A607	19	-	B.F.W.A
10070.1	ENCLAVE	1016	2135	DMNT	-	-	TG	-	ALUM.	PAINTED EBONY (SATIN)	J4	14	-	GLASS PIVOT DOOR LEAF SINGLE WINDOW FILM REFER TO INTERIOR ELEVATIONS
10080.1	VESTIBULE	1016	2135	D5	-	-	L.G.	-	-	ANOD.	5.6/A607	15	-	B.F.W.A. S.C.R
10080.2	VESTIBULE	1016	2135	D5	-	-	L.G.	-	-	ANOD.	5.6/A607	19	-	B.F.W.A
10090.1	MAIN CORRIDOR	965	2135	D4	H.M	PT2	T.G	F1	P.S.F	PT2	H2/J2	18	-	B.F.W.A

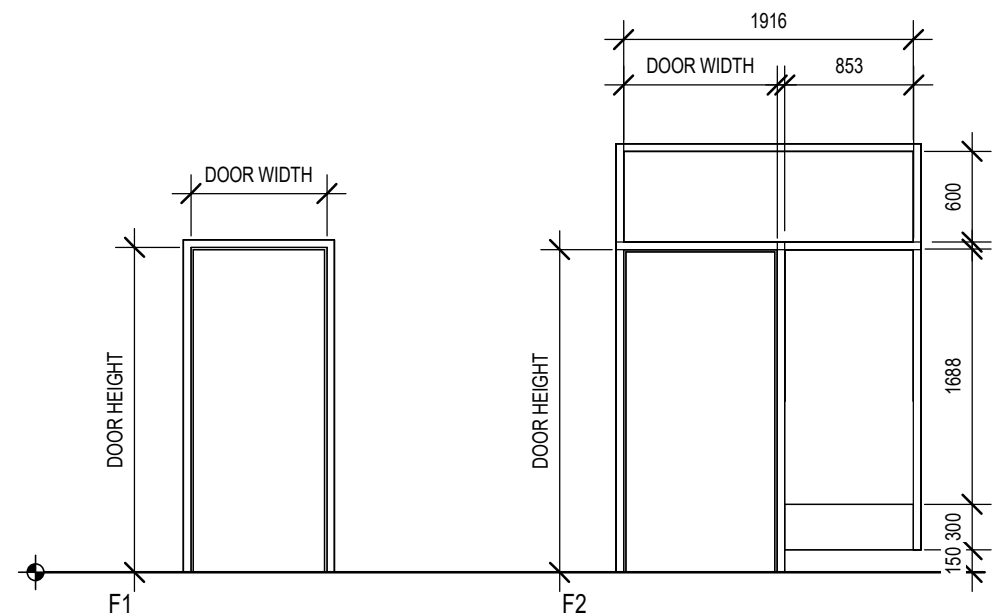
ABBREVIATIONS	
ALUM.	ALUMINUM
ANOD.	ANODIZED
B.F.W.A.	BARRIER FREE WAVE ACTUATOR
C.O.	CONCRETE OPENING
CL.O.	CLEAR OPENING
DWGS.	DRAWINGS
F.R.R.	FIRE RESISTANCE RATING
F.R.G.	FIRE RATED GLASS
G.R.P.	GLASS REINFORCED POLYESTER
H.M.	HOLLOW METAL
H.M.I.	HOLLOW METAL INSULATED
L.G.	LAMINATED GLASS
O.H.	OVERHEAD
P.S.F.	PRESSED STEEL FRAME
R.O.	ROUGH OPENING
S.C.R.	SWIPE CARD READER
S.C.W.	SOLID CORE WOOD
S.S.	STAINLESS STEEL
S.S.F.	STAINLESS STEEL FRAME
S.S.G.	SILICONE STRUCTURAL GLAZING
T.G.	TEMPERED GLASS
WD.	WOOD

DOOR SCHEDULE NOTES	
1.	REFER TO SPECIFICATION SECTION 08 70 00 FOR HARDWARE GROUPS.
2.	SITE CONFIRM ALL DIMENSIONS OF DOORS, CONFIRM HARDWARE IS COMPATIBLE WITH DOOR SIZE.
3.	DOOR AND FRAME FINISHES TO BE APPLIED TO BOTH SIDES U.N.O.
4.	ALL EXISTING AND NEW FIRE RATED FRAMES ARE TO BE IN COMPLIANCE WITH OBC 2012.
5.	REFER TO SPECIFICATION SECTION 08 99 99 FOR FINISH CODES & DESCRIPTIONS.

ROOM FINISH SCHEDULE												
ROOM NUMBER	NAME	FLOOR		WALLS				CEILING		MILLWORK	COMMENTS	
		FINISH	BASE	NORTH	EAST	SOUTH	WEST	MATERIAL	FINISH			
				FINISH	FINISH	FINISH	FINISH					
T.O. MAIN FLOOR SLAB												
100	WASH BAY EQUIPMENT ROOM GARAGE MULTIPURPOSE TOOL / PARTS ROOM	EC1	EC1	PT1	PT1	PT1	PT1	C2	PT2		EPOXY-BASED COATING APPLIED TO WALLS	
100A		EC1		PT1	PT1	PT1	PT1	C5	C5			
101		EC1	EC1	PT1	PT1	PT1	PT1	C2	PT2			
101A		EC1	EC1	PT1	PT1	PT1	PT1	C2	PT2			
103	MECHANICAL	RC1	RC1	PT1	PT1	PT1	PT1	C2	PT2			
104	IT	RC1	RC1	PT1	PT1	PT1	PT1	C2	PT2			
105	ELECTRICAL	RC1	RC1	PT1	PT1	PT1	PT1	C2	PT2			
106	FEMALE CHANGEROOM	FT-1, FT-2		WT-1, WT-2	WT-2	WT-2	WT-2	C4, C6	C4, C6	BENCH	MM1 FOR BENCH	
107	MALE CHANGEROOM	VCT2, FT-1, FT-2	RB1	PT2, WT-1, WT-2	PT2, PT3, WT-2	PT1, PT2, PT3, WT-1, WT-2	PT1, PT2, PT3, WT-1, WT-2	C4, C6	C4, C6	BENCH	MM1 FOR BENCH	
108	JANITOR	VCT2	RB1	PT1	PT1	PT1	PT1	C2	C2			
109	UNIVERSAL WIC	FT-1, FT-2		WT-2	WT-1, WT-2	WT-2	WT-2	C4, C6	C4, C6	BENCH	EPOXY-BASED PAINT APPLIED TO WALLS	
110	FIRST AID ROOM	VCT2	RB1	PT2	PT2	PT2	PT2	C4	C4			
111	SIGN GARAGE	EC1	EC1	PT2	PT2	PT2	PT2	C2	PT2			
10000	OFFICE	VCT1	RB1	PT2	PT2	PT3	PT2	C1	C1			
10010	SHARED OFFICE	VCT1	RB1	PT2	PT2	PT2	PT2	C1	C1			
10020	MANAGER'S OFFICE	VCT1	RB1	PT2	PT2	PT2	PT2	C1	C1			
10030	MAIN VESTIBULE	VCT2	RB1	PT1	PT1	WD1	PT1	C6	PT1			
10040	MEETING ROOM	VCT1	RB1	PT2	PT3	PT2	PT2	C1	C1			
10050	LUNCH ROOM	VCT1	RB1	PT2	PT2	PT2	PT1	C1	C1	KITCHENETTE	SS1 AND PL1 FOR MILLWORK	
10060	VESTIBULE	VCT1	RB1	-	-	-	PT3	C6	PT1			
10070	ENCLAVE	VCT1	RB1	PT2	PT3	PT2	PT2	C1	C1			
10080	VESTIBULE	VCT1	RB1	-	-	-	PT1	C4	C4			
10090	MAIN CORRIDOR	VCT1	RB1	PT2	PT3	PT2	PT2	C1	C1			

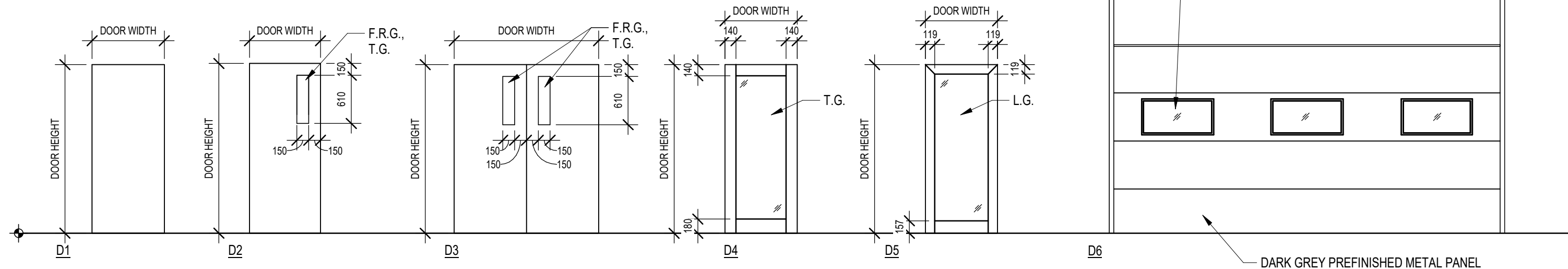
## DOOR FRAME TYPES:

NOTES:



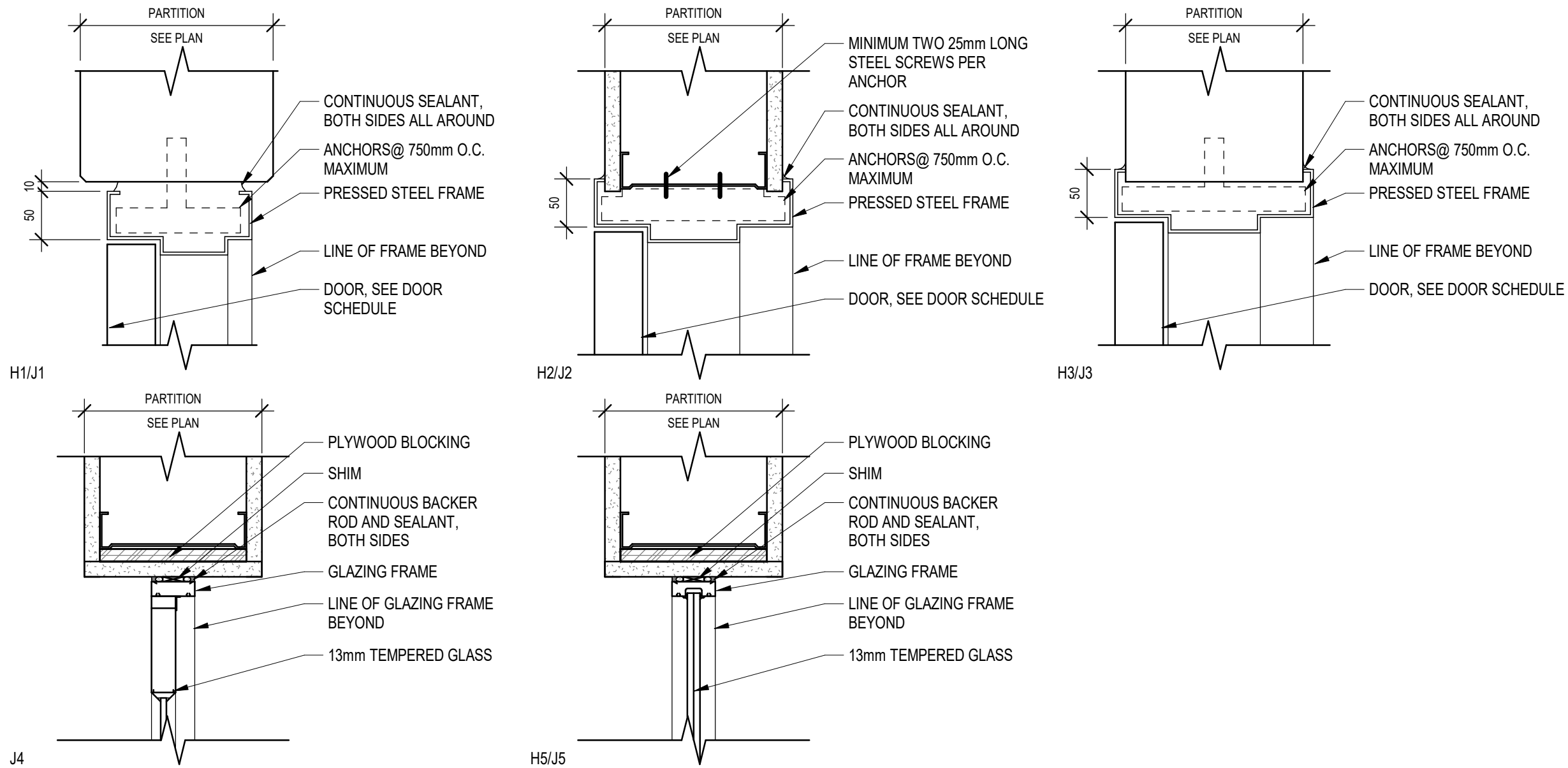
## DOOR TYPES:

NOTES:



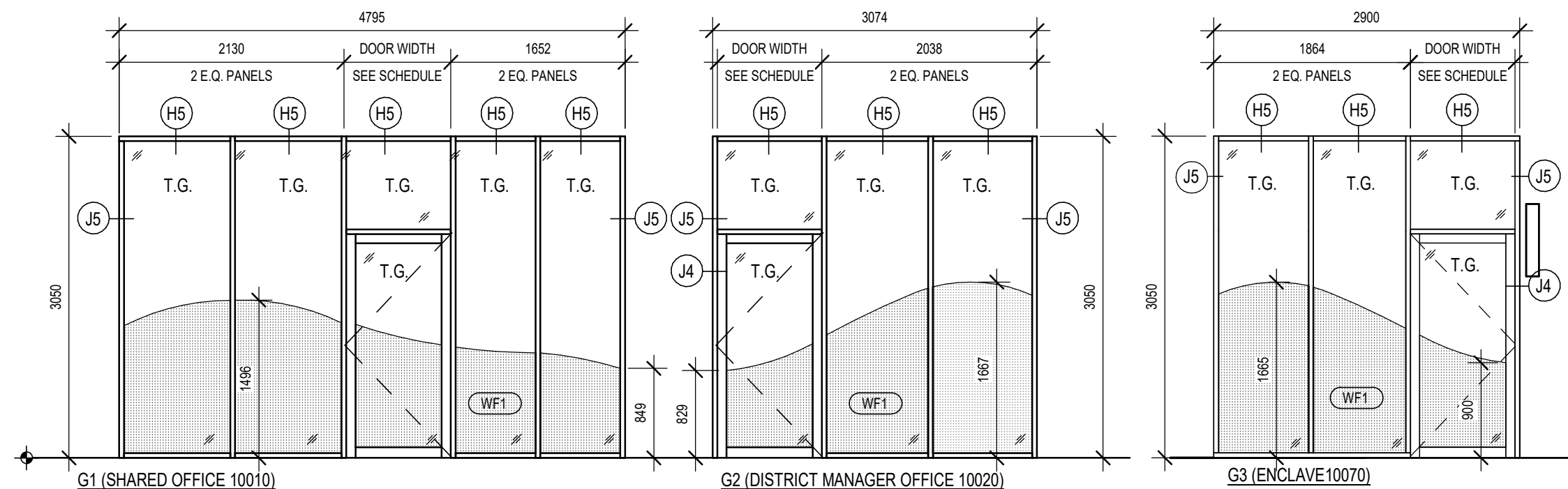
## HEADER & JAMB DETAILS:

NOTES:



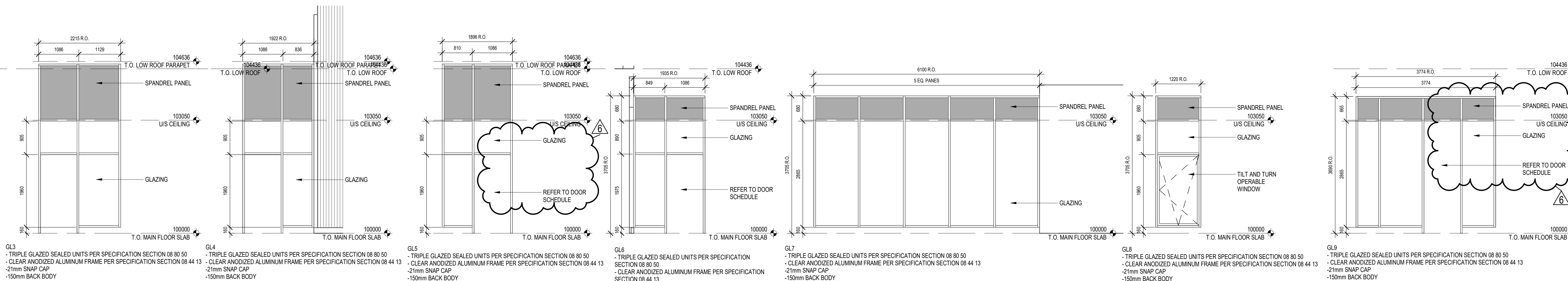
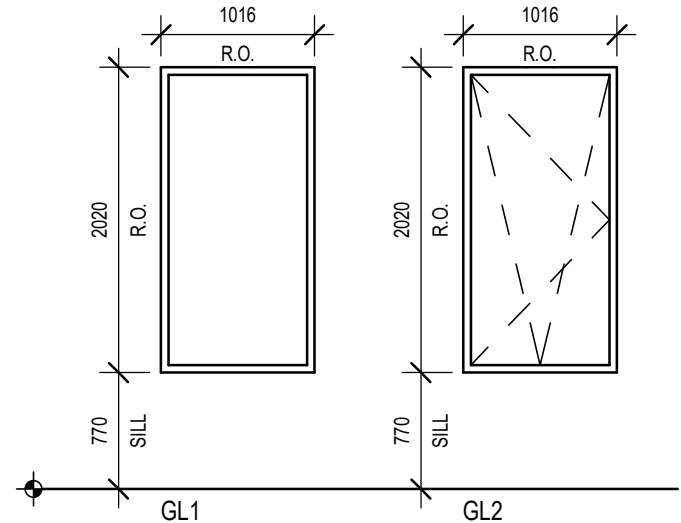
## DEMOUNTABLE GLASS SYSTEMS PARTITIONS TYPES:

NOTES: REFER TO SPECIFICATION SECTION 09 99 99 FOR DEMOUNTABLE PANEL INFORMATION



## WINDOW FRAME TYPES:

NOTES: TRIPLE GLAZED SEALED UNITS PER SPECIFICATION SECTION 08 80 50  
ANTHRACITE GREY ALUMINUM FRAME PER SPECIFICATION SECTION 08 44 13



Project Team:  
Prime Consultant  
**GEC ARCHITECTURE**  
Structural and Building Envelope Consultant  
**ENTUITIVE**  
Mechanical and Electrical Consultant  
**MCW CONSULTANTS LTD.**  
Civil Consultant  
**PLANMAC ENGINEERING**  
Passive House Consultant  
**PEEL PASSIVE HOUSE**  
LEED Consultant  
**MCW CONSULTANTS LTD.**  
Landscape Consultant  
**MHBC**

Client  
**YORK REGION**

Seal & Permit

6	ISSUED FOR ADDENDUM 4	2025-07-18
5	REISSUED FOR TENDER	2025-05-23
4	ISSUED FOR TENDER	2025-04-25
3	ISSUED FOR BUILDING PERMIT	2024-11-27
2	ISSUED FOR PRE-TENDER REVIEW	2024-10-31
1	ISSUED FOR 60% CD	2024-05-02
NO.	ISSUED FOR	DATE

Scale  
**As indicated**

Region of York Project Number  
**22046**

Region of York Building Code  
**22046**

Project  
**YORK REGION NORTH ROADS OPERATIONS CENTRE**

3525 BASELINE RD. SUTTON WEST, ON L0E 1R0

Drawing Title  
**DOOR & FRAME SCHEDULE**

Project Number  
**6016**

Drawing Number  
**A015**

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KEY PLAN - NOT TO SCALE

IMAGERY:  
AERIAL IMAGERY SHOWN IS FOR ILLUSTRATIVE PURPOSES  
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TOPOGRAPHIC BASE PLAN OF  
YORK REGION  
NORTH YARD

SCALE 1 : 150 METRES  
0 10 20

COORDINATES:  
VERTICAL AND HORIZONTAL CONTROL ESTABLISHED USING  
LEICA SMARTNET RTK.

HORIZONTAL DATUM

SMARTNET BROADCASTS UTM17N NAD 83 CSRS

VERTICAL DATUM

ELEVATIONS ARE GEODETIC TO CVGD-1928

CONTOURS:

CONTOURS SHOWN HEREON ARE DRAWN AT 0.50 METRE  
INTERVALS.  
CONTOURS CAPTURED USING LIDAR DRONE.

NOTE:

1. FIELD WORK FOR THIS SURVEY COMPLETED BY  
PLANMAC INC. ON NOV 14, 2023.
2. HORIZONTAL AND VERTICAL CONTROL ESTABLISHED  
USING LEICA SMARTNET REF NETWORK.
3. FOR LOCAL HORIZONTAL AND VERTICAL CONTROL "CUT  
CROSSES" POINTS SHOULD BE USED AS A REFERENCE.

#### LEGEND

- AN DENOTES ANCHOR POINT
- BPD DENOTES BELL PEDESTAL
- BOLLARD DENOTES BOLLARD
- CB DENOTES CATCH BASIN
- CO DENOTES CLEAN OUT
- CT DENOTES CONIFEROUS TREE
- DT DENOTES DECIDUOUS TREE
- ECD DENOTES ELECTRICAL CABINET
- FP DENOTES FLAG POLE
- HP DENOTES HYDRO POLE
- LP DENOTES LIGHT POST
- ✕ MB DENOTES MAIL BOX
- MH DENOTES MAINTENANCE HOLE
- ✕ OW DENOTES OBSERVATION WELL
- POST POWER DENOTES POST WITH POWER
- ▲ DENOTES SIGN
- ✕ SPOT ELEV DENOTES SPOT ELEVATION
- IRB DENOTES STANDARD IRON BAR
- ✕ WELL DENOTES WELL
- BB DENOTES BOTTOM BANK
- BUILDG DENOTES BUILDING
- CC DENOTES CUT CROSS
- CL DENOTES CENTER LINE
- CLF DENOTES CHAIN LINK FENCE
- CSP DENOTES CORRUGATED STEEL PIPE
- DI DENOTES DITCH LINE
- DS DENOTES DOOR SILL
- DWYG DENOTES DRIVEWAY - GRAVEL
- EO DENOTES EDGE OF CONCRETE
- EG DENOTES EDGE OF GARVEL
- EP DENOTES EDGE OF PAVEMENT
- EW DENOTES EDGE OF WATER
- GR DENOTES GUARDRAIL
- HDPE DENOTES HIGH DENSITY POLYETHYLENE PIPE
- INV DENOTES INVERT ELEVATION AT CENTRE
- MON OR WELL DENOTES MONITORING OBSERVATION WELL
- NP DENOTES NO PARKING
- PAV/PL DENOTES PAVEMENT MARKING
- PWF DENOTES POST WIRE FENCE
- RWC DENOTES RETAINING WALL - CONCRETE
- RWS DENOTES RETAINING WALL - STONE
- RWW DENOTES RETAINING WALL - WOOD
- SB DENOTES STOP BAR
- TB DENOTES TOP OF BANK
- TL DENOTES TREE LINE
- UGG DENOTES UNDERGROUND GAS
- UGH DENOTES UNDERGROUND HYDRO
- WD DENOTES WHITE DASHED LINE
- WS DENOTES WHITE SOLID LINE
- DENOTES PROPERTY LINE



#### CAUTION

THIS IS NOT A PLAN OF SURVEY AND SHALL NOT BE USED  
EXCEPT FOR THE PURPOSE INDICATED IN THE TITLE BLOCK.  
THE WORK AND DRAWINGS HEREIN WERE COMPLETED FOR THE  
EXCLUSIVE USE OF OUR CLIENT AND NO LIABILITY IS  
ASSUMED TO ANY THIRD PARTIES OR SUBSEQUENT OWNERS.

**PLANMAC** ENGINEERING INC.  
2425 Matheson Blvd East  
8th Floor office, Suite# 793  
Mississauga, ONT L4W 5K4  
Tel: (905) 961-6534  
Fax: (416) 574-2956

DRAWN BY: K.L. CHECKED BY: J.H.PLOT DATE: SEPT 23, 2023  
FILE NAME: YORK\_YARD\_Survey\_R2

POINT NAME	EASTING	NORTHING	ELEVATION	DESCRIPTION
100 CC	626181.6120	4905082.7629	254.875	
101 CC	6261963.2560	4904996.8188	255.368	
102 CC	626071.2807	4905337.0660	254.696	
103 CC	626159.7904	4905256.0586	252.346	
368 WL	626223.6544	4905040.2567	253.767	





Project Team:

Prime Consultant

GEC ARCHITECTURE

Structural and Building Envelope Consultant

ENTUITIVE

Mechanical and Electrical Consultant

MCW CONSULTANTS LTD.

Civil Consultant

PLANMAC ENGINEERING

Passive House Consultant

PEEL PASSIVE HOUSE

LEED Consultant

MCW CONSULTANTS LTD.

Landscape Consultant

MHBC

Client

YORK REGION



Seal & Permit

8	ISSUED FOR ADDENDUM 4	2025-07-18
7	REISSUED FOR TENDER	2025-05-23
6	ISSUED FOR TENDER	2025-04-25
5	ISSUED FOR BUILDING PERMIT REVIEW	2024-11-27
4	ISSUED FOR PRE-TENDER REVIEW	2024-10-31
3	ISSUED FOR 60% CD	2024-05-02
2	100% DD	2024-02-29
1	60% DD	2024-01-25
NO.	ISSUED FOR	DATE

Drawing History

Scale	As indicated	Checked By	TB
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Region of York Project Number	Region of York Building Code
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22046 G013-B

Project

YORK REGION NORTH ROADS  
OPERATIONS CENTRE

3525 BASELINE RD. SUTTON WEST, ON L0E 1R0

Drawing Title

KEY SITE PLAN

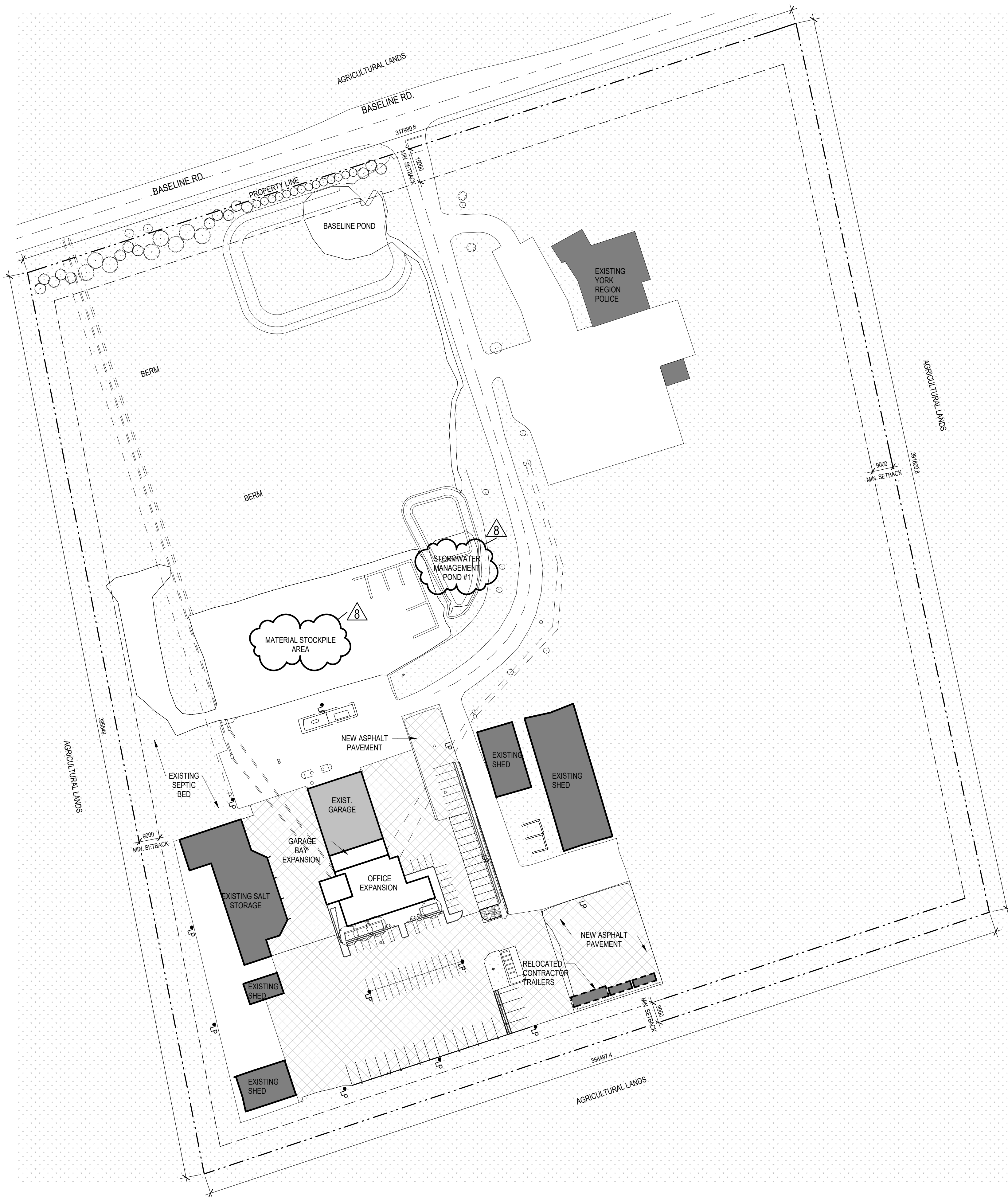
Project Number

6016

Drawing Number

A050

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1 KEY SITE PLAN  
Scale: 1 : 1000

KEY SITE PLAN LEGEND

	LANDSCAPE AREAS		ASPHALT
	EXISTING ACCESSORY BUILDING		PROPERTY LINE
	EXISTING GARAGE		SETBACK LINE
	PROPOSED EXPANSION		FENCING
	GRAVEL		EXISTING TREE

KEY SITE PLAN NOTES

MUNICIPAL ADDRESS:  
3525 BASELINE RD. SUTTON WEST, ON L0E 1R0


LEGAL ADDRESS:  
PART OF LOT 23 CONCESSION 5, PART 1 ON PLAN 6SR-20334, SUTTON WEST

1. NOTES



Client

YORK REGION



--	--

A051 Scale: 1 : 500

—

**DEMOLITION SITE PLAN NOTES**

MUNICIPAL ADDRESS:  
3525 BASELINE RD. SUTTON WEST, ON L0E 1R0

LEGAL ADDRESS:  
PART OF LOT 23 CONCESSION 5, PART 1 ON PLAN 65R-20334; SUTTON WEST

1. EXISTING GARAGE IS TO REMAIN OPERATIONAL THROUGH CONSTRUCTION. SHUTDOWNS TO EXISTING GARAGE ARE TO BE COORDINATED WITH YORK REGION AND ARE LIMITED TO PERIODS WHEN ACTIVE SNOW AND ICE CONTROL IS NOT OCCURRING.

2. EXISTING SITE SERVICES (INCLUDING, BUT NOT LIMITED TO, UTILITIES, GENERATOR, FIRE AND LIFE SAFETY SYSTEMS AND SITE LIGHTING) ARE TO REMAIN OPERATIONAL UNTIL NEW SERVICES ARE IN PLACE AND COMMISSIONED TO ENSURE CONTINUITY OF OPERATIONS

NO.	ISSUED FOR	DATE
Drawing History		
Scale	As indicated	Checked By TB

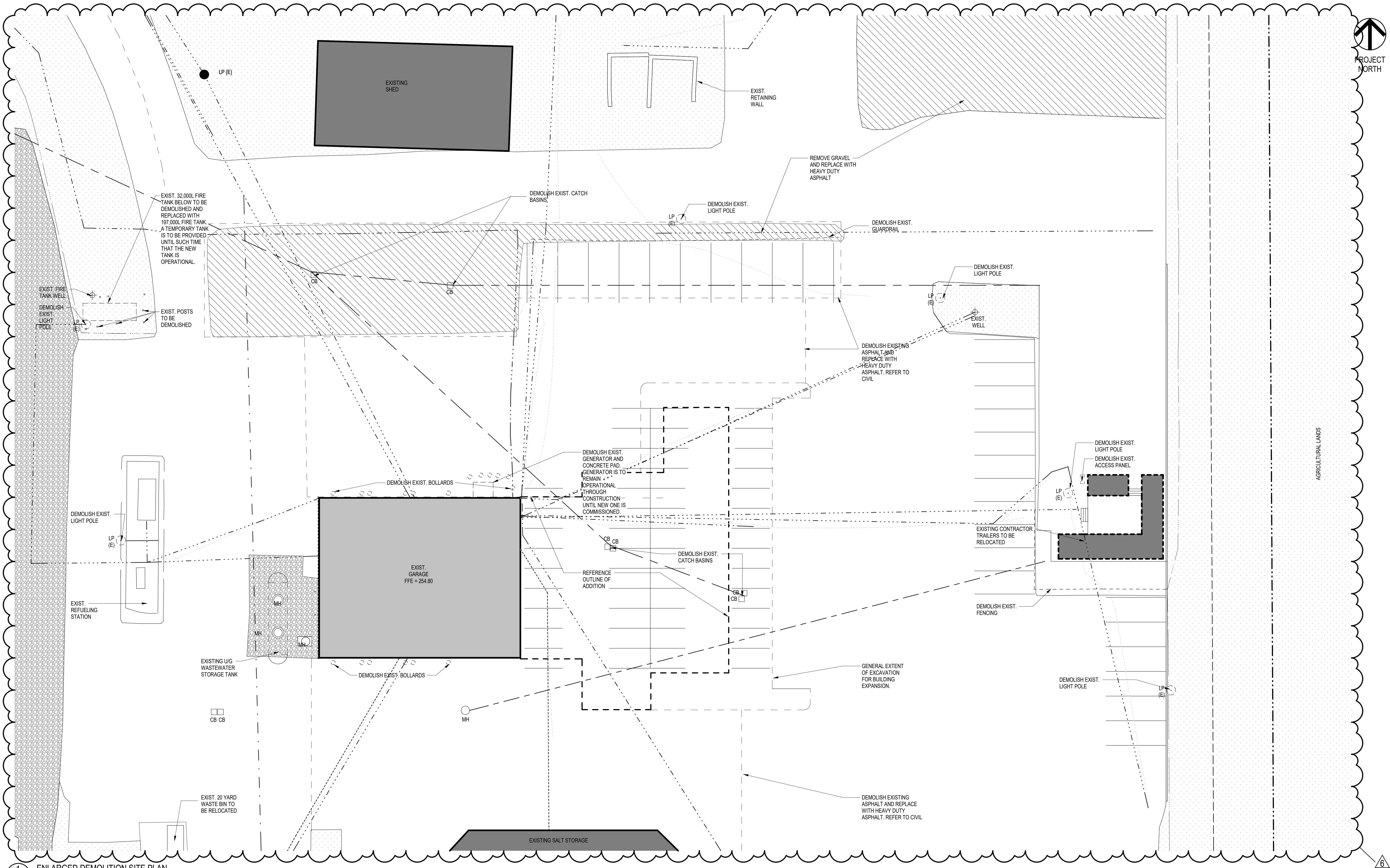
Project

YORK REGION NORTH ROADS  
OPERATIONS CENTRE

DEMOLITION SITE PLAN

Project Number	Drawing Number
6016	<b>A051</b>





1 ENLARGED DEMOLITION SITE PLAN  
A052 Scale: 1 : 250

#### DEMOLITION SITE PLAN LEGEND

	LANDSCAPE AREAS		PROPERTY LINE		MAN HOLE		EXISTING TREE
	EXISTING ACCESSORY BUILDING		SETBACK LINE		CATCH BASIN		EXISTING LIGHT POLE
	EXISTING GARAGE		FENCING		UNDERGROUND GAS		UNDERGROUND ELECTRICAL
	GRAVEL		UNDERGROUND HYDRO		UNDERGROUND COMMUNICATIONS		
	EXIST. GRAVEL TO BE REMOVED AND REPLACED WITH HEAVY DUTY ASPHALT						

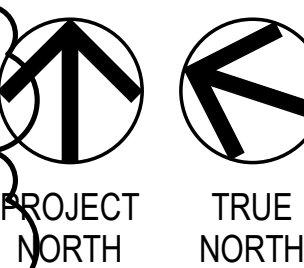
#### DEMOLITION SITE PLAN NOTES

MUNICIPAL ADDRESS:  
3525 BASELINE RD. SUTTON WEST, ON L0E 1R0

LEGAL ADDRESS:  
PART OF LOT 23 CONCESSION 5, PART 1 ON PLAN 65R-20334; SUTTON WEST

1. EXISTING GARAGE IS TO REMAIN OPERATIONAL THROUGH CONSTRUCTION. SHUTDOWNS TO EXISTING GARAGE ARE TO BE COORDINATED WITH YORK REGION AND ARE LIMITED TO PERIODS WHEN ACTIVE SNOW AND ICE CONTROL IS NOT OCCURRING.

2. EXISTING SITE SERVICES (INCLUDING, BUT NOT LIMITED TO, UTILITIES, GENERATOR, FIRE AND LIFE SAFETY SYSTEMS AND SITE LIGHTING) ARE TO REMAIN OPERATIONAL UNTIL NEW SERVICES ARE IN PLACE AND COMMISSIONED TO ENSURE CONTINUITY OF OPERATIONS



Project Team:  
Prime Consultant  
**GEC ARCHITECTURE**  
Structural and Building Envelope Consultant  
**ENTUITIVE**  
Mechanical and Electrical Consultant  
**MCW CONSULTANTS LTD.**  
Civil Consultant  
**PLANMAC ENGINEERING**  
Passive House Consultant  
**PEEL PASSIVE HOUSE**  
LEED Consultant  
**MCW CONSULTANTS LTD.**  
Landscape Consultant  
**MHBC**

Client  
**YORK REGION**

Seal & Permit

6	ISSUED FOR ADDENDUM 4	2025-07-18
5	REISSUED FOR TENDER	2025-05-23
4	ISSUED FOR TENDER	2025-04-25
3	ISSUED FOR BUILDING PERMIT REVIEW	2024-11-27
2	ISSUED FOR PRE-TENDER REVIEW	2024-10-31
1	ISSUED FOR 60% CD	2024-05-02

Drawing History

Scale	As indicated	Checked By	TB
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Region of York Project Number	22046	Region of York Building Code	G013-B
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Project

**YORK REGION NORTH ROADS OPERATIONS CENTRE**

3525 BASELINE RD. SUTTON WEST, ON L0E 1R0

Drawing Title

**ENLARGED DEMOLITION SITE PLAN**

Project Number

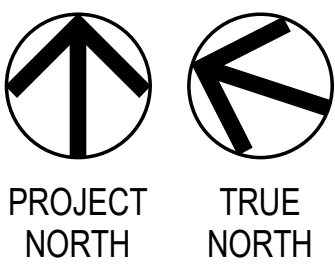
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Drawing Number

**A052**

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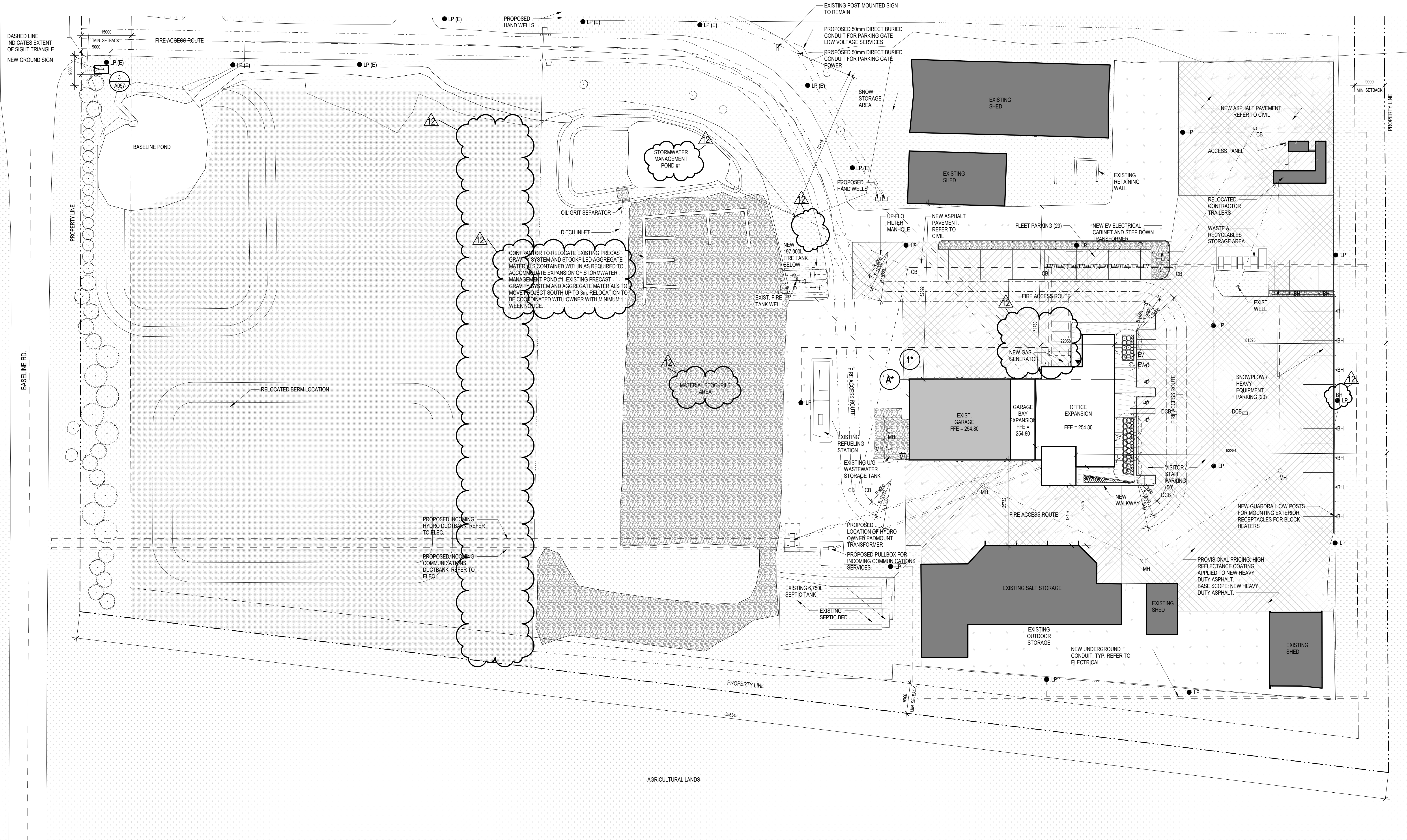




Project Team:  
Prime Consultant  
**GEC ARCHITECTURE**  
Structural and Building Envelope Consultant  
**ENTUITIVE**  
Mechanical and Electrical Consultant  
**MCW CONSULTANTS LTD.**  
Civil Consultant  
**PLANMAC ENGINEERING**  
Passive House Consultant  
**PEEL PASSIVE HOUSE**  
LEED Consultant  
**MCW CONSULTANTS LTD.**  
Landscape Consultant  
**MHBC**

Client  
**YORK REGION**  

























Seal & Permit



**1 SITE PLAN**  
A053 Scale: 1: 500

SITE STATISTICS	
SITE VARIABLE	STATISTIC
TOTAL LOT AREA	13.78 HA (34.05 ACRES) 137,791 SM (1,483,161 SF)
TOTAL COVERAGE AREA	6,571.13 SM (70,731 SF)
TOTAL EXISTING GFA (ACCESSORY BUILDINGS)	3,610.94 SM (38,868 SF)
TOTAL EXISTING GFA (YORK REGION POLICE BUILDING)	1,182.19 SM (12,725 SF)
TOTAL EXISTING GFA (GARAGE BUILDING)	725.00 SM (7,804 SF)
TOTAL PROPOSED GFA (GARAGE BUILDING)	953.00 SM (10,258 SF)
TOTAL EXISTING & PROPOSED GFA (GARAGE BUILDING)	1,678.00 SM (18,062 SF)
F. A. R.	4.70%
LOT COVERAGE PERCENTAGE	4.77%
MIN. FRONT YARD SETBACK	15 M
MIN. REAR YARD SETBACK	9 M
MIN. SIDE YARD SETBACK	9 M
BUILDING HEIGHT	8.1 M
MIN. NUMBER OF PARKING REQUIRED <sup>1</sup>	62 SPACES
MIN. NUMBER OF ACCESSIBLE PARKING REQUIRED <sup>2</sup>	4 SPACES
NUMBER OF STAFF/VISITOR PARKING PROVIDED	50 SPACES
NUMBER OF ACCESSIBLE PARKING PROVIDED	4 SPACES
NUMBER OF FLEET PARKING PROVIDED	20 SPACES
NUMBER OF PLOW / HEAVY EQUIPMENT PARKING PROVIDED	20 SPACES
TOTAL NUMBER OF PARKING PROVIDED	90 SPACES

NOTES  
1. 3.3 PARKING SPACES FOR EACH 65SM OF GFA FOR OFFICE & MECHANICAL GARAGE  
(1,678 SM / 95 SM = 17.7 X 3.3 SPACES = 62 SPACES REQUIRED)  
2. MINIMUM 4% OF REQUIRED PARKING TO BE BARRIER-FREE  
(90 SPACES PROVIDED X 4% = 4 SPACES)

SITE PLAN LEGEND	
 LANDSCAPE AREAS	 PROPERTY LINE
 EXISTING ACCESSORY BUILDING	 SETBACK LINE
 EXISTING GARAGE	 FENCING
 PROPOSED EXPANSION	 FIRE ACCESS ROUTE
 GRAVEL	 UNDERGROUND GAS
 MH MAN HOLE	 NEW HEAVY DUTY ASPHALT PAVING
 BH BLOCK HEATER WITH RECEPTACLE	 NEW EV CHARGING STATION. REFER TO ELEC.
 EV ELECTRIC VEHICLE PARKING	 LP (E) EXISTING LIGHT POLE
 (EV) FUTURE ELECTRIC VEHICLE PARKING	 LP NEW LIGHT POLE
 UNDERGROUND HYDRO	 PRINCIPAL ENTRANCE
 EXISTING TREE	 PROPOSED TREES/SHRUBS. REFER TO LANDSCAPE.
 HYDROSEEDING. REFER TO LANDSCAPE.	

**SITE PLAN NOTES**

MUNICIPAL ADDRESS:  
3525 BASELINE RD. SUTTON WEST, ON L0E 1R0

LEGAL ADDRESS:  
PART OF LOT 23 CONCESSION 5, PART 1 ON PLAN 65R-20334; SUTTON WEST

1. NO PERMANENT IRRIGATION SYSTEM REQUIRED

12	ISSUED FOR ADDENDUM 4	2025-07-18
11	REISSUED FOR TENDER	2025-05-23
10	ISSUED FOR TENDER	2025-04-25
9	ISSUED FOR SITE PLAN AGREEMENT	2025-01-09
8	ISSUED FOR BUILDING PERMIT	2024-11-27
7	ISSUED FOR SPA 2ND RESUBMISSION	2024-11-22
6	ISSUED FOR PRE-TENDER REVIEW	2024-10-31
5	ISSUED FOR SPA 1ST RESUBMISSION	2024-10-07
4	ISSUED FOR 60% CD	2024-05-02
3	ISSUED FOR SPA	2024-04-12
2	100% DD	2024-02-29
1	60% DD	2024-01-25
NO.	ISSUED FOR	DATE

Drawing History	
Scale	As indicated
Checked By	TB
Region of York Project Number	Region of York Building Code
22046	G013-B
Project	
YORK REGION NORTH ROADS OPERATIONS CENTRE	
3525 BASELINE RD. SUTTON WEST, ON L0E 1R0	
Drawing Title	
SITE PLAN	
Project Number	Drawing Number
6016	A053





Client

YORK REGION



***York Region***



NO.	ISSUED FOR	DATE
Drawing History		

Region of York Project Number      Region of York Building Code

Project

OPERATIONS CENTRE

3525 BASELINE RD. SUTTON WEST, ON L0E 1R0






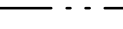



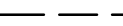







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ENLARGED SITE PLAN

Project Number	Drawing Number
	1054

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SITE PLAN LEGEND			
	LANDSCAPE AREAS		PROPERTY LINE
	EXISTING ACCESSORY BUILDING		SETBACK LINE
	EXISTING GARAGE		FENCING
	PROPOSED EXPANSION		FIRE ACCESS ROUTE
	GRAVEL		UNDERGROUND GAS
			UNDERGROUND HYDRO
		MH	MAN HOLE
		BH	BLOCK HEATER WITH RECEPTACLE
		EV	ELECTRIC VEHICLE PARKING
		(EV)	FUTURE ELECTRIC VEHICLE PARKING
			NEW HEAVY DUTY ASPHALT PAVING
			NEW EV CHARGING STATION. REFER TO ELEC.
			PRINCIPAL ENTRANCE
			EXISTING TREE
			PROPOSED TREES/SHRUBS. REFER TO LANDSCAPE.
			HYDROSEEDING. REFER TO LANDSCAPE.
		CB	CATCH BASIN
		LP (E)	EXISTING LIGHT POLE
		LP	NEW LIGHT POLE





Client

YORK REGION

  
**York Region**

[illegible]

<p><b><u>INTERIM WORKS SITE PLAN NOTES</u></b></p> <p>MUNICIPAL ADDRESS: 3525 BASELINE RD. SUTTON WEST, ON L0E 1R0</p> <p>LEGAL ADDRESS: PART OF LOT 23 CONCESSION 5, PART 1 ON PLAN 65R-20334, SUTTON WEST</p> <p>1. EXISTING GARAGE IS TO REMAIN OPERATIONAL THROUGH CONSTRUCTION. SHUTDOWNS TO EXISTING GARAGE ARE TO BE COORDINATED WITH YORK REGION AND ARE LIMITED TO PERIODS WHEN ACTIVE SNOW AND ICE CONTROL IS NOT OCCURRING.</p> <p>2. EXISTING SITE SERVICES (INCLUDING, BUT NOT LIMITED TO, UTILITIES, GENERATOR, FIRE AND LIFE SAFETY SYSTEMS AND SITE LIGHTING) ARE TO REMAIN OPERATIONAL UNTIL NEW SERVICES ARE IN PLACE AND COMMISSIONED TO ENSURE CONTINUITY OF OPERATIONS.</p> <p>3. THE PURPOSE OF THE INTERIM WORKS SITE PLAN IS TO PROVIDE THE GENERAL INTENT FOR MAINTAINING OPERATIONAL CONTINUITY THROUGH THE INITIAL CONSTRUCTION PRIOR TO THE OCCUPANCY OF THE BUILDING, ADULT, SITE SERVICES, EQUIPMENT, AND INFRASTRUCTURE. WORK MAY NEED TO BE TEMPORARILY ADJUSTED, REPLACED, OR REMOVED DURING THIS PERIOD TO ENABLE CONSTRUCTION TO PROGRESS, BUT THE FACILITY MUST REMAIN OPERATIONAL.</p>		<p><b>YORK REGION NORTH ROADS OPERATIONS CENTRE</b></p> <p>3525 BASELINE RD. SUTTON WEST, ON L0E 1R0</p> <p>Drawing Title</p> <p><b>ENLARGED INTERIM SITE PLAN</b></p> <p>Project Number      Drawing Number</p> <p>6016      <b>A056</b></p>
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Project Number	Drawing Number
6016	<b>A056</b>

Project Team:

Prime Consultant  
GEC ARCHITECTURE

Structural and Building Envelope Consultant  
ENTUITIVE

Mechanical and Electrical Consultant  
MCW CONSULTANTS LTD.

Civil Consultant  
PLANMAC ENGINEERING

Passive House Consultant  
PEEL PASSIVE HOUSE

LEED Consultant  
MCW CONSULTANTS LTD.

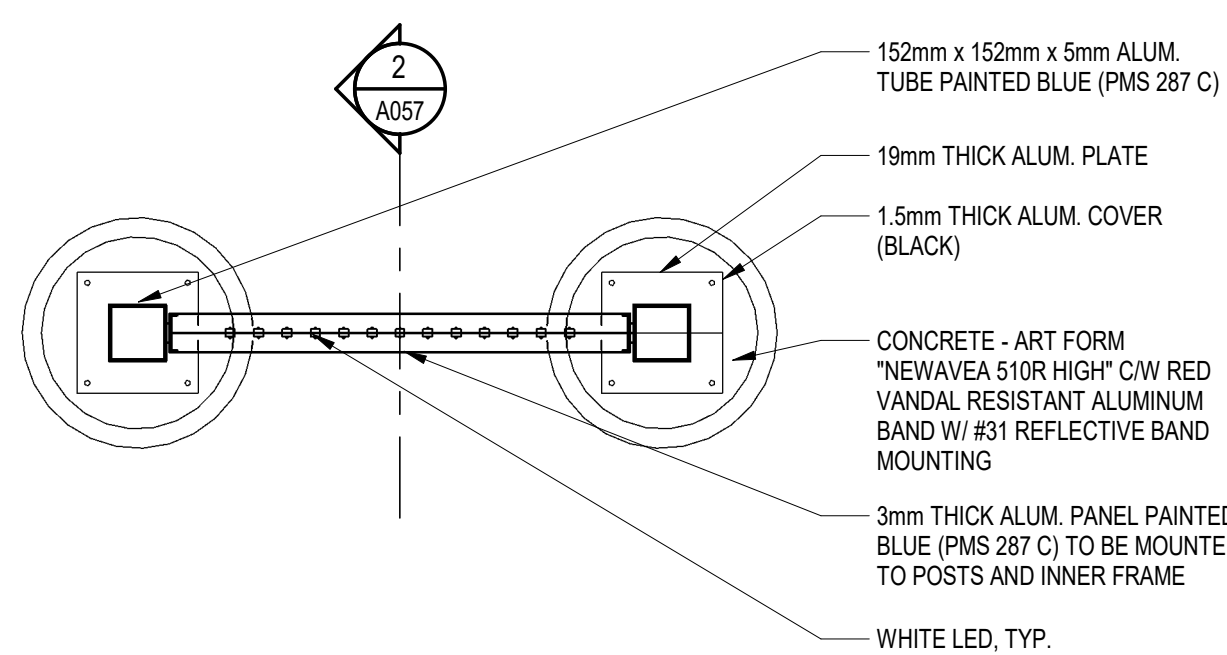
Landscape Consultant  
MHBC

Client

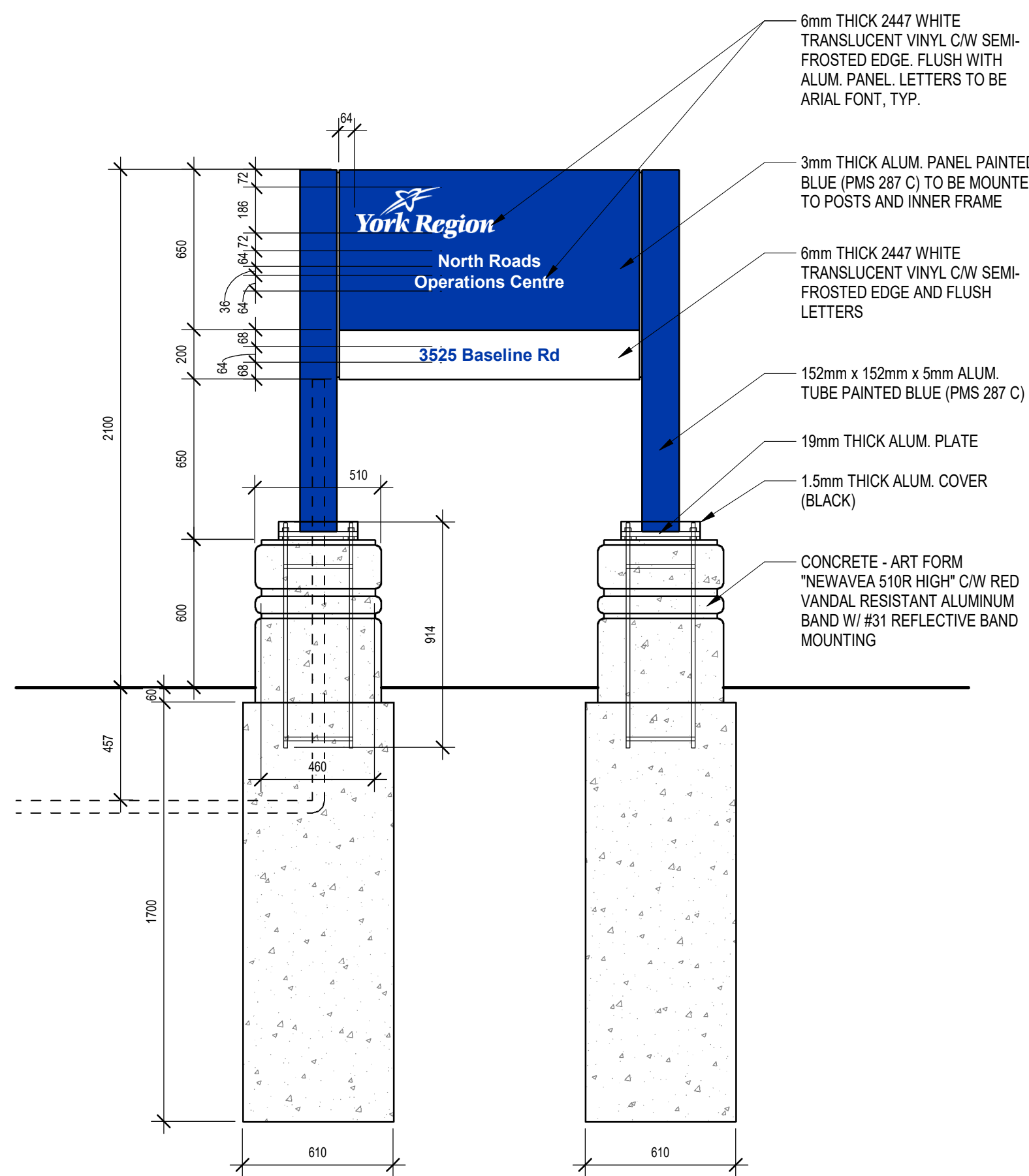
YORK REGION



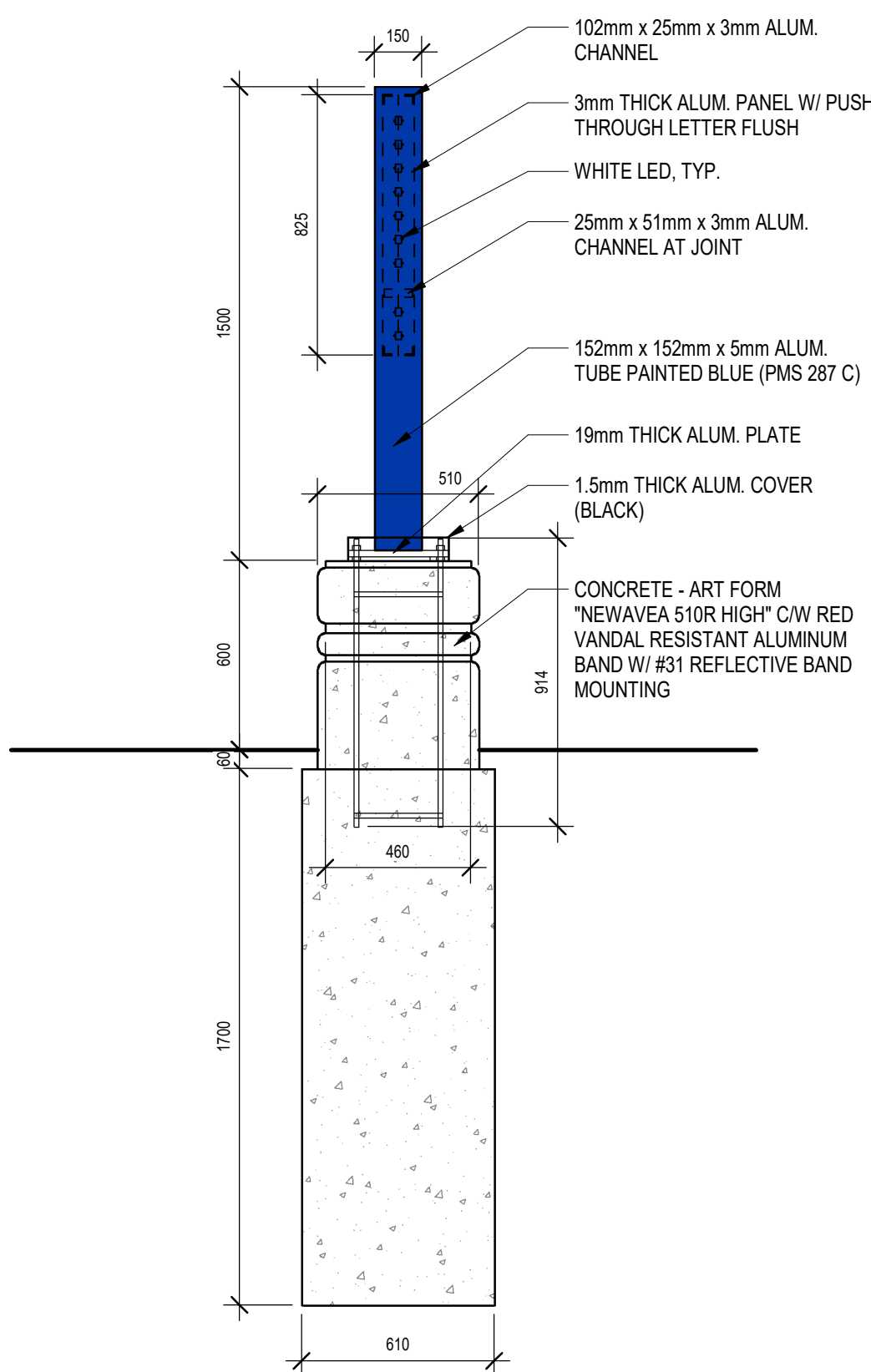
Seal & Permit



3 EXTERIOR GROUND SIGN - PLAN  
A057 Scale: 1 : 20



1 EXTERIOR GROUND SIGN - FRONT/ REAR ELEVATION  
A057 Scale: 1 : 20



2 EXTERIOR GROUND SIGN - SECTION  
A057 Scale: 1 : 20

2	ISSUED FOR ADDENDUM 4	2025-07-18
1	REISSUED FOR TENDER	2025-05-23
NO.	ISSUED FOR	DATE

Drawing History

Scale	1 : 20	Checked By	TB
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Region of York Project Number	22046	Region of York Building Code	G013-B
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Project

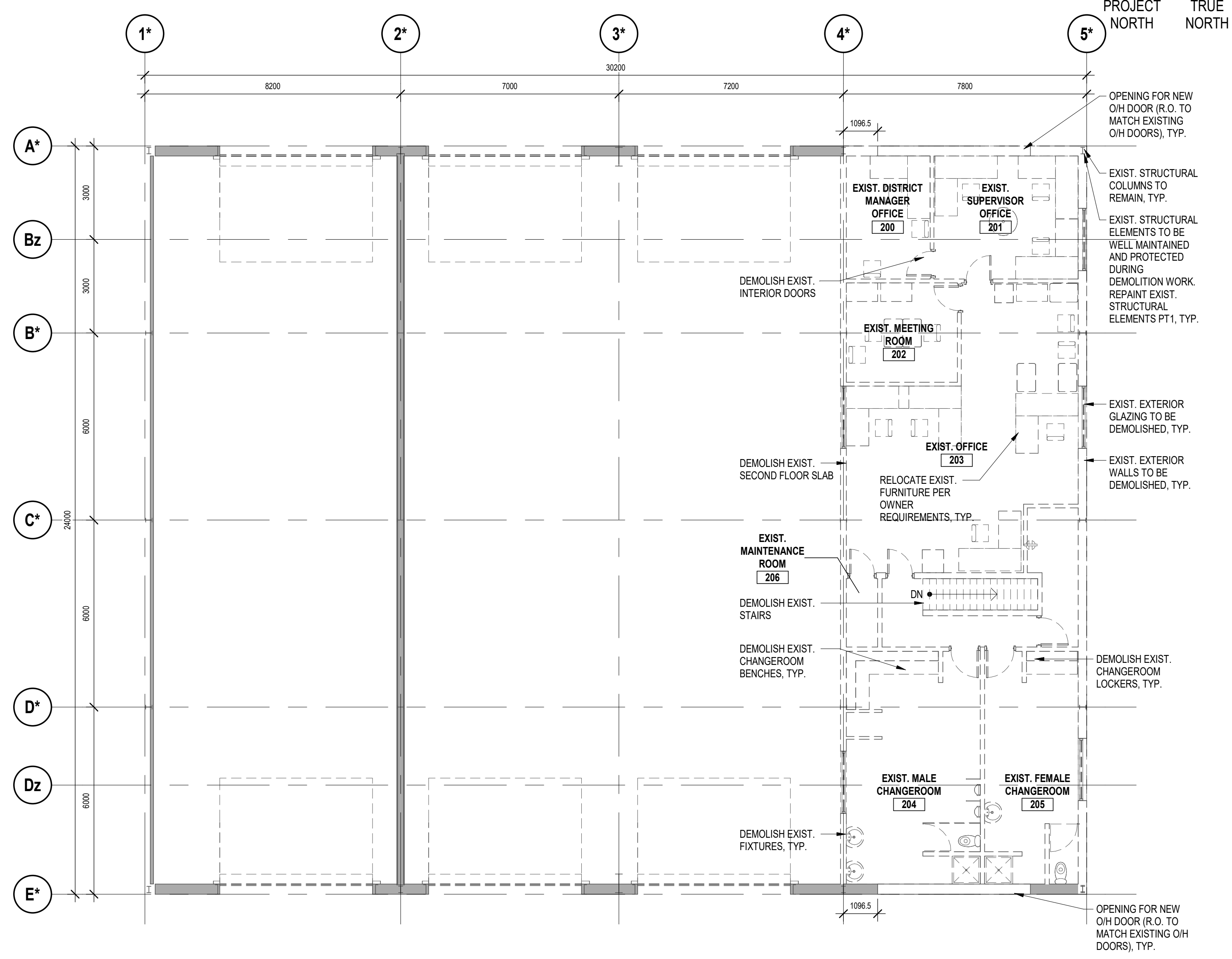
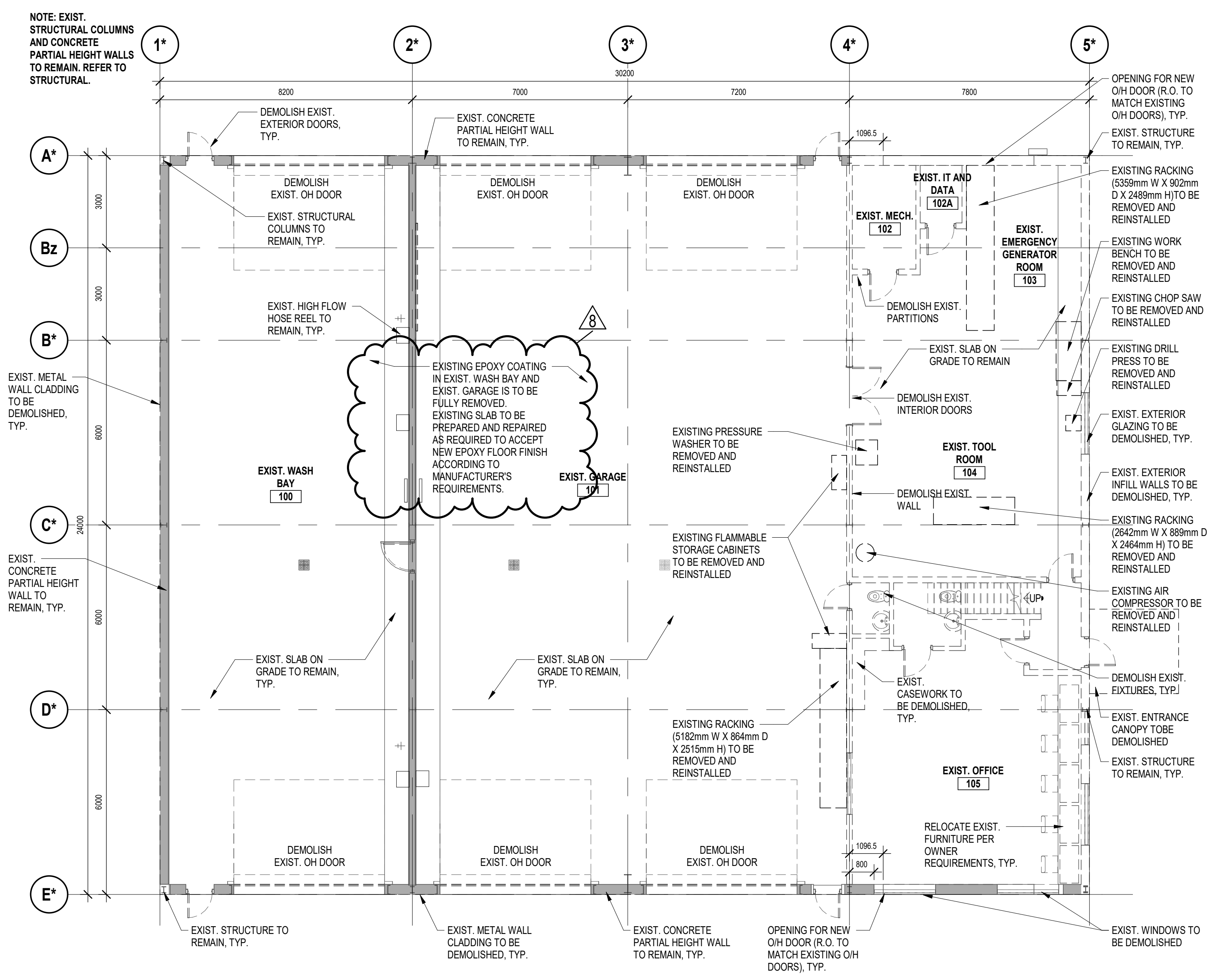
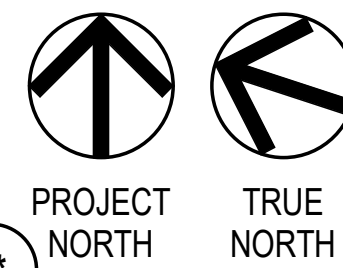
YORK REGION NORTH ROADS  
OPERATIONS CENTRE

3525 BASELINE RD. SUTTON WEST, ON L0E 1R0

Drawing Title

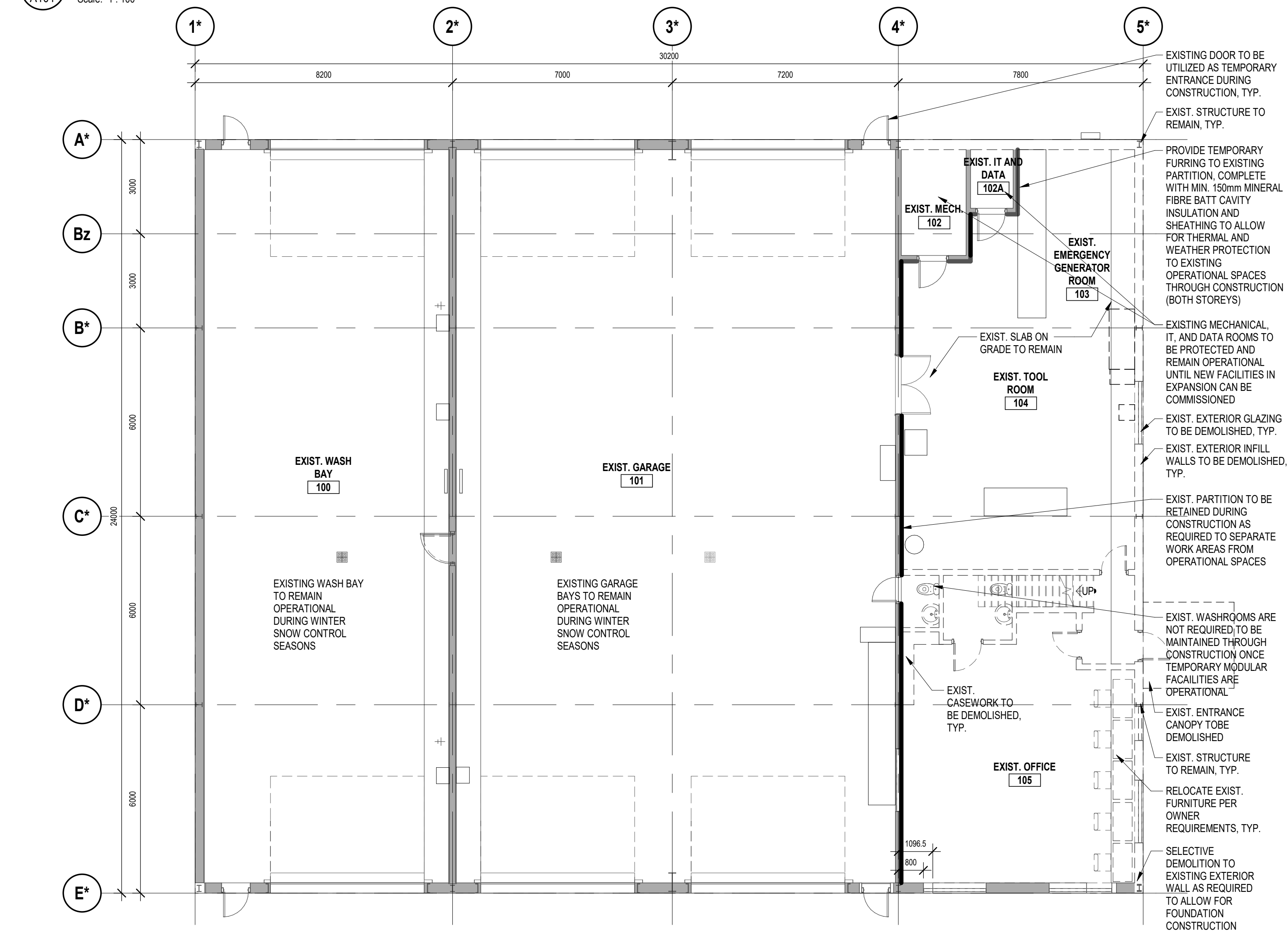
GROUND SIGN DETAILS

Project Number	6016	Drawing Number	A057
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1 LEVEL 01 DEMOLITION FLOOR PLAN  
A101 Scale: 1:100

2 LEVEL 02 DEMOLITION FLOOR PLAN  
A101 Scale: 1:100



3 LEVEL 01 INTERIM FLOOR PLAN  
A101 Scale: 1:100

DEMOLITION FLOOR PLAN LEGEND

- EXISTING WALL TO REMOVE
- EXISTING WALL TO REMAIN

DEMOLITION FLOOR PLAN NOTES

- DRAWING TO BE READ IN CONJUNCTION WITH ALL OTHER CONTRACT DOCUMENTS. COORDINATE WITH OTHER TRADES PRIOR TO COMMENCING WORK.
- CARRY OUT ALL DEMOLITION, REMOVAL AND DISPOSAL IN ACCORDANCE WITH ALL APPLICABLE PROVINCIAL AND LOCAL REGULATIONS.
- ALL CONTRACTORS SHALL REFER TO MECHANICAL AND ELECTRICAL DRAWINGS FOR DETAILS OF SCOPE OF MECHANICAL AND ELECTRICAL DEMOLITIONS.
- MECHANICAL AND ELECTRICAL CONTRACTORS SHALL LOCATE, DISCONNECT, CAP AND PLUG ALL ABANDONED HYDRO, WATER, SEWER, TELEPHONE, GAS, AND OTHER SERVICES AS REQUIRED.
- GENERAL CONTRACTOR SHALL PATCH AND MAKE GOOD ALL MASONRY & GYPSUM SURFACES WHERE DISTURBED BY REMOVAL OF WALL ASSEMBLY AND/OR EXISTING FINISHES/EQUIPMENT.
- CONTRACTOR SHALL REMOVE EXISTING FURNITURE AND CHANGEROOM LOCKERS. CONTRACTOR TO COORDINATE SCHEDULING OF REMOVALS WITH OWNER. TO SUIT CONSTRUCTION ACTIVITIES.
- PRIOR TO PAINTING EXISTING SURFACES, GENERAL CONTRACTOR SHALL FILL ALL HOLES AND MAKE GOOD ALL SURFACES TO MATCHING ADJACENT/ADJOINING MATERIAL FINISH, READY FOR NEW FINISH AS SPECIFIED. INCLUDE PATCHING OF SURFACES AT LOCATIONS WHERE ITEMS REMOVED BY OWNER.
- CONTRACTOR TO PROVIDE HOARDING PLAN PRIOR TO CONSTRUCTION WHICH DEMONSTRATES THAT THE INTERIOR HOARDING ACCOMMODATES FOR CONTINUOUS OPERATIONS AND VEHICLE MOVEMENTS AS REQUIRED BY YORK REGION INSIDE THE EXISTING GARAGE AND EXISTING WASH BAY.
- CONTRACTOR TO PROVIDE HOARDING PLAN PRIOR TO CONSTRUCTION WHICH DEMONSTRATES THAT THE INTERIOR HOARDING ACCOMMODATES FOR CONTINUOUS OPERATIONS AND VEHICLE MOVEMENTS AS REQUIRED BY YORK REGION INSIDE THE EXISTING GARAGE AND EXISTING WASH BAY.
- CONTRACTOR TO SALVAGE ALL EXISTING WATER HEATERS, PRESSURE WASHER, AND WATER TREATMENT SKID AND RETURN THEM TO OWNER.

NO.	ISSUED FOR	DATE
8	ISSUED FOR ADDENDUM 4	2025-07-18
7	REISSUED FOR TENDER	2025-05-23
6	ISSUED FOR TENDER	2025-04-25
5	ISSUED FOR BUILDING PERMIT REVIEW	2024-11-27
4	ISSUED FOR PRE-TENDER REVIEW	2024-10-31
3	ISSUED FOR 60% CD	2024-05-02
2	100% DD	2024-02-29
1	60% DD	2024-01-25

Scale	As indicated	Checked By	TB
Region of York Project Number	22046	Region of York Building Code	G013-B

Project  
**YORK REGION NORTH ROADS OPERATIONS CENTRE**

3525 BASELINE RD, SUTTON WEST, ON L0E 1R0  
Drawing Title  
**DEMOLITION FLOOR PLANS**

Project Number  
6016  
Drawing Number  
**A101**

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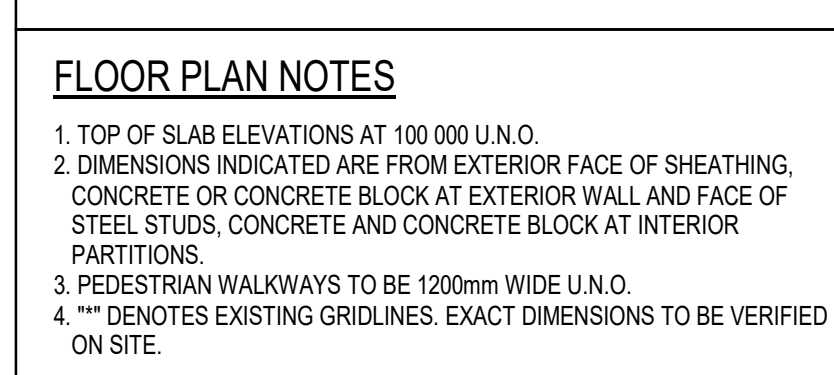


Client

YORK REGION



**York Region**



Drawing History	
Scale As indicated	Checked By TB

22046 G013-B

3525 BASELINE RD. SUTTON WEST, ON L0E 1R0

Starting time	
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FLOOR PLAN

Project Number	Drawing Number
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Landscape Consultant  
**MHBC**

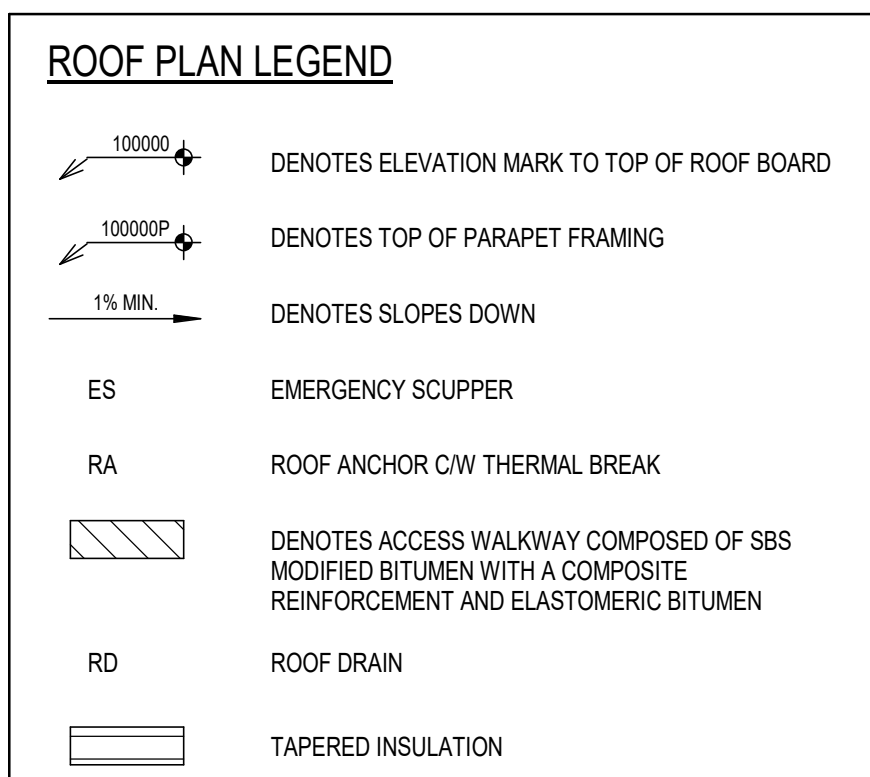


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ROOF PLAN

**A202**

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ROOF PLAN NOTES

1. PROVIDE AND INSTALL PRE-FORMED FLASHING HOODS FOR ALL PIPE AND VENT PENETRATION THROUGH THE ROOFS.
2. COORDINATE, PROVIDE AND INSTALL ALL STEEL MISCELLANEOUS METALS, FLASHING AND ANGLES NEEDED FOR PENETRATION OPENINGS THROUGH ROOFS.
3. A MINIMUM OF 200mm is TO BE MAINTAINED BETWEEN THE TOP OF THE ROOF AND THE TOP OF THE FLASHING HOODS.
4. COORDINATE, PROVIDE AND INSTALL ALL CRICKETS TO ALLOW FOR DRAINAGE OF WATER AROUND MECHANICAL EQUIPMENT, DUCTS, PENETRATIONS, ETC.
5. ROOF LADDER DETAILS TO CONFORM TO OBC 2012.
6. ROOF WALKWAYS ARE TO BE INSTALLED AS INDICATED WITH 1 EXTRA LAYER OF TEXTURED TOP WALKING PAD at 610mm wide. WALKWAY TO BE DIFFERENT TO DIFFERENT ROOF LEVELS.
7. ENSURE SCUPPERS 300mm wide, TYPICAL PROJECT MIN. 50mm PAST WALL FINISH AND sealed ALL AROUND.
8. ALL DOWN CURBS TO BE PROVIDED BY UNIT MANUFACTURER.
9. SCUPPERS ARE TO BE LOCATED SO MAXIMUM DEPTH OF WATER CANNOT EXCEED 150mm for ANY DRAINAGE AREA.
10. PRIMARY ROOF SCUPPERS ACHIEVED WITH SLOPED STRUCTURE. CUSTOM DRAIN PIPES REQUIRED FOR ALL SCUPPERS.
11. DEMOLISH ALL EXISTING ROOF TOP EQUIPMENT, INCLUDING EXHAUSTS AND VENTS AND ROOF EXHAUSTS AND EXISTING ROOF CURBS AT EQUIPMENT ARE TO BE DEMOLISHED. ALL ROOF PENETRATIONS ARE TO BE REPAIRED TO MATCH ADJACENT ROOFING. ALL JOINTS ARE TO BE REPAIRED AND CALLED IN ACCORDANCE WITH ROOFING STANDARDS AND BUILDING CODES.

A202 Scale: 1 : 100

Scale: 1 : 100



Project Team:

Prime Consultant  
**GEC ARCHITECTURE**

Structural and Building Envelope Consultant  
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Mechanical and Electrical Consultant  
**MCW CONSULTANTS LTD.**

Civil Consultant  
**PLANMAC ENGINEERING**

Passive House Consultant  
**PEEL PASSIVE HOUSE**

LEED Consultant  
**MCW CONSULTANTS LTD.**

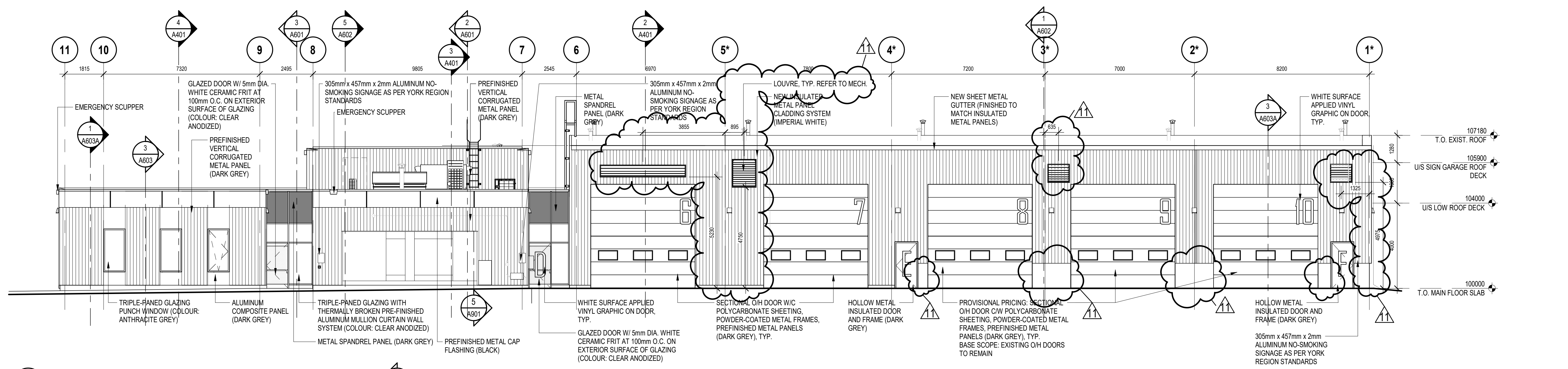
Landscape Consultant  
**MHBC**

Client

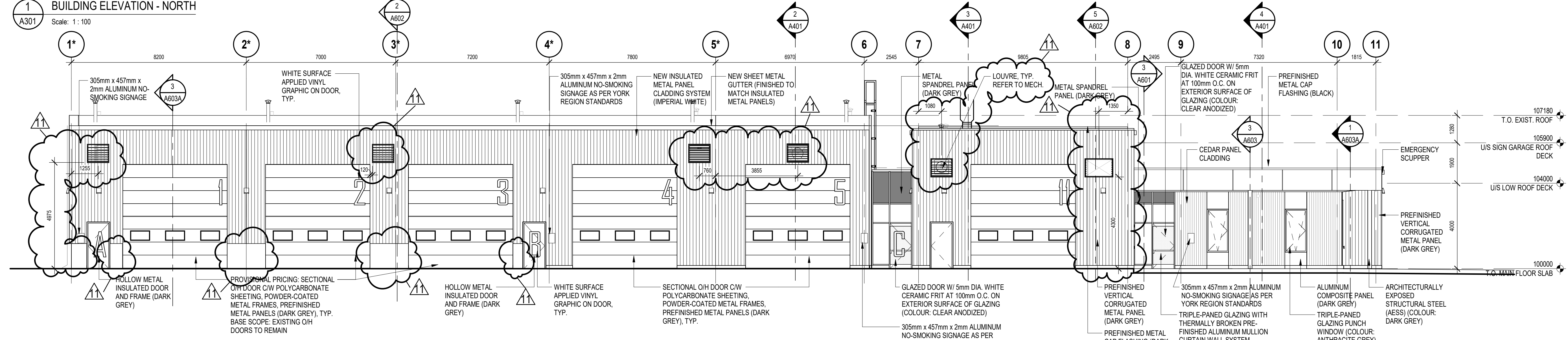
**YORK REGION**



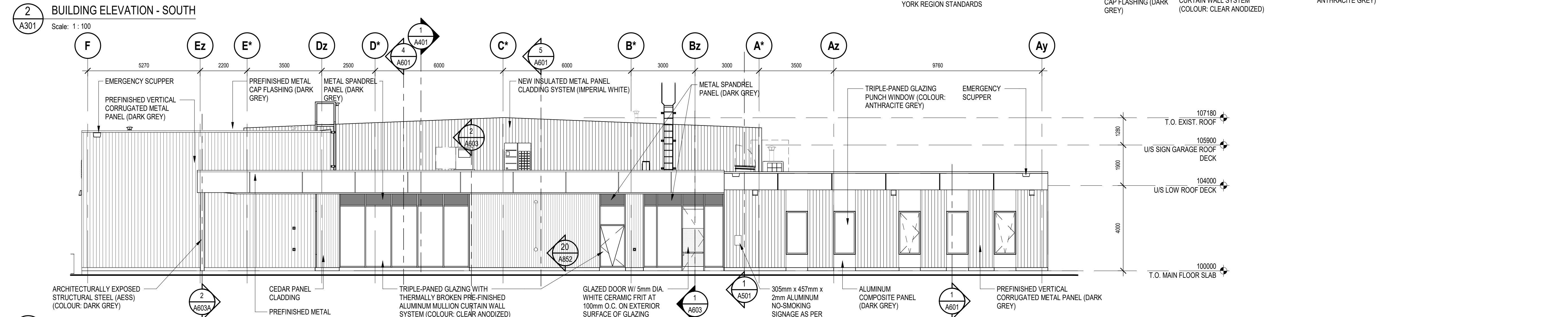
Seal & Permit



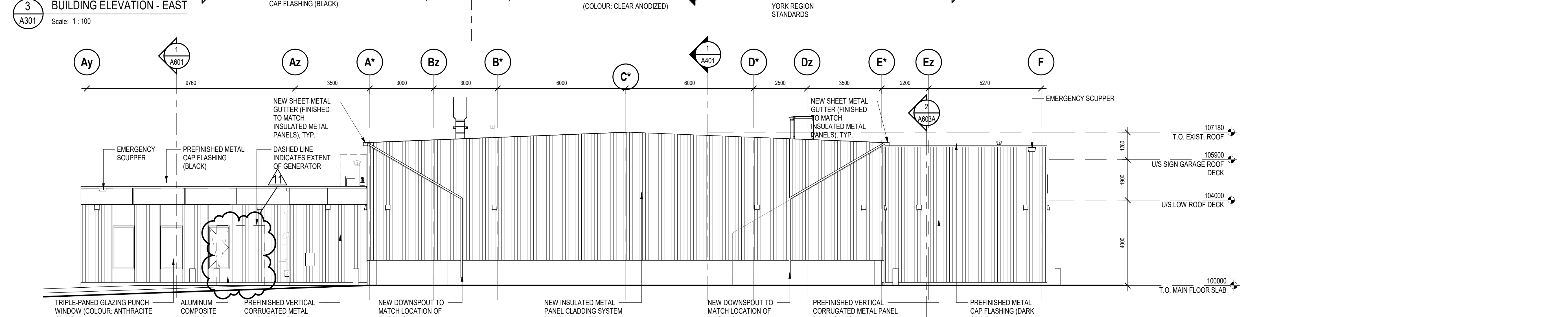
**1 BUILDING ELEVATION - NORTH**  
Scale: 1 : 100



**2 BUILDING ELEVATION - SOUTH**  
Scale: 1 : 100



**3 BUILDING ELEVATION - EAST**  
Scale: 1 : 100



**4 BUILDING ELEVATION - WEST**  
Scale: 1 : 100

11	ISSUED FOR ADDENDUM 4	2025-07-18
10	REISSUED FOR TENDER	2025-05-23
9	ISSUED FOR TENDER	2025-04-25
8	ISSUED FOR BUILDING PERMIT	2024-11-27
7	ISSUED FOR SPA 2ND RESUBMISSION	2024-11-22
6	ISSUED FOR PRE-TENDER REVIEW	2024-10-31
5	ISSUED FOR SPA 1ST RESUBMISSION	2024-10-07
4	ISSUED FOR 60% CD	2024-05-02
3	ISSUED FOR SPA	2024-04-12
2	100% DD	2024-02-29
1	60% DD	2024-01-25

Drawing History

Scale	1 : 100	Checked By	TB
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Region of York Project Number  
**22046**

Region of York Building Code  
**G013-B**

Project  
**YORK REGION NORTH ROADS OPERATIONS CENTRE**

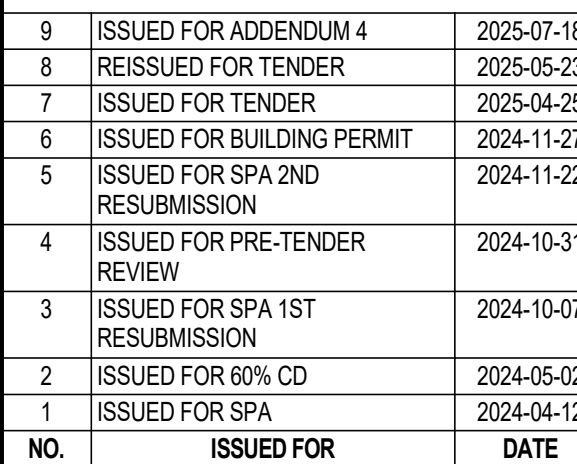
**3525 BASELINE RD, SUTTON WEST, ON L0E 1R0**

Drawing Title  
**ELEVATIONS**

Project Number  
**6016**

Drawing Number  
**A301**

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22046	G013-B
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YORK REGION NORTH ROADS

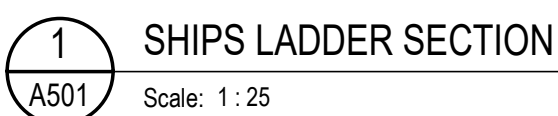
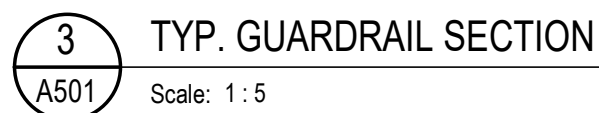
OPERATIONS CENTRE

Drawing Title

## SECTIONS

6016 **A401**

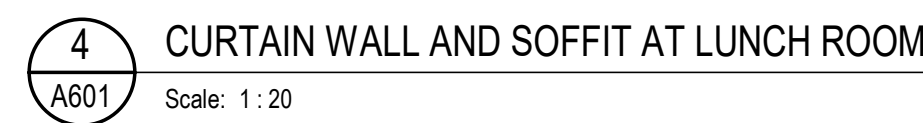




No.	ISSUED FOR	DATE
Drawing History		

Region of York Project Number	Region of York Building Code
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Project3525 BASELINE RD. SUTTON WEST. ON L0E 1R0Drawing TitleSLIPS, LADDER AND CATWALKSHIPS LADDER AND CATWALK  
DETAILS

Drawing History

Region of York Project Number	Region of York Building Code
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Project

3525 BASELINE RD. SUTTON WEST. ON L0E 1R0

Drawing Title

Starting time

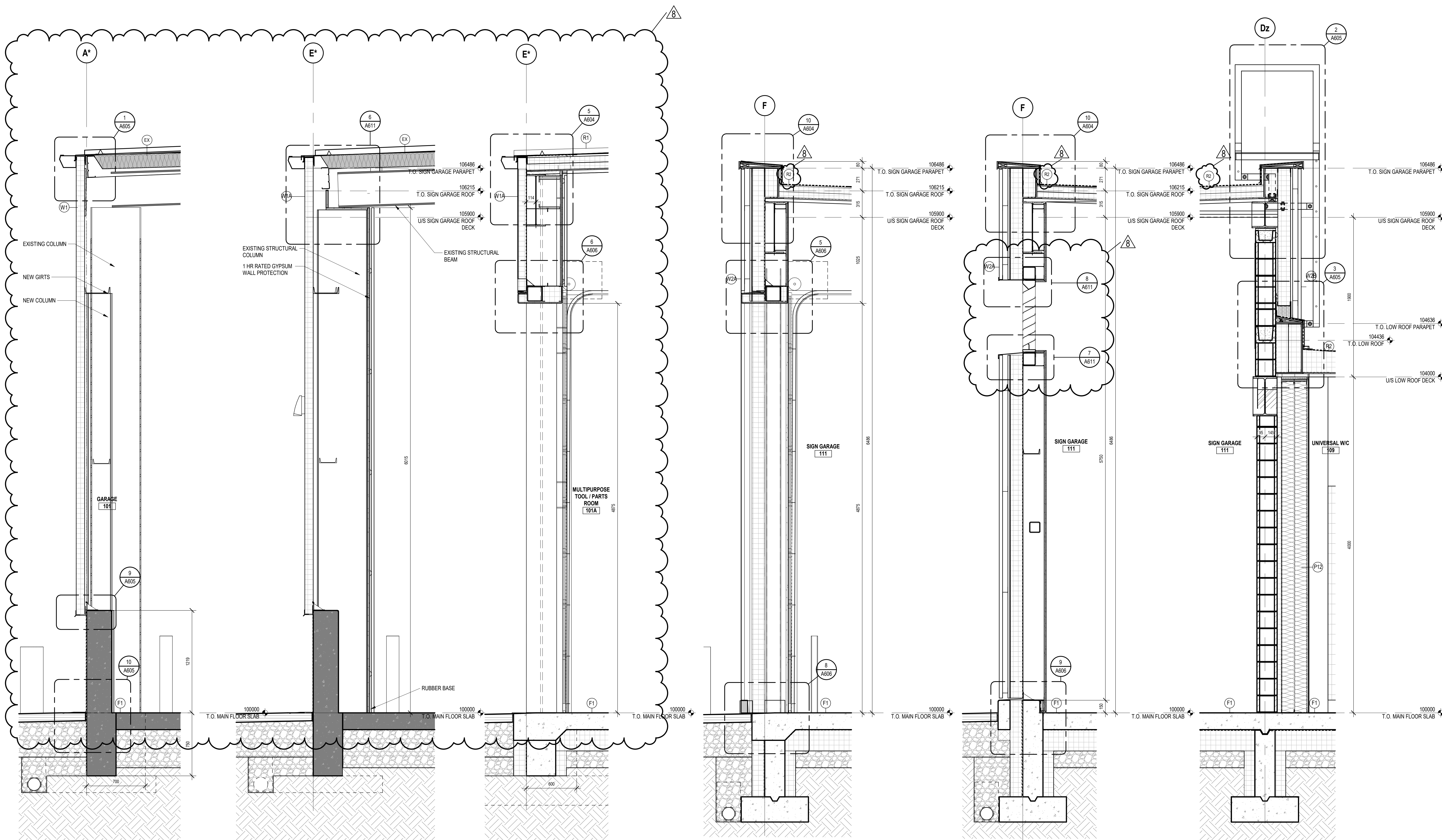
WALL SECTIONS

\_\_\_\_\_

Project Number	Drawing Number
	1001

6016 **A601**

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1 EXTERIOR WALL AT GARAGE TYP. 2  
Scale: 1 : 20

2 WALL SECTION - EXISTING SOUTH EXTERIOR WALL  
Scale: 1 : 20

3 EXTERIOR WALL AT OH DOOR TYP.  
Scale: 1 : 20

4 EXTERIOR WALL AT SIGN GARAGE OH DOOR  
Scale: 1 : 20

5 EXTERIOR WALL AT SIGN GARAGE  
Scale: 1 : 20

6 WALL BETWEEN SIGN GARAGE AND UNIVERSAL WC  
Scale: 1 : 20

8	ISSUED FOR ADDENDUM 4	2025-07-18
7	REISSUED FOR TENDER	2025-05-23
6	ISSUED FOR TENDER	2025-04-25
5	ISSUED FOR BUILDING PERMIT REVIEW	2024-11-27
4	ISSUED FOR PRE-TENDER REVIEW	2024-10-31
3	ISSUED FOR 60% CD	2024-05-02
2	100% DD	2024-02-29
1	60% DD	2024-01-25
NO.	ISSUED FOR	DATE

Drawing History  
Scale: 1 : 20  
Checked By: TB

Region of York Project Number: 22046  
Region of York Building Code: G013-B

Project: YORK REGION NORTH ROADS OPERATIONS CENTRE  
3525 BASELINE RD. SUTTON WEST, ON L0E 1R0

Drawing Title: WALL SECTIONS

Project Number: 6016  
Drawing Number: A602  
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Project Team:

Prime Consultant  
**GEC ARCHITECTURE**

Structural and Building Envelope Consultant  
**ENTUITIVE**

Mechanical and Electrical Consultant  
**MCW CONSULTANTS LTD.**

Civil Consultant  
**PLANMAC ENGINEERING**

Passive House Consultant  
**PEEL PASSIVE HOUSE**

LEED Consultant  
**MCW CONSULTANTS LTD.**

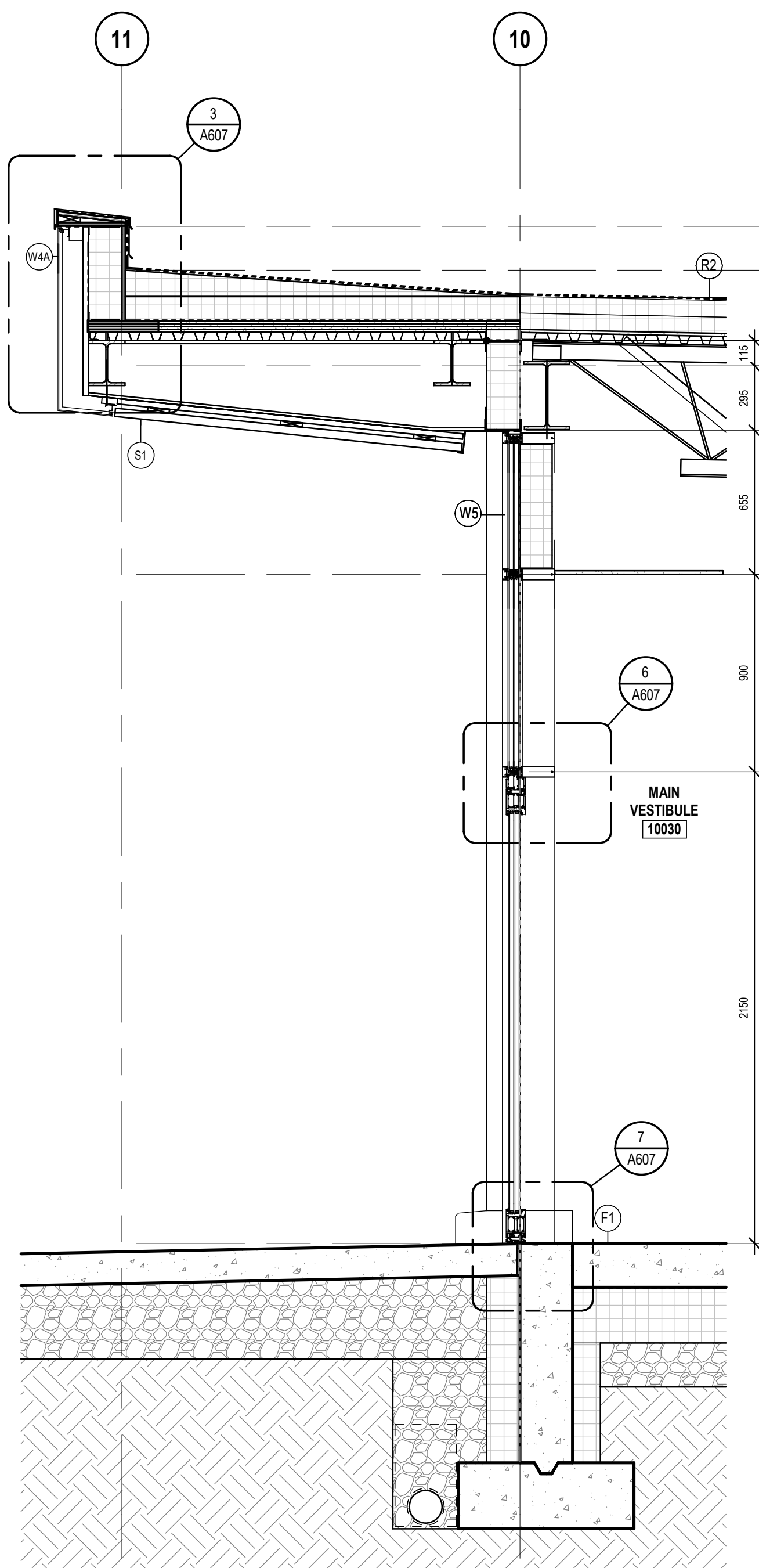
Landscape Consultant  
**MHBC**

Client

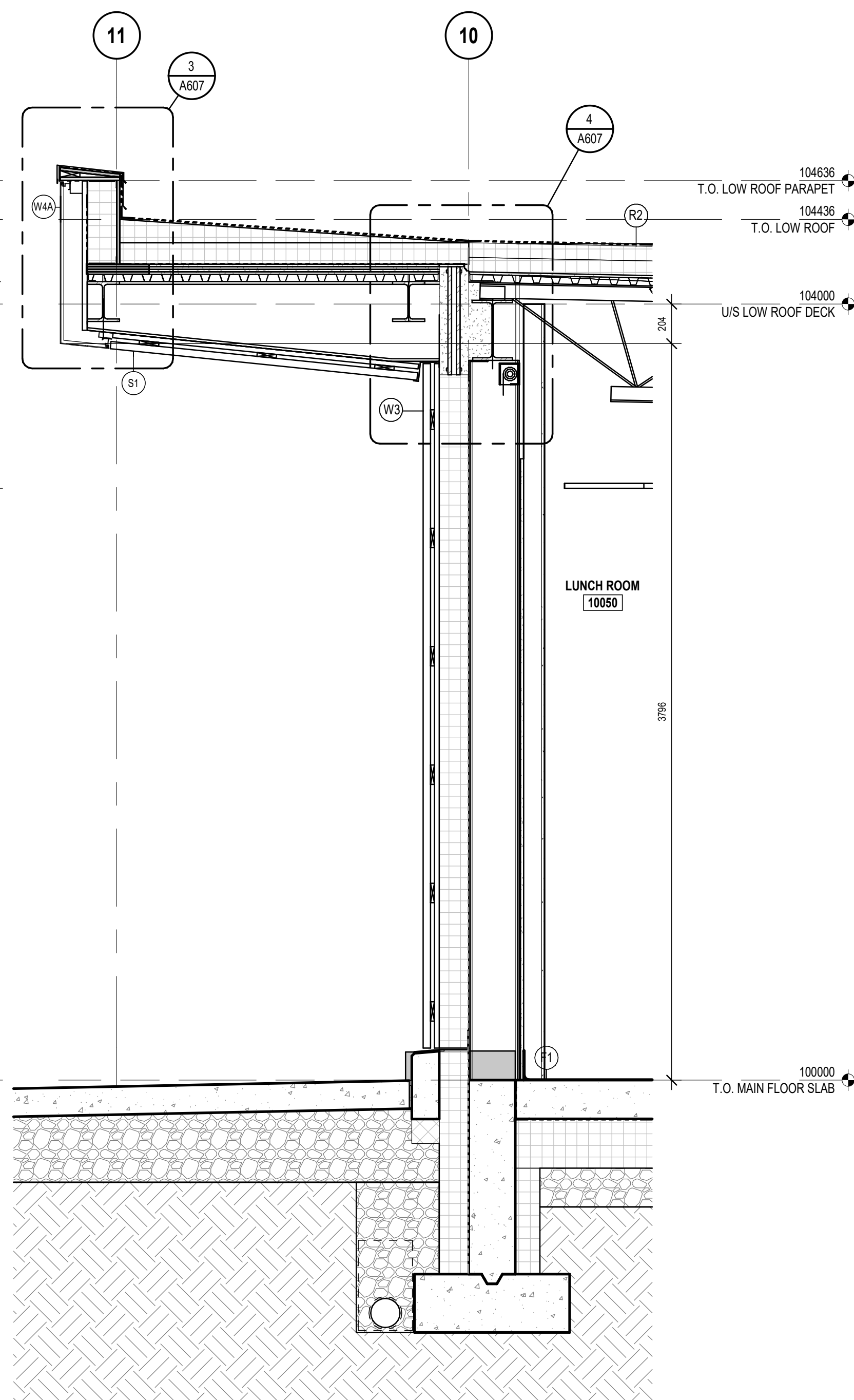
**YORK REGION**



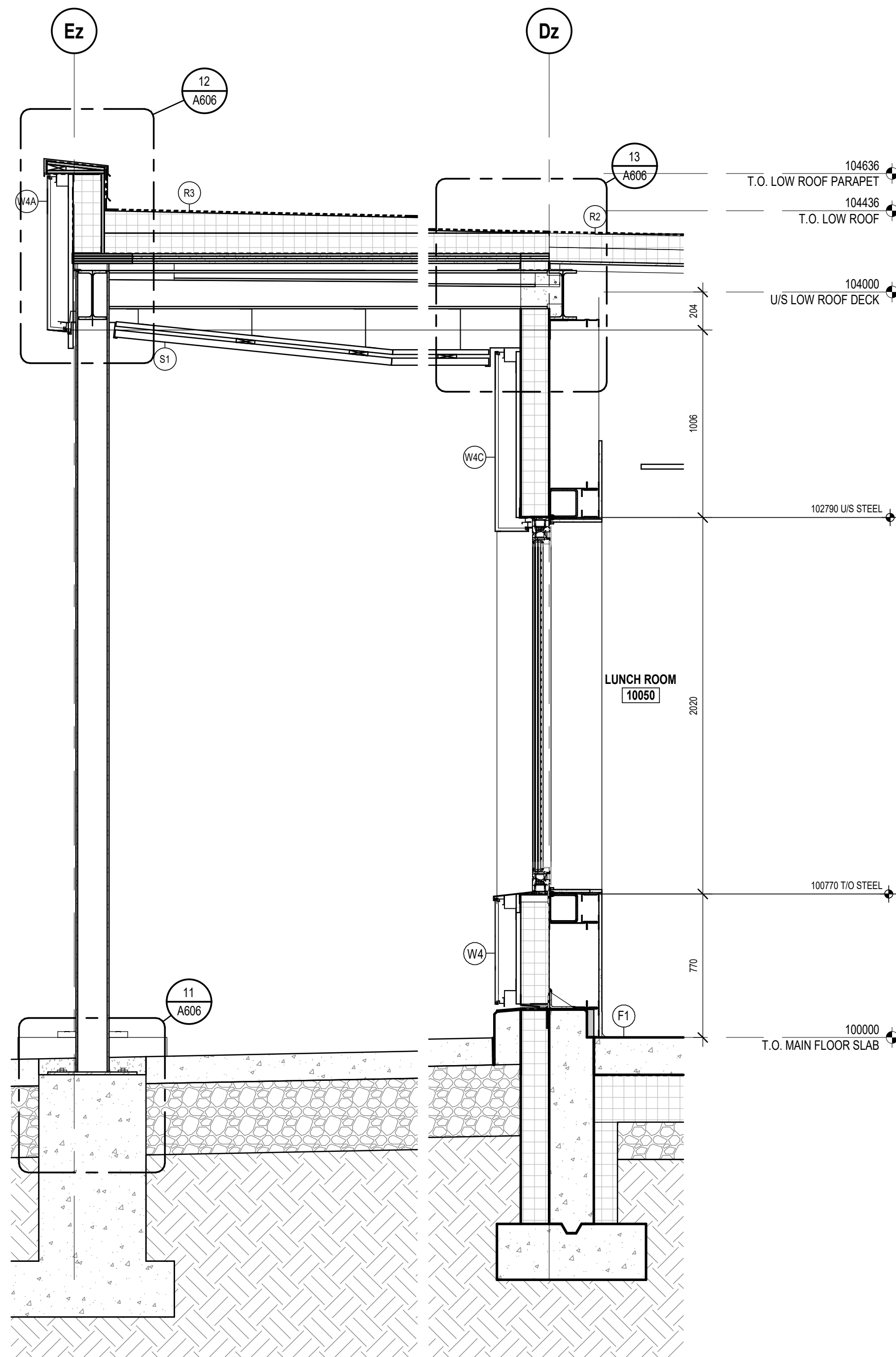
Seal & Permit



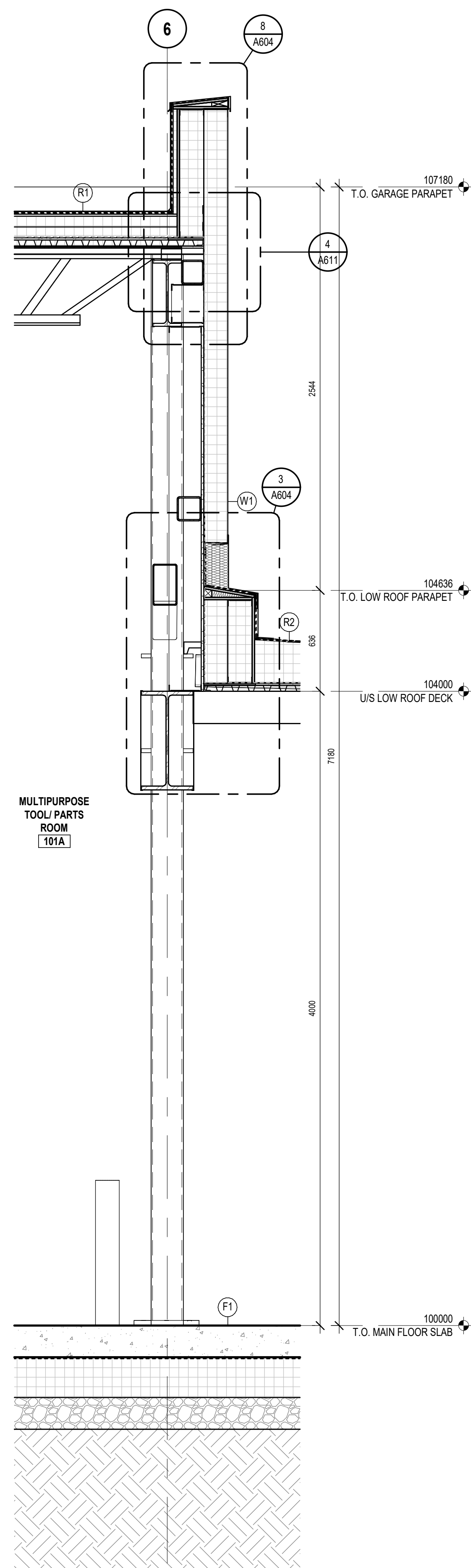
**1** CURTAIN WALL DOOR AND SOFFIT AT MAIN VESTIBULE  
A603 Scale: 1 : 20



**2** EXTERIOR WALL AND CANOPY AT LUNCH ROOM COLUMN  
A603 Scale: 1 : 20



**3** ACM EXTERIOR WALL AT WINDOW UNDER CANOPY  
A603 Scale: 1 : 20



**4** WALL BETWEEN TOOL/ PARTS ROOM AND CHANGEROOM  
A603 Scale: 1 : 20

7	ISSUED FOR ADDENDUM 4	2025-07-18
6	REISSUED FOR TENDER	2025-05-23
5	ISSUED FOR TENDER	2025-04-25
4	ISSUED FOR BUILDING PERMIT REVIEW	2024-11-27
3	ISSUED FOR PRE-TENDER REVIEW	2024-10-31
2	100% DD	2024-02-29
1	60% DD	2024-01-25
NO.	ISSUED FOR	DATE

Drawing History

Scale: **1 : 20** Checked By: **TB**

Region of York Project Number: **22046** Region of York Building Code: **G013-B**

Project: **YORK REGION NORTH ROADS OPERATIONS CENTRE**  
3525 BASELINE RD. SUTTON WEST, ON L0E 1R0

Drawing Title

**WALL SECTIONS**

Project Number

**6016**

Drawing Number

**A603**

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Project Team:

Prime Consultant  
GEC ARCHITECTURE

Structural and Building Envelope Consultant  
ENTUITIVE

Mechanical and Electrical Consultant  
MCW CONSULTANTS LTD.

Civil Consultant  
PLANMAC ENGINEERING

Passive House Consultant  
PEEL PASSIVE HOUSE

LEED Consultant  
MCW CONSULTANTS LTD.

Landscape Consultant  
MHBC

Client

YORK REGION



Seal & Permit

5	ISSUED FOR ADDENDUM 4	2025-07-18
4	REISSUED FOR TENDER	2025-05-23
3	ISSUED FOR TENDER	2025-04-25
2	ISSUED FOR BUILDING PERMIT	2024-11-27
1	ISSUED FOR PRE-TENDER REVIEW	2024-10-31
NO.	ISSUED FOR	DATE

Drawing History

Scale	1 : 20	Checked By	TB
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Region of York Project Number	22046	Region of York Building Code	G013-B
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Project

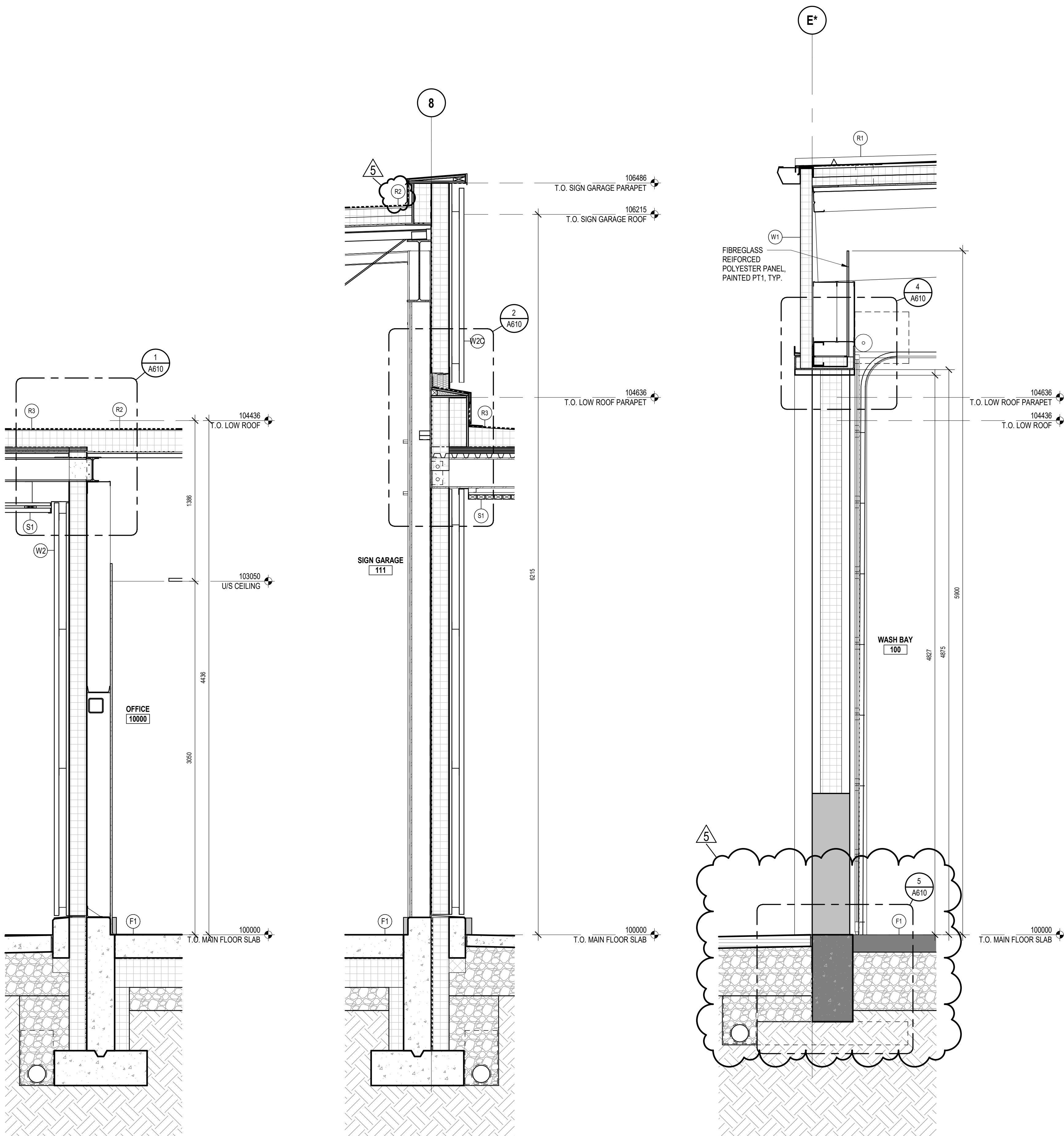
YORK REGION NORTH ROADS  
OPERATIONS CENTRE

3525 BASELINE RD. SUTTON WEST, ON L0E 1R0

Drawing Title

WALL SECTIONS

Project Number	6016	Drawing Number	A603A
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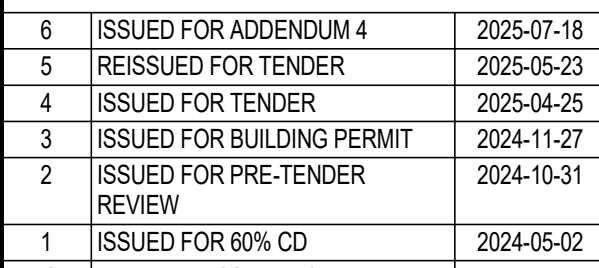
1 EXTERIOR WALL AND CANOPY AT OFFICE  
A603A Scale: 1 : 20

2 CANOPY AT SIGN GARAGE - SECTION  
A603A Scale: 1 : 20

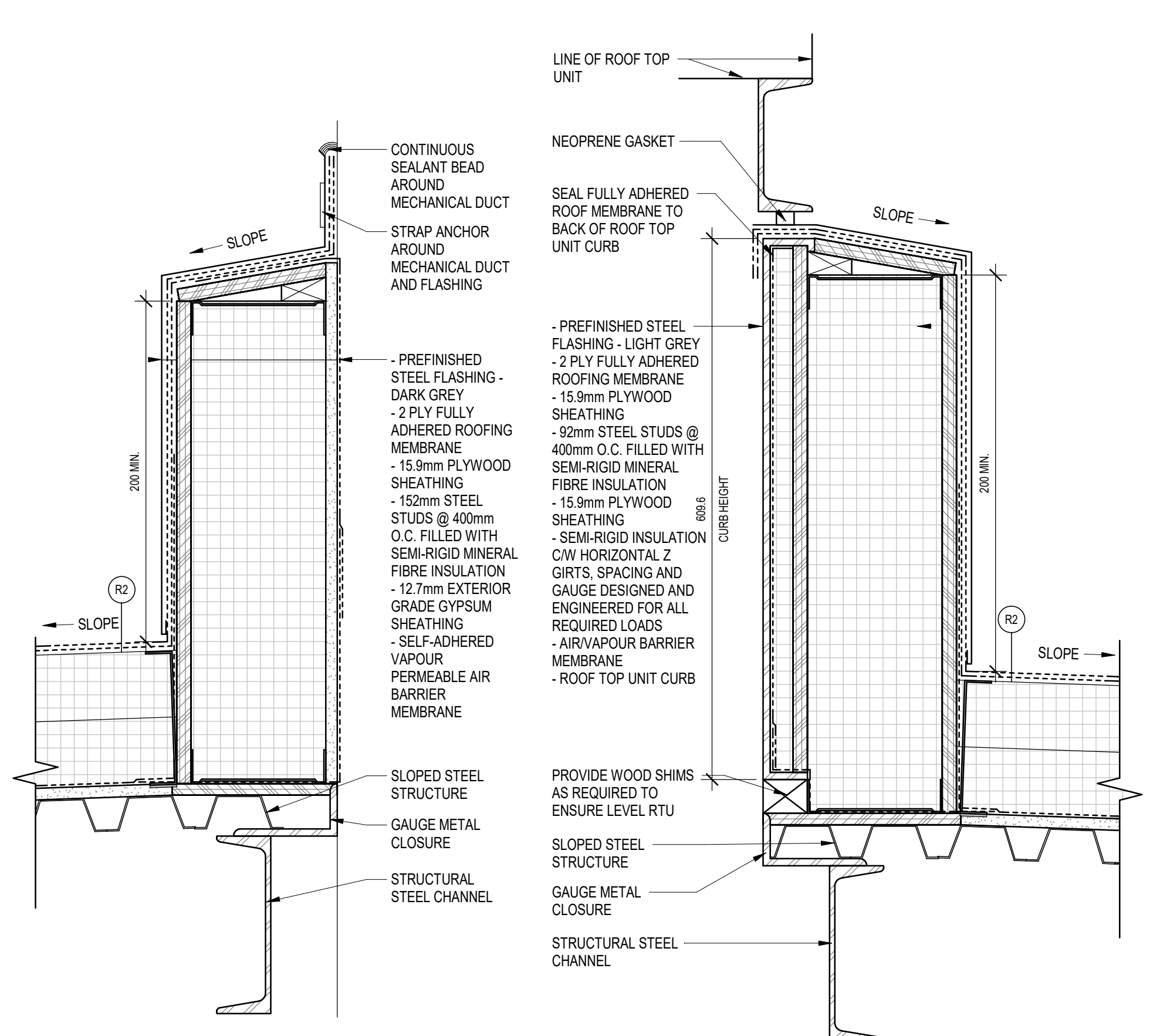
3 EXTERIOR WALL AT EXIST. OH DOOR TYP.  
A603A Scale: 1 : 20





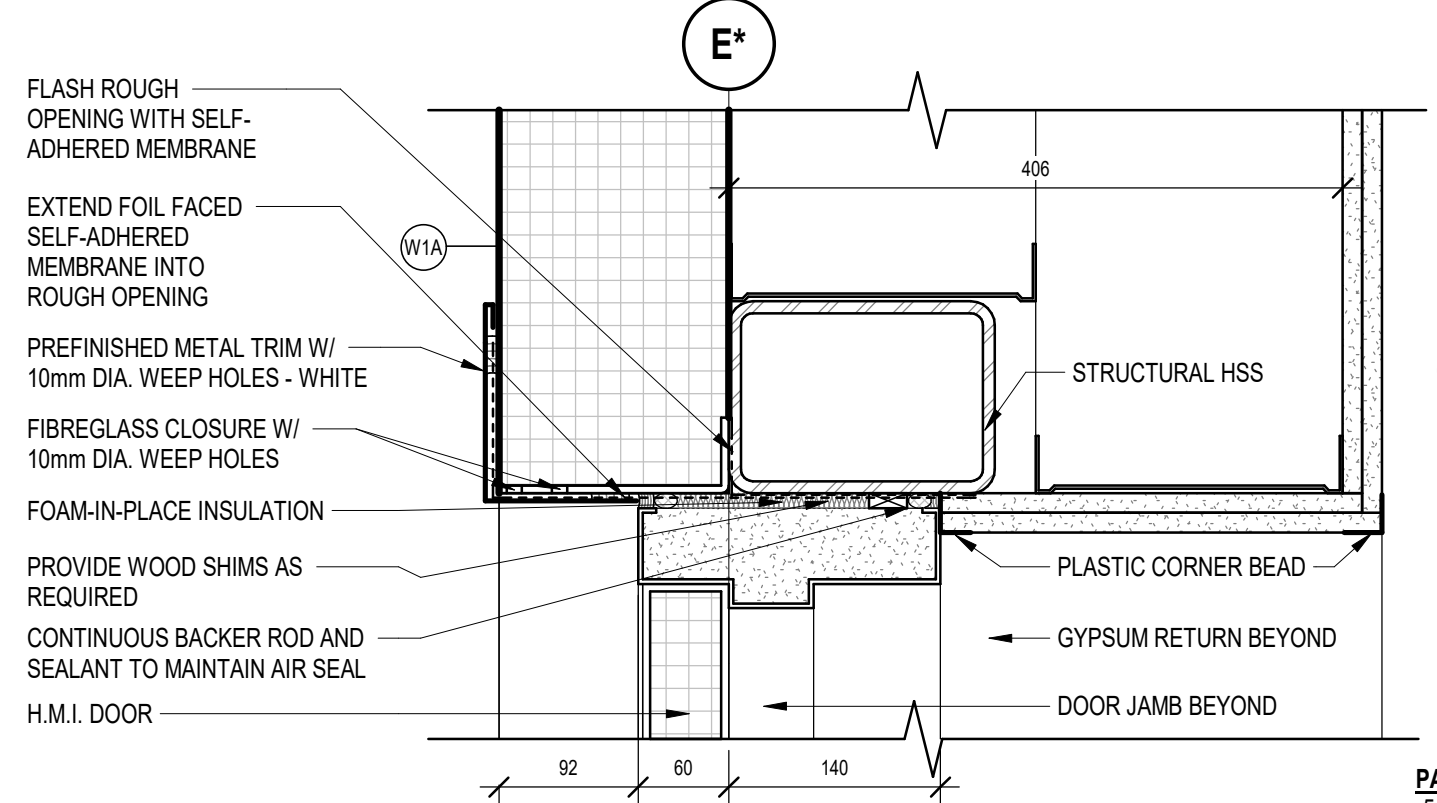




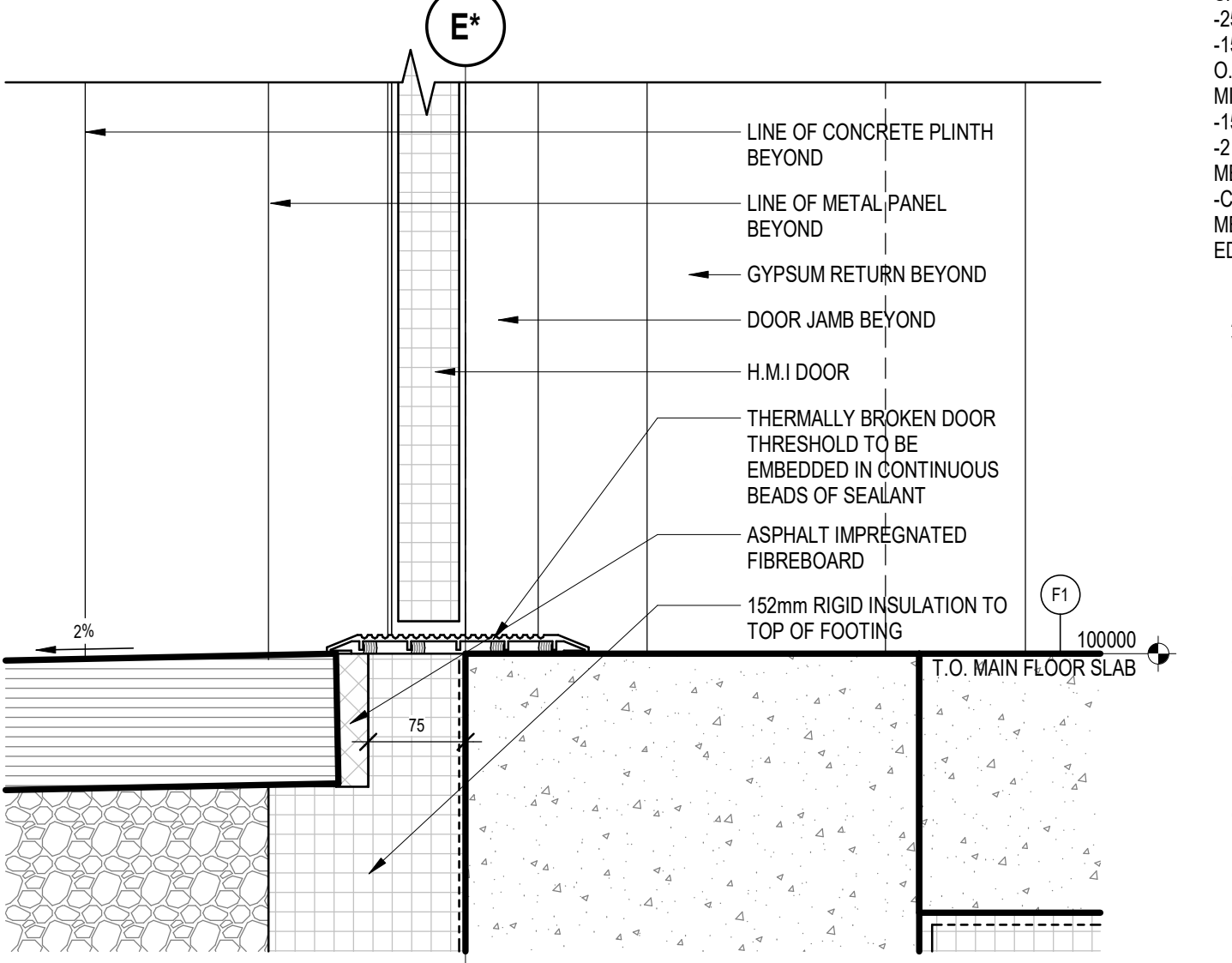


**1** ROOF PENETRATION - SECTION  
A606 Scale: 1:5

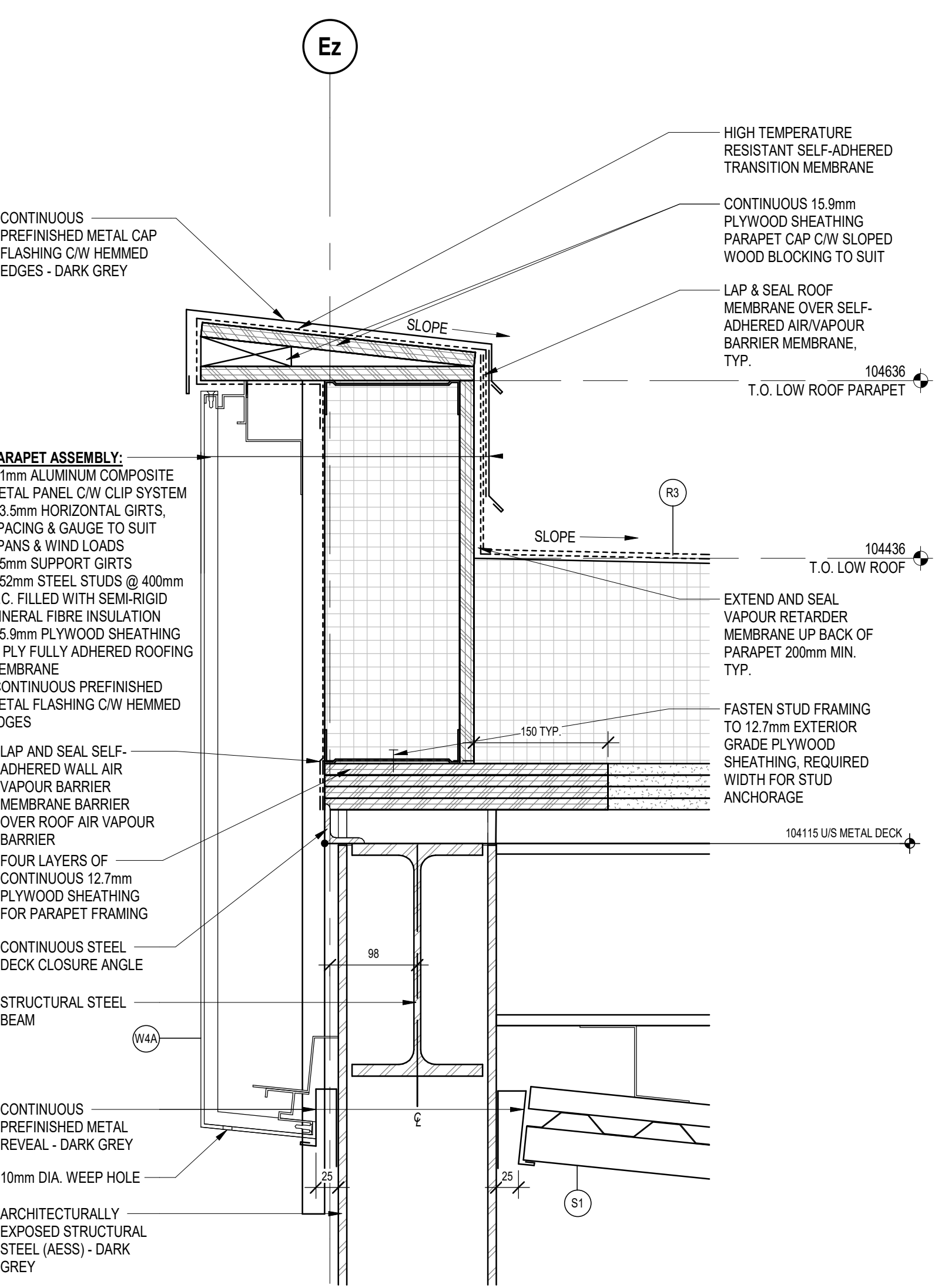
**2** TYP. CURB AT RTU - SECTION  
A606 Scale: 1:5



**3** TYP. PEDESTRIAN DOOR HEAD - SECTION  
A606 Scale: 1:5

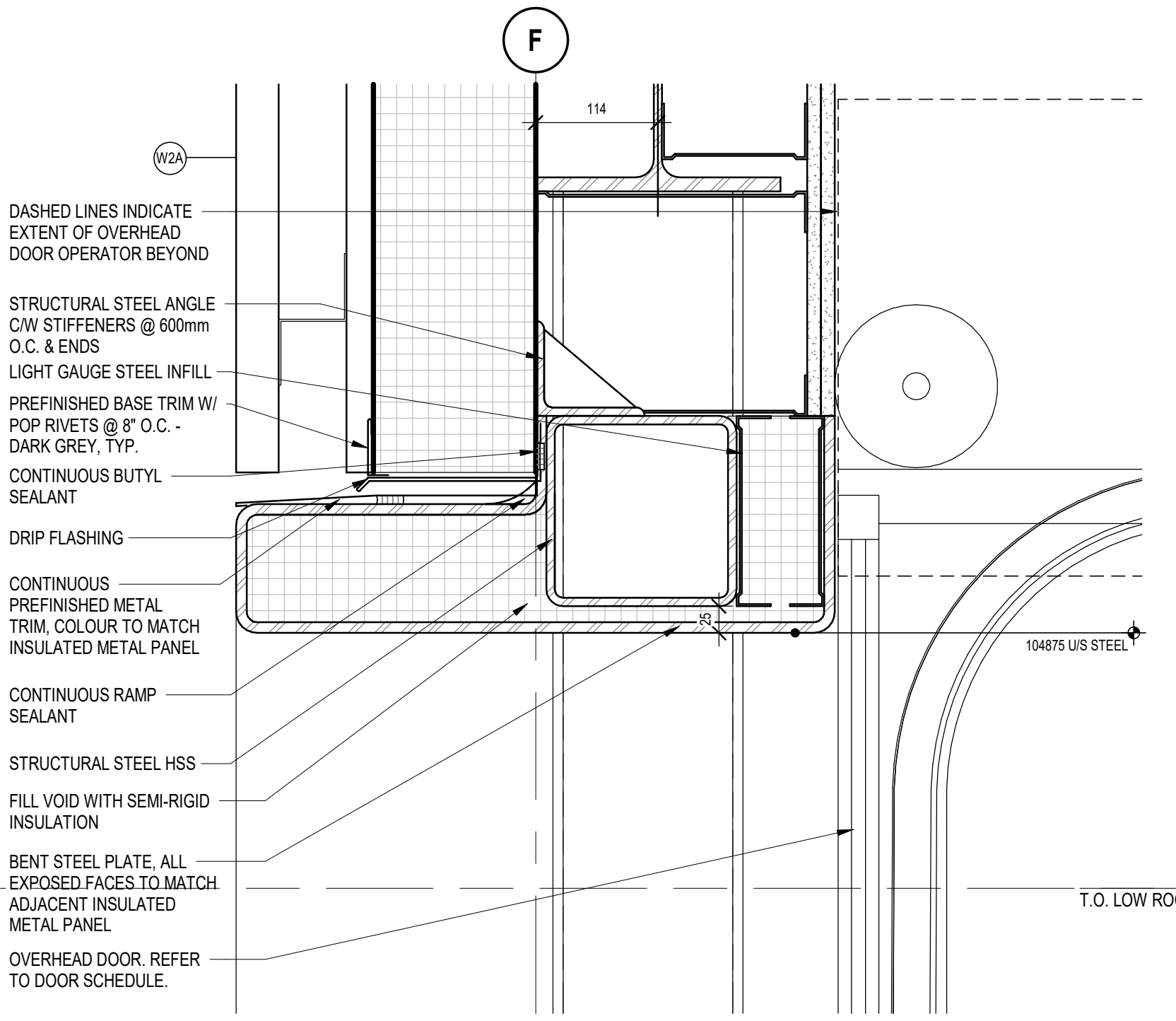


**4** TYP. PEDESTRIAN DOOR SILL - SECTION  
A606 Scale: 1:5

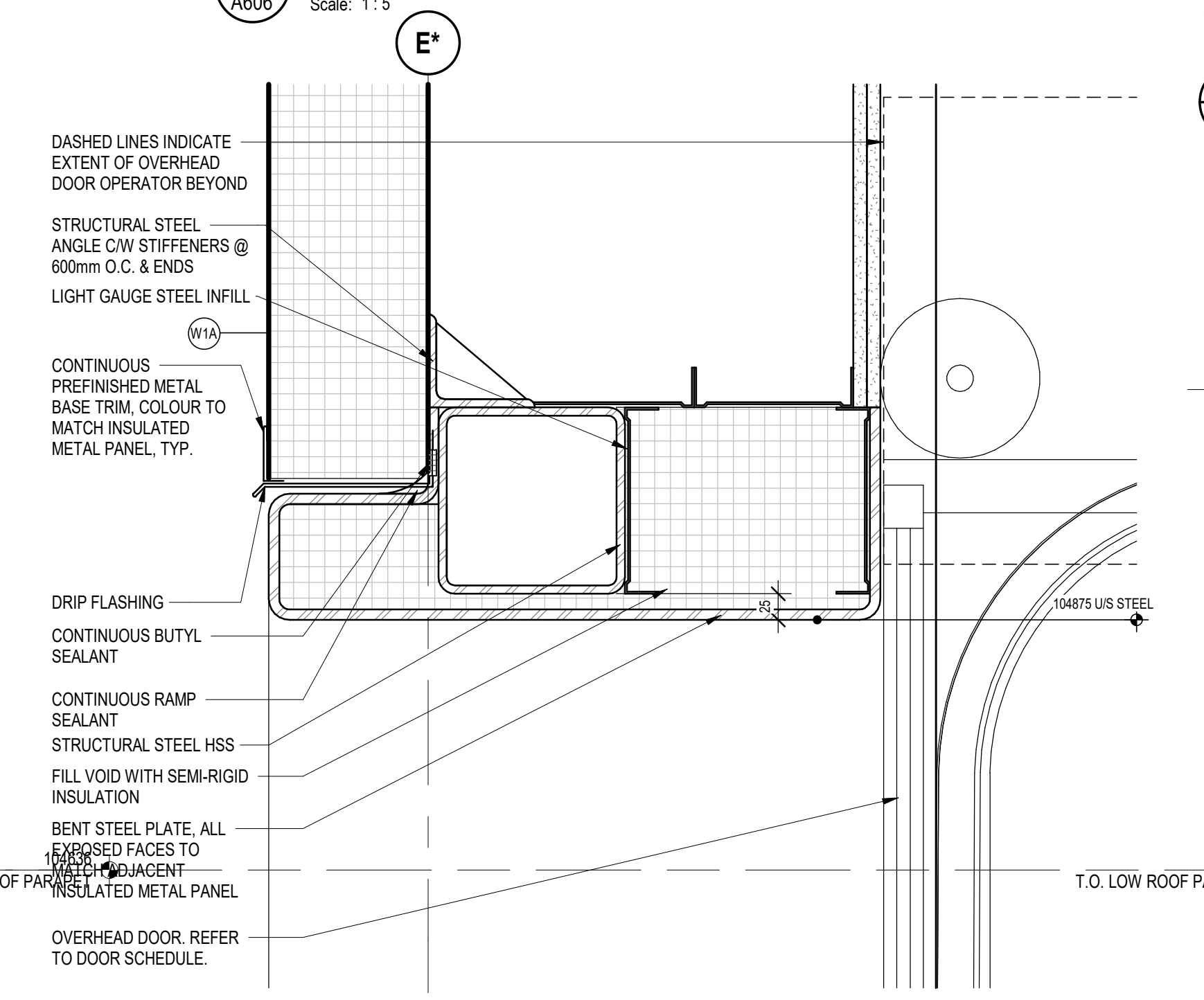


**12** SOUTH CANOPY FASCIA - SECTION  
A606 Scale: 1:5

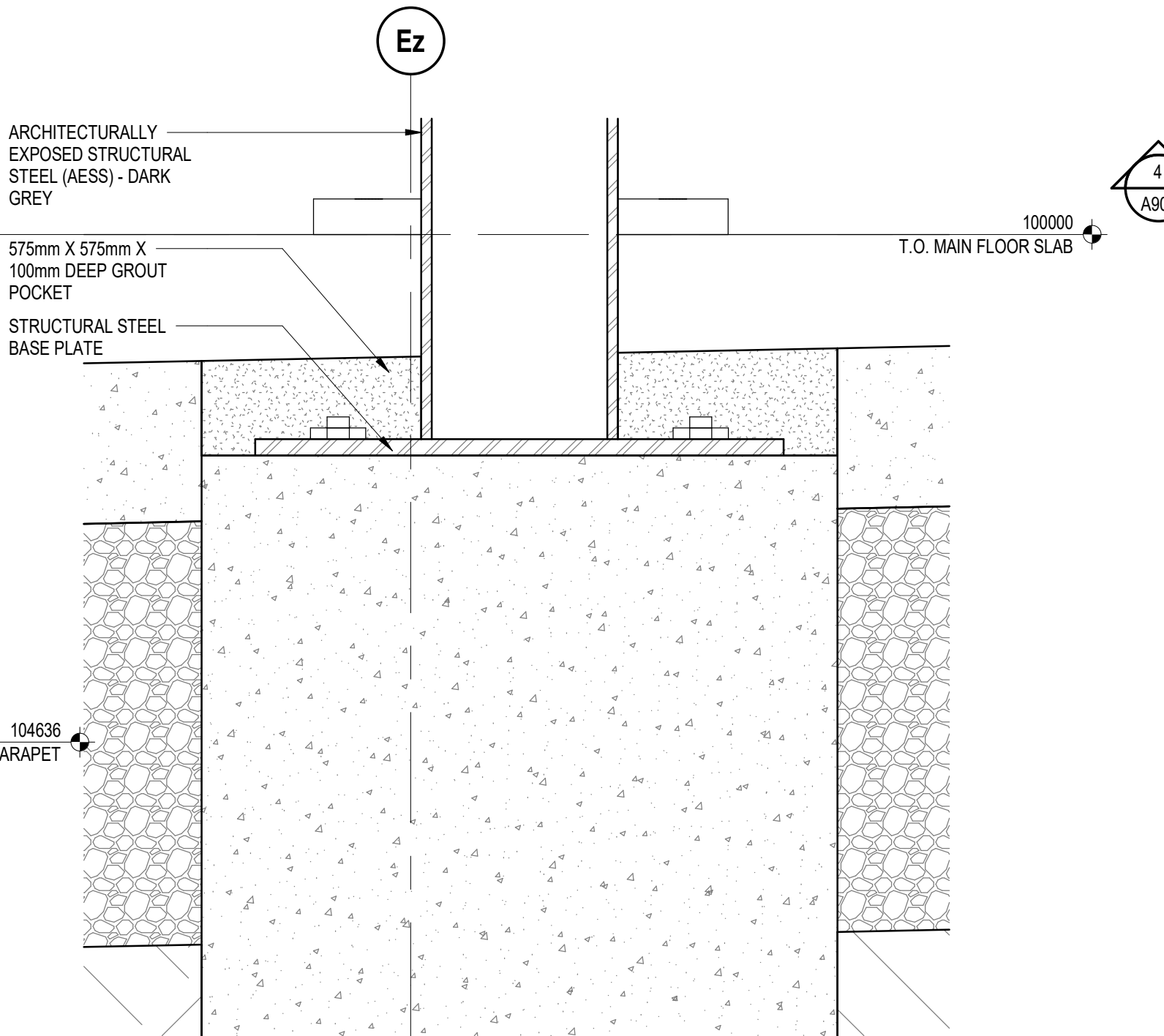
**13** TYP. WOOD SOFFIT TO ACM - SECTION  
A606 Scale: 1:5



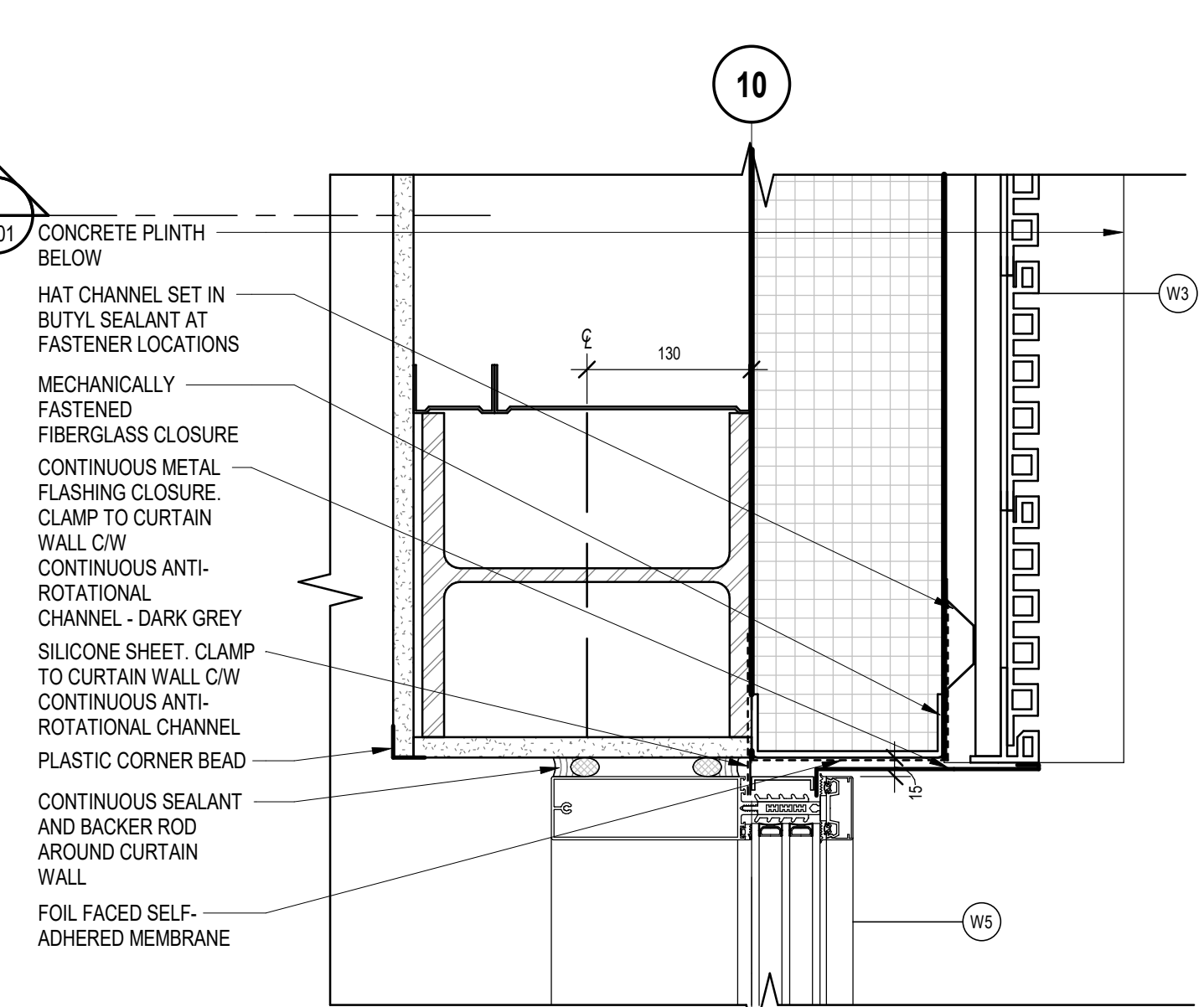
**5** SIGN GARAGE OH DOOR HEAD - SECTION  
A606 Scale: 1:5



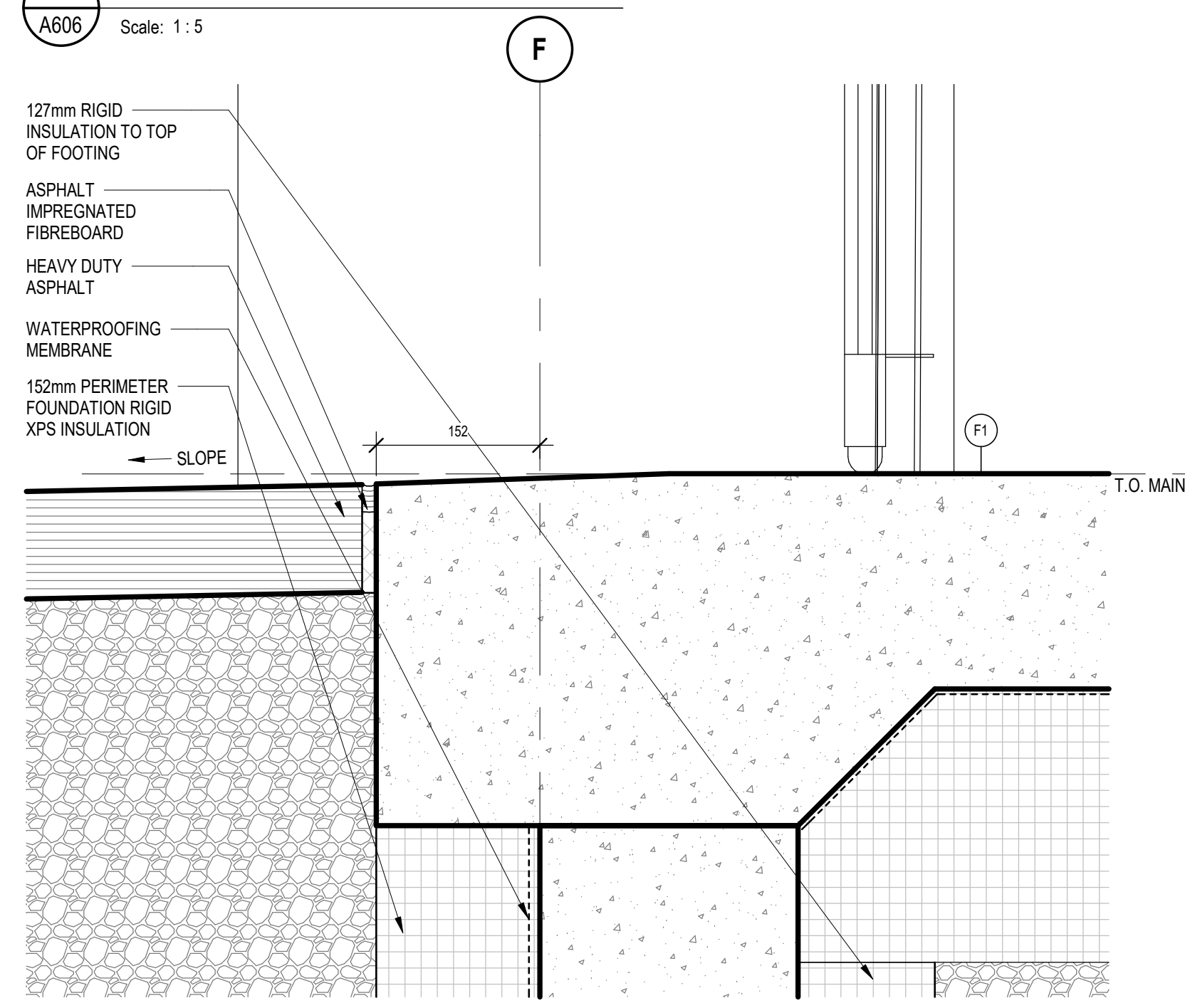
**6** TYP. OH DOOR HEAD - SECTION  
A606 Scale: 1:5



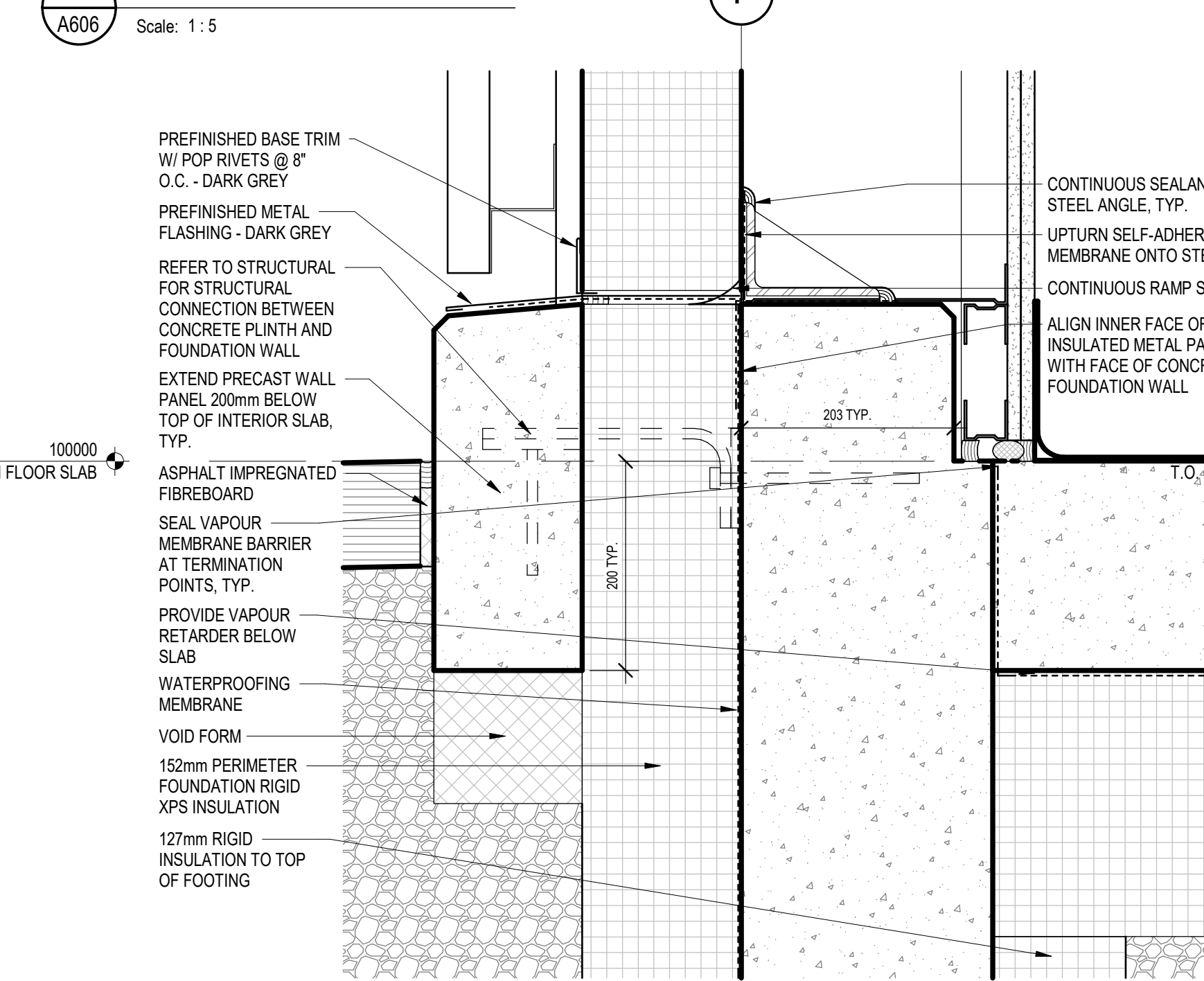
**11** COLUMN BASE - SECTION  
A606 Scale: 1:5



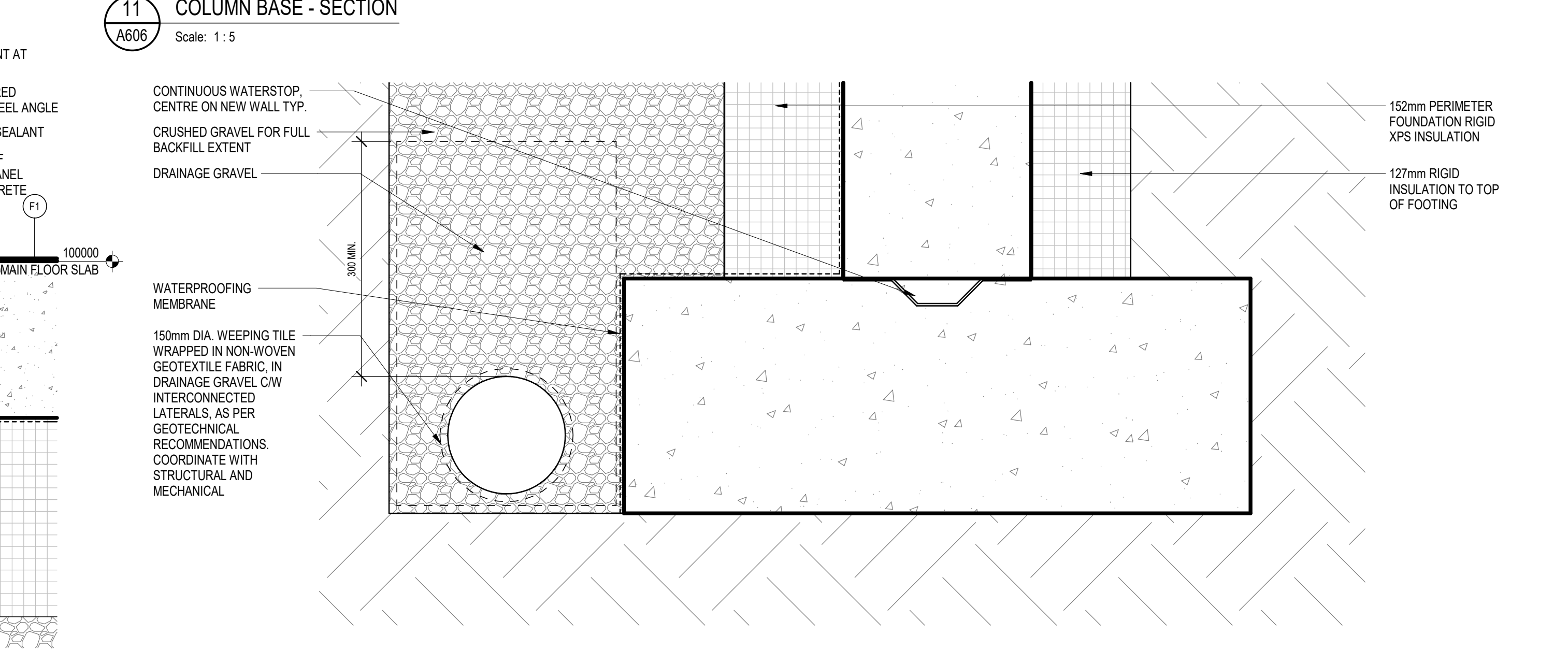
**7** CURTAIN WALL TO WOOD CLADDING - PLAN  
A606 Scale: 1:5



**8** TYP. OH DOOR SILL - SECTION  
A606 Scale: 1:5



**9** SIGN GARAGE METAL PANEL BASE - SECTION  
A606 Scale: 1:5

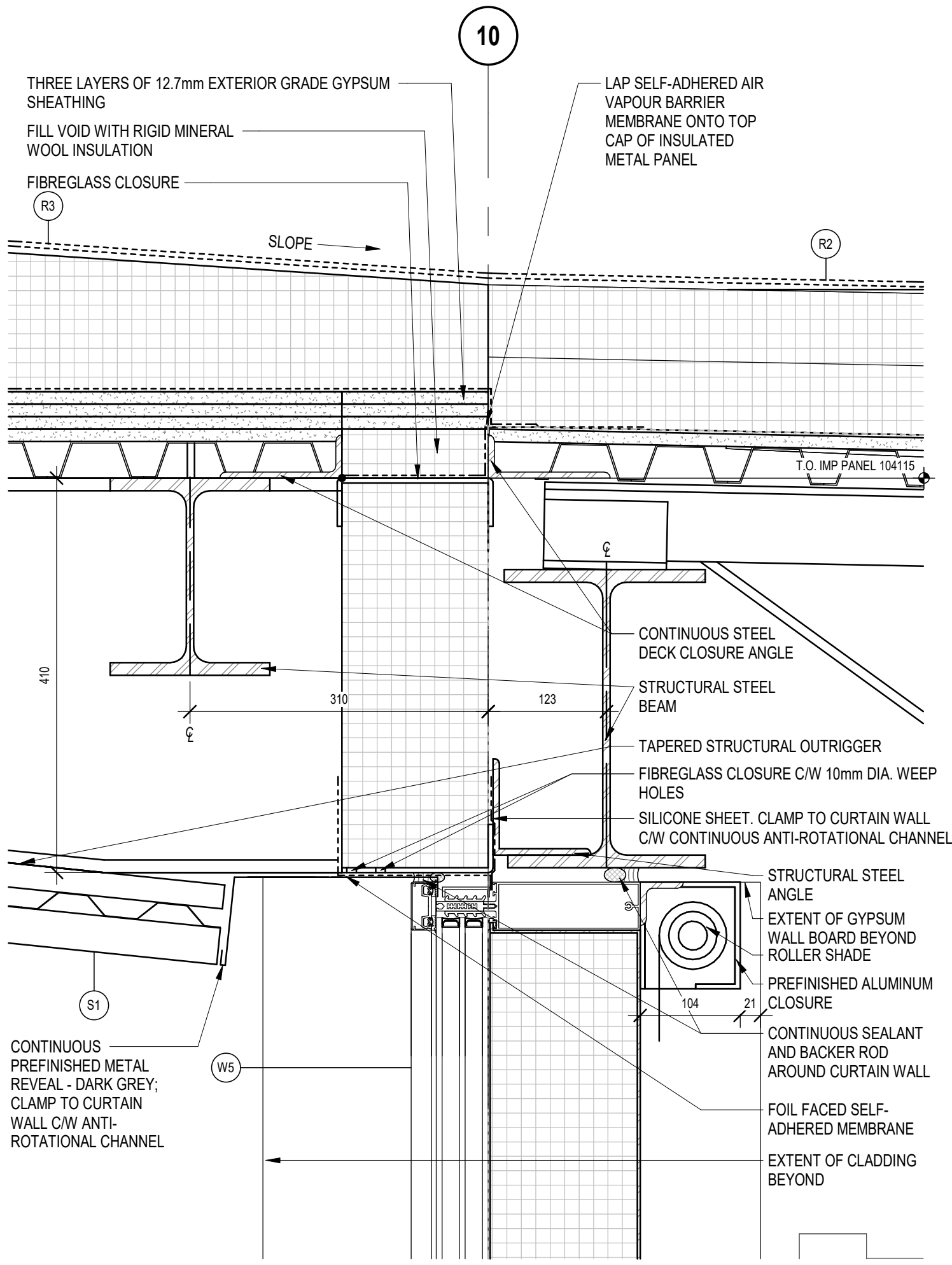


**10** TYP. WEEPING TILE AT PERIMETER FOUNDATION WALL - SECTION  
A606 Scale: 1:5

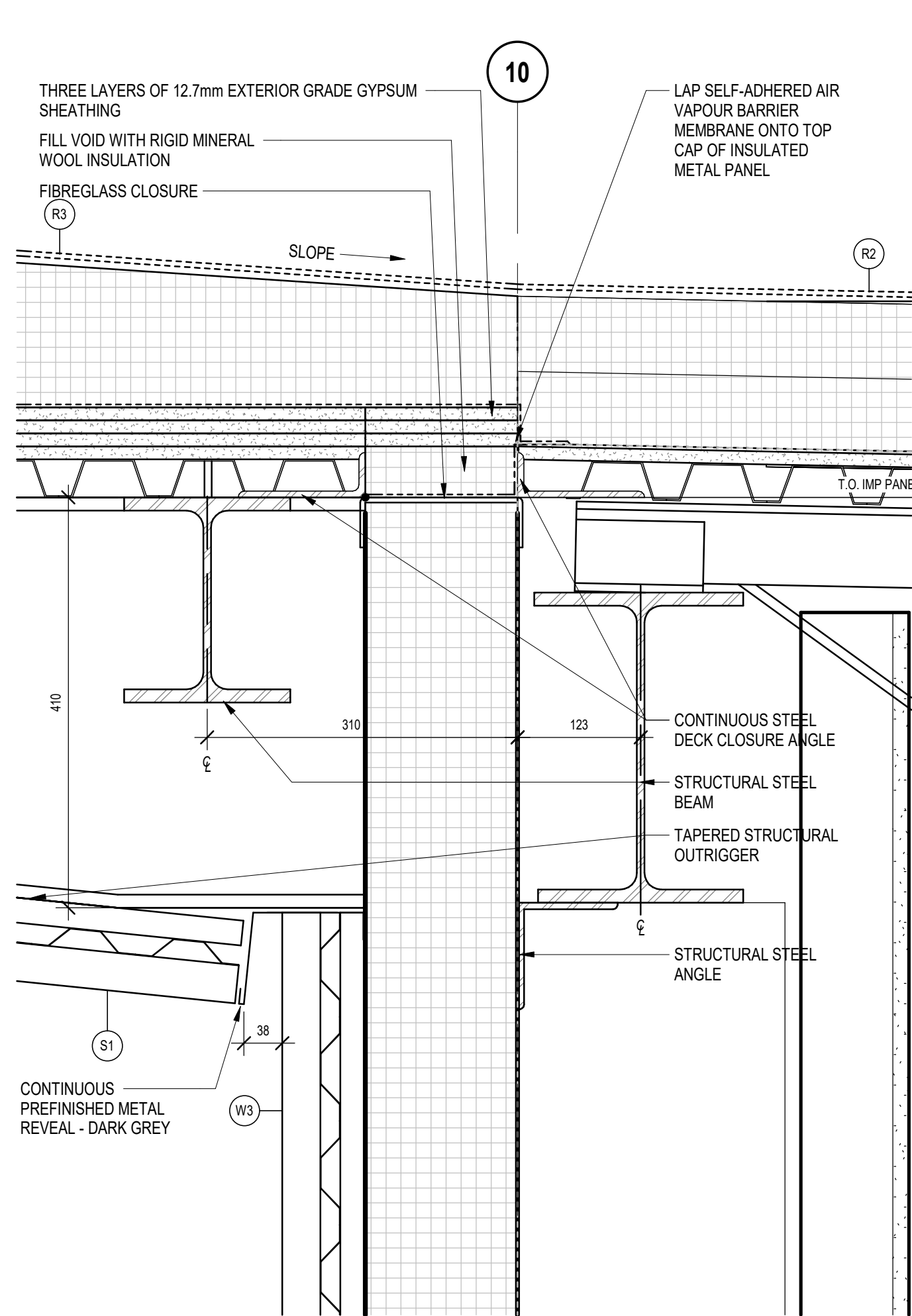
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5	REISSUED FOR TENDER	2025-05-23
4	ISSUED FOR TENDER	2025-04-25
3	ISSUED FOR BUILDING PERMIT	2024-11-27
2	ISSUED FOR PRE-TENDER REVIEW	2024-10-31
1	ISSUED FOR 60% CD	2024-05-02

ISSUED FOR		DATE
Drawing History		
Scale	1 : 5	Checked By TB
Region of York Project Number	22046	Region of York Building Code G013-B
Project	YORK REGION NORTH ROADS OPERATIONS CENTRE	
3525 BASELINE RD. SUTTON WEST, ON L0E 1R0		
Drawing Title		
DETAILS		
Project Number	Drawing Number	
6016	A606	
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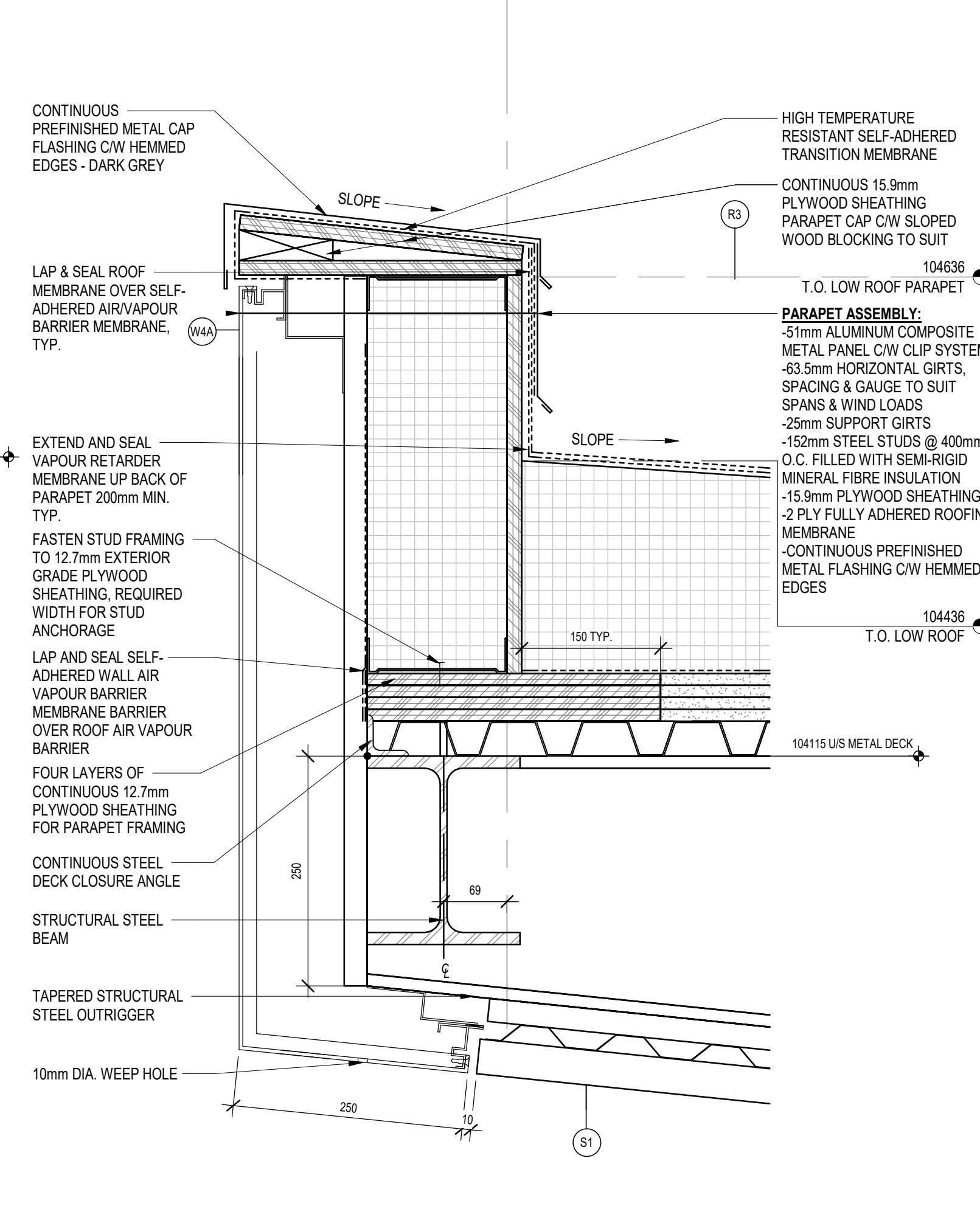




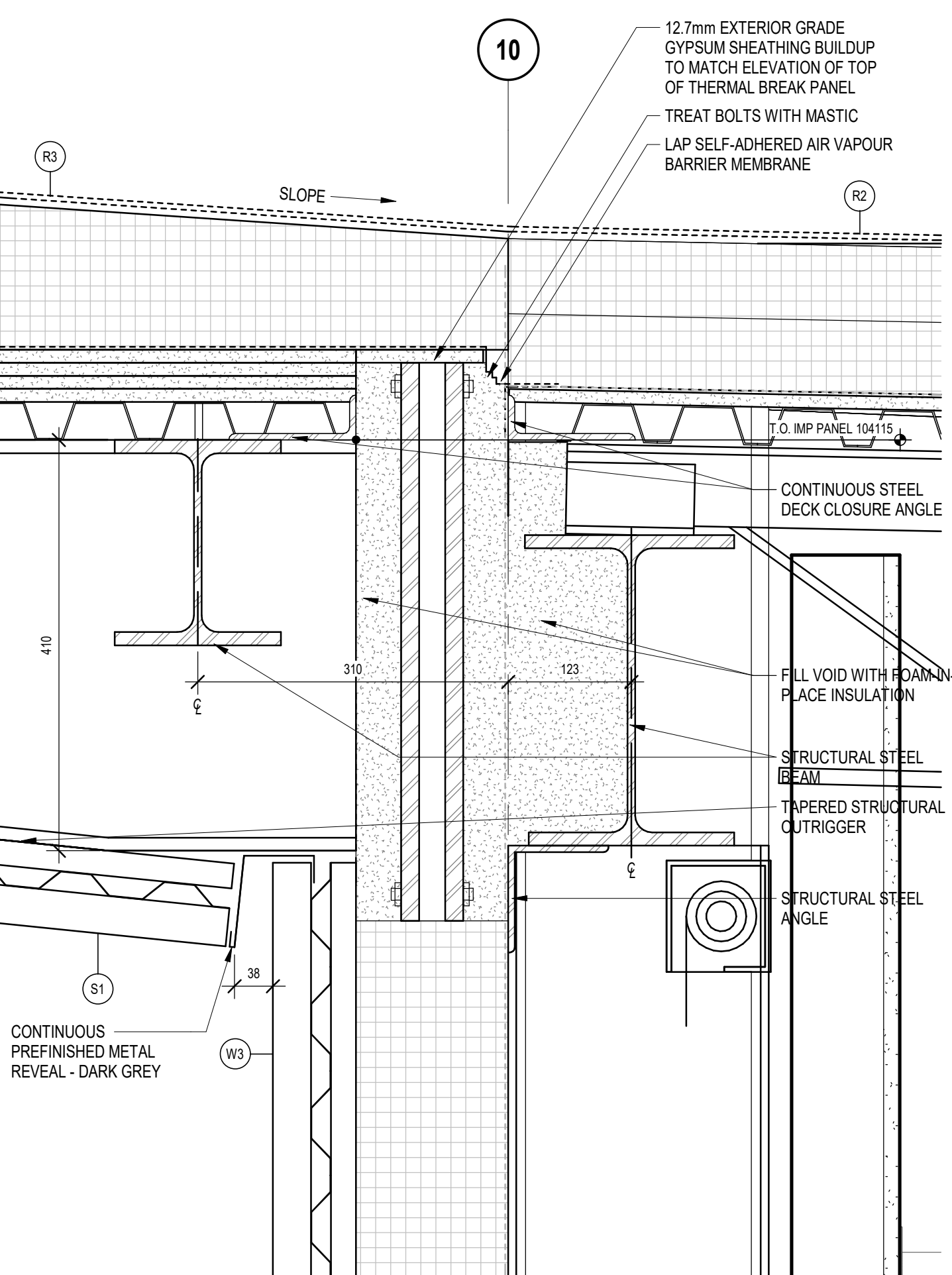
1 TYP. CANOPY AND CURTAIN WALL - SECTION  
A607 Scale: 1:5



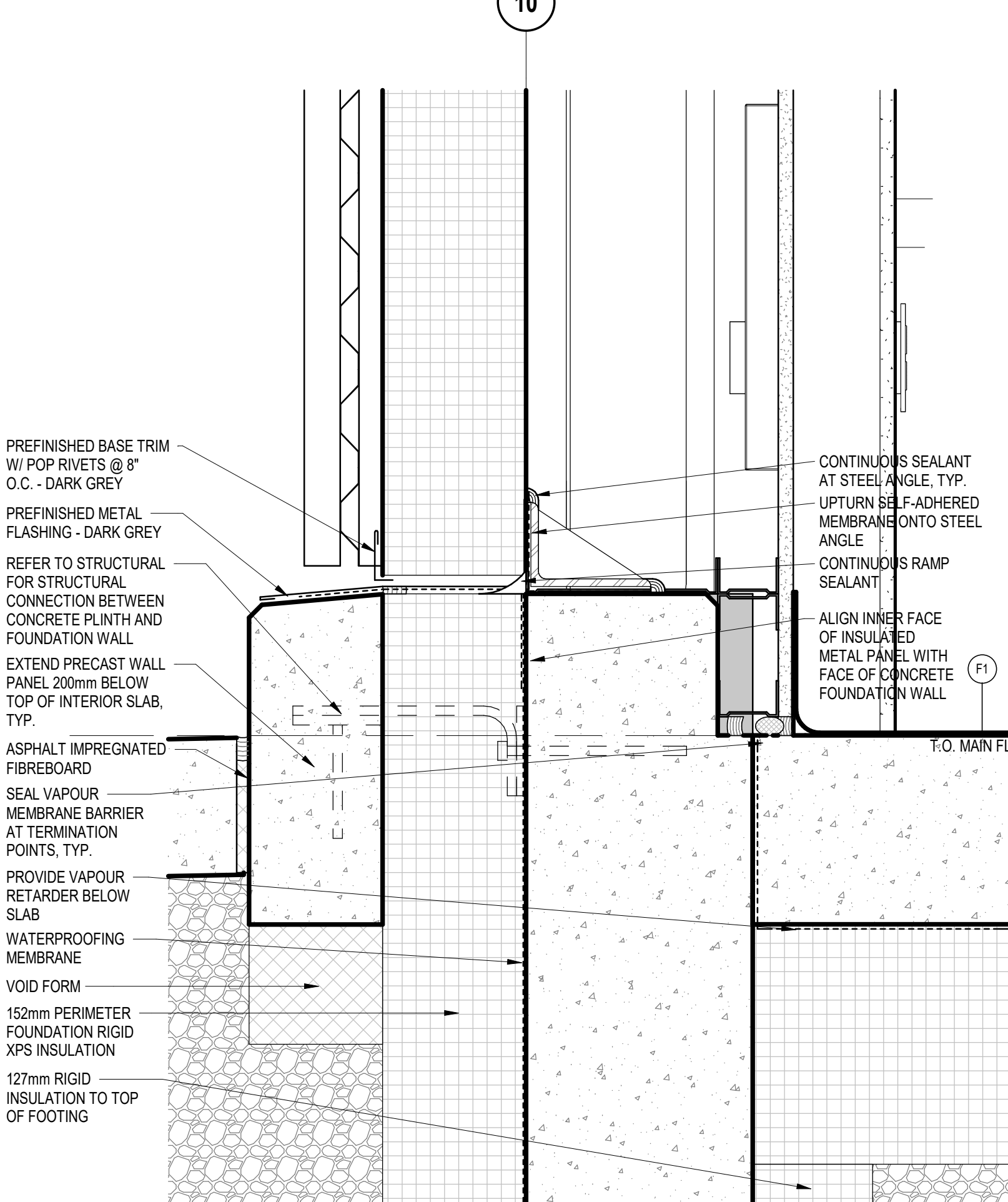
2 TYP. WOOD CLADDING TOP - SECTION  
A607 Scale: 1:5



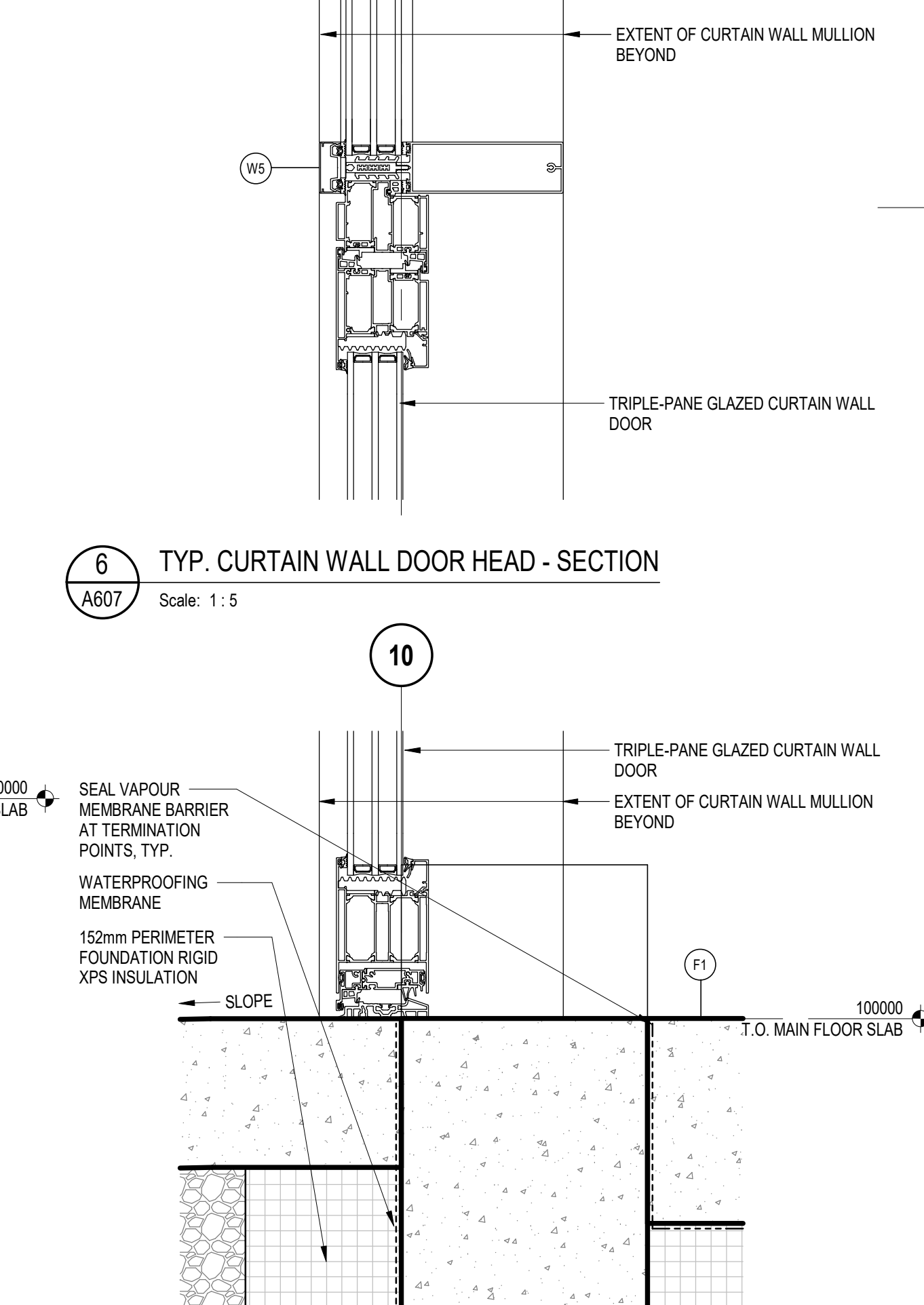
3 TYP. CANOPY FASCIA - SECTION  
A607 Scale: 1:5



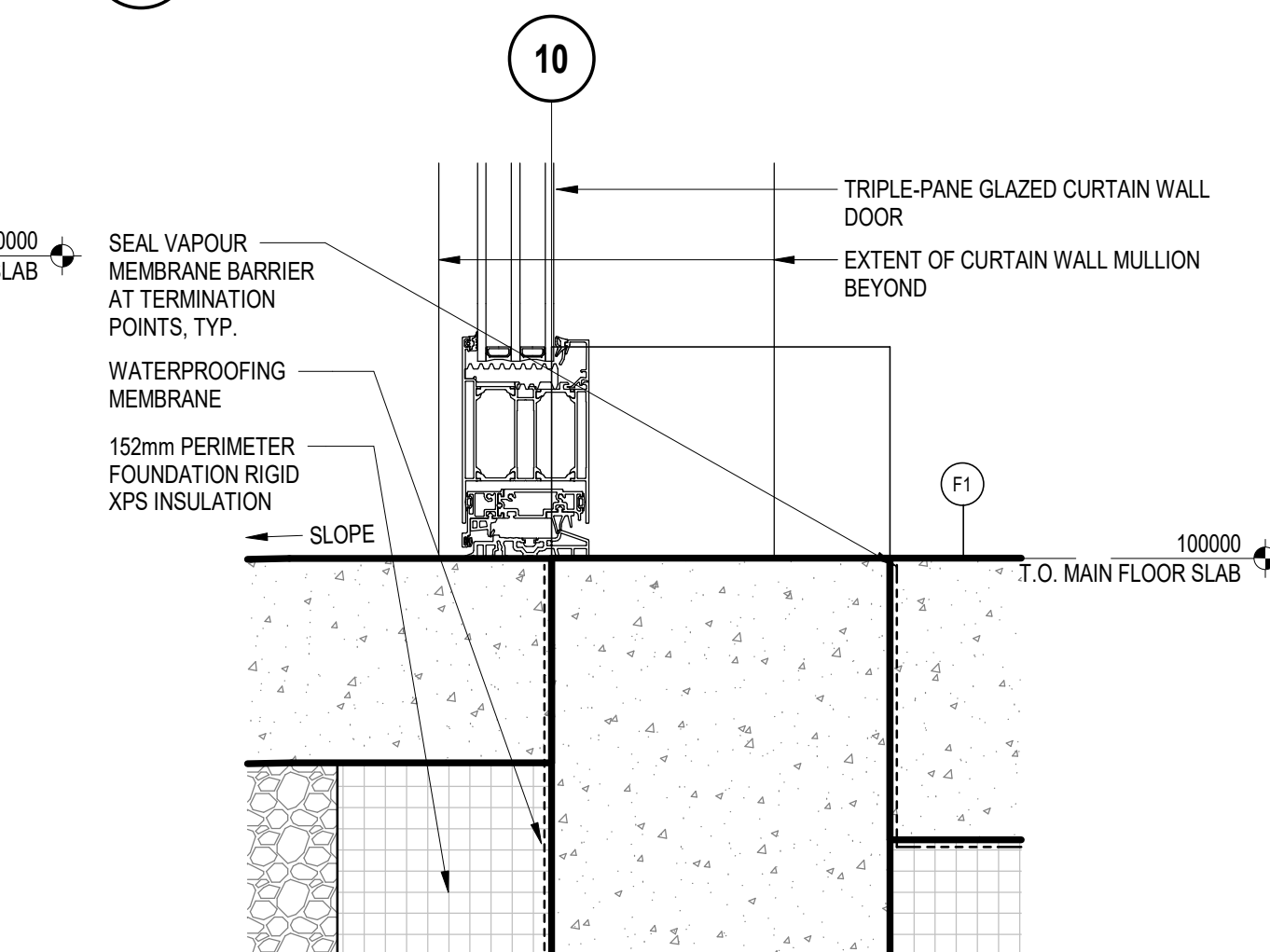
4 TYP. CANOPY AT MOMENT CONNECTION - SECTION  
A607 Scale: 1:5



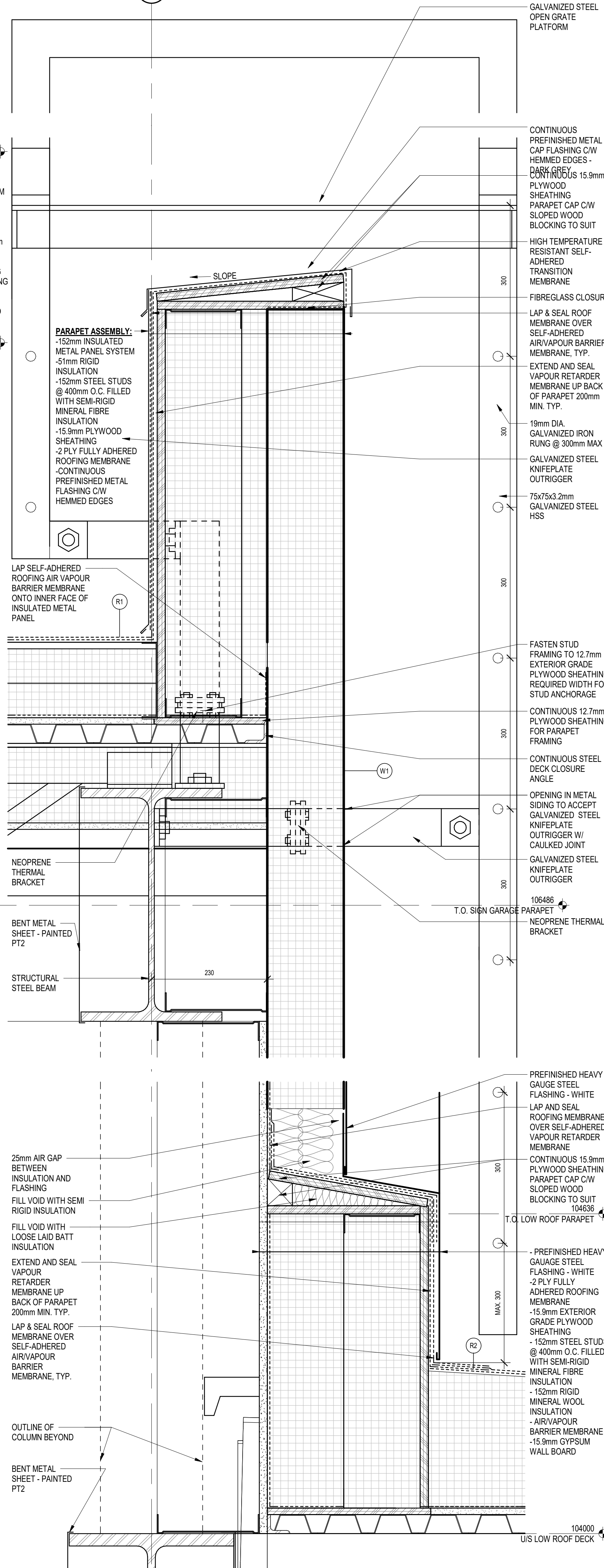
5 TYP. WOOD CLADDING BASE - SECTION  
A607 Scale: 1:5



6 TYP. CURTAIN WALL DOOR HEAD - SECTION  
A607 Scale: 1:5



7 TYP. CURTAIN WALL DOOR SILL - SECTION  
A607 Scale: 1:5



8 ROOF ACCESS LADDER - SECTION  
A607 Scale: 1:5

Project Team:

Prime Consultant  
**GEC ARCHITECTURE**

Structural and Building Envelope Consultant  
**ENTUITIVE**

Mechanical and Electrical Consultant  
**MCW CONSULTANTS LTD.**

Civil Consultant  
**PLANMAC ENGINEERING**

Passive House Consultant  
**PEEL PASSIVE HOUSE**

LEED Consultant  
**MCW CONSULTANTS LTD.**

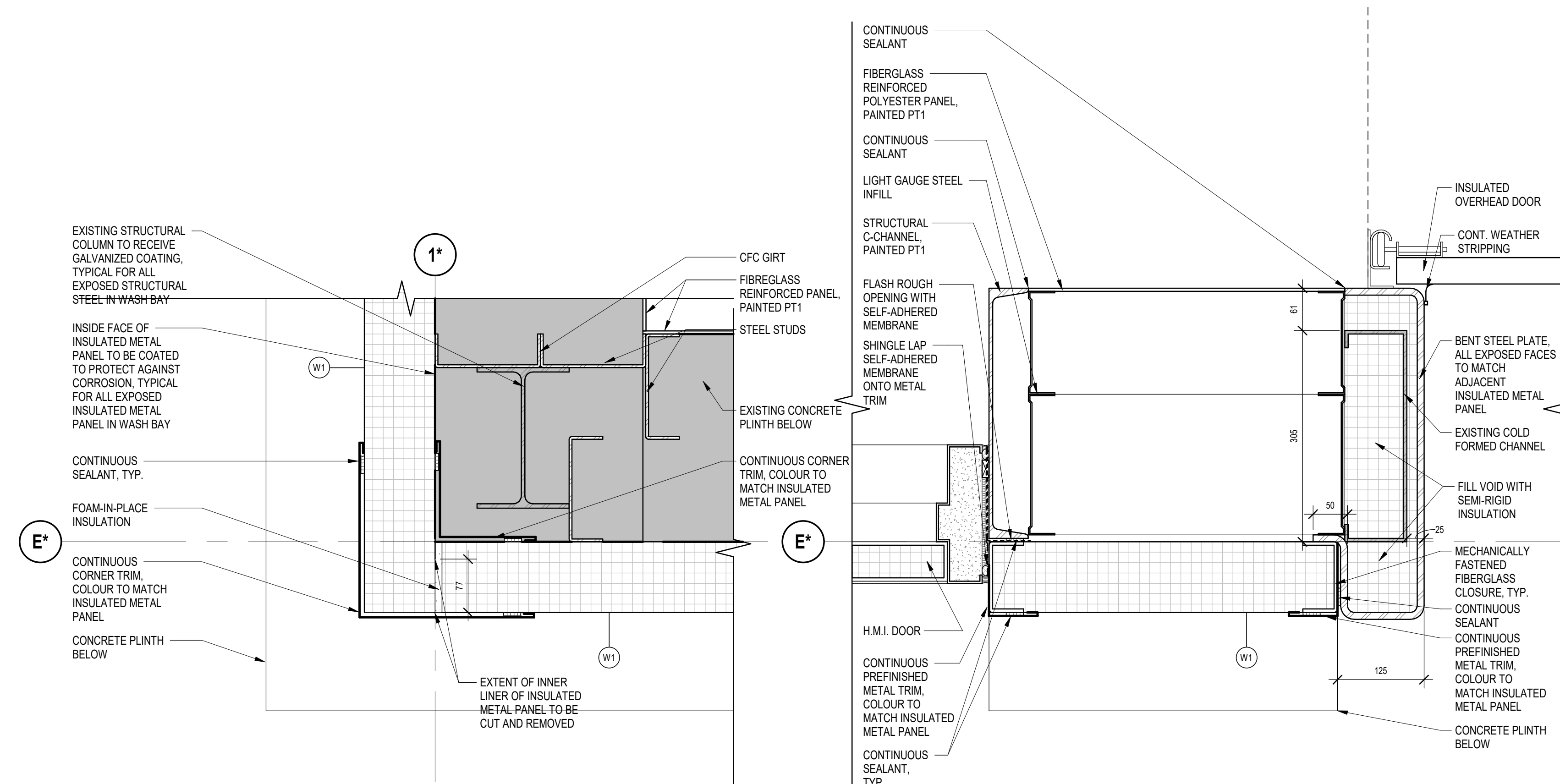
Landscape Consultant  
**MHBC**

Client

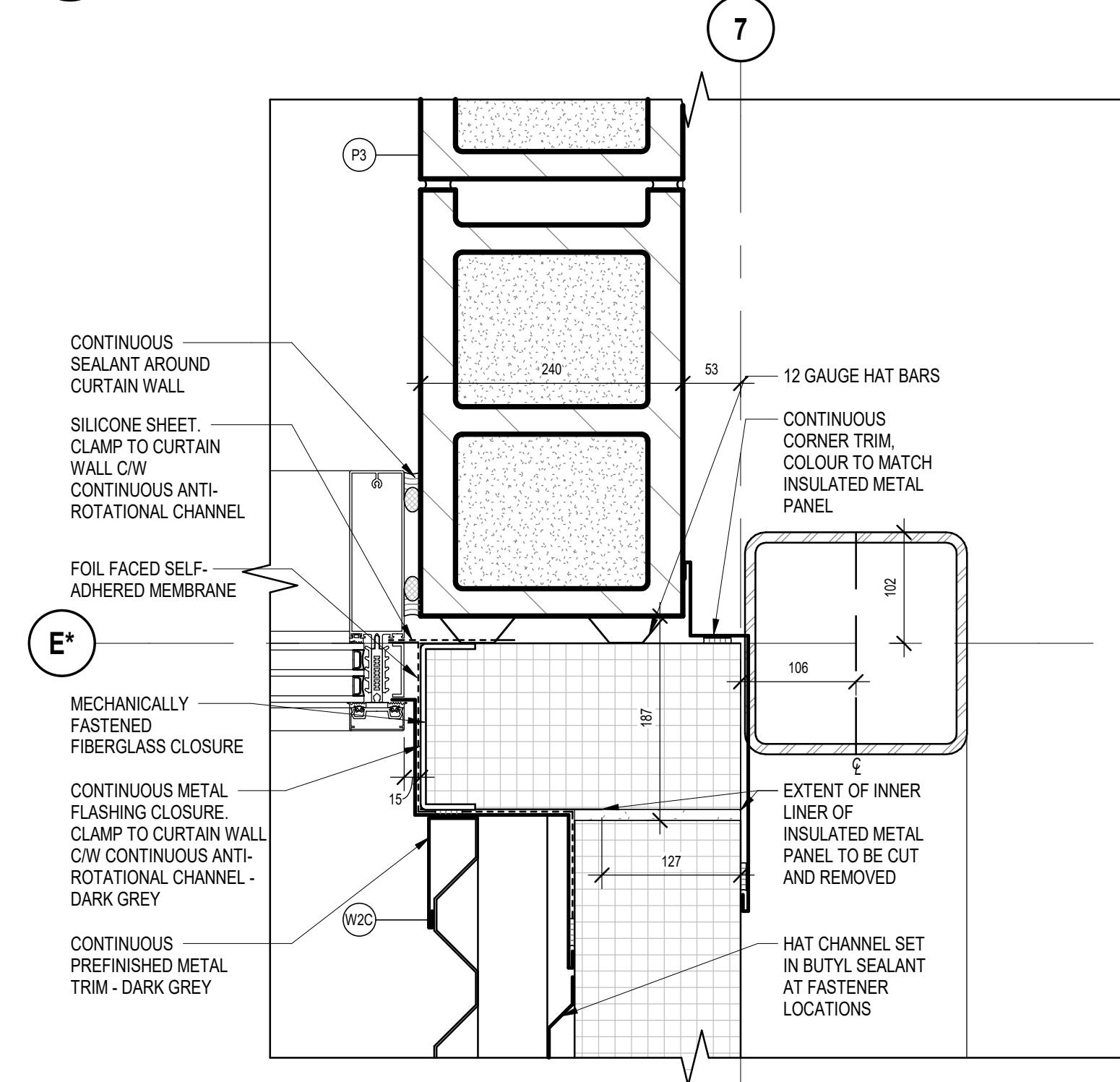
**YORK REGION**



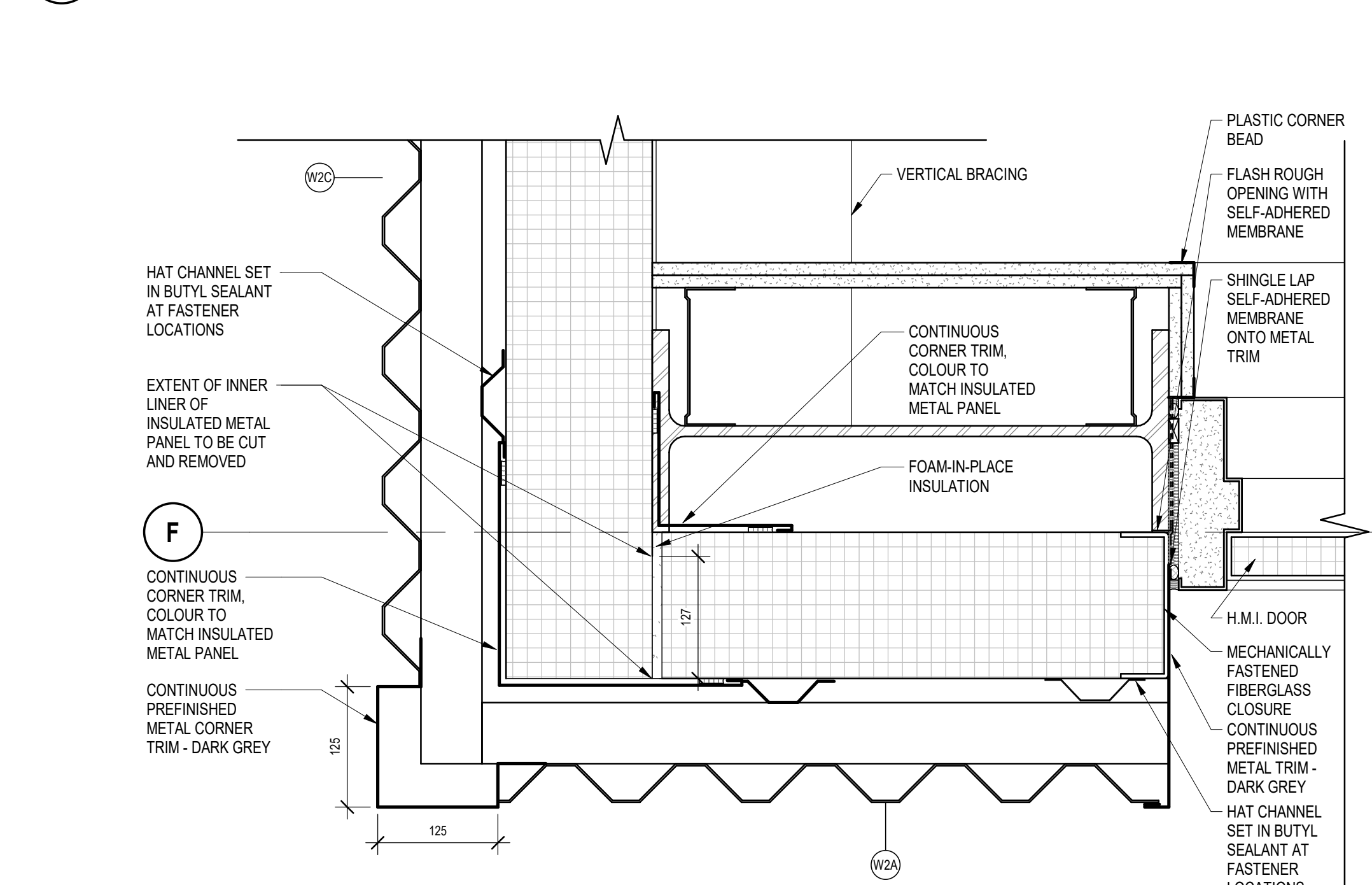
Seal & Permit



1 OUTSIDE CORNER AT INSULATED METAL PANEL - PLAN  
A608 Scale: 1:5

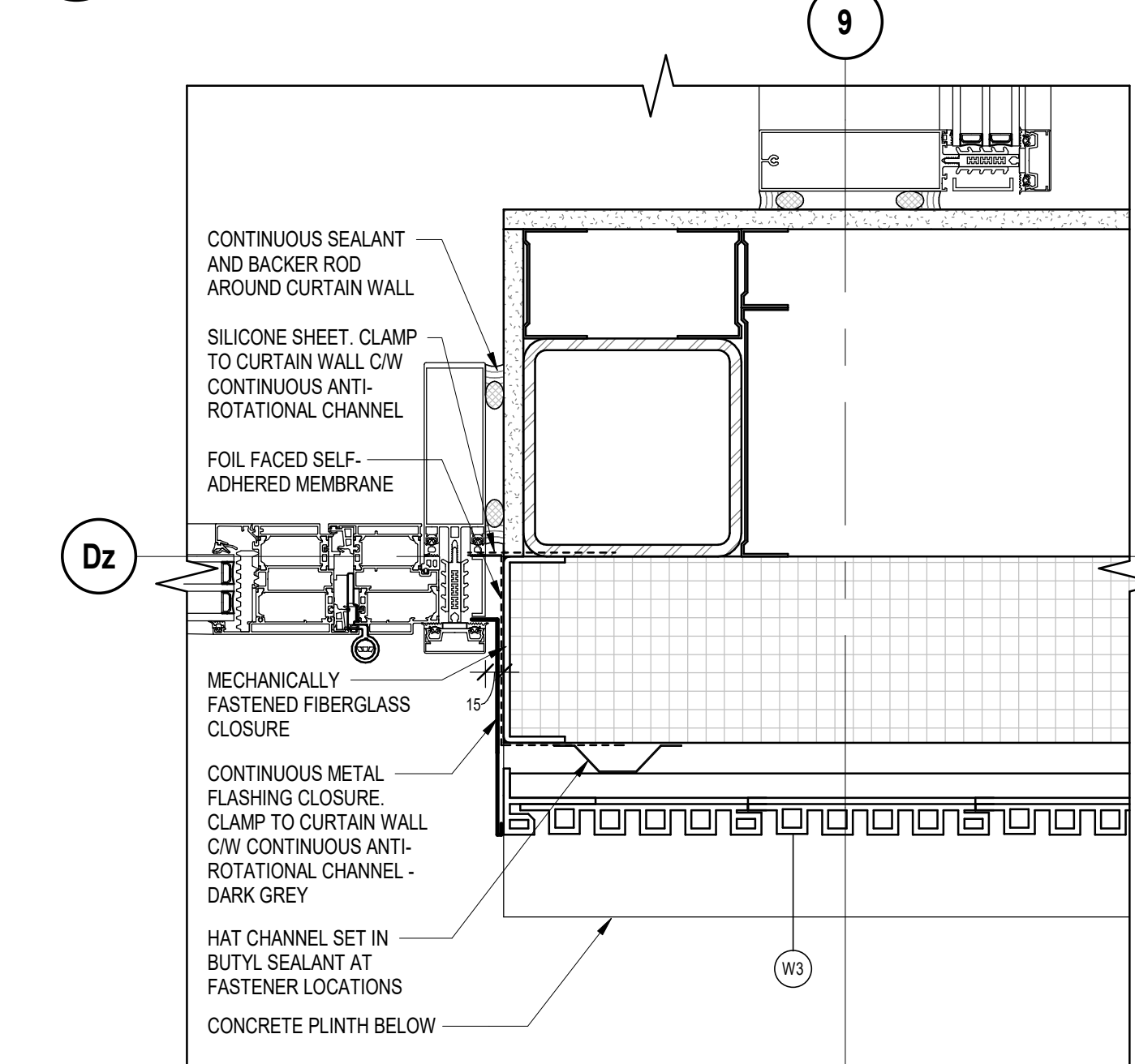


5 CURTAIN WALL TO CORRUGATED METAL PANEL - PLAN  
A608 Scale: 1:5

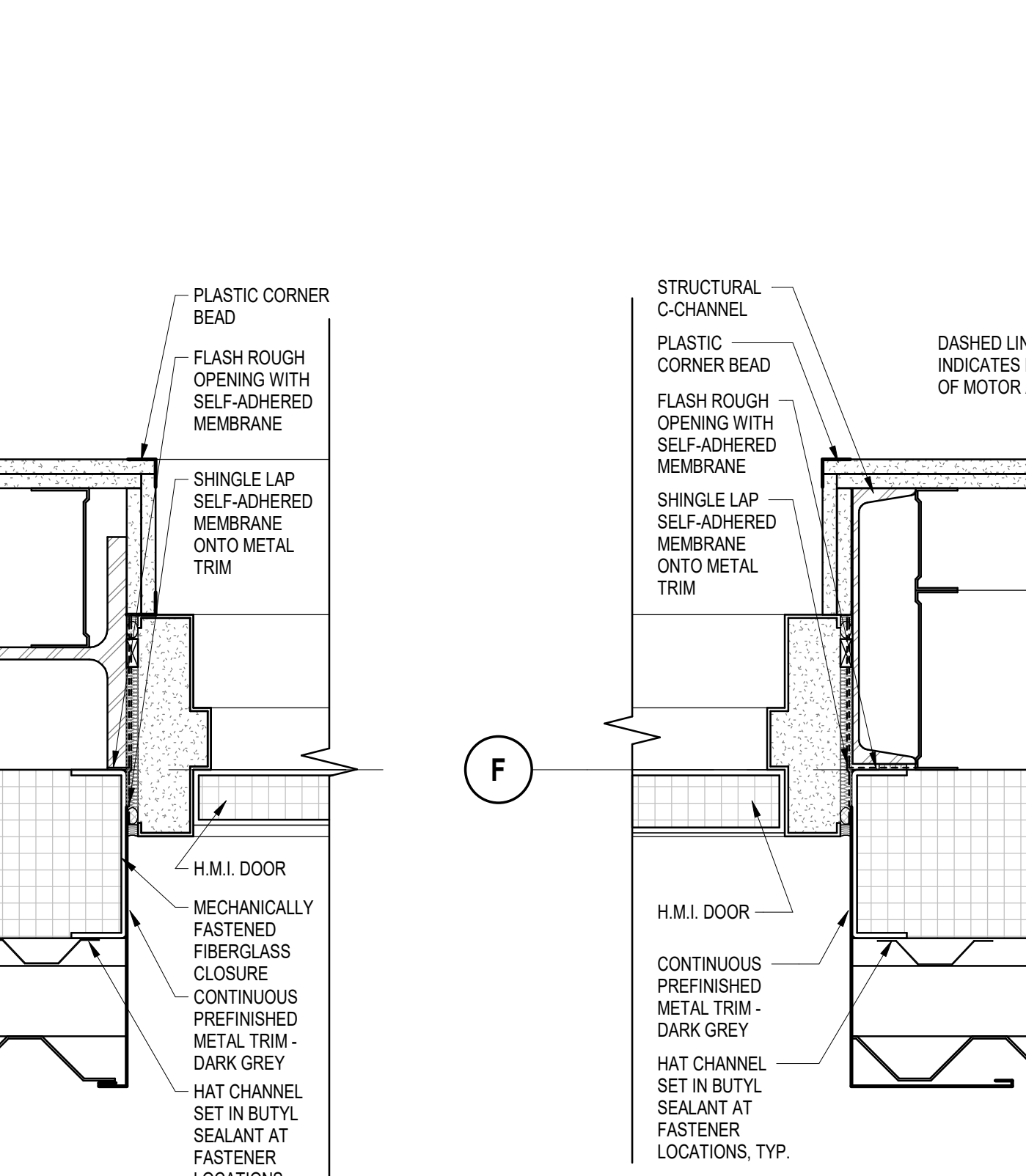


9 OUTSIDE CORNER AT INSULATED METAL PANEL - PLAN 2  
A608 Scale: 1:5

2 OH DOOR AND PEDESTRIAN DOOR JAMBS - PLAN 1  
A608 Scale: 1:5

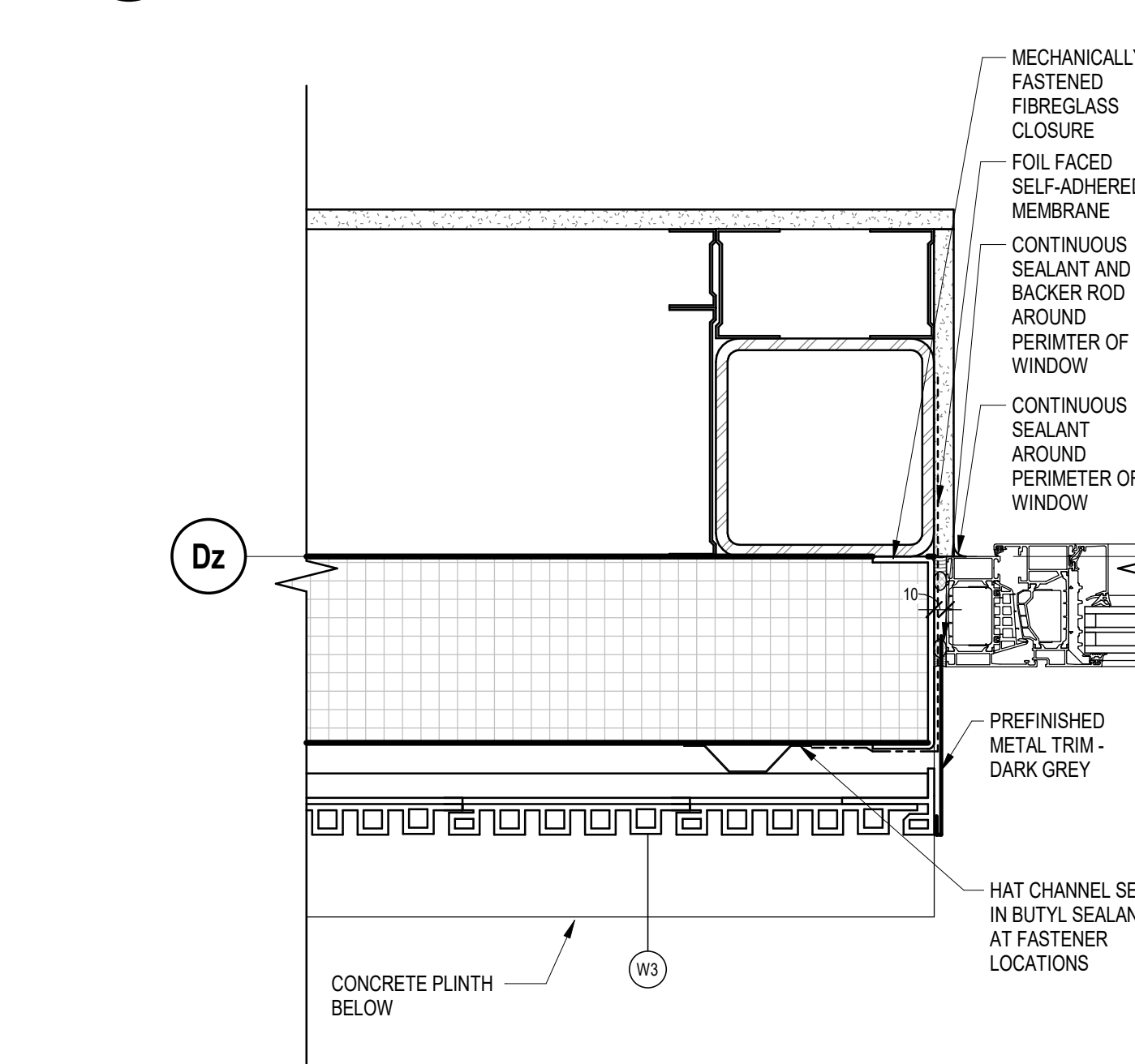


6 CURTAIN WALL DOOR TO WOOD CLADDING - PLAN  
A608 Scale: 1:5

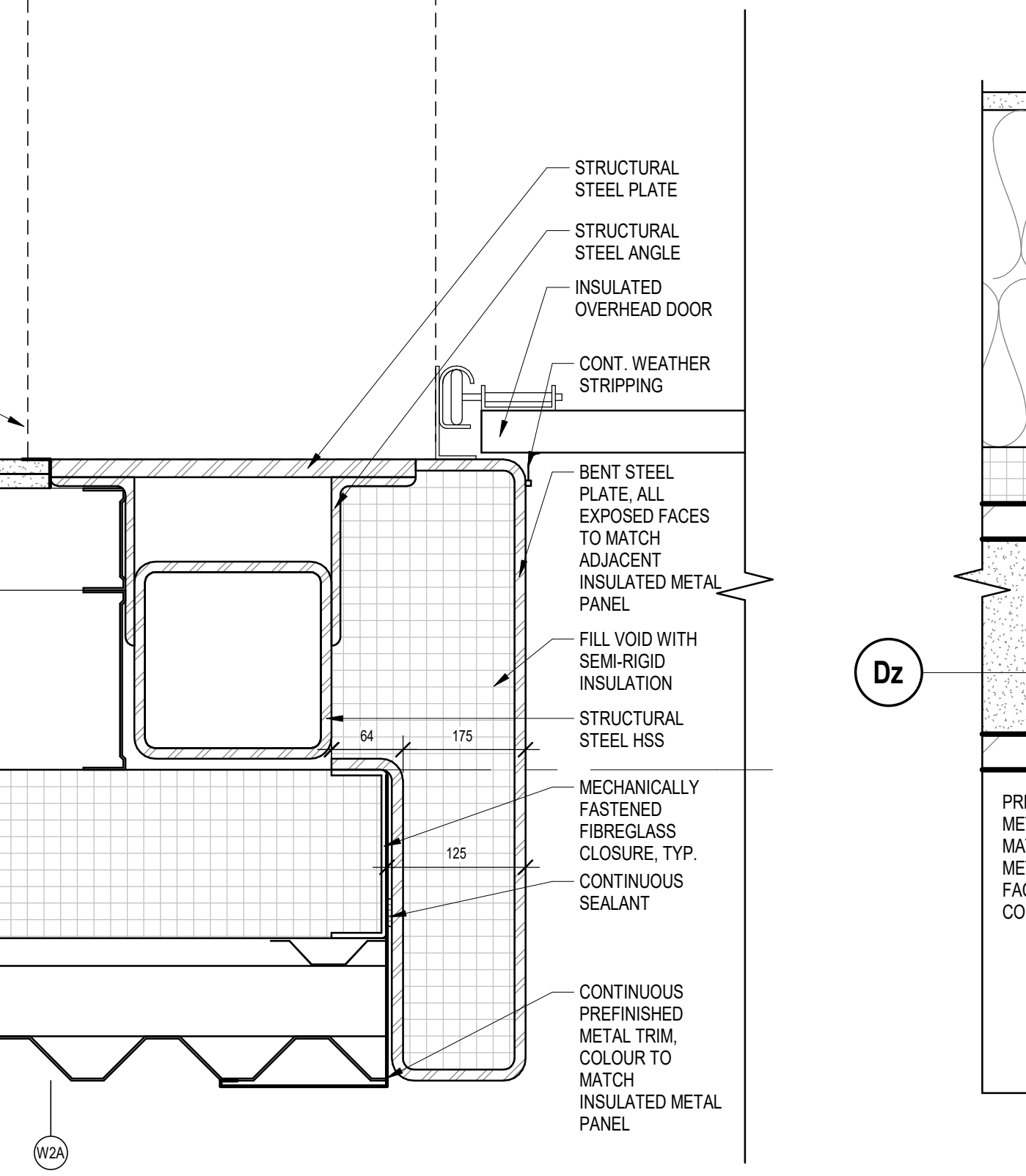


10 OH DOOR AND PEDESTRIAN DOOR JAMBS - PLAN 3  
A608 Scale: 1:5

3 OH DOOR AND PEDESTRIAN DOOR JAMBS - PLAN 2  
A608 Scale: 1:5

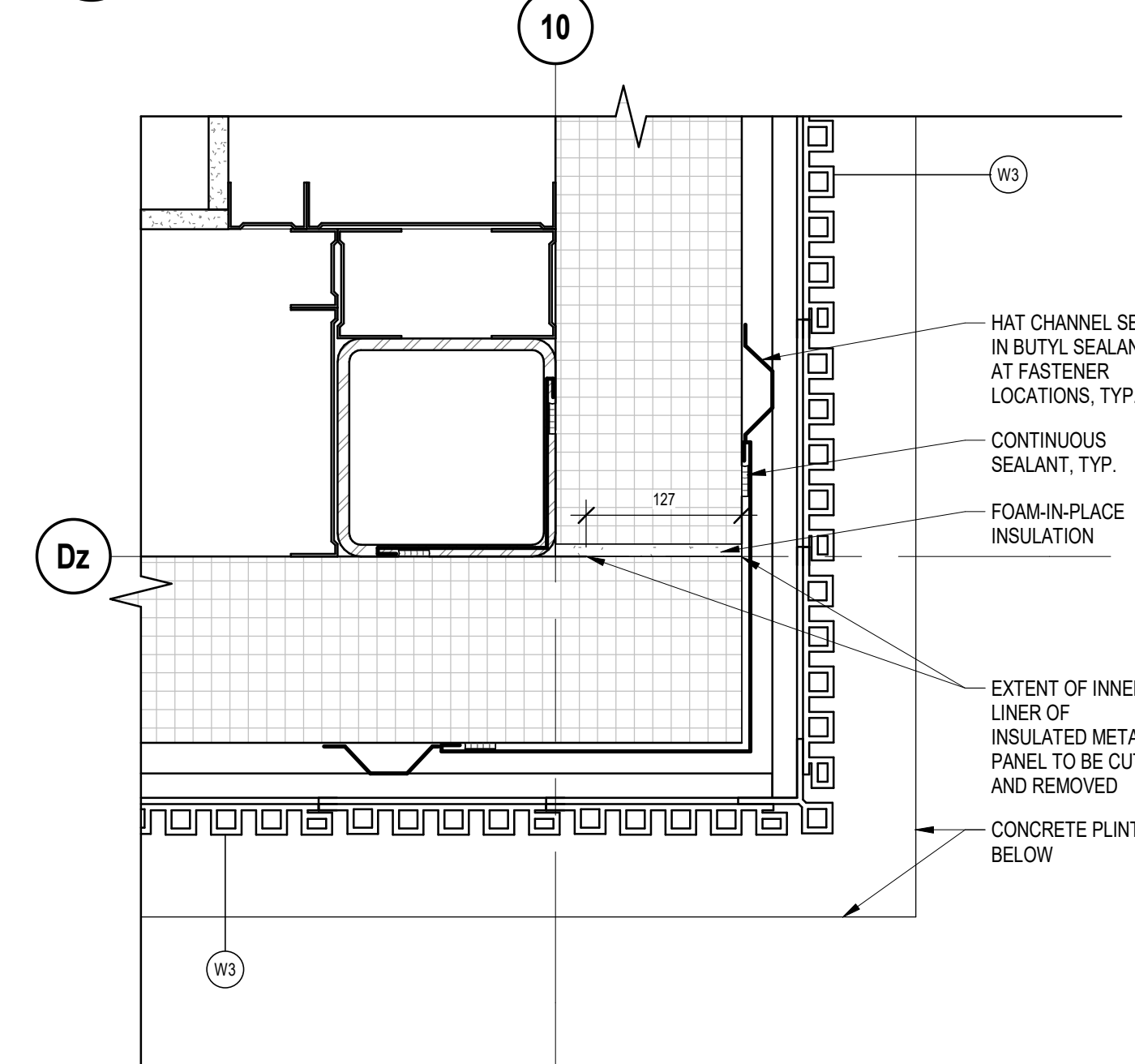


7 WINDOW TO WOOD CLADDING - PLAN  
A608 Scale: 1:5

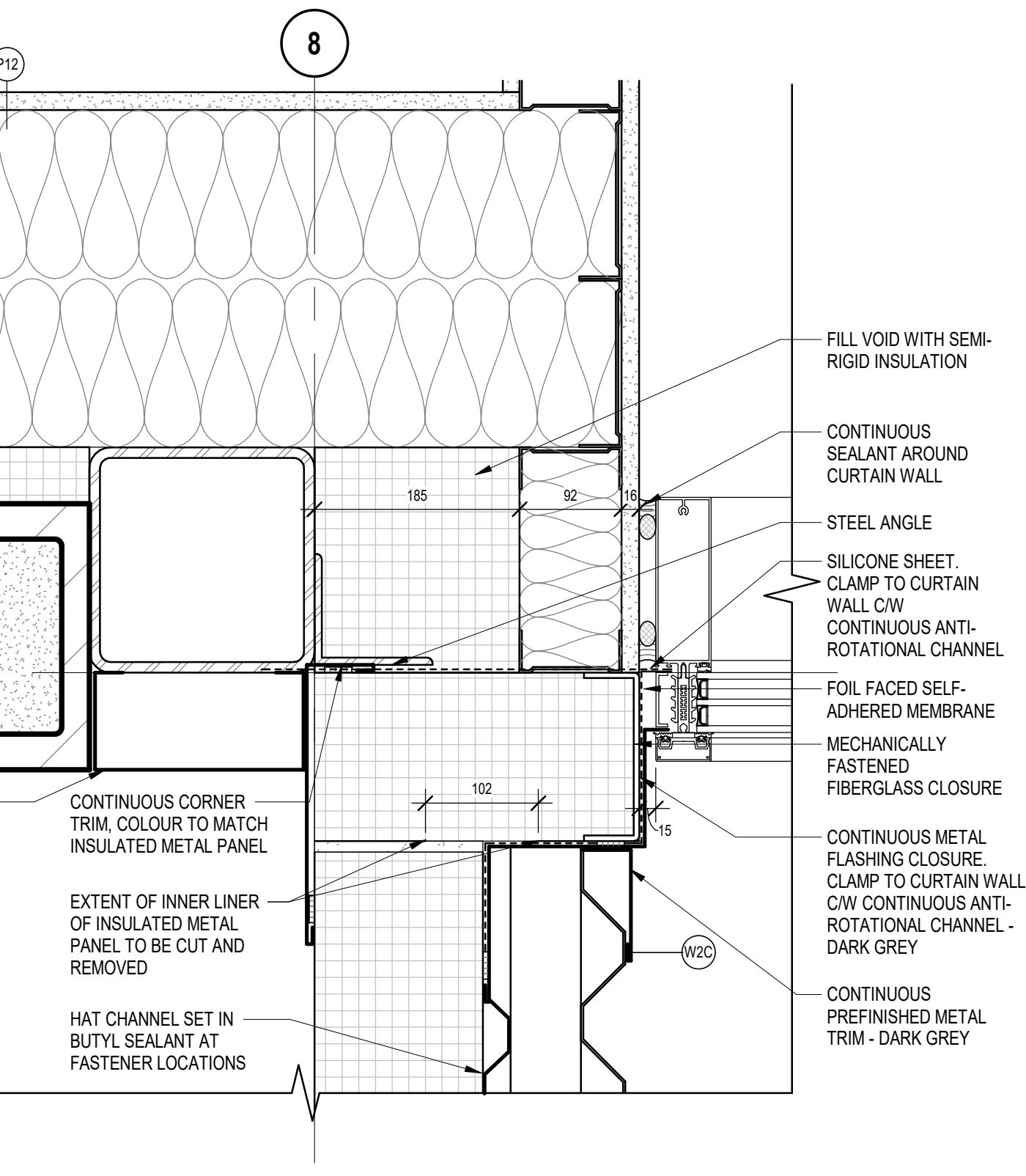


10 OH DOOR AND PEDESTRIAN DOOR JAMBS - PLAN 3  
A608 Scale: 1:5

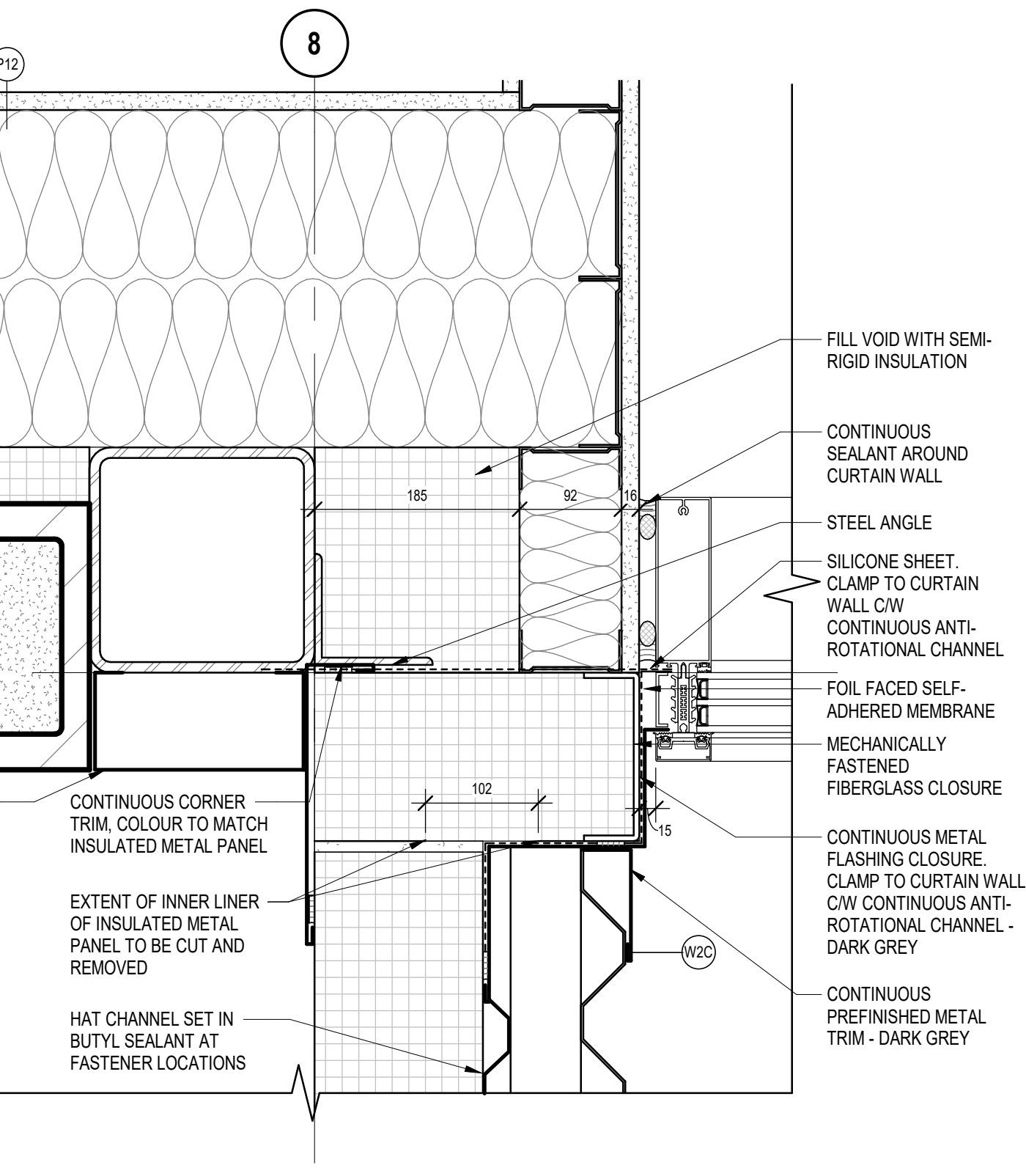
4 INSULATED METAL PANEL TO CURTAIN WALL - PLAN  
A608 Scale: 1:5



8 OUTSIDE CORNER AT WOOD CLADDING - PLAN  
A608 Scale: 1:5



11 INSIDE CORNER AT INSULATED METAL PANEL AND CURTAIN WALL - PLAN  
A608 Scale: 1:5



6	ISSUED FOR ADDENDUM 4	2025-07-18
5	REISSUED FOR TENDER	2025-05-23
4	ISSUED FOR TENDER	2025-04-25
3	ISSUED FOR BUILDING PERMIT REVIEW	2024-11-27
2	ISSUED FOR PRE-TENDER REVIEW	2024-10-31
1	ISSUED FOR 60% CD	2024-05-02
NO.	ISSUED FOR	DATE

Scale	1:5	Checked By	TB
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Region of York Project Number	22046	Region of York Building Code	G013-B
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Project  
**YORK REGION NORTH ROADS OPERATIONS CENTRE**

3525 BASELINE RD, SUTTON WEST, ON L0E 1R0

Drawing Title  
**DETAILS**

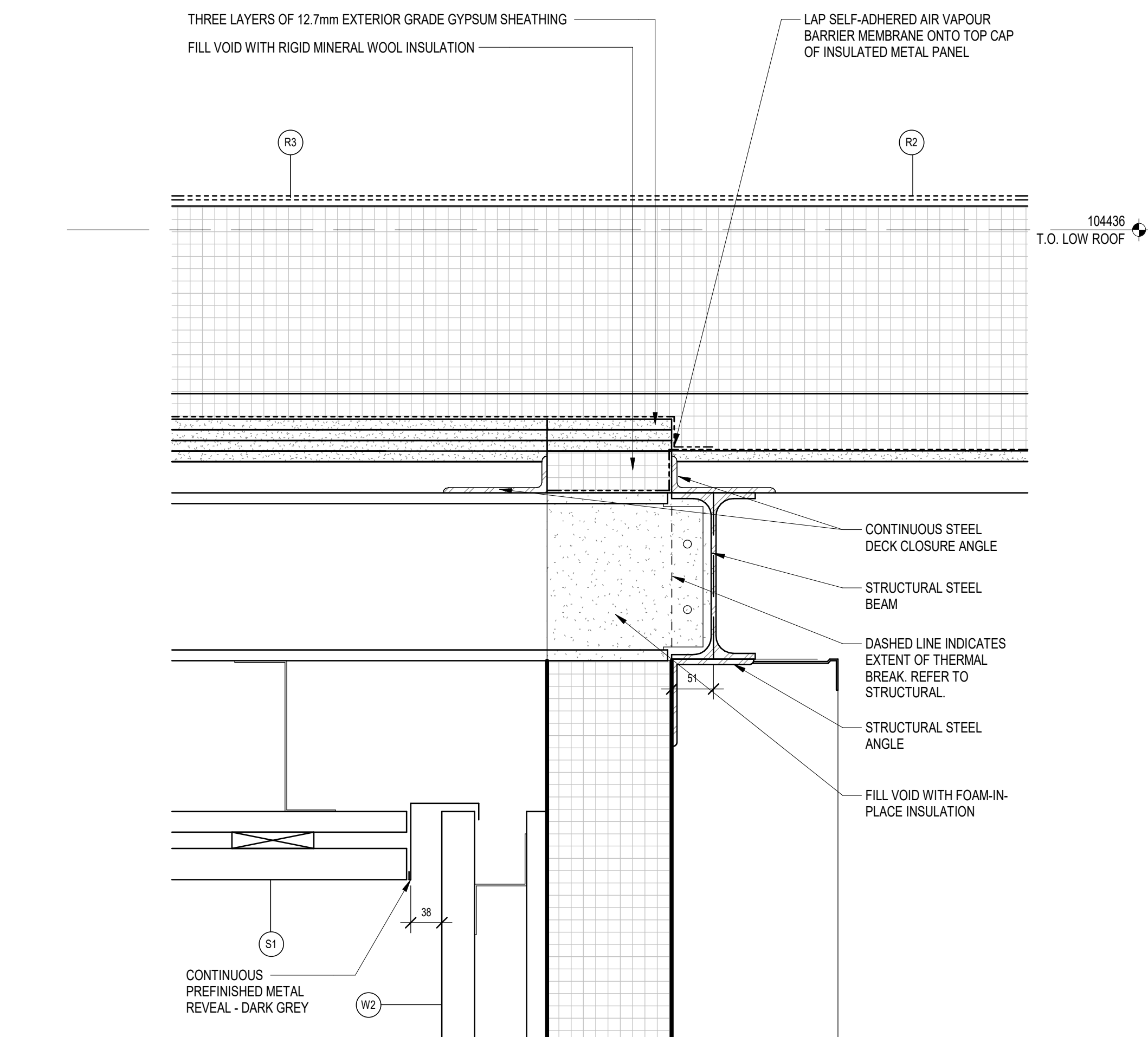
Project Number  
**6016**

Drawing Number  
**A608**

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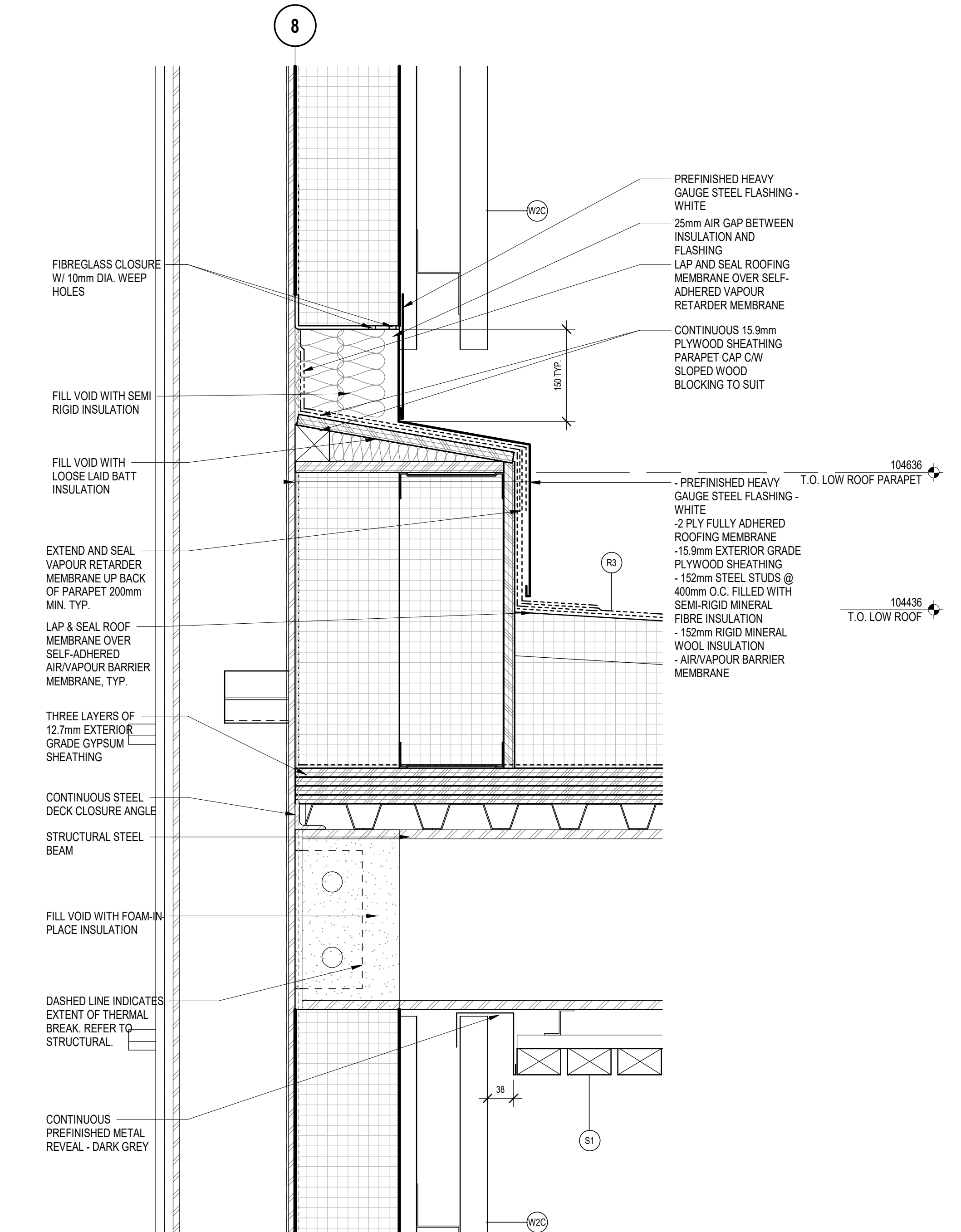






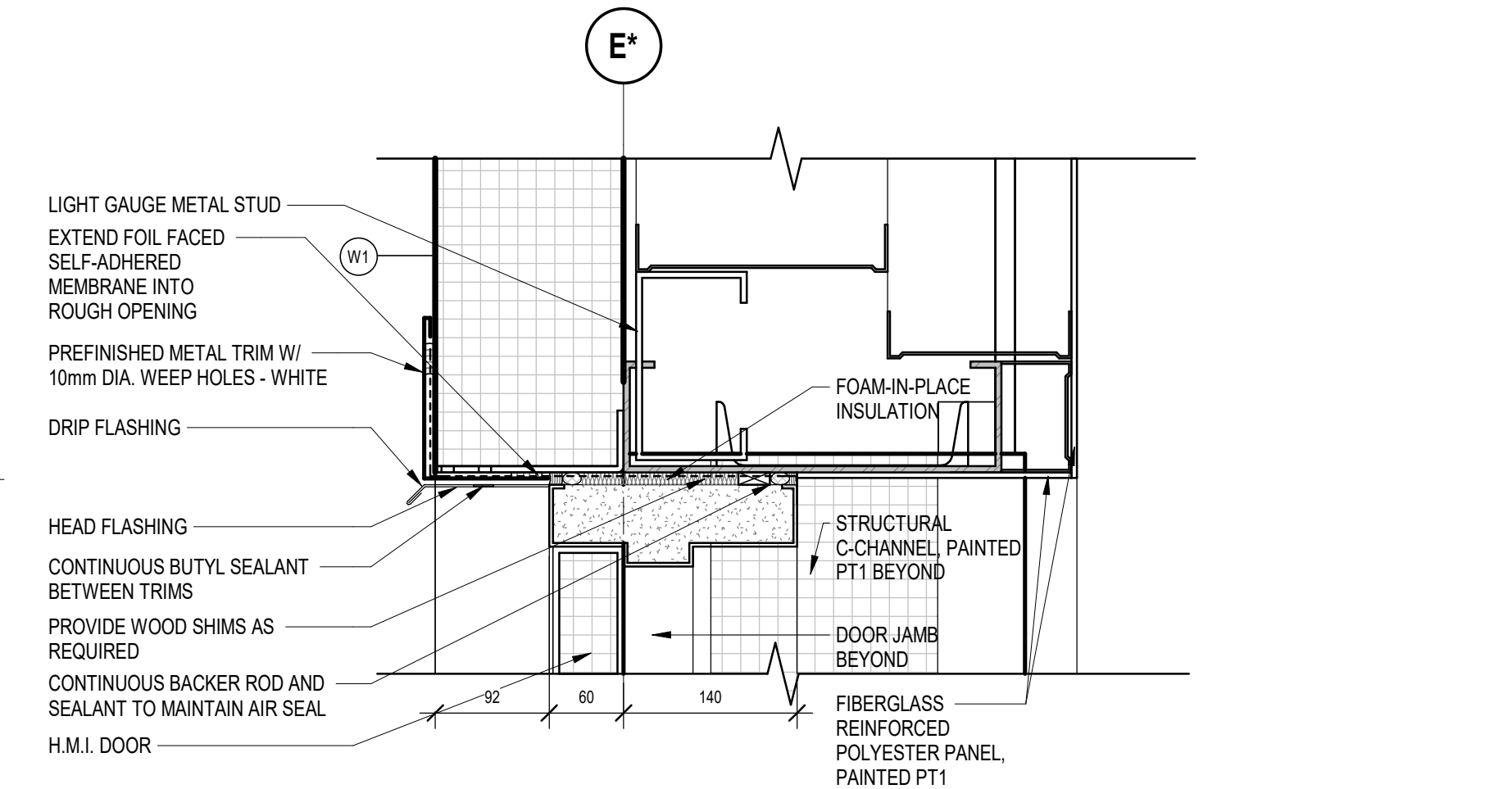
**1** EXTERIOR WALL AND CANOPY - SECTION

A610 Scale: 1:5



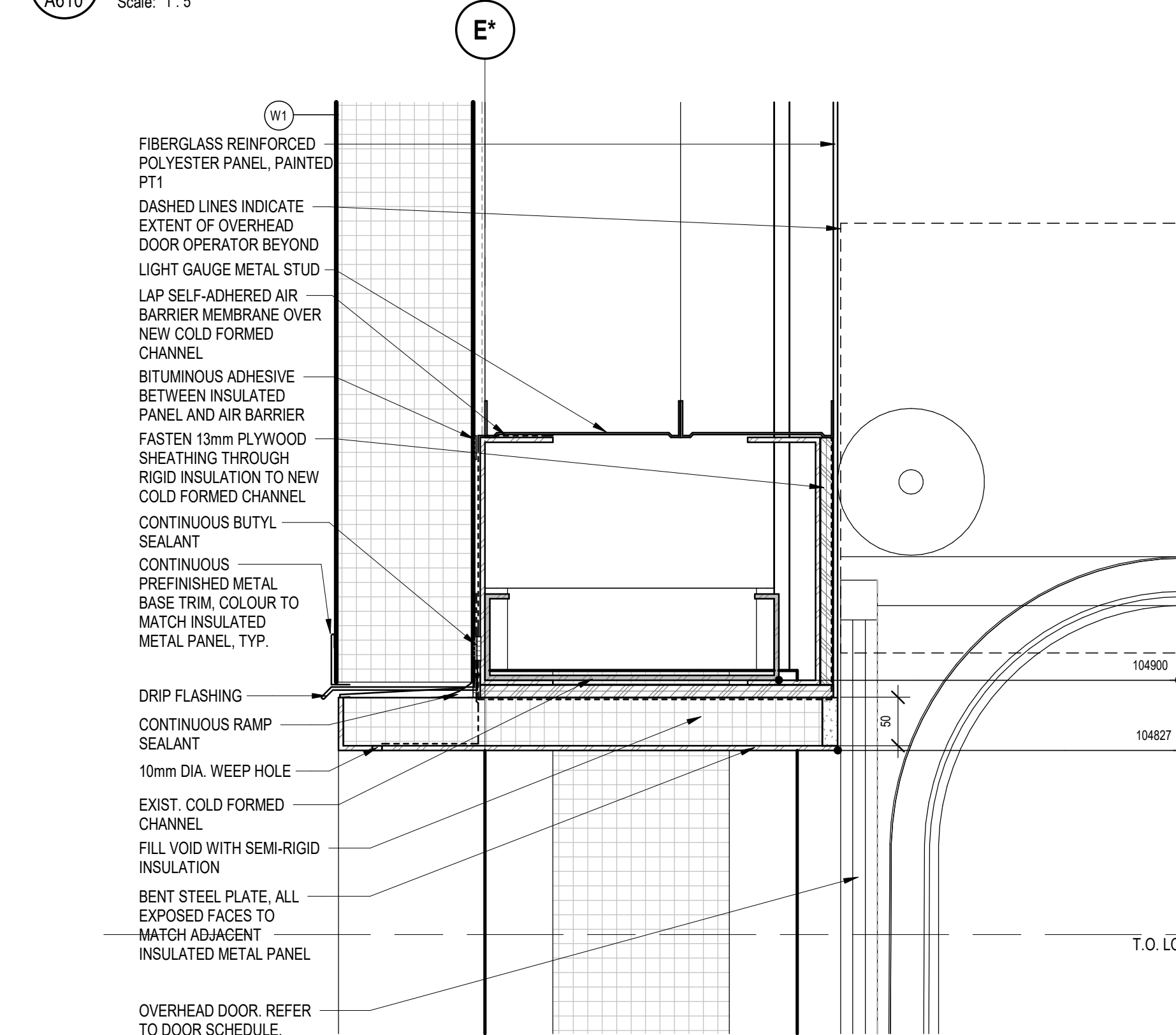
**2** CANOPY CONNECTION - SECTION

A610 Scale: 1:5



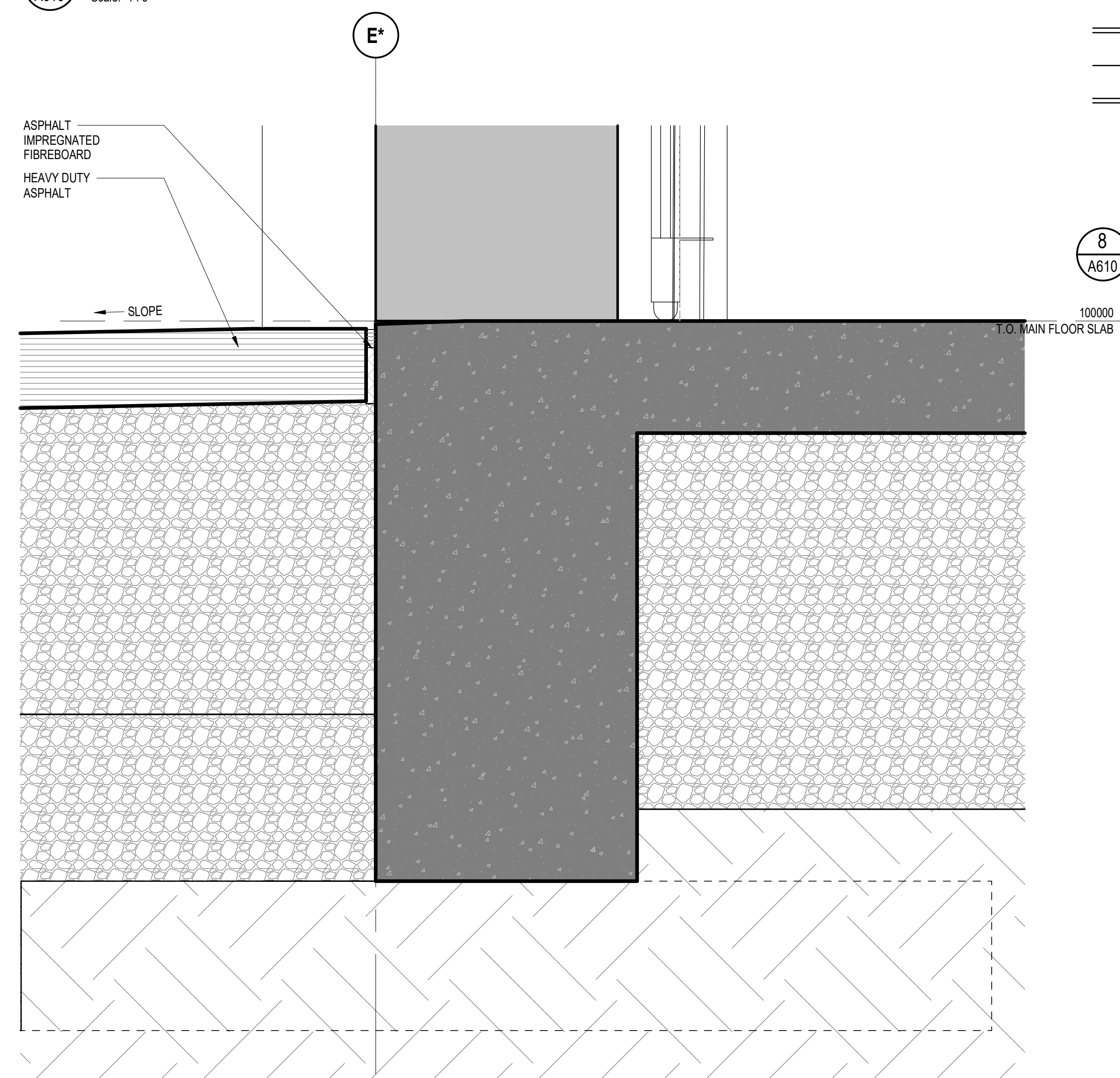
**3** TYP. PEDESTRIAN DOOR HEADER - SECTION 2

A610 Scale: 1:5



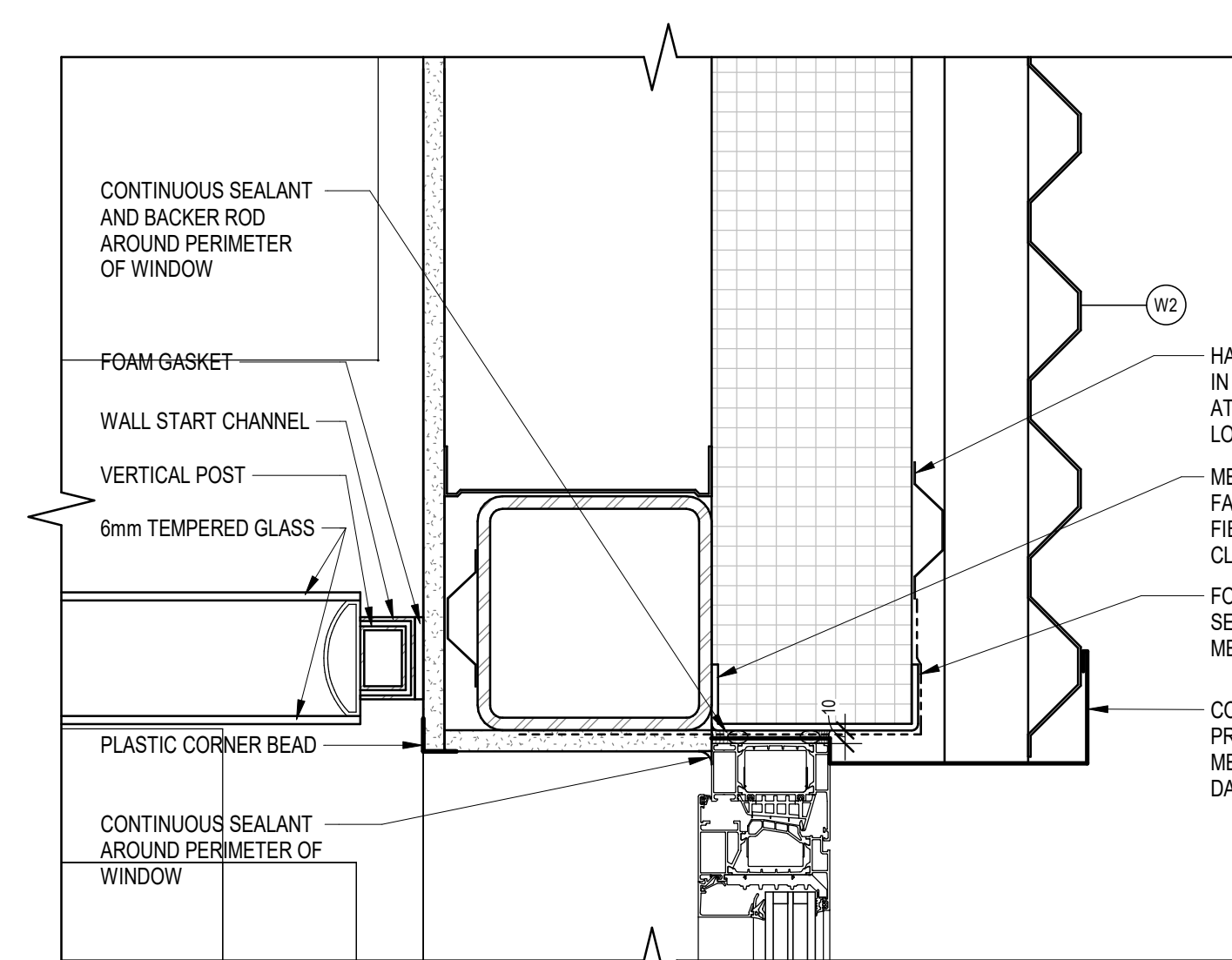
**4** TYP. OH DOOR HEAD - SECTION 2

A610 Scale: 1:5



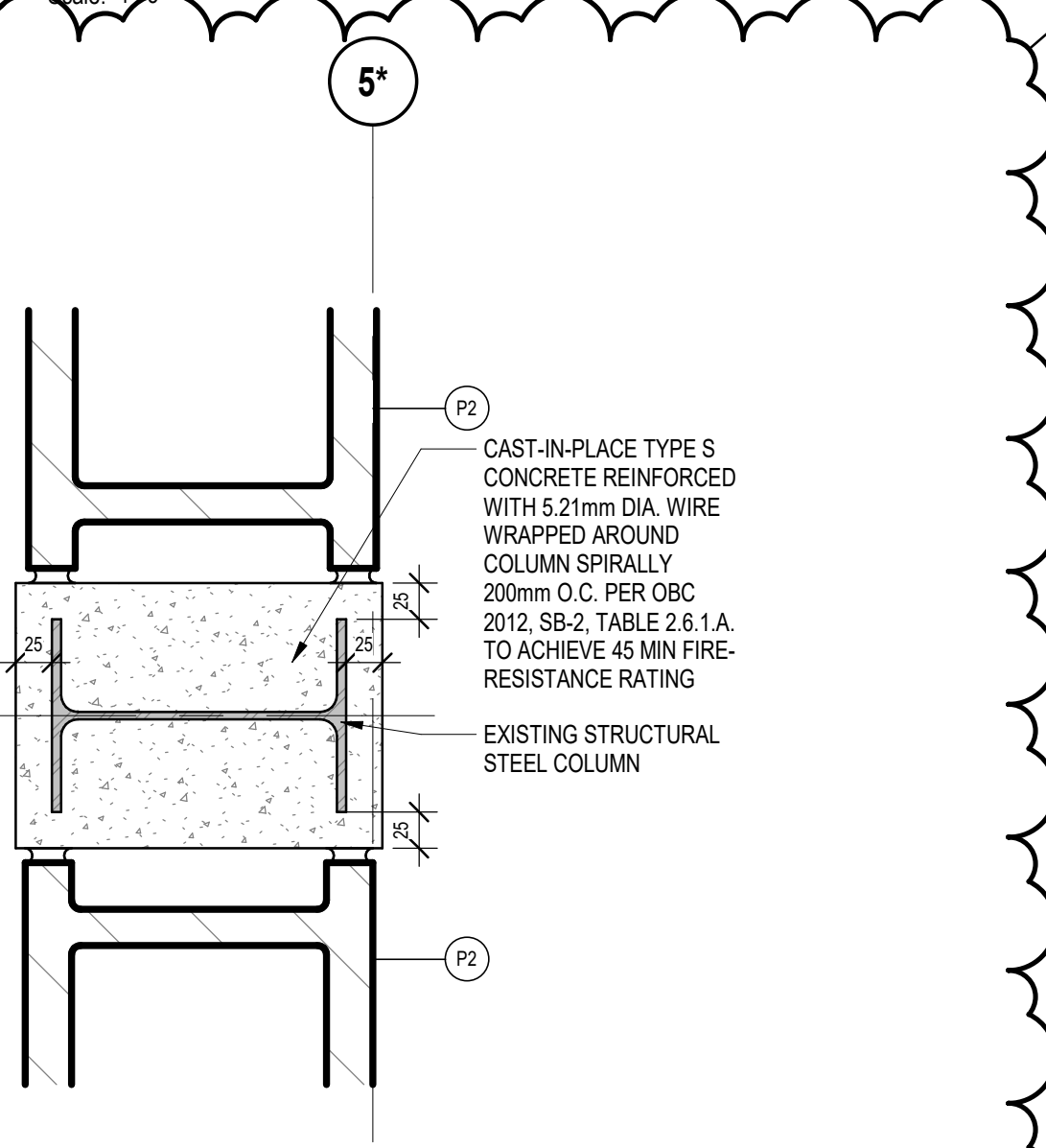
**5** TYP. OH DOOR SILL - SECTION 2

A610 Scale: 1:5



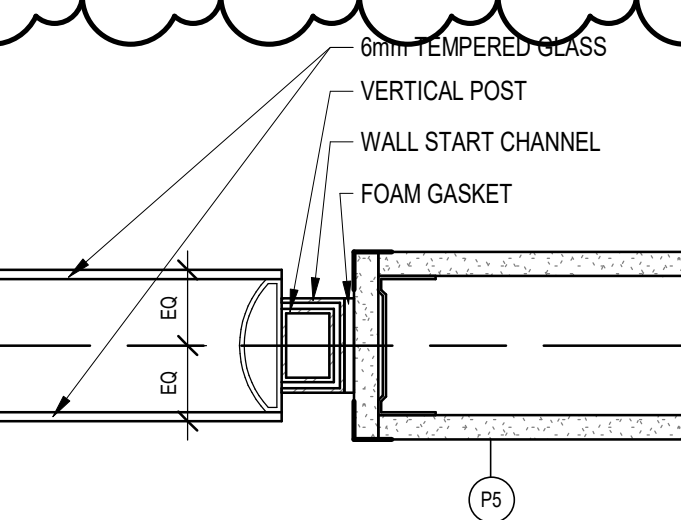
**6** DEMOUNTABLE PARTITION END - PLAN 2

A610 Scale: 1:5



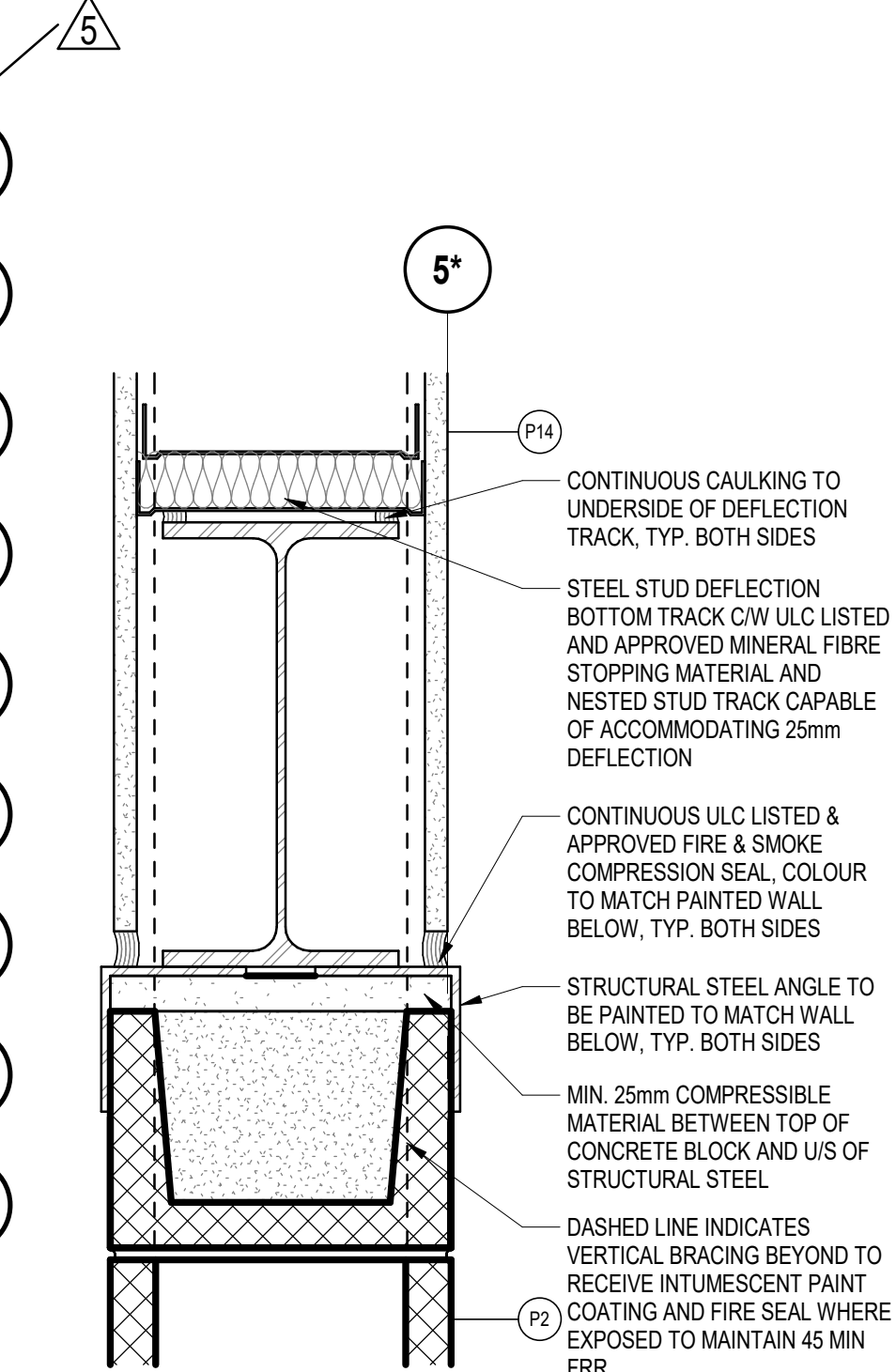
**7** 45 MIN FIRE RATED COLUMN AT CONCRETE BLOCK WALL - PLAN

A610 Scale: 1:5



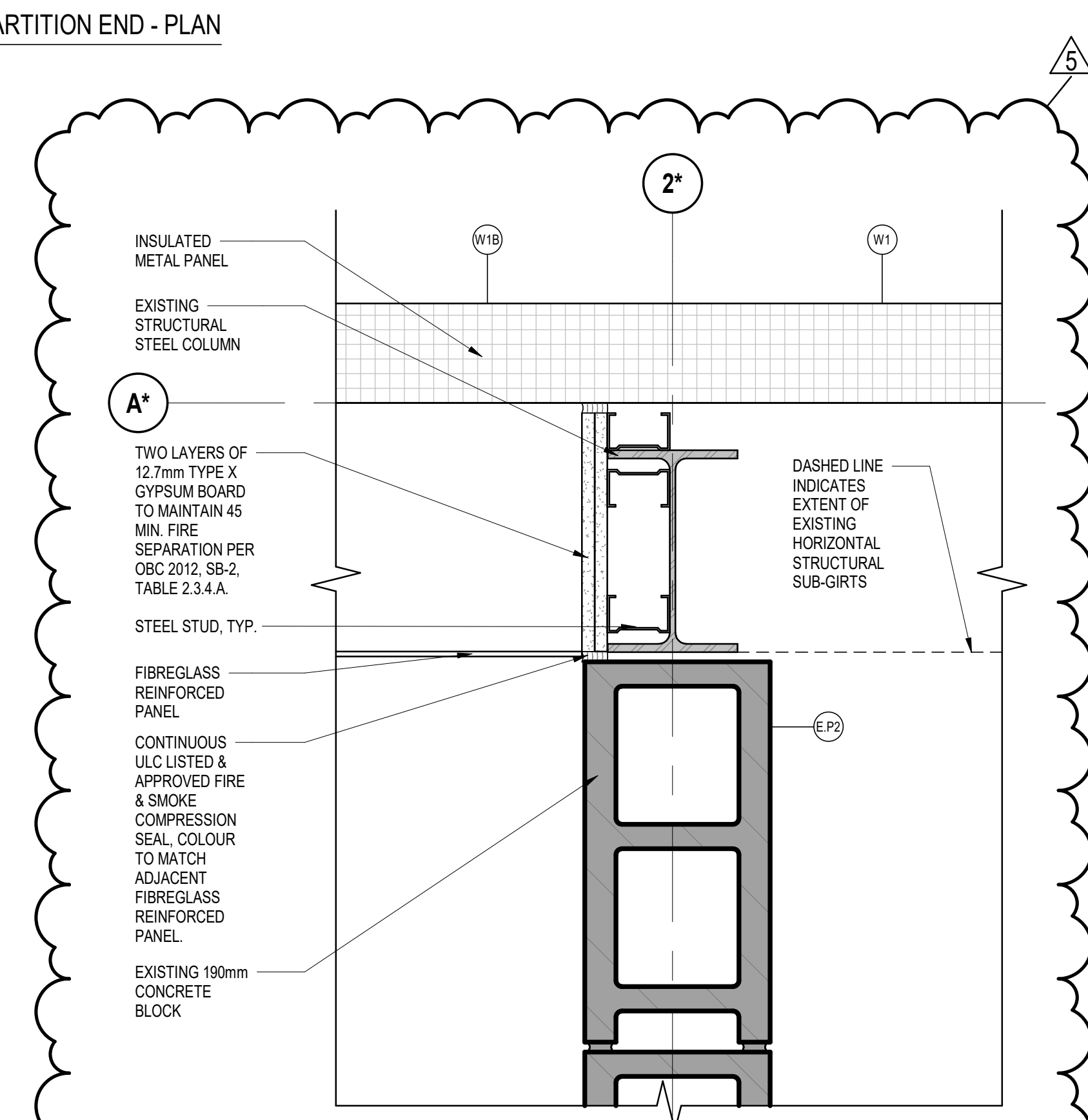
**8** DEMOUNTABLE PARTITION END - PLAN

A610 Scale: 1:5



**9** 45 MIN FRR PARTITION - SECTION

A610 Scale: 1:5



**10** 45 MIN FIRE RATED COLUMN AT EXISTING CONCRETE BLOCK WALL - PLAN

A610 Scale: 1:5

5	ISSUED FOR ADDENDUM 4	2025-07-18
4	REISSUED FOR TENDER	2025-05-23
3	ISSUED FOR TENDER	2025-04-25
2	ISSUED FOR BUILDING PERMIT REVIEW	2024-11-27
1	ISSUED FOR PRE-TENDER REVIEW	2024-10-31

NO. ISSUED FOR DATE

Drawing History

Scale 1:5 Checked By TB

Region of York Project Number 22046 Region of York Building Code G013-B

Project YORK REGION NORTH ROADS OPERATIONS CENTRE

3525 BASELINE RD. SUTTON WEST, ON L0E 1R0

Drawing Title DETAILS

Project Number 6016 Drawing Number A610

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Client

YORK REGION



**York Region**

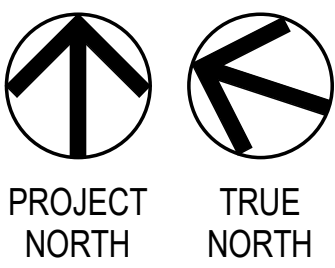
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## REFLECTED CEILING PLAN NOTES

1. EXISTING GRIDLINE & DIMENSIONS ARE BASED ON EXISTING DRAWINGS. ALL DIMENSIONS ARE APPROXIMATED & TO BE CONFIRMED ON SITE BY CONTRACTOR PRIOR TO WORK.
2. IT IS THE CONTRACTOR'S RESPONSIBILITY TO CONFIRM EXISTING WALL TYPES.
3. FACE OF ALL BULKHEADS TO RETURN VERTICAL TO UNDERSTADJACENT CEILINGS, UNLESS OTHERWISE NOTED.
4. ALL GYPSUM BOARD CEILINGS TO BE PAINTED P1 UNLESS OTHERWISE NOTED.
5. REFER TO SPECIFICATION SECTION 09 99 99 FOR FINISH CODE DESCRIPTIONS.
6. T-BAR EDGE TRIM IS TO BE CONTINUOUS AROUND THE CEILING PERIMETER.
7. T-BAR EDGE TRIM ON ALL T-BAR CEILINGS.

NO.	ISSUED FOR	DATE
Drawing History		
Scale	As indicated	Checked By TB
Region of York Project Number	Region of York Building Code	
22046	G013-B	
Project		

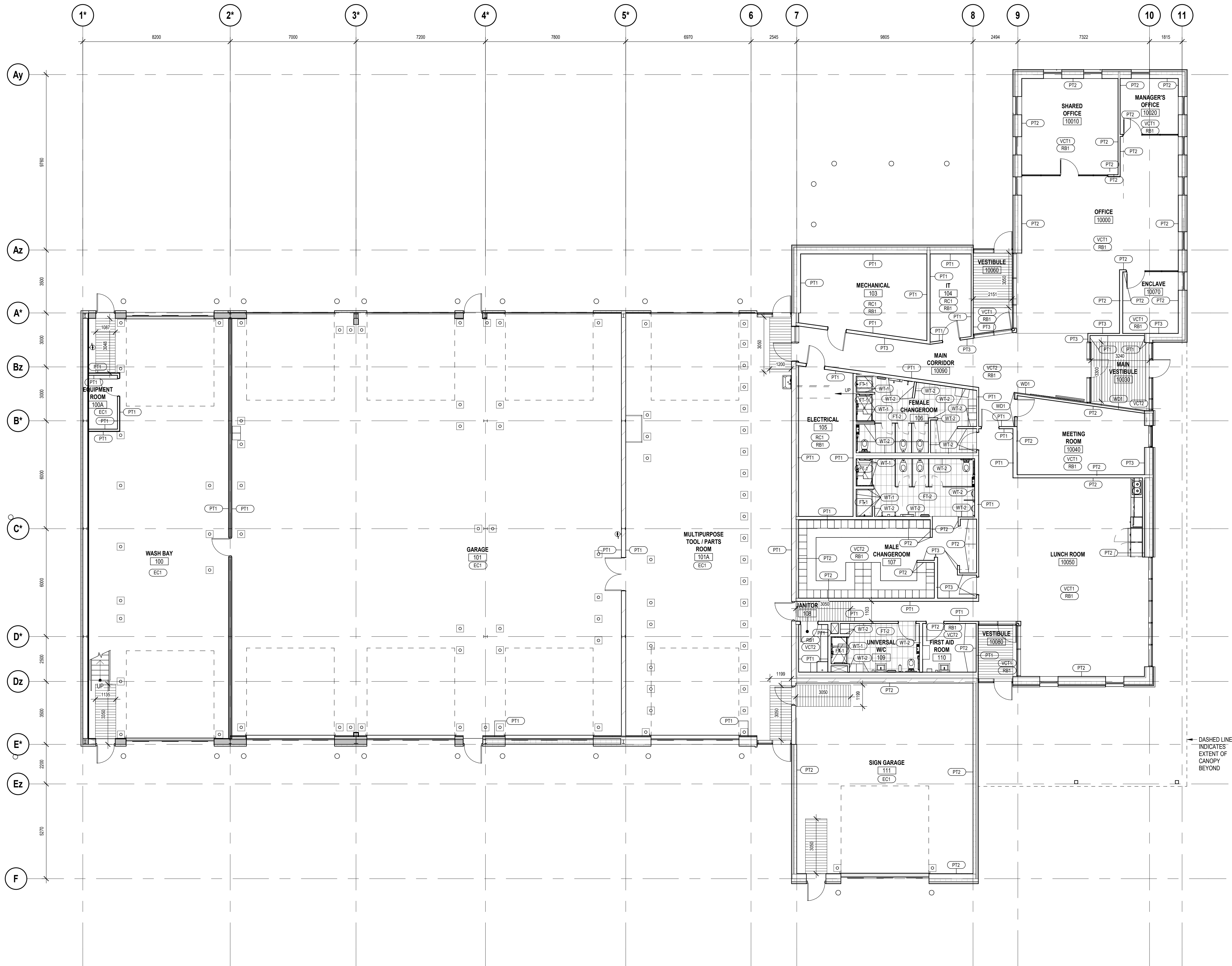
<p><b>YORK REGION NORTH ROADS OPERATIONS CENTRE</b></p> <p>3525 BASELINE RD. SUTTON WEST, ON L0E 1R0</p> <p>Drawing Title</p> <p><b>REFLECTED CEILING PLAN &amp; DETAILS</b></p>	
<p>Project Number</p> <p><b>6016</b></p>	<p>Drawing Number</p> <p><b>A701</b></p>



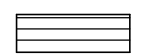
Project Team:  
Prime Consultant  
**GEC ARCHITECTURE**  
Structural and Building Envelope Consultant  
**ENTUITIVE**  
Mechanical and Electrical Consultant  
**MCW CONSULTANTS LTD.**  
Civil Consultant  
**PLANMAC ENGINEERING**  
Passive House Consultant  
**PEEL PASSIVE HOUSE**  
LEED Consultant  
**MCW CONSULTANTS LTD.**  
Landscape Consultant  
**MHBC**



Seal & Permit



**FINISHES PLAN LEGEND**

 ROLL OUT FLOOR MAT TO BE SUPPLIED, INSTALLED, AND MAINTAINED BY OWNER

**FINISHES PLAN NOTES**

1. ALL INTERIOR WALLS TO BE PAINTED PT1 EXCEPT WHERE OTHERWISE NOTED

**1 FINISH FLOOR PLAN**  
A801 Scale: 1 : 100

7	ISSUED FOR ADDENDUM 4	2025-07-18
6	REISSUED FOR TENDER	2025-05-23
5	ISSUED FOR TENDER	2025-04-25
4	ISSUED FOR BUILDING PERMIT REVIEW	2024-11-27
3	ISSUED FOR PRE-TENDER REVIEW	2024-10-31
2	ISSUED FOR 60% CD	2024-05-02
1	100% DD	2024-02-29
NO.	ISSUED FOR	DATE

Drawing History	
Scale	Checked By
As indicated	TB

Region of York Project Number	Region of York Building Code
22046	G013-B

Project

**YORK REGION NORTH ROADS OPERATIONS CENTRE**

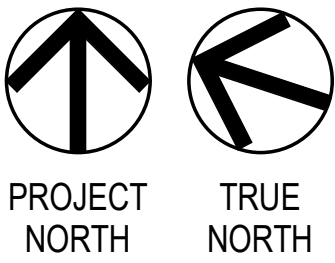
3525 BASELINE RD, SUTTON WEST, ON L0E 1R0

Drawing Title

Project Number	Drawing Number
6016	<b>A801</b>

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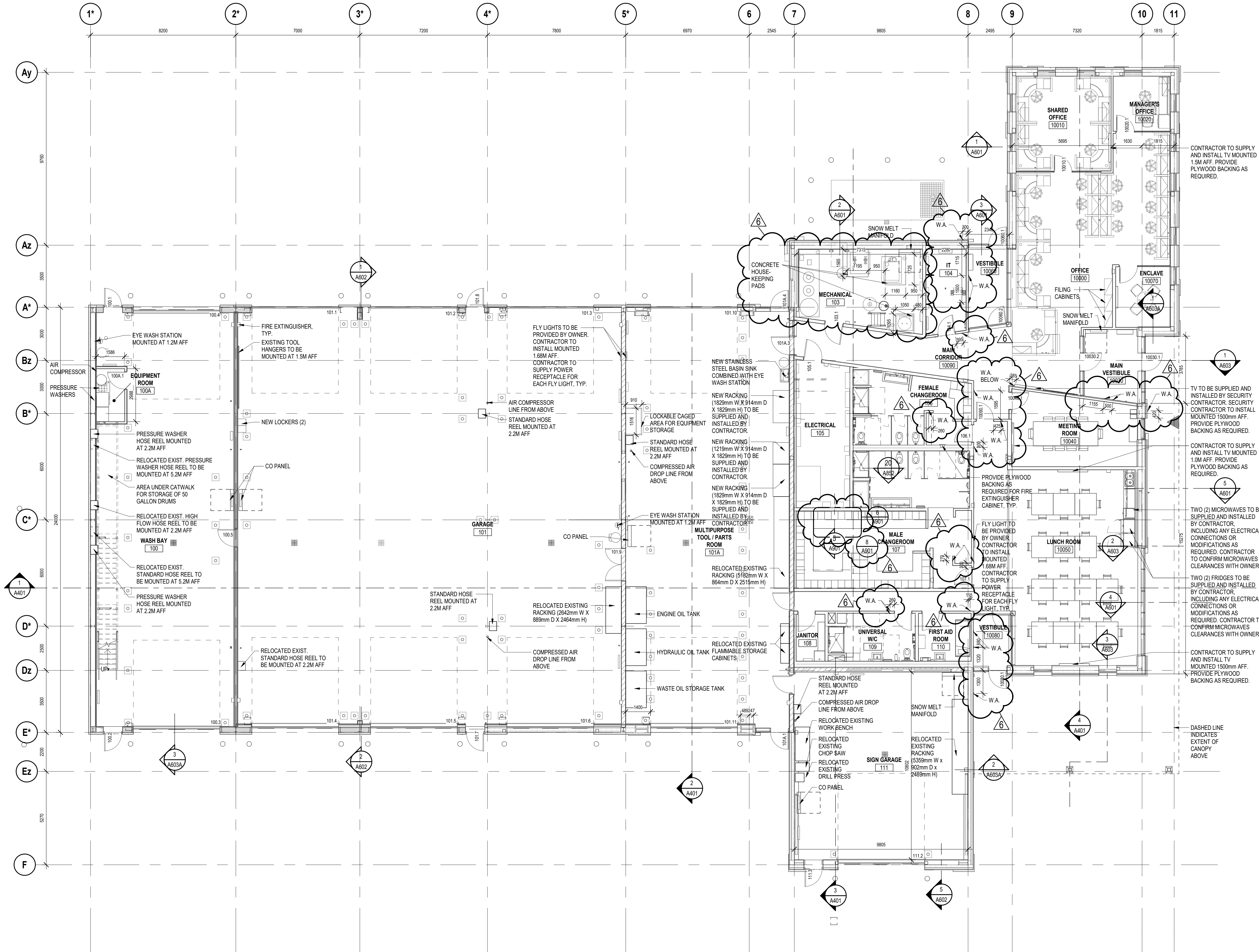




Project Team:  
Prime Consultant  
**GEC ARCHITECTURE**  
Structural and Building Envelope Consultant  
**ENTUITIVE**  
Mechanical and Electrical Consultant  
**MCW CONSULTANTS LTD.**  
Civil Consultant  
**PLANMAC ENGINEERING**  
Passive House Consultant  
**PEEL PASSIVE HOUSE**  
LEED Consultant  
**MCW CONSULTANTS LTD.**  
Landscape Consultant  
**MHBC**

Client  
**YORK REGION**

Seal & Permit



1 FURNITURE AND EQUIPMENT PLAN  
A803 Scale: 1 : 100

6	ISSUED FOR ADDENDUM 4	2025-07-18
5	REISSUED FOR TENDER	2025-05-23
4	ISSUED FOR TENDER	2025-04-25
3	ISSUED FOR BUILDING PERMIT REVIEW	2024-11-27
2	ISSUED FOR PRE-TENDER REVIEW	2024-10-31
1	ISSUED FOR 60% CD	2024-05-02

Drawing History

Scale	1 : 100	Checked By	TB
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Region of York Project Number

22046

Region of York Building Code

G013-B

Project

YORK REGION NORTH ROADS

OPERATIONS CENTRE

3525 BASELINE RD. SUTTON WEST, ON L0E 1R0

Drawing Title

FURNITURE AND EQUIPMENT PLAN

Project Number

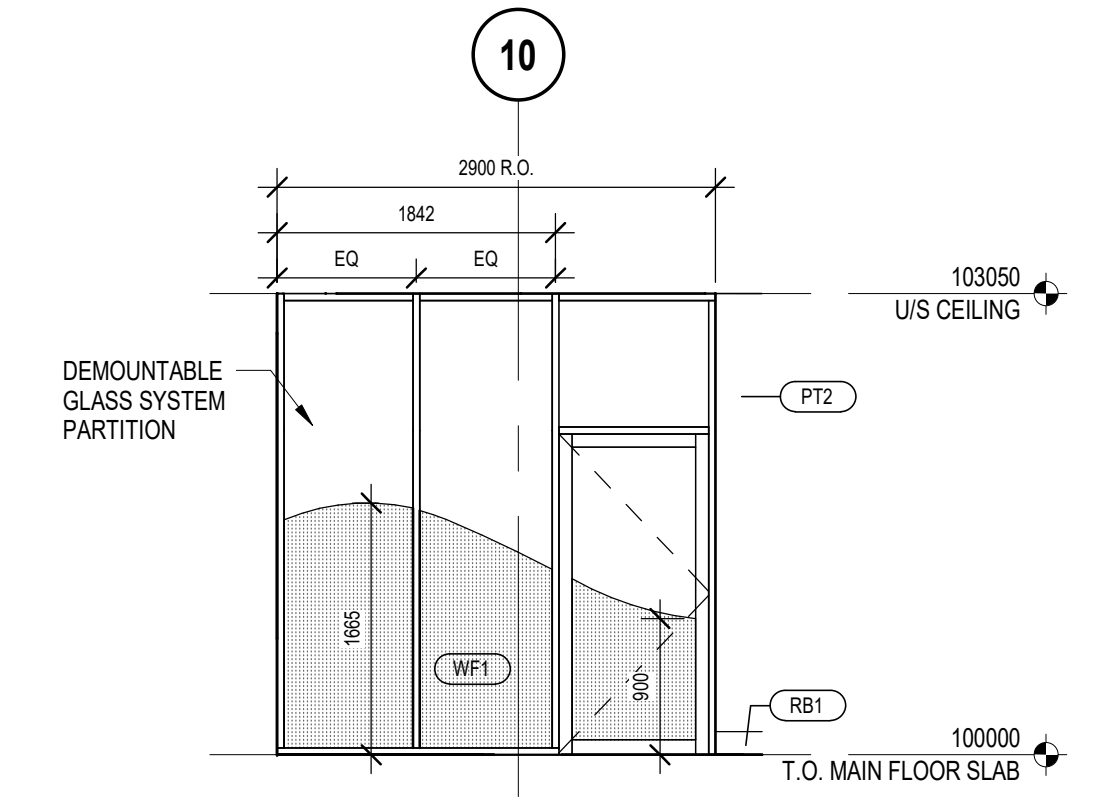
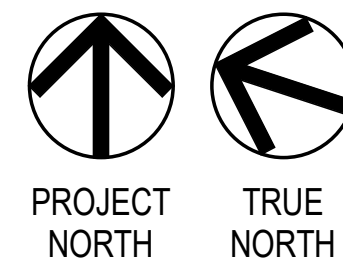
6016

Drawing Number

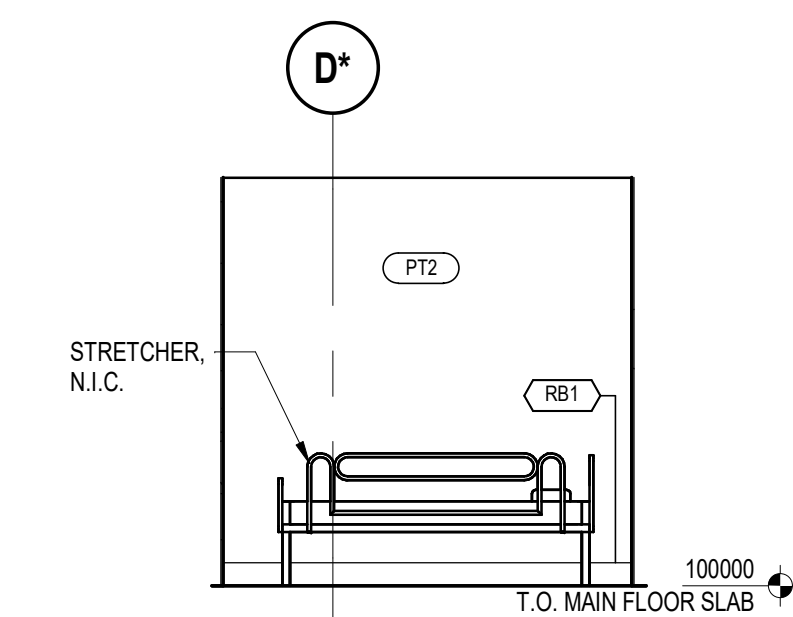
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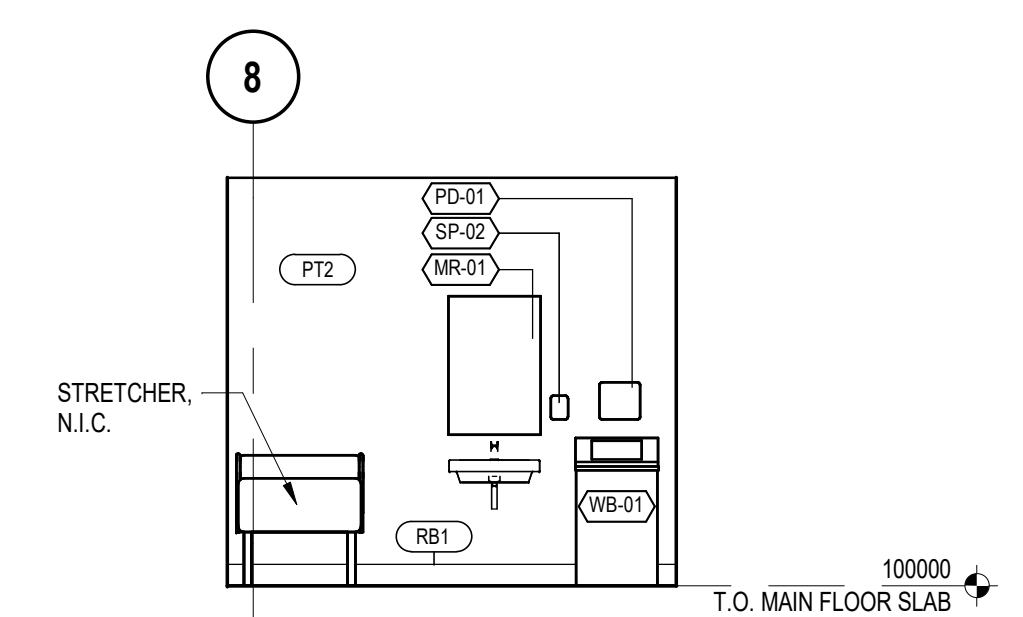




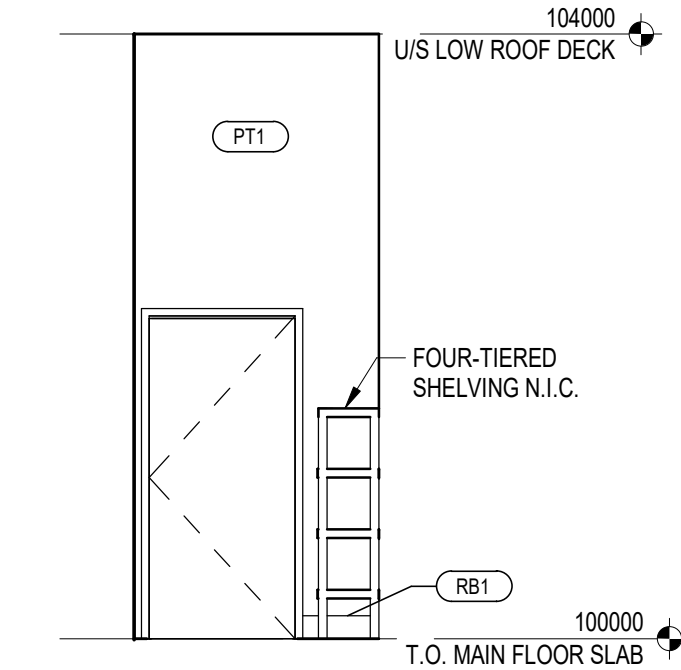
22 MEETING ROOM - SOUTH ELEVATION  
Scale: 1 : 50



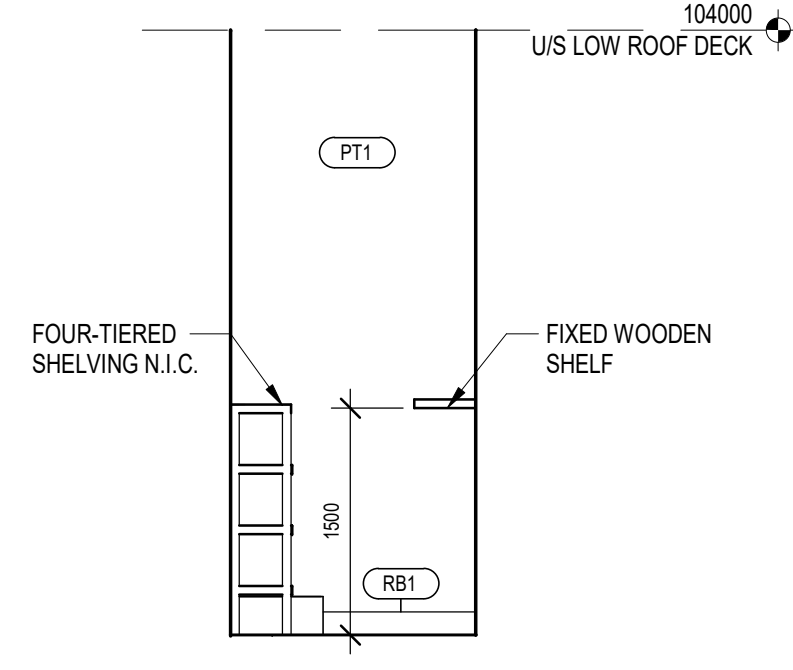
12 FIRST AID EAST ELEVATION  
Scale: 1 : 50



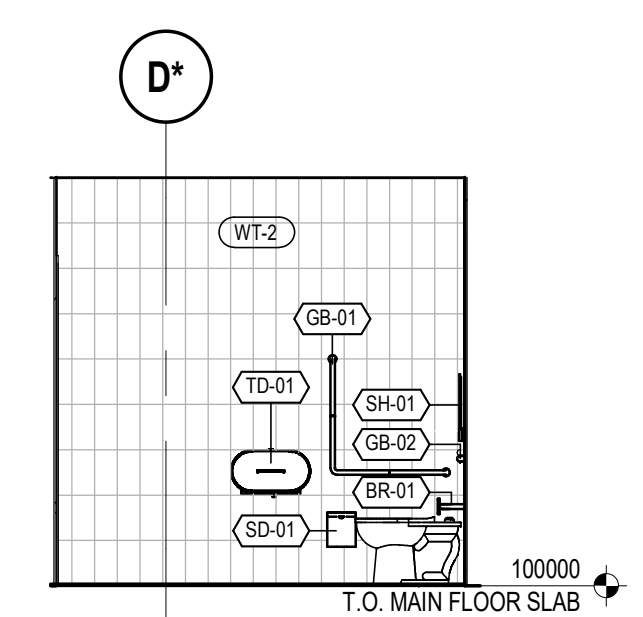
11 FIRST AID SOUTH ELEVATION  
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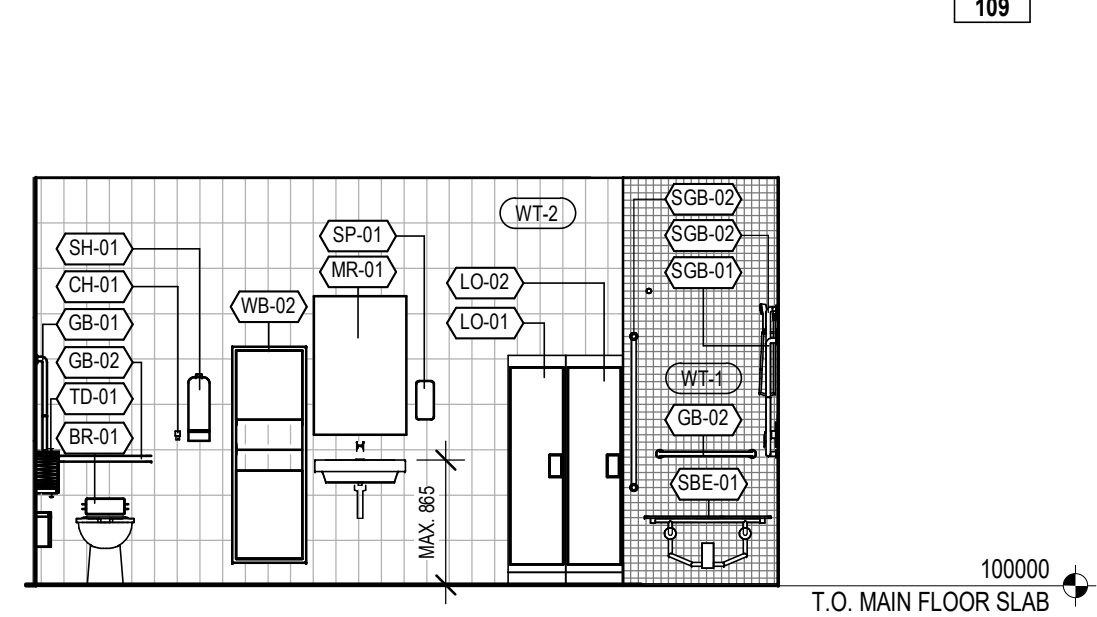
8 JANITOR SOUTH ELEVATION  
Scale: 1 : 50



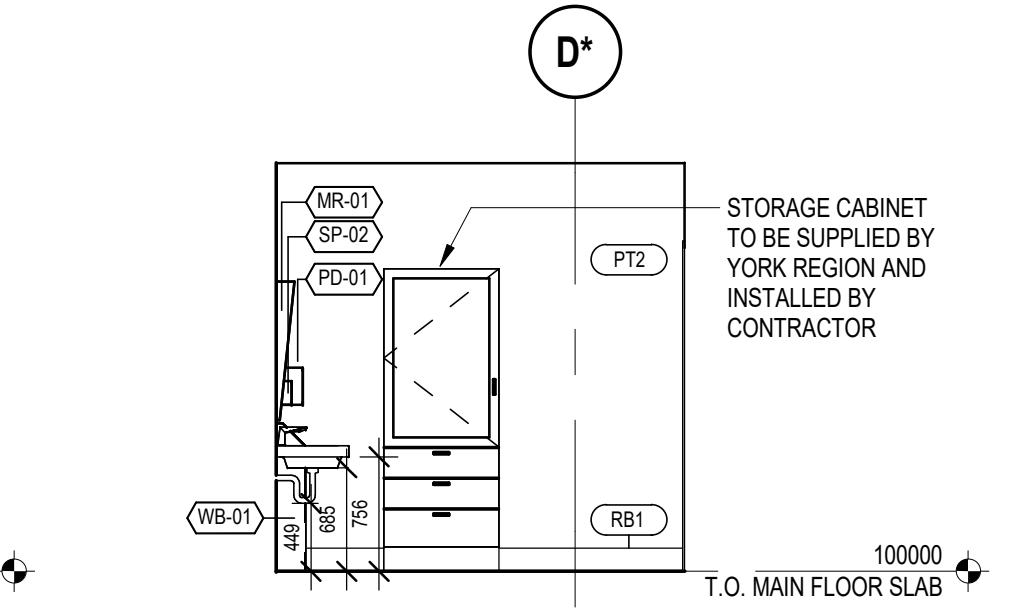
6 JANITOR NORTH ELEVATION  
Scale: 1 : 50



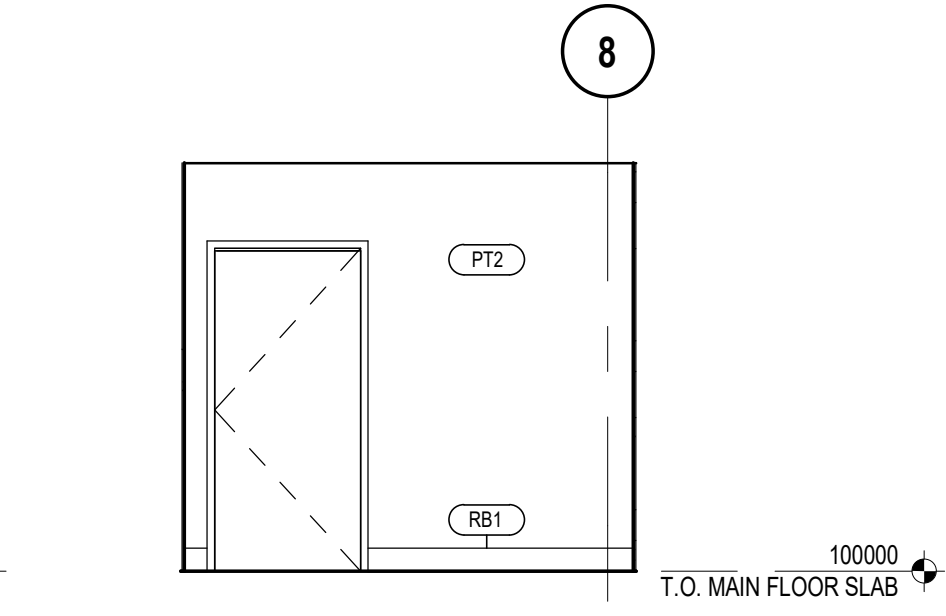
5 UNIVERSAL W/C EAST ELEVATION  
Scale: 1 : 50



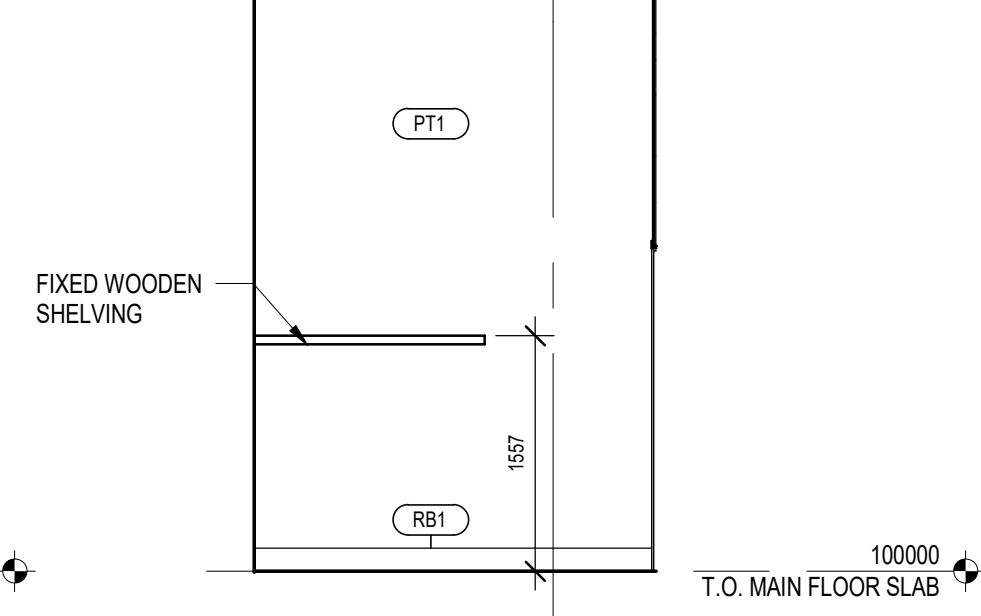
2 UNIVERSAL W/C SOUTH ELEVATION  
Scale: 1 : 50



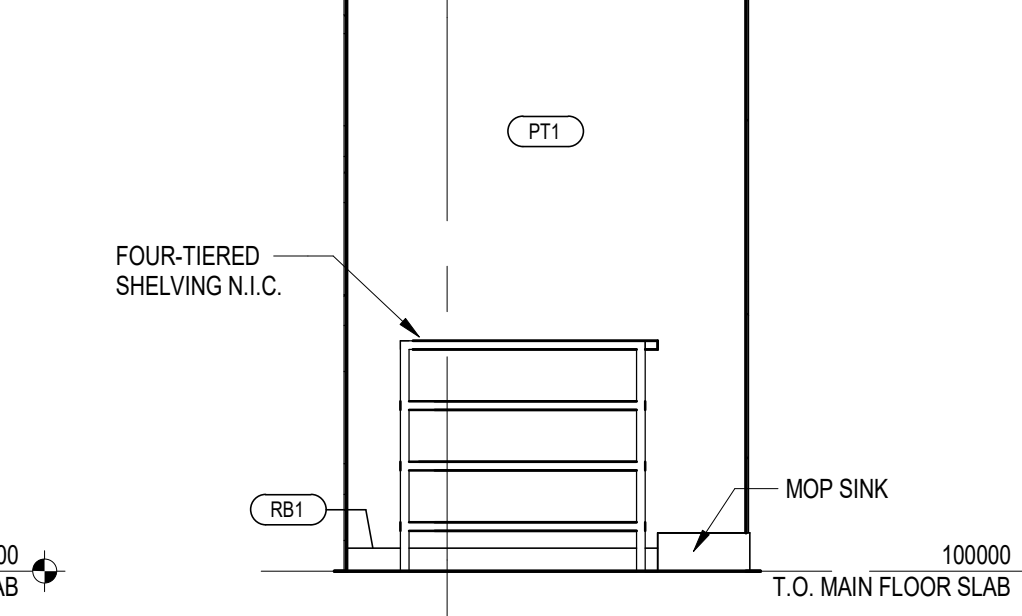
14 FIRST AID WEST ELEVATION  
Scale: 1 : 50



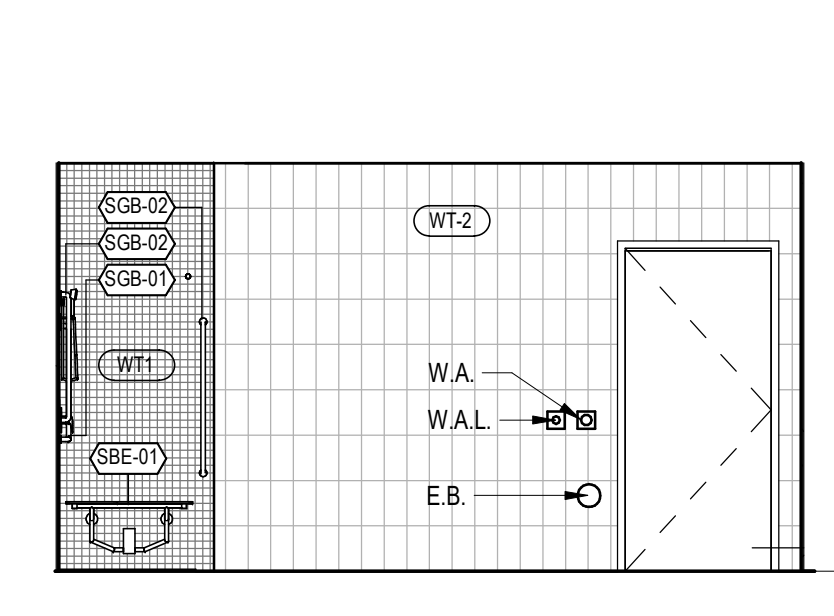
13 FIRST AID NORTH ELEVATION  
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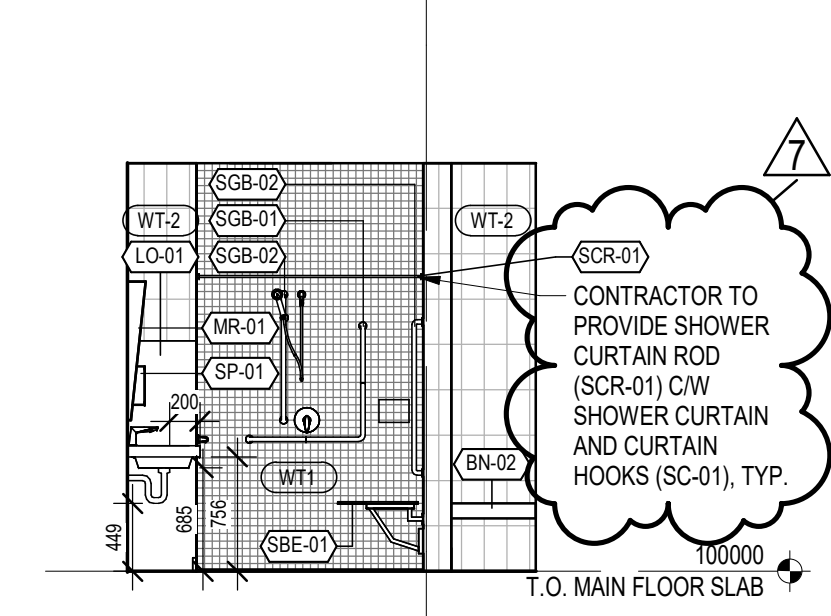
9 JANITOR WEST ELEVATION  
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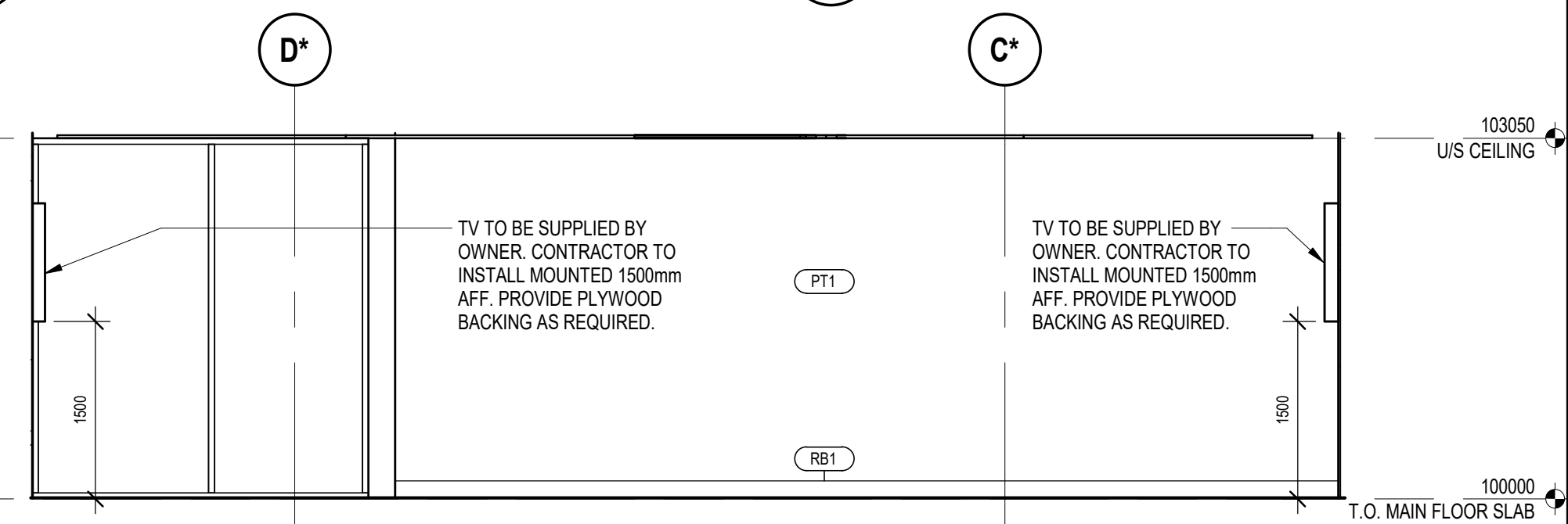
7 JANITOR W/C EAST ELEVATION  
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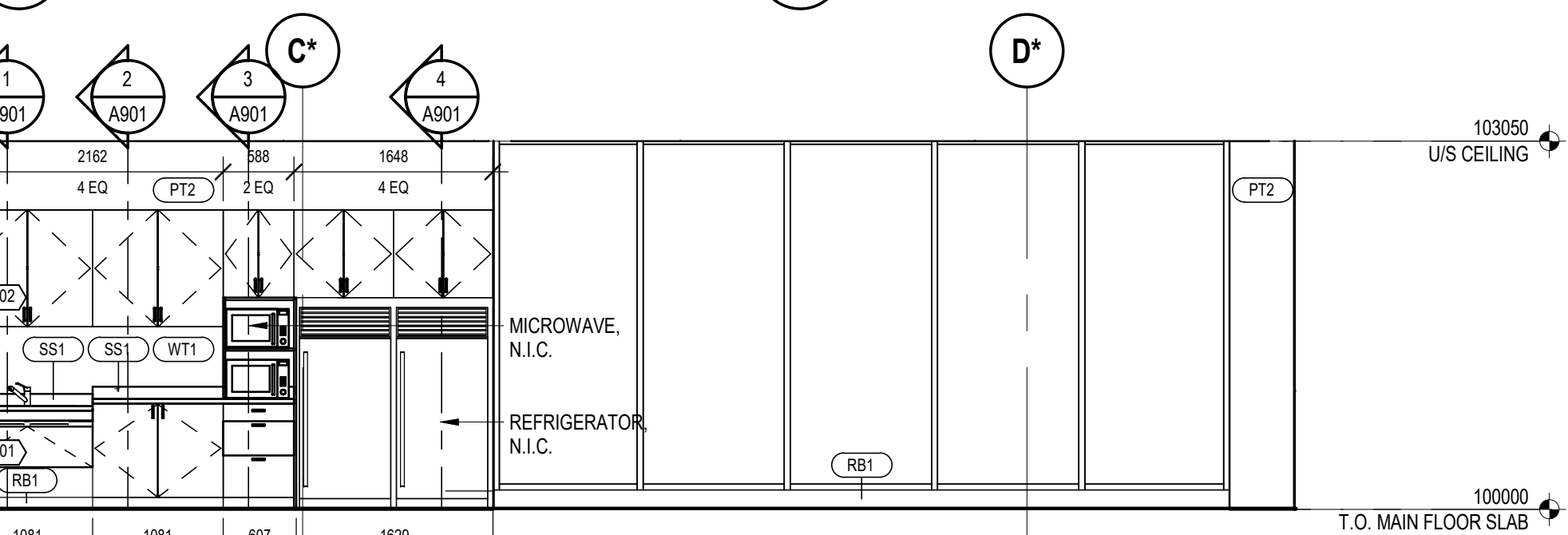
4 UNIVERSAL NORTH ELEVATION  
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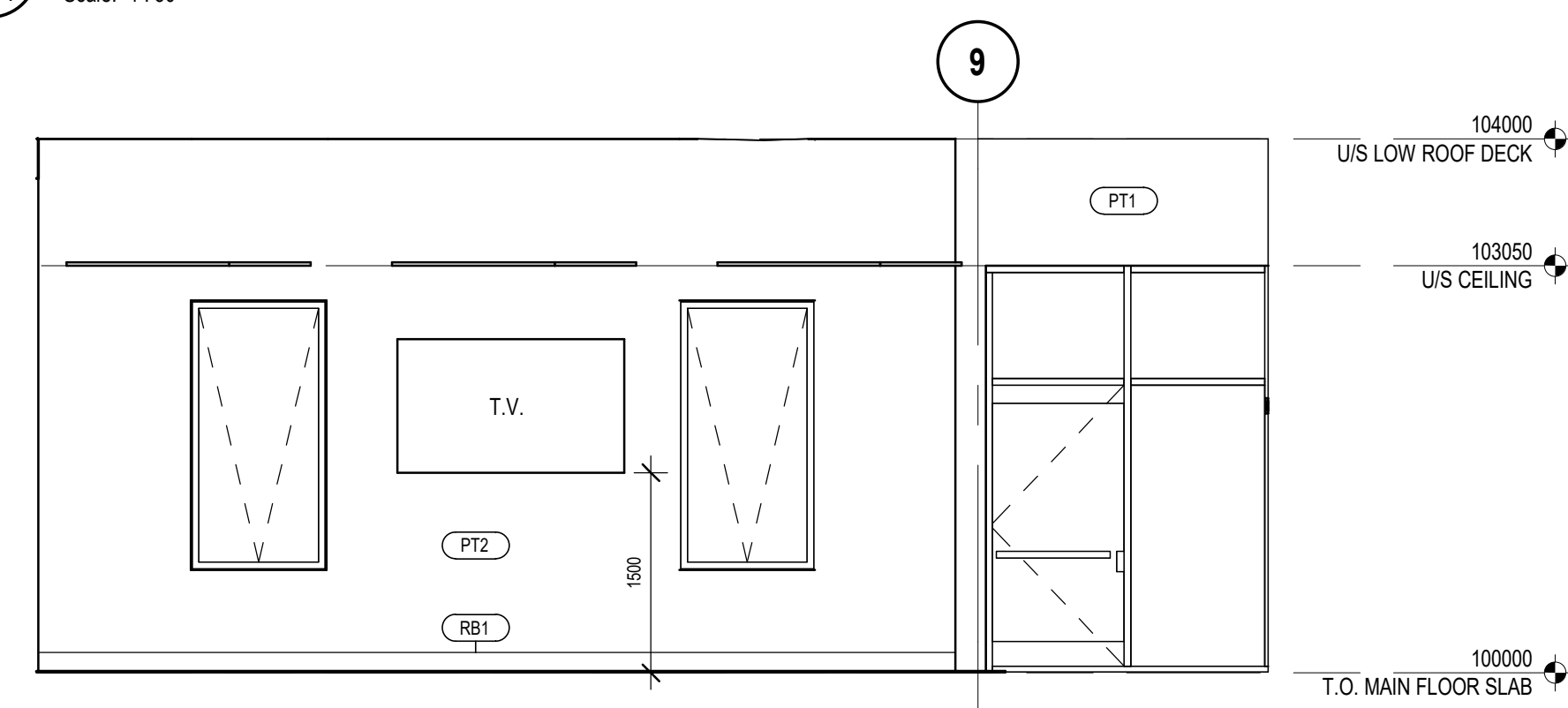
3 UNIVERSAL W/C WEST ELEVATION  
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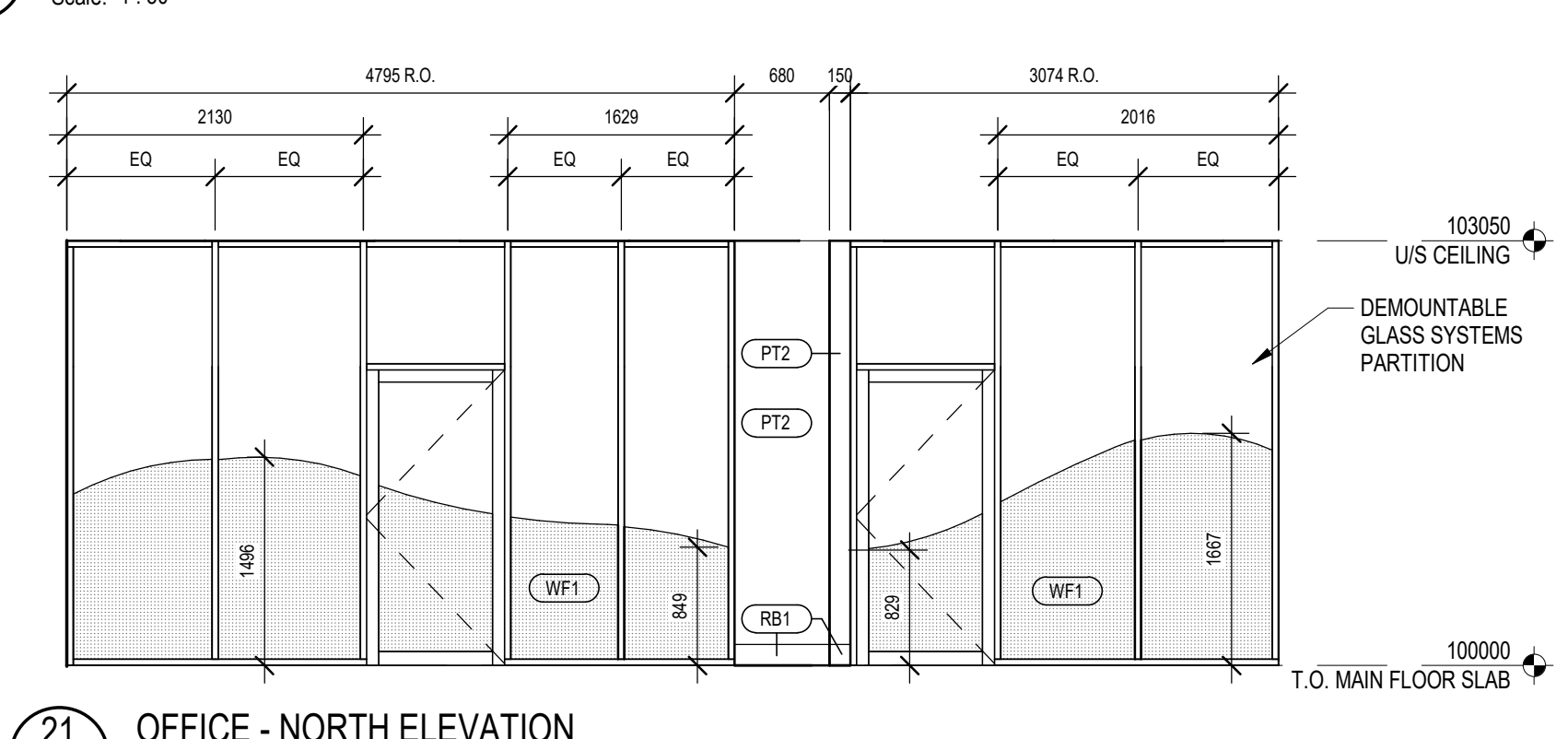
18 LUNCHROOM - WEST ELEVATION  
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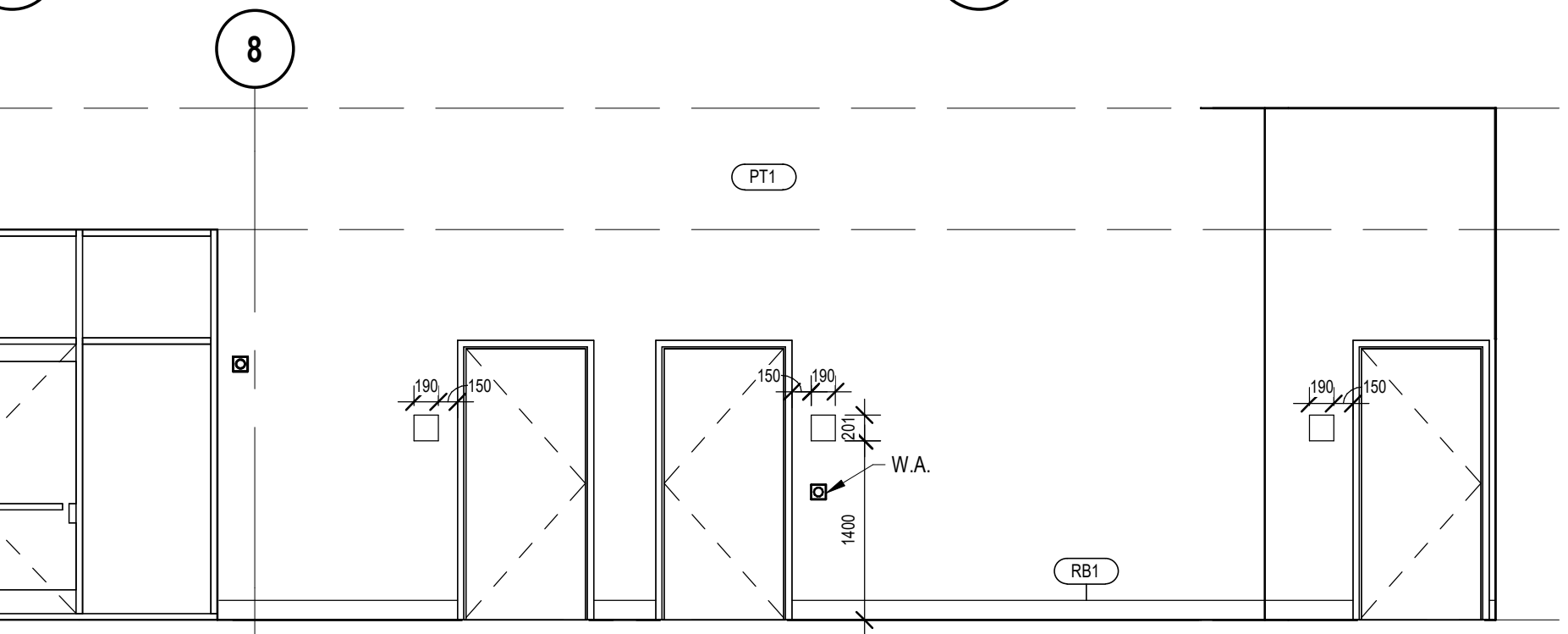
17 LUNCHROOM - EAST ELEVATION  
Scale: 1 : 50



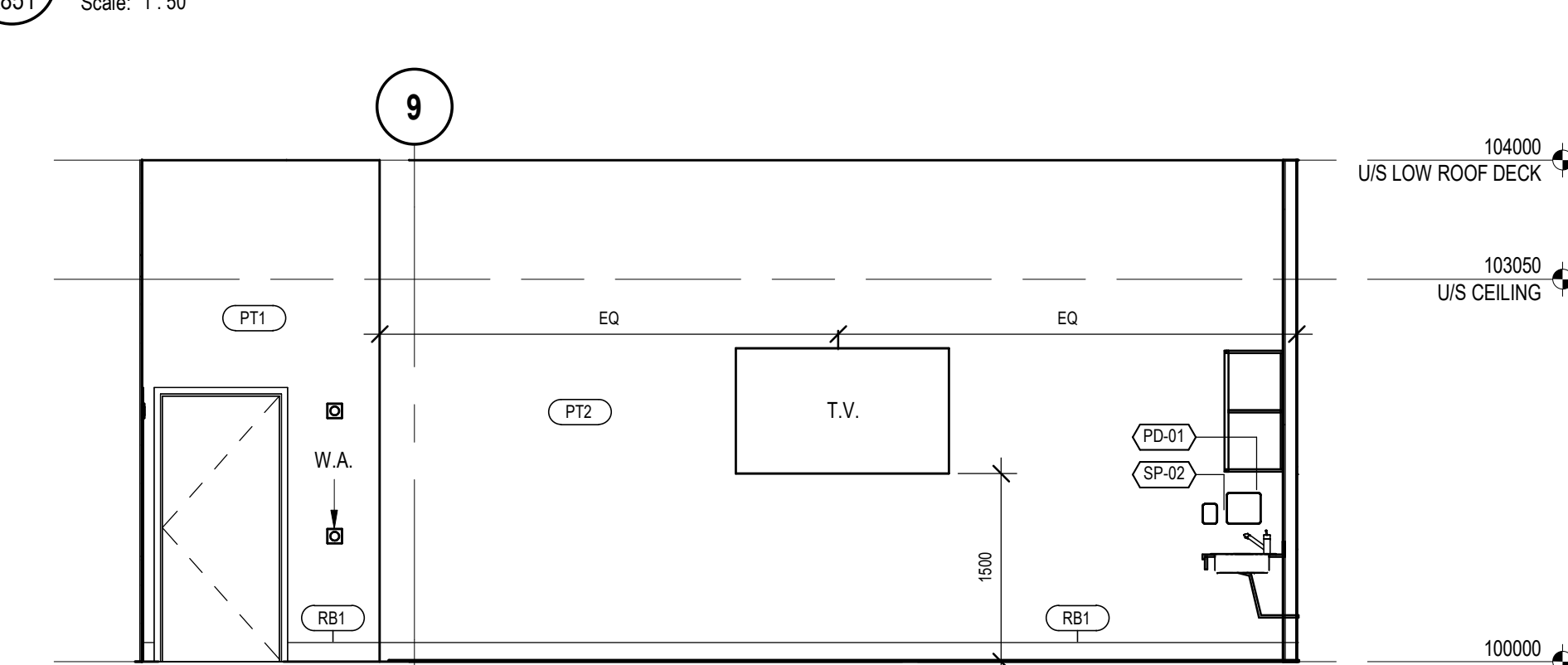
20 LUNCHROOM - SOUTH ELEVATION  
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21 OFFICE - NORTH ELEVATION  
Scale: 1 : 50

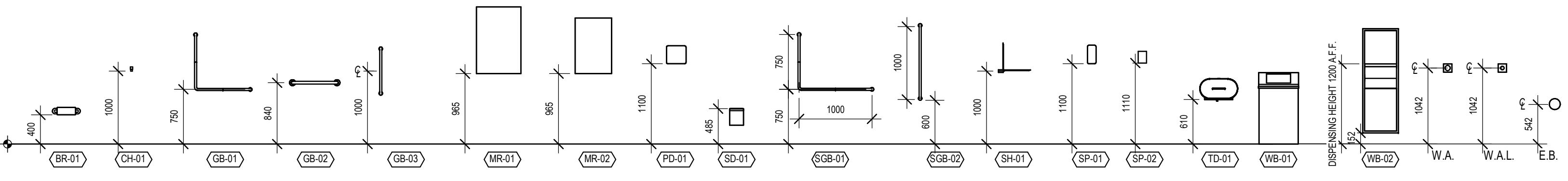


10 JANITOR, FIRST AID, UNIVERSAL W/C EXTERIOR ENTRANCE ELEVATION  
Scale: 1 : 50



19 LUNCHROOM - NORTH ELEVATION  
Scale: 1 : 50

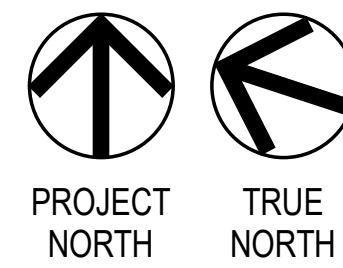
WASHROOM ACCESSORY & FIXTURE LEGEND



WASHROOM ACCESSORY SCHEDULE					
TYPE	DESCRIPTION	TYPE	DESCRIPTION	TYPE	DESCRIPTION
BR-01	BACK REST	LO-03	LOCKER	SP-01	SOAP DISPENSER
BN-01	BENCH	MR-01	TILTED MIRROR	SP-02	SOAP DISPENSER
BN-02	BENCH	MR-02	FLAT MIRROR	TD-01	TOILET TISSUE DISPENSER
CH-01	COAT HOOK	PD-01	PAPER TOWEL DISPENSER	TP-01	TOILET PARTITION
GB-01	GRAB BAR - 90° L' SHAPED BAR	GB-01	FOLDING BENCH	UD-01	URINAL DIVIDER
GB-02	GRAB BAR - HORIZONTAL STRAIGHT BAR	SD-01	SANITARY NAPKIN DISPOSAL	WB-01	WASTE BIN
GB-03	GRAB BAR - VERTICAL STRAIGHT BAR	GB-01	SHOWER GRAB BAR - 90° L' SHAPED BAR	WB-02	SEMI-RECESSED TOILET PAPER DISPENSER AND WASTE BIN
LO-01	LOCKER	GB-02	SHOWER GRAB BAR - VERTICAL STRAIGHT BAR	SCR-01	SHOWER CURTAIN ROD
LO-02	LOCKER	SH-01	SURFACE MOUNTED SHELF		

WASHROOM ACCESSORY NOTES

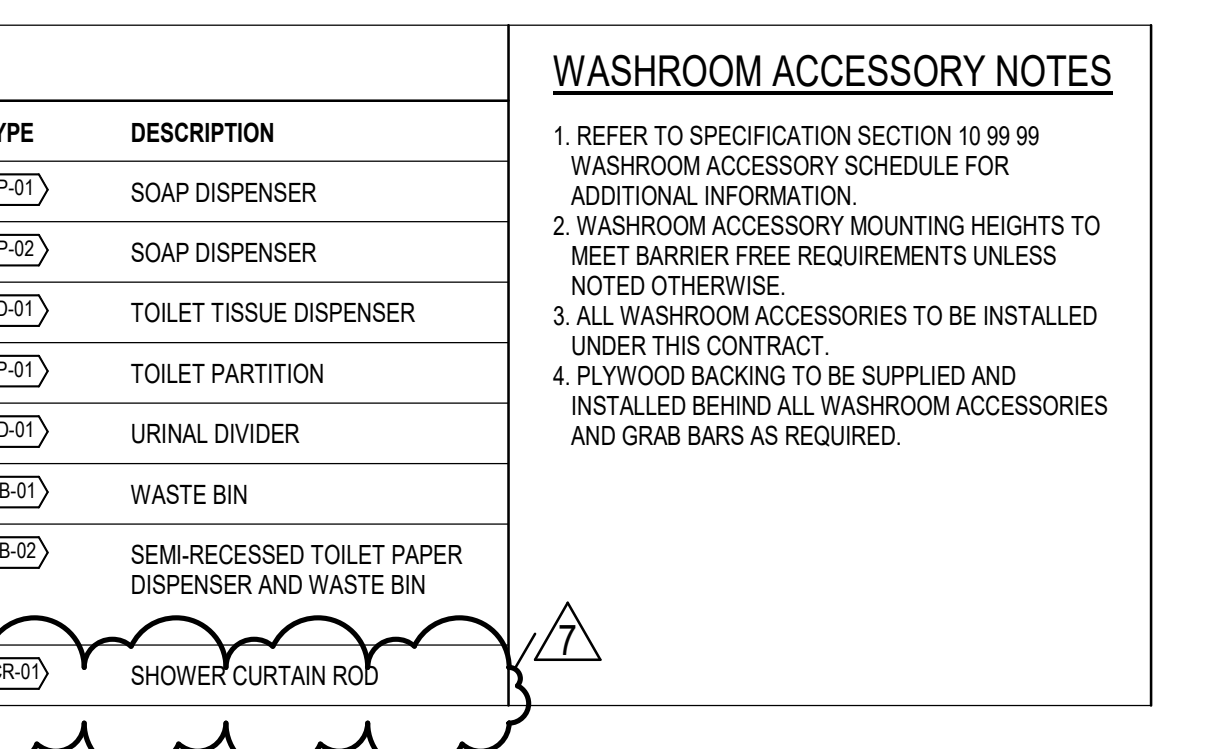
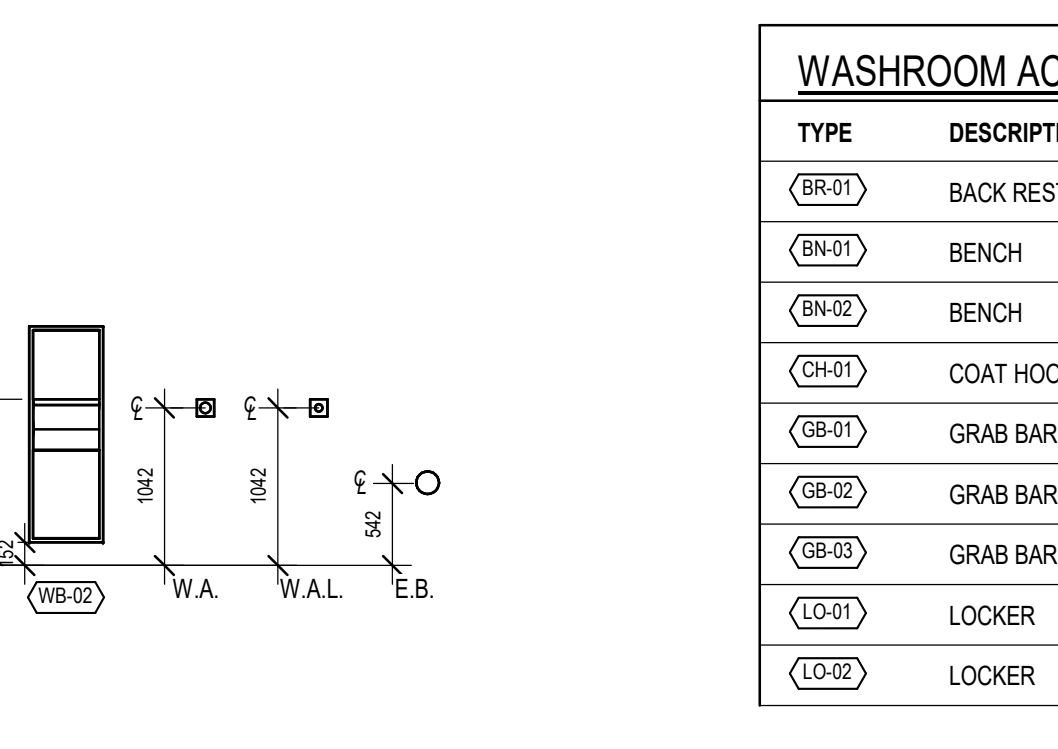
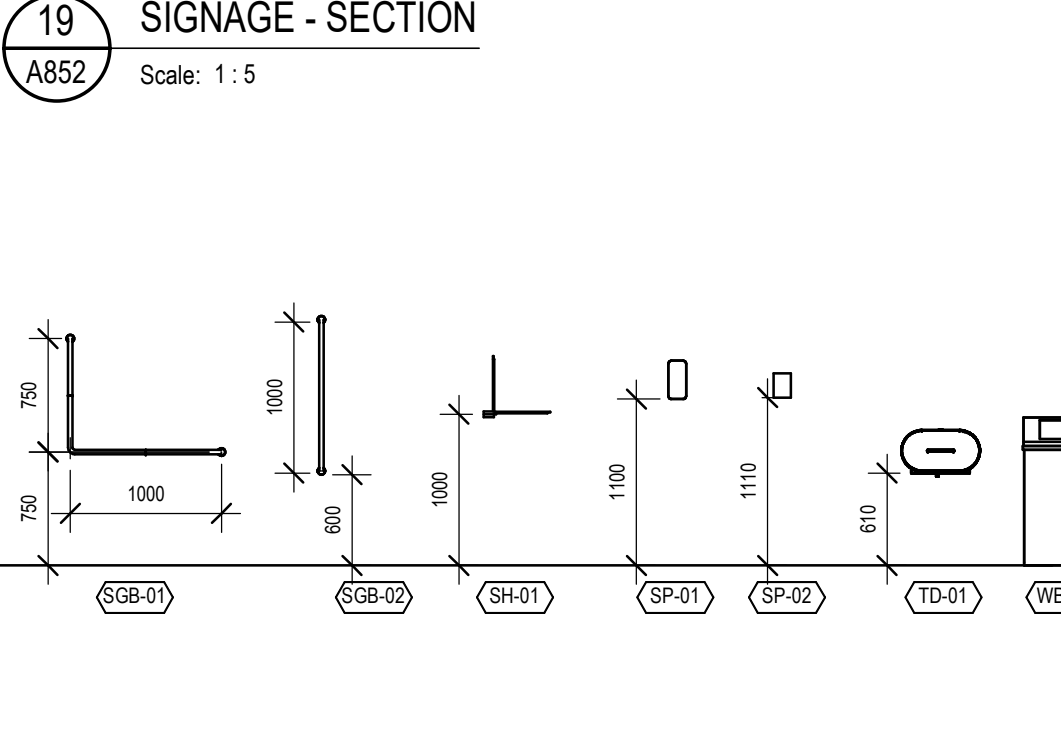
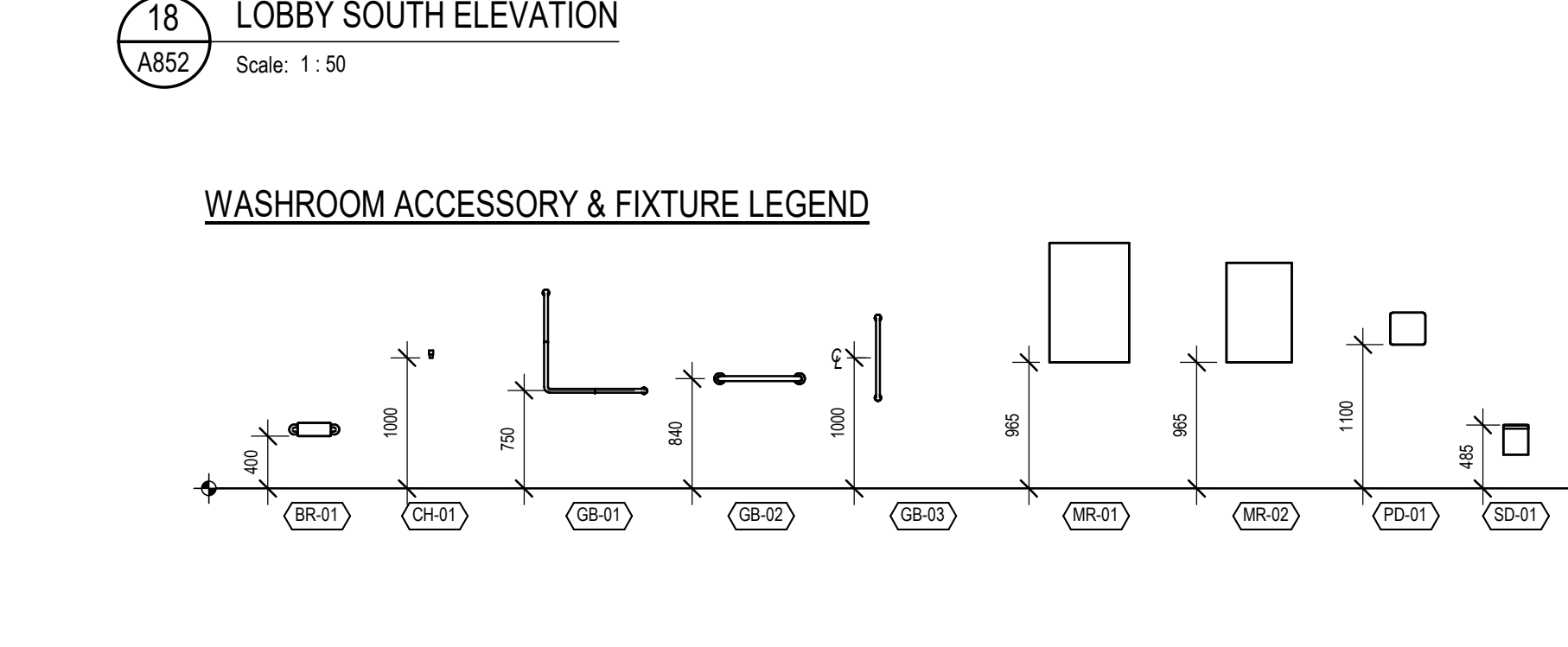
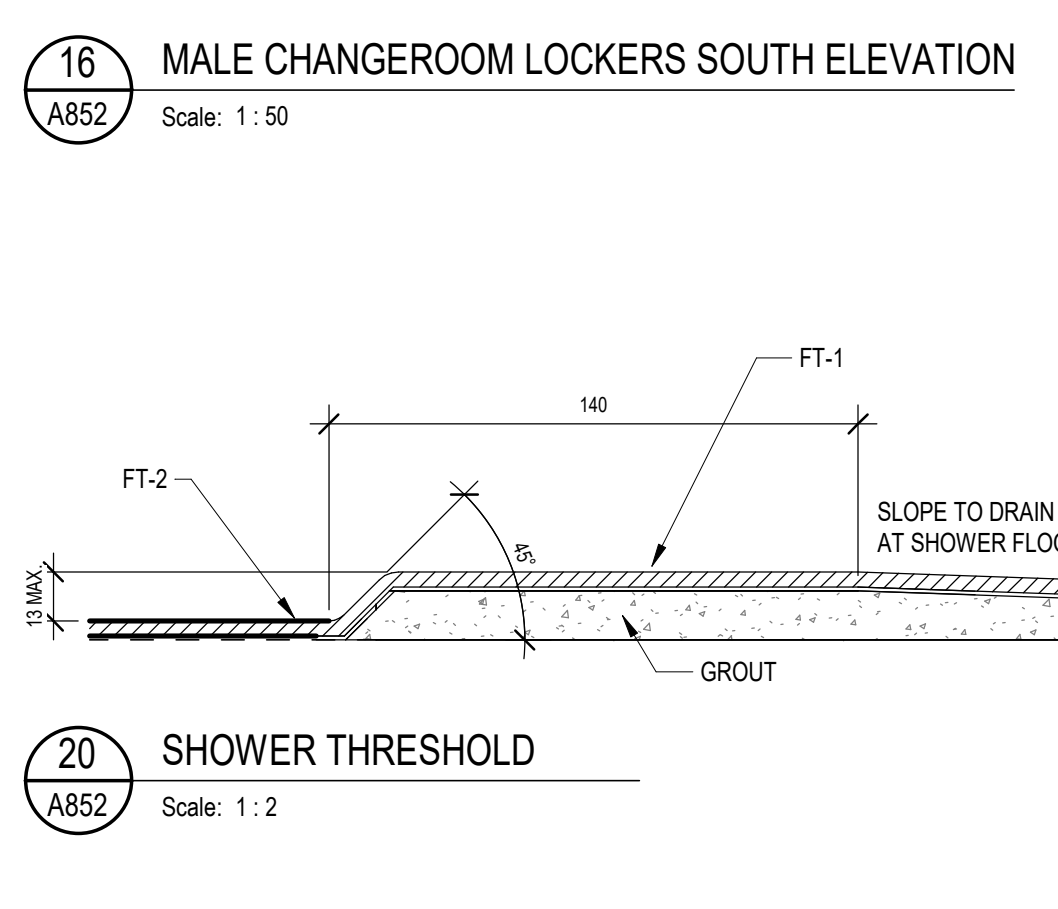
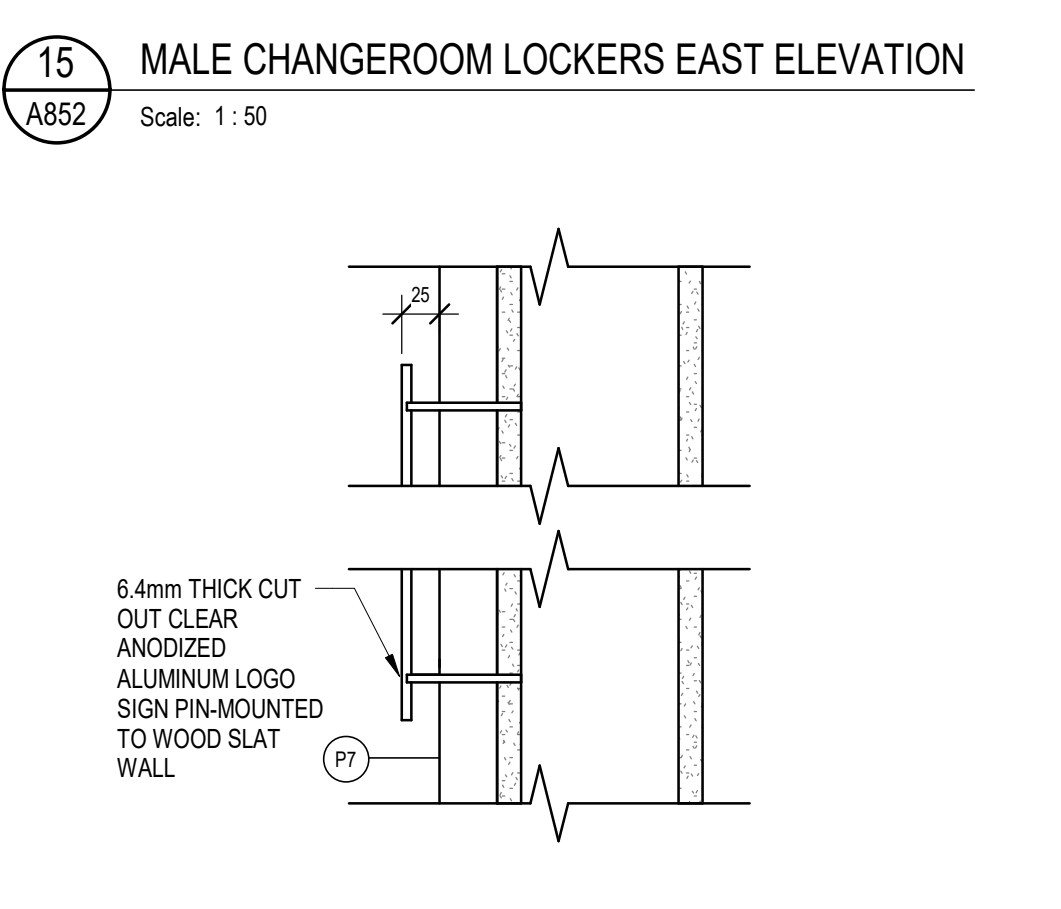
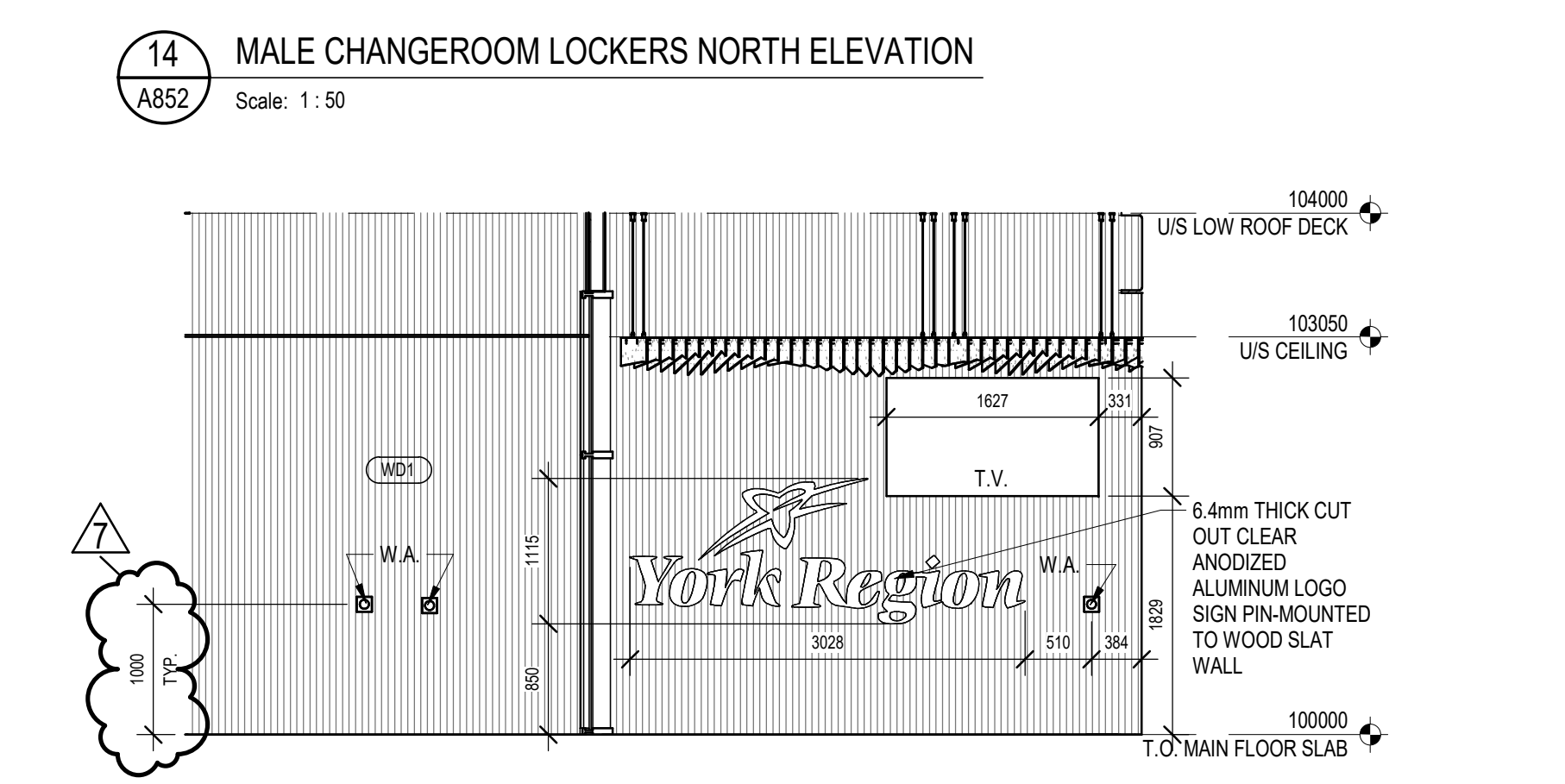
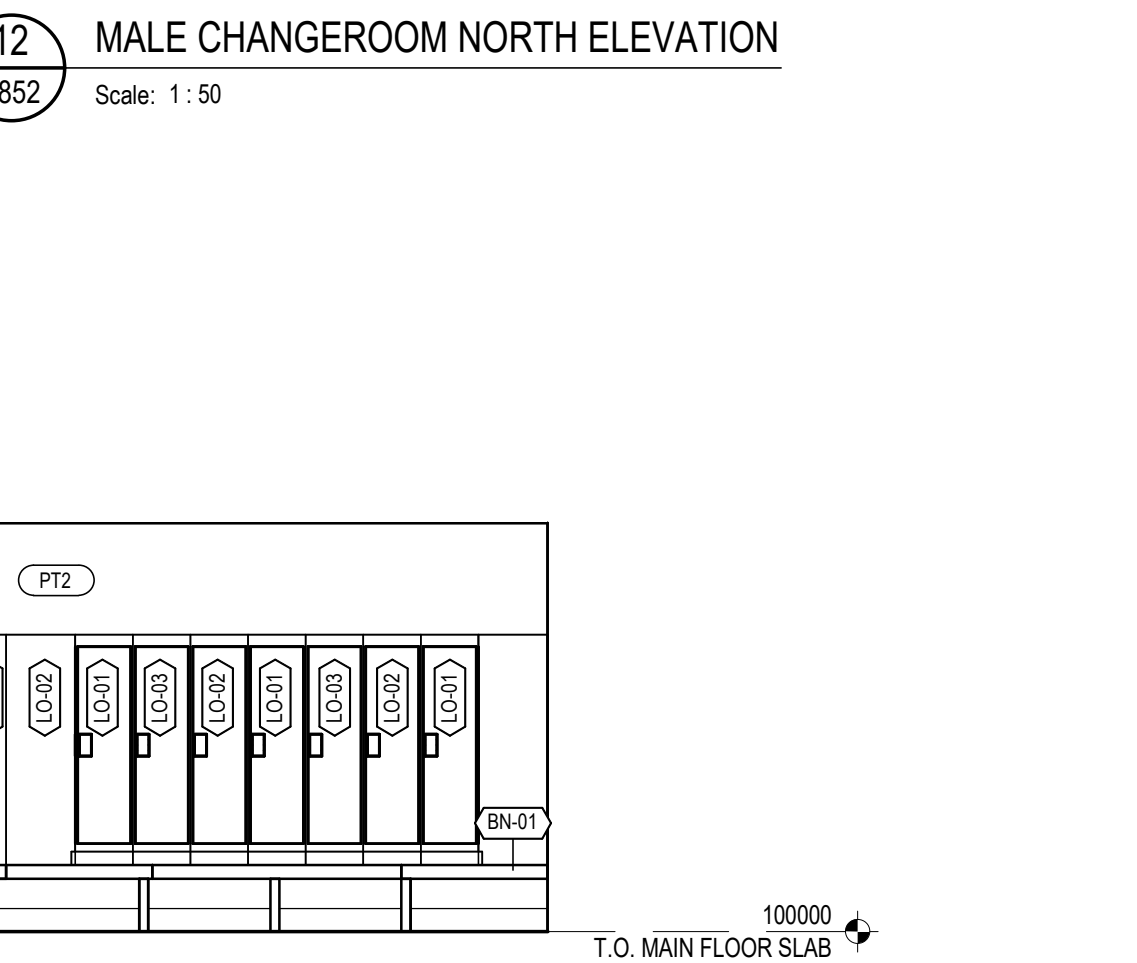
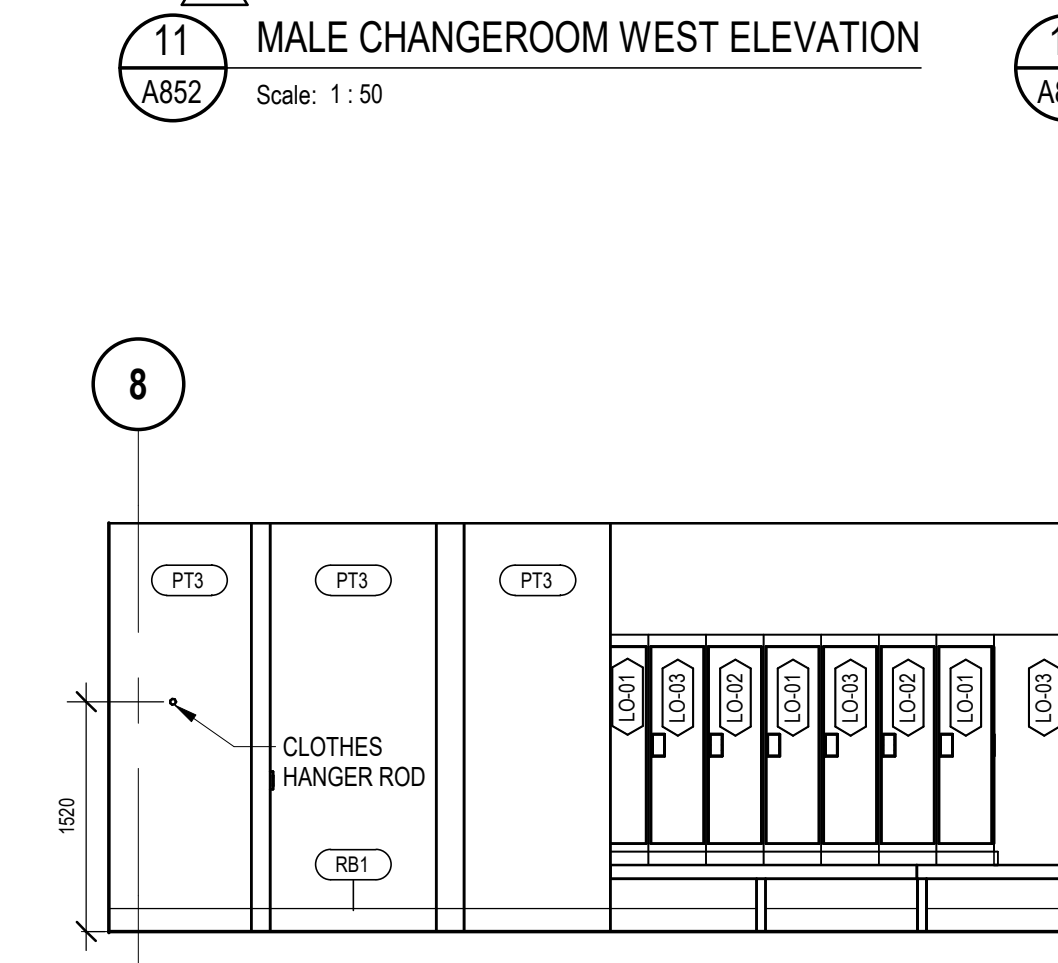
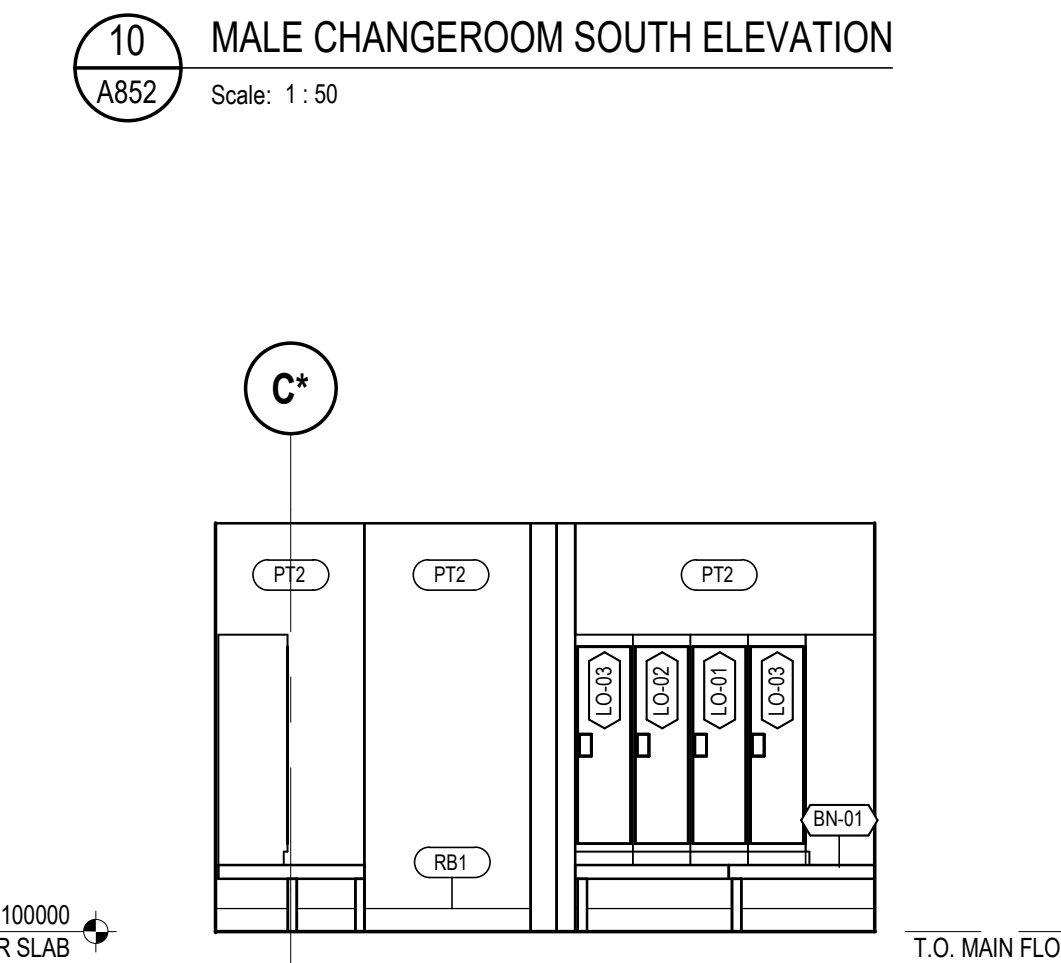
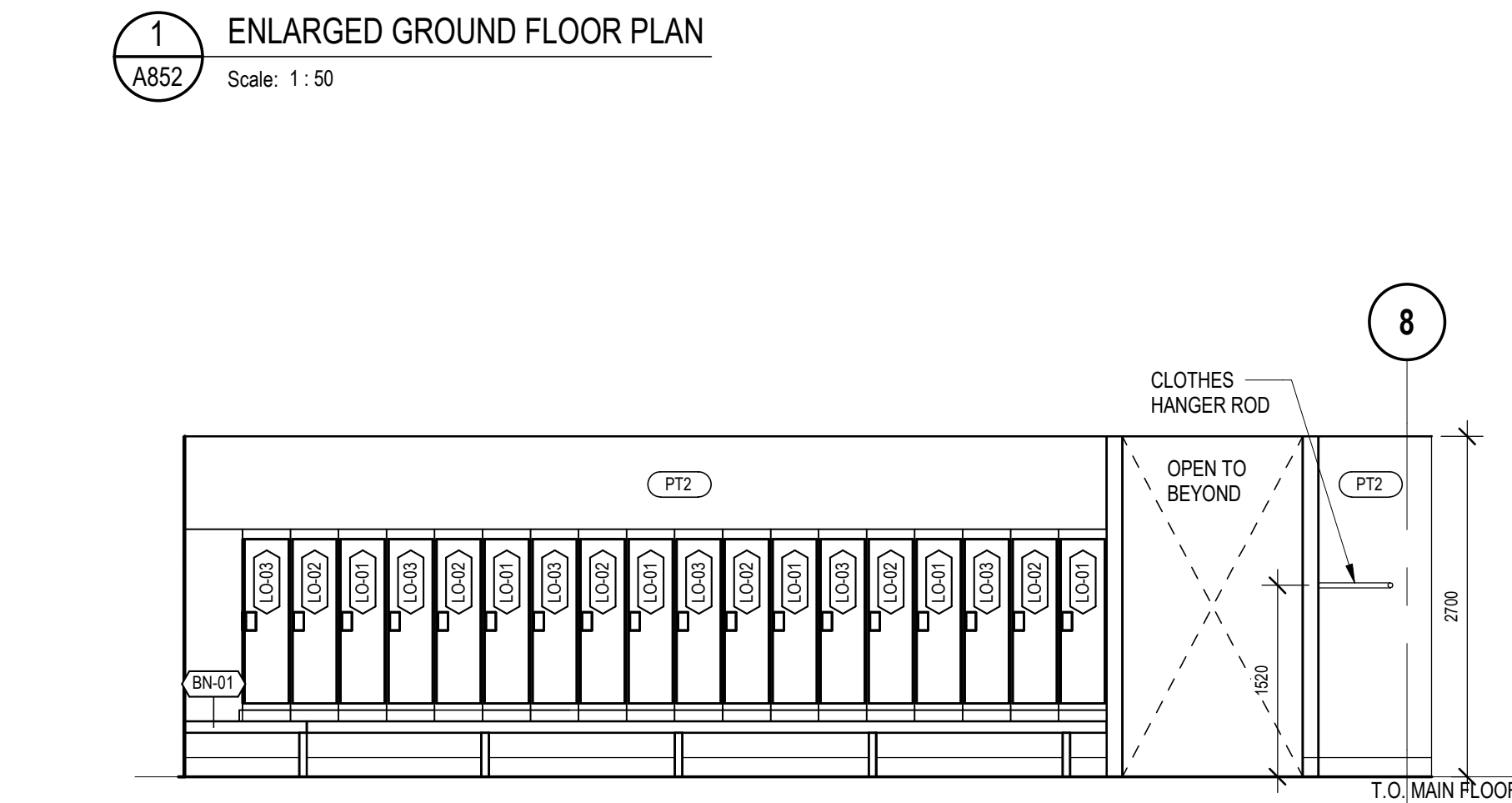
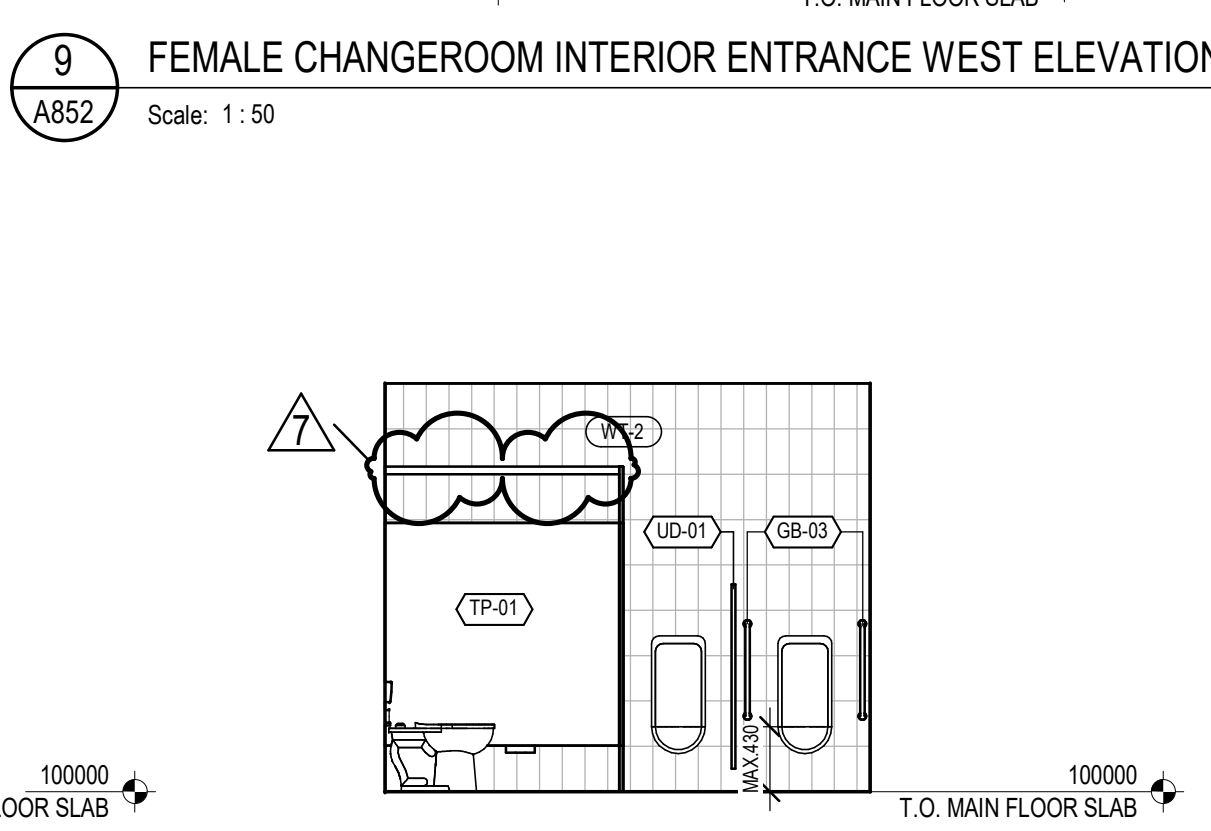
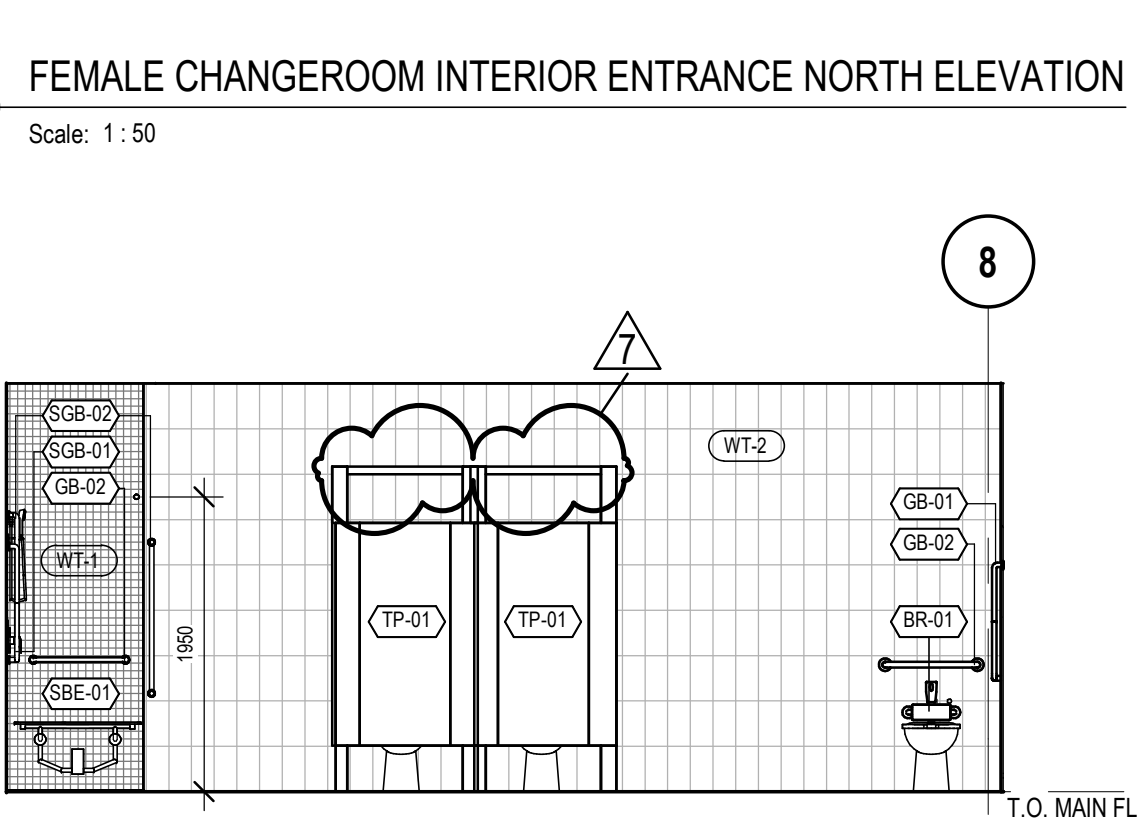
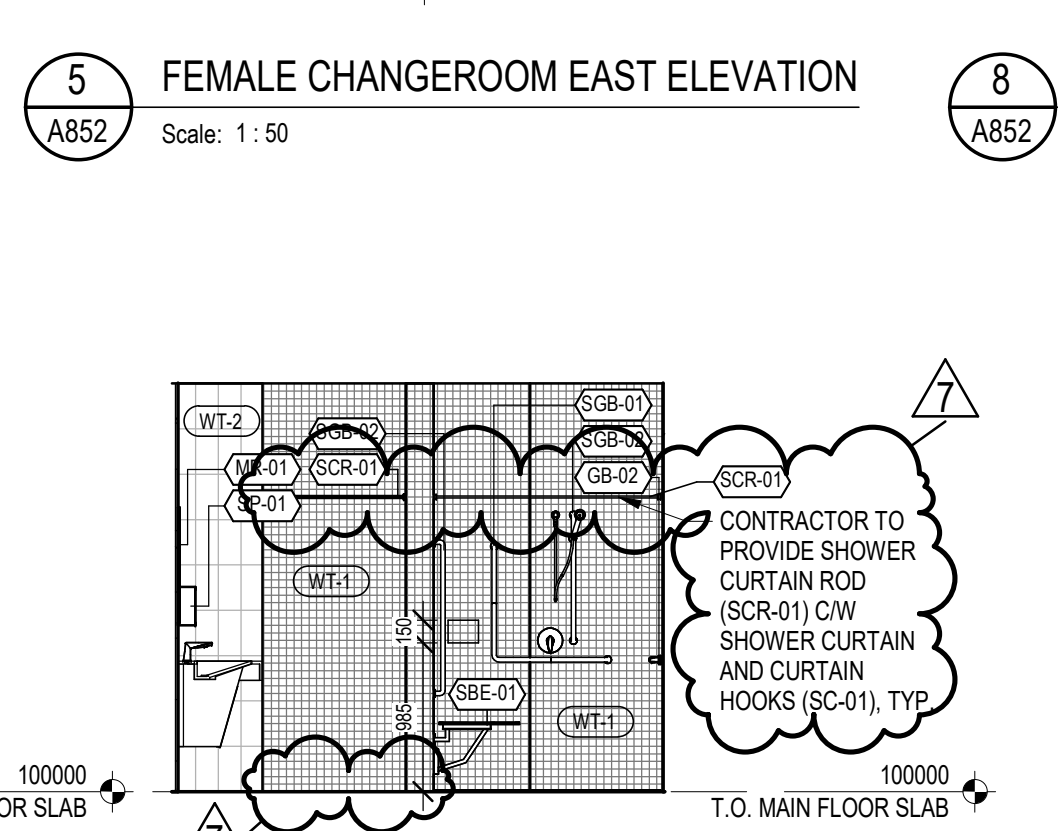
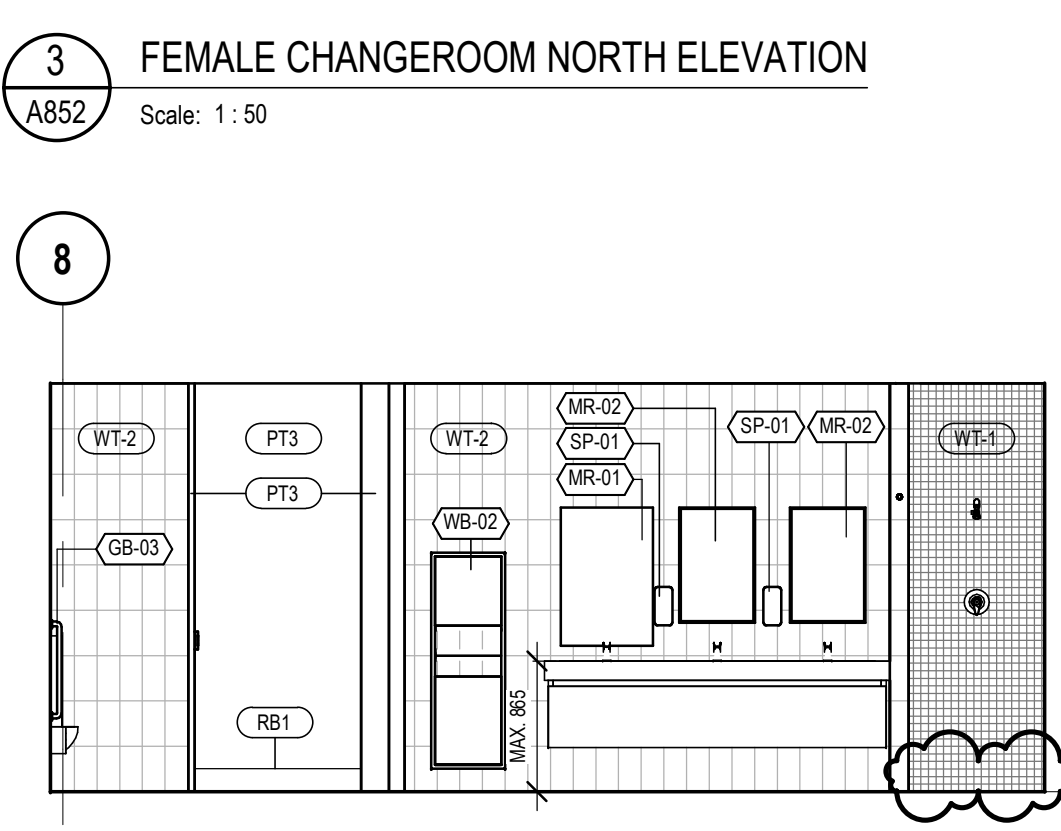
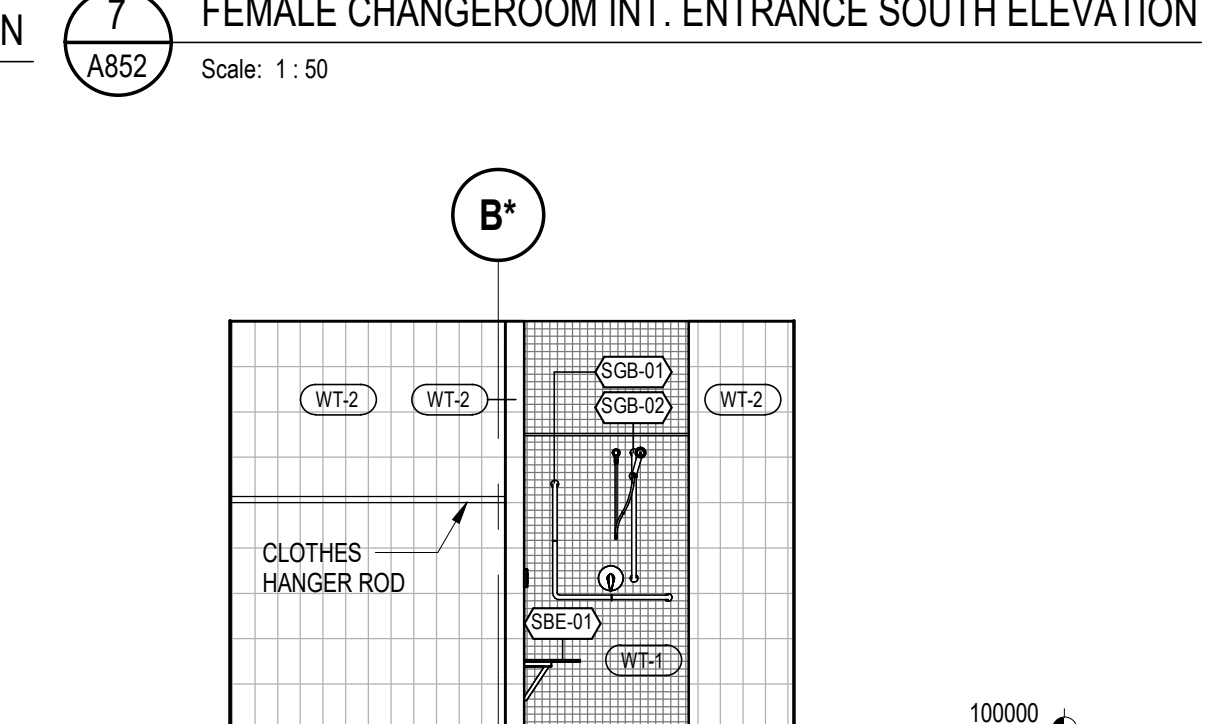
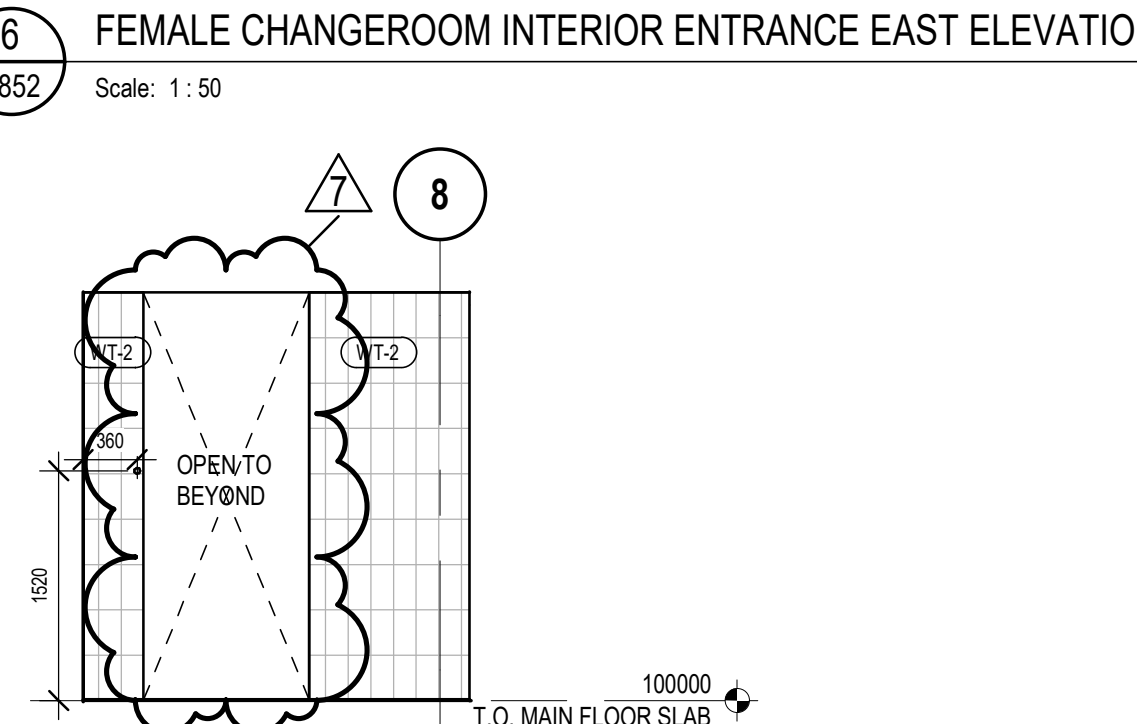
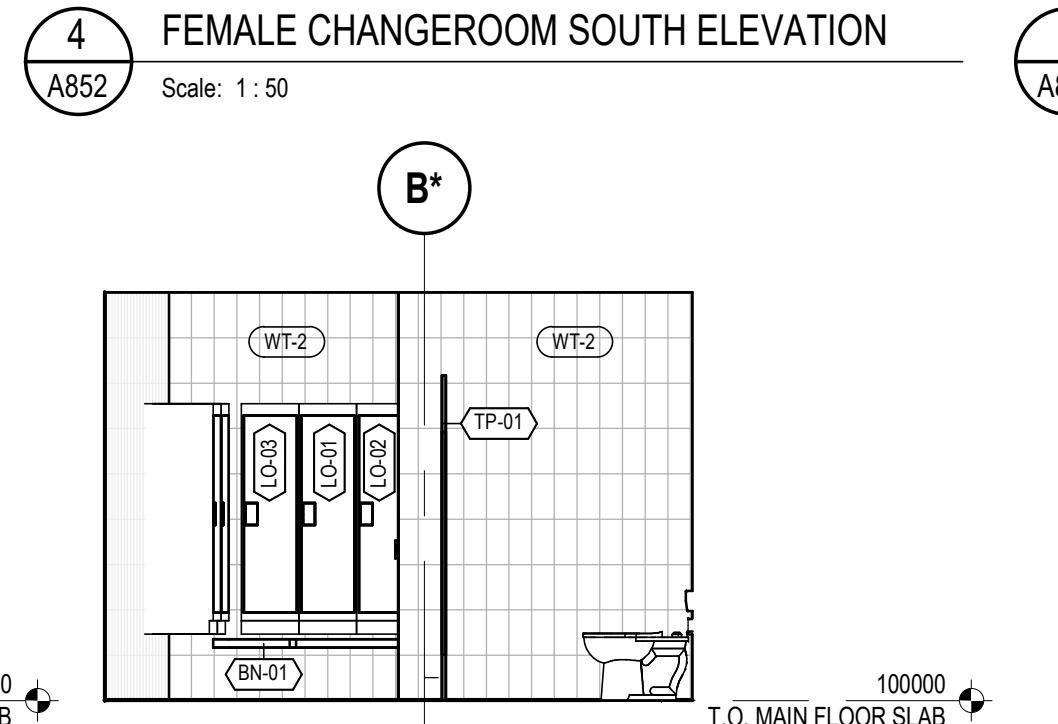
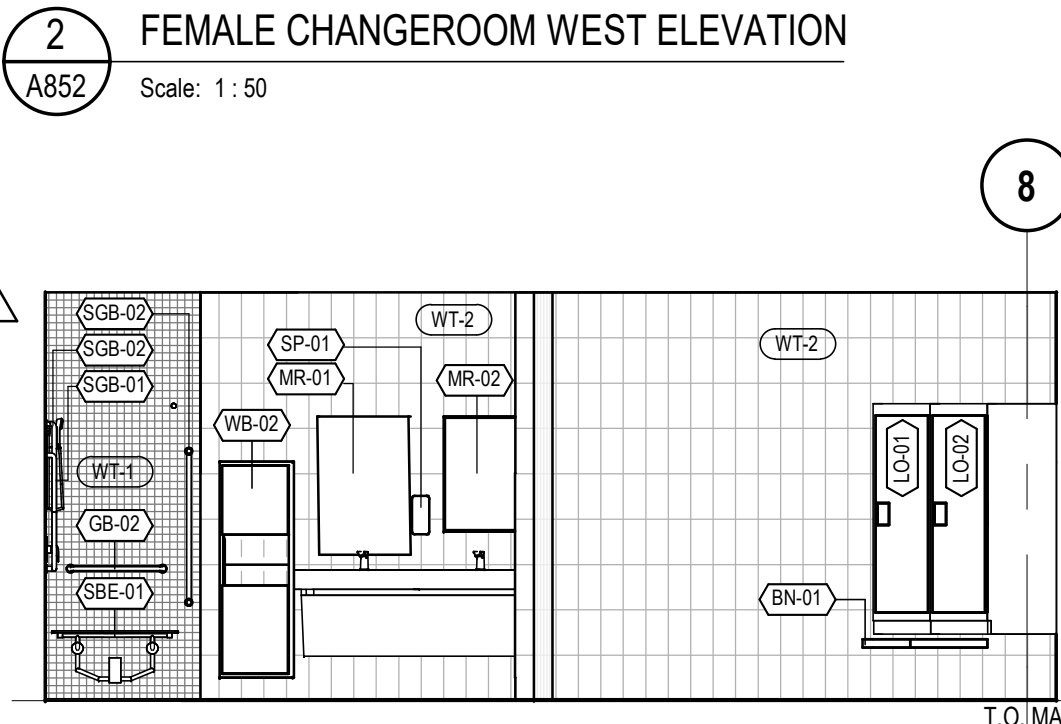
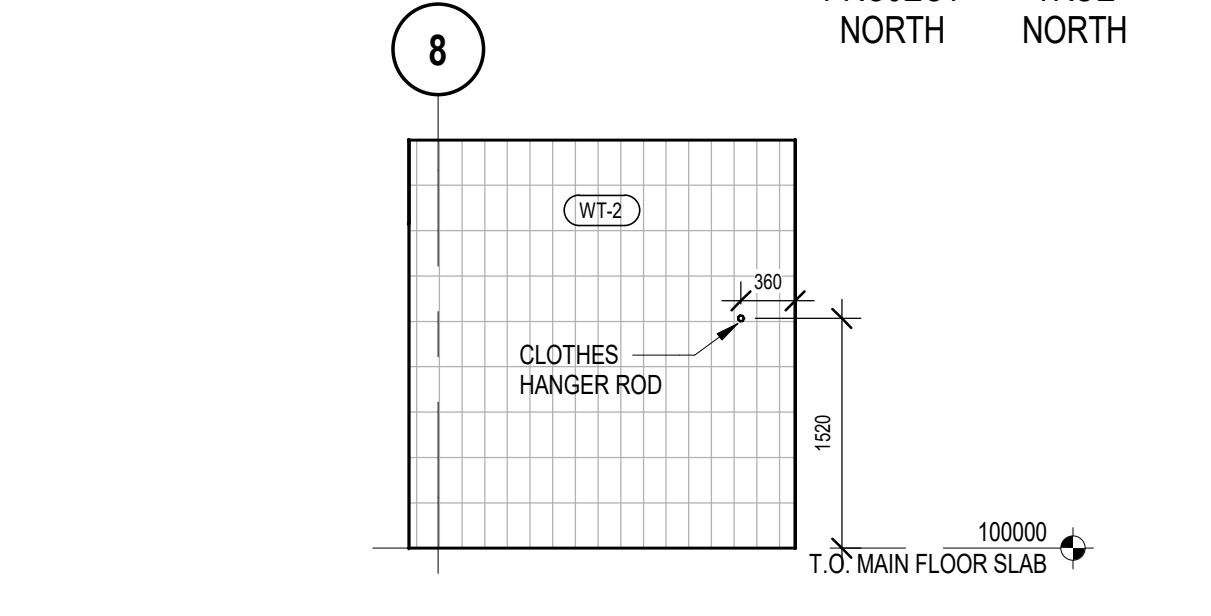
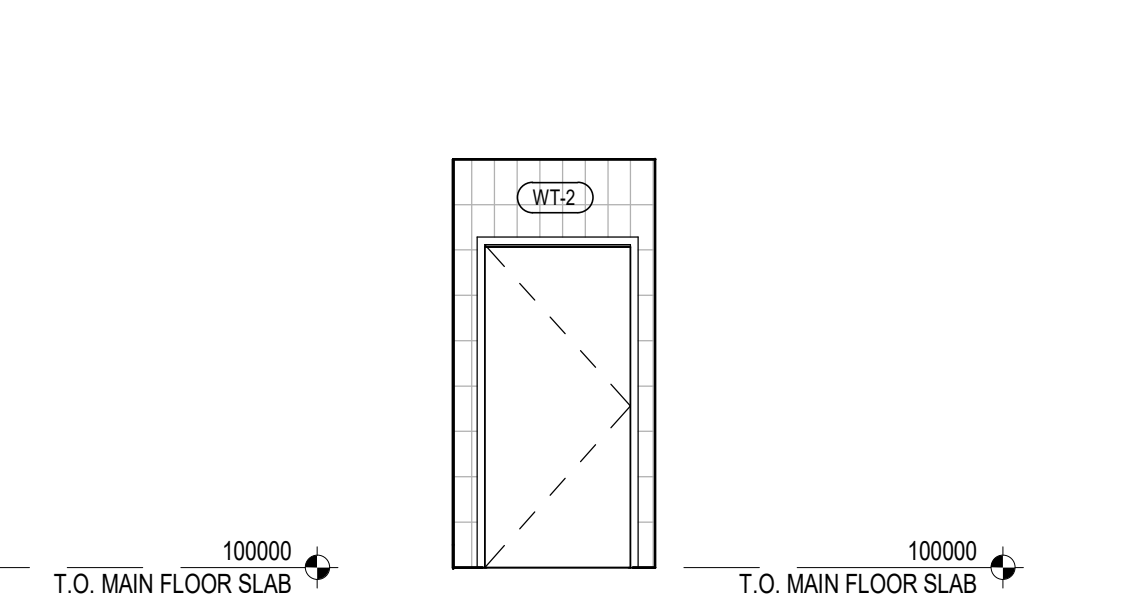
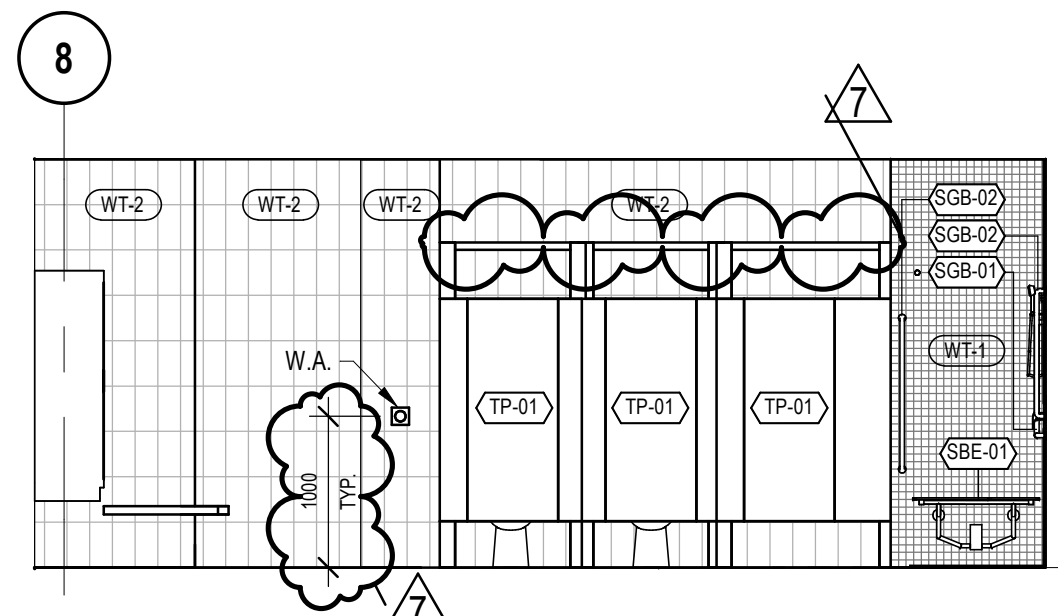
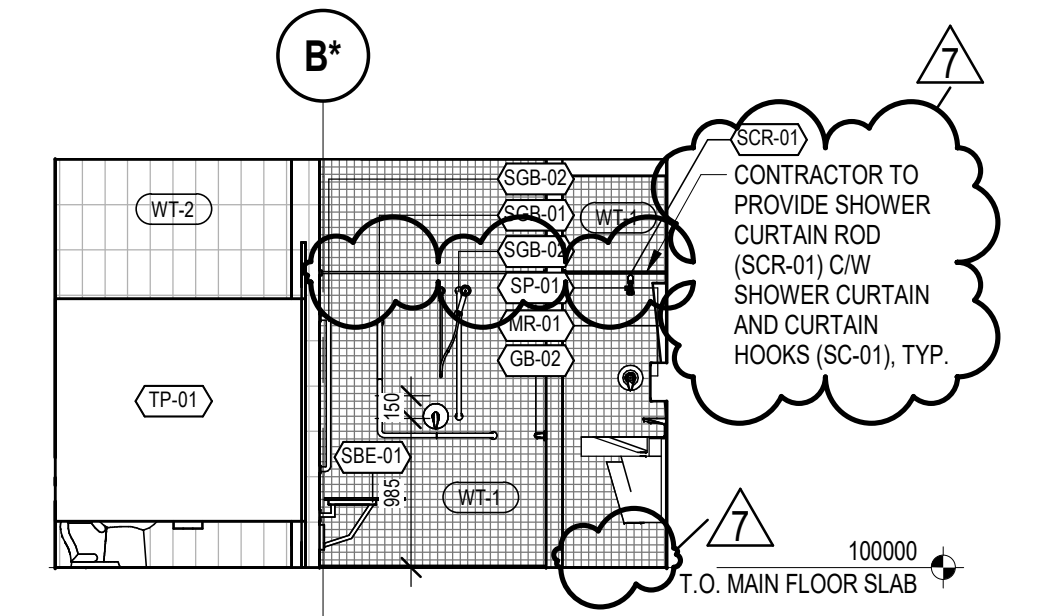
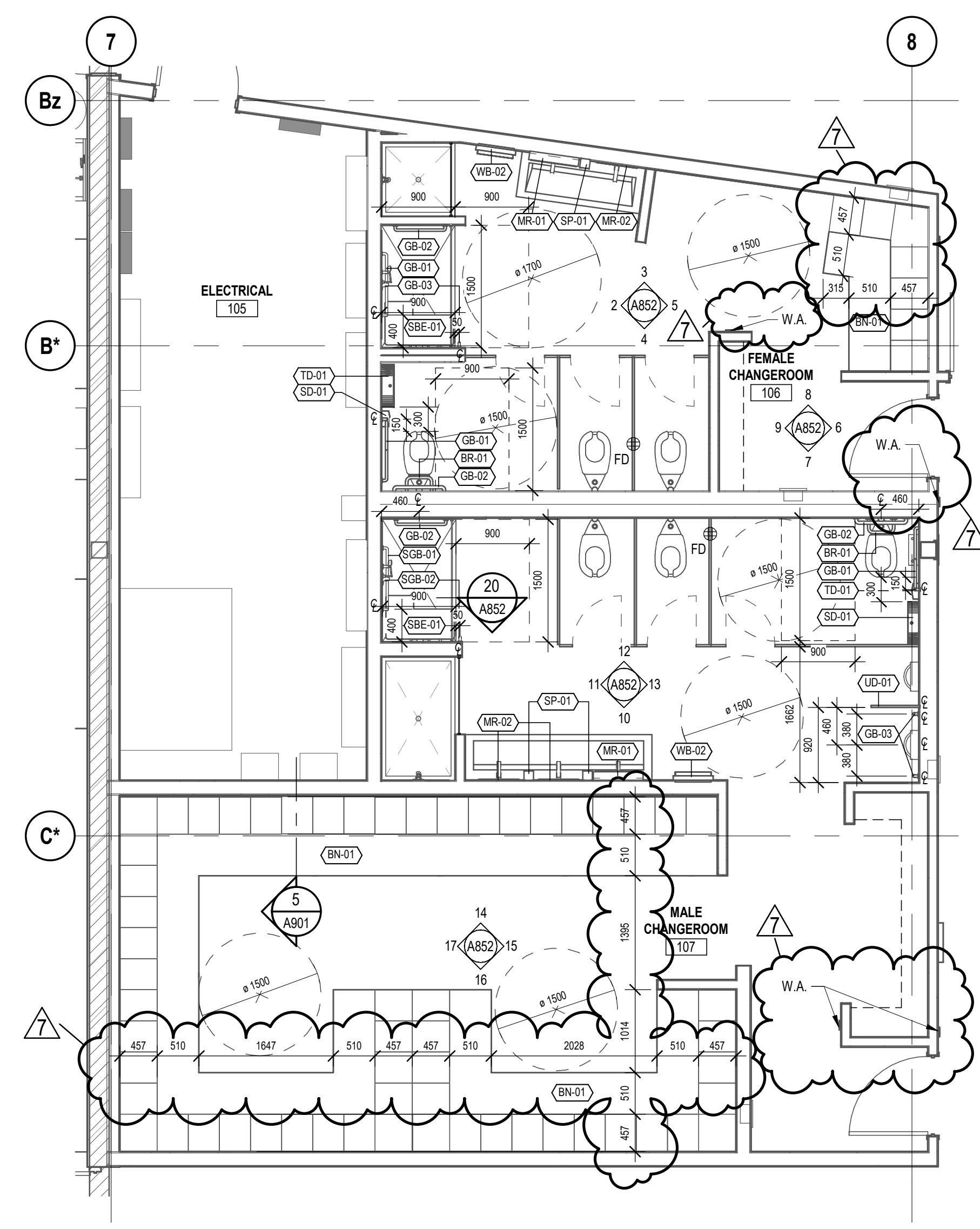
- REFER TO SPECIFICATION SECTION 10 99 99 WASHROOM ACCESSORY SCHEDULE FOR ADDITIONAL INFORMATION.
- WASHROOM ACCESSORY MOUNTING HEIGHTS TO MEET BARRIER FREE REQUIREMENTS UNLESS NOTED OTHERWISE.
- ALL WASHROOM ACCESSORIES TO BE INSTALLED UNDER THIS CONTRACT.
- PLYWOOD BACKING TO BE SUPPLIED AND INSTALLED BEHIND ALL WASHROOM ACCESSORIES AND GRAB BARS AS REQUIRED.



Project Team:  
Prime Consultant  
**GEC ARCHITECTURE**  
Structural and Building Envelope Consultant  
**ENTUITIVE**  
Mechanical and Electrical Consultant  
**MCW CONSULTANTS LTD.**  
Civil Consultant  
**PLANMAC ENGINEERING**  
Passive House Consultant  
**PEEL PASSIVE HOUSE**  
LEED Consultant  
**MCW CONSULTANTS LTD.**  
Landscape Consultant  
**MHBC**



Seal & Permit



WASHROOM ACCESSORY SCHEDULE					
TYPE	DESCRIPTION	TYPE	DESCRIPTION	TYPE	DESCRIPTION
BR-01	BACK REST	LD-03	LOCKER	SP-01	SOAP DISPENSER
BN-01	BENCH	MR-01	TILTED MIRROR	SP-02	SOAP DISPENSER
BN-02	BENCH	MR-02	FLAT MIRROR	TD-01	TOILET TISSUE DISPENSER
CH-01	COAT HOOK	PD-01	PAPER TOWEL DISPENSER	TP-01	TOILET PARTITION
GB-01	GRAB BAR - 90° L SHAPED BAR	SBE-01	FOLDING BENCH	UD-01	URINAL DIVIDER
GB-02	GRAB BAR - HORIZONTAL STRAIGHT BAR	SD-01	SANITARY NAPKIN DISPOSAL	WB-01	WASTE BIN
GB-03	GRAB BAR - VERTICAL STRAIGHT BAR	SGB-01	SHOWER GRAB BAR - 90° L SHAPED BAR	WB-02	SEMI-RECESSED TOILET PAPER DISPENSER AND WASTE BIN
LD-01	LOCKER	SGB-02	SHOWER GRAB BAR - VERTICAL STRAIGHT BAR		
LD-02	LOCKER	SH-01	SURFACE MOUNTED SHELF	SCR-01	SHOWER CURTAIN ROD

**WASHROOM ACCESSORY NOTES**

- REFER TO SPECIFICATION SECTION 10 99 99 WASHROOM ACCESSORY SCHEDULE FOR ADDITIONAL INFORMATION.
- WASHROOM ACCESSORY MOUNTING HEIGHTS TO MEET BARRIER-FREE REQUIREMENTS UNLESS NOTED OTHERWISE.
- ALL WASHROOM ACCESSORIES TO BE INSTALLED UNDER THIS CONTRACT.
- PLYWOOD BACKING TO BE SUPPLIED AND INSTALLED BEHIND ALL WASHROOM ACCESSORIES AND GRAB BARS AS REQUIRED.

7	ISSUED FOR ADDENDUM 4	2025-07-18
6	REISSUED FOR TENDER	2025-05-23
5	ISSUED FOR TENDER	2025-04-25
4	ISSUED FOR BUILDING PERMIT	2024-11-27
3	ISSUED FOR PRE-TENDER REVIEW	2024-10-31
2	ISSUED FOR 60% CD	2024-05-02
1	100% DD	2024-02-29
NO.	ISSUED FOR	DATE
Drawing History		
Scale	As indicated	Checked By TB
Region of York Project Number	22046	Region of York Building Code
Region of York Project Number	G013-B	
Project		
YORK REGION NORTH ROADS OPERATIONS CENTRE		
3525 BASELINE RD, SUTTON WEST, ON L0E 1R0		
Drawing Title		
ENLARGED FLOOR PLANS & REFLECTED CEILING PLAN & INTERIOR ELEVATIONS, DETAILS		
Project Number	6016	Drawing Number
		<b>A852</b>

Project Team:

Prime Consultant  
GEC ARCHITECTURE

Structural and Building Envelope Consultant  
ENTUITIVE

Mechanical and Electrical Consultant  
MCW CONSULTANTS LTD.

Civil Consultant  
PLANMAC ENGINEERING

Passive House Consultant  
PEEL PASSIVE HOUSE

LEED Consultant  
MCW CONSULTANTS LTD.

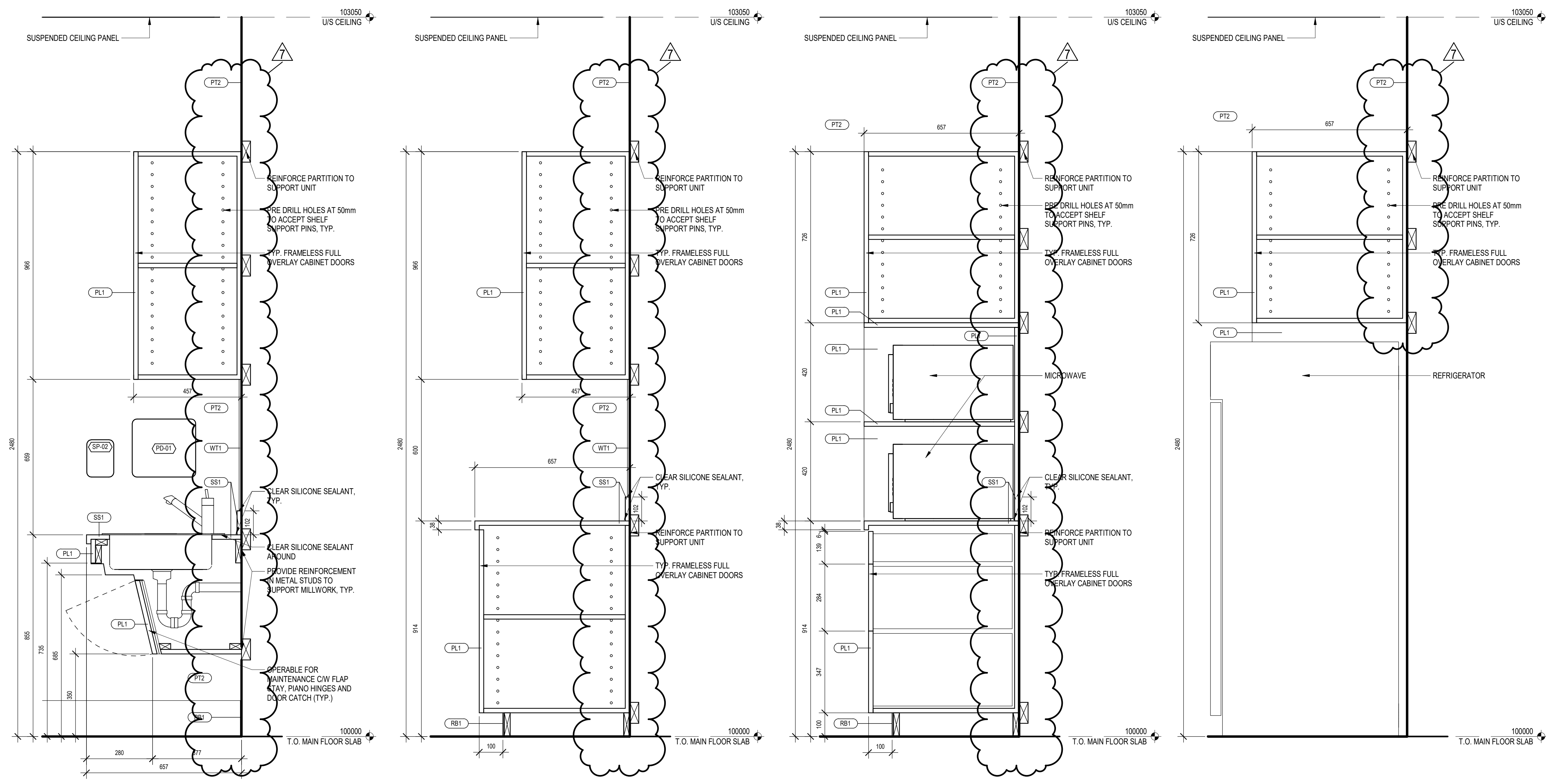
Landscape Consultant  
MHBC

Client

YORK REGION



Seal & Permit

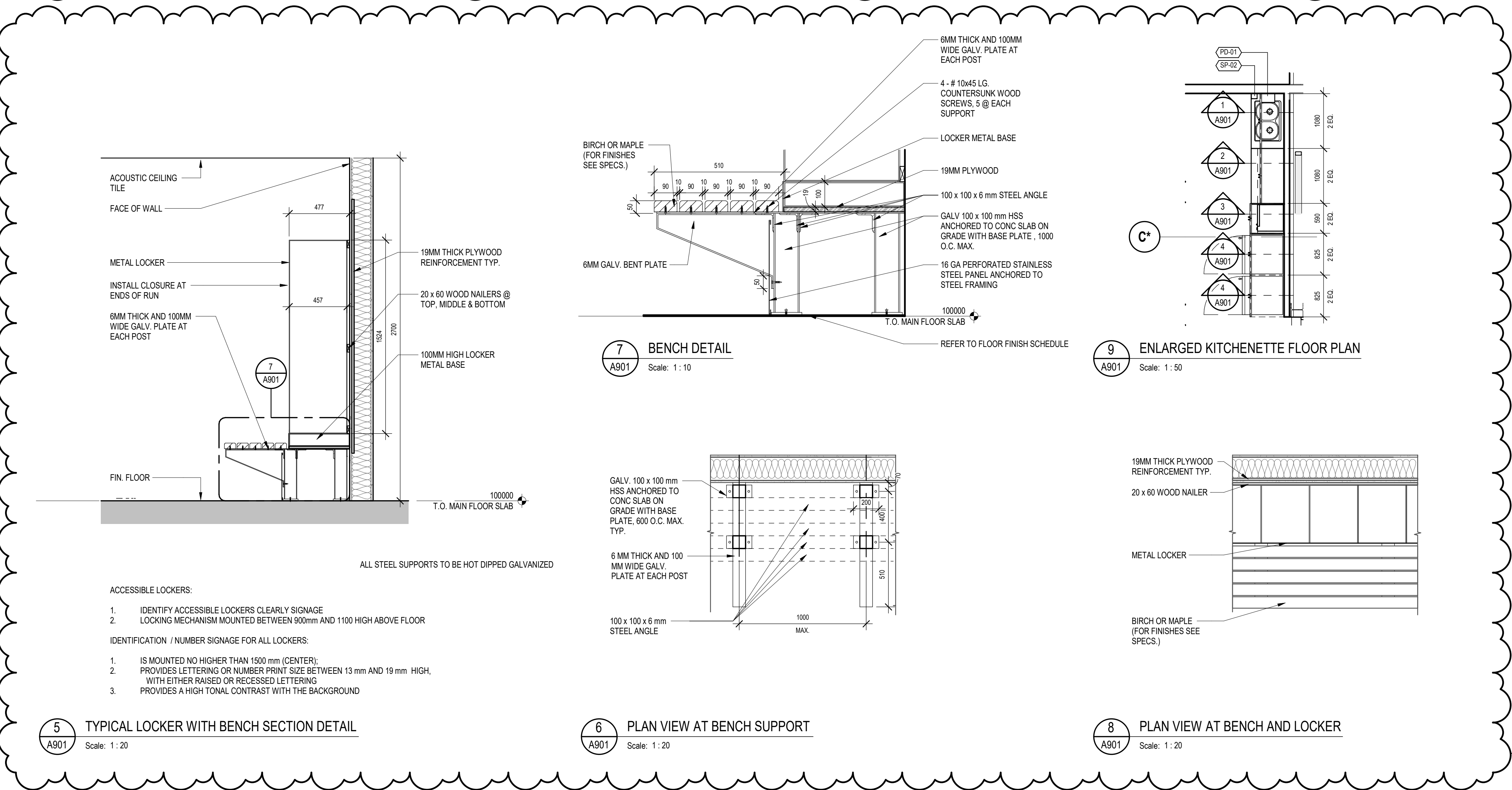


1 BARRIER FREE SINK MILLWORK - SECTION  
A901 Scale: 1:10

2 MILLWORK - SECTION 1  
A901 Scale: 1:10

3 MILLWORK - SECTION 2  
A901 Scale: 1:10

4 MILLWORK - SECTION 3  
A901 Scale: 1:10



5 TYPICAL LOCKER WITH BENCH SECTION DETAIL  
A901 Scale: 1:20

6 PLAN VIEW AT BENCH SUPPORT  
A901 Scale: 1:20

7 BENCH DETAIL  
A901 Scale: 1:10

8 PLAN VIEW AT BENCH AND LOCKER  
A901 Scale: 1:20

9 ENLARGED KITCHENETTE FLOOR PLAN  
A901 Scale: 1:50

7	ISSUED FOR ADDENDUM 4	2025-07-18
6	REISSUED FOR TENDER	2025-05-23
5	ISSUED FOR TENDER	2025-04-25
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3	ISSUED FOR PRE-TENDER REVIEW	2024-10-31
2	ISSUED FOR 60% CD	2024-05-02
1	100% DD	2024-02-29

Drawing History

Scale	As indicated	Checked By	TB
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Region of York Project Number	22046	Region of York Building Code	G013-B
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Project

YORK REGION NORTH ROADS  
OPERATIONS CENTRE

3525 BASELINE RD. SUTTON WEST, ON L0E 1R0

Drawing Title

MILLWORK SECTIONS

Project Number	6016	Drawing Number	A901
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# ENTUITIVE

## Structural Addendum

SA No.: 1

	York Region – North District		
PROJECT NAME	Road Facility Expansion	PREPARED BY	Hayden Bellows
PROJECT NO.	EN023-01007	DATE	July 18, 2025
RE	Issued for Addendum #4 (Structural Addendum #1)	PAGES	3 Cover, 13 Drawings
Issued To			
NAME	COMPANY	EMAIL	
Tyson Bolduc	GEC Architecture	Tyson.bolduc@gecarchitecture.com	
Angela Ng	GEC Architecture	Angela.ng@gecarchitecture.com	
Andrew Au-Yeung	Entuitive	Andrew.auyeung@entuitive.com	

Drawings issued:			
DRAWING NO.	DRAWING TITLE	REVISION NO.	DATE
S002	General Notes	9	2025-07-16
S005	Design Notes	9	2025-07-16
S011	Typical Details	9	2025-07-16
S013	Typical Details	9	2025-07-16
S014	Typical Details	9	2025-07-16
S050	Loading Plans	7	2025-07-16
S190	Foundation Plan	9	2025-07-16
S200	Roof Framing Plan	9	2025-07-16
S400	Foundation Sections	8	2025-07-16
S401	Foundation Sections	8	2025-07-16
S420	Framing Sections	8	2025-07-16
S422	Framing Sections	8	2025-07-16
S501	Elevations	6	2025-07-16

Description of Revisions	
DRAWING NO.	
S002	<ul style="list-style-type: none"> <li>Note #14 added to Section N - Masonry</li> </ul>
S005	<ul style="list-style-type: none"> <li>Existing roof loading removed from Section B</li> <li>Existing roof loading removed from Section F</li> <li>Design criteria updated in Section B</li> </ul>
S011	<ul style="list-style-type: none"> <li>Detail CS20 updated to reflect interior housekeeping pads only.</li> <li>Note #4 added to detail CS20</li> </ul>
S013	<ul style="list-style-type: none"> <li>Abbreviations added to detail G1</li> </ul>
S014	<ul style="list-style-type: none"> <li>Detail M7 updated</li> </ul>
S050	<ul style="list-style-type: none"> <li>Mechanical equipment schedule and plan revised.</li> <li>AHU-2A &amp; AHU-2B removed.</li> <li>ERV-1, HUM-1, RTH-1, RTH-2, RTH-3 added.</li> </ul>

The following Addendum items shall be referred to by all concerned and shall be incorporated as part of the Contract Documents.

S190	<ul style="list-style-type: none"> <li>• Roof loading plan updated to suit new mechanical layout.</li> <li>• Three area drains in existing garage revised to show as existing.</li> <li>• Instructions provided for new area drain between GL 4* &amp; 5* for modifications to existing SOG.</li> <li>• 4/S400 reference along GL 5* removed</li> <li>• Interior housekeeping pads added in new expansion area to suit Mechanical.</li> <li>• Exterior housekeeping pad removed in coordination with Civil.</li> <li>• Plan notes #10, 11, 12 &amp; 13 added.</li> <li>• Steel post schedule updated.</li> <li>• Construction sequence added</li> <li>• New masonry wall along GL 2* updated to existing wall to remain. New strip footing and slab repair along GL 2* removed.</li> <li>• 10/S400 along GL 5* revised.</li> </ul>
S200	<ul style="list-style-type: none"> <li>• New roof anchors and support steel along GL C* between GL 1* and 5* removed.</li> <li>• SP4 revised to SP3 along GL 6</li> <li>• Steel post schedule revised.</li> <li>• AHU-2A &amp; AHU-2B removed.</li> <li>• ERV-1, HUM-1 added.</li> <li>• Beam web opening locations and design table revised.</li> <li>• Plan note #11 revised.</li> <li>• Construction sequence added</li> </ul>
S400	<ul style="list-style-type: none"> <li>• 4/S400 revised to include additional horizontal bar</li> <li>• 7/S400 revised to include extension of horizontal bar in strip footing</li> <li>• 10/S400 revised to include instruction for infill of new SOG, subsurface preparation for new strip footing supporting masonry wall.</li> <li>• 11A/S400 revised to include clarification on supplementary reinforcement shape</li> </ul>
S401	<ul style="list-style-type: none"> <li>• 1/S401 revised to include "North" indicator 11A/S400 and clarification on supplementary reinforcement shape</li> <li>• 1A/S401 &amp; 2A/S401 revised to include dimension to T/O existing footing and instruction for contractor to verify depth to T/O existing footing</li> <li>• Individual T&amp;B rebar call-offs added to 1A/S401 and 2A/S401</li> <li>• 2/S401 revised to include "North" indicator 11A/S400 and clarification on supplementary reinforcement shape</li> <li>• Void form noted on 1A/S401 updated</li> </ul>
S420	<ul style="list-style-type: none"> <li>• Detail 6/S420 removed</li> </ul>
S422	<ul style="list-style-type: none"> <li>• Bearing connection force added in 9/S422</li> </ul>
S501	<ul style="list-style-type: none"> <li>• SP4 revised to SP3 in 2/S501</li> </ul>

#### Reason for Addendum

In coordination with all consultant's addendum #3 drawings, third-party reviewer HDR's comments on IFT drawing set and as per client's request.

End of Structural Addendum

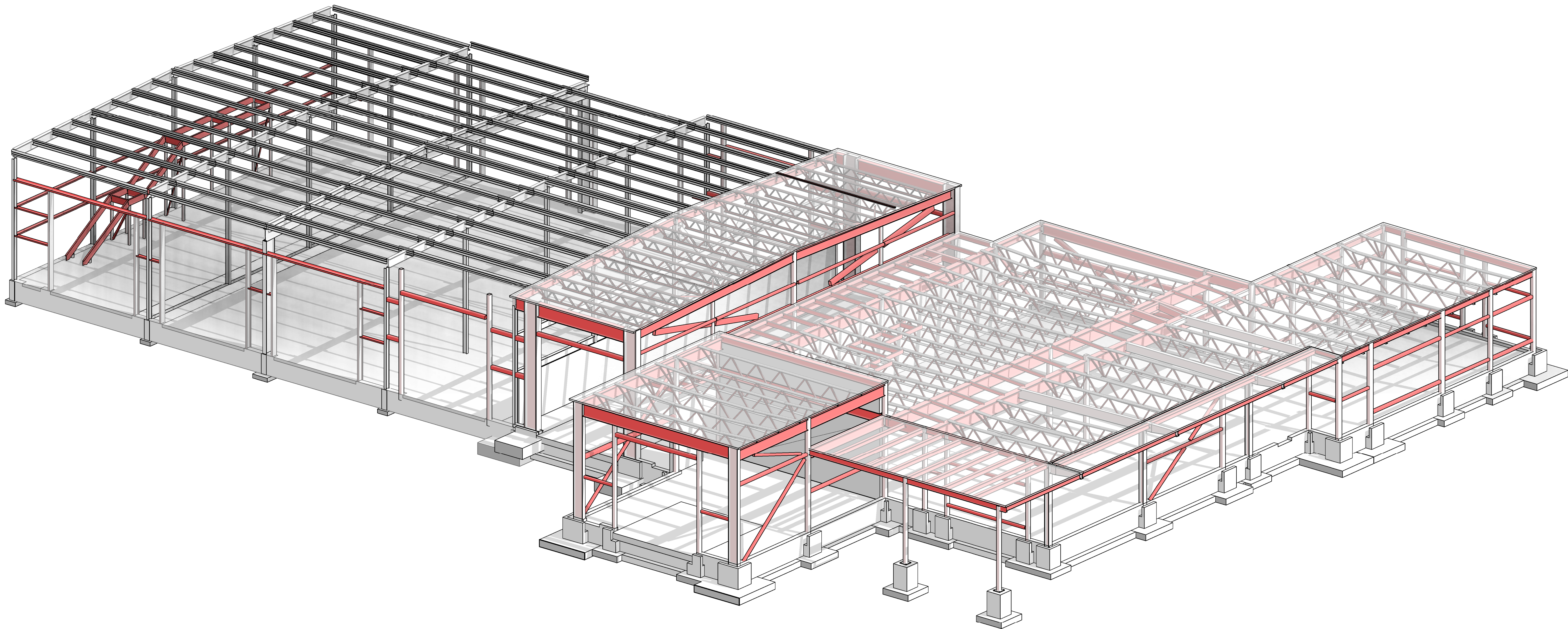
*The following Addendum items shall be referred to by all concerned and shall be incorporated as part of the Contract Documents.*

Sincerely,  
Entuitive

A handwritten signature in black ink, appearing to read 'Norris', with a stylized flourish at the end.

Norris Cheng, P.Eng.  
Senior Engineer  
Norris.cheng@entuitive.com  
C: 437.247.8709





ENTUITIVE

DRAWING LIST	
DRAWING No.	DRAWING TITLE
S000	COVER SHEET
S001	GENERAL NOTES
S002	GENERAL NOTES
S003	GENERAL NOTES
S004	GENERAL NOTES
S005	DESIGN NOTES
S010	TYPICAL DETAILS
S011	TYPICAL DETAILS
S012	TYPICAL DETAILS
S013	TYPICAL DETAILS
S014	TYPICAL DETAILS
S015	TYPICAL DETAILS
S016	TYPICAL DETAILS
S050	LOADING PLANS
S190	FOUNDATION PLAN
S200	ROOF FRAMING PLAN
S300	COLUMN SCHEDULE
S400	FOUNDATION SECTIONS
S401	FOUNDATION SECTIONS
S420	FRAMING SECTIONS
S421	FRAMING SECTIONS
S422	FRAMING SECTIONS
S500	ELEVATIONS
S501	ELEVATIONS

ENTUITIVE

200 University Avenue, 7th Floor  
Toronto, ON M5H 3C6  
+1 416 477 5832

Project Team:  
Prime Consultant  
GEC ARCHITECTURE  
Structural Consultant  
ENTUITIVE  
Mechanical Consultant  
Electrical Consultant  
Civil Consultant

Client  
OWNER  


Seal & Permit

8	REISSUED FOR TENDER	2025-05-23
7	ISSUED FOR TENDER	2025-04-25
6	ISSUED FOR COORDINATION	2025-04-17
5	ISSUED FOR BUILDING PERMIT	2024-11-27
4	ISSUED FOR PRE TENDER REVIEW	2024-10-31
3	ISSUED FOR 80% CD	2024-05-02
2	ISSUED FOR 100% DD	2024-02-29
1	ISSUED FOR 60% DD	2024-01-25
NO.	ISSUED FOR	DATE

Drawing History	
Scale	Checked By HB
Region of York Project Number	Region of York Building Code

Project  
York Region North Roads Operations  
Centre  
3525 Baseline Road  
Georgina, ON, L0E 1R0  
Drawing Title

COVER SHEET

Project Number  
EN023-01007  
Drawing Number  
S000

3D VIEWS ARE PROVIDED TO AID CLARITY  
AND MAY NOT BE COMPLETE. REFER TO  
PLANS, SECTIONS AND SPECIFICATIONS



A. GENERAL

1. THE STRUCTURE IS TO BE BUILT IN ACCORDANCE WITH THE REQUIREMENTS OF THE ONTARIO BUILDING CODE 2012 (OBC), AND ANY APPLICABLE REQUIREMENTS OR BY LAWS OF THE AUTHORITY HAVING JURISDICTION.
2. ALL DIMENSIONS IN THE STRUCTURAL DRAWING SET ARE IN MILLIMETERS (mm) UNLESS NOTED OTHERWISE.
3. WHERE DOCUMENTS ARE REFERENCED IN THE GENERAL AND DESIGN NOTES, THEY SHALL BE THE LATEST EDITIONS OR REVISION, UNLESS NOTED OTHERWISE.
4. READ STRUCTURAL DRAWINGS AND SPECIFICATIONS IN CONJUNCTION WITH ALL OTHER CONTRACT DOCUMENTS.
5. THE TERM CONTRACTOR IS DEFINED TO INCLUDE ANY OF THE FOLLOWING: GENERAL CONTRACTOR, SUB-CONTRACTOR, CONSTRUCTION MANAGER.
6. BEFORE PROCEEDING WITH WORK, CHECK THE DIMENSIONS SHOWN ON THE STRUCTURAL DRAWINGS AGAINST ALL OTHER DRAWINGS AND REPORT DISCREPANCIES TO THE CONSULTANT. DO NOT SCALE THE DRAWINGS.
7. REFER TO THE ARCHITECTURAL AND OTHER DRAWINGS FOR LOCATIONS AND SIZES OF PITS, BASES, HOUSEKEEPING PADS, SLUMPS, TRENCHES, DEPRESSIONS, GROOVES, CURBS, CHAMFERS, SLOPES, OPENINGS AND SLEEVES NOT SHOWN ON THE STRUCTURAL DRAWINGS. OBTAIN THE CONSULTANT'S PRIOR APPROVAL BEFORE INSTALLING OPENINGS, SLEEVES, ETC... WHICH ARE NOT SHOWN ON STRUCTURAL DRAWINGS.
8. THE STRUCTURE HAS BEEN DESIGNED FOR THE LOADS SHOWN. ENSURE THEY ARE NOT EXCEEDED DURING CONSTRUCTION.
9. TYPICAL STRUCTURAL DETAILS SHALL GOVERN THE WORK. IF DETAILS DIFFER ON OTHER DRAWINGS, THE MOST STRINGENT SHALL GOVERN. IN SOME TYPICAL DETAILS, PORTIONS OF THE STRUCTURE HAVE BEEN CUT BACK OR REMOVED FOR CLARITY PURPOSES ONLY. REFER TO PLANS AND SECTIONS FOR ACTUAL CONDITIONS.
10. THE STRUCTURAL PLANS SHOW FRAMING BELOW THE FLOOR LEVEL IDENTIFIED ON THE PLAN OR DRAWING TITLE. AS SUCH CONCRETE WALLS, COLUMNS, CONCRETE BEAMS, DROP PANELS AND THE LIKE WHICH ARE BELOW THE SLAB ARE SHOWN DOTTED ON PLAN. WALLS, COLUMNS OR CONCRETE BEAMS THAT EXTEND ABOVE THE TOP OF THE SLAB ARE SHOWN AS CONTINUOUS OR SOLID LINES. STEEL BEAMS BELOW THE SLAB ARE SHOWN SOLID ON PLAN, TYPICALLY.
11. PERFORMANCE ITEMS

- A. THE CONTRACTOR SHALL EMPLOY OR RETAIN A PROFESSIONAL ENGINEER, LICENSED IN THE PROVINCE WHERE THE PROJECT IS LOCATED TO DESIGN, DETAIL AND PROVIDE P.ENG. STAMPED SHOP DRAWINGS FOR REVIEW FOR PERFORMANCE ITEMS AS PART OF THE BASE BUILDING STRUCTURE AND OTHER COMPONENTS INDICATED IN THE CONTRACT DOCUMENTS INCLUDING BUT NOT LIMITED TO:
  1. STRUCTURAL STEEL CONNECTIONS
  2. STEEL DECK, INCLUDING ROOF DECK, FLOOR DECK, COMPOSITE DECK AND ALL FASTENING BETWEEN DECK SHEETS AND ALL CONNECTIONS TO SUPPORTING MEMBERS, WHETHER THEY ARE WELDED OR MECHANICALLY FASTENED
  3. STEEL JOISTS, BRIDGING AND CONNECTIONS
  4. CURTAIN WALL, CLADDING, GLAZING, ROOFING, INSULATED METAL PANELS AND THE LIKE; INCLUDING THE DETERMINATION OF WIND LOADS FOR THE DESIGN OF THESE ELEMENTS
  5. HELICAL PILES & ALL ASSOCIATED CONNECTIONS

12. INSPECTION AND TESTING

1. THE OWNER WILL APPOINT AN INDEPENDANT INSPECTION AND TESTING COMPANY TO MAKE INSPECTIONS OR PERFORM TESTS AS THE OWNER DIRECTS. THE INDEPENDENT INSPECTION AND TESTING COMPANIES SHALL BE RESPONSIBLE ONLY TO THE OWNER AND SHALL MAKE ONLY SUCH INSPECTIONS OR TESTS AS THE OWNER MAY DIRECT. AUTHORIZED INSPECTION AND TESTING SHALL BE PAID FOR BY THE OWNER. AT A MINIMUM THE FOLLOWING WILL BE REQUIRED:
  1. CONCRETE TESTING FOR ALL CONCRETE ELEMENTS
  2. STEEL INSPECTIONS FOR NEW STEEL WORK
  3. BEARING CAPACITY CHECKS FOR ALL NEW FOUNDATION WORK
  4. SUBGRADE PREPARATION REVIEW FOR ALL NEW SLAB ON GRADE WORK
  5. REBAR INSPECTIONS
  6. HELICAL PILE AS-BUILT INSPECTION

13. CONTRACT ADMINISTRATION BY ENTUITIVE

1. ENTUITIVE HAS BEEN RETAINED TO PROVIDE CONTRACT ADMINISTRATION SERVICES FOR THE PROJECT. THESE SERVICES INCLUDE FIELD REVIEW, REVIEW OF SHOP DRAWINGS, ATTENDANCE AT SITE MEETINGS DURING THE CONSTRUCTION OF THE STRUCTURAL WORK, RESPONSE TO SITE GENERATED QUESTIONS, CLARIFICATIONS, RFI'S, AS WELL AS ADDITIONAL ACTIVITIES ASSOCIATED WITH THE ADMINISTRATION OF THE CONSTRUCTION CONTRACT.
2. FIELD REVIEW:
  1. ENTUITIVE WILL CARRY OUT PERIODIC FIELD REVIEWS OF THE WORK SHOWN ON THE STRUCTURAL CONTRACT DOCUMENTS ONLY. THESE REVIEWS WILL BE PERFORMED ON BEHALF OF THE OWNER TO DETERMINE WHETHER THE CONSTRUCTION IS BEING CARRIED OUT IN GENERAL CONFORMITY WITH THE CONTRACT DOCUMENTS. THE CONTRACTOR IS SOLELY RESPONSIBLE FOR ENSURING THAT THE WORK IS COMPLETED IN CONFORMANCE WITH THE CONTRACT DOCUMENTS AND ALL APPLICABLE CODES, STANDARDS AND ACTS.
  2. THE CONTRACTOR IS NOT TO CONSTRUE THESE REVIEWS AS BEING PART OF OR IN LIEU OF THEIR OWN FIELD REVIEW OF THE WORK BEING CARRIED OUT ON SITE.
  3. THE EXTENT AND NATURE OF THE WORK REVIEWED ON SITE IS AT THE SOLE DISCRETION OF ENTUITIVE'S SITE REPRESENTATIVE. THE WORK WILL BE REVIEWED ON A SAMPLING BASIS.
  4. THE CONTRACTOR IS TO PROVIDE A MINIMUM OF 24 HOURS ADVANCE NOTICE WHEN A PARTICULAR ASPECT OF THE WORK IS READY FOR REVIEW. THE WORK TO BE REVIEWED SHALL BE GENERALLY COMPLETE, PRIOR TO ENTUITIVE'S SITE REPRESENTATIVE VISITING THE SITE.
  5. WHEN DEFICIENCIES ARE NOTED ON SITE REVIEW REPORTS, THE CONTRACTOR IS TO ADDRESS THE DEFICIENCIES AND PROMPTLY RESPOND TO ENTUITIVE IN WRITING. THE RESPONSE IS TO INCLUDE A DESCRIPTION OF ACTIONS TAKEN TO REMEDIATE THE DEFICIENCIES, WITH APPROPRIATE SUPPORTING DOCUMENTATION AS DETERMINED BY ENTUITIVE.
3. SHOP DRAWING REVIEW:
  1. ENTUITIVE'S REVIEW OF SHOP DRAWINGS IS CARRIED OUT ON A RANDOM SAMPLING BASIS. AS SUCH, NOT ALL SHOP DRAWINGS ARE REVIEWED NOR IS ALL OF THE INFORMATION ON ANY PARTICULAR SHOP DRAWING REVIEWED BY ENTUITIVE.
  2. REVIEW OF SHOP DRAWINGS IS ONLY FOR GENERAL CONFORMITY WITH THE CONTRACT DOCUMENTS. THE REVIEW OF SHOP DRAWINGS DOES NOT RELIEVE THE CONTRACTOR OF ANY OF THEIR CONTRACTUAL RESPONSIBILITIES, NOR DOES IT RELIEVE THE CONTRACTOR OF THEIR RESPONSIBILITIES TO ENSURE THE SHOP DRAWINGS ARE COMPLETE, COORDINATED WITH THE WORK OF ALL OTHER TRADES AND FREE OF ERRORS. THE CONTRACTOR IS SOLELY RESPONSIBLE FOR ENSURING THAT INFORMATION SHOWN ON THE SHOP DRAWINGS INCLUDING BUT NOT LIMITED TO: MEMBER SIZES, QUANTITIES, DIMENSIONS, EXISTING SITE CONDITIONS, FABRICATION PROCESSES, MEANS AND METHODS OF CONSTRUCTION AND THE LIKE ARE CORRECT, CONSISTENT WITH THE REQUIREMENTS OF THE CONTRACT DOCUMENTS AND ARE COORDINATED WITH THE WORK OF ALL OTHER TRADES.
  3. ALL SHOP DRAWINGS ARE TO BE REVIEWED BY THE CONTRACTOR PRIOR TO BEING SUBMITTED TO ENTUITIVE. THE CONTRACTOR'S REVIEWED STAMP SHALL BE AFFIXED TO ALL SHOP DRAWINGS SUBMITTED TO ENTUITIVE FOR REVIEW.
  4. SHOP DRAWINGS ARE TO BE SEALED AND SIGNED BY A PROFESSIONAL ENGINEER AS REQUIRED BY THE CONTRACT DOCUMENTS. ANY SHOP DRAWINGS SUBMITTED WITHOUT THE PROFESSIONAL ENGINEER'S SEAL AND SIGNATURE (WHERE REQUIRED) WILL BE RETURNED "UNREVIEWED" AND MARKED FOR RESUBMISSION.
  5. COMMENTS MADE ON SHOP DRAWINGS ARE NOT TO BE CONSTRUED AS INSTRUCTIONS OR AUTHORIZED CHANGES TO THE CONTRACT DOCUMENTS. IF THE CONTRACTOR BELIEVES THAT COMMENTS MADE ON THE SHOP DRAWINGS WILL RESULT IN CHANGES TO THE CONTRACT, THEY ARE TO NOTIFY THE CONSULTANT OF THIS PRIOR TO UNDERTAKING THE WORK.
  6. SHOP DRAWINGS WILL BE PROCESSED WITHIN THE TIME FRAMES NOTED IN THE CONTRACT DOCUMENTS UNLESS OTHER ARRANGEMENTS ARE MADE IN ADVANCE OF THE SUBMISSION OF THE SHOP DRAWINGS.
4. RESPONSE TO RFI'S:
  1. RFI'S WILL BE PROCESSED IN A TIMELY MANNER, PROVIDED THE TIME FRAMES IDENTIFIED ARE REASONABLE AND CONSISTENT WITH THE URGENCY OF THE REQUIRED RESPONSE.
  2. THE EXTENT OF ANY PARTICULAR RFI SHALL BE LIMITED TO A PARTICULAR AREA OF THE WORK OR A CONSISTENT ISSUE AFFECTING DIFFERENT AREAS OF THE WORK. ANY PARTICULAR RFI SHALL NOT INCLUDE TWO OR MORE UNRELATED ITEMS.

14. TEMPORARY WORKS

1. TEMPORARY WORKS ARE INSTALLATIONS REQUIRED TO PROVIDE ACCESS, PROTECTION, SUPPORT OR SERVICES FOR WORKERS, EQUIPMENT AND MATERIALS DURING THE CONSTRUCTION, RENOVATION, RETROFIT, OR DEMOLITION OF PERMANENT WORKS. TEMPORARY WORKS ARE ALSO REQUIRED TO PROVIDE TEMPORARY SUPPORT FOR ANY PART OF THE EXISTING OR PERMANENT WORKS UNTIL THE PERMANENT WORKS HAVE ACHIEVED A STATE OF COMPLETION ALLOWING THE TEMPORARY WORKS TO BE REMOVED. SOME TYPICAL EXAMPLES OF THIS INCLUDE BUT ARE NOT LIMITED TO:

1. FORMWORK OR FALSEWORK FOR STRUCTURES.
2. SHORING AND TEMPORARY BRACING FOR NEW AND/OR EXISTING STRUCTURAL ELEMENTS INCLUDING THEIR CONNECTIONS TO EXISTING STRUCTURE WHERE REQUIRED.
3. FOUNDATIONS REQUIRED TO SUPPORT SHORING.
4. SHORING FOR EXCAVATIONS AND TRENCHES.
5. TEMPORARY UNDERPINNING.
6. CRANES, CRANE TIE-INS, AND CRANE FOUNDATIONS.
7. HOISTS.
8. RESHORES FOR MULTI-STOREY CONCRETE STRUCTURES.
9. REVIEW OF BASE BUILDING CAPACITY TO SUPPORT TEMPORARY LOADS FROM MATERIALS AND EQUIPMENT (LIFTS, CONCRETE TRUCKS, CRANES, HOISTS, EXCAVATORS, ETC...)
2. THE CONTRACTOR SHALL EMPLOY A PROFESSIONAL ENGINEER, LICENSED IN THE PROVINCE WHERE THE PROJECT IS LOCATED, TO DESIGN AND DETAIL ALL TEMPORARY WORKS ITEMS (THE "TEMPORARY WORKS ENGINEER"). THE DESIGN SHALL INCLUDE FULL RESOLUTION OF ANY AND ALL LOADS APPLIED ONTO THE BASE BUILDING STRUCTURE, CONSIDERING THE TEMPORARY CONDITION OF THE STRUCTURE, AND SHALL INCLUDE REVIEW OF THE EXISTING STRUCTURES CAPACITY TO SUPPORT THESE LOADS. WHERE NECESSARY, ADDITIONAL SHORING, REINFORCEMENT, AND/OR TEMPORARY FOUNDATIONS MAY BE REQUIRED. THESE ELEMENTS ARE TO BE DESIGNED BY THE TEMPORARY WORKS ENGINEER AND PROVIDED BY THE CONTRACTOR.
3. THE CONTRACTOR SHALL SUBMIT FOR REVIEW BY THE CONSULTANT, DRAWINGS, SPECIFICATIONS, AND CALCULATIONS DEFINING THE TEMPORARY WORKS INCLUDING:
  1. THE DURATION FOR WHICH THE TEMPORARY WORKS ARE INTENDED TO REMAIN AND THE MEASURES REQUIRED SHOULD IT APPEAR THIS DURATION MAY BE EXCEEDED.
  2. ALL LIVE, DEAD, WIND AND SEISMIC LOADS FOR WHICH THE TEMPORARY WORKS WERE DESIGNED.
  3. THE LIVE, DEAD, WIND AND SEISMIC LOAD REACTIONS ON THE BASE BUILDING STRUCTURE.
  4. CALCULATIONS THAT SHOW THE BASE BUILDING STRUCTURE OR ADDED TEMPORARY WORKS ELEMENTS CAN SAFELY RESIST THE APPLIED LOADS INCLUDING SUPPORTING COLUMNS AND FOUNDATIONS
  5. ANY REQUIRED STAGING OF THE CONSTRUCTION, MODIFICATIONS REQUIRED DURING CONSTRUCTION, AND SPECIAL PRECAUTIONS REQUIRED DURING ERECTION AND DISMANTLING.
  6. SPECIAL TOLERANCES AND CLEARANCES.
  7. NECESSARY INSPECTION, TESTING, MONITORING AND PROCEDURES.
  8. ALL RELEVANT STANDARDS OR CODES TO WHICH THE TEMPORARY WORKS HAVE BEEN DESIGNED AND THE REQUIREMENTS WITH WHICH THE CONTRACTOR OF TEMPORARY WORKS MUST COMPLY DURING CONSTRUCTION.
  9. ALL DRAWINGS ARE TO BEAR THE SEAL OF THE PROFESSIONAL ENGINEER LICENSED IN THE PROVINCE WHERE THE PROJECT IS LOCATED, RESPONSIBLE FOR THE DESIGN OF THE TEMPORARY WORKS.
  10. THE TEMPORARY WORK MUST BE COORDINATED SUCH THAT IT DOES NOT IMPEDE THE CONSTRUCTION OF THE PERMANENT WORK. THE TEMPORARY WORK MUST HAVE NO ADVERSE EFFECTS ON THE PERMANENT WORK AS IT IS DESIGNED.
  11. THE TEMPORARY WORKS CONTRACTOR MUST REVIEW CHANGES MADE TO THE PERMANENT WORK AND ADAPT TEMPORARY WORKS ACCORDINGLY.
  12. THE TEMPORARY WORKS ENGINEER SHALL PERFORM FIELD REVIEWS TO VERIFY THAT TEMPORARY WORKS ARE CONSTRUCTED IN GENERAL CONFORMANCE WITH THE DESIGN.
4. TEMPORARY WORKS SHALL NOT BE REMOVED WITHOUT WRITTEN APPROVAL FROM THE TEMPORARY WORKS ENGINEER.

B. OPENINGS THROUGH THE STRUCTURE

1. PLACEMENT AND DETAILING OF REINFORCEMENT AROUND SLEEVES, FORMED OPENINGS AND THE LIKE ARE TO CONFORM TO THE REQUIREMENTS NOTED ON THE STRUCTURAL CONTRACT DOCUMENTS. PROVIDE COORDINATED SLEEVING/LIFT DRAWINGS IN ACCORDANCE WITH SPECIFICATION REQUIREMENTS.
2. REFER TO TYPICAL DETAIL FOR MINIMUM SPACING OF SLEEVES. IF THESE SPACING REQUIREMENTS CAN NOT BE MAINTAINED, REINFORCE AROUND SLEEVES AS PER DETAILS FOR FORMED OPENINGS IN TYPICAL DETAIL.

C. SERVICES CAST INTO THE STRUCTURE

1. PLACE CONDUITS IN ACCORDANCE WITH TYPICAL DETAILS. CONTRACTOR TO SUBMIT CONDUIT LAYOUT PLANS IN ADVANCE OF PLACING CONDUITS ON SITE. FINAL LAYOUT OF CONDUITS IS SUBJECT TO REVIEW AND ACCEPTANCE BY THE CONSULTANT.
2. NO METAL CONDUITS, BOXES OR OTHER SERVICES ARE PERMITTED WITHIN THE PARKING STRUCTURE SLABS.
3. PIPES ARE NOT PERMITTED TO BE CAST INTO THE STRUCTURAL SLAB, UNLESS APPROVED IN WRITING BY THE STRUCTURAL CONSULTANT.
4. CONCENTRATIONS OF CONDUITS THAT DO NOT CONFORM TO THE TYPICAL DETAILS ARE SUBJECT TO REVIEW BY THE CONSULTANT. THE CONSULTANT RESERVES THE RIGHT, AT NO EXTRA COST TO THE OWNER, TO INCREASE THE THICKNESS OF THE SLAB IN THESE AREAS AND/OR INCREASE THE CONCRETE STRENGTH AS REQUIRED. IN ADDITION, CONCRETE WITH A 10 mm MAXIMUM AGGREGATE SIZE (PEA GRAVEL) SHALL BE USED TO ACHIEVE CONSOLIDATION.

D. SEQUENCE OF CONSTRUCTION

WHERE PROPOSED CONSTRUCTION SEQUENCING / PHASING REQUIREMENTS ARE INDICATED OR IMPLIED IN THE CONTRACT DOCUMENTS, COORDINATE CONSTRUCTION OF THE BUILDING STRUCTURE / PHASING REQUIREMENTS AND PROVIDE ALL NECESSARY CONNECTIONS AND TEMPORARY SUPPORTS AS REQUIRED TO SAFELY CONSTRUCT THE STRUCTURE.

1. UNLESS NOTED OTHERWISE, THE FINAL CONSTRUCTION SEQUENCING OR PHASING REQUIREMENTS ARE THE RESPONSIBILITY OF THE CONTRACTOR AND SHALL BE DETERMINED AS AN INTEGRAL PART OF THEIR OVERALL CONSTRUCTION MEANS AND METHODS.
2. THE STEEL FRAME ALONE IS NOT STABLE UNTIL MASONRY WALLS ARE BUILT AND TIED INTO THE STEEL COLUMNS, THE STEEL BRACING IS INSTALLED AND THE STEEL ROOF DECK IS INSTALLED.
3. MAINTAIN ERECTION BRACING UNTIL COMPLETION OF ENTIRE STRUCTURE INCLUDING ROOF DECKS AND OTHER ELEMENTS WHICH ARE PART OF THE LATERAL LOAD RESISTING SYSTEM, OR UNTIL SUCH TIME AS THE ENGINEER OF RECORD FOR THE TEMPORARY WORKS / ERECTION CONFIRMS IN WRITING, THAT THE ERECTION BRACING MAY BE REMOVED.
4. WHERE THE SCOPE OF THE STRUCTURAL WORK IS DELINEATED INTO PHASES ON THE DRAWINGS, THE SCOPE OF THE INITIAL PHASE(S) SHALL INCLUDE THE SUPPLY AND INSTALLATION OF ALL WORK SHOWN CAST OR SET INTO THIS INITIAL WORK AS WELL AS ALL DOWELS AND THE LIKE THAT MAY PROJECT OUT OF THIS WORK, UNLESS NOTED OTHERWISE.

E. ALTERATIONS AND/OR CONNECTIONS TO EXISTING STRUCTURE

1. INSPECT THE EXISTING BUILDING AND BECOME THOROUGHLY FAMILIAR WITH THE EXISTING CONDITIONS. DETAILS SHOWN ARE BASED ON INFORMATION AVAILABLE FROM EXISTING BUILDING DRAWINGS ONLY.
2. CHECK ALL DRAWINGS AGAINST ACTUAL CONDITIONS ON SITE PRIOR TO FABRICATING ANY STRUCTURAL STEEL. REPORT DISCREPANCIES TO THE CONSULTANT BEFORE PROCEEDING WITH THE WORK.
3. PRIOR TO FABRICATION OF ANY WORK, OPEN UP ALL AREAS TO ALLOW THE INSTALLATION OF THE NEW STRUCTURAL WORK, AS WELL AS THE CONNECTION OF NEW WORK TO THE EXISTING WORK. TAKE ANY AND ALL NECESSARY FIELD MEASUREMENTS. MODIFY INSTALLATION METHODS AND METHODS FOR CONNECTING TO THE EXISTING STRUCTURE TO SUIT SITE CONDITIONS FOUND AND TO THE APPROVAL OF THE CONSULTANT. CARRY OUT LOCAL REPAIRS TO THE EXISTING WORK AS NECESSARY AND AS DIRECTED BY THE CONSULTANT.
4. PROPOSED SCHEDULE OF WORK AND SEQUENCE TO BE COORDINATED WITH ALL SUBTRADES, THE CONSULTANT AND OWNER. SUBMIT SCHEDULE / SEQUENCE TO THE CONSULTANT FOR REVIEW PRIOR TO START OF WORK.
5. SHORE EXISTING WORK AS REQUIRED UNTIL ALL NEW WORK HAS BEEN COMPLETED.
6. DO NOT CUT CONCRETE REINFORCEMENT UNLESS REVIEWED AND APPROVED BY THE CONSULTANT.
7. OPENINGS AND HOLES IN EXISTING STRUCTURES:
  1. PRIOR TO CUTTING AND CORING ANY OPENINGS IN THE EXISTING STRUCTURE, PROVIDE THE CONSULTANT WITH A SLEEVING DRAWING INDICATING THE SIZE AND EXACT LOCATION OF ALL PROPOSED OPENINGS RELATIVE TO THE BUILDING GRID LINES. EXISTING OPENINGS IN THE VICINITY OF ANY NEW OPENING MUST ALSO BE SHOWN.
  2. LOCATE EXISTING REINFORCEMENT AND ALL EMBEDDED SERVICES, BY A POSITIVE MEANS (I.E. X-RAYING, LOCAL CHIPPING OF SLAB - WHERE APPROVED BY THE CONSULTANT, COVER METER AND THE LIKE) PRIOR TO CUTTING THE NEW OPENING.
  3. AFTER EXISTING REINFORCEMENT AND SERVICES HAVE BEEN LOCATED, NOTIFY CONSULTANT WHO WILL REVIEW AND APPROVE OF THE PROPOSED OPENING LOCATION PRIOR TO CUTTING/DRILLING. MAKE ANY NECESSARY ADJUSTMENTS TO THE HOLE LOCATION AS DIRECTED BY THE CONSULTANT.

4. CORE DRILL NEW HOLES FOR PIPES TO A DIAMETER NOT LARGER THAN THE OUTSIDE PIPE DIAMETER PLUS 25 mm. DO NOT CUT EXISTING REINFORCEMENT OR SERVICES WITHOUT PRIOR APPROVAL OF THE CONSULTANT.
5. WHERE OPENINGS ARE TO BE SAWCUT, PRE-DRILL THE CORNERS USING A 100 mm Ø CORE DRILL. DO NOT OVER CUT THE CORNERS.
6. IN ANY AREAS WHERE THE CONSULTANT PERMITS THE CUTTING OF EXISTING REINFORCEMENT, THE CONTRACTOR IS TO EXAMINE THE CORE/OPENING AFTER DRILLING/CUTTING TO DETERMINE THE SIZE, COVER AND ORIENTATION OF ANY REINFORCEMENT THAT WAS CUT. THE CONTRACTOR IS TO MARK THIS INFORMATION ON THE SLEEVING DRAWING AND FORWARD A COPY OF IT TO THE CONSULTANT FOR THEIR RECORDS.
7. MODIFY THE LAYOUT OF NEW THROUGH BOLTS, EXPANSION ANCHORS AND OTHER ANCHORING DEVICES REQUIRED TO AVOID EXISTING CONCRETE REINFORCEMENT.
8. SHORE FLOORS AS REQUIRED TO SUPPORT CRANES, HOISTS AND OTHER CONSTRUCTION EQUIPMENT.

F. FUTURE PROVISIONS

1. THE STRUCTURE HAS BEEN DESIGNED FOR THE FOLLOWING FUTURE PROVISIONS:

1. FUTURE PV PANELS WITH A MAXIMUM WEIGHT OF 0.30kPa. ACCUMULATED SNOW LOAD AROUND THE PV PANELS HAS NOT BEEN INCLUDED WITHIN THE FUTURE DESIGN PROVISIONS. REFER TO DRAWING S200 FOR EXTENT OF FUTURE PV PANEL SEGMENTS.

G. MATERIALS

1. CONCRETE: CONFORM TO THE REQUIREMENTS OF CSA-A23.1 AND THE REQUIREMENTS IDENTIFIED IN TABLES 1-1, 1-2 AND 1-3.
2. REINFORCEMENT:
  - A. CONFORM TO CSA G30 SERIES, fy = 400 MPa FOR ALL REINFORCEMENT EXCEPT THAT fy = 450 MPa FOR WELDED WIRE FABRIC EQUAL TO OR GREATER THAN MW7.7 (Ø=3.1mm) AND fy=386 MPa FOR WELDED WIRE FABRIC LESS THAN MW7.7 (Ø3.1mm).
  - B. ALL REINFORCEMENT IS TO BE BLACK EXCEPT WHERE THE SUFFIX C IS USED TO DESIGNATE EPOXY COATED REINFORCEMENT.
3. REINFORCEMENT BAR END ANCHORS: SHALL BE LENTON TERMINATOR D6 OR D16 OR APPROVED ALTERNATE.
4. STRUCTURAL STEEL:
  - A. STRUCTURAL WIDE FLANGE SHAPES TO CONFORM TO CAN/CSA-G40.20/G40.21 GRADE 350W.
  - B. STRUCTURAL WELDED WIDE FLANGE SHAPES TO CONFORM TO CAN/CSA-G40.20/G40.21 GRADE 350W.
  - C. ANGLES, PLATES AND CHANNELS TO CONFORM TO CAN/CSA-G40.20/G40.21 GRADE 300W.
  - D. HOLLOW STRUCTURAL SECTIONS TO CONFORM TO CAN/CSA-G40.20/G40.21 GRADE 350W (CLASS C).
5. SHOP PAINT/PRIMER:
  1. ENSURE THAT THE SHOP PRIMER OR PAINT IS COMPATIBLE WITH SPRAY FIREPROOFING AND/OR THE TOP COAT PAINT SYSTEM SPECIFIED, WHERE APPLICABLE.
  2. SHOP PAINT: TO CISC/CPMA 1-73A OR SSPC PAINT 15.
  3. SHOP PRIMER: TO CISC/CPMA STANDARD 2-75.
6. INORGANIC ZINC-RICH PRIMER: ZINC CLAC II AS SUPPLIED BY SHERWIN-WILLIAMS COMPANY (2 TO 4 MILS DRY FILM THICKNESS), OR APPROVED EQUIVALENT.
7. ORGANIC ZINC-RICH PRIMER: ZINC GLAD 200 AS SUPPLIED BY SHERWIN-WILLIAMS COMPANY (3 TO 5 MILS DRY FILM THICKNESS), OR APPROVED EQUIVALENT.
8. EPOXY PAINT: MACROPOXY 646 FAST CURE EPOXY AS SUPPLIED BY SHERWIN-WILLIAMS COMPANY (4 TO 6 MILS DRY FILM THICKNESS), OR APPROVED EQUIVALENT.
9. ZINC-RICH TOUCH-UP PAINT: ZINC CLAD 5 AS SUPPLIED BY SHERWIN-WILLIAMS COMPANY OR APPROVED EQUIVALENT.
10. HOT DIP GALVANIZING: CONFORM TO CSA G164, MINIMUM ZINC COATING OF 600 g/m<sup>2</sup>.
11. ANCHOR RODS: CONFORM TO 300W THREADED ROD CONFORMING TO CSA G40.21-M, UNLESS NOTED OTHERWISE.
12. STRUCTURAL BOLTS SHALL CONFORM TO ASTM F3125 (GRADES A325, F1852, A490 AND F2280), NUTS SHALL CONFORM TO ASTM A563, WASHERS SHALL CONFORM TO ASTM F436M.
13. WELDED STUD SHEAR CONNECTORS:
  - A. HEADED STUDS SHALL BE MANUFACTURED BY NELSON (OR APPROVED ALTERNATIVE).
  - B. STUDS SHALL BE MADE FROM MILD STEEL CONFORMING TO ASTM A108 GRADE 1010 THROUGH 1020.
  - C. HEADED STUDS SHALL BE WELDED PER MANUFACTURER'S RECOMMENDATIONS.
  - D. MECHANICAL PROPERTIES OF HEADED STUDS SHALL BE IN ACCORDANCE WITH AWS D1.1.
  - E. STUDS SHALL BE 19Ø AND SHALL HAVE A LENGTH (AFTER WELDING) OF 75 WHEN 38 DECK IS SPECIFIED AND 115 WHEN 76 DECK IS SPECIFIED. WHERE SLAB THICKNESS EXCEEDS 100 ON 76 DECK, LENGTH OF STUDS, AFTER WELDING, IS TO BE 150 THROUGHOUT.
14. DEFORMED BAR ANCHORS: SHALL BE NELSON, FLUX FILLED DEFORMED BAR ANCHORS, TYPE D2L OR APPROVED ALTERNATIVE.
15. STEEL DECK : CONFORM TO ASTM A653M GRADE A OR B.
16. CONCRETE MASONRY UNITS: CONFORM TO CAN3-A165 SERIES, 15 MPa MINIMUM COMPRESSIVE STRENGTH AT 28 DAYS.
17. MORTAR: CONFORM TO CSA A179 TYPE "S" FOR LOAD BEARING WALLS.
18. MASONRY GROUT: CONFORM TO CSA A179, 15 MPa MINIMUM COMPRESSIVE STRENGTH AT 28 DAYS, 250 mm SLUMP, MAXIMUM AGGREGATE SIZE 10 mm.
19. NON-SHRINK GROUT: 35 MPa MINIMUM COMPRESSIVE STRENGTH AT 28 DAYS.
20. RIGID INSULATION (FOR USE WITH FOUNDATIONS AND THE LIKE): EXTRUDED POLYSTYRENE WITH A MINIMUM COMPRESSIVE STRENGTH OF 0.24 MPa, AT 5% DEFORMATION UNLESS NOTED OTHERWISE.

H. FOUNDATIONS

1. A COPY OF THE GEOTECHNICAL INVESTIGATION REPORT BY ENGTEC CONSULTING INC. DATED DECEMBER 4, 2023 IS AVAILABLE FROM THE CONSULTANT. THIS INFORMATION IS AVAILABLE SOLELY AS A GUIDE. NO RESPONSIBILITY IS ACCEPTED BY THE OWNER OR THE CONSULTANT FOR ITS CORRECTNESS, NOR SHALL ITS ACCURACY AFFECT THE PROVISION OF THIS CONTRACT.
2. FOUND ALL FOOTINGS ON NATURALLY CONSOLIDATED UNDISTURBED SOIL CAPABLE OF SAFELY SUSTAINING AN ULTIMATE LIMIT STATES (ULS) BEARING PRESSURE OF 225 kPa AND A SERVICEABILITY LIMIT STATE (SLS) BEARING PRESSURE OF 150 kPa. IF THESE CONDITIONS DO NOT PREVAIL AT THE FOUNDING ELEVATIONS SHOWN, ADVISE THE CONSULTANT BEFORE PROCEEDING WITH THE WORK.
3. FOUNDING ELEVATION OF FOOTINGS ARE NOTED ON THE FOUNDATION PLAN. THESE ELEVATIONS HAVE BEEN DETERMINED BASED ON RECOMMENDATIONS INCLUDED IN THE GEOTECHNICAL REPORT. FOUNDING ELEVATIONS ARE SUBJECT TO CONFIRMATION BY THE GEOTECHNICAL ENGINEER DURING CONSTRUCTION. FOUND FOOTINGS SUSCEPTIBLE TO FROST DAMAGE A MINIMUM OF 1200 mm BELOW FINISHED GRADE UNLESS NOTED OTHERWISE.
4. A MODULUS OF SUBGRADE REACTION OF 30 MPa/m HAS BEEN ASSUMED IN THE DESIGN OF THE SLAB ON GRADE.
5. PROVIDE TEMPORARY FROST PROTECTION, DURING CONSTRUCTION, FOR ALL FOUNDATIONS WHICH ARE NOT FOUNDED A MINIMUM OF 1200 mm BELOW GRADE.
6. FOUND NEW FOOTINGS WHICH ARE LOCATED ADJACENT TO EXISTING FOOTINGS, AT THE SAME ELEVATION AS THE EXISTING FOOTINGS, UNLESS NOTED OTHERWISE.
7. INSULATION IS SHOWN WHERE REQUIRED FOR PROTECTION OF THE FOUNDATIONS FROM DAMAGE DUE TO FROST ACTION ONLY. REFER TO ARCHITECTURAL DRAWINGS FOR FOUNDATION INSULATION NOT SHOWN ON THE STRUCTURAL DRAWINGS.
8. THE LINE OF SLOPE BETWEEN ADJACENT FOOTINGS OR EXCAVATIONS OR ALONG STEPPED FOOTINGS SHALL NOT EXCEED A RISE OF 7 IN A RUN OF 10 UNLESS NOTED OTHERWISE.
9. DO NOT PLACE BACKFILL AGAINST WALLS RETAINING EARTH (OTHER THAN CANTILEVER RETAINING WALLS) UNTIL THE WALLS AND THE FLOOR CONSTRUCTION AT TOP AND BOTTOM OF THE WALLS HAVE BEEN CAST AND ATTAINED 100% OF THEIR DESIGN STRENGTH.
10. WHERE THE SLAB-ON-GRADE IS USED TO TIE THE TOP OF A WALL RETAINING EARTH, THAT WALL SHALL BE ADEQUATELY BRACED UNTIL THE SLAB HAS BEEN CAST AND ATTAINED 100% OF ITS DESIGN STRENGTH.
11. CARRY OUT BACKFILLING AGAINST FOUNDATION WALLS WHERE THERE IS GRADE ON BOTH SIDES IN SUCH A MANNER THAT THE LEVEL OF BACKFILLING ON ONE SIDE OF THE WALL IS NEVER MORE THAN 600 mm DIFFERENT FROM THE LEVEL ON THE OTHER SIDE OF THE WALL.
12. DO NOT COMPACT CLOSER THAN 1800 mm FROM WALLS WITH HEAVY EQUIPMENT. USE LIGHT HAND CONTROLLED EQUIPMENT WITHIN 1800 mm FROM WALLS.
13. REFER TO TYPICAL DETAIL FOR MASONRY WALL BEARING DETAILS AT SLAB-ON-GRADE.

I. SLAB-ON-GRADE

1. PLACE SLAB-ON-GRADE ON MATERIAL CAPABLE OF SUSTAINING A MINIMUM SLS BEARING PRESSURE OF 25 kPa WITHOUT SETTLEMENT.
2. PRIOR TO PLACING SLAB-ON-GRADE PLACE 200mm MINIMUM THICK BASE COURSE CONSISTING OF GRANULAR A (OPSS 1010) THOROUGHLY AND CONSOLIDATE TO THE LINES AND LEVELS REQUIRED. REFER TO GEOTECHNICAL REPORT FOR SUBGRADE PREPARATION.

Project Team:

Prime Consultant  
GEC ARCHITECTURE

Structural Consultant  
ENTUITIVE

Mechanical Consultant

Electrical Consultant

Civil Consultant

Client

OWNER  


Seal & Permit

8	REISSUED FOR TENDER	2025-05-23
7	ISSUED FOR TENDER	2025-04-25
6	ISSUED FOR COORDINATION	2025-04-17
5	ISSUED FOR BUILDING PERMIT	2024-11-27
4	ISSUED FOR PRE TENDER REVIEW	2024-10-31
3	ISSUED FOR 80% CD	2024-05-02
2	ISSUED FOR 100% CD	2024-02-29
1	ISSUED FOR 60% DD	2024-01-25

NO.	ISSUED FOR	DATE
Drawing History		
Scale	1 : 1	Checked By HB
Region of York Project Number		Region of York Building Code

Project

York Region North Roads Operations  
Centre

3525 Baseline Road  
Georgina, ON, L0E 1R0

Drawing Title

GENERAL NOTES

Project Number	Drawing Number
EN023-01007	S001







1. HELICAL PILES SHALL BE MANUFACTURED BY EBS, (EQUIVALENT PRODUCT BY OTHER MANUFACTURERS ARE ACCEPTABLE UPON APPROVAL BY THE STRUCTURAL CONSULTANT).
2. PILES SHALL BE INSTALLED BY AN AUTHORIZED INSTALLING CONTRACTOR WHO HAS SATISFIED THE CERTIFICATION REQUIREMENTS RELATING TO THE TECHNICAL ASPECTS OF THE PRODUCT AND THE ASCRIBED INSTALLATION TECHNIQUES. PROOF OF CURRENT CERTIFICATION MUST BE PROVIDED.
3. ALL WORK AS DESCRIBED HEREIN SHALL BE PERFORMED IN ACCORDANCE WITH THE APPLICABLE SAFETY CODES IN EFFECT AT THE TIME OF INSTALLATION.
4. HELICAL PILES AS SPECIFIED SHALL CONFORM TO THE ONTARIO BUILDING CODE 2012.
5. THE HELICAL LEAD SECTIONS AND EXTENSION SECTION SHALL BE SOLID STEEL, ROUND CORNERED SQUARE SHAFT, OR ROUND STEEL PIPE SHAFT, OR COMPOSITE STEEL AND GROUT SHAFT CONFIGURED WITH ONE OR MORE HELICAL BEARING PLATES WELDED TO THE SHAFT
6. ALL PILES MUST BE CORROSION PROTECTED BY HOT DIPPED GALVANIZATION.
7. INSTALLATION UNITS SHALL CONSIST OF A ROTARY TYPE TORQUE MOTOR WITH FORWARD AND REVERSE CAPABILITIES. THESE UNITS ARE TYPICALLY POWERED.
8. INSTALLATION UNITS SHALL BE CAPABLE OF DEVELOPING THE MINIMUM TORQUE AS REQUIRED.
9. INSTALLATION UNITS SHALL BE CAPABLE OF POSITIONING THE HELICAL PIER AT THE PROPER INSTALLATION ANGLE. THIS ANGLE MAY VARY BETWEEN VERTICAL AND 5 DEGREES DEPENDING UPON APPLICATION AND TYPE OF LOAD TRANSFER DEVICE SPECIFIED OR REQUIRED.
10. INSTALLATION TORQUE SHALL BE MONITORED THROUGHOUT THE INSTALLATION PROCESS
11. HELICAL PIERS SHALL BE INSTALLED TO THE MINIMUM TORQUE VALUE REQUIRED TO PROVIDE THE LOAD CAPACITIES SHOWN ON THE PLANS.
12. THE APPROPRIATE STEEL NEW CONSTRUCTIONS LOAD TRANSFER DEVICE SHALL BE USED.
13. APPROPRIATE HELICAL PIER SELECTION WILL CONSIDER DESIGN LOAD PLUS SAFETY FACTOR, SOIL PARAMETERS AND THE INSTALLATION TORQUE VS. CAPACITY EQUATION AS PER THE MANUFACTURERS RECOMMENDATIONS.
14. DESIGN OF HELICAL SCREW PILES AND ANCHORS SHALL BE PERFORMED BY THE ENTITY AS REQUIRED IN ACCORDANCE WITH EXISTING LOCAL CODE REQUIREMENTS OR ESTABLISHED LOCAL PRACTICES. THIS DESIGN WORK TO BE PERFORMED BY A LICENSED PROFESSIONAL ENGINEER.
15. A CERTIFICATE CONFORMING THE PILES ARE CORRECTLY INSTALLED AND WILL PROVIDE THE SPECIFIED LOAD CAPACITY SEALED BY A PROFESSIONAL ENGINEER SHALL BE PROVIDED ON THE COMPLETION OF THE WORK.
16. ACCOUNT FOR SACRIFICIAL THICKNESS TO PROVIDE DESIGN SERVICE LIFE OF 75 YEARS.
17. CONTRACTOR TO PROVIDE CONTINGENCY COSTING AT TIME OF TENDER TO ACCOUNT FOR DOUBLE THE AMOUNT OF HELICAL PILES & INCREASED PILE CAP DIMENSIONS/REINFORCEMENT TO ACCOUNT FOR DIFFERENCES IN THE FINAL HELICAL PILE DESIGN & LAYOUT, WHICH IS TO BE DETERMINED AND FINALIZED BY THE HELICAL PILE SUPPLIER. TYPICAL FOR ALL (4) W690 COLUMNS ADJACENT TO THE NEW GARAGE DOORS.

Civil Consultant



Seal &amp; Permit

8	REISSUED FOR TENDER	2025-05-23
7	ISSUED FOR TENDER	2025-04-25
6	ISSUED FOR COORDINATION	2025-04-17
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1	ISSUED FOR 60% DD	2024-01-25
<b>NO.</b>	<b>ISSUED FOR</b>	<b>DATE</b>

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Design of York District Number

3525 Baseline Road  
Georgina, ON, L0E 1R1

Drawing Title

### GENERAL NOTES

Project Number

Drawing Number

EN023-01007

**S003**

2025-05-23 10:00:00 AM  
Drawing Title: GENERAL NOTES  
Drawing Number: S004  
Project Number: EN023-01007  
Region of York Building Code

TABLE 1-1: PERFORMANCE REQUIREMENTS FOR CONCRETE ELEMENTS EXPOSED TO CHLORIDES WITH/WITHOUT FREEZING AND THAWING			
STRUCTURAL ELEMENTS	EXPOSURE CLASS	MIN COMPRESSIVE <sup>a,c</sup> STRENGTH f'c (MPa)	COMMENTS
FOOTINGS AND PIERS	C-1	35	ALL PERIMETER STRIP AND PAD FOOTINGS
STRUCTURAL SLAB-ON-GRADE	C-1	35	
FOUNDATION WALLS/ RETAINING WALLS *	C-1	35	ALL PERIMETER FOUNDATION WALLS
TOPPINGS	C-2	32	
SIDEWALKS, CURBS	C-2	32	

- TABLE 1-1 NOTES:
- REFER TO THE CONCRETE AND REINFORCEMENT SECTION OF THE GENERAL NOTES FOR FURTHER INFORMATION.
  - REFER TO LEGEND SHOWN BELOW TABLE 1-3.

TABLE 1-2: PERFORMANCE REQUIREMENTS FOR CONCRETE ELEMENTS EXPOSED TO FREEZING AND THAWING (BUT NOT EXPOSED TO CHLORIDES)			
STRUCTURAL ELEMENTS	EXPOSURE CLASS	MIN COMPRESSIVE <sup>a,c</sup> STRENGTH f'c (MPa)	COMMENTS
STRUCTURAL SLAB-ON-GRADE	F-1	30	
FOUNDATION WALLS/ RETAINING WALLS *	F-2	30	
TOPPINGS	F-1	32	

- TABLE 1-2 NOTES:
- REFER TO THE CONCRETE AND REINFORCEMENT SECTION OF THE GENERAL NOTES FOR FURTHER INFORMATION.
  - REFER TO LEGEND SHOWN BELOW TABLE 1-3.

TABLE 1-3: PERFORMANCE REQUIREMENTS FOR CONCRETE ELEMENTS NOT EXPOSED TO CHLORIDES NOR FREEZING AND THAWING			
STRUCTURAL ELEMENTS	EXPOSURE CLASS	MIN COMPRESSIVE <sup>a,c</sup> STRENGTH f'c (MPa)	COMMENTS
FOOTINGS AND PIERS		35	
STRUCTURAL SLAB-ON-GRADE		25	
HOUSEKEEPING PADS		25	
TOPPINGS		30	
SKIM SLABS		20	
UNSHRINKABLE FILL		MAX 0.40	
LEAN-MIX CONCRETE		8	
PITS/TRENCHES		25	

- TABLE 1-3 NOTES:
- REFER TO THE CONCRETE AND REINFORCEMENT SECTION OF THE GENERAL NOTES FOR FURTHER INFORMATION.
  - LEGEND FOR TABLES 1-1, 1-2 AND 1-3:
    - SEE SCHEDULES AND FLOOR PLANS FOR AREAS/ELEMENTS WITH DIFFERENT CONCRETE STRENGTHS.
    - MAXIMUM AGGREGATE SIZE IS 20 mm.
    - MINIMUM COMPRESSIVE STRENGTHS ARE AT 28 DAYS UNLESS NOTED OTHERWISE.
    - WHERE WALLS ARE INTEGRAL WITH COLUMNS CAST WALLS AND COLUMNS WITH CONCRETE OF THE HIGHER SPECIFIED STRENGTH.

TABLE 2-1: MINIMUM CONCRETE COVER FOR CONCRETE ELEMENTS EXPOSED TO CHLORIDES WITH/WITHOUT FREEZING AND THAWING				
ELEMENTS		COMMENTS	BAR SIZE	TOP COVER
				NORMAL/SEVERE
				FIRE RATING
				≤ 4
WALLS	FOUNDATION WALLS, SHEAR WALLS AND MISC. WALLS	ALL PERIMETER FOUNDATION WALLS	Ø ≤ 25M	60
			30M	60
			35M	70
PIERS	PIERS	ALL PERIMETER PIERS & ALL PILE CAPS	Ø ≤ 30M	60
			35M	70
			45M	90
SLABS (UNPROTECTED)	SLABS		Ø ≤ 25M	60
			30M	
			35M	70

- TABLE 2-1 NOTES:
- REFER TO THE CONCRETE AND REINFORCEMENT SECTION OF THE GENERAL NOTES FOR FURTHER CONCRETE COVER REQUIREMENTS.
  - REFER TO LEGEND SHOWN BELOW TABLE 2-3.

TABLE 2-2: MINIMUM CONCRETE COVER FOR CONCRETE ELEMENTS EXPOSED TO FREEZING AND THAWING (BUT NOT EXPOSED CHLORIDES)				
ELEMENTS		COMMENTS	BAR SIZE	FIRE RATING
				≤ 3
WALLS	FOUNDATION WALLS, SHEAR WALLS <sup>a</sup> , RETAINING WALLS AND MISC. WALLS		Ø ≤ 25M	40
			30M	45
			35M	55
PIERS	PIERS		Ø ≤ 30M	45
			35M	55 <sup>c</sup>
SLABS	SLABS		Ø ≤ 25M	40
			30M	45
			35M	55

- TABLE 2-2 NOTES:
- REFER TO THE CONCRETE AND REINFORCEMENT SECTION OF THE GENERAL NOTES FOR FURTHER CONCRETE COVER REQUIREMENTS.
  - REFER TO LEGEND SHOWN BELOW TABLE 2-3.

TABLE 2-3: MINIMUM CONCRETE COVER FOR CONCRETE ELEMENTS NOT EXPOSED TO CHLORIDES NOR FREEZING AND THAWING				
ELEMENTS		COMMENTS	BAR SIZE	FIRE RATING
				≤ 2
WALLS	FOUNDATION WALLS, SHEAR WALLS <sup>a</sup> , RETAINING WALLS AND MISC. WALLS		Ø ≤ 25M	25
			30M	30
			35M	35
PIERS	PIERS		Ø ≤ 35M	40
SLABS	SLABS		Ø ≤ 25M	25
			30M	30
			35M	35

- TABLE 2-3 NOTES:
- REFER TO THE CONCRETE AND REINFORCEMENT SECTION OF THE GENERAL NOTES FOR FURTHER CONCRETE COVER REQUIREMENTS.
  - LEGEND FOR TABLES 2-1, 2-2 AND 2-3:
    - PROVIDE COVER FOR MINIMUM 2 HOURS FIRE RATING UNLESS NOTED OTHERWISE.
    - THE COVER FOR A BUNDLE OF BARS SHALL BE THE SAME AS THAT FOR A SINGLE BAR WITH AN EQUIVALENT AREA.
    - FOR COLUMN COVERS (TO MAIN REINFORCEMENT) EXCEEDING 63 mm WITH 4 HOUR FIRE RATING PROVIDE WIRE MESH USING 1.57 mm Ø @ 100 mm EA WAY.
    - CONCRETE WALLS EXPOSED TO FIRE ON BOTH SIDES SIMULTANEOUSLY SHALL HAVE THE MINIMUM COVER REQUIREMENTS FOR COLUMNS.

TABLE 3: INTERIOR NON-LOAD BEARING MASONRY PARTITION WALL MINIMUM REINFORCEMENT			
SEISMIC HAZARD INDEX	WALL THICKNESS	VERTICAL REINFORCEMENT	HORIZONTAL REINFORCEMENT
I <sub>h</sub> Fa Sa (0.2) < 0.35	140	NO MANDATED MINIMUM	STANDARD 3.6 mm LADDER TYPE EVERY THIRD BED JOINT
	190	NO MANDATED MINIMUM	STANDARD 3.6 mm LADDER TYPE EVERY THIRD BED JOINT
	240	NO MANDATED MINIMUM	STANDARD 3.6 mm LADDER TYPE EVERY THIRD BED JOINT
	290	NO MANDATED MINIMUM	STANDARD 3.6 mm LADDER TYPE EVERY THIRD BED JOINT

- TABLE 3 NOTES:  
CONDITIONS WHERE THIS DETAIL IS APPLICABLE:
- "PIN-PIN" WALLS. LATERAL SUPPORT IS REQUIRED AT THE TOP OF ALL MASONRY PARTITION WALLS, REFER TO MASONRY LATERAL SUPPORT TYPICAL DETAILS.
  - MASONRY WALL PIERS ONLY WHEN THEIR LENGTH EXCEEDS 800 mm, PIERS MUST BE CONTINUOUS TO TOP OF WALL.
  - INTERIOR PARTITIONS ONLY WITH A MAXIMUM HEIGHT OF 4000 mm.
  - DOES NOT APPLY TO MASONRY PARAPETS.

TABLE 4: MINIMUM TEMPERATURE REINFORCEMENT FOR CONCRETE SLABS			
SLAB THICKNESS	MINIMUM REINFORCEMENT	SLAB THICKNESS	MINIMUM REINFORCEMENT
150	10@325	250	15@375
175	10@275	275	15@350
200	15@500	300	15@325
225	15@450	---	---

- TABLE 4 NOTE:
- FOR SLAB THICKNESSES NOT COVERED BY THE TABLE, PROVIDE TEMPERATURE REINFORCEMENT EQUAL TO 0.002 TIMES THE GROSS CROSS-SECTIONAL AREA OF THE SLAB. MAXIMUM SPACING OF REINFORCEMENT IS TO BE 3 TIMES SLAB THICKNESS OR 500 mm.

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Civil Consultant

Client  
OWNER  
York Region

Seal & Permit

8	REISSUED FOR TENDER	2025-05-23
7	ISSUED FOR TENDER	2025-04-25
6	ISSUED FOR COORDINATION	2025-04-17
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1	ISSUED FOR 60% DD	2024-01-25

NO.	ISSUED FOR	DATE
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Scale	Checked By
1 : 1	HB
Region of York Project Number	Region of York Building Code

Project  
York Region North Roads Operations Centre  
3525 Baseline Road  
Georgina, ON, L0E 1R0  
Drawing Title

GENERAL NOTES

Project Number  
EN023-01007  
Drawing Number  
S004



#### A. GENERAL

- THE STRUCTURE HAS BEEN DESIGNED IN ACCORDANCE WITH THE REQUIREMENTS OF THE BUILDING CODE IDENTIFIED IN THE STRUCTURAL GENERAL NOTES.
- ALL REINFORCED CONCRETE ELEMENTS HAVE BEEN DESIGNED IN ACCORDANCE WITH CSA A23.3, DESIGN OF CONCRETE STRUCTURES.
- ALL STRUCTURAL STEEL ELEMENTS HAVE BEEN DESIGNED IN ACCORDANCE WITH CSA-S16, DESIGN OF STEEL STRUCTURES.
  - THE STRUCTURAL STEEL DESIGN IS BASED ON SIMPLE CONSTRUCTION.
  - THE STEEL STRUCTURE HAS BEEN DESIGNED TO PROVIDE DUCTILE RESPONSE UNDER SEISMIC LOADING. REFER TO THE LATERAL LOAD RESISTING SYSTEM DESIGN NOTES FOR FURTHER INFORMATION.
  - ALL CONNECTIONS ARE ASSUMED TO BE BEARING TYPE CONNECTIONS, UNLESS NOTED OTHERWISE. THE BOLTS SHALL BE BROUGHT TO A SNUG-TIGHT CONDITION AS DEFINED IN CSA-S16.
- ALL STRUCTURAL MASONRY ELEMENTS HAVE BEEN DESIGNED IN ACCORDANCE WITH CSA-S304, MASONRY DESIGN FOR BUILDINGS BASED ON ENGINEERING ANALYSIS.
- ALL COLD FORMED STEEL STRUCTURAL MEMBERS HAVE BEEN DESIGNED IN ACCORDANCE WITH CSA-S136 COLD FORMED STEEL STRUCTURAL MEMBERS.

#### B. LATERAL LOAD RESISTING SYSTEM

- THE LATERAL WIND AND EARTHQUAKE LOADS APPLIED TO THE STRUCTURE ARE RESISTED BY THE FOLLOWING:
  - CONVENTIONAL CONSTRUCTION STRUCTURAL STEEL BRACED FRAMES, STRUCTURAL STEEL MOMENT FRAMES & REINFORCED MASONRY SHEAR WALLS
- THE STRUCTURE HAS BEEN DESIGNED TO RESIST LATERAL WIND AND EARTHQUAKE LOADS IN ACCORDANCE WITH THE BUILDING CODE IDENTIFIED IN THE STRUCTURAL GENERAL NOTES.
- THE DESIGN PARAMETERS FOR WIND AND EARTHQUAKE ARE AS NOTED BELOW:
  - WIND LOADS  
  
THE WIND LOADS HAVE BEEN CALCULATED IN ACCORDANCE WITH STATIC PROCEDURE AS OUTLINED IN BUILDING CODE IDENTIFIED IN THE STRUCTURAL GENERAL NOTES.
    - HOURLY WIND PRESSURES FOR BARRIE, ONTARIO:  
q10 = 0.28 kPa  
q50 = 0.36 kPa
    - WIND IMPORTANCE FACTOR  
CATEGORY - NORMAL  
Iw = 1.0 (ULS)  
Iw = 0.75 (SLS)
    - EXPOSURE FACTORS BASED ON OPEN TERRAIN  
Ce = 0.9    Cel = 0.9
    - TOPOGRAPHIC FACTOR  
Ct = 1.0
    - EXTERNAL PRESSURE AND GUST COEFFICIENT (LOW BUILDING)  
CpCg, BASED ON FIGURE 4.1.7.6-A OF THE BUILDING CODE WHICH VARIES BASED ON BUILDING SURFACE LOCATION.
    - INTERNAL PRESSURE COEFFICIENT, Cpi: LARGE OPENINGS LIKELY TO REMAIN OPEN DURING STORMS, Cpi = -0.70 TO +0.70
  - EARTHQUAKE LOADS  
  
THE EARTHQUAKE LOADS HAVE BEEN CALCULATED IN ACCORDANCE WITH THE EQUIVALENT STATIC FORCE PROCEDURE.
    - EARTHQUAKE IMPORTANCE FACTOR  
CATEGORY -NORMAL (AS PER EXISTING BASE BUILDING DRAWINGS).  
Ie = 1.0 (ULS)
    - SEISMIC HAZARD PARAMETERS FOR BARRIE ONTARIO:  
Sa(0.2) = 0.108, Sa(0.5) = 0.077, Sa(1.0) = 0.047, Sa(2.0) = 0.025, Sa(5.0) = 0.006, Sa(10.0) = 0.003, PGA = 0.063, PGV = 0.060
    - SITE CLASSIFICATION FOR SEISMIC SITE RESPONSE:  
CLASS = D
    - ACCELERATION AND VELOCITY BASED SITE COEFFICIENTS:  
Fa = 1.24, Fv = 1.55
    - TYPE OF SEISMIC FORCE RESISTING SYSTEM (SFRS):  
Rd = 1.5, Rn = 1.3
    - FUNDAMENTAL LATERAL PERIOD USED FOR CALCULATIONS  

**A. SIGN GARAGE**  
Tsx = 0.27 SEC  
Tsy = 0.27 SEC

**B. LOW ROOF**  
Tsx = 0.20 SEC  
Tsy = 0.26 SEC










#### A. SIGN GARAGE

#### A. SIGN GARAGE



#### A. SIGN GARAGE

#### C. LOADS ON FOUNDATION / RETAINING WALLS

- THE WALLS HAVE BEEN DESIGNED ASSUMING FREE DRAINING BACKFILL WHICH DOES NOT PERMIT THE BUILD-UP OF HYDROSTATIC PRESSURE.
- THE WALLS HAVE BEEN DESIGNED FOR A HORIZONTAL PRESSURE 'P' (kPa) AT ANY DEPTH 'h' (m) GIVEN BY THE EXPRESSION:

$$P = P_s + P_e$$
$$P_s \text{ (HORIZONTAL SOIL PRESSURE)} = K (\gamma * h + q)$$

WHERE THE

SOIL PRESSURE COEFFICIENT,    K    =    0.5  
UNIT WEIGHT OF SOIL,            γ    =    21 kN/m³  
SURCHARGE,                        q    =    12 kPa  
EARTHQUAKE SOIL PRESSURE,    Pe   =    0 kPa

#### D. LIVE LOADS ON FLOORS

- SEE NOTES ON KEY PLANS. ALL LOADS GIVEN ARE UNFACTORED LOADS UNLESS NOTED OTHERWISE.
- LIVE LOADS ON ALL STRUCTURAL ELEMENTS HAVE BEEN REDUCED AS PERMITTED BY CODE.
- EXTERIOR AREAS ACCESSIBLE TO VEHICULAR TRAFFIC HAVE BEEN DESIGNED FOR A UNIFORM LIVE LOAD OF 12.0 kPa AND THE CONCENTRATED LOADS LISTED IN THE BUILDING CODE IDENTIFIED IN THE STRUCTURAL GENERAL NOTES, WHICHEVER PRODUCES THE MOST CRITICAL EFFECT.

#### E. LIVE LOADS ON ROOFS

- THE ROOF AREAS HAVE BEEN DESIGNED TO RESIST LIVE SNOW, RAIN AND WIND LOADS IN ACCORDANCE WITH THE BUILDING CODE IDENTIFIED IN THE STRUCTURAL GENERAL NOTES. THE DESIGN PARAMETERS FOR THESE LOADS ARE AS NOTED BELOW.
- SNOW LOAD:

THE SNOW LOADS BELOW HAVE BEEN CALCULATED IN ACCORDANCE WITH THE BUILDING CODE IDENTIFIED IN THE STRUCTURAL GENERAL NOTES.

- SNOW IMPORTANCE FACTOR  
CATEGORY - NORMAL (AS PER EXISTING BASE BUILDING DRAWINGS).  
Is = 1.0 (ULS)  
Is = 0.9 (SLS)

- GROUND SNOW LOAD (1 IN 50 YEAR)  
Ss = 2.5 kPa

- BASIC ROOF SNOW LOAD FACTOR  
Cb = 0.8

WIND EXPOSURE FACTOR  
Cw = 1.0

SLOPE FACTOR  
Cs = 1.0

SHAPE FACTOR  
Ca = 1.0

ASSOCIATED RAIN LOAD (1 IN 50 YEAR)  
Sr = 0.4 kPa

SPECIFIED SNOW LOAD  
S = Is[Ss(CbCwCsCa) + Sr] = 2.4 kPa

- DISTRIBUTION OF SNOW LOAD WITH ACTUAL VALUES ADJACENT TO HIGHER WALLS, ROOFS AND MECHANICAL UNITS IS SHOWN ON THE LOADING PLANS.

- RAIN LOAD

- THE DESIGN OF THE ROOF STRUCTURE IS BASED ON THE ASSUMPTION THAT THE FLOW CONTROL ROOF DRAINS SATISFY ALL REQUIREMENTS OF THE NATIONAL PLUMBING CODE OF CANADA.
- THE TOTAL LOAD ASSOCIATED WITH THE 24 HOUR RAINFALL, IN ACCORDANCE WITH THE BUILDING CODE IDENTIFIED IN THE STRUCTURAL GENERAL NOTES IS EQUIVALENT TO 97 mm OF WATER OVER THE ENTIRE ROOF AREA.
- THE ACTUAL DISTRIBUTION OF THIS LOAD HAS BEEN ADJUSTED TO ACCOUNT FOR THE ROOF SLOPES AND PROFILE.
- WIND LOAD - REFER TO THE LATERAL LOAD RESISTING SYSTEM SECTION OF THESE NOTES.
- THE ROOF AREAS HAVE BEEN DESIGNED FOR A MINIMUM LIVE LOAD OF 1.0 kPa AND NOT COMBINED WITH SNOW LOAD UNLESS NOTED OTHERWISE.

- OWSJ AND METAL DECK SUPPLIER TO ENSURE ALL STRUCTURAL ELEMENTS INCLUDED IN THEIR DELEGATED DESIGN ARE DESIGNED FOR A MAXIMUM RAIN PONDING LOAD OF 4.15kPa, IN ADDITION TO ANY P-DELTA EFFECTS. THE MAXIMUM RAIN PONDING LOAD OCCURS AT ROOF DRAIN LOCATIONS. ACTUAL DISTRIBUTION OF THIS LOAD IS TO BE ADJUSTED TO ACCOUNT FOR THE ROOF SLOPES AND PROFILES. REFER TO ARCHITECTURAL FOR ROOF SLOPES TO DRAIN AND PROFILES.

#### F. SUPERIMPOSED DEAD LOADS AND OTHER LOADS

- THE STRUCTURE HAS BEEN DESIGNED TO RESIST THE SUPERIMPOSED DEAD LOADS NOTED ON PLAN.
- THESE SUPERIMPOSED DEAD LOADS HAVE BEEN DETERMINED BASED ON THE MATERIALS SHOWN ON THE ARCHITECTURAL DRAWINGS AND INFORMATION PROVIDED BY THE OTHER DESIGN DISCIPLINES. IF THE CONTRACTOR PROPOSES TO SUBSTITUTE ANY SPECIFIED MATERIALS WITH MATERIALS OF HEAVIER CONSTRUCTION, THEY SHALL INFORM THE CONSULTANT WHO WILL ASSESS THE IMPACT OF THE PROPOSED SUBSTITUTION PRIOR TO PROPOSED SUBSTITUTION BEING ACCEPTED.
- ASSUMED EQUIPMENT LOADS, PIPE SUPPORT REACTIONS AND THE LIKE HAVE BEEN OBTAINED FROM THE MEP CONSULTANTS. THE CONTRACTOR IS REQUIRED TO SUBMIT SUFFICIENT INFORMATION TO THE CONSULTANT SUCH THAT THESE ASSUMPTIONS CAN BE CONFIRMED.
- LOADS IMPOSED BY WINDOW WASHING, ELEVATORS AND OTHER SYSTEMS ARE ALSO NOTED. THIS INFORMATION IS TO BE CONFIRMED BY THE CONTRACTOR PRIOR TO THE INSTALLATION OF THE VARIOUS SYSTEMS.
- IT HAS BEEN ASSUMED THAT:  
MASONRY VENEER SPANNING VERTICALLY BETWEEN TWO ADJACENT LEVELS IS BEARING ON THE LOWER LEVEL.  
STEEL STUD BACKUP, METAL PANEL, AND WINDOW WALL SPANNING BETWEEN TWO ADJACENT LEVELS IS BEARING ON THE LOWER LEVEL.

SUPERIMPOSED DEAD LOADS (BUILDING EXPANSION):  
ROOF: ROOFING                    0.40kPa  
DECK                                0.15kPa  
JOISTS                               0.15kPa  
MECHANICAL/ELECTRICAL/CEILING    0.50kPa  
SOLAR PANELS (FUTURE PROVISION) 0.30kPa  
**TOTAL ROOF LOAD                1.50kPa**

#### G. STRUCTURAL MOVEMENTS

- TYPICAL HORIZONTAL ELEMENTS (NOT SUPPORTING THE BUILDING ENCLOSURE) HAVE BEEN DESIGNED SO THAT THE THEORETICAL VERTICAL DEFLECTIONS WILL NOT EXCEED THE VALUES NOTED IN DESIGN NOTES TABLE 1 BELOW.
- ELEMENTS SUPPORTING THE BUILDING ENCLOSURE HAVE BEEN DESIGNED FOR A THEORETICAL VERTICAL DEFLECTION OF L/360.
- INTERIOR NON LOAD BEARING WALLS AND PARTITIONS, INCLUDING MASONRY WALLS, DRYWALL PARTITIONS AND THE LIKE ARE TO BE DETAILED TO ACCOMMODATE A MINIMUM OF 25mm VERTICAL MOVEMENT AT THE TOP OF THE PARTITION, UNLESS NOTED OTHERWISE.
- THE STRUCTURE HAS BEEN DESIGNED TO LIMIT THE MAXIMUM INTERSTOREY DRIFT AT THE SERVICEABILITY LIMIT STATE (SLS) TO h/500, FOR WIND LOADS WHERE 'h' IS THE FLOOR TO FLOOR HEIGHT BETWEEN TWO ADJACENT FLOORS, AND TO 0.025 hs FOR EARTHQUAKE LOADS, WHERE 'hs' IS THE HEIGHT OF THE STOREY.
- NON STRUCTURAL ELEMENTS SUCH AS THE BUILDING ENCLOSURE, MECHANICAL AND ELECTRICAL SERVICES AND SUPPORTS, AND THE LIKE, INCLUDING NON STRUCTURAL MOVEMENT JOINTS INCORPORATED WITHIN THESE ELEMENTS, MUST BE DESIGNED AND DETAILED TO ACCOMMODATE, AS A MINIMUM, THE ANTICIPATED MOVEMENTS NOTED ABOVE.

DESIGN NOTES TABLE 1: VERTICAL DEFLECTION LIMITATIONS		
TYPE OF MEMBER	DEFLECTION TO BE CONSIDERED	DEFLECTION LIMITATION
STRUCTURAL STEEL CONSTRUCTION		
SIMPLE SPAN MEMBERS OF FLOORS AND ROOFS SUPPORTING CONSTRUCTION AND FINISHES NOT SUSCEPTIBLE TO CRACKING	LIVE LOAD	L/300
SIMPLE SPAN MEMBERS OF FLOORS AND ROOFS SUPPORTING CONSTRUCTION AND FINISHES SUSCEPTIBLE TO CRACKING	LIVE LOAD	L/360
SIMPLE SPAN MEMBERS OF ALL FLOORS AND ROOFS	TOTAL LOAD	L/240

#### H. SEISMIC HAZARD INDEX AND SEISMIC DESIGN FOR NON-STRUCTURAL ELEMENTS

IeFaSa(0.2) = 0.16 < 0.35

DESIGN FOR SEISMIC REQUIRED FOR CATEGORIES 6 TO 21, TABLE 4.1.1.18. NOT REQUIRED

Project Team:

Prime Consultant  
**GEC ARCHITECTURE**

Structural Consultant  
**ENTUITIVE**

Mechanical Consultant

Electrical Consultant

Civil Consultant

Client

OWNER



Seal & Permit

9	ISSUED FOR ADDENDUM 4	2025-07-18
8	REISSUED FOR TENDER	2025-05-23
7	ISSUED FOR TENDER	2025-04-25
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1	ISSUED FOR 60% DD	2024-01-25

NO.	ISSUED FOR	DATE
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Drawing History

Scale	1 : 1	Checked By	HB
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Region of York Project Number      Region of York Building Code

Project

**York Region North Roads Operations  
Centre**

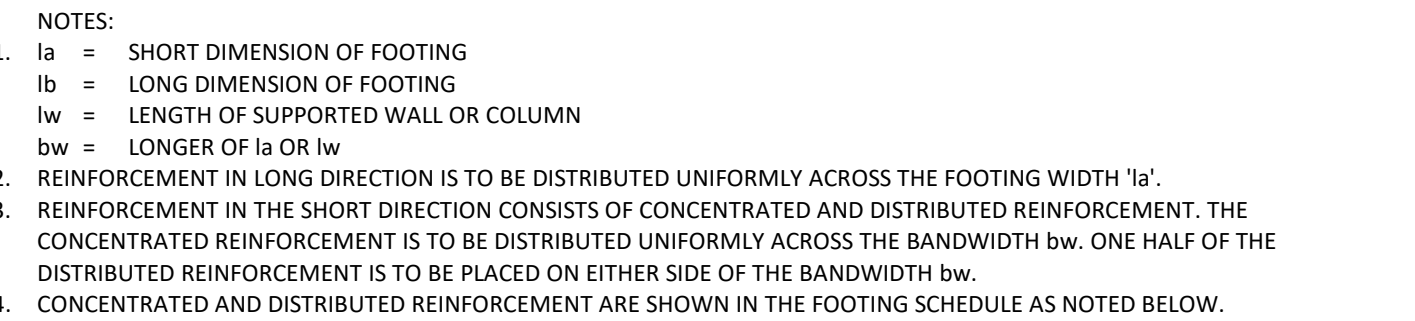
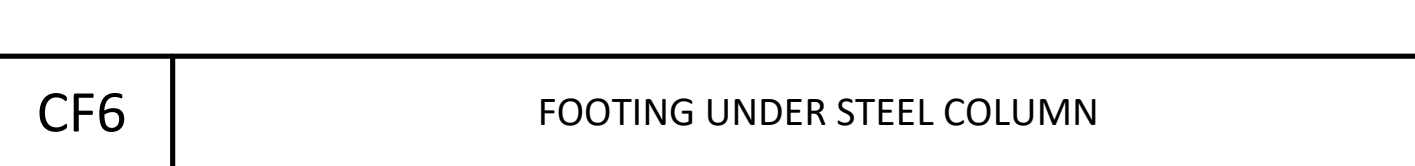
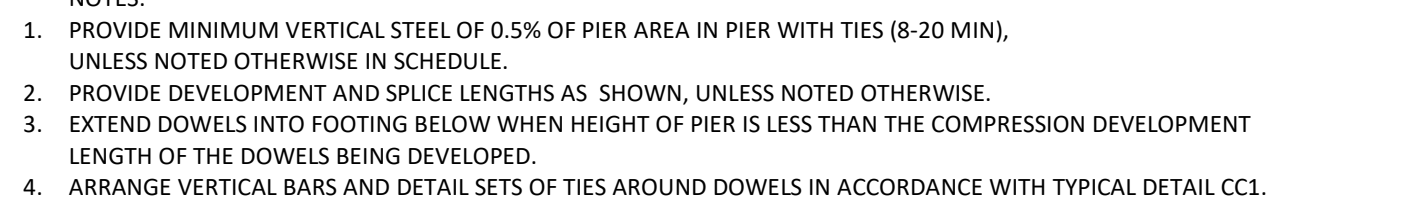
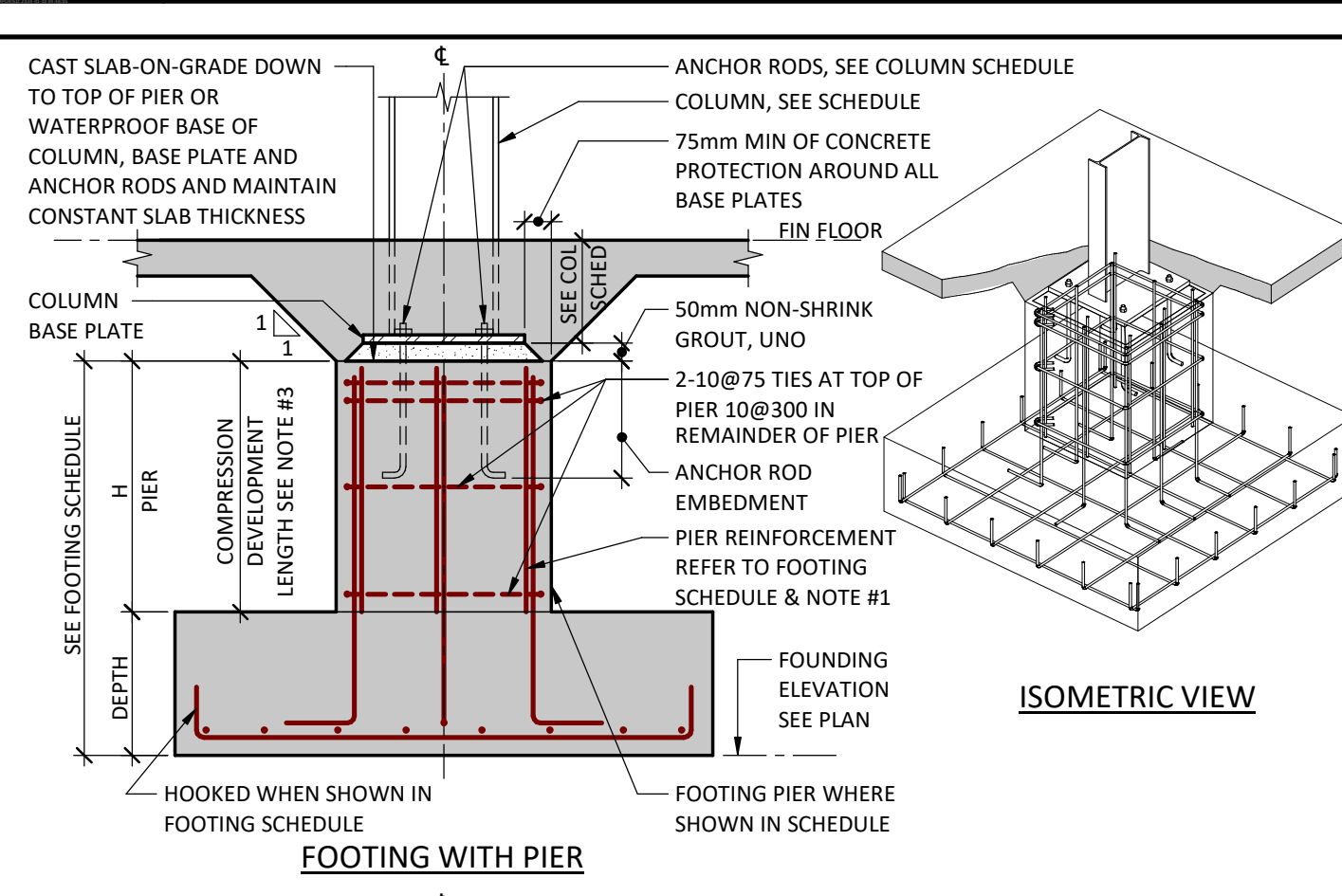
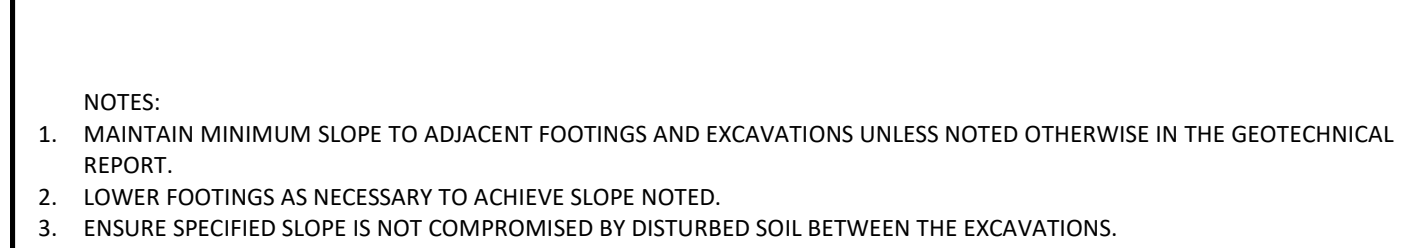
3525 Baseline Road  
Georgina, ON, L0E 1R0

Drawing Title

**DESIGN NOTES**

Project Number	Drawing Number
EN023-01007	<b>S005</b>





FOOTING SCHEDULE (EXAMPLE)				
FOOTING				
MARK	WIDTH (mm)	LENGTH (mm)	DEPTH (mm)	REINF EACH WAY EXCEPT AS NOTED
F1	1500	1800	500	(9#6)-20BUL 5-20BLL

REINFORCEMENT IN SHORT DIRECTION  
 9-20 - CONCENTRATED REINF  
 6-20 - DISTRIBUTED REINF

UNIFORM REINFORCEMENT IN  
 LONG DIRECTION



TYPICAL DETAIL LIST		DRAWING No.
DETAIL No.	DETAIL TITLE	
CONCRETE COLUMNS		
CC1	REINFORCEMENT IN CONCRETE COLUMNS/PIERS	S010
CONCRETE FOOTINGS		
CF1	STEPPED DOWN FOOTING	S010
CF2	NON LOAD BEARING MASONRY WALL FOOTINGS	S010
CF3	ADJACENT FOOTINGS AND EXCAVATIONS	S010
CF4	BACKFILL AROUND SERVICES BENEATH STRIP FOOTINGS	S010
CF6	FOOTING UNDER STEEL COLUMN	S010
CF7	PLACEMENT OF REINFORCEMENT IN RECTANGULAR FOOTINGS	S010
CONCRETE SLABS		
CS7A	ROOF DECK DETAIL	S011
CS11	REINFORCEMENT AT STEPS IN SLAB-ON-GRADE	S011
CS12	CONCRETE CURB DETAILS	S011
CS14	JOINTS IN SLAB-ON-GRADE	S011
CS20	DETAILS FOR HOUSEKEEPING PADS	S011
CS26	SAWCUT OF OPENING IN EXISTING SLAB OR WALL	S011
CS28	DUCT BANK UNDER SLAB	S011
CONCRETE STAIRS		
CT3	SUPPORT OF STAIRS AT GRADE	S016
CONCRETE WALLS		
CW1	PITS AND TRENCHES	S012
CW2	REINFORCEMENT DETAILS IN CONCRETE WALLS	S012
CW3	VERTICAL JOINTS IN CONCRETE WALLS	S012
CW6	WATERSTOP BETWEEN NEW AND EXISTING WALLS	S012
ERECTION TOLERANCES		
ETS81	ERECTION TOLERANCES FOR STRUCTURAL STEEL BEAMS	S013
ETSC1	ERECTION TOLERANCES FOR STRUCTURAL STEEL COLUMNS	S013
GENERAL		
G1	ABBREVIATIONS AND SYMBOLS	S013
G2	STRUCTURE LEGEND	S013
G3	STEEL MEMBER FORCE NOTATIONS AND DIRECTIONS	S013
G4	BACKFILL AT FOUNDATION WALLS	S013
G6	ACCUMULATED SNOW LOAD	S013
MASONRY		
M1	LINTELS FOR NON-LOAD BEARING MASONRY WALLS	S014
M2	BEAM BEARING ON MASONRY WALL	S014
M6	REINFORCEMENT PLACEMENT IN MASONRY ELEMENTS	S014
M7	LATERAL SUPPORT AT TOP OF MASONRY PARTITIONS (STEEL CONSTRUCTION)	S014
M10	REINFORCEMENT DETAILS FOR MASONRY WALLS	S014
M11	MASONRY ANCHORAGE TO STEEL COLUMNS AND BEAMS	S014
M12	VERTICAL CONTROL JOINTS IN MASONRY WALLS	S014
M15	OPENINGS THROUGH MASONRY WALLS	S014
M16	LAP SPICE AND TENSION EMBEDMENT LENGTH IN REINFORCED MASONRY WALLS	S014
PROJECT DETAILS		
PD1	TYPICAL INTERIOR BOLLARD DETAIL	S016
PD2	TYPICAL EXTERIOR BOLLARD DETAIL	S016
STEEL DECK		
DK2	STEEL DECK AT ROOFS (STRUCTURAL STEEL FRAMING)	S012
DK3	PLACEMENT OF STUD SHEAR CONNECTORS FOR NON-COMPOSITE BEAMS	S012
STEEL JOISTS		
PD3	TYPICAL JOIST REINFORCEMENT AT CONCENTRATED LOADS	S016
S11	BRIDGING DETAILS FOR STEEL JOISTS	S015
S12	STEEL JOISTS AT ROOF	S015
STRUCTURAL STEEL		
S1	STEEL FRAMING NOMENCLATURE	S015
S2	FRAMING OPENINGS IN STEEL FLOOR DECK AND ROOF DECK	S015
S14	STEEL BEAM BEARING ON STEEL COLUMN	S015
S16	MOMENT CONNECTIONS	S015
STRUCTURAL STEEL BEAMS		
SB14	RECTANGULAR OPENINGS IN STEEL BEAMS	S016
WINDOW WASHING		
WW2	ROOF ANCHOR TO STEEL STRUCTURE	S016
WW3	ROOF ANCHOR TO STEEL STRUCTURE	S016
WW4	ROOF ANCHOR TO STEEL STRUCTURE	S016

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Seal &amp; Permit

8	REISSUED FOR TENDER	2025-05-23
7	ISSUED FOR TENDER	2025-04-25
6	ISSUED FOR COORDINATION	2025-04-17
5	ISSUED FOR BUILDING PERMIT	2024-11-27
4	ISSUED FOR PRE TENDER REVIEW	2024-10-31
3	ISSUED FOR 60% CD	2024-05-02
2	ISSUED FOR 100% DD	2024-02-29
1	ISSUED FOR 60% DD	2024-01-25
<b>NO.</b>	<b>ISSUED FOR</b>	<b>DATE</b>

Drawing History	
Scale 1 : 1	Checked By HB
Region of York Project Number	Region of York Building Code

Project  
York Region North Roads Operations  
Centre

3525 Baseline Road  
Georgina, ON, L0E 1R0

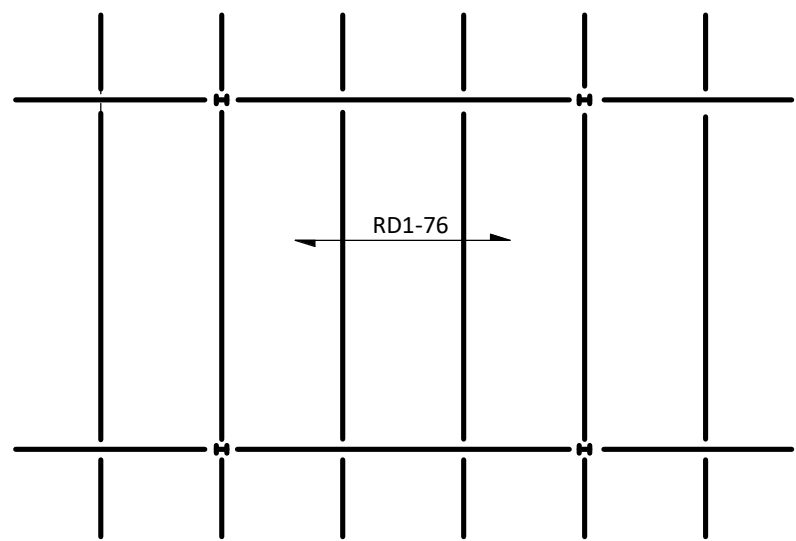
## TYPICAL DETAILS

Project Number	Drawing Number
EN023-01007	<b>S010</b>



9	ISSUED FOR ADDENDUM 4	2025-07-18
8	REISSUED FOR TENDER	2025-05-23
7	ISSUED FOR TENDER	2025-04-25
6	ISSUED FOR COORDINATION	2025-04-17
5	ISSUED FOR BUILDING PERMIT REVIEW	2024-11-27
4	ISSUED FOR PRE TENDER REVIEW	2024-10-31
3	ISSUED FOR 80% CD	2024-05-02
2	ISSUED FOR 100% DD	2024-02-29
1	ISSUED FOR 60% DD	2024-01-25
NO.	ISSUED FOR	DATE

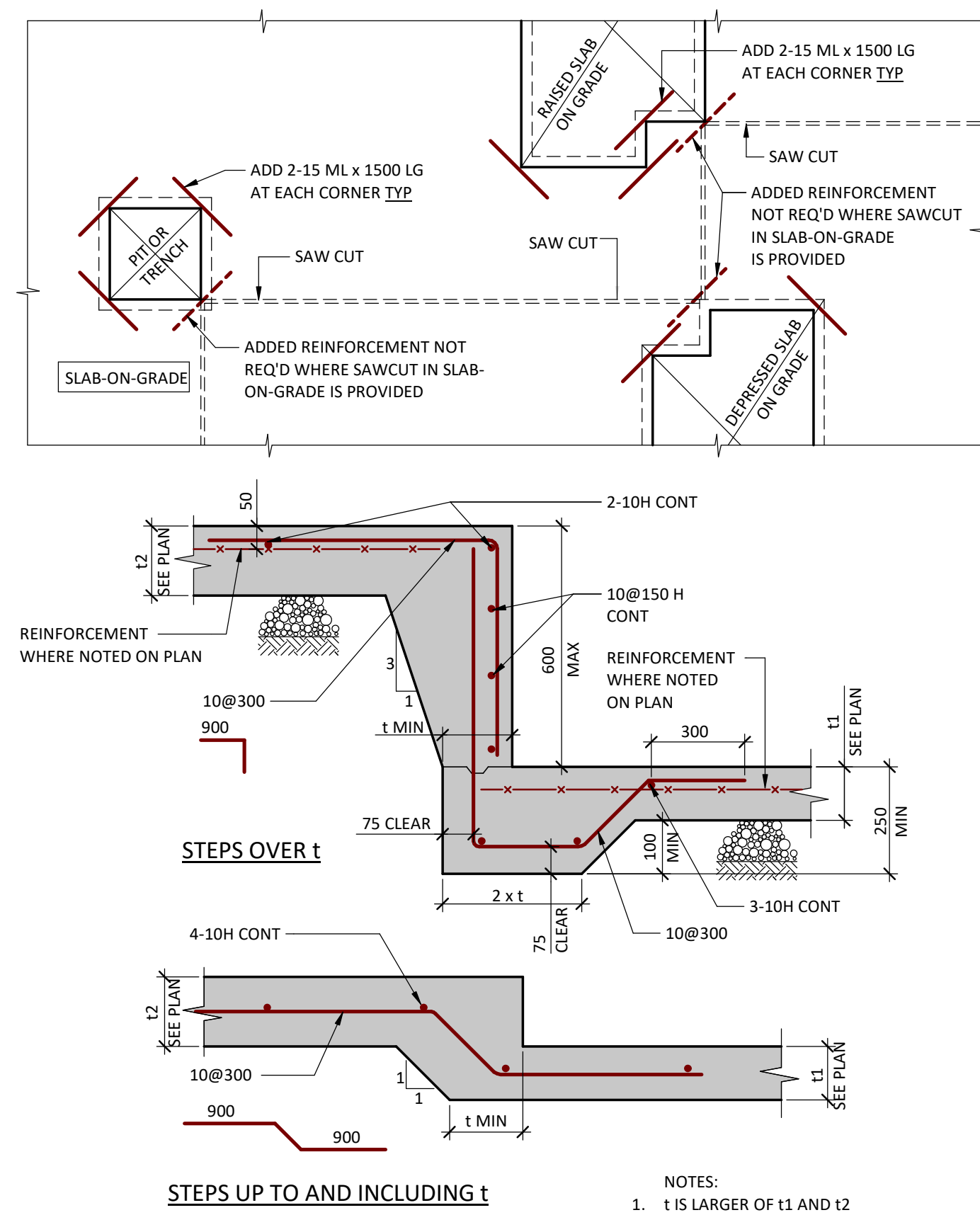
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Region of York Project Number		Region of York Building Code	



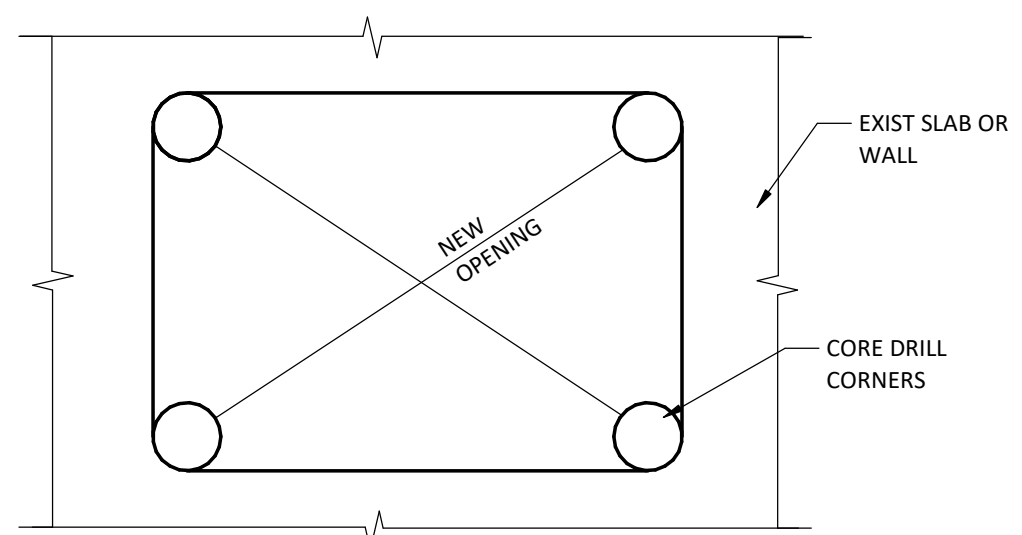
ROOF DECK SCHEDULE			
DECK MARK	IMPOSED SERVICE LOADS (kPa)		REMARKS
RD1-38	DL	LL	
	1.5	2.4+ASL	Cb=0.8, Cw=1

- NOTES:
- MARK DESIGNATION IS TO BE READ AS FOLLOWS:  
RD1-76  
STEEL DECK MARK  
STEEL DECK DEPTH  
DIRECTION OF SPAN
  - REFER TO LOADING PLANS FOR DESIGN LOADS NOT INDICATED IN SCHEDULE ABOVE.

CS7A ROOF DECK DETAIL

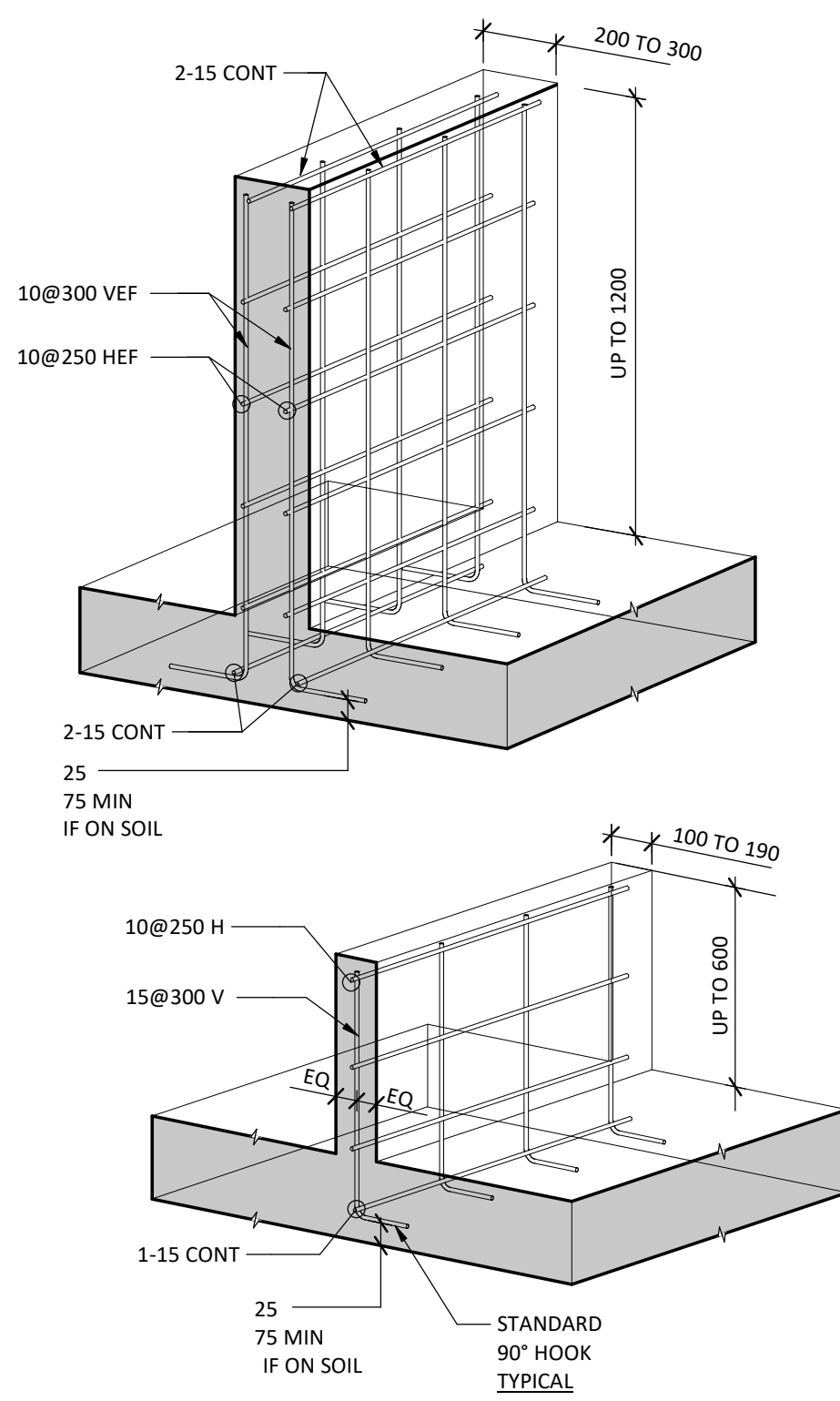


CS11 REINFORCEMENT AT STEPS IN SLAB-ON-GRADE



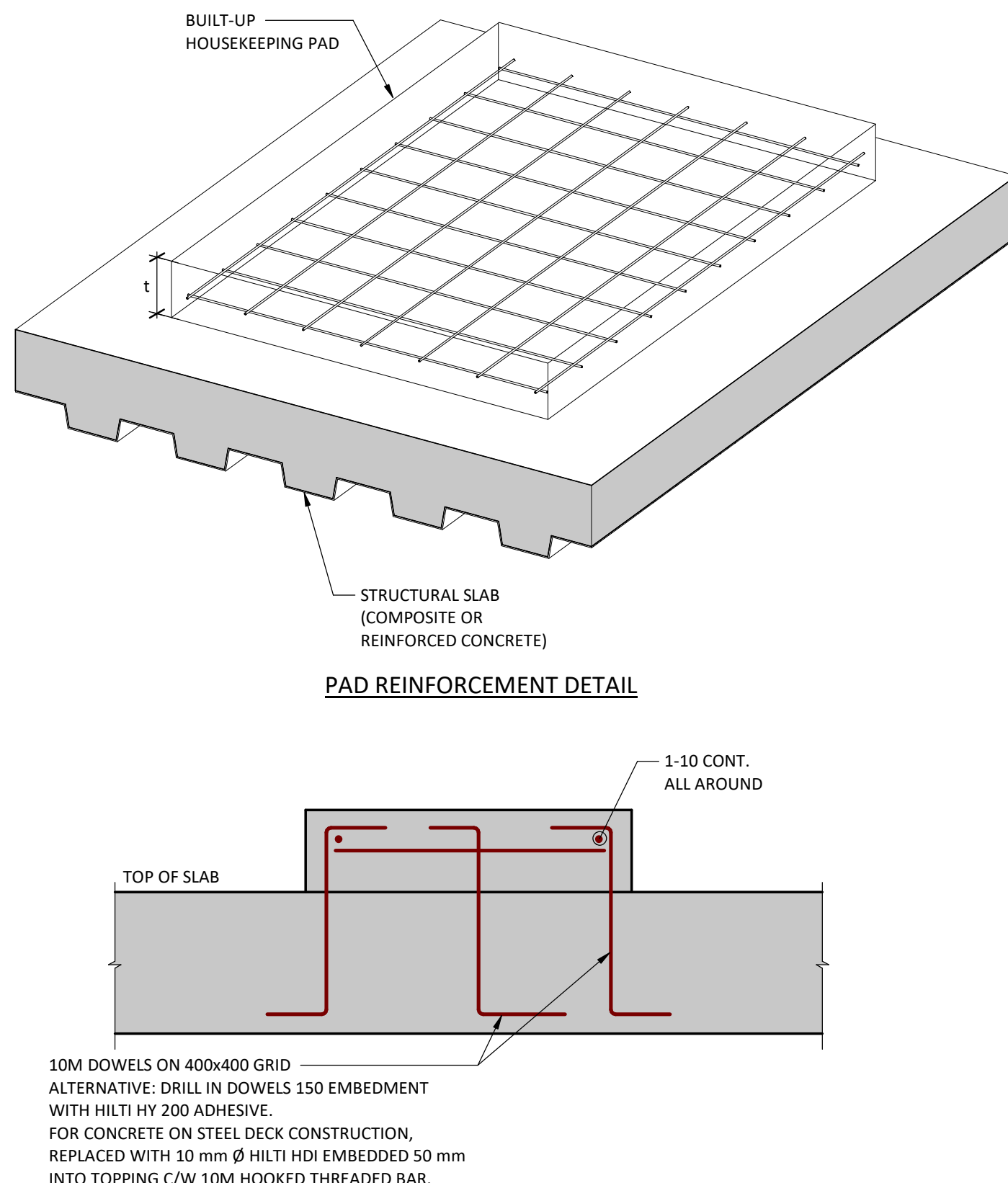
- NOTES:
- ESTABLISH LOCATION OF PROPOSED OPENING AND LOCATE EXISTING REINFORCEMENT AS REQUIRED.
  - OBTAIN APPROVAL FROM CONSULTANT TO CUT OPENING IN PROPOSED LOCATION.
  - CORE DRILL 100 mm Ø HOLE AT CORNERS OF NEW OPENING.
  - SAW CUT OPENING TO HOLE (DO NOT OVERCUT AT CORNERS).
  - CHIP CORNERS OUT SQUARE AND SMOOTH, AS REQUIRED.
  - MAKE GOOD EDGES OF OPENING AS REQUIRED.

CS26 SAWCUT OF OPENING IN EXISTING SLAB OR WALL



- NOTES:
- REFER TO ARCHITECTURAL DRAWINGS FOR WIDTH, HEIGHT AND LOCATION OF CONCRETE CURBS.
  - FOR CURBS GREATER THAN 300 mm IN THICKNESS PROVIDE REINFORCEMENT EQUIVALENT TO A<sub>s</sub>=0.00125 A<sub>g</sub> PER METRE HORIZONTAL AND VERTICAL EACH FACE.

CS12 CONCRETE CURB DETAILS

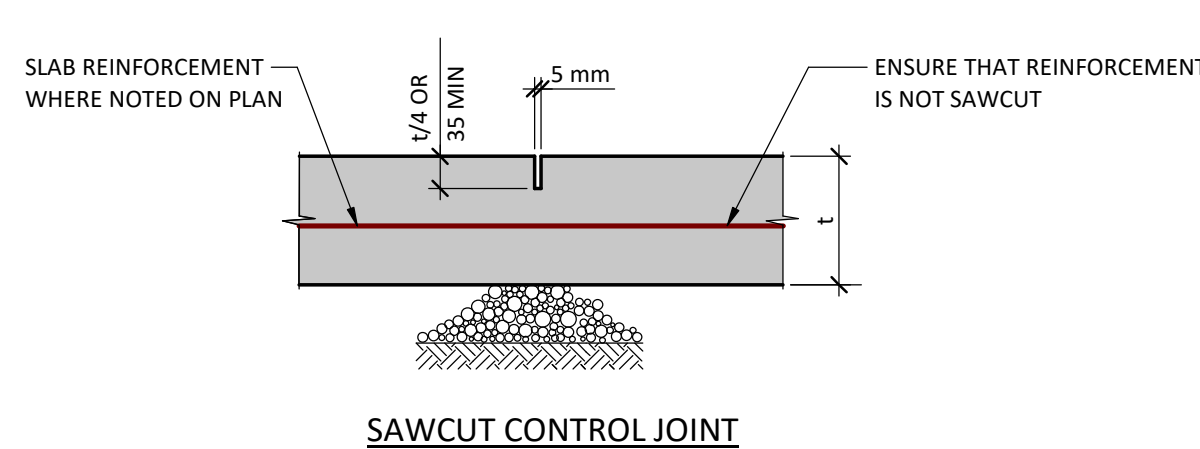


- ANCHORAGE DETAIL (SEISMIC RESTRAINT ONLY)
- ANCHORAGE DETAIL ONLY PROVIDES RESISTANCE TO HORIZONTAL SEISMIC FORCES (SLIDING). EQUIPMENT ANCHORAGE FOR OVERTURNING SHOULD BE DESIGNED TO BYPASS THE HOUSEKEEPING PAD AND ANCHOR INTO THE BASE SLAB.

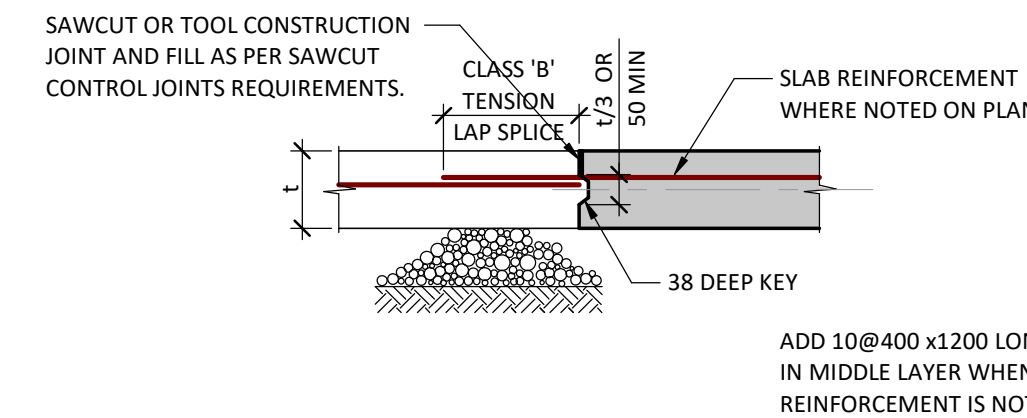
PAD THICKNESS 't'	REINFORCEMENT	ANCHORS
50	152x152MMW18.7xMMW18.7WVF 1 LAYER	10M DOWELS ON 400x400 GRID WITH A ROW CLOSE TO PAD EDGE
100	152x152MMW18.7xMMW18.7WVF 1 LAYER	10M DOWELS ON 400x400 GRID WITH A ROW CLOSE TO PAD EDGE
150	10@300 T EW	10M DOWELS ON 400x400 GRID WITH A ROW CLOSE TO PAD EDGE
200	10@400 T&B EW	10M DOWELS ON 400x400 GRID WITH A ROW CLOSE TO PAD EDGE

- NOTES:
- PRIOR TO SUBSTANTIAL COMPLETION OF THE PROJECT AND BEFORE EQUIPMENT IS PLACED ROUT ALL CRACKS IN THE HOUSEKEEPING PADS AND FILL WITH MORTAR CONTAINING CEMENT, SAND AND LATEX BONDING AGENT OR AS NOTED IN SPECIFICATIONS.
  - FOR PAD THICKNESSES BETWEEN THOSE NOTED ABOVE, PROVIDE REINF. FOR PAD THICKNESS IMMEDIATELY ABOVE. ACTUAL THICKNESS (E.G. FOR 125 mm PAD PROVIDE REINF. NOTED FOR 150 mm PAD).
  - REFER TO ARCHITECTURAL, MECHANICAL AND ELECTRICAL DRAWINGS FOR SIZE AND LOCATION OF PADS. ADJUST SIZE OF PADS AS NECESSARY TO MAINTAIN MINIMUM DIMENSIONS SHOWN AND TO SUIT LOCATION OF LOW DECK FLUTES.
  - FOR ALL EXTERIOR HOUSEKEEPING PADS, REFER TO CIVIL.

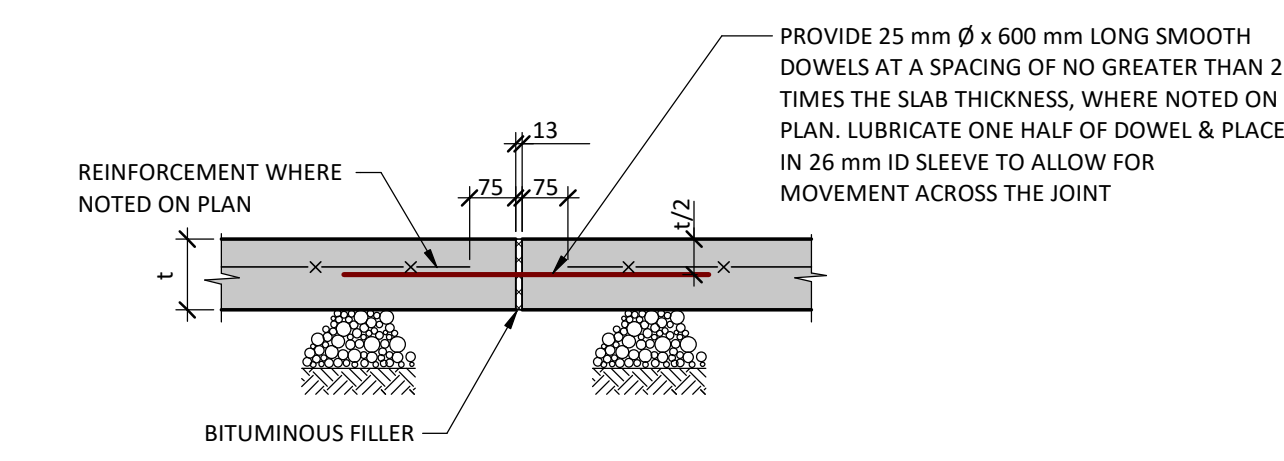
CS20 INTERIOR HOUSEKEEPING PADS



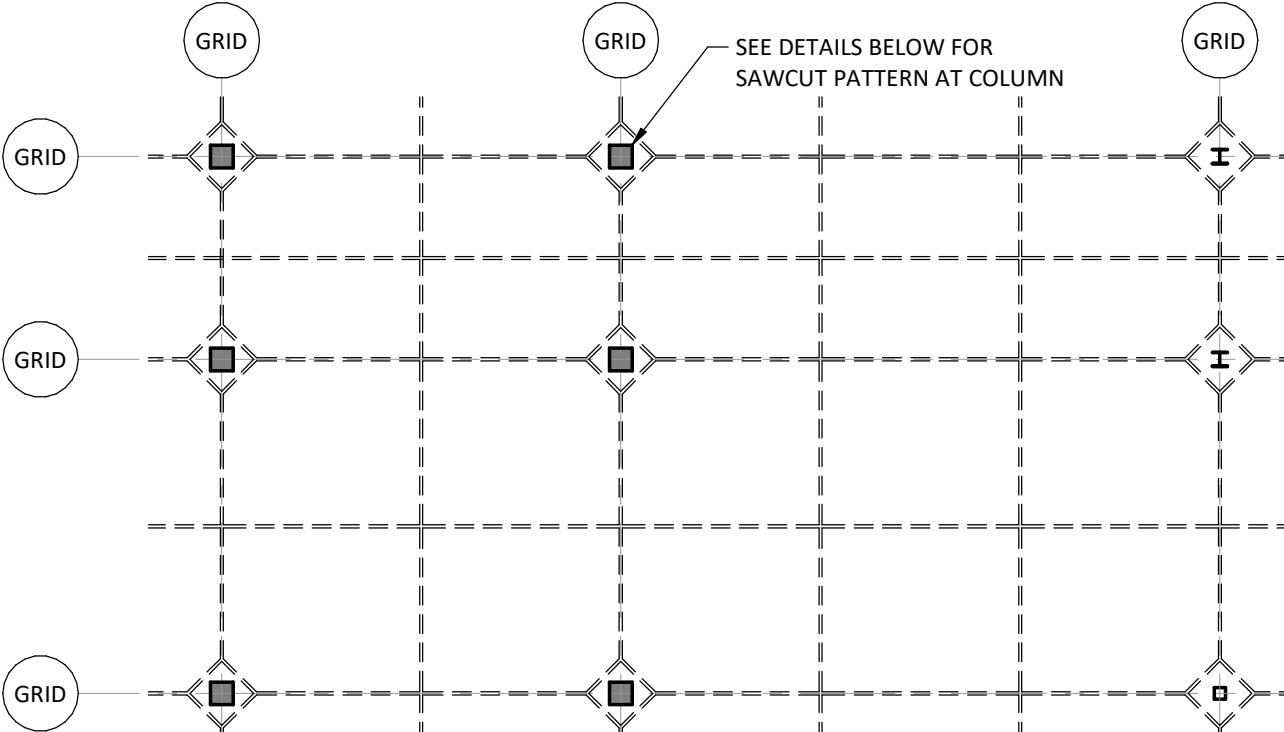
- NOTES:
- SAW CUT SLAB-ON-GRADE WITHIN 6 TO 18 HOURS AFTER PLACING CONCRETE.
  - COORDINATE EXACT LOCATIONS OF SAWCUTS IN SLAB-ON-GRADE WITH ARCHITECTURAL REQUIREMENTS.
  - MAXIMUM SPACING OF SAWCUTS IN SLAB-ON-GRADE SHALL NOT EXCEED THE FOLLOWING, UNO.
- |                               |              |
|-------------------------------|--------------|
| SLAB THICKNESS 100            | 3000 MAXIMUM |
| SLAB THICKNESS 125 OR GREATER | 4500 MAXIMUM |
- LIMIT LENGTH TO WIDTH RATIO OF ANY SAWCUT PANEL TO 1.5 MAXIMUM.
  - SAW CUT SLAB-ON-GRADE AT LOCATIONS SHOWN ON PLAN OR AS NOTED BELOW. ALTERNATE LOCATIONS SHALL BE SUBMITTED TO CONSULTANT FOR REVIEW, WELL IN ADVANCE OF POURING SLAB-ON-GRADE.
  - AFTER THE SLAB IS A MINIMUM 60 DAYS OLD, REMOVE ALL DEBRIS FROM THE SAW CUTS AND FILL WITH MORTAR CONTAINING CEMENT, SAND AND LATEX BONDING AGENT, OR AS NOTED IN SPECIFICATIONS.
  - PRIOR TO SUBSTANTIAL COMPLETION OF THE PROJECT ROUT ALL CRACKS IN THE SLAB-ON-GRADE AND FILL WITH MORTAR CONTAINING CEMENT, SAND AND LATEX BONDING AGENT OR AS NOTED IN SPECIFICATIONS.



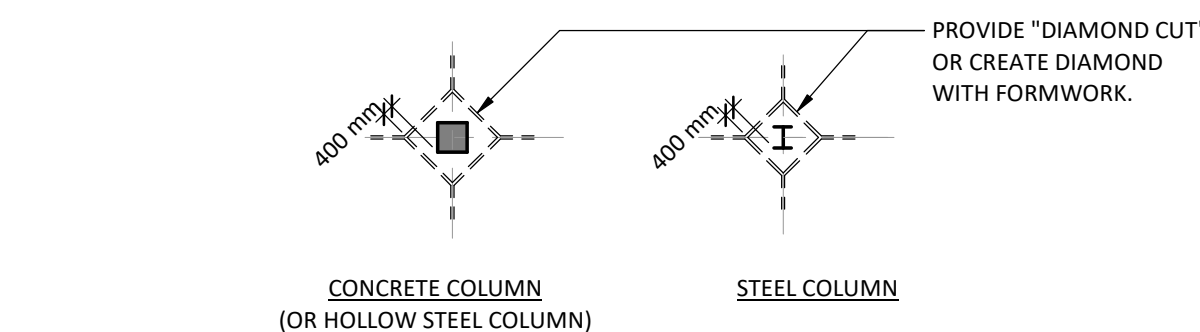
CONSTRUCTION JOINT



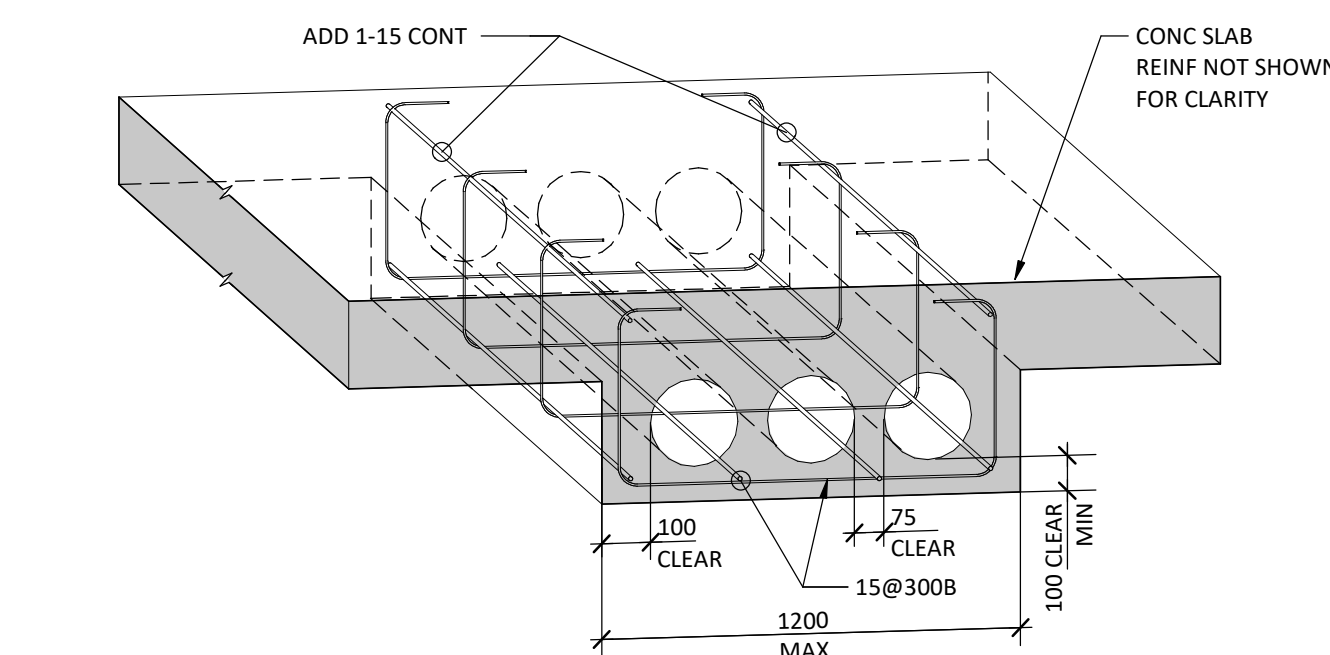
MOVEMENT JOINT



TYPICAL SAWCUT PATTERN IN SLAB-ON-GRADE



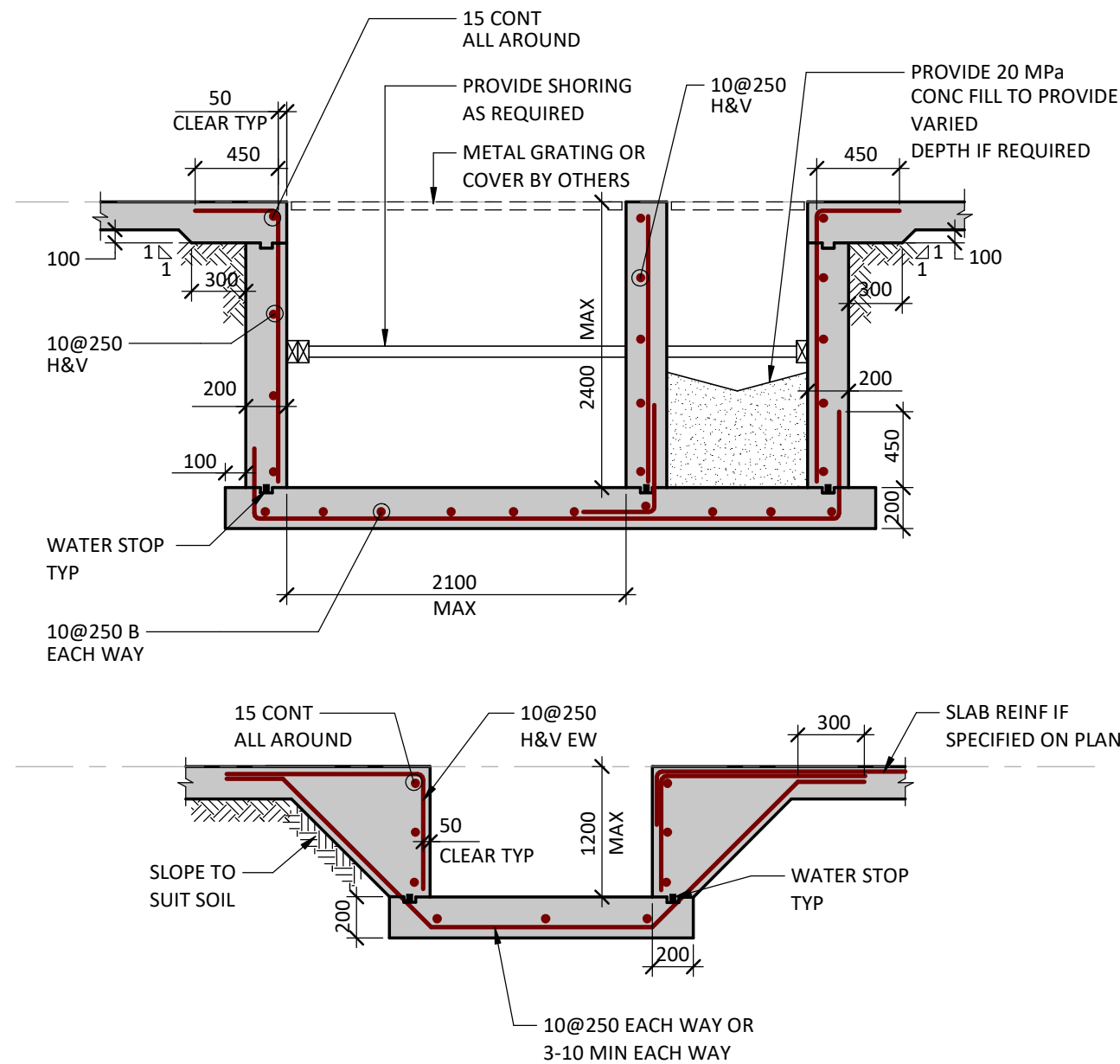
CS14 JOINTS IN SLAB-ON-GRADE



- NOTES:
- REFER TO ELECTRICAL DRAWINGS FOR EXACT NUMBER AND CONFIGURATION OF ELECTRICAL DUCTS.
  - ELECTRICAL DUCTS TO BE TIED SECURELY IN PLACE TO ENSURE THEY ARE NOT DISPLACED DURING CONCRETING.

CS28 DUCT BANK UNDER SLAB

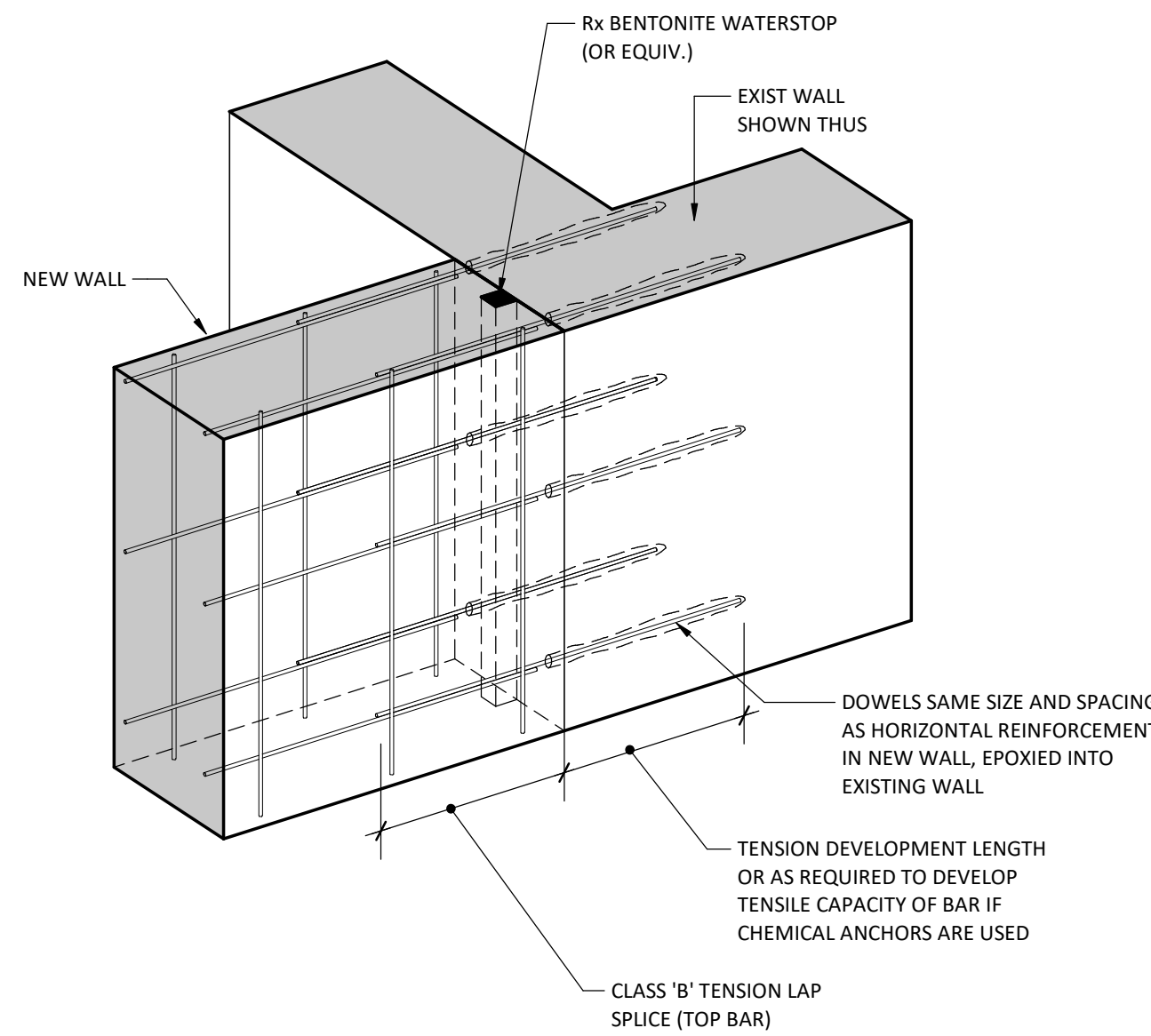




TYPICAL PIT OR TRENCH DETAIL

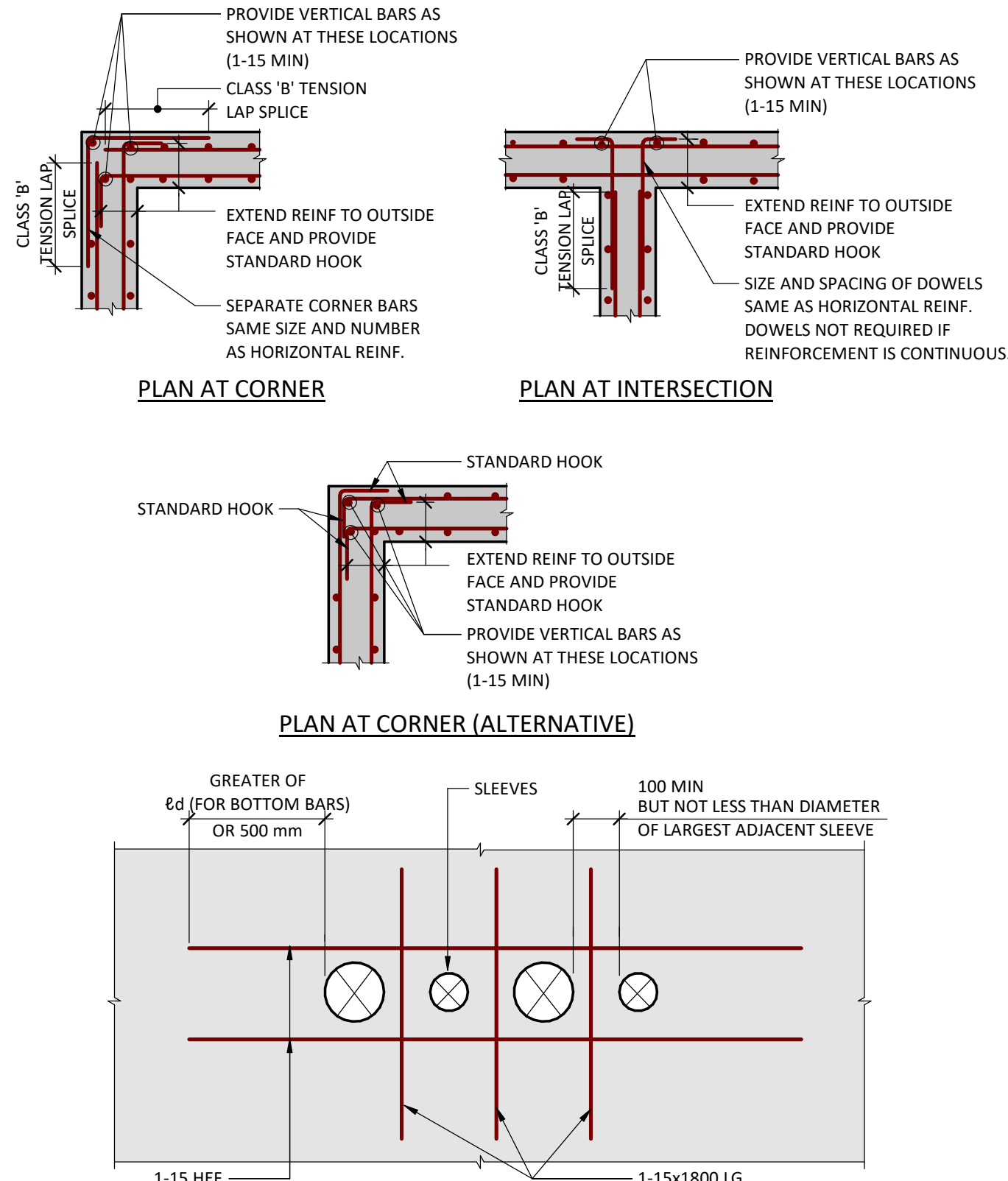
- NOTES:
- THE USE OF PRECAST PITS IS ACCEPTABLE PROVIDED THEY ARE SUPPLIED WITH A CONCRETE BASE AND ARE DESIGNED TO RESIST LOADS IDENTIFIED IN THE DESIGN NOTES.
  - PROVIDE RECESS OR CAST-IN STEEL ANGLES TO RECEIVE GRATING OR PIT COVER AS PER ARCHITECTURAL DRAWINGS, TYPICAL.

CW1 PITS AND TRENCHES

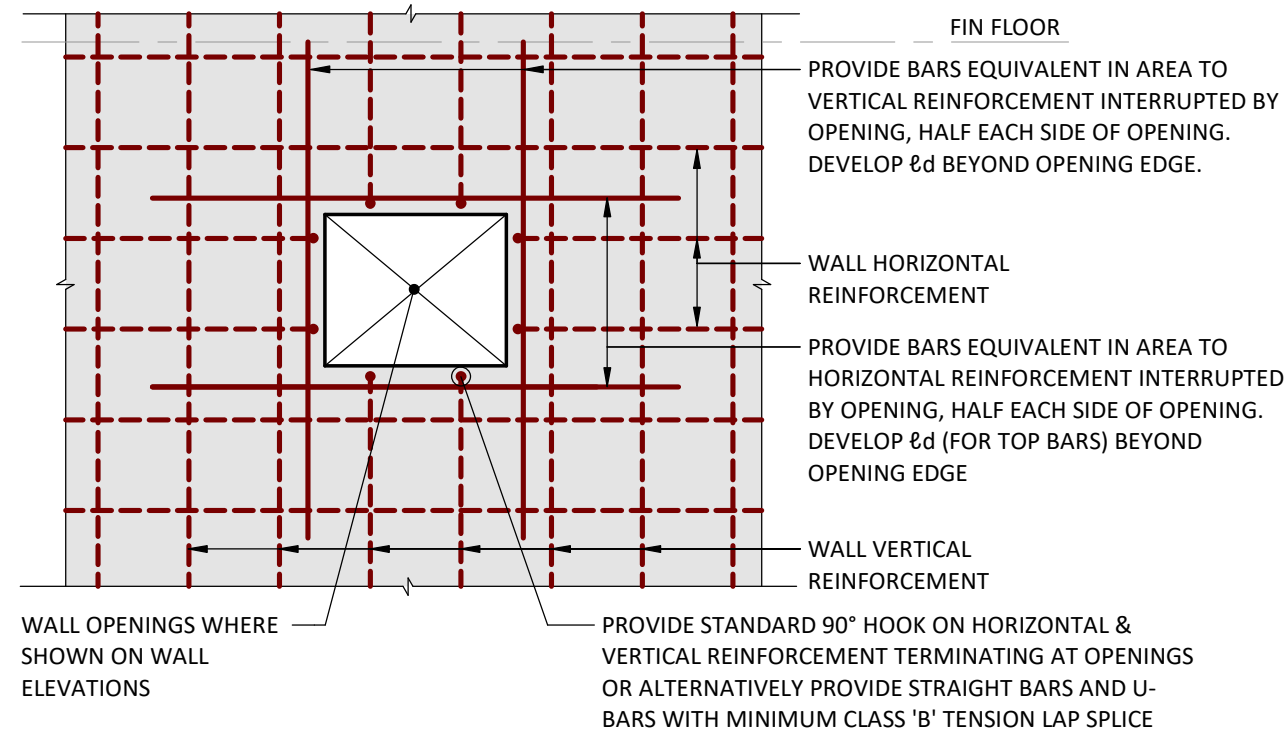


- NOTE:
- CLEAN AND PREPARE SURFACE OF EXISTING WALL AND FASTEN WATERSTOP TO EXISTING WALL IN ACCORDANCE WITH WATERSTOP MANUFACTURERS RECOMMENDATIONS.

CW6 WATERSTOP BETWEEN NEW AND EXISTING WALLS

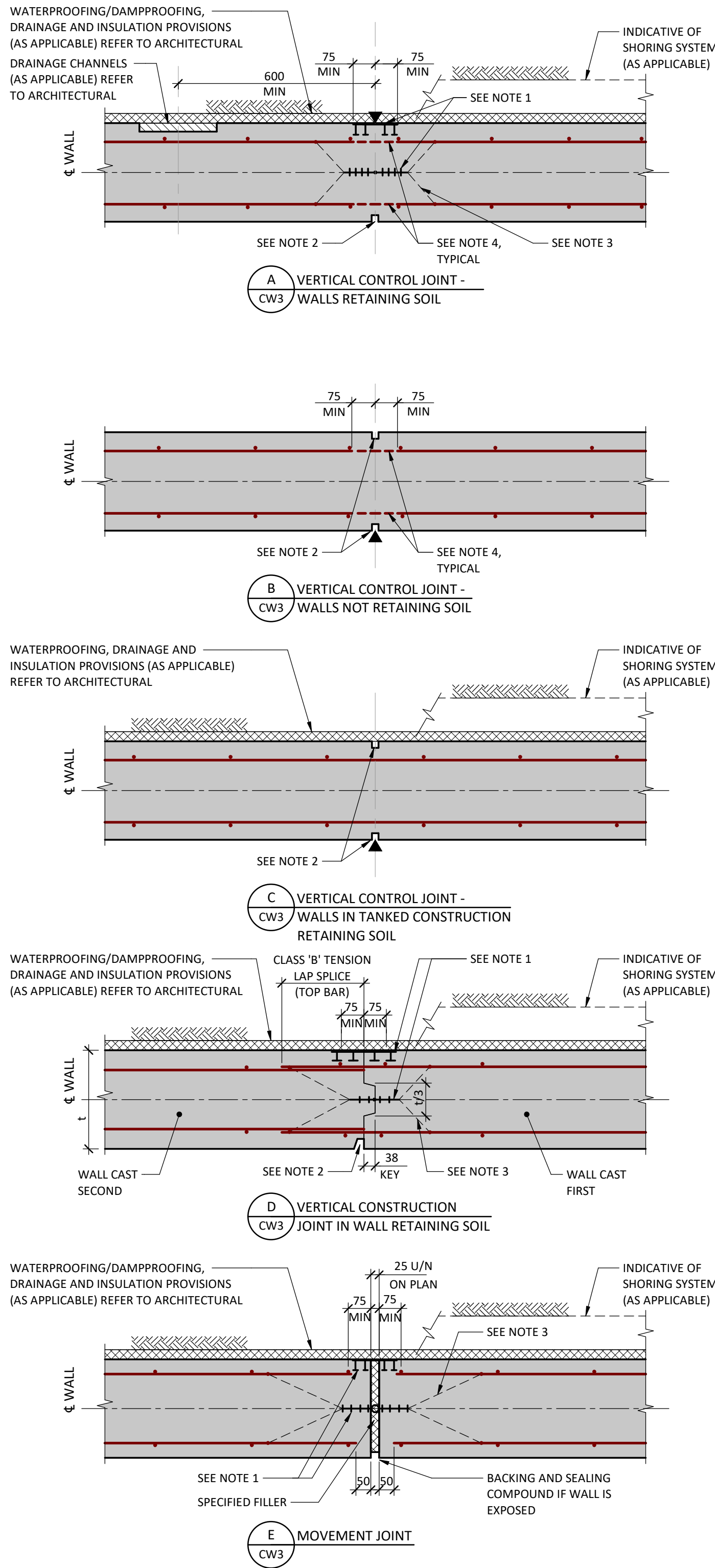


ADDITIONAL REINFORCEMENT FOR SLEEVES, UNLESS NOTED OTHERWISE



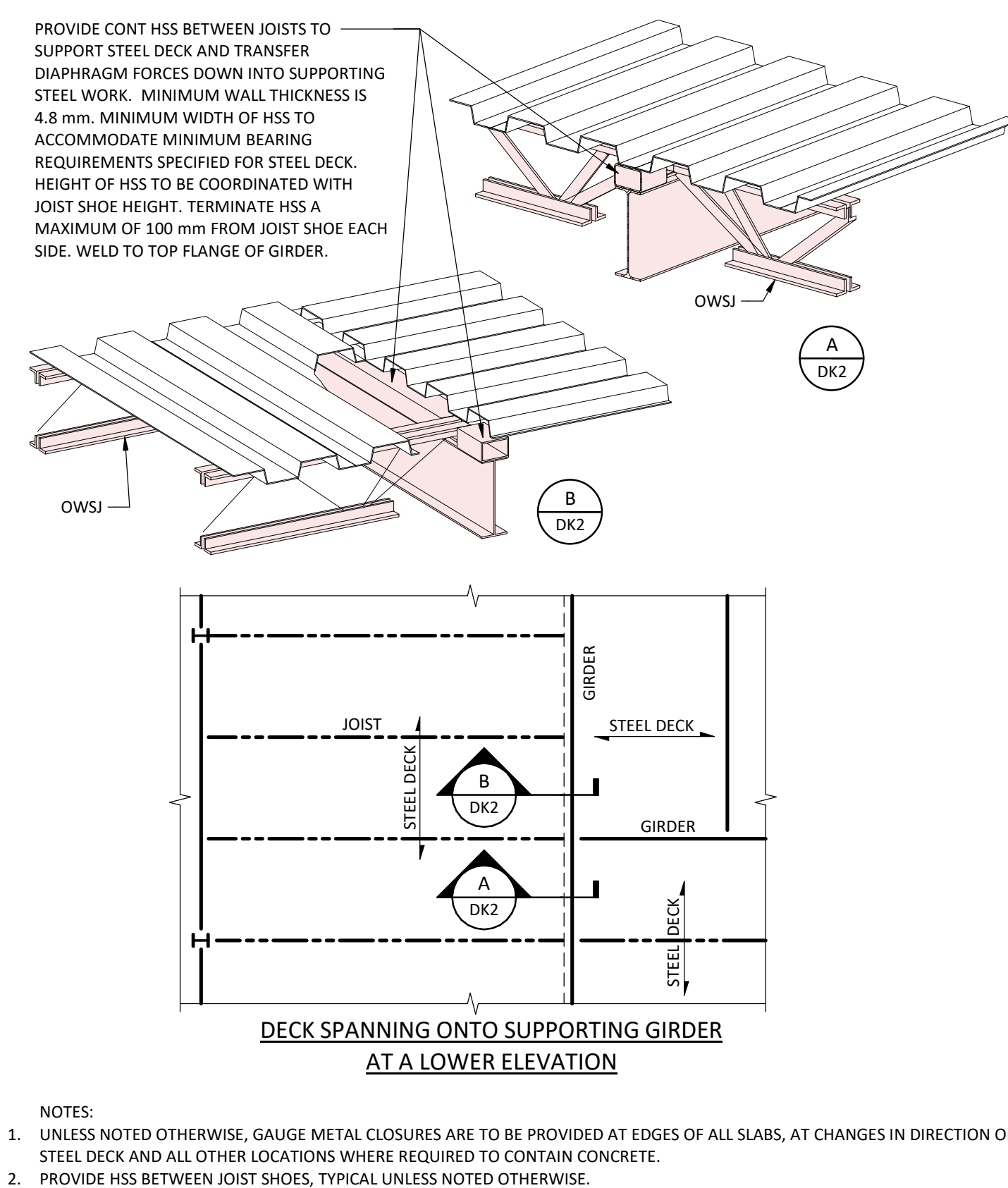
ADDITIONAL REINFORCEMENT FOR OPENINGS, UNLESS NOTED OTHERWISE

CW2 REINFORCEMENT DETAILS IN CONCRETE FOUNDATION WALLS

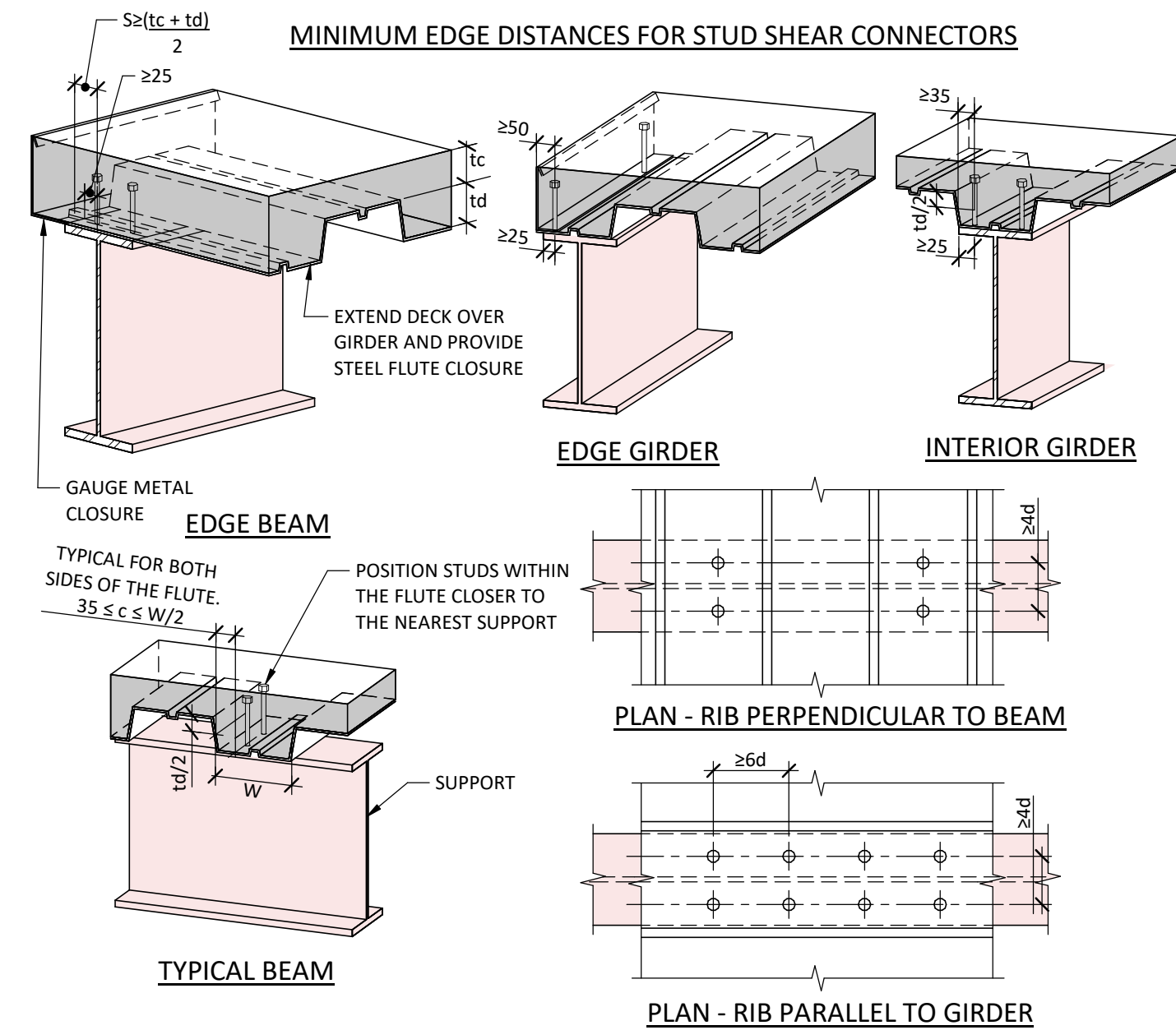


- NOTES:
- PROVIDE INTERNAL OR EXTERNAL WATERSTOP FOR WALLS RETAINING SOIL AND INTERNAL WATERSTOP FOR WALLS EXPOSED TO WEATHER. REFER TO ARCHITECTURAL.
  - PROVIDE 20 x 20 REGLET IN WALLS EXPOSED TO VIEW. WHERE WALLS ARE DESIGNATED ARCHITECTURAL EXPOSED CONCRETE, REFER TO ARCH. DRAWINGS FOR REGLET DETAILS.
  - TIE WATERSTOP TO REINFORCEMENT AS REQUIRED TO ENSURE WATERSTOP IS NOT DISPLACED DURING CONCRETING.
  - STOP EVERY OTHER HORIZONTAL BAR 75 mm BACK FROM JOINT EACH SIDE, EXCEPT CONTINUOUS TOP AND BOTTOM REINFORCEMENT, TYPICAL.
  - MAXIMUM SPACING OF VERTICAL CONTROL JOINTS SHALL BE 4500 mm UNLESS NOTED OTHERWISE. REFER TO PLAN FOR LOCATION.
  - DO NOT PROVIDE VERTICAL CONTROL JOINTS IN WALLS WHICH SPAN HORIZONTALLY.
  - FOR WALLS SUPPORTED ON CAISSONS OR PIER FOOTINGS, CONSTRUCTION JOINTS ARE TO BE PLACED AT MIDSPAN OF WALL.
  - JOINTS ARE TO BE LOCATED A MINIMUM OF 1200 mm FROM ANY PENETRATION OR OPENING THROUGH THE WALL.

CW3 VERTICAL JOINTS IN CONCRETE WALLS



DK2 STEEL DECK AT ROOFS (STRUCTURAL STEEL FRAMING)



- NOTES:
- $d$  IS THE SHAFT DIAMETER OF THE HEADED STUD SHEAR CONNECTORS.
  - REFER TO TYPICAL DETAIL S1 FOR PLACEMENT OF STUD SHEAR CONNECTORS WHERE SPECIFIED.
  - DIVIDE THE TOTAL NUMBER OF SHEAR CONNECTORS IN HALF, PLACE ONE CONNECTOR IN EACH DECK FLUTE, STARTING AT EACH END AND WORKING TOWARDS CENTRE OF BEAM.
  - IF THE TOTAL NUMBER OF STUDS EXCEEDS THE NUMBER OF FLUTES, DOUBLE UP STUDS IN EACH FLUTE STARTING AGAIN AT EACH END AND WORKING TOWARDS CENTRE OF BEAM. IF ADDITIONAL STUDS REMAIN, ADD A THIRD STUD IN EACH FLUTE STARTING AT EACH END AND WORKING TOWARDS CENTRE OF BEAM.
  - REFER TO GENERAL NOTES FOR SIZE AND LENGTH OF SHEAR CONNECTORS AND TO PLANS FOR EXACT NUMBER OF CONNECTORS.
  - MAXIMUM SPACING OF STUD SHEAR CONNECTORS ON BEAMS WHERE CONNECTORS ARE SPECIFIED IS 800 mm. ADD STUD SHEAR CONNECTORS AS REQUIRED TO MAINTAIN THIS MAXIMUM SPACING.

DK3 PLACEMENT OF STUD SHEAR CONNECTORS FOR NON-COMPOSITE BEAMS

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Electrical Consultant  
Civil Consultant

Client  
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York Region

Seal & Permit

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2	ISSUED FOR 100% DD	2024-02-29
1	ISSUED FOR 60% DD	2024-01-25

NO.	ISSUED FOR	DATE
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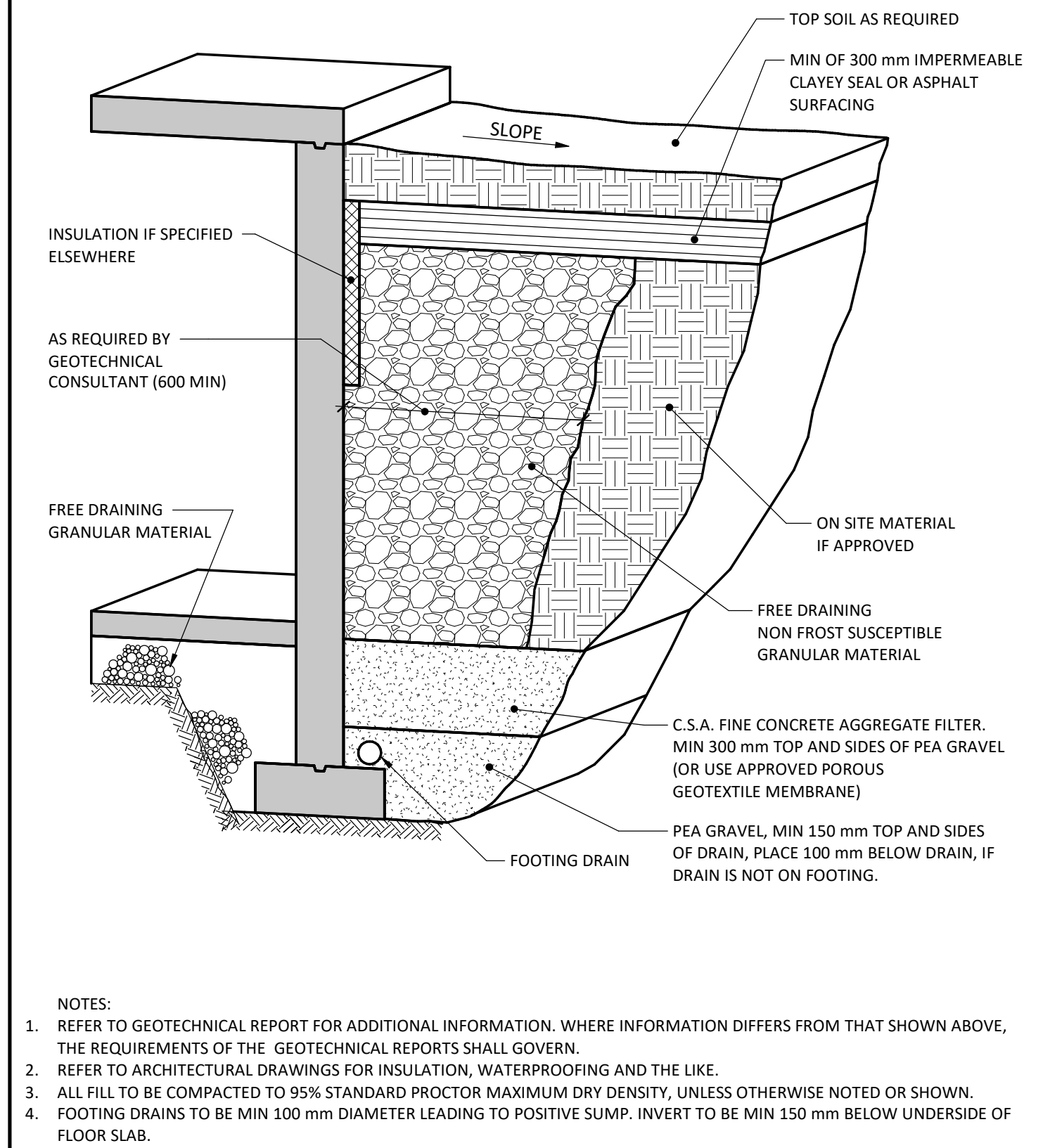
Drawing History	Scale	Checked By
	1 : 1	HB
Region of York Project Number	Region of York Building Code	

Project  
York Region North Roads Operations Centre  
3525 Baseline Road  
Georgina, ON, L0E 1R0  
Drawing Title

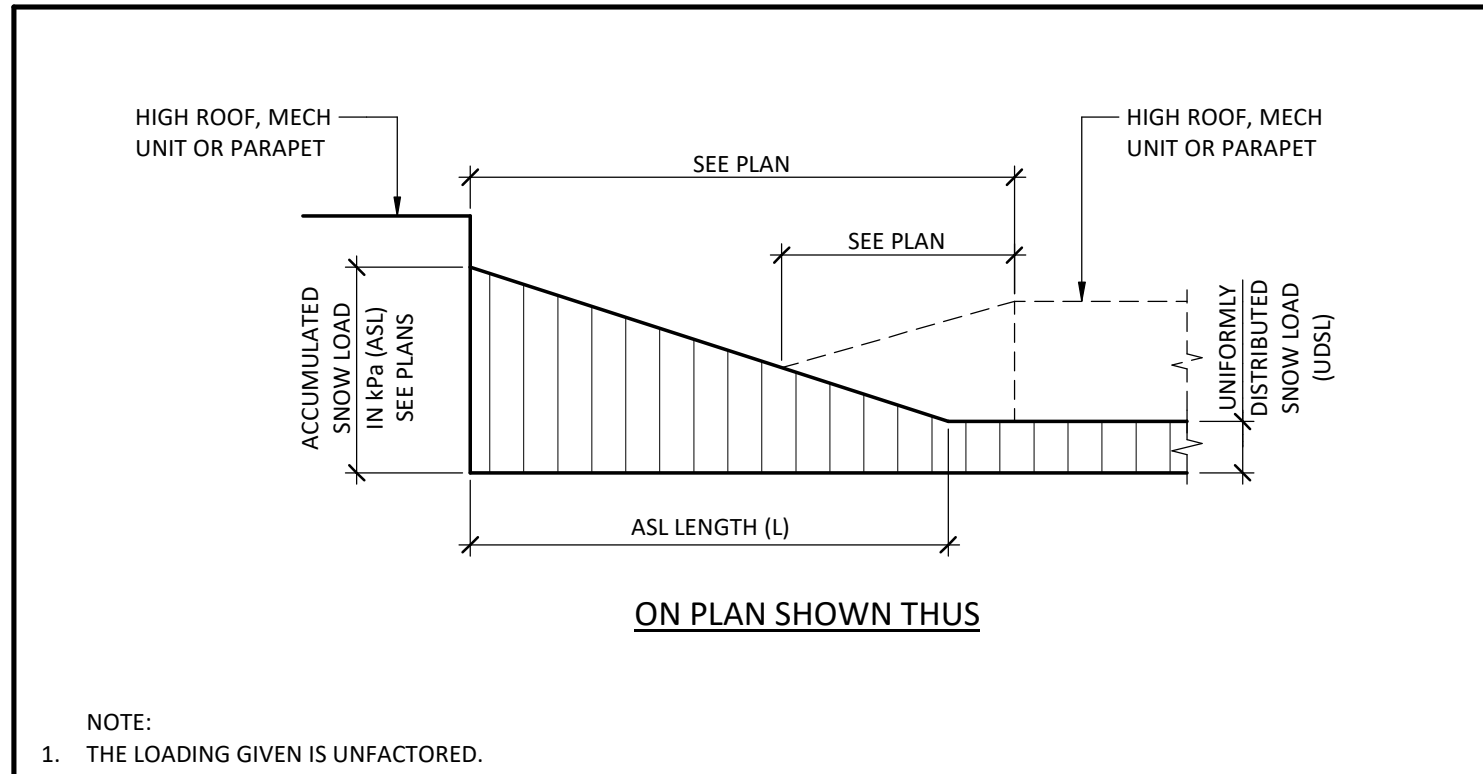
TYPICAL DETAILS

Project Number	Drawing Number
EN023-01007	S012



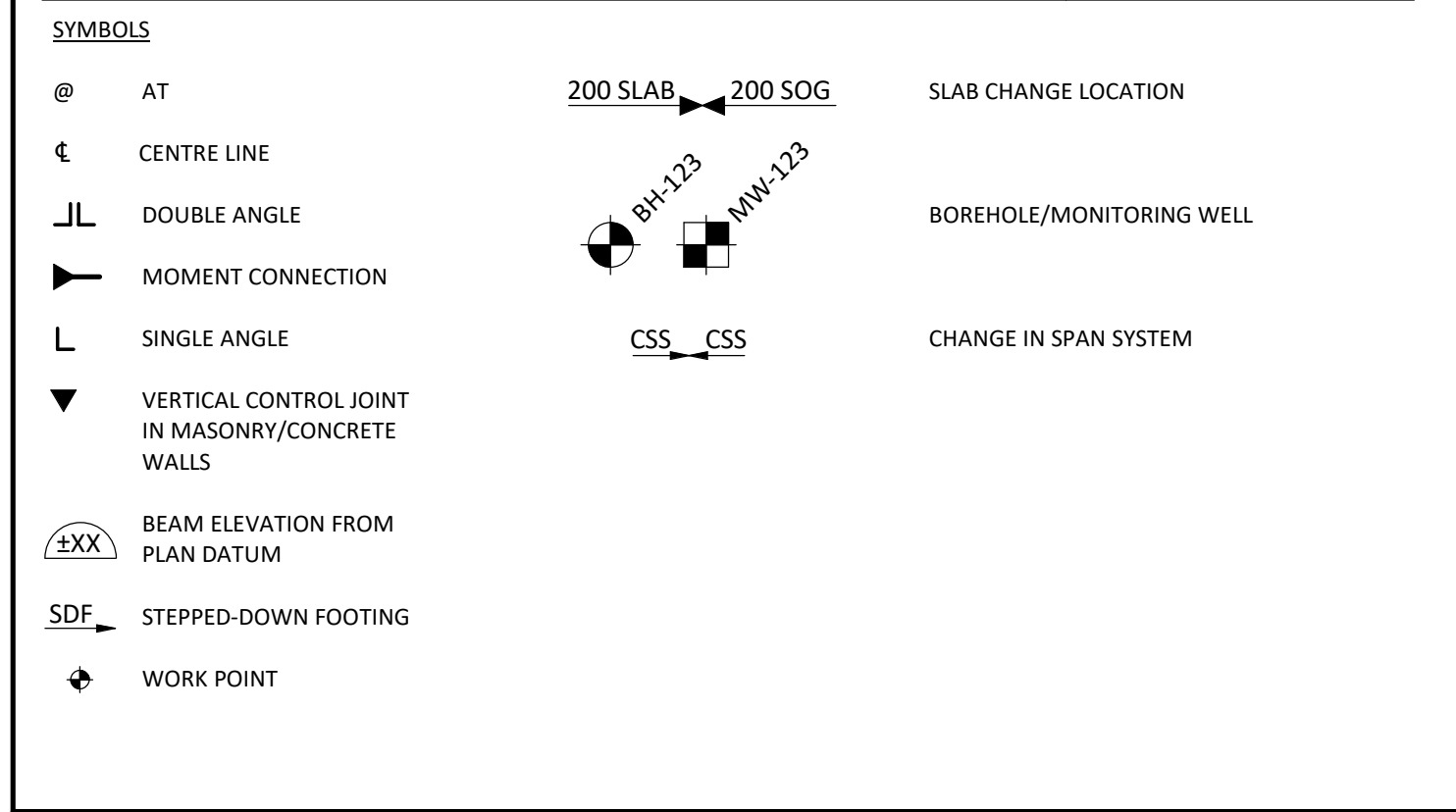


**G4** BACKFILL AT FOUNDATION WALLS

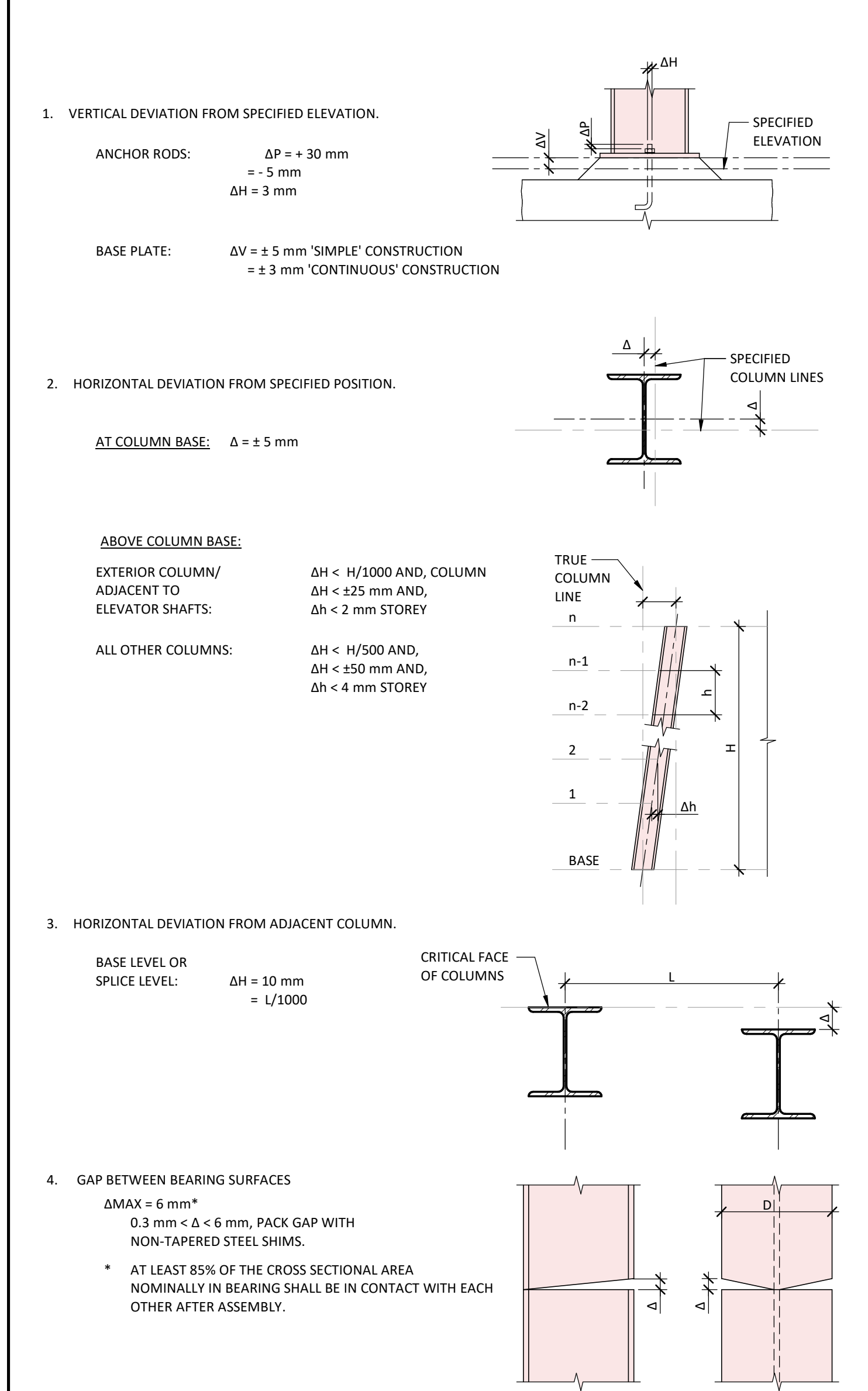


**G6** ACCUMULATED SNOW LOAD

ABBREVIATIONS		FORCES	
A, ABV	ABOVE	BR	FACTORED BEARING FORCE, kN
A, ROD	ANCHOR ROD	DL	DEAD LOAD
AEC	ARCH EXPOSED CONCRETE	H	FACTORED END SHEAR FORCE ALONG X-X AXIS (Vx), kN
AECS	ARCH EXPOSED STRUCTURAL STEEL	LL	LIVE LOAD
AHU	AIR HANDLING UNIT	M, Mx	FACTORED BENDING MOMENT ABOUT X-X AXIS, kN-m
ALT	ALTERNATE	My	FACTORED BENDING MOMENT ABOUT Y-Y AXIS, kN-m
ARCH	ARCHITECTURAL	P+	FACTORED TENSION AXIAL FORCE, kN
ASL	ACCUMULATED SNOW LOAD	P-	FACTORED COMPRESSION AXIAL FORCE, kN
AT	FACTORED AXIAL LOAD	P±	FACTORED TENSION / COMPRESSION (REVERSIBLE) FORCE, kN
B, BOT	BOTTOM	PTF	FACTORED PASS THROUGH FORCE, kN
BLL	BOTTOM LOWER LAYER	TM	FACTORED TORSIONAL MOMENT, kN-m
BM	BEAM	V	FACTORED END SHEAR FORCE ALONG Y-Y AXIS (Vy), kN
BML	BOTTOM MIDDLE LAYER	WD	UNFACTORED UNIFORMLY DISTRIBUTED DEAD LOAD ON STEEL DECK, PRECAST OR OWSJ'S
BOF	BOTTOM (FOUNDING ELEVATION) OF FOOTING	WL	UNFACTORED UNIFORMLY DISTRIBUTED LIVE LOAD ON STEEL DECK, PRECAST OR OWSJ'S
BPL	BASE-PLACING PLATE		
BOL	BOTTOM LOWER LAYER		
BEW	BOTTOM EACH WAY		
C	EPOXY COATED		
C/C	CENTRE TO CENTRE		
C/W	CONNECT WITH		
CA, CB	COLUMN ABOVE, BELOW		
CANT	CANTILEVER		
CJ	CONSTRUCTION JOINT		
CLR	CLEAR		
CLS	COMPRESSION LAP SPICE		
COL	COLUMN		
CONC	CONCRETE		
CONT	CONTINUOUS		
CDS	CONFIRM ON SITE		
CP	CAST-IN PLATE		
CSS	CHANGE IN SPANNING SYSTEM		
DB	DIVIDER BEAM		
DET	DETAIL		
DIA, Ø	DIAMETER		
DIAG	DIAGONAL		
DIM	DIMENSION		
DWG(S)	DRAWING(S)		
DWL(S)	DOWEL(S)		
E-W	EAST-WEST		
EA	EACH		
EE	EACH END		
EF	EACH FACE		
EJ, EXP JT	EXPANSION JOINT		
EL	ELEVATION		
ELECT	ELECTRICAL		
ELEV	ELEVATOR		
EQ	EQUAL		
ES	EACH SIDE		
EW	EACH WAY		
EX, EXIST	EXISTING		
EXT	EXTERIOR		
f'c	CONCRETE COMPRESSIVE STRENGTH		
FDN	FOUNDATION		
FF	FAR FACE		
FIN	FINISHED		
FL	FLOOR		
FMC	FULL MOMENT CONNECTION		
FTG	FOOTING		
fy	YIELD STRENGTH FOR STEEL REINFORCEMENT		
Fy	YIELD STRENGTH FOR STRUCTURAL STEEL		
GA	GAUGE		
GALV	GALVANIZED		
H, HORIZ	HORIZONTAL		
HA, HB	HANGER ABOVE, BELOW		
HEF	HORIZONTAL EACH FACE		
HH	HOKED EACH END		
HI	HIGHER OF TWO BEAMS		
HP	HIGH POINT		
HSC	HORIZONTALLY SLOTTED CONNECTION		
HF	FACTORED HORIZONTAL LOAD		
IF	INSIDE FACE		
INT	INTERIOR		
IR	INTEGRITY REINFORCEMENT		
JT	JOINT		
Ed	DEVELOPMENT LENGTH OF REINFORCEMENT		
LG	LONG		
LL	LOWER LAYER		
LLH	LONG LEG HORIZONTAL		
LLV	LONG LEG VERTICAL		
LO	LOWER OF TWO BEAMS		
LP	LOW POINT		
LSH	LONG SIDE HORIZONTAL		
LSV	LONG SIDE VERTICAL		
MAX	MAXIMUM		
MC	MOMENT CONNECTION		
MECH	MECHANICAL		
MEZZ	MEZZANINE		
MIN	MINIMUM		
MJ	MOVEMENT JOINT		
ML	MIDDLE LAYER		
MOM	MOMENT		
N-S	NORTH-SOUTH		
NIC	NOT IN CONTRACT		
NF	NEAR FACE		
#, No.	NUMBER		
NTS	NOT TO SCALE		
OF	OUTSIDE FACE		
OPEN	OPENING		
OWSJ	OPEN WEB STEEL JOIST		
PA, PB	POST ABOVE, BELOW		
PC	PRECAST		
PL	PLATE		
PROJ	PROJECTION		
R	RADIUS		
R/W	REINFORCE WITH ROOF DRAIN		
RD	ROOF DRAIN		
REF	REFERENCE		
REINF	REINFORCE, REINFORCEMENT		
REQ'D	REQUIRED		
REV	REVISION, REVISED		
RTU	ROOFTOP UNIT		
SA	SHELF ANGLE		
SDF	STEP DOWN FOOTING		
SL	SLAB		
SOG	SLAB-ON-GRADE		
SPEC'S	SPECIFICATIONS		
SQ	SQUARE		
STD	STANDARD		
STRUCT	STRUCTURAL		
SW	SELF WEIGHT		
t, THK	THICKNESS		
T	TOP		
TD	TYPICAL DETAIL		
TEMP	TEMPERATURE		
TJ	TIE JOIST		
TLL	TOP LOWER LAYER		
TLS	TENSION LAP SPICE		
TML	TOP MIDDLE LAYER		
TOW	TOP OF WALL		
TUL	TOP UPPER LAYER		
U/N, UNO	UNLESS NOTED OTHERWISE		
U/S	UNDERSIDE		
UL	UPPER LAYER		
V, VERT	VERTICAL		
VBR	VERTICAL BRACING		
VEF	VERTICAL EACH FACE		
VSC	VERTICALLY SLOTTED CONNECTION		
W/	WITH		
WP	WORK POINT		
WPA, WPB	WIND POST ABOVE, BELOW		
WPL	WALL PLATE		
WWF	WELDED WIRE FABRIC		
SYMBOLS		UNITS	
@	AT	kg	KILOGRAM
⊕	CENTRE LINE	m	METRE
⌄	DOUBLE ANGLE	Pa	PASCAL
⌄	MOMENT CONNECTION	kPa	KILOPASCAL
L	SINGLE ANGLE	kn/m²	KILONEWTON PER SQUARE METRE (KILOPASCAL)
▼	VERTICAL CONTROL JOINT IN MASONRY/CONCRETE WALLS	MPa	MEGAPASCAL
⊕XX	BEAM ELEVATION FROM PLAN DATUM	N	NEWTON
SDF	STEPPED-DOWN FOOTING	kN	KILONEWTON
⬮	WORK POINT	kN-m	KILONEWTON METRE
		kN/m	KILONEWTON PER METRE



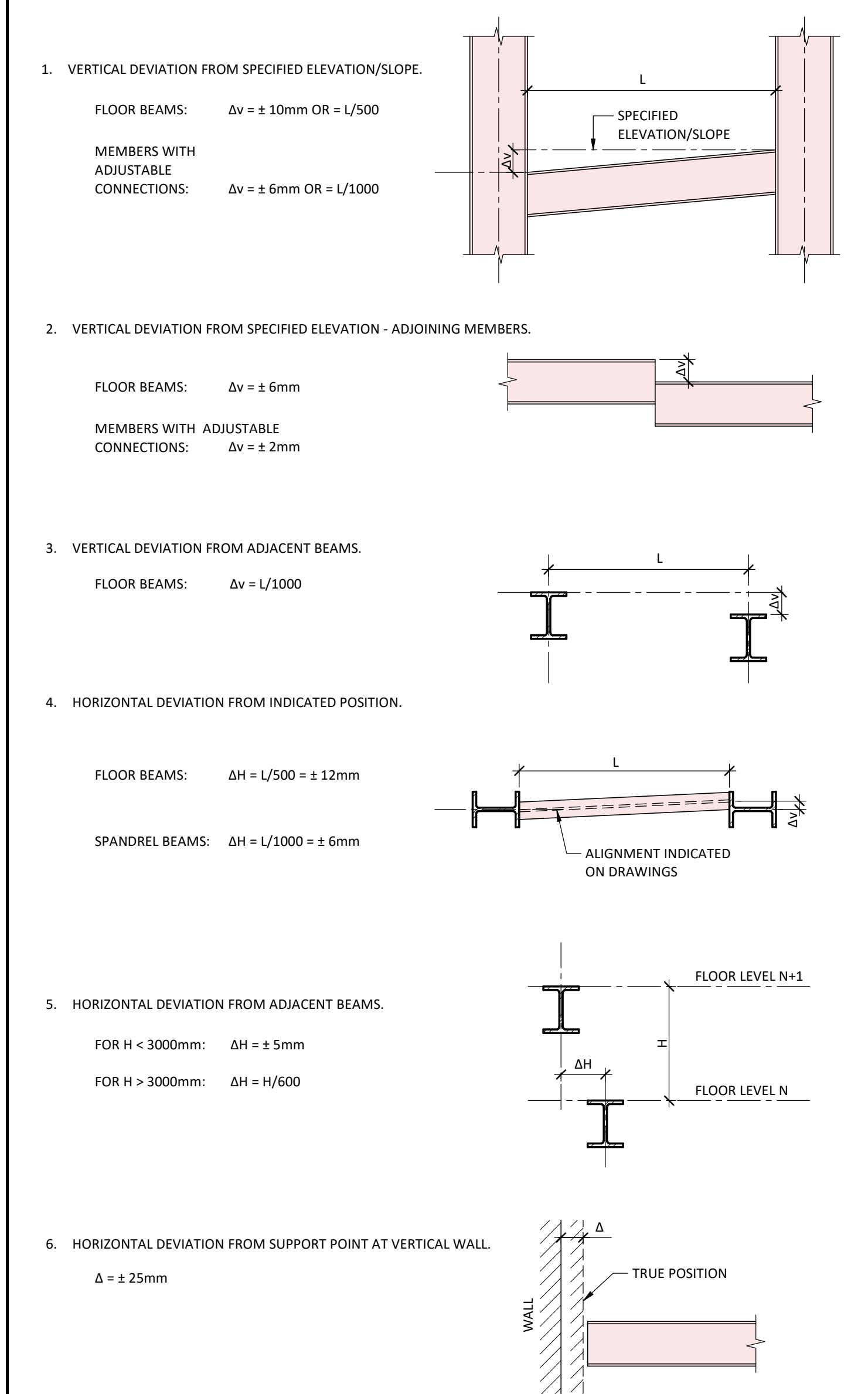
**G1** ABBREVIATIONS AND SYMBOLS



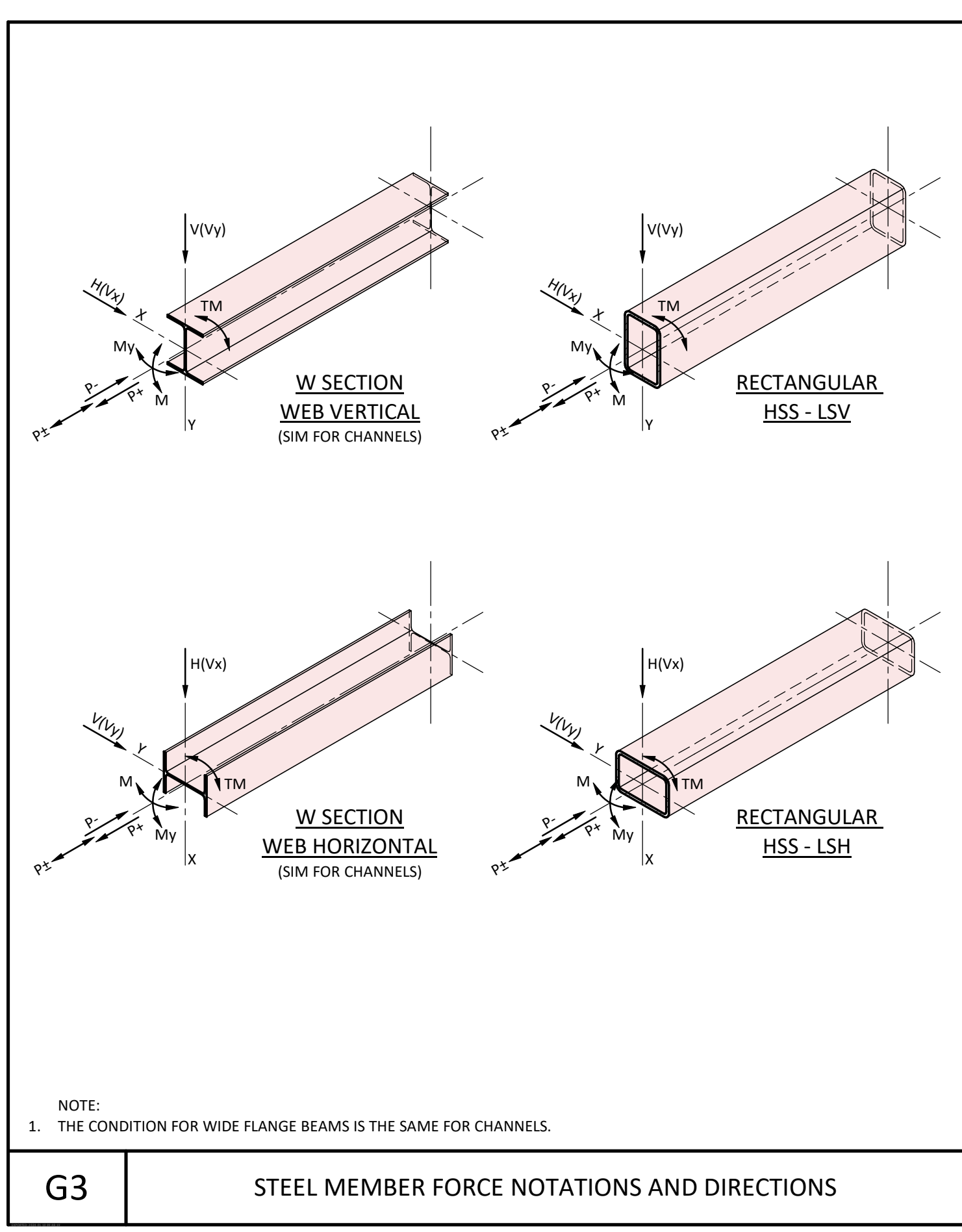
**ETS1** ERECTION TOLERANCES FOR STRUCTURAL STEEL COLUMNS

MARK		INDICATIVE OF
NEW	EXISTING	
		CONCRETE / MASONRY / WOOD STRUCTURE BELOW
		CONCRETE STRUCTURE ABOVE
		CONCRETE UPTURNED BEAMS AND CURBS
		CONCRETE IN SECTION
		MASONRY WALL ABOVE AND IN SECTION
		WOOD SHEAR WALL ABOVE
		WOOD LOAD BEARING WALL ABOVE

**G2** STRUCTURE LEGEND



**ETSB1** ERECTION TOLERANCES FOR STRUCTURAL STEEL BEAMS



**G3** STEEL MEMBER FORCE NOTATIONS AND DIRECTIONS

9	ISSUED FOR ADDENDUM 4	2025-07-18
8	REISSUED FOR TENDER	2025-05-23
7	ISSUED FOR TENDER	2025-04-25
6	ISSUED FOR COORDINATION	2025-04-17
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4	ISSUED FOR PRE TENDER REVIEW	2024-10-31
3	ISSUED FOR 80% CD	2024-05-02
2	ISSUED FOR 100% DD	2024-02-29
1	ISSUED FOR 60% DD	2024-01-25

NO.	ISSUED FOR	DATE
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Drawing History	
Scale	As indicated
Region of York Project Number	Region of York Building Code

Project	York Region North Roads Operations Centre
3525 Baseline Road Georgina, ON, L0E 1R0	
Drawing Title	TYPICAL DETAILS

Project Number	Drawing Number
EN023-01007	<b>S013</b>



Project Team:

Prime Consultant  
GEC ARCHITECTURE

Structural Consultant  
ENTUITIVE

Mechanical Consultant

Electrical Consultant

Civil Consultant

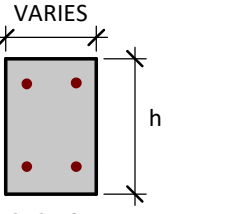
Client

OWNER

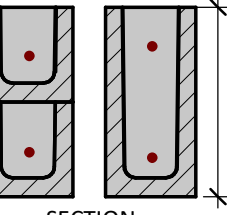


Seal & Permit

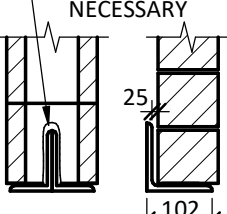
PRE-CAST CONCRETE LINTELS

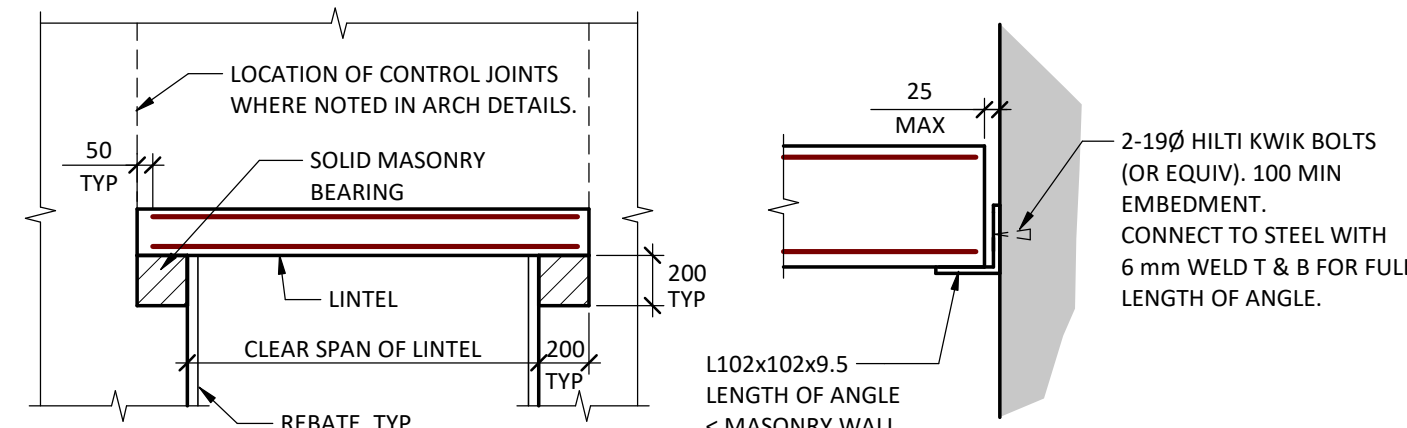
CLEAR SPAN	WALL THICKNESS										NOTES
	90	140	190	240	290	340	390	440	490	540	
UP TO 1200	190	1-10	190	2-10	190	2-10	190	2-10	190	2-10	1. PROVIDE REINF LISTED BOTH TOP AND BOTTOM  VARIES 
> 1200 TO 1800	190	1-10	190	2-10	190	2-10	190	2-10	190	2-10	
> 1800 TO 2400	---	---	190	2-10	190	2-10	190	2-15	190	2-15	
> 2400 TO 3000	---	---	390	2-10	390	2-10	390	2-10	390	2-10	

MASONRY LINTELS

CLEAR SPAN	TOP AND BOTTOM REINFORCEMENT										NOTES
	h	As	h	As	h	As	h	As	h	As	
UP TO 1200	390	1-10	390	1-10	390	1-10	390	1-10	390	1-10	1. PROVIDE REINF LISTED BOTH TOP AND BOTTOM. 2. PROVIDE UNTEL BLOCK (2-150 H OR 1-390 H). GROUT IS TO BE CONTINUOUS ALONG SPAN OF LINTEL  
> 1200 TO 1800	390	1-10	390	1-10	390	1-10	390	1-10	390	1-10	
> 1800 TO 2400	390	1-10	390	1-10	390	1-10	390	1-10	390	1-15	
> 2400 TO 3000	---	---	390	1-10	390	1-15	390	1-15	390	1-15	

STEEL LINTELS

CLEAR SPAN	WALL THICKNESS					NOTES
	90 VENEER	140	190	240	290	
UP TO 1200	L102x76x6.4	2 L64x64x6.4	2 L89x76x6.4	L102x76x6.4 & L127x76x6.4	3 L89x76x6.4	SAWCUT WEB OF BLOCK, AS NECESSARY 
> 1200 TO 1800	L102x76x6.4	2 L64x64x6.4	2 L89x89x6.4	L102x76x6.4 & L127x76x6.4	3 L89x89x6.4	
> 1800 TO 2400	L102x102x6.4	2 L89x64x6.4	2 L89x89x6.4	L102x102x7.9 & L127x76x7.9	3 L89x89x6.4	
> 2400 TO 3000	L152x102x7.9	---	2 L127x89x6.4	L102x102x7.9 & L127x127x7.9	3 L127x89x6.4	
DETAIL	102 LEGS HORIZ	64 LEGS HORIZ	89 LEGS HORIZ	102 & 127 LEGS HORIZ	89 LEGS HORIZ	90 VENEER LINTEL

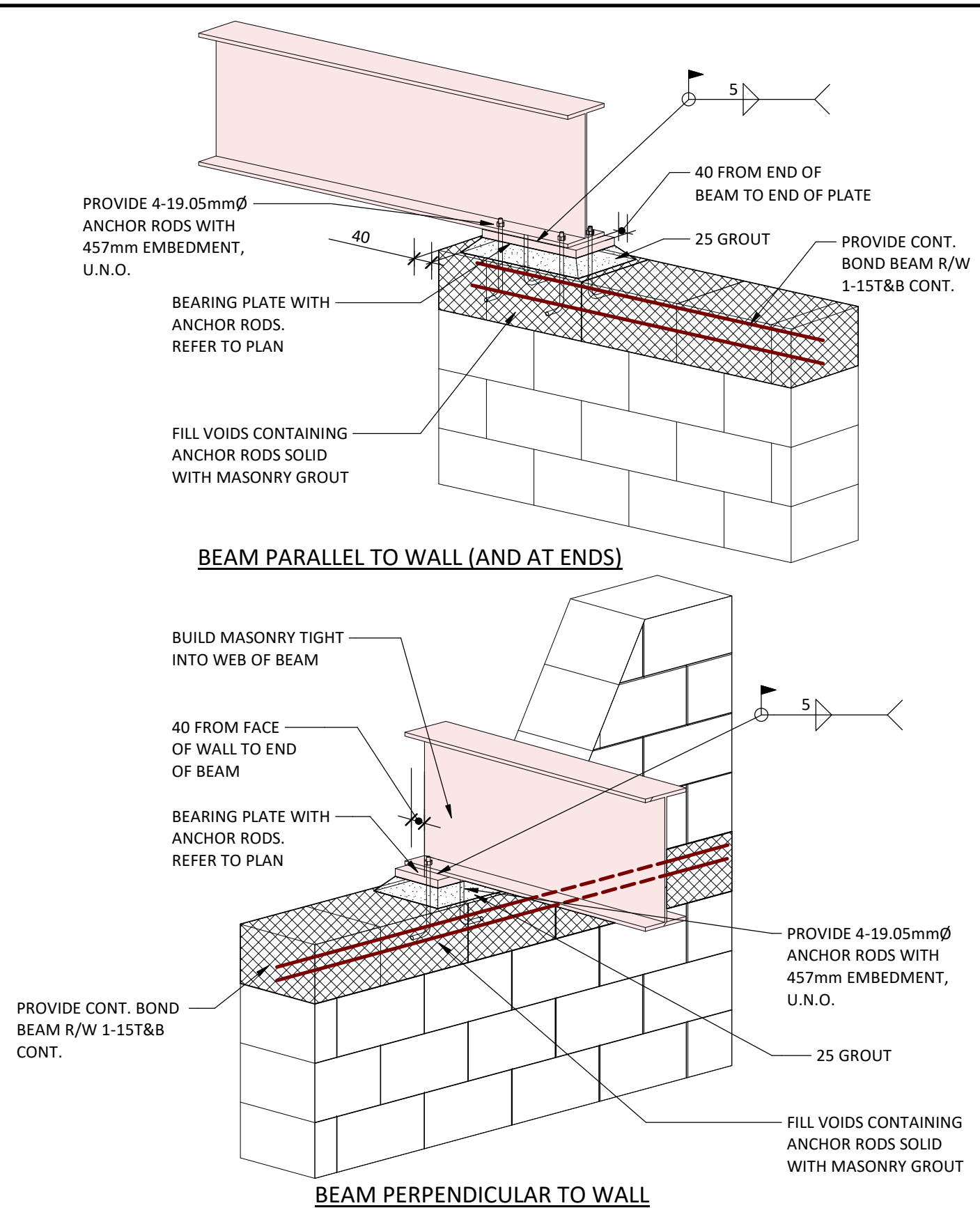


ELEVATION

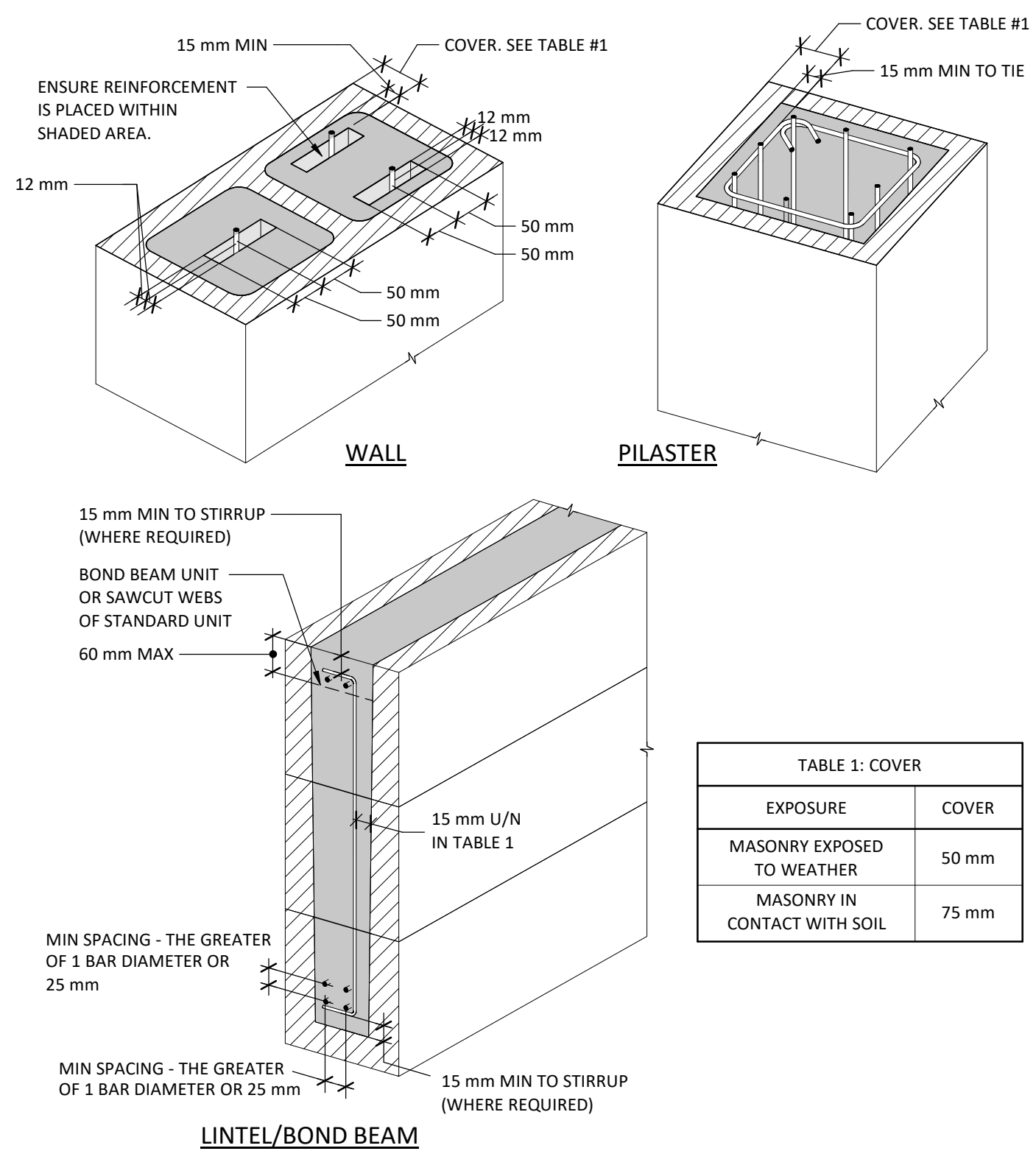
PRE-CAST, MASONRY OR STEEL LINTEL SUPPORTED BY CONCRETE OR STEEL MEMBER

- NOTES:
- REFER TO ARCHITECTURAL DRAWINGS FOR THICKNESS AND EXTENT OF NON-LOAD BEARING MASONRY WALLS.
  - REFER TO ARCHITECTURAL DRAWINGS FOR LOCATION AND TYPE OF LINTELS REQUIRED.
  - INCLUDE REBATES ADJACENT TO OPENING WHEN DETERMINING CLEAR SPAN OF LINTELS.
  - BOLT DOUBLE ANGLES BACK-TO-BACK USING 16Ø BOLTS @450 C/C OR PROVIDE 6x50 LONG WELDS @450 C/C TOP AND BOTTOM. DISTANCE FROM END OF LINTEL TO FIRST BOLT OR WELD SHOULD NOT EXCEED 100 mm.
  - 90 VENEER MUST BE SOLID BRICK OR BLOCK FOR SINGLE ANGLE LINTEL.

M1 LINTELS FOR NON-LOAD BEARING MASONRY WALLS

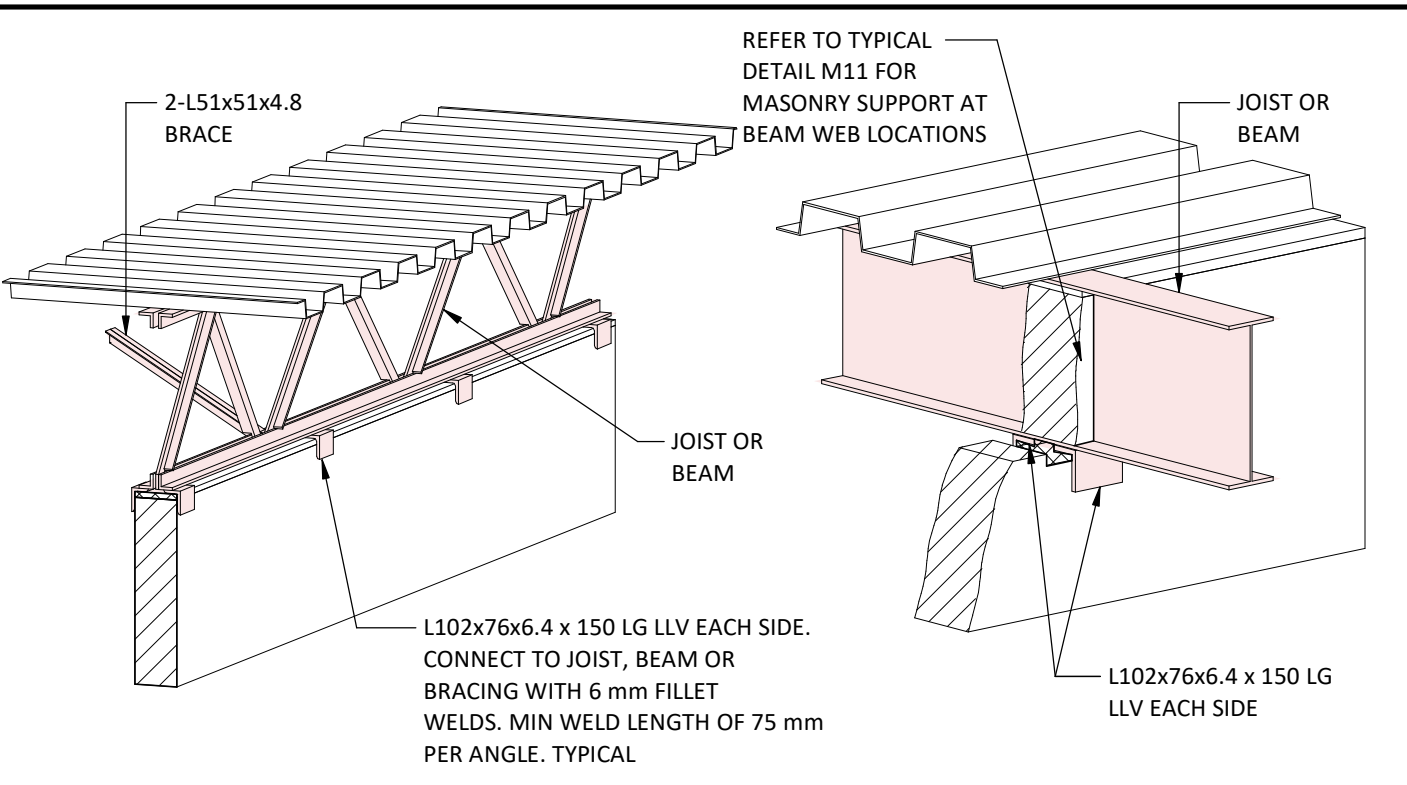


M2 BEAM BEARING ON MASONRY WALL

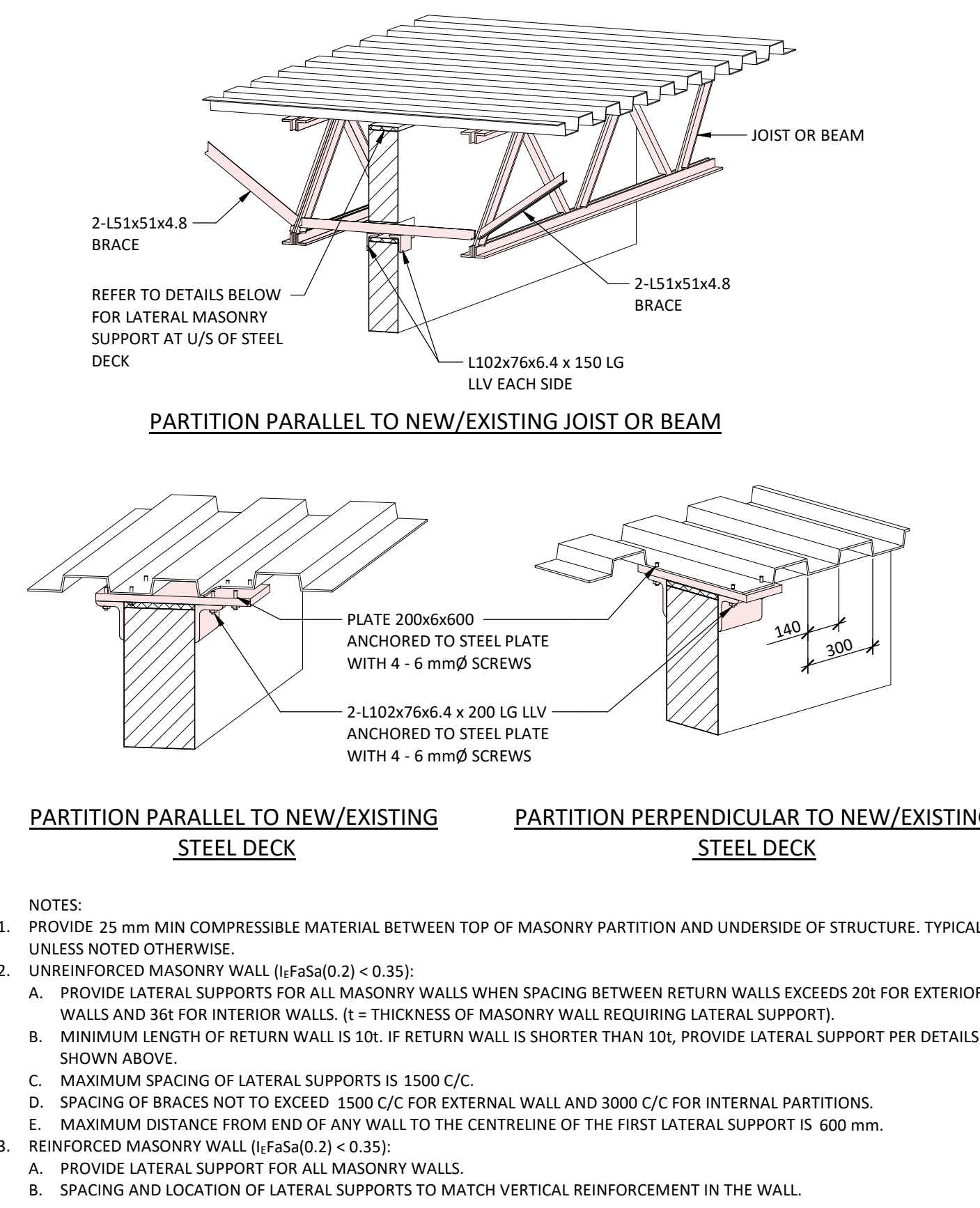


- NOTE:
- REINFORCEMENT TO BE SUPPORTED TO PREVENT DISPLACEMENT DURING PLACEMENT OF MASONRY GROUT. AS A MINIMUM PROVIDE WIRE POSITIONERS OR SIMILAR DEVICES AT THE TOP AND BOTTOM, ENDS AND AT INTERVALS NOT EXCEEDING 200 BAR DIAMETERS.

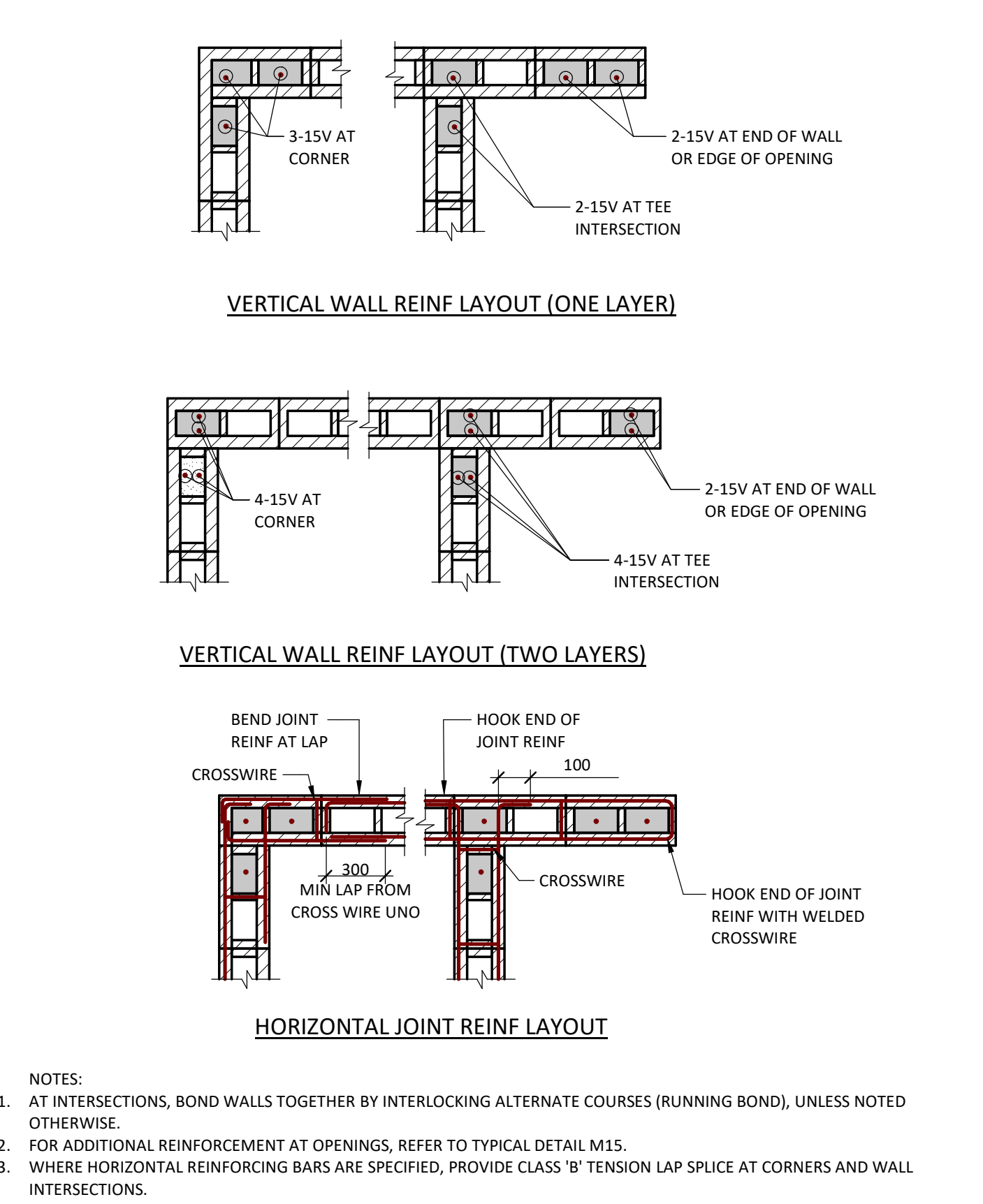
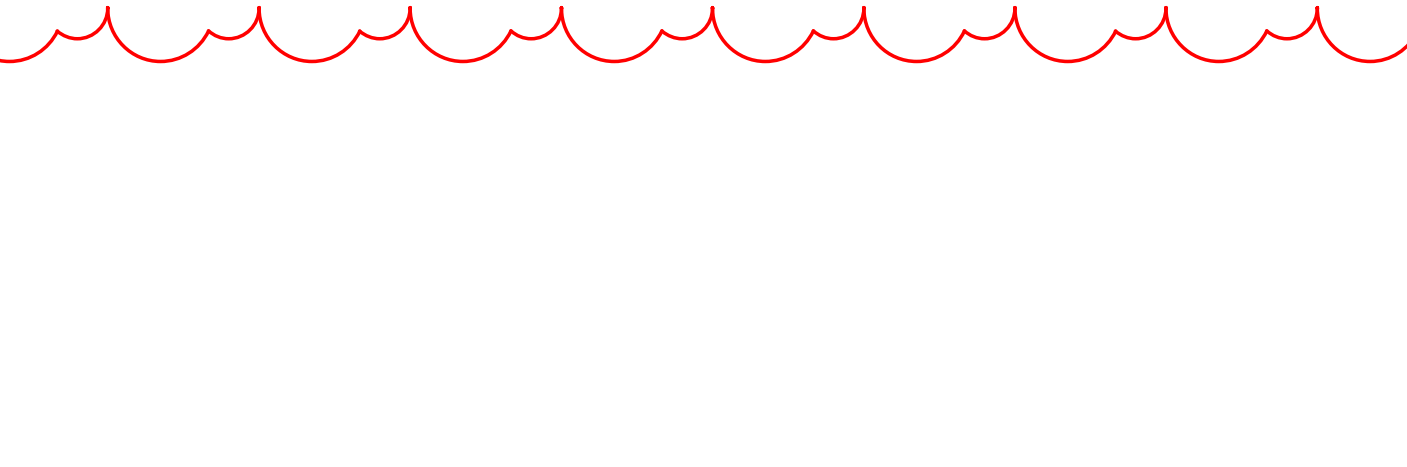
M6 REINFORCEMENT PLACEMENT IN MASONRY ELEMENTS



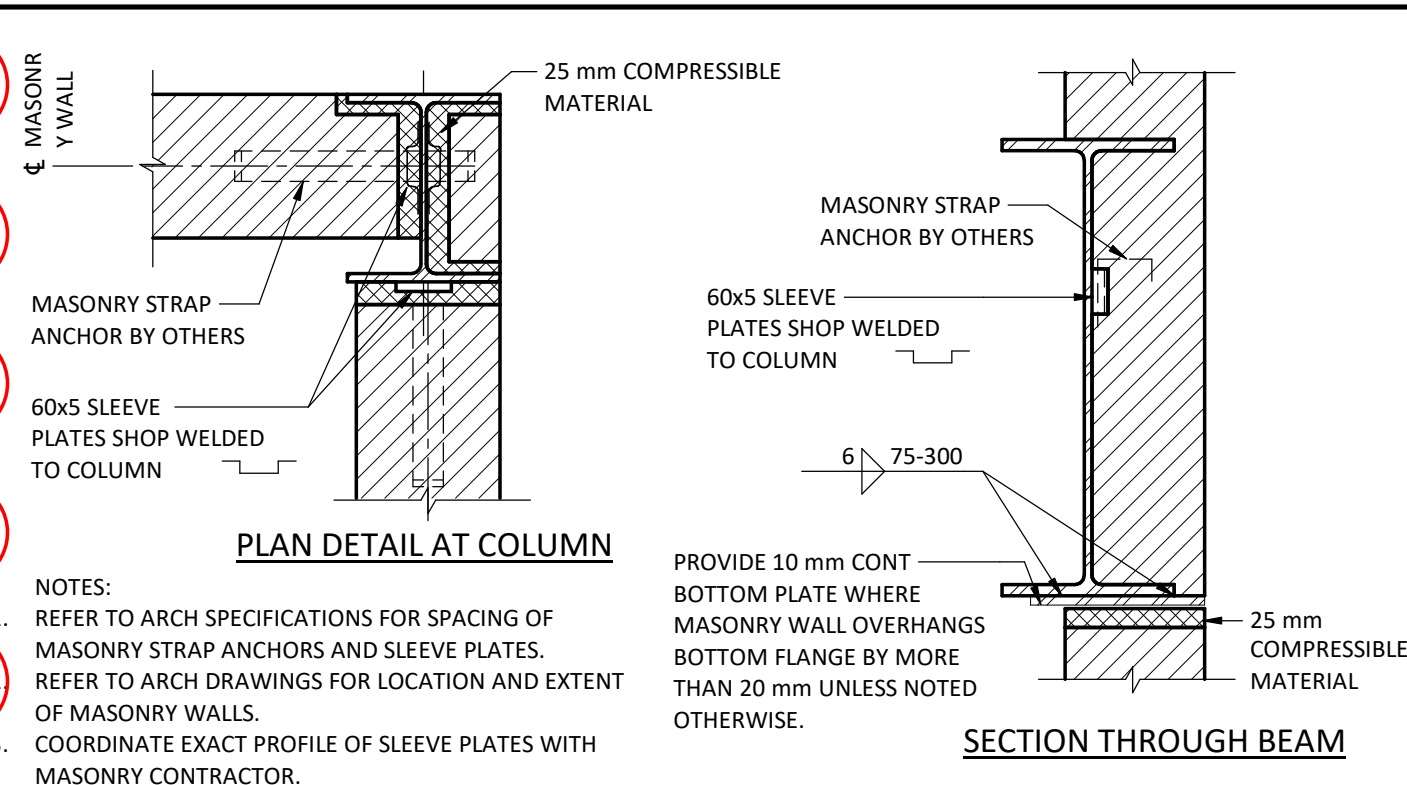
M7 LATERAL SUPPORT AT TOP OF MASONRY PARTITIONS (STEEL CONSTRUCTION)



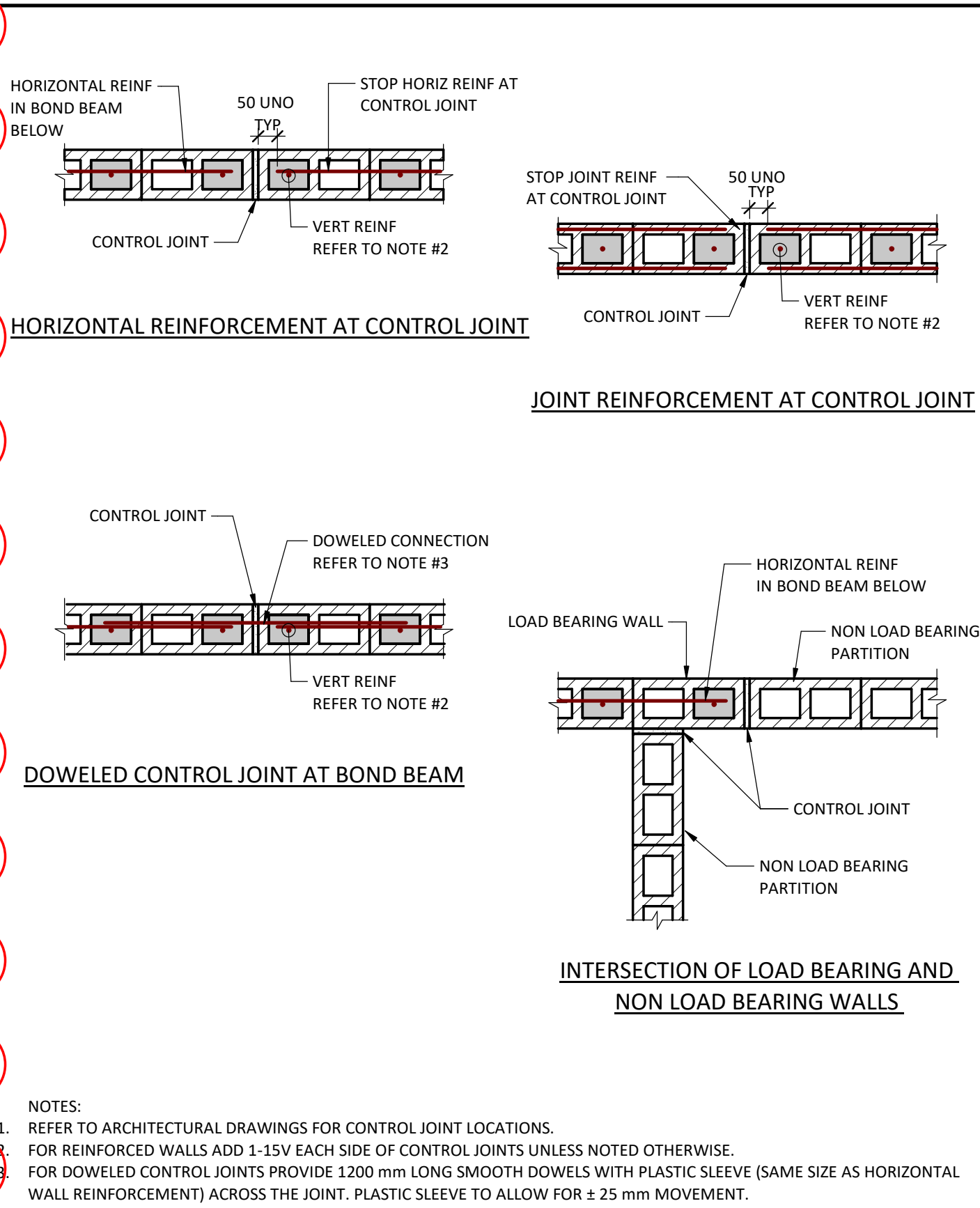
M8 LATERAL SUPPORT AT TOP OF MASONRY PARTITIONS (STEEL CONSTRUCTION)



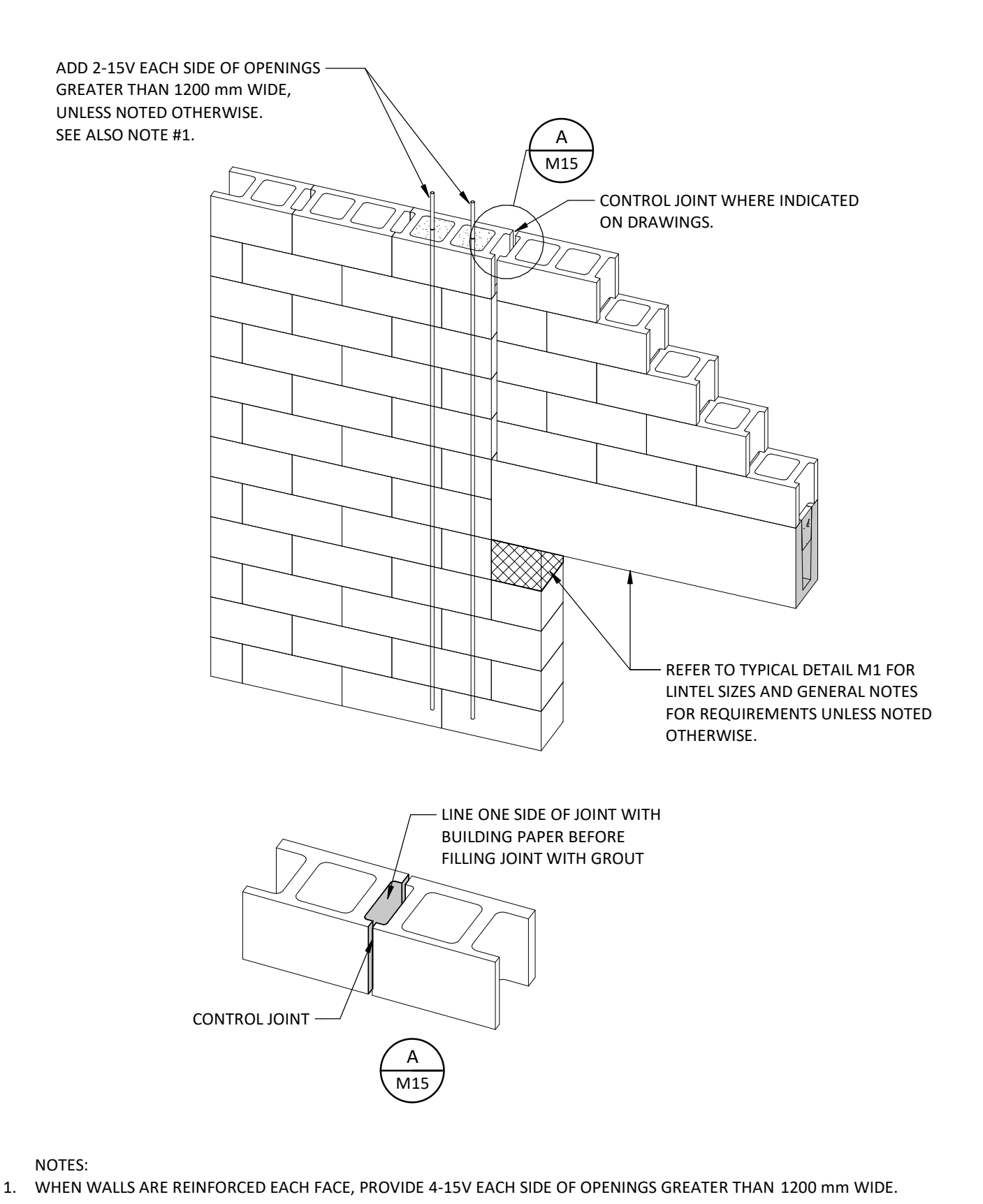
M10 REINFORCEMENT DETAILS FOR MASONRY WALLS



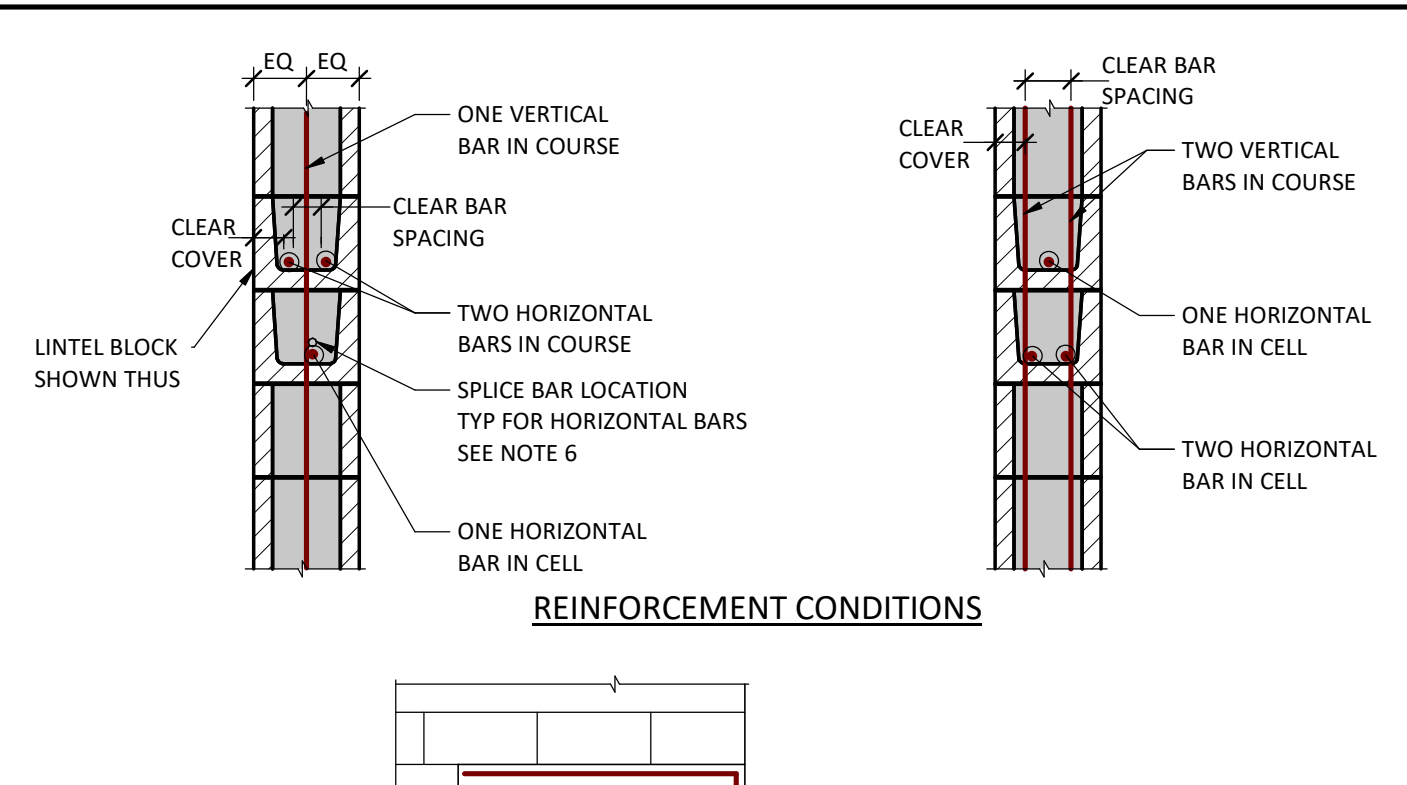
M11 MASONRY ANCHORAGE TO STEEL COLUMNS AND BEAMS



M12 VERTICAL CONTROL JOINTS IN MASONRY WALLS



M15 OPENINGS THROUGH MASONRY WALLS



M16 LAP SPICE AND TENSION EMBEDMENT LENGTH IN REINFORCED MASONRY WALLS

SCHEDULED REINFORCEMENT CONDITION	BAR SIZE		
	10	15	20
ONE BAR IN CELL OR COURSE	475	675	825
TWO BARS IN CELL OR COURSE	635	900	1100

M16 LAP SPICE AND TENSION EMBEDMENT LENGTH IN REINFORCED MASONRY WALLS



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4	ISSUED FOR PRE TENDER REVIEW	2024-10-31
3	ISSUED FOR 80% CD	2024-05-02
2	ISSUED FOR 100% DD	2024-02-20
1	ISSUED FOR 60% DD	2024-01-25

NO.	ISSUED FOR	DATE
1	ISSUED FOR	DATE

Scale	1 : 1	Checked By	HB
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Region of York Project Number	Region of York Building Code
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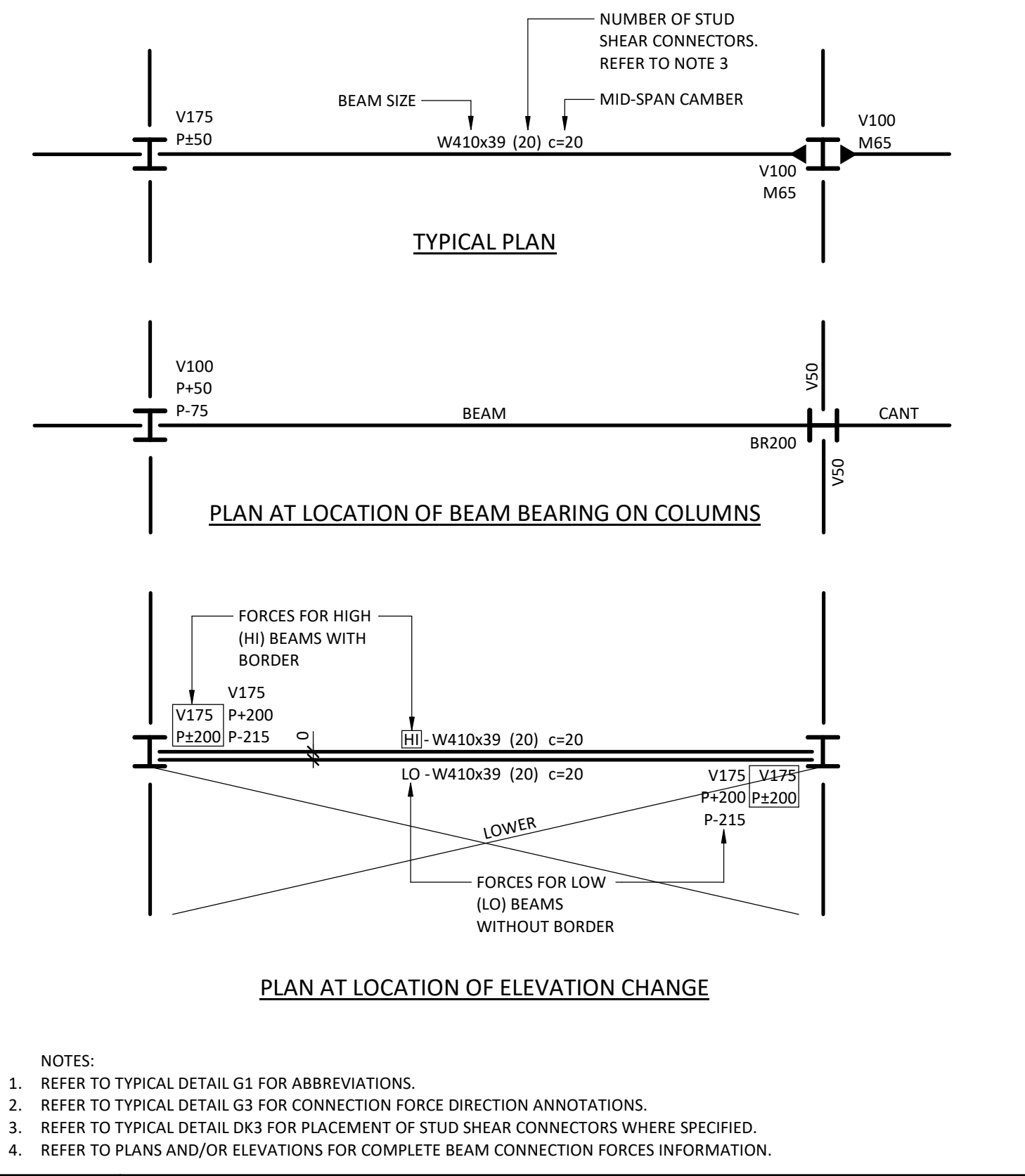
Project  
York Region North Roads Operations Centre

3525 Baseline Road  
Georgina, ON, L0E 1R0  
Drawing Title

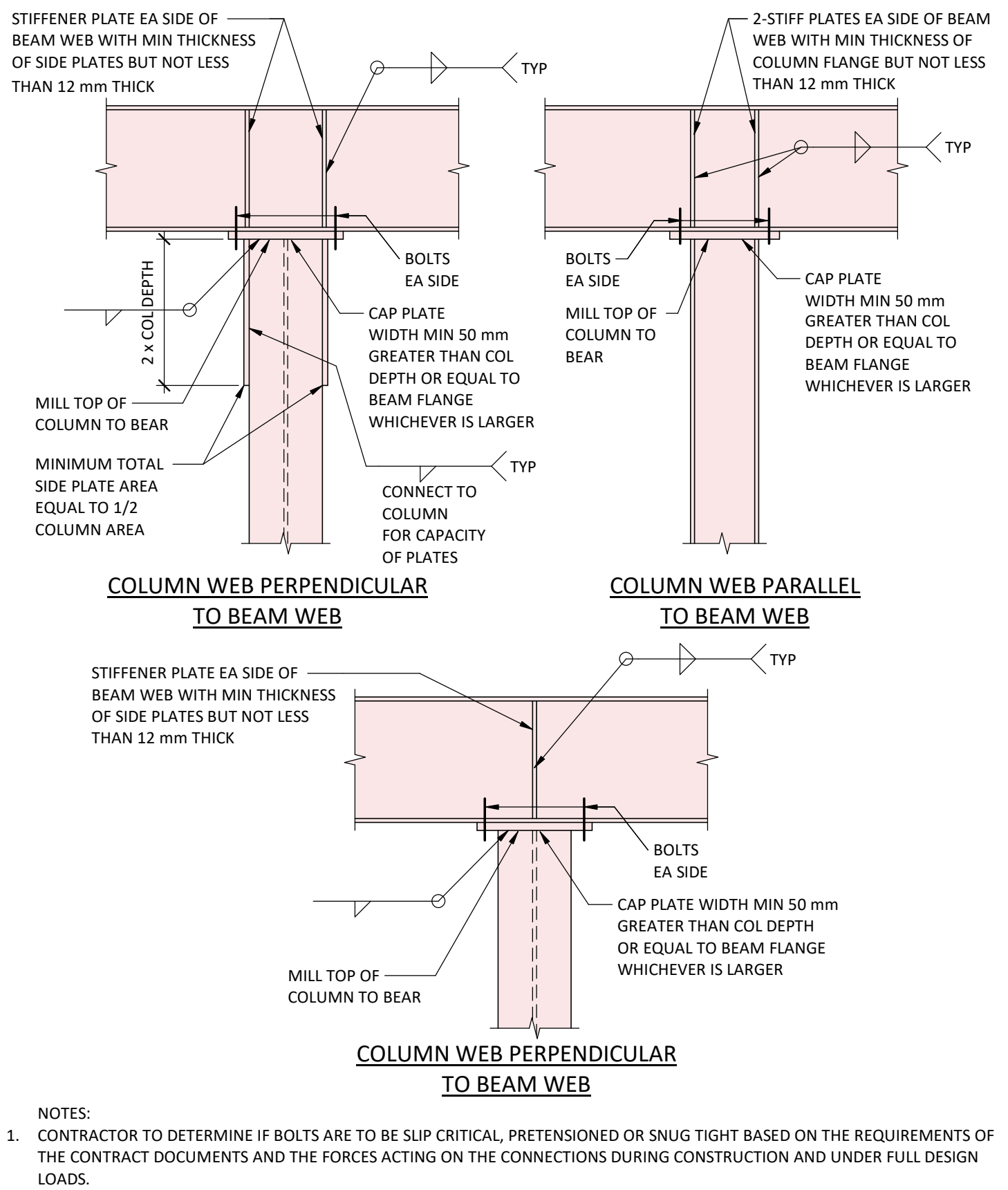
TYPICAL DETAILS

Project Number	Drawing Number
EN023-01007	S014

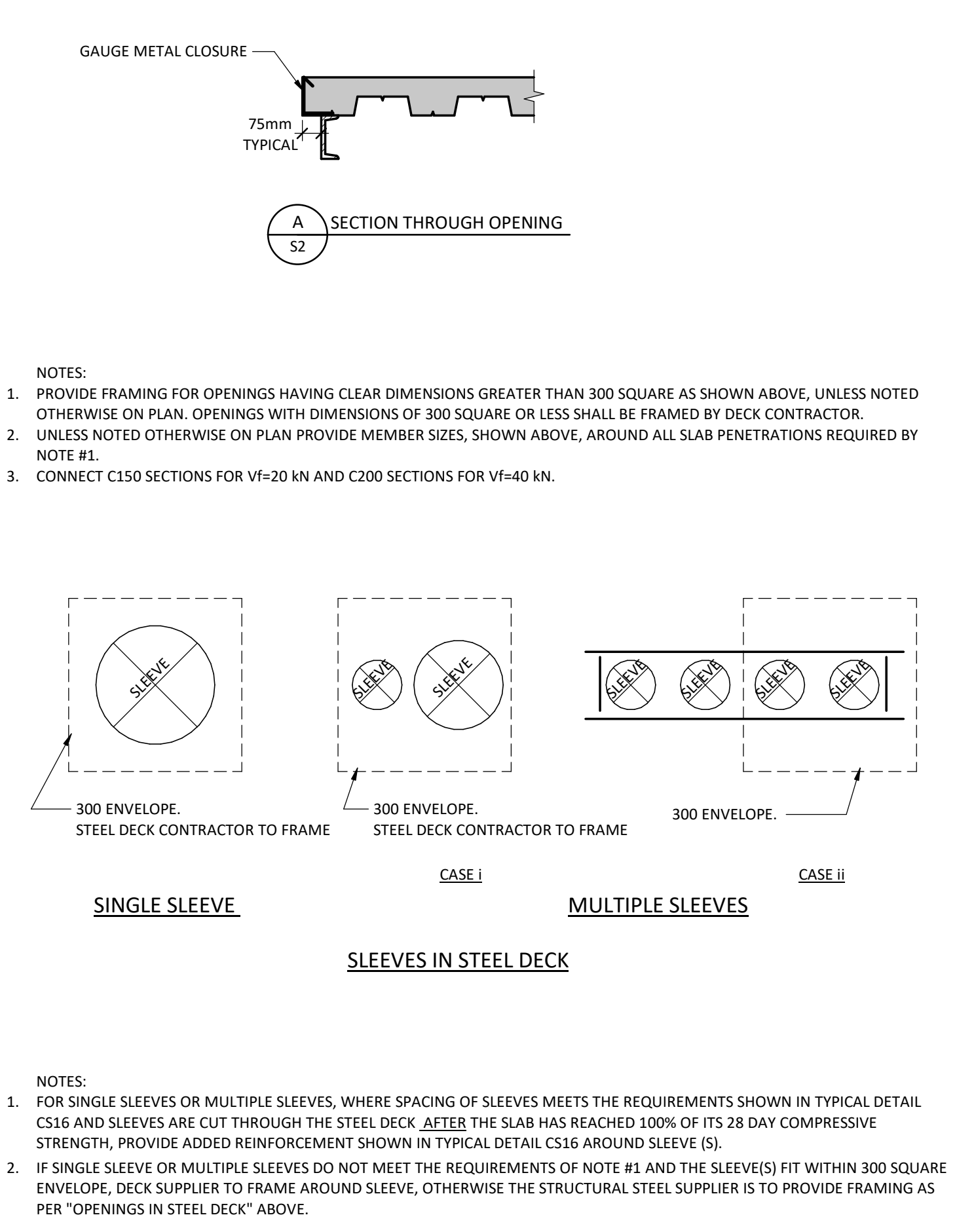
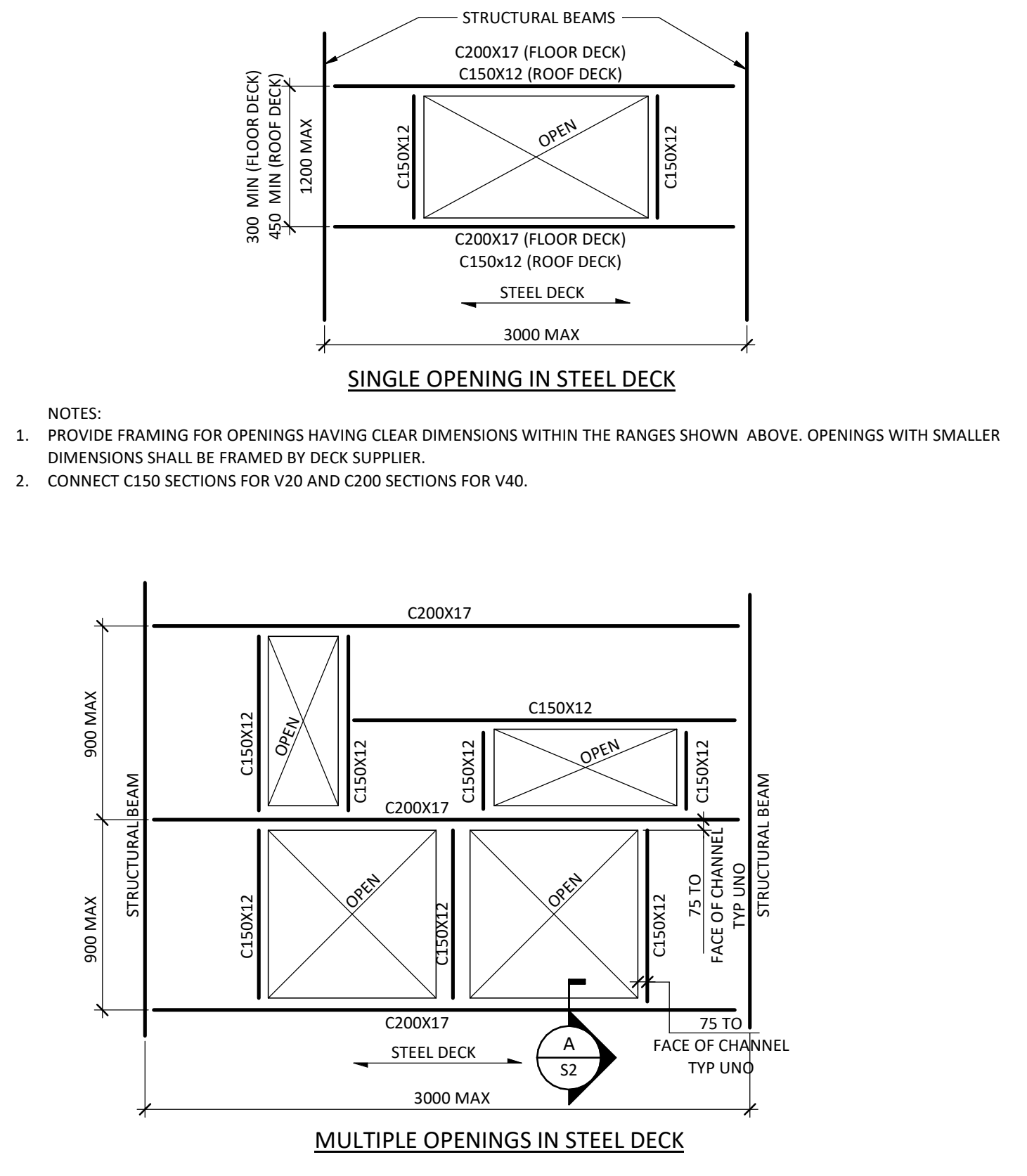




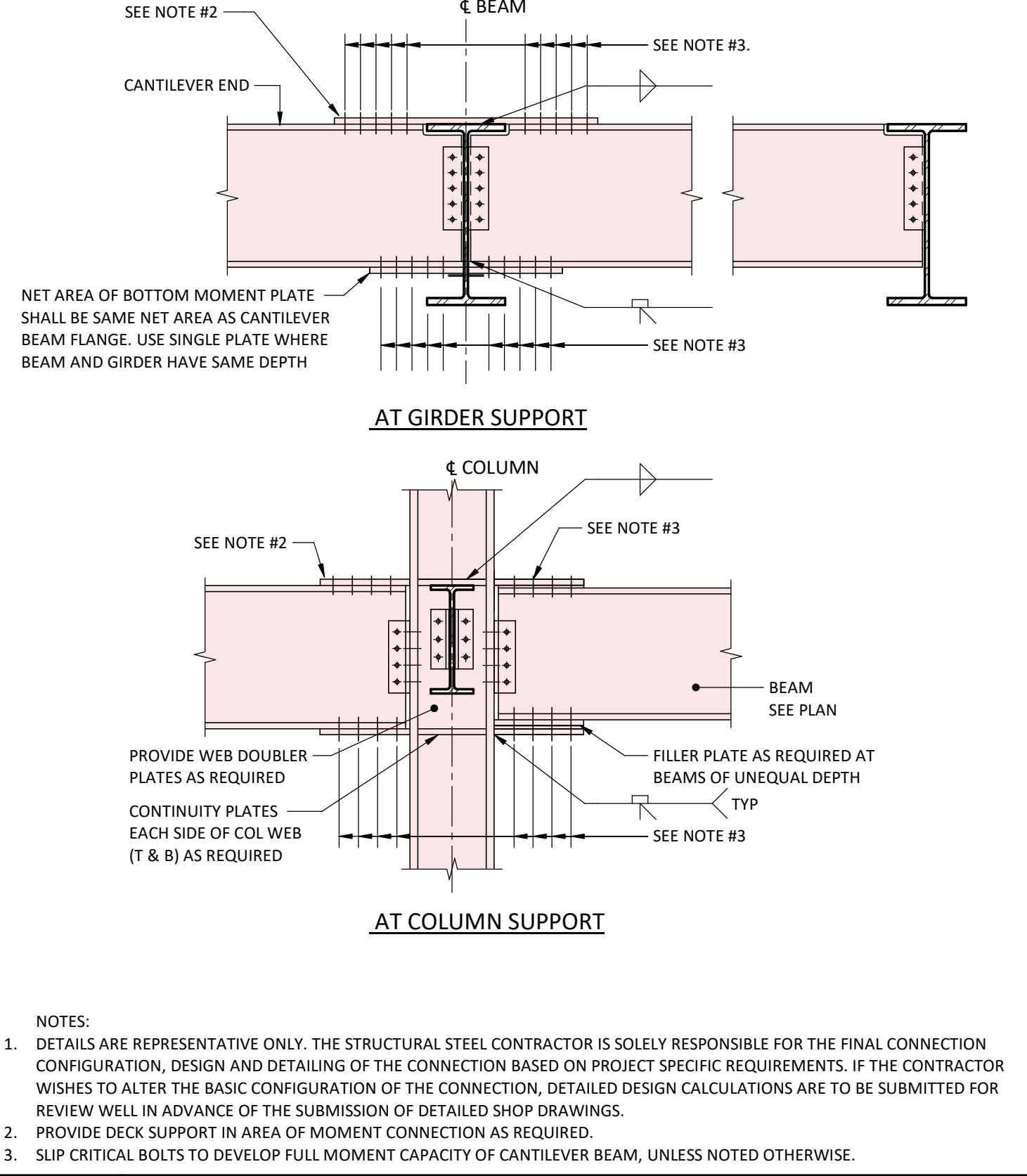
**S1** STEEL FRAMING NOMENCLATURE



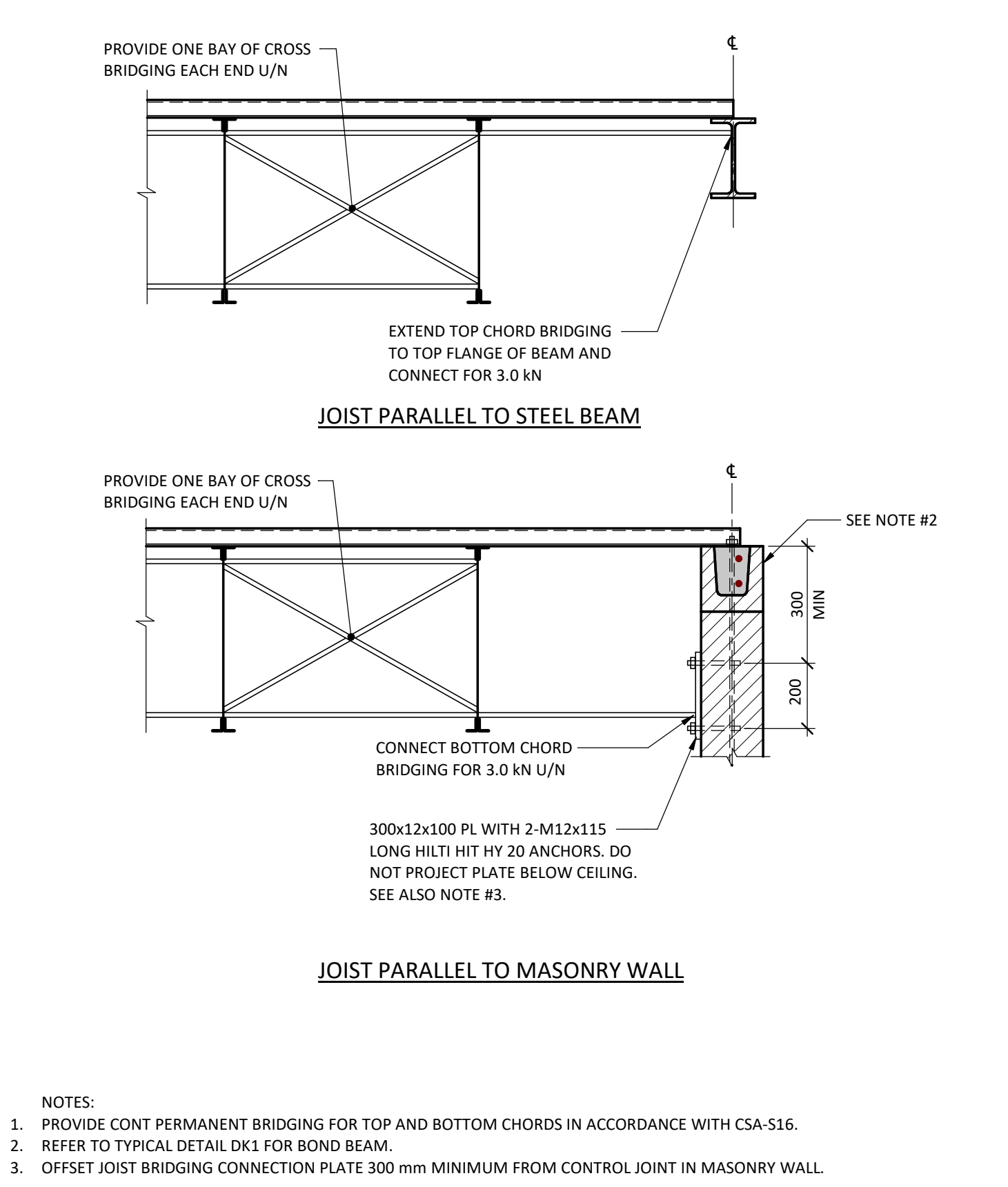
**S14** STEEL BEAM BEARING ON STEEL COLUMN



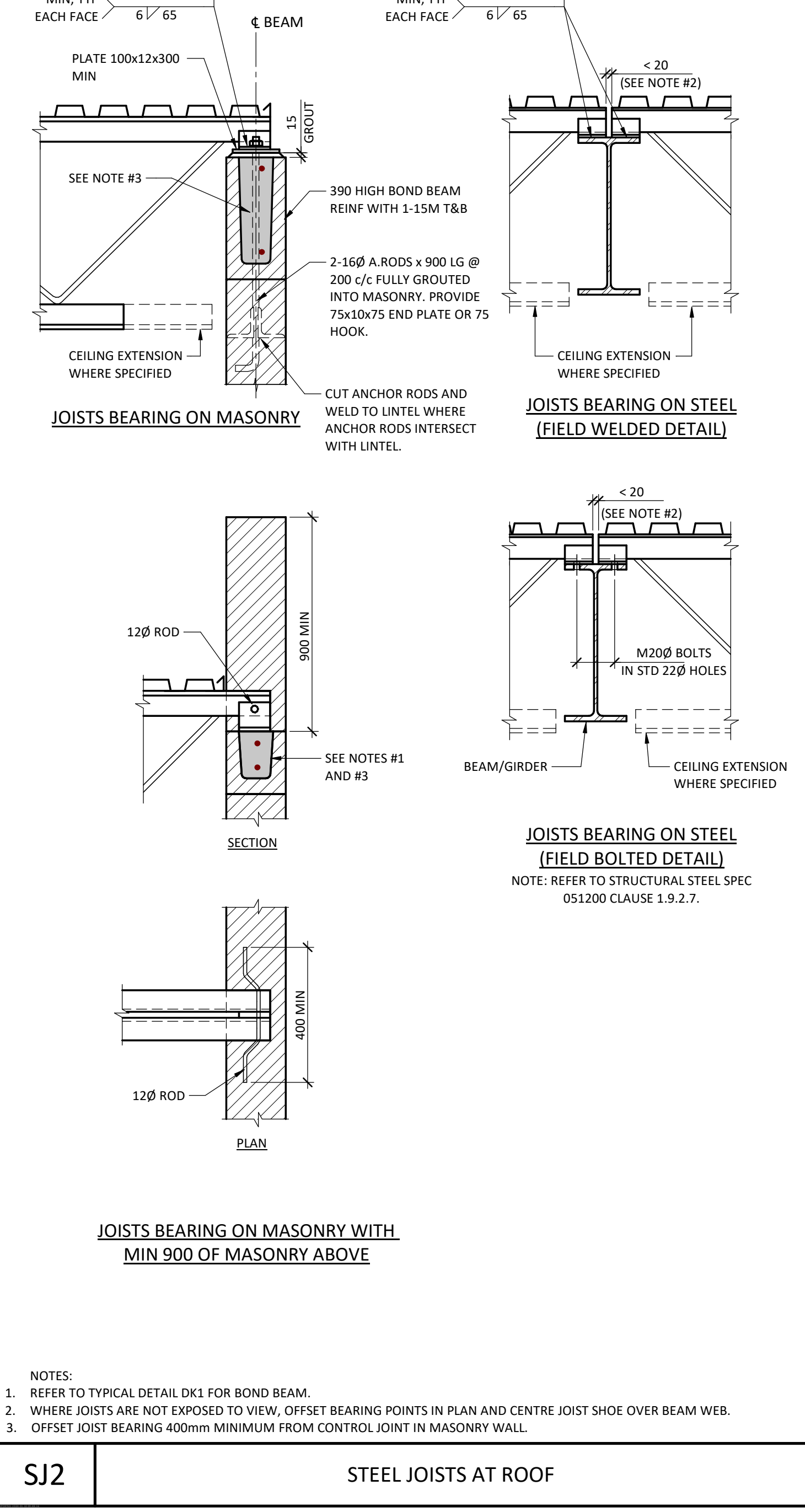
**S2** FRAMING OPENINGS IN STEEL FLOOR DECK AND ROOF DECK



**S16** MOMENT CONNECTIONS



**SJ1** BRIDGING DETAILS FOR STEEL JOISTS



**SJ2** STEEL JOISTS AT ROOF

8	REISSUED FOR TENDER	2025-05-23
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5	ISSUED FOR BUILDING PERMIT REVIEW	2024-11-27
4	ISSUED FOR PRE TENDER REVIEW	2024-10-31
3	ISSUED FOR 60% CD	2024-05-02
2	ISSUED FOR 100% DD	2024-02-29
1	ISSUED FOR 60% DD	2024-01-25

NO.	ISSUED FOR	DATE
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Drawing History	Checked By
Scale	HB
1 : 1	
Region of York Project Number	Region of York Building Code



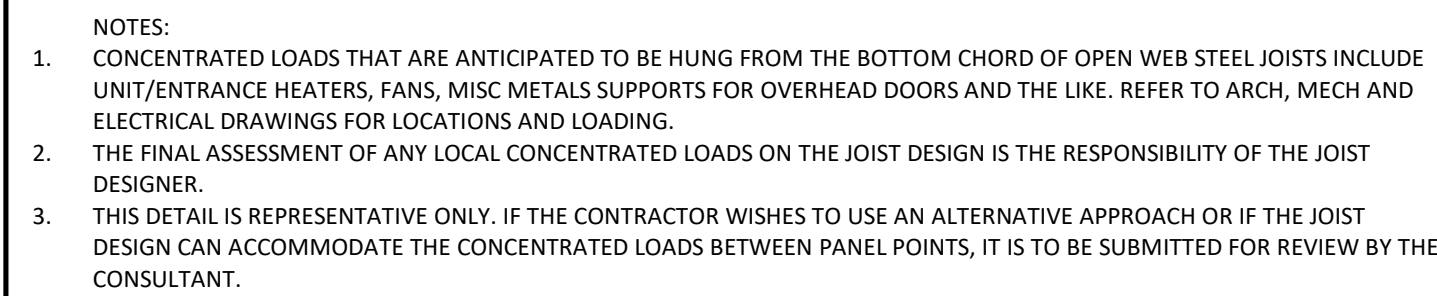
Prime Consultant  
GEC ARCHITECTURE

Mechanical Consultant

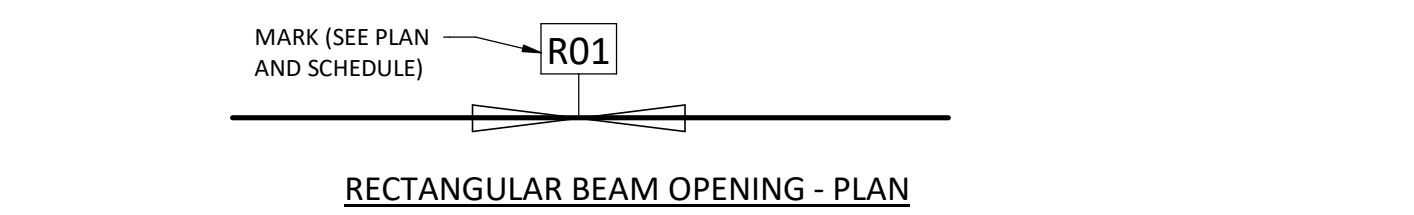
Civil Consultant



Seal &amp; Permit

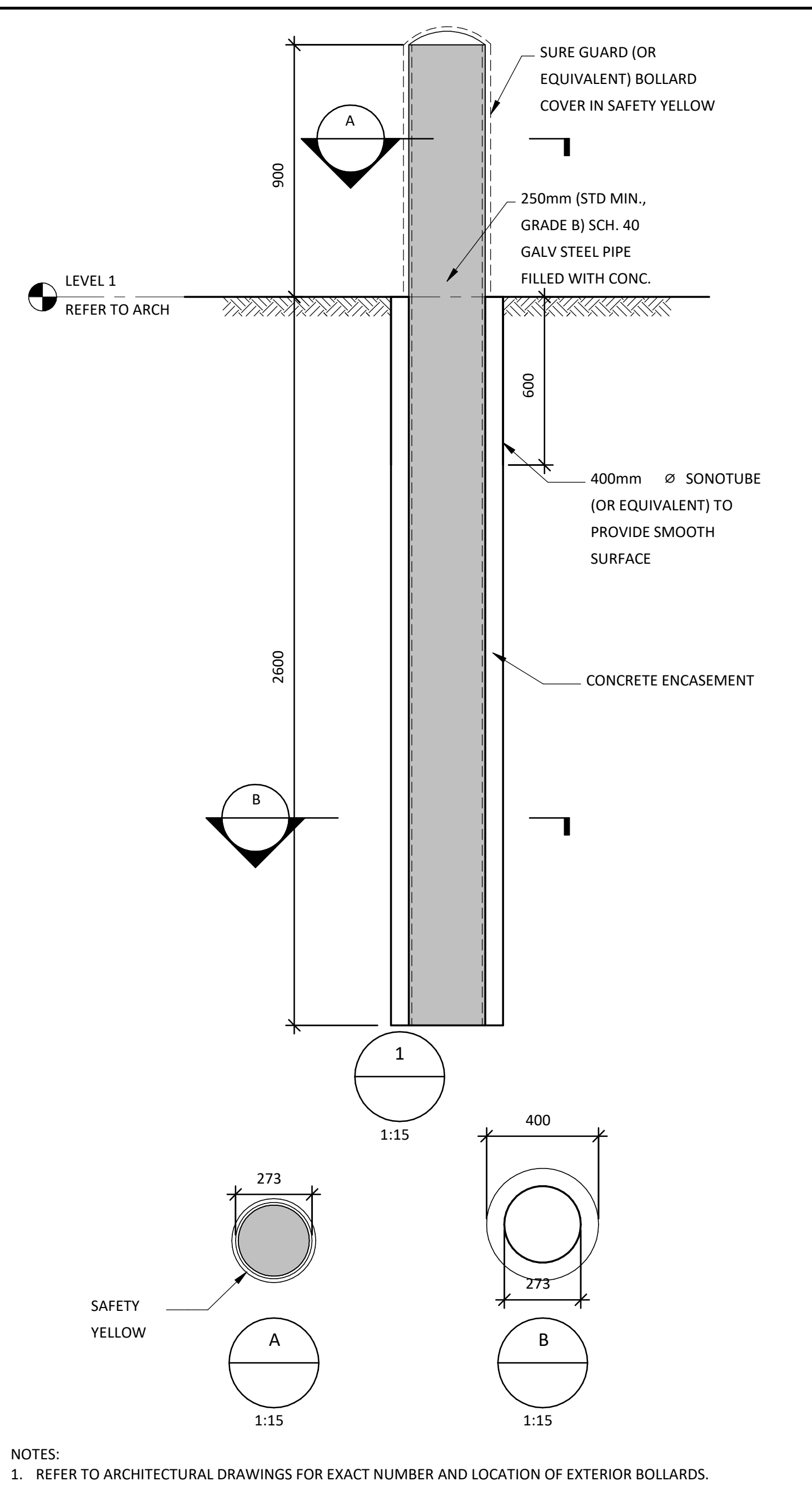


PD3 TYPICAL JOIST REINFORCEMENT AT CONCENTRATED LOADS

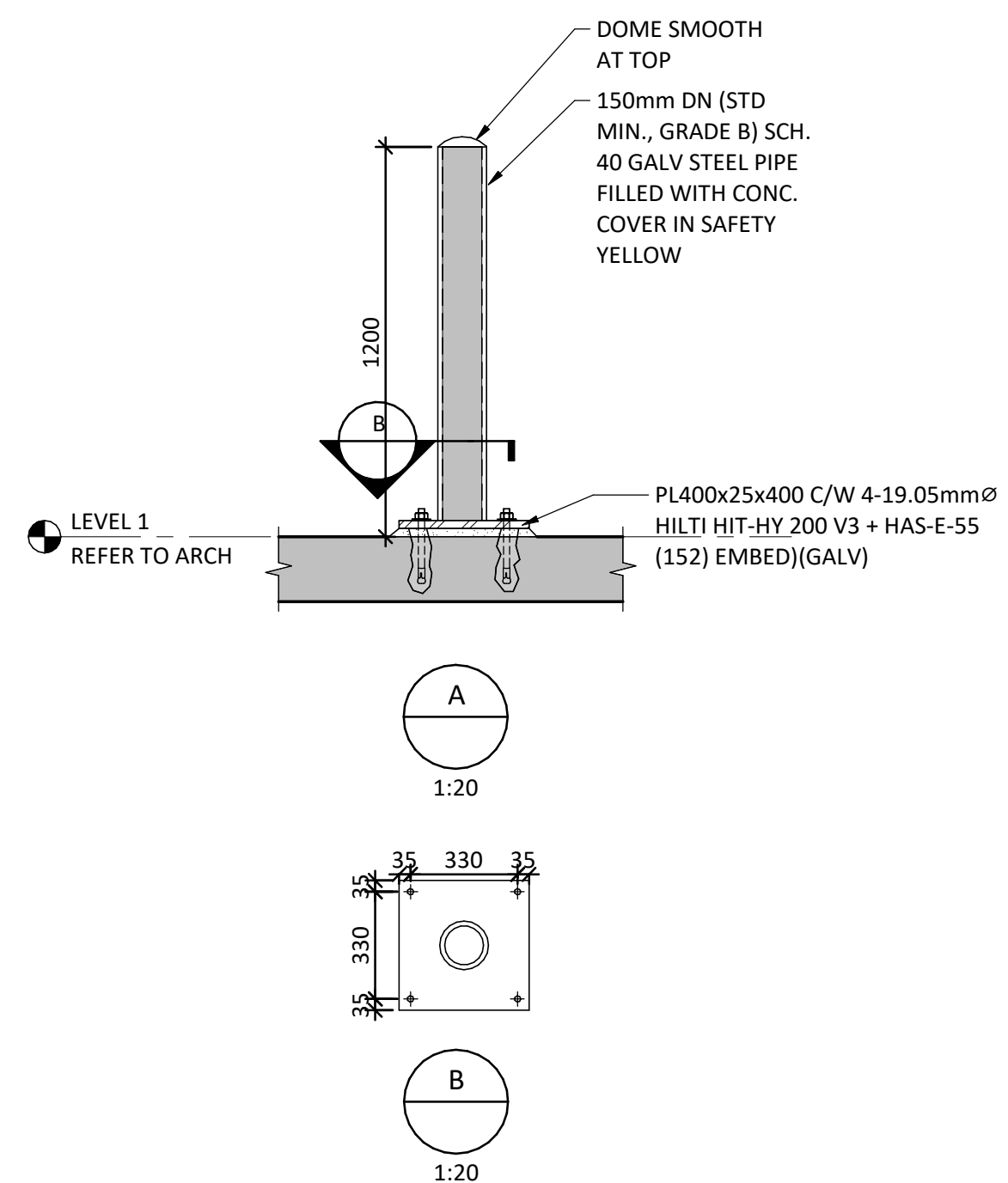


- NOTE(S):
1. SEE SCHEDULE ON PLAN FOR REINFORCEMENT SIZE.
  2. FILLET WELD SIZE TO CONFORM TO CSA-S16 REQUIREMENTS FOR MINIMUM SIZE OF FILLET WELDS, BUT NOT LESS THAN 6mm. WELDS TO BE CONTINUOUS ALONG BOTH SIDES OF PLATE, TYPICAL PLATE LENGTHS HAVE BEEN DETERMINED BASED ON FILLET WELD SIZE NOTED.
  3. REFER TO PLAN FOR OPENING LOCATIONS.
  4. THICKNESS OF VERTICAL REINFORCEMENT TO MATCH THICKNESS OF HORIZONTAL REINFORCEMENT UNLESS NOTED OTHERWISE.

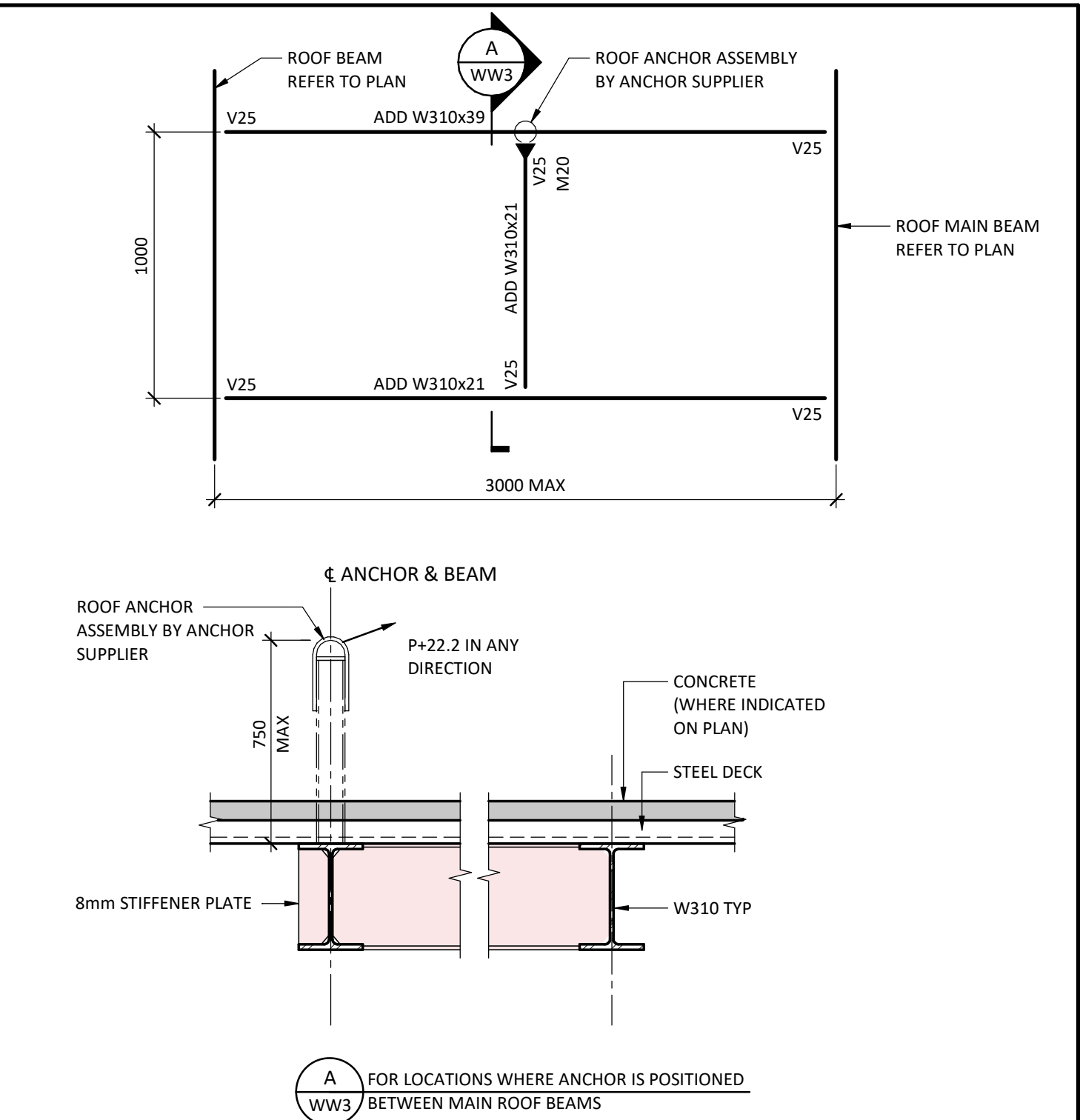
SB14 RECTANGULAR OPENINGS IN STEEL BEAMS



PD2 TYPICAL EXTERIOR BOLLARD DETAIL



PD1	TYPICAL INTERIOR BOLLARD DETAIL
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WW3	ROOF ANCHOR TO STEEL STRUCTURE
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8	REISSUED FOR TENDER	2025-05-23
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6	ISSUED FOR COORDINATION	2025-04-17
5	ISSUED FOR BUILDING PERMIT	2024-11-27
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3	ISSUED FOR 60% CD	2024-05-02
2	ISSUED FOR 100% DD	2024-02-29
1	ISSUED FOR 60% DD	2024-01-25
NO	ISSUED FOR	DATE

Drawing History		Scale	Checked By
		As indicated	HB
Region of York Project Number		Region of York Building Code	

Project  
York Region North Roads Operations  
Centre

3525 Baseline Road  
Georgina, ON, L0E 1R0

Drawing Title

## TYPICAL DETAILS

Project Number	Drawing Number
EN023-01007	<b>S016</b>



will Consultant



**New York Region**

Deal &amp; Permit

MECHANICAL UNIT WEIGHT SCHEDULE		
MARK	DIMENSIONS (LxWxH)(mm)	WEIGHT, kg (lb)
ERV-1	386x86x89;1372	353 (3.46)
CU-2	124x76x60;1690	239 (2.35)
CU-3	95x50;330x834	28 (0.28)
CU-1	95x50;330x834	67 (0.66)
CF-1, CF-2, CF-3	484x80	125 (1.23)
EF-1, 2, 3	610x8	88 (0.86)
EH-1, 3	711x68x66;100	53 (0.52)
U-1, 2, 3	610x496x559	45 (0.44)
HUM-1	330x508x584	34 (0.33)
RTH-1	1212x10 G	97 (0.95)
RTH-2	1212x10 G	97 (0.95)
RTH-3	606x10 G	58 (0.562)

ZONE	DECK	JOISTS
	FACTORED NET UPLIFT	FACTORED NET UPLIFT
R1	1.08 kPa	0.51 kPa
S1	1.10 kPa	0.73 kPa
C1	2.42 kPa	1.10 kPa

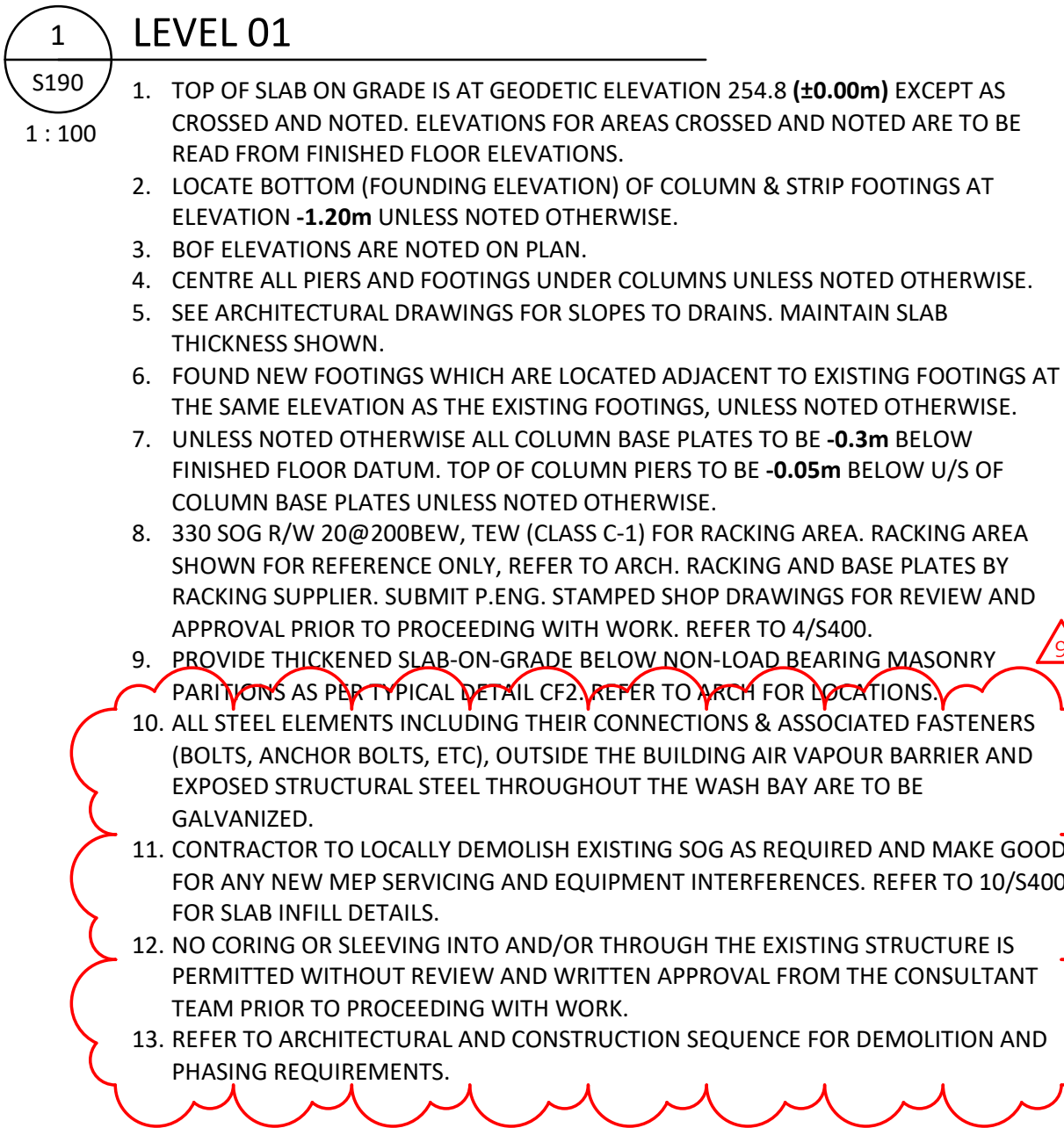
1 : 200

Region of York Project Number      Region of York Building Code

Drawing Title

ing Number





NON-LOAD BEARING PARTITION WALL SCHEDULE		
MARK	REINFORCEMENT	REMARKS
W1	240 CMU R/W 15 @400V, 2-4.76mmØ WIRES @400H	REFER TO TYPICAL DETAIL CF2 FOR FOUNDATION SUPPORT REQUIREMENTS & TYPICAL DETAIL M7 FOR LATERAL SUPPORT REQUIREMENTS.
NOTES:		
1. BENEATH STEEL BEAMS, JOIST & METAL DECK, OR AT ANY LOCATION WHERE A CONCENTRATED LOAD IS BEARING ON MASONRY, PROVIDE BOND BEAM R/W 1-15T&B CONTINUOUS FOR ENTIRE SPAN. TYPICAL AT MAIN ROOFS AND FLOOR LEVELS.		

STEEL POST SCHEDULE				
MARK	POST SIZE	BASEPLATE SIZE & ANCHORS	CONNECTION FORCE	REMARKS
SP1	HSS178x178x9.5	BP07 - PL200x12.7x320 & 2-16mm <sup>Ø</sup> HILTI HIT-HY 200 HAS-V-36 (152 EMBED)	Hf=25KN	CONNECT BP07 TO T/J OF EX. GRADE BEAM. PROVIDE VSC AT TOP
SP2	HSS102x102x7.9	BP06 - PL190x12.7x310 & 4-12.7mm <sup>Ø</sup> HILTI KWIK BOLT T22 (65 EMBED)	Vfy=Vfx=15KN	PROVIDE SLAB THICKENING UNDER POST AS PER TYPICAL DETAIL CTC3
SP3	HSS127x127x8.0	N/A	Hf=15KN	PROVIDE VSC AT TOP

### CONSTRUCTION SEQUENCE

- PRIOR TO THE REMOVAL OF THE EX. 2ND FLOOR SLAB, EX. OWSJ, EX. W410 BEAMS ALONG GL 4" & 5" & ALL EX. VERTICAL 2ND ROD BRACING BETWEEN GL D\* & C\*, THE CONTRACTOR SHALL:
  1. REFER TO 2/5401 & 9/5422.
  2. INSTALL ALL NEW W310x45 (HI), (MID) & (LO) STEEL BEAMS ALONG GL 5", EXCEPT W310x45 (LO) BETWEEN GL C\* & B\*, D\* & C\* AS PER 6/5500.
  3. INSTALL TEMPORARY 200 ROD BRACE (F<sub>y</sub>=300MPa) BETWEEN GL E\* & D\*. CONNECT LOW END OF BRACE TO COLUMN WORK POINT AT GL D/5" & HIGH END OF BRACE AT NEW W310x45 (LO) & EX. COLUMN WORK POINT AT GL E/5". CONNECT EA. END FOR FULL TENSILE CAPACITY OF ROD.
  4. REMOVE EX. 200 ROD BRACE BETWEEN GL C\* & B\* ONLY, INSTALL NEW W310x45 (LO) & NEW LOWER 2-HSS VERTICAL BRACES BETWEEN GL C\* & B\*.
  5. REMOVE EX. 200 FLOOR SLAB, EX. OWSJ, EX. W410 BEAMS BETWEEN GL C\* & B\* ONLY.
  6. INSTALL REMAINING NEW VERTICAL BRACING BETWEEN GL C\* & B\*.
  7. REMOVE EX. 200 ROD BRACE BETWEEN GL D\* & C\*, INSTALL NEW W310x45 (LO) BETWEEN GL D\* & C\*.
  8. REMOVE TEMPORARY 200 ROD BRACE BETWEEN GL E\* & D\*.

9	ISSUED FOR ADDENDUM 4	2025-07-18
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3	ISSUED FOR 60% CD	2024-05-02
2	ISSUED FOR 100% DD	2024-02-29
1	ISSUED FOR 60% DD	2024-01-25
<b>NO.</b>	<b>ISSUED FOR</b>	<b>DATE</b>

Drawing History	
Scale <b>1 : 100</b>	Checked By <b>HB</b>
Region of York Project Number	Region of York Building Code

Project

**York Region North Roads Operations Centre**

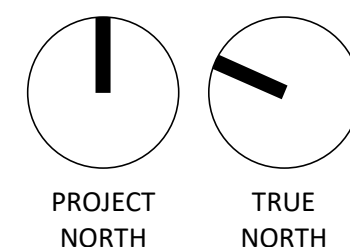
3525 Baseline Road  
Georgina, ON L0E 1R0

Drawing Title

**FOUNDATION PLAN**

Project Number	Drawing Number
<b>EN023-01007</b>	<b>\$190</b>





Project Team:

Prime Consultant

GEC ARCHITECTURE

Structural Consultant

ENTUITIVE

Mechanical Consultant

Electrical Consultant

Civil Consultant

Client

OWNER



Seal & Permit

9	ISSUED FOR ADDENDUM 4	2025-07-18
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NO.	ISSUED FOR	DATE
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Drawing History

Scale	1 : 100	Checked By	HB
Region of York Project Number		Region of York Building Code	

Project

York Region North Roads Operations  
Centre

3525 Baseline Road  
Georgina, ON, L0E 1R0

Drawing Title

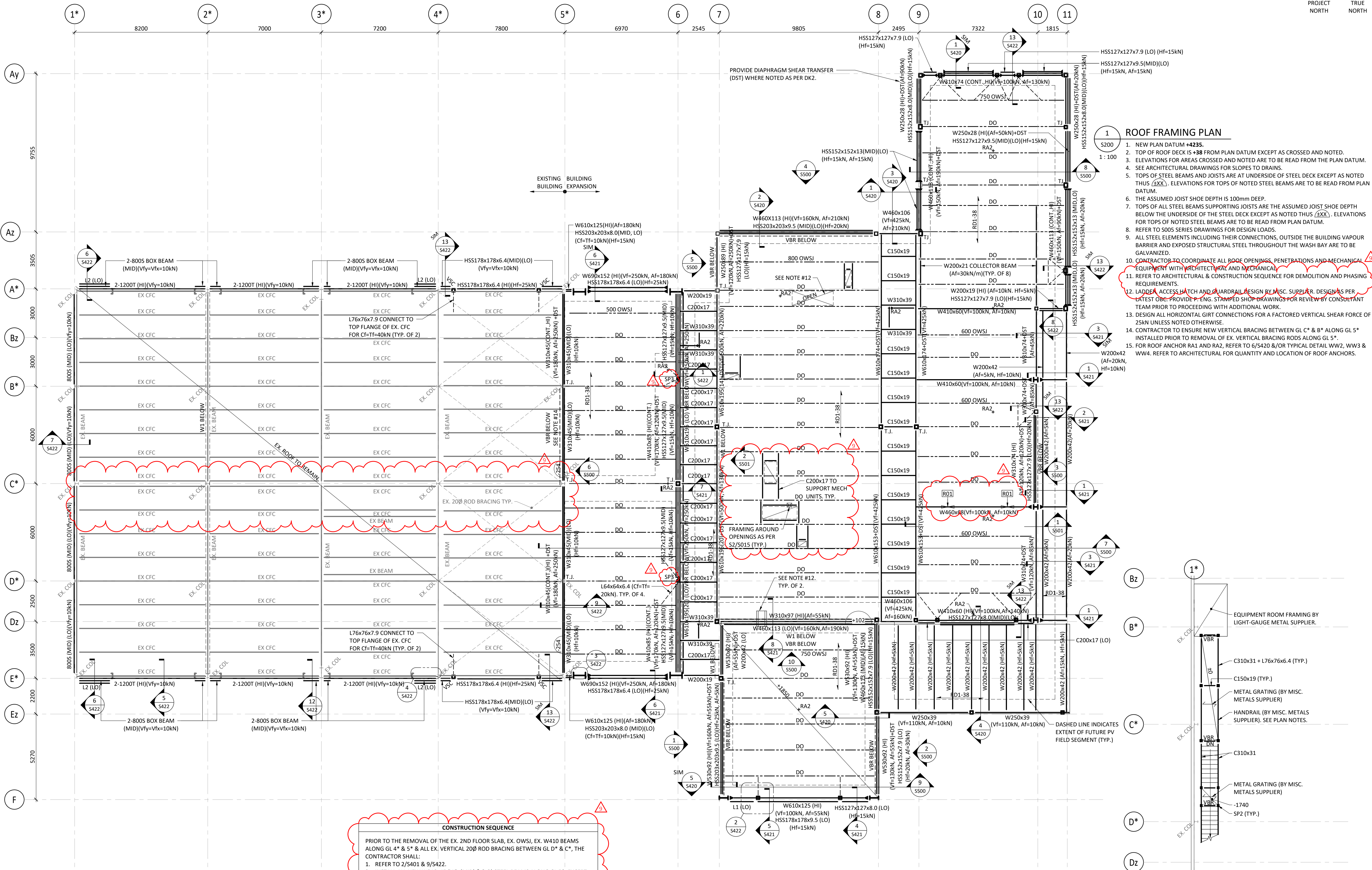
ROOF FRAMING PLAN

Project Number

EN023-01007

Drawing Number

S200



RECTANGULAR BEAM OPENING SCHEDULE						
MARK	OPENING DIMENSIONS AxH	DISTANCE FROM T/O BEAM TO T/O OPENING, V	PLATE LENGTH, L	PLATE THICKNESS, t	PLATE WIDTH, W	TWO SIDED REINF. REQUIRED
R01	2400	93-209	500	12.7	90	Y

1. REFER TO MECHANICAL AND ARCHITECTURAL FOR FINAL LOCATION OF DUCT & BEAM WEB OPENING.

NON-LOAD BEARING PARTITION WALL SCHEDULE		
MARK	REINFORCEMENT	REMARKS
W1	240 CMU R/W 15@400V, 2-4.76mm $\phi$ WIRES @400H	REFER TO TYPICAL DETAIL CF2 FOR FOUNDATION SUPPORT REQUIREMENTS & TYPICAL DETAIL M7 FOR LATERAL SUPPORT REQUIREMENTS.

NOTES:

1. BENEATH STEEL BEAMS, JOIST & METAL DECK, OR AT ANY LOCATION WHERE A CONCENTRATED LOAD IS BEARING ON MASONRY, PROVIDE BOND BEAM R/W 1-15T&B CONTINUOUS FOR ENTIRE SPAN. TYPICAL AT MAIN ROOFS AND FLOOR LEVELS.

CONSTRUCTION SEQUENCE		
PRIOR TO THE REMOVAL OF THE EX. 2ND FLOOR SLAB, EX. OWSJ, EX. W410 BEAMS ALONG GL 4" & 5" & ALL EX. VERTICAL 20 $\phi$ ROD BRACING BETWEEN GL D* & C*, THE CONTRACTOR SHALL:		
1.	REFER TO 2/S401 & 9/S422.	
2.	INSTALL ALL NEW W310x45 (HI), (MID) & (LO) STEEL BEAMS ALONG GL 5", EXCEPT W310x45 (LO) BETWEEN GL C* & B*, D* & C* AS PER 6/S500.	
3.	INSTALL TEMPORARY 20 $\phi$ ROD BRACE (Vf=300MPa) BETWEEN GL C* & D*, CONNECT LOW END OF BRACE TO COLUMN WORK POINT AT GL D*/5" & HIGH END OF BRACE AT NEW W310x45 (LO) & EX. COLUMN WORK POINT AT GL E*/5". CONNECT EA. END FOR FULL TENSILE CAPACITY OF ROD.	
4.	REMOVE EX. 20 $\phi$ ROD BRACE BETWEEN GL C* & B* ONLY, INSTALL NEW W310x45 (LO) & NEW LOWER 2-HSS VERTICAL BRACES BETWEEN GL C* & B*.	
5.	REMOVE EX. 2ND FLOOR SLAB, EX. OWSJ, EX. W410 BEAMS BETWEEN GL C* & B* ONLY.	
6.	INSTALL REMAINING NEW VERTICAL BRACING BETWEEN GL C* & B*.	
7.	REMOVE EX. 20 $\phi$ ROD BRACE BETWEEN GL D* & C*, INSTALL NEW W310x45 (LO) BETWEEN GL D* & C*.	
8.	REMOVE TEMPORARY 20 $\phi$ ROD BRACE BETWEEN GL E* & D*.	

LINTEL SCHEDULE		
MARK	SECTION SIZE	REMARKS
L1	HSS127x127x8.0 (Hf=15kN)	CONNECTION OF INSULATED METAL PANEL TO LINTEL BY PANEL SUPPLIER
L2	400-TRACK (Vf=10kN, Hf=10kN)	REFER TO 6/S422

STEEL POST SCHEDULE			
MARK	POST SIZE	BASEPLATE SIZE & ANCHORS	CONNECTION FORCE
SP1	HSS178x178x9.5	BP07 - PL200x12.7x320 & 2-16mm $\phi$ HILTI HIT-HY 200 HAS-V-36 (152 EMBED)	Hf=25kN
SP2	HSS102x102x7.9	BP06 - PL190x12.7x190 & 4-12.7mm $\phi$ HILTI KWIK BOLT T22 (65 EMBED)	Vf=Vfx=15kN
SP3	HSS127x127x8.0	N/A	Hf=15kN

## STAIR PARTIAL FRAMING PLAN

- NEW STAIR DATUM +4000.
- STAIR STRINGER, POSTS, BASEPLATES & ANCHORS ARRANGEMENT AND SIZES SHOWN ONLY FOR GUIDANCE. FINAL DESIGN & DETAILS BY MISC. METALS SUPPLIER. PROVIDE HANDRAIL AND GUARD TO ALL STAIRS. DESIGN AS PER LATEST OBC. SUBMIT P.ENG. STAMPED SHOP DRAWINGS TO CONSULTANT TEAM FOR REVIEW AND APPROVAL PRIOR TO FABRICATION.
- ALL STRINGERS AND STAIR FRAMING TO BE DESIGNED TO WITHSTAND GUARD LOADS FROM HANDRAIL AS PER LATEST OBC.
- CONCENTRATED HORIZONTAL LOAD OF 1.0kN AT ANY POINT, OR DISTRIBUTED HORIZONTAL LOAD OF 0.75kN/m AT ANY POINT, OR DISTRIBUTED VERTICAL LOAD OF 1.5kN/m AT ANY POINT.
- ALL EXPOSED STEEL ELEMENTS FOR THE CATWALK STRUCTURE WITHIN THE WASH BAY, INCLUDING THEIR CONNECTIONS, ARE TO BE GALVANIZED.
- LATERAL LOAD RESTRAINING SYSTEM AND LATERAL STABILITY DESIGN OF STAIR IN S-E, W DIRECTION TO BE BY MISC. METALS SUPPLIER.



6	REISSUED FOR TENDER	2025-05-23
5	ISSUED FOR TENDER	2025-04-25
4	ISSUED FOR COORDINATION	2025-04-17
3	ISSUED FOR BUILDING PERMIT	2024-11-27
2	ISSUED FOR PRE TENDER	2024-10-31
1	ISSUED FOR 60% CD	2024-05-02
<b>NO.</b>	<b>ISSUED FOR</b>	<b>DATE</b>

Scale	As indicated	Checked By	HB
Region of York Project Number		Region of York Building Code	

Project	York Region North Roads Operations Centre
3525 Baseline Road Georgina, ON, L0E 1R0	
Drawing Title	

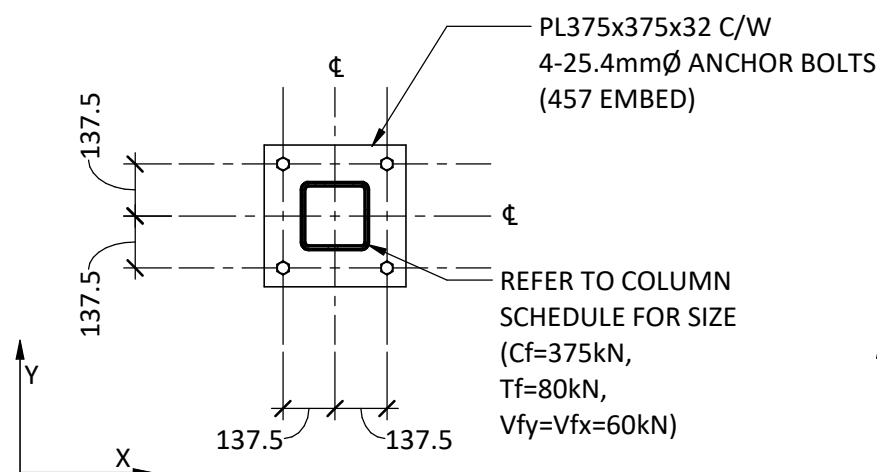
COLUMN SCHEDULE

Project Number	Drawing Number
EN023-01007	<b>S300</b>

STEEL COLUMN SCHEDULE

STEEL COLUMN SCHEDULE																																																						
U/S SIGN GARAGE ROOF DECK	TOP OF COLUMN		TOP OF COLUMN		TOP OF COLUMN		TOP OF COLUMN		TOP OF COLUMN		TOP OF COLUMN		TOP OF COLUMN		TOP OF COLUMN		TOP OF COLUMN		TOP OF COLUMN		TOP OF COLUMN		TOP OF COLUMN		TOP OF COLUMN		U/S SIGN GARAGE ROOF DECK																											
6085	TOP OF COLUMN		TOP OF COLUMN		TOP OF COLUMN		TOP OF COLUMN		TOP OF COLUMN		TOP OF COLUMN		TOP OF COLUMN		TOP OF COLUMN		TOP OF COLUMN		TOP OF COLUMN		TOP OF COLUMN		TOP OF COLUMN		TOP OF COLUMN		6085																											
U/S LOW ROOF DECK	TOP OF COLUMN		TOP OF COLUMN		TOP OF COLUMN		TOP OF COLUMN		TOP OF COLUMN		TOP OF COLUMN		TOP OF COLUMN		TOP OF COLUMN		TOP OF COLUMN		TOP OF COLUMN		TOP OF COLUMN		TOP OF COLUMN		TOP OF COLUMN		U/S LOW ROOF DECK																											
4235	W630x101 LL=45 DL=85 EQ=45 WL=35		HSS178x178x9.5 LL=15 DL=35 EQ=40 WL=30		W630x101 LL=30 DL=60 EQ=45 WL=35		HSS178x178x9.5 LL=15 DL=35 EQ=40 WL=30		W690x384 LL=10 DL=50 EQ=180 WL=100		W690x384 LL=110 DL=165 EQ=180 WL=100		HSS203x203x13 LL=200 DL=160 EQ=295 WL=80		HSS178x178x9.5 LL=85 DL=50 EQ=95 WL=35		HSS254x203x13 LL=60 DL=65 EQ=80 WL=35		HSS254x203x13 LL=20 DL=25 EQ=65 WL=45		HSS203x203x13 LL=25 DL=30 EQ=65 WL=20		HSS203x203x13 LL=15 DL=15 EQ=25 WL=10		HSS254x203x13 LL=45 DL=50 EQ=105 WL=55		HSS178x178x9.5 LL=10 DL=20 EQ=50 WL=15		HSS178x178x9.5 LL=10 DL=20 EQ=50 WL=10		HSS203x203x13 LL=30 DL=35 EQ=80 WL=25		HSS203x203x13 LL=40 DL=50 EQ=90 WL=80		HSS203x203x13 LL=25 DL=30 EQ=75 WL=35		HSS254x203x13 LL=120 DL=140 EQ=145 WL=50		HSS254x203x13 LL=55 DL=60 EQ=55 WL=35		HSS254x203x13 LL=55 DL=60 EQ=80 WL=35		HSS203x203x9.5 LL=370 DL=255 EQ=90 WL=300		HSS203x203x9.5 LL=270 DL=300 EQ=90 WL=300		HSS203x203x9.5 LL=150 DL=185 EQ=90 WL=300		4235					
LEVEL 01	LL=45 DL=85 EQ=45 WL=35		LL=15 DL=35 EQ=40 WL=30		LL=30 DL=60 EQ=45 WL=35		LL=15 DL=35 EQ=40 WL=30		LL=10 DL=50 EQ=180 WL=100		LL=110 DL=165 EQ=180 WL=100		LL=200 DL=160 EQ=295 WL=80		LL=85 DL=50 EQ=95 WL=35		LL=60 DL=65 EQ=80 WL=35		LL=20 DL=25 EQ=65 WL=45		LL=25 DL=30 EQ=65 WL=20		LL=15 DL=15 EQ=25 WL=10		LL=45 DL=50 EQ=105 WL=55		LL=10 DL=20 EQ=50 WL=15		LL=10 DL=20 EQ=50 WL=10		LL=30 DL=35 EQ=80 WL=25		LL=40 DL=50 EQ=90 WL=80		LL=25 DL=30 EQ=75 WL=35		LL=120 DL=140 EQ=145 WL=50		LL=55 DL=60 EQ=55 WL=35		LL=55 DL=60 EQ=80 WL=35		LL=370 DL=255 EQ=90 WL=300		LL=270 DL=300 EQ=90 WL=300		LL=150 DL=185 EQ=90 WL=300		LEVEL 01					
0	BASE PLATE		BASE PLATE		BASE PLATE		BASE PLATE		BASE PLATE		BASE PLATE		BASE PLATE		BASE PLATE		BASE PLATE		BASE PLATE		BASE PLATE		BASE PLATE		BASE PLATE		BASE PLATE		BASE PLATE		BASE PLATE		BASE PLATE		BASE PLATE		BASE PLATE		BASE PLATE		BASE PLATE		BASE PLATE		0									
Column Locations	F-7		F(105)-7(2388)		F-8		F(105)-8(-2358)		A*-5*(898)		A*-6		A*-7		A*(-1212)-10		A*(1113)-11(-102)		A*(-1212)-11(-102)		Ay-9		Ay-9(1310)		Ay(-3272)-9		Ay-10(-1172)		Ay-10(-2512)		Ay-11		Ay(-3293)-11		Az-7		Az(-106)-8(-141)		Az-9(102)		Az(2895)-9(102)		Az(2887)-11		B*(-2500)-7(-145)		B*(-2500)-8(141)		B*(-2500)-9(-159)					
BASE PLATE SIZE LENGTH x WIDTH x THK (mm)	370x600x32		375x375x32		370x600x32		375x375x32		520x800x32		520x800x32		490x490x51		375x375x32		490x490x32		490x490x32		490x490x32		490x490x32		490x490x32		375x375x32		375x375x32		490x490x32		375x375x32		490x490x51		490x490x32		490x490x32		490x490x32		490x490x32		375x375x32		375x375x32		490x490x32					
BASE PLATE TYPE	BP03		BP01		BP03		BP01		BP04		BP04		BP10		BP01		BP09		BP09		BP02		BP02		BP09		BP01		BP01		BP02		BP01		BP10		BP02		BP09		BP09		BP09		BP01		BP01		BP02					
ANCHOR TYPE	REFER TO 3/S300		REFER TO 1/S300		REFER TO 3/S300		REFER TO 1/S300		REFER TO 4/S300		REFER TO 4/S300		REFER TO 8/S300		REFER TO 1/S300		REFER TO 7/S300		REFER TO 7/S300		REFER TO 7/S300		REFER TO 2/S300		REFER TO 2/S300		REFER TO 7/S300		REFER TO 1/S300		REFER TO 1/S300		REFER TO 2/S300		REFER TO 8/S300		REFER TO 2/S300		REFER TO 7/S300		REFER TO 7/S300		REFER TO 1/S300		REFER TO 1/S300		REFER TO 2/S300							
NOTES																																																						

STEEL COLUMN SCHEDULE																	
U/S SIGN GARAGE ROOF DECK			TOP OF COLUMN			TOP OF COLUMN	TOP OF COLUMN					TOP OF COLUMN	TOP OF COLUMN	TOP OF COLUMN	TOP OF COLUMN		U/S SIGN GARAGE ROOF DECK
6085	TOP OF COLUMN	TOP OF COLUMN		TOP OF COLUMN				TOP OF COLUMN	TOP OF COLUMN	TOP OF COLUMN	TOP OF COLUMN					TOP OF COLUMN	TOP OF COLUMN
U/S LOW ROOF DECK																	U/S LOW ROOF DECK
4235	W250x89 LL=55 DL=75	HSS203x203x13 LL=45 DL=65 EQ=85 WL=40	HSS203x203x13 LL=220 DL=260	W250x89 LL=95 DL=130 EQ=85 WL=40	HSS203x203x13 LL=270 DL=245 EQ=80 WL=40	HSS203x203x13 LL=215 DL=280 EQ=80 WL=40	HSS178x178x9.5 LL=50 DL=55	HSS178x178x9.5 LL=105 DL=105	W250x89 LL=65 DL=90	HSS178x178x9.5 LL=30 DL=45	W690x384 LL=10 DL=50 EQ=180 WL=100	W690x384 LL=110 DL=170 EQ=180 WL=100	HSS203x203x13 LL=85 DL=125 EQ=35 WL=30	HSS203x203x13 LL=130 DL=165 EQ=65 WL=70	HSS178x178x9.5 LL=55 DL=60	HSS178x178x9.5 LL=25 DL=35	4235
LEVEL 01																	LEVEL 01
0	BASE PLATE	BASE PLATE	BASE PLATE	BASE PLATE	BASE PLATE	BASE PLATE	BASE PLATE	BASE PLATE	BASE PLATE	BASE PLATE	BASE PLATE	BASE PLATE	BASE PLATE	BASE PLATE	BASE PLATE	BASE PLATE	0
Column Locations	B*(400)-10	B*(-1569)-10	C*-6	C*(-1436)-10	Dz-7(-145)	Dz-8	Dz-9(1131)	Dz-9(-194)	Dz-10(-130)	Dz-10(-1338)	E*-5*(900)	E*(184)-6	E*-7(106)	Ez-8	Ex(98)-9(3243)	Ex(98)-11(-290)	
BASE PLATE SIZE LENGTH x WIDTH x THK (mm)	450x380x32	490x490x32	490x490x32	450x380x32	490x490x32	490x490x32	375x375x32	375x375x32	450x380x32	375x375x32	520x800x32	520x800x32	490x490x32	490x490x32	375x375x32	375x375x32	
BASE PLATE TYPE	BP05	BP02	BP02	BP05	BP02	BP02	BP01	BP01	BP05	BP01	BP04	BP04	BP02	BP02	BP01	BP01	
ANCHOR TYPE	REFER TO 5/S300	REFER TO 2/S300	REFER TO 2/S300	REFER TO 5/S300	REFER TO 2/S300	REFER TO 2/S300	REFER TO 1/S300	REFER TO 1/S300	REFER TO 5/S300	REFER TO 1/S300	REFER TO 4/S300	REFER TO 4/S300	REFER TO 2/S300	REFER TO 2/S300	REFER TO 1/S300	REFER TO 1/S300	
NOTES															AE55-3 575x120x575 POCKET REFER TO 12/S400	AE55-3 575x120x575 POCKET REFER TO 12/S400	

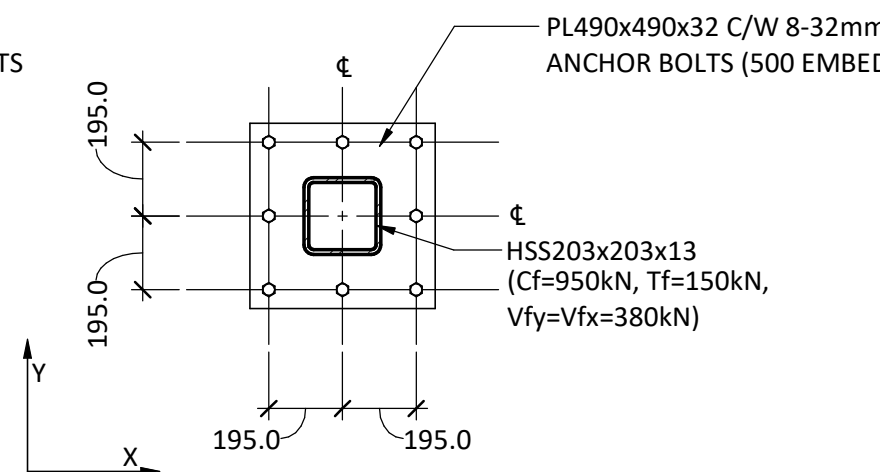


1

BASE PLATE, BP01

S300

1 : 20

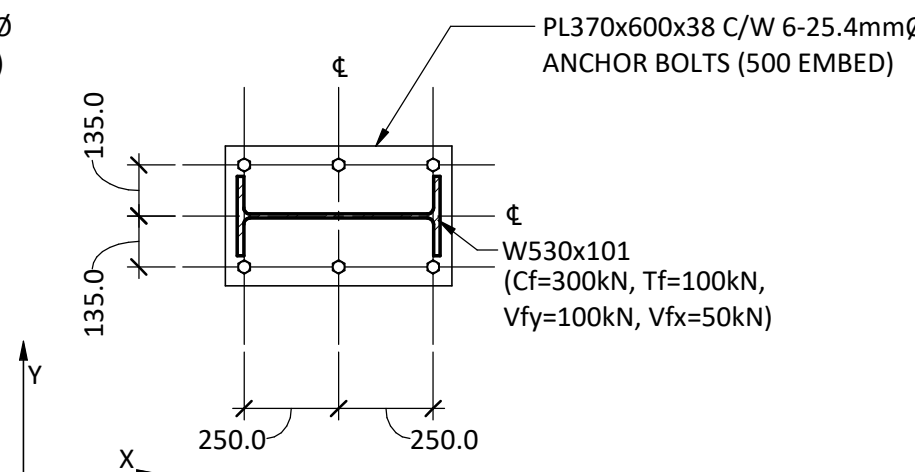


2

BASE PLATE, BP02

S300

1 : 20

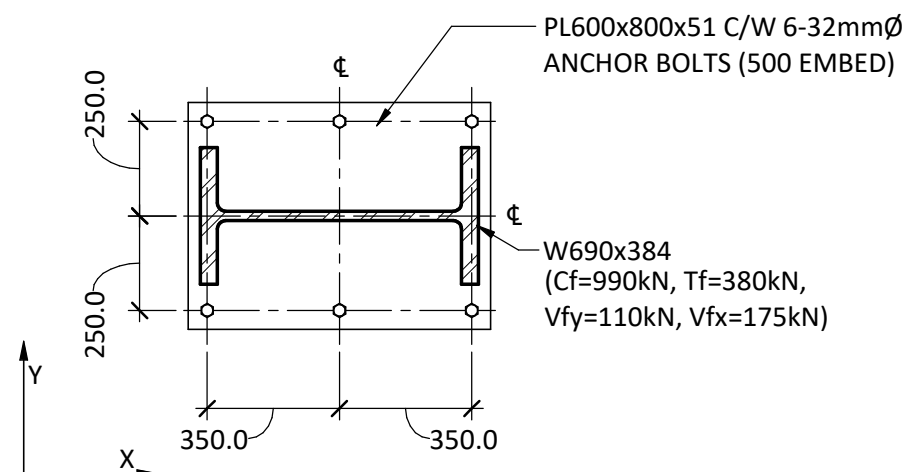


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BASE PLATE, BP03

S300

1 : 20

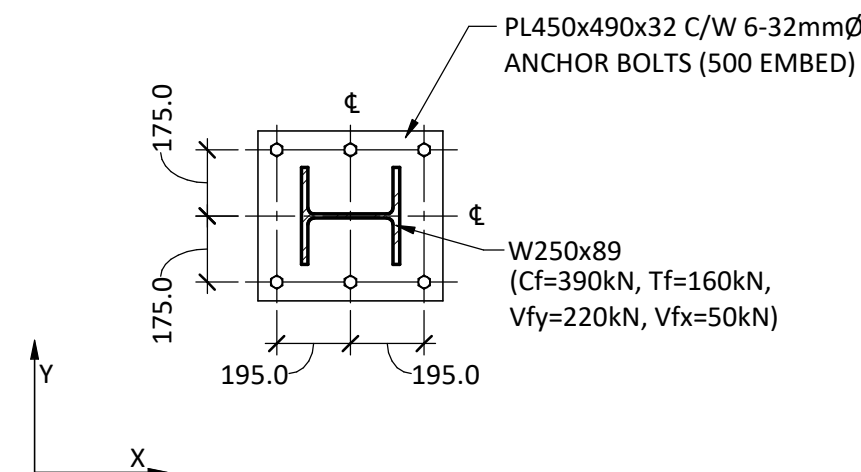


4

BASE PLATE, BP04

S300

1 : 20

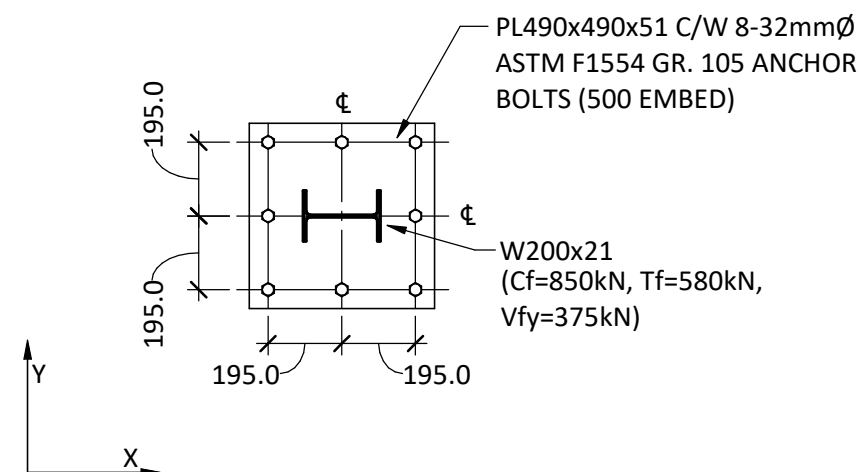


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BASE PLATE, BP05

S300

1 : 20

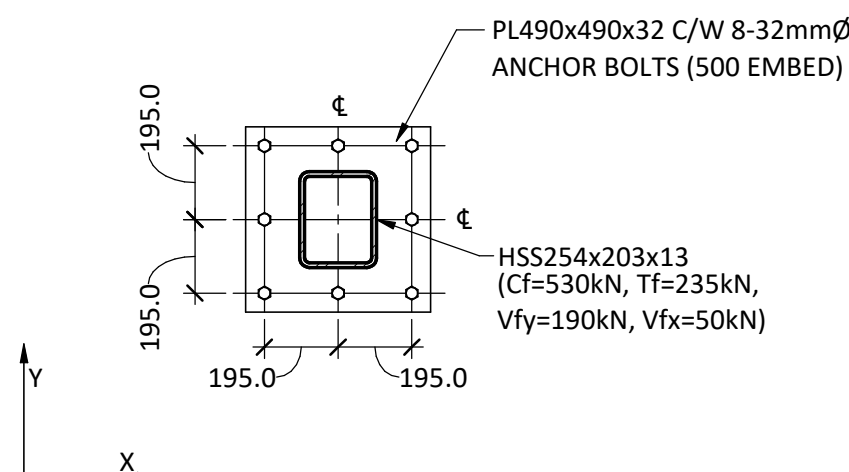


6

BASE PLATE, BP08

S300

1 : 20

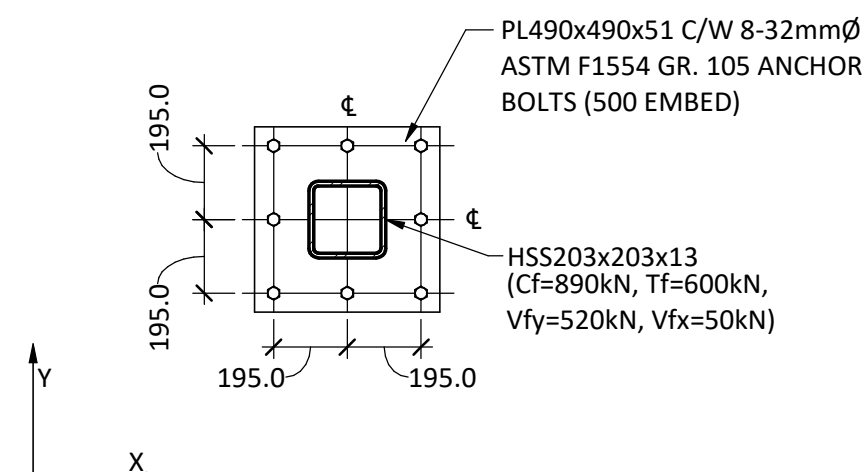


7

BASE PLATE, BP09

S300

1 : 20



8

BASE PLATE, BP10

S300

1 : 20

STEEL COLUMN SCHEDULE NOTES

- ALL STEEL COLUMN LOADS ARE UNFACTORED LOADS IN KN.
- BASE PLATE DIMENSION GIVEN FIRST FOR STEEL COLUMNS INDICATES NORTH SOUTH DIRECTION.
- THICKNESS OF GROUT PROVIDED UNDER BASE PLATES SHALL BE 50 mm U.N.O.



Project Team:

Prime Consultant

GEC ARCHITECTURE

Structural Consultant

ENTUITIVE

Mechanical Consultant

Electrical Consultant

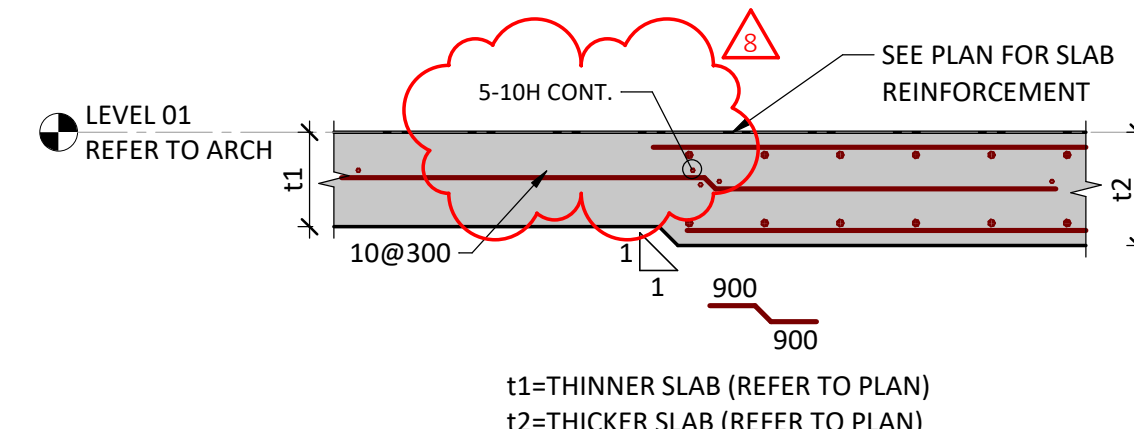
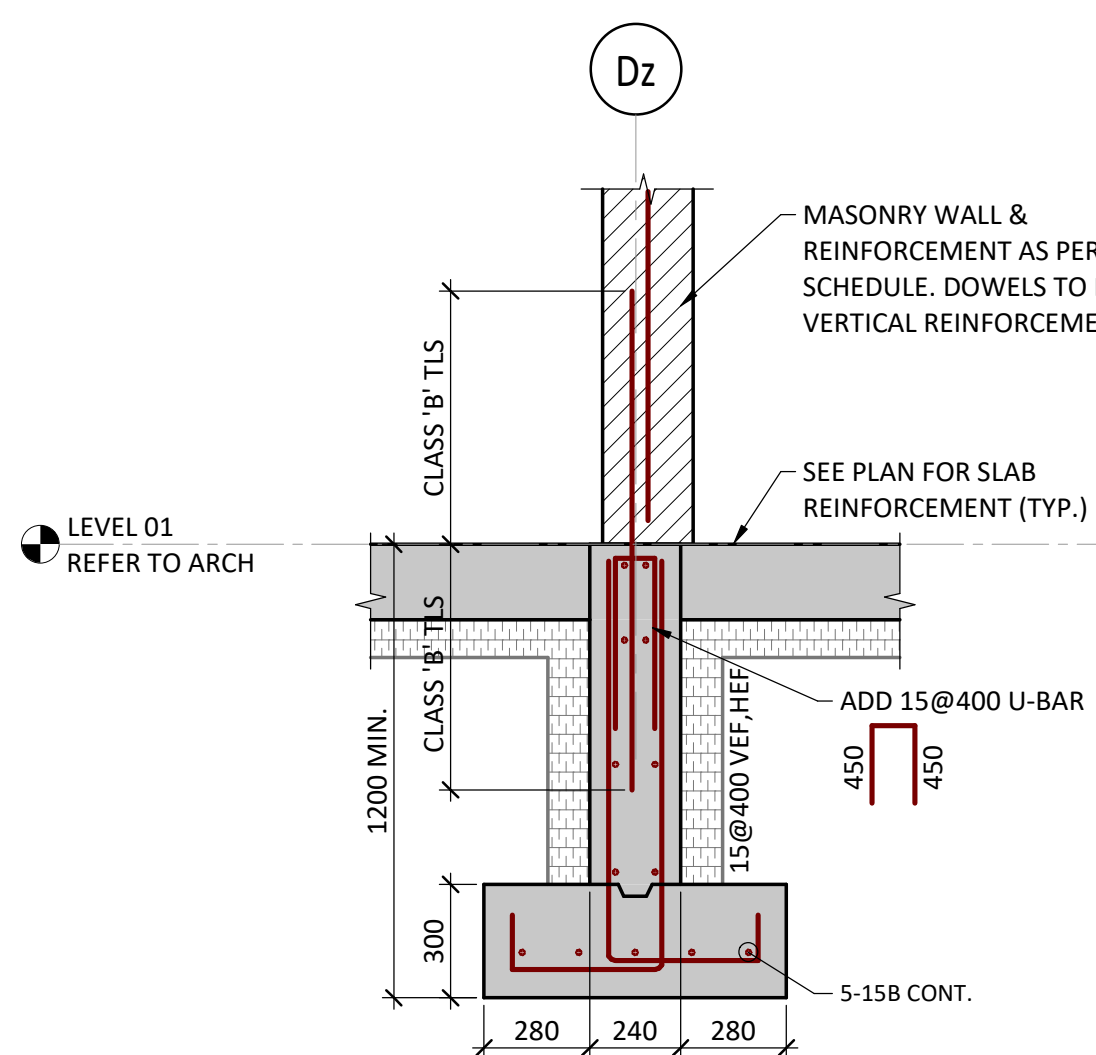
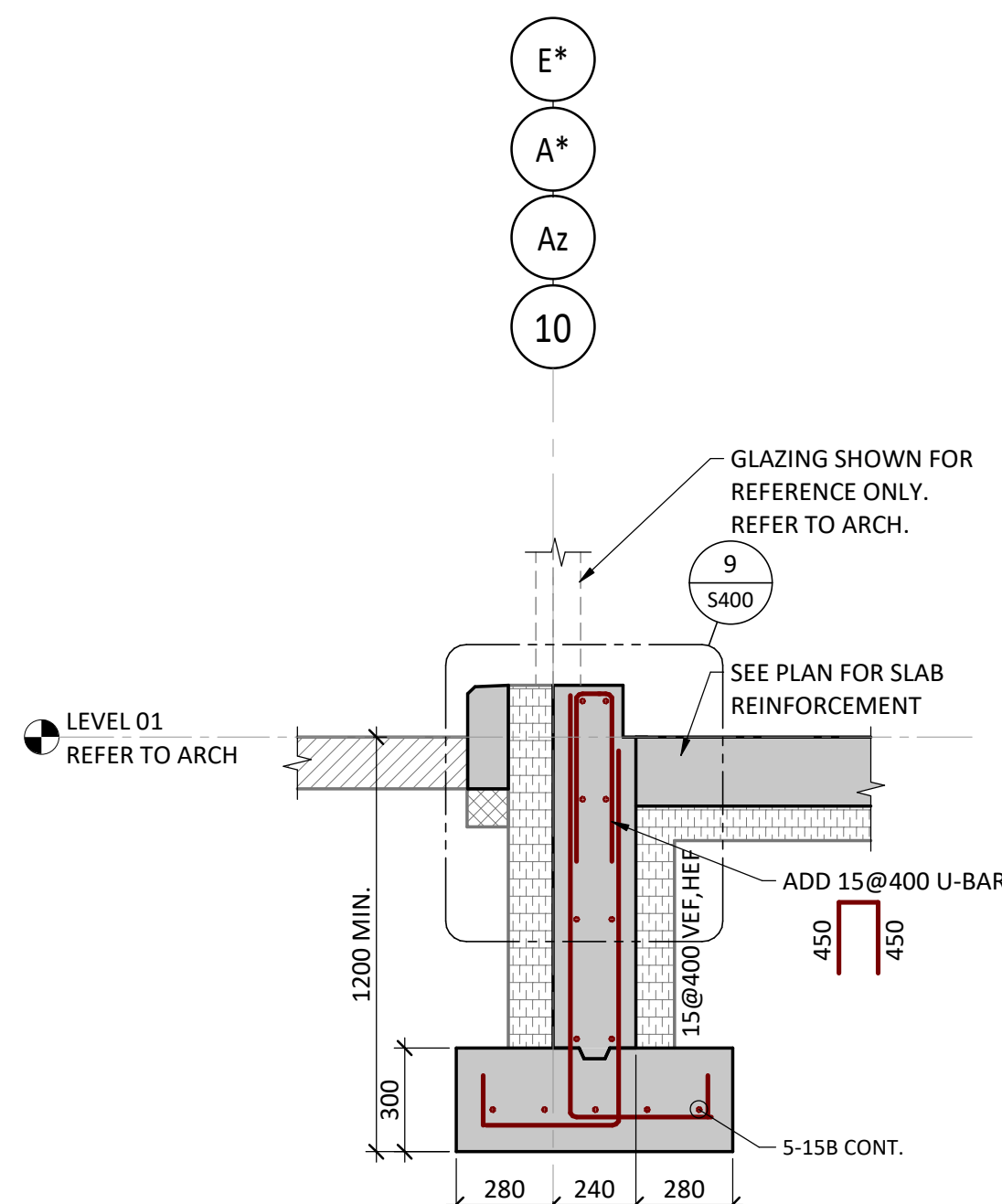
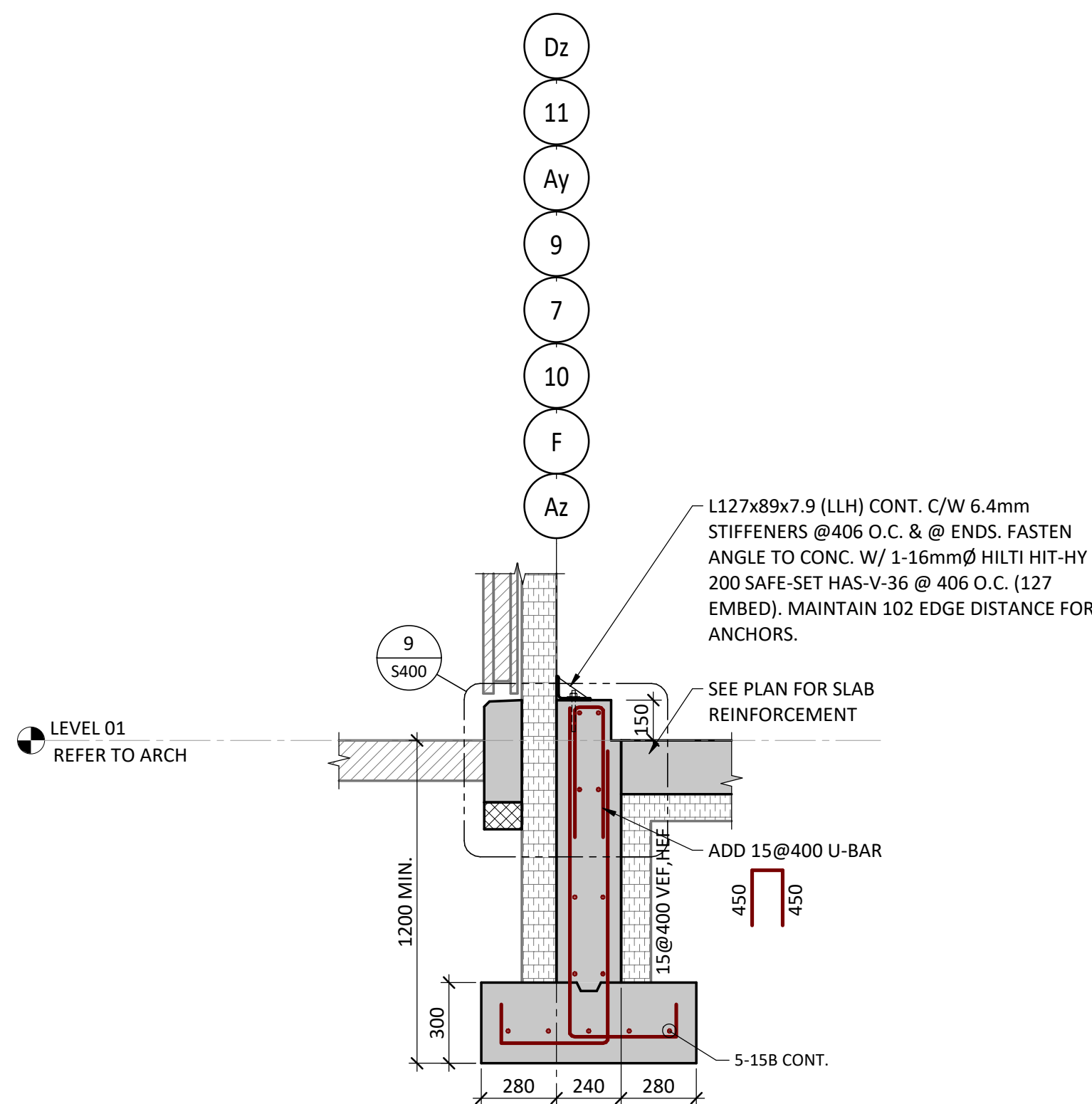
Civil Consultant

Client

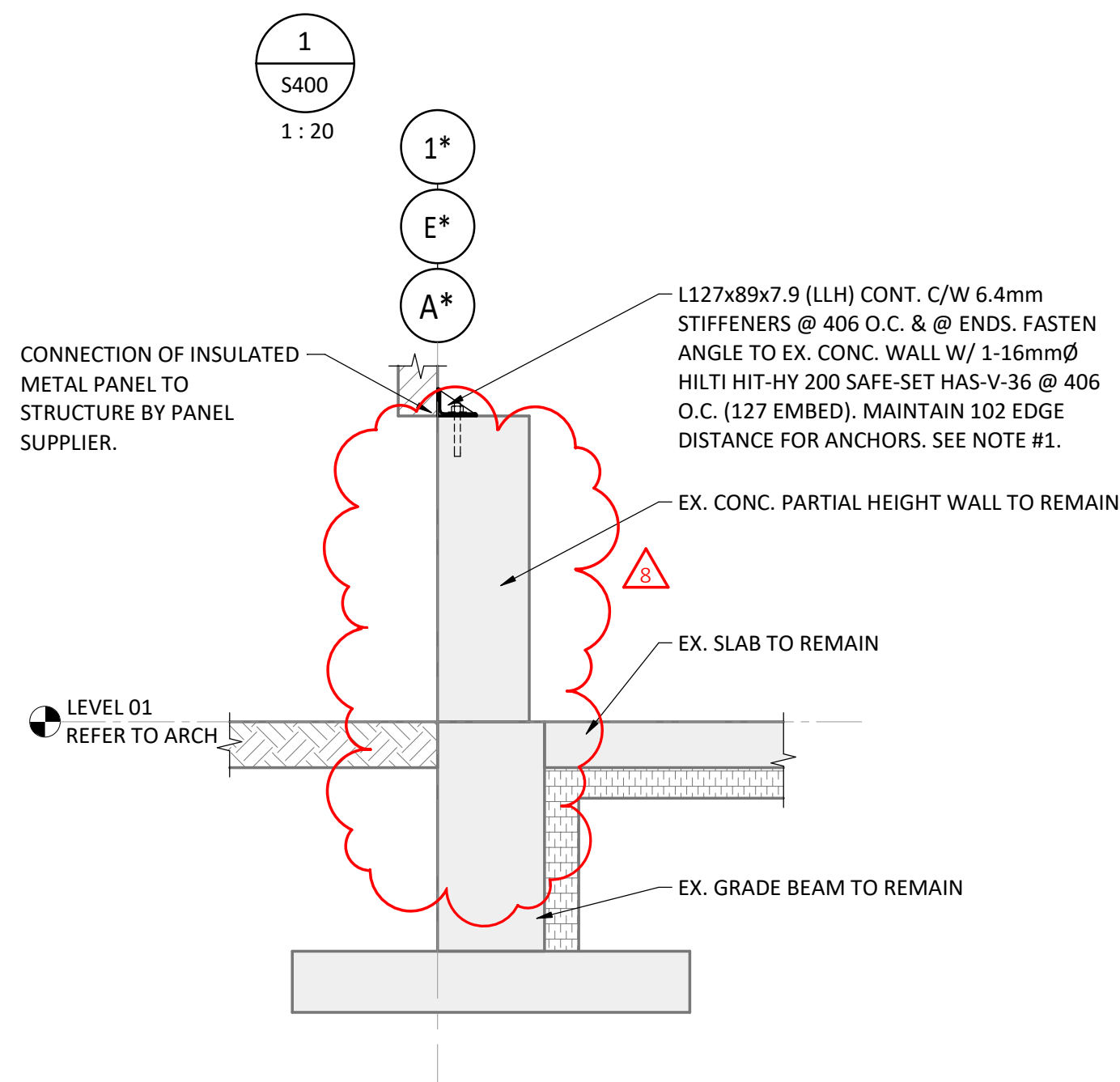
OWNER



Seal & Permit

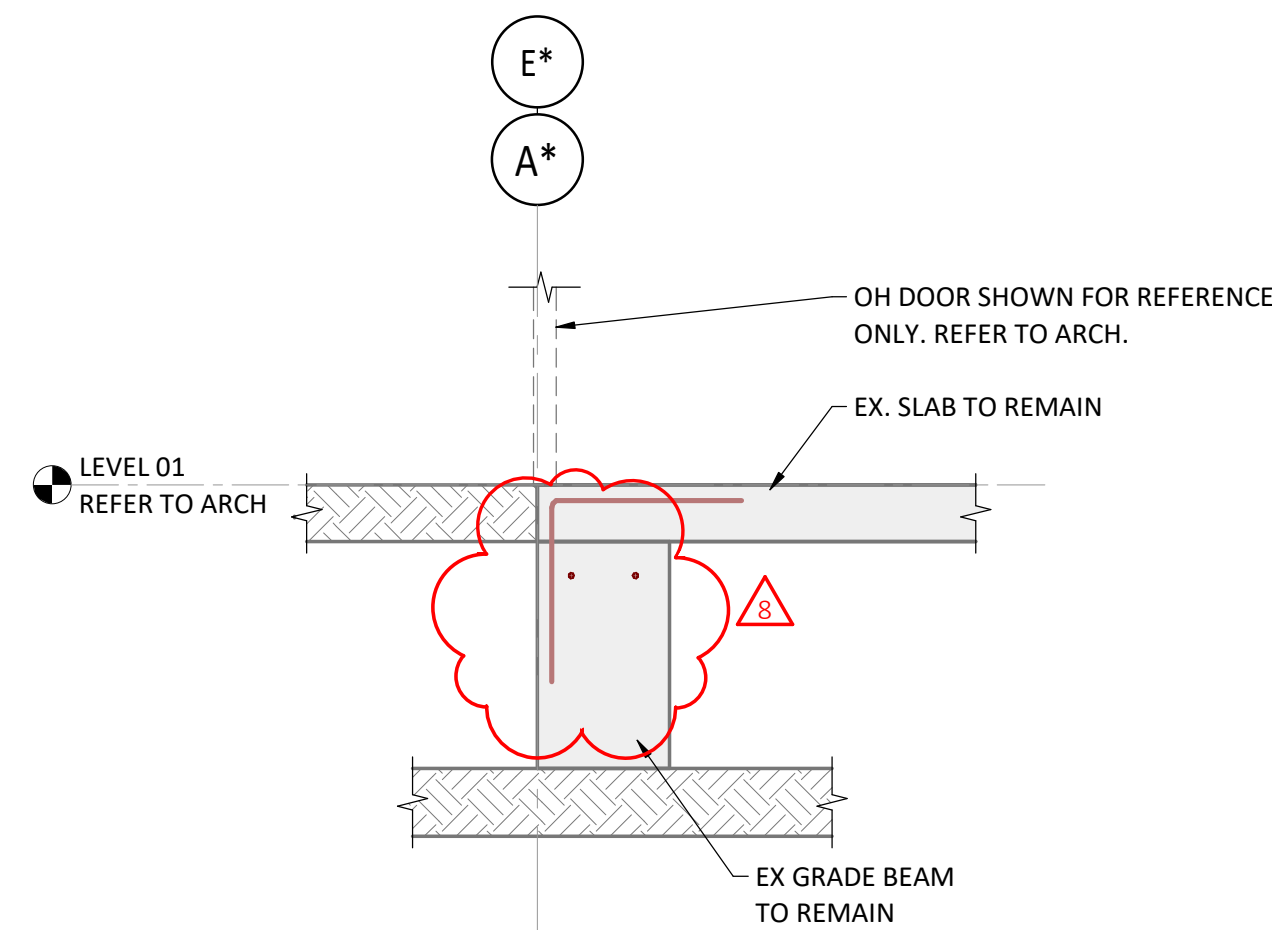


TYPICAL SLAB TRANSFER DETAIL AT DOOR OPENINGS & RACKING AREAS

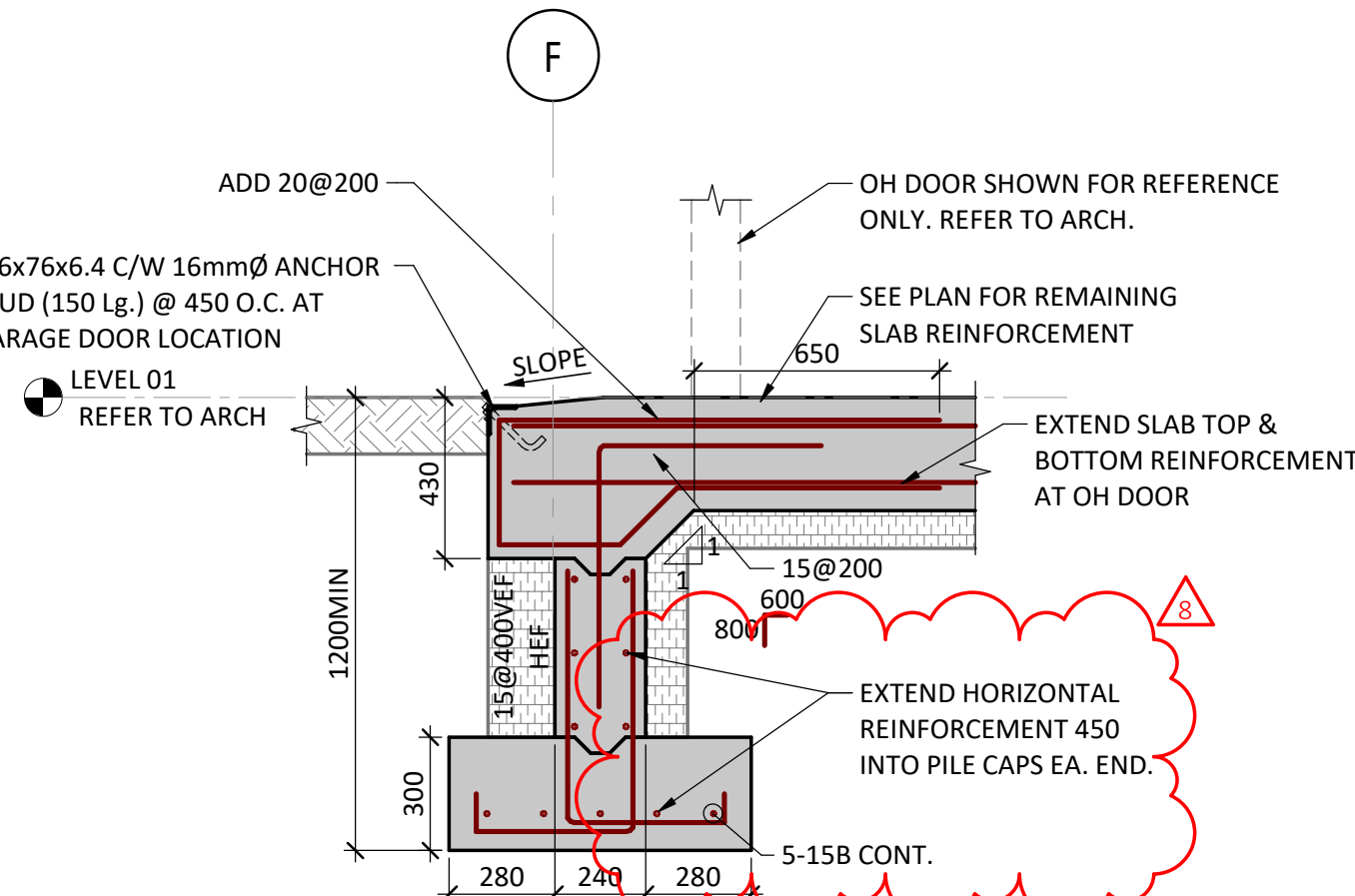


5 TYPICAL EXTERIOR WALL AT EX. GARAGE

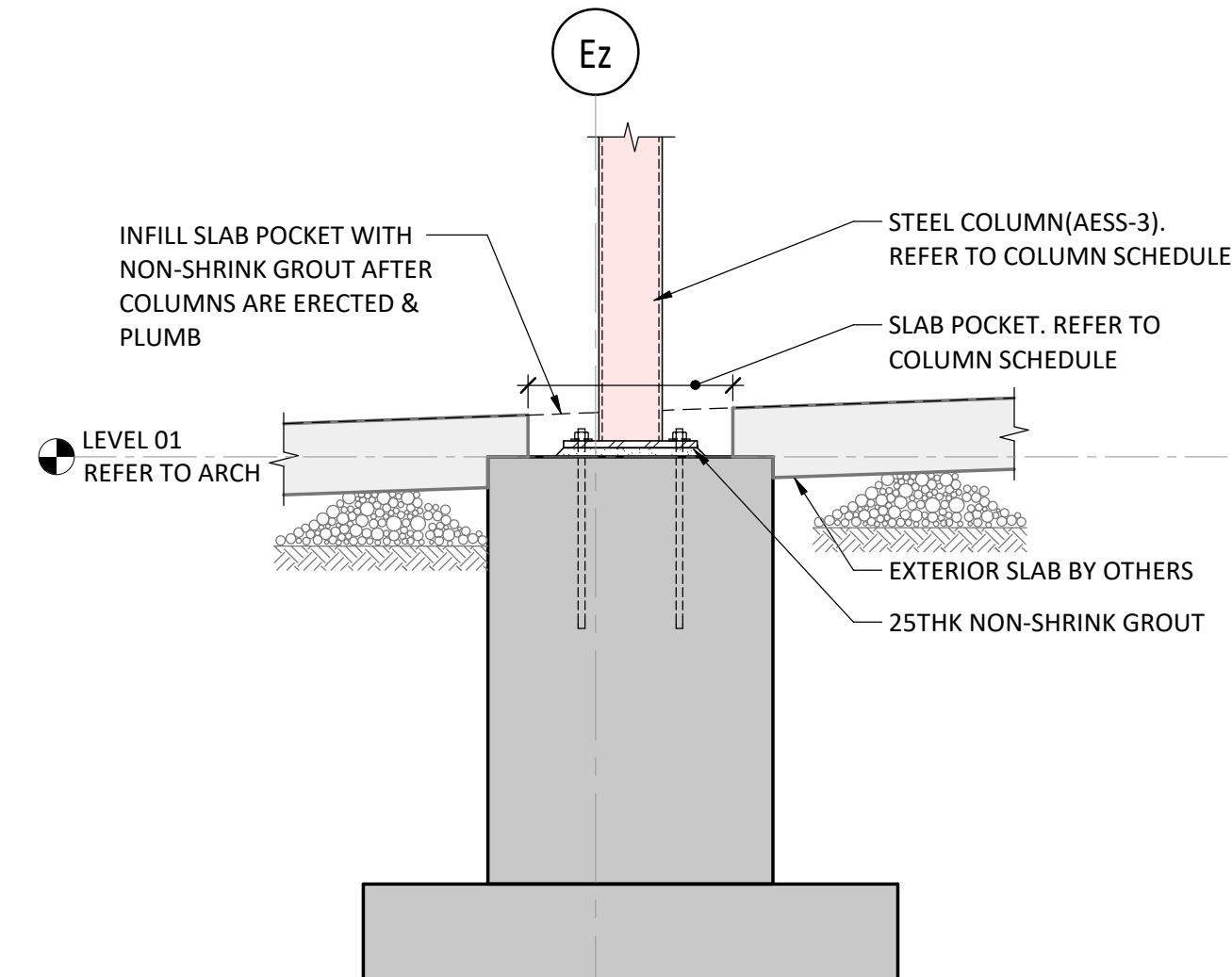
NOTES:  
1. CONTRACTOR IS TO SCAN EXISTING CONCRETE PLINTH FOR INTERFERENCE WITH EX. REBAR PRIOR TO ADDITIONAL WORK TAKING PLACE. DO NOT CUT OR DAMAGE EX. REBAR. RELOCATE ANCHORS AS REQUIRED IF EX. REBAR IS HIT.



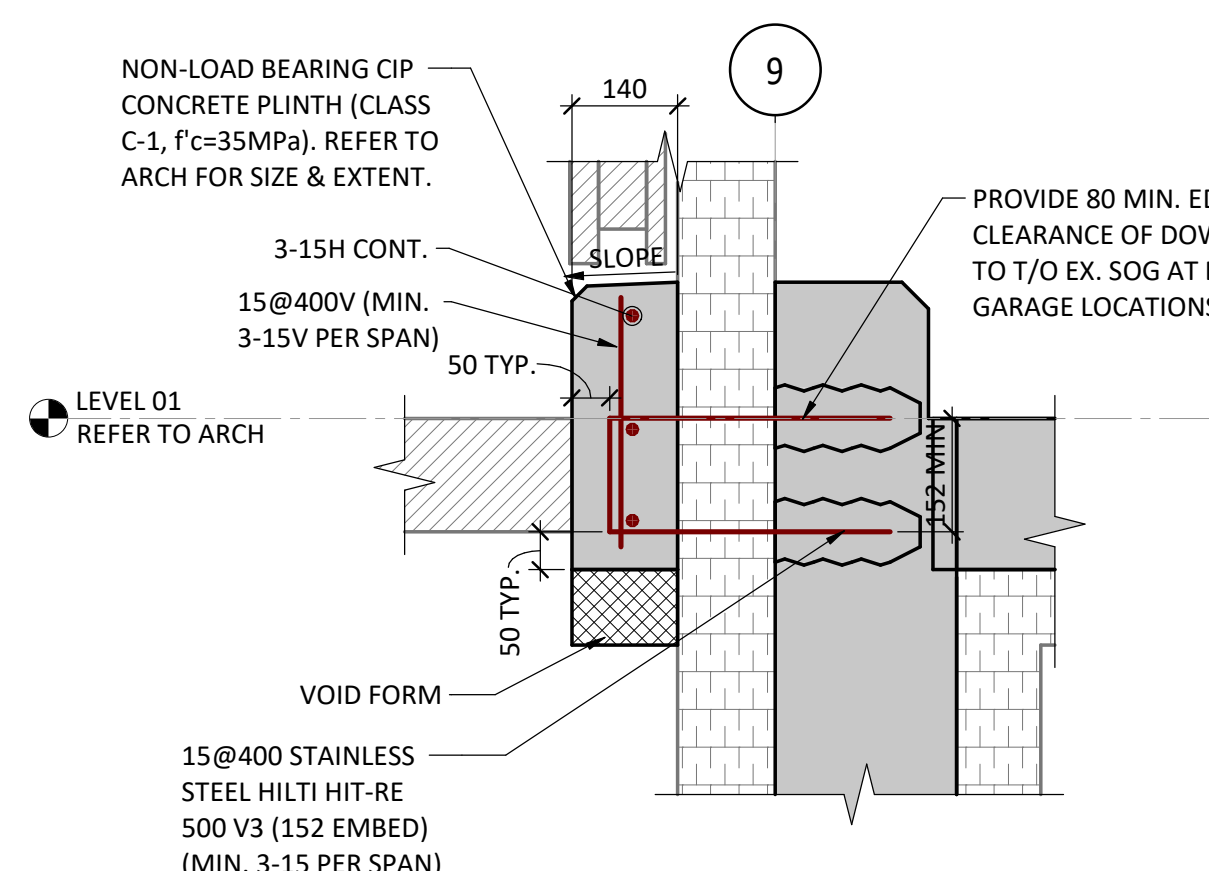
6 EXTERIOR WALL AT EX. GARAGE OH DOOR



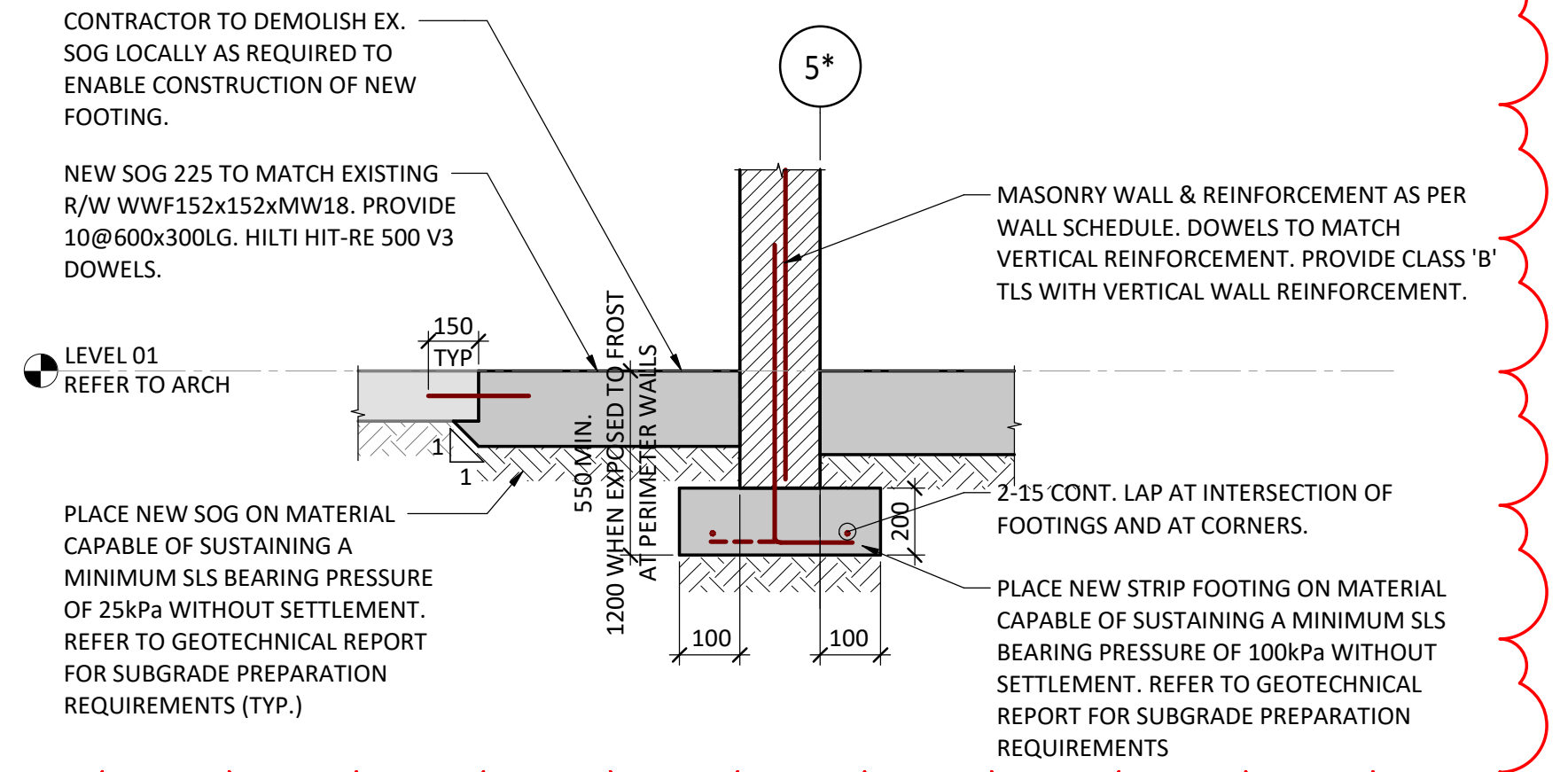
7 EXTERIOR WALL AT SIGN GARAGE OH DOOR



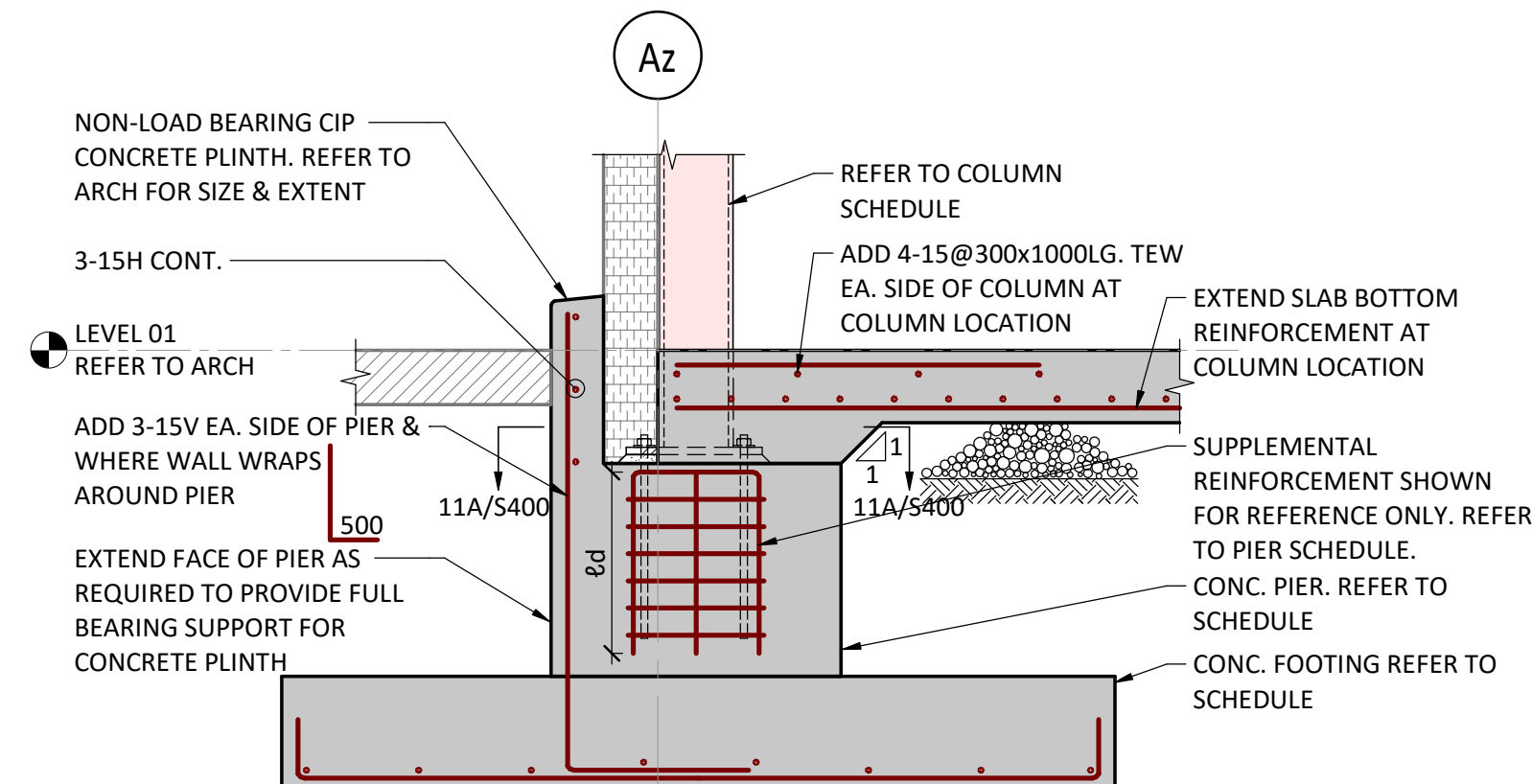
8 EXTERIOR CANOPY COLUMN SLAB POCKET



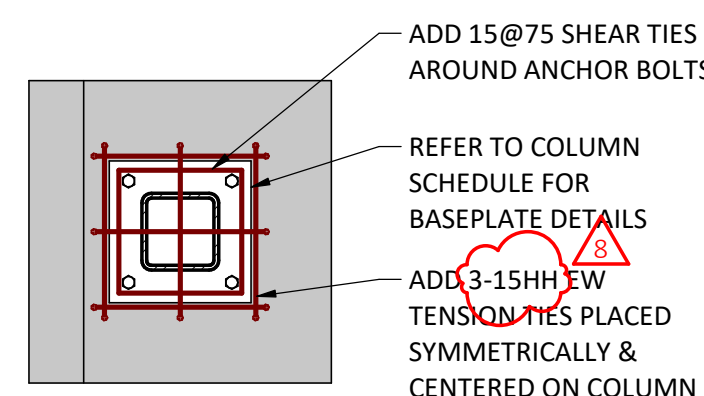
9 TYPICAL CIP CONCRETE PLINTH DETAIL



10



11 TYPICAL EXTERIOR WALL AT CONCRETE PIER



11A

8	ISSUED FOR ADDENDUM 4	2025-07-18
7	REISSUED FOR TENDER	2025-05-23
6	ISSUED FOR TENDER	2025-04-25
5	ISSUED FOR COORDINATION	2025-04-17
4	ISSUED FOR BUILDING PERMIT	2024-11-27
3	ISSUED FOR PRE TENDER	2024-11-31
2	ISSUED FOR 60% CD	2024-05-02
1	ISSUED FOR 100% DD	2024-02-29

NO. ISSUED FOR DATE

Drawing History

Scale As indicated Checked By HB

Region of York Project Number Region of York Building Code

Project

York Region North Roads Operations Centre

3525 Baseline Road Georgina, ON, L0E 1R0

Drawing Title

FOUNDATION SECTIONS

Project Number Drawing Number

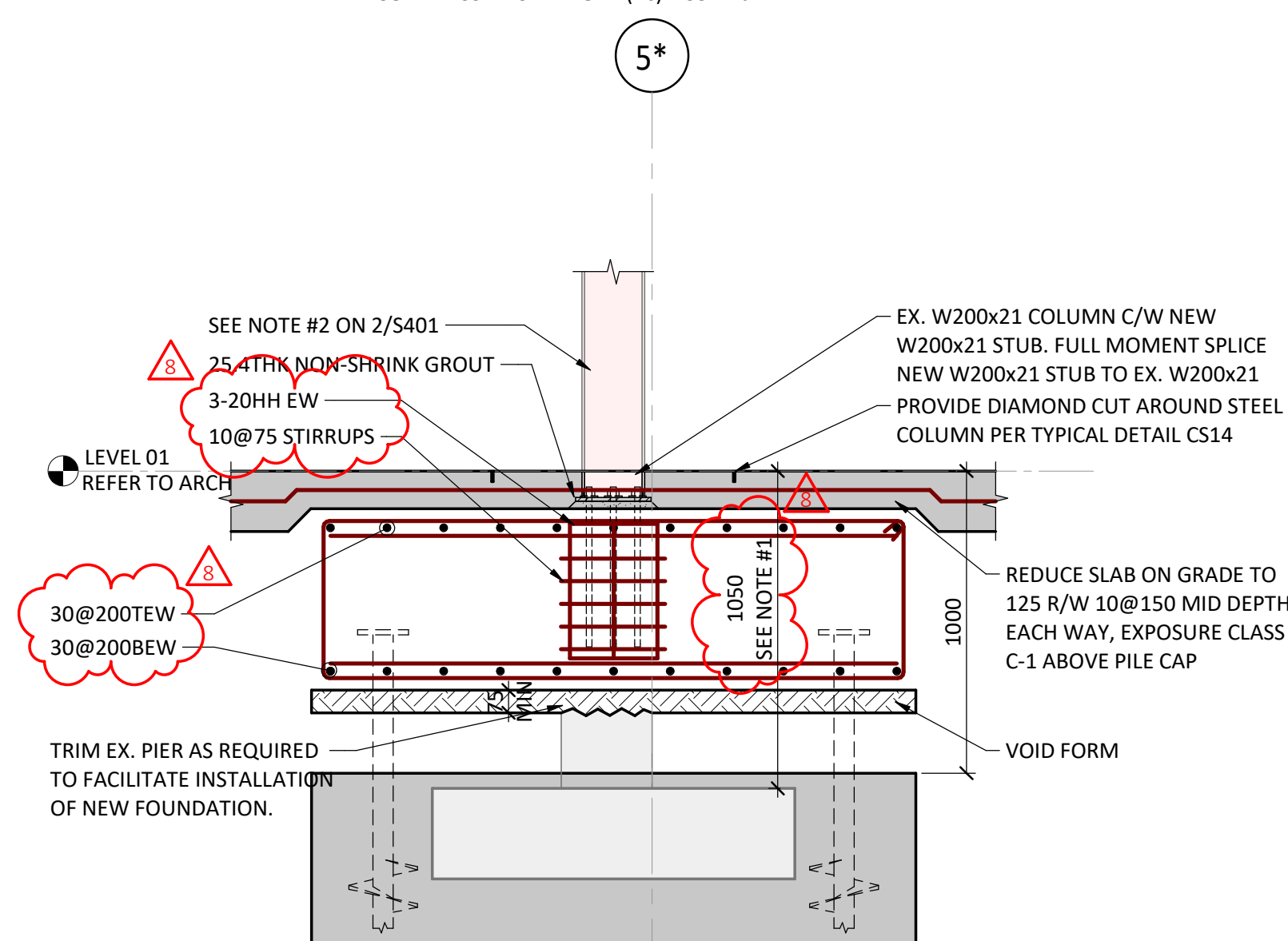
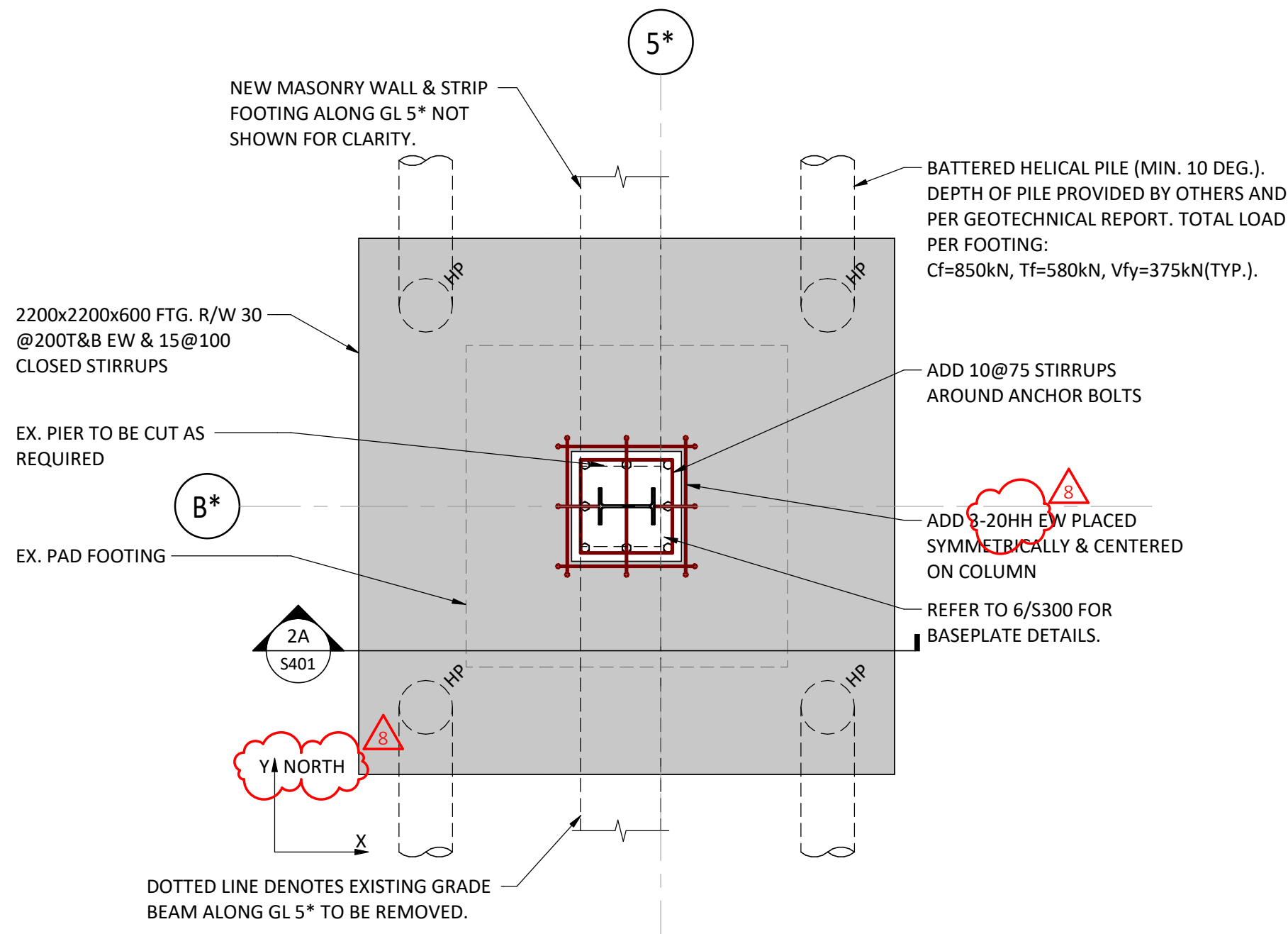
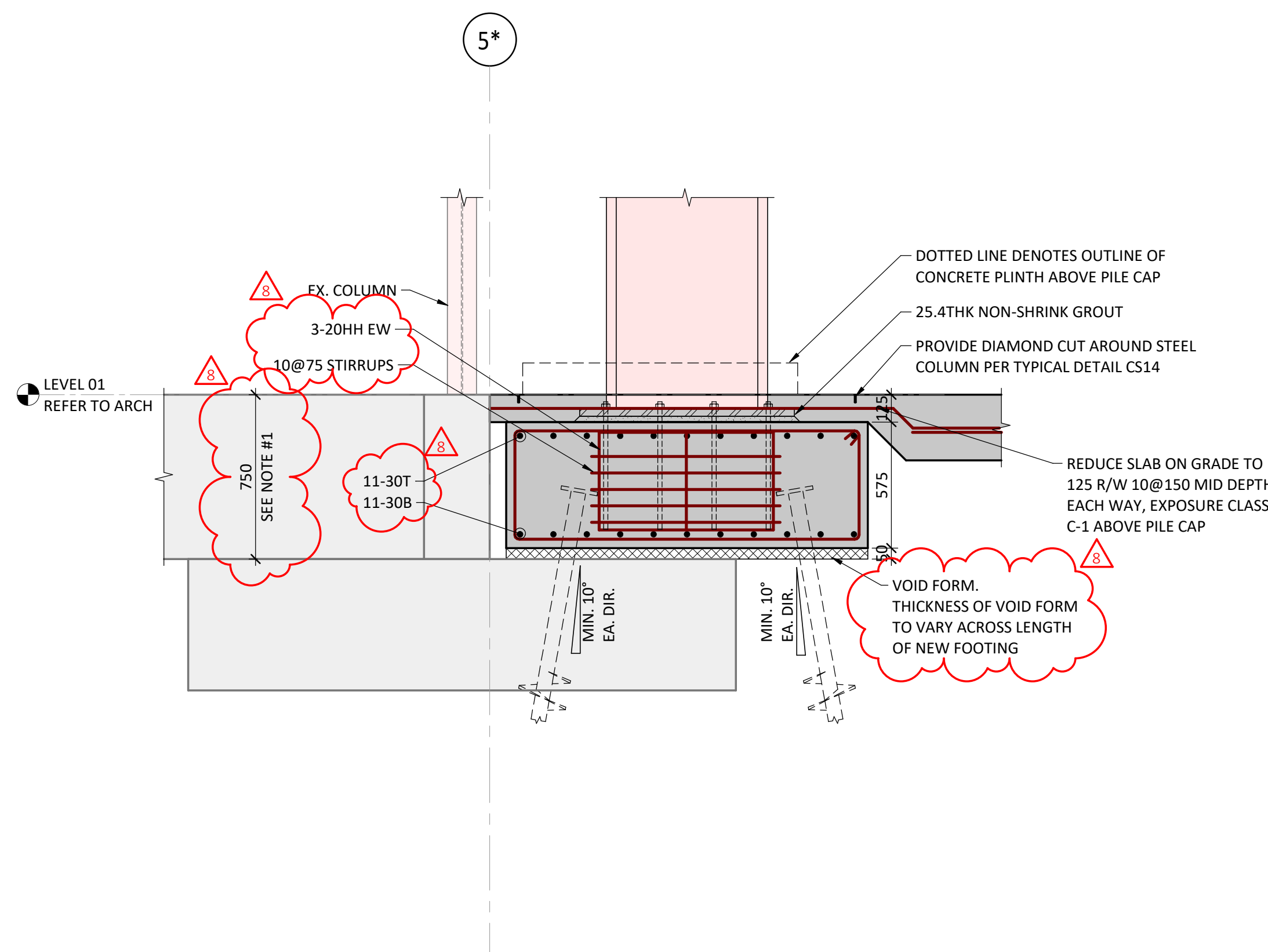
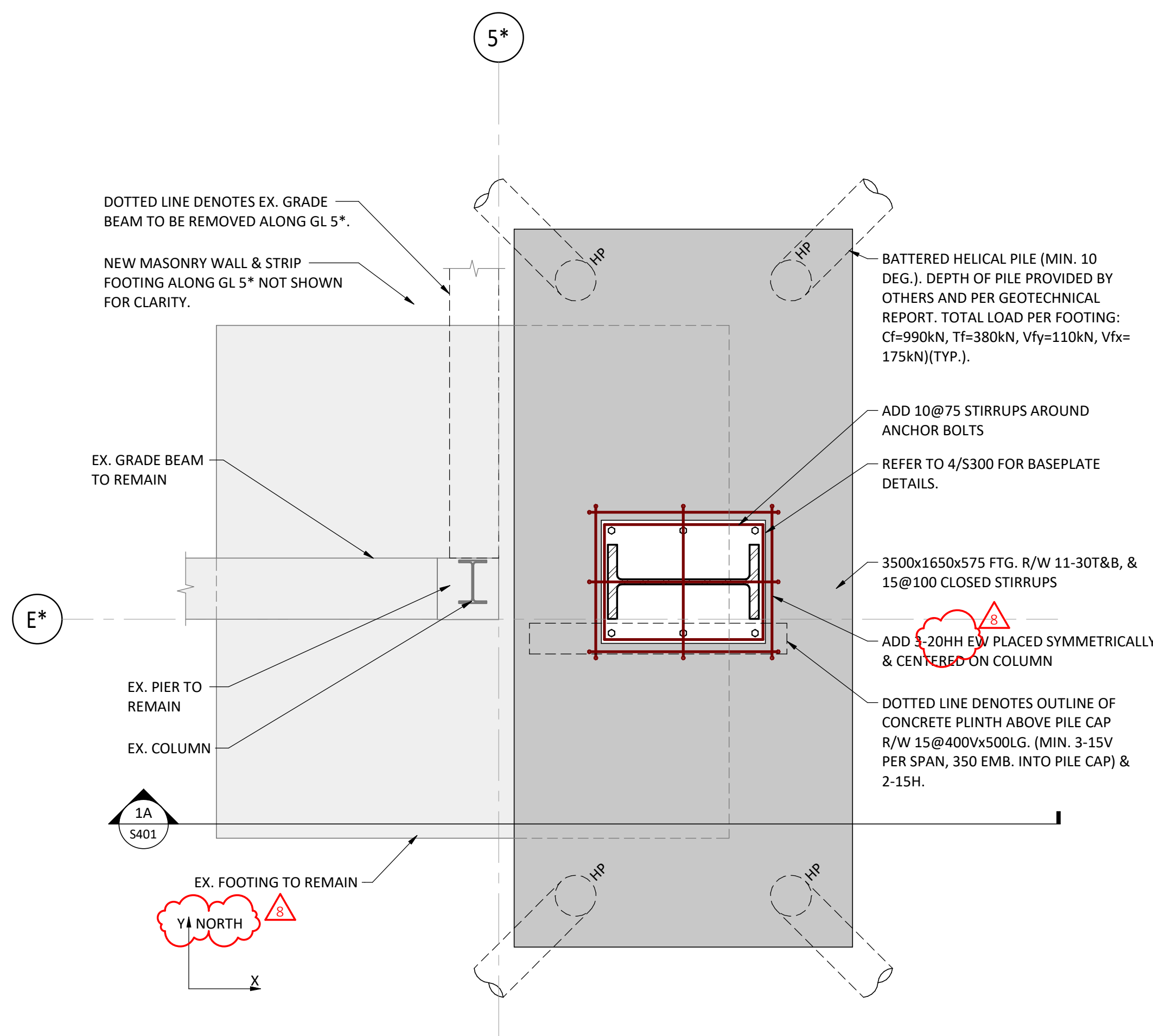
EN023-01007 S400



Project Team:  
Prime Consultant  
GEC ARCHITECTURE  
Structural Consultant  
ENTUITIVE  
Mechanical Consultant  
Electrical Consultant  
Civil Consultant

Client  
OWNER  
**York Region**

Seal & Permit



8	ISSUED FOR ADDENDUM 4	2025-07-18
7	REISSUED FOR TENDER	2025-05-23
6	ISSUED FOR TENDER	2025-04-25
5	ISSUED FOR COORDINATION	2025-04-17
4	ISSUED FOR BUILDING PERMIT REVIEW	2024-11-27
3	ISSUED FOR PRE TENDER REVIEW	2024-10-31
2	ISSUED FOR 60% CD	2024-05-02
1	ISSUED FOR 100% DD	2024-02-29
NO.	ISSUED FOR	DATE

Scale	Checked By
1 : 20	HB
Region of York Project Number	Region of York Building Code

Project  
York Region North Roads Operations Centre  
3525 Baseline Road  
Georgina, ON, L0E 1R0  
Drawing Title

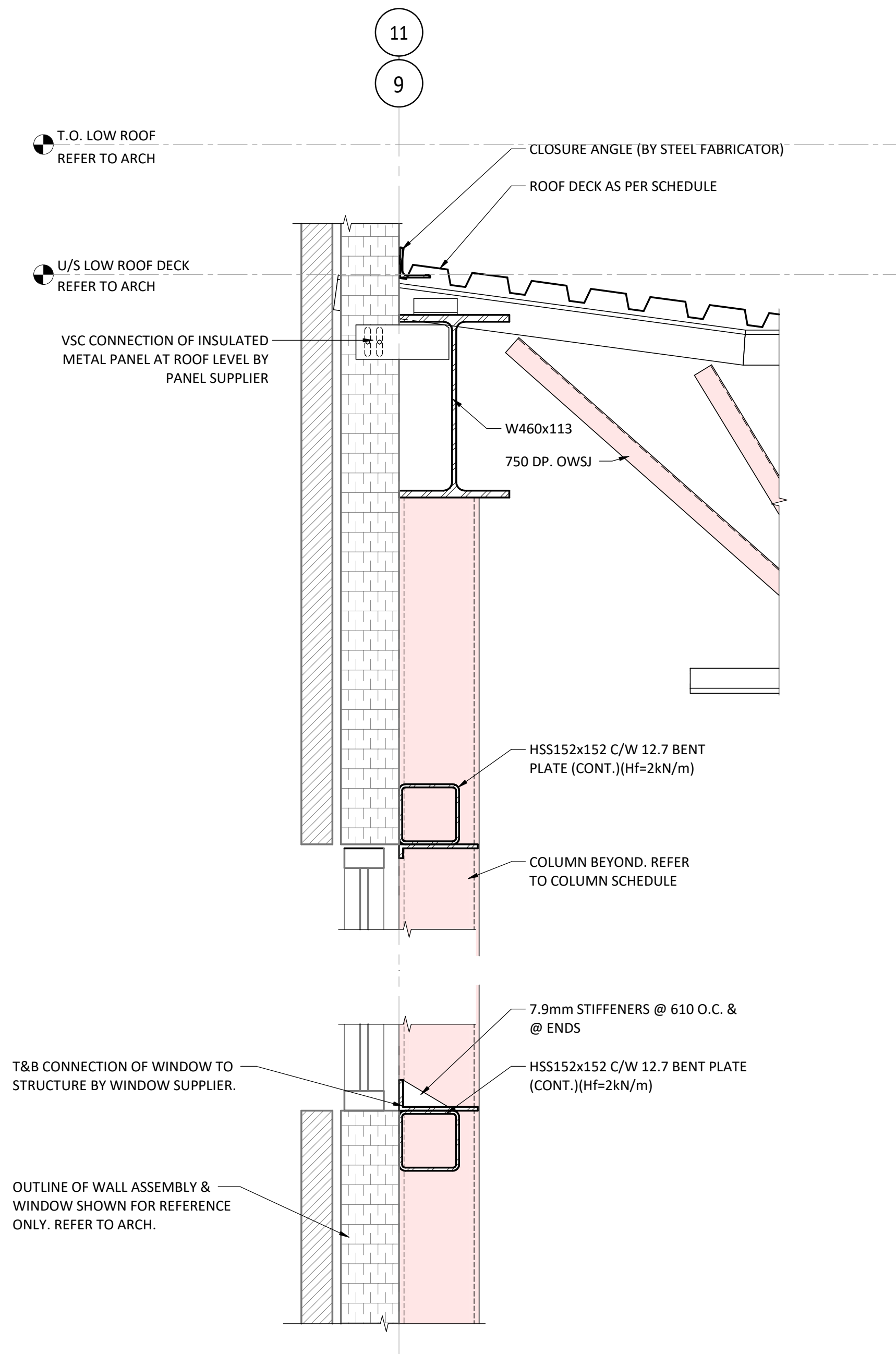
FOUNDATION SECTIONS

Project Number  
EN023-01007  
Drawing Number  
S401

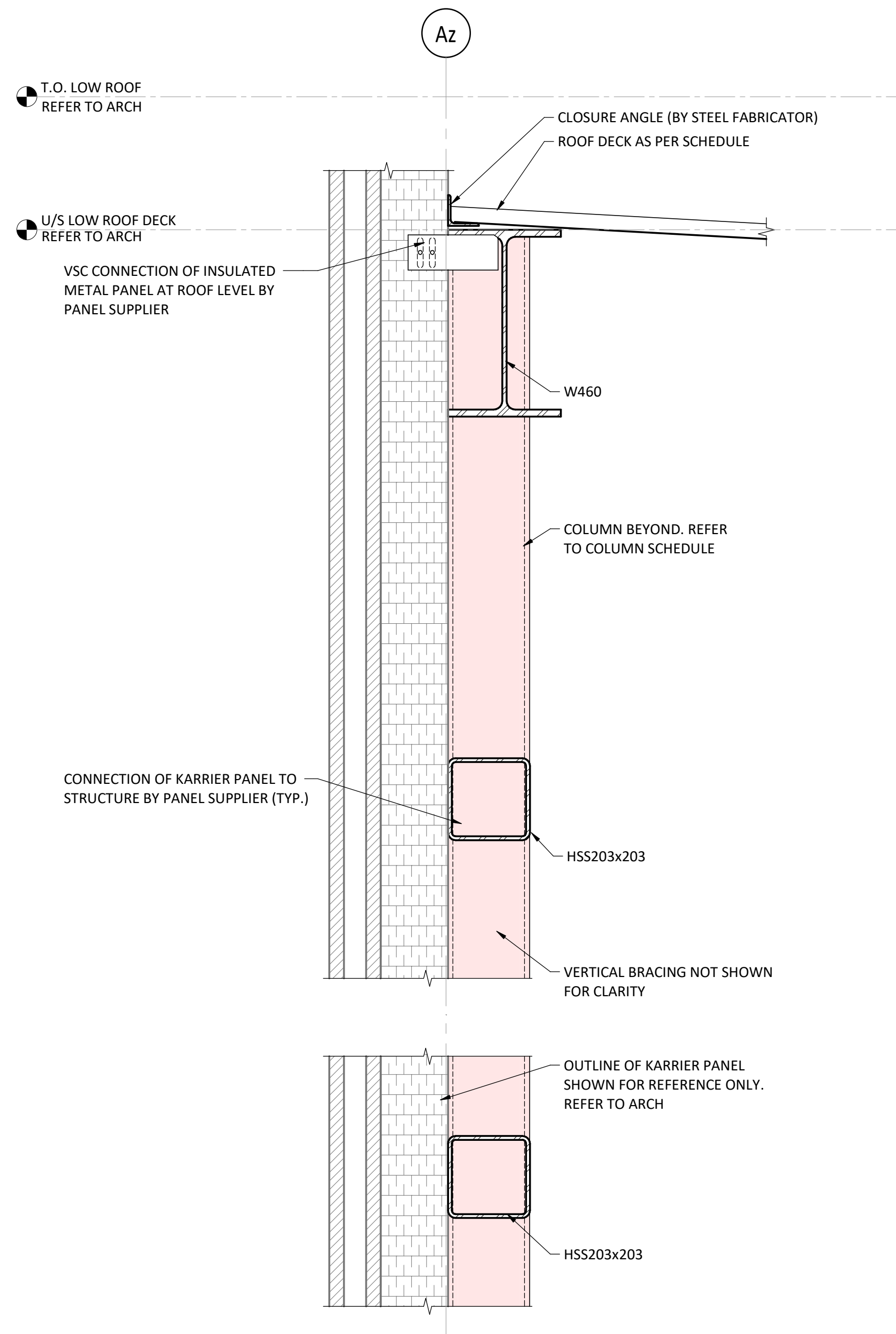
Project Team:  
Prime Consultant  
GEC ARCHITECTURE  
Structural Consultant  
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Mechanical Consultant  
Electrical Consultant  
Civil Consultant

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OWNER  
**York Region**

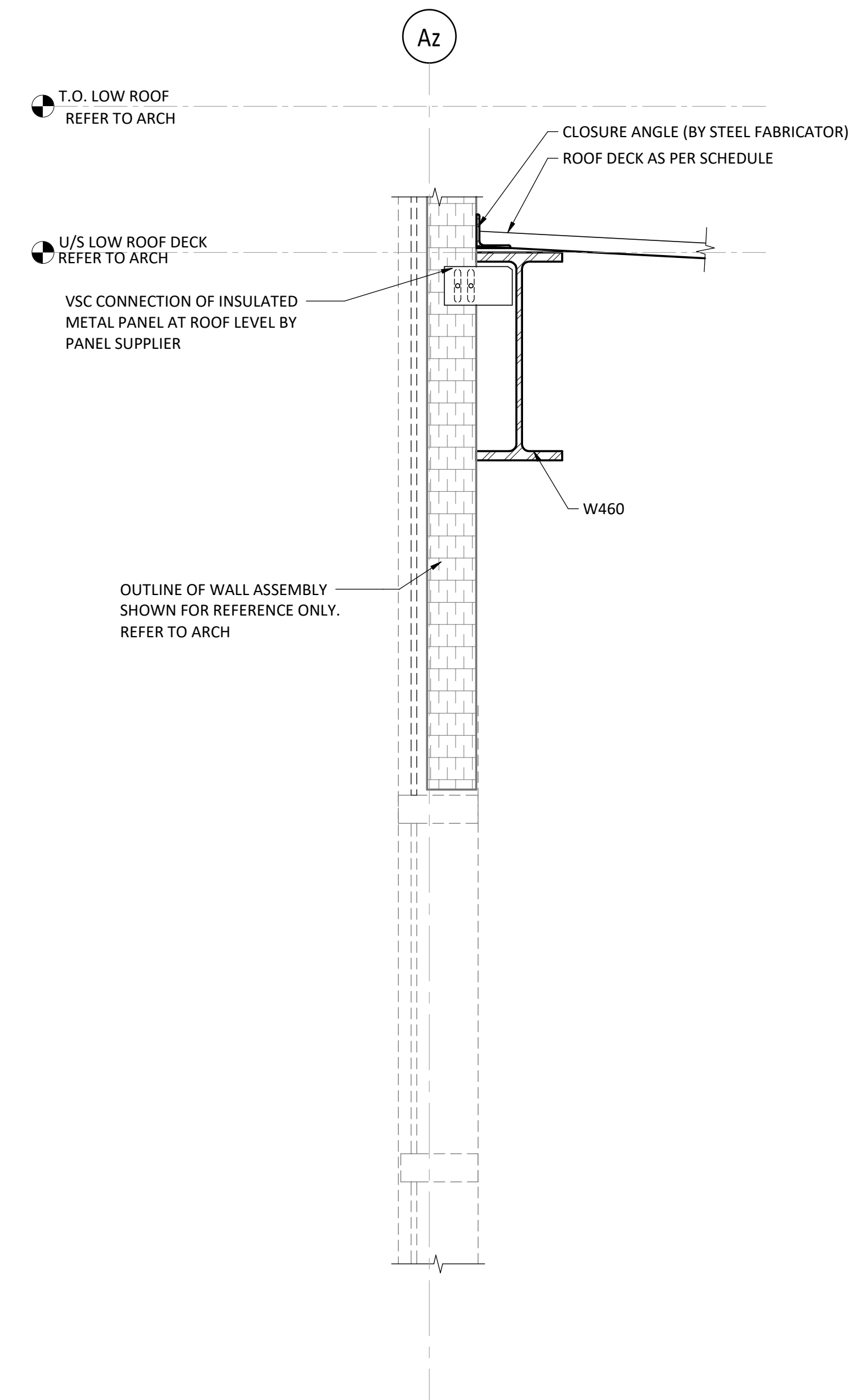
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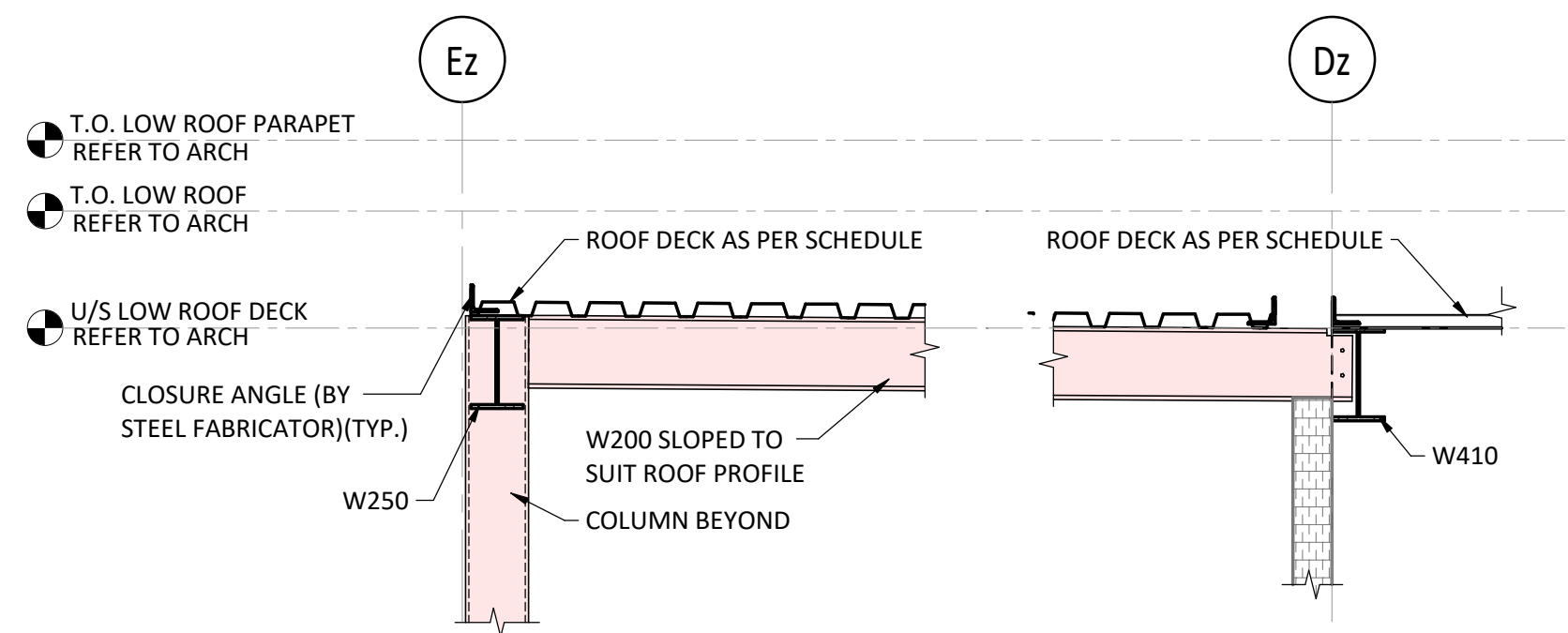
1  
S420  
1 : 10  
TYPICAL EXTERIOR WALL AT PROPOSED EXPANSION WINDOW



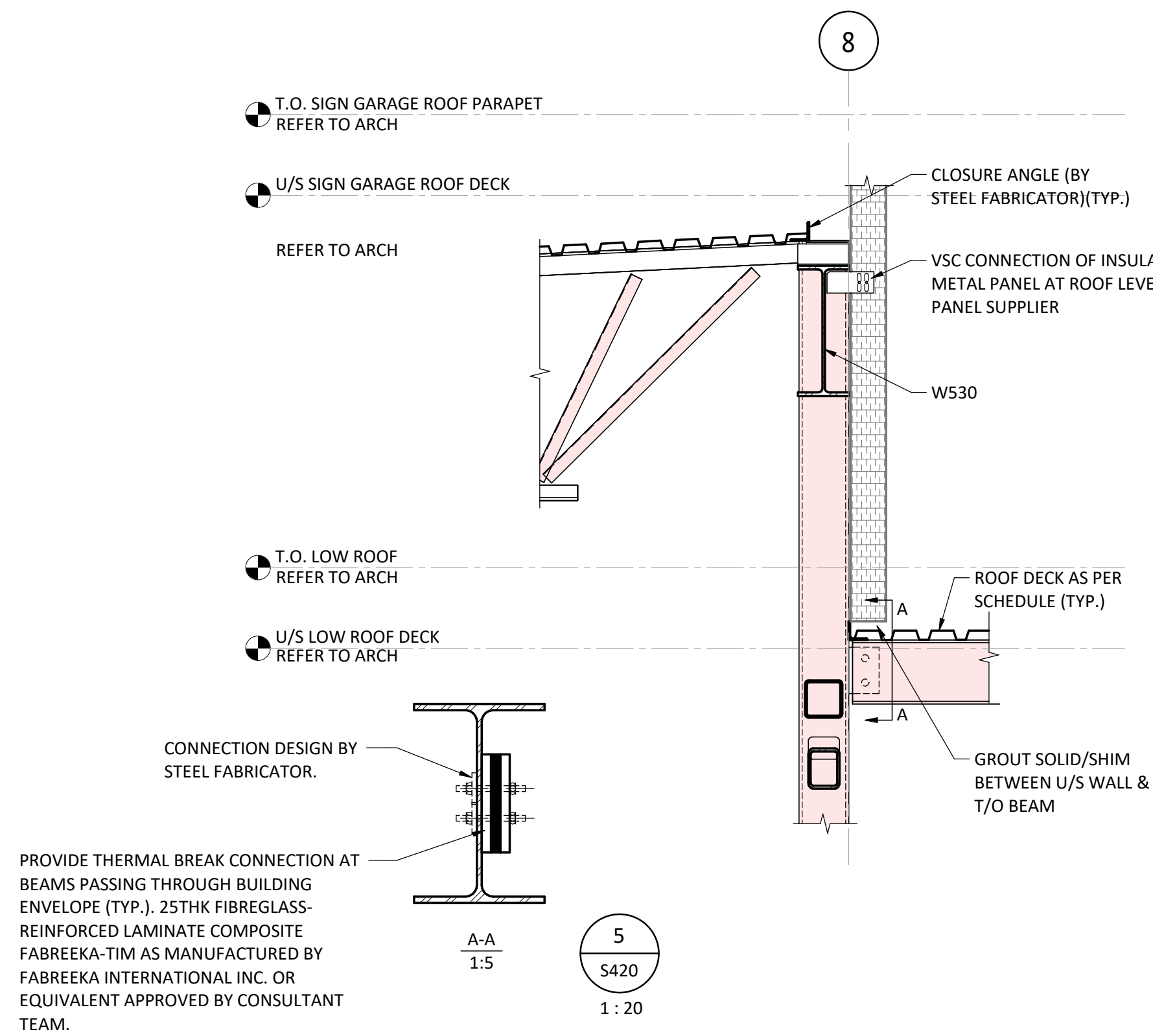
2  
S420  
1 : 10  
EXTERIOR WALL AT PROPOSED EXPANSION



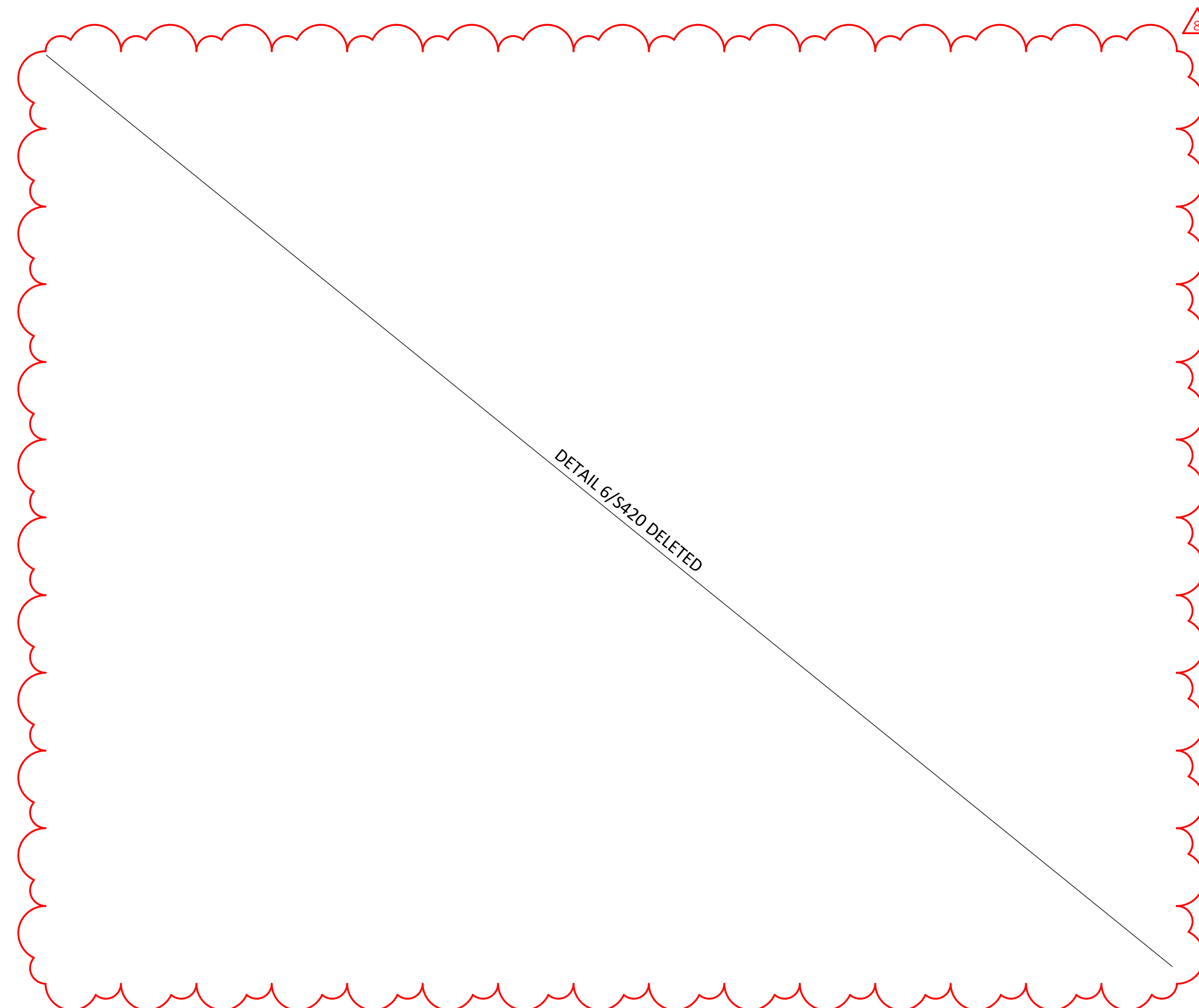
3  
S420  
1 : 10  
EXTERIOR GLAZED WALL AT EXPANSION



4  
S420  
1 : 20



5  
S420  
1 : 20



8	ISSUED FOR ADDENDUM 4	2025-07-18
7	REISSUED FOR TENDER	2025-05-23
6	ISSUED FOR TENDER	2025-04-25
5	ISSUED FOR COORDINATION	2025-04-17
4	ISSUED FOR BUILDING PERMIT REVIEW	2024-11-27
3	ISSUED FOR PRE TENDER	2024-10-31
2	ISSUED FOR 60% CD	2024-05-02
1	ISSUED FOR 100% DD	2024-02-29

NO.	ISSUED FOR	DATE
Scale	As indicated	Checked By HB
Region of York Project Number	Region of York Building Code	

Project  
York Region North Roads Operations Centre  
3525 Baseline Road  
Georgina, ON, L0E 1R0  
Drawing Title

FRAMING SECTIONS

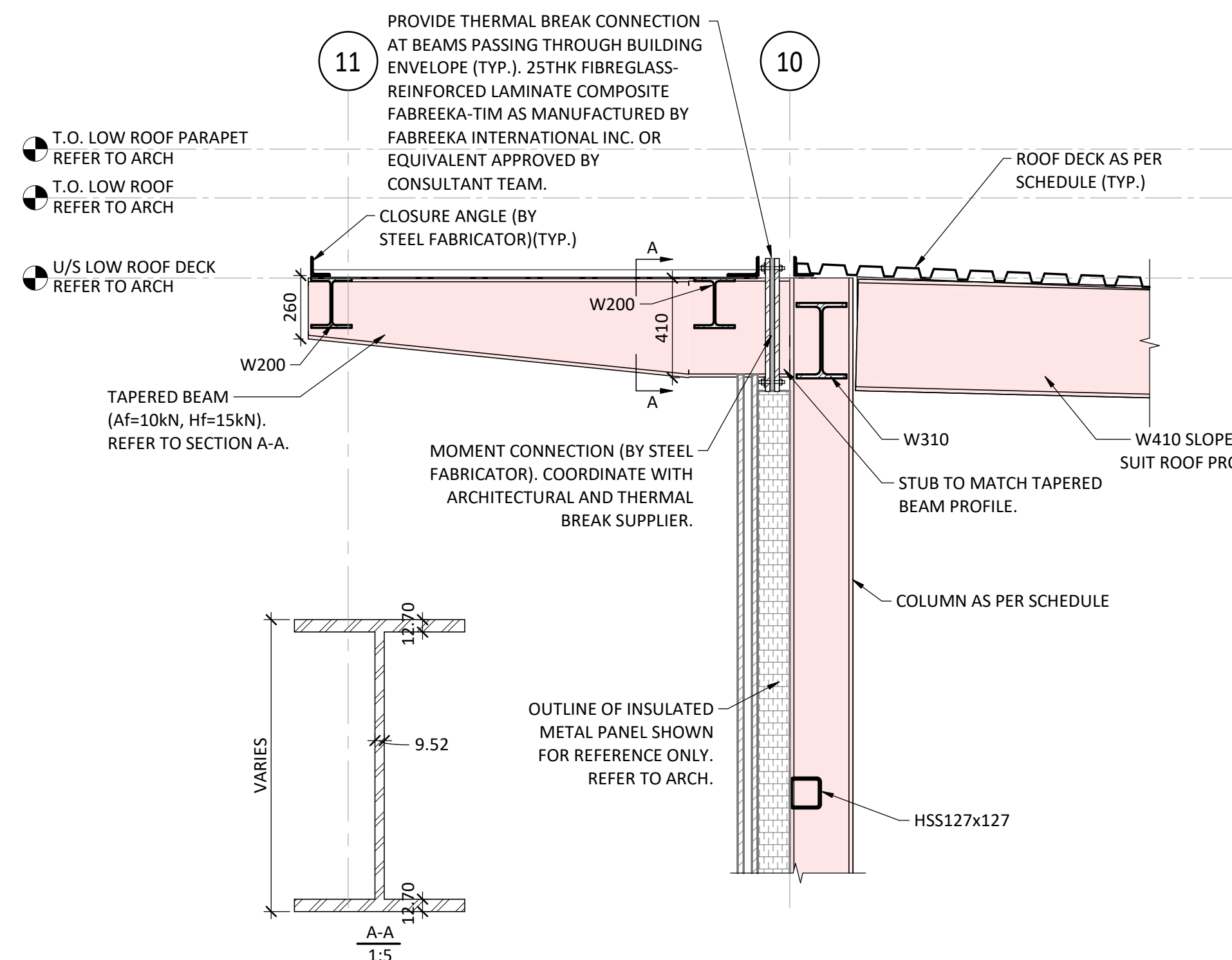
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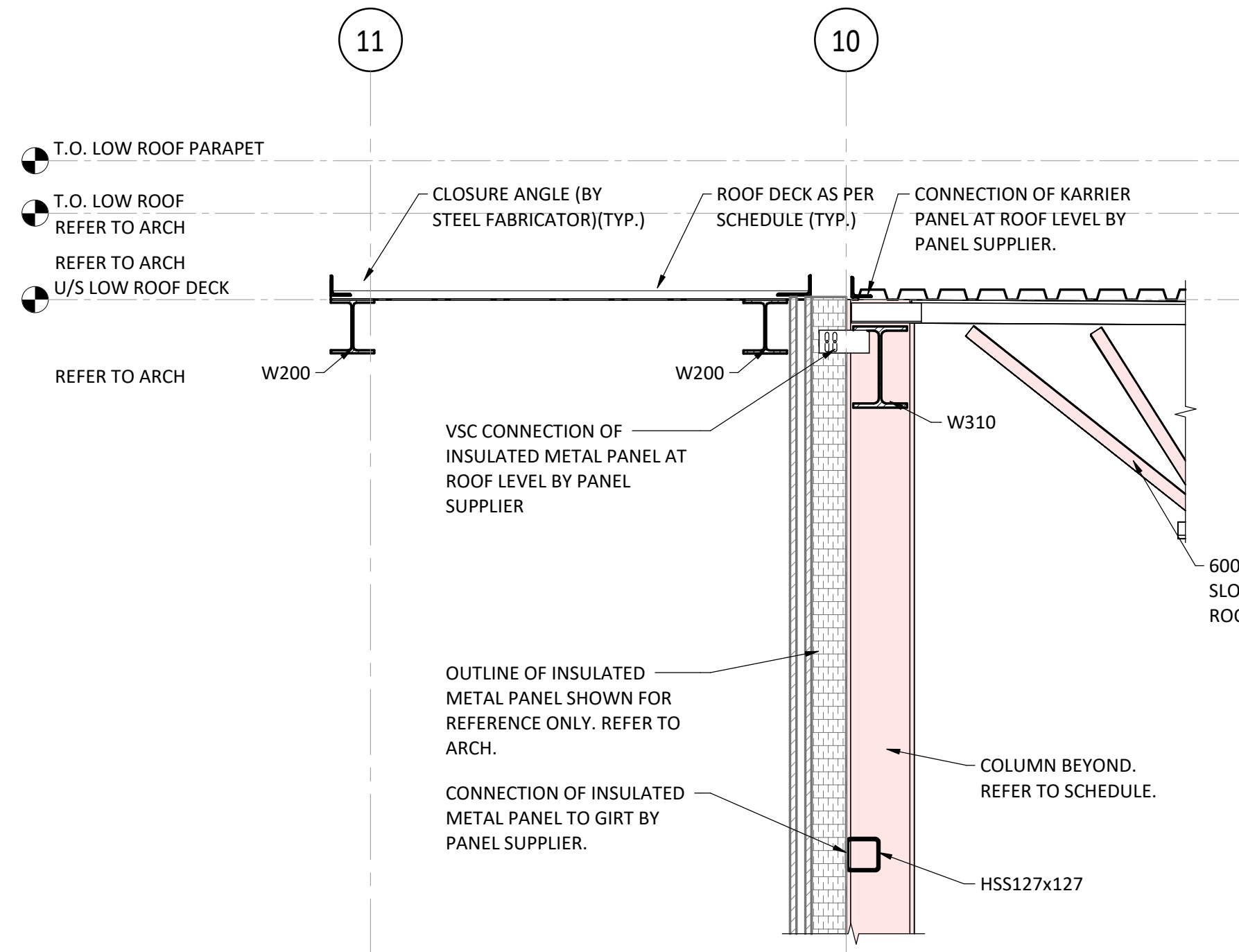
Project Team:  
Prime Consultant  
**GEC ARCHITECTURE**  
Structural Consultant  
**ENTUITIVE**  
Mechanical Consultant  
Electrical Consultant  
Civil Consultant

Client  
**OWNER**  
**York Region**

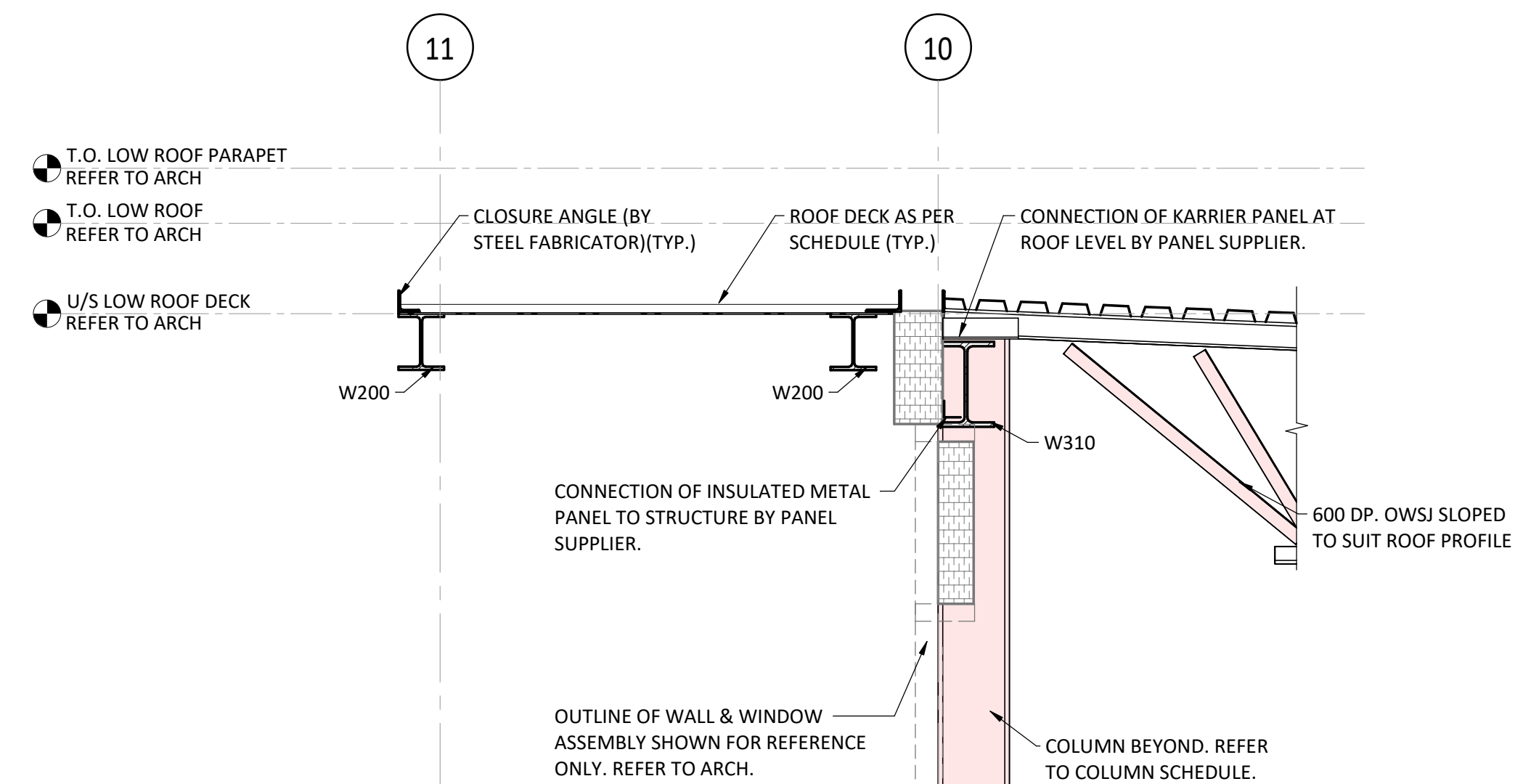
Seal & Permit



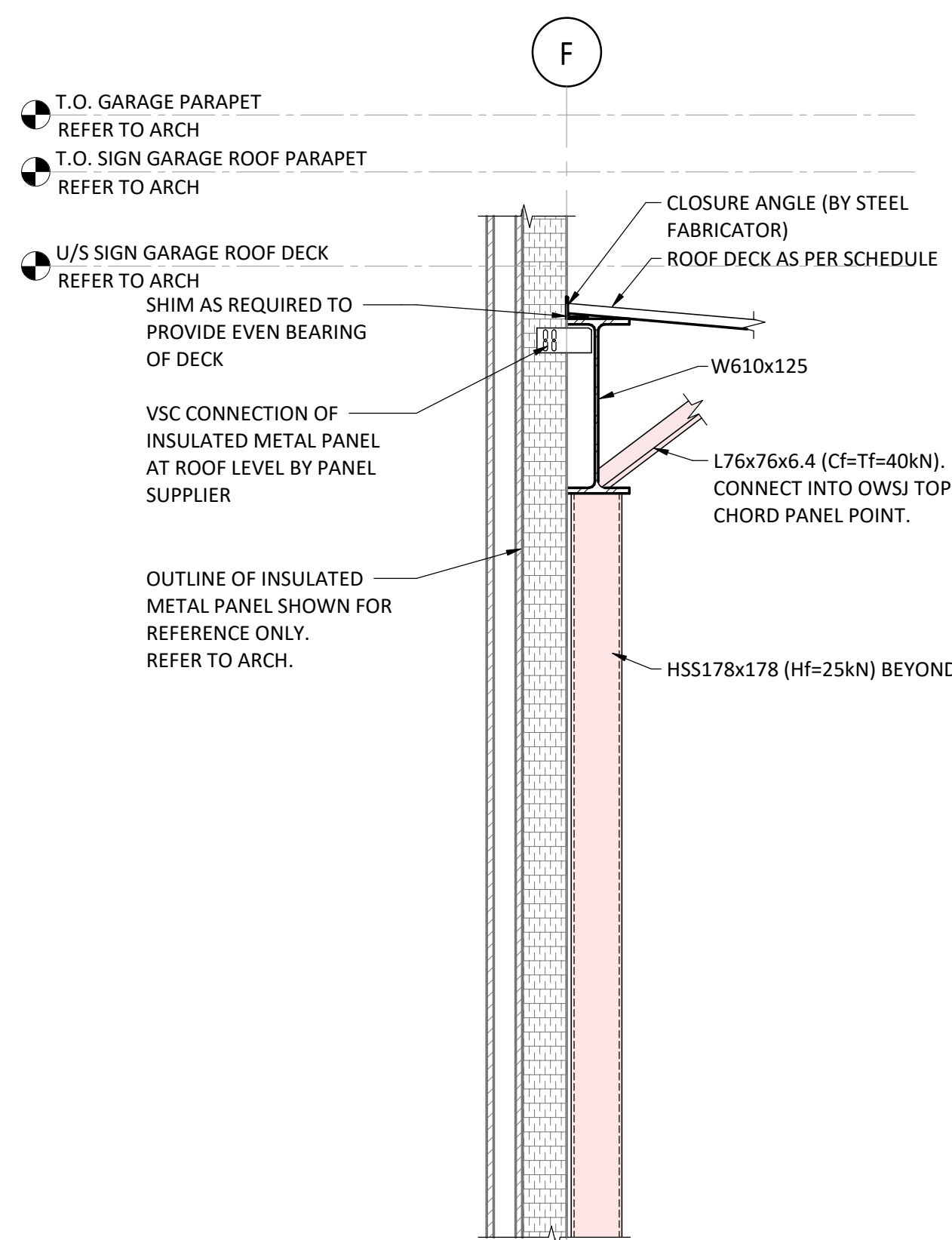
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TYPICAL CANOPY SECTION AT COLUMN



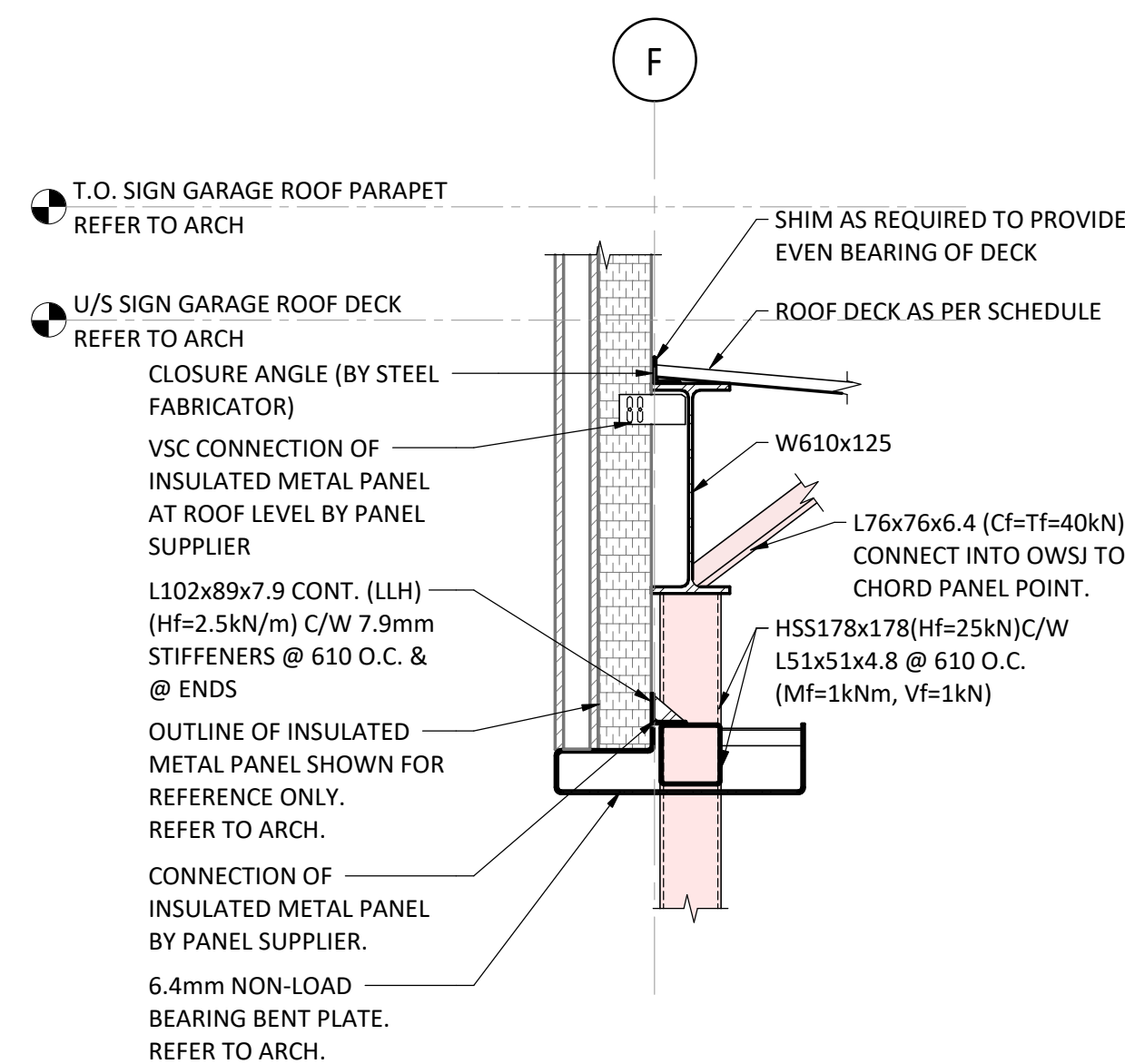
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TYPICAL CANOPY SECTION



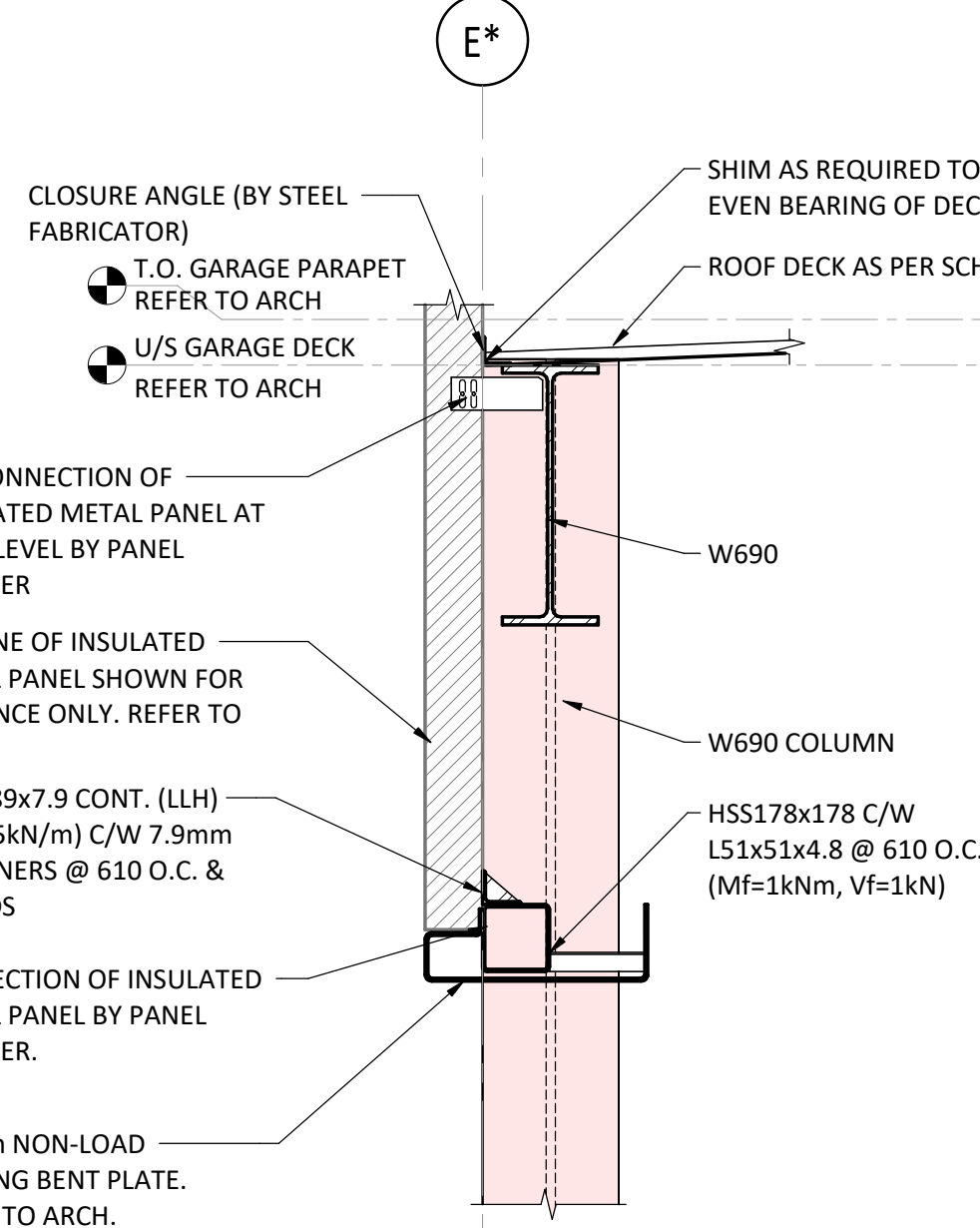
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CANOPY SECTION AT WINDOW



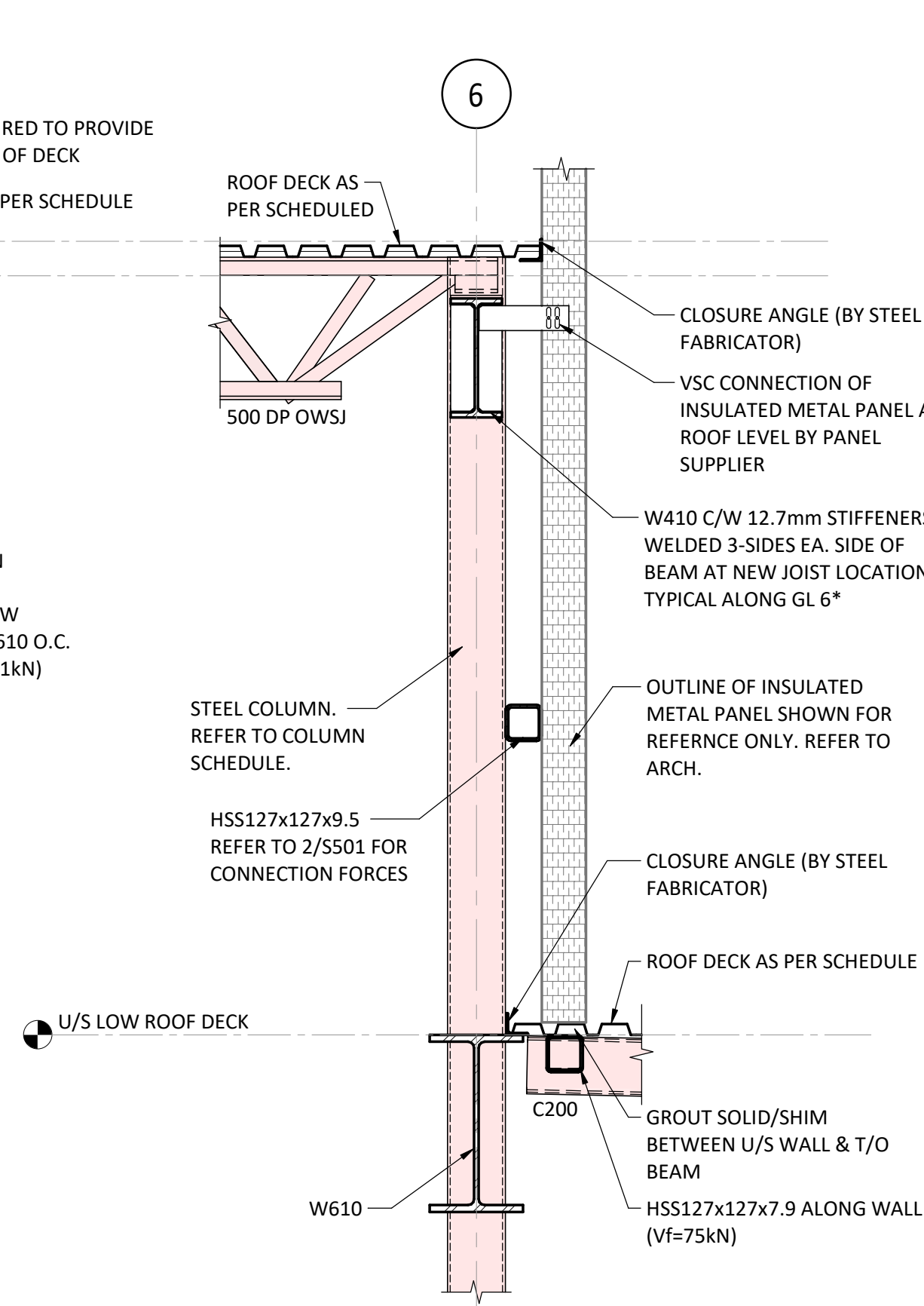
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EXTERIOR WALL SECTION AT SIGN GARAGE



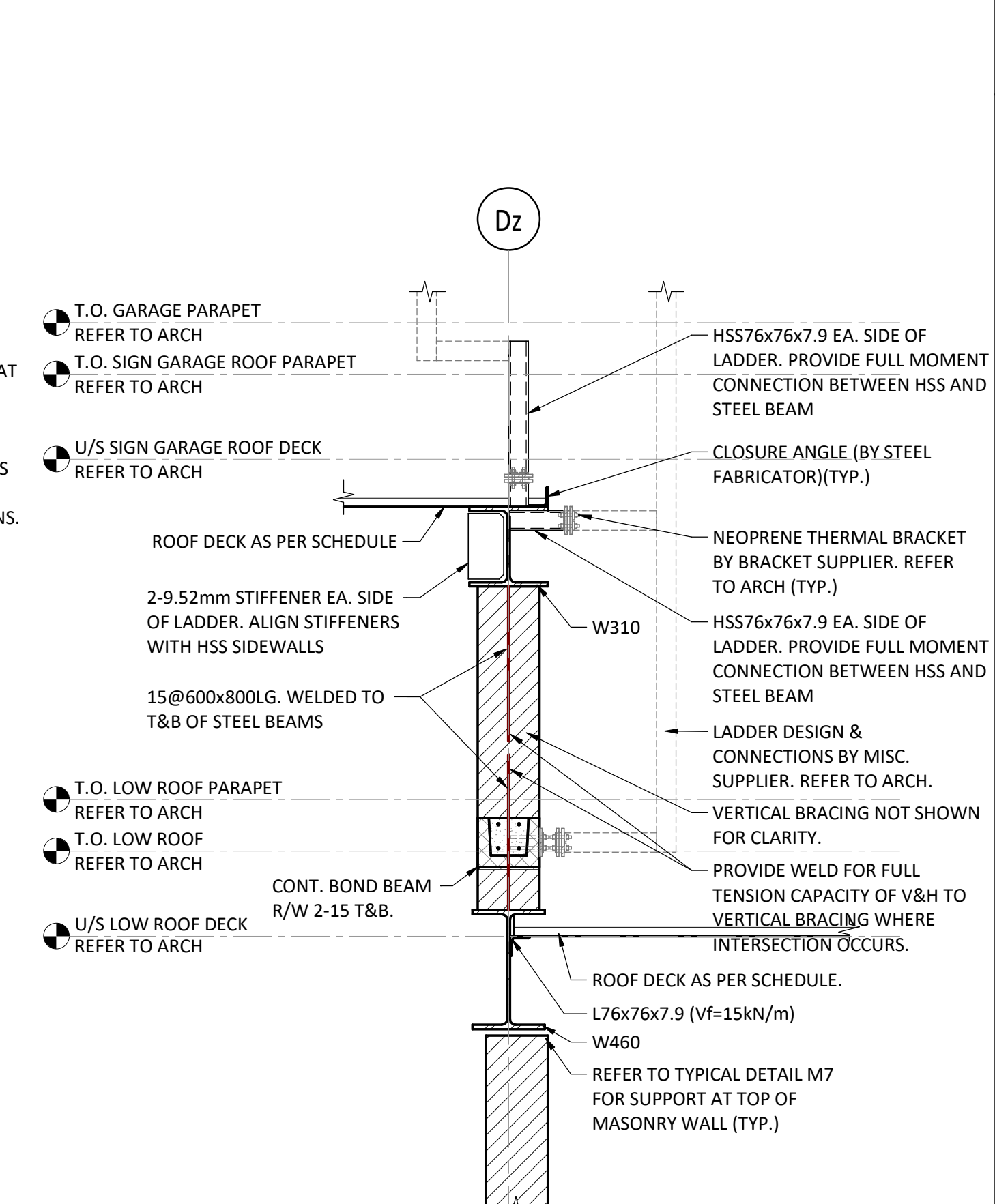
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S421  
1 : 20  
EXTERIOR WALL SECTION AT SIGN GARAGE



6  
S421  
1 : 20  
EXTERIOR WALL AT OH DOOR



7  
S421  
1 : 20



8  
S421  
1 : 20

7	REISSUED FOR TENDER	2025-05-23
6	ISSUED FOR TENDER	2025-04-25
5	ISSUED FOR COORDINATION	2025-04-17
4	ISSUED FOR BUILDING PERMIT	2024-11-27
3	ISSUED FOR PRE TENDER REVIEW	2024-10-31
2	ISSUED FOR 80% CD	2024-05-02
1	ISSUED FOR 100% DD	2024-02-29
NO.	ISSUED FOR	DATE

Scale	Checked By
1 : 20	HB
Region of York Project Number	Region of York Building Code

Project  
**York Region North Roads Operations Centre**  
3525 Baseline Road  
Georgina, ON, L0E 1R0  
Drawing Title

FRAMING SECTIONS

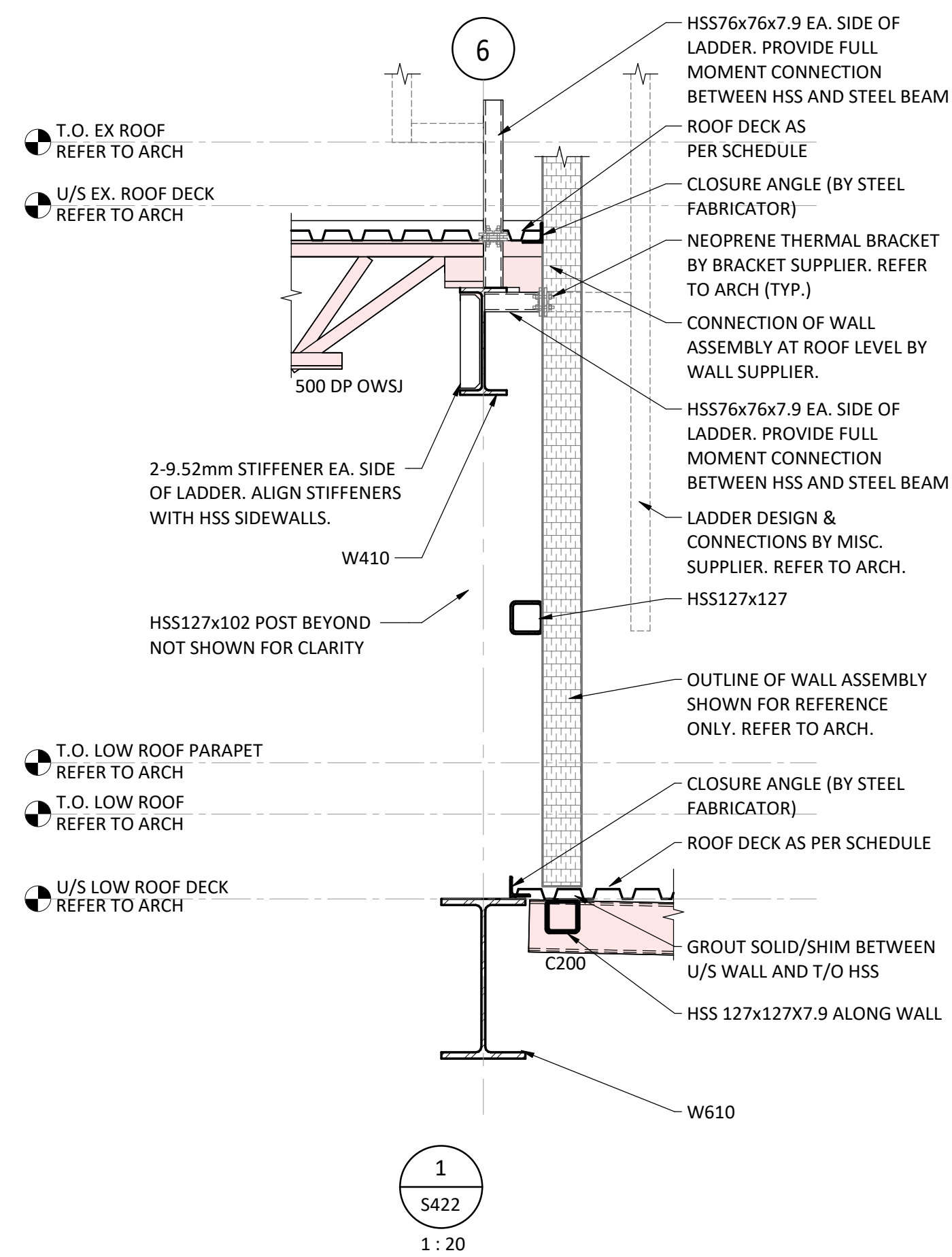
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EN023-01007  
Drawing Number  
**S421**



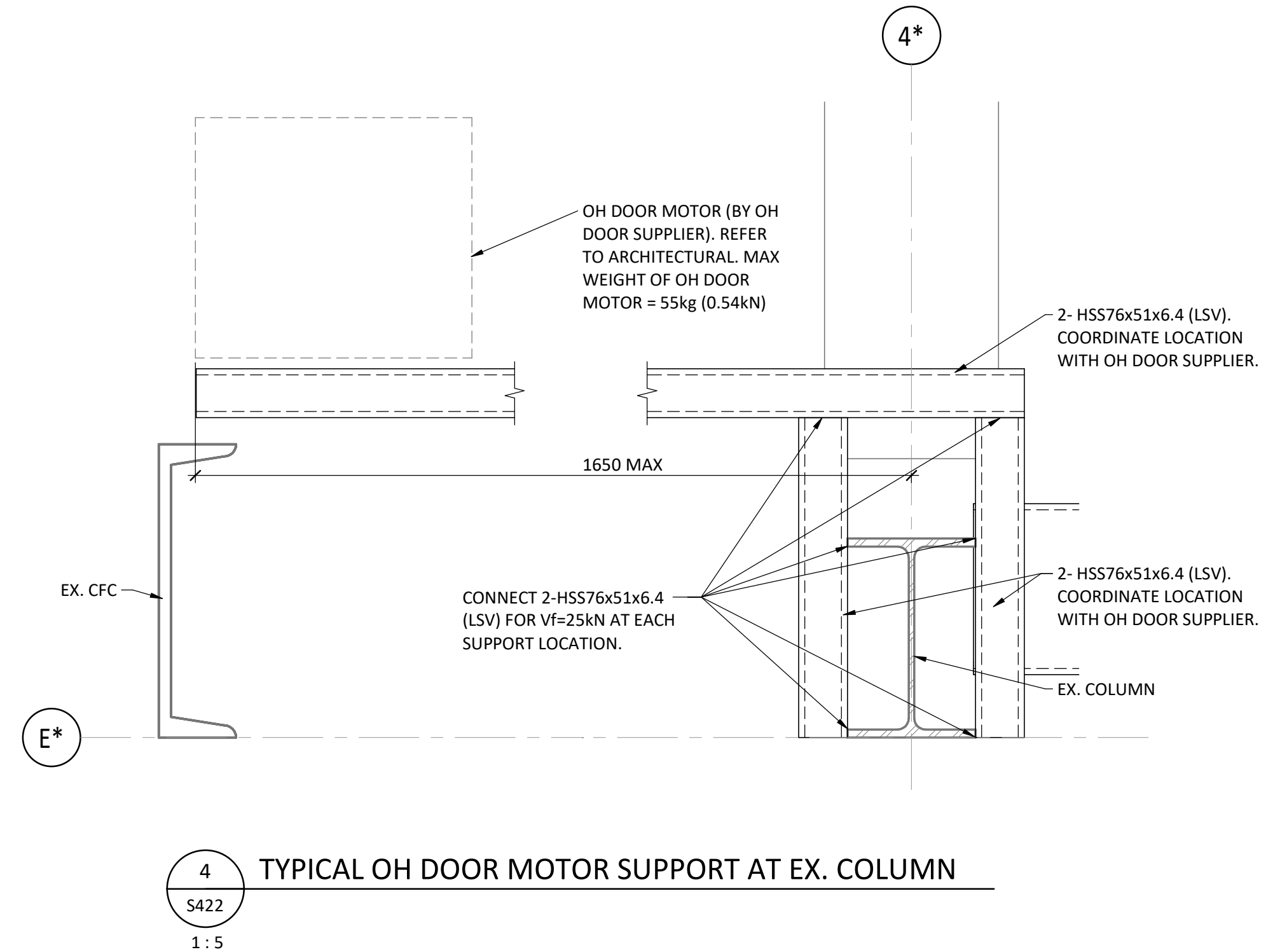
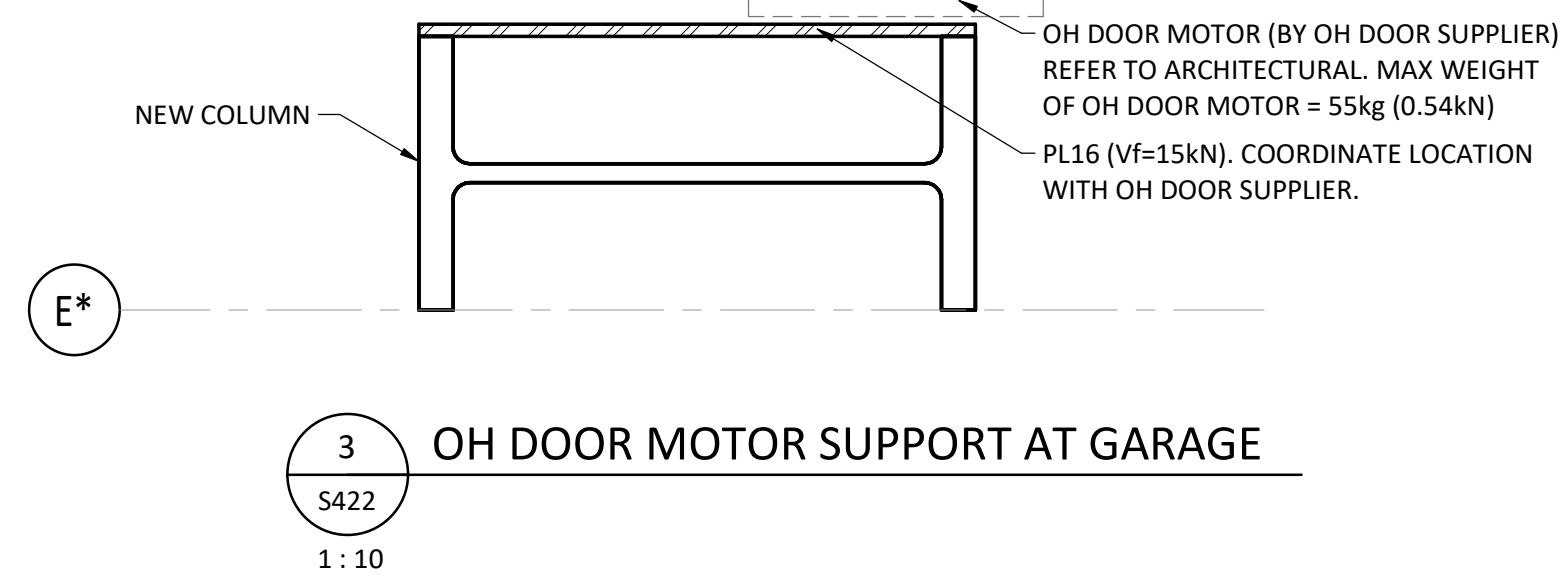
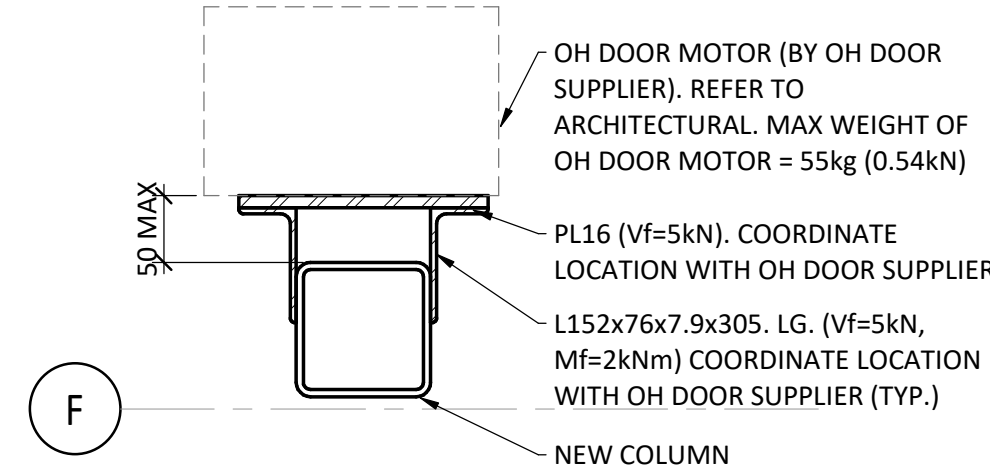
Project Team:  
Prime Consultant  
**GEC ARCHITECTURE**  
Structural Consultant  
**ENTUITIVE**  
Mechanical Consultant  
Electrical Consultant  
Civil Consultant

Client  
**OWNER**  
**York Region**

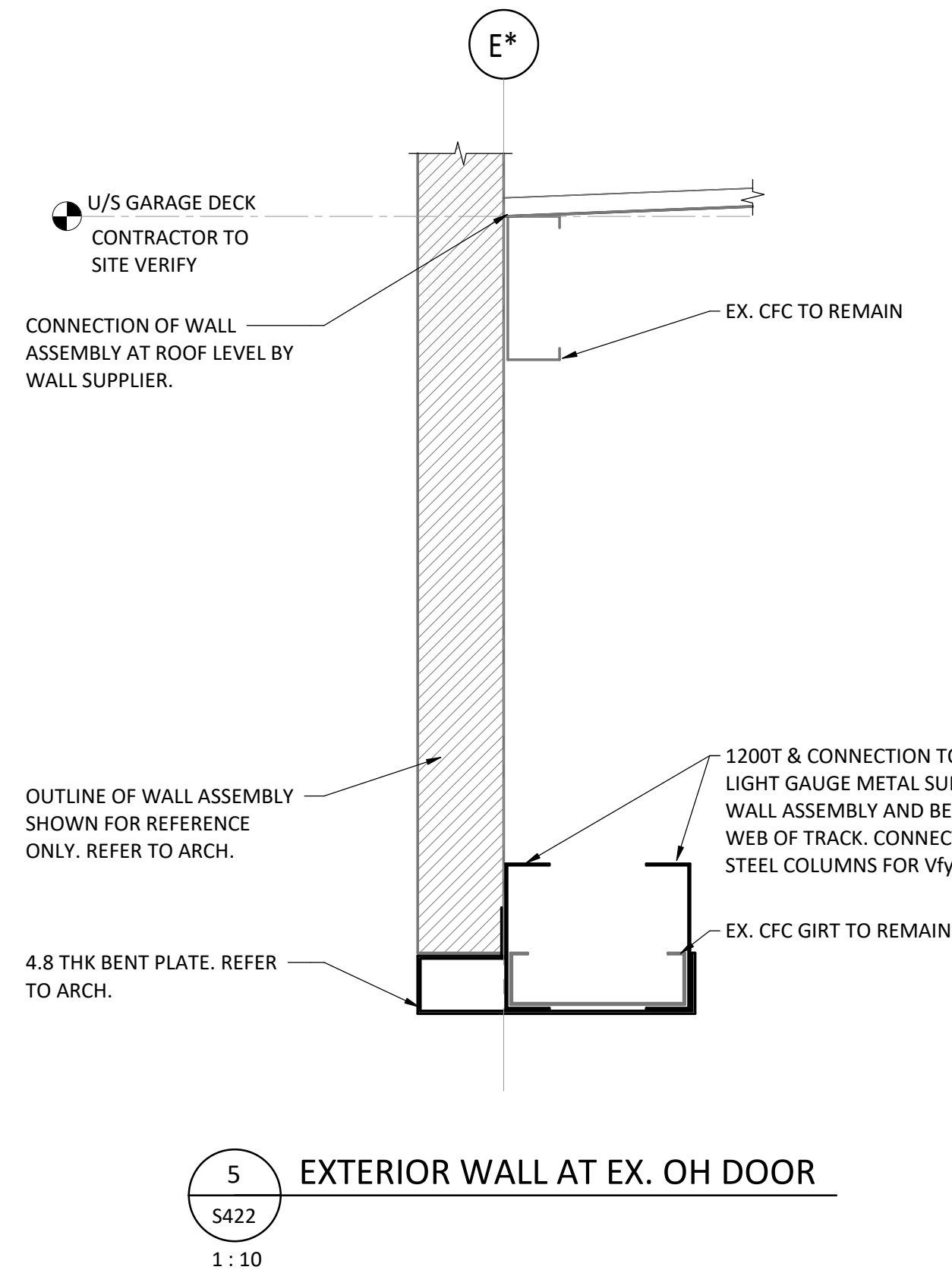
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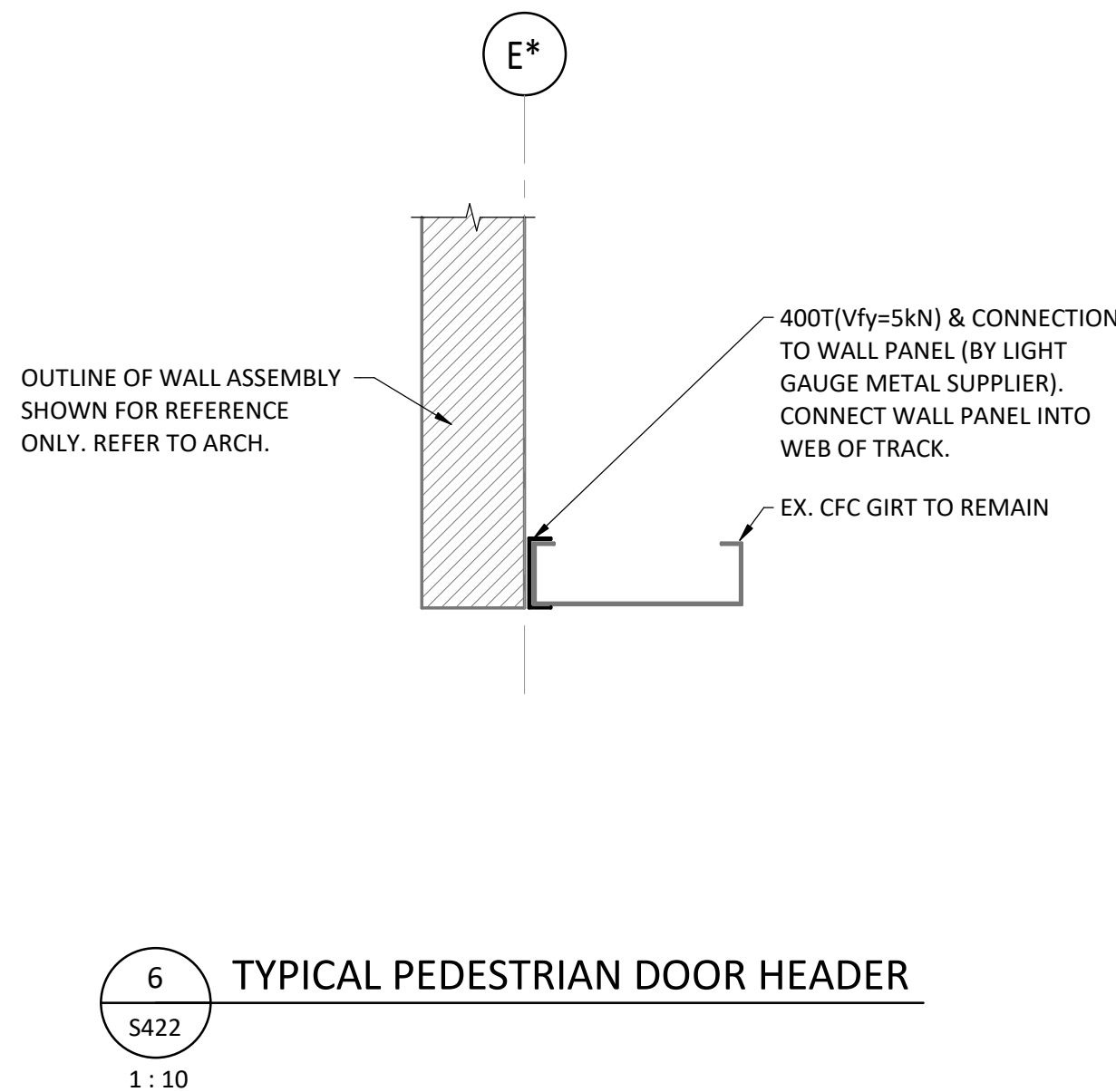
2 SIGN GARAGE OH DOOR HEAD - SECTION  
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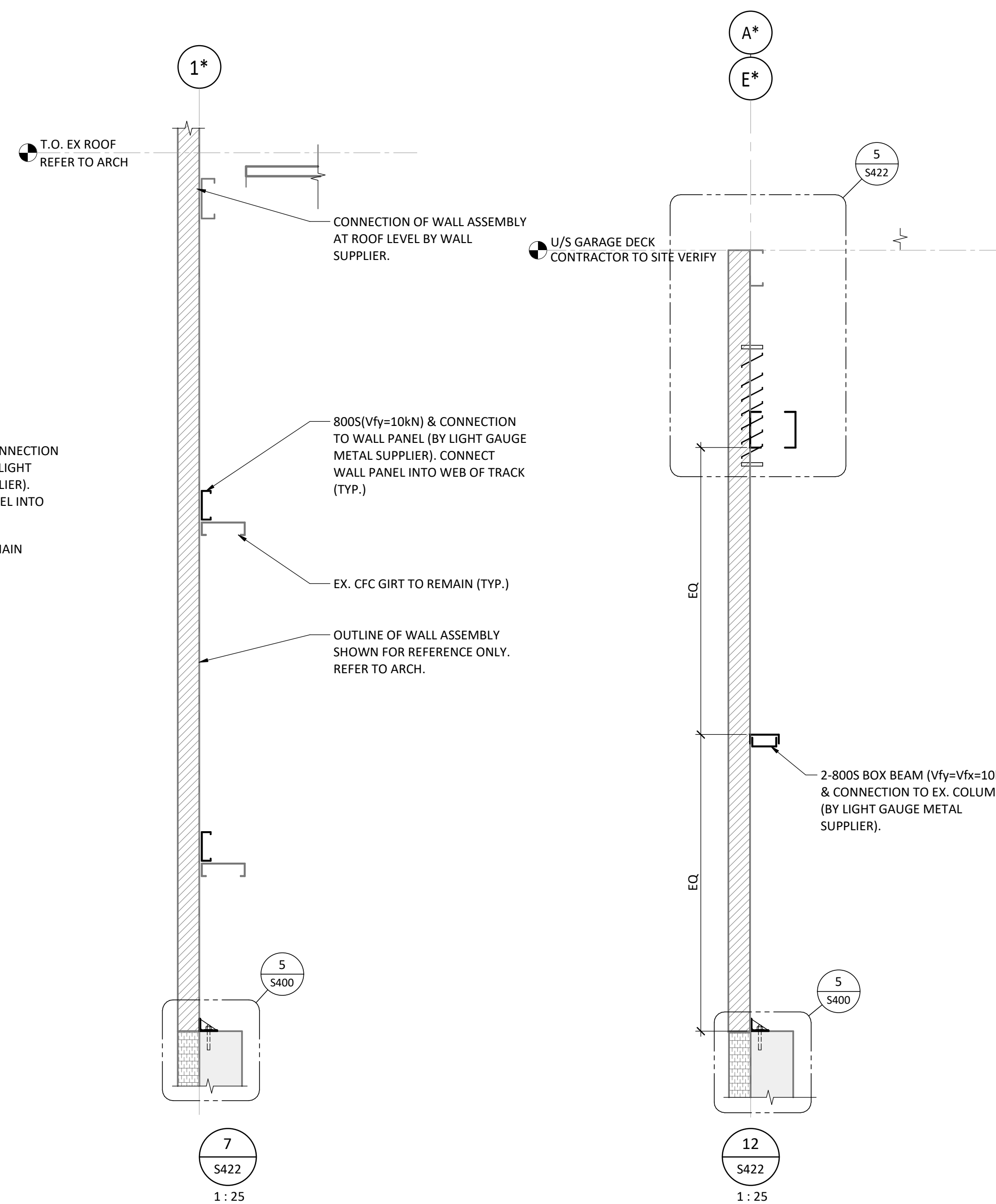
4 TYPICAL OH DOOR MOTOR SUPPORT AT EX. COLUMN  
S422  
1:5



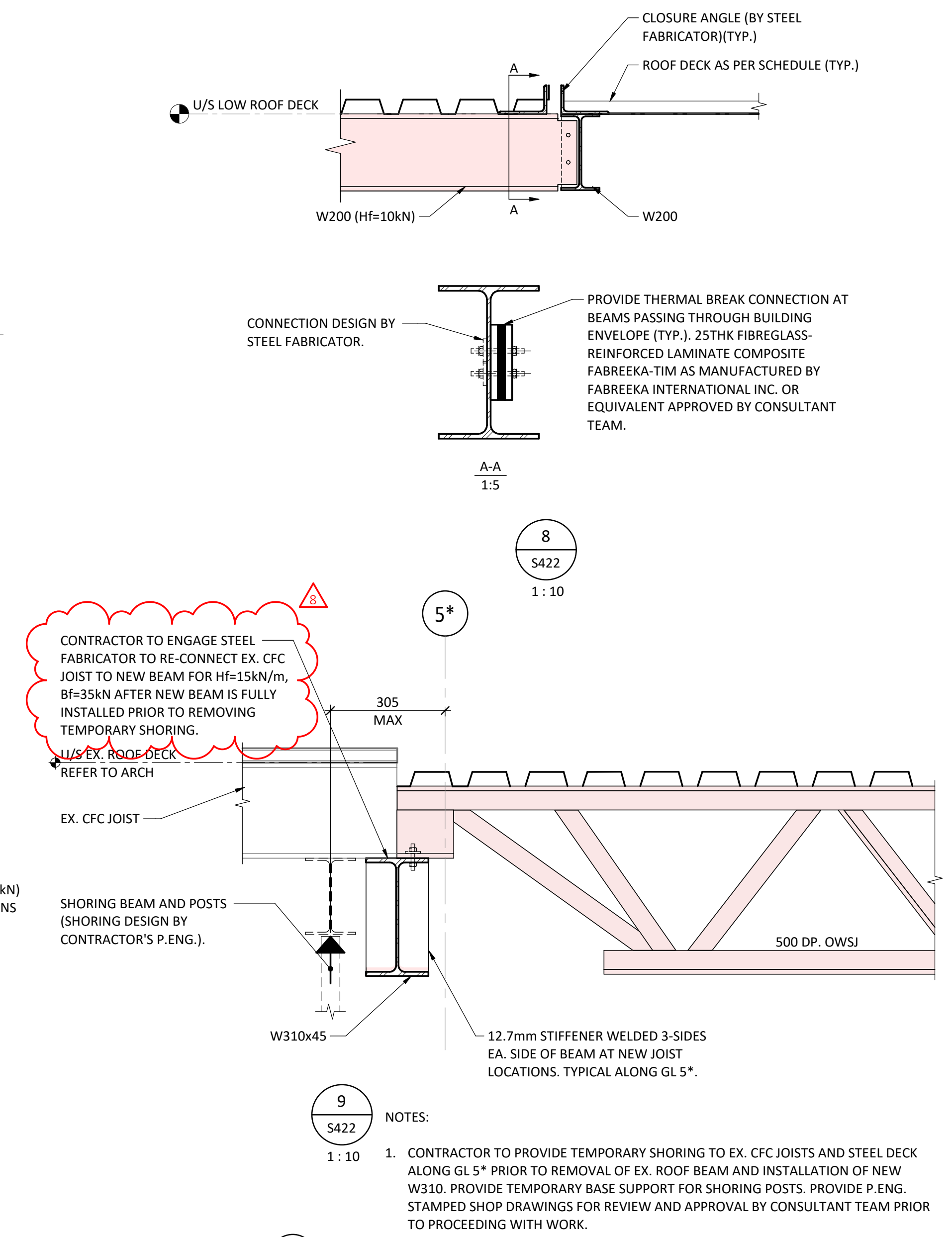
5 EXTERIOR WALL AT EX. OH DOOR  
S422  
1:10



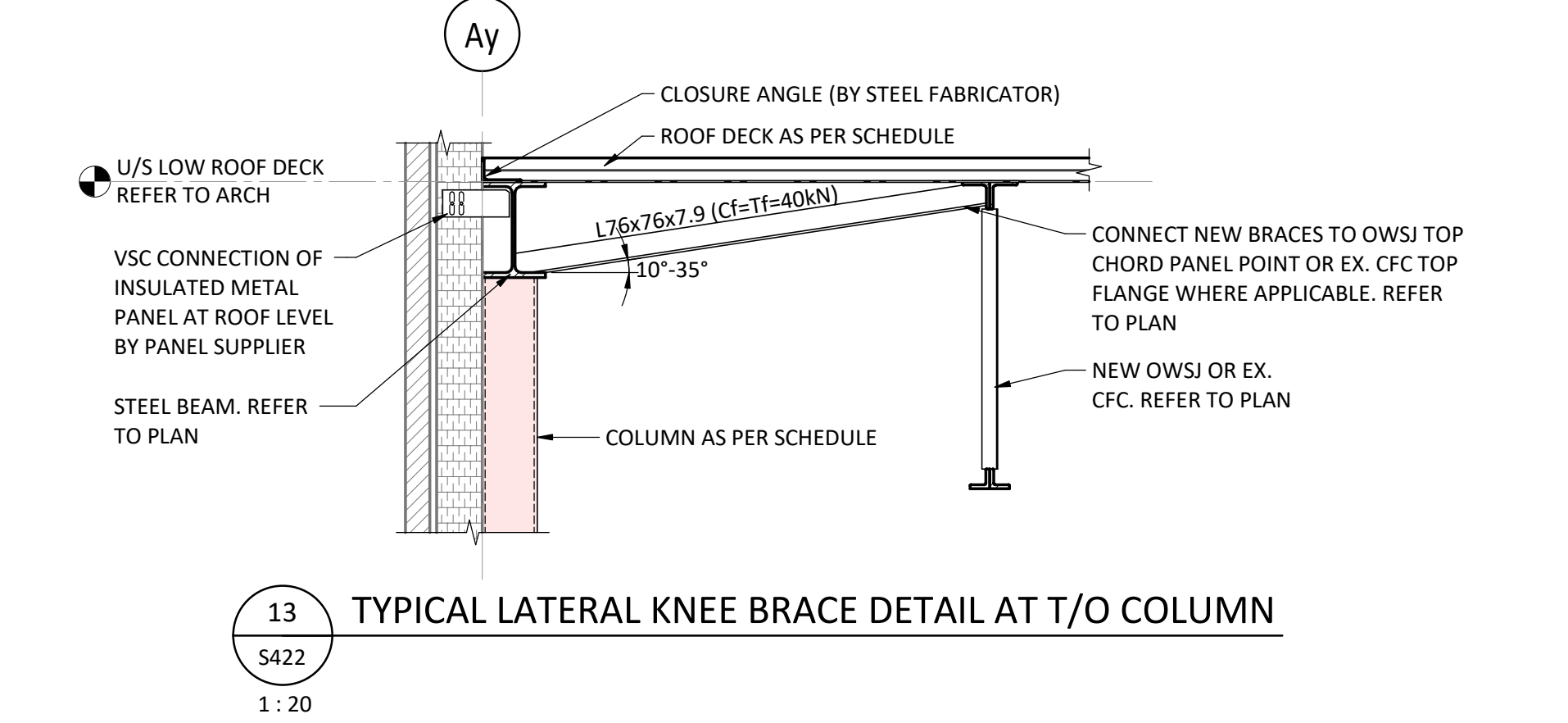
6 TYPICAL PEDESTRIAN DOOR HEADER  
S422  
1:10



7 EXTERIOR WALL AT EX. OH DOOR  
S422  
1:25



8 TYPICAL PEDESTRIAN DOOR HEADER  
S422  
1:10



13 TYPICAL LATERAL KNEE BRACE DETAIL AT T/O COLUMN  
S422  
1:20

8	ISSUED FOR ADDENDUM 4	2025-07-18
7	REISSUED FOR TENDER	2025-05-23
6	ISSUED FOR TENDER	2025-04-25
5	ISSUED FOR COORDINATION	2025-04-17
4	ISSUED FOR BUILDING PERMIT REVIEW	2024-11-27
3	ISSUED FOR PRE TENDER REVIEW	2024-10-31
2	ISSUED FOR 60% CD	2024-05-02
1	ISSUED FOR 100% DD	2024-02-29

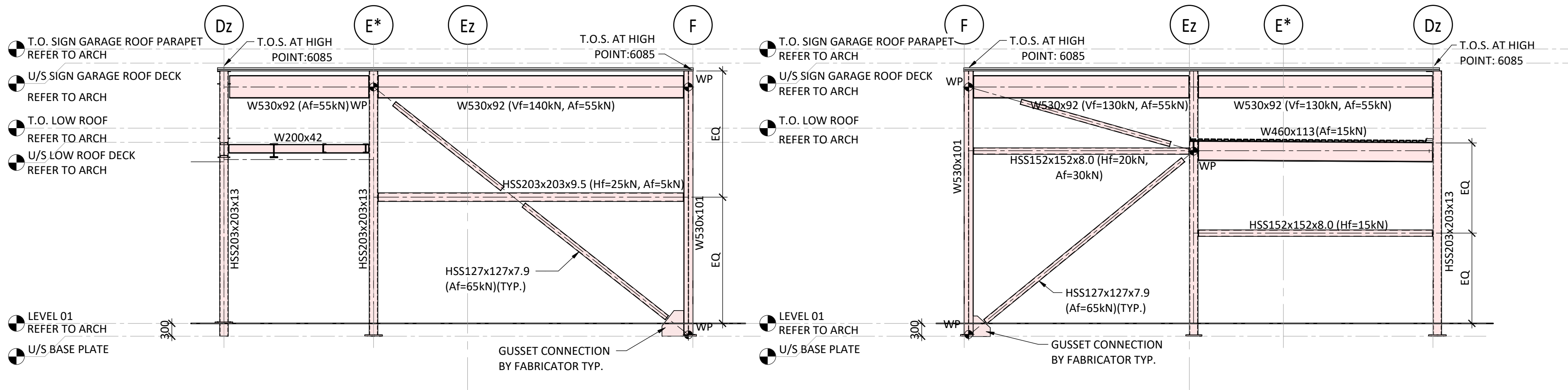
NO.	ISSUED FOR	DATE
As indicated	HB	

Project  
**York Region North Roads Operations Centre**  
3525 Baseline Road  
Georgina, ON, L0E 1R0  
Drawing Title

Project Number  
EN023-01007  
Drawing Number  
**S422**

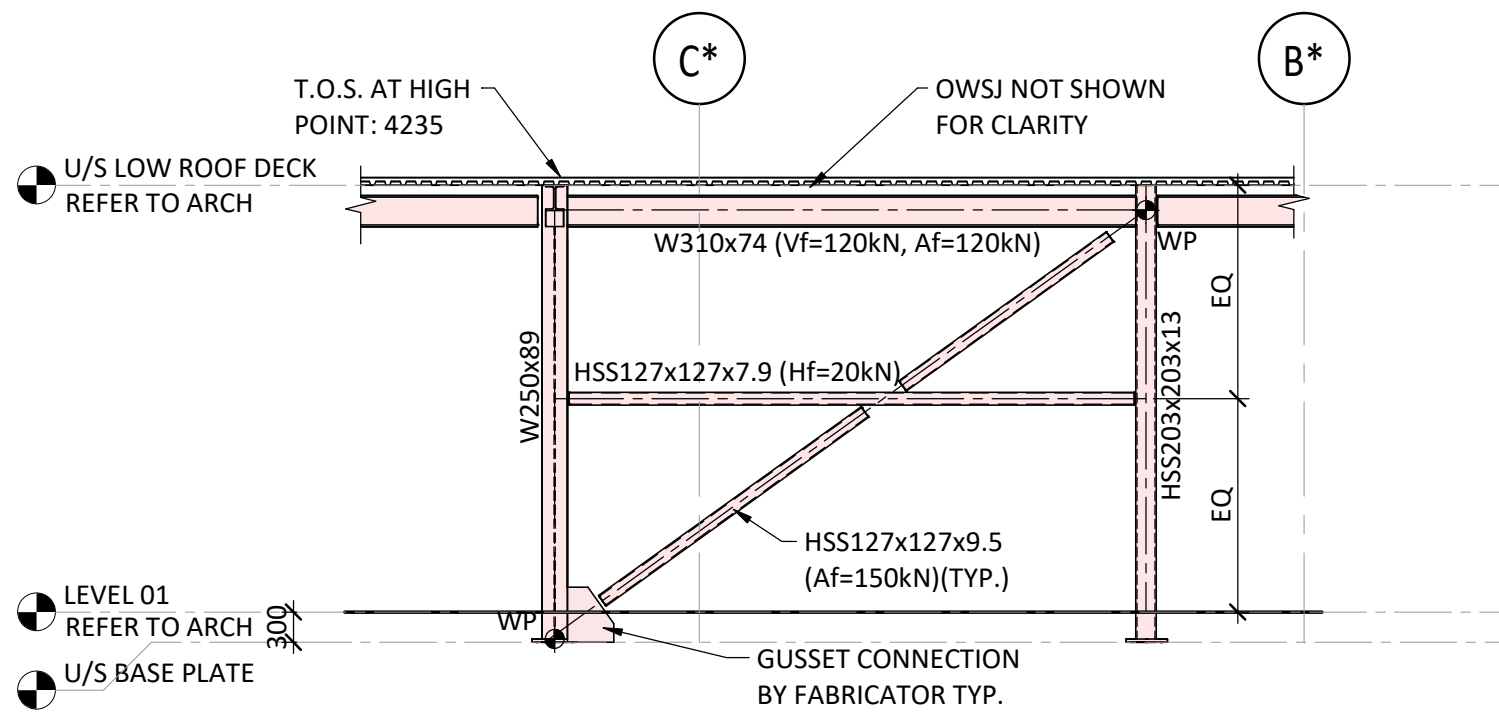
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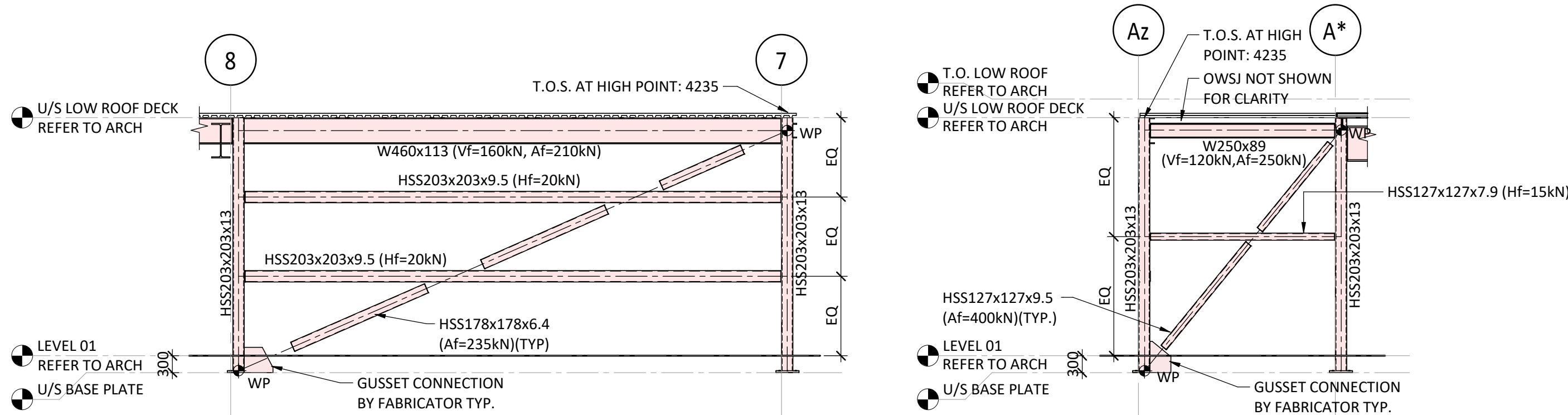


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S500  
1 : 75

2 Elevation 2 - SIGN GARAGE  
S500  
1 : 75

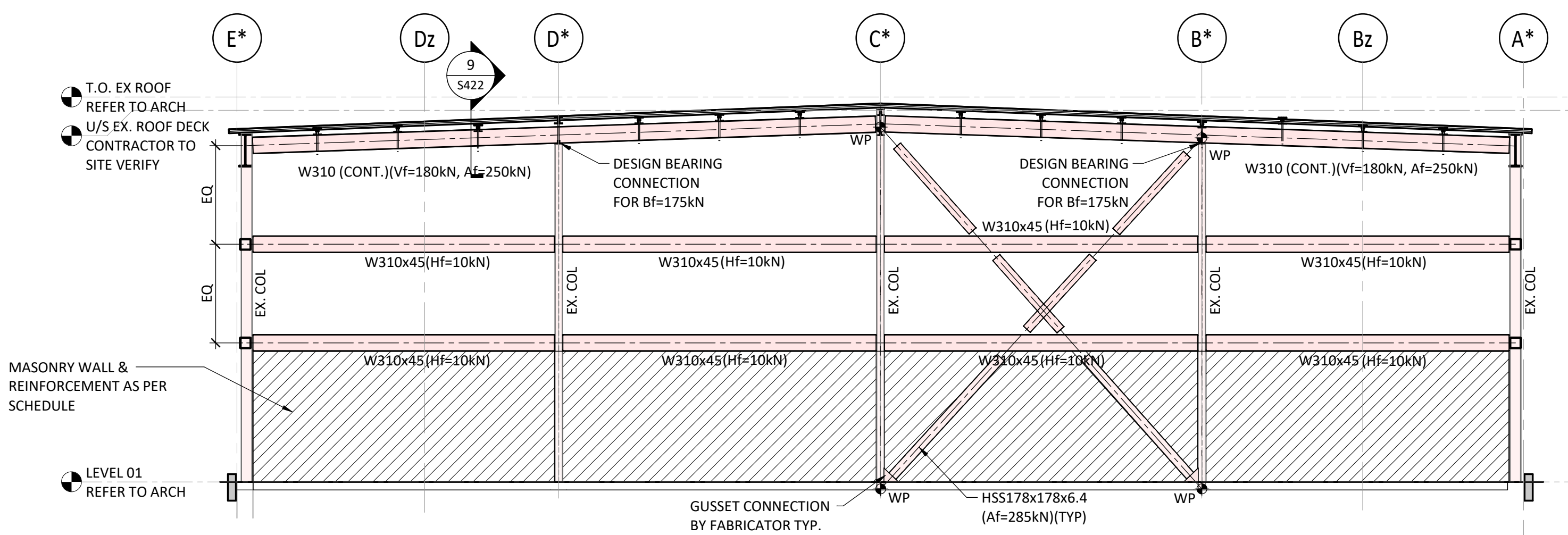


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S500  
1 : 75

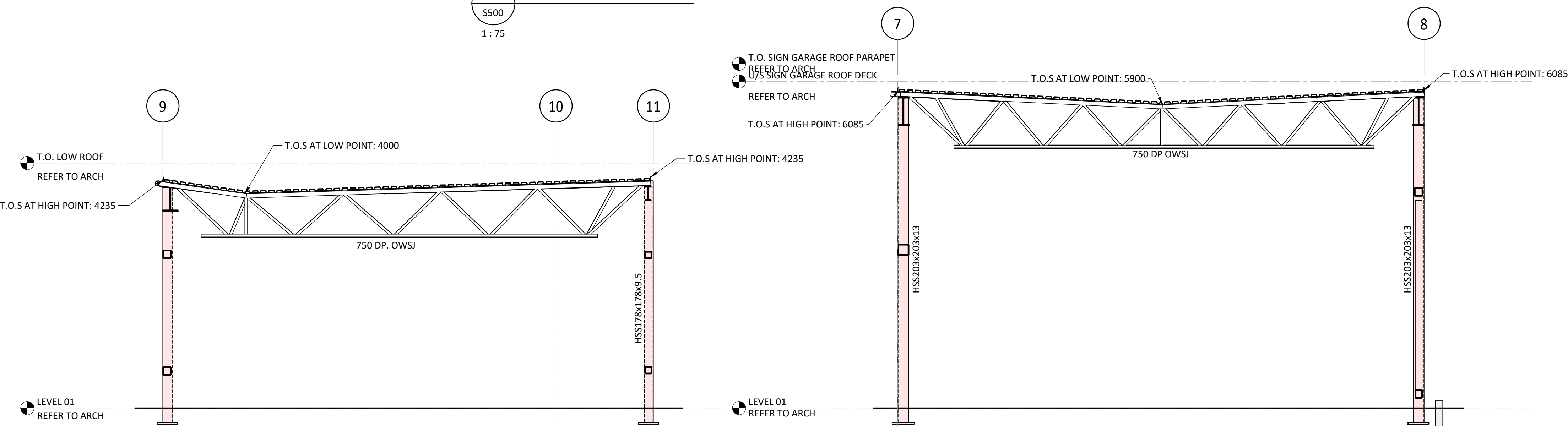
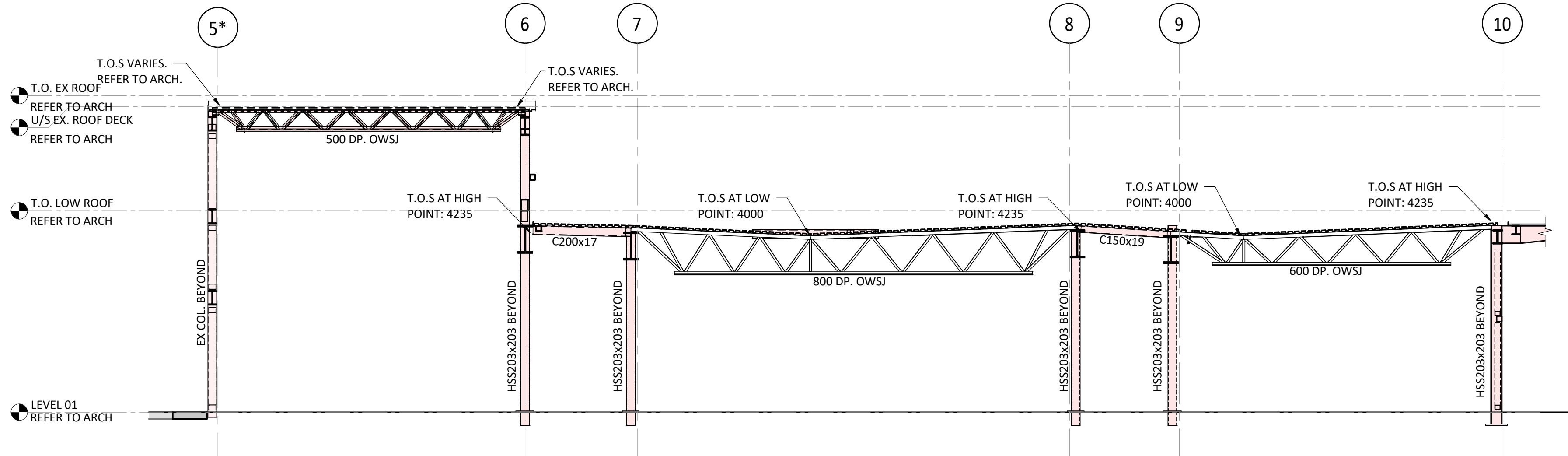


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5 Elevation 6 - LOW ROOF  
S500  
1 : 75

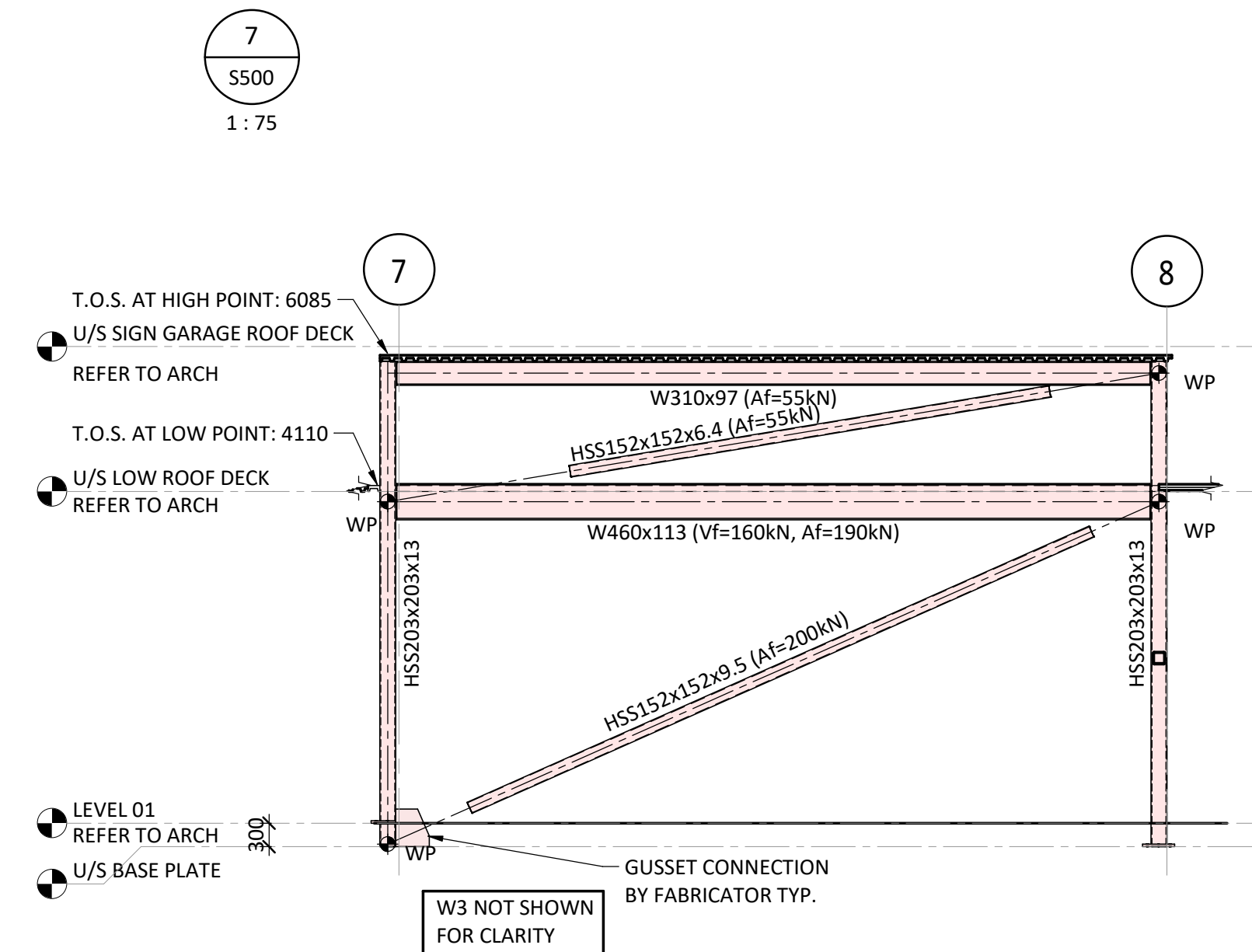


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8  
S500  
1 : 50

9  
S500  
1 : 50



10 Elevation 3 - SIGN GARAGE  
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1 : 75

6	REISSUED FOR TENDER	2025-05-23
5	ISSUED FOR TENDER	2025-04-25
4	ISSUED FOR COORDINATION	2025-04-17
3	ISSUED FOR BUILDING PERMIT REVIEW	2024-11-27
2	ISSUED FOR PRE TENDER REVIEW	2024-10-31
1	ISSUED FOR 60% CD	2024-05-02

NO.	ISSUED FOR	DATE
Scale	As indicated	Checked By HB
Region of York Project Number	Region of York Building Code	

Project  
York Region North Roads Operations Centre  
3525 Baseline Road  
Georgina, ON, L0E 1R0  
Drawing Title

ELEVATIONS

Project Number EN023-01007  
Drawing Number S500

Project Team:  
Prime Consultant  
GEC ARCHITECTURE  
Structural Consultant  
ENTUITIVE  
Mechanical Consultant  
Electrical Consultant  
Civil Consultant

Client  
OWNER  


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6	ISSUED FOR ADDENDUM 4	2025-07-18
5	REISSUED FOR TENDER	2025-05-23
4	ISSUED FOR TENDER	2025-04-25
3	ISSUED FOR COORDINATION	2025-04-17
2	ISSUED FOR BUILDING PERMIT REVIEW	2024-11-27
1	ISSUED FOR PRE TENDER REVIEW	2024-10-31

NO.	ISSUED FOR	DATE
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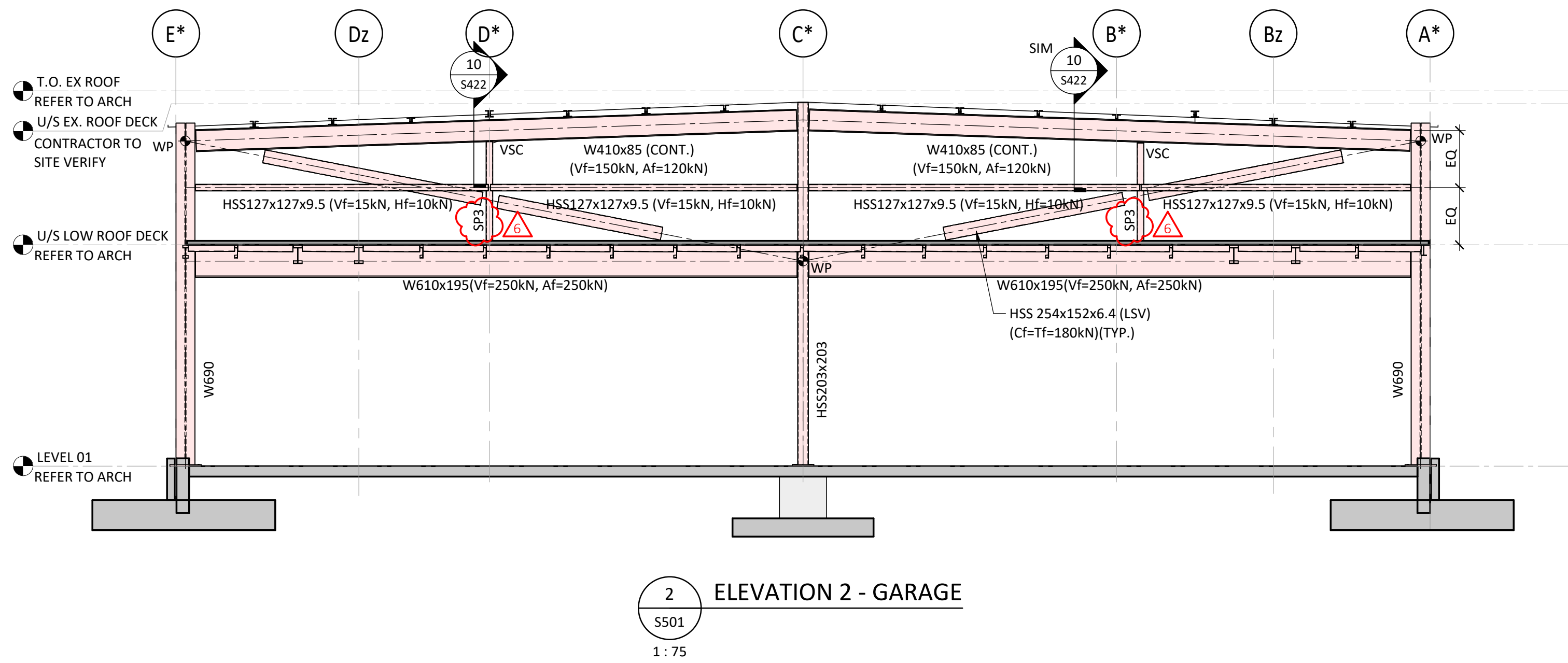
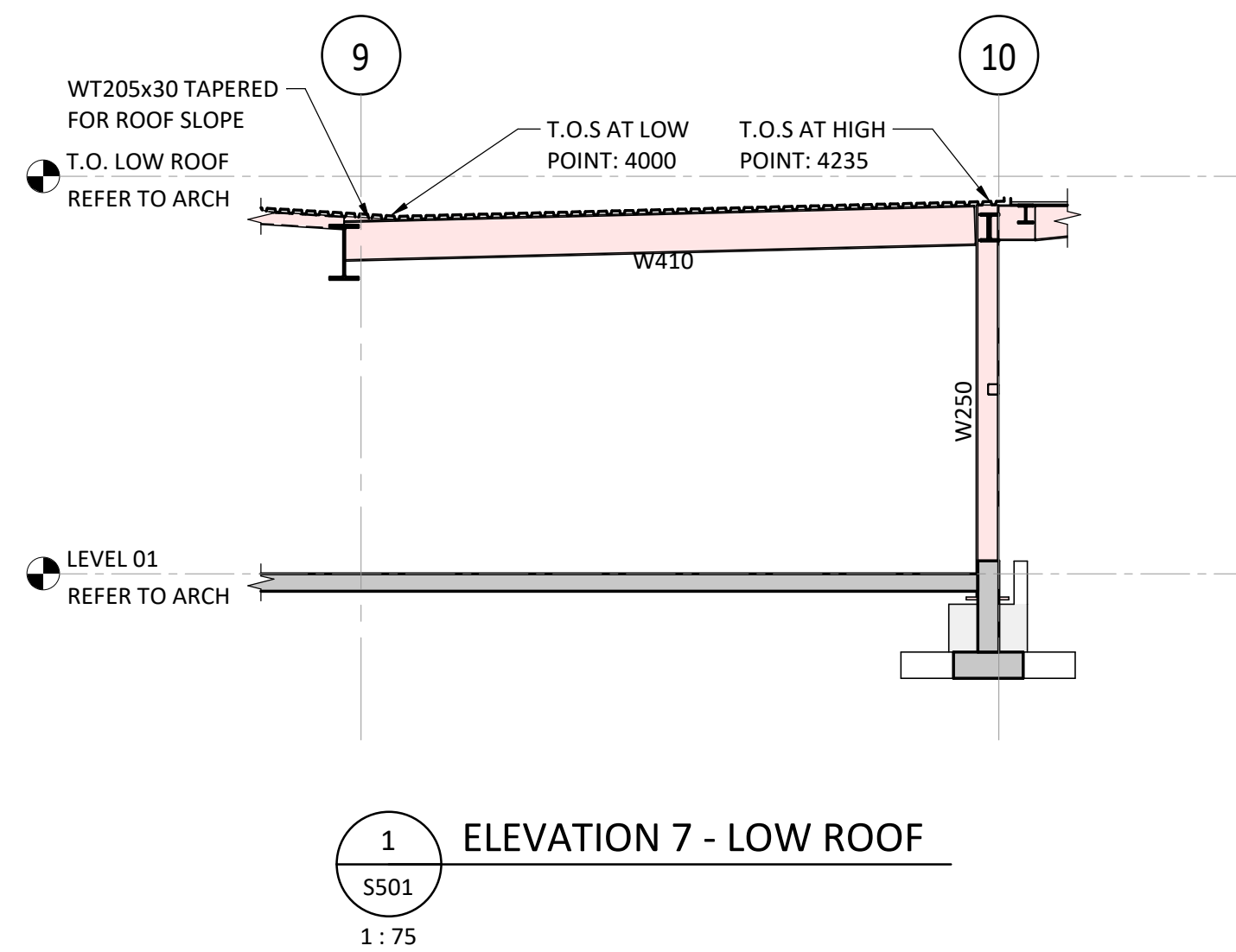
Drawing History

Scale	Checked By
1 : 75	HB
Region of York Project Number	Region of York Building Code

Project  
York Region North Roads Operations  
Centre  
3525 Baseline Road  
Georgina, ON, L0E 1R0

Drawing Title  
ELEVATIONS

Project Number  
EN023-01007  
Drawing Number  
S501





Queen's Quay Terminal  
207 Queen's Quay West, Suite 615  
Toronto, Ontario M5J 1A7  
Phone 416-598-2920 Fax 416-598-5394  
[www.mcw.com](http://www.mcw.com)

Date: July 18, 2025

Project Name: York Region North Roads Operations Centre

Client: York Region

To: GEC Architecture

Attention: Angela Ng - GEC [angela.ng@gecarchitecture.com](mailto:angela.ng@gecarchitecture.com)

From: David MacKeracher - MCW [dmackeracher@mcw.com](mailto:dmackeracher@mcw.com)

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Nathan Lao – MCW [NLao@mcw.com](mailto:NLao@mcw.com)

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Vytautas Stasiulevicius – MCW [VStasiulevicius@mcw.com](mailto:VStasiulevicius@mcw.com)

Shivam Bhojak – MCW [SBhojak@mcw.com](mailto:SBhojak@mcw.com)

Desmond Lau – MCW [DLau@mcw.com](mailto:DLau@mcw.com)

Project #: 23137

ADD #: M-001

Page #: 1 of 5

+ Attachment

In accordance with the drawings and specifications, provide in the tender all costs required to complete the work including items as listed below.

Title: Mechanical Addendum M-001 – (ADD-004)
Reason for Change: Change of Scope and Direction

## Specifications:

Section #	Revisions
20 00 00	<ul style="list-style-type: none"> <li>Table of contents updated.</li> </ul>
20 01 10	<ul style="list-style-type: none"> <li>Mechanical General Requirements – updated to include new specification sections.</li> </ul>
20 05 14	<ul style="list-style-type: none"> <li>Mechanical Work in Existing Building, added reference to Section 01 14 00 Work Restrictions</li> </ul>
22 11 10	<ul style="list-style-type: none"> <li>Potable Water Piping and Pumping Systems – revised potable water flow balancing valve spec.</li> </ul>
22 13 10	<ul style="list-style-type: none"> <li>Sanitary and Storm Water Drainage and Vent Piping and Pumping Systems (specification for underground drainage piping in unstable conditions revised to suit drawing detail revision)</li> </ul>
22 15 13	<ul style="list-style-type: none"> <li>Compressed Air Systems, revised to include ½" quick-connect fitting.</li> </ul>
22 30 10	<ul style="list-style-type: none"> <li>Plumbing Equipment and Specialties – section revised to add DHW heaters and Storage Tanks, ancillary devices and Mixing Valves.</li> </ul>
23 21 23	<ul style="list-style-type: none"> <li>HVAC Pumps – section revised to add Grundfos</li> </ul>
23 51 10	<ul style="list-style-type: none"> <li>Breeching Chimneys and Vent Stacks – New section added</li> </ul>
23 52 16	<ul style="list-style-type: none"> <li>Condensing Boilers – New Section added</li> </ul>
23 55 23	<ul style="list-style-type: none"> <li>Gas-Fired Radiant Heaters – New Section Added</li> </ul>
23 58 10	<ul style="list-style-type: none"> <li>Electric Heat – New Section added</li> </ul>

**Specifications:**

Section #	Revisions
20 00 00	<ul style="list-style-type: none"><li>Table of contents updated.</li></ul>
23 33 10	<ul style="list-style-type: none"><li>Specification section added to include duct accessories and CFSD's with integral smoke detectors.</li></ul>
23 72 10	<ul style="list-style-type: none"><li>Air to Air Recovery Systems (ERV unit specification revised to Oxygen8)</li></ul>
23 83 15	<ul style="list-style-type: none"><li>Hydronic Radiant Floor Heating – Updated with Klimatol system specific information</li></ul>
23 84 13	<ul style="list-style-type: none"><li>Humidifiers – Revised content to reflect manufacturer changed to SteamOvap</li></ul>

**Mechanical Drawings:**

Drawing #	Revisions
M-00	<ul style="list-style-type: none"><li>Added general note 4 regarding phasing of construction works.</li></ul>
M0-01	<ul style="list-style-type: none"><li>Scope clarification notes added.</li><li>Added General Notes section.</li></ul>
M0-02	<ul style="list-style-type: none"><li>Added note to refer to Civil drawings for scope surrounding the fire tank wells.</li><li>Notes added to clarify BAS scope at existing salt storage and shed areas</li><li>Fire tank notes revised</li><li>Existing water main line shown on site plan.</li><li>Added general Notes Section.</li></ul>
M1-00	<ul style="list-style-type: none"><li>Added notes to clarify scope.</li><li>Revised storm pipe routing and sizing.</li><li>Revised sanitary pipe routing.</li><li>Added missing pipe sizes.</li><li>Moved funnel floor drains in 103 Mechanical Room.</li><li>Moved the funnel floor drain in 100A Equipment Room.</li></ul>
M1-01	<ul style="list-style-type: none"><li>Added notes to clarify scope.</li><li>Revised storm pipe routing and sizing.</li><li>Revised sanitary pipe routing.</li><li>Moved funnel floor drains in 103 Mechanical Room.</li><li>Moved the funnel floor drain in 100A Equipment Room.</li><li>Revised natural gas routing and sizing.</li><li>Revised layout of equipment in 103 Mechanical Room.</li><li>Added floor drain in 107 Male Changeroom.</li><li>Revised compressed air pipe routing and sizing.</li><li>Revised DCW pipe routing.</li><li>Revised routing of piping to/from pressure washers.</li><li>Revised DHWR pipe size.</li></ul>
M1-02	<ul style="list-style-type: none"><li>Added notes to clarify scope.</li><li>Revised roof drain tags.</li><li>Revised compressed air pipe routing and sizing.</li><li>Revised DCW pipe routing.</li><li>Revised routing of piping to/from pressure washers.</li></ul>
M1-03	<ul style="list-style-type: none"><li>Added notes to clarify scope.</li><li>Revised roof drain tags.</li><li>Added notes regarding roof gutter system for the garage / shop areas high roof.</li></ul>

**Mechanical Drawings:**

Drawing #	Revisions
M-00	<ul style="list-style-type: none"><li>Added general note 4 regarding phasing of construction works.</li></ul>
M0-01	<ul style="list-style-type: none"><li>Scope clarification notes added.</li><li>Added General Notes section.</li></ul>
M2-01	<ul style="list-style-type: none"><li>Added HVAC General notes section.</li><li>AHU-2A/2B removed and replaced with ERV unit on the roof (ERV-1)</li><li>Snowmelt areas clarified and snow-melt areas added to perimeter entrance areas</li><li>Snowmelt manifold locations and associated glycol piping sizing/routing revised to serve intended snow-melt areas</li><li>Thermostat and speed controllers for radiant tube heaters and circulator fans added in garage bays/sign garage</li><li>Humidifier added in male changeroom to serve ERV-1</li><li>Electric duct heater EDH-1 location revised</li><li>Ductwork sizes and routing serving central ERV-1 revised</li><li>Diffuser tags added and airflow values specified throughout office area</li><li>Diffuser layout in lunch room revised</li><li>VAV-01 added to serve north corridor area</li><li>Transfer air ductwork acoustic lining shown</li><li>CFSD's and duct mounted smoke detectors added to ducts crossing fire separations as indicated on plans</li><li>Enlarged mechanical plan revised<ul style="list-style-type: none"><li>Piping within mechanical room revised</li><li>Water treatment skid size and location revised</li><li>Incoming water service layout revised</li><li>HX-1 removed</li><li>HB-1 boiler added to serve snow-melt system</li></ul></li><li>Equipment sizes and locations revised within mechanical room</li></ul>
M2-02	<ul style="list-style-type: none"><li>Added General HVAC Notes.</li><li>Garage exhaust and intake air notes revised</li><li>Intake air louver sizes revised</li><li>Fire dampers added to intake/exhaust air louvers serving garages</li><li>Existing intake/exhaust louvers and fans to be removed. New louvers, dampers and fans specified in existing garages</li><li>Snow-melt glycol piping added within garage areas to serve manifolds throughout</li><li>ERV-1 unit added to low roof<ul style="list-style-type: none"><li>Condensing units tags revised to match schedules/schematics</li></ul></li></ul>
M2-03	<ul style="list-style-type: none"><li>Added General HVAC Notes.</li><li>High roof HVAC plan added to sheet list</li><li>Intake/Exhaust air terminations from radiant tube heaters shown on roof plan</li></ul>
M3-01	<ul style="list-style-type: none"><li>Added notes to clarify scope.</li><li>Added fire extinguisher in office area.</li><li>Revised fire extinguisher type in kitchenette area.</li></ul>
M4-01	<ul style="list-style-type: none"><li>Air distribution schematic revised to match floor plans.</li></ul>
M4-02	<ul style="list-style-type: none"><li>Hydronic heating schematic revised to match floor plans</li></ul>
M4-03	<ul style="list-style-type: none"><li>Incoming water treatment schematic revised.</li><li>Revised DHWR piping size.</li></ul>
M4-04	<ul style="list-style-type: none"><li>Revised schematic to suit revisions to plan drawing.</li></ul>
M4-05	<ul style="list-style-type: none"><li>Revised storm schematic to suit revisions made to the plan drawings.</li></ul>



**Mechanical Drawings:**

Drawing #	Revisions
M-00	<ul style="list-style-type: none"><li>Added general note 4 regarding phasing of construction works.</li></ul>
M0-01	<ul style="list-style-type: none"><li>Scope clarification notes added.</li><li>Added General Notes section.</li></ul>
M4-06	<ul style="list-style-type: none"><li>Revised natural gas schematic to suit revisions to plan drawings.</li><li>Compressed air schematic added</li></ul>
M4-08	<ul style="list-style-type: none"><li>Revised condensing unit tags to match floor plans and schedules</li></ul>
M5-02	<ul style="list-style-type: none"><li>Glycol heat exchanger sequence removed from scope.</li><li>Revised Variable Speed Pumping Control sequence.</li></ul>
M5-03	<ul style="list-style-type: none"><li>ERV-1 unit sequence added to controls drawings</li><li>Snow-melt controls sequence revised</li></ul>
M5-04	<ul style="list-style-type: none"><li>Garage bay gas detection sequence added</li></ul>
M6-01	<ul style="list-style-type: none"><li>Humidifier detail added / Roof ducting detail removed.</li><li>Revised buried drainage piping support detail.</li></ul>
M6-03	<ul style="list-style-type: none"><li>Roof curb detail for rooftop equipment added</li></ul>
M6-04	<ul style="list-style-type: none"><li>Unit heater piping and rooftop exhaust details removed</li><li>Snow melt details added</li><li>Emergency eye wash detail added</li></ul>
MD1-00	<ul style="list-style-type: none"><li>Added notes to clarify scope.</li></ul>
MD1-01	<ul style="list-style-type: none"><li>Added notes to clarify scope.</li></ul>
MD1-02	<ul style="list-style-type: none"><li>Added notes to clarify scope.</li></ul>
MD2-01	<ul style="list-style-type: none"><li>Added notes to clarify scope.</li></ul>
MD2-02	<ul style="list-style-type: none"><li>Added notes to clarify scope.</li><li>Existing intake/exhaust louvers, dampers and fans to be removed as indicated</li><li>Existing equipment to remain shown on plans</li></ul>
MD2-03	<ul style="list-style-type: none"><li>Added notes to clarify scope.</li></ul>

**M / E Schedules:**

Drawing #	Revisions
ME-01	<ul style="list-style-type: none"><li>ERV schedule revised</li><li>Electric duct heater schedule revised</li><li>Heat wheel schedule removed</li><li>Heat exchanger schedule removed</li><li>Pump schedule revised</li><li>Tanks/Expansion vessel tank schedule revised</li><li>Heating boiler schedule added</li><li>Radiant tube heater schedule added</li><li>Humidifier schedule added</li><li>Entrance and unit heater schedule power requirements revised</li><li>Emergency power requirements revised for all equipment</li></ul>



Project Name: York Region North Roads Operations Centre

Client: York Region

Project #: 23137

ADD #: M-001

Page #: 5 of 5

+ Attachment

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**M / E Schedules:**

Drawing #	Revisions
ME-02	<ul style="list-style-type: none"><li>• Water Treatment Skid schedule revised</li><li>• Snow-melt system schedule revised</li><li>• Fan schedule revised</li><li>• VAV schedule revised</li><li>• Emergency power requirements revised for all equipment.</li><li>• Revised VRF Schedule.</li><li>• Revised Air-Cooled Condenser Schedule.</li></ul>
ME-03	<ul style="list-style-type: none"><li>• Grilles and Diffusers schedule revised</li></ul>

End of ADD # M-001

## CONTENTS

SECTION	TITLE
<b>DIVISION 20</b>	<b>COMMON MECHANICAL WORK SECTIONS:</b>
20 01 10	MECHANICAL GENERAL REQUIREMENTS
20 01 50	MECHANICAL BASIC MATERIALS AND METHODS
20 05 05	MECHANICAL DEMOLITION
20 05 14	MECHANICAL WORK IN EXISTING BUILDING
20 05 33	ELECTRIC HEAT TRACING
20 05 48	VIBRATION ISOLATION
20 05 70	MOTORS, MOTOR STARTERS, MOTOR CONTROL CENTRES, AND WIRING
20 05 75	VARIABLE FREQUENCY DRIVES
20 05 95	TESTING ADJUSTING AND BALANCING
20 07 13	MECHANICAL DUCTWORK INSULATION
20 07 16	MECHANICAL EQUIPMENT INSULATION
20 07 19	MECHANICAL PIPING INSULATION
20 08 10	MECHANICAL COMMISSIONING
<b>DIVISION 21</b>	<b>FIRE PROTECTION SECTIONS:</b>
21 20 10	FIRE EXTINGUISHERS
<b>DIVISION 22</b>	<b>PLUMBING AND DRAINAGE SECTIONS:</b>
22 11 10	POTABLE WATER PIPING AND PUMPING SYSTEMS
22 13 10	SANITARY AND STORM WATER DRAINAGE AND VENT PIPING AND PUMPING SYSTEMS
22 15 13	COMPRESSED AIR SYSTEMS
22 30 10	PLUMBING EQUIPMENT AND SPECIALTIES
22 40 10	PLUMBING FIXTURES AND DRAINS
<b>DIVISION 23</b>	<b>HVAC SECTIONS:</b>
23 10 10	FUEL SYSTEMS
23 21 13	HVAC PIPING SYSTEMS, VALVES AND ACCESSORIES
23 21 23	HVAC PUMPS
23 23 10	REFRIGERANT PIPING
23 25 10	HVAC CHEMICAL TREATMENT SYSTEMS
23 30 10	HVAC DUCTWORK
23 33 10	AIR DUCT ACCESSORIES
23 35 10	FANS AND BLOWERS
23 36 10	AIR GRILLES AND DIFFUSERS
23 37 10	AIR TERMINAL CONTROL UNITS



23 40 10	AIR FILTERS
<b>23 51 10</b>	<b><i>BREECHING CHIMNEYS AND VENT STACKS</i></b>
<b>23 52 16</b>	<b><i>CONDENSING BOILERS</i></b>
<b>23 55 23</b>	<b><i>GAS-FIRED RADIANT HEATERS</i></b>
23 57 10	HVAC HEAT EXCHANGERS
<b>23 58 10</b>	<b><i>ELECTRIC HEAT</i></b>
23 72 10	AIR TO AIR RECOVERY SYSTEMS
23 74 16	PACKAGED ROOFTOP AIR-CONDITIONING UNITS
23 81 26	SPLIT SYSTEM AIR CONDITIONING UNITS
23 81 29	VARIABLE REFRIGERANT FLOW SYSTEMS
23 81 43	AIR SOURCE HEAT PUMP CHILLERS
23 82 10	TERMINAL HVAC EQUIPMENT
23 83 15	RADIANT FLOOR HEATING AND SNOW MELTING SYSTEMS
23 84 13	HUMIDIFIERS

**DIVISION 25 BUILDING AUTOMATION SYSTEM (“BAS”) AND CONTROLS SECTIONS:**

25 05 10	BAS GENERAL REQUIREMENTS
25 10 10	BAS CONTROL NETWORK
25 30 10	BAS INSTRUMENTATION AND DEVICES
25 56 26	INTEGRATED LIGHTING SYSTEM CONTROLS

**END OF SECTION**

## **CONTENTS**

### **PART 1 - GENERAL**

- 1.01 GENERAL REQUIREMENTS**
- 1.02 DEFINITIONS AND TERMS**
- 1.03 WORK INCLUDED**
- 1.04 CONTRADICTION AND AMBIGUITY**
- 1.05 REGULATORY REQUIREMENTS**
- 1.06 STANDARDS**
- 1.07 LEED REQUIREMENTS**
- 1.08 PERMITS, FEES & INSPECTIONS**
- 1.09 CONTRACT DRAWINGS**
- 1.10 EXAMINATION OF THE PLACE OF THE WORK AND DOCUMENTATION**
- 1.11 PRODUCT STANDARDS, ACCEPTABLE MANUFACTURERS, AND REQUESTS FOR PRODUCT SUBSTITUTION**
- 1.12 IDENTIFICATION OF NON-CONFORMING MATERIALS AND EQUIPMENT**
- 1.13 SHOP DRAWINGS**
- 1.14 PATENTS**
- 1.15 RIGHTS RESERVED**
- 1.16 EQUIPMENT NAMEPLATES**
- 1.17 COMPLETION**
- 1.18 WARRANTIES**
- 1.19 SCHEDULE**
- 1.20 SCHEDULE OF VALUES**
- 1.21 CHANGES TO THE WORK**

### **PART 2 - PRODUCTS**

- 2.01 GENERAL**
- 2.02 INTERFERENCE/ COORDINATION MODEL**
- 2.03 EMBEDDED MECHANICAL SERVICES DRAWINGS**
- 2.04 SLEEVING DRAWINGS**
- 2.05 FINAL RECORD SET "AS-CONSTRUCTED" OR "AS-BUILT" DRAWINGS**
- 2.06 OPERATING AND MAINTENANCE ("O&M") MANUALS**

### **PART 3 - EXECUTION**

- 3.01 GENERAL INSTALLATION REQUIREMENTS**
- 3.02 FIREWATCH**
- 3.03 SMOKING**
- 3.04 HOUSEKEEPING MEASURES**
- 3.05 SPECIAL CLEANING**
- 3.06 PROTECTION**
- 3.07 TEMPORARY SERVICES**
- 3.08 INTERRUPTION OF EXISTING SERVICES**
- 3.09 RUN-IN**
- 3.10 TRIAL USAGE, TESTING AND COMMISSIONING**
- 3.11 INSTRUCTIONS TO OWNER'S STAFF**

## PART 1 - GENERAL

### 1.01 GENERAL REQUIREMENTS

- .1 Comply with requirements of the Owner's General Requirements and all documents referred to therein.

### 1.02 DEFINITIONS AND TERMS

- .1 The following Definitions and Terms shall be read in conjunction with the Definitions included in the Division 01 Specifications and all Mechanical Division Contract Documents.
  - .1 **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.
  - .2 **concealed:** means hidden from normal sight in furred spaces, shafts, ceiling spaces, walls and partitions.
  - .3 **delete** or **remove:** includes tenses of "delete" or "removed" means to disconnect, make safe, remove obsolete materials including any back box and exposed piping and raceways; 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 Consultant.
  - .4 **exposed:** means work normally visible, including work in equipment rooms, tunnels, and similar spaces.
  - .5 **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.
  - .6 **OSHA** and **OHSA:** stands for Occupational Safety and Health Administration and Occupational Health and Safety Act respectively, 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.
  - .7 **Work:** includes tenses of "work" when used in the Mechanical Division Documents it means all equipment, permits, materials, labour and other services as may be necessary for a complete Mechanical system as described in the Mechanical Division Documents.
  - .8 **Documents:** Include one or more combinations of Mechanical Division Drawing(s), Specification(s), Plan(s), Report(s), Design(s), Model(s), or similar means of communicating the Basis of Design, and may be in paper or electronic format, and must be considered in their entirety.
  - .9 **Basis of Design:** refers the mechanical design intent inherent in the Mechanical Division Documents to establish a specific performance expectation and/or requirement. The Basis of Design may refer to specific equipment and/or products that have been used to establish an energy performance benchmark, and/or space constraint, and/or structural load, and/or a specific equipment arrangement, and/or operating sequence, and/or other similar consideration specific to the mechanical design intent.
  - .10 **Consultant:** when used in the Mechanical Division Documents it means the Prime Consultant and MCW Consultants Limited, Queen's Quay Terminal, 207 Queen's Quay West, Toronto, Ontario M5J 1A7.
  - .11 **Acceptable Manufacturer(s):** also referred to as "Standard of Acceptance", and/or "Alternative Manufacturer", "and/or Acceptable Alternative" and/or similar language that describes manufacturers other than the manufacturer used as the Basis of Design and shall all have the same meaning throughout the Mechanical Division Documents. Acceptable Manufacturers may be used in the Work in lieu of the Basis of Design manufacturers subject to meeting conditions stipulated elsewhere in the Documents.



- .12 **Supply:** includes tenses of "supply" when used in the Mechanical Division Documents means supply only for installation by Trades other than Mechanical Division Trades or under separate agreement. Additional obligations may be required by the Documents.
- .13 **Install:** includes tenses of "install" when used in the Mechanical Division Documents means install, connect, test, balance, and start-up complete. Additional obligations may be required by the Documents.
- .14 **Provide or provision of:** includes tenses of "provide" when used for any part of the Work of the Mechanical Division Documents it means to Supply, Install, connect, test, balance, and start-up. "Provide" or "provision of" includes preparation of Coordination Drawings, preparation of Final Set of "As-built" or "As-constructed" Drawings, and Commissioning in accordance with the Basis of Design. Further, "provide" or "provision of" means to procure, prepare, supervise, pay for, and take responsibility for the services referenced. Additional obligations may be required by the Mechanical Division Documents.
- .15 **Authorities or Authorities Having Jurisdiction or AHJs:** when used in the Mechanical Division Documents it means any and all agencies that enforce the applicable Laws, By-laws, Codes, Standards, Ordinances, Rules, Regulations, and Interpretations of same in the place of Work. There may be more than one AHJ.
- .16 **Acceptable:** when used in the Mechanical Division Documents, it means acceptable to the Consultant.
- .17 **Performance:** when used in the Mechanical Division Documents in relation to specified equipment, it means the performance inherent in the Basis of Design, and includes, but is not limited to;
- the flow capacity of equipment and systems as it applies to air, steam, water and other hydronic mediums,
  - heating and/or cooling energy, and energy transfer capacity,
  - the pressure capacities of equipment and systems as it applies to air, steam, water and other hydronic mediums;
  - physical limitations including, but not limited to, weight and space (both occupied and service requirements);
  - effect on ambient sound levels.
- .18 **BAS:** refers to the Building Automation System; also refers to "BMS" (Building Management System), also refers to "FMS" (Facility Management System), also refers to "DDC" (Direct Digital Control system). References to "BAS", "BMS", "FMS" and "DDC" generally have the same meaning; refer to Section 25 05 10 BAS General Requirements for additional information.
- .19 Wherever terms "indicated", "shown", "noted", "listed", or similar words or phrases are used they are understood, unless defined otherwise, to mean "indicated", "shown", "noted" or "listed" in the Mechanical Division Documents.
- .20 Wherever terms "reviewed", "satisfactory", "as directed", "submit", or similar words or phrases are used in the Mechanical Division Documents they are understood, unless defined otherwise, to mean that work or product(s) referred to as "reviewed by", "to the satisfaction of", "submitted to", the Consultant.
- .2 Additional Definitions and Terms are included in succeeding Mechanical Division 20, 21, 22, 23 and 25 Specification Sections, and in other Documents, and are inclusive to the list of Definitions and Terms above.

### 1.03 WORK INCLUDED

- .1 Sections of the Specifications are not intended to delegate functions, or to delegate Work or apply to any specific trade. The Work of the Contractor includes all labour, materials, equipment, permits and tools required for a complete and working installation as described in the Mechanical

Division Contract Documents, and are not necessarily limited to items in the following Mechanical Specification Sections:

**Division 20 - Common Mechanical Work Sections:**

20 01 10	Mechanical General Requirements
20 01 50	Mechanical Basic Materials and Methods
20 05 05	Mechanical Demolition
20 05 14	Mechanical Work in Existing Building
20 05 33	Electric Heat Tracing
20 05 48	Vibration Isolation
20 05 70	Motors, Motor Starters, Motor Control Centres, and Wiring
20 05 75	Variable Frequency Drives
20 05 95	Testing Adjusting and Balancing
20 07 13	Mechanical Ductwork Insulation
20 07 16	Mechanical Equipment Insulation
20 07 19	Mechanical Piping Insulation
20 08 10	Mechanical Commissioning

**Division 21 - Fire Protection Sections:**

21 20 10	Fire Extinguishers
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**Division 22 - Plumbing and Drainage Sections:**

22 11 10	Potable Water Piping and Pumping Systems
22 13 10	Sanitary and Storm Water Drainage and Vent Piping and Pumping Systems
22 15 13	Compressed Air Systems
22 30 10	Plumbing Equipment and Specialties
22 40 10	Plumbing Fixtures and Drains

**Division 23 - HVAC Sections:**

23 10 10	Fuel Systems
23 21 13	HVAC Piping Systems, Valves and Accessories
23 21 23	HVAC Pumps
23 23 10	Refrigerant Piping
23 25 10	HVAC Chemical Treatment Systems
23 30 10	HVAC Ductwork
23 33 10	Air Duct Accessories
23 35 10	Fans and Blowers
23 36 10	Air Grilles and Diffusers
23 37 10	Air Terminal Control Units
23 40 10	Air Filters
<b>23 51 10</b>	<b><i>Breeching Chimneys and Vent Stacks</i></b>
<b>23 52 16</b>	<b><i>Condensing Boilers</i></b>
<b>23 55 23</b>	<b><i>Gas-Fired Radiant Heaters</i></b>
23 57 10	HVAC Heat Exchangers

<b>23 58 10</b>	<b><i>Electric Heat</i></b>
23 72 10	Air to Air Recovery Systems
23 74 16	Packaged Rooftop Air-Conditioning Units
23 81 26	Split System Air Conditioning Units
23 81 29	Variable Refrigerant Flow (VRF) Systems
23 81 43	Air Source Heat Pump Chillers
23 82 10	Terminal HVAC Equipment
23 83 15	Radiant Floor Heating and Snow Melting Systems
23 84 13	Humidifiers

**Division 25 - Building Automation System ("BAS") and Controls Sections:**

25 05 10	BAS General Requirements
25 10 10	BAS Control Network
25 30 10	BAS Instrumentation and Devices
25 56 26	Integrated Lighting System Controls

**1.04 CONTRADICTION AND AMBIGUITY**

- .1 Where there is apparent contradiction or ambiguity in the documents, or where there are apparent discrepancies in or omissions from the documents, or if there is any doubt as to the intent of the Contract Documents, the bidder shall request and obtain written clarification(s) from the Consultant prior to Bid submission.
- .2 Consideration will not be granted for misunderstanding of the intent of the Contract Documents or the extent of the Work to be performed.
- .3 Attend the job site prior to Bid submission and verify all conditions. Prior to submitting Bid price, the Mechanical Trade Contractor shall review any discrepancies and verify the locations of existing services that are being extended and the routing of new services. Report all ambiguities, discrepancies, departures from Laws, Building Code requirements, Regulations, By-laws and/or from good practice. Failure to do so will result in all additional costs being the responsibility of the Mechanical Trade Contractor. Include in the Bid submission price for any alternative routing of new or existing services to accommodate site conditions.

**1.05 REGULATORY REQUIREMENTS**

- .1 Comply with all requirements of the Authorities having Jurisdiction ("AHJs").
- .2 Comply with requirements of all Municipal, Provincial and Federal Bylaws and Ordinances as well as requirements of Utilities such as Ontario Gas Utilization Code and The Ontario Electrical Safety Code.
- .3 Do not reduce quality of any part of the Work shown on the Contract Documents and/or specified references by the Associations and Agencies in the following paragraphs.
- .4 In general, and as applicable, perform all Work of the Mechanical Trade Contractor such that it complies in all respects with the physical and chemical properties, characteristics and performance requirements of recognized Associations and Agencies as required by these Specifications, and as follows:

AMCA -	Air Moving & Conditioning Association
ADC -	Air Diffusion Council
ANSI -	American National Standards Institute
AHRI -	Air Conditioning Heating & Refrigeration Institute
ASCII -	American Standard Communication Information Interchange
ASHRAE -	American Society of Heating, Refrigeration and Air Conditioning Engineers



ASME -	American Society of Mechanical Engineers
ASPE-	American Society of Plumbing Engineers
ASTM -	American Society for Testing and Materials
AWWA -	American Water Works Association
CGA -	Canadian Gas Association
CGSB -	Canadian General Standards Board
CSA -	Canadian Standards Association
EIA -	Electronic Industry Association
ETL -	Electrical Testing Laboratories
FM -	Factory Mutual
ISA -	Instrument Society of America
IAO -	Insurers Advisory Organization
MMAH -	Ministry of Municipal Affairs and Housing
MTC -	Ministry of Transportation and Communication
NBC -	National Building Code of Canada
NPC -	National Plumbing Code of Canada
NFC -	National Fire Code of Canada
NFPA -	National Fire Protection Association
OESC -	Ontario Electrical Safety Code
OBC -	Ontario Building Code
OFC -	Ontario Fire Code
MOEE -	Ontario Ministry of Environment and Energy
OML -	Ministry of Labour and Worker's Compensation Requirements
TSSA -	Technical Standards & Safety Authority
ULC -	Underwriter's Laboratories of Canada
UL -	Underwriter's Laboratories Inc.
cUL -	Underwriter's Laboratories Inc. (testing completed to Canadian Standards)

#### **1.06 STANDARDS**

- .1 Provide new materials and equipment of proven design and quality. Provide current models of specified equipment manufactured in Canada or the United States of America, unless specified otherwise with published ratings certified by recognized North American testing and standards agencies.
- .2 Comply with ASHRAE/IES 90.1 Standards in the supply and installation of all parts of the Work.
- .3 Conform to the best modern practices of workmanship and installation means and methods, and employ only skilled tradesmen working under the direction of fully qualified personnel.

#### **1.07 LEED REQUIREMENTS**

- .1 The building will be certified under the Canadian Green Buildings Council, Leadership in Energy and Environmental Design. This requires all Construction Trades to adhere to certain requirements with respect to cleanliness, recycling, materials reuse and other practices which are part of the Contract requirements.
- .2 In addition to the above, ensure the following requirements are observed on site:

- .1 Smoking shall not be permitted within the Work area, or outside the Work area but within the existing building. Refer to 'Smoking' Article in this Section of the specifications.
- .2 Open ended ductwork shall be protected with plastic sheeting.
- .3 Open ended piping shall be capped to limit ingress of debris.
- .4 All trades shall practice recycling of waste, under direction of the Construction Manager.
- .3 ***Preparation and Implementation of a Demolition/ Construction IAQ Management Plan***
  - .1 ***Prior to the commencement of Demolition/ Construction the Contractor shall prepare an IAQ Management Plan for review by the Owner's Project Manager and the Consultant. The purpose of the IAQ Management Plan is to identify potential sources of contamination at the site and to minimize their impact through appropriate preventative or mitigative controls.***
  - .2 ***The Contractor shall be responsible for implementing all measures described in the reviewed IAQ Management Plan.***
  - .3 ***Monitoring and documentation of implemented measures shall be required to demonstrate compliance with the IAQ Management Plan.***
  - .4 ***The IAQ Management Plan shall include the following approaches for the demolition and construction stages of the Work:***
    - .1 ***HVAC system protection as specified in this Section,***
    - .2 ***Source Control Measures as follows:***
      - .1 ***Control sources of contamination through implementation of the following practices to manage the anticipated or potential contaminant sources:***
        - .1 ***Contractor shall notify the Owner's Project Manager when a construction activity is anticipated to cause contamination of the indoor air (i.e. excess dust, increased humidity, use of a product that will result in off-gassing to indoor air).***
        - .2 ***Notification shall be made at least 48 hours before the planned commencement of the activity.***
        - .3 ***The Contractor shall ensure that proper source control measures are in place prior to commencement of the activity.***
      - .2 ***All adhesives, sealants, paints, coatings, flooring and wood products are to be low-emitting VOCs; shop drawings and/or product data sheets identifying the product's emissions and VOC content shall be submitted to the Owner's Project Manager for review prior to installation or application. Products that have not been approved are to be removed from the site.***
      - .3 ***For potential off-gassing products, i.e. cleaning solutions, the Contractor shall follow the safe material handling procedures specified for the product. As necessary, additional temporary ventilation or exhaust measures shall be provided in the Work area.***
      - .4 ***Contractors shall utilize demolition and construction techniques that minimize the release of contaminants, including airborne dust.***
      - .5 ***Contractors shall utilize temporary dust extraction measures where possible to minimize airborne dust.***
      - .6 ***Contractors are to immediately report any uncontrolled odours, dust or other contaminants identified in the work areas to the Owner's Project Manager.***

- .7 ***No vehicles are to idle in areas where emissions could be drawn into the building interior.***
- .8 ***Contractors will select electric powered rather than gasoline powered equipment to reduce emissions.***
- .9 ***Equipment will be turned off when not in use.***
- .10 ***Containers of wet products will be kept closed when not in use.***
- .11 ***Waste materials that release dust or odors will be covered or sealed.***
- .3 ***Pathway Interruption measures as follows:***
  - .1 ***Where a contaminant source(s) cannot be satisfactorily controlled, the Contractor shall implement the following Pathway Interruption measures:***
    - .1 ***A negative pressure will be created in the work area subject to contamination (i.e. air borne dust particles and other related pollutants).***
    - .2 ***The negative pressurization will reduce contamination of other work areas.***
    - .3 ***Make-up air for that being exhausted shall be achieved by the installation of portable fans. Air supply to the negative pressure spaces will be 100% fresh air.***
    - .4 ***Exhaust air shall not be discharged where it can be drawn back into to the building (a minimum of 10m (30 ft.) of separation distance shall be provided to any building opening or air intake. Filtration for the temporary system may be required, depending on the controlled contaminant.***
    - .5 ***Barriers will be erected to contain the construction area.***
    - .6 ***Wood cutting will be conducted behind barriers to control dust.***
    - .7 ***Persons working near drywall dust must wear protective masks.***
    - .8 ***Welding arc exhaust fumes will be controlled with a point source exhaust system.***
    - .9 ***As required, equipment or activities that produce excessive contaminants shall be located outdoors and away from air intakes so as not to compromise indoor air quality.***
- .4 ***Housekeeping Measures as specified in this Section.***
- .5 ***Scheduling measures as follows:***
  - .1 ***The Contractor shall identify and schedule the Work to address and manage any potential IAQ concerns related to Demolition/ Construction activities.***
  - .2 ***Scheduling measures shall address the following:***
    - .1 ***Protection measures proposed,***
    - .2 ***Source control measures proposed,***
    - .3 ***Pathway interruption measures proposed,***
    - .4 ***Specific housekeeping measures proposed.***
- .5 ***Documentation, Inspection and Maintenance of IAQ Management Plan***



- .1 ***Requests to modify management processes outlined in this IAQ Management Plan must be submitted in writing to Owner's Project Manager for approval.***
- .2 ***Contractor's responsibilities with regard to the IAQ Management Plan will be communicated at the weekly contractor site meetings.***
- .3 ***A copy of the IAQ Management Plan shall be posted on site in a location available to all Trades.***
- .4 ***Contractor shall take digital photographs throughout the construction to capture the steps taken to comply with the requirements of the IAQ Management Plan. The Contractor shall forward photographs complete with date taken and identification of type of control measure highlighted.***
- .5 ***The Consultant shall conduct site inspections to ensure that the controls specified in the plan are being implemented. Information from Contractors, site inspection checklists and photographic documentation of the management controls will be collected to document compliance with the IAQ Management Plan. The Contractor shall be informed in writing of any deficiencies found during the site review.***
- .6 ***The Contractor shall provide 18 photographs—six photographs taken on three different occasions during construction—along with identification of the SMACNA approach featured in each photo. All SMACNA approaches used should be represented by at least one photo. The Region's consultant or Project Manager shall take additional photographs during routine site visits to document compliance with the IAQ Management Plan.***
- .7
- .8 ***Where deficiencies are identified by the Consultant or the Owner's Project Manager, the Contractor shall take corrective action and provide photographic evidence of correction within 48 hours.***
- .9 ***The Project Indoor Air Quality (IAQ) Management Checklist shall be completed by the project LEED Consultant and/pr the Owner's Project Manager; Checklist shall be provided to the successful Contractor following Contract award.***
- .10 ***The Contractor shall complete the Weekly Indoor Air Quality (IAQ) Management Checklist on a weekly basis and provide copies to the project consultants and the Owner's Project Manager. Any noted issues will be rectified immediately. Weekly Indoor Air Quality (IAQ) Management Checklist shall be provided to the successful Contractor following Contract award.***
- .11 ***The Contractor shall complete the Filter Listing at the end of the project and provide copies to the Consultants and the Owner's Project Manager. Filter Listing shall be provided to the successful Contractor following Contract award.***
- .6 ***Complete the An IAQ testing or flush-out procedure Specified in Section 20 08 10. Submit a copy of the IAQ testing and/or flush-out/ procedures and the documented results.***
- .7 ***Modifications to IAQ Management Plan***
  - .1 ***The IAQ Management Plan identifies the indoor air quality management controls to be implemented, maintained, and monitored on this project, however, it should be considered a "living document" that may be changed or adapted during the life of the project to be effective.***
  - .2 ***Changes or adaptations to the IAQ Management Plan may occur under the following conditions:***

- .1 ***Controls and/or practices are not achieving the desired results,***
- .2 ***Project scheduling prevents certain activities from being completed, or***
- .3 ***An alternative procedure for control that meets the intent of the original plan and is approved by the Owner's Project Manager.***
- .8 ***Copies of all photographs, Project Indoor Air Quality (IAQ) Management Checklist, Weekly Indoor Air Quality (IAQ) Management Checklists, Pre-Occupancy Filter List and flush-out/IAQ testing procedures and results shall be provided to the Owner's Sustainable Building Engineer, Property Services Branch for LEED submission purposes.***
- .9 ***Periodic checks for Plan compliance will be made by the LEED Facilitator.***
- .4 Mechanical initiatives selected to be designed into the project include the following:
  - .1 Use of ultra-low flow plumbing fixtures throughout the project.
  - .2 Energy efficient cooling and heating systems through the use of internal energy reclaim, condensing gas boilers, variable speed drives on multiple pumps and fans, and other measures inherent in the design.
  - .3 Use of CO2 sensors and air flow measurement to monitor and control air quality on each high density occupied HVAC Control zone;
  - .4 Use of high efficiency building envelope and glazing systems.
  - .5 Commissioning of all mechanical building systems, including verification by a third party.
  - .6 Use of non-chlorinated refrigerants in all equipment.
  - .7 ***An IAQ Management Plan as Specified above.***

#### **1.08 PERMITS, FEES & INSPECTIONS**

- .1 Apply for, pay for, and obtain all permits, licenses, inspections, examinations and fees required for the Work. Also submit, when required by the Authorities Having Jurisdiction ("AHJs"), information such as heat loss calculations, and other data that may be obtained from the Consultant. Should the AHJs require the information on specific forms, fill in these forms by transcribing the required information provided by the Consultant.
- .2 Before starting any work, submit the required number of copies of Drawings and Specifications to the AHJs for their approval and comments. Comply with any changes requested as part of the contract, but notify the Consultant immediately of such changes. Prepare and submit any additional drawings, details or information as may be required.
- .3 Arrange for inspection of all Work by the Authorities Having Jurisdiction ("AHJs") over the Work. On completion of the Work, present to the Consultant the final unconditional certificate of acceptance of the inspecting AHJs.
- .4 In case of conflict, codes and regulations take precedence over the Contract Documents. In no instance reduce the standard or scope of work or intent established by the Drawings and Specifications by applying any of the Codes and Standards referenced in these Specifications.

#### **1.09 CONTRACT DRAWINGS**

- .1 The Drawings for Mechanical Work are performance drawings, diagrammatic, intended to convey the scope of work, indicate general Design Intent, arrangement and approximate location of mechanical equipment. The Drawings do not intend to show Architectural and Structural details.
- .2 Do not scale Drawings. Obtain information involving accurate dimensions from dimensions shown on Architectural and Structural Drawings, and by site measurement.
- .3 Make, at no additional cost, any changes or additions to materials, and/or equipment necessary to accommodate structural conditions (pipes or ducts around beams and columns and other structural elements).

- .4 Alter, at no additional cost, the locations of materials and/or equipment as directed that do not necessitate additional material.
- .5 Install ceiling mounted or exposed components (examples include diffusers, sprinkler heads, grilles) in accordance with reflected ceiling drawings or floor plans.
- .6 Confirm on the site the exact location and mounting elevation of outlets and fixtures as related to existing Mechanical and Electrical components and Architectural and Structural details.

#### **1.10 EXAMINATION OF THE PLACE OF THE WORK AND DOCUMENTATION**

- .1 Prior to submitting tender, carefully examine conditions at the place of the Work that could affect the Work of the Mechanical Trades. Refer to and examine all Contract Documents.
- .2 Verify that materials and equipment can be delivered to the Place of the Work and that sufficient space and access is available to permit installation thereof in locations shown on the Drawings.
- .3 Verify location and elevation of existing services (water, electrical, sanitary, storm sewers, equipment, ductwork and piping) which may affect the Tender and Work of the Mechanical Trades. Repair any damage to existing underground services caused by neglect to determine and mark out the location of such services prior to excavation work commencing.
- .4 Please direct any inquiries regarding the bid documents in writing to: [dmackeracher@mcw.com](mailto:dmackeracher@mcw.com). Other forms of communication will be ignored. All questions will be responded to in writing and submitted to all active proponents. Directly contacting any other member of the Owner's staff with respect to this RFP at any time prior to the award of a Contract or the termination of the RFP, and the Owner may reject the Proposal of any Proponent that makes any such contact.

#### **1.11 PRODUCT STANDARDS, ACCEPTABLE MANUFACTURERS, AND REQUESTS FOR PRODUCT SUBSTITUTION**

- .1 Provide new material and equipment as specified and to acceptance of the Consultant. Acceptable Manufacturers' names are listed to set a standard of quality, performance, capacity, size, weight, appearance and serviceability.
- .2 Where no Acceptable Manufacturer is indicated, provide only as specified. Where "or equivalent" or "or equal" is noted in the Specifications under Acceptable Manufacturers, a request for acceptance of an equivalent Manufacturer or Product not listed must be submitted not less than seven (7) working days prior to the bid submission date. Submissions for an equivalent or equal manufacturer made after bid submission must be accompanied by a credit offering to the Owner for consideration, otherwise the listed Manufacturer shall be provided.
- .3 Assume full responsibility for ensuring that when providing Acceptable Manufacturers, all performance, space, weight, connection sizes and location (mechanical and electrical), power and wiring requirements, are included within the scope of the item quoted, and costs for any variances therefore are included in the quoted Tender amount. Equipment requiring greater than specified energy requirements, or greater installation and service space requirements, or requiring greater than the structural capacity allowed for, or otherwise adversely affecting the appearance or integrity of the building may be considered grounds for rejection by the Consultant.
- .4 All electrically operated equipment and electrical materials to bear the label of approval of CSA or be so stamped, or have special approval of the Authorities Having Jurisdiction. All material, wiring and devices to conform to the Canadian Electrical Code for the purpose for which they are to be used. All electrical equipment to be designed and manufactured in accordance with applicable EEMAC and ANSI specifications.
- .5 All gas fired equipment to bear the label of the CGA or be so stamped.
- .6 All plumbing products such as fixtures, faucets, flush valves and shower heads to bear the label of approval of the CSA or be so stamped.

#### **1.12 IDENTIFICATION OF NON-CONFORMING MATERIALS AND EQUIPMENT**

- .1 Submit documentation at time of bid, identifying nature and extent of non-conformance and/or variances from specifications or referenced standards.



- .2 Failure to submit this documentation at time of bid will be interpreted as confirmation that materials and equipment, including workmanship, hardware, software and other related ancillaries required will be provided in strict accordance with the Mechanical Contract Documents.

### 1.13 SHOP DRAWINGS

- .1 As soon as possible after the award of the Contract the Contractor shall submit to the Consultant a summary of Shop Drawing submissions for review.
- .2 Submit shop drawings for review in sufficient quantities to satisfy contractual requirements. Shop drawings pertain to each particular item as specified; show project and component name, item reference number, certified physical and performance data; and clearly indicate all applicable parts and accessories. Affix Contractor's "Approved" stamp on all copies of all shop drawings prior to their submittal to the Engineer for review. Approval stamp shows name of firm, date the approval was made and the checker's signature or initials. Should the above requirements not be adhered to, submitted shop drawings will be returned without further Consultant review for proper re-submittal.
- .3 Submit shop drawings for items and equipment specified in the sections of the Mechanical Division. Identify the equipment by system name and number as similarly identified on the drawings.
- .4 Each Shop Drawing will be stamped by the Consultant in the following format:

<input type="checkbox"/> NOT REVIEWED	<input type="checkbox"/> REVIEWED
<input type="checkbox"/> RESUBMIT	<input type="checkbox"/> REVIEWED AS MODIFIED
<input type="checkbox"/> NOT SPECIFIED BY MCW, REVIEWED FOR MEP ONLY	

- This stamp will be applied by the Consultant to each shop drawing.
- .5 This review by the Consultant is for the sole purpose of ascertaining conformance with the design concept. This review shall not mean that the Consultant approved the detail design inherent in the shop drawings, responsibility for which to remain with the Contractor, and such review shall not relieve the Contractor of responsibility for errors or omissions in the shop drawings or responsibility for meeting all requirements of the Mechanical Division Contract Documents. The Contractor is responsible for dimensions to be confirmed and correlated at the job site, for information that pertains solely to fabrication processes or to techniques of construction and installation and for co-ordination of the work of other interfacing Trades as well as compliance with all Codes and requirements of the Authorities Having Jurisdiction.
- .6 Products not specified by MCW are reviewed to confirm compliance with services provided only. Any changes required between provided services and shop drawing requirements will be identified for coordination between trades.
- .7 It is the Contractor's responsibility to bring to the attention of the Consultant all physical, performance or other deviations from the Contract requirements. The Contractor shall provide a cover sheet with each Shop Drawing submission, on the Contractor's letterhead, including a summary clearly highlighting any and all deviations from the requirements of the Mechanical Division Contract Documents.
- .8 For equipment, provide performance, physical and operating data as described in the Mechanical Division Contract Documents and listed in equipment schedules. Provide performance curves for all pumps and fans specified. Include sound power data for any equipment such as fans, pumps, terminal devices, grilles and diffusers, chillers, cooling towers, or whenever equipment performance affects sound sensitive spaces.
- .9 Provide dimensions and mounting details for all items of equipment, and weight and support point loads of equipment weighing in excess of 14 kg (30 lbs.).
- .10 All dimensions, weights and performance characteristics to be in the same units used in the Specifications and shown on the Drawings (SI or Imperial). Shop drawings not submitted in conformance with the foregoing may be considered grounds for rejection.

- .11 Where equipment is specified with control panels or electrical control components such as float switches, control valves, level controllers, relays and similar components provide wiring diagrams and descriptions that are specific to the item. General data covering a wide range of similar devices or components is not acceptable.
- .12 Bind one complete set of "Reviewed" or "Reviewed as Modified" shop drawings in the Operating and Maintenance ("O&M") manuals; do not include shop drawing marked "Revise and Re-Submit".

#### **1.14 PATENTS**

- .1 Pay all royalties and license fees, and defend all suits or claims for infringement of any patent rights, and save the Owner and Consultant harmless of loss or annoyance on account of suit, or claims of any kind for violation or infringement of any letters patent or patent rights, by this Subcontractor or anyone directly or indirectly employed by him or by reason of the use by him or them of any part, machine, manufacture or composition of matter on the work, in violation or infringement or such letters patent or rights.

#### **1.15 RIGHTS RESERVED**

- .1 Rights are reserved to issue any additional Detail Drawings, which in the judgement of the Consultant may be necessary to clarify the Work, and such Drawings shall form a part of the Contract.

#### **1.16 EQUIPMENT NAMEPLATES**

- .1 Provide apparatus (including electric motors) with proper nameplates affixed thereto, showing the size, name of equipment, serial number and all information usually provided, which also includes voltage, cycle, phase and horsepower of motors and the name and address of the Manufacturer.

#### **1.17 COMPLETION**

- .1 The following are considered to be the minimum requirements of mechanical systems readiness in order that they may be considered by the Owner as ready for the intended use of the Work contracted to be performed in accordance with requirements described in the Ontario Construction Lien Act regardless of the value of Work remaining to be performed.
- .2 General completion requirements:
  - .1 Mechanical Commissioning complete in accordance with Section 20 08 10.
  - .2 Operating and Maintenance ("O&M") Manuals submitted to Engineer for review.
  - .3 Letter of Completion and documentation from all Sub-trade(s) submitted.
  - .4 Mechanical wiring including all power, control and communication wiring, has been completed and accepted by the Authorities Having Jurisdiction (AHJs)
  - .5 All certification, test and inspection certificates submitted.
  - .6 Integrated Systems Testing of Fire Protection and Life Safety Systems shall be completed in accordance with CAN/ULC-S1001 with the participation of all affected Trades.
  - .7 Final Record Set of "As-Constructed" or "As-built" Drawings completed, checked and submitted for HVAC, and Plumbing & Drainage.
  - .8 Final Record Set of "As-Constructed" or "As-built" Drawings completed, checked and submitted for fire protection.
  - .9 Confirm program for warranty period, including site visits and assistance to Owners for Operations and maintenance and controls. Extended warranty forms completed and submitted.
  - .10 System performance tests complete and verified.
  - .11 Cleanup completed (air filters, strainers, and other similar equipment cleaned and/ or replaced).
  - .12 Confirm access to equipment and other components requiring servicing (valves, dampers, and other similar serviceable equipment and devices).

- .13 Thermometers, pressure gauges and filter gauges in place.
- .14 Flexible connections and isolators free from binding.
- .15 Painting, identification and valve tagging completed.
- .16 Equipment lubricated and accessible for maintenance.
- .17 Testing, Adjusting and Balancing ("TAB") work completed or nearing completion.
- .18 Vibration and sound control verified in accordance with reference levels.
- .19 Insulation repaired and proper finish applied.
- .20 Pipe, duct and equipment identification completed.
- .21 Fire-stopping completed.
- .22 Turnover seminar and instructions to Owner completed.
- .3 Plumbing and Drainage system completion requirements:
  - .1 Pumps adjusted, balanced and operating correctly.
  - .2 Hydro-pneumatic and/ or expansion tank(s) charged and functioning correctly.
  - .3 All backflow preventers installed and functioning.
  - .4 Plumbing fixtures cleaned and water flows adjusted.
  - .5 Proper access to all cleanouts confirmed.
  - .6 Equipment drains taken to hub or funnel drain.
  - .7 Expansion and contraction provisions satisfactory.
  - .8 Thermometers and gauges installed.
  - .9 Gas connections to all equipment completed and inspected.
- .4 Fire Protection and Life Safety System completion requirements:
  - .1 Sprinkler systems tested and inspected as per NFPA 13.
  - .2 Standpipe systems tested and inspected as per NFPA 14.
  - .3 Emergency power generating equipment, transfer switches and distribution systems are complete and operational.
  - .4 Emergency power natural gas service and distribution systems are complete and operational.
  - .5 Fire extinguishers installed (or turned over to Owner if mutually agreed).
  - .6 Fire dampers, smoke dampers and combination fire and smoke dampers installed, tested and functioning as intended.
- .5 Hot Water Heating and Hydronic Circulation System completion requirements:
  - .1 Chemical cleaned piping and treatment charged.
  - .2 Expansion tank charged.
  - .3 Terminal units operating.
  - .4 Pumps adjusted, balanced and operating correctly.
  - .5 Boiler test fired and results submitted.
- .6 Chilled Water Cooling and Hydronic Circulation System completion requirements:
  - .1 Chiller start-up and commissioning complete;
  - .2 Cooling tower and/ or similar heat rejection equipment start-up and commissioning complete.
  - .3 Chemical cleaned piping, feed pump installed and treatment charged.



- .4 Expansion tank charged.
- .5 Pumps adjusted, balanced and operating correctly.
- .6 Terminal unit isolators installed and units secured to mounting pads.
- .7 Heat trace and freeze protection installed and tested.
- .8 Refrigerant charged.
- .9 Terminal unit controls tested and operating.
- .10 Terminal units commissioned test and results submitted.
- .11 Leak exhaust system installed and tested.
- .7 Heating Water System completion requirements:
  - .1 Chemical cleaned piping, feed pump installed and treatment charged.
  - .2 Heat pump start-up and commissioning complete.
  - .3 Humidifier operation verified.
- .8 Ventilation System completion requirements:
  - .1 Building exhaust systems serving building are complete, operational and balanced.
  - .2 Air handling system and exhaust fan system controls are complete, operational and balanced.
  - .3 Supply, return and exhaust air distribution ductwork complete and pressure tested.
  - .4 Supply, return and exhaust air outlets tested, adjusted and balanced.
  - .5 Distribution ductwork and air intake and exhaust plenums cleaned.
  - .6 Construction filters removed and new permanent air filters provided.
  - .7 Space ambient sound levels verified and any excess noises resolved.
  - .8 Shipping blocks removed.
  - .9 Start-up reports completed.
  - .10 Cooling coil condensate drains installed, cleared and flowing freely.
- .9 Rooftop HVAC Equipment completion requirements:
  - .1 Roof-mounted exhaust fans secured on bases.
- .10 Building Automation Systems ("BAS") and Control system completion requirements:
  - .1 Building Automation Systems ("BAS") and Control systems for all building systems are complete, operational and verified as functioning correctly.
  - .2 Panel layout sheets complete with point name, point address and wire identification number. One copy attached to each respective panel door.
  - .3 All points tagged with point name, point address and panel number.
  - .4 "As-built" control drawings submitted.
  - .5 "As-built" program flowcharts submitted.
  - .6 "As-built" ladder wiring diagrams showing all hardware interlocks submitted.
  - .7 Complete O&M Manual submitted (including apparatus and O&M Manual for all sensors, transducers, solid state relays, and similar equipment and devices).
- .11 ***IAQ Testing or Flush-out Procedure as specified in Section 20 08 10 completed.***

#### **1.18 WARRANTIES**

- .1 Provide warranties on specified products, equipment and components as well as on the installation of these items. Include for all costs for cutting and patching, removal of equipment

and restoration materials and work and repairs to other equipment affected in performance of warranty work.

- .2 Provide warranty certificates, wherever given or required, that are in excess of the normal warranty period showing the name of the firm giving the warranty, dated and acknowledged, on specific equipment and systems.
- .3 Warranty periods for temperature controls and Building Automation System ("BAS") to start on the date of verification of acceptance issued in writing by the Consultant.
- .4 The date of verification of acceptance is independent of Substantial Performance of the Work and may occur after certification of Substantial Performance.
- .5 Acceptance of the Building Automation System ("BAS"); refer to Section 25 10 10.
- .6 Include verification of acceptance certificates with the maintenance and operating manuals in the appropriate sections.

#### **1.19 SCHEDULE**

- .1 Comply with the Owner's target Substantial Performance date.
- .2 As soon as possible after the award of the Contract the Contractor shall submit to the Consultant a Schedule for review that achieves the target Substantial Performance date.
- .3 Building Services and normal operation of the remainder of the building shall be maintained.
- .4 Include for all necessary premium or overtime costs to perform work outside of normal working hours that, in the Owner's opinion, would disrupt the normal operation and use of the building.
- .5 Existing services shall be cut back and connections capped at concealed locations. Finishes shall be made good to match adjoining surfaces.
- .6 Where existing equipment is to be re-used, but interferes with the new construction, the existing work shall be temporarily relocated until new work is complete. Services to temporarily located equipment shall be maintained at all times.
- .7 Unless noted otherwise, existing mechanical equipment and materials which become redundant shall be completely disconnected and removed from the site. At the Owner's instruction, equipment and materials shall be turned over to the Owner on site. Disposition shall be confirmed with the Owner prior to removal.

#### **1.20 SCHEDULE OF VALUES**

- .1 As soon as possible after the award of the Contract the Contractor, shall submit to the Consultant for review a Schedule of Values (SOV) breaking down of the Contract amount according to Trades performing the Work, major equipment purchases, and site mobilization and demobilization costs.
- .2 Site mobilization costs shall be no more than 1.5 times the value of site demobilization costs.

#### **1.21 CHANGES TO THE WORK**

- .1 Unless otherwise stated in the Contract, the Supplementary Conditions or General Instructions, whenever Consultant proposes in writing to make a Change or revision to design, arrangement, quantity, or type of any work from that required by the Documents, prepare and submit to Consultant for review, a quotation for executing the Change or revision. The Change or revision shall be determined by one or more of the following methods as determined by the Consultant:
  - .1 By estimate and acceptance of a lump sum ("Lump Sum Method"); or
  - .2 Where unit prices, discounts and allowances are set out in the Contract Documents or subsequently agreed upon, in accordance with such unit prices ("Unit Price Method"); or
  - .3 By actual time and material costs and a fixed or percentage fee for overhead and profit ("Time and Material Method").
- .2 Changes in the Work evaluated using the Lump Sum Method or Time and Material Method shall be based on the following factors:

- .1 For Materials and Equipment - The latest edition of Allpriser published list prices, less the following discounts:

	Item	Discount
1	Steel Pipe	50%
2	Copper Pipe	45%
3	Cast Iron Soil Pipe	45%
4	Stainless Steel Pipe and fittings:	45%
5	Welded Fittings:	50%
6	Grooved Fittings:	30%
7	Threaded Fittings:	40%
8	Cast Iron Screwed Fittings:	40%
9	Copper Fittings:	45%
10	Cast Iron MJ Fittings:	35%
11	Valves:	25%
12	Insulation Materials:	35%
13	All Other Materials:	25%
14	Equipment Rental:	Actual Rate, but not to exceed local rates.

- .2 For Base Labour Units:
- .1 mechanical labour unit costs are to be in accordance with Mechanical Contractors Association of America (MCAA) Labor Estimating Manual;
  - .2 electrical labour unit costs are to be in accordance with National Electrical Contractors Association (NECA) Manual of Labor Units;
  - .3 other such standardized trade units that may exist, on a Journeyman basis.
- .3 Provide copies of the Allpriser published list prices used to estimate material and equipment costs, and copies of the NECA, MCAA, SMACNA or other such standardized trade rates used to determine labour units when requested by the Consultant.
- .4 It is understood that each change may have a variety of non-typical or abnormal factors that will require adjustments. Under no circumstances shall the cumulative total of additional factors exceed 20% of the hours established using Base Labour units.
- .5 Labour rates shall include all associated project management, estimating, supervision, scheduling, coordination, interference, as-built drawing production/updates, travel time and associated expenses, delivery charges, clean-up, printing, telephone and other office expenses, and applicable employee benefits and burdens including, but not limited to:
- .1 Base Rate
  - .2 Vacation/Stat Pay
  - .3 Union Deductions
  - .4 Legislated Burdens
    - .1 Employer Health Tax (EHT)



- .2 Workplace Safety and Insurance Board (WSIB)
    - .3 Employment Insurance (EI)
    - .4 Canadian Pension Plan (CPP)
    - .5 Retail Sales Tax (RST) on Hardware.
  - .5 Expendable Small Tools
  - .6 Additional Unionized Charges
  - .7 Finance Payroll
  - .8 Rest Breaks
  - .9 Idle Time
  - .10 Safety
    - .1 Job Box Talks
    - .2 WHMIS
    - .3 Fall Protection
    - .4 Personal Protective Equipment
    - .5 Committees
  - .11 Labour Warranties
- .3 The following additional requirements apply to all Change quotations submitted:
- .1 costs for Journeyman and Apprentice labour must not exceed prevailing rates at time of execution of Contract and must reflect actual personnel performing the work;
  - .2 Change pricing must be such that Site Superintendent's involvement is necessary; cost for Site Superintendent must not exceed 10% of total hours of labour estimated for Change or revision;
  - .3 Change quotations, including those for deleted work, to include a figure for any required change to Contract time.
- .4 The Contractor shall at the request of the Owner, and/or the Project Manager, and/or the Consultant provide all required supplementary documentation requested by the Owner, and/or the Project Manager, and/or the Consultant for any Change.
- .5 Where Changes are evaluated using either the Lump Sum Method, or the Time and Material Method, the cost to the Owner shall be the actual cost of credits and, where additional work is required. The cost to the Owner shall be the actual cost plus a percentage covering overhead and profit, after all credits included in the Change have been deducted.
- .6 Where Changes are evaluated using either the Lump Sum Method, or the Time and Material Method, credit pricing for deleted work not already performed shall have a credit value assessed that is not less than 80% of the value of charges for similar new work.
- .7 Where Changes are evaluated using either the Lump Sum Method, or the Time and Material Method, the mark-up for overhead and profit shall be limited to and be calculated as follows;
- .1 Work carried out by the Trade Contractor or Trade Subcontractor: 10% overhead and profit combined.
  - .2 Trade Contractor's overhead and profit on Trade Subcontractor's work: 5% overhead and profit combined.
- .8 The cumulative total percentage for overhead and profit charged by the Trade Contractor, Trade Subcontractor and others shall not exceed 20% of the cumulative total value of such change in the work, net of overhead and profit.
- .9 Trade Contractor and Trade Sub-contractor's overhead and profit shall be calculated based on net additional work only.

- .10 For Changes involving net deletions only, overhead and profit shall not be deducted, but shall include taxes and duties.
- .11 Where Changes are evaluated using the Unit Price method, the value of the change shall be based on the net difference in quantities with the appropriate Unit Rate applied.
- .12 Where changes are extensive, or where requested by the Owner, and/or Project Manager, and/or Consultant, material and labour take-offs shall be organized on a drawing-by-drawing, or area-by-area basis by the Contractor to more readily facilitate verification of quantities and labour hours.
- .13 Change quotation summaries shall itemize HST separately.
- .14 Change quotations submitted that are not in accordance with requirements specified above will be rejected and returned for re-submittal.
- .15 Failure to submit a proper quotation to enable the Owner, and/or Project Manager, and/or Consultant to expeditiously process quotation and issue a Change Order will not be grounds for any additional change to Contract time.
- .16 Submit proposed Change quotations in writing for review by Consultant; if Consultant agrees a Change Order will be issued.
- .17 Do not execute any Change or revision until written authorization for Change or revision has been issued by the Consultant.

## **PART 2 - PRODUCTS**

### **2.01 GENERAL**

- .1 ***Generally, and unless specified otherwise, HVAC equipment, shall be provided as "Thermostat-Ready" meaning that the Building Automation System (BAS) shall have direct control over terminal equipment, and custom fabricated air handling units (AHUs) and other similar built-up equipment that include dampers, control valves, heating and cooling stages without the requirement of BACnet, Lonworks or other type of communication interface. Factory installed interlocks, safeties and anti-cycle timers shall be provided as required.***

### **2.02 INTERFERENCE/ COORDINATION MODEL**

- .1 The Mechanical Trade Contractor shall take the lead role in preparation of electronic Three Dimensional (3D) Building Information Model (BIM) interference/ coordination model with drawing sheet files set similar to Consultant drawings views. Use all other disciplines electronic drawings as basis for preparation of interference/coordination model. Position all Mechanical Trade and Sub-trade services to accommodate the work of other Construction Trades.
- .2 The tender documents including, the BIM model are not complete, nor fully coordinated. The model is not to be considered sufficiently detailed to build from.
- .3 Continuously update the interference/coordination model to accurately reflect all instructions issued by the architect and consultants in whatever format these instructions are issued. Assume for Bid submission purposes, that an updated BIM model will not be issued with each instruction.
- .4 Prior to commencement of work, submit for Consultant review the Mechanical Trade Contractor shall fully develop their own interference/coordination model using models from all other Construction Trades, and fully coordinate the installation prior to fabrication or installation of any services on site. All sub-trades whose work is affected by the information presented on each of these interference/coordination models shall sign-off on the drawings and thereby agrees to coordinate their parts of the work. Submit the completed interference/coordination model for review using the same procedures as specified for Shop Drawings.
- .5 Coordinate equipment placement to ensure that all components will have adequate access for operation, service and maintenance prior to commencement of Work. Services shall be laid out in an organized manner, including running services in parallel or at right angles from one another where these are exposed. Adequate access points shall be provided to service, maintain and operate the equipment as required.

- .6 Use the project's Architectural Revit model as the starting point for the creation of interference/coordination model. The contractor's drawings will show angles, braces, supports, and similar equipment that are not in the design model. Use the electrical contractor's model and not the electrical design files; use the structural steel contractor's model and not the structural design files.
- .7 Prepare interference/coordination model in conjunction with other Construction Trades, wherever a potential conflict due to the positioning of Mechanical Trade Contractor equipment, piping, ductwork or other Work exists.
- .8 Dimension proposed location of Mechanical Trade Contractor Work with respect to building elevations and established grid lines.
- .9 Prepare fully dimensioned details of all shafts, duct spaces and pipe spaces. Show sleeving, recessed and formed holes required in concrete for Mechanical Trade Contractor Work. Include information pertaining to access, clearances, tappings, housekeeping pads, drains and electrical connections.
- .10 Base information used to prepare interference/coordination model on reviewed Shop Drawings.
- .11 Provide field interference/coordination model showing the position of various services when required by Consultant.
- .12 The Mechanical Trade Contractor shall be responsible for the full coordination of all mechanical services with the existing building, new construction, and all new and existing services from all Construction Trade disciplines.
- .13 Submit a list of access doors and panels showing proposed type, size and location. The interference/coordination model shall incorporate Architectural details including reflected ceiling plans prior to submission.
- .14 Revise or alter the arrangement of work that has been installed without proper coordination, study and review, in order to conceal the work behind finishes, or to allow the installation of other work, at no additional cost. If any conflicts are identified submit alternate proposal to the consultant for review prior to proceeding with any work.
- .15 All 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.
- .16 The Contractor and their Sub-trades shall take complete responsibility for remedial work that results from failure to coordinate the work prior to fabrication, purchasing and/or installation. Pay for the cost of alterations to other work required by the alterations work made necessary due to a lack of preparing a comprehensive interference/coordination model.

### **2.03 EMBEDDED MECHANICAL SERVICES DRAWINGS**

- .1 Prepare embedded mechanical services drawings, showing size and location of elements including any conduit and inslab services required.
- .2 Prepare insert setting drawings for work to be cast into concrete and/or mortared into masonry elements.
- .3 Submit embedded mechanical services drawings to the Consultant and Structural Engineering Sub-Consultant for review.

### **2.04 SLEEVING DRAWINGS**

- .1 Prepare sleeving drawing in conjunction with all affected Trades. Showing sleeves and openings for passage through structure, and all inserts, equipment bases, sumps, pits and supports, and relate these to suitable grid lines and elevation datum.
- .2 Submit sleeving drawings to the Consultant and Structural Engineering Sub-Consultant for review.

### **2.05 FINAL RECORD SET "AS-CONSTRUCTED" OR "AS-BUILT" DRAWINGS**



- .1 Meet the requirements of Division 01 and the following.
- .2 Suitably store and protect Record "As-Constructed" or "As-built" Drawings on site and make available at all times for inspection.
- .3 Record inverts of underground piping at building entry/exit and below floor slab at each branch, riser base, change in direction as well as at least three points on straight runs.
- .4 Show locations of access doors and panels and identify the equipment and components that they serve.
- .5 Transfer all of the Mechanical Trade Contractor's "As-Constructed" or "As-built" information to an electronic, editable version of the Consultant's BIM model format Record Drawings prior to submission to Consultant for review.
- .6 Submit Final Record Set of "As-Constructed" or "As-built" Drawings for review in PDF format and hard copy for review. Submit reviewed Final Record Set of "As-Constructed" or "As-built" Drawings in an editable format with the O&M Manuals.

## **2.06 OPERATING AND MAINTENANCE ("O&M") MANUALS**

- .1 Each O&M Manual shall contain the following information:
  - .1 The Mechanical Trade Contractor(s) and Subcontractor(s) contact information including name, address, telephone number and email address;
  - .2 Mechanical Equipment Suppliers and Mechanical Sub-trades names and telephone numbers;
  - .3 description of each system with description in layman's terms of each major component of system;
  - .4 complete sets of "Reviewed" or "Reviewed as Modified" Shop Drawings and other Submittals including Interference/ Coordination Model, Embedded Mechanical System's Drawings, and Sleeving Drawings;
  - .5 equipment manufacturer's installation, start-up and operation manuals;
  - .6 equipment manufacturer's recommended spare parts lists;
  - .7 equipment wiring diagrams;
  - .8 lubrication schedule for all equipment;
  - .9 equipment identification list with serial numbers;
  - .10 page size valve tag schedule and flow diagrams;
  - .11 final balancing reports;
  - .12 water treatment procedure and tests;
  - .13 complete set of Mechanical Trade Contractor Final Record Set of "As-constructed" or "As-built" Drawings including updated Control Drawings and Schematics;
  - .14 full and final sequences of operations;
  - .15 facility operating schedules (climate control, security, lighting, access, and similar);
  - .16 relevant fire and emergency systems and procedures;
  - .17 energy conservation strategy, optimization benchmarks, and tests;
  - .18 seasonal start-up and shutdown procedures;
  - .19 copies of posted instructions;
  - .20 environmental authorities' compliance requirements;
  - .21 problem- and issue-reporting procedures;
  - .22 the potential consequences if the equipment or system malfunctions;

- .23 alternative and backup systems that should be used in the event of a breakdown or failure.
- .24 extended warranty documentation if applicable;
- .25 certificates for:
  - .1 equipment start-up and Commissioning complete;
  - .2 Controls and Building Automation Systems Commissioning complete;
  - .3 Pressure tests (domestic water piping, drainage system piping, fire protection piping, heating/cooling piping, ductwork) certifying system tested, pressure held, time of test and date and certification by the Consultant.
- .2 Ensure that the terminology used in various sections of the O&M Manual is consistent.

### **PART 3 - EXECUTION**

#### **3.01 GENERAL INSTALLATION REQUIREMENTS**

- .1 Periodic inspections of the work in progress will be made to check general conformity of the work to the Contract Documents. Observed deficiencies will be reported. Correct deficiencies immediately upon notification.
- .2 Comply with Manufacturer's requirements for the installation of all specified equipment and the requirements of all Laws, Bylaws, Codes, Regulations, and all requirements of the Authorities Having Jurisdiction ("AHJs"). Furnish certificates and evidence that Mechanical Trades Work meets the requirements of the Authorities Having Jurisdiction.
- .3 Where the Contract Documents, instructions or where the Authorities Having Jurisdiction ("AHJs") require Mechanical Trades Work to be tested, inspected, or approved, give sufficient notice of its readiness for inspection and schedule the date and time for such inspection.
- .4 Uncover Work performed by Mechanical Trades that is covered up without consent, upon Consultant request, for examination and restore at no extra cost to the Owner.
- .5 Provide all required Mechanical equipment, including all devices, components and other ancillaries required for the intended system operation inherent in the Design as outlined in the Drawings and Specifications.
- .6 Include for all labour necessary for the successful completion of point-to-point verification of equipment, including all devices, components and other ancillaries as part of the project commissioning requirements.
- .7 Include for all labour necessary for the successful completion of performance verification of equipment, including all devices, components and other ancillaries as part of the project commissioning requirements.

#### **3.02 FIREWATCH**

- .1 Throughout all construction activities, Fire Alarm and Life Safety Systems shall remain operational. If any portion of a Fire Alarm System including zones or devices needs to be bypassed, or otherwise deactivated to complete the Work, the Contractor shall implement a Firewatch.
- .2 Firewatch procedures are to be conducted in accordance with latest edition of the Ontario Fire Code. Where interpretations are required, coordinate with the Owner, the Consultant and Authorities Having Jurisdiction (AHJ). Refer to the Ontario Fire Code for Firewatch requirements and expectations.
- .3 The following outlines the anticipated Firewatch procedures required:
  - .1 Contact the Owner a minimum of 48 hours (2 business days) prior to initiation of Firewatch.
  - .2 Contractor shall subcontract an Owner approved fire alarm contractor to put the device(s) or zone(s) affected on bypass. If the building fire alarm devices are addressable, the devices can be bypassed individually. If a building has a "conventional" fire alarm system,

- the entire zone affected must be bypassed. Under no circumstances is an entire panel to be bypassed.
- .3 If devices are covered during the Work the Contractor shall follow the manufacturer's recommended procedures. Covers shall be removed at the end of each working day.
  - .4 Other activities that generate dust or airborne particulate including spray painting may disturb or actuate fire alarm devices. Such activities may warrant fire alarm bypass and Firewatch procedures.
  - .5 During Firewatch, Contractor personnel conducting the watch shall:
    - .1 carry a radio for communication with the Owner's security personnel,
    - .2 remain onsite for the duration of the Firewatch, and
    - .3 tour building areas affected once every hour.
  - .4 Once the Firewatch has ended;
    - .1 Owner approved fire alarm contractor to verify the fire alarm system including all devices affected are back online and ensure all "trouble signals" at the fire alarm panel are cleared.
    - .2 Return the radio(s) to the Owner.
    - .3 Once the Work is completed, all devices that were covered are to be re-verified.
    - .4 Notify the Owner the Firewatch has ended.

### **3.03 SMOKING**

- .1 Smoking is at all times be prohibited inside demolition or construction zones in all areas of the Work.
- .2 The Contractor shall post signage indicating the prohibition of smoking in all areas of the Work and shall enforce the no-smoking policy.
- .3 Smoking outside of areas of the Work shall only be permitted in a designated location agreeable to the Owner, but in no case shall be allowed within 9m of any building opening or air intake.

### **3.04 HOUSEKEEPING MEASURES**

- .1 The following housekeeping measures shall be practiced for the duration of the Work, at all times, to limit accumulation of contaminants and debris at the construction site:
  - .1 Maintain a dry, clean workspace throughout construction.
  - .2 The Contractor shall visually inspect job site daily for dust, dirt and water accumulation and take remedial action to correct deficiencies. Increase frequency of cleaning as required to maintain the site in clean and dry condition.
  - .3 Wherever possible, an efficient dust collection method other than dry sweeping shall be used (damp rag, wet mop or vacuum).
  - .4 If dry sweeping is the only alternative, it shall be accompanied by a dust suppression agent. Vacuuming with HEPA filtered vacuum cleaners shall be used to prevent aerosolization of settled dust.
  - .5 Waste products shall be diverted to the appropriate enclosed waste bins or storage areas.
  - .6 Low emitting cleaners shall be used that are certified in accordance with project LEED requirements.
  - .7 All surfaces shall be kept clean, including higher ledges and behind equipment or furniture.
  - .8 Building materials shall be protected from precipitation and other contamination prior to installation. This includes protection of porous materials (i.e. insulation, drywall, and ceiling tile) from exposure to moisture and sources of contamination.



- .9 Materials shall not be stored directly on the floor. All materials will be elevated by a minimum of 75mm on pallets or by other means.
- .10 Acceptable areas to store the building materials on-site will be identified by the Owner's Project Manager.
- .11 All coils, air filters, fans and duct work will remain clean during the installation and will be cleaned prior to performing testing, adjusting and balancing of systems.
- .12 Any accumulation of water in the building will be immediately removed.

### **3.05 SPECIAL CLEANING**

- .1 Vacuum clean and remove debris from the inside of air handling systems, fans, ducts, coils and terminal units.
- .2 Clean exposed surfaces of Mechanical equipment, ductwork and piping. Polish plated work.
- .3 Comb all bent fins to proper configuration on all coils in indoor and outdoor air handling units.

### **3.06 PROTECTION**

- .1 Protect all Work from damage. All Mechanical Equipment, including existing equipment, shall be protected from exposure to moisture and from collecting dust, debris, odours and other contaminants while demolition and construction activities are ongoing.
- .2 Cover openings in equipment and cover equipment where damage may occur from weather. Cover temporary openings in ducts and pipes with minimum 6-mil polyethylene sheeting, until final connection is made. Cover all items cast into concrete floors or walls such as floor drains and cleanouts prior to pour, with heavy plastic tape or duct tape.
- .3 Protect equipment which may be harmed by excessive dirt with filters, or bypass during cleaning.
- .4 Cover and seal, with polyethylene sheeting, all equipment, coils and motors in place during construction to prevent entry of dust, paint and debris.
- .5 Ductwork Protection:
  - .1 Provide adequate access into ductwork for cleaning purposes.
  - .2 The ends of all ductwork and duct open ends in HVAC equipment are to be sealed tightly, whether they are installed or being stored prior to installation. All ductwork and equipment that is waiting to be installed must be kept off the floor a minimum of 75 mm.
  - .3 Protect equipment which may be harmed by excessive dirt with filters, or bypass during cleaning.
  - .4 Where heavy dust loading is expected to impact operating HVAC systems, higher efficiency MERV 12 filters shall be used to provide increased protection where minimum airflow can be maintained.
  - .5 Equipment filtration shall be replaced immediately prior to occupancy.
  - .6 Upon completion flush-out or successful IAQ testing, HVAC and lighting systems shall be returned to their designed or modified operation.
  - .7 Prior to start-up, the project Architect, Mechanical Designer and/or Commissioning Authority and the Region's Project Manager shall verify that the HVAC systems are free of contamination.
  - .8 If after inspection by the project Consultants, Commissioning Authority or Region Project Manager the ductwork system is deemed to be unacceptable due to construction or demolition activities, the Contractor shall, at its cost and prior to operation or test and balance, clean systems and equipment including but not limited to ductwork (supply/return/exhaust), air handling equipment, plenums, terminal units, fans, dampers, grilles/registers/diffusers with high power vacuum machines.
    - .1 At the discretion of the Region's Project Manager, cleaning shall be performed in accordance with National Duct Cleaners Association (NADCA) standards, and by

- agent specializing in this field of work, and a member in good standing with NADCA.
- .2 Submit report, verified by Testing and Balancing Agent, identifying the extent of duct system cleaning and certifying that NADCA standards have been met.
- .9 Return/Exhaust Side Protection:
  - .1 Immediately after installation, the open ends of return and exhaust ductwork shall be sealed with 6-mil polyethylene sheeting.
  - .2 Where feasible, permanent HVAC equipment shall not be operated during demolition.
  - .3 If air handlers must be used during demolition or construction, temporary filtration media with a minimum MERV 8 rating shall be used at each return air grille or opening. Filters shall be inspected regularly during demolition and construction and be maintained in good condition. Filters shall be removed prior to occupancy.
  - .4 Where ceiling cavities are used as return air plenums, replace all missing ceiling tiles and seal all return air grilles and openings.
  - .5 Mechanical rooms with return-side equipment will not be used to store construction or waste materials.
- .10 Supply Side Protection:
  - .1 HVAC systems in areas where major demolition is scheduled shall be de-energized during the performance of the Work.
  - .2 Equipment left in place during demolition and construction shall be wrapped in 6-mil polyethylene sheeting.
  - .3 Where HVAC systems are disabled for the duration of construction, equipment, including VAV boxes, open ductwork, grilles and diffusers installed on the supply side of the HVAC systems shall be sealed with 6- mil polyethylene sheeting following installation.
- .6 Porous Building Materials:
  - .1 Porous building materials, those materials that have pores that may allow fluids or gasses to pass through; this includes drywall, insulation, carpeting, ceiling tiles, and similar.
  - .2 Porous materials shall be protected from exposure to precipitation, other moisture sources and VOCs contaminants.
  - .3 Protection measures may include:
    - .1 Storing the porous products in a location free from moisture and contamination sources prior to installation.
    - .2 Installing porous products utilizing recommended environmental conditions.
    - .3 Avoiding installation of products in environments subject to high- VOCs emissions.
    - .4 Depending on the result of the visual assessment and moisture readings, temporary dehumidification, heating and air circulation equipment may be required in the applicable areas or alternative drying methods may be required to the acceptance of the Consultant and the Owner.
- .7 Repair any damage caused by improper protection of equipment and materials.

### **3.07 TEMPORARY SERVICES**

- .1 Provide temporary mechanical services in accordance with the requirements of Division 01.
- .2 Temporary ventilation and heating units shall be used as needed while construction is ongoing.
- .3 Make arrangements for connections to temporary energy sources (electrical power, natural gas, water, drainage and similar) for use by during construction.

- .4 Provide and maintain temporary fire protection services as required by the Authorities Having Jurisdiction (AHJs).
- .5 When the permanent water service is installed, it shall be used to supply water for the use of other Construction Trade Contractors.
- .6 Perform operations necessary for checking, testing and balancing after written approval is given to start up systems. Ensure that care is taken to protect equipment from damage and to prevent distribution of dust through duct systems.
- .7 Do not use permanent plumbing, heating or air conditioning systems for temporary services during construction, except with written permission from Consultant. Permanent HVAC equipment shall not be used to dry out the building materials during, or immediately following, completion of any Work.
- .8 ***Where mechanical work interrupts operation of the surrounding maintenance facility buildings, such as, but not limited to, monitoring of remote sensors, and control of equipment in surrounding maintenance facility buildings, Mechanical Trades shall provide measures to ensure continued monitoring of these remote sensors, and control of this equipment.***

### **3.08 INTERRUPTION OF EXISTING SERVICES**

- .1 ***Maintain existing facility operational requirements in accordance with the requirements of Division 01.***
- .2 Arrange, schedule and perform Demolition Work with minimum disturbance to existing facilities and services.
- .3 Submit a complete schedule of service interruptions and changeovers with approximate dates required, durations and times of day, for approval before proceeding.
- .4 Notify Owner in writing at least 72 hours in advance of planned interruption to existing services.
- .5 Interruption of service must occur at the times and for the duration stipulated by the Owner.
- .6 Keep service interruption duration to an absolute minimum. Carry out all preparatory Work, measurements, performance evaluation, and similar, without interruption of existing services.
- .7 If the Owner requires service interruptions during the night or on weekends, include any premium time in the Bid Price. No extra charges will be allowed at a later date for failure to include for premium time.

### **3.09 RUN-IN**

- .1 Systems shall be run-in, tested and balanced for proper operation prior to application for Substantial Performance of the Work.

### **3.10 TRIAL USAGE, TESTING AND COMMISSIONING**

- .1 Testing shall be performed as required by Codes, Bylaws, and Authorities Having Jurisdiction ("AHJs"); commissioning shall be performed in accordance with Section 20 08 10.
- .2 Perform testing and commissioning as instructed by the Consultant to demonstrate that the work conforms to the contract documents, and where required, perform any additional testing requested by the AHJs.
- .3 Repeat tests as necessary to demonstrate Contract compliance to the satisfaction of the Consultant and the AHJs.
- .4 Include, as part of the Work, trial usage of Mechanical Systems and equipment for the purpose of testing and commissioning, including assistance for the Owner's staff to learn the operation and maintenance procedures, for new equipment and systems.
- .5 Assist in trial usage over a length of time sufficient to confirm specified equipment capacities and operating characteristics.



- .6 Maintain full responsibility for all mechanical equipment and systems required to temporarily operate during trial usage. Warranty period commencement for any equipment operated during trial usage will not occur until certification of Substantial Performance.

### **3.11 INSTRUCTIONS TO OWNER'S STAFF**

- .1 Instruct the Owner's designated staff on all aspects of the operation of systems and equipment. Advise the Consultant at least one week in advance of the schedules of all instruction sessions.
- .2 Obtain the services of Sub-trade and Manufacturers' representatives to provide information and instructions on each part of the Mechanical Work and on items of equipment.
- .3 Submit to the Consultant immediately following final inspections a "Confirmation of Instructions to Owner's Operating and Maintenance Staff" statement for each system or item of equipment confirming:
  - .1 Date and time instructions commenced for each system.
  - .2 Duration (hours) instructions were given for each system.
  - .3 Names of Owner's staff receiving instructions.
  - .4 Other parties present (Manufacturer's representative, consultants, any other project stakeholders).
  - .5 Signatures of each of the Owner's staff in attendance.

**END OF SECTION**

## **CONTENTS**

### **PART 1 - GENERAL**

- 1.01 GENERAL REQUIREMENTS**
- 1.02 WORK INCLUDED**
- 1.03 SUBMITTALS**
- 1.04 WORK IN EXISTING BUILDING**

### **PART 2 - PRODUCTS**

- 2.01 NIL**

### **PART 3 - EXECUTION**

- 3.01 FIRE PROTECTION SERVICES TO BE MAINTAINED**
- 3.02 PLUMBING AND DRAINAGE SERVICES TO BE MAINTAINED**
- 3.03 HVAC SERVICES TO BE MAINTAINED**
- 3.04 CONTROLS AND BAS SERVICES TO BE MAINTAINED**

## **PART 1 - GENERAL**

### **1.01 GENERAL REQUIREMENTS**

- .1 Comply with requirements of the Owner's General Requirements and all documents referred to therein.
- .2 Comply with requirements of Section 20 01 10 Mechanical General Requirements.
- .3 Comply with requirements of Section 20 01 50 Basic Materials and Methods.
- .4 Comply with requirements of Section 20 05 05 Mechanical Demolition.

### **1.02 WORK INCLUDED**

- .1 Planning and phasing of construction activities that allow for the continued operation of the facility, or designated areas of the facility, during the construction period, including, but not necessarily limited to:
  - .1 Limitations on access to areas of the site,
  - .2 Limitations on use of the site,
  - .3 Coordination with site personnel,
  - .4 Maintenance of identified existing mechanical services during construction, or construction related activities, under control of the Contractor.

### **1.03 SUBMITTALS**

- .1 Submit a Work Plan identifying how existing mechanical services identified to be maintained during construction activities are intended to continue in operation unless approved as part of a pre-planned scheduled service disruption. The Work Plan will address the following:
  - .1 Services being disrupted,
  - .2 Anticipated start of disruption, length of disruption, and date when mechanical services are anticipated to be re-established,
  - .3 Mechanical services in the operational areas of the facility outside of the construction site that will be affected during the service disruption,
  - .4 How the mechanical service, or portion of the mechanical service, will be maintained during construction activities, or construction related activities, under control of the Contractor,
  - .5 The Contractor's plan for remedial work to reestablish any required mechanical services to be maintained, but disrupted because of construction related activities, regardless of the effort to maintain the mechanical services intended by the Work Plan.
- .2 Carefully schedule all disruption and/or shutdowns and ensure that the duration of same is kept to the absolute minimum.
- .3 The Contractor shall not execute any work on site until the Work Plan has been submitted and reviewed by the Owner.

### **1.04 WORK IN EXISTING BUILDING**

- .1 ***Maintain existing facility operational requirements in accordance with the requirements of Division 01.***
- .2 Areas of the facility identified in the Documents shall remain open and in operation during construction, or construction related activities under the control of the Contractor.
- .3 The existing building is to remain online and operational unless a service disruption is required to complete the work, and only then at a time and duration agreed to by the Owner. Where existing services such as water, drainage, fire protection, natural gas, heating, cooling, exhaust, make-up (ventilation) air, stand-alone controls, the Building Automation System (BAS) elements, and other similar mechanical services are required to be maintained during construction, the Contractor shall coordinate any required service shut-downs with the Owner as identified in the Work Plan and carry out the work at a time and in a manner acceptable to them.



- .4 Where disruption to life safety systems are required, provide a Fire Watch in accordance with Section 20 01 10 during the service shut down period and ensure that all systems are reactivated prior to leaving site at the end of each working day.
- .5 Should any temporary connections be required to maintain services during work in the existing building, supply and install all necessary material and equipment and provide all labour at no extra cost. Should any existing system be damaged, make full repairs, without additional cost, to the satisfaction of the Consultant.
- .6 Refer to Owner's General Requirements and Division 01 for phasing and staging of work and adhere to those requirements. Comply with instructions regarding working hours to maintain the building in operation.
- .7 The drawings indicating items of equipment to be deleted or relocated have been prepared as a guideline for the Contractor but shall not be construed as indicating every item of equipment or ancillary device. Be responsible for determining site conditions by personal examination prior to any service shutdown.
- .8 Where existing services mounted on, and/or concealed behind, existing finishes become exposed during the work and where these services are required to remain but will no longer be concealed behind or mounted on new finishes as part of the work, identify the services to the Consultant. Co-ordinate new service locations or means to conceal these services with the Consultant.

## **PART 2 - PRODUCTS**

### **2.01 NIL**

## **PART 3 - EXECUTION**

### **3.01 FIRE PROTECTION SERVICES TO BE MAINTAINED**

- .1 During construction the following Fire Protection Services are to be maintained:
  - .1 Fire extinguishers inside the wash bays and services are to remain in place.

### **3.02 PLUMBING AND DRAINAGE SERVICES TO BE MAINTAINED**

- .1 During construction the following Plumbing and Drainage Services are to be maintained:
  - .1 Potable water supply to the building, including UV filtration and water softening equipment to maintain functionality of the wash bays and service bays is to remain operational,
  - .2 Floor drains and below grade sanitary drainage serving the wash bays and service bays, and related trap seal primer and venting systems are to remain operational,
  - .3 Wash bay and service bay roof drainage is to remain operational.
  - .4 Natural gas service to radiant heating system is to remain operational.
  - .5 Air compressor serving compressed air distribution piping in wash bay and service bay to remain operational.

### **3.03 HVAC SERVICES TO BE MAINTAINED**

- .1 During construction the following Heating, Ventilation and Air-Conditioning (HVAC) Services are to be maintained:
  - .1 Wash bay and service bay exhaust fans are to remain operational.
  - .2 Wash bay and service bay make-up air intake louvers and dampers are to remain operational.
  - .3 Natural gas radiant heating serving the wash bays and service bays are to remain operational.
- .2 Where natural gas radiant heating in the wash bays and service bays cannot be maintained due to scheduled demolition of other services, provide temporary propane heaters in the wash bays and service bays in lieu of existing radiant heaters.

### **3.04 CONTROLS AND BAS SERVICES TO BE MAINTAINED**

- .1 During construction the following Controls and Building Automation System (BAS) Services are to be maintained:
  - .1 Controls related to the wash bay and service bay exhaust fans, and make-up air dampers.
  - .2 Controls related to the wash bay and service bay space heating.
  - .3 Remote BAS monitoring and control of the following buildings on site, but unrelated to the construction:
    - .1 Existing salt storage building.
    - .2 Grey water system control panel monitoring and controlling storage tank and pumps adjacent to salt storage building.
    - .3 Existing sheds (four total, refer to site plan for location)

**END OF SECTION 20 05 14**

## **CONTENTS**

### **PART 1 - GENERAL**

- 1.01 GENERAL REQUIREMENTS**
- 1.02 SCOPE OF WORK**
- 1.03 QUALITY ASSURANCE**
- 1.04 SUBMITTALS**
- 1.05 SITE VISIT**

### **PART 2 - PRODUCTS**

- 2.01 POTABLE WATER PIPE, FITTINGS AND JOINTS**
- 2.02 SHUT-OFF VALVES**
- 2.03 STRAINERS – Y (WYE) PATTERN**
- 2.04 CHECK VALVES**
- 2.05 DRAIN VALVES**
- 2.06 DOMESTIC WATER FLOW BALANCING VALVES**
- 2.07 DOMESTIC WATER PRESSURE BOOSTER PUMP PACKAGE**
- 2.08 DOMESTIC HOT WATER RECIRCULATING PUMPS**

### **PART 3 - EXECUTION**

- 3.01 DOMESTIC WATER PIPING INSTALLATION REQUIREMENTS**
- 3.02 SHUT OFF VALVES**
- 3.03 STRAINERS**
- 3.04 DRAIN VALVES**
- 3.05 DOMESTIC HOT WATER PIPING FLOW BALANCING VALVES**
- 3.06 DOMESTIC WATER BOOSTER PUMP PACKAGE**
- 3.07 DOMESTIC HOT WATER RECIRCULATING PUMP**
- 3.08 TESTING OF POTABLE WATER SYSTEMS**
- 3.09 FLUSHING AND DISINFECTION OF PIPING**
- 3.10 EQUIPMENT WATER SERVICE CONNECTIONS**



## **PART 1 - GENERAL**

### **1.01 GENERAL REQUIREMENTS**

- .1 Comply with requirements of the Owner's General Requirements and all documents referred to therein.
- .2 Comply with requirements of Section 20 01 10 Mechanical General Requirements.
- .3 Comply with requirements of Section 20 01 50 Basic Materials and Methods.
- .4 Comply with the requirements of Section 25 10 10 BAS Control Network
  - .1 Comply with all requirements including those referenced in Article "BAS Integration with Third Party Devices"

### **1.02 SCOPE OF WORK**

- .1 Provision of domestic water piping, valves, circulation pumps, and flushing and disinfection of piping.
- .2 Provision of water service piping for Owner's Fixture, Furniture and Equipment (FF&E) connection requirements;

### **1.03 QUALITY ASSURANCE**

- .1 Execute work of this Section only by skilled tradesmen regularly employed in the installation of plumbing and drainage piping systems, and related equipment.

### **1.04 SUBMITTALS**

- .1 Submit the following Shop Drawings:
  - .1 Stainless steel piping;
  - .2 Stainless steel piping system fittings;
  - .3 Stainless steel piping system joints;
  - .4 Formal cleaning and disinfecting procedure for stainless steel piping systems;
  - .5 Valves;
  - .6 Domestic water pressure booster pumps sets.

### **1.05 SITE VISIT**

- .1 Visit the site prior to tender and verify all conditions. Prior to submitting price, the Mechanical Division Proponent is to review all discrepancies and verify the locations of all existing services that are being extended and the routing of new services. Also report all ambiguities, discrepancies, departures from building by-laws and/or from good practice. Failure to do so will result in all additional costs being the responsibility of the successful Mechanical Division Contractor. Include for any alternate routing of new or rerouting of existing services to accommodate all site conditions in the Bid Price.

## **PART 2 - PRODUCTS**

### **2.01 POTABLE WATER PIPE, FITTINGS AND JOINTS**

- .1 Above Ground Piping: Copper Tubing, Type "L", Hard Drawn, ASTM B88. Fittings: wrought copper solder joint pressure fittings, ANSI/ASME B16.22 or cast copper alloy solder joint pressure fittings, ANSI/ASME B16.18.
- .2 Below Grade Piping: Type "K" soft copper to ASTM B88, supplied in continuous coil with no joints as possible, and with, when joints are required, complete with soldered fittings to the requirements specified elsewhere in this Article.
- .3 Copper Piping Soldered and Brazed Joints:
  - .1 Soldered Fittings in Potable Water Systems up to 200 psi: Solder filler material to ASTM B 32, Alloy Sn95 (or equal) with Tin (Sn) approximately 95%, and Silver (Ag) approximately 5%;

- .2 Brazed Fittings in Potable Water Systems 200 psi to 300 psi: Brazing filler material to ANSI/AWS A5.8, BAg Series Silver alloys.
- .3 Maximum Lead (Pb) content of solder and brazed joint filler materials shall not exceed 0.2%.
- .4 Copper Piping Grooved End Joints and Fittings:
  - .1 Domestic water piping in accessible spaces with working pressures up to 300 psig (2100 kPa), provide Victaulic QuickVic Style 607 grooved copper piping systems utilizing rigid couplings consisting of ductile iron cast housings, with Grade EPDM gaskets, or equal, meeting NSF/ANSI Standard 61 for cold water (+73°F/+23°C) and hot water (+180°F/+82°C), with plated nuts and bolts to secure assembly together.
    - .1 Wrought copper fittings per ASTM B75 C12200, or ASTM B152 C110001 and ANSI B16.22;
    - .2 Bronze sand cast fittings conforming to UNS C89836.
- .5 Stainless Steel Piping, Fittings and Joints:
  - .1 At the option of the Contractor, and where allowed by the Authorities Having Jurisdiction ("AHJs"), domestic water piping size 2" (50 mm) in diameter or larger may be Schedule 10 type 304 stainless steel pipe conforming to ASTM A-312 with stainless steel fittings per ASTM A-403.
  - .2 Stainless steel pipe joints shall be roll grooved Victaulic Style 807N rigid type couplings and Grade EPDM coupling gaskets, or approved equal, meeting NSF/ANSI Standard 61, with plated nuts and bolts to secure assembly together; welded joints in stainless steel piping systems are not allowed unless an acceptable quality control program can be demonstrated to the Consultant.

## 2.02 SHUT-OFF VALVES

- .1 Ball Valves: Class 600, 4140 kPa (600 psi) WOG rated full port ball type valves, each complete with a forged brass body with solder ends, forged brass cap, and blowout-proof stem, solid forged brass chrome plated ball, "Teflon" or "PTFE" seat, and a removable lever handle. Valves in insulated piping are to be complete with stem extensions.
- .2 Butterfly Valves - Flanged Ends: Non-corrosive, minimum 1200 kPa (175 psi) cold water pressure rated, resilient seated butterfly valves, each complete with a coated cast ductile iron lug type body, stainless steel shaft, bronze disc, and EPDM seat, and each suitable for domestic water bubble-tight dead end service with the valve in position and either side of the connecting piping removed. Butterfly valves to and including 100 mm (4") dia. are to be equipped with lever handles; valves larger than 100 mm (4") dia. are to be equipped with worm gear operators.

## 2.03 STRAINERS – Y (WYE) PATTERN

- .1 Size ½" (12mm) to 2" (50mm), **Class 125** cast copper silicon alloy body, Y (wye) pattern strainer, equal to Watts Series LF777 (threaded ends), or LFS777 (soldered ends), as follows:
  - .1 Standards:
    - .1 NSF 372 for potable water applications
  - .2 Pressure and Temperature:
    - .1 ¼" (6mm) to 3" (75mm):
      - .1 **400 psi WOG** at 210°F
      - .2 125 psi WSP to 353°F
    - .2 4" (100mm):
      - .1 **300 psi WOG** at 210°F
      - .2 125 psi WSP to 353°F
  - .3 Materials:

- .1 Body: cast copper silicon alloy
- .2 Solid retainer cap: cast copper silicon alloy
- .3 Cap seal: EPDM O-ring for sizes ¼" (6mm) to 3" (75mm ); Garlock gasket for size 4" (100mm)
- .4 Gasket: EPDM
- .5 Screen: #20 stainless steel mesh for sizes ½" (12mm) to 2 ½" (65mm); 3/64" (1.2mm) 304 stainless steel perforated screen for size 3" (75mm); 1/8" (3mm) 304 stainless steel perforated screen for size 4" (100mm)
- .2 Size 2 ½" (65mm) to 12" (300mm), cast iron body, Y (wye) pattern strainer, equal to Watts Series 77F-DI-FDA-125 flanged ends, as follows:
  - .1 Standards:
    - .1 NSF 372 for potable water applications
  - .2 Pressure and Temperature:
    - .1 **200 psi WOG** at 210°F
    - .2 125 psi WSP to 353°F
    - .3 Maximum 140°F operating temperature with epoxy coating
  - .3 Materials:
    - .1 Body: ASTM A-126 Class B cast iron complete with FDA approved epoxy coating on the interior and exterior surfaces
    - .2 Cover: ASTM A-126 Class B cast iron with drain/ blowoff connection and ASTM A6 closure plug; assembly complete with FDA approved epoxy coating on the interior and exterior surfaces
    - .3 Cover bolt: ASTM A6
    - .4 Cover bolt nut: ASTM A6
    - .5 Set screw: ASTM B16
    - .6 Plate: ASTM A6 complete with FDA approved epoxy coating on the interior and exterior surfaces
    - .7 Cotter pin: ASTM A112
    - .8 Washer: ASTM A6
    - .9 Cover gasket: Graphite
    - .10 Screen: 304 stainless steel with 1/16" perforations for sizes 2" (50mm) to 5" (125mm); 304 stainless steel with 1/8" perforations for sizes 6" (150mm) to 8" (200mm); 304 stainless steel with 3/16" perforations for sizes 10" (250mm) to 12" (300mm)

## 2.04 CHECK VALVES

- .1 Horizontal: Class 125, bronze, 1380 kPa (200 psi) WOG rated horizontal swing type check valves with solder ends.
- .2 Vertical: Bronze, 1725 kPa (250 psi) WOG rated vertical lift check valve with soldering ends.

## 2.05 DRAIN VALVES

- .1 Minimum 2070 kPa (300 psi) water rated, 20 mm (¾") dia., straight pattern full port bronze ball valves, each complete with a threaded outlet suitable for coupling connection of 20 mm (¾") dia. garden hose, and a cap and chain.

## 2.06 DOMESTIC WATER FLOW BALANCING VALVES

- .1 **Domestic water flow balancing valves ½" (12mm) to 2" (50mm):**



- .1 **Provide Armstrong, or equal, Y-pattern globe valve style potable water balancing valve soldered or threaded end connections with fixed (venturi) orifice.**
- .2 **Low-lead (< 0.25% lead content) certified and listed to NSF 372, and NSF 61 for drinking water applications.**
- .3 **Brass body, bonnet and control stem.**
- .4 **Stainless steel valve plug.**
- .5 **PTFE stem guide bearing.**
- .6 **Brass seal seat.**
- .7 **Peroxide-cured EPDM hydraulic seals suitable for potable water applications.**
- .8 **Adjusting valve handle with memory stop.**
- .9 **Two (2), ¼" (6mm) threaded brass metering ports with check valves and gasketed caps located on the inlet side of the valve.**
- .10 **Maximum working pressure: 232 psi (16 bar).**
- .11 **Working temperature range: -4 to 250°F (-20 to 120°C).**
- .12 **Performance as follows:**

Valve size		Minimum flow rate		Maximum flowrate		Flow coefficient	
imperial	metric	usgpm	l/s	usgpm	l/s	Cv	Kv
½" LF	15LF	0.26	0.02	1.98	0.12	0.69	0.59
¾" LF	20 LF	0.41	0.03	3.11	0.20	1.08	0.93
½"	15	1.22	0.08	9.57	0.60	3.20	2.74
¾"	20	1.99	0.13	13.76	0.87	5.21	4.47
1"	25	4.57	0.29	22.97	1.45	12.01	10.29
1¼"	32	6.17	0.39	38.00	2.39	16.19	13.88
1½"	40	9.02	0.57	50.07	3.15	23.69	20.30
2"	50	15.50	0.98	81.92	5.16	40.70	34.88

- .13 **Accuracy: +/-3% on nominal Cv's**
- .14 **Provide pre-formed insulation shells for field installation.**
- .15 **Acceptable Manufacturers:**
  - .1 **Armstrong**
  - .2 **Caleffi**
  - .3 **Jomar**
  - .4 **Red-White Valve Corp.**
  - .5 **Or Consultant Accepted Equal**
- .2 **Domestic water flow balancing valves 3" (75mm) and larger:**
  - .1 **Provide eccentric plug valves DeZurik Model PEF, or approved equal, suitable for use in potable water applications for sizes 3" (75mm) and larger, in accordance with requirements as follows.**
  - .2 **Plugs shall be solid one piece, Cast Iron ASTM A126 Class B (applications up to 125 psi operation) or Ductile Iron ASTM A536 Grade 65-45-12 (applications up to 250 psi operation).**
  - .3 **The plug shall have a cylindrical seating surface eccentrically offset from the center of the shaft.**

- .4 **Plug shall not contact the seat until at least 90% closed. Resilient plug facing shall be Chloroprene (CR).**
- .5 **Bodies and covers shall be Cast Iron ASTM A126 Class B (applications up to 125 psi operation) or Ductile Iron ASTM A536 Grade 65-45-12 12 (applications up to 250 psi operation).**
- .6 **The valve port area shall meet or exceed standard pipe area per ASME/ANSI B36.10M.**
- .7 **Bearings shall be sleeve type and made of sintered, oil impregnated permanently lubricated type 316 stainless steel for sizes 3-18" (75-450mm) and ASTM A743 Grade CF8M for sizes 20-36" (500-900mm). For valve sizes larger than 36" (900mm), the upper and lower plug journals shall be fitted with ASTM A240 type 316 stainless sleeves with body bearings of ASTM B30, Alloy C95400 aluminum bronze.**
- .8 **Seats on shall be 1/8" thick welded overlay of not less than 95% pure nickel. Seat shall be at least 1/2" wide, 1/8" thick through entire width and raised. The raised surface shall be completely covered with nickel to ensure that the resilient plug face contacts only the nickel seat.**
- .9 **Adjustable packing shall be Acrylonitrile-Butadiene (NBR) multiple V-ring type, with a packing gland follower. Packing gland shall permit inspection, adjustment or complete replacement of packing without disturbing any part of the valve or actuator assembly, except the gland follower.**
- .10 **Pressure ratings shall be 175 psi (1210 kPa) on valve sizes through 12" (300mm) and 150 psi (1035 kPa) for 14" (350mm) and larger. Every valve shall have a factory certified hydrostatic shell test and seat test, with test reports being available upon request.**
- .11 **All valves larger than 6" (150mm) shall be installed with worm gear actuators. All gearing shall be enclosed in a cast iron housing, with outboard seals to protect the bearings and other internal components. The actuator shaft and gear quadrant shall be supported on permanently lubricated bronze bearings.**
- .12 **End connections shall meet or exceed the latest revisions of AWWA C517 and other applicable standards. End Connections shall be Flanged drilled per ASME B16.1 and/or Grooved End per AWWA C111.**
- .13 **Eccentric plug valve shall generally have the following flow performance characteristics when partially open:**

DeZurik Model PEF Cv Values for Partially Open Valves										
Valve Size	100%	90%	80%	70%	60%	50%	40%	30%	20%	10%
3"	880	781	644	515	392	288	205	139	79	29
4"	1160	1030	849	679	517	380	270	183	104	38
6"	1960	1740	1435	1147	874	642	457	309	175	64
8"	3100	2752	2269	1814	1382	1016	722	488	277	101
10"	4540	4031	3323	2656	2024	1488	1058	715	406	147
12"	6300	5593	4611	3686	2808	2064	1468	992	563	205
14"	7560	6712	5533	4423	3370	2477	1761	1190	676	246
16"	9840	8736	7202	5757	4386	3224	2293	1549	879	320
18"	12500	11098	9149	7314	5572	4096	2912	1968	1117	406
20"	15400	13673	11272	9011	6864	5046	3588	2425	1376	500
24"	41400	34840	27289	20480	14446	10086	6871	4448	2554	1013
30"	65500	55122	43175	32402	22855	15957	10870	7038	4041	1603
36"	95100	80032	62685	47044	33184	23168	15783	10218	5868	2327

- .14 **Provide the following options:**
  - .1 **Two (2), 1/4" (6mm) pipe taps, downstream & upstream suitable for flow measurement and/or balancing**

.2 **Dial positioning indicator**

.15 **Certifications:**

- .1 **ASTM A126 Class B "Gray Iron Castings for Valves, Flanges and Pipe Fittings"**
- .2 **ASME B16.1 "Pipe Flanges and Flanged Fittings"**
- .3 **AWWA C517 "Resilient-Seated Cast-Iron Eccentric Plug Valves"**
- .4 **AWWA C111 "Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings"**
- .5 **NSF/ANSI 61 "Drinking Water System Components - Health Effects"**
- .6 **NSF/ANSI 372 "Drinking Water System Components - Lead Content"**

.16 **Acceptable Manufacturers:**

- .1 **DeZurik**
- .2 **VSI Waterworks**
- .3 **Val-Matic**
- .4 **J&S Valve**
- .5 **Consultant Accepted Equal**

**2.07 DOMESTIC WATER PRESSURE BOOSTER PUMP PACKAGE**

- .1 Skid-mounted pumping package Acceptable Manufacturers: Taco, Wilo, ITT Bell & Gossett, SA Armstrong, or approved equal.
- .2 The pumps shall be vertical inline, multi-stage design.
- .3 The capacities and characteristics shall be as called for in the Documents.
- .4 Pump outer casing shall be constructed as follows:
  - .1 For working pressure to 232 psig (16bar) at 248°F (120°F): 304 Stainless Steel with ANSI 150 Flanges;
  - .2 For working pressure to 370 psig (25bar) at 248°F (120°F): 304 Stainless Steel with ANSI 250 Flanges;
  - .3 For working pressure to 440 psig (30bar) at 248°F (120°F): 304 Stainless Steel with ANSI 300 Flanges.
- .5 Pump shall have type 304 Stainless Steel wetted parts, NSF 61 certified, suitable for use in potable water applications.
- .6 Each impeller shall be fitted with a Teflon seal ring; the 316L stainless steel shaft shall be fitted with Tungsten Carbide bearings.
- .7 The mechanical seal shall be suitable for the full pressure and temperature range of the pump and shall be fitted with carbon rotating face and silicon carbide stationary face.
- .8 The thrust bearing must be connected to the adaptor and shaft coupling in such manner as to eliminate pump axial loads from the motor, allowing NEMA design motors to be used.
- .9 Totally enclosed fan cooled ("TEFC") motors with thermal overload protection in accordance with Section 20 05 70 "Motors, Motor Starters, Motor Control Centres, and Wiring".
- .10 The base mounted pump shall be assembled in a vertical shaft configuration with the suction and discharge connections being in-line at the bottom.
- .11 The suction and discharge headers shall be made of Type L copper.
- .12 The system shall include mainly the pump & motor assemblies on a common structural steel base, the Integrated Drive Controller (IDC), suction and discharge piping & headers.



- .13 The system shall include stainless steel suction & discharge ball valves, bronze non-slam check valve on the discharge.
- .14 One single point pressure sensor to be wired by Mechanical Trades to the discharge pressure setpoint in accordance with the sequence of operation.
- .15 The system shall require only suction and discharge connections and a single point power connection.
- .16 Field connection of remote sensor/transmitters and connection to Building Automatic System (BAS) shall installed by Controls Trades.
- .17 All components shall be mounted on a structural steel base suitable for grouting.
- .18 The discharge of each pump shall be fitted with a check valve. Each pump and discharge valve assembly shall also be equipped with isolation valves so that the pump can be serviced without disruption to other pump operation.
- .19 Pressure gauges shall be installed on the suction and discharge headers.
- .20 Integrated Drive Controller:
  - .1 The pump system controller shall be integrated with the variable frequency drive (IDC) as one unit.
  - .2 The controller shall be microprocessor based capable of having software changes and updates via personal computer.
  - .3 The controller shall have a fully graphic, multilingual display with a large, bright, backlit graphic display to provide complete drive information.
  - .4 The controller shall provide internal galvanic isolation to all digital and analog inputs as well as all fieldbus connections.
  - .5 The controller shall display the following as status readings from a single display on the controller:
    - .1 Current value of the control parameter.
    - .2 Most recent existing alarm (if any).
    - .3 System status with current operating mode.
    - .4 Status of each pump with current operating mode and rotational speed as a percentage.
  - .6 The controller shall have as a minimum the following hardware inputs and outputs:
    - .1 2 Analog Inputs (4-20mA or 0-5Vdc or 0-10Vdc).
    - .2 6 Digital Inputs (Programmable and 2 can be used as outputs).
    - .3 1 Analog Output (Programmable).
    - .4 2 Standard Form C 240V Relay.
    - .5 Ethernet connection.
    - .6 Field Service connection to PC.
  - .7 All analog inputs shall be provided with current limit circuitry to provide short circuit protection and safeguard against incorrect wiring of sensors.
  - .8 Pump system programming shall include the following protections:
    - .1 Ground Fault
    - .2 Motor stall
    - .3 Motor over temperature
    - .4 Motor compensation & overload
    - .5 Pump no-flow

- .6 Dry Pump
- .7 Fault Tolerant Control
- .8 Pump end of curve
- .9 Short-cycle
- .9 The controller shall be capable of receiving a remote analog set point (0-5V, and 0-10V).
- .10 No flow shutdown shall not require any external flow meters or flow switches or pressure switches to determine when a NO FLOW condition exists.
- .11 The controller shall be compatible with the following communication protocols via the RS-485 port :
  - .1 Johnson Controls Metasys (N2)
  - .2 Siemens Building technologies system 600 (FLN)
  - .3 BACnet, FC Protocol
  - .4 Modbus RTU systems
- .21 Variable Frequency Drive ("VFD"):
  - .1 The VFD shall convert incoming fixed frequency single phase (1Ø) or three phase (3Ø) AC power into a variable frequency and voltage for controlling the speed of the three phases AC induction motors.
  - .2 The VFD shall be a six pulse input design, and the input voltage rectifier shall employ a full wave diode bridge; VFD's utilizing controlled SCR rectifiers shall not be acceptable. The output waveform shall closely approximate a sine wave. The VFD shall be of a PWM output design utilizing current IGBT inverter technology and voltage vector control of the output PWM waveform.
  - .3 The VFD shall be in a NEMA 12 enclosure; VFD with plastic enclosure shall not be acceptable.
  - .4 The VFD shall provide internal DC link reactors to minimize power line harmonics and to provide near unity power factor.
  - .5 The VFD shall be able to provide its full rated output current continuously at 110% of rated current for 60 seconds.
  - .6 Automatic motor adaptation (AMA) algorithm shall be utilized. This feature shall allow for automatically optimized drive performance and efficiency leading to additional energy savings.
  - .7 The VFD shall provide full torque to the motor given input voltage fluctuations of up to +10% to 15% of the rated input voltage.
  - .8 The VFD shall be suitable for elevations to 3300 feet above sea level without derating. Maximum operating ambient temperature shall not be less than 104 degrees °F VFD shall be suitable for operation in environments up to 95% non-condensing humidity.
  - .9 The VFD shall be capable of displaying the following information in plain English via a 40-Character alphanumeric display:
    - .1 Frequency
    - .2 Voltage
    - .3 Current
    - .4 Actual System Set point
    - .5 Actual System Demand
    - .6 Kilowatts per hour
    - .7 Fault identification

- .8 Percent torque
- .9 Percent power
- .10 RPM
- .22 Sensor/Transmitters:
  - .1 Provide field mounted single point pressure sensor transmitter(s). Unit shall transmit an isolated 0-5V or 0-10V DC signal indicative of process variable to the integrated drive controller via standard two wire 24VDC system.
  - .2 Unit shall have stainless steel wetted parts and a ceramic diaphragm with one ¼" male NPT process connection.
  - .3 A pressure snubber shall be required to protect against any water hammering. Accuracy shall be within 0.25% of full span.
  - .4 A certification of final calibration shall be required for each sensor/transmitter.
- .23 Sequence of Operation:
  - .1 The IDC shall compare each sensor signal to the independent DCC representative determined set points
  - .2 When all set points are satisfied by the process variable, the pump speed shall remain constant at the optimum energy consumption level.
  - .3 The IDC shall continuously scan and compare each process variable to its individual set point and control to the least satisfied zone.
  - .4 If the set point cannot be satisfied by the designated lead pump, the IDC shall initiate a timed sequence of operation to stage a lag pump.
  - .5 The lag pump shall accelerate resulting in the lead pump decelerating until they equalize in speed.
  - .6 Further change in process variable shall cause the pumps to change speed together.
  - .7 No-Flow Detection:
    - .1 In addition to staging a pump off when it is running at minimum frequency, the VFD can also monitor the power provided to the motor by the drive. If this power is low for the operating speed, a no-flow condition is indicated.
    - .2 The no-flow power level for each drive/pump combination can be easily determined by using an automated macro during system start-up. If a drive's output power for its operating speed indicates a no-flow condition and the No- Flow Delay timer expires, the drive will enter a sleep condition and turn off.
  - .8 End-Of-Curve Detection:
    - .1 End-of-curve detection is intended to detect a situation where a broken pipe causes one or more pumps to run at full speed and create excessive flow without reaching the set point pressure, the LEAD drive will issue a warning to indicate this.
  - .9 Dry Pump Protection:
    - .1 This feature is used to detect if a pump has run dry, such as improper system fill at start up or when a pump has been out of service and restarted without water. This condition can cause pump damage if not detected and corrected promptly.
  - .10 IDC Duplex Pump Set Operation:
    - .1 Both VFD's will be configured to be the LEAD and LAG Pump.
    - .2 The first VFD will act as the LEAD drive, using its PID controller to control the pressure based on sensor readings. The word LEAD PUMP will be displayed on the screen.



- .3 The second VFD will act as the LAG drive, it will be instructed when to run by the LEAD drive. The word LAG PUMP will be displayed on the screen.
- .4 The role of LEAD and LAG drive will be alternated between the 2 VFDs based on a predetermined time schedule. The system can also be manually altered by simultaneously pressing the [OK] and [RIGHT] keys on drive 1's keypad.
- .5 In the event that the LEAD pump cannot maintain the load it will bring on the LAG pump and both will run in unison to maintain pressure. Once the VFDs reach a predetermined low speed together the LAG VFD will turn off and the LEAD VFD will maintain the load.
- .6 In the event that either drive should fail the other will automatically take over regardless of the timer.
- .7 The feedback signal will be piggybacked to both VFDs.
- .8 Stall protection will be provided in the event that either of the pumps should experience a stall or locked rotor.
- .9 A personal menu in the drive will be set to allow the operator to easily access the pressure set point, the LEAD-LAG timer settings, and to access the sensor range.
- .10 In the event that the pressure sensor should fail the VFD will go to a predetermined speed and remain there until the sensor is repaired. The LAG VFD will display the "Live Zero" alarm while the LEAD VFD will continue to run with a warning "Live zero".
- .11 IDC Triplex Pump Set Operation:
  - .1 A pressure feedback signal is compared to a pressure set point. The LEAD drive uses IDC's PID to analyze the error between the pressure feedback and set point and to adjust the speed of the system to correct for any error. An auto-tuning algorithm is provided in the drive to simplify adjustment of the system. The drives my Personal Menu allows for easy access to the pressure set point.
  - .2 The three VFD's will work in unison to control the flow required to maintain building domestic water pressure. The VFDs are set up such that all three can act as the LEAD, LAG1 or LAG2 VFD. The lead drive will be cycled on a rotation that will allow for similar run time for all of the pumps.
  - .3 When VFD #1 is the LEAD it will operate standalone until such time that it can no longer maintain pressure. If VFD #1 can no longer maintain pressure it will bring on VFD #2 (First lag pump), and these pumps will operate in unison to control the flow required to maintain building pressure. If VFD #1 and VFD #2 cannot maintain flow then VFD#3 (Second lag pump) will be started and all three VFD's will operate in unison to control the flow to maintain building pressure. Once the pressure begins to rise above set point with all three VFDs running at minimum speed then the two lag pumps will sequentially be dropped off and the lead pump will control the flow to maintain building pressure.
  - .4 On a regular schedule the VFD's will share the time as the LEAD pump, LAG pump #1 and LAG pump #2. The control of the alternation schedule will be maintained within VFD #1, and in the event of a failure of this pump the VFD#2 will become the lead pump and remain this way until the schedule in pump #1 is re-engaged.
  - .5 In the event that any of the VFDs should go into a failure or alarm mode then the VFD next in line will pick up the control.
- .12 The sensor that is being used to control the building pressure will be daisy- chained to all Pump Set VFDs to give the active lead drive access to the sensor reading. The daisy-chaining shall be wired in the factory; the installing contractor shall be responsible to wire the sensor into the control relay box (CRB).
- .24 Factory Prefabrication:

- .1 The system shall be factory prefabricated, including isolation ball valves on the suction and discharge of each pump as well as headers sized for the flow rate indicated in the schedule.
- .2 Type L copper construction with flanged connections; the only field connections required shall be piping to the system headers, over temperature drain tube and one incoming power connection at the control panel.
- .25 Factory Test and Certification:
  - .1 The booster system and its component parts shall undergo a complete operational flow test from zero to 100% design flow rate under the specified suction pressure conditions at factory prior to shipment, or be tested on site.
  - .2 The system certification shall include copies of the test data as certified by a factory engineer. Performance test certifications to be placed inside the control panel and extra copies with installation manual.
  - .3 The entire system shall be third party certified by Underwriters Laboratories Inc. In accordance with OSHA 29 CFR with references to nationally recognized testing laboratories.

## **2.08 DOMESTIC HOT WATER RECIRCULATING PUMPS**

- .1 Capacity: As shown on the Equipment Schedules.
- .2 All wetted surfaces shall be suitable for use in potable water applications, the entire assembly shall be NSF 61 certified.
- .3 Construction: Closed-coupled, in-line centrifugal, all bronze construction, stainless steel or alloy steel shaft, stainless steel or bronze shaft sleeve, two oil lubricated bronze sleeves or ball bearing. Design for 125 psi at 230°F (860 kPa at 105°C) continuous service.
- .4 Motor: Totally Enclosed Fan Cooled ("TEFC") in accordance with 20 05 70 "Motors, Motor Starters, Motor Control Centres, and Wiring" with thermal overload protection.
- .5 Where noted on the Equipment Schedules pump(s) shall be complete with Variable Frequency Drive ("VFD") in accordance with Section 20 05 75 "Variable Frequency Drives" for variable flow control.
- .6 Acceptable Manufacturers: Taco, Wilo, S.A. Armstrong, ITT Bell & Gossett, or approved equal.

## **PART 3 - EXECUTION**

### **3.01 DOMESTIC WATER PIPING INSTALLATION REQUIREMENTS**

- .1 Install plumbing and pumping systems in accordance with Manufacturer's requirements and the requirements of the Authorities Having Jurisdiction ("AHJs").
- .2 Provide all required domestic water piping. Type M copper piping shall not be allowed.
- .3 Lay pipes true to line and grade with bells up grade. Fit sections together so that, when complete, the pipe has a smooth and uniform invert. Keep pipe thoroughly clean so that jointed compound will adhere. Inspect the pipe for defects before being lowered into the trench.
- .4 Slope all piping so that it can be completely drained.
- .5 Provide proper dielectric unions in all connections between copper pipe and ferrous pipe or equipment. Dielectric unions are to conform to ASTM F1545-97 and are to be complete with a thermoplastic liner.
- .6 Provide all required labour necessary for the installation of control components and devices supplied by Controls Trades. Include all additional labour necessary for the successful completion of point-to-point verification of devices, and performance verification of devices and systems as part of the project commissioning requirements.

### **3.02 SHUT OFF VALVES**

- .1 Provide shut-off valves at:
  - .1 all equipment connections

- .2 base of all piping risers;
- .3 branch piping connection from mains (branch piping serves two or more fixtures);
- .4 where shown on the drawings.
- .2 Provide minimum ¼" (6mm) full port ball valves in the pressure class required by the application for isolation of instrumentation components such as pressure gauges, thermometers, and other similar types of devices.

### **3.03 STRAINERS**

- .1 Provide line size strainers in the following locations:
  - .1 On inlet side of water meters
  - .2 at the suction side of each pump;
  - .3 immediately upstream of each pressure reducing valve;
  - .4 immediately upstream of each entering side of a plate and frame heat exchanger;
  - .5 immediately upstream of each control valve;
  - .6 where shown on the Drawings and the Details
- .2 Install strainers in horizontal or down flow (Y (wye) pattern only) piping with clearance for removal of basket.
- .3 Supply strainers with extra construction screens and remove after systems have been thoroughly cleaned.
- .4 Equip each strainer 2" (50 mm) and smaller in size with plugged blow off tappings.
- .5 Equip each strainer 2 ½" (75mm) and larger in size with blow off tapping connection complete with shut off valve and blow off piping with same pressure and temperature rating of strainer. Terminate blow off piping in downward vertical position. Size blow off piping and valve the same size as the blow off tapping.
- .6 Ensure that each strainer can be isolated from piping systems with isolating valves on each side of strainer, and which are not more than 10 ft (3 metres) upstream or downstream from strainer.
- .7 Clean strainer baskets after piping system flushing and cleaning is complete, and before water quantity balancing commences.

### **3.04 DRAIN VALVES**

- .1 Provide a drain valve at the bottom of domestic water piping risers, at all other piping low points, and wherever else shown.
- .2 Locate drain valves so that they are easily accessible

### **3.05 DOMESTIC HOT WATER PIPING FLOW BALANCING VALVES**

- .1 Provide line size flow balancing valves in domestic hot water recirculation piping where shown on the drawings and where required by TAB Trades.
- .2 Locate each valve such that it is easily accessible.

### **3.06 DOMESTIC WATER BOOSTER PUMP PACKAGE**

- .1 Install pumps in accordance with manufacturer's requirements.
- .2 Mount domestic water pressure booster pump package on a 100mm (4") housekeeping pad.
- .3 Make piping and electrical connections to pump and motor assembly and controls as indicated.
- .4 Mechanical Trades to provide conduit and wiring from the supply pressure sensor to the pump control package.
- .5 Provide drains for bases and stuffing boxes piped to and discharging into floor drains
- .6 Support piping adjacent to pump such that no weight is carried on pump casings.

- .7 Support suction guide and discharge elbow from a floor stand with rubber and shear sandwich pad isolators or from above with hangers and spring isolators
- .8 Check motor and pump lubrication points, fill oil reservoir on in-inline of pumps
- .9 Provide vibration isolated pipe hangers (resilient support) next to pumps on piping.
- .10 Start-Up of Domestic Water Pressure Booster Pump Package:
  - .1 The service of a factory-trained representative shall be made available on the job site to verify the installation and Start-Up and instruct operating personnel.
  - .2 Confirm pump rotation is correct.
  - .3 Set up and adjust all controls.

### **3.07 DOMESTIC HOT WATER RECIRCULATING PUMP**

- .1 Install pumps in accordance with manufacturer's requirements.
- .2 Make piping and electrical connections to pump and motor assembly and controls as indicated.
- .3 Ensure pump and motor assembly do not support piping.
- .4 Confirm pump rotation is correct.
- .5 Set up and adjust all controls.
- .6 Provide, ball or butterfly valve, union or flange, as applicable, and strainer on pump discharge piping connections.
  - .1 Provide pressure gauges piped up to measure pressure at pump suction, pump discharge and across strainer.
- .7 Provide, ball or butterfly valve, union or flange, as applicable, check valve and on pump discharge piping connections
  - .1 Check valves in pump discharge shall be swing type with external lever and adjustable weight.
- .8 The service of a factory-trained representative shall be made available on the job site to verify the installation and Start-Up and instruct operating personnel.

### **3.08 TESTING OF POTABLE WATER SYSTEMS**

- .1 Application of Tests
  - .1 After a section of a potable water system has been completed, and before it is placed in operation, a water pressure test shall be conducted, except that an air pressure test may be used during ambient test conditions below 39°F (4°C).
  - .2 A pressure test may be applied to each section of the system or to the system as a whole.
  - .3 Where a pre-fabricated system is assembled off the building site in such a manner that it cannot be inspected and tested on site, off site inspections and pressure tests shall be conducted, and in the presence of the Authorities Having Jurisdiction, or the Consultant, when requested.
  - .4 Where a prefabricated system is installed as part of a water system,
    - .1 All other plumbing work shall be tested and inspected, and
    - .2 The complete system shall be pressure tested when requested by the Authorities Having Jurisdiction, or the Consultant.
- .2 Pressure Tests of Potable Water Systems
  - .1 Except as required in Sentence (4) below, every potable water system shall be capable of:
    - .1 withstanding, without leaking, a water pressure that is at least equal to 1.5 times the maximum anticipated in-service pressure in potable water piping systems designed for operating pressures in excess of 80 psi (560 kpa), but in no case less than 145 psi (1000 kPa), for at least 60 minutes, or



- .2 withstanding, without leakage, a water pressure that is at least 145 psi (1000 kPa) for systems designed for operating pressures less than 80 psi (560 kPa), for at least 60 minutes, or
- .3 withstanding, for at least 120 minutes without a drop in pressure, an air pressure that is at least 100 psi (700 kPa) for systems designed for operating pressures less than 80 psi (560 kPa).
- .2 Where a water pressure test is made, all air shall be expelled from the system before fixture shut-off valves or faucets are closed for system testing.
- .3 Only potable water shall be used to test a potable water system.
- .4 If a piping, or piping system component manufacturer states that an air pressure test is not recommended, a water pressure test shall be performed.

### 3.09 FLUSHING AND DISINFECTION OF PIPING

- .1 Flush and disinfect all new and/or reworked domestic water piping after leakage testing is complete.
- .2 Flushing:
  - .1 Before disinfecting, the mechanical contractor shall flush all foreign matter from the pipeline.
  - .2 Flush piping until all foreign materials have been removed and the flushed water is clear.
  - .3 Provide hoses, pumps, temporary pipes as required to dispose of flushing water without causing damage to the building or adjacent properties. Open and close valves, faucets, hose outlets, and service connections to ensure thorough flushing.
  - .4 The flushing velocities shall be at least 2.5 FPS.
  - .5 For large diameter pipe, where it is impractical or impossible to flush the pipe at 2.5 FPS velocity, the pipeline shall be cleaned in place from the inside by brushing and sweeping, then flushing the line at a lower velocity.
- .3 Disinfection:
  - .1 Pipes intended to carry potable water shall be disinfected before being placed in service.
  - .2 Disinfection procedures shall conform to AWWA C601 and AWWA C651 as hereinafter modified or expanded, and the requirements of any governing agency having jurisdiction.
- .4 Disinfection Mixture:
  - .1 The mechanical contractor shall prepare the disinfection mixture with a chlorine-water solution having a free chlorine residual of 40 - 50 PPM.
  - .2 The disinfection mixture shall be prepared by injecting calcium or sodium hypochlorite and water into the piping and allowing it to flow at a measured rate so that water-chlorine solution is of the specified strength.
  - .3 If the calcium hypochlorite procedure is used, first mix the dry powder with water to make a thick paste, then thin to approximately a one percent solution (10,000 PPM Chlorine).
  - .4 If the sodium hypochlorite procedure is used, dilute the liquid with water to obtain a one percent solution.
- .5 Point of Application:
  - .1 The chlorine mixture shall be injected into the piping to be treated at the beginning of the line, and through a corporation stop or suitable tap in the top of the line.
  - .2 Water from the existing system or other approved sources shall be controlled so as to flow slowly into the newly installed pipe during the application of chlorine.
  - .3 The rate of chlorine mixture flow shall be in such proportion to the rate of water entering the pipe that the combined mixture shall contain 40-50 PPM of free available chlorine.
  - .4 Valves shall be manipulated so that the strong chlorine solution in the line being treated will not flow back into the line supplying the water.

- .5 Check valves shall be used if deemed necessary.
- .6 The chemical treatment representative shall analyze and record the free chlorine residual at the farthest fixtures from the injection point.
- .6 All valves, fixtures and other appurtenances shall be operated during disinfection to ensure that the disinfection mixture is dispersed into all parts of the line, including dead ends, new services and similar areas that otherwise may not receive the treated water.
- .7 Retention Period:
  - .1 Treated water shall be retained in the pipeline long enough to destroy all nonspore-forming bacteria.
  - .2 With proper flushing and the specified solution strength, 24 hours is adequate.
  - .3 At the end of the 24-hour period, the disinfection mixture shall have a strength of at least 25 PPM of chlorine.
  - .4 The chemical treatment representative shall analyze and record the free chlorine residual at the farthest fixtures from the injection point.
- .8 The above procedure shall be repeated at the mechanical contractor's expense if the free chlorine level drops below the minimum requirements.
- .9 After chlorination, the water from the line shall be flushed until it meets health department requirements.
- .10 Disposal of Disinfection Water:
  - .1 Disposal of disinfecting water shall be done in an approved manner.
  - .2 Disinfecting water should not be allowed to flow into a waterway without adequate dilution or other satisfactory method of reducing chlorine concentrations to a safe level.
- .11 Where stainless steel piping is used for domestic water applications, piping systems shall be annealed, de-greased and pickled and will be subject to formal cleaning and disinfecting along with all other parts and components of the domestic water system as per ASTM A-380.

### **3.10 EQUIPMENT WATER SERVICE CONNECTIONS**

- .1 Provide all potable water service piping connection requirements required for Owner's Fixture, Furniture and Equipment (FF&E) supplied under other Sections of the Work.
- .2 Where required by the Documents, or the Authorities having Jurisdiction (AHJs), provide appropriate Back Flow Preventer (BFP) on equipment water service equipment connections to protect potable water supply(ies).
- .3 Provide all pipe fittings, valves, strainers, vacuum breakers, backflow preventers, unions, piping insulation any other ancillaries as indicated, specified or as recommended by Equipment Manufacturer.
- .4 Arrange for rough-in and piping connections to equipment, as recommended by Equipment Manufacturer.
- .5 Provide chrome plated uninsulated piping and piping components exposed to view, unless otherwise indicated. Provide chrome plate escutcheons at wall and floor penetrations.
- .6 Connect Equipment requiring plumbing connections.
- .7 Piping servicing Equipment shall be neatly racked together with heating pipes and shall be minimum of 12" (300 mm) above floor.

**END OF SECTION**

## **CONTENTS**

### **PART 1 - GENERAL**

- 1.01 GENERAL REQUIREMENTS**
- 1.02 SCOPE OF WORK**
- 1.03 QUALITY ASSURANCE**
- 1.04 SUBMITTALS**
- 1.05 SITE VISIT**

### **PART 2 - PRODUCTS**

- 2.01 STORM AND SANITARY DRAINAGE AND VENT PIPING**
- 2.02 SHUT-OFF VALVES**
- 2.03 CHECK VALVES**
- 2.04 BACKWATER VALVES**
- 2.05 BACKWATER VALVES**

### **PART 3 - EXECUTION**

- 3.01 GENERAL INSTALLATION REQUIRMENTS**
- 3.02 EXCAVATION, TRENCHING, BEDDING AND BACKFILL**
- 3.03 DRAIN, WASTE AND VENT PIPING INSTALLATION**
- 3.04 TESTING OF DRAINAGE AND VENT PIPING SYSTEMS**
- 3.05 BACKWATER VALVES**
- 3.06 EQUIPMENT DRAINAGE CONNECTIONS**
- 3.07 EQUIPMENT WASTE WATER SERVICE CONNECTIONS**

## **PART 1 - GENERAL**

### **1.01 GENERAL REQUIREMENTS**

- .1 Comply with requirements of the Owner's General Requirements and all documents referred to therein.
- .2 Comply with requirements of Section 20 01 10 Mechanical General Requirements.
- .3 Comply with requirements of Section 20 01 50 Basic Materials and Methods.

### **1.02 SCOPE OF WORK**

- .1 Provision of sanitary drainage piping, vent piping, sanitary sump pumps, and valves.
- .2 Provision of storm drainage piping, storm water sump pumps, and valves.
- .3 Provision of waste effluent drainage piping for Owner's Fixture, Furniture and Equipment (FF&E) connection requirements;

### **1.03 QUALITY ASSURANCE**

- .1 Execute work of this Section only by skilled tradesmen regularly employed in the installation of plumbing and drainage piping systems, and related equipment.

### **1.04 SUBMITTALS**

- .1 Submit the following Shop Drawings:
  - .1 Valves.

### **1.05 SITE VISIT**

- .1 Visit the site prior to tender and verify all conditions. Prior to submitting price, the Mechanical Division Proponent is to review all discrepancies and verify the locations of all existing services that are being extended and the routing of new services. Also report all ambiguities, discrepancies, departures from building by-laws and/or from good practice. Failure to do so will result in all additional costs being the responsibility of the successful Mechanical Division Contractor. Include for any alternate routing of new or rerouting of existing services to accommodate all site conditions in the Bid Price.

## **PART 2 - PRODUCTS**

### **2.01 STORM AND SANITARY DRAINAGE AND VENT PIPING**

- .1 PVC Sewer: SDR35 rigid, green PVC hub and spigot pattern sewer pipe and fittings to CAN/CSA B182.2, with gasket joints assembled with pipe lubricant.
- .2 Copper- Solder Joint: Type DWV hard temper to ASTM B306, with forged copper solder type drainage fittings and 50% lead - 50% tin solder joints.
- .3 Cast Iron: cast iron pipe, fittings, and mechanical coupling joints to CAN/CSA B70.
- .4 Copper-Victaulic Coupling Joint: Type DWV hard temper to ASTM B306, with factory or site rolled grooved ends (with grooving rolls designed for copper) and Victaulic "Copper Connection" wrought copper or cast bronze fittings and Style 606 gasket type couplings.

### **2.02 SHUT-OFF VALVES**

- .1 Ball Valves: Class 600, 4140 kPa (600 psi) WOG rated full port ball type valves, each complete with a forged brass body with solder ends, forged brass cap, and blowout-proof stem, solid forged brass chrome plated ball, "Teflon" or "PTFE" seat, and a removable lever handle. Valves in insulated piping are to be complete with stem extensions.
- .2 Butterfly Valves - Flanged Joint: Non-corrosive, minimum 1200 kPa (175 psi) cold water pressure rated, resilient seated butterfly valves, each complete with a coated cast ductile iron lug type body, stainless steel shaft, bronze disc, and EPDM seat, and each suitable for domestic water bubble-tight dead end service with the valve in position and either side of the connecting piping removed. Butterfly valves to and including 100 mm (4") dia. are to be equipped with lever handles. Butterfly valves larger than 100 mm (4") dia. are to be equipped with worm gear operators.



Contract Number: RFTC-1868-24-TR88179

### 2.03 CHECK VALVES

- .1 Horizontal: Class 125, bronze, 1380 kPa (200 psi) WOG rated horizontal swing type check valves with solder ends.
- .2 Vertical: Bronze, 1725 kPa (250 psi) WOG rated vertical lift check valve with soldering ends.

### 2.04 BACKWATER VALVES

- .1 In-line backwater valves equal to Watts model BV-200 epoxy coated cast iron backwater valve with gasketed cover and removable bronze seat and flapper.

### 2.05 BACKWATER VALVES

- .1 Provide access to backwater valve seat and flapper through minimum 48" (1200mm) diameter pre-cast concrete maintenance access chamber with flat 24" (610mm) free diameter, gasketed water tight steel frame, and solid maintenance hole cover; pit depth to suit.

### 2.06 VOID FORMS

- .1 ***Provide corrugated paper based void forms where specified and shown on the Drawings. t***
- .2 ***Corrugated paper based void forms shall be by VoidForm Products, LLC, SureVoid product line, or Consultant approved equal. Void forms shall be degradable, lose strength through moisture absorption, and create an effective isolation pocket for underground piping installations.***
- .3 ***Void form components shall be constructed of a double-faced partially wax-impregnated or standard kraft corrugated paper that is laminated with moisture-resistant adhesive. The interior construction shall be of uniform, cellular configuration.***
- .4 ***Void form products shall be as follows:***
  - .1 ***TrenchVoid: Void forms that properly create void space directly under earth-formed concrete grade beams and walls.***
- .5 ***Void form products shall be designed to support typical, applied vertical loads until such loads can be supported by the concrete structure. Manufacturer shall be engaged to review the unique applications and anticipated working loads of the installation during construction and operation of underground piping systems.***

## PART 3 - EXECUTION

### 3.01 GENERAL INSTALLATION REQUIREMENTS

- .1 Install drainage and drainage pumping systems in accordance with Manufacturer's requirements and the requirements of the Authorities Having Jurisdiction ("AHJs").
- .2 Provide all required labour necessary for the installation of control components and devices supplied by Controls Trades. Include all additional labour necessary for the successful completion of point-to-point verification of devices, and performance verification of devices and systems as part of the project commissioning requirements.

### 3.02 EXCAVATION, TRENCHING, BEDDING AND BACKFILL

- .1 Perform excavation, trenching, bedding, backfill and related work required to complete the Mechanical scope of work. Ensure all services are buried a minimum of 5 ft. (1500mm) where piping is located outside the building perimeter walls.
- .2 Where excavation and backfill is required outside perimeter foundation walls, provide all required layout of mechanical services trenches.
- .3 Perform carving and trimming of final 150 mm (6") of trench bottom excavation.
- .4 Perform bedding, installation of services, backfilling and testing to 300 mm (12") above uppermost buried service.
- .5 Grade the bottom of the pipe trench excavation as required.

Contract Number: RFTC-1868-24-TR88179

- .6 In firm undisturbed soil, lay pipes directly on the soil and shape soil to fit the lower segment of all pipes and pipe bells. Ensure even bearing along the barrels.
- .7 In rock and shale excavate to 150mm (6") below and a minimum of 200mm (8") to either side of the pipe. Fill back with a bedding of 12mm (1/2") crushed stone or granular 'A' gravel.
- .8 Prepare new bedding under pipe in unstable soil, and in all cases where pipe bedding has been removed in earlier excavation, particularly near perimeter walls of buildings, at manholes and catch basins. In-fill and compact to maximum possible density and support the pipe by 200mm (8") thick concrete cradle, spanning full length between firm supports. Install reinforcing steel in cradle and construct piers every 2400mm (8 ft.) or closer, down to solid load bearing strata. Provide a minimum of one pier per length of pipe. Use the same method where pipes cross.
- .9 ***Where underground piping is located in unstable soil and below a suspended structural slab, install underground drain waste and vent piping suspended from the structural slab in accordance with the drawing detail. Set piping elevation on a built-up assembly of void form sections creating a minimum 12" (300mm) void below piping.***
  - .1 ***Void form products shall be protected from moisture before installation. Any void forms that are damaged due to exposure to moisture must be replaced before concrete is placed.***
- .10 Where excavation is necessary in proximity to and below the level of any footing, bed with 14,000 kPa (2000 psi) concrete to the level of the highest adjacent footing. Proximity is determined by the angle of repose as established by the Project Structural Engineer.
- .11 Provide support over at least the bottom one third segment of the pipe in all bedding methods.
- .12 Do not open trench ahead of pipe laying and bedding more than weather will permit. Break up rocks and boulders and remove by drilling and wedging. Do not use blasting unless specifically approved.
- .13 Perform all, or required portions of backfilling as specified in Section 31 23 33 in 150mm (6") layers with clean selected materials acceptable to the Consultant.
- .14 Backfill and compact to the following standard Proctor percentages:
  - .1 Sodded area: 85%
  - .2 Under paving: 95%
  - .3 Under Floor slabs: 100%
- .15 Dispose of excavated material as directed by the Contractor.

### 3.03 DRAIN, WASTE AND VENT PIPING INSTALLATION

- .1 For underground pipe inside the building and to points 1.5 m (5') outside the building lines - rigid PVC sewer pipe, minimum 75mm (3") diameter;
- .2 For pipe inside the building and above ground in sizes to and including 65mm (2½") diameter - type DWV copper;
- .3 For pipe inside the building and above ground in sizes 75mm (3") diameter and larger - cast iron;
  - .1 for piping in Hospital Diagnostic Imaging Suites where material may be subject to magnetic fields (CT Scan and similar), provide DWV piping for size required;
- .4 For drainage pump discharge pipe connections from the pump to and including shut-off and check valve connections - Type "DWV" copper with grooved fittings and couplings, or Schedule 40 galvanized steel with grooved fittings and couplings.
- .5 Unless otherwise specified, slope horizontal drainage piping above ground in sizes to and including 75 mm (3") diameter 25mm (1") in 1.2 m (4'), and pipe 100mm (4") diameter and larger 25mm (1") in 2.4 m (8').
- .6 Install and slope underground drainage piping to inverts or slopes indicated on the drawings to facilitate straight and true gradients between the points shown. Verify available slopes before installing the pipes.

Contract Number: RFTC-1868-24-TR88179

- .7 Unless otherwise specified, slope horizontal branches of vent piping down to the fixture or pipe to which they connect with a minimum pitch of 25mm (1") in 1.2 m (4'-0").
- .8 PVC drainage waste and vent piping that penetrates a fire separation shall be sealed at the penetration by a fire stop that has an FT rating not less than the fire-resistance rating of the fire separation in accordance with fire test method in CAN/ULC-S115.
- .9 Extend vent stacks up through the roof generally where shown but with exact locations to suit site conditions and in any case a minimum of 3m (10') from fresh air intakes. Terminate vent stacks a minimum of 330 mm (13") above the roof (including roof parapets) in vent stack covers as per CSA.
- .10 Provide proper dielectric unions at connections between copper pipe and ferrous pipe or equipment.

### **3.04 TESTING OF DRAINAGE AND VENT PIPING SYSTEMS**

- .1 Except in the case of an external leader, after a section of a drainage system or a vent piping system has been roughed in, and before any fixture is installed or piping is covered, a water pressure test or an air pressure test shall be conducted.
- .2 After every fixture is installed and before any part of the drainage system or vent piping system is placed in operation, a final test shall be carried out when requested.
- .3 Where a prefabricated system is assembled off the building site in such a manner that it cannot be inspected and tested on site, off-site inspections and tests shall be conducted.
- .4 Where a prefabricated system is installed as part of a drainage system or venting system, all other plumbing work shall be tested and inspected and a final test shall be carried out on the complete system when requested.
- .5 When requested, a ball test shall be made to any pipe in a drainage system.
- .6 Tests of Pipes in Drainage Systems:
  - .1 Pipes in a drainage system, except an external leader or fixture outlet pipe, shall be capable of withstanding, without leakage, a water pressure test, air pressure test, and final test.
  - .2 Pipes in a drainage system shall be capable of meeting a ball test.
- .7 Tests of Venting Systems:
  - .1 Venting systems shall be capable of withstanding, without leakage, a water pressure test, air pressure test and final test.
- .8 Water Pressure Tests:
  - .1 A water pressure test shall consist in applying a pressure of at least 4.5 psi (10.ft.wg, or 3m water column) to all joints.
  - .2 In making a water pressure test:
    - .1 Every opening, except the highest, shall be tightly closed with a testing plug or a screw cap, and
    - .2 The system, or the section, shall be kept filled with water for 15 minutes.
- .9 Air Pressure Tests
  - .1 Air pressure tests shall be conducted in accordance with the manufacturer's instructions for each piping material, and
    - .1 Air shall be forced into the system until a pressure of 35 kPa is created, and
    - .2 This pressure shall be maintained for at least 15 minutes without a drop in pressure.
  - .2 The addition of a non-toxic indicating substance, such as an aerosol, a fluorescent dye, smoke or an odorant, to an air pressure test may be used to identify the location of a leak, however, the additive must be compatible with the piping material being tested and in no way adversely affect the integrity of the plumbing system.
- .10 Final Tests

- .1 Where a final test is made:
  - .1 every trap shall be filled with water,
  - .2 the bottom of the system being tested shall terminate at a building trap, test plug or cap,
  - .3 except as provided in Sentence (.10.2) below, smoke from smoke generating machines shall be forced into the system,
  - .4 when the smoke appears from all roof terminals, they shall be closed, and
  - .5 a pressure equivalent to a 1 in.wg (25 mm water column) shall be maintained for 15 minutes without the addition of more smoke.
- .2 The smoke referred to in Clauses (.10.1.3) and (.10.1.4) above is permitted to be omitted, provided the roof terminals are closed and the system is subjected to an air pressure equivalent to 1 in.wg (25 mm water column) maintained for 15 minutes without the addition of more air.
- .11 Final Tests General Procedures:
  - .1 Fill all traps to their minimum water seal
  - .2 Plug the building drain through the main cleanout where the drain leaves the building
  - .3 All future connections are capped with permanent caps.
  - .4 One General Final Test Procedure is successfully completed.
  - .5 A final visual is done for the plumbing fixtures and trim.
  - .6 General Final Test Procedure #1
    - .1 Smoke (or air) is forced into the system through the main cleanout or other convenient connection.
    - .2 When the smoke appears at the vent terminal it shall be closed.
    - .3 Smoke will continue to be added until a pressure of 1 in.wg (25 mm water column) is achieved.
    - .4 This pressure will then be maintained for a minimum of 15 minutes without the addition of more smoke.
    - .5 If this pressure cannot be maintained, the leak shall be located and repaired. Once this is complete the procedure shall be repeated until the test passes.
    - .6 The test equipment is removed, the main drain unplugged, and the caps on the vent terminals removed. All traps are to have their trap seals replenished if necessary.
  - .7 General Final Test Procedure #2

**Note:** General Final Test Procedure #2 is intended to require no pressure gauges and will exert a pressure equal to or greater than 1 in.wg (25 mm water column).

    - .1 A toilet bowl is filled slowly with water, until the level in the bowl rises to the underside of the bowl rim.
    - .2 If the system is air tight, the level of the water in the bowl will remain at the underside of the bowl rim. The pressure that is created by the head of the water is equal to the air pressure in the plumbing system. This proves the system air tight.
    - .3 If the water level drops slowly, a small leak in the system is evident. If the water will not rise at all, then a large leak is evident. The leak must be located and repaired. The final test must then be repeated.



Contract Number: RFTC-1868-24-TR88179

- .4 Once the water level has remained constant for 15 minutes, a cleanout will be opened or the plug in the main drain pulled. At this time the toilet bowl will flush and the traps may siphon.
- .5 The caps on the vent terminals are to be removed and the water seal replenished on all fixtures.
- .12 Ball Tests:
  - .1 Where a ball test is made, a hard ball, dense enough not to float, shall be rolled through the pipe.
  - .2 The diameter of the ball shall be not less than
  - .3 2" (50 mm) where the size of the pipe is 3" (75 mm) or more, or
  - .4 1" (25 mm) where the size of the pipe is less than 3" (75 mm).
  - .5 Ball Testing Procedure:
    - .1 The test ball shall be placed at the high end of the pipe, and allowed to roll through the pipe to the low end of the pipe.
    - .2 If there are not obstructions and the pipe is graded correctly, the test ball shall be caught and removed.
    - .3 The piping then passes the ball test.
    - .4 If the test ball doesn't roll all the way through, the Consultant will allow one 5 Imperial gallon bucket of water to be poured into the drain.
    - .5 If this does not dislodge the test ball and cause it to roll through the piping then the piping does not pass the ball test.
    - .6 The ball will have to be retrieved and test procedure repeated again until a pass is achieved.
    - .7 For newly installed plastic piping, the solvent used is heavily corrosive towards billiard balls. Ensure the solvent is given sufficient time to cure prior to conducting the test.

### 3.05 BACKWATER VALVES

- .1 Provide access to backwater valve seat and flapper through minimum 48" (1200mm) diameter pre-cast concrete maintenance access chamber with flat 24" (610mm) free diameter, gasketed water tight steel frame, and solid maintenance hole cover; pit depth to suit.

### 3.06 EQUIPMENT DRAINAGE CONNECTIONS

- .1 Provide all waste effluent drainage piping required for Owner's Fixture, Furniture and Equipment (FF&E) connection requirements.

### 3.07 EQUIPMENT WASTE WATER SERVICE CONNECTIONS

- .1 Provide all waste effluent drainage service piping connection requirements required for Owner's Fixture, Furniture and Equipment (FF&E) supplied under other Sections of the Work.
- .2 Provide all waste water fittings, valves, strainers, vacuum breakers, unions, piping insulation any other ancillaries as indicated, specified or as recommended by Equipment Manufacturer.
- .3 Arrange for rough-in and piping connections to equipment, as recommended by Equipment Manufacturer.
- .4 Provide chrome plated uninsulated waste water drainage piping and piping components exposed to view, unless otherwise indicated. Provide chrome plate escutcheons at wall and floor penetrations.
- .5 Connect Equipment requiring waste water drainage piping connections.

**END OF SECTION**

## **CONTENTS**

### **PART 1 - GENERAL**

- 1.01 GENERAL REQUIREMENTS**
- 1.02 SCOPE OF WORK**
- 1.03 REFERENCES**
- 1.04 SUBMITTALS**
- 1.05 QUALITY CONTROL**
- 1.06 VIBRATION ISOLATION GENERAL REQUIREMENTS**

### **PART 2 - PRODUCTS**

- 2.01 PIPING, JOINTS AND FITTINGS**
- 2.02 SHUT-OFF VALVES**
- 2.03 PRESSURE REDUCING VALVE STATIONS**
- 2.04 PRESSURE GAUGES**
- 2.05 OUTLET STATIONS**
- 2.06 COUPLERS/CONNECTORS**
- 2.07 CONTROLS**
- 2.08 AIR COMPRESSOR**
- 2.09 AIR RECEIVER**
- 2.10 AIR COMPRESSOR FLEXIBLE CONNECTORS**
- 2.11 REFRIGERATED AIR DRYER**
- 2.12 COMBINATION FILTER-REGULATOR**
- 2.13 COMPRESSED AIR FILTERS**

### **PART 3 - EXECUTION**

- 3.01 COMPRESSED AIR SYSTEM INSTALLATION**
- 3.02 PIPE LEAKAGE TESTING**
- 3.03 INSTALLATION OF COMPRESSORS**
- 3.04 MAIN AIR PRESSURE REGULATORS**
- 3.05 INSTALLATION OF COMPRESSED AIR FILTERS**
- 3.06 EQUIPMENT TESTING**
- 3.07 SYSTEM START-UP**

## **PART 1 - GENERAL**

### **1.01 GENERAL REQUIREMENTS**

- .1 Comply with requirements of the Owner's General Requirements and all documents referred to therein.
- .2 Comply with requirements of Section 20 01 10 Mechanical General Requirements.
- .3 Comply with requirements of Section 20 10 50 Basic Materials and Methods.

### **1.02 SCOPE OF WORK**

- .1 Provide all labour, materials, products, equipment and services to supply, install and commission compressed air system including all equipment, distribution piping and outlets.

### **1.03 REFERENCES**

- .1 American Society of Mechanical Engineers ("ASME")
  - .1 ASME Boiler and Pressure Vessel Code ("BPVC") Section VIII Pressure Vessels.
    - .1 BPVC-VIII B, BPVC Section VIII - Rules for Construction of Pressure Vessels Division 1.
    - .2 BPVC-VIII-2 B, BPVC Section VIII - Rules for Construction of Pressure Vessels Division 2 - Alternative Rules.
    - .3 BPVC-VIII-3 B, BPVC Section VIII - Rules for Construction of Pressure Vessels Division 3 - Alternative Rules High Press Vessels.
  - .2 ASME B16.5, Pipe Flanges and Flanged Fittings
  - .3 ASME 16.9, Factory-Made Wrought Buttwelding Fittings
  - .4 ASME B16.11, Forged Fittings, Socket-Welding and Threaded
  - .5 ASME B16.15 Cast Bronze Threaded Fittings, Classes 125 and 250
  - .6 ASME B16.22 Wrought Copper and Copper Alloy Solder Joint Pressure Fittings
  - .7 ASME B16.50 Wrought Copper and Copper Alloy Braze-Joint Pressure Fittings
  - .8 ASME B31.1, Power Piping
  - .9 ASME B31.3, Process Piping
- .2 American Society for Testing and Materials International ("ASTM")
  - .1 ASTM A53/A53M, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless
  - .2 ASTM A181/A181M, Standard Specification for Carbon Steel Forgings for General Purpose Piping
  - .3 ASTM B88, Standard Specification for Seamless Copper Water Tube
  - .4 ASTM B828, Standard Practice for Making Capillary Joints by Soldering of Copper and Copper Alloy Tube and Fittings
- .3 American Welding Society Inc. ("AWS")
  - .1 AWS A5.8M/A5.8 Specification for Filler Metals for Brazing and Braze Welding.
- .4 Canadian Standards Association International ("CSA")
  - .1 CSA B51, Boiler, Pressure Vessel, and Pressure Piping Code.
- .5 Health Canada Workplace Hazardous Materials Information System ("WHMIS")
  - .1 Material Safety Data Sheets (MSDS).

### **1.04 SUBMITTALS**

- .1 Submit shop drawings for all compressed air system Products Specified in this Section of the Specifications except for pipe and fittings.



- .2 Submit engineering design data to confirm products proposed meet requirements specified in this Section. Include certified power and control wiring diagrams where applicable.
- .3 Submit copies of all test and inspection reports, including test reports supplied by authority making the inspection, for all inspections specified in this Section. Complete and submit TSSA "Piping Systems Installation and Test Data Report", and submit all other documents required by TSSA.
- .4 Submit a letter from Air Compressor Manufacturer, or Manufacturer's designated representative, certifying air compressor set installation is in accordance with requirements specified in Part 3 of this Section.
- .5 Submit valid and up-to-date qualification certificates for tradesmen performing the work, all as specified in this Section.

#### **1.05 QUALITY CONTROL**

- .1 The work shall be carried out in accordance with the Specifications and, where applicable, in accordance with the manufacturer's instructions by Trades experienced in this type of work.
- .2 Trades performing registered pressure piping work to be licensed in accordance with the requirements of the Authorities Having Jurisdiction (AHJs).
- .3 Prior to submitting shop drawings/product data sheets for any system governed by the Boilers and Pressure Vessels Act, review Contract Documents for conformance with CSA B51 and related standards, and immediately report any discrepancies so as not to delay the work. This review is intended to avoid installation of materials and/or products that may later be rejected by AHJs.
- .4 Employ a subcontractor approved by AHJs (Boiler and Pressure Vessels Division), who has a Quality Plan filed with AHJs to complete the work of this Section.
- .5 Work is to be performed only by certified welders in accordance with requirements of Section entitled Basic Mechanical Materials and Methods, and by certified journeyman pipe fitters and licensed petroleum mechanics. Maintain copies of each registered tradesman's certificate on-site for examination upon request.
- .6 Install all work required to be registered under Boiler and Pressure Vessels Act in accordance with requirements of this Section and CSA B51, including related Codes and Standards.
- .7 Schedule, pay costs, and obtain reports for inspections by governing authority at regular intervals including but not limited to pre-construction material inspection, demonstration of welding procedures, general installation inspections, and any other inspection(s) requested by governing authority.

#### **1.06 VIBRATION ISOLATION GENERAL REQUIREMENTS**

- .1 All vibration isolators and bases shall be supplied by an approved supplier with the exception of isolators which are factory installed and are standard equipment with the machinery.
- .2 Provide shop and placement drawings for all vibration isolation elements for review, before materials are ordered. The drawings shall bear the stamp and signature of the responsible supplier's technical representative.
- .3 All vibration isolators shall have either known undeflected heights or other markings so that after adjustment, when carrying their load, the deflection under load can be verified to confirm the load is within the proper range of the device and that the correct degree of vibration isolation is being provided according to the requirements.
- .4 All isolators shall operate in the linear portion of their load versus deflection curve. Load versus deflection curves shall be furnished by the manufacturer and shall be linear over a deflection range of 50 percent above the design deflection.
- .5 The ratio of lateral to vertical stiffness shall not be less than 1.0 or greater than 2.0.

### **PART 2 - PRODUCTS**

#### **2.01 PIPING, JOINTS AND FITTINGS**

- .1 Copper Piping:

- .1 Provide Type "L" hard-drawn copper piping conforming to ASTM Standard B88 for compressed air piping sizes up to NPS ¾" (20 mm).
- .2 Provide wrought copper braze joint fittings. Do not use cast fittings.
- .3 Make connection to piping of a different material with dielectric fittings.
- .4 Brazing Alloys:
  - .1 Provide silver type brazing alloys with a melting point of approximately 1100°F (593°C) and a tensile strength of 90,000 psi (621 MPa) minimum, cadmium free, requiring no flux for installation. Silver brazing alloy shall be Aircosil 45.
- .2 Black Steel Piping:
  - .1 Provide ASTM A53/A53M, seamless black steel.
  - .2 NPS 2" (50mm) and smaller:
    - .1 ASME 16.9, Schedule 40, welded joints
    - .2 ASME B16.11, Schedule 80 steel, threaded joints.
  - .3 NPS 2½" (65 mm) and larger:
    - .1 ASME 16.9, Schedule 80, welded joints
    - .2 ASME B16.11, Schedule 80, socket welded joints.
  - .4 Where welding is employed wall thickness to match pipe thickness
  - .5 Where threaded is employed for sizes NPS 2" (50mm) and smaller:
    - .1 Threaded malleable iron fittings, Class 150 to ANSI B16.3,
    - .2 150 psi (1030 kPa) black malleable iron, bronze face, ground joint unions.
  - .6 Couplings: To ASME B16.11, socket welded or threaded half coupling type.
  - .7 Unions: Malleable iron with brass-to-iron ground seat.
  - .8 Dissimilar metal junctions: Use di-electric unions.
  - .9 Flanges:
    - .1 NPS 2" (50mm) and smaller:
      - .1 Class 150 to ASME B16.5, forged steel, raised face and socket welded.
    - .2 NPS 2½" (65 mm) and larger:
      - .1 Class 150 to ANSI B16.5, forged steel raised face and slip-on or weld neck.
      - .2 Gaskets to ANSI B16.21, ANSI B16.20 or ANSI A21.11 of heavy duty graphite impregnated compressed sheet 1/16" (1.6 mm) thick
  - .10 Studs, bolts and nuts:
    - .1 to ANSI B18.2.1, ANSI 18.2.2 and ASTM A194, "high strength" type
  - .11 Jointing compound for screwed pipe:
    - .1 pulverized lead paste.

## 2.02 SHUT-OFF VALVES

- .1 Three-piece design or top entry for ease of in-line maintenance.
- .2 Black Steel Piping Service:
  - .1 To ASTM A181/A181M, Class 70, carbon steel body socket welded ends, carbon steel ball and associated trim suitable for compressed air application.
  - .2 To withstand 600 psig (4135 kPa) maximum pressure.
- .3 Copper Piping Service:

- .1 Provide for valves 2" (50 mm) and smaller, bronze ball valves ASME rated for non-shock cold water pressure of 600 psig (4135 kPa).
- .2 Provide for valves 2½" (65 mm) and larger, bronze solder and globe valves.

## 2.03 PRESSURE REDUCING VALVE STATIONS

- .1 Provide pilot operated pressure reducing valve stations complete with isolation valves where indicated on the Drawings. Pressure reducing valves shall be suitable for an operating pressure range from 150 psi (1035 kPa) inlet and an outlet pressure of 20 psi (140 kPa).
- .2 Provide pressure reducing valve stations at each piece of equipment indicated on the drawings. Station shall be complete with isolation valves, ¼" (6 mm) female quick detachable coupling and pressure gauge. Valve shall be suitable for an inlet pressure of 150 psi (1035 kPa) and an outlet pressure of 75 psi (515 kPa).

## 2.04 PRESSURE GAUGES

- .1 Provide 1½" (38 mm) pressure gauges complete with shutoff cocks and snubbers. Select gauges with 0-200 psig (0-1380 kPa) range.

## 2.05 OUTLET STATIONS

- .1 Provide, at each compressed air outlet station, 8 ft. (2440 mm) long by 3/8" (10 mm) internal dia. heavy duty neoprene standard service station hose, complete with plug hose stem to snap onto the female detachable coupling. Provide female hose barb for the other end of the hose.

## 2.06 COUPLERS/CONNECTORS

- .1 Industrial interchange series, full-bore coupling, ¼" (6 mm), **3/8" (10mm), ½" (12mm), ¾" (20mm) or 1" (25mm), sized per the Drawings**, female Quick-Connect Air Hose Fittings unless noted otherwise.
- .2 Maximum rated inlet pressure: 300 psi (2070 kPa).
- .3 Inlet temperature range: -40°F to +250°F (-40°C to +121°C)
- .4 Valve seat: moulded nylon.
- .5 Body: **brass/ stainless steel**.
- .6 Threads: NPT.

## 2.07 CONTROLS

- .1 Pressure switch shall be capable to initiate compressor start at 95 psi (655 kPa) and to stop at a pressure of 150 psi (1035 kPa); pressure start and stop setpoints shall be field adjustable.
- .2 For duplex or multi-plex systems, provide electrical alternation set to operate each compressor for 12 hours period and automatically alternate to the second compressor at the pre-set timeframe. In the event one compressor fails or is unable to supply the necessary demand, the stand by compressor automatically starts to maintain air pressure. Controls shall be integral to each individual compressor unit and be configured to communicate between compressor units.
- .3 Manual control with Hand-Off-Auto ("H-O-A") starter switch.
- .4 Provide panel suitable for 600V/3ph/60Hz cycle electric power supply and complete with external hinged metal cover with tamperproof lock concealing start/stop buttons and other instruments.
- .5 Provide all required motor control wiring.
- .6 Provide a remote status panel complete with 3" (75 mm) alarm bell, flashing red light, alarm silence button, all in 5¼" x 19" (135 mm x 485 mm) long enclosure arranged for electronic rack installation.
- .7 Provide auxiliary contacts at compressor control panel to enable BAS status and alarm connection.

## 2.08 AIR COMPRESSOR

- .1 Provide Atlas Copco GA-series, or equivalent, oil-injected rotary screw, full feature, floor-mounted air compressors complete with ASME rated receiver tank.
- .2 Maximum working pressure to be 150 psig (1035 kPa).

- .3 This unit to also be complete with matched set V-belt drive, pressure switch for automatic start/stop, check valve, air cooled after cooler, drain valve, belt guard, silenced inlet filler and pre-wired automatic drain.
- .4 Provide pressure reducing valves assemblies where noted on the drawings, and complete with pressure gauges on high and low pressure side of valve.
- .5 Safety relief valves: safety relief valves shall be provided in accordance with the requirements of the Authorities Having Jurisdiction. Provide relief vent piping to atmosphere with termination at roof level.
- .6 Motor: standard protected, 10 HP, 600V/3ph/60Hz.
- .7 Control:
  - .1 Manual control with H-O-A starter switch.
  - .2 Pressure switch to cut out at 115 psi (800 kPa) (adjustable) and with minimum differential pressure.
  - .3 Provide all required motor control wiring.
- .8 Accessories: Belt guard and pressure gauges.
- .9 Air intakes: Complete with bird screen, replaceable cartridge type intake filter and silencer.
- .10 Capacity: Refer to mechanical equipment schedules.
- .11 Vibration isolation: 95% minimum efficiency.

## **2.09 AIR RECEIVER**

- .1 Provide vertical 120 gallon receiver built to CSA B51 Provincial regulations for working pressure of 200 psi (1378 kPa). Flange or screw inlet and outlet connections.
- .2 Fittings shall include adjustable pressure regulator, safety valve, pressure gauge, drain cock and automatic condensate drain.
- .3 Tank finish shall be shop primed.
- .4 Tank to have valid CRN Registration.

## **2.10 AIR COMPRESSOR FLEXIBLE CONNECTORS**

- .1 Provide flexible stainless steel metal pipe connectors in discharge piping from each compressor. Flexible connectors shall have a minimum burst pressure of four times operating pressure. Pipe sizes through 2" (50 mm) ID shall be furnished with Hex male nipple fittings and pipe sizes 2½" (65 mm) ID and larger shall be furnished with fixed steel flanges both sides.

## **2.11 REFRIGERATED AIR DRYER**

- .1 Provide refrigerated air dryer integral with air compressor package, or as an accessory as part of a built-up compressor package.
- .2 Provide non-cycling air dryer of self-contained mechanical refrigeration type.
- .3 Dryer shall be capable of achieving 37°F (3°C) dew point.

## **2.12 COMBINATION FILTER-REGULATOR**

- .1 Factory assembled, heavy-duty with mounting bracket and low pressure side relief valve.
- .2 Maximum inlet pressure: 115 psi (800 kPa).
- .3 Operating temperature: 0°F to 125°F (-18°C to 52°C).
- .4 Filter element: 40 micron. Bowls: Polycarbonate.
- .5 Pressure range in regulator: 5 psi (34 kPa) to 115 psi (800 kPa).
- .6 Gauge range: 0 to 160 psi (1100 kPa).

## **2.13 COMPRESSED AIR FILTERS**



- .1 Provide general purpose coalescing filter downstream of the refrigerant dryers capable of reducing water/oil aerosol to 0.1 PPM and particulates of 0.01 micron.
- .2 Provide an active carbon filter removing hydrocarbon odors to 0.003 PPM and shall be down stream of the refrigerant dryers.
- .3 Provide a general particulate filter upstream of the refrigerant dryer capable of 99% efficiency as it relates to particulate removal.

### **PART 3 - EXECUTION**

#### **3.01 COMPRESSED AIR SYSTEM INSTALLATION**

- .1 Provide interconnecting compressed air piping including fittings, valves and auxiliaries required to achieve a fully functional compressed air generation and distribution system.
- .2 Piping joints and fittings:
  - .1 Up to NPS  $\frac{3}{4}$ " (20 mm): copper with brazed fittings
    - .1 Connections between steel and copper pipe to made up with dielectric unions or brass adapters, or brass valves.
  - .2 NPS 2" (50 mm) and smaller: steel pipe, threaded with threaded fittings made up with joint compound.
  - .3 NPS 2½" (65 mm) and larger: steel pipe, welded with butt weld or socket weld fittings.
- .3 Provide tees in lieu of elbows at changes in direction of piping. Install plug in open ends of tees.
- .4 Make all branch takeoffs from top of main.
- .5 Grade compressed air piping not less than 1% (1" in 8 ft. or 10mm in 1m) to dirt pocket with drain.
- .6 Install full size dirt pockets not less than 6" (150 mm) long at the bottom of each riser and elsewhere where dirt or condensate may accumulate each complete with drain valve connection with drain piping extended to nearest drain. Do not exceed 100 ft. (30 m) between drain points.
- .7 Provide check valves on compressor discharge piping.
- .8 Provide shut-off valves at all outlets, each main, branch and riser, and in locations as indicated in the Documents. Install valves with stems upright or horizontal.
- .9 Provide quick-coupler chucks and pressure gauges on drop pipes.
- .10 Weld steel piping in accordance with Section 20 10 50 Basic Mechanical Materials and Methods and;
  - .1 To ASME code and requirements of Authorities Having Jurisdiction (AHJs).
  - .2 Weld concealed and inaccessible piping regardless of size.
- .11 Connections to equipment:
  - .1 Provide shut-off valves at each equipment connection.
  - .2 Make connections to equipment using steel pipe with screwed unions up to NPS 2" (50 mm), and flanges for NPS 2½" (65 mm) and larger to permit removal or replacement.

#### **3.02 PIPE LEAKAGE TESTING**

- .1 Meet testing requirements of all Authorities Having Jurisdiction (AHJs). Obtain certification and certify tests not required by AHJs. Perform not less than the following tests.
- .2 Complete pipe leakage in accordance with the Mechanical Contractors Association of America (MCAA) "Guide to Pressure Testing Safety".
- .3 Complete pipe leakage testing in accordance with the requirements of ASTM A1047 / A1047M-05 "Standard Test Method for Pneumatic Leak Testing of Tubing", as follows:
- .4 Pneumatic Pipe Leakage Testing:

- .1 A preliminary pneumatic test not to exceed 25 psig may be applied, prior to other methods of leak testing, as a means of locating major leaks for piping subject to ASME B31.1 and/or ASME B31.3.
- .2 For piping subject to ASME B31.1 and/ or ASME B31.1, perform a pneumatic pressure test.
- .3 For piping subject to ASME B31.1, the pneumatic test pressure shall be not less than 1.2 nor more than 1.5 times the design pressure of the piping system, but shall not exceed the maximum test pressure for any vessel, compressor, valve, or other component in the system under test.
- .4 For piping subject to ASME B31.3, the pneumatic test pressure shall be not less than 1.1 times the design pressure of the piping system
- .5 Pressurize test circuit with air or nitrogen to a gage pressure, which is the lesser of one-half the test pressure or 25 psig.
- .6 After reaching one-half the test pressure, gradually increase pressure in steps of one-tenth the test pressure until the test pressure is reached.
- .7 Test without pressure drop for a period of not less than 10 minutes at the maximum test pressure, then reduce to the design pressure, and hold for a period that allows for a complete visual inspection of the piping systems under test, however, for a period not less than 4 hours. Pneumatic leakage testing shall be repeated until no leaks are found.
- .8 Examination for leakage shall be conducted using soap bubble or equivalent detection methods, shall be made of all joints and connections. The piping system, exclusive of possible localized instances at pump or valve packing, shall show no visual evidence of weeping or leaking. Wipe joints clean after test.
- .5 Perform tests before piping is covered or concealed.
- .6 Eliminate leaks or remove and refit defective parts. Do not caulk threaded or welded joints.
- .7 Remove all components which will not withstand test pressure following any remedial work after testing.
- .8 After pressure testing is completed, adjust and put all parts of the system into proper working order. Leave the complete job ready for regular operation, all to the satisfaction of the Consultant.
- .9 After the testing period, drain the system, and compressed air is introduced into the system, clean out all dirt pockets and strainers.
- .10 The final test and acceptance shall not be made until the work is fully completed.

### **3.03 INSTALLATION OF COMPRESSORS**

- .1 Install compressor(s) in accordance with manufacturer's written instructions, and all requirements of the Authorities having Jurisdiction (AHJs).
- .2 Install compressor(s) on vibration isolators set on 4" (100mm) high concrete housekeeping pad.

### **3.04 MAIN AIR PRESSURE REGULATORS**

- .1 Install compressed air pressure regulating stations where noted on the drawings, and in accordance with drawing details.
- .2 Install pressure regulators in three valve by-pass arrangements.

### **3.05 INSTALLATION OF COMPRESSED AIR FILTERS**

- .1 Install filters in accordance with Manufacturer's Installation requirements.
- .2 Install a general particulate filter upstream of the refrigerant dryer.
- .3 Install general purpose coalescing filter downstream of the refrigerant dryers.
- .4 Install an active carbon filter downstream of the refrigerant dryers.
- .5 Install filters in three valve by-pass arrangements.

### **3.06 EQUIPMENT TESTING**

- .1 Have manufacturer of products Supplied under this Section review work involved in handling, installation, application, protection, and cleaning of their products and submit written reports, in acceptable format, to verify compliance with the operation of their product.
- .2 Provide manufacturer's commissioning services, consisting of periodic site visits for inspection of product installation, product use recommendations and, operating and service training of Owner's designated personnel.
- .3 Schedule site visits to review work at stages listed:
  - .1 After delivery and storage of products, and when preparatory work on which work of this Section depends is complete, but before installation begins.
  - .2 Twice during progress of work at 25% and 60% complete.
  - .3 Upon completion of Work, after cleaning is carried out.
  - .4 Operator training of Owner's service personnel.
- .4 Submit reports within three (3) days of manufacturer's site attendance.

### **3.07 SYSTEM START-UP**

- .1 Thoroughly clean the compressed air system before and after testing to ensure that all dirt, water and moisture are removed.
- .2 Demonstrate the condition and operation of the complete compressed air installation to the satisfaction of the Consultant.
- .3 Upon completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.
- .4 Warrant the system to be completely oil free.

**END OF SECTION**

## **CONTENTS**

### **PART 1 - GENERAL**

- 1.01 GENERAL REQUIREMENTS**
- 1.02 SCOPE OF WORK**
- 1.03 QUALITY ASSURANCE**
- 1.04 SUBMITTALS**

### **PART 2 - PRODUCTS**

- 2.01 TRAP SEAL PRIMERS**
- 2.02 BACKFLOW PREVENTERS**
- 2.03 TRAP SEAL PRIMERS**
- 2.04 WATER HAMMER ARRESTORS**
- 2.05 PRESSURE REDUCING VALVES**
- 2.06 PLUMBING SYSTEM PRESSURE SAFETY RELIEF VALVES**
- 2.07 WATER MAKE-UP PRESSURE REDUCING VALVES**
- 2.08 COMBINATION TEMPERATURE-AND-PRESSURE RELIEF VALVES**
- 2.09 VACUUM RELIEF VALVES**
- 2.10 THERMOSTATIC MIXING VALVES**
- 2.11 ELECTRIC DOMESTIC HOT WATER HEATER (LOW BOY)**
- 2.12 ELECTRIC DOMESTIC HOT WATER HEATER**
- 2.13 ELECTRIC DOMESTIC HOT WATER HEATER WITH BAS INTERFACE**
- 2.14 DOMESTIC HOT WATER TANKLESS (INSTANTANEOUS) HEATER - ELECTRIC**
- 2.15 DRAIN PANS**
- 2.16 DOMESTIC HOT WATER HEATER FLOOR STANDS**
- 2.17 DOMESTIC HOT WATER HEATER MOUNTING BRACKETS**
- 2.18 HYDRO-PNEUMATIC TANKS FOR POTABLE WATER SYSTEMS**
- 2.19 HYDRO-PNEUMATIC TANK FITTINGS**
- 2.20 WATER SOFTENER SYSTEMS**
- 2.21 POTABLE WATER SEDIMENT FILTRATION SYSTEMS**
- 2.22 ULTRAVIOLET (UV) LAMP HIGH INTENSITY DISINFECTION SYSTEM**
- 2.23 ULTRA-VIOLET POTABLE WATER STERILIZER SYSTEMS**
- 2.24 WATER METERS**

### **PART 3 - EXECUTION**

- 3.01 GENERAL INSTALLATION REQUIREMENTS**
- 3.02 PRESSURE REDUCING VALVES**
- 3.03 TRAP SEAL PRIMERS**
- 3.04 WATER HAMMER ARRESTORS**
- 3.05 BACKFLOW PREVENTERS**
- 3.06 INSTALLATION OF THERMOSTATIC MIXING VALVES**
- 3.07 DOMESTIC WATER HEATER INSTALLATION**
- 3.08 INSTALLATION OF WATER SOFTENER**
- 3.09 INSTALLATION OF POTABLE WATER SEDIMENT FILTRATION SYSTEMS**
- 3.10 INSTALLATION OF ULTRAVIOLET (UV) LAMP HIGH INTENSITY DISINFECTION SYSTEM**
- 3.11 INSTALLATION OF WATER METERS**



## **PART 1 - GENERAL**

### **1.01 GENERAL REQUIREMENTS**

- .1 Comply with requirements of the Owner's General Requirements and all documents referred to therein.
- .2 Comply with requirements of Section 20 01 10 Mechanical General Requirements.
- .3 Comply with requirements of Section 20 01 50 Basic Materials and Methods.
- .4 Comply with requirements of Section 20 10 10 Plumbing Piping and Pumping Systems.

### **1.02 SCOPE OF WORK**

- .1 Provision of plumbing equipment and specialties as described in this Section.

### **1.03 QUALITY ASSURANCE**

- .1 Execute the Work of this Section only by skilled tradesmen regularly employed in the manufacture and installation of plumbing equipment and specialties.

### **1.04 SUBMITTALS**

- .1 Submit the following Shop Drawings:
  - .1 Floor drain trap seal primers;
  - .2 Pressure reducing valves;
  - .3 Water hammer arrestors;
  - .4 Domestic hot water storage tanks;
  - .5 Hydro-pneumatic tanks;
  - .6 Backflow preventers;
  - .7 Water meters;

## **PART 2 - PRODUCTS**

### **2.01 TRAP SEAL PRIMERS**

- .1 Primer Valve Type: Precision Plumbing Products Inc. Model P2-500, or equal, trap primer valve, constructed of brass, adjustable to high or low water pressures and complete with "O" ring seals, 12 mm (½") threaded inlet and outlet connections, and, for priming two traps from the same primer, a DU-2 dual outlet distribution unit.
- .2 Primer Valve Type with Manifold: Precision Plumbing Products Inc. Model P1-500, or equal, trap primer valve constructed as specified above for the Model P2-500 primer valve, complete with a Model DU-3 or DU-4, 3 or 4 outlet distribution unit for priming 3 or 4 traps, and at Model "YS-8" supply tube with combinations of Model DU-3 and DU-4 distribution units for priming from 5 to 6 traps.
- .3 Electronic Type: Precision Plumbing Products #PT Series, or equal, surface wall mounting, CSA certified, 115 volt, 1 phase, 60 Hz., electronic, automatic trap priming manifolds, each sized to suit the number of drain traps or interceptors serviced, and each complete with:
  - .1 a galvanized steel cabinet with door;
  - .2 20 mm (¾") dia. NPT copper pipe inlet with shut-off valve and water hammer arrestor;
  - .3 a solenoid valve, an atmospheric vacuum breaker, and a discharge manifold with 12 mm (½") dia. compression type copper tube connections on 40 mm (1½") centres with quantity to suit the number of items to be primed;
  - .4 a control panel with circuit breaker, 5 ampere fuse, 24 hour timer, and manual override toggle switch.

### **2.02 BACFLOW PREVENTERS**

- .1 Reduced pressure zone ("RPZ") style dual check valve design backflow preventers in accordance with CAN/CSA B64 (including supplements), each of bronze or epoxy coated cast iron bronze fitted construction depending on size, and complete with inlet strainer, inlet and outlet shut-off valves, an intermediate relief valve, ball valve type test cocks, and a proper air gap fitting.

## **2.03 TRAP SEAL PRIMERS**

- .1 Equal to Precision Plumbing Products (PPP) model PTS electronic trap seal trap priming assembly shall automatically maintains a constant water seal in floor drain traps configured to accommodate 4 to 30 connections. Electronic trap seal primer assembly shall be as follows:
  - .1 Surface mounted NEMA-1 metal cabinet with cover plate: 12" x 12" x 4" deep (305mm x 305mm x 102mm deep)
  - .2 Domestic water inlet: ¾" (20mm) shut-off valve with female threaded connection to ANSI/ASME BI.20.1.
  - .3 Outlet: ½" (12mm) compression fitting(s) to SAEJ512.
  - .4 Manifold: ¾" (20mm) Type "L" copper tubing to ASTM B88.
  - .5 Soldered joints: 95-5 lead free containing lead not in excess of 0.2%.
  - .6 Electrical components: 2 Amp circuit breaker, manual over-ride switch/test button, timer, solenoid valve marked as UL listed.
  - .7 Backflow prevention: Anti-Siphon atmospheric vacuum breaker meets American Society of Sanitary Engineering (ASSE) Standard 1001 and CSA.
  - .8 Temperature rating: 32°F to 125°F (0°C to 51.7°C)
  - .9 Pressure rating: 20 psi to 150 psi (140 kPa to 1035 kPa).
  - .10 Electrical Specifications: 120V/1ph/60Hz; Watts: 6; Holding: 16 VA; In-rush: 34 VA

## **2.04 WATER HAMMER ARRESTORS**

- .1 Piston type, 304 stainless steel, pressurized water hammer arrestors, each complete with a nesting type bellows and a casing of sufficient displacement volume to dissipate the kinetic energy generated in the piping system, a male treaded nipple connection, suitable for either vertical or horizontal installation, and each sized to suit the connecting potable water pipe and equipment it is provided for.

## **2.05 PRESSURE REDUCING VALVES**

- .1 For piping 65 mm (2-1/2") diameter and larger, non-corrosive pilot operated pressure reducing valve to CAN/CSA B356, factory set at the required pressure, field adjustable, and complete with a bronze body and trim, screwed or flanged connections, and brass body pilot valve with stainless steel seat.

## **2.06 PLUMBING SYSTEM PRESSURE SAFETY RELIEF VALVES**

- .1 Valve: to ASME Section IV.
- .2 Body Construction: brass.
- .3 Adjustable Pressure Setting: 8 to 25 psig (55 to 172 kPa).
- .4 Maximum Operating Differential Pressure From Open To Close:
  - .1 3 psig (20 kPa).
- .5 Acceptable Manufacturers:
  - .1 Bell & Gossett;
  - .2 Watts;
  - .3 Or Approved Equivalent

## **2.07 WATER MAKE-UP PRESSURE REDUCING VALVES**

- .1 Iron body water pressure regulator with:

- .1 Low inlet pressure check valve;
- .2 fast fill /purge lever;
- .3 Removable stainless steel strainer, and;
- .4 Iron body diaphragm operated relief valve
- .2 Adjustable Low Pressure: 0.8 to 25 psig (55 to 172 kPa).
- .3 Acceptable Manufacturers:
  - .1 Bell & Gossett;
  - .2 Watts - No.1450F series
  - .3 A.W. Cash Valve - Type CBL
  - .4 Or Approved Equivalent

## **2.08 COMBINATION TEMPERATURE-AND-PRESSURE RELIEF VALVES**

- .1 ***ASME rated and stamped. Include relieving capacity at least as great as heat input and include pressure setting less than working-pressure rating of domestic hot water heater. Select relief valves with sensing element that extends into storage tank.***

## **2.09 VACUUM RELIEF VALVES**

- .1 ***ANSI Z21.22/CSA 4.4.***

## **2.10 THERMOSTATIC MIXING VALVES**

- .1 ***Provide Lawler Mfg. Co., Inc., or Consultant approved equal, Master Controller mixing valves in accordance with the following.***
- .2 ***Reference Standards:***
  - .1 ***ASSE 1070 – Performance Requirements for Water Temperature Limiting Devices.***
  - .2 ***ANSI Z358.1 - American National Standard for Emergency Eyewash and Shower Equipment.***
  - .3 ***CSA B125.3 - Plumbing Fittings.***
  - .4 ***cUPC - Certification and listed for compliance with both ASSE 1017 and Canadian Standard B125.3.***
  - .5 ***Certified Lead Free to NSF 372.***
- .3 ***Construction:***
  - .1 ***Maximum Inlet Pressure: 125 psi (862 kPa).***
  - .2 ***Maximum Inlet Temperature: 200°F (93°C).***
  - .3 ***stainless steel piston and liner.***
  - .4 ***bronze body with replaceable corrosion-resistant components.***
  - .5 ***liquid-filled thermal motor.***
  - .6 ***one of three adjustable temperature setpoint range (see table below).***
  - .7 ***high temperature limit stop.***
  - .8 ***check valve inlets with stainless steel strainers.***
  - .9 ***vandal-resistant temperature adjustment.***
- .4 ***Performance:***
  - .1 ***Temperature maintained to within ASSE and cUPC guidelines if change in hot or cold water is not more than 30°F (17°C).***
  - .2 ***pressure fluctuations compensated for up to 50 percent drop in inlet supply pressure; water flow reduced if supply fails (Lawler 310).***

**.3 Capacity shall be in accordance with the following:**

Thermostatic Mixing Valve Performance Requirements									
Lawler Model	Inlet Size (in.)	Outlet Size (in.)	Min Flow (usgpm)	Min Flow with Recirc. (usgpm)	Rated Flow at 10 psi WPD (usgpm)	Rated Flow at 45 psi WPD (usgpm)	Temp. Setpoint Range (1) (°F)	Temp. Setpoint Range (2) (°F)	Temp. Setpoint Range (3) (°F)
310-1/2"	1/2"	1/2"	0.5	N/A	2.5	7	100°F – 150°F	50°F – 100°F	85°F – 135°F
310-3/4"	1/2"	3/4"	0.5	N/A	5.5	12	100°F – 150°F	50°F – 100°F	85°F – 135°F
6625	3/4"	3/4"	3.75	0.5	12	25	100°F – 150°F	50°F – 100°F	85°F – 135°F
6650	3/4"	1"	7.5	0.5	25	50	100°F – 150°F	50°F – 100°F	85°F – 135°F
801	3/4"	1"	1	0.5	25	50	110°F – 140°F	70°F – 100°F	90°F – 120°F
802	1"	1-1/4"	2	0.5	39	80	110°F – 140°F	70°F – 100°F	90°F – 120°F
803	1-1/2"	1-1/2"	3	0.5	60	125	110°F – 140°F	70°F – 100°F	90°F – 120°F
804	1-1/2"	2"	4	0.5	72	150	110°F – 140°F	70°F – 100°F	90°F – 120°F
805	2"	2"	5	0.5	96	200	110°F – 140°F	70°F – 100°F	90°F – 120°F

**.5 Finish:**

**.1 Rough bronze unless noted otherwise.**

**2.11 ELECTRIC DOMESTIC HOT WATER HEATER (LOW BOY)**

- .1 The Domestic Hot Water heater(s) shall be Dura-Power Commercial Electric Model DEL as manufactured by A. O. Smith, or approved equal, cUL listed, CSA labeled, and approved to the NSF Standard 5. Tanks shall be ASME rated for 150 psi working pressure.**
- .2 Domestic Hot Water heaters(s) shall be in accordance with storage volume, heater capacity and heater electrical service in accordance with the Equipment Schedules.**
- .3 Domestic Hot Water heaters(s) shall meet the standby loss requirements of the U.S. Department of energy and current edition of ASHRAE/IES 90.1.**
- .4 Domestic Hot Water heaters(s) shall be equipped with extruded high density anode rod.**
- .5 All internal surfaces of the heater(s) exposed to water shall be glasslined with an alkaline borosilicate composition that has been fused-to-steel by firing at a temperature range of 1400°F to 1600°F.**
- .6 Electric heating elements shall be medium watt density with zinc plated copper sheath.**
- .7 Each element shall be controlled by an individually mounted thermostat and high temperature cutoff switch.**
- .8 Manufacturer shall supply CSA, ASME rated Temperature and Pressure (T&P) relief valve.**
- .9 The outer jacket shall be of backed enamel finish and shall enclose the tank with foam insulation.**
- .10 Electrical junction box with heavy duty terminal block shall be provided, except on 120V & 277V models, and no junction box provided on models DEL-6 through DEL-20.**
- .11 The drain valve shall be located in the front for ease of servicing.**
- .12 Heater tank shall have a three year limited warranty.**



- .13 **Acceptable Manufacturers:**
- .1 **A.O. Smith;**
  - .2 **Rheem- Ruud;**
  - .3 **PVI Industries;**
  - .4 **Or Consultant approved equal.**

**2.12 ELECTRIC DOMESTIC HOT WATER HEATER**

- .1 **The Domestic Hot Water heater(s) shall be Gold Series Commercial Electric Model DRE as manufactured by A. O. Smith, or approved equal, cUL listed, CSA labeled, and approved to the NSF Standard 5. Tanks shall be ASME rated for 160 psi working pressure.**
- .2 **Heater(s) shall be in accordance with storage volume, heater capacity and heater electrical service in accordance with the Equipment Schedules.**
- .3 **Tanks shall be equipped with extruded high-density anode. All internal surfaces of the heater(s) exposed to water shall be glasslined with an alkaline borosilicate composition that has been fused-to-steel by firing at a temperature range of 1400°F to 1600°F.**
- .4 **Electric heating elements shall be low watt density. Each heating element shall be controlled by a thermostat and high temperature cut-off switch mounted to the surface of the storage tank directly above the heating elements they control. All internal circuits shall be fused.**
- .5 **The outer jacket shall be of baked enamel finish and shall be provided with full size control compartment for performance of service and maintenance through hinged front panel. The outer jacket shall enclose the tank with foam insulation that meets standby loss requirements of NRCan and current edition of ASHRAE/IES 90.1.**
- .6 **Electrical junction box with heavy duty terminal block shall be provided.**
- .7 **A drain valve shall be located in the front for ease of servicing.**
- .8 **Manufacturer shall supply CSA, ASME rated Temperature and Pressure (T&P) relief valve.**
- .9 **Heater tank shall have a three year limited warranty.**
- .10 **Acceptable Manufacturers:**
  - .1 **A.O. Smith;**
  - .2 **Rheem- Ruud;**
  - .3 **PVI Industries;**
  - .4 **Or Consultant approved equal.**

**2.13 ELECTRIC DOMESTIC HOT WATER HEATER WITH BAS INTERFACE**

- .1 **The heater shall be a glass-lined Custom Xi commercial electric model DSE as manufactured by A. O. Smith, or approved equal.**
- .2 **Heater(s) shall be in accordance with storage volume, heater capacity and heater electrical service in accordance with the drawing schedules.**
- .3 **Heater shall be constructed in accordance with ASME Code, shall bear appropriate symbol and be listed with the National Board as required. Heater shall be cUL listed, CSA labeled and classified to The National Sanitation Foundation Standard No. 5.**
- .4 **All internal surfaces of the tank shall be glass-lined with an alkaline borosilicate composition that has been fused-to-steel by firing at a temperature of 1600°F. Tank shall be cathodically protected with a combination of sacrificial and powered anodes.**
- .5 **The entire vessel is to be enclosed in a round steel outer jacket with baked enamel finish. The outer jacket shall enclose the tank with foam insulation that meets standby loss requirements of NRCan and current edition of ASHRAE/IES 90.1.**
- .6 **Water heater shall have an electronic control with large LCD displaying current water heater status; provide real time element status and sensing, low water cut-off and economy mode**

*operation, and have the capability of connecting to a Building Automation System (BAS) via BACnet or MODBUS gateway. Heater shall include a 120 volt control circuit transformer, transformer fusing, magnetic contactor(s), element fusing per N.E.C., and commercial grade incoloy elements. Temperature controls include limiting switch which will require resetting manually in the event the temperature reaches 202°F.*

- .7 *A drain valve shall be located in the front for ease of servicing.*
- .8 *Heater shall include a CSA Certified and ASME Rated Temperature and Pressure (T&P) relief valve.*
- .9 *Acceptable Manufacturers:*
  - .1 *A.O. Smith;*
  - .2 *Rheem- Ruud;*
  - .3 *PVI Industries;*
  - .4 *Or Consultant approved equal.*

#### **2.14 DOMESTIC HOT WATER TANKLESS (INSTANTANEOUS) HEATER - ELECTRIC**

- .1 *Provide Chronomite Laboratories Inc., R Series, or equal, undercounter, tankless, domestic-water heaters with performance as noted on the Equipment Schedules.*
- .2 *Heaters shall be listed to UL 499 "Electric Heating Appliance", and certified to CAN/CSA C22.2 Canadian Electrical Code, Part II, No. 88 "Industrial Heating Equipment."*
- .3 *Construction: Plastic heating chamber with direct-insertion heating element, mounted in a No. 4 brushed finish stainless steel housing.*
  - .1 *Connections: 3/4 NPS ASME B1.20.1 male pipe thread.*
  - .2 *Operating Pressure: [25 psig (175 kPa)]*
  - .3 *Pressure Rating: [150 psig (1035 kPa)]*
  - .4 *Minimum Operating Flow: 0.35 gpm (1.3 L/m).*
  - .5 *Heating Element: Celcon plastic element with nichrome coil, resistance-type heating system.*
  - .6 *Temperature Control: Microprocessor-based, to maintain temperature setpoint over full range of flows.*
  - .7 *Enclosure: Cast aluminum, NEMA 1.*
- .4 *Capacity and Characteristics:*
  - .1 *Flow Rate Range: 0.35 - 5.0 usgpm (1.3 - 18.9 L/m)*
  - .2 *Minimum Operating Flow to Activate Heater: 0.35 usgpm (1.3 L/m).*
  - .3 *Temperature Setting, Adjustable: 70 - 125°F (21 - 52°C).*
  - .4 *Electrical Characteristics: as noted on the Equipment Schedules*
  - .5 *Ambient Operating Temperature: 140°F (60°C), maximum.*
- .5 *Accessories:*
  - .1 *Disconnect Switch: 80A, lockable, in NEMA 4X enclosure.*
  - .2 *Q-Quite, clickless activation.*
  - .3 *Digital readout.*
  - .4 *Support bracket for wall mounting.*
- .6 *Acceptable Manufacturers;*
  - .1 *Chronomite Laboratories Inc.*
  - .2 *A.O. Smith.*

.3 ***Bosch Thermotechnology Corp.***

.4 ***Eemax, Inc.***

.5 ***Stiebel Eltron, Inc.***

.6 ***Or Consultant approved equal***

## **2.15 DRAIN PANS**

.1 ***Corrosion-resistant metal with raised edge. Include dimensions not less than base of domestic-water heater, and include drain outlet not less than NPS 3/4 (DN 20) with ASME B1.20.1 pipe threads.***

## **2.16 DOMESTIC HOT WATER HEATER FLOOR STANDS**

.1 ***Manufacturer's factory-fabricated steel stand for floor mounting, capable of supporting domestic hot water heater and water. Include dimension that will support bottom of domestic hot water heater a minimum of 18" (457 mm) above the floor.***

## **2.17 DOMESTIC HOT WATER HEATER MOUNTING BRACKETS**

.1 ***Manufacturer's factory-fabricated steel bracket for wall mounting, or mounting above a ceiling, capable of supporting domestic-water heater and water.***

## **2.18 HYDRO-PNEUMATIC TANKS FOR POTABLE WATER SYSTEMS**

.1 Bladder type tank for Hydro-pneumatic applications for potable water system. The Domestic Cold Water shall not come into contact with the steel tank.

.2 Capacity: As indicated on drawings.

.3 Tanks shall be welded steel construction, ASME Section VIII, Division 1 suitable for a working pressure upto 250 psig (1722.5 kPa) and a temperature of 240°F (115°C).

.4 Air shall be pre-charged at 40 psig (275.6 kPa). Tank shall be complete with an air charging valve.

.5 Bladder shall be made of heavy duty Butyl Bladder.

.6 All internal parts shall comply with the requirements of ANSI/NSF 61, FDA, Canadian Water Quality Association and Health Canada requirements.

.7 Tanks shall be supported by steel legs or base for floor installations and shall be supported by adequate straps and hangers for ceiling installations.

.8 Acceptable Manufacturers:

.1 Amtrol Well-X-Trol Series;

.2 Armstrong WX-L Series;

.3 HG Spec Expanflex AFX Series;

.4 Or Approved Equivalent.

## **2.19 HYDRO-PNEUMATIC TANK FITTINGS**

.1 Expansion tank air control fitting.

.2 Working Pressure: 125 psig (860 kPa).

.3 Adjustable vent tube and built in manual vent valve.

.4 Acceptable Manufacturers:

.1 Amtrol;

.2 Bell and Gossett;

.3 Or Approved Equivalent.

## **2.20 WATER SOFTENER SYSTEMS**

.1 Softener to have performance as noted on the ***Drawings.***

- .2 Provide a complete automatic packaged and matched **duplex** commercial water softening system comprised of **softener tank(s), brine tank and control valve(s)** complete with following components:
  - .1 Softener Tank(s):
    - .1 Tanks to be sized for 100% of make-up requirements.
    - .2 Electrical welded pressure vessel, low carbon steel construction rated for 689.5 kPa (100 psi) working pressure and a minimum design pressure of 1.2 times working pressure amount. Tanks to be capable of withstanding testing with pressure fluctuations from 0 to 827 kPa (0 to 120 psi) for a minimum of 30,000 cycles.
    - .3 Each tank to be equipped with openings for mineral filling and periodic inspection.
    - .4 Tank finish to be a rust inhibiting primer.
  - .2 **Poly Brine tank with cover.**
  - .3 **All tanks to be supported on** structural steel legs that permit skid mounting. If required, comply with seismic zone 4 loading requirements.
  - .4 **Control valve shall be Fleck Model 2900, or Consultant approved equal, fully integrated programmable microprocessor driven electronic controller to automatically cycle main operating valve through regeneration cycle, and as follows:**
    - .1 **Valve Material: Lead-free Brass**
    - .2 **Regeneration Type: Time Clock or Metered**
    - .3 **Flow Rate: 2" (65mm) up to 106 usgpm (continuous), up to 140 usgpm (peak)**
    - .4 **Adjustable backwash rate**
    - .5 **Operating Pressure: 20 - 125 psi**
    - .6 **Operating Temperature: 34°F - 110°F (1°C - 43°C)**
    - .7 **Certifications:**
      - .1 **NSF/ANSI Standard 61 Certified**
      - .2 **NSF/ANSI Standard 372 Certified (Lead-free).**
  - .5 Audible alarm capable of emitting a tone of ~70 dBA and able to be disabled.
  - .6 Easily removable flow sensor with accuracy to 1% over full range and repeatability to +/- 0.5% of full range.
  - .7 Ion exchange resin capable of removing 30,000 grains of hardness with 6.8 kg (15 lb) of salt.
  - .8 Complete set of instructions, installation and operating manuals.
  - .9 Field service availability to supervise, inspect and provide operator training.
  - .10 Warranty covering workmanship and materials.
  - .11 Acceptable manufacturers are:
    - .1 **Neotec Water Treatment**
    - .2 Culligan Canada;
    - .3 Petwa Ltd;
    - .4 WaterMart;
    - .5 WaterGroup Companies Inc.

## 2.21 POTABLE WATER SEDIMENT FILTRATION SYSTEMS



- .1 Provide Judo model Profimat-Plus-ATP, or equal, protective potable water sediment filters with automatic backwash (time and differential pressure controlled) with performance and capacity as noted on the **Drawings**, and as follows:
  - .1 Suitable for installation in horizontally and vertically orientation,
  - .2 Complete with silver coated, stainless steel filter screen and high-efficiency point rotation system.
  - .3 Suitable for drinking water temperature up to 86°F (30°C)
  - .4 Operating pressure range: 20 - 230 psi (1.5 - 16 bar) for systems up to 2" (50mm) line size,
  - .5 20 – 145 psi (1.5 - 10 bar) for sizes 2 ½" – 4" (65 – 100mm),
  - .6 Plastic filter housing,
  - .7 Servomotor,
  - .8 Threaded connections (up to 2" [50mm]) line size; **flanged connections for sizes 2½" (65mm) and larger.**
  - .9 Automatic time-controlled and differential pressure-dependent backwash cycle,
  - .10 Backwashing based on point rotation system with simultaneous cleaning of the inspection bell,
  - .11 Adjustable backwash differential pressure up to maximum 1.5 psi (0.1 bar),
  - .12 Electronic controller with function and fault display (light diode and buzzer), including:
    - .1 plug-in power supply,
    - .2 timer controlled backwash,
    - .3 settings: hourly, daily, weekly, monthly,
    - .4 manual backwash start-up button.

## 2.22 WELL-WATER PRE-TREATMENT FILTRATION SYSTEM

- .1 **Provide Viqua model AWP42B-V, or Consultant approved equal, heavy-duty three-piece design filter housing as follows:**
  - .1 **maximum 40 usgpm (2.5 l/s) flow rate per filter housing.**
  - .2 **accepts 4-½" x 20" nominal filter cartridges (provide additional set of spare filter cartridges at turn over).**
  - .3 **manufactured from food grade materials.**
  - .4 **complete with pressure relief valve.**
  - .5 **complete with mounting bracket and wrench.**
  - .6 **NSF 42 Certified.**

## 2.23 ULTRAVIOLET (UV) LAMP HIGH INTENSITY DISINFECTION SYSTEM

- .1 **Provide UV Pure, Model Hallett 1000P, or equal, high intensity amalgam ultraviolet (UV) pressurized/enclosed treatment disinfection system including all equipment, performance, components, requirements to achieve the desired system output.**
- .2 **UV equipment shall be designed for continuous and intermittent operation in environments and conditions that are typically found in a water treatment facility.**
- .3 **UV equipment shall be arranged for easy access to serviceable items such as, but not limited to, UV lamps, UV sensors, and ballasts.**
- .4 **The UV reactor, including all wetted components shall be certified to the NSF/ANSI 61 standard by third party independent body.**
- .5 **Water Quality and Operating Range:**

<b>Maximum Solids Content (Turbidity)</b>	<b>1 NTU</b>
<b>Maximum Hardness</b>	<b>855 mg/L</b>
<b>Maximum Iron Concentration</b>	<b>3 mg/L</b>
<b>Maximum Manganese Concentration</b>	<b>0.05 mg/L</b>
<b>UV Transmittance (UVT) Range @ 253.7 nm</b>	<b>50-99%*</b>
<b>Water Temperature Range</b>	<b>34-95°F (1-35°C)</b>
<b>Ambient Air Temperature Range</b>	<b>34-104°F (1-40°C)</b>
<b>Relative Humidity</b>	<b>30% to 70%</b>
<b>Flow Range</b>	<b>0-100 USgpm (0-378 Lpm)*</b>
<b>Water Pressure Range</b>	<b>5-100 psi (34-690kPa)</b>

**\*The UV dosage dependent on the min. UVT and max. water flow**

**.6 UV Equipment Requirements**

<b>Inlet Connection Required</b>	<b>2" Female NPT</b>
<b>Outlet Connection Required</b>	<b>2" Female NPT</b>
<b>Input Power</b>	<b>120Vac, 1phase, 60Hz, 403W (max) (2 wire + ground)</b>
<b>Maximum Headloss (@100gpm, 378 lpm) – see Flow Curve for flow characteristic</b>	<b>4.4 psi (30kPa)</b>
<b>Minimum Lamp aging factor</b>	<b>0.85</b>

**.7 UV dosage at end-of-lamp-life (EOLL):**

- .1 UV dosage at end-of-lamp-life shall be validated from 16.8 to 200.6 mJ/cm2 in flows ranging from 6.2 to 101.5 USgpm and Ultraviolet Transmittance (UVT) ranges of 34.3 to 98.9%.**
- .2 The default UV dose alarm setting is 40mJ/cm2, at the end-of-lamp-life, and this can be adjusted for application specific requirements.**

**.8 Flow Characteristics:**

- .1 Maximum 1 psi WPD at 32 usgpm,**
- .2 Maximum 4 psi WPD at 94 usgpm.**

**.9 Product Requirements:**

- .1 The UV equipment shall operate in an enclosed reactor and use high output amalgam UV lamps.**
- .2 Arrange system such that draining of the UV equipment shall not be required to change UV lamps or to perform calibration checks on the UV intensity sensors.**
- .3 All wetted materials exposed to UV light shall be 316 stainless steel, quartz equivalent to GE Type 214, FKM, or other suitable UV resistant material.**
- .4 The electrical system shall be designed to provide maximum reliability of the UV equipment.**
- .5 All heat sensitive components shall be adequately cooled with forced dry air.**
- .6 The UV equipment shall be equipped with over temperature safety devices to prevent scalding conditions should any device fail.**

- .7 *The UV equipment shall be designed to allow operators to perform routine maintenance such as lamp replacement, without the use of special tools.*
- .8 *The UV equipment shall be equipped with a safety interlock to prevent accidental exposure to UV light in the event the system is not powered down during lamp replacement.*
- .10 **UV Lamps:**
  - .1 *The UV Lamp shall be rated for minimum useful life of 12,000 hours.*
  - .2 *The UV Lamp shall be able to be cycled up to 12 times within a 24 hour period.*
  - .3 *The UV Lamp shall use high purity quartz such as GE type 219 or equivalent with coating to ensure constant UV output over complete lamp lifetime.*
  - .4 *The UV Lamp shall use bases of ceramic construction, resistant to UV light with electrical connection at one end only.*
  - .5 *The UV Lamp filament shall be rugged to withstand shock and vibration.*
  - .6 *The UV Lamp shall have monochromatic spectral output with the emissions peaking at 253.7nm and shall be non-ozone producing.*
  - .7 *The UV Lamps shall maintain a steady output over water temperature range of 34-95°F (1-35°C).*
  - .8 *The UV Lamps shall be removable with the quartz sleeve and automatic quartz cleaning device remaining in place.*
  - .9 *The UV Lamps shall be able to startup and reach full power without water flow for up to 15 minutes in ambient conditions.*
- .11 **UV Reactor:**
  - .1 *The 2" male NPT ports of UV reactor shall be connected through a 2-bolt pump flange for convenient installation and disassembly.*
  - .2 *The UV chamber within the UV reactor shall be easily accessible without tools to allow inspection of quartz sleeve and automatic quartz cleaning device without draining of the reactor.*
  - .3 *The UV lamps within the UV reactor shall be mounted in air to minimize effect from changes in water temperature.*
  - .4 *The UV chamber within the UV reactor shall contain reflective panels to ensure 360° coverage of UV radiation to prevent shadowing.*
  - .5 *The quartz sleeve shall be clear fused quartz GE Type 214 or equivalent with a minimum UV transmissibility of 88 percent.*
- .12 **Automatic Quartz Cleaning System:**
  - .1 *Each UV reactor shall be equipped with an electronically powered quartz cleaning system that will automatically function without operator intervention.*
  - .2 *The automatic quartz cleaning system shall consist of 316 stainless steel wipers for mechanical cleaning.*
  - .3 *The automatic quartz cleaning system shall not use any chemicals.*
  - .4 *The wiping cycle shall occur on power up of the lamps and then once every 4 hours by default. The wiping cycle shall be adjustable and also be initiated at any time by an operator.*
  - .5 *The wiped portion of the quartz sleeve shall consist of the entire length of the exposed quartz within the UV chamber.*
  - .6 *The automatic quartz cleaning system shall contain a sensor to confirm operation and also return wipers to correct park position.*

**.13 UV Intensity Monitoring System:**

- .1 Each individual UV lamp shall be continuously monitored by its own UV intensity sensor.**
- .2 Each UV intensity sensor shall be mounted in air to prevent water fouling from affecting its performance.**
- .3 The UV intensity sensor shall be removable from the UV reactor for reference checking with a factory calibrated spare without interrupting the disinfection process or draining of the UV reactor.**
- .4 The UV intensity sensor shall measure the germicidal portion of the light emitted by the UV lamps at 253.7nm.**
- .5 The UV intensity sensor shall be factory calibrated. Calibration shall be valid for a minimum of one (1) year from beginning of service.**

**.14 Automatic Purging System:**

- .1 Each UV reactor shall be equipped with a purge valve to regulate water temperature within the UV reactor during periods of no flow.**
- .2 The setpoint for purge valve operation shall be adjustable.**
- .3 The purge valve shall discharge water from the UV reactor if low UVT water is detected within the UV chamber.**

**.15 Electrical Enclosure:**

- .1 The UV equipment shall be powered and controlled by one electrical enclosure.**
- .2 The electrical enclosure shall be mounted to the UV reactor and contain the microcontroller, electronic ballasts, and power distribution devices.**
- .3 The electrical enclosure shall be powered by a detachable power cord.**

**.16 Electronic Ballasts:**

- .1 Each ballast shall drive one UV lamp.**
- .2 Ballasts shall incorporate a filament pre-heat circuit to improve reliability of lamp startup and allow for multiple on/off lamp cycles per day.**
- .3 Ballasts shall be installed with polarized connectors for ease of maintenance.**
- .4 Operating power factor for the ballasts shall be 0.98 or higher.**

**.17 Instrumentation and Controls**

- .1 The control system shall continuously monitor and control the UV equipment's functions.**
- .2 Complete control and monitoring of the UV equipment shall be accomplished through the operator interface.**
- .3 The operator interface shall be a color touchscreen and display the following information: UV system status, UV Dose, UV Intensity, UVT prediction, UV lamp lifetime, maximum prescribed flow rate, countdown for warm up and power down, UV Lamp cycles, power cycles, cycle time of automatic quartz cleaning device, unit temperatures including water, pcb, lamp and overall system.**
- .4 The control system shall provide warnings and alarms for all critical devices and functions in both visual and audible format.**
- .5 The control system shall contain a real time clock.**
- .6 The control system shall maintain a log of the last 100 events and record the time of the event and all critical parameters.**
- .7 The control system shall provide discrete outputs in the form of dry contacts for warning and alarm conditions for remote monitoring.**



- .8 ***The control system shall allow remote operation of the UV lamps with the UV reactor on standby when not in use.***
- .9 ***The control system shall be able to provide analog outputs for UV Dose, or UV Intensity, or predicted UVT, and Modbus connectivity.***
- .10 ***The control system shall be able to provide continuous data logging every 30 seconds onto a USB drive.***
- .11 ***The control system shall be able to connect to and control a solenoid valve for automatic shutdown of untreated water.***
- .18 **Safety Warnings and Alarms:**
  - .1 ***The control system shall provide the following warnings at a minimum:***
    - .1 ***End of lamp life approaching***
    - .2 ***End of lamp life exceeded***
    - .3 ***Lamps cycling too often***
    - .4 ***Quartz Cleaning device not operating***
    - .5 ***Water temperature approaching high limit***
    - .6 ***System temperature approaching high limit***
    - .7 ***Temperature sensor failure***
  - .2 ***The control system shall provide the following alarms at a minimum:***
    - .1 ***Low UV Dose***
    - .2 ***Low UV Intensity***
    - .3 ***UV Lamp failure***
    - .4 ***Lamps Not Starting***
    - .5 ***UV Door Open***
    - .6 ***PCB temperature too high***
    - .7 ***System temperature too high***
    - .8 ***Water temperature too high***
    - .9 ***UV sensor failure***
    - .10 ***Microprocessor failure***

## **2.24 — ULTRA-VIOLET POTABLE WATER STERILIZER SYSTEMS**

- .1 — Provide Pure Aqua Inc. Series UVI, or equal, ultra-violet (UV) potable water sterilizer systems with performance and capacity as noted on the Drawing schedules.
- .2 — UV potable water sterilizer systems shall employ ultraviolet generator technology. Untreated water shall enter the reaction chamber, circulate around a low-pressure mercury vapor lamp emitting ultraviolet light energy at 235.7nm wavelength to disrupt DNA of any microbiological (bacteria, viruses, ozone, chlorine, total organic carbon, and other micro-organisms) contaminants prior to discharge.
- .3 — UV potable water sterilizer systems shall be constructed as follows:
  - .1 — Electrical supply: 100-240V/50-60Hz,
  - .2 — Maximum Operating Pressure: 100 psi (6.9 bar),
  - .3 — Ambient Temperature: 32-104°F (0-40°C),
  - .4 — Flow meter,
  - .5 — Dynamic flow restrictor,
  - .6 — Temperature management valve,

- .7 — Solenoid valve,
- .8 — Sensor reading output (4-20mA) UV sensor,
- .9 — Low-pressure high-output lamps (LPHO),
- .10 — Lamp status visual indicator,
- .11 — System hours of operation,
- .12 — Lamp out audible and visual alert (LOA),
- .13 — Remote start/stop (HOA),
- .14 — 304 stainless steel control cabinet,
- .15 — 316L stainless steel treatment reaction chamber,
- .16 — Ra 15 internal surface finish,
- .17 — EPDM elastomers,
- .18 — UV monitoring package: UV intensity reading with NIST certified sensor,
- .19 — Cool touch fan,
- .20 — Control panel:
  - .1 — UL type 4X or UL type 12,
  - .2 — sloped top,
  - .3 — 4-20mA sensor reading output signal with UV monitoring option.

## **2.25 WATER METERS**

- .1 Provide Neptune, or equal, municipal type water meter in accordance with sizes shown on the drawings and meeting City of Toronto requirements for accuracy and repeatability.
- .2 Provide dry contact type pulsed output with one pulse every 10 liters, or in units as otherwise noted on the Submittal, suitable for interface with the Building Automation System ("BAS"). Output to BAS shall provide instantaneous and totalized flow.

## **PART 3 - EXECUTION**

### **3.01 GENERAL INSTALLATION REQUIREMENTS**

- .1 Install plumbing equipment and specialties in accordance with Manufacturer's requirements and the requirements of the Authorities Having Jurisdiction ("AHJs").
- .2 Provide all required labour necessary for the installation of control components and devices supplied by Controls Trades. Include all additional labour necessary for the successful completion of point-to-point verification of devices, and performance verification of devices and systems as part of the project commissioning requirements.

### **3.02 PRESSURE REDUCING VALVES**

- .1 Provide domestic water pressure reducing valves in piping where required. Install so that each valve is readily accessible. Whenever possible, provide pressure reducing valves factory pre-set to required pressures.
- .2 Check and test operation and adjust as required.

### **3.03 TRAP SEAL PRIMERS**

- .1 Prime all traps as required by Code and the Authorities having Jurisdiction (AHJs).
- .2 Prime all traps where called for in the design documents, such as fuel fired appliance flue vent drainage piping connections.
- .3 Install unit plumb and true with suitable access above finished floor.
- .4 Allow 1 ft. (300mm) of elevation for every 20 ft. (6m) of distance ran for floor drain make up line.

- .5 Coordinate with Electrical Trades suitable power source to provide power to electronic trap seal primer.

### 3.04 WATER HAMMER ARRESTORS

- .1 Provide accessible water hammer arrestors in domestic water piping in locations as follows:
  - .1 in headers at groups of plumbing fixtures;
  - .2 at the top of risers;
  - .3 at ends of long horizontal runs of piping;
  - .4 in piping connecting solenoid valves or equipment with integral solenoid valves;
  - .5 wherever else shown or required by Code.
- .2 Install each unit in a piping tee either horizontally or vertically in the path of potential water shock in accordance with the manufacturer's published instructions and details.

### 3.05 BACKFLOW PREVENTERS

- .1 Provide a backflow preventer in each direct domestic cold water connection to equipment other than plumbing fixtures and fittings.
- .2 Do not group make-up water connections to hydronic systems on a common backflow preventer. Provide a dedicated backflow preventer in the make-up water line to each system.
- .3 Locate each backflow preventer on a wall and above the floor such that it is easily accessible for maintenance and testing in accordance with Code requirements. Equip each backflow preventer with an air gap fitting and pipe the reduced pressure zone water outlet to drain.
- .4 Test operation of each backflow preventer in accordance with requirements of CAN/CSA B64 by personnel certified for such testing by governing authorities, and submit signed test results and a properly and clearly identified and marked inspection and test record card for each backflow preventer.
- .5 Provide drains to nearest floor drain on all back flow preventers.

### 3.06 INSTALLATION OF THERMOSTATIC MIXING VALVES

- .1 ***Install thermostatic mixing valves where indicated in the Documents.***
- .2 ***Thermostatic mixing valves shall be installed in accordance with the Manufacturer's requirements, and the requirements of the Authorities having Jurisdiction (AHJs).***
- .3 ***Install thermostatic mixing valves in accordance with the drawing Detail and as follows:***
  - .1 ***Isolation valves and check valves on the hot and cold-water inlet connection; provide isolation valve on tempered water discharge connection.***
  - .2 ***Provide domestic water balancing valve upstream of hot water inlet connection.***
  - .3 ***Provide thermometers downstream of tempered water discharge connection.***
- .4 ***Select thermostatic mixing valves in accordance with the performance table specified above, or in accordance with sizing noted on the Drawings. Provide multiple thermostatic mixing valves arranged in parallel where design capacity exceeds performance table values indicated or where shown on the Drawings.***
- .5 ***Install thermostatic mixing valve at every emergency eyewash, emergency face wash, and emergency shower fixture set to maintain tempered water supply temperature of 60°F (adjustable).***

### 3.07 DOMESTIC WATER HEATER INSTALLATION

- .1 ***General:***
  - .1 ***Install equipment and specialties level and plumb in accordance with Manufacturer's requirements and the requirements of the Authorities Having Jurisdiction ("AHJs"). Comply with manufacturer's written recommendations, including product technical bulletins, handling, storage and installation instructions and datasheets.***

- .2 ***Provide all required labour necessary for the installation of control components and devices supplied by Controls Trades. Include all additional labour necessary for the successful completion of point-to-point verification of devices, and performance verification of devices and systems as part of the project commissioning requirements.***
- .3 ***Where integration of domestic water heater integral controls with the Building Automation System (BAS) is required, coordinate with Controls Trades the correct integration gateway protocol and include with shop drawing submission.***
- .4 ***Provide a hydro-pneumatic expansion tank in accordance with Section 22 30 10 for each independent domestic hot water systems, whether shown on the drawings or not. Hydro-pneumatic expansion tank shall be minimum 2 US gallon capacity unless noted otherwise in the Documents.***
- .5 ***Provide Combination Temperature-and-Pressure Relief Valves for installation in piping or where no relief valve is specified with the domestic-water heater.***
- .6 ***Provide Pressure Relief Valves for installation in piping or where no relief valve is specified with the domestic-water heater.***
- .7 ***Provide Vacuum Relief Valves for installation in piping or where no relief valve is specified with the domestic-water heater.***
- .2 ***Mount Domestic Hot Water Heaters, on drain pans set on 4" (100mm) concrete housekeeping pads.***
  - .1 ***Where noted on the Drawings or Details, or Specified elsewhere in this Section, provide additional Domestic Hot Water heaters floor stands.***
- .3 ***Provide structural steel for horizontal mounted tanks and for instantaneous heaters.***
- .4 ***Provide insulation between Domestic Hot Water heater storage tank and supplementary steel supports.***
- .5 ***Provide additional Domestic Hot Water heaters floor stands to ensure high efficiency gas-fired condensing Domestic Hot Water heaters are mounted at a height that allows for acidic condensate to drain by gravity through acid neutralizing tanks.***
- .6 ***Provide two (2) coats of rustoleum paint on all Domestic Hot Water heater supplementary steel support framing.***
- .7 ***Provide 4" (100mm) floor drain, primed and vented, adjacent to individual Domestic Hot Water heaters, or groups of Domestic Hot Water heaters, whether shown on the Drawings or not.***
- .8 ***Provide one acid neutralizing tank for each high efficiency condensing water heater provided. Terminate flue gas vent drain over acid neutralizing tank; terminate acid neutralizing tank drain over 4" (100mm) floor drain.***
- .9 ***For multiple domestic-water heater installation provide domestic-water-heater series, parallel or combination series and parallel piping manifolds as shown on the Drawings.***
  - .1 ***Include shut-off valves in accordance with Section 22 11 13 to isolate each domestic-water heater.***
  - .2 ***Provide domestic water domestic water flow balancing valves in accordance with Section 22 11 13 for parallel or combination series and parallel manifold piping arrangements to provide balanced flow through each domestic-water heater.***

### **3.08 INSTALLATION OF WATER SOFTENER**

- .1 Provide a package type water softener assembly and secure in place on a concrete housekeeping pad.
- .2 Install equipment and components supplied loose with softener in accordance with softener manufacturer's instructions. Provide required valved piping, including drain piping terminated at a funnel floor drain combination.



- .3 Provide low voltage control wiring required in accordance with softener manufacturer's certified control wiring schematics. Install control wiring in conduit in accordance with requirements of electrical work specification.
- .4 Install initial charge of softener salt. Hand spare salt and soap test kit to Owner at site and store where directed.
- .5 Refer to General Mechanical requirements for equipment/system start-up requirements.
- .6 Refer to Section entitled Basic Mechanical Materials and Methods for equipment/system manufacturer certification requirements. Submit a copy of the letter prior to Substantial Performance of the Work.
- .7 Include for 4 hours of on-site training for 2 groups of 6 people. Training is to be a full review of all components including but not limited to a full operation and maintenance demonstration, with abnormal events.
- .8 ***Coordinate with electrical trades for the provision of a 110V, 1ph, 60Hz power supply.***

### **3.09 INSTALLATION OF POTABLE WATER SEDIMENT FILTRATION SYSTEMS**

- .1 Install potable water sediment filtration system in accordance with manufacturer's requirements, and all requirements of the Authorities Having Jurisdictions (AHJs.)
- .2 Provide isolation valves on the inlet and discharge piping connections to each potable water sediment filtration system.
- .3 Provide bypass valve around each potable water sediment filtration system with locking mechanism to allowing for valve to be locked in the closed position.
- .4 ***Run backwash flushing drain connection to nearest hub drain using an indirect connection.***
- .5 ***Coordinate with electrical trades for the provision of a 3-prong duplex box outlet with a ground-fault circuit-interrupter (GFCI) receptacle for each filter.***

### **3.10 INSTALLATION OF WELL-WATER PRE-TREATMENT FILTRATION SYSTEMS**

- .1 ***Install well-water pre-treatment filtration system in accordance with manufacturer's requirements, and all requirements of the Authorities Having Jurisdictions (AHJs.)***
- .2 ***Provide isolation valves on the inlet and discharge piping connections to each well-water pre-treatment filtration system.***
- .3 ***Provide bypass valve around each well-water pre-treatment filtration system with locking mechanism to allowing for valve to be locked in the closed position.***
- .4 ***Run backwash flushing drain connection to nearest hub drain using an indirect connection.***

### **3.11 INSTALLATION OF ULTRAVIOLET (UV) LAMP HIGH INTENSITY DISINFECTION SYSTEM**

- .1 Install Ultra-violet (UV) water sterilizer system in accordance with manufacturer's requirements, and all requirements of the Authorities Having Jurisdictions (AHJs.)
- .2 ***The UV equipment shall be installed indoors, in a dry location.***
- .3 Provide isolation valves on the inlet and discharge piping connections to each UV water sterilizer system.
- .4 Provide bypass valve around each UV water sterilizer system with locking mechanism to allowing for valve to be locked in the closed position.
- .5 ***Coordinate with electrical trades for the provision of a power supply of 120V, 1ph, 60 Hz, two wire plus a ground, 60Hz, with a ground-fault circuit-interrupter (GFCI) receptacle in the vicinity of each the UV lamp.***

### **3.12 INSTALLATION OF WATER METERS**

- .1 Install water meter in accordance with Municipal requirements, manufacturer's instructions, and with isolation valves on inlet and discharge, and with lockable bypass valve around entire water meter assembly.

- .2 If water meter is not immediately available, provide spool pieces and filler connection. Remove filler pieces and install meter when available. Provide stanchion supports within {150 mm} [6"] of water meter inlet and outlet.

**END OF SECTION**

## **CONTENTS**

### **PART 1 - GENERAL**

- 1.01 GENERAL REQUIREMENTS**
- 1.02 SCOPE OF WORK OF THIS SECTION**
- 1.03 QUALITY ASSURANCE**
- 1.04 SUBMITTALS**
- 1.05 SITE VISIT**

### **PART 2 - PRODUCTS**

- 2.01 HVAC SYSTEM PUMPS AND CIRCULATORS GENERAL REQUIREMENTS**
- 2.02 BASE MOUNTED FLEX COUPLED PUMPS**
- 2.03 VERTICAL IN-LINE PUMPS**
- 2.04 SEISMIC IN-LINE PUMP STANDS**
- 2.05 IN-LINE CIRCULATORS**

### **PART 3 - EXECUTION**

- 3.01 GENERAL INSTALLATION REQUIREMENTS**
- 3.02 HVAC PUMPS**
- 3.03 TESTING**
- 3.04 EQUIPMENT START UP**
- 3.05 WATER BALANCING**

## **PART 1 - GENERAL**

### **1.01 GENERAL REQUIREMENTS**

- .1 Comply with requirements of the Owner's General Requirements and all documents referred to therein.
- .2 Comply with requirements of Section 20 01 10 Mechanical General Requirements.
- .3 Comply with requirements of Section 20 01 50 Basic Materials and Methods.
- .4 Comply with requirements of Section 20 05 70 Motors, Motor Starters, Motor Control Centres, and Wiring
- .5 Comply with requirements of Section 20 08 10 Mechanical Commissioning

### **1.02 SCOPE OF WORK OF THIS SECTION**

- .1 Provision of HVAC system water piping systems, pumping systems, heat exchangers and all related ancillaries.

### **1.03 QUALITY ASSURANCE**

- .1 Qualifications: execute work of this section only by skilled tradesmen regularly employed in the installation of pressure piping and pumping systems for hydronic heating and cooling applications.
- .2 All combustible piping to be ULC labelled and listed for flame spread rating of less than 25 and smoke classification of less than 50.

### **1.04 SUBMITTALS**

- .1 Submit shop drawings for the following Products:
  - .1 HVAC Pumps;
  - .2 HVAC Pump Accessories

### **1.05 SITE VISIT**

- .1 Visit the site prior to tender and verify all conditions. Prior to submitting price, the Mechanical Division Contractor is to review all discrepancies and verify the locations of all existing services that are being extended and the routing of new services. Also report all ambiguities, discrepancies, departures from building by-laws and/or from good practice. Failure to do so will result in all additional costs being the responsibility of the Mechanical Division Contractor. Include for any alternate routing of new or rerouting of existing services to accommodate all site conditions in the tender price.

## **PART 2 - PRODUCTS**

### **2.01 HVAC SYSTEM PUMPS AND CIRCULATORS GENERAL REQUIREMENTS**

- .1 Comply with Manufacturer's requirements for the installation of all specified equipment and all requirements of the Authorities Having Jurisdiction ("AHJs").
- .2 Provide all required labour necessary for the installation of control components and devices supplied by Controls Trades. Include all additional labour necessary for the successful completion of point-to-point verification of devices, and performance verification of devices and systems as part of the project commissioning requirements.
- .3 Provide HVAC pumps and circulators of type and size as indicated on the Equipment Schedules.
- .4 The following General Requirements apply to all HVAC Pumps and Circulators:
  - .1 Equipped with mechanical seals, non-overloading motor (not including motor service factor) in accordance with Section 20 05 70 over entire performance curve and bronze fitted except where noted.
  - .2 Provide split coupling for pumps with motor sizes equal to or greater than 7½ HP.
  - .3 The pump bearings shall be maintenance free permanently lubricated and sealed bearings with an L-10 life in excess of 100,000 hours, and L-50 life at 500,000 hours. Bearing frame shall be equipped with seals to protect bearings from moisture and airborne contaminants.



- .4 All pumps to be complete with suction and discharge flanged connections, tapings for gauges, drain and flush line connections.
- .5 Provide pump Suction Diffuser as follows:
  - .1 Standard Class 125 flange rated for 175 PSIG (1210 kPa) pressure and 250°F (120°C) temperature;
  - .2 Where noted, provide Class 250 flange rated for 300 PSIG (2070 kPa) pressure and 250°F (120°C) temperature;
  - .3 Ductile Iron Body;
  - .4 Ductile Iron Cover;
  - .5 Integral Ductile Iron Straightening Vanes;
  - .6 Stainless Steel (304) Permanent Strainer;
  - .7 Bronze (16 Mesh) Disposable Start Up Strainer;
  - .8 EPDM Cover O-Ring;
  - .9 Steel Grooved Adapter;
  - .10 Metering Port
  - .11 Blow Down port
  - .12 Magnetic Insert
- .6 Provide pump Multi-purpose Discharge Valve as follows:
  - .1 Standard Class 125 flange rated for 175 PSIG (1210 kPa) pressure and 250°F (120°C) temperature;
  - .2 Where noted, provide Class 250 flange rated for 300 PSIG (2070 kPa) pressure and 250°F (120°C) temperature;
  - .3 Five (5) functions as follows:
    - .1 shut off valve
    - .2 Globe style flow control valve with memory indicator, pointer and scale
    - .3 Non-slam check valve
    - .4 Flow metering valve complete with metering ports;
  - .4 Straight pattern valve shall be capable of field conversion to a right angle pattern valve;
  - .5 Ductile iron body;
  - .6 Stainless Steel (302) spring;
  - .7 Bronze gland;
  - .8 Teflon Impregnated Aramid Fiber (asbestos free) stem packing;
  - .9 Bronze/Stainless Steel (416) stem;
  - .10 EPDM seat
  - .11 Stainless Steel (304) seat disc;
  - .12 EPDM Body O-Ring;
  - .13 Steel grooved adapter.
- .7 Provide pump assembly supply and return piping connections double sphere neoprene flex connector with control units equal to Vibro-Acoustics type NNDCU.

## 2.02 BASE MOUNTED FLEX COUPLED PUMPS

- .1 Pumps shall be **Grundfos Canada**, FloFab, ITT Bell & Gossett, S.A. Armstrong, TACO, Wilo Pumps, or approved equivalent meeting all Specification requirements. Alternative pumps may be considered by the Consultant provided a cost savings to the Owner can be demonstrated.
- .2 The pumps shall be single stage end suction rear pull out design. The bearings and seal shall be serviceable without disturbing the piping connections. The capacities and characteristics shall be as called for in the Schedules.
- .3 Pump casing shall be constructed of ASTM A48 class 30 cast iron. The pump casing/volute shall be rated for 250 psi working pressure.
- .4 The pump flanges shall be matched to suit the working pressure of the piping components on the job, with either ANSI Class 125 flanges or ANSI class 250 flanges.
- .5 The pump casing shall be drilled and tapped for gauge ports on both the suction and discharge connections and for a drain port at the bottom of the casing. The casing shall have an additional tapping on the discharge connection to allow for the installation of a seal flush line. The pump cover shall be drilled and tapped to accommodate a seal flush line connected to the corresponding tapping on the discharge connection, or to an external source to facilitate cooling and flushing of the seal faces.
- .6 All casings shall be flanged. Threaded casings not allowed unless extra unions and fittings are provided with that pump to allow servicing.
- .7 Pump volute shall be foot mounted; overhung cantilevered design will not be accepted.
- .8 The pump shall be center line discharge for both positive air venting and load distribution.
- .9 The pump casing inlet shall have an integrally cast anti-rotational vane.
- .10 The pump impeller shall be ASTM B584-836/875 bronze and hydraulically balanced.
- .11 The impeller shall be dynamically balanced to ANSI Grade G6.3 and shall be fitted to the shaft with a key.
- .12 The pump shaft shall be a dry shaft design to prevent the circulating fluid from contacting the shaft and shall be constructed of ASTM A582 Type 416T or ASTM A582 Type 410T stainless steel with field replaceable bronze SAE 660 shaft sleeve.
- .13 The pump shall be fitted with a single mechanical seal, with EPT elastomers and Carbon/Ceramic faces, rated up to 250°F. This seal must be capable of being flushed externally via a tapping in the pump cover adjacent to the seal cavity.
- .14 Open system pumping applications (condenser water pumps and similar) and closed system pumping applications (chilled water, heating water and similar) shall be furnished with a seal flush line and a Cuno / Kynar / Purocell #900 replaceable cartridge filter or separator with shut-off isolation valve installed in the seal flushing line. The filter shall have the ability to remove particles down to five microns in size.
- .15 All pumps to be provided with a fully welded, rigid structural steel base. The base shall include closed ends and top openings to allow for grouting. The base shall include an integral drain pan fabricated from steel with a minimum thickness of 0.1875" and shall contain an integral ¾" drain connection.
- .16 The pump shall be flexibly coupled to a NEMA standard T frame motor in accordance with Section 20 05 70. The coupler shall be suitable for across the line starting as well as variable speed conditions associated with variable frequency drives. The coupling shall be equal to a Woods Dura-Flex coupler.
- .17 The coupling and shafts shall be covered by a metal guard.
- .18 Pump shall be aligned upon receipt at job, during installation, and after system fill by Mechanical Contractor.

## 2.03 VERTICAL IN-LINE PUMPS

- .1 Pumps shall be **Grundfos Canada**, FloFab, ITT Bell & Gossett, S.A. Armstrong, TACO, Wilo Pumps, or approved equivalent closed coupled for pumps with motors 5 HP and smaller, or split

- coupled for pumps with motors larger than 5 HP, meeting all Specification requirements. Alternative pumps may be considered by the Consultant provided a cost savings to the Owner can be demonstrated.
- .2 The pumps shall be single stage end suction rear pull out design. The seal shall be serviceable without disturbing the piping connections. The capacities and characteristics shall be as called for in the plans/schedules.
  - .3 Pump casing shall be constructed of ASTM A48 class 30 cast iron.
  - .4 The pump casing/volute shall be rated for 250 psi working pressure.
  - .5 The pump flanges shall be matched to suit the working pressure of the piping components, with either ANSI Class 125 flanges or ANSI class 250 flanges.
  - .6 The pump casing shall be drilled and tapped for gauge ports on both the suction and discharge connections and for a drain port at the bottom of the casing. The casing shall have an additional tapping on the discharge connection to allow for the installation of a seal flush line.
  - .7 The pump cover shall be drilled and tapped to accommodate a seal flush line which can be connected to the corresponding tapping on the discharge connection, or to an external source to facilitate cooling and flushing of the seal faces.
  - .8 All casings shall be flanged. Threaded casings not allowed unless extra unions and fittings are provided with that pump to allow for servicing.
  - .9 The pump shall have a factory installed vent/flush line to ensure removal of trapped air from the casing and mechanical seal cooling. The vent/flush line shall run from the seal chamber to the pump discharge.
  - .10 The pump impeller shall be ASTM B584-836/875 bronze and hydraulically balanced. The impeller shall be dynamically balanced to ANSI Grade G6.3 and shall be fitted to the shaft with a key.
  - .11 The pump shall be manufactured with ASTM A582 Type 416T or ASTM A582 Type 410T stainless steel shaft.
  - .12 The pump shall be fitted with a single mechanical seal, with EPT elastomers and Carbon/Ceramic faces, rated up to 250°F. This seal must be capable of being flushed externally via a tapping in the pump cover adjacent to the seal cavity.
  - .13 Model KS split coupled pumps shall be coupled via a high tensile aluminum split style coupling. The design shall permit easy replacement of the mechanical shaft seal without removal of the motor. The motor mount must be designed to accept several different motor frame standards; CZ and HP.

#### 2.04 SEISMIC IN-LINE PUMP STANDS

- .1 For each vertical in-line pump assembly provide a Vibro-Acoustics, model SIPS-NP, or equal, seismic pump stand to ensure rigid support and restraint for vertical inline pump and motor assembly as follows:
  - .1 withstand at least 1 g of lateral seismic force for complete pump and motor assembly;
  - .2 complete with Neo+ isolation pads;
  - .3 tested per ANSI/ASHRAE 171;
  - .4 ANSI Class 125 and Class 250 bolt patterns to suit pump pressure rating;
- .2 Provide low-profile model where spring isolators are required.

#### 2.05 IN-LINE CIRCULATORS

- .1 Pumps shall be **Grundfos Canada**, FloFab, ITT Bell & Gossett, S.A. Armstrong, TACO, Wilo Pumps, or approved equivalent meeting all Specification requirements. Alternative pumps may be considered by the Consultant provided a cost savings to the Owner can be demonstrated.
- .2 The pumps shall be single stage horizontal in-line design. The seal shall be serviceable without disturbing the piping connections.
- .3 The capacities and characteristics shall be as called for in the Equipment Schedules.

- .4 Pump shall be constructed of ASTM A48 class 30 cast iron.
- .5 The pump casing shall be drilled and tapped for gauge ports on both the suction and discharge connections.
- .6 All casings shall be flanged connections.
- .7 The impeller shall be ASTM C87500 or C89833 bronze and hydraulically balanced.
- .8 The impeller shall be dynamically balanced to ANSI Grade G6.3 and shall be fitted with a holding taper and left handed 431 series stainless steel bolt.
- .9 The pump shall incorporate a dry shaft design to prevent the circulating fluid from contacting the shaft.
- .10 The pump shaft shall be AISI 1045 carbon steel with field replaceable copper nickel 90-10 shaft sleeve.
- .11 The pump shall be fitted with a single mechanical seal, with EPT elastomers and Carbon/Ceramic faces, rated up to 250°F.
- .12 The pump shall be coupled to a NEMA 56C face motor in accordance with Section 20 05 70 with threaded on shaft extension.

### **PART 3 - EXECUTION**

#### **3.01 GENERAL INSTALLATION REQUIREMENTS**

- .1 Comply with Manufacturer's requirements for the installation of all specified equipment and all requirements of the Authorities Having Jurisdiction ("AHJs").
- .2 Locate equipment as shown on the drawings to provide connection arrangement and accessibility for servicing.
- .3 Provide clearances on all sides of equipment as required by the Manufacturer's Installation Instructions.
- .4 Install items of equipment with due regard to Architectural treatment, and ensure all items are level and finished in keeping with good workmanship.
- .5 Provide chemical treatment connections on heating and cooling circuits as directed by chemical treatment supplier.
- .6 Provide branch take-offs from mains of heating and cooling pipes with shut off valves.
- .7 Install and connect remote components such as thermostats, humidistats, control panels, level controllers, etc., that are supplied with the equipment. Install in locations as shown on the drawings.

#### **3.02 HVAC PUMPS**

- .1 Install HVAC pumps as shown on detail drawings.
- .2 Pump shall be aligned upon receipt at job, during installation, and after system fill by the Mechanical Contractor.
- .3 Mount all vertical in line pumps over 5 HP at floor level as shown on the detail drawings.
- .4 Provide all pumps with Suction Diffusers and Multipurpose Discharge Valves in accordance with the specifications. Where Suction Diffusers and Multipurpose Discharge Valves are unavailable due to size or space restrictions provide the following:
  - .1 Pump Suction: line size shut-off valve, line size inlet strainer;
  - .2 Pump Discharge: line size check valve, line size Flow Balancing Valve.
- .5 Provide 12mm (1/2") drain lines with ball valves from Cuno filters to nearest floor drain.

#### **3.03 TESTING**

- .1 Meet testing requirements of all Authorities Having Jurisdiction (AHJs). Obtain certification and certify tests not required by AHJs. Perform not less than the following tests.



- .2 Prove hydronic piping tight under a hydrostatic test of 150% of design working pressure but not less than 700kPa (100 psi). Test without pressure drop for a period of not less than 4 hours.
- .3 Perform tests before piping is covered or concealed.
- .4 Remove all components which will not withstand test pressure and replace after tests.
- .5 Eliminate leaks or remove and refit defective parts. Do not caulk threaded or welded joints.
- .6 After work is completed, adjust and put all parts of the system into proper working order. Adjust all valves to achieve specified heating capacities. Leave the complete job ready for regular operation, all to the satisfaction of the Consultant.
- .7 After the testing period, drain the system, and before water treatment is introduced into the system, clean out all dirt pockets and strainers.
- .8 Provide lubricating oils, packing, and other accessories, for proper operation of the system.
- .9 The final test and acceptance shall not be made until the work is finally completed.

#### **3.04 EQUIPMENT START UP**

- .1 Follow manufacturer's instructions and have manufacturer's representative present to certify the installation.
- .2 Check each item of equipment to ensure proper piping connections, electrical connections, pump rotation and similar, to verify proper operation.

#### **3.05 WATER BALANCING**

- .1 Refer to Section 20 05 95.
- .2 Provide flow measurement ports as shown on detail drawings and piping schematics in locations as directed by the Testing Adjusting and Balancing ("TAB") Trades. Provide additional balancing valves where recommended by the TAB Trades.

**END OF SECTION**

## **CONTENTS**

### **PART 1 - GENERAL**

- 1.01 GENERAL REQUIREMENTS**
- 1.02 DESCRIPTION**
- 1.03 WORK PERFORMED BY THIS SECTION**
- 1.04 QUALITY ASSURANCE**
- 1.05 REFERENCE STANDARDS**
- 1.06 VOLATILE ORGANIC COMPOUND ("VOC") REQUIREMENTS**
- 1.07 SITE VISIT**

### **PART 2 - PRODUCTS**

- 2.01 DUCT ACCESS DOORS**
- 2.02 INSTRUMENT TEST PORTS**
- 2.03 ROUND TO RECTANGULAR DUCT CONNECTIONS**
- 2.04 AIR TURNING VANES**
- 2.05 SPLITTER DAMPERS**
- 2.06 SINGLE BLADE BALANCING DAMPERS**
- 2.07 MULTI-BLADED BALANCING DAMPERS**
- 2.08 MULTI-LEAF AUTOMATIC CONTROL DAMPERS**
- 2.09 AIR FLOW STATIONS**
- 2.10 BACKDRAFT DAMPERS**
- 2.11 CASING AND PLENUM ACCESS DOORS**
- 2.12 SILENCERS**
- 2.13 DYNAMIC FIRE DAMPERS**
- 2.14 MULTI-BLADE FIRE DAMPERS**
- 2.15 LOW LEAKAGE MOTORIZED SMOKE DAMPERS**
- 2.16 COMBINATION FIRE/SMOKE DAMPERS**
- 2.17 COMBINATION DUCT MOUNTED SMOKE DAMPER OR COMBINATION FIRE SMOKE DAMPER WITH INTEGRAL SMOKE DETECTOR**
- 2.18 WIRE MESH (BIRDScreen)**
- 2.19 LOUVRES**
- 2.20 LOUVRE BLANK-OFF PANELS**

### **PART 3 - EXECUTION**

- 3.01 GENERAL AIR DUCT ACCESSORIES INSTALLATION REQUIREMENTS**
- 3.02 DUCT ACCESS DOORS**
- 3.03 INSTRUMENT TEST PORTS**
- 3.04 INSTALLATION OF ROUND TO RECTANGULAR DUCT CONNECTIONS**
- 3.05 INSTALLATION OF TURNING VANES**
- 3.06 INSTALLATION OF SPLITTER DAMPERS**
- 3.07 MANUAL BALANCING DAMPERS**
- 3.08 AUTOMATIC CONTROL DAMPERS**
- 3.09 AIR FLOW STATIONS**
- 3.10 INSTALLATION OF FIRE DAMPERS, SMOKE DAMPERS AND COMBINATION FIRE AND SMOKE DAMPERS**
- 3.11 COMBINATION DUCT MOUNTED SMOKE DAMPER OR COMBINATION FIRE SMOKE DAMPER WITH INTEGRAL SMOKE DETECTOR**
- 3.12 INSTALLATION OF WIRE MESH (BIRDScreen)**
- 3.13 INSTALLATION OF LOUVRES**
- 3.14 INSTALLATION OF LOUVRE BLANK-OFF PANELS**
- 3.15 AIR BALANCING**

## **PART 1 - GENERAL**

### **1.01 GENERAL REQUIREMENTS**

- .1 Comply with requirements of the Owner's General Requirements and all documents referred to therein.

### **1.02 DESCRIPTION**

- .1 Comply with requirements of Section 20 01 10 Mechanical General Requirements.
- .2 Comply with requirements of Section 20 01 50 Basic Materials and Methods.

### **1.03 WORK PERFORMED BY THIS SECTION**

- .1 Provision of air distribution equipment and related ancillaries.
- .2 Louvers are to be supplied and installed by Trades other than Mechanical Division Trades.

### **1.04 QUALITY ASSURANCE**

- .1 Qualifications: execute work of this section only by skilled tradesmen regularly employed in the construction and installation of air distribution equipment and related ancillaries.
- .2 Submittals: Submit shop drawings for the following Products:

### **1.05 REFERENCE STANDARDS**

- .1 SMACNA HVAC Duct Construction Standards Metal and Flexible - Second Edition
- .2 NFPA 96 – 2008 Ventilation Control and Fire Protection of Commercial Cooking Operations
- .3 NFPA 90A-2009 Installation of Air Conditioning and Ventilating Systems
- .4 NFPA 90B-2009 Installation of Warm Air Conditioning and Air Conditioning Systems
- .5 ASTM A621 & A621M - 1998 Specification for Forming Steel (FS), sheet and Strip, Carbon, Hot Rolled.
- .6 ASTM A653M – 09 Specification for Steel Sheet, Zinc Coated Galvanized or Zinc Alloy Coated (Galvannealed) by the Hot Dip Process
- .7 ASTM A924M – 09 General Requirements for Sheet Steel, Metallic Coated by the Hot Dip Process
- .8 Duct dimensions shown on Drawings are net, inside insulation and acoustic duct lining.

### **1.06 VOLATILE ORGANIC COMPOUND ("VOC") REQUIREMENTS**

- .1 All adhesives, sealants, paints and coatings used on or inside of building weatherproofing layer shall have a VOC content that is less than the content limits defined in LEED® Product Requirements.

### **1.07 SITE VISIT**

- .1 Visit the site prior to tender and verify all conditions. Prior to submitting price, the Mechanical Division Contractor is to review all discrepancies and verify the locations of all existing services that are being extended and the routing of new services. Also report all ambiguities, discrepancies, departures from building by-laws and/or from good practice. Failure to do so will result in all additional costs being the responsibility of the Mechanical Division Contractor. Include for any alternate routing of new or rerouting of existing services to accommodate all site conditions in the tender price.

## **PART 2 - PRODUCTS**

### **2.01 DUCT ACCESS DOORS**

- .1 General.
  - .1 The access doors shall be of ultra-low leakage, premium quality design. Flat oval design optimizes access area and simplifies installation.
  - .2 The access doors shall be complete with insulated double flanged door with pre-punched holes on inner flange for surface mounting.

- .3 Provide camlock for positive seal and easy opening.
- .2 Construction
  - .1 Die-formed 24 gauge galvanized flanged frame for extra strength.
  - .2 Die-formed 24 gauge galvanized door panel for extra strength.
  - .3 1" (25mm) insulation with 24 gauge galvanized backing plate.
  - .4 3/16" (5mm) dia pre-punched attachment holes on inner flange for surface mounting.
  - .5 Plated steel camlock fasteners.
  - .6 Positive bulb door seal.
  - .7 Oval or flat oval shaped opening adaptable to all ducts 5" (125mm) and over.
  - .8 Tested in accordance to DW142 Class C – maximum leakage at 8 in.wg. (2kPa):
    - .1 12"x 6" (300 x 150 mm): 0.06 cfm (1.8 l/min)
    - .2 18"x12" (450 x 300 mm): 0.13 cfm (3.8 l/min)
    - .3 25"x 17" (625 x 425 mm): 0.28 cfm (8.1 l/min)
- .3 Acceptable Manufacturers:
  - .1 Nailor;
  - .2 Or approved equivalent.

## **2.02 INSTRUMENT TEST PORTS**

- .1 0.063" (1.6 mm) thick steel zinc plated after manufacture.
- .2 Cam lock handles with neoprene expansion plug.
- .3 1" (25 mm) minimum inside diameter. Length to suit insulation thickness.
- .4 Neoprene mounting gasket.
- .5 Acceptable Manufacturers:
  - .1 Duro Dyne IP1 or IP2 for insulated ducts;
  - .2 Duro Dyne IP4 for non-insulated ducts.

## **2.03 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.

## **2.04 AIR TURNING VANES**

- .1 For square duct elbows - multiple-radius turning vanes, interconnected with bars, adequately reinforced to suit the pressure and velocity of the system, and constructed of the same material as the duct they are associated with, and in accordance with SMACNA HVAC Duct Construction Standards Metal and Flexible.
- .2 For short branch ducts at grille and diffuser connections - air extractor type, each equipped with a matching bottom operated 90 degree opposed blade volume control damper, constructed of the same material as the duct it is associated with, and in accordance with SMACNA HVAC Duct Construction Standards Metal and Flexible.

## **2.05 SPLITTER DAMPERS**

- .1 Minimum #20 gauge damper blade constructed of same material as duct, reinforced as required to suit blade size, system velocity, and to prevent "chatter", and complete with operating hardware equal to DynAir Inc. #Q-50 "DYN-A-QUAD S-S" quadrant regulator with RW-50 backup washers to prevent leakage, long square bearing pin, and slide pin.

## **2.06 SINGLE BLADE BALANCING DAMPERS**



- .1 Of same material as duct. V-groove stiffened.
- .2 Size and configuration to recommendations of SMACNA, except maximum height 12" (300 mm).
- .3 Locking device.
- .4 Inside and outside end bearings for special fume exhaust ducts.

#### **2.07 MULTI-BLADED BALANCING DAMPERS**

- .1 Factory manufactured of material compatible with duct.
- .2 Opposed blade: configuration to recommendations of SMACNA.
- .3 Bearings: pin in bronze bushings.
- .4 Linkage: shaft extension with locking quadrant.
- .5 Channel frame complete with angle stop.
- .6 Inside and outside end bearings.

#### **2.08 MULTI-LEAF AUTOMATIC CONTROL DAMPERS**

- .1 Automatic Control Dampers are specified in Section 25 30 10 shall be supplied by the BAS Trades for installation in the Air Distribution system. Coordinate all requirements with BAS Trades.

#### **2.09 AIR FLOW STATIONS**

- .1 Air flow stations are specified in Section 25 30 10 shall be supplied by the BAS Trades for installation in the Air Distribution system. Coordinate all requirements with BAS Trades.

#### **2.10 BACKDRAFT DAMPERS**

- .1 Backdraft dampers shall meet the following minimum construction standards:
  - .1 Frame shall be 0.125" (3.2 mm) wall thickness 6063T5 extruded aluminum.
  - .2 Frame shall have galvanized steel braces at all corners.
  - .3 Blades shall be 0.070" (1.8 mm) wall thickness 6063T5 extruded aluminum.
  - .4 Blades shall begin to open at approximately 0.12 in. wg. and be fully open at approximately 0.20 in.wg. static pressure.
  - .5 Blade edge seals shall be extruded vinyl mechanically locked into blade edge; adhesive type seals are unacceptable.
  - .6 Bearings shall be corrosion resistant long life synthetic for quiet operation.
  - .7 Linkage shall be ½" (13mm) tie bar with stainless steel pivot pins; linkage shall have the capability of being manually locked in the closed position for independent fan isolation from the remained of fans in the array.
  - .8 Damper shall be designed for 3500 fpm maximum spot air velocity.

#### **2.11 CASING AND PLENUM ACCESS DOORS**

- .1 Gasketed access doors, factory insulated type in insulated casings or plenums, each constructed of galvanized steel (unless otherwise specified) in accordance with SMACNA HVAC Duct Construction Standards Metal and Flexible, to suit the pressure classification of the casing or plenum.
- .2 Where access doors occur in casings and/or plenums constructed of materials other than galvanized steel, the doors shall be as above but constructed of material to match the casing and plenum material.

#### **2.12 SILENCERS**

- .1 Provide silencers to maintain the maximum Noise Criteria (NC) levels as stated in the following Table:

Area	Maximum NC Level
------	------------------

Open office/reception areas	35
Private offices	30
Conference, interview & meeting rooms	30
Circulation and lobbies	40
Washrooms, service and storage areas	40

- .2 Silencers certified to ASTM E477 "Standard Method of Testing Duct Liner Materials and Prefabricated Silencers For Acoustical and Airflow Performance" completely prefabricated and as follows:

.1 Materials:

- .1 No-medial type rectangular type silencers shall be constructed with a 22 gauge (0.78 mm) galvanized steel outer casing and 26 gauge (0.47 mm) galvanized perforated steel;
- .2 Film lined rectangular type silencers shall be constructed with a 22 gauge (0.78 mm) galvanized steel outer casing and 26 gauge (0.47 mm) galvanized perforated steel.
- .3 No-media and film lined elbow silencers shall be constructed with an 18 gauge (1.24 mm) galvanized steel outer casing and 22 gauge (0.78 mm) galvanized perforated steel. All acoustical splitters shall be internally radiused and aerodynamically designed for efficient turning of the air. Half and full splitters are required as necessary to achieve the scheduled insertion loss. All elbow silencers with a turning cross-section dimension greater than 48" (1200 mm) shall have at least two half splitters and one full splitter.
- .4 Circular silencers shall be constructed with a galvanized steel casing as noted below and 22 gauge (0.78 mm) galvanized perforated steel. All casing and seams and joints shall be lock formed and sealed or stitch welded and sealed.

CASING DIAMETER	CASING GAUGE
Less than 30" (750 mm)	20
30" (750 mm) to 54" (1350 mm)	18
Over 54" (1350 mm)	16

.2 Acoustic Media:

- .1 Media for film lined silencers shall be media containing 100% natural cotton fibers treated with an EPA registered, non-toxic borate solution, "flash dried" to provide resistance to mold, mildew and fungi. Media shall comply with UL181 and NFPA 90A. Media shall be packed with a minimum of 15% compression during silencer assembly. Media shall not cause or accelerate corrosion of aluminum or steel.

.3 Acoustic Media Protection:

- .1 Film lined silencers shall be as above with acoustic media completely wrapped with Tedlar film to prevent shedding, erosion and impregnation of glass fibre. The wrapped acoustic media shall be separated from the perforated metal by a factory installed 1/2" (12 mm) thick acoustically transparent spacer. The spacer shall be flame retardant and erosion resistant. A mesh, screen or corrugated liner will not be acceptable as a substitute for the specified spacer.

.4 High Transmission Loss ("HTL") Ductwork

- .1 Silencers shall have a High Transmission Loss ("HTL") walls externally applied and completely sealed to the silencer casing by the silencer manufacturer to assure quality controlled transmission loss. The HTL walls shall consist of media, airspace, mass and outer protective metal skin, as required to obtain the specified room noise criteria. Standard acoustical panels will not be accepted as HTL walls. Provide breakout noise calculations as part of the silencer shop drawing submissions for each air handling and fan system with HTL silencers. Breakout noise shall be based on the sound power levels of the specified equipment.
- .3 Manufacturer shall certify on shop drawings that silencer performance is per ASTM E477.

## **2.13 DYNAMIC FIRE DAMPERS**

- .1 Application:
  - .1 HVAC System operates under fire alarm, smoke control, or smoke evacuation modes.
- .2 Construction:
  - .1 Provide Dynamic rated fire dampers, meeting or exceeding the following criteria:
    - .1 Fire dampers shall all the requirements of UL and NFPA 80, 90A and 101 for fire dampers in dynamic HVAC systems, as well as National Building Code of Canada (NBC) requirements.
    - .2 Manufactured, tested and labeled in accordance with UL 555 and CAN/ULC-S112 Standard for Dynamic Fire Dampers, including Dynamic Closure Test (formerly the Operation Test). Dampers shall be classified for dynamic closure against an airflow velocity of 2000 fpm (10.16 m/s) at 4" w.g. (1 kPa) static pressure differential across closed damper.
  - .2 Each fire damper shall bear a UL 1½ hours or 3 hours fire resistance rating label in addition to label verifying the airflow and closure pressure ratings as established by the Dynamic Closure Test.
  - .3 Each fire damper shall also be marked with the words "For use in dynamic systems"; Dampers marked "For use in static systems only" are not acceptable.
  - .4 Each fire damper shall be complete with a 165°F (74°C) UL Listed fusible link.
  - .5 Fire dampers shall each include a steel sleeve of appropriate length/gauge and retaining angles, supplied by damper manufacturer to ensure proper installation in accordance with damper manufacturer's instructions.
  - .6 Contractor shall provide an access door at each fire damper, of appropriate size to allow for inspection, testing and fusible link replacement.
  - .7 Fusible link dampers shall be Type B or Type C (as required) with curtain blade out of air stream. Type A dampers (with the curtain blade in the air stream) may be installed only where size or location are such that Type B and Type C cannot be installed. Consultant shall review application of Type A use prior to installation.
  - .8 Fusible link dampers in ductwork other than galvanized steel are to be as specified above but constructed of type 316 stainless steel.
- .3 Acceptable Manufacturers:
  - .1 Nailor Industries D0100 series for 1½ hr rated, and D0500 series for 3 hr rated.
  - .2 EH Price, Brisk, Ruskin;
  - .3 Or acceptable equivalent

## **2.14 MULTI-BLADE FIRE DAMPERS**

- .1 Application:
  - .1 Provide Multi-Blade Dynamic Fire Dampers as shown on plans and/or schedules,

- .2 Each fire damper shall also be marked with the words "For use in dynamic systems". Dampers marked "For use in static systems only" are not acceptable.
- .2 Construction:
  - .1 Fire dampers shall meet the requirements of NFPA 80, 90A and 101 and shall be manufactured, tested and labeled in accordance with UL 555.
  - .2 Each damper shall bear a UL fire resistance rating label of 1½ hours or 3 hours, in accordance with the fire rating of the assembly being penetrated, and in addition, a label verifying the airflow and closure pressure ratings of 2000 fpm (10 m/s) at 4 in.wg. (1 kPa) static pressure differential, as established by the Dynamic Closure Test.
  - .3 Frame shall be constructed of 16 ga. (1.6) galvanized steel hat channel with mitered corners reinforced with die-formed corner gussets for strength.
  - .4 Blades shall be 14 ga. (2.0) equivalent galvanized steel formed double skin, airfoil design, on 5 1/2" (140) centers.
  - .5 Dampers shall be of opposed blade configuration with an inter-locking blade design. Blade seals are not acceptable.
  - .6 Blade axles shall be plated steel, double bolted at each end of blade to provide positive locking connection. Hex, square friction-fit or press-fit axles are not acceptable.
  - .7 Bearings shall be self-lubricating oilite bronze type. Blade linkage shall be zero-maintenance, concealed in frame, out of airstream. Each fire damper shall be complete with a 165°F (74°C) UL Listed fusible link that will cause the damper to close and lock in closed position by means of an over center/knee lock linkage for assured closure.
  - .8 Fire dampers shall each include a steel sleeve of appropriate length/gauge as field verified by contractor, with retaining angles supplied by damper manufacturer to ensure proper installation in accordance with damper manufacturer's instructions.
  - .9 Each damper shall be supplied with an internal manual quadrant(s) for setting and locking of blades in desired position. Contractor shall provide and install an access door at each fire damper, of appropriate size to allow for inspection, testing and fusible link replacement.
- .3 Acceptable Manufacturers:
  - .1 Nailor Industries.
  - .2 EH Price, Brisk, Ventex/Lloyd Industries, Ruskin;
  - .3 Or acceptable equivalent

## **2.15 LOW LEAKAGE MOTORIZED SMOKE DAMPERS**

- .1 Application:
  - .1 Provide Class I low leakage motorized smoke dampers as shown on plans and/or schedules.
  - .2 Dampers shall be suitable for use in dynamic or static smoke control systems.
  - .3 Dampers shall be fail safe opposed blade configuration with an interlocking blade design that provides complete smoke seal under elevated temperature conditions when in closed position.
- .2 Construction:
  - .1 Dampers shall meet the requirements of NFPA 90A, 92, 101 and 105 and shall be classified as a Class I Leakage Rated (Smoke) Damper under UL 555S at an elevated temperature of 250°F (121°C) and each damper shall bear a ULC label verifying same.
  - .2 Dampers must comply with the requirements of AMCA 511 Certified Ratings Program and be qualified to bear the AMCA Seal.
  - .3 Dampers shall have been operation tested by ULC to a minimum velocity/pressure rating of 2000 fpm @ 4 in.wg.



- .4 Frame shall be constructed of 16 ga. (1.6mm) galvanized steel hat channel with mitered corners reinforced with die-formed corner gussets for strength.
- .5 Blades shall be type 6063-T5 extruded aluminum airfoil design on maximum 6" (152) centers with integral structural reinforcing tube running full length of each blade
- .6 Blade axles shall be ½" (13mm) dia. plated steel, double bolted at each end of blade to provide positive locking connection; hex, square friction-fit or press-fit axles are not acceptable.
- .7 Bearings shall be self-lubricating bronze type.
- .8 Blade linkage shall be zero-maintenance, concealed in frame, out of airstream.
- .9 Jamb seals shall be compression type stainless steel.
- .10 Blade seals shall be silicone, mechanically locked in extruded blade slots.
- .11 Externally mounted electrical actuators shall be installed by the damper manufacturer in the factory; review with Consultant any smoke damper actuator proposed to be internally mounted prior to installation. Actuators shall incorporate an OEM internal spring-return mechanism. Damper and actuator assembly shall be factory cycled a minimum of three (3) times to ensure correct operation.
- .12 Submitted pressure drop data to be based on tests in accordance with AMCA Standard 500-D and shall demonstrate a maximum pressure drop of 0.02 in.wg. @ 849 fpm (5 Pa @ 4.3 m/s) across a 36" x 36" (914mm x 914mm) damper.
- .13 Damper shall come complete with a position indicator switch where damper is required to be reopened or closed from a remote location for smoke management and control; damper open end switches shall be adjustable in the field.
- .14 Provide manual test switch to demonstrate proper damper operation as part of regular on-going system maintenance and verification.
- .3 Acceptable Manufacturers:
  - .1 Nailor Industries
  - .2 EH Price
  - .3 Ruskin
  - .4 Or acceptable equivalent

## **2.16 COMBINATION FIRE/SMOKE DAMPERS**

- .1 Application:
  - .1 Provide Combination Fire/Smoke Dampers as shown on plans and/or schedules.
- .2 Construction:
  - .1 Combination Fire Smoke Dampers shall meet the requirements of NFPA 80, 90A, 92 101 and 105.
  - .2 Combination Fire Smoke Dampers shall be classified by Underwriter's Laboratories and labeled as a 1½ hour Fire Damper under UL 555, and as a Class I Smoke Damper under UL 555S at an elevated temperature of 250°F (121°C). Each Combination Fire Smoke Damper shall bear a ULC label verifying same for use in dynamic or static Smoke Control Systems.
  - .3 Dampers must comply with the requirements of AMCA 511 Certified Ratings Program and be qualified to bear the AMCA Seal.
  - .4 Frame shall be constructed of 16 ga. (1.6mm) galvanized steel hat channel with mitered corners reinforced with die-formed corner gussets for strength.
  - .5 Blades shall be 14 ga. (2.0mm) equivalent galvanized steel formed double skin, airfoil design.

- .6 Dampers shall be of opposed blade configuration with an interlocking blade design that provides complete flame and smoke seal under fire conditions at an elevated temperature of 2000°F (1093°C) when in closed position.
- .7 Blade axles shall be plated steel, double bolted at each end of blade to provide positive locking connection.
- .8 Bearings shall be self-lubricating bronze type.
- .9 Blade linkage shall be zero-maintenance, concealed in frame, out of airstream.
- .10 Jamb seals shall be compression-type stainless steel.
- .11 Dampers shall have been tested for dynamic closure by UL to a minimum velocity/pressure rating of 2000 fpm @ 4in.wg.
- .12 Dampers shall be supplied with factory installed sleeves of minimum 16" (406mm) length and shall be field verified by contractor, dependent on wall thickness. Factory sleeves shall be caulked to UL requirements and shall be 20 ga. (1.0mm) through 84" (2134mm) wide, and 18 ga (1.2mm) above 84" (2134mm) wide.
- .13 Appropriate electric (115 V/1ph/60Hz) actuator shall be installed by the damper manufacturer in the factory and shall have been tested and classified under UL 555S. Actuators shall incorporate an OEM internal spring return mechanism.
- .14 Each damper shall be equipped with a UL Classified heat responsive device that will cause the damper to close in a controlled manner and lock in a closed position by means of an over center/knee lock linkage, when the duct temperature reaches the maximum degradation temperature of the damper/actuator assembly as required by UL 555S. Closure devices that cause instantaneous closure are not acceptable.
- .15 Submitted pressure drop data to be based on tests in accordance with AMCA Standard 500-D and shall demonstrate a maximum pressure drop of 0.02 in.wg. @ 849 fpm (5 Pa @ 4.3 m/s) across a 36" x 36" (914 x 914) damper.
- .16 Damper shall come complete with a position indicating switch where damper is required to be reopened or closed from a remote location for smoke management and control; damper open end switches shall be adjustable in the field.
- .17 Provide manual test switch to demonstrate proper damper operation as part of regular on-going system maintenance and verification.
- .3 Acceptable Manufacturers:
  - .1 Nailor Industries.
  - .2 EH Price
  - .3 Ruskin
  - .4 Or acceptable equivalent

**2.17 COMBINATION DUCT MOUNTED SMOKE DAMPER OR COMBINATION FIRE SMOKE DAMPER WITH INTEGRAL SMOKE DETECTOR**

- .1 ***Application:***
  - .1 ***At the Contractor's Option, provide standalone Combination Duct Mounted Smoke Detector and Smoke Damper or Combination Fire Smoke Damper Assembly at penetrations of fire separations noted on the plans and/or schedules where smoke detector is not required to be monitored by the building fire alarm system.***
  - .2 ***Duct smoke detector to be utilized to detect the presence of smoke within HVAC ductwork, whether or not there is airflow, and close the smoke damper or combination fire/smoke damper to prevent smoke from spreading to other areas of the building.***

- .3 ***The standalone Combination Duct Mounted Smoke Detector and Smoke Damper or Combination Fire Smoke Damper Assembly may be a packaged assembly constructed by the damper manufacturer or built-up in the field using components noted below.***
- .2 **Construction:**
  - .1 ***Refer to Low Leakage Motorized Smoke Dampers and/or Combination Fire/Smoke Dampers specifications above for damper component requirements.***
  - .2 ***Provide ULC listed photoelectric duct smoke detector meeting the requirements of NFPA 72, 90A, 92 and 101 and FM Approved.***
  - .3 ***Where Smoke Damper or Combination Fire and Smoke Damper is intended to function as part of a smoke management system, provide requisite controls suitable for remote override of local detector operation, and provide damper end switches to prove damper closed and damper open; damper open end switches shall be adjustable in the field.***
  - .4 ***Smoke detectors shall be mounted in downstream of the smoke damper or combination fire/smoke damper in accordance with CAN/ULC-S524 "Standard for Installation of Fire Alarm Systems" and wired to actuator(s) and heat sensor(s), as applicable.***
- .3 **Operation:**
  - .1 ***Upon detection of smoke, the smoke detector causes the smoke damper or combination fire/smoke damper to close by cutting off power to the actuator.***
  - .2 ***The actuator return spring forces the smoke damper or combination fire/smoke damper closed.***
  - .3 ***The smoke detector is reset through a momentary power interruption.***
  - .4 ***Provide manual test switch to demonstrate proper damper operation as part of regular on-going system maintenance and verification.***
- .4 **Acceptable Manufacturers:**
  - .1 ***Nailor Industries.***
  - .2 ***Or acceptable equivalent***

## **2.18 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.

## **2.19 LOUVRES**

- .1 Fixed Blade Horizontal Louvers, 6" (150mm) Deep:
  - .1 Nailor model 1606KD extruded aluminum stationary blade drainable louvers as follows:
    - .1 Frame: 6" (152mm) deep, Type 6063-T6 extruded aluminum, .080" (2.03mm) nominal wall thickness. Integral caulking slot provided;
    - .2 Blades: Type 6063-T6 extruded aluminum, .080" (2.03) nominal wall thickness, with reinforcing bosses; K style.
    - .3 Blade Angel: Fixed at 37 degrees;
    - .4 Blade Spacing: Approx. 6" (152mm) on centers;
    - .5 Free Area: 50%
    - .6 Performance: 0.14 in.wg. APD at 1017 ft/min velocity through free area.
    - .7 Blade Support Brackets: Concealed type, factory installed on rear of louver

- on maximum 60" (1524mm) centers; reinforced with 1 1/2" x 2" (38mm x 51mm) angle; adds approximately 2" (51mm) to overall louver depth;
- .8 Mullions: Concealed type allowing continuous line appearance up to 120" (3048mm) wide; larger assemblies require separate visible frames with downspouts;
- .9 Birdscreen: 3/4" x .051" (19mm x 1.3mm) expanded, flattened aluminum bird screen in removable frame, inside (rear) mount; adds approximately 3/8" (10mm) to louver depth.
- .10 Finish: Custom high performance powder coat finish to suit architectural requirements.

- .2 Other acceptable manufacturers: Ruskin, Greenheck, Ventex, Construction Specialties.

## **2.20 LOUVRE BLANK-OFF PANELS**

- .1 Insulated, framed, sandwich construction panels consisting of two staggered layers of (2") 50 mm thick low temperature phenolic board insulation between minimum #20 gauge galvanized sheet steel with exterior face of panels finished to match finish of exterior wall louvres.

## **PART 3 - EXECUTION**

### **3.01 GENERAL AIR DUCT ACCESSORIES INSTALLATION REQUIREMENTS**

- .1 Install ducts in accordance with SMACNA Standards and as indicated, and all requirements of the Authorities Having Jurisdiction ("AHJs").
- .2 Provide all required labour necessary for the installation of control components and devices supplied by Controls Trades. Include all additional labour necessary for the successful completion of point-to-point verification of devices, and performance verification of devices and systems as part of the project commissioning requirements.
- .3 Do not break continuity of insulation vapour barrier with hangers or rods. Insulate strap hangers 4" (100 mm) beyond insulated duct.
- .4 Support risers in accordance with SMACNA Standards or as indicated.
- .5 Provide a drain at the low point of all exhaust and outside air plenums. Slope plenum back to louver. Pipe drain to funnel floor drain.
- .6 Provide all required labour necessary for the installation of control components and devices supplied by Controls Trades. Include all additional labour necessary for the successful completion of point-to-point verification of devices, and performance verification of devices and systems as part of the project commissioning requirements.

### **3.02 DUCT ACCESS DOORS**

- .1 Size:
  - .1 25" x 17" (650 x 425 mm) for person size entry.
  - .2 21" x 14" or 18" x 10" (525 x 350 mm or 450 x 250 mm) for servicing entry depending on required space.
  - .3 18" x 10" or 12" x 6" (450 x 250 mm or 300 x 150 mm) for viewing depending on site condition.
  - .4 As indicated on the Drawings and in the Specifications.
- .2 Location:
  - .1 At fire and smoke dampers.
  - .2 At control dampers if linkage is located internally.
  - .3 Upstream of all reheat coils.
  - .4 At devices requiring maintenance.



- .5 At locations required by Code.
- .6 As indicated on the Drawings and in the Specifications.

### **3.03 INSTRUMENT TEST PORTS**

- .1 General:
  - .1 For traverse readings, install in accordance with recommendations of SMACNA.
  - .2 Provide adjacent to all control sensors installed by Control Contractors to allow for confirmation and validation of the readings provided by these sensors. This includes but is not limited to temperature sensors, relative humidity sensors, pressure sensors, and flow stations.
  - .3 Install in accordance with manufacturer's instructions.

### **3.04 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.

### **3.05 INSTALLATION OF TURNING VANES**

- .1 Provide turning vanes in ductwork elbows where shown on drawings and wherever else required where, due to site installation routing and duct elbow radius, turning vanes are recommended in accordance with ANSI/SMACNA HVAC Duct Construction Standards Metal and Flexible.
- .2 Provide volume extractor type turning vanes in short branch supply duct connections off mains to grilles and diffusers where shown and/or specified.

### **3.06 INSTALLATION OF SPLITTER DAMPERS**

- .1 Provide splitter dampers in supply ductwork at branch duct connections off supply air mains, and wherever else shown and/or specified on the drawings.
- .2 Install splitter dampers so they do not vibrate and rattle and so damper operation mechanisms are in an easily accessible and operable location.
- .3 Ensure operators for dampers in insulated ducts are equipped with stand-off mounting brackets.

### **3.07 MANUAL BALANCING DAMPERS**

- .1 Provide balancing dampers as follows:
  - .1 at each branch duct connection from a main trunk duct (branch ducts serve more than one terminal device, diffuser, grille, or register);
  - .2 at each duct run-out to an individual terminal device, diffuser, grille, or register;
  - .3 where indicated in the Documents.
- .2 Install balancing dampers in accordance with recommendations of SMACNA.
- .3 Install dampers so operating mechanism is accessible and positioned for easy operation, and so dampers do not move or rattle.
- .4 Ensure operating mechanisms for dampers in insulated ducts are complete with stand-off mounting brackets.
- .5 Where a duct for which a balancing damper is required has dimensions larger than dimensions of maximum size volume damper available, provide multiple dampers bolted together in a properly sized assembly, or bolted to a heavy-gauge black structural steel angle or channel framework which is properly sized. Seal to prevent air by-pass, and provide connecting linkage.
- .6 Confirm exact damper locations with TAB Trades performing air balancing testing work and install dampers to suit. Include for providing an additional eight [8] manual balancing dampers at no additional cost.

### **3.08 AUTOMATIC CONTROL DAMPERS**

- .1 Sheet Metal Trades shall install Automatic Control Dampers supplied by BAS Trades.

- .2 Install in the exhaust air ducts from all air handling units and return fans where the exhaust duct connects to the exhaust air plenum unless otherwise noted on the drawings.
- .3 Outside air and return air dampers shall be factory mounted within the air handling units unless otherwise noted on the drawings.
- .4 Install in accordance with recommendations of SMACNA and in accordance with manufacturer's instructions.
- .5 Seal multiple damper modules with UL listed non-transparent silicon sealant.
- .6 Upon system start-up, ensure that dampers operate properly. Refer to BAS Specification Sections for additional requirements.

### 3.09 AIR FLOW STATIONS

- .1 Sheet Metal Trades shall install Air Flow Stations supplied by BAS Trades.

### 3.10 INSTALLATION OF FIRE DAMPERS, SMOKE DAMPERS AND COMBINATION FIRE AND SMOKE DAMPERS

- .1 General:
  - .1 Install dampers as per manufacturer's ULC listing.
  - .2 Where a fire damper, smoke damper or combination fire smoke damper exceeds maximum size limitations then a hybrid or Multi-blade dampers must be installed.
  - .3 Maintain integrity of fire wall and/or fire separation.
  - .4 For fire dampers, smoke dampers and combination fire/smoke dampers provide an access door adjacent to the damper to allow for inspection of the damper. Refer to Section 23 33 10 for access door requirements.
  - .5 After completion and prior to concealment, obtain approvals from the Authorities having Jurisdiction (AHJs) of complete installation.
  - .6 Provide fire stop flaps on any grilles penetrating fire-rated ceilings.
  - .7 The Mechanical Contractor shall review the Architectural Drawings. Any discrepancies between fire damper locations and the fire rated walls shall be brought to the attention of the Consultant.
- .2 Fire Dampers and Combination Smoke/Fire Dampers:
  - .1 Install fire dampers in accordance with NFPA 90A, UL555 and suppliers instructions, complete with retaining angles on both sides of wall or floor and fastened to damper collars.
  - .2 Minimum size of the opening for the fire damper shall be larger than the fire damper by 1/8" (3 mm) for each 12" (300 mm) of width or height of the damper to allow for expansion. The maximum allowable size of the opening shall be 1/2" (12 mm) larger in either dimension than the allowable minimum size.
    - .1 **Example, a sleeve dimension of 36" x 48" (900 x 1200 mm) shall have an opening of 36-3/8" x 48-1/2" (912 x 1212 mm) The maximum opening size shall be 36-7/8" x 49" (924 x 1224 mm).**
  - .3 The damper shall be connected to the sleeve by one (1) of the following methods:
    - .1 Where the sleeve is the same metal gauge as the duct, the duct shall be connected to the sleeve utilizing one (1) of the approved slip joints.
    - .2 Where the sleeve is 16-gauge up to 36" x 24" (900 x 600 mm) and 14-gauge for sizes exceeding 36" x 24" (900 x 600 mm) the duct may be connected with a rigid or fixed joint.
  - .4 The damper shall be centred horizontally in the opening and all of the clearance in the vertical plane shall be at the top.
  - .5 Dampers shall not be cast-in-place. Retaining angles and damper shall not be fastened directly to the wall or floor.

- .6 The damper shall be installed in the plane of the fire separation.
- .3 Smoke Dampers:
  - .1 Smoke dampers shall be installed in accordance with NFPA 92A, UL555S and the supplier's installation listing.
  - .2 All joints between the damper and the sleeve or duct and between dampers in multiple sections shall be sealed with silicone sealant on one (1) side only.
  - .3 Damper shall be installed a maximum of 24" (600 mm) from the smoke barrier.

### 3.11 COMBINATION DUCT MOUNTED SMOKE DAMPER OR COMBINATION FIRE SMOKE DAMPER WITH INTEGRAL SMOKE DETECTOR

- .1 ***Generally, Combination Duct mounted Smoke Detector and Smoke Damper or Combination Fire/ Smoke Damper Assembly, not required to be monitored at the building Fire Alarm system, shall be installed in accordance with Smoke Damper or Combination Fire/ Smoke Damper installation requirements specified in Article above. However, these smoke damper and combination fire and smoke damper assemblies, not required to be monitored and annunciated at the building fire alarm system, may be built up by the Sheet Metal Trade contractor in coordination with the BAS Trade Contractor. Field wiring between the duct mounted smoke detector and the smoke damper or combination fire and smoke damper actuator shall ensure damper closes on activation; additional 110V/1Ø/60Hz power wiring connection from emergency power supply shall be provided by the BAS Trade Contractor from the termination provided by Division 26.***
- .2 ***At the Contractor's option, review with Consultant the use of a consolidated smoke damper and/or combination fire and smoke damper detector packaged assembly equal to Nailor model DSD-NF to satisfy the installation requirements. Prior to ordering and release into fabrication confirm that packaged assembly can be constructed in accordance with the manufacturer's installation listing particularly where smoke damper and/or combination fire and smoke dampers are located at or near branch duct connections or duct elbows.***
- .3 ***Provide power wiring and/or control wiring (as may be required by the damper function) to assembly termination points provided by the assembly manufacturer.***
- .4 ***Verify operation of Combination Duct mounted Smoke Detector and Smoke Damper or Combination Fire/ Smoke Damper Assembly in accordance with ULC-S537 "Standard for the Verification of Fire Alarm Systems"***

### 3.12 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.

### 3.13 INSTALLATION OF LOUVRES

- .1 Provide louvres for wall openings.
- .2 Install louver assemblies and secure in place in accordance with manufacturer's instructions and details.
- .3 Confirm exact louver sizes and finish prior to ordering.
- .4 Provide vertical blade louvers for commercial kitchen exhaust applications subject to NFPA 96 requirements.
- .5 Hurricane rated louvers and sill flashing to be installed in accordance with the manufacturer's recommended procedures to ensure complete water integrity performance of louver system.

### 3.14 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.

### **3.15 AIR BALANCING**

- .1 Refer to Section 20 05 95.

**END OF SECTION**

## **CONTENTS**

### **PART 1 - GENERAL**

- 1.01 GENERAL REQUIREMENTS**
- 1.02 COORDINATION**
- 1.03 SUBMITTALS**
- 1.04 CERTIFICATION OF RATINGS**

### **PART 2 - PRODUCTS**

- 2.01 CONDENSING BOILER VENTING**
- 2.02 DOUBLE WALL TYPE "B" VENT**

### **PART 3 - EXECUTION**

- 3.01 GENERAL**
- 3.02 CONDENSING BOILERS**
- 3.03 INSTALLATION OF FLUE GAS VENTS**



## **PART 1 - GENERAL**

### **1.01 GENERAL REQUIREMENTS**

- .1 Comply with requirements of the Owner's General Requirements and all documents referred to therein.
- .2 Comply with requirements of Section 20 01 10 Mechanical General Requirements.
- .3 Comply with requirements of Section 20 01 50 Mechanical Basic Materials and Methods.
- .4 Breeching and Chimneys shall be a manufactured chimney product. The use of Schedule 40 steel pipe with insulation is not acceptable.

### **1.02 COORDINATION**

- .1 Clearly indicate proposed routing, fittings, expansion joints, supports, radiation shield and all other related parts.
- .2 Height of stacks shall be at least 3.0 m (10'-0") unless noted otherwise. Also refer to mechanical and architectural drawings.

### **1.03 SUBMITTALS**

- .1 Complete breeching, chimney and vent stack shop drawings including proposed layout and pressure drop calculations associated with each vent section.
- .2 Provide adjustable, weighted barometric dampers where calculated stack pressure exceeds maximum negative pressure allowed at appliance connection.
- .3 Submit shop drawing or product data sheet to the appropriate trade to indicate the exhaust system building penetration size, and accurately locate the building opening.

### **1.04 CERTIFICATION OF RATINGS**

- .1 Catalogued or published ratings shall be those obtained from test(s) carried out by the manufacturer, or those obtained from an independent testing agency, signifying adherence to the following Codes and Standards, as applicable:
  - .1 CSA B149.1 "Natural Gas and Propane Code"
  - .2 CSA B149.2 "Propane Storage and Handling Code"
  - .3 NFPA 37 "Standard for the Installation and Use of Stationary Combustion Engines and Gas Turbines"
  - .4 NFPA 211 "Standard for Chimneys, Fireplaces, Vents, and Solid Fuel-Burning Appliances"
  - .5 UL 103 "Standard for Factory-Built Chimneys for Residential Type and Building Heating Appliances"

## **PART 2 - PRODUCTS**

### **2.01 CONDENSING BOILER VENTING**

- .1 Provide ULC listed and labeled venting system for the intended application, double-wall, factory-built type for use on condensing appliances or pressurized venting systems serving Category II, or IV appliances as specified by the boiler manufacturer.
- .2 Vent shall be listed for an internal static pressure of 6 in.wg. (1.5 kPa) and tested to 15 in.wg. (3.75 kPa)
- .3 Vent shall be constructed with an inner and outer wall, with a 1" (25.4 mm) annular insulating air space.
  - .1 The inner wall (vent) shall be constructed of AL29-4C superferritic stainless steel, 0.015 in. (0.38 mm) thickness for 6 in. -12 in. (152 mm – 305 mm) nominal vent stacks diameter and 0.024 in. (0.61 mm) thickness for 14 in. -24 in. (355 mm – 610 mm) diameters.
  - .2 The outer wall (casing) shall be constructed of aluminized steel, 0.018 in. (0.46 mm) thickness for 6 in. – 12 in. (152 mm – 305 mm) nominal vent stacks diameter and 0.024 in. (0.61 mm) thickness for 14 in. -24 in. (355 mm – 610 mm) diameters.

- .3 Inner and outer walls shall be connected by means of spacer clips that maintain the concentricity of the annular space and allow unobstructed differential thermal expansion of the inner and outer walls.
- .4 All parts exposed to the weather shall be protected by one (1) coat of corrosion and heat resistant base primer and one (1) coat of heat resistant paint.
- .5 All supports, roof or wall penetrations, terminations, appliance connectors and drain fittings, required to install the vent system shall be included.
- .6 Provide ULC listed roof penetration thimble supplied by the vent manufacturer.
- .7 Where roof pitch is greater than 12:12, provide roof curbs.
- .8 All inner vent connections shall be secured by means of profiled connector bands with gear clamp tighteners; joints shall be sealed.
- .9 Where exposed to weather, the outer closure band shall be sealed to prevent rainwater from entering the space between inner and outer walls.
- .10 Vent shall termination shall be in accordance with installation instructions and requirements of local authorities.

## **2.02 DOUBLE WALL TYPE "B" VENT**

- .1 Sectional, prefabricated, double wall Type "B" gas vent, ULC listed and Labelled to CAN/ULC S605, Gas Vents, maximum 243°C (460°F) rated, with an aluminium alloy inner wall, G90 galvanized steel outer wall, annular air space, prefabricated mated fittings, couplings and accessories including a flashing accessory, storm collar counter-flashing piece, and a termination cap.

## **PART 3 - EXECUTION**

### **3.01 GENERAL**

- .1 Comply with Manufacturer's listed installation instructions for all materials provided, and all requirements of the Authorities Having Jurisdiction ("AHJs").
- .2 Hangers and supports shall be constructed in accordance with recommendations of SMACNA.
- .3 Provide all required labour necessary for the installation of control components and devices supplied by Controls Trades. Include all additional labour necessary for the successful completion of point-to-point verification of devices, and performance verification of devices and systems as part of the project commissioning requirements.
- .4 Breeching, chimneys and vents shall be supported at base; provide additional guy wire supports where stack height exceeds minimum self-support height.
- .5 Install thimbles where breeching, chimneys and vents penetrate roof and floor(s).
- .6 Install breeching, chimneys and vents penetrating roofs as indicated, complete with flashings to suit installation.
- .7 All breeching, chimneys and vents for all appliances shall be sealed as if under positive pressure, regardless of calculated stack pressure.
- .8 Submit detailed shop drawings, including pressure calculations, prior to fabrication.
- .9 For all breeching, chimneys and vents, insure the shaft enclosure provided is non-combustible.
- .10 Do not penetrate the flue gas chamber of vent with screws or mechanical fasteners.
- .11 Install breeching, chimneys and vents with positive slope upward away from appliance.
- .12 Suspend breeching using trapeze hangers at 1.5 m (6'-0") centres.
- .13 Install cleanout at the base of breeching, chimneys and vents.
- .14 Provide for expansion and contraction of breeching, chimneys and vents.
- .15 Provide barometric dampers when required by system design calculations to suit the maximum draft pressure at the appliance vent connection, and where indicated on the drawings.

### **3.02 CONDENSING BOILERS**

- .1 In addition to the General requirements outlined above, provided drain connection(s) at the low point(s) of the venting system suitable for connection to the flue gas condensate drainage system specified in Section 23 52 16.

### **3.03 INSTALLATION OF FLUE GAS VENTS**

- .1 Provide ULC listed and labelled flue gas vents for gas-fired radiant heating equipment. Confirm flue gas vent diameters prior to ordering.
- .2 Secure horizontal sections in place by means of support hardware supplied with vents and conforming to flue diameter, and hanger rods attached to structure. Support spacing is to be in accordance with vent manufacturer's instructions.
- .3 Support vertical flue sections inside building at roof level and wherever else required by means of purpose made vertical support accessories supplied by manufacturer.
- .4 Hand flashing collars to roofing trade at site on roof for installation and flashing into roof construction. Install counter-flashing pieces over collars.
- .5 Equip termination of each chimney with a rain cap. Confirm height requirement for chimney above roof prior to installation, and ensure proper distance from fresh air intakes is maintained.
- .6 Where required, provide braided stainless steel aircraft cable guy wires attached to roof anchors and to stainless steel strap anchors on the vents as required and/or shown.
- .7 Provide required accessories, including insulated thimbles at building wall penetrations, barometric damper(s), cleanout(s), fire stops, and expansion joints where shown and/or required.

**END OF SECTION 23 51 10**

## **CONTENTS**

### **PART 1 - GENERAL**

- 1.01 GENERAL REQUIREMENTS**
- 1.02 DESCRIPTION OF WORK**
- 1.03 QUALITY ASSURANCE**
- 1.04 PRODUCT HANDLING**
- 1.05 CODES, BYLAWS, STANDARDS AND APPROVALS**
- 1.06 SUBMITTALS**
- 1.07 QUALITY CONTROL**
- 1.08 SITE EXAMINATION**
- 1.09 WARRANTY**

### **PART 2 - PRODUCTS**

- 2.01 CONDENSING BOILERS**
- 2.02 CONDENSATE ACID NEUTRALIZING TANK**

### **PART 3 - EXECUTION**

- 3.01 EXAMINATION**
- 3.02 BOILER INSTALLATION**
- 3.03 CONNECTIONS**
- 3.04 FIELD QUALITY CONTROL**

## **PART 1 - GENERAL**

### **1.01 GENERAL REQUIREMENTS**

- .1 Comply with requirements of the Owner's General Requirements and all documents referred to therein.
- .2 Comply with requirements of Section 20 01 10 Mechanical General Requirements.
- .3 Comply with requirements of Section 20 01 50 Basic Materials and Methods.
- .4 Comply with the requirements of Section 25 10 10 BAS Control Network
  - .1 Comply with all requirements including those referenced in Article "BAS Integration with Third Party Devices"

### **1.02 DESCRIPTION OF WORK**

- .1 Provide condensing heating water boilers and all required ancillaries.

### **1.03 QUALITY ASSURANCE**

- .1 Condensing boilers shall be provided by the Mechanical Trades licensed for the Work intended, and they shall assume responsibility for interface and successful operation of the complete heating system.
- .2 Ensure boiler pressure ratings are at least equal to system maximum operating pressure at point where installed, but not less than specified.
- .3 Mechanical Trades shall be responsible for providing certified equipment start-up and field certified training session.
- .4 Boiler start-up shall be by pump Manufacturer or certified factory-trained representative.
- .5 Manufacturer Qualifications: Firms regularly engaged in the manufacture of condensing hydronic boilers with welded steel pressure vessels. The manufacturer must manufacture pressure vessels in an ASME-certified facility.
- .6 Electrical Components, Devices and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- .7 ASME Compliance: Fabricate and label boilers to comply with ASME Boiler and Pressure Vessel Code, Section IV "Heating Boilers", for a maximum allowable working pressure of 160 PSIG.
- .8 CSD-1 Compliance: The boiler shall comply with ASME Controls and Safety Devices for Automatically Fired Boilers (CSD-1).
- .9 ASHRAE/IESNA 90.1 Compliance: Boilers shall have minimum efficiency according to "Gas and Oil Fired Boilers - Minimum Efficiency Requirements."
- .10 UL Compliance: Boilers must be tested for compliance with UL 795, "Standard for Commercial-Industrial Gas Heating Equipment." Boilers shall be listed and labeled by ETL.
- .11 AHRI Compliance: Boilers shall be tested and rated according to the BTS-2000 test standard and verified by AHRI.
- .12 The equipment shall fit within the allocated space, leaving ample allowance for maintenance and inspection.
- .13 The equipment shall be new and fabricated from new materials. The equipment shall be free from defects in materials and workmanship.

### **1.04 PRODUCT HANDLING**

- .1 Protect equipment before, during, and after installation in accordance with Manufacturer's storage, installation and maintenance instructions.

### **1.05 CODES, BYLAWS, STANDARDS AND APPROVALS**

- .1 Installation, workmanship, and testing shall conform to the following standards:



- .1 ASME Section IV, "Heating Boilers"
- .2 CAN-1.3.1-77, "Industrial and Commercial Gas Fired Packaged Boilers"
- .3 CSD-1, "Controls and Safety Devices"
- .4 XL GAPS
- .5 NEC, National Electric Code
- .6 CSA 4.9, ANSI Z21.13
- .7 AHRI, BTS-2000
- .8 ASHRAE 90.1

#### **1.06 SUBMITTALS**

- .1 Product Data: Include performance data, operating characteristics, and technical product data, rated capacities of selected model, weights (shipping, installed and operating), installation and start-up instructions, and furnished accessory information.
- .2 Shop Drawings:
  - .1 Boiler trim and accessories.
  - .2 End Assembly Drawing: Detail overall dimensions, connection sizes, connection locations, and clearance requirements.
  - .3 Wiring Diagrams: Detail electrical requirements for the boiler including ladder type wiring diagrams for power, interlock and control wiring. Clearly differentiate between portions of wiring that are factory installed and portions to be field installed.
- .3 Certificate of Product Rating: Submit AHRI Certificate indicating Thermal Efficiency, Combustion Efficiency, Materials of Construction, Input, and Gross Output conform to the design basis.
- .4 Thermal efficiency curves: Submit thermal efficiency curves between and including minimum and maximum rated capacities, for return water temperatures ranging from 80°F to 180°F.
- .5 Water side pressure drop curve.
- .6 Flue gas temperature curves: Submit flue gas temperature curves for minimum and maximum boiler capacity, for return water temperatures ranging from 80°F to 160°F.
- .7 Quality-control test reports.
- .8 Field quality-control test reports: Start-up by a factory authorized Service Company.
- .9 Operation and Maintenance Data: Data to be included in Installation and Operation Manual.

#### **1.07 QUALITY CONTROL**

- .1 Test and inspect factory-assembled boilers, before shipping, according to ASME Boiler and Pressure Vessel Code.
- .2 Each boiler shall be installed and operated in a functioning hydronic system, inclusive of venting, as part of the manufacturing process. A factory test fire report corresponding to the boiler configuration shall be included with each boiler.

#### **1.08 SITE EXAMINATION**

- .1 Visit the site prior to tender and verify all conditions. Prior to submitting price, the Mechanical Division Trade Contractor is to review all discrepancies and verify the locations of all existing services that are being extended, and the routing of new services.
- .2 Report all ambiguities, discrepancies, departures from building by-laws and/or from good practice. Failure to do so will result in all additional costs being the responsibility of the Mechanical Division Trade Contractor.
- .3 Include for any alternate routing of new or rerouting of existing services to accommodate all site conditions in the tender price.

## 1.09 WARRANTY

- .1 The heat engine shall have a limited lifetime warranty. All other parts shall have a five year limited warranty covering defects in materials and workmanship. The warranty period is based from the date of installation. Warranty is subject to the terms and conditions stated in NTI Limited Lifetime Warranty.

## PART 2 - PRODUCTS

### 2.01 CONDENSING BOILERS

- .1 General
  - .1 The boiler NY Thermal Inc. (NTI) high efficiency gas-fired condensing boiler(s), model FTG, or Consultant approved equal, in accordance with performance requirements indicated on the Equipment Schedules.
  - .2 Each boiler shall be factory assembled and tested. Each boiler shall be shipped self-contained and ready for operation except for connection at the installation site of heating piping, fuel, electrical, combustion air, exhaust venting, condensate drainage and relief valve discharge piping.
  - .3 The boiler shall be capable of normal operation and full rated input with natural gas supply pressure between 4 inches w.c. [1.0kPa] and 10.5 inches w.c. [2.6kPa]. The boiler shall be factory set for natural gas.
  - .4 The boiler shall be certified for installation with zero clearance to combustibles, and shall be certified for closet and alcove installation when vented in accordance with the manufacturer's instructions.
  - .5 The boiler shall be certified to the ANSI Z21.13 / CSA 4.9 Gas-fired Boiler Standard.
  - .6 The boiler stainless steel heat engine shall be designed and constructed in compliance with the ASME Boiler and Pressure Vessel Code Section IV. A permanent nameplate bearing the "H" stamp and National Board registration number shall be attached to the heat engine in a readily viewable location.
- .2 Boiler Construction
  - .1 Heat Engine:
    - .1 The heat engine shall be a vertical firetube down-fired design. The combustion chamber, firetubes, tubesheets and shell shall be constructed of Type 439 (ASME SA240, UNS S43932) stainless steel. The heat shall be rated for 160 psi [1103 kPa] maximum operating pressure.
    - .2 The heat engine shall be able to accept up to 50% mixture of inhibited propylene glycol HVAC antifreeze, without damage to the heat engine or other components.
    - .3 The heat engine shall be accessible for inspection and cleaning via a removable burner access cover. The cover shall include a flame observation port.
    - .4 A factory-supplied condensate trap shall be connected to the combustion chamber for collection and removal of condensate. The trap shall be translucent to permit visual inspection and shall be easily disassembled for cleaning.
    - .5 The combustion chamber exhaust outlet shall include a ½" [12mm] diameter port with a removable EPDM plug to permit insertion of a combustion analyzer probe.
    - .6 The boiler shall employ a sealed cabinet and incorporate a serviceable built-in combustion air filter.
  - .2 Gas Train and Combustion System:
    - .1 The combustion system shall be fully modulating with a 20:1 turndown ratio.
    - .2 The combustion system shall contain:
      - .1 Adjustable air/gas ratio valve with integral regulator

- .2 Mixing venturi
- .3 Variable speed blower utilizing pulse width modulation
- .4 Stainless steel cylindrical premix burner with woven stainless steel mesh covering
- .5 Dual-electrode spark igniter
- .6 Independent flame sensing electrode.
- .3 Cabinet
  - .1 The unit internal structure shall be constructed of 16ga galvanized steel.
  - .2 The cabinet jacket shall be constructed of removable panels fabricated from 20ga steel finished with a durable factory applied coating on both sides.
- .4 Electrical
  - .1 The boiler shall operate from a 120VAC/1 phase/60Hz power supply with a current draw of 12A.
  - .2 A line-voltage barrier strip shall be provided for connection of supply power and up to three (3) circulator pumps. Pump control relays shall be sized for 1.5HP @ 120VAC.
  - .3 A low-voltage barrier strip shall be provided for connection of:
    - .1 Outdoor temperature sensor
    - .2 System temperature sensor
    - .3 DHW indirect tank aquastat or DHW temperature sensor
    - .4 4-20mA signal from external control for burner modulation
    - .5 EIA-485 communication for Lead-Lag cascade control.
    - .6 Two (2) heating thermostats
    - .7 External safety limit
    - .8 Auxiliary proof
    - .9 Time of day signal for night setback
    - .10 Alarm signal to a building automation system
  - .4 A factory wired on-off switch shall be provided.
- .5 Controls
  - .1 The boiler control system shall operate on 24VAC provided by an internal 75VA transformer.
  - .2 A factory supplied and field installed, CSD-1 compliant, Low Water Cutoff (LWCO) shall be furnished with the boiler.
  - .3 High and Low Gas Pressure switches shall be factory installed and wired; opening of either switch shall cause a lockout requiring manual reset (CSD-1 compliant).
  - .4 The integrated microprocessor-based controller shall incorporate all operational and safety control functions, including:
    - .1 Burner spark ignition
    - .2 Flame detection and supervision
    - .3 Burner firing rate modulation
    - .4 High temperature limit (UL353 rated)
    - .5 Meets the following CSD-1 requirements:
      - .1 CS-300 requirements as Primary Safety Control

- .2 CW-400 requirements as Temperature Operation Control
- .3 CW-400 requirements as a Temperature High Limit Control.
- .5 The controller shall incorporate a proportional-integral-derivative (PID) algorithm for three (3) separate temperature controls: two (2) for space heating with independent setpoints; one (1) for domestic hot water.
- .6 The controller shall provide:
  - .1 Operation of up to three (3) pumps: Boiler, Central Heating and Indirect Domestic Hot Water
  - .2 Domestic hot water prioritization with a field-adjustable priority time
  - .3 Field-adjustable outdoor reset to automatically set system water temperature based on outdoor air temperature. An outdoor sensor shall be factory-supplied for field installation
  - .4 Manual firing rate control, adjustable between minimum and maximum firing rate
  - .5 Warm weather shutdown to disable heating, with field adjustable setpoint
  - .6 Pump exercise for 10 seconds at 24 hour intervals
  - .7 Freeze protection to operate the boiler and central heat pumps when outlet water temperature falls below 45°F [7.2°C], and fire the burner at minimum modulation when the outlet temperature falls below 38°F [3.3°C]
  - .8 Field setting of the following:
    - .1 Low temperature central heat (CH1) setpoint from 60°F [15°C] to 195°F [90.5°C]
    - .2 High temperature central heat (CH2) setpoint from 60°F [15°C] to 195°F [90.5°C]
    - .3 Outdoor reset parameters – low temperature central heating
    - .4 Outdoor reset parameters – high temperature central heating
    - .5 Outdoor reset boost parameters (time, step & maximum off point)
    - .6 Domestic hot water (DHW) setpoint from 60°F [15.6°C] to 195°F [90.5°C]
    - .7 CH and DHW time-of-day setpoint from 60°F [15.6°C] to 195°F [90.5°C]
    - .8 Modulation parameters (minimum, CH maximum, DHW maximum & CH slow start enable/degrees/ramp)
    - .9 Post-purge parameters (time & rate)
    - .10 Ignition rate
    - .11 Boiler pump overrun time from 0 to 30 minutes
    - .12 CH and DHW pump overrun time from 0 to 10 seconds
    - .13 CH and DHW pump start delay from 0 to 5 seconds
    - .14 Warm weather shutdown (WWSD) temperature from 50°F [10°C] to 90°F [32.2°C]
    - .15 DHW priority override timer from 0 to 18 hours
    - .16 CH modulation sensor (inlet, outlet or system water temperature)
    - .17 CH modulation source (local or 4-20mA)
    - .18 CH setpoint source (local or 4-20mA)

- .19 CH demand switch (thermostat or sensor only)
  - .20 DHW modulation sensor (inlet or outlet water temperature)
  - .21 DHW demand source (tank thermostat or sensor)
  - .22 Lead and lag selection method (sequence order or measured runtime)
  - .23 Lead rotation time from 0 to 960 hours
  - .24 Slave order priority method (equalize runtime, use first or use last)
  - .25 Anti short-cycle interval from 0 to 60 minutes
  - .26 Temperature units, °F or °C.
- .7 The control system shall include a built-in colour touchscreen display to permit monitoring of unit operation and field adjustment of control parameters. The control shall support three (3) levels of password-protected access permission: User (no password), Installer, and OEM. The display shall be capable of showing:
- .1 Heat demand source
  - .2 Burner state
  - .3 Demanded firing rate in RPM
  - .4 Actual blower RPM
  - .5 Current setpoint
  - .6 Heat engine entering water temperature
  - .7 Heat engine exiting water temperature
  - .8 Exhaust gas temperature
  - .9 Outdoor Temperature
  - .10 System Temperature
  - .11 Flame ionization current
  - .12 Milliamp signal from external control device
  - .13 Lockouts, Alerts and Holds
- .8 The controller shall be capable of Lead-Lag staging and rotation of up to eight (8) TFT-series boilers with no additional control hardware required, apart from the necessary field-supplied cabling to connect the units via terminals provided on the low-voltage barrier strip. Field configuration of Lead- Lag operation shall be accomplished through the built-in touchscreen display.
- .9 The controller shall provide integrated communication capability using the Modbus RTU protocol over an EIA-485 interface. Communication with external third-party building management networks utilizing BACnet MS/TP, BACnet/IP, Johnson Metasys N2, or LonWorks protocol shall be accomplished with factory-optional NTI communication gateway(s). The gateway shall map factory-selected internal controller data registers to (select one): BACnet objects, Johnson Metasys N2 data points or LonWorks SNVTs. The gateway shall:
- .1 communicate with the boiler controller(s) at 38,400 bits/second
  - .2 be equipped with DIP switches for field selection of node address and protocol
  - .3 auto-discover Modbus addresses of up to 8 connected boilers.
- .10 When two (2) or more boilers are connected in a Lead-Lag cascade configuration, the control shall allow for connection of an outdoor temperature sensor on any slave



unit, thereby permitting connection of a system temperature sensor on the master unit.

.3 Trim Kit:

.1 The following shall be factory supplied with each boiler, for field installation:

- .1 Qty. 1 - Outdoor air temperature sensor, 10k thermistor
- .2 Qty. 1 – System temperature sensor, 10k thermistor
- .3 Qty. 1 – Pressure/temperature gauge, 0-75 psi / 50-320 °F
- .4 Qty. 1 – 1 inch NPT ASME relief valve, 50 psi
- .5 Qty. 1 – LP conversion kit
- .6 Qty. 2 – 3 inch grooved end coupling
- .7 Qty. 2 – 6 inch diameter anti-bird screen

.4 Manuals:

- .1 Each boiler shall include the following manuals:
  - .1 Installation and Operating Manual (IOM)
  - .2 Controller and Touchscreen Display reference manual
  - .3 User Information Manual

## 2.02 CONDENSATE ACID NEUTRALIZING TANK

- .1 For every condensing boiler provided, provide one condensate neutralization tank.
- .2 Condensate neutralizing tanks shall be Axiom Industries Ltd, model NT25, or approved equal, as follows:
  - .1 4.8 U.S Gallon (8 litre) polypropylene tank and lid
  - .2 two 1" (25 mm) FNPT inlet/outlet connections,
  - .3 two 1" (25mm) NPT PVC unions,
  - .4 two 1" (25 mm) NPT PVC close nipples.
- .3 Provide new neutralization media in each neutralizing tank at turn-over, and sufficient neutralizing media for one full media replacement with each neutralizing tank provided.

## PART 3 - EXECUTION

### 3.01 EXAMINATION

- .1 Before boiler installation, examine roughing-in for concrete equipment bases, anchor-bolt sizes and locations, and piping and electrical connections to verify actual locations, sizes, and other conditions affecting boiler performance, maintenance, and operations.
  - .1 Final boiler locations indicated on Drawings are approximate. Determine exact locations before roughing-in for piping and electrical connections.
- .2 Examine mechanical spaces for suitable conditions where boilers will be installed.
- .3 Proceed with installation only after satisfactory conditions have been verified.
- .4 Install and connect remote components and other similar ancillary devices specified or supplied loose with the equipment. Install in serviceable locations as shown on the equipment manufacturer's installation details, and where shown on the drawings.

### 3.02 BOILER INSTALLATION

- .1 Install gas-fired condensing boilers in accordance with Boiler Manufacturer's Installation Instructions, the requirements of the Authorities Having Jurisdiction (AHJs) and requirements of NFPA 54.
- .2 Install boilers level on concrete base, minimum 4" (100 mm) high.

- .3 Assemble and install boiler trim.
- .4 Install electrical devices furnished with the boiler but not specified to be factory mounted.
- .5 Install control wiring to field-mounted electrical devices.
- .6 Boiler shall be installed and vented in accordance with manufacturers' instructions.
- .7 Venting:
  - .1 The boiler shall be vented as shown on the plans and specified below:
  - .2 Direct Vent system with rooftop termination of both the exhaust-vent and combustion air-inlet piping, using termination method detailed in the Installation and Operation Manual. Exhaust-vent and combustion air-inlet piping shall be sealed.
  - .3 Vent system with rooftop termination of the exhaust-vent piping and sidewall termination of the combustion air-inlet piping, using termination kit/method detailed in the Installation and Operation Manual. Exhaust-vent and combustion air-inlet piping shall be sealed.
  - .4 Vent system with sidewall or rooftop termination of the exhaust-vent piping, using termination kit/method detailed in the Installation and Operation Manual. Exhaust-vent piping shall be sealed; combustion air-inlet shall be drawn from the equipment room in accordance with the National Fuel Gas Code, ANSI Z223.1/NFPA 54 (U.S.), or Clause 8.2, 8.3 or 8.4 of Natural Gas and Propane Installation Code, CAN/CSA B149.1 (Canada).
- .8 Exhaust venting
  - .1 Exhaust vent material shall be 8 inch diameter Category IV approved PVC, CPVC, PP or SS sealed vent material.
  - .2 The boiler exhaust vent connection shall be designed to receive 8 inch FasNSeal® or Z-VENT™ single-wall special gas vent system piping.
  - .3 An adapter shall be field supplied for adapting the boiler exhaust vent connection to receive other approved 8 inch Category IV vent material.
  - .4 Exhaust vent length shall not exceed 150 equivalent ft. [45.7 m] of pipe including fittings.
- .9 Combustion air inlet
  - .1 Combustion air inlet material shall be 8 inch Schedule 40 PVC pipe, or (to be inserted by specifier using material acceptable to the local Authority Having Jurisdiction).
  - .2 The boiler combustion air-inlet connection shall be designed to receive 8 inch Schedule 40 PVC (or equivalent).
  - .3 Combustion air inlet length shall not exceed 150 equivalent ft. [45.7 m] of pipe including fittings.

### 3.03 CONNECTIONS

- .1 Piping installation requirements are specified in other Mechanical Division Sections. Drawings indicate general arrangement of piping, fittings, and specialties.
- .2 Install piping from equipment drain connection to nearest floor drain. Piping shall be at least full size of connection. Provide an isolation valve if required.
- .3 Connect gas piping to boiler gas train inlet with isolation valve and union. Piping shall be at least full size of gas train connection. Provide a reducer if required.
- .4 Boiler connections shall incorporate swing joints comprised of a minimum of three (3) 90 degree elbows with minimum 600mm (24") straight piping between elbows. Connect hot water supply and return water connections with shutoff valve and union or flange at each swing joint connection. Arrangement of swing joints, and unions or flanges, shall facilitate isolation and removal of boilers without disruption to the remaining surrounding arrangement of piping, fittings and other system ancillaries.
- .5 Install piping from safety relief valves to the nearest floor drain.

- .6 Install piping from flue gas condensate drain connection to the condensate drain pH neutralization bed, then and to the nearest floor drain. Provide drainage trap with suitably sized depth to meet maximum boiler vent discharge pressure rating, complete with trap seal primer connection made in accordance with Section 22 30 10.
- .7 Boiler Venting:
  - .1 Install combustion air-intake in accordance with local requirements;
  - .2 Install flue venting in accordance with Section 23 51 10.
  - .3 Connect to boiler connections, flue size and type as recommended by the manufacturer.
- .8 Ground equipment according to Electrical Division requirements.
- .9 Connect wiring according to Electrical Division 26 requirements.

#### **3.04 FIELD QUALITY CONTROL**

- .1 Perform tests and inspections and prepare test reports.
  - .1 After boiler installation is completed, the manufacturer shall provide the services of a field representative to inspect components, assemblies, and equipment installations, including connections and provide startup of the boiler and training to the operator.
  - .2 Arrange Authorities Having Jurisdiction for inspection of boilers and piping. Obtain certification for completed boiler units, deliver to Owner, and obtain receipt.
- .2 Tests and inspections:
  - .1 Perform installation and startup checks according to manufacturer's written instructions.
  - .2 Leak Test: Hydrostatic test. Repair leaks and retest until no leaks exist.
  - .3 Operational Test: Start units to confirm proper motor rotation and unit operation. Adjust air-fuel ratio and combustion.
  - .4 Check and adjust initial operating set points and high- and low-limit safety set points of fuel supply, water level and water temperature.
- .3 Remove and replace malfunctioning units and retest as specified above.

**END OF SECTION 23 52 16**

## **CONTENTS**

### **PART 1 - GENERAL**

- 1.01 GENERAL REQUIREMENTS**
- 1.02 WORK PERFORMED BY THIS SECTION**
- 1.03 REFERENCE STANDARDS**
- 1.04 QUALITY ASSURANCE**
- 1.05 SUBMITTALS**
- 1.06 DELIVERY, STORAGE, AND HANDLING**
- 1.07 SITE VISIT**

### **PART 2 - PRODUCTS**

- 2.01 GAS-FIRED RADIANT HEATERS**

### **PART 3 - EXECUTION**

- 3.01 INSTALLATION OF GAS-FIRED RADIANT HEATERS**
- 3.02 FIELD QUALITY CONTROL**
- 3.03 DEMONSTRATION**
- 3.04 PROTECTION**

## **PART 1 - GENERAL**

### **1.01 GENERAL REQUIREMENTS**

- .1 Comply with requirements of the Owner's General Requirements and all documents referred to therein.
- .2 Comply with requirements of Section 20 01 10 Mechanical General Requirements.
- .3 Comply with requirements of Section 20 01 50 Basic Materials and Methods.
- .4 Comply with the requirements of Section 25 10 10 BAS Control Network
  - .1 Comply with all requirements including those referenced in Article "BAS Integration with Third Party Devices"

### **1.02 WORK PERFORMED BY THIS SECTION**

- .1 Provision of Gas-fired Radiant Heaters and all required ancillaries.

### **1.03 REFERENCE STANDARDS**

- .1 Assemblies:
  - .1 Assemblies shall be CSA approved.
  - .2 Low intensity heaters to ANSI Z83.20 (latest revision) and CSA 2.34 (latest revision) for use in commercial and industrial applications.
  - .3 Approval shall include components of the complete heater, including burners, hangers, reflectors, reflector supports, thermostats and associated controls, and/or other accessories as noted in Contract Document plans and specifications.
- .2 Electrical:
  - .1 Heaters shall be electrically grounded in accordance with the Canadian Electric Code, CSA C22.1 (Canada), and shall comply with all local requirements.
- .3 General Installation and Gas Codes:
  - .1 Heaters shall be installed only for use with the type of gas appearing on the rating plate, and the installation shall conform to the Natural Gas and Propane Installation Code, CAN/CGA B 149.1 & B149.2 (Canada).
  - .2 Aircraft Hangar Installation: Installation in aircraft hangars shall conform to the Standard for Aircraft Hangars, CAN/CGA B149.1 & B149.2 (Canada).
  - .3 Public Garage Installation: Installation in public garages shall conform to the Standard for Parking Structures, NFPA-88A or Standard for Repair Garages, NFPA 88B, in the US and CAN/CGA B149.1 & B149.2 in Canada.
  - .4 Parking Structures: Technical requirements are outlined in the Standard for Parking Structures, ANSI/NFPA 88a, in the US and CAN/CGA B149.1 & B149.2 in Canada.
- .4 Gas Supply Lines:
  - .1 Gas supply pipe sizing shall be in accordance with the Natural Gas and Propane Installation Code, CAN/CGA B149.1 & B149.2 (Canada).
  - .2 A 1/8" (3 mm) NPT plugged tap shall be installed in the gas line connection immediately upstream of the burner farthest from the gas supply meter to allow checking of system gas pressure.
- .5 Venting:
  - .1 Refer to the Natural Gas and Propane Installation Code, CAN/CGA B149.1 and B149.2 (Canada) for proper location, sizing and installation of vents as well as information on termination clearance requirements when penetrating combustible walls for venting purposes.



- .6 Manufacturer Qualifications:
  - .1 Certified to ISO 9001 - Quality Management System (QMS).

#### **1.04 QUALITY ASSURANCE**

- .1 Heaters and installation of heaters shall be in accordance with requirements of following:
  - .1 All requirements of the Authorities Having Jurisdiction (AHJs)
  - .2 Gas-fired radiant heater Manufacturer's Installation Instructions.
  - .3 all applicable Codes and Standards.
- .2 Heater installation tradesmen are to be factory trained journeyman tradesmen licensed to install gas fired equipment.

#### **1.05 SUBMITTALS**

- .1 Submit shop drawings/product data sheets for radiant heaters, including accessories, control, and power and control wiring schematics.
- .2 Product Data:
  - .1 Rated capacities, operating characteristics, and accessories for each type of gas-fired radiant heater.
  - .2 Preparation instructions and recommendations.
  - .3 Storage and handling requirements and recommendations.
  - .4 Installation methods.
- .3 Shop Drawings:
  - .1 Submit complete shop drawings indicating system components, control diagrams and load calculations.
  - .2 Field quality-control test reports.
  - .3 Installation, Operation and Service Data: Provide copy of Installation, Operation & Service document.
- .4 Warranty:
  - .1 Provide a copy of manufacturer's warranty statement.

#### **1.06 DELIVERY, STORAGE, AND HANDLING**

- .1 Store products in manufacturer's unopened packaging until ready for installation.
- .2 Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer. Do not install products under environmental conditions outside manufacturer's recommended limits.

#### **1.07 SITE VISIT**

- .1 Visit the site prior to tender and verify all conditions. Prior to submitting price, the Mechanical Division contractor is to review all discrepancies and verify the locations of all existing services that are being extended and the routing of new services. Also report all ambiguities, discrepancies, departures from building by-laws and/or from good practice. Failure to do so will result in all additional costs being the responsibility of the Mechanical Division Contractor. Include for any alternate routing of new or rerouting of existing services to accommodate all site conditions in the tender price.

### **PART 2 - PRODUCTS**

#### **2.01 GAS-FIRED RADIANT HEATERS**

- .1 Provide Superior Radiant Products (SRP), T Series, or approved equal, low intensity two-stage Infrared gas-fired radiant tube heaters, in accordance with requirements indicated on the Equipment Schedules.

- .1 Radiant Tube Length shall be as called for on the Contract documents within the range of 10 feet (3048 mm) to 70 feet (21336 mm).
- .2 100% efficient reflector design with minimum 65% radiant factor as determined by independent lab testing to EN416-2 Standard. Baffles required as per manufacturer's instructions.
- .3 All burner operating components shall be enclosed in burner housing.
- .2 Gas-fired radiant tube heater shall be of a sealed blower design:
  - .1 Model TA: exposed blower design,
  - .2 Model TX: enclosed blower design, sealed control cabinet), or
  - .3 Model TXR: enclosed blower design, moisture sealed control cabinet for outdoor use.
- .3 Design and Performance:
  - .1 Reflector Design:
    - .1 Reflector shall be 10-sided reflector design reflecting virtually 100% of the infrared energy out and away from the emitter tubes.
    - .2 Reflector shall be "Deep Dish" design with emitter tubes fully recessed within reflector.
    - .3 Reflectors shall have a minimum 10 reflective surfaces.
    - .4 Reflector end caps shall be factory provided as standard and shall be fitted to the end of each reflector run to minimize convective heat loss.
    - .5 Reflectors shall provide a distribution pattern of 90 degrees inclusive beneath the heater.
    - .6 Directing of radiant pattern outside the standard distribution pattern shall be accomplished through use of side shields or bottom shields.
  - .2 Heat Uniformity:
    - .1 Burner shall distribute hot gases evenly to the entire heat exchanger.
  - .3 Serviceability:
    - .1 Burner controls shall be located outside of the air supply stream.
    - .2 Service and diagnostic control checks shall be possible with the blower fan running.
  - .4 Construction:
    - .1 Control Box:
      - .1 Heavy-duty powder coated galvanized steel.
      - .2 Box shall include gaskets to seal access doors, and compartment such that gas and electric controls shall be isolated from the combustion air stream.
    - .2 Emitter Tube:
      - .1 Shall be 4"(102 mm) diameter, minimum 16 gauge thickness and shall be one of, or a combination of, the following allowed materials as called for in the Equipment Schedules:
        - .1 Hot rolled steel tube
        - .2 Heat-treated Type 1 aluminized steel tube
        - .3 Type 409 Stainless steel tube.
        - .4 High temperature epoxy coated steel tube.
    - .3 Combustion Tube:
      - .1 4"(102 mm) diameter, 16 gauge, and shall be one of the following allowed materials as called for in the Equipment Schedules.

- .1 Heat-treated Type 1 aluminized steel tube
  - .2 Type 409 Stainless steel tube.
  - .3 High temperature epoxy coated steel tube.
- .2 Combustion tubing shall incorporate a welded, 11-gauge steel, 4 bolt flange to orient the burner to the tube as designed.
- .4 Couplings:
  - .1 Shall be 16-gauge aluminized steel, minimum 12 inches in length and be of heavy-duty design incorporating two 1-inch-wide draw bands.
- .5 Reflector:
  - .1 Deep dish, 100% efficient, with two reflector support brackets for each 10 feet (3048 mm) reflector section.
  - .2 Reflectors shall extend below the lowest position of the tubing at all times and include standard end caps.
  - .3 Reflector materials shall be one of the following materials as called for in the Equipment Schedules.
    - .1 Mill-finished aluminum, ASTM 1100, minimum .024-inch thickness aluminum sheet metal
    - .2 Type 430 Stainless steel, minimum .024-inch thickness
    - .3 Marine Grade aluminum, ASTM 5052, minimum .032 in thicknessAluminized steel shall not be allowed as reflector material.
- .6 Reflector Extension Shields:
  - .1 Reflector extensions shall be the same material as reflectors, arranged for fixed connection to lower reflector lip and incorporate rigid support to provide 100 percent cutoff of direct radiation from tubing at angles greater than 30 degrees from vertical.
- .7 Reflector end caps:
  - .1 Shall be fitted to the end of each reflector run to reduce convective heat loss and shall be standard equipment.
- .8 Hangers:
  - .1 Minimum 0.3125", stainless steel wire-formed hangers shall be included as standard.
  - .2 Hangers shall allow for tipping the reflector up to 45 degrees in either direction from horizontal centerline of the heat exchanger.
- .9 Burner:
  - .1 Shall be a positive pressure burner system, where exhaust gases and other products of combustion are not routed through the blower.
  - .2 The burner shall operate at a minimum gas inlet pressure of 5.0 inches W.C. (natural gas) or 11.5 inches W.C. (propane) and draw no more than 1 Amp at 120VAC, 60Hz.
  - .3 Burner head material shall be chrome plated steel.
- .10 Burner operation controls:
  - .1 Shall be factory assembled, piped, and wired.
  - .2 Gas and electric controls shall be isolated from the combustion air stream.
- .11 Burner Safety Controls:

- .1 Gas Control Valve: a proportional, regulated, redundant 24VAC electric gas valve, incorporating a pressure regulator and manual shutoff all in one body.
- .2 Access Panel Interlock: Burner shall be serviceable while system is running with no additional requirements for safety interlock.
- .3 Integral air pressure switches shall provide for air proving and shall monitor adequate inlet air and vent flow.
- .4 Indicator Lights: Burner on and run indicator lights shall be LED style and standard equipment.
- .12 Burner ignition system:
  - .1 Shall be 24 VAC direct spark (DSI) with gas ignition and flame proving taking place within the main burner head for reliability.
  - .2 DSI ignition control shall:
    - .1 Provide for 3 trials for ignition before lockout.
    - .2 Recycle again in one hour after lockout, with 3 subsequent trials for ignition.
    - .3 Provide a lighted diagnostic display capability.
    - .4 Provide openly accessible sense current measurement contacts within the burner housing for service purposes.
    - .5 Provide a standard blower post purge function when called for in the Contract documents.
    - .6 Accept 24V thermostat wiring
    - .7 Model TXR, the ignition control shall be epoxy potted to further seal against moisture and contamination.
- .13 Air blower motor shall be Permanent Split Capacitor (PSC) type, totally enclosed requiring no oiling and shall be equipped with a thermal overload switch.
  - .1 For heaters 40,000 to 175,000 BTUs the Electrical supply is 120V, 60Hz, 35W, 0.3A.
  - .2 For heaters 205,000 to 220,000 BTUs the Electrical supply is 120V, 60Hz, 50W, 0.45 A
- .14 Secure burner fastening:
  - .1 Hanger shall incorporate chrome plated fastening means to secure burner and prevent rotation about the centerline axis of the heat exchanger over time.
- .15 Combustion-Air Connection:
  - .1 Duct connection to the burner for combustion air to be drawn directly from outside or inside shall be provided as factory standard.
- .5 Heaters shall be factory designed and approved to operate on either Natural gas (NG) or Liquid propane gas (LPG) as called for in the Equipment Schedules.
  - .1 Heaters shall be field convertible between Natural gas (NG) and Liquid propane gas (LPG) via a factory supplied and CSA approved conversion kit.
  - .2 Heaters shall be field modified for operation at higher elevations via a factory supplied and CSA approved high altitude kit.
- .4 Acceptable Manufacturers:
  - .1 Superior Radiant Products (SRP),
  - .2 Consultant approved equal.

## **PART 3 - EXECUTION**

### **3.01 INSTALLATION OF GAS-FIRED RADIANT HEATERS**

- .1 Installation shall comply with manufacturer supplied Installation, Operation and Service Instructions, approved drawings, applicable local codes and/or gas utility requirements and any additional requirements of the Authorities Having Jurisdiction (AHJs).
- .2 Reference should be made to CAN 1- B149.1 and B149.2 Installation Codes and/or National Fuel Gas Code ANSI Z223.1 (NFPA 54).
- .3 Comply with manufacturer's installation recommendations including the following:
  - .1 Clearance to combustibles shall comply with those in the Installation, Operation and Service Instructions supplied by the manufacturer for the firing rate specified.
  - .2 Provide manufacturer approved flexible gas connectors.
  - .3 Wire heaters in accordance with the National Electrical Code ANSI/NFPA 70 and local ordinances and/or Canadian Electrical Code as applicable.
  - .4 Suspend heater units in accordance with manufacturer's instruction with chain and turnbuckles exceeding 540 lb. (245 kg) pull test.
  - .5 Install and connect gas-fired radiant heaters and associated fuel and vent features and systems according to either NFPA 54 or CAN/CSA B149.1 as applicable for local codes and regulations. Sidewall vents shall be as approved with the appliance by the manufacturer.
  - .6 Install products in accordance with manufacturer's written Installation, Operation and Service instructions.
  - .7 Hang suspended units from substrate using chain hanger kits and building attachments as required for safe installation and to meet all seismic requirements for specific building location.
  - .8 Connections: Provide all electrical connections required for complete installation including installation of electrical devices furnished with heaters but not specified to be factory mounted.
  - .9 Install piping to gas-fired radiant heaters to allow service and maintenance as required.
  - .10 Connect gas piping to gas train inlet; provide shut off and union with enough clearance for burner removal and service.
  - .11 Connect vent connections as required.
- .4 Minimum hanging heights shall be 10 feet to 29 feet (3048 to 8839 mm) as called for in the Documents and reviewed Submittals.

### **3.02 FIELD QUALITY CONTROL**

- .1 Manufacturer's Field Services:
  - .1 Engage a factory-authorized service representative to inspect, test and adjust components, assemblies, and equipment installations, including connections, and to assist in testing.
  - .2 Testing shall include the following:
    - .1 Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
    - .2 Verify proper motor rotation.
    - .3 Test Reports: Prepare a written report to record the following:
      - .1 Test procedures used.
      - .2 Test results that comply with requirements.
      - .3 Test results that do not comply with requirements and corrective action taken to achieve compliance with requirements.



- .4 Submit Verification Reports indicating acceptance of the gas-fired radiant tube heaters installation, operation, and Owner's training is complete.
- .2 Remove and replace malfunctioning units or components and retest until satisfactory results are obtained.

**3.03 DEMONSTRATION**

- .1 Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain gas-fired radiant heaters.

**3.04 PROTECTION**

- .1 Protect installed products until completion of project.
- .2 Touch-up, repair or replace damaged products before Substantial Completion.

**END OF SECTION 23 55 23**

## **CONTENTS**

### **PART 1 - GENERAL**

- 1.01 GENERAL REQUIREMENTS**
- 1.02 REFERENCES**
- 1.03 WORK PERFORMED BY THIS SECTION**
- 1.04 QUALITY ASSURANCE**

### **PART 2 - PRODUCTS**

- 2.01 GENERAL FILTER REQUIREMENTS**
- 2.02 PRE-FILTERS**
- 2.03 HIGH EFFICIENCY CARTRIDGE TYPE FINAL FILTERS**
- 2.04 AIR FILTER HOUSING**

### **PART 3 - EXECUTION**

- 3.01 GENERAL INSTALLATION REQUIREMENTS**
- 3.02 INSTALLATION OF FILTERS**
- 3.03 INSTALLATION OF AIR FILTER HOUSING**

## **PART 1 - GENERAL**

### **1.01 GENERAL REQUIREMENTS**

- .1 Comply with requirements of the Owner's General Requirements and all documents referred to therein.
- .2 Comply with requirements of Section 20 01 10 Mechanical General Requirements.
- .3 Comply with requirements of Section 20 01 50 Basic Materials and Methods.
- .4 Comply with the requirements of Section 25 10 10 BAS Control Network
  - .1 Comply with all requirements including those referenced in Article "BAS Integration with Third Party Devices"

## **PART 2 - GENERAL**

### **2.01 GENERAL REQUIREMENTS**

- .1 Comply with requirements of the Division 01 General Requirements and all documents referred to therein.
- .2 Comply with requirements of Section 20 01 10 Mechanical General Requirements.
- .3 Comply with requirements of Section 20 01 50 Basic Materials and Methods.

### **2.02 WORK INCLUDED**

- .1 Provide all parts of the Electric Heating systems and related components as indicated in the Specifications, Drawings and other referenced Contract Documents.

### **2.03 REFERENCE STANDARDS**

All electric heaters shall be CSA labeled, ULC listed and ETL approved

### **2.04 SITE EXAMINATION**

- .1 Visit the site prior to tender and verify all conditions. Prior to submitting price, the Mechanical Division Trade Contractor is to review all discrepancies and verify the locations of all existing services that are being extended, and the routing of new services.
- .2 Report all ambiguities, discrepancies, departures from building by-laws and/or from good practice. Failure to do so will result in all additional costs being the responsibility of the Mechanical Division Trade Contractor.
- .3 Include for any alternate routing of new or rerouting of existing services to accommodate all site conditions in the tender price.
- .4 Immediately after Contract award, ascertain the location of existing utility lines, verify all field service conditions and existing inverts. Submit report to Consultant.

### **2.05 SUBMITTALS**

- .1 Submit shop drawings for all products specified in this Section

### **2.06 RECORD DRAWINGS**

- .1 Installing Trades shall provide record drawings of the equipment installation, including maintenance and operating instructions.

## **PART 3 - PRODUCTS**

### **3.01 ELECTRIC BASEBOARD HEATERS**

- .1 Electric baseboard heater by Ouellet Canada Inc., or Consultant approved equal, CSA Certified, capacity and voltage as noted on the Drawings, 22-gauge steel casing construction capable of supporting 165 lb. (75 kg) centre point load, full-length wireway, cabinet designed for even heated air distribution, with epoxy-polyester powder coat white (standard).
- .2 Element: single tubular, stainless steel sheathed element with boxed aluminum fins, secured at unit centre, floating in nylon sleeves at each end to compensate for expansion and contraction.

- .3 Control: complete with low voltage relay kit (left junction box only) suitable for electronic wall mounted temperature sensor (by BAS Trades), or optional built-in thermostat installed in the left or right junction box.

### **3.02 ELECTRIC CABINET UNIT HEATERS**

- .1 Wall Mounted Cabinet Heater:
- .2 Wall Mounted Cabinet Heater by Ouellet Canada Inc., or Consultant approved equal, CSA Certified, capacity and voltage as noted on the Drawings, 20-gauge steel cabinet, 18-gauge punched steel grille, top air intake with bottom air discharge, epoxy-polyester powder coat standard white finish.
  - .1 Fan: single unit 1 x 160 CFM; double unit 2 x 160 CFM; triple unit 3 x 160 CFM; closed and permanently lubricated three-speed motor.
  - .2 Element: high-quality nichrome element, thermal protection with automatic reset.
  - .3 Control: three (3) speed control knobs (white, soft white and black) included for standard installation, without control knob for tamper-proof installation. External temperature sensor (by BAS Trades); provide transformer kit for multiple unit control from common temperature sensor. Where noted provide optional built-in thermostat.
  - .4 Installation: recessed wall mounted, or surface mounted with surface adapter.
- .3 Ceiling Mounted Cabinet Heater:
  - .1 Wall Mounted Cabinet Heater equal to Stelpro model CF, CSA Certified, capacity and voltage as noted on the Drawings, 20-gauge steel cabinet, 18-gauge punched steel grille, top air intake with bottom air discharge, epoxy-polyester powder coat standard white finish.
  - .2 Fan: single unit 1 x 160 CFM; double unit 2 x 160 CFM; closed and permanently lubricated three-speed motor.
  - .3 Element: high-quality nichrome element, thermal protection with automatic reset.
  - .4 Control: three (3) speed control knobs (white, soft white and black) included for standard installation, without control knob for tamper-proof installation. External temperature sensor (by BAS Trades); provide transformer kit for multiple unit control from common temperature sensor. Where noted provide optional built-in thermostat.
  - .5 Installation: recessed ceiling mounted, or surface mounted with surface adapter, or T-bar ceiling adaptor.

### **3.03 ELECTRIC CEILING VERTICAL DISCHARGE HEATERS**

- .1 Electric Ceiling Vertical Discharge Heaters by Ouellet Canada Inc., or Consultant approved equal, CSA Certified, with output capacity of 2 kW to 10 kW, and voltage as noted on the Drawings, manufactured from 20-gauge steel cabinet and 14-gauge steel grille, helicoidal fan, thermal protection with automatic reset, closed and permanently lubricated motor, epoxy-polyester powder coat standard white, or soft white finish. DRR model, or equal shall be ceiling recessed in a T-bar; DRI and DRII models, or equal, shall be ceiling surface mounted with bracket to support unit.
- .2 Element: nichrome heating element
- .3 Control: wall mounted electronic thermostat (by BAS Trades). Fan-only mode for continuous air circulation, controlled by built-in selection switch; fan-only mode available for use with wall-mounted switch. Heating mode, confirmed by pilot light when heating is ON. Connection of multiple units to the same thermostat is possible with a relay kit and an external transformer. 2 to 6 wires required for connections according to the selected control mode.

### **3.04 SUSPENDED ELECTRIC UNIT HEATERS**

- .1 Suspended Electric Unit Heaters shall be by Ouellet Canada Inc., or Consultant approved equal, and be CSA Certified, with capacities from 1500W to 5000W and voltage in accordance with the Drawings and/or Equipment Schedules.

- .1 Suspended Electric Unit Heaters shall be constructed with a 20-gauge steel cabinet and complete with a totally enclosed permanently lubricated motor, 350 CFM capacity helicoidal fan, adjustable directional louvers, nichrome heating element with thermal protection and automatic reset. Heater shall be epoxy-polyester powder coat finish with charcoal colour.
  - .2 Control: External temperature sensor (by BAS Trades); provide transformer kit for multiple unit control from common temperature sensor. Where noted provide optional built-in thermostat.
  - .3 Installation: wall hung or ceiling mounted with universal mounting bracket.
- .2 Large Capacity Suspended Electric Unit Heaters shall be equal to Stelpro model SHU and be CSA Certified, with capacities from 2kW to 60kW and voltage in accordance with the Drawings and/or Equipment Schedules.
- .1 Large Capacity Suspended Electric Unit Heaters shall be constructed with a 18-gauge steel cabinet and complete with a totally enclosed permanently lubricated motor, helicoidal fan, adjustable directional louvers, protective screen, nichrome heating element with thermal protection and automatic reset. Heater shall be epoxy-polyester powder coat finish with charcoal colour.
  - .2 Control: External temperature sensor (by BAS Trades); provide transformer kit for multiple unit control from common temperature sensor. Where noted provide optional built-in thermostat.
  - .3 Installation: wall hung or ceiling mounted with universal mounting bracket. Minimum distance from adjacent walls: 6" (153mm) for units 2 kW to 30 kW capacity; 12" (305mm) for units 40 kW to 60 kW capacity. Mounting heights: 2 to 8 ft. (610mm to 2440mm) for units 2 kW to 10 kW; 2 to 10 ft. 610mm to 3050mm) for units 15 kW to 30 kW units; 15 to 20 ft. (4575mm to 6100mm) for units 40 kW to 60 kW capacity.

### **3.05 ELECTRIC DUCT HEATERS**

- .1 Electric Duct Heaters by Ouellet Canada Inc., or Consultant approved equal, cUL Listed, capacity and voltage as noted on the Drawings, corrosion resistant galvanized steel cabinet (20 to 16 gauge), junction box door, double thermal protection (manual and automatic), optional neoprene gasket, Nema 4x control box, and optional stainless steel element housing.
- .2 Elements: open, nichrome elements; SCR modulation of the elements to maintain a constant supply air temperature.
- .3 Controls: External temperature sensor (by BAS Trades); provide transformer kit, electronic air velocity sensor; built-in high limit temperature limit sensor; heater interlock included.
  - .1 control voltage: 0-10 V, 2-10 V (4-20mA), 24Vac (PWM), or 24Vdc for 3 stage modulating control (0-40-70-100%); refer to sequence of operations.

### **3.06 ACCEPTABLE ELECTRIC HEATING MANUFACTURERS**

- .1 Acceptable manufacturers are:
  - .1 Ouellet Canada Inc.;
  - .2 Stelpro Design Inc.;
  - .3 Chromalox Inc.;
  - .4 Or equal as approved by the Consultant.

## **PART 4 - EXECUTION**

### **4.01 GENERAL REQUIREMENTS**

- .1 Install Electric Heating systems and components in accordance with the Building Code requirements, Manufacturer's requirements, and the requirements of the Authorities Having Jurisdiction (AHJs).

### **4.02 ELECTRIC BASEBOARD HEATERS**



- .1 Install electric baseboard heaters surface mounted with knockouts for the BX and cable clamps at each end, mounting holes spaced at 1" (25mm) intervals along the top and the bottom.

#### **4.03 ELECTRIC CABINET UNIT HEATERS**

- .1 Wall Mounted Cabinet Heaters shall be recessed wall mounted, or surface mounted with surface adapter.
- .2 Ceiling Mounted Cabinet Heaters shall be recessed ceiling mounted, or surface mounted with surface adapter, or T-bar ceiling adaptor.

#### **4.04 ELECTRIC CEILING VERTICAL DISCHARGE HEATERS**

- .1 Heaters shall be install at a minimum distance from adjacent or surrounding walls: 12" (DRR or DRI models); 24" (DRII models). Heaters shall be ceiling surface mounted or ceiling recessed, suspended at a minimum of 8'-0" from the floor for 2 kW or 3 kW units; 10'-0" from floor for 4 kW or 5 kW units; 12'-0" for 7.5 kW or 10 kW units.

#### **4.05 SUSPENDED ELECTRIC UNIT HEATERS**

- .1 Suspended Electric Unit Heaters shall be wall hung or ceiling mounted with universal mounting bracket.
- .2 Large Capacity Suspended Electric Unit Heaters shall be wall hung or ceiling mounted with universal mounting bracket.
  - .1 Minimum distance from adjacent walls: 6" (153mm) for units 2 kW to 30 kW capacity; 12" (305mm) for units 40 kW to 60 kW capacity.
  - .2 Mounting heights: 2 to 8 ft. (610mm to 2440mm) for units 2 kW to 10 kW; 2 to 10 ft. 610mm to 3050mm) for units 15 kW to 30 kW units; 15 to 20 ft. (4575mm to 6100mm) for units 40 kW to 60 kW capacity.

#### **4.06 ELECTRIC DUCT HEATERS**

- .1 Install duct heaters in the vertical, horizontal, upflow or downflow position, certified "zero" clearance from flammable materials, round duct minimum 4" (100mm) for SDHR model; rectangular duct minimum 6" x 6" (150mm x 150mm) for SDHI and SDHF models.
- .2 maintenance requirements shall be complied with to ensure safe and correct operation of the unit.

**END OF SECTION 23 58 10**

## **CONTENTS**

### **PART 1 - GENERAL**

- 1.01 GENERAL REQUIREMENTS**
- 1.02 DESCRIPTION**
- 1.03 WORK PERFORMED BY THIS SECTION**
- 1.04 QUALITY ASSURANCE**
- 1.05 REFERENCE STANDARDS**
- 1.06 ACOUSTICAL PERFORMANCE**
- 1.07 SITE VISIT**
- 1.08 SUMMITTALS**
- 1.09 QUALITY ASSURANCE**
- 1.10 DELIVERY, STORAGE AND HANDLING**
- 1.11 COORDINATION**
- 1.12 WARRANTY**

### **PART 2 - PRODUCTS**

- 2.01 ENERGY RECOVERY VENTILATION SYSTEMS**
- 2.02 AIR TO AIR RECOVERY SYSTEMS**

### **PART 3 - EXECUTION**

- 3.01 INSTALLATION**
- 3.02 HUMIDIFIERS**
- 3.03 START-UP SERVICE**

## **PART 1 - GENERAL**

### **1.01 GENERAL REQUIREMENTS**

- .1 Comply with requirements of the Owner's General Requirements and all documents referred to therein.

### **1.02 DESCRIPTION**

- .1 Comply with requirements of Section 20 01 10 Mechanical General Requirements.
- .2 Comply with requirements of Section 20 01 50 Basic Materials and Methods.
- .3 Comply with requirements of Section 20 05 70 Motors, Motor Starters, Motor Control Centres, Variable Frequency Drives and Wiring
- .4 Comply with the requirements of Section 25 10 10 BAS Control Network
  - .1 Comply with all requirements including those referenced in Article "BAS Integration with Third Party Devices"

### **1.03 WORK PERFORMED BY THIS SECTION**

- .1 Provision of Air to Air Recovery Systems

### **1.04 QUALITY ASSURANCE**

- .1 Qualifications: execute work of this section only by skilled tradesmen regularly employed in the construction and installation of Air to Air Recovery Systems.
- .2 Submittals: Submit shop drawings for the following Products:
  - .1 Air to Air Recovery Systems and all components and accessories

### **1.05 REFERENCE STANDARDS**

- .1 Provide fan ratings based on tests meeting ASHRAE and AMCA procedures and provide only fans carrying the AMCA seals. No fan will be accepted which has a point of rating not listed in the published data or which is not rated for air and sound performance.
- .2 Fans shall be factory balanced, statically and dynamically to AMCA Standards.
- .3 Factory finish coat over primer on all parts. Spray paint before assembly and repaint after reassembly.
- .4 Units shall be designed and constructed to meet the following standards:
  - .1 CSA Z317.2-15 Special Requirements for Heating, Ventilation, and Air-Conditioning (HVAC) Systems in Health Care Facilities. Note: Not all the requirements in this CSA Standard are summarized in this Section of Specification. Manufacturer shall make reference to and comply with this CSA standard.
  - .2 ASHRAE 51-07 – Laboratory Methods of Testing Fans for Certified Aerodynamic Performance Rating.
  - .3 ASHRAE 90.1 – 2010 Standard for Energy Efficient Design for New Buildings.
  - .4
  - .5 AMCA Standard 300-2006 Reverberant Room Method for Sound Testing of Fans.
  - .6 AMCA Standard 301-2006 Methods for Calculating Fan Sound Ratings from Laboratory Test Data.
  - .7 ARI Standard 575-94 Method of Measuring Machinery Sound Levels within Equipment Rooms.
  - .8 ARI Standard 350-2000 Sound Rating of Non-Ducted Indoor Air-Conditioning Equipment.
  - .9 ASHRAE Standard 68-97/ AMCA Standard 330-97 Method of Testing In-Duct Sound Power Measurement Procedure for Fans.
  - .10 ASHRAE 52.2

- .11 ANSI Standard 221.47
- .12 ARI 850-93 Section 7.4
- .13 CGA, ETLC, CSA or UL/ULC certified for prewired equipment
- .14 NRCA Standard for Roof Curbs
- .15 NFPA 90A for flame and smoke spread for adhesives
- .16 ***Entire unit shall be UL 1812 or UL 1995 certified and bear certification label by ETL, UL or CSA.***

#### 1.06 ACOUSTICAL PERFORMANCE

- .1 Acoustical performance shall be established by AMCA standard 330, ASHRAE Standard 68 or ARI 260P procedures.
- .2 Sound data shall be supplied that does not exceeds levels requirements indicated on schedules or fan performance data sheets; any sound data presented as 'sones' or 'Bels' is not acceptable.

#### 1.07 SITE VISIT

- .1 Visit the site prior to tender and verify all conditions. Prior to submitting price, the Mechanical Division contractor is to review all discrepancies and verify the locations of all existing services that are being extended and the routing of new services. Also report all ambiguities, discrepancies, departures from building by-laws and/or from good practice. Failure to do so will result in all additional costs being the responsibility of the Mechanical Division Contractor. Include for any alternate routing of new or rerouting of existing services to accommodate all site conditions in the tender price.

#### 1.08 SUMITTALS

- .1 Submit product Shop Drawings in accordance with requirements of Section 20 01 10 with the following information:
  - .1 General layout drawing with plan and elevation views including all relevant dimensions,
  - .2 Performance schedule including airflow, heating and cooling capacities, electrical data, unit weight.
  - .3 Energy recovery wheel performance characteristics including:
    - .1 sensible and latent energy recovery efficiency,
    - .2 frost point based on design conditions,
    - .3 speed range in RPM.
  - .4 Fan energy consumption:
    - .1 kW of supply and exhaust fans at design condition,
    - .2 watts per CFM calculation defined as:  
$$\frac{(\text{design condition supply fan watts} + \text{design condition exhaust fan watts})}{\text{supply fan airflow}}$$
  - .5 Full fan curve.
  - .6 Sound power data by octave band for all openings and radiated through cabinet.
  - .7 Electrical schematics including field wiring connections.
  - .8 Component details including construction method and materials.
  - .9 Control point schematic and complete written sequence of operation.
  - .10 Curb mounting details.

#### 1.09 QUALITY ASSURANCE

#### 1.10 DELIVERY, STORAGE AND HANDLING

- .1 ***Store equipment away from construction areas where it may be damaged and protected from harmful weather conditions.***
- .2 ***Keep factory shipping packaging in place until unit is ready to be installed.***
- .3 ***Follow manufacturer's instructions for rigging and placement of equipment.***

#### **1.11 COORDINATION**

- .1 ***Coordinate all system connections and building penetrations including electrical, gas and duct connections.***

#### **1.12 WARRANTY**

- .1 ***Standard Warranty for the Unit: 24 months (2 years) from shipment date.***

### **PART 2 - PRODUCTS**

#### **2.01 ENERGY RECOVERY VENTILATION SYSTEMS**

##### **.1 General**

- .1 ***Provide factory assembled and tested Oxgen8, Nova series, Energy Recovery Ventilation (ERV) air units, or Consultant approved equal with performance as indicated on the Equipment Schedules.***
- .2 ***Units shall include insulated steel cabinet with steel base, plate heat exchanger, electric heat, fan and motor assembly, and filter rack.***

##### **.2 Cabinet**

- .1 ***Cabinet shall be nominal 1" (25mm) double wall panel with R6.5 2.5lb/ft<sup>3</sup> polyurethane foam thermal insulation.***
- .2 ***Cabinet exterior shall be 22-gauge pre-painted steel that meets or exceeds 650-hour salt spray test based on ASTM B117.***
- .3 ***20-gauge interior panel liners and other steel components shall be galvanized steel.***
- .4 ***All seams shall be sealed to provide airtight casing.***
- .5 ***Doors shall be nominal 1" (25mm) double wall panel with the same construction as cabinet.***
  - .1 ***Doors shall be fitted with hinges and door handles.***
  - .2 ***The doors shall have one lockable handle as standard.***
- .6 ***The unit will be designed for service and maintenance on one side only.***
- .7 ***All dampers shall have extruded heavy gauge 6063 aluminum frame that includes jamb seals.***
  - .1 ***Damper blades shall be airfoil shaped extruded aluminum and include rubber blade seals.***
  - .2 ***Linkage shall be installed in the frame outside of the airstream.***
- .8 ***All dampers shall include factory mounted, wired and tested actuators.***
  - .1 ***Dampers shall be modulating or two position as required by the control sequences. Provide spring return dampers for outdoor air connections.***
- .9 ***Standing seam roof to provide weather protection for outdoor installation with exhaust air and outdoor air weather hoods***

##### **.3 Filters**

- .1 ***Unit shall include 2" (50mm) filter rack for the supply air and return air paths upstream of energy recovery exchanger.***
- .2 ***Filters shall be accessed through hinged filter access door.***



- .3 ***Supply one set of MERV 13 pleated filters for the Outdoor air stream and one set of MERV8 for the Return air stream.***
- .4 ***All filters must be UL approved.***
- .5 ***Provide factory mounted pressure sensors to measure filter pressure drop across pre-filter and main filter.***
- .6 ***Pressure drop shall be digitally feedback to the BAS for utilization in control and alarm sequencing.***
- .7 ***BAS shall monitor filter pressure level and report when filter changes are required.***
- .4 ***Fans***
  - .1 ***Fans shall be mixed flow plenum type with direct drive motor.***
  - .2 ***Fan and motor assembly shall be factory mounted and balanced.***
  - .3 ***The fans will be capable of operating in ambient temperatures of up to 40°C.***
  - .4 ***Fan motors shall be permanent magnet, synchronous motor type with integral digital motor controller.***
  - .5 ***Fan bearings shall be serviceable type with an L-10 life of 40,000 hours.***
  - .6 ***Fan motors shall be UL approved.***
  - .7 ***All fans shall be equipped with integral airflow monitoring system connected to the BAS.***
  - .8 ***Provide means to easily remove fan-motor assembly for service through standard doors.***
  - .9 ***Fans should be designed such that all service can be performed in the field, including replacement of bearings.***
  - .10 ***Fan motor drives shall have UL approved electric service connections in accordance with Equipment Schedules.***
  - .11 ***Fans will be protected by UL approved motor protection circuit breaker.***
- .5 ***Energy Recovery Device***
  - .1 ***Where indicated, units shall include plate type cross flow heat exchanger fabricated from polymer membrane.***
  - .2 ***Unit shall be capable of withstanding a maximum of 7.2 in.wg. Maximum leakage between airstreams shall be 0.5% of nominal airflow.***
  - .3 ***The energy recover efficiency must be a minimum of 50% Total to meet ASHRAE 90.1.***
  - .4 ***The energy recovery device must have an ISO Hygiene rating of 0.***
  - .5 ***Energy recovery device shall be AHRI 1060 certified***
- .6 ***Electric Heating Coil***
  - .1 ***Provide open coil electric heaters of the size, capacity and performance shown in the Equipment schedules.***
  - .2 ***All duct heaters shall be tested and certified to UL and CSA.***
  - .3 ***Frame to be corrosion-resistant and made of galvanized steel.***
  - .4 ***Coils shall be made of high-grade Nickel-Chrome alloy and shall be insulated from the frame by means of non-rotating ceramic bushings.***
  - .5 ***Heater shall come with door mounted disconnect switch and air proving switch.***
  - .6 ***SCR control is time proportioning type that modulates the heater and supplies the exact amount of power to match the demand; input signal shall be 0-10V.***

- .7 *Heaters shall be equipped with a fail-safe automatic reset disc-type thermal cut-out located in the top frame component above the heating element.*
- .8 *Duct heaters shall be non-sensitive to air flow direction and interchangeable for horizontal or vertical ducts without impairing safety.*
- .9 *Where an electric heating coil is coupled to the inlet of a unit for outdoor installation, provide a fine nylon mesh to face of the fresh air intake hood.*
- .7 **Controls**
  - .1 *Provide unit with 'no control' option.*
  - .2 *BAS Trades shall provide all required control components on site to achieve intended control sequence as noted on the Drawings.*
- .8 **Unit Electrical**
  - .1 *Provide unit mounted non-fused disconnect switch with single point power connection.*
- .9 **Plastic Components**
  - .1 *All plastic components that are in the airstream, must be of a UL94 rated material.*
  - .2 *If gasketing is used to join unit sections together, gasketing must be a UL94 approved compound.*
- .10 **Roof Curbs**
  - .1 *Roof Curb: 18 inches (457 mm) high, unvented, with 1-1/2 inch (38 mm) thick insulation.*
  - .2 *Curb Cap: One-piece, weather-tight construction, pre-punched mounting holes for correct attachment to roof curb. Fabricate aluminum and include flange to mate with fan unit inlet flange.*
  - .3 *Curbs shall to be fully gasketed between the curb top and unit bottom with the curb providing full perimeter support, cross structure support and air seal for the unit.*
  - .4 *Curb gasket shall be furnished within the control compartment of the rooftop unit to be mounted on the curb immediately before mounting of the Air-to-Air Recovery Unit.*
- .11 **Acceptable Manufacturers**
  - .1 *Oxygen8*
  - .2 *Trane*
  - .3 *Swegon*
  - .4 *Annexair*
  - .5 *Haakon*
  - .6 *Air Wise*
  - .7 *Scott Springfield*
  - .8 *Or Consultant approved equal.*

## **2.02 AIR TO AIR RECOVERY SYSTEMS**

- .1 **Casing**
  - .1 ~~*Cabinet shall be nominal 2" double wall panel with 3.0lb density glass fibre insulation. Insulation shall have a flame spread of rating not exceeding 25 and a smoke developed rating not exceeding 50. Cabinet exterior shall be 20 gauge pre-painted steel that meets or exceeds 650hour salt spray test based on ASTM B117. Liners and other steel components shall be galvalume AZ180 or equivalent. All seams shall be sealed to provide air tight casing.*~~

- ~~.2 — Doors shall be nominal 50mm double wall panel with the same construction as the cabinet. Doors shall be fitted with flush mounted lockable two stage handles. Panel deflection shall not exceed L/240 at 125% of design static pressure, minimum +/- 1.25 kPa. Deflection shall be measured at the midpoint of the panel height.~~
- ~~.3 — The unit will be designed for service and maintenance on one side only to allow for a compact installation.~~
- ~~.4 — Units shall be tested in accordance with EN 1886 or equivalent and meet the following criteria:
  - ~~.1 — Casing air leakage = A (Air tightness class L2); Under 1.6 in.wg air leakage rate shall be no more than 3 cfm/100 sq.ft and under 2.8 in.wg air leakage rate shall be no more than 10 cfm/sq.ft.~~
  - ~~.2 — Thermal transmittance = T3;~~
  - ~~.3 — Thermal bridging factor = TB3; The ratio between the lowest temperature difference between any point on the external surface and the mean air-to-air temperature difference. Unit shall meet 0.6 bridging~~
  - ~~.4 — Environmental Class C4.~~~~
- ~~.5 — Units shall be designed so they can be unbolted and broken down into sections for access to restricted locations.~~
- ~~.6 — Provide SS 304 drain pans with cross break and pitch to drain connection. Provide extended drain pans under cooling coil section to avoid drift carryover.~~
- ~~.7 — All dampers shall have extruded heavy gauge 6063 aluminium frame that includes jamb seals. Blades will be airfoil shaped extruded aluminium with rubber blade seals. Damper blades shall be insulated with expanded polyurethane foam providing R-2.29 and include a thermal break. Linkage shall be installed in the frame outside the airstream.~~
- ~~.2 — Fans
  - ~~.1 — Fans shall be axial-centrifugal type with EC direct drive motor suitable for variable speed operation. Fan and motor assembly shall be mounted on common base with 25mm (1") deflection Rubber in shear isolation. on common base with 25mm (1") deflection spring isolation. Fan shall be connected to fan bulkhead by a canvas type flex connector.~~
  - ~~.2 — Locate fan and motor internally on a steel base. Factory mount motor on a slide base that can be slid out of unit. Fan motors shall be permanent magnet, synchronous motor type with integral digital motor controller.~~
  - ~~.3 — Provide self-aligning, grease lubricated, ball or roller bearings with extended copper lubrication lines to access side of unit. Provide grease fittings attached to fan base assembly near access door.~~
  - ~~.4 — DOAS unit must not have unit sound power levels exceeding maximum Passive House Standards.~~~~
- ~~.3 — Bearings and Drives
  - ~~.1 — Fan motors shall be permanent magnet, synchronous motor type with integral digital motor controller. Fan bearings shall be serviceable type with an L-10 life of 40,000 hours.~~
  - ~~.2 — All fans shall be equipped with integral airflow monitoring system connected to the unit controller.~~~~
- ~~.4 — Coils
  - ~~.1 — Provide access to coils from connection side of unit for service and cleaning. Enclose coil headers and return bends fully within unit casing. Fabricate coil connections, vents and drains to extend beyond unit casing including grommets for~~~~

- ~~an airtight unit casing. Coils shall be removable through side panels and/or top panels of unit without removal and disassembly of entire section.~~
- ~~.2 Provide dual sloped 304 stainless steel drain pan located underneath and extending downstream of coil and intermediate drain pans.~~
- ~~.3 Coil performance shall be as scheduled. Coil performance data shall be certified in accordance with ARI Standard 410 where applicable.~~
- ~~.4 Construction:~~
- ~~.1 Tubes: Copper.~~
- ~~.2 Fins: Aluminum mechanically bonded to tubes.~~
- ~~.3 Headers: Seamless copper with vent and drain connections.~~
- ~~.4 Casing: 16-gauge, galvanized steel channels with 16-gauge center and end supports.~~
- ~~.5 Cooling/dehumidification and heating coils where water is the fluid shall be circuited drainable with a vent connection at the highest point and a drain connection at the lowest point. Coil headers shall be copper with steel male pipe connections.~~
- ~~.6 For water coils supply 2-way modulating control valves complete with valve actuators for field installation. Include wiring harness with quick connect wiring harness for both valve power source and control signals.~~
- ~~.7 Dehumidification coil section shall include passive wrap around heat pipe for passive reheat~~
- ~~.5 Humidifier Section~~
- ~~.1 Provide a 1200 (48") long blank section, complete with access door and drain base, suitable for field installation of an electronic humidifier as Specified in Section 23-84 13.~~
- ~~.6 Filters~~
- ~~.1 Provide filter box section with side loading MERV 8 pleated pre-filter section on exhaust side.~~
- ~~.2 Unit shall include side loaded cartridge filter rack suitable for 560mm (22"), ten (10) pocket MERV 13 bag filters on the fresh air side with MERV 8 pre-filters. Filters will be held in position by an expanding locking device.~~
- ~~.7 Energy Recovery Device~~
- ~~.1 Unit shall include AHRI 1060 certified rotary heat exchanger that transfers both sensible and latent energy. Wheel shall be constructed of corrugated aluminium coated with Zeolite. Desiccant material shall be 4A or smaller molecular sieve. Wheel supports shall be galvanized steel with a rigid steel hub. Cassette shall be heavy duty reinforced galvanized steel with a built in purge section. Bearings shall be permanently sealed type. Rotary heat exchanger shall include adjustable face and peripheral brush seals. Drive motor shall be variable speed type integrated into unit controller.~~
- ~~.2 Dry Bulb temperature recovery efficiency to be not lower than indicated on schedules.~~
- ~~.3 Humidity recovery efficiency to be not lower than indicated on schedules.~~
- ~~.4  $\geq 75\%$  heat recovery efficiency is required for Passive Compliance. Heat recovery efficiency must be confirmed either according to PHI or through Passive House calculation procedure including ERV performance derating.~~
- ~~.5 Rotary Heat Exchanger carry over must not exceed 0.45% and be certified to EN308: 1997.~~

- ~~.6 — Provide airflow monitor to measure outdoor airflow through enthalpy wheel. Monitor shall be integrated into unit controller. Airflow accuracy shall be minimum  $\pm 5\%$  of design airflow.~~
- ~~.7 — The heat recovery wheel must be equipped with dual drive belts for redundancy.~~
- ~~.8 — The energy recovery wheel must be Carbon Trusts ETL listed and eligible for ECA.~~
- ~~.8 — Cross Contamination (EATR) Control~~
  - ~~.1 — Units shall include and utilize the following means to maintain cross contamination (EATR) at less than 0.5% of the supply airflow through the use of brush seals, rotor purge sector, variable speed rotor control to vary the rotor speed with supply airflow modulation, and return air opening pressure balance plates to ensure the correct pressure balance within the unit to ensure purge airflow from the outside airstream to the exhaust airstream:~~
    - ~~.1 — Units shall include standard pressure balancing plates at return air opening. These plates are to be set at startup, based on the pressure differential between supply and return air, to ensure purge airflow moves from the supply airstream to the exhaust airstream. Pressure gradient across the rotor seal must be between 0 and 0.08" and deliver EATR less than 0.5% as certified by 3rd party verification.~~
    - ~~.2 — Unit controls shall include built-in Air Quality Control algorithms. This feature includes standard algorithms in the unit controller and an optional factory installed modulating damper on the return airstream. The unit controls shall constantly monitor the pressure differential between supply and return air and maintain the pressure differential between 0 and 0.08" over the entire operating airflow range.~~
- ~~.9 — Digital Controls~~
  - ~~.1 — Unit shall include an integrated microprocessor based unit controller. The controls shall be located in the integral controls cabinet. All controls shall operate off a transformer from the main power supply for single point power connection. All internal controls and sensors shall be factory prewired and tested. The microprocessor shall have dual Ethernet ports with an internal firewall to allow remote access via third party without compromising the clients internal Network.~~
  - ~~.2 — ERV units must utilize built-in controls and ERV wheel speed control algorithms that use wheel speed modulation to:~~
    - ~~.1 — Control supply air temperature~~
    - ~~.2 — Prevent wheel frost development — Wheel frost control shall be done by reading wheel pressure differential. With an increase in pressure drop due to frost accumulation the wheel speed will slow providing wheel defrost. Frost controls based upon exhaust air temperature shall not be allowed due to loss of energy savings~~
    - ~~.3 — Modulate wheel speed as supply airflow modulates to ensure maximum purge efficiency and absolute minimum airflow cross-contamination at less than 0.45% EATR at all airflow conditions.~~
  - ~~.3 — Provide airflow monitor to measure outdoor airflow through enthalpy wheel. Monitor shall be integrated into unit controller. Airflow accuracy shall be minimum  $\pm 5\%$  of design airflow.~~
  - ~~.4 — Provide temperature sensors at all four (4) cardinal point positions on the ERV wheel. Display outside air temperature and return air temperature on the unit handheld, touchscreen controls interface panel and provide all four (4) temperature readings via BACnet output to the BAS.~~
  - ~~.5 — Provide factory mounted pressure sensors to measure filter pressure drop across pre-filter and main filter. Pressure drop shall be digitally feedback to controller for~~



- ~~utilization in control and alarm sequencing. Unit controller shall monitor filter pressure level and report when filter changes are required.~~
- ~~.6 — Include each unit with a touch pad type human interface that allows monitoring and control of all unit functions. Human interface shall communicate with unit controller by hardwire connection. Human interface shall be unit mounted.~~
- ~~.7 — The control system will regulate temperatures, airflows and other functions as required. Unit controller shall be pre-programmed with factory test software for all possible functions. Controller shall utilize "plug and play" feature that will automatically load and operate any necessary algorithm based on components and accessories that are connected to the controller such as air flow monitors, damper actuators, fans, rotary energy recovery, water control valves, etc.~~
- ~~.8 — The controller shall provide the following;~~
- ~~.1 — Control of fans correcting for both changes in total static pressure and air density in both VAV and constant airflow applications.~~
- ~~.2 — Real time total unit power consumption (fans, ERV wheel motor and controls) as "watts/CFM" monitored through the BAS.~~
- ~~.3 — Fan performance monitoring.~~
- ~~.4 — Ventilation airflow monitoring and control.~~
- ~~.5 — Airflow density correction for winter and summer conditions.~~
- ~~.6 — Energy recovery optimization including operation of rotary energy recovery device.~~
- ~~.7 — Supplemental heating and cooling when included.~~
- ~~.8 — Integration to VRF condensing units when included.~~
- ~~.9 — Frost protection certified to meet the frost protection requirements of Passive House Institute~~
- ~~.10 — Recirculation module when included.~~
- ~~.11 — Monitoring alarms, faults and maintenance points including filter changeout.~~
- ~~.12 — Time and date schedules.~~
- ~~.13 — Building pressurization.~~
- ~~.14 — Humidity control.~~
- ~~.15 — Data logging and trending.~~
- ~~.9 — The microprocessor unit controller shall have the ability to control two (2) independent zones complete with heating and cooling coils, control valves and all sensors to accomplish the independent control sequence.~~
- ~~.10 — Include wireless capability via built-in WiFi connection that will allow the client to access remotely via Smart Phone, laptop, tablet, and similar without supplemental software.~~
- ~~.11 — Controller shall be BACnet certified and also include Modbus communication capability.~~
- ~~.12 — Controller shall be BTL certified for BACnet IP and also include Modbus, and Metasys communication. Communication shall include monitoring, control, alarms, faults and maintenance information.~~
- ~~.13 — Provide factory installed and tested contactors, overloads, fusing, motor speed controllers for supply, exhaust and rotary energy recovery device. Include all necessary control transformers.~~
- ~~.14 — Supply all necessary temperature and pressure sensors complete with plug in wiring harnesses for proper option of unit.~~

~~.10 — **Unit Electrical**~~

- ~~.1 — **Provide unit mounted non-fused disconnect switch with single point power connection for main ERV.**~~

**PART 3 - EXECUTION**

**3.01 INSTALLATION**

- .1 Installation of air-to-air recovery systems shall be in strict accordance with manufacturer's instructions and the requirements of the Authorities Having Jurisdiction (AHJs).
- .2 Install floor mounted **air-to-air recovery systems** on a flat surface leveled within 3mm. **Air-to-air recovery systems** shall be mounted on housekeeping pads. Height of pad to be sufficient to allow for proper draining of deep P-trap sized to account for pressure differential between air handling unit interior and drain termination.
- .3 **Install outdoor air-to-air recovery systems on a roof curb.**
- .4 Provide condensate traps in accordance with manufacturers recommendations.
- .5 Install **air-to-air recovery systems** to allow proper service to all components.
- .6 Provide drain valves and vent cocks to each coil.
- .7 Arrange units for floor mounting complete with vibration isolators
- .8 Provide flexible duct connections between the equipment and duct connections
- .9 The equipment including coils, fans, and similar components shall be cleaned thoroughly before performing testing and balancing procedures.
- .10 Return/Exhaust side of all HVAC equipment shall be isolated from the surrounding environment during construction activities.
- .11 Protect acoustic lining and insulation as well as pre-lined and insulated ductwork from moisture accumulation and damage. This applies both to stored material and installed systems.

**3.02 HUMIDIFIERS**

- .1 The humidifier grid shall be installed at the factory of the **air-to-air recovery system manufacturer**. Installation instruction shall be provided to **air-to-air recovery system** manufacturer for reference.
- .2 Humidifier factory representative shall review shop drawing and installation to ensure absorption distance is maintained and humidifiers are installed in accordance with the manufacturer's instructions.
- .3 Provide a factory-trained service technician without additional charge to start and commission the humidifiers. In addition, factory shall allow for job site review of each **air-to-air recovery system** to carry out start-up, commissioning and instruct Owner's representatives; dates will be determined by owner's representative.

**3.03 START-UP SERVICE**

- .1 Provide a factory-trained service technician to start and commission the units. In addition, factory shall allow for each unit to carry out start-up, commissioning and instruct Owner's representatives; dates will be determined by Owner's representative. These shall be in addition to the field pressure testing of the **air-to-air recovery systems**.
- .2 Manufacturer shall allow for additional site visits to ensure compliance of the installation; these are in addition to those specified for start-up, testing and commissioning noted above. Dates will be assigned by Owner's representative.
- .3 Provide a start-up log by the manufacturer to document the unit start-up.

**END OF SECTION 23 72 10**

## **CONTENTS**

### **PART 1 - GENERAL**

- 1.01 GENERAL REQUIREMENTS**
- 1.02 DESCRIPTION**
- 1.03 REFERENCES**
- 1.04 SUBMITTALS**
- 1.05 SUPERVISION**
- 1.06 WARRANTY**

### **PART 2 - PRODUCTS**

- 2.01 RADIANT FLOOR HEATING SYSTEM**
- 2.02 GLYCOL SNOW MELTING SYSTEM**

### **PART 3 - EXECUTION**

- 3.01 RADIANT FLOOR SYSTEM INSTALLATION**
- 3.02 GLYCOL SNOW MELTING SYSTEM INSTALLATION**

## **PART 1 - GENERAL**

### **1.01 GENERAL REQUIREMENTS**

- .1 ***Comply with requirements of Division 01 General Requirements and all documents referred to therein.***
- .2 ***Comply with requirements of Section 20 01 10 Mechanical General Requirements.***
- .3 ***Comply with requirements of Section 20 01 50 Basic Materials and Methods.***
- .4 ***Comply with the requirements of Section 25 10 10 BAS Control Network***
  - .1 ***Comply with all requirements including those referenced in Article "BAS Integration with Third Party Devices"***

### **1.02 DESCRIPTION**

- .1 ***Provide a Snow and Ice Melting (SIM) system equal to KLIMATROL Environmental Systems Ltd. as specified herein.***
- .2 ***Systems shall be complete with REHAU piping, distribution manifold(s), pipe to manifold fittings, manufacturer-approved Everloc pipe repair couplings (if required) and non-metallic pipe fasteners. Include installation specialties, site supervision and field engineering as required for complete and proper function of the system.***
- .3 ***Additional components shall consist of boiler, boiler pump, duty/standby system pumps, pump sequencer, expansion tank, glycol assembly, glycol, air purge, air vents, manifolds, 3/4" RaupeX, modulating mixing valve, actuator, BACnet Controller and 2 x slab sensors.***

### **1.03 REGULATORY REQUIREMENTS**

- .1 ***Cross-linked polyethylene (PEXa) pipe shall be manufactured by the high-pressure peroxide (Engel) method with a minimum degree of cross-linking of 80%, and conform to ASTM F876, F877 and CSA B137.5.***
- .2 ***Fittings shall conform to ASTM F877, F2080 and CSA B137.5. Pipe oxygen diffusion barrier shall conform to DIN 4726.***
  - .1 ***ASTM F 876: Standard Specification for Cross-linked Polyethylene (PEX) Pipe***
  - .2 ***ASTM F 877: Cross-linked Polyethylene (PEX) Plastic Hot- and Cold-Water Distribution Systems***
  - .3 ***ASTM F 2080: Standard Specification for Cold-Expansion Fittings with Metal Compression-Sleeves for use with Cross-linked Polyethylene (PEX) Pipe***
  - .4 ***CSA B 137.5: Cross-linked Polyethylene (PEX) Tubing Systems for Pressure Applications***
  - .5 ***DIN 4726: German Standard for Plastic Piping Used in Warm Water Floor Heating Systems***

### **1.04 SUBMITTALS**

- .1 ***ASHRAE HVAC Applications Chapter 51 Snow Melt Design Guide shall be used as the design basis as follows:***
  - .1 ***Snow Free Area Ratio of 1.0 and Frequency Distribution 98.5% to determine surface snow melt Heat Fluxes for Toronto, Ontario, Canada.***
- .2 ***Provide submittals with computer-generated snow melt system design indicating pipe sizing and panel performance at pipe spacing and water temperatures selected and in accordance with the General Requirements and as specified herein.***
- .3 ***Shop drawings shall indicate schematic layout of system, including equipment, critical dimensions and piping/slab penetration details.***
- .4 ***Submit manufacturer's technical installation instructions.***

- .5 ***Submit independent certification results for the piping systems from a recognized testing laboratory.***
- .6 ***Submit catalog data on all equipment, fittings, fasteners and associated items necessary for the installation of the piping and manifolds.***

#### **1.05 DELIVERY, STORAGE AND HANDLING**

- .1 ***Deliver and store piping and equipment in shipping containers with labeling in place. Pipe to be kept in original shipping boxes until required for installation. Do not expose pipe to ultraviolet (sun) light for more than 30 days.***
- .2 ***Protect piping and manifolds from entry of contaminating materials by installing suitable plugs in all open pipe ends until installation. Where possible, connect pipes to assembled manifolds to eliminate possibility of contaminants.***
- .3 ***Pipe shall be protected from oil, grease, paint, direct sunlight and other elements as recommended by manufacturer.***

#### **1.06 WARRANTY**

- .1 ***The Snow and Ice Melt pipe manufacturer shall warrant the cross-linked polyethylene piping to be free from defects in material and workmanship for a period of twenty-five (25) years. Everloc couplings, if used, shall be warranted for 5 years from any defects. The design shall be approved either by submittal or stamped by a registered engineer as being complete and accurate.***
- .2 ***All manifolds and controls shall be warranted for 18 months and/or two seasons of operation.***

### **PART 2 - PRODUCTS**

#### **2.01 RADIANT FLOOR HEATING SYSTEM**

- .1 Tubing:
  - .1 Tubing embedded in concrete shall be high density cross linked polyethylene tubing in accordance with ASTM F877 as certified by NSF or CSA. All tubing shall be fully cross linked to the specified standard prior to shipment from the manufacturing facility.
  - .2 All piping shall be rated at 180°F maximum working temperature and up to 100 psi working pressure in accordance with ASTM standard F876 and F877. Tubing shall have 100% thermal memory when heated to 130°C (266°F).
  - .3 The minimum bend radius for cold bending of the tubing shall not be less than five (5) times the outside diameter. Bends with a radius less than stated will require the use of a bend support by the tubing manufacturer.
  - .4 Tubing shall be provided with an oxygen diffusion barrier. Oxygen diffusion barrier shall be capable of limiting oxygen diffusion through the tube to no greater than 0.10/g/cu.m/day at 104°F water temperature.
  - .5 Steel, copper, polybutylene, polypropylene, nitrile, polyester, rayon, neoprene and rubber piping are not acceptable.
- .2 Fittings and Manifolds:
  - .1 Tubing fittings shall be manufactured of dezincification resistant brass. These fittings must be supplied by the tube manufacturer. The tube fitting consists of a barbed insert, a serrated compression ring and a nut and be capable of connecting to the manifold or tube splice.
  - .2 Manifolds shall be of cast bronze construction and shall have integral loop balancing and loop control valves. Supply and return manifolds shall be able to vent air from the system and shall be provided with support (mounting) brackets. Manifolds shall be isolated from supply and return piping with valves that are suitable for isolation and balancing.
- .3 Controls:



- .1 The system shall be controlled by the Building Automation System (BAS). Refer to the Controls specification and operating sequences.
- .4 Radiant Floor Heating Capacity:
  - .1 The in-floor radiant heating system shall be provided in the locations shown on the drawings. The in-floor radiant heating system shall provide the heat densities noted on the drawing/ equipment schedules but should not be lower than 32 BTUH/sq.ft (101 W/sq.m) throughout the area where it is installed and shall heat the slab to a temperature no higher than 90°F (32.2°C).
- .5 Pre-Assembled Mixing Control Panels:
  - .1 For each area of snow melting/radiant floor heating, provide a pre-assembled mixing control panel.
  - .2 Each panel shall consist of a compact, pre-piped mechanical system with connections to the supply and the return manifolds, in-line circulating pump in accordance with Section 23 21 23, check valves, isolation valves, supply and return temperature gauges, pressure bypass valve and a 24V activated 3-way modulating mixing valve with discharge temperature controls.
  - .3 The pre-assembled mixing control panel shall be in a compact insulated foam box ready for field mounting with supplied brackets.
  - .4 The mixing control panel shall include integral temperature control to control the local supply fluid temperature through BAS control.
  - .5 Provide all required transformers and relays required by BAS to control pumps and control valves.
  - .6 Each panel location shall come complete with slab temperature sensor.
  - .7 Sensors shall be installed in appropriate locations within the zone to allow proper of monitoring of slab conditions.
  - .8 Sensor shall be installed such that they can be replaced through non-destructive means if a sensor failure should occur.
  - .9 Sensor termination points shall be within pre-assembled mixing control panels.
- .6 Acceptable Manufacturers:
  - .1 Uponor,
  - .2 Rehau,
  - .3 Or approved equal.

## 2.02 GLYCOL SNOW AND ICE MELTING SYSTEM

- .1 **Piping**
  - .1 **Material:** All snow and ice melt system piping shall be high density cross-linked polyethylene manufactured by REHAU, or Consultant approved equal, using the peroxide method of cross-linking (PEXa) and with an approved cell classification in accordance with ASTM D3350. Pipe shall conform with ASTM F876 and CSA B137.5 and be certified by CSA or equivalent testing organization.
  - .2 **Temperature and Pressure Ratings:** Piping shall be rated for 100 PSIG gauge pressure at 180°F temperature (690 kPa @ 82°C) continuous, and 80 PSIG gauge pressure at 200°F temperature (550 kPa @ 93°C) continuous.
  - .3 **Oxygen Diffusion Barrier:** Piping shall have a co-extruded oxygen diffusion barrier capable of limiting oxygen diffusion through the pipe to less than 0.10 mg/l/day at 104°F (40°C) water temperature, in accordance with DIN 4726. Oxygen Diffusion Barrier not required when ferrous (iron or steel) components do not share the same system fluid as the cross-linked polyethylene pipe, such as when separated by a heat exchange device.

- .4 **Bend Radius:** *The minimum bend radius for cold bending of the pipe shall be not less than five (5) times the outside diameter. Bends with a radius less than this shall require the use of a bending template as supplied by the pipe manufacturer, and/or hot air.*
- .2 **Fittings**
  - .1 *Fittings shall be manufactured of dezincification-resistant brass and shall be supplied by the piping manufacturer as part of a proven cataloged system. Manifold fittings to be compression nut style with split compression ring.*
  - .2 *Fittings shall be certified to ASTM F 877, F 2080 and CSA B 137.5 as part of the manufacturer's PEX piping system. Pipe couplings embedded within the thermal mass shall be EVERLOC® cold-expansion compression-sleeve fittings.*
- .3 **Manifolds**
  - .1 *Material: Industrial sized distribution manifolds shall be manufactured and be supplied by the piping manufacturer as a proven cataloged part of the manufacturer's system.*
  - .2 *For systems up to 10 circuits shall use 1-¼" stainless steel or machined brass manifolds or for larger flow systems 1-½" or 2" Type L Copper. Manifolds shall have pressure gauges, temperature gauges, fill and drain service valves and individual circuits shall be complete with isolation valves.*
- .4 **Control Panel:**
  - .1 *Control Panel shall be pre-built pump / mixing panel shall BACnet compatible and consist of 0-10Vdc mixing valve and slow opening 24V Zone control valves, space for SIM controller including temperature mixing and slab safety features.*
  - .2 *Pre-piped Pumps shall be silent and energy efficient as manufactured by Grundfos and sized specifically for area being melted.*
  - .3 *Heat exchanger shall be pre-built into KLIMAPANEL as required for glycol anti-freeze applications or separation from building hydraulic pressures in excess of 100 psig. Heat exchanger shall be rated and warranted for 450 psi. Panels with heat exchanger shall include expansion tank and glycol auto fill system.*
  - .4 *Control Panel shall be supplied pressure tested and factory setup, tested and programmed.*
- .5 **Snow Ice Melt (SIM) BACnet Controls:**
  - .1 *SIM Control Panel: Microprocessor control in NEMA Type 1 enclosure, 120V/60Hz/1Ph power connection, programmable function heating source activation, signal, floating mixing, analog mixing, primary / secondary pumping, tandem snow/ice detection, warm weather shutdown, exercising, slab protection, idling, energy monitoring, 10A ½ Hp primary pump and system pump relays, 5 A 1/3 hp heating source pump relay. Complete with power "ON" LED, manual reset of glycol solution high temperature limit, manual system activation pushbutton with LED, schematic wiring diagram, and all hardware required for control and connection of the system into the Building automation System via BACnet MSTP, IP compatible.*
  - .2 *Automatic silicon brass snow/ice sensor, rated for 15,000 lb. distributed load, 5 conductor electronic sensor with 65' lead to be sleeved back to control, maximum extension 435' using 18 AWG wire and 5-gang PVC junction box, activation through precipitation sensor or integral slab temperature sensor, sensor with integral low voltage trickle charge for freeze protection.*
  - .3 *Snow ice sensor shall be installed no less than 10' from building envelope for exposure to precipitation and to mitigate heat migration from foundation walls.*
  - .4 *The SIM snow/ice melting control and snow detector shall be programmable for:*
    - .1 *Melting at set point (34 to 44°F) when precipitation is detected.*

- .2 ***Idling set point (adjustable Off - 70°F) for each zone when snow or ice is not detected.***
- .3 ***Shutting down the system on outdoor ambient temperature rise above set point (34 to 44°F).***
- .4 ***Shutting down system when outdoor temperature drops below set point (-5 to +10°F).***
- .5 ***Modulating the temperature input into slab to maintain a maximum differential setting (25 to 50°F).***
- .6 ***24V output for mixing control valve and "heat demand"***
- .7 ***Remote override enable/disable switch***
- .5 ***There shall be one for the all manifolds.***
- .6 ***SIM controls shall be provided installed within the pre-built Control Panel.***
- .7 ***Manufacturer shall provide commissioning assistance for the SIM control snow melting system.***
- .6 ***Accessories:***
  - .1 ***Utilize manufacturer's system installation accessories including: nylon cable binders, pipe sleeves, protective sleeving, pipe cutters, pipe uncoilers and other installation tools and aids and pipe ties.***
- .7 ***Performance:***
  - .1 ***Snow and Ice Melting System capacity shall be in accordance with Equipment Schedule indicated on the Drawings.***
- .8 ***Acceptable Manufacturers:***
  - .1 ***Klimatrol - Rehau***
  - .2 ***Uponor,***
  - .3 ***Or Consultant approved equal.***

### **PART 3 - EXECUTION**

#### **3.01 RADIANT FLOOR SYSTEM INSTALLATION**

- .1 Tubing shall be embedded in concrete and shall be secured to a welded wire fabric or approved alternate fabric with wire ties provided by the pipe manufacturer.
- .2 Spacing of wire ties shall be a maximum of 900mm for straight lengths of tubing and a minimum of three (3) ties per 180° turn.
- .3 Contractor to supply field coordination and supervision of the water pressure testing of the field tubing.
- .4 Provide compressed air, inert gas or 80 psi water source for pressure testing.
- .5 Manufacturer's Representative shall be on site during all concrete pours. The system shall be pressure tested at 80psi for minimum of six (6) hours prior to and during the concrete application.
- .6 Test equipment to be supplied by and installed by the contractor. Pressure test using compressed air or inert gas is not acceptable.
- .7 Repair kits shall be on-site during the pour to allow for immediate repair of leaks should they occur during the concrete application period
- .8 In the event of freezing weather, the contractor shall install a glycol solution to the prescribed percentage to prevent any possibility of freezing the tubing system.
- .9 The system shall be thoroughly checked for possible tubing punctures by the authorized supervisor and shall be repaired by the contractor prior to and during the concrete application.
- .10 At all expansion joint penetrations provide sleeves for tubing.

- .11 Where tubing is light/UV sensitive, do not expose tubing to ultraviolet light for extended periods of time either in storage or during construction. Tubing exposure shall be under total exposure period stipulated by the manufacturer.
- .12 Tubing shall be installed by an installer that has been trained by the radiant heating supplier.
- .13 Provide start-up assistance to balance flow in the circuits and confirm proper control sequence. Submit start-up report to the Engineer.
- .14 Coordinate the timing of related activities.
- .15 The sequence should be: installation of rebar/wire mesh, field looping, tying tubes to rebar/wire mesh and pour of concrete.

### 3.02 GLYCOL SNOW MELTING SYSTEM INSTALLATION

#### .1 **Preparation**

- .1 ***Minimum 25mm Hi-40 compressive strength Styrofoam shall be installed under the SIM system to prevent downward heat loss and to increase SIM system response time.***

#### .2 **Concrete Slab**

- .1 ***Reinforcing wire mesh or rebar, if required by structural design, must be flat and level, with all sharp ends pointing down. Finished grade of the thermal mass must be a minimum of 3/4" (19 mm) above the top of PEX heating pipes and not more than 65mm above the top of PEX heating pipes.***
- .2 ***On Structural Concrete: Concrete surface must be clean and free from all construction debris that could potentially damage the pipe. Insulation, if used, to be installed above existing surface. Finished grade of the thermal mass overpour must be a minimum of 3/4" (19 mm) above the top of PEX heating pipes.***
- .3 ***Stairs: install tubing parallel to step tread at 3 – 5" spacing, 3 loop runs per tread. Install supply side of the loop within 76mm (3") of the steps edge. Install at a consistent depth below the surface elevation.***
- .4 ***Preparation of Space for Manifold Installation: Review drawings and/or design to determine proper locations for manifolds. Manifolds should be installed in a secure location. Manifold must be installed in an area that will allow easy access for supply/return piping as well as future access for maintenance. Ceiling penetrations shall be carefully waterproofed.***

#### .3 **Installation**

- .1 ***Install in accordance with the Manufacturer's published installation manual and/or published guidelines.***
- .2 ***Mount manifolds in the locations previously prepared. Manifolds should be mounted as level as possible.***
- .3 ***Route piping in an orderly manner, according to layout and spacing shown in approved submittal drawings. All notes on drawings shall be followed.***
- .4 ***At connections and fittings, use a plastic pipe cutter to ensure square and clean cuts, and join pipes immediately or cap ends of pipe to seal from contaminants. Where fittings are installed within the thermal mass, they shall be wrapped in chloride-free tape or sealed within a heat-shrink Material approved by the manufacturer.***
- .5 ***Pipe should be dispensed using a suitable uncoiling device. Remove all twists prior to securing pipe. Pipe must lie flat on an even plane. Finished grade of a thermal mass must be a minimum of 3/4" (19 mm) above the top of PEX heating pipes. Fasten piping at no more than 3 feet (915mm) intervals, being careful not to twist the pipe. In thin concrete slabs, it may be necessary to secure piping every 2 feet (610mm). Use only fasteners supplied or approved by the manufacturer of the PEX pipe.***

- .6 ***Piping that must pass through expansion joints shall be covered in protective polyethylene convoluted sleeving (flexible conduit) extending 8 inches (20 cm) on each side of the joint. Sleeving must be secured on pipe to prevent movement during installation of thermal mass.***
- .7 ***Where piping exits the thermal mass, a protective conduit shall be placed around the pipe, with the conduit extending a minimum of 6 inches (15 cm) into the floor and exiting by a minimum of 6 inches. For penetrations at manifolds, use rigid PVC bend guides secured in place to prevent movement.***
- .8 ***At the time of installation of each circuit of pipe, connect the pipe to the correct manifold outlet and record pipe length for balancing. If manifold is not installed, cap the end of the pipe and label the pipe's circuit numbers along with S for supply and R for return. Connect pipes to manifold as soon as possible and record circuit lengths. All circuits shall be labeled to indicate circuit length and serviced area.***
- .9 ***The SIM system should not be put into operation until poured concrete thermal mass has cured a minimum of 28 days, unless otherwise specified and approved by thermal mass supplier. If it is necessary to operate the SIM system to prevent freezing, a maximum flow temperature of 72°F (22°C) must not be exceeded while the thermal mass is curing. After curing, gradually increase the flow temperature by no more than 10°F (6°C) each day until system reaches the required operating temperature.***
- .10 ***General Contractor shall be responsible for provision of***
  - .1 ***Wire mesh or rebar to secure tubing***
  - .2 ***any insulations (Hi-40 or Hi-60) and installation thereof***
  - .3 ***subgrade engineered fill, structural slabs or civil work***
- .11 ***Mechanical Contractor shall be responsible for provision of:***
  - .1 ***Labour to install Snow Melting system***
  - .2 ***Water Glycol 40-50% blend and any chemical solutions.***
  - .3 ***Field coordination of the pressure test equipment. (It is recommended to use the REHAU hydraulic pressure test unit available through Manufacturer to conduct pressure tests.)***
  - .4 ***Supervision of concrete pours to instruct concrete installers on maintenance of pipe integrity and position of pipe in slab during concrete installation***
  - .5 ***Installation of snow sensors, control valves, pumps, supply and return piping, all valves and fittings***
  - .6 ***BACnet and Internet controls and connections and coordination with controls contractor***
  - .7 ***Manufacturer Coordination for installation inspection and to provide Letters of Inspection reports***
  - .8 ***Manufacturer Coordination for installation of mechanical room piping and control sensor point locations***
  - .9 ***Fill system in a systematic way (one loop at a time, then mains) to ensure all air is purged from system.***
  - .10 ***Manufacturer coordination for system Nautilus "WEATHERNET" SIM system commissioning and start up***
- .4 ***Field Quality Control***
  - .1 ***Filling, Testing & Balancing: Tests of hydronic heating systems shall comply with local codes, and, where required, shall be witnessed by the building official.***



***(Reference BOCA, ICBO, SBCCI or other requirements of the Authorities Having Jurisdiction).***

- .1 Pressure gauges used must show pressure increments of 1 PSIG and should be located at or near the lowest points in the distribution system.***
- .2 Air Test: Charge the completed, yet unconcealed pipes with air. Do not exceed 150 PSIG. Use liquid gas detector or soap solution to check for leakage at manifold connections.***
  - .1 Perform a preliminary pressure test pressurizing the system to the greater of 1.5 times the maximum operating pressure or 100 psi for 30 minutes. As the piping expands, restore pressure, first at 10 minutes into the test and again at 20 minutes. At the end of the 30-minute preliminary test, pressure must not fall by more than 5 PSIG from the maximum, and there shall be no leakage.***
  - .2 After performing the preliminary test, perform the main pressure test immediately. The main pressure test shall last 2 hours. The test pressure should be restored and must not fall more than 3 PSIG after 2 hours. No leakage should be detected.***
  - .3 Pressure shall be maintained and monitored during installation of the thermal mass. If any leak is detected during installation of thermal mass, the leak must be found immediately and the area cleared for repair using manufacturer approved repair coupling. Retest before covering repair. Maintain pressure test for entirety of building construction.***

**END OF SECTION 23 83 15**

## **CONTENTS**

### **PART 1 - GENERAL**

- 1.01 GENERAL REQUIREMENTS**
- 1.02 WORK PERFORMED BY THIS SECTION**
- 1.03 QUALITY ASSURANCE**
- 1.04 REFERENCE STANDARDS**
- 1.05 SITE VISIT**

### **PART 2 - PRODUCTS**

- 2.01 ELECTRIC STEAM HUMIDIFICATION SYSTEM**

### **PART 3 - EXECUTION**

- 3.01 GENERAL**
- 3.02 INSTALLATION**
- 3.03 FIELD QUALITY CONTROL**

## **PART 1 - GENERAL**

### **1.01 GENERAL REQUIREMENTS**

- .1 ***Comply with requirements of Division 01 General Requirements and all documents referred to therein.***
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  - .1 ***Comply with all requirements including those referenced in Article "BAS Integration with Third Party Devices"***

### **1.02 WORK PERFORMED BY THIS SECTION**

- .1 Provision of Humidifiers.

### **1.03 QUALITY ASSURANCE**

- .1 Qualifications: execute work of this section only by skilled tradesmen regularly employed in the construction and installation of Humidifiers.
- .2 Submittals: Submit shop drawings for the following Products:
  - .1 Humidifiers, as specified below, including all components and accessories

### **1.04 REFERENCE STANDARDS**

- .1 Humidifiers shall be designed and constructed to meet the following standards:
  - .1 ISO 9001-2000.
  - .2 CSA Z317.2 (2015) - Special Requirements for Heating, Ventilation, and Air-Conditioning (HVAC) Systems in Health Care Facilities.
  - .3 ANSI/AHRI 640 (2005) – Performance Rating of Commercial and Industrial Humidifiers
  - .4 ASHRAE 90.1 (2010) - Standard for Energy Efficient Design for New Buildings.
  - .5 CGA, ETLC, CSA or UL/ULC certified for prewired equipment
  - .6 ANSI/NFPA 70 - National Electrical Code.

### **1.05 SITE VISIT**

- .1 Visit the site prior to tender and verify all conditions. Prior to submitting price, the Mechanical Division contractor is to review all discrepancies and verify the locations of all existing services that are being extended and the routing of new services. Also report all ambiguities, discrepancies, departures from building by-laws and/or from good practice. Failure to do so will result in all additional costs being the responsibility of the Mechanical Division Contractor. Include for any alternate routing of new or rerouting of existing services to accommodate all site conditions in the tender price.

## **PART 2 - PRODUCTS**

### **2.01 ELECTRIC SELF-CONTAINED HUMIDIFIER**

- .1 ***Provide SteamOvap model IER, or Consultant approved equal, electric self-contained humidifier with performance as outlined in the Equipment Schedules.***
- .2 ***The humidifier shall be certified as per UL998 by a Nationally Recognized Testing Laboratory (NRTL).***
- .3 ***Humidifier internal parts including boiling chamber, hydraulic circuit components, electrical components should be easy to access with a unique front door access.***
- .4 ***Boiling chamber, cover and fittings constructed from series 300 stainless steel.***
- .5 ***Boiling chamber cylinder provided with thermal insulation. Thermal insulation shall not be able to lose thermal properties when in contact with water.***

- .6 ***Immersion heaters INCOLOY alloy-sheathed resistance type with bending radius of 1in minimum to reduce stress concentration, with a tube diameter of 0.43in minimum to maximize surface contact area to water and with no more than 70 watts per square inch of watt density.***
- .7 ***Humidifier to have the following safety protection features:***
  - .1 ***Hi-limit temperature switch***
  - .2 ***Electronic continuous water level sensor.***
  - .3 ***Evaporation rate control algorithm.***
  - .4 ***EcoEnerSmart™ water dilution auto adaptable depending on water quality***
  - .5 ***Integrated back flow prevention water hydraulic with no check valve or open fill cup that are prone to overflow***
  - .6 ***Conductive foam detection sensor.***
- .8 ***Humidifier shall be able to be supplied with tap or well water or treated water such as softened or reverse osmosis (RO) water without alteration or add-on option.***
- .9 ***Removal of boiling chamber cylinder for regular cleaning and maintenance shall be done without the need of tools, and without the use of consumable such as gasket or others.***
- .10 ***Humidifier to provide full modulation using integrated SSR control, without additional option.***
- .11 ***Humidifier shall include an integrated automatic wasted water drain cooling function ensuring a maximum water drained temperature of 140°F (60°C), without additional option.***
- .12 ***Automatic drain of humidifier's boiling chamber should be done with a drain pump allowing for fast and efficient partial or complete flush out without being affected by scale with a minimum flow of 6GPM.***
- .13 ***Humidifier control and user interface to be provided by 7in touch screen and microprocessor with real time operating system and multilingual screens and menus. User interface should include the following:***
  - .1 ***Dashboard screen indicating real time power consumption and log of events, with the 200 last events recorded in non volatile memory***
  - .2 ***Overview screen indicating real time status of all internal sensors and operation of the humidifiers.***
  - .3 ***Control and humidifier setting screens with possible restricted access allowing for the full set-up of the humidifier and control communication including PID adjustments for optimize humidity control of critical applications***
  - .4 ***Ethernet or Wi-Fi settings for remote control through steamOcloud proprietary web server.***
  - .5 ***Easy software upgrade through USB 2.0 connection***
- .14 ***Supplied with Modbus RTU for secure and easy integration to Building Management System (BMS), as standard and without additional option.***
- .15 ***Three (3) years warranty.***
- .16 ***Optional Accessories***
  - .1 ***Air flow proving switch.***
  - .2 ***High limit switch humidistat.***
  - .3 ***Electronic RH% sensor for duct or space.***
  - .4 ***BACnet MSTP remote communication to Building Management System (BMS).***
  - .5 ***Stand metal frame for floor installation.***

- .6 **Wall mounting bracket to ease of wall installation**
- .17 **Acceptable Manufacturers:**
  - .1 **SteamOvap**
  - .2 **Condair,**
  - .3 **Dri-Steem,**
  - .4 **Pure Humidifier Co, or**
  - .5 **Consultant approved equal.**

### **PART 3 - EXECUTION**

#### **3.01 GENERAL**

- .1 Air handling units with humidifier section shall be shipped as a complete packaged system. Shop drawings shall be submitted as one complete system.
- .2 Provide a factory-trained service technician without additional charge to start and commission the humidifiers. In addition, factory shall allow for job site review of each humidifier to carry out start-up, commissioning and instruct Owner's representatives; dates will be determined by owner's representative.

#### **3.02 INSTALLATION**

- .1 Install components plumb and level, in accordance with approved shop drawings, product installation details and manufacturer's recommendations.
  - .1 Install humidifiers and components per manufacturers' instructions.
  - .2 Seal humidifier duct penetrations with flange.
  - .3 Install with required clearance for service and maintenance.
- .2 Install humidity sensor as indicated on the floor plans and/or control sequences.
- .3 Terminate water supply overflow over nearest funnel and floor drain (FFD).
- .4 For humidifiers installed in ductwork, install access doors or panels in adjacent to humidifiers for servicing.
  - .1 Provide waterproof duct up and downstream of humidifier.
  - .2 Install drain connection at low point in duct, extend drain and terminate over nearest funnel and floor drain (FFD).
- .5 For humidifiers installed in air handling units, the humidifier grid shall be installed at the air handling unit factory.
  - .1 Installation instruction shall be provided to air handling unit manufacturer for reference.

#### **3.03 FIELD QUALITY CONTROL**

- .1 Manufacturer's Field Services:
  - .1 Manufacturer's Field Services: 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.
  - .2 Schedule site visits, to review Work, at stages listed:
    - .1 After delivery and storage of products, and when preparatory Work, or other Work, on which the Work of this Section depends, is complete but before installation begins.
    - .2 Upon completion of the Work, after cleaning is carried out.
- .2 Start-up:
  - .1 General: In accordance with project General Requirements, supplemented as follows:

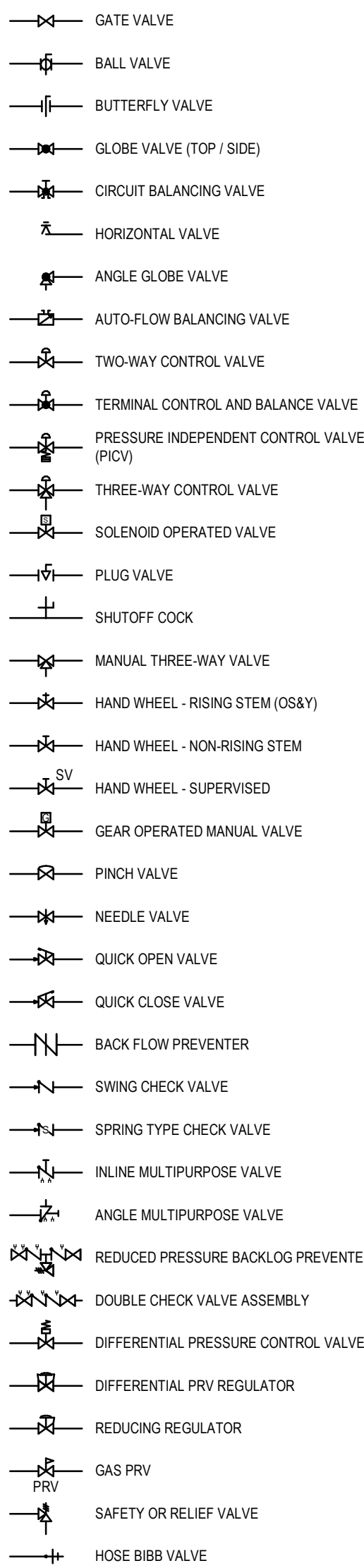


- .1 Steam lines are sloped to ensure steam condensate is drained away from the humidifier.
- .2 Vapour lines and manifolds are sloped to ensure condensate is drained away from the duct system.
- .3 Visually check distribution manifold to ensure:
  - .1 Even distribution of vapour.
  - .2 Freedom from water deposits.
- .3 Verification Reports:
  - .1 Submit Verification Reports indicating factory-trained service technician's acceptance of the humidifier installation, operation, and Owner's training is complete.

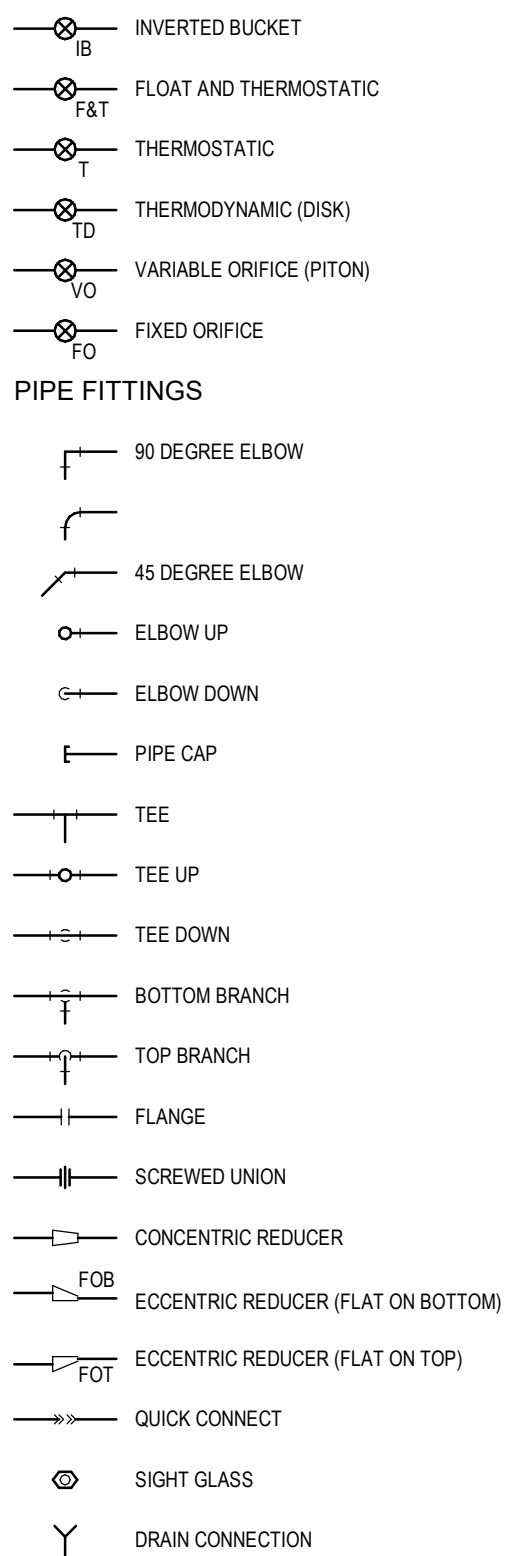
**END OF SECTION 23 84 13**

## MECHANICAL SYMBOL LEGEND

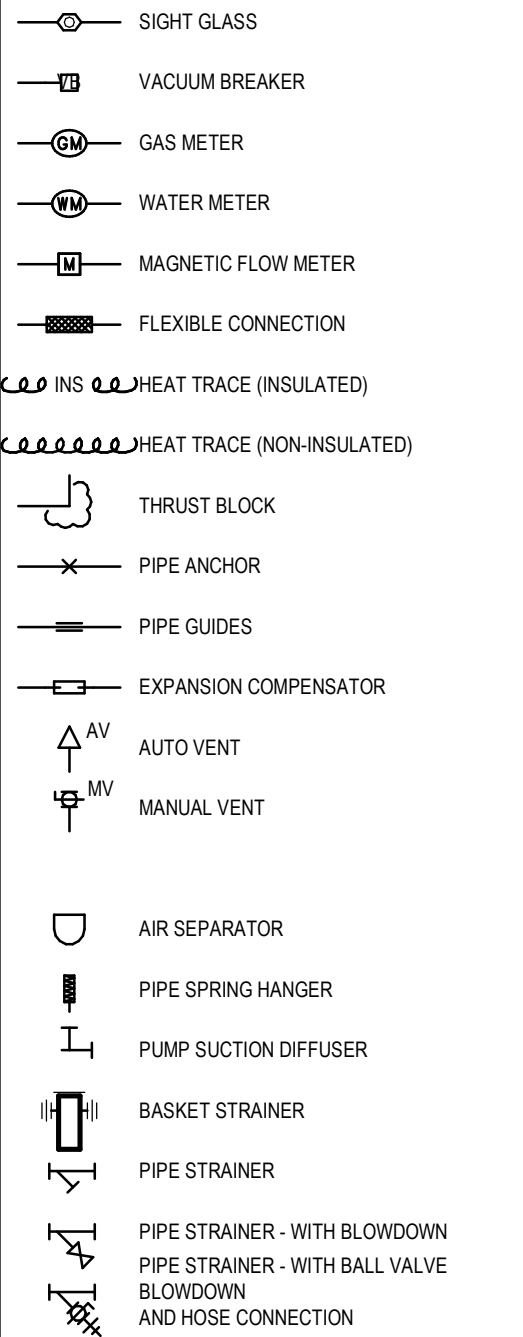
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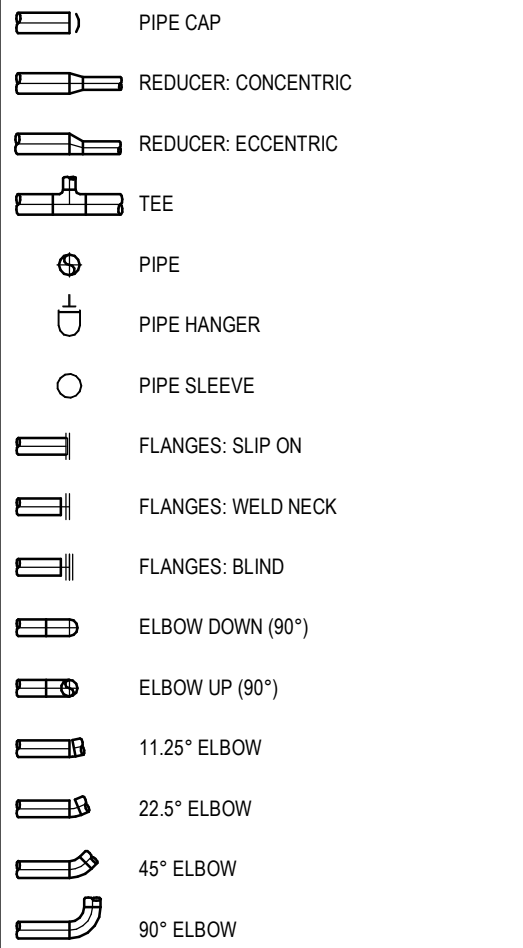
### STEAM TRAPS



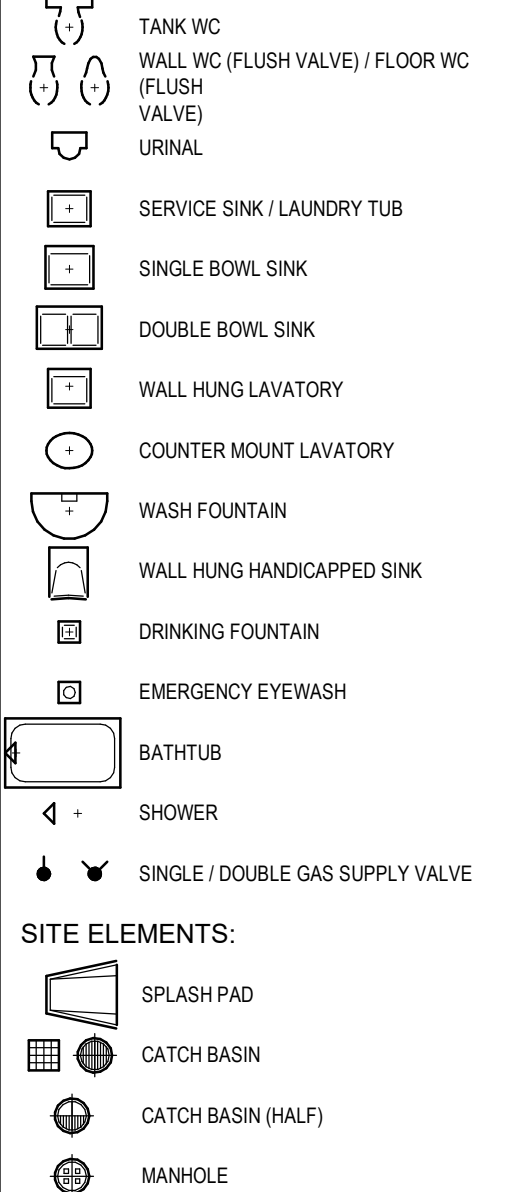
### PIPE ACCESSORIES



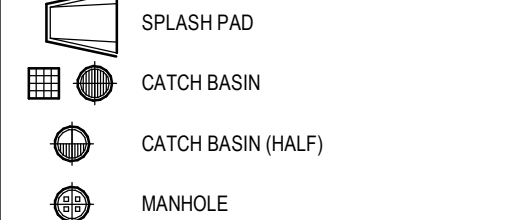
### MULTI-LINE VALVE SYMBOLS



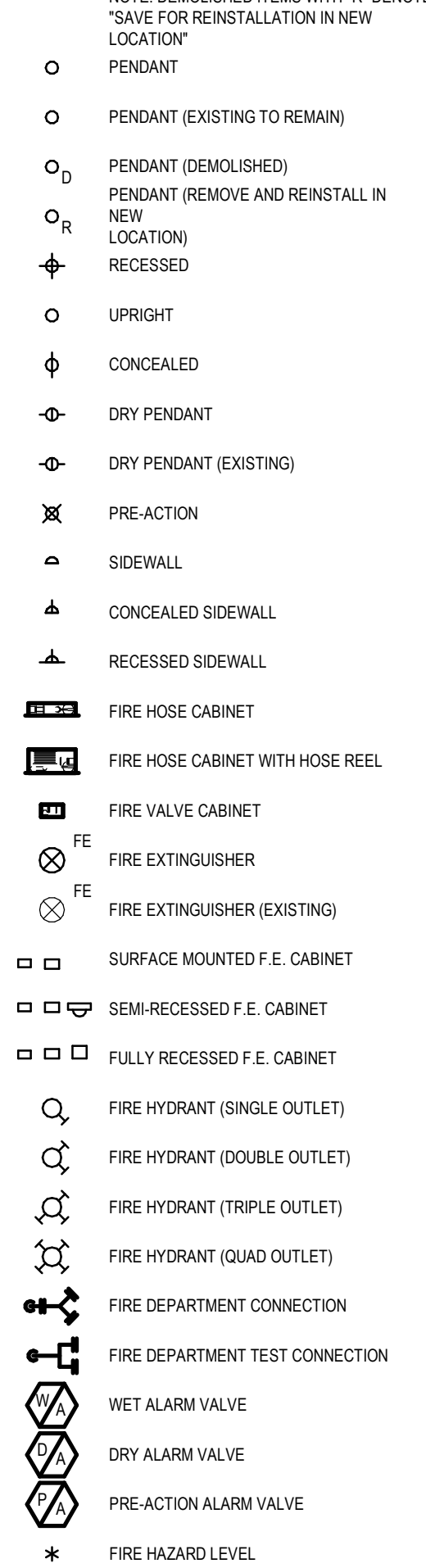
### PLUMBING FIXTURES



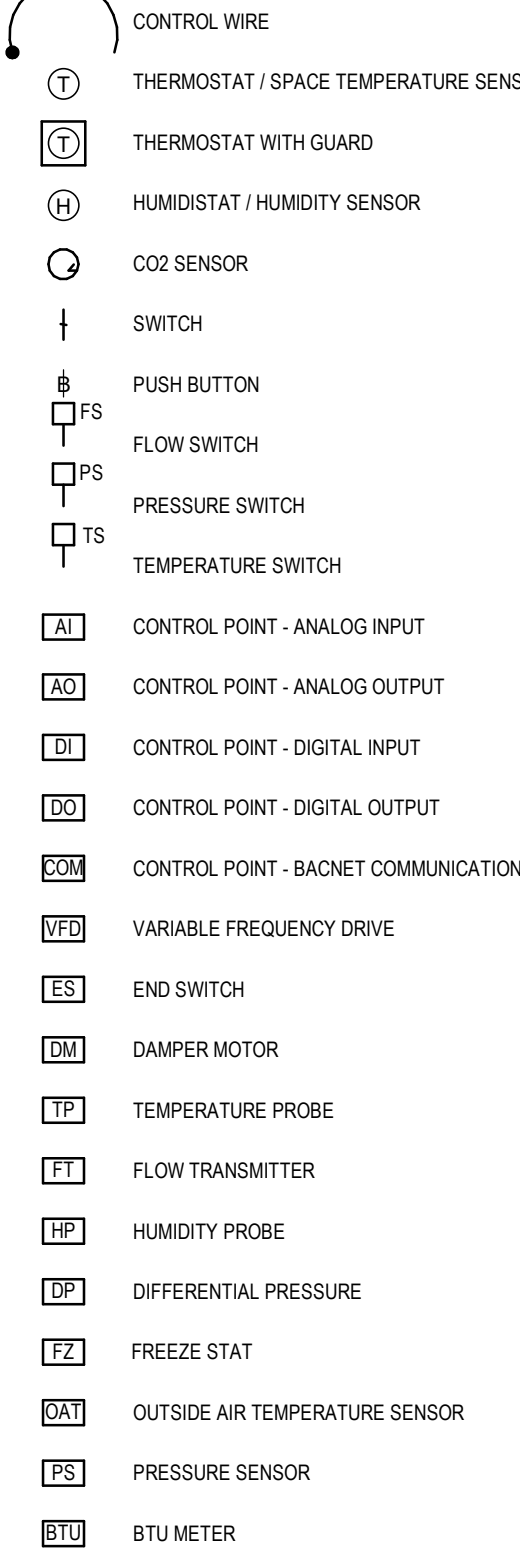
### SITE ELEMENTS:



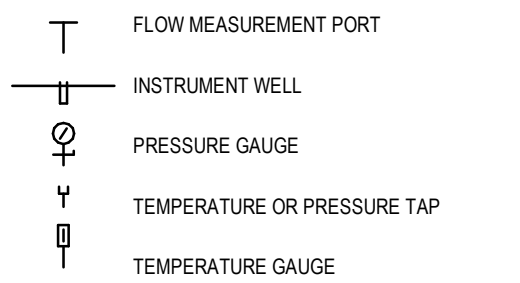
### FIRE PROTECTION



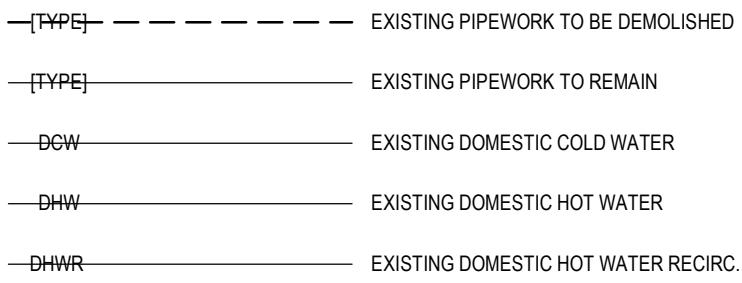
### CONTROLS AND CONTROL POINTS



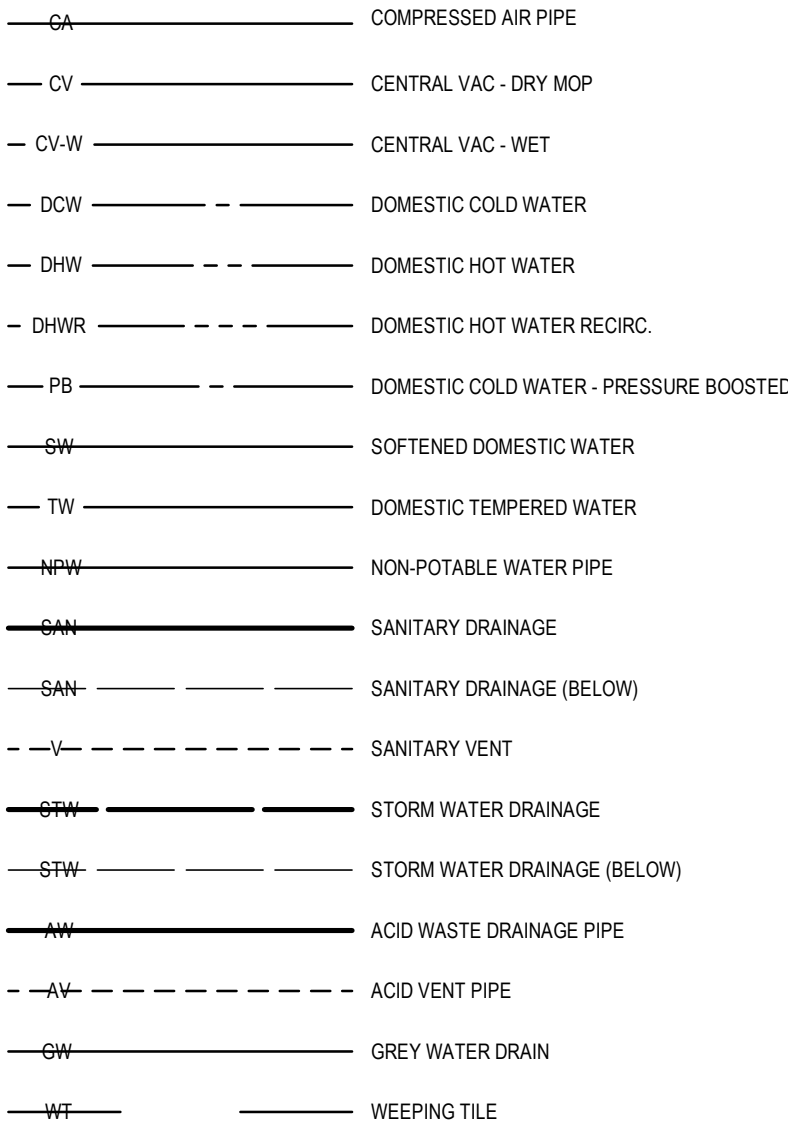
### PIPE INSTRUMENTS



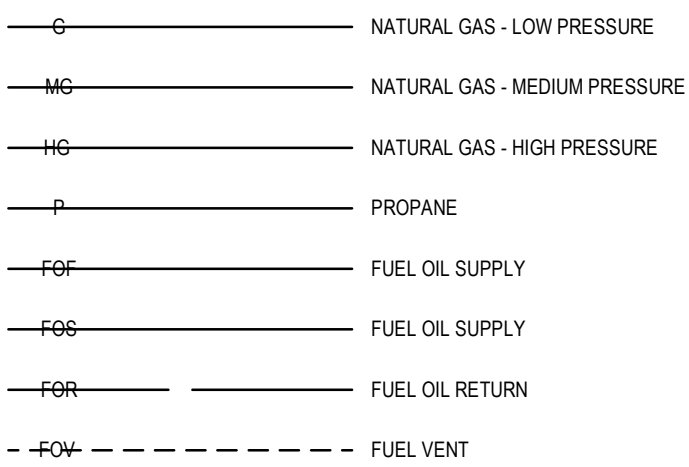
### EXISTING/DEMOLISHED PIPING:



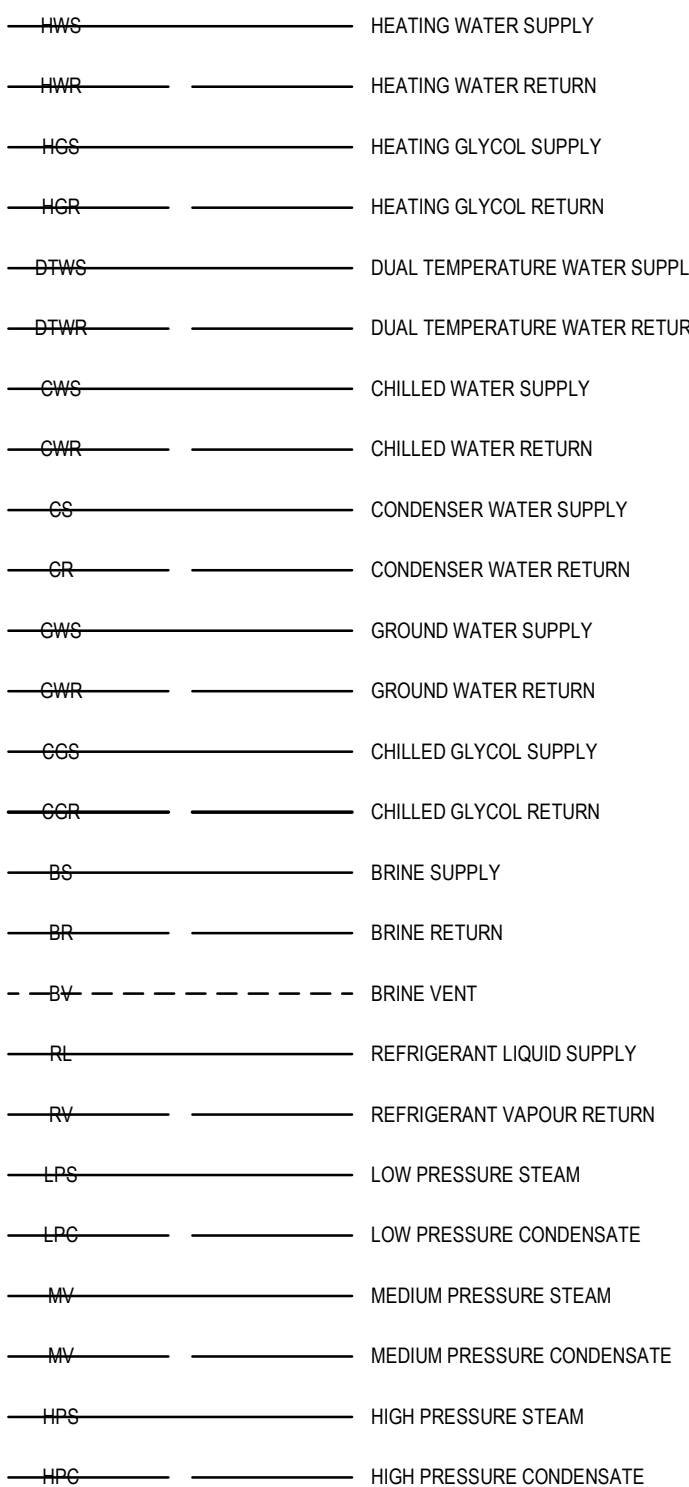
### PLUMBING:



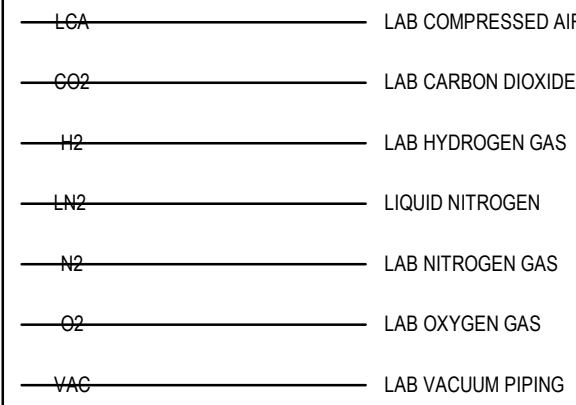
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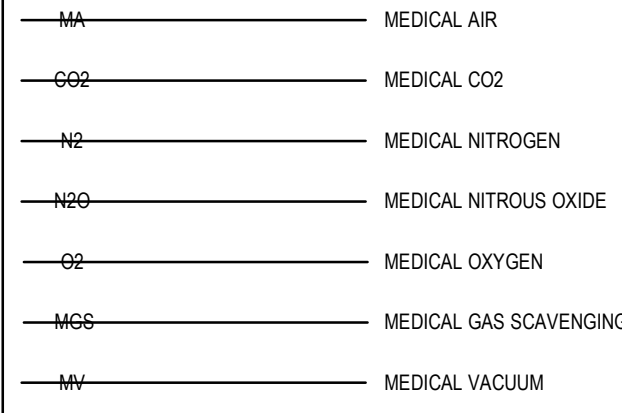
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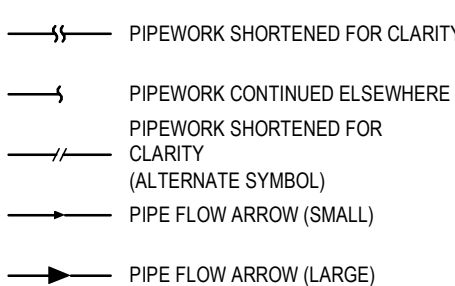
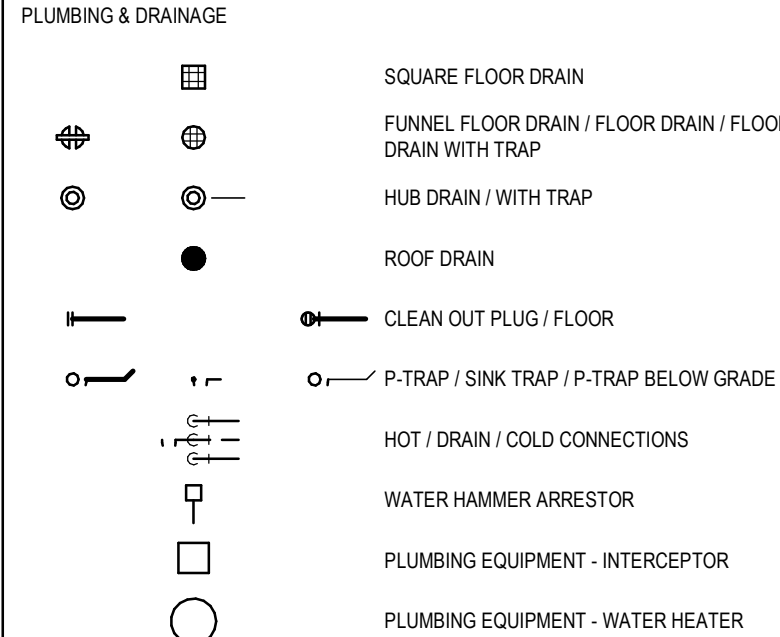
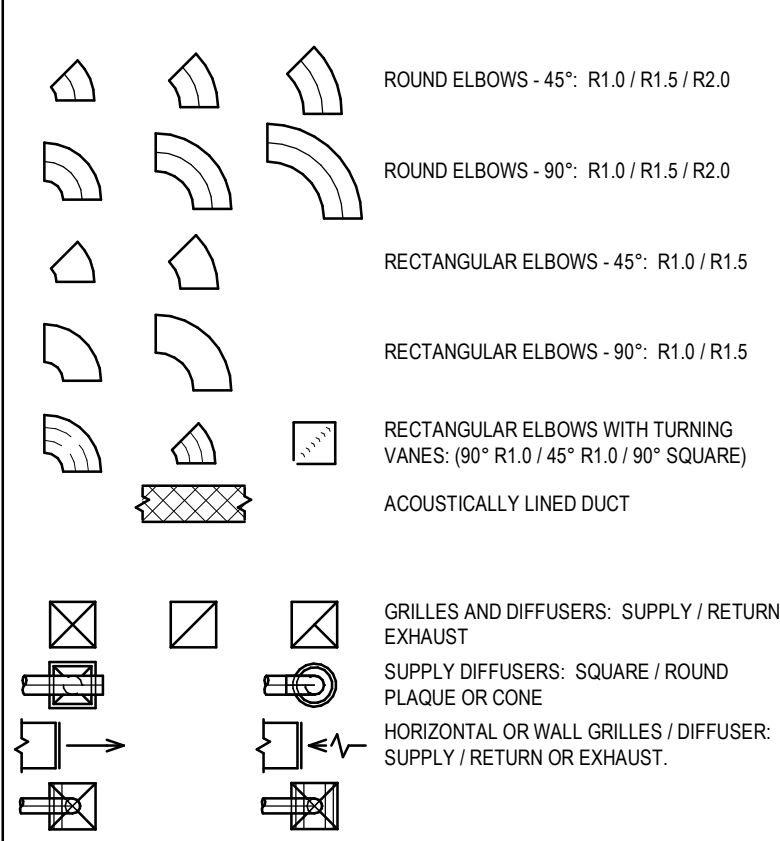
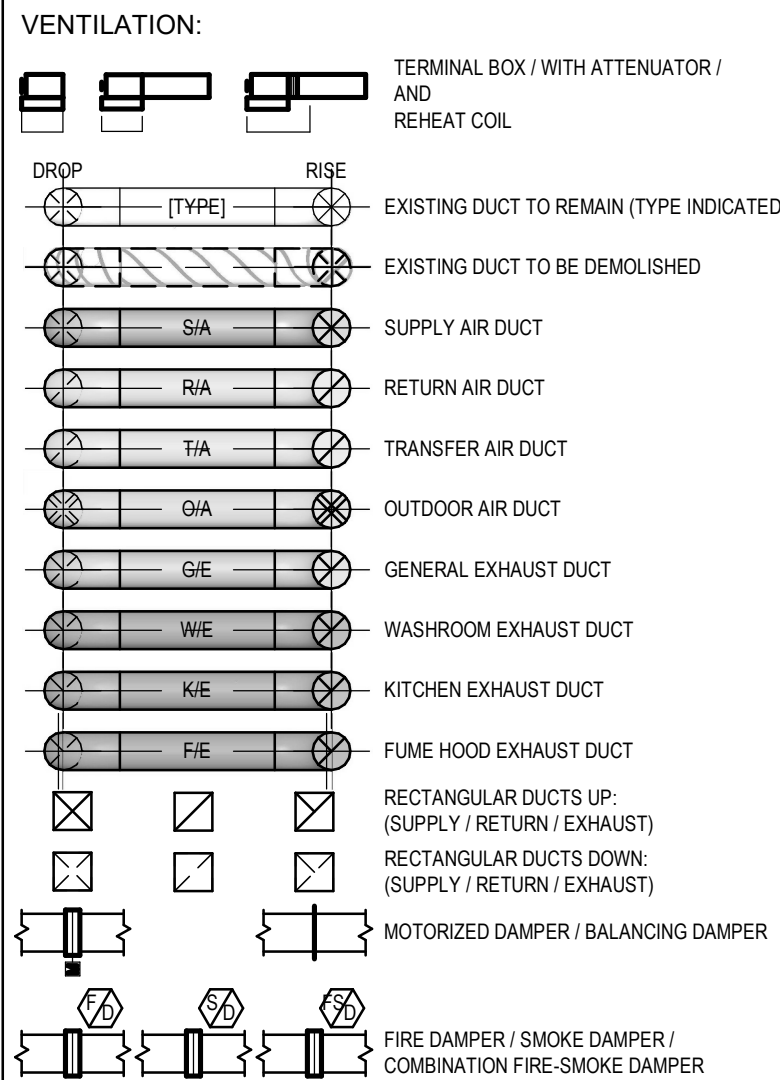
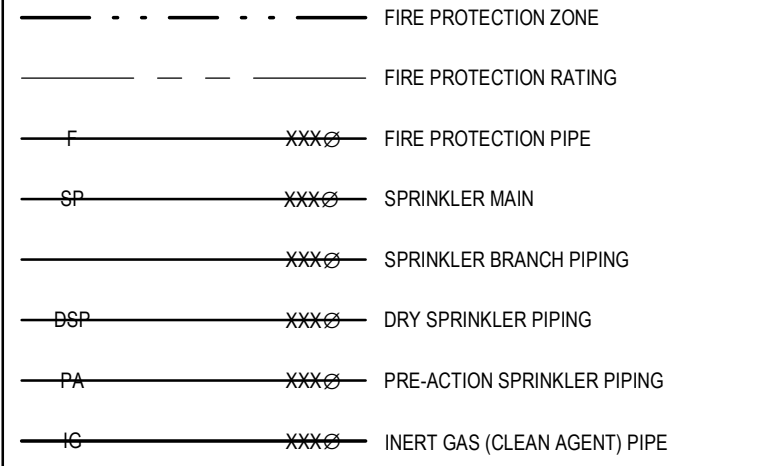
### LAB GAS:



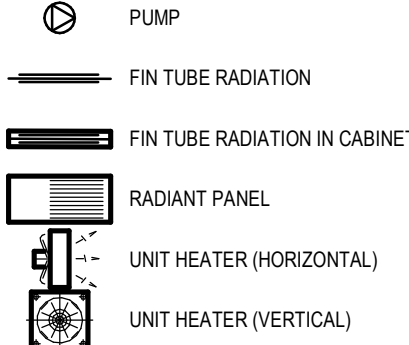
### MEDICAL GAS:



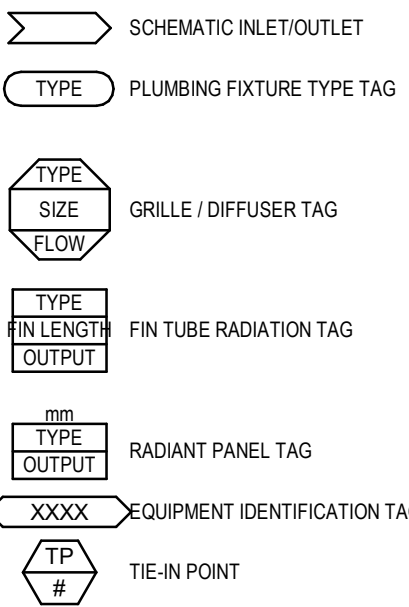
### SPRINKLER AND FIRE PROTECTION



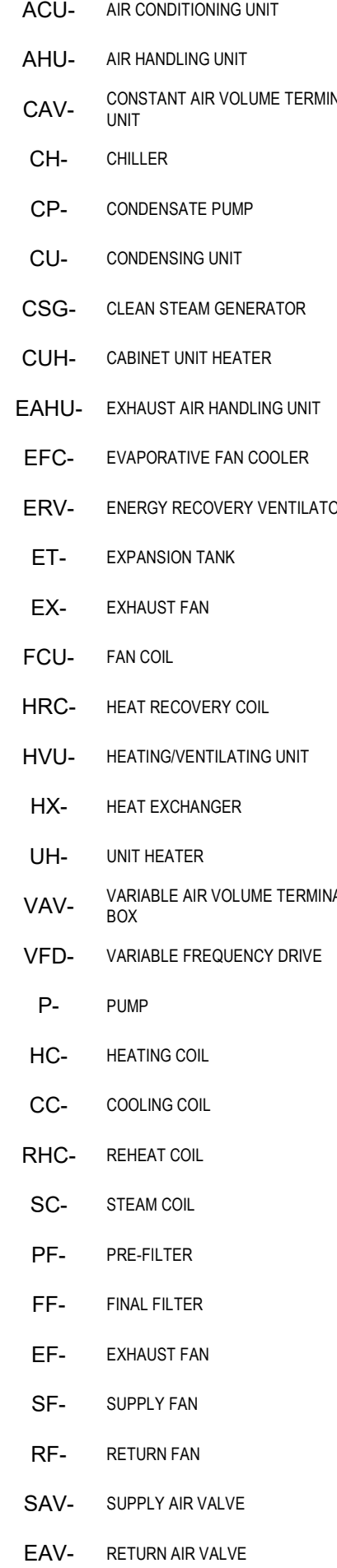
### EQUIPMENT:



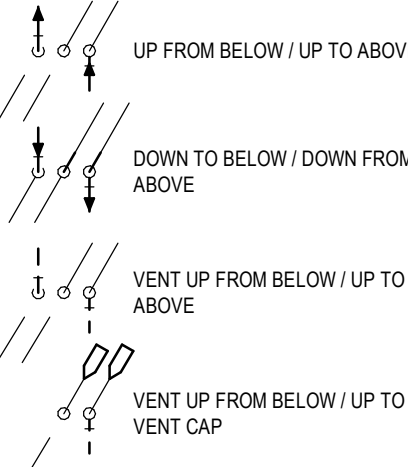
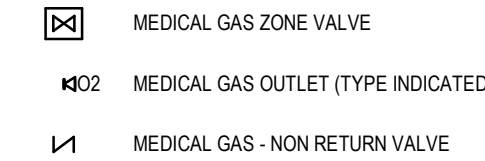
### TAGS AND ANNOTATION:



### EQUIPMENT ACRONYMS:



### MEDICAL GAS VALVES



### GENERAL ABBREVIATIONS:



## MECHANICAL DRAWING LIST

DWG NO.	DRAWING NAME
M0-00	MECHANICAL SYMBOL LEGEND, DRAWING LIST & GENERAL NOTES
M0-01	SITE PLAN - MECHANICAL - DEMO
M0-02	SITE PLAN - MECHANICAL - NEW WORK
MD1-00	FOUNDATION - PLUMBING & DRAINAGE DEMOLITION PLAN
MD1-01	LEVEL 1 - PLUMBING & DRAINAGE DEMOLITION PLAN
MD1-02	LEVEL 2 - PLUMBING & DRAINAGE DEMOLITION PLAN
MD2-01	LEVEL 1 - HVAC DEMOLITION PLAN
MD2-02	LEVEL 2 - HVAC DEMOLITION PLAN
MD2-03	EXISTING ROOF - HVAC DEMOLITION PLAN
W1-00	FOUNDATION - PLUMBING & DRAINAGE PLAN
W1-01	LEVEL 1 - PLUMBING & DRAINAGE PLAN
W1-02	LEVEL 2 & LOW ROOF - PLUMBING & DRAINAGE PLAN
W1-03	HIGH ROOF & SIGN GARAGE ROOF - PLUMBING & DRAINAGE PLAN
W2-01	LEVEL 1 - HVAC PLAN
W2-02	LEVEL 2 & LOW ROOF - HVAC PLAN
W2-03	HIGH ROOF - HVAC PLAN
M3-01	LEVEL 1 - FIRE PROTECTION PLAN
M4-01	AIR DISTRIBUTION SCHEMATIC
M4-02	HYDRONIC HEATING SCHEMATIC
M4-03	DOMESTIC COLD & HOT WATER SCHEMATIC
M4-04	SANITARY DRAINAGE SCHEMATIC
M4-05	STORM WATER SCHEMATIC
M4-06	GAS SCHEMATIC & COMPRESSED AIR SCHEMATIC- DEMO & NEW
M4-08	VRF SCHEMATIC
M5-01	CONTROL DIAGRAMS 1
M5-02	CONTROL DIAGRAMS 2
M5-03	CONTROL DIAGRAMS 3
M5-04	CONTROL DIAGRAMS 4
M6-01	MECHANICAL DETAILS 1
M6-02	MECHANICAL DETAILS 2
M6-03	MECHANICAL DETAILS 3
M6-04	MECHANICAL DETAILS 4
M6-05	MECHANICAL DETAILS 5
M6-06	MECHANICAL DETAILS 6
ME-01	EQUIPMENT SCHEDULES #1
ME-02	EQUIPMENT SCHEDULES #2
ME-03	EQUIPMENT SCHEDULES #3

DRAWING SET GENERAL NOTES:	
NOTE	DESCRIPTION
1.	THESE DRAWINGS DO NOT REPRESENT A FULLY COORDINATED INFORMATION PACKAGE FOR THE PURPOSES OF CONSTRUCTION, AND DO NOT RELIEVE THE CONTRACTOR OF THE REQUIREMENT TO COORDINATE THE WORK IN ALL RESPECTS. IT IS THE SOLE RESPONSIBILITY OF THE CONTRACTOR TO COORDINATE THE WORK OF ALL TRADES AND SUPPLIERS TO ACHIEVE COMPLETE AND OPERATIONAL BUILDING SYSTEMS.
2.	ALL DRAWINGS AND ALL SPECIFICATION DIVISIONS, INCLUDING ALL ADDENDA, FORM THE CONTRACT DOCUMENTS INCLUSIVE OF: ARCHITECTURAL, STRUCTURAL, ELECTRICAL, MECHANICAL, LANDSCAPING AND CIVIL (BUT NOT LIMITED TO THESE DIVISIONS) AND APPLY TO AND FORM AN INTEGRAL PART OF THIS SCOPE OF WORK.
3.	SCOPE OF WORK TO BE PERFORMED IN A PHASED AND SEQUENTIAL FASHION IN ORDER TO AVOID DISRUPTION TO THE CURRENT CLIENT OPERATIONS. REFER TO ARCHITECTURAL PHASING PLANS FOR DETAILS. CONTRACTOR TO PROPOSE PHASING PLAN ALONG WITH CONSTRUCTION SCHEDULE TO ACCOMMODATE THIS. NO DEMOLITION OF EXISTING MECHANICAL SERVICES ARE TO BE CARRIED OUT WITHOUT SUFFICIENT NOTICE AND CLIENT SIGN-OFF.
4.	

Project Team:

Prime Consultant  
GEC ARCHITECTURE

Structural Consultant  
ENTUITIVE

Mechanical Consultant  
MCW CONSULTANTS LTD.

Electrical Consultant  
MCW CONSULTANTS LTD.

Civil Consultant  
PLANMAC ENGINEERING

Passive House Consultant  
PEEL PASSIVE HOUSE

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8	ISSUED FOR ADDENDUM #4	2025/07/18
7	REISSUED FOR TENDER	2025/05/23
6	ISSUED FOR TENDER	2025/04/22
5	ISSUED FOR BUILDING PERMIT	2024/11/27
4	ISSUED FOR PRE-TENDER REVIEW	2024/10/31
3	ISSUED FOR 60% CD	2024/05/02
2	ISSUED FOR 100% DD	2024/02/29
1	ISSUED FOR 60% DD	2024/01/25
NO.	ISSUED FOR	DATE

Drawing History

Scale	N.T.S.	Checked By	NL
Region of York Project Number	22046	Region of York Building Code	G013-B

Project  
YORK REGION NORTH ROADS  
OPERATIONS CENTRE

6525 BASELINE RD, SUITON WEST, ON L0E 1R0

Drawing Title

MECHANICAL SYMBOL LEGEND,  
DRAWING LIST & GENERAL NOTES

Project Number

23137

Drawing Number

M0-00

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NO.	ISSUED FOR	DATE
Drawing History		

Region of York Project Number      Region of York Building Code

22046	G013-B
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YORK REGION NORTH ROADS

PORT REGION NORTHROADS  
OPERATIONS CENTRE

3525 BASELINE RD.SUTTON WEST, ON L0E 1R0

Drawing Title	Author	Year
1. A simple line drawing of a person's head in profile, facing right. The drawing is minimalist, showing only the outline of the head, neck, and jawline. The hair is represented by a few simple lines.	John Doe	2020
2. A drawing of a landscape featuring a body of water, a small boat, and a distant shoreline with trees and hills. The style is impressionistic, with soft colors and visible brushstrokes.	Jane Smith	2018
3. A detailed drawing of a classical building facade, showing columns, arches, and intricate carvings. The drawing is done in a realistic style with fine lines and shading.	Michael Chen	2015
4. A drawing of a person's face, focusing on the eyes and expression. The drawing uses cross-hatching for shading and is highly detailed.	Sarah Johnson	2019
5. A drawing of a landscape with a large, gnarled tree in the foreground and a small house in the background. The style is more sketchy and expressive than the others.	David Lee	2017

## SITE PLAN - MECHANICAL - NEW WORK

Project Number	Drawing Number
----------------	----------------

MO-02

1 : 500

02/26--07-10 2:22:59 PM Re: Author  
 BuffaloDash Docu://MO18 York Region North Beach Facility/23133 - YR North Beach - M&E - 0233.rvt





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Fax: 416-598-5394  
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8	ISSUED FOR ADDENDUM #4	2025/07/10
7	REISSUED FOR TENDER	2025/05/01
6	ISSUED FOR TENDER	2025/04/08
5	ISSUED FOR BUILDING PERMIT	2024/11/11
4	ISSUED FOR PRE-TENDER REVIEW	2024/10/01
3	ISSUED FOR 60% CD	2024/05/01
2	ISSUED FOR 100% DD	2024/02/01
1	ISSUED FOR 60% DD	2024/01/01
<b>NO.</b>	<b>ISSUED FOR</b>	<b>DATE</b>

Drawing History

Scale	Checked By
As indicated	NL

Region of York Project Number      Region of York Building Code

22046 G013-B

Project

WORK REGION: NORTH-EAST

YORK REGION NORTH ROADS  
OPERATIONS CENTRE

OPERATIONS CENTRE

3525 BASELINE RD SUTTON WEST ON L0E 1R0

Drawing Title

Starting time

FOUNDATION - PLUMBING &amp;

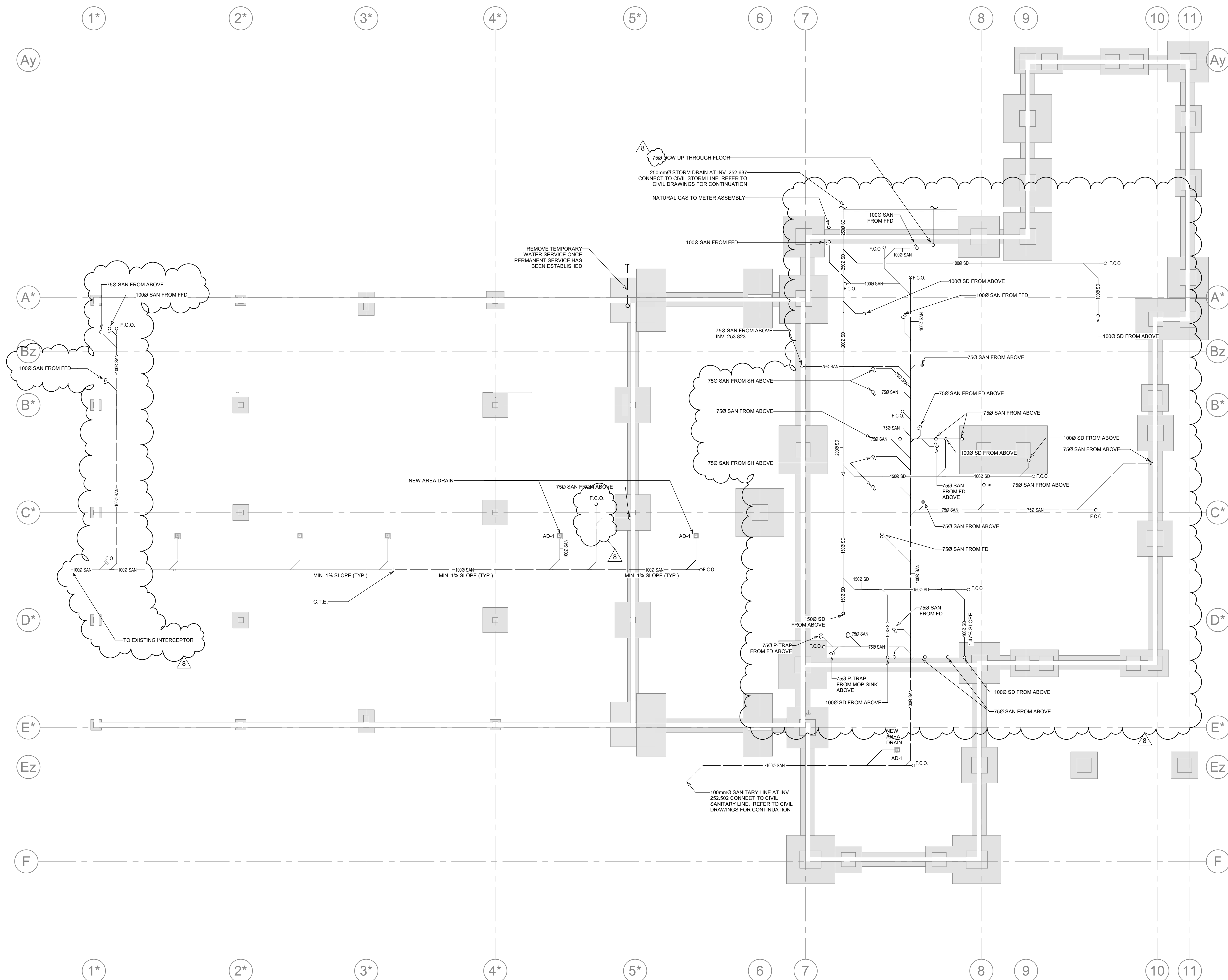
### FOUNDATION, FLOORING & DRAINAGE PLAN


**Table 1**

Project Number	Drawing Number
----------------	----------------


23137 M1-00

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PROJECT  
NORTH



TRUE  
NORTH

PLUMBING GENERAL NOTES	
NOTE	DESCRIPTION
1.	ALL UNDERGROUND PIPING IS TO BE SLOPED AS FOLLOWS UNLESS OTHERWISE NOTED: - ALL PIPING 750 TO BE 2% SLOPE. - ALL PIPING 1000 AND LARGER TO BE 1% SLOPE.
2.	MINIMUM SIZE OF UNDERGROUND DRAINAGE PIPING SHALL BE 750.
3.	REFER TO CLIMATE DRAWINGS FOR LEAVING CONNECTION SIZES.
4.	PROVIDE AND CONNECT TRAP SEAL PRIMER AT EACH FLOOR DRAIN.
5.	PIPE ROUTING IS SHOWN DIAGRAMMATICALLY AND INDICATES DESIGN INTENT. CONFIRM EXACT ROUTING AND COORDINATE WITH DUCTWORK, PIPING, EQUIPMENT, HANGERS, ELECTRICAL AND SUCTWORK ON SITE. PROVIDE OFFSETS AND ADJUST ROUTING AS REQUIRED.
6.	PLUMBING VENTING IS NOT SHOWN. ALL PLUMBING VENTS ARE TO BE INSTALLED IN ACCORDANCE WITH THE BUILDING CODE. ALL PLUMBING VENT ROUTING TO BE COORDINATED WITH OTHER DISCIPLINES ON SITE BY CONTRACTOR.
7.	COORDINATE FINAL LOCATIONS OF FLOOR DRAINS AND CLEANOUTS WITH ARCHITECTURAL FLOOR FINISHING PLANS.
8.	NOT ALL PLUMBING CLEANOUTS ARE SHOWN. INSTALL CLEANOUTS IN ACCORDANCE WITH THE INTOWN BUILDING CODE.
9.	ALL UNDERGROUND WORK SHALL BE INSPECTED BY THE AUTHORITY HAVING JURISDICTION AND THE MECHANICAL CONSULTANT PRIOR TO BACKFILL. ALL UNDERGROUND PIPING TO BE PRESSURE TESTED IN ACCORDANCE WITH LOCAL CODE REQUIREMENTS.
10.	REFER TO ARCHITECTURAL DRAWINGS FOR PHASING PLAN.
11.	SCOPE OF WORK TO BE PERFORMED IN A PHASED AND SEQUENTIAL FASHION IN ORDER TO AVOID DISRUPTION TO THE CURRENT CLIENT OPERATIONS. REFER TO ARCHITECTURAL PHASING PLANS FOR DETAILS. CONTRACTOR TO PROPOSE PHASING PLAN ALONG WITH CONSTRUCTION SCHEDULE TO ACCOMMODATE THIS. NO DEMOLITION OF EXISTING MECHANICAL SERVICES ARE TO BE CARRIED OUT WITHOUT SUFFICIENT NOTICE AND CLIENT SIGN-OFF.
12.	SCOPE OF WORK TO BE PERFORMED IN A PHASED AND SEQUENTIAL FASHION IN ORDER TO AVOID DISRUPTION TO THE CURRENT CLIENT OPERATIONS. REFER TO ARCHITECTURAL PHASING PLANS FOR DETAILS. CONTRACTOR TO PROPOSE PHASING PLAN ALONG WITH CONSTRUCTION SCHEDULE TO ACCOMMODATE THIS. NO DEMOLITION OF EXISTING MECHANICAL SERVICES ARE TO BE CARRIED OUT WITHOUT SUFFICIENT NOTICE AND CLIENT SIGN-OFF.
13.	ALL OTHER EXISTING MECHANICAL SERVICES (DOMESTIC WATER) TO REMAIN ACTIVE OR MIGRATED ACCORDINGLY TO ACCOMMODATE CONSTRUCTION PHASING PLANS. REFER TO ARCHITECTURAL DRAWINGS FOR DETAILS.
14.	ALL EXISTING UNDERGROUND SERVICES TO BE VERIFIED BY THE CONTRACTOR ON SITE. INVERT LOCATIONS AND DRAIN SCOPING TO BE CARRIED OUT FOR TO CONFIRM PIPE SIZING OF EXISTING SANITARY UNDERGROUND DRAINAGE.



8	ISSUED FOR ADDENDUM #4	2025/07/18
7	REISSUED FOR TENDER	2025/05/23
6	ISSUED FOR TENDER	2025/04/22
5	ISSUED FOR BUILDING PERMIT REVIEW	2024/11/27
4	ISSUED FOR PRE-TENDER REVIEW	2024/10/31
3	ISSUED FOR 60% CD	2024/05/02
2	ISSUED FOR 100% DD	2024/02/29
1	ISSUED FOR 60% DD	2024/01/25

NO. ISSUED FOR DATE

Drawing History

Scale As indicated Checked By NL

Region of York Project Number 22046 Region of York Building Code G013-B

Project YORK REGION NORTH ROADS OPERATIONS CENTRE

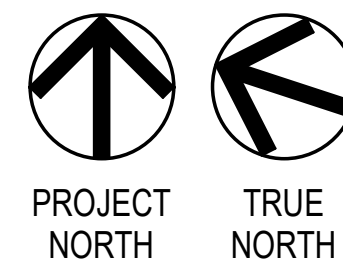
6525 BASELINE RD, SUITON WEST, ON L0E 1R0

Drawing Title

LEVEL 1 - PLUMBING & DRAINAGE PLAN

Project Number 23137 Drawing Number M1-01

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PROJECT NORTH TRUE NORTH

PLUMBING GENERAL NOTES

NOTE	DESCRIPTION
1.	ALL UNDERGROUND PIPING IS TO BE SLOPED AS FOLLOWS UNLESS OTHERWISE NOTED: - ALL PIPING 750 AND SMALLER TO BE 2% SLOPE - ALL PIPING 1000 AND LARGER TO BE 1% SLOPE
2.	MINIMUM SIZE OF UNDERGROUND DRAINAGE PIPING SHALL BE 750. ENLARGE SMALLER PIPING TO 750 BEFORE PENETRATING FLOOR SLAB.
3.	PROVIDE AND CONNECT TRAP SEAL PRIMER AT EACH FLOOR DRAIN.
4.	PIPE ROUTING IS SHOWN DIAGRAMMATICALLY AND INDICATES DESIGN INTENT. CONFIRM EXACT ROUTING AND COORDINATE WITH DUCTWORK, PIPING, EQUIPMENT, HANGERS, ELECTRICAL AND STRUCTURE ON SITE. PROVIDE OFFSETS AND ADJUST ROUTING AS REQUIRED.
5.	PLUMBING VENTING IS NOT SHOWN. ALL PLUMBING VENTS ARE TO BE INSTALLED IN ACCORDANCE WITH THE ONTARIO BUILDING CODE. ALL PLUMBING VENT ROUTING TO BE COORDINATED WITH OTHER DISCIPLINES ON SITE BY CONTRACTOR.
6.	COORDINATE FINAL LOCATIONS OF FLOOR DRAINS AND CLEANOUTS WITH ARCHITECTURAL FLOOR FINISHING PLANS.
7.	NOT ALL PLUMBING CLEANOUTS ARE SHOWN. INSTALL CLEANOUTS IN ACCORDANCE WITH THE ONTARIO BUILDING CODE.
8.	DO NOT ROUTE PIPE OVER ELECTRICAL EQUIPMENT.
9.	PROVIDE DRIP PAN UNDER ALL PIPING IN ELECTRICAL / IT ROOMS. ROOMS C/W DRAIN LINE TO CLOSEST WOP SINK OR FUNNEL FLOOR DRAIN.
10.	REFER TO ARCHITECTURAL DRAWINGS FOR PROJECT PHASING AND CONSTRUCTION SCHEDULE.
11.	COORDINATE INSTALLATION OF GENERATOR AND NATURAL GAS METER. ENSURE CLEARANCES ARE MET IN ACCORDANCE WITH AHJ AND CSA B148.1.
12.	SCOPE OF WORK TO BE PERFORMED IN A PHASED AND SEQUENTIAL FASHION IN ORDER TO AVOID DISRUPTION TO THE CURRENT CLIENT OPERATIONS. REFER TO ARCHITECTURAL PHASING PLANS FOR DETAILS. CONTRACTOR TO PROPOSE PHASING PLAN ALONG WITH CONSTRUCTION SCHEDULE TO ACCOMMODATE THIS. NO DEMOLITION OF EXISTING MECHANICAL SERVICES ARE TO BE CARRIED OUT WITHOUT SUFFICIENT NOTICE AND CLIENT SIGN-OFF.
13.	CONTRACTOR TO COORDINATE WITH NATURAL GAS SERVICE PROVIDER REGARDING ANY INFRASTRUCTURE UPGRADE REQUIREMENTS DUE TO ADDITIONAL EQUIPMENT GAS LOADS. THIS INCLUDES ANY INCOMING PIPING UPGRADE REQUIREMENTS TO THE BUILDING AND APPROPRIATE METERING STATION AND SERVICE PRESSURE UPGRADES. DEMOLITION OF EXISTING GAS SERVICES AND METERING STATION TO BE COORDINATED AND INCORPORATED INTO THE GENERAL PHASING CONSTRUCTION PLAN TO MINIMIZE DISRUPTION TO THE EXISTING CLIENT OPERATIONS. DEMOLITION OF EXISTING INFRASTRUCTURE TO ONLY OCCUR ONCE NEW INFRASTRUCTURE HAS BEEN INSTALLED AND IS OPERATIONAL.
14.	ALL OTHER EXISTING MECHANICAL SERVICES (DOMESTIC WATER) TO REMAIN ACTIVE OR MIGRATED ACCORDINGLY TO OCCUR IN ACCORDANCE WITH THE GENERAL PHASING PLAN DEFINED DURING CONSTRUCTION. EXISTING GENERATOR TO REMAIN IN SERVICE UNTIL PROVISION FOR NEW HAS BEEN ACCOMMODATED. REFER TO ARCHITECTURAL DRAWINGS AND SPECIFICATIONS FOR PROPOSED PHASING PLAN DETAILS.
15.	ALL EXISTING UNDERGROUND SERVICES TO BE VERIFIED BY THE CONTRACTOR ON SITE. INVERT ELEVATIONS AND DRAIN SCOPING TO BE CARRIED FOR TO CONFIRM PIPE SIZING OF EXISTING SANITARY UNDERGROUND DRAINAGE.
16.	EXISTING FUEL OIL PIPING SERVING GENERATOR TO BE CUT, CAPPED AND ABANDONED SAFELY. DEMOLITION TO OCCUR IN ACCORDANCE WITH THE GENERAL PHASING PLAN DEFINED DURING CONSTRUCTION. EXISTING GENERATOR TO REMAIN IN SERVICE UNTIL PROVISION FOR NEW HAS BEEN ACCOMMODATED. REFER TO ARCHITECTURAL DRAWINGS AND SPECIFICATIONS FOR PROPOSED PHASING PLAN DETAILS.

LEVEL 1 - PLUMBING

1 : 100



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**GEC ARCHITECTURE**

Mechanical Consultant  
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Civil Consultant  
**PLANMAC ENGINEERING**

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8	ISSUED FOR ADDENDUM #4	2025/07/11
7	REISSUED FOR TENDER	2025/06/24
6	ISSUED FOR TENDER	2025/04/12
5	ISSUED FOR BUILDING PERMIT	2024/11/21
4	ISSUED FOR PRE-TENDER REVIEW	2024/10/03
3	ISSUED FOR 60% CD	2024/05/01
2	ISSUED FOR 100% DD	2024/02/22
1	ISSUED FOR 60% DD	2024/01/12
<b>NO.</b>	<b>ISSUED FOR</b>	<b>DATE</b>

Scale

Checked By  
A.H.

Region of York Building Code

G013 B

3525 BASELINE RD. SUTTON WEST. ON L0E 1R0

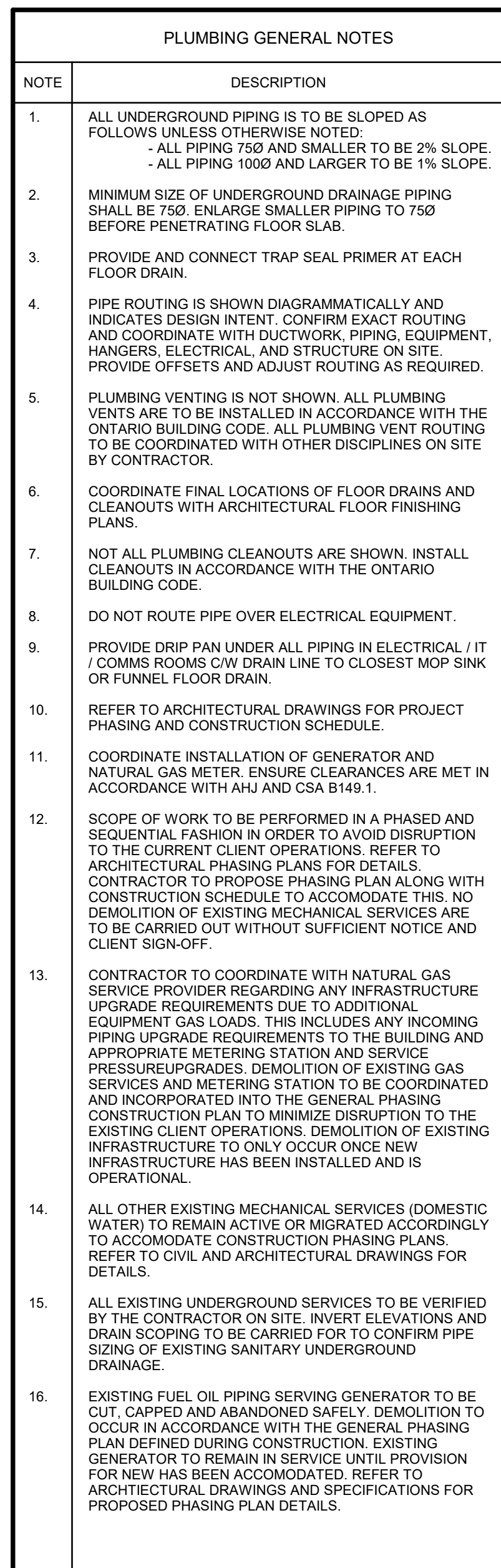
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## LEVEL 2 & LOW ROOF - PLUMBING & DRAINAGE PLAN

Drawing Number

**M1-02**

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1 : 100



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8	ISSUED FOR ADDENDUM #4	2025/07/18
7	REISSUED FOR TENDER	2025/05/23
6	ISSUED FOR TENDER	2025/04/22
5	ISSUED FOR BUILDING PERMIT	2024/11/27
4	ISSUED FOR PRE-TENDER REVIEW	2024/10/31
3	ISSUED FOR 60% CD	2024/05/02
2	ISSUED FOR 100% DD	2024/02/29
1	ISSUED FOR 60% DD	2024/01/25
<b>NO.</b>	<b>ISSUED FOR</b>	<b>DATE</b>

Scale

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NL

Region of York Building Code

G013-B

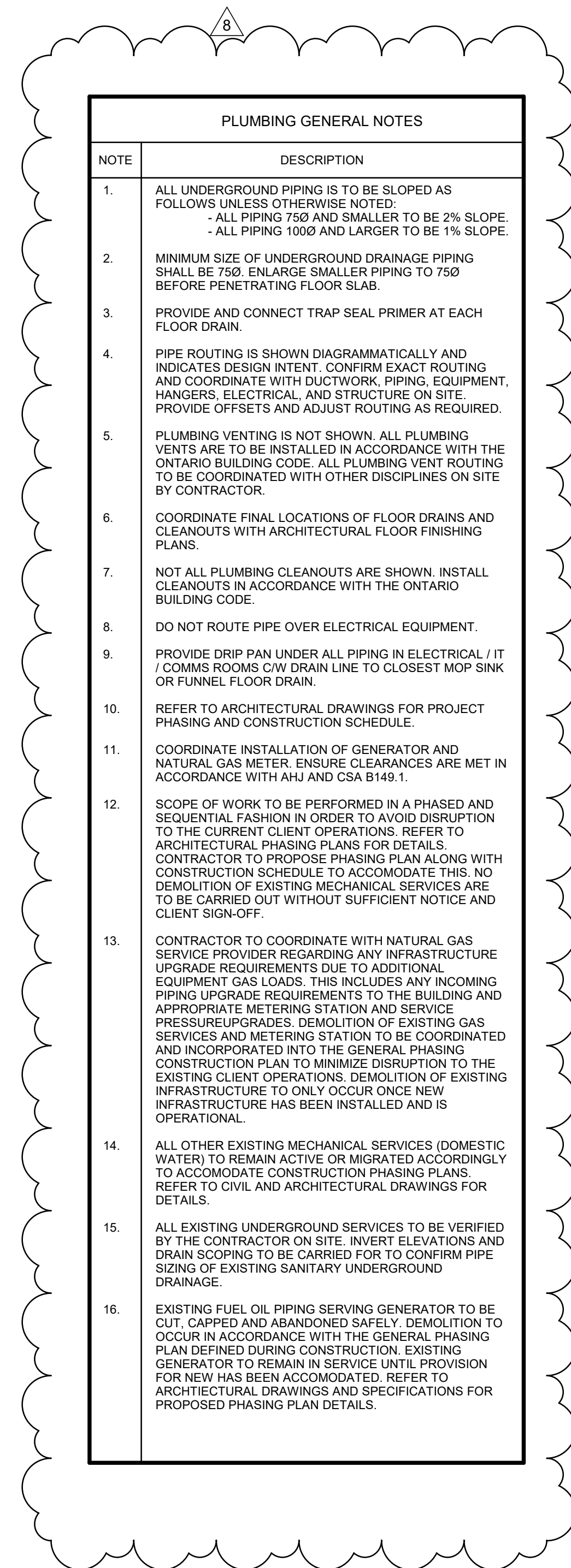
3525 BASELINE RD.SUTTON WEST, ON L0E 1R0

## HIGH ROOF & SIGN GARAGE ROOF - PLUMBING & DRAINAGE PLAN

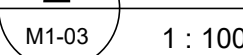
Drawing Number

**M1-03**

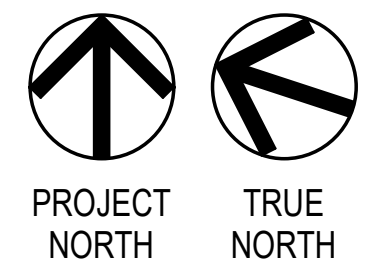
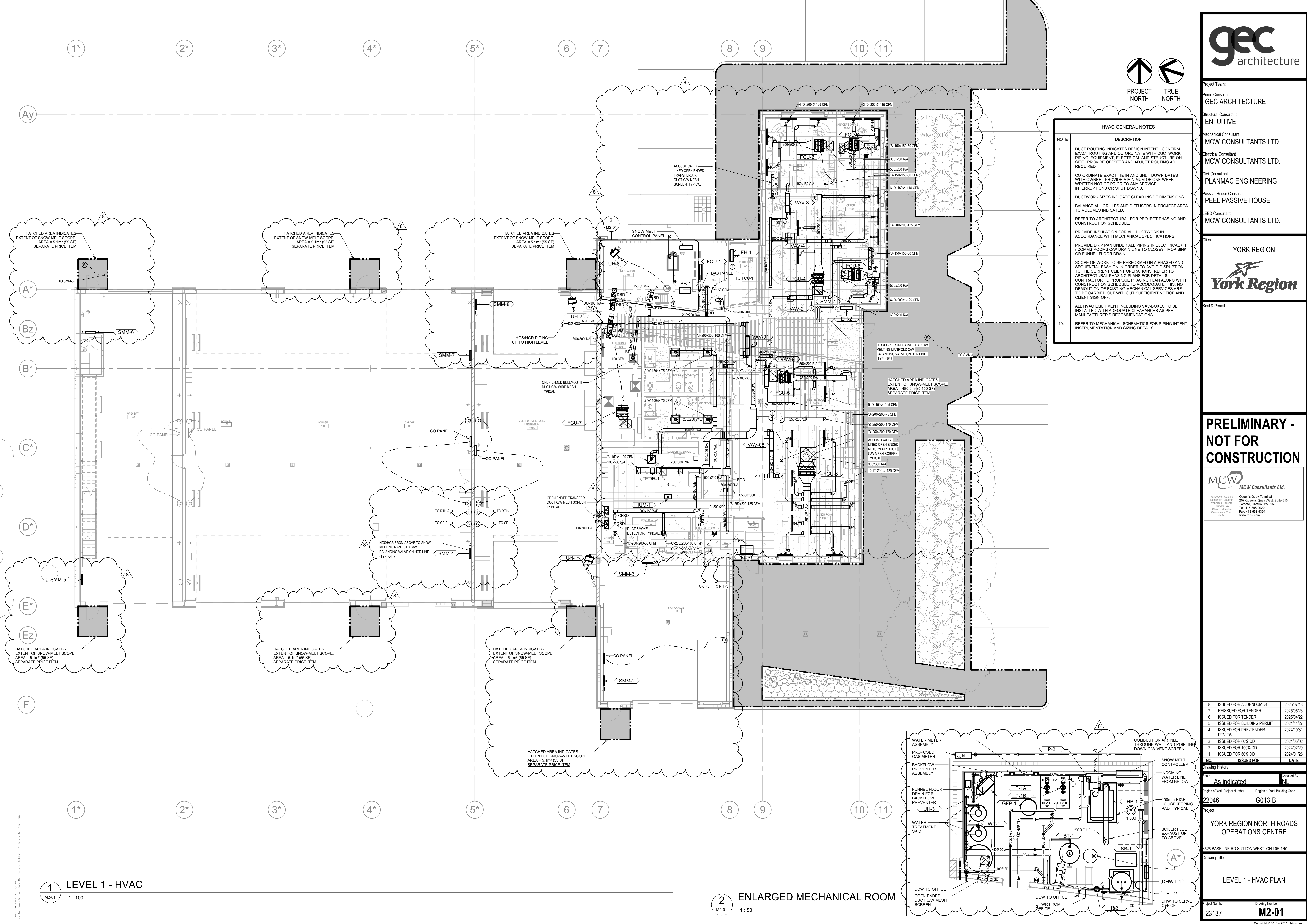
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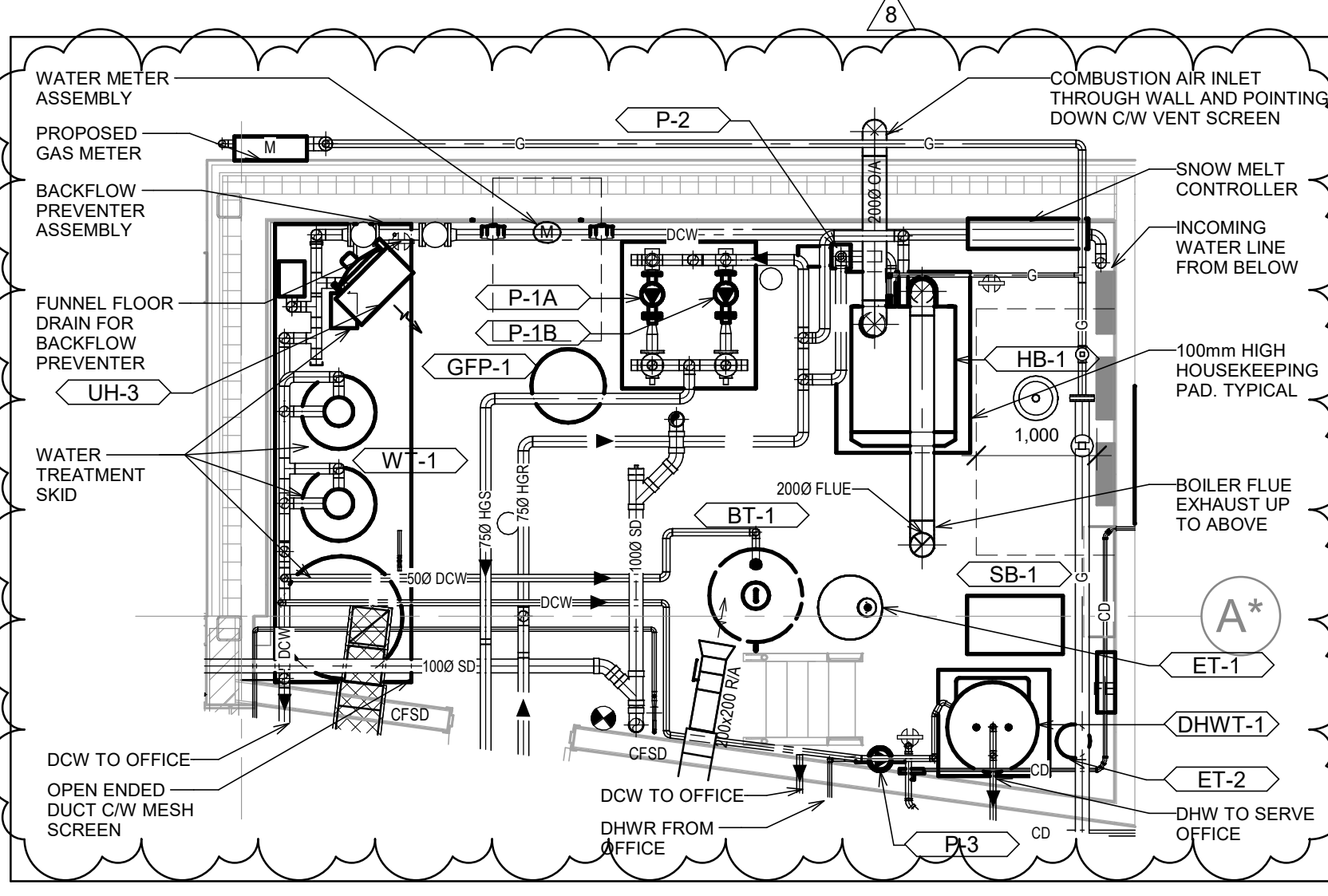
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HVAC GENERAL NOTES	
NOTE	DESCRIPTION
1.	DUCT ROUTING INDICATES DESIGN INTENT. CONFIRM EXACT ROUTING AND CO-ORDINATE WITH DUCTWORK, PIPING, EQUIPMENT, ELECTRICAL AND STRUCTURE ON SITE. PROVIDE OFFSETS AND ADJUST ROUTING AS REQUIRED.
2.	CO-ORDINATE EXACT TIE-IN AND SHUT DOWN DATES WITH OWNER. PROVIDE A MINIMUM OF ONE WEEK WRITTEN NOTICE PRIOR TO ANY SERVICE INTERRUPTIONS OR SHUT DOWNS.
3.	DUCTWORK SIZES INDICATE CLEAR INSIDE DIMENSIONS.
4.	BALANCE ALL GRILLES AND DIFFUSERS IN PROJECT AREA TO VOLUMES INDICATED.
5.	REFER TO ARCHITECTURAL FOR PROJECT PHASING AND CONSTRUCTION SCHEDULE.
6.	PROVIDE INSULATION FOR ALL DUCTWORK IN ACCORDANCE WITH MECHANICAL SPECIFICATIONS.
7.	PROVIDE DRIP PAN UNDER ALL PIPING IN ELECTRICAL / IT / COMMS ROOMS C/W DRAIN LINE TO CLOSEST MOP SINK OR FUNNEL FLOOR DRAIN.
8.	SCOPE OF WORK TO BE PERFORMED IN A PHASED AND SEQUENTIAL FASHION IN ORDER TO AVOID DISRUPTION TO THE CURRENT CLIENT OPERATIONS. REFER TO ARCHITECTURAL PHASING PLANS FOR DETAILS. CONTRACTOR TO PROPOSE PHASING PLAN ALONG WITH CONSTRUCTION SCHEDULE TO ACCOMMODATE THIS. NO DEMOLITION OF EXISTING MECHANICAL SERVICES ARE TO BE CARRIED OUT WITHOUT SUFFICIENT NOTICE AND CLIENT SIGN-OFF.
9.	ALL HVAC EQUIPMENT INCLUDING VAV-BOXES TO BE INSTALLED WITH ADEQUATE CLEARANCES AS PER MANUFACTURER'S RECOMMENDATIONS.
10.	REFER TO MECHANICAL SCHEMATICS FOR PIPING INTENT, INSTRUMENTATION AND SIZING DETAILS.



Project Team:

Prime Consultant  
**GEC ARCHITECTURE**

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Mechanical Consultant  
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5	ISSUED FOR BUILDING PERMIT	2024/11/27
4	ISSUED FOR PRE-TENDER REVIEW	2024/10/31
3	ISSUED FOR 60% CD	2024/05/02
2	ISSUED FOR 100% DD	2024/02/29
1	ISSUED FOR 60% DD	2024/01/25

NO.	ISSUED FOR	DATE
Drawing History		
Scale	As indicated	Checked By: NL
Region of York Project Number	22046	Region of York Building Code
Project	YORK REGION NORTH ROADS OPERATIONS CENTRE	
3525 BASELINE RD SUITON WEST, ON L0E 1R0		
Drawing Title	LEVEL 1 - HVAC PLAN	
Project Number	23137	Drawing Number: M2-01

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Project Team:

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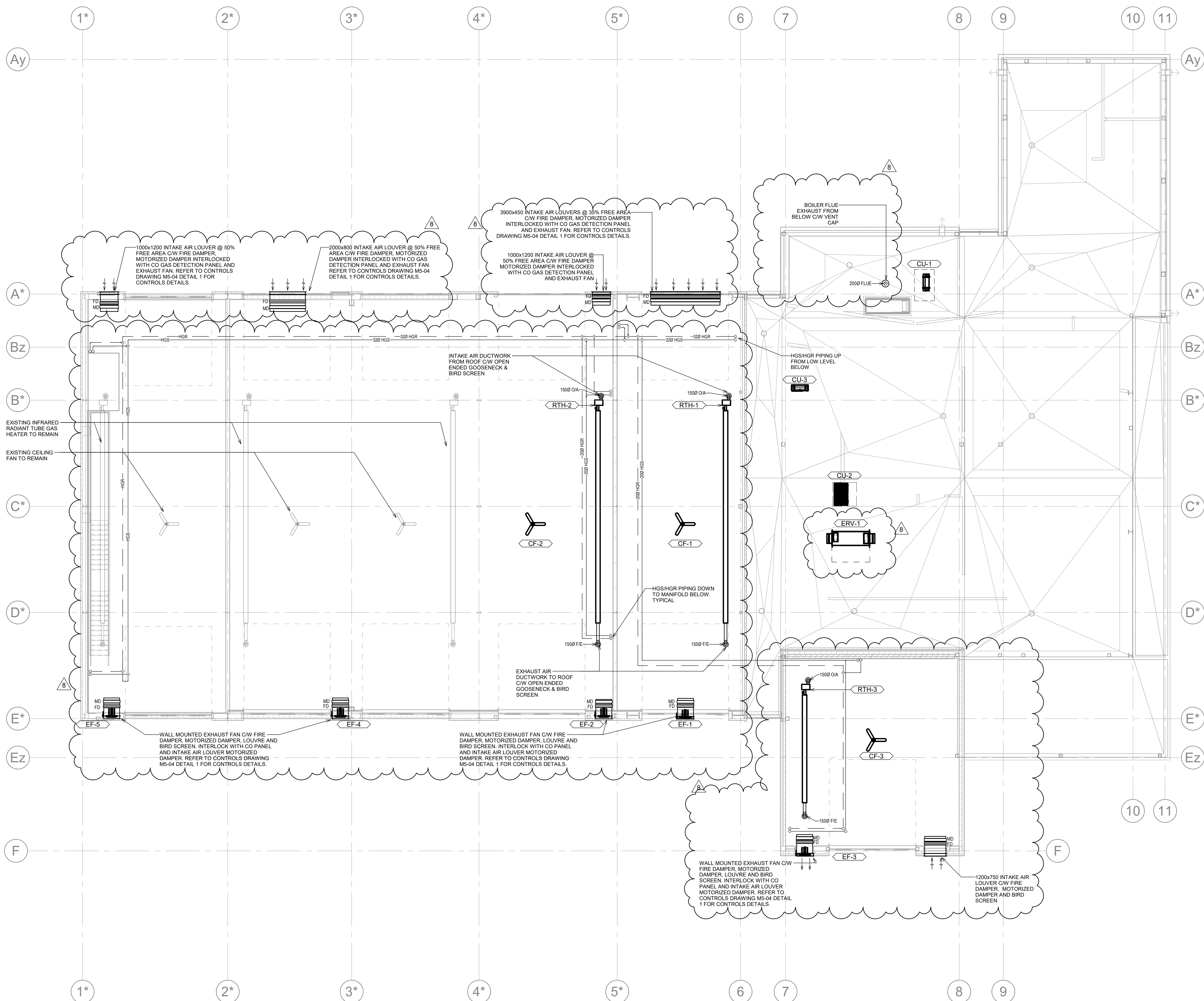
Region of York Project Number	22046	Region of York Building Code	G013-B
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Project  
**YORK REGION NORTH ROADS  
OPERATIONS CENTRE**

6525 BASELINE RD, SUTTON WEST, ON L0E 1R0

Drawing Title  
**LEVEL 2 & LOW ROOF - HVAC  
PLAN**

Project Number	23137	Drawing Number	M2-02
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**HVAC GENERAL NOTES**

NOTE	DESCRIPTION
1.	DUCT ROUTING INDICATES DESIGN INTENT. CONFIRM EXACT ROUTING AND CO-ORDINATE WITH DUCTWORK, PIPING, EQUIPMENT, ELECTRICAL AND STRUCTURE ON SITE. PROVIDE OFFSETS AND ADJUST ROUTING AS REQUIRED.
2.	CO-ORDINATE EXACT TIE-IN AND SHUT DOWN DATES WITH OWNER. PROVIDE A MINIMUM OF ONE WEEK WRITTEN NOTICE PRIOR TO ANY SERVICE INTERRUPTIONS OR SHUT DOWNS.
3.	DUCTWORK SIZES INDICATE CLEAR INSIDE DIMENSIONS.
4.	BALANCE ALL GRILLES AND DIFFUSERS IN PROJECT AREA TO VOLUMES INDICATED.
5.	REFER TO ARCHITECTURAL FOR PROJECT PHASING AND CONSTRUCTION SCHEDULE.
6.	PROVIDE INSULATION FOR ALL DUCTWORK IN ACCORDANCE WITH MECHANICAL SPECIFICATIONS.
7.	PROVIDE DRIP PAN UNDER ALL PIPING IN ELECTRICAL / IT / COMMS ROOMS C/W DRAIN LINE TO CLOSEST MOP SINK OR FUNNEL FLOOR DRAIN.
8.	SCOPE OF WORK TO BE PERFORMED IN A PHASED AND SEQUENTIAL FASHION IN ORDER TO AVOID DISRUPTION TO THE CURRENT CLIENT OPERATIONS. REFER TO ARCHITECTURAL PHASING PLANS FOR DETAILS. CONTRACTOR TO PROPOSE PHASING PLAN ALONG WITH CONSTRUCTION SCHEDULE TO ACCOMMODATE THIS. NO DEMOLITION OF EXISTING MECHANICAL SERVICES ARE TO BE CARRIED OUT WITHOUT SUFFICIENT NOTICE AND CLIENT SIGN-OFF.
9.	ALL HVAC EQUIPMENT INCLUDING EXHAUST FANS AND ROOF TOP EQUIPMENT INSTALLED WITH ADEQUATE CLEARANCES AS PER MANUFACTURER'S RECOMMENDATIONS.
10.	ALL ROOFTOP EQUIPMENT TO BE PLACED ON ISOLATED ROOF CURBS UNLESS NOTED OTHERWISE.
11.	ALL ROOF PENETRATIONS TO BE MADE GOOD.
12.	ALL DUCTWORK ON ROOF TO BE MOUNTED AT MINIMUM 24" ABOVE THE ROOF SURFACE FOR TO ACCOMMODATE FOR SNOW BUILD.
13.	EXACT PLACEMENT OF EQUIPMENT TO BE COORDINATED ON SITE BASED ON EXISTING SITE CONDITIONS.



HVAC GENERAL NOTES	
NOTE	DESCRIPTION
1.	DUCT ROUTING INDICATES DESIGN INTENT. CONFIRM DUCT ROUTING AND CO-ORDINATE WITH DUCTWORK PIPING, EQUIPMENT, ELECTRICAL AND STRUCTURE ON SITE. PROVIDE OFFSETS AND ADJUST ROUTING AS REQUIRED.
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3.	DUCTWORK SIZES INDICATE CLEAR INSIDE DIMENSIONS. INDICATED.
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6.	PROVIDE INSULATION FOR ALL DUCTWORK IN ACCORDANCE WITH MECHANICAL SPECIFICATIONS.
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13.	EXACT PLACEMENT OF EQUIPMENT TO BE CO-ORDINATED ON SITE BASED ON EXISTING SITE CONDITIONS.

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1	ISSUED FOR ADDENDUM #4	2025/07/1
NO	ISSUED FOR	DATE

NO.	ISSUED FOR	DATE
Drawing History		

Scale	Checked By
As indicated	NL

Region of York Project Number      Region of York Building Code

22046	G013-B
Project	

YORK REGION NORTH ROADS  
OPERATIONS CENTRE

3525 BASELINE RD.SUTTON WEST, ON L0E 1R0

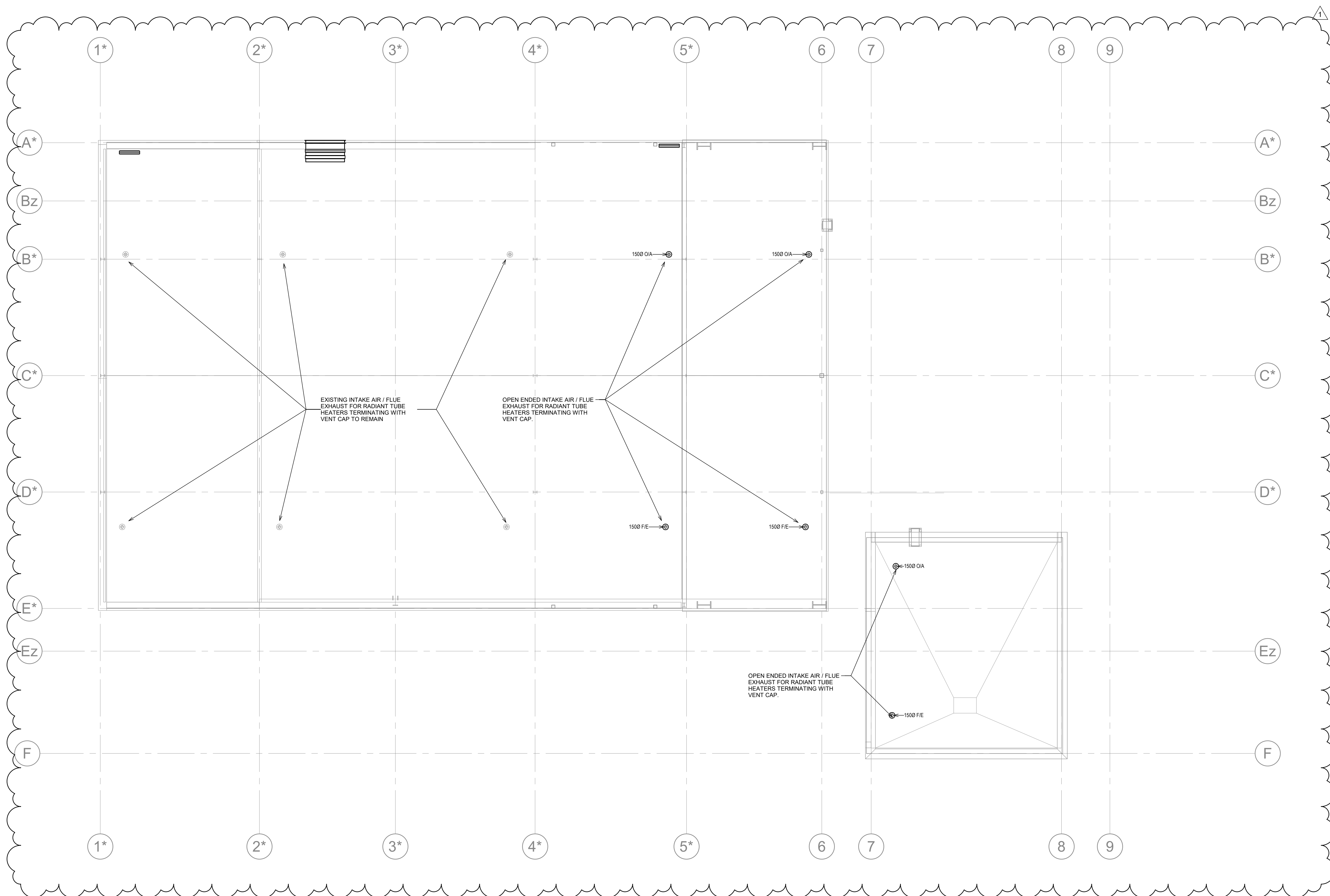
Drawing Title

HIGH ROOF - HVAC PLAN

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Project Number	Drawing Number
23137	M2-03

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1 HIGH ROOF - HVAC  
M2-03 1 : 100

1 : 100

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8	ISSUED FOR ADDENDUM #4	2025/07/18
7	REISSUED FOR TENDER	2025/05/22
6	ISSUED FOR TENDER	2025/04/24/25
5	ISSUED FOR BUILDING PERMIT	2024/11/12
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2	ISSUED FOR 100% DD	2024/02/22/23
1	ISSUED FOR 60% DD	2024/01/12
<b>NO.</b>	<b>ISSUED FOR</b>	<b>DATE</b>

Drawing History

Scale	Checked By
As indicated	NL

Region of York Project Number	Region of York Building Code
22046	G013-B

Project

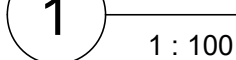
YORK REGION NORTH ROADS  
OPERATIONS CENTRE

3525 BASELINE RD.SUTTON WEST, ON L0E 1R0

Drawing Title

## LEVEL 1 - FIRE PROTECTION PLAN

Project Number  
23137



Drawing History

N.T.S.	NL
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23046 G013 B

22040 GUTS-D

Project

YORK REGION NORTH ROADS

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OPERATIONS CENTRE

OPERATIONS CENTRE

\_\_\_\_\_

3525 BASELINE RD.SUTTON WEST, ON L0E 1R0

Drawing Title

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### AIR DISTRIBUTION SCHEMATIC

[illegible]

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Project Number	Drawing Number
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00407 M4-01

23137 M4-01

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1	ISSUED FOR 60% DD	2024/01/25
NO.	ISSUED FOR	DATE

Drawing History

Scale	Checked By
N.T.S.	NL

Region of York Project Number	Region of York Building Code
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22046 G013-B

Project

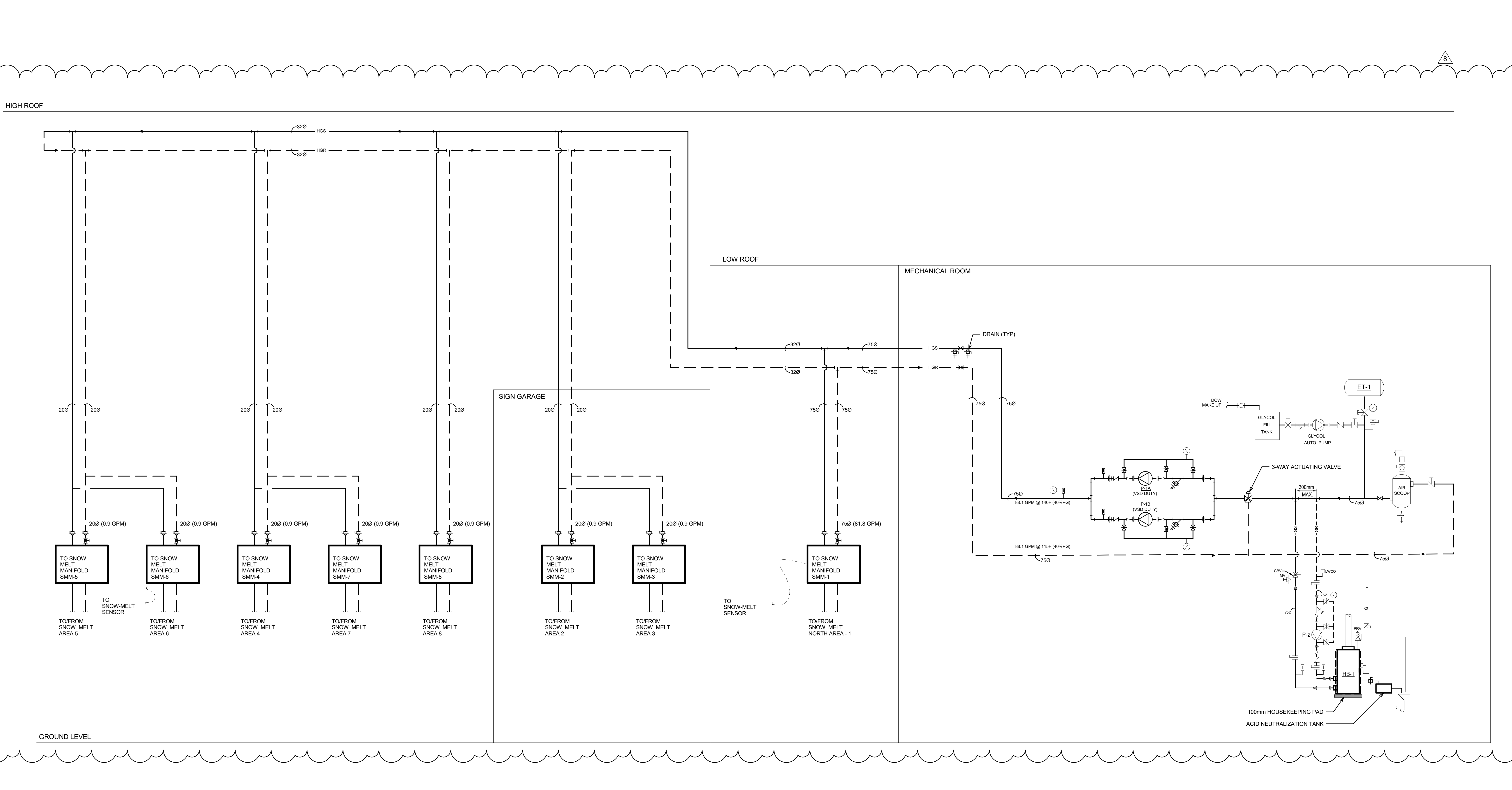
YORK REGION NORTH ROADS  
OPERATIONS CENTRE

6525 BASELINE RD SUTTON WEST, ON L0E 1R0

Drawing Title

HYDRONIC HEATING SCHEMATIC

Project Number	Drawing Number
23137	M4-02



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8	ISSUED FOR ADDENDUM #4	2025/07/11
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6	ISSUED FOR TENDER	2025/04/01
5	ISSUED FOR BUILDING PERMIT	2024/11/11
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2	ISSUED FOR 100% DD	2024/02/11
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<b>NO.</b>	<b>ISSUED FOR</b>	<b>DATE</b>

Drawing History

Scale	Checked By
N.T.S.	NL

Region of York Project Number	Region of York Building Code
22046	G013-B

Project

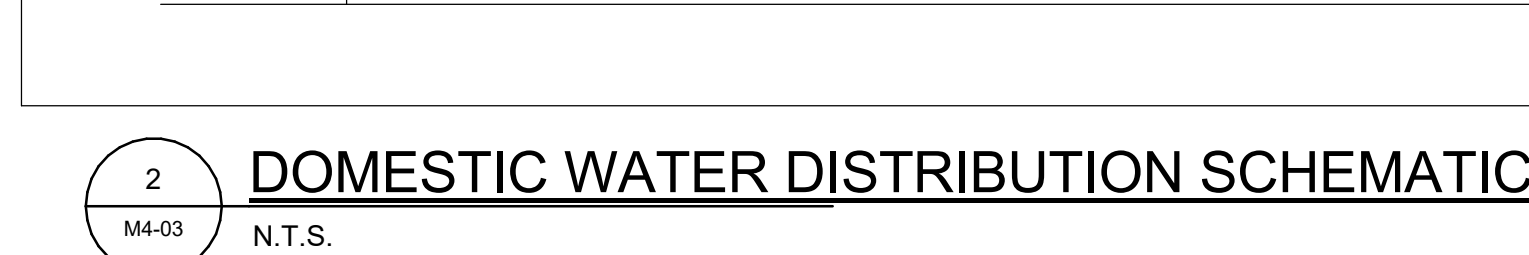
YORK REGION NORTH ROADS  
OPERATIONS CENTRE

3525 BASELINE RD.SUTTON WEST, ON L0E 1R0

Drawing Title

## DOMESTIC COLD & HOT WATER SCHEMATIC

Project Number	Drawing Number
23137	<b>M4-03</b>





Project Team:

Prime Consultant  
**GEC ARCHITECTURE**

Structural Consultant  
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Civil Consultant  
**PLANMAC ENGINEERING**

Passive House Consultant  
**PEEL PASSIVE HOUSE**

LEED Consultant  
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2	ISSUED FOR 100% DD	2024/02/29
1	ISSUED FOR 60% DD	2024/01/25
NO.	ISSUED FOR	DATE

Drawing History

Scale	Checked By
N.T.S.	NL

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**22046**

Region of York Building Code  
**G013-B**

Project

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Drawing Title

**SANITARY DRAINAGE SCHEMATIC**

Project Number

**23137**

Drawing Number

**M4-04**

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HIGH ROOF

LOW ROOF

WASH BAY/  
GARAGE/  
PARTS STORAGE/  
EQUIPMENT ROOM

VENT THROUGH ROOF (TYP.)  
EXISTING AREA DRAINS TO REMAIN

GROUND LEVEL

NOTE: NOT ALL PLUMBING VENTS ARE SHOWN. INSTALL PLUMBING VENTS IN ACCORDANCE WITH ONTARIO BUILDING CODE. COORDINATE VENT ROUTING WITH OTHER DISCIPLINES ON SITE.

8

Project Team:

Prime Consultant  
**GEC ARCHITECTURE**

Structural Consultant  
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1	ISSUED FOR 60% DD	2024/01/25
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**NL**

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**22046**

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Project  
**YORK REGION NORTH ROADS  
OPERATIONS CENTRE**

6525 BASELINE RD SUTTON WEST, ON L0E 1R0

Drawing Title

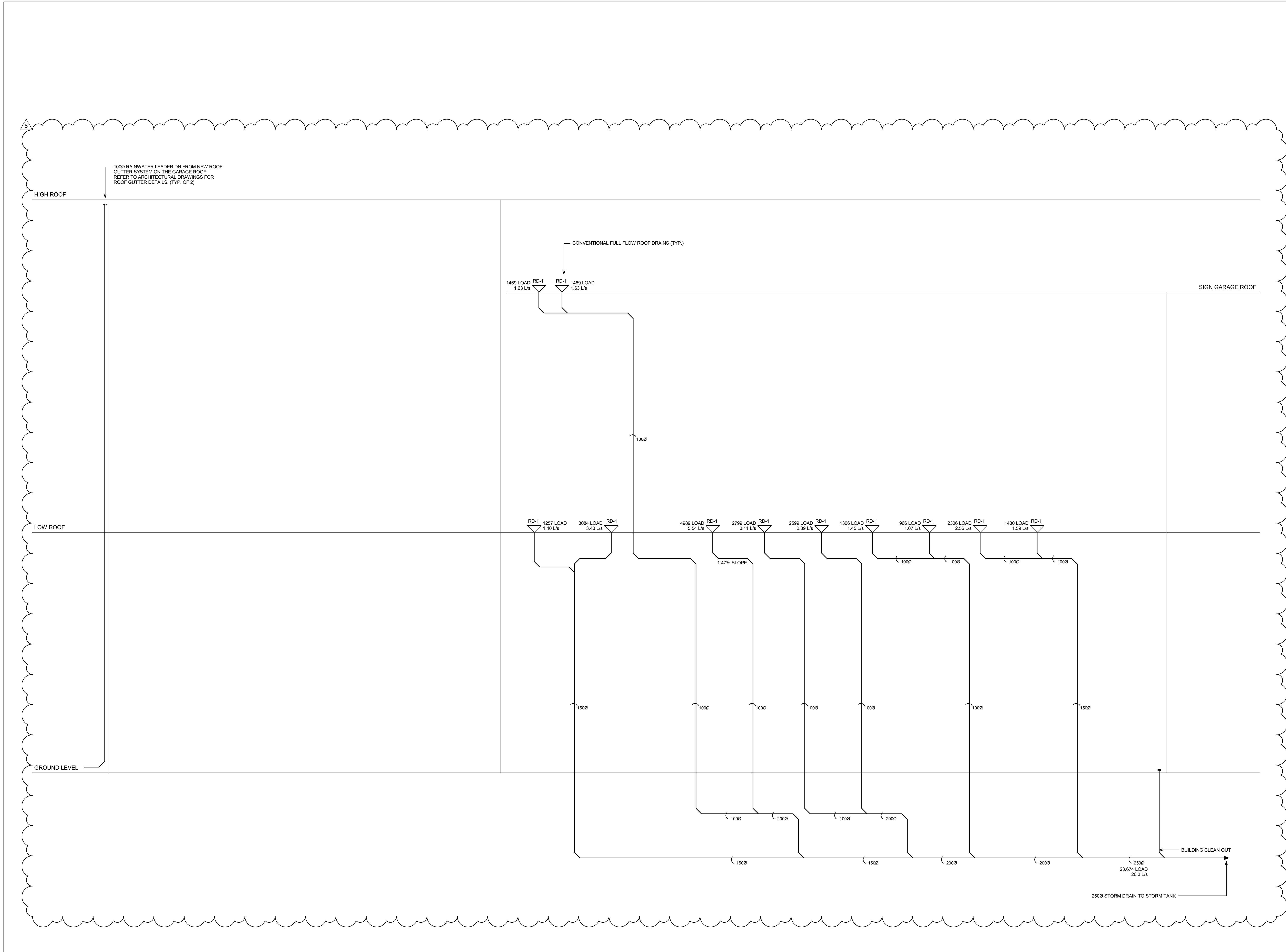
**STORM WATER SCHEMATIC**

Project Number

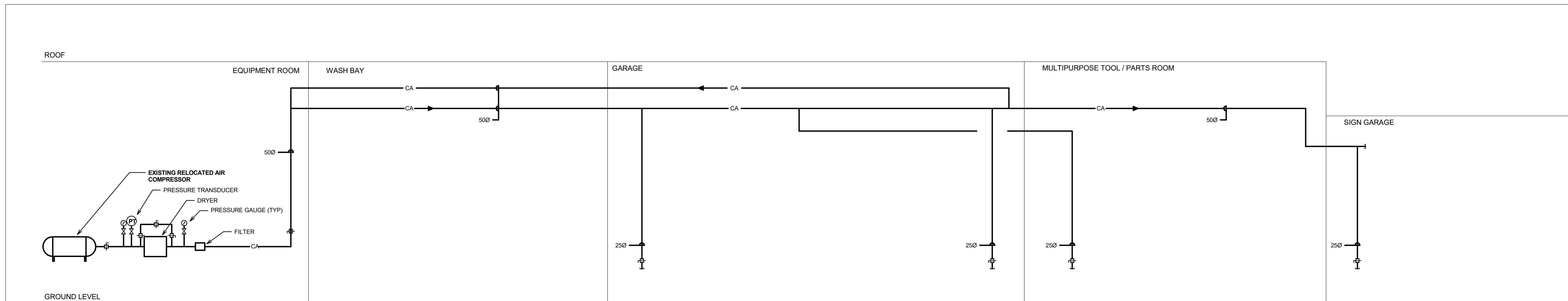
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Drawing Number

**M4-05**

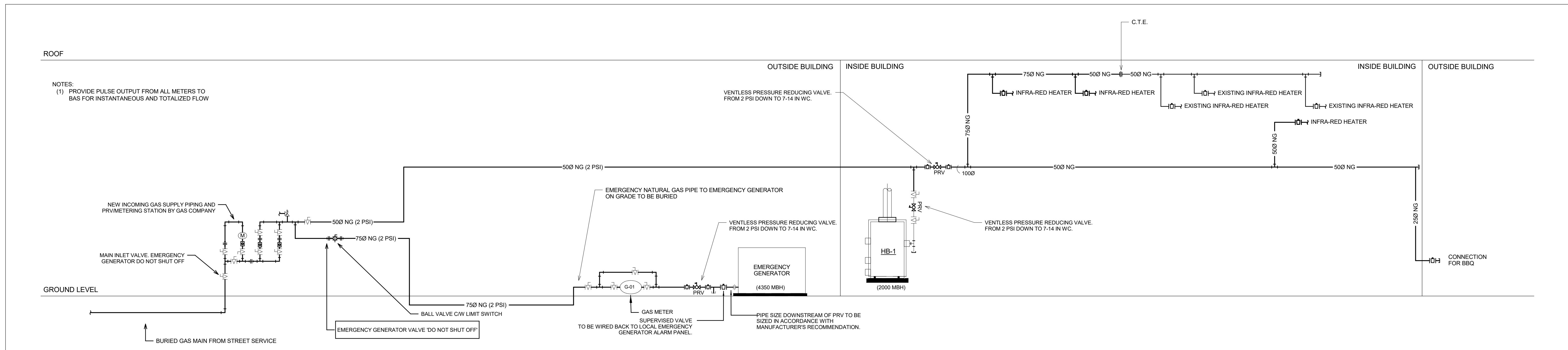


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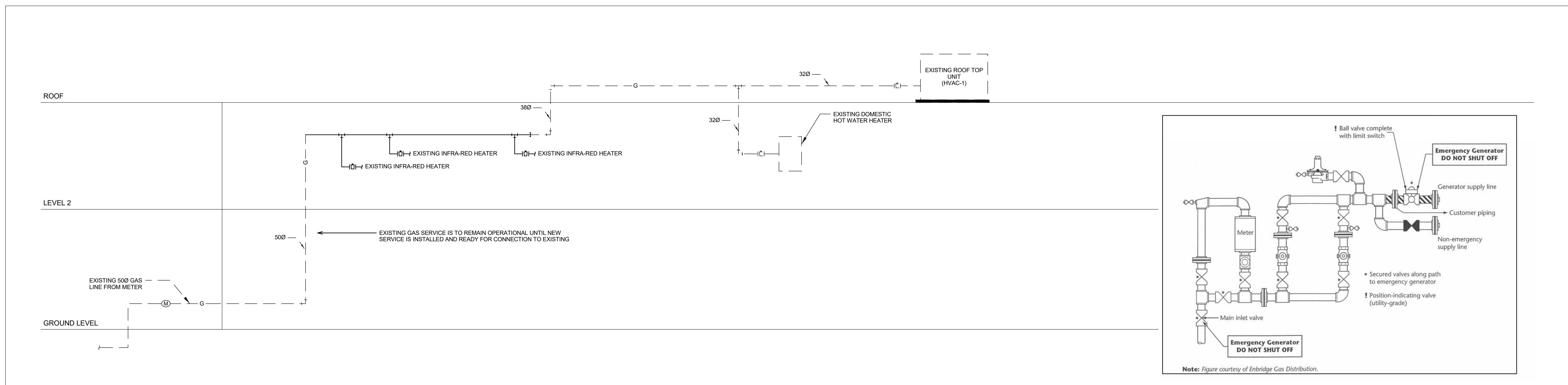
### 3 COMPRESSED AIR SCHEMATIC - NEW WORK

M4-06 N.T.S.



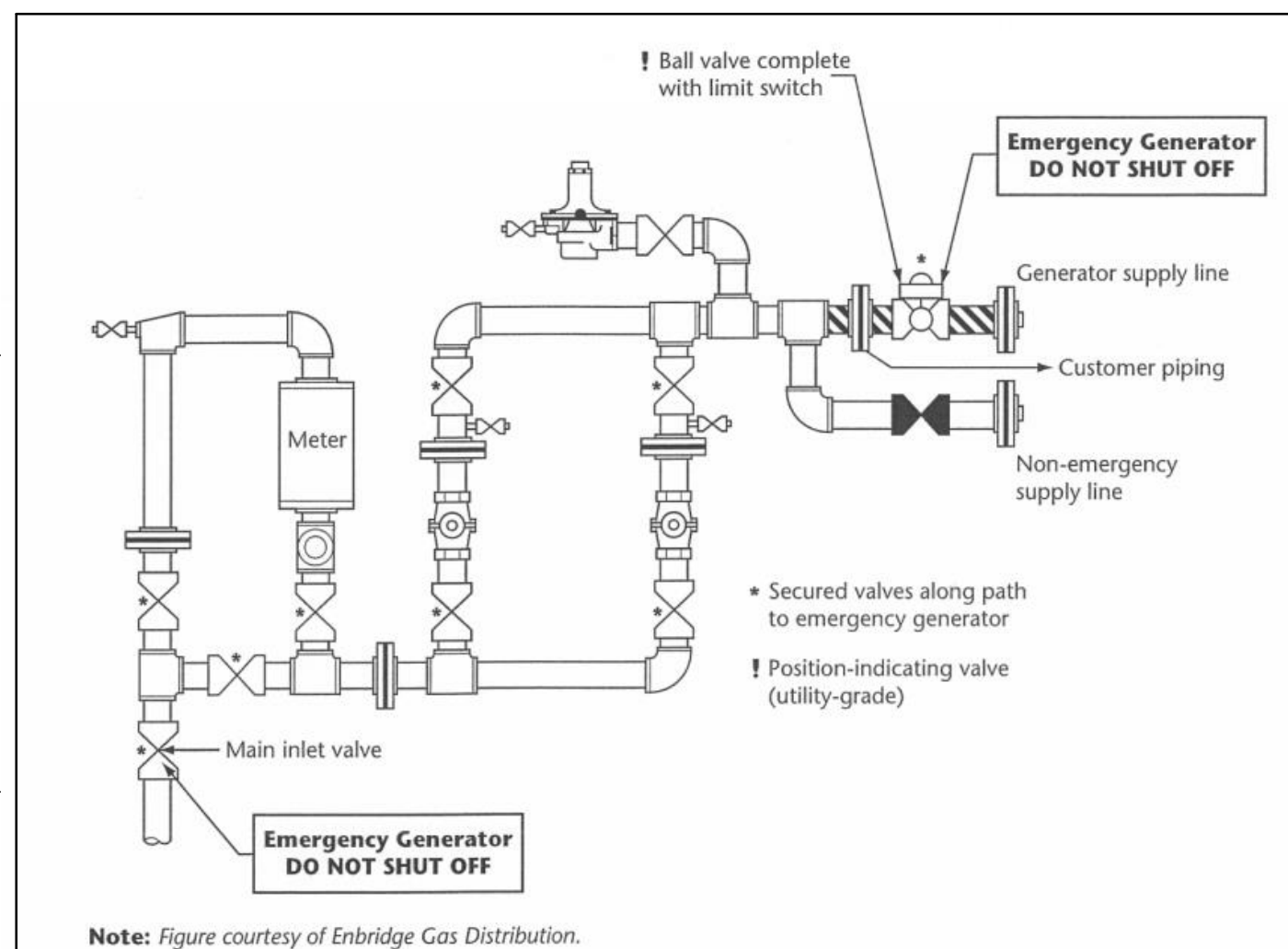
### 2 NATURAL GAS SCHEMATIC - NEW WORK

M4-06 N.T.S.



### 1 NATURAL GAS SCHEMATIC - DEMOLITION

M4-06 N.T.S.



### 4 UTILITY-FED EMERGENCY GENERATOR GAS REGULATOR STATION

M4-06 N.T.S.

Project Team:

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**GEC ARCHITECTURE**

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1	ISSUED FOR 60% DD	2024/01/25
NO.	ISSUED FOR	DATE

Drawing History

Scale  
**N.T.S.**

Checked By  
**NL**

Region of York Project Number  
**22046**

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Drawing Title

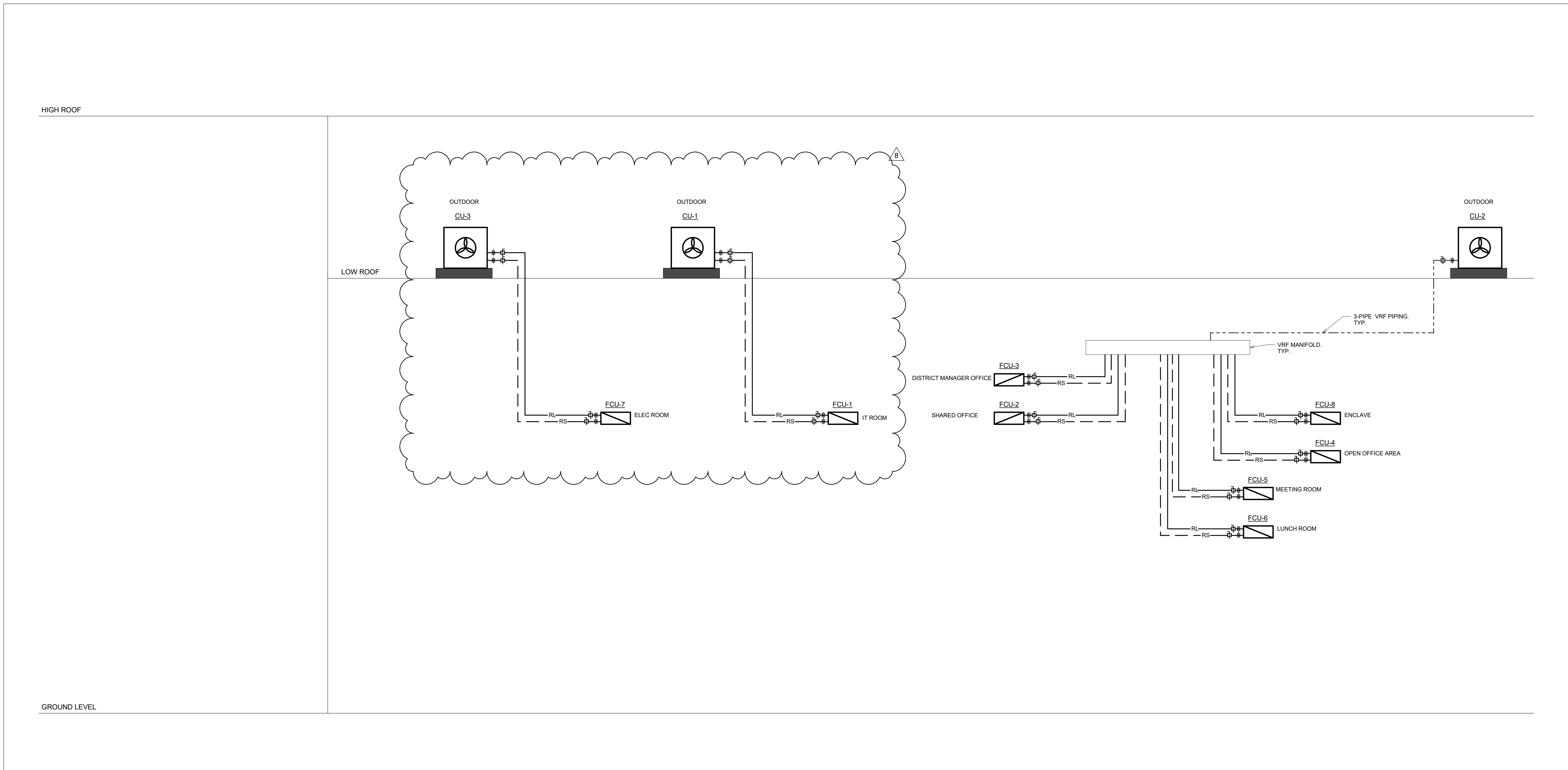
**VRF SCHEMATIC**

Project Number

**23137**

Drawing Number

**M4-08**



Project Team:

Prime Consultant  
**GEC ARCHITECTURE**

Structural Consultant  
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6	ISSUED FOR TENDER	2025/04/22
5	ISSUED FOR BUILDING PERMIT	2024/11/27
4	ISSUED FOR PRE-TENDER REVIEW	2024/10/31
3	ISSUED FOR 60% CD	2024/05/02
2	ISSUED FOR 100% DD	2024/02/29
1	ISSUED FOR 60% DD	2024/01/25
NO.	ISSUED FOR	DATE

Drawing History

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<b>N.T.S.</b>	<b>NL</b>

Region of York Project Number      Region of York Building Code

**22046**      **G013-B**

Project

**YORK REGION NORTH ROADS  
OPERATIONS CENTRE**

6525 BASELINE RD, SUTTON WEST, ON L0E 1R0

Drawing Title

**CONTROL DIAGRAMS 2**

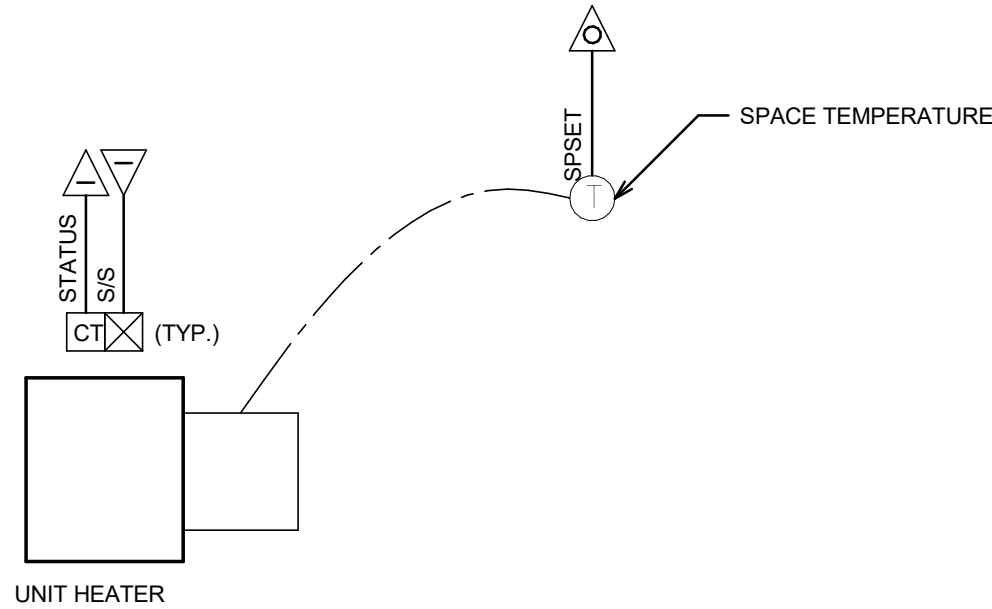
Project Number

**23137**

Drawing Number

**M5-02**

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SEQUENCE OF OPERATION:

APPLIES TO ALL UNIT HEATERS & ENTRANCE HEATERS.

SUMMER MODE:

SUMMER MODE IS ENABLED WHEN THE OUTSIDE AIR TEMPERATURE IS GREATER THAN 16°C (59°F) (OPERATOR ADJUSTABLE).

SIGNAL HEATERS TO MAINTAIN SPACE TEMPERATURE AT SETPOINT (ADJUSTABLE).

WINTER MODE:

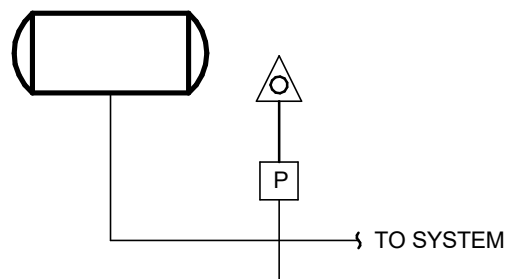
WINTER MODE IS ENABLED WHEN THE OUTSIDE AIR TEMPERATURE IS LESS THAN 14°C (57°F) (OPERATOR ADJUSTABLE).

SIGNAL HEATERS TO MAINTAIN SPACE TEMPERATURE AT SETPOINT (ADJUSTABLE).

## 6 TERMINAL UNITS CONTROL - UNIT HEATERS / ENTRANCE HEATERS

M5-02

SCALE: NTS



SEQUENCE OF OPERATION:

APPLIES TO:

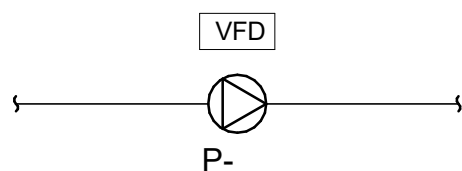
- DOMESTIC COLD WATER EXPANSION TANK
- DOMESTIC HOT WATER EXPANSION TANK
- CHILLED WATER SYSTEM EXPANSION TANK
- AHU-6 CHILLED WATER EXPANSION TANK

PROVIDE PRESSURE SENSOR FOR ALL CLOSED EXPANSION TANKS. REFER TO SCHEDULES FOR TANK PRESSURE SETPOINT. ON SENSING TANK PRESSURE LESS THAN 80% OR MORE THAN 120% OF TANK SET POINT PRESSURE, ALARM BAS.

## 4 EXPANSION TANK

M5-02

SCALE: NTS



SEQUENCE OF OPERATION:

APPLIES TO ALL VARIABLE SPEED SINGLE PUMPS.

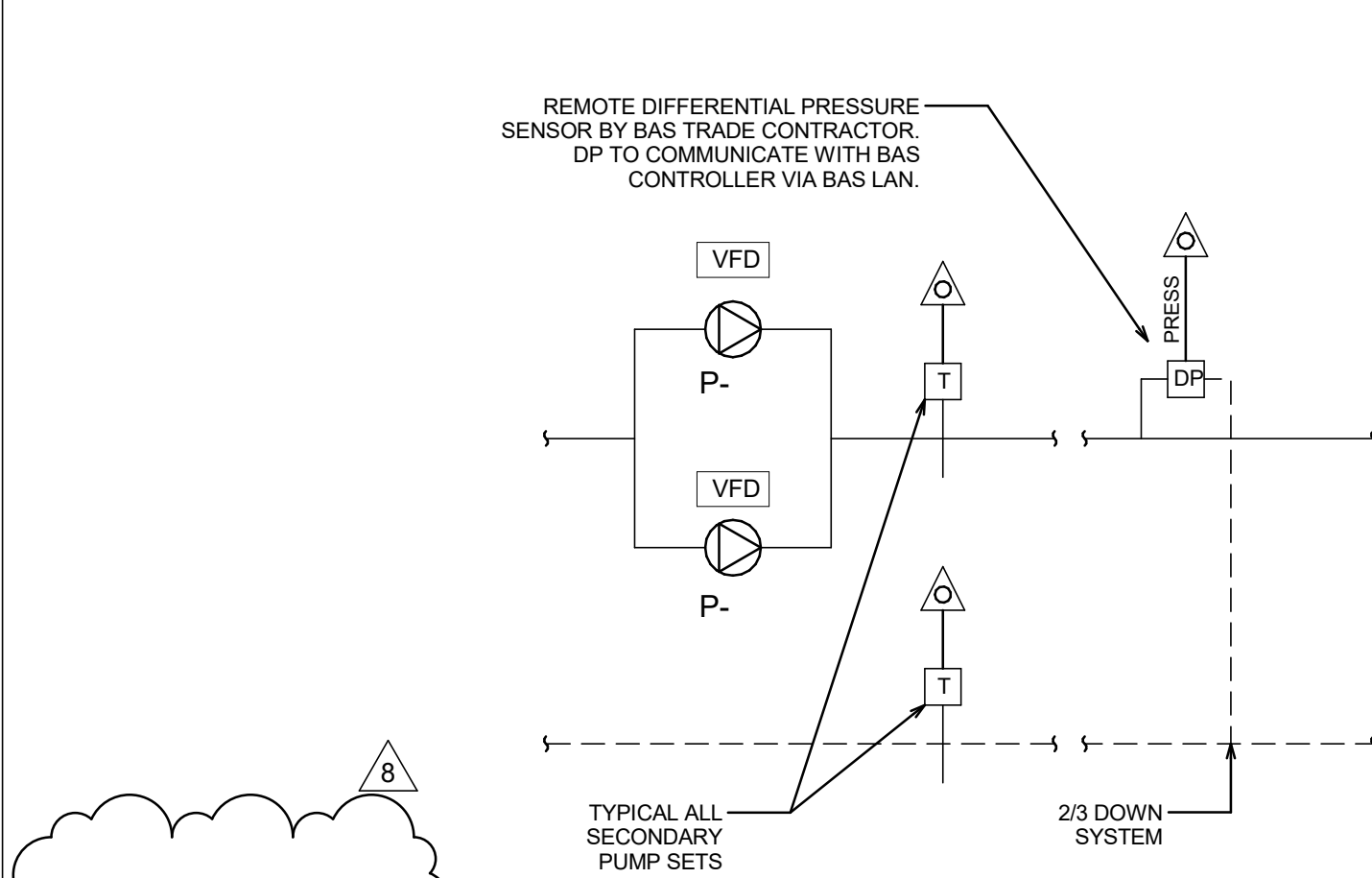
ON CALL TO START PUMP START PUMP; PROVIDE PROOF OF OPERATION AT BAS VIA STARTER CONTACT. WHEN PUMP OPERATES, TOTALIZE RUNNING HOURS FOR MAINTENANCE PURPOSES.

ON 2ND STAGE FIRE ALARM, BAS TO DISABLE PUMP OPERATION. ONCE FIRE ALARM IS RESET, BAS TO ENABLE PUMP THROUGH GLOBAL RE-START COMMAND.

## 2 VARIABLE SPEED PUMPING CONTROL (SINGLE)

M5-02

SCALE: NTS



SEQUENCE OF OPERATION:

APPLIES TO: P-1A/R-1B

PROVIDE PUMP START/STOP AND FAULT STATUS POINTS. PROVIDE DUTY/STANDBY, LEAD/LAG OR DUTY/DUTY STANDBY ON EACH OF THE SYSTEMS.

ON START SIGNAL, START LEAD PUMP AT MINIMUM SPEED (20%). MODULATE PUMP SPEED TO MAINTAIN DIFFERENTIAL PRESSURE AT AN ADJUSTABLE SETPOINT DETERMINED AT THE TIME OF BALANCING. (PROVIDE AN INTERFACE WITH THE PUMP VFD TO ALLOW THE BAS TO SET THE PUMP SPEED. THE INTERFACE SHALL ALSO PROVIDE THE VFD SPEED FEEDBACK TO THE BAS.)

TOTALIZE RUNNING HOURS OF PUMPS (SEPARATELY) FOR MAINTENANCE PURPOSES. ALTERNATE DUTY/STANDBY PUMPS TO EQUALIZE RUN TIME.

WHEN LEAD PUMP IS OPERATING AT 90% FLOW, REDUCE TO 45% FLOW AND START LAG PUMP AT 45% FLOW. MODULATE BOTH PUMPS IN PARALLEL TO MAINTAIN D.P. SETPOINT. IF BOTH PUMPS FALL BELOW 30% FLOW, STOP LAG PUMP AND MODULATE LEAD PUMP SPEED TO MAINTAIN D.P. SETPOINT.

UPON SENSING OF FAILURE OF LEAD PUMP, STOP PUMP, GENERATE ALARM AT BAS AND START STANDBY PUMP.

WHEN THE LEAD PUMP IS OPERATING AT THE LOWEST ACCEPTABLE DRIVE SPEED, THE DIFFERENTIAL BYPASS VALVE CONTROL WILL BE ACTIVATED AND WILL MODULATE TO MAINTAIN PRESSURE SETPOINTS. THIS IS A SECOND STAGE OF PRESSURE CONTROL AND WILL ALSO WORK AS A SAFETY IF THE VARIABLE SPEED SYSTEM IS NOT RESPONDING.

PROVIDE TEMPERATURE SENSORS AT THE SUPPLY AND RETURN OF EACH SYSTEM.

MAXIMUM AND MINIMUM DIFFERENTIAL PRESSURE SET POINTS WILL BE ESTABLISHED IN CONJUNCTION WITH THE WATER BALANCING CONTRACTOR.

VFD'S ARE SPECIFIED TO BE COMPLETE WITH BACNET ETHERNET I/P CARDS AND BOARDS TO ACCEPT I/P CARD. WHERE THE COMMUNICATION CAPABILITY OF THIS I/P CARD CAN REDUCE CONTROL POINTS IDENTIFIED FOR VFD OPERATION ON CONTROL DRAWINGS, POINTS MAY BE ELIMINATED PROVIDED THERE IS NO COMPROMISE TO THE SEQUENCES SPECIFIED AND INFORMATION FEEDBACK REQUESTED AT THE BAS.

OPERATE GLYCOL PUMP SPEED CONTROL ON GLYCOL RETURN WATER TEMPERATURE.

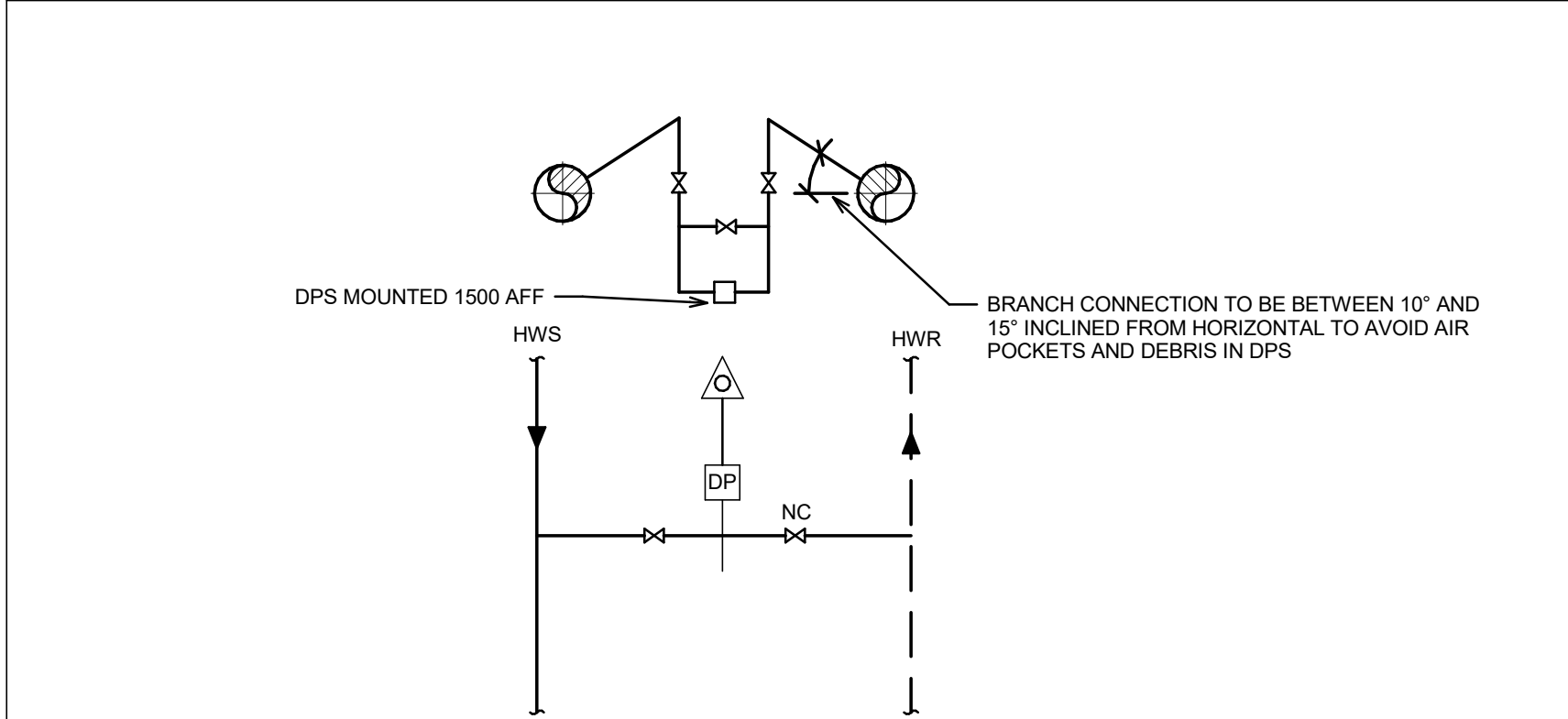
PROVIDE EQUIVALENT STAGING/ALTERNATING FOR TRIPLE PUMP (DUTY/DUTY/STANDBY) CONTROL.

ON 2ND STAGE FIRE ALARM, BAS TO DISABLE PUMP OPERATION. ONCE FIRE ALARM IS RESET, BAS TO ENABLE PUMP THROUGH GLOBAL RE-START COMMAND.

## 1 VARIABLE SPEED PUMPING CONTROL (LEAD/LAG)

M5-02

SCALE: NTS



SEQUENCE OF OPERATION:

REFER TO PUMP AND SYSTEM CURVES FOR DIFFERENTIAL PRESSURE (DP) REQUIRED TO MAINTAIN ALLOWABLE PUMP SPEED. ON DROP IN DIFFERENTIAL PRESSURE SET POINT, INCREASE PUMP VFD SPEED. PROVIDE ALARM AT BAS IF DP EXCEEDS SET POINT BY MORE THAN 15% (ADJUSTABLE). ON INCREASE IN DP, REDUCE PUMP VFD SPEED.

## 3 DIFFERENTIAL PRESSURE SENSOR (DPS)

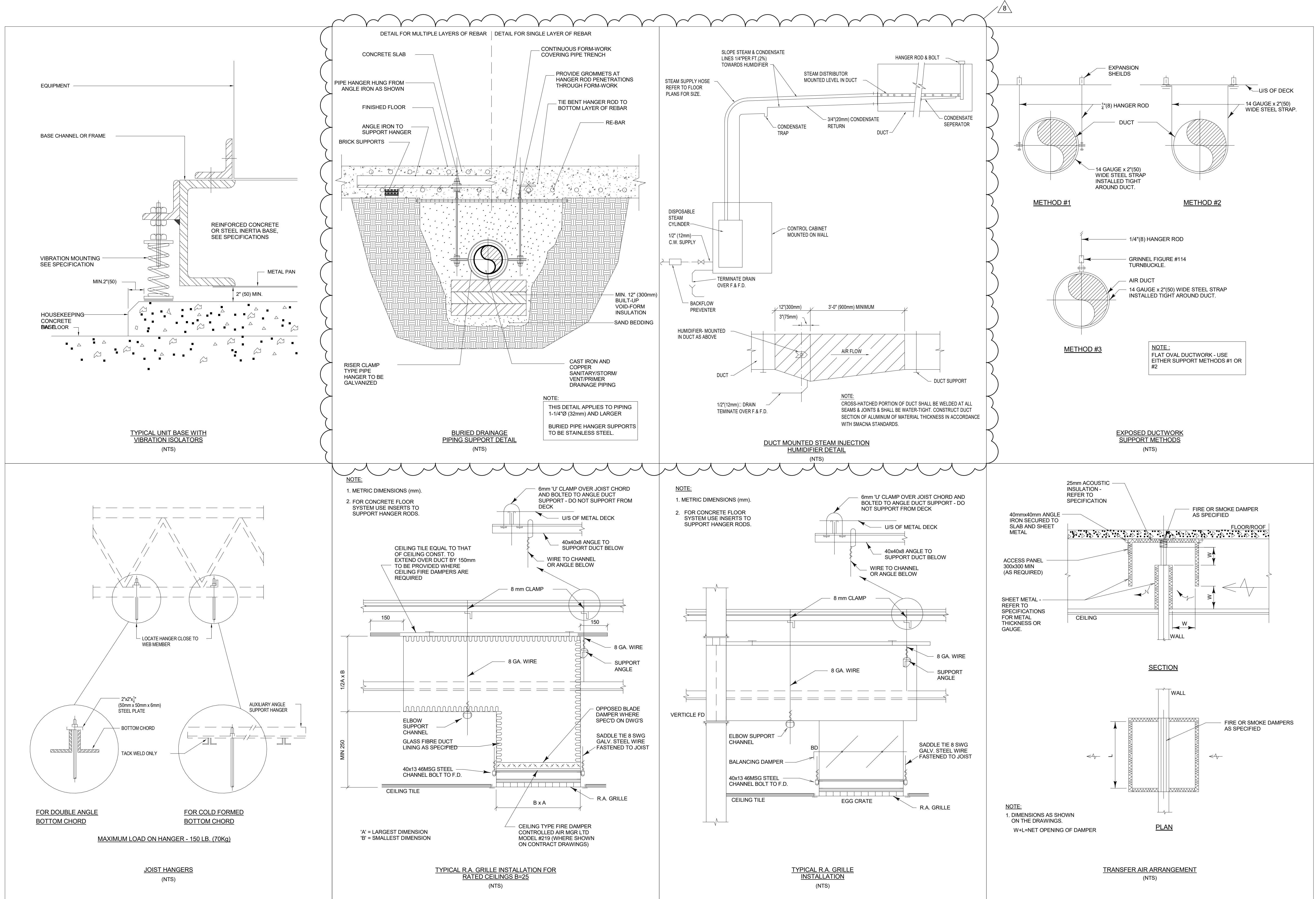
M5-02

SCALE: NTS





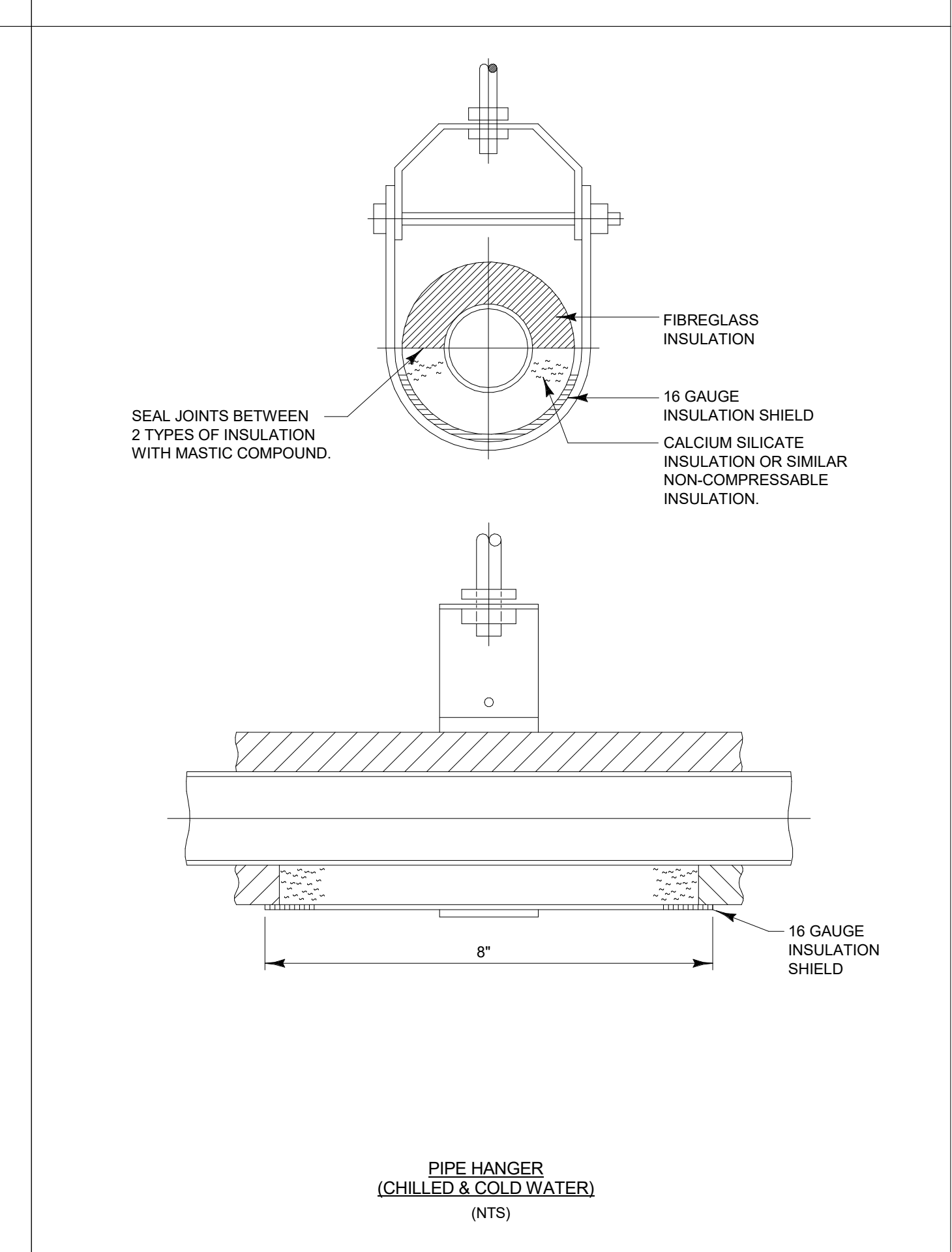
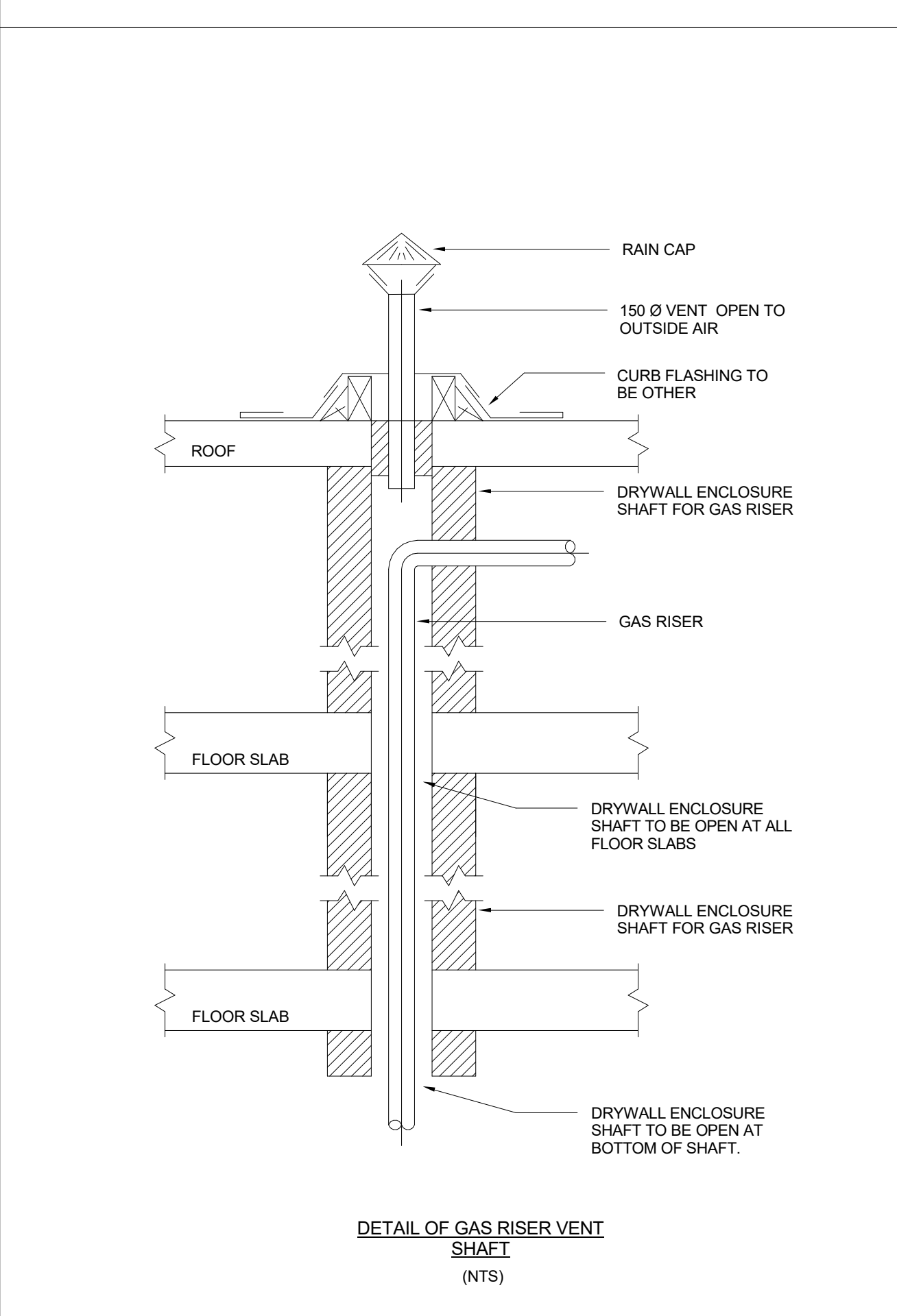
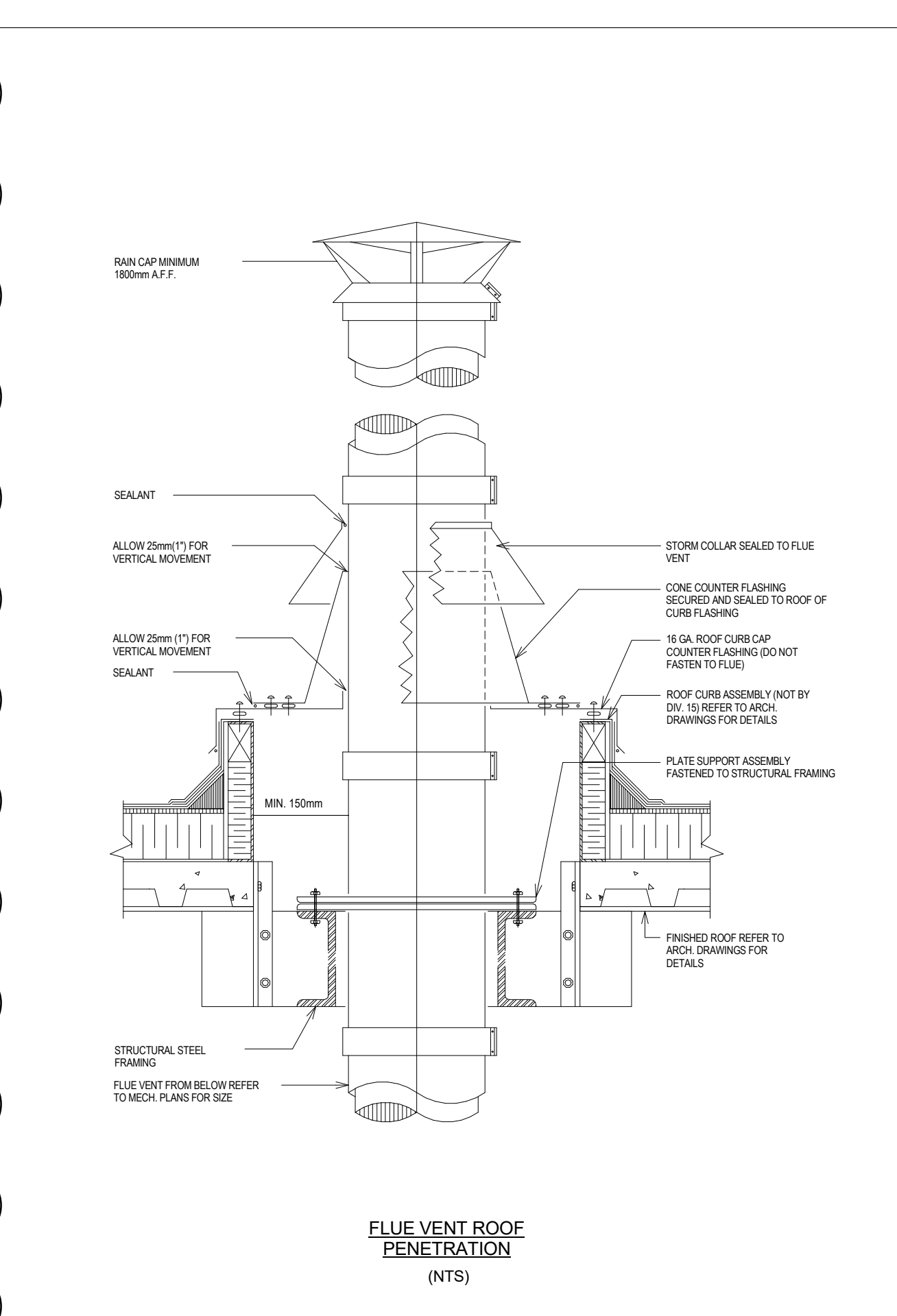
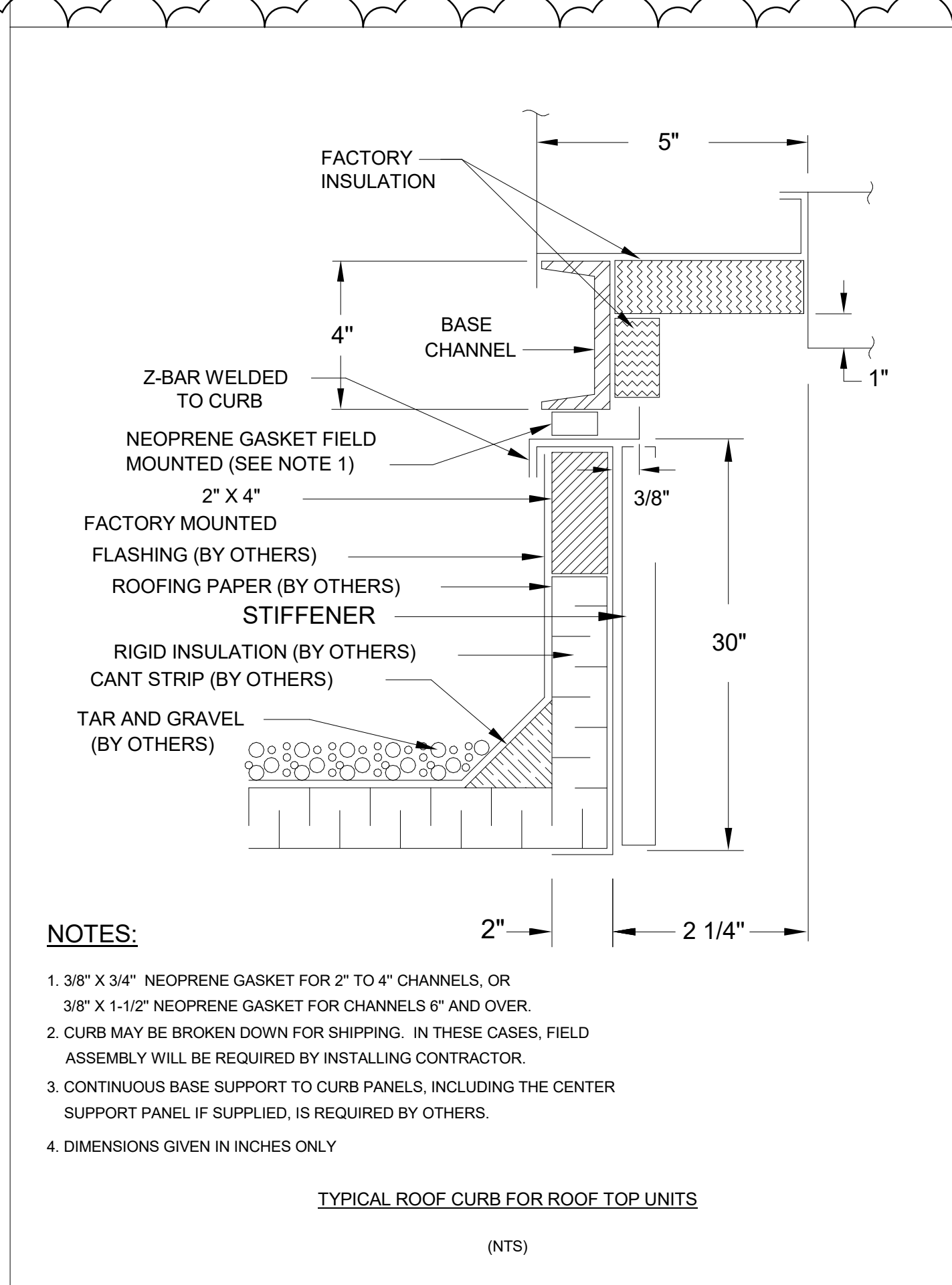




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2	ISSUED FOR 100% DD	2024/02/29
1	ISSUED FOR 60% DD	2024/01/25
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Drawing History	
Scale	Checked By
N.T.S.	NL
Region of York Project Number	Region of York Building Code
22046	G013-B
Project	
YORK REGION NORTH ROADS OPERATIONS CENTRE	
6525 BASELINE RD. SUTTON WEST, ON L0E 1R0	
Drawing Title	
MECHANICAL DETAILS 1	
Project Number	Drawing Number
23137	M6-01

8	ISSUED FOR ADDENDUM #4	2025/07/11
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6	ISSUED FOR TENDER	2025/04/11
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1	ISSUED FOR 60% DD	2024/01/01
<b>NO.</b>	<b>ISSUED FOR</b>	<b>DATE</b>

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Scale	Checked By
N.T.S.	NL

Region of York Project Number      Region of York Building Code

22046 G013-B

Project

**NORTH BRIDGE, NORTH DAKOTA**

YORK REGION NORTH ROADS  
OPERATIONS CENTRE

OPERATIONS CENTRE

3525 BASELINE RD SUTTON WEST ON L OF 180

Drawing Title

**Starting Time**

[illegible]

MECHANICAL DETAILS 4

10. *Journal of the American Medical Association*, 2000; 284: 2689-2695.

Project Number \_\_\_\_\_ Drawing Number \_\_\_\_\_

23137 M6-04

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Project Team:

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1	ISSUED FOR 60% DD	2024/01/25

Drawing History

Scale  
As indicated

Region of York Project Number  
22046

Region of York Building Code  
G013-B

Project

YORK REGION NORTH ROADS  
OPERATIONS CENTRE

6525 BASELINE RD. SUTTON WEST, ON L0E 1R0

Drawing Title

FOUNDATION - PLUMBING &  
DRAINAGE DEMOLITION PLAN

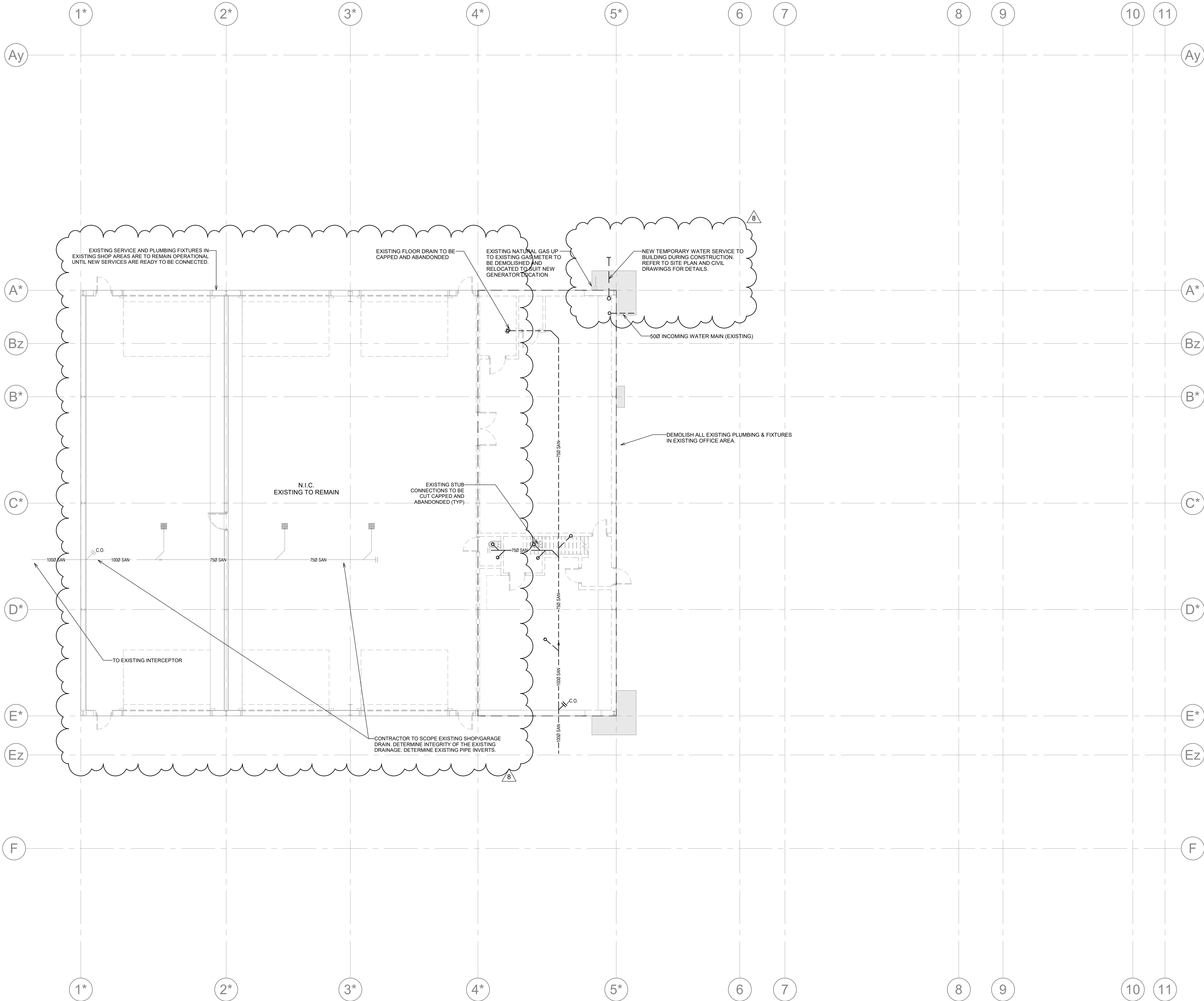
Project Number

23137

Drawing Number

MD1-00

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DEMOLITION PLUMBING GENERAL NOTES	
NOTE	DESCRIPTION
1.	PIPE ROUTING IS SHOWN DIAGRAMMATICALLY BASED ON EXISTING DRAWINGS. CONFIRM EXACT ROUTING ON SITE AND CO-ORDINATE WITH DUCTWORK, PIPING, EQUIPMENT, HANGERS, ELECTRICAL AND STRUCTURE ON SITE.
2.	PLUMBING VENTING NOT SHOWN.
3.	CO-ORDINATE EXACT TIE-IN AND SHUT DOWN DATES WITH OWNER. PROVIDE A MINIMUM OF ONE WEEK WRITTEN NOTICE PRIOR TO ANY SERVICE INTERRUPTIONS OR SHUT DOWNS.
4.	REFER TO ARCHITECTURAL DRAWINGS FOR PHASING PLAN.
5.	SCOPE OF WORK TO BE PERFORMED IN A PHASED AND SEQUENTIAL FASHION IN ORDER TO AVOID DISRUPTION TO THE CURRENT CLIENT OPERATIONS. REFER TO ARCHITECTURAL PHASING PLANS FOR DETAILS. CONTRACTOR TO PROPOSE PHASING PLAN ALONG WITH CONSTRUCTION SCHEDULE TO ACCOMMODATE THIS. NO DEMOLITION OF EXISTING MECHANICAL SERVICES ARE TO BE CARRIED OUT WITHOUT SUFFICIENT NOTICE AND CLIENT SIGN-OFF.
6.	ALL OTHER EXISTING MECHANICAL SERVICES (DOMESTIC WATER) TO REMAIN ACTIVE OR MIGRATED ACCORDINGLY TO ACCOMMODATE CONSTRUCTION PHASING PLANS. REFER TO CIVIL AND ARCHITECTURAL DRAWINGS FOR DETAILS.
7.	ALL EXISTING UNDERGROUND SERVICES TO BE VERIFIED BY THE CONTRACTOR ON SITE. INVERT ELEVATIONS AND DRAIN SCOPING TO BE CARRIED FOR TO CONFIRM PIPE SIZING OF EXISTING SANITARY UNDERGROUND DRAINAGE.

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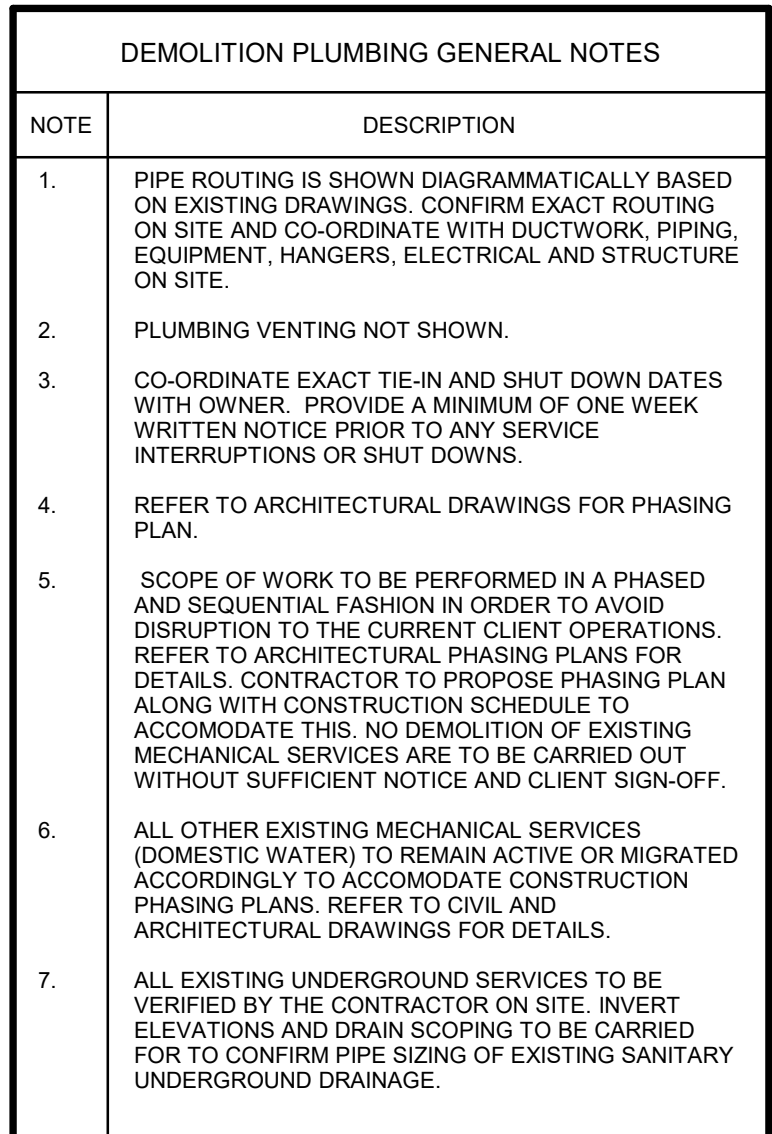
YORK REGION NORTH ROADS  
OPERATIONS CENTRE

3525 BASELINE RD.SUTTON WEST, ON L0E 1R0

Drawing Title

LEVEL 1 - PLUMBING & DRAINAGE  
DEMOLITION PLAN

Project Number	Drawing Number
23137	<b>MD1-01</b>



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2	ISSUED FOR 100% DD	2024/02/29
1	ISSUED FOR 60% DD	2024/01/23
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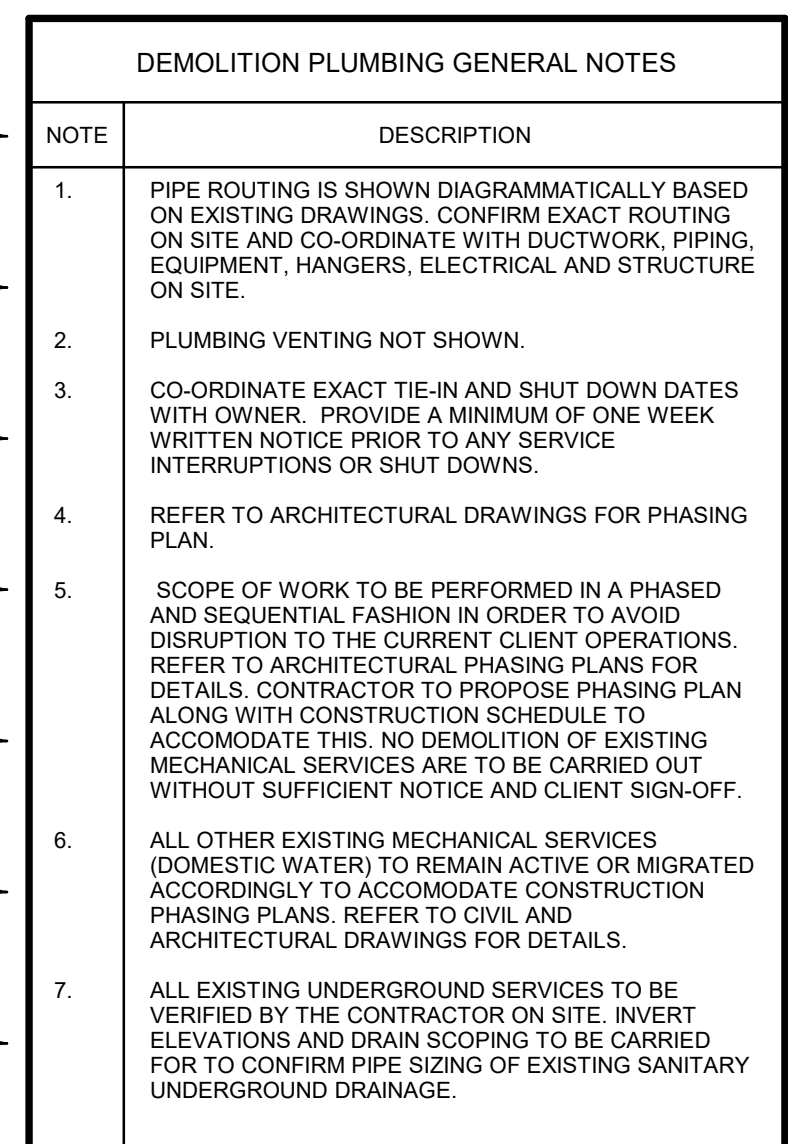
YORK REGION NORTH ROADS  
OPERATIONS CENTRE

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Drawing Title

## LEVEL 2 - PLUMBING & DRAINAGE DEMOLITION PLAN

Project Number	Drawing Number
23137	MD1-02



Project Team:

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22046

Region of York Building Code  
G013-B

Project

YORK REGION NORTH ROADS  
OPERATIONS CENTRE

6525 BASELINE RD. SUTTON WEST, ON L0E 1R0

Drawing Title

LEVEL 1 - HVAC DEMOLITION PLAN

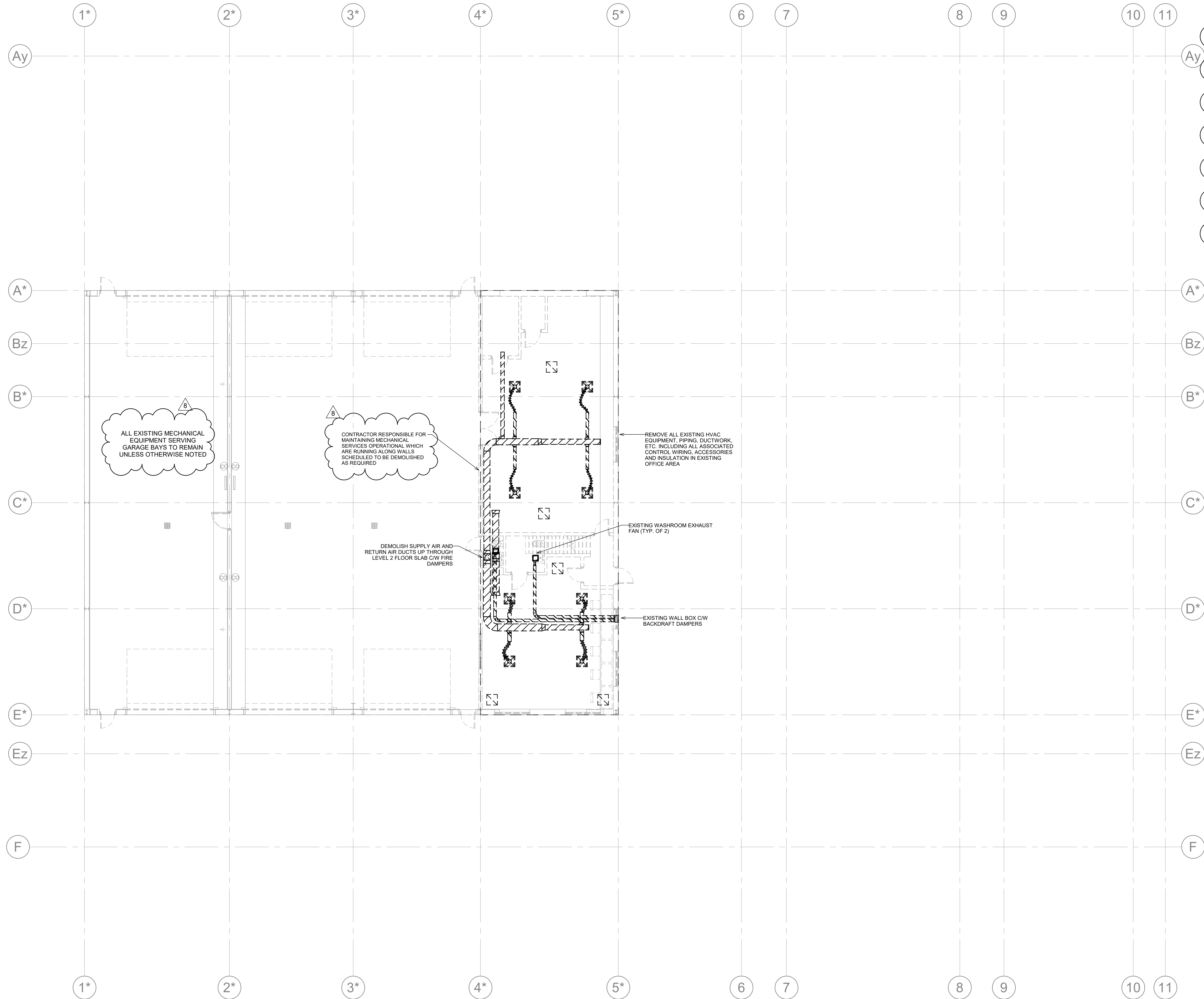
Project Number

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Drawing Number

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1 LEVEL 1 - HVAC DEMO  
1 : 100

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5	ISSUED FOR BUILDING PERMIT	2024/11/12
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2	ISSUED FOR 100% DD	2024/02/22/23
1	ISSUED FOR 60% DD	2024/01/28
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NO.	ISSUED FOR	DATE
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22046	G013-B
Project	

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OPERATIONS CENTRE

3525 BASELINE RD.SUTTON WEST, ON L0E 1R0

Drawing Title

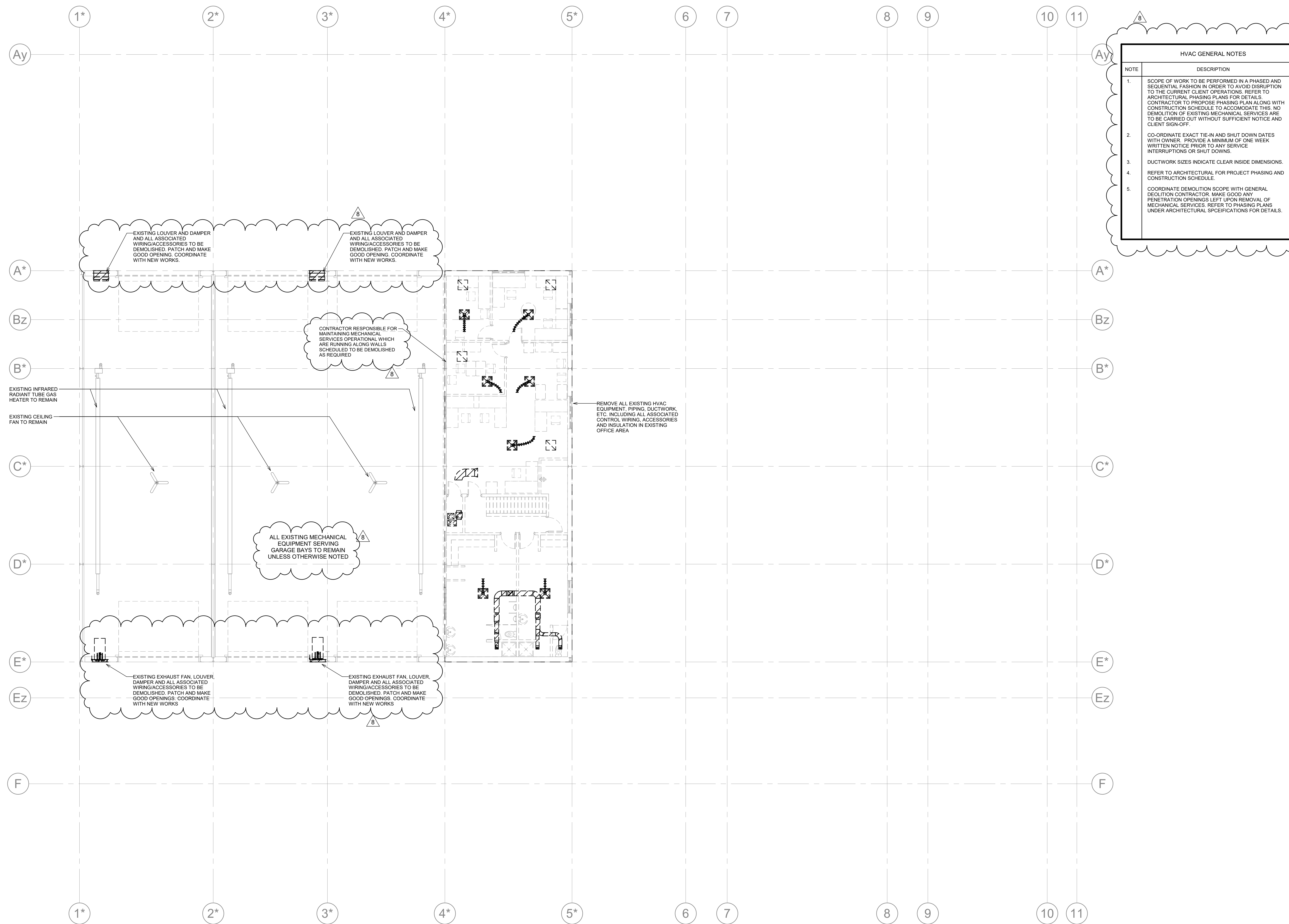
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LEVEL 2 - HVAC DEMOLITION PLAN

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Project Number	Drawing Number
23137	MD2-02

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## LEVEL 2 - HVAC DEMO

1 : 100



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1	ISSUED FOR 60% DD	2024/01/25

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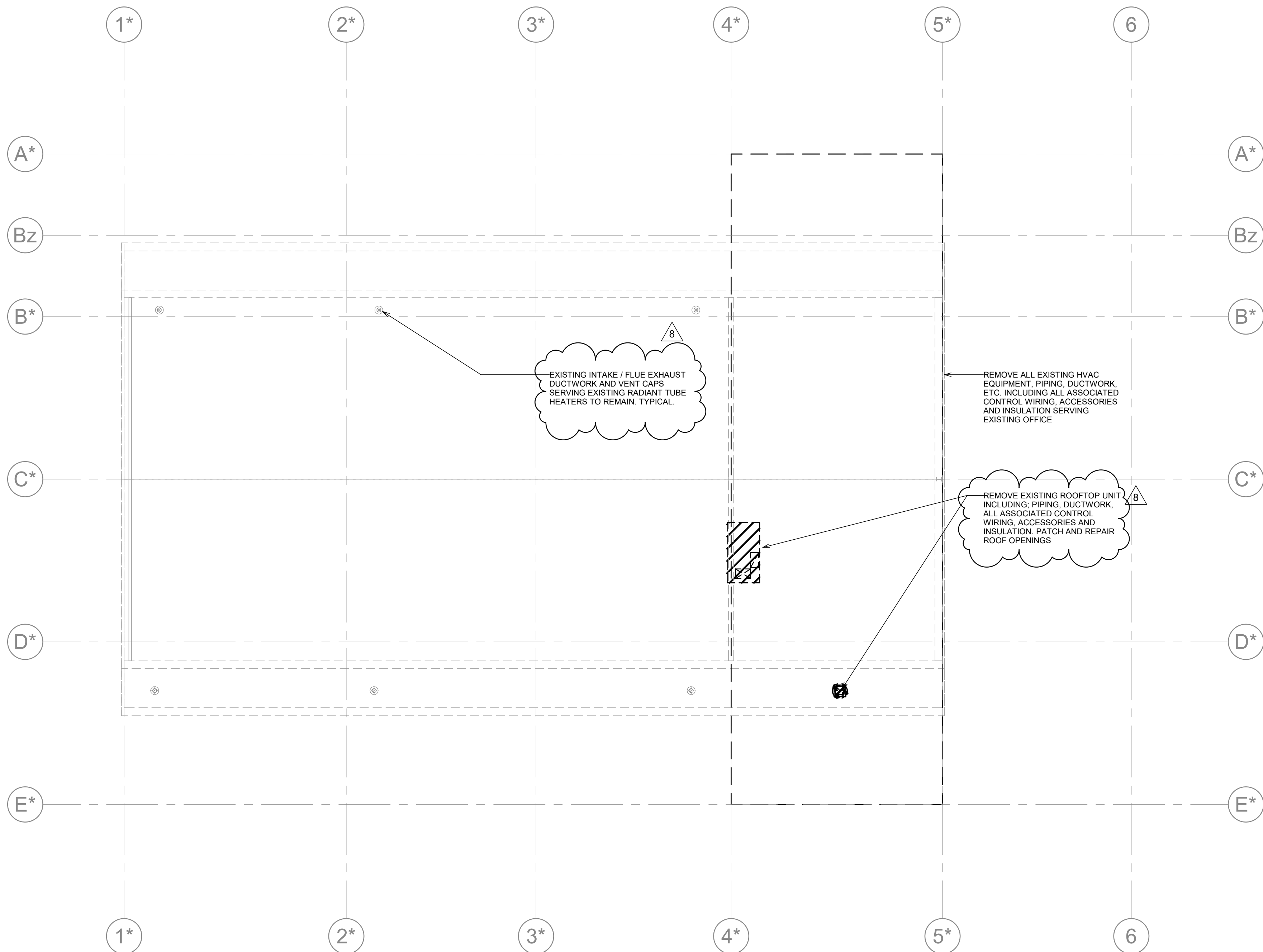
Project YORK REGION NORTH ROADS OPERATIONS CENTRE

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Drawing Title EXISTING ROOF - HVAC DEMOLITION PLAN

Project Number 23137 Drawing Number MD2-03

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1 HIGH ROOF - HVAC DEMO  
1 : 100

## ENERGY RECOVERY VENTILATOR SCHEDULE

REFERENCE	DESCRIPTION	LOCATION	SERVING	SUPPLY AIR		EXH. AIR		SUMMER				WINTER				MANUFACTURER	MODEL	DIMENSIONS LxWxH (IN.)	WEIGHT (LBS.)	POWER SUPPLY							STARTER			CONTROLS			OTHER REQUIREMENTS:		REMARKS:	NOTES:			
				AIRFLOW (CFM)	E.S.P. (IN.WC)	AIRFLOW (CFM)	E.S.P. (IN.WC)	DB / WB (°F)	%RH	DB / WB (°F)	%RH	TOTAL EFFECTIVENESS	DB / WB (°F)	%RH	DB / WB (°F)					%RH	TOTAL EFFECTIVENESS	FLA	MCA	MOP	VOLTS	PHASE	EMERGENCY LS	NLS	SUPPLIED BY:	INSTALLED BY:	TYPE	MANUAL	AUTO.	INTERLOCK BY:			DISC. AT MOTOR	W.P. DISC. AT MOTOR	
ERV-1	ENERGY RECOVERY UNIT	ROOF	OFFICE AREA	900	0.40	900	0.40	85.6 / 70.2	47.2	78.7 / 66.2	52.4		57.2%	5 / 2.2	26.8	47.3 / 37.5	37.4	61.7%	OXYGEN8	NOVA B220U	153x35x54	775	31.86	39.42	40	208	3	-	YES	DIV. 20	DIV. 20	PKG	-	YES	DIV. 20	PLUG	-	CW MERV 13 FILTER ON OUTSIDE AIR SIDE. MAIN POWER TO ELECTRIC PRE-HEAT. WIRING FROM ELECTRIC HEATER TO THE UNIT BY MECHANICAL. CW ROOF CURB. REFER TO SPECIFICATIONS FOR DETAILS.	REFER TO SECTIONS 23 72 00 AND 23 74 20.

## HUMIDIFIER SCHEDULE

REFERENCE	DESCRIPTION	LOCATION	MOISTURE REMOVAL LOAD	SUPPLY AIR	MANUFACTURER	DIMENSIONS LxWxH (IN.)	WEIGHT (LBS.)	STEAM GENERATOR				STEAM DISPERSION				POWER SUPPLY					CONTROLS			REMARKS
			LBS / HR	CFM				MODEL	UNIT QUANTITY	UNIT CAPACITY (LBS/HR)	UNIT OPERATING WEIGHT (LB)	MODEL	UNIT QUANTITY	OPERATING WEIGHT (LBS)	NON-WETTING DISTANCE (IN.)	FLA	VOLTS	PHASE	EMERGENCY LS	NLS	MANUAL	AUTO	INTERLOCK BY:	
HUM-1	ELECTRIC STEAM HUMIDIFIER	GARAGE	8.35	900	STEAM OVAP	13x20x23	74	IER04	1	10.00	120.00	IER04	1	120	-	9.3	208	3	-	YES	-	YES	DIV. 20	CW HIGH-LIMIT HUMIDISTAT. ELECTRIC MODULATING AIRFLOW PROVING SWITCH. ELECTRIC PRESSURE HUMIDITY TRANSMITTER. DISCONNECT SWITCH. HUMIDIFIER TO BE CW/ DRAKE KOOL-TEMPERING TANK OR EQUIPPED WITH EQUIVALENT MEASURES TO ENSURE TEMPERATURE OF CONDENSATE DRAIN IS CODE COMPLIANT.

## ELECTRIC DUCT HEATER SCHEDULE

REFERENCE	DESCRIPTION	LOCATION	SERVING	AIR FLOW (CFM)	DIMENSIONS (in.)			CAPACITY (KW)	DELTA T (°F)	STAGES	MANUFACTURER	MODEL	CONTROLS	POWER SUPPLY					CONTROLS			OTHER REQUIREMENTS			OTHERS	REMARKS:		
					FLA	VOLTS	PHASE							EMERGENCY		MANUAL	AUTO.	INTERLOCK BY:	DISC. AT MOTOR	W.P. DISC. AT MOTOR	F.A. SHUT DOWN							
														LS	NLS													
EDH-1	ELECTRIC DUCT HEATER	LEVEL 1	ERV-1	900	34	25	18	7	25	1	OXYGEN8	ELEC COIL E1	SCR	30.58	208	3	-	YES	-	YES	DIV. 20	-	-	-	-	-	-	HEATERS INTERLOCKED WITH ERV-1 - CW/ AIRFLOW SWITCH. ELECTRONIC DUCT THERMOSTAT (DT) AND REMOTE ADJUSTABLE DUCT SENSOR (RADS) - SCR CONTROLLED BY DUCT TEMPERATURE SENSOR TO MAINTAIN SAT

## PUMP SCHEDULE

REFERENCE	DESCRIPTION	LOCATION	SERVING	OPERATING ARRANGEMENT	FLOW (US GPM)	HEAD (FT.HD)	RPM	MANUFACTURER	MODEL	TYPE / SIZE	MOTOR SIZE		POWER SUPPLY				STARTER			CONTROLS			OTHER REQUIREMENTS			REMARKS:	NOTES:
											HP	BHP	VOLTS	PHASE	EMERGENCY		SUPPLIED BY:	INSTALLED BY:	TYPE	MANUAL	AUTO.	INTERLOCK BY:	W.P. DISC. AT MOTOR	DISC. AT MOTOR	F.A. SHUT.		
															LS	NLS											
P-1A	GLYCOL DISTRIBUTION PUMP	MECHANICAL ROOM	SNOW-MELT	DUTY	87	50	-	GRUNDFOS	TP 50-2302 A-G-A	INLINE	2	1.71	600	3	-	YES	DIV. 20	DIV. 20	VFD	-	YES	DIV. 20	-	YES	-		
P-1B	GLYCOL DISTRIBUTION PUMP	MECHANICAL ROOM	SNOW-MELT	STANDBY	87	50	-	GRUNDFOS	TP 50-2302 A-G-A	INLINE	2	1.71	600	3	-	YES	DIV. 20	DIV. 20	VFD	-	YES	DIV. 20	-	YES	-		
P-2	BOILER CIRCULATOR PUMP	MECHANICAL ROOM	SNOW-MELT	DUTY	90	15	-	GRUNDFOS	UPS 40-180/2	INLINE	1.5	0.83	600	3	-	YES	DIV. 20	DIV. 20	ECM	-	YES	DIV. 20	-	YES	-		
P-3	DOMESTIC HOT WATER RECIRCULATION PUMP	MECHANICAL ROOM	DOMESTIC HOT WATER SYSTEM	DUTY	2	10	-	GRUNDFOS	ALPHA CS 15-55	CIRCULATOR	1/2	0.018	120	1	-	YES	DIV. 20	DIV. 20	ECM	-	YES	DIV. 20	-	YES	-	ALL BRONZE CONSTRUCTION.	

## TANKS / EXPANSION VESSELS SCHEDULE

REFERENCE	DESCRIPTION	LOCATION	SERVING	TYPE	DIMENSIONS (IN.)			MAX. WORKING PRESSURE (PSI)	TANK CAPACITY (GAL.)	ACCEPTANCE CAPACITY (GAL.)	MANUFACTURER	MODEL	ELECTRIC HEATER	POWER SUPPLY			STARTER			CONTROLS			OTHER REQUIREMENTS			REMARKS:	NOTES:		
					LxWxH	DIA.	WEIGHT (LBS)							KW	VOLTS	PHASE	EMERGENCY LS    NLS	SUPPLIED BY:	INSTALLED BY:	TYPE	MANUAL	AUTO.	INTERLOCK BY:	DISC. AT MOTOR	W.P. DISC. AT MOTOR			F.A. SHUT DOWN	
TANKS																													
DHW1-1	DOMESTIC HOT WATER TANK	MECHANICAL ROOM	DOMESTIC	ELECTRIC WATER HEATER	62" HIGH	30	350	150	120	-	AO SMITH	DRE-120A-18	18	600	3	-	YES	DIV. 20	DIV. 20	PKG	-	YES	DIV. 20	YES	-	-	REFER TO SECTION 22 30 05		
DHW1-1	TANKLESS ELECTRIC DOMESTIC HOT WATER HEATER	LUNCH ROOM	KITCHEN SINK	TANKLESS ELECTRIC WATER HEATER	7x18x16	-	26	150	-	-	CHRONOMITE	ER-43L800	25.60	600	3	-	YES	DIV. 22	DIV. 22	PKG	-	YES	DIV. 20	YES	-	-			C/W 104°F (40°C) FACTORY PRESET
DHW1-2	DOMESTIC HOT WATER TANK	GARAGE 101	EYE WASH	ELECTRIC WATER HEATER	32" HIGH	22	145	160	20	-	AO SMITH	DSE-20A-9	9.00	208	3	-	YES	DIV. 22	DIV. 22	PKG	-	YES	DIV. 20	YES	-	-			
DHW1-3	DOMESTIC HOT WATER TANK	WASH BAY 100	EYE WASH	ELECTRIC WATER HEATER	32" HIGH	22	145	160	20	-	AO SMITH	DSE-20A-9	9.00	208	3	-	YES	DIV. 22	DIV. 22	PKG	-	YES	DIV. 20	YES	-	-			
DHW1-4	DOMESTIC HOT WATER TANK	MULTIPURPOSE 101A	SINK	ELECTRIC WATER HEATER	22" HIGH	22	73	150	19	-	AO SMITH	DEL-20-3	3.00	208	1	-	YES	DIV. 22	DIV. 22	PKG	-	YES	DIV. 20	YES	-	-			
BT-1	DOMESTIC WATER BUFFER TANK	MECHANICAL ROOM	DOMESTIC WATER SYSTEM	VERTICAL STORAGE TANK	91" HIGH	30	602	125	211	211	AMTROL	WX-452	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
EXPANSION VESSELS																													
ET-1	GLYCOL HEATING LOOP EXPANSION TANK	MECHANICAL ROOM	SNOW MELT	VERTICAL DIAPHRAGM	48" HIGH	21	112	100	62	25	WATTS	ETBX-110	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
ET-2	DOMESTIC HOT WATER EXPANSION TANK	MECHANICAL ROOM	DHW LOOP	VERTICAL DIAPHRAGM	18" HIGH	12	26	150	6.40	3.20	AMTROL	ST-77C-DD	-	-	-	-	-	-	-	-	-	-	-	-	-	-			

## ELECTRIC ENTRANCE AND UNIT HEATER SCHEDULE

REFERENCE	DESCRIPTION	LOCATION	HEATING CAPACITY (MBH)	SUPPLY AIR (CFM)	ARRANGEMENT/CONFIGURATION				MANUFACTURER	MODEL	MOTOR SIZE (HP)	ELECTRIC HEATING ELEMENT (KW)	POWER SUPPLY				STARTER			CONTROLS			OTHER REQUIREMENTS			REMARKS:	NOTES:	
					CEILING / WALL	FULLY RECESSED	SEMI RECESSED	SURFACE					VOLTS	PHASE	EMERGENCY		SUPPLIED BY:	INSTALLED BY:	TYPE	MANUAL	AUTO.	INTERLOCK BY:	DISC. AT MOTOR	W.P. DISC. AT MOTOR	F.A. SHUT DOWN			
															LS	NLS												
ENTRANCE HEATERS																												
EH-1	ELECTRIC ENTRANCE HEATER	NORTH VESTIBULE	20.5	200	WALL				X	OUELLET	OCA06038	1 1/2	6	208	3	-	YES	DIV. 20	DIV. 20	PKG	-	YES	DIV. 20	-	-	-	CW REMOTE WALL-MOUNTED THERMOSTAT	REFER TO SECTION 23 82 39.
EH-2	ELECTRIC ENTRANCE HEATER	EAST VESTIBULE	20.5	200	WALL				X	OUELLET	OCA06038	1 1/2	6	208	3	-	YES	DIV. 20	DIV. 20	PKG	-	YES	DIV. 20	-	-	-	CW REMOTE WALL-MOUNTED THERMOSTAT	
EH-3	ELECTRIC ENTRANCE HEATER	SOUTH EXIT	20.5	200	CEILING	X				OUELLET	OCA06038	1 1/2	6	208	3	-	YES	DIV. 20	DIV. 20	PKG	-	YES	DIV. 20	-	-	-	CW REMOTE WALL-MOUNTED THERMOSTAT & RECESS TRIM KIT.	
UNIT HEATERS																												
UH-1	ELECTRIC UNIT HEATER	PARTS RM SOUTH	34.12	700	CEILING					OUELLET	OASU10038AM	1 1/2	10	208	3	-	YES	DIV. 20	DIV. 20	PKG	-	YES	DIV. 20	-	-	-	CW REMOTE WALL-MOUNTED THERMOSTAT	
UH-2	ELECTRIC UNIT HEATER	PARTS RM NORTH	34.12	700	CEILING					OUELLET	OASU10038AM	1 1/2	10	208	3	-	YES	DIV. 20	DIV. 20	PKG	-	YES	DIV. 20	-	-	-	CW REMOTE WALL-MOUNTED THERMOSTAT	
UH-3	ELECTRIC UNIT HEATER	MECHANICAL RM	34.12	700	CEILING					OUELLET	OASU10038AM	1 1/2	10	208	3	-	YES	DIV. 20	DIV. 20	PKG	-	YES	DIV. 20	-	-	-	CW REMOTE WALL-MOUNTED THERMOSTAT	

## HEATING BOILER SCHEDULE

REFERENCE	DESCRIPTION	LOCATION	SERVING	INPUT (MBH)	OUTPUT (MBH)	OPERATING PRESSURE MAX. (PSI)	DESIGN OPERATING TEMPERATURE °F		FLUID	FLOW (GPM)	PRESSURE DROP (FT.HD)	DIMENSIONS (IN.)		MANUFACTURER	MODEL	POWER SUPPLY					STARTER			CONTROLS			OTHER REQUIREMENTS			REMARKS:	NOTES:	
							SUPPLY	RETURN				LxWxH	OP. WEIGHT (LBS)			MCA	MOP	VOLTS	PHASE	EMERGENCY												
																				LS	NLS	SUPPLIED BY:	INSTALLED BY:	TYPE	MANUAL	AUTO.	INTERLOCK BY:	DISC. AT MOTOR	W.P. DISC. AT MOTOR			F.A. SHUT DOWN
HB-1	GAS FIRED CONDENSING BOILER	MECHANICAL ROOM	SNOW-MELT	1,200	1,020	160	140	115	40% PG	90	6	46x34x66	1,500	NTI	FTG 1200	12	15	120	1	-	YES	DIV. 20	DIV. 20	PKG	-	YES	DIV. 20	-	-	-		REFER TO SECTION 23 52 00.

## RADIANT TUBE HEATER SCHEDULE

REFERENCE	DESCRIPTION	LOCATION	SERVING	MIN. / MAX. GAS TRAIN INLET PRESSURE (IN.WC)	GAS INPUT HIGH / LOW (MBH)	LENGTH (FT.)	WEIGHT (LBS)	FLUE / VENT CONNECTION DIAMETER (IN.)	CONFIGURATION	MANUFACTURER	MODEL	POWER SUPPLY					STARTER			CONTROLS			OTHER REQUIREMENTS			REMARKS:	NOTES:	
												FLA	VOLTS	PHASE	EMERGENCY		SUPPLIED BY	INSTALLED BY	TYPE	MANUAL	AUTO	INTERLOCK BY	DISC. AT MOTOR	W.P. DISC. AT MOTOR	F.A. SHUT DOWN			
RTH-1	RADIANT TUBE HEATER	GARAGE BAY	GARAGE BAY	5 / 14	125 / 95	40	212	4	STRAIGHT - 45° TILT	SUPERIOR RADIANT PRODUCTS	TRX 125	1	120	1	-	YES	DIV. 20	DIV. 20	PKG	-	YES	DIV. 20	YES	-	-	-	SUITABLE FOR HARSH / OUTDOOR ENVIRONMENTS. CW/ DISCONNECT TO ALLOW FOR LINE VOLTAGE CONNECTION	
RTH-2	RADIANT TUBE HEATER	GARAGE BAY	GARAGE BAY	5 / 14	125 / 95	40	212	4	STRAIGHT - 45° TILT	SUPERIOR RADIANT PRODUCTS	TRX 125	1	120	1	-	YES	DIV. 20	DIV. 20	PKG	-	YES	DIV. 20	YES	-	-	-	SUITABLE FOR HARSH / OUTDOOR ENVIRONMENTS. CW/ DISCONNECT TO ALLOW FOR LINE VOLTAGE CONNECTION	
RTH-3	RADIANT TUBE HEATER	SIGN GARAGE	SIGN GARAGE	5 / 14	100 / 75	20	126	4	STRAIGHT - 45° TILT	SUPERIOR RADIANT PRODUCTS	TRX 100	1	120	1	-	YES	DIV. 20	DIV. 20	PKG	-	YES	DIV. 20	YES	-	-	-	SUITABLE FOR HARSH / OUTDOOR ENVIRONMENTS. CW/ DISCONNECT TO ALLOW FOR LINE VOLTAGE CONNECTION	

## IN-SLAB SNOW MELT HEATING SCHEDULE

MANIFOLD DESIGNATION	ZONE	CAPACITY (BTU/H/FT <sup>2</sup> )	TOTAL CAPACITY (MBH)	AREA SERVED (SQ.FT.)	MANIFOLD LOCATION	FLUID	EWT (°F)	LWT (°F)	FLOW (GPM)	FLUID PD (FT.HD.)	PIPE SPACING (IN.)	MOTOR SIZE (HP)	POWER SUPPLY					STARTER			CONTROLS			OTHER REQUIREMENTS			REMARKS	NOTES:
													FLA	MOP	VOLTS	PHASE	LS	NLS	SUPPLIED BY:	INSTALLED BY:	TYPE	MANUAL	AUTO.	INTERLOCK BY:	DISC. AT MOTOR	W/P DISC AT MOTOR		
SMM-1	1	185	94.9	5,132	MAIN VESTIBULE	40% PG	140	115	81.8	60	9	-	-	15	120	1	-	YES	DIV. 20	DIV. 20	PKG	-	YES	DIV. 20	-	-	-	1. 120V CONNECTION TO MAIN SNOW MELT CONTROLLER LOCATED IN MECHANICAL ROOM
SMM-2	2	185	10.2	55	GARAGE BAY	40% PG	140	115	0.9	15	6	-	-	15	120	1	-	YES	DIV. 20	DIV. 20	PKG	-	YES	DIV. 20	-	-	-	
SMM-3	3	185	10.2	55	GARAGE BAY	40% PG	140	115	0.9	15	6	-	-	15	120	1	-	YES	DIV. 20	DIV. 20	PKG	-	YES	DIV. 20	-	-	-	
SMM-4	4	185	10.2	55	GARAGE BAY	40% PG	140	115	0.9	15	6	-	-	15	120	1	-	YES	DIV. 20	DIV. 20	PKG	-	YES	DIV. 20	-	-	-	
SMM-5	5	185	10.2	55	GARAGE BAY	40% PG	140	115	0.9	15	6	-	-	15	120	1	-	YES	DIV. 20	DIV. 20	PKG	-	YES	DIV. 20	-	-	-	
SMM-6	6	185	10.2	55	GARAGE BAY	40% PG	140	115	0.9	15	6	-	-	15	120	1	-	YES	DIV. 20	DIV. 20	PKG	-	YES	DIV. 20	-	-	-	
SMM-7	7	185	10.2	55	GARAGE BAY	40% PG	140	115	0.9	15	6	-	-	15	120	1	-	YES	DIV. 20	DIV. 20	PKG	-	YES	DIV. 20	-	-	-	
SMM-8	8	185	10.2	55	GARAGE BAY	40% PG	140	115	0.9	15	6	-	-	15	120	1	-	YES	DIV. 20	DIV. 20	PKG	-	YES	DIV. 20	-	-	-	
NOTES: 1. IN SLAB ON GRADE AREAS LASH 3/4" RAUPEX PIPING TO A 6" WIRE MESH GRID AT 6" O.C. (WIRE MESH PROVIDED BY GENERAL CONTRACTOR) 2. MINIMUM 1" OF CONCRETE/CONCRETE SAND COVERING OVER THE RAUPEX PIPES 3. SLEEVE RAUPEX ACROSS EXPANSION JOINTS AND WHEREVER PIPE PASSES OUT OF THE SLAB 4. INSTALL MANIFOLDS IN SERVICEABLE LOCATION. ENSURE CABINETS ARE LEVEL AND SQUARE. PURGE ALL AIR FROM SYSTEM WHEN FILLING / ALTERNATE MANIFOLD CONFIGURATION MAY BE NECESSARY AS PER MANUFACTURER'S RECOMMENDATION 5. ONLY EVERLOC COUPLERS SHALL BE USED IF PIPE SPLICE IS REQUIRED. 6. MANUFACTURER SHALL PROVIDE DETAILED SYSTEM LOOP DESIGN SHOP DRAWINGS FOR SUBMITTAL AND CONSTRUCTION. CONTRACTOR SHALL NOT DEVIATE FROM APPROVED DRAWINGS. 7. APPLY A 60 LB AIR PRESSURE TEST TO MANIFOLDS AND PIPE FIELD FOR CONCRETE POURS AND THE DURATION OF BUILDING CONSTRUCTION 8. CONTACT MANUFACTURER TO WITNESS INSTALLATION AND PROVIDE INSPECTION REPORT FOR EACH AREA IMMEDIATELY PRIOR TO CONCRETE EMPLACEMENT 9. FILL WITH A 40% MINIMUM GLYCOL. SNOW MELT SYSTEM SHALL BE FILLED AT THE MANIFOLD ONE LOOP AT A TIME ENSURING ALL AIR IS PURGED PRIOR TO FILLING NEXT LOOP. FILL MAINS LAST.																												

## FAN SCHEDULE

REFERENCE	DESCRIPTION	LOCATION	SERVING	WEIGHT (LBS)	AIRFLOW (CFM)	PRESSURE (kPa)	FAN RPM	DIAMETER (FT.)	MANUFACTURER	MODEL	MOTOR SIZE		POWER SUPPLY							STARTER			CONTROLS			OTHER REQUIREMENTS:			REMARKS:	NOTES:
						EXTERNAL STATIC (ESP)					HP	BHP	FLA	MCA	MCOP	VOLTS	PHASE	EMERGENCY		SUPPLIED BY:	INSTALLED BY:	TYPE	MANUAL	AUTO.	INTERLOCK BY:	DISC. AT MOTOR	W/P. DISC. AT MOTOR	F.A. SHUT		
																		LS	NLS											
CEILING FANS																														
CF-1	PARTS/STORAGE BAY CEILING FAN	PARTS ROOM	PARTS ROOM	275	-	-	80	16	ENVIRA-NORTH SYSTEMS LTD.	EN675X5010	1.5	-	-	3.60	15	600	3	-	YES	DIV. 20	DIV. 20	PKG	YES	NO	DIV. 20	-	-	-	C/W LOW VOLTAGE MANUAL SPEED CONTROLLER	
CF-2	PARTS/STORAGE BAY CEILING FAN	GARAGE	GARAGE	275	-	-	80	16	ENVIRA-NORTH SYSTEMS LTD.	EN675X5010	1.5	-	-	3.60	15	600	3	-	YES	DIV. 20	DIV. 20	PKG	YES	NO	DIV. 20	-	-	-	C/W LOW VOLTAGE MANUAL SPEED CONTROLLER	
CF-3	SIGN GARAGE CEILING FAN	SIGN GARAGE	SIGN GARAGE	275	-	-	80	16	ENVIRA-NORTH SYSTEMS LTD.	EN675X5006	1	-	-	3.00	15	600	3	-	YES	DIV. 20	DIV. 20	PKG	YES	NO	DIV. 20	-	-	-	C/W LOW VOLTAGE MANUAL SPEED CONTROLLER	
PROPELLER FANS																														
EF-1	GARAGE BAY EXHAUST FAN	PARTS ROOM	PARTS ROOM	192	4,000	0.4	1750	24"	TWIN CITY FAN	24B105	1/4	0.59	-	-	-	208	3	-	YES	DIV. 20	DIV. 20	VFD	NO	YES	DIV. 20	-	-	-	INTERLOCK WITH EXHAUST MOTORIZED DAMPER, CO PANEL AND INTAKE AIR MOTORIZED DAMPER	
EF-2	GARAGE BAY EXHAUST FAN	GARAGE	GARAGE	192	4,000	0.4	1750	24"	TWIN CITY FAN	24B105	1/4	0.59	-	-	-	208	3	-	YES	DIV. 20	DIV. 20	VFD	NO	YES	DIV. 20	-	-	-	INTERLOCK WITH EXHAUST MOTORIZED DAMPER, CO PANEL AND INTAKE AIR MOTORIZED DAMPER	
EF-3	SIGN GARAGE EXHAUST FAN	SIGN GARAGE	SIGN GARAGE	192	2,500	0.4	1750	24"	TWIN CITY FAN	21B105	1/4	0.59	-	-	-	208	3	-	YES	DIV. 20	DIV. 20	VFD	NO	YES	DIV. 20	-	-	-	INTERLOCK WITH EXHAUST MOTORIZED DAMPER, CO PANEL AND INTAKE AIR MOTORIZED DAMPER	
EF-4	GARAGE BAY EXHAUST FAN	GARAGE	GARAGE	192	4,000	0.4	1750	24"	TWIN CITY FAN	24B105	1/4	0.59	-	-	-	208	3	-	YES	DIV. 20	DIV. 20	VFD	NO	YES	DIV. 20	-	-	-	INTERLOCK WITH EXHAUST MOTORIZED DAMPER, CO PANEL AND INTAKE AIR MOTORIZED DAMPER	
EF-5	GARAGE BAY EXHAUST FAN	WASH BAY	WASH BAY	192	4,000	0.4	1750	24"	TWIN CITY FAN	24B105	1/4	0.59	-	-	-	208	3	-	YES	DIV. 20	DIV. 20	VFD	NO	YES	DIV. 20	-	-	-	INTERLOCK WITH EXHAUST MOTORIZED DAMPER, CO PANEL AND INTAKE AIR MOTORIZED DAMPER	

## VAV TERMINAL SCHEDULE

REFERENCE	AREA SERVED	AIR QUANTITY (CFM)		INLET SIZE (mm)	MAX. N.C. LEVEL		PRESSURE DROP (Pa)	MANUFACTURER	MODEL	REMARKS:	NOTES:
		MIN.	MAX.		DISCHARGE						
VAV-1	MAIN CORRIDOR	40	100	100	20		125	NALOR	D3001	CW 3 FT. SOUND ATTENUATOR	1. REFER TO SECTION 23 36 00. 2. C/W 900mm LONG SOUND ATTENUATOR. 3. DISCHARGE MAXIMUM SOUND POWER LEVEL IN 250Hz OCTAVE BAND (AT 250Pa) w/ 900mm LONG INTEGRAL SOUND ATTENUATION. 4. WHERE TERMINALS ARE DESIGNATED "C/W" PROVIDE NORMALLY CLOSED (100% SHUT-OFF) CONSTANT VOLUME TERMINAL UNIT. 5. ALL BOXES SHALL BE PRESSURE INDEPENDENT WITH ELECTRIC ACTUATOR AND DIGITAL CONTROLS. CONTROLLER PROVIDED BY CONTROLS SUB-CONTRACTOR AND FIELD INSTALLED. 6. C/W VOLTAGE FROM JUNCTION BOXES TO BE CARRIED BY MECHANICAL CONTRACTOR. 7. STEP DOWN TRANSFORMER FROM JUNCTION BOX BY MECHANICAL CONTRACTOR.
VAV-2	OPEN OFFICE	70	175	150	21		125	NALOR	D3001	CW 3 FT. SOUND ATTENUATOR	
VAV-3	SHARED OFFICE	25	50	100	-		125	NALOR	D3001	CW 3 FT. SOUND ATTENUATOR	
VAV-4	DISTRICT MANAGER'S OFFICE	25	50	100	-		125	NALOR	D3001	CW 3 FT. SOUND ATTENUATOR	
VAV-5	RESERVED										
VAV-6	RESERVED										
VAV-7	RESERVED										
VAV-8	LUNCH AREA	190	465	200	23		125	NALOR	D3001	CW 3 FT. SOUND ATTENUATOR	
VAV-9	MEETING ROOM	25	75	100	-		125	NALOR	D3001	CW 3 FT. SOUND ATTENUATOR	

## VRF INDOOR FAN COIL UNIT SCHEDULE

REFERENCE	LOCATION	SERVING	SUPPLY AIR (CFM)	E.S.P. (IN.WC)	REFRIGERANT	COOLING (DX COIL)		HEATING		MANUFACTURER	MODEL	MCA	MOP	POWER SUPPLY				STARTER		CONTROLS			OTHER REQUIREMENTS			REMARKS:	NOTES:			
						TOTAL (MBH)	SENS (MBH)	E.A.T. (°F)	TOTAL (MBH)					VOLTS	PHASE	FED FROM	EMERGENCY	SUPPLIED BY:	INSTALLED BY:	TYPE	MANUAL	AUTO.	INTERLOCK BY:	DISC. AT MOTOR	W/P DISC. AT MOTOR			F.A. SHUT DOWN		
																													DB	WB
FCU-1	IT ROOM	IT ROOM	742	-	R410A	28.70	-	72	60	-	70.00	LG	LSN363HLV3	-	-	208	1	OUTDOOR UNIT CL-3	-	YES	DIV 23	DIV 23	T-STAT	YES	DIV 23	YES	NO	NO	COMPLETE WITH REMOTE THERMOSTAT. COMPLETE WITH LOW-AMBIENT TEMPERATURE KIT FOR COOLING OPERATION.	
FCU-2	SHARED OFFICE	SHARED OFFICE	494	0.25	R410A	9.4	8.3	72	60	8.5	70.00	LG	ARNJ123MAA4	2.2	208	1	SEE FLOOR PLANS FOR CIRCUIT NUMBER	-	YES	DIV 23	DIV 23	T-STAT	YES	DIV 23	YES	NO	NO	COMPLETE WITH REMOTE THERMOSTAT. COMPLETE WITH LOW-AMBIENT TEMPERATURE KIT FOR HEATING OPERATION.		
FCU-3	DISTRICT MANAGER OFFICE	DISTRICT MANAGER OFFICE	353	0.25	R410A	7.3	6.5	72	60	6.6	70.00	LG	ARNJ009MAA4	2.2	208	1	SEE FLOOR PLANS FOR CIRCUIT NUMBER	-	YES	DIV 23	DIV 23	T-STAT	YES	DIV 23	YES	NO	NO	COMPLETE WITH REMOTE THERMOSTAT. COMPLETE WITH LOW-AMBIENT TEMPERATURE KIT FOR HEATING OPERATION.		
FCU-4	OPEN OFFICE	OPEN OFFICE	706	0.5	R410A	18.4	15.2	72	60	16.7	70.00	LG	ARNJ243MAA4	2.2	208	1	SEE FLOOR PLANS FOR CIRCUIT NUMBER	-	YES	DIV 23	DIV 23	T-STAT	YES	DIV 23	YES	NO	NO	COMPLETE WITH REMOTE THERMOSTAT. COMPLETE WITH LOW-AMBIENT TEMPERATURE KIT FOR HEATING OPERATION.		
FCU-5	MEETING ROOM	MEETING ROOM	530	0.25	R410A	11.7	10.4	72	60	10.6	70.00	LG	ARNJ153MAA4	2.2	208	1	SEE FLOOR PLANS FOR CIRCUIT NUMBER	-	YES	DIV 23	DIV 23	T-STAT	YES	DIV 23	YES	NO	NO	COMPLETE WITH REMOTE THERMOSTAT. COMPLETE WITH LOW-AMBIENT TEMPERATURE KIT FOR HEATING OPERATION.		
FCU-6	LUNCH ROOM AREA	LUNCH ROOM AREA	1260	0.5	R410A	32	26.7	72	60	29	70.00	LG	ARNJ423MDA4	2.9	208	1	SEE FLOOR PLANS FOR CIRCUIT NUMBER	-	YES	DIV 23	DIV 23	T-STAT	YES	DIV 23	YES	NO	NO	COMPLETE WITH REMOTE THERMOSTAT. COMPLETE WITH LOW-AMBIENT TEMPERATURE KIT FOR HEATING OPERATION.		
FCU-7	ELECTRICAL ROOM	ELECTRICAL ROOM	530	0.25	R410A	17	-	72	60	5.1	70.00	LG	LHN188HV1	-	-	208	1	OUTDOOR UNIT CL-3	-	YES	DIV 23	DIV 23	T-STAT	YES	DIV 23	YES	NO	NO	COMPLETE WITH REMOTE THERMOSTAT. COMPLETE WITH LOW-AMBIENT TEMPERATURE KIT FOR COOLING OPERATION.	
FCU-8	ENCLAVE	ENCLAVE	494	0.25	R410A	9.4	8.3	72	60	8.5	70.00	LG	ARNJ123MAA4	2.2	208	1	SEE FLOOR PLANS FOR CIRCUIT NUMBER	-	YES	DIV 23	DIV 23	T-STAT	YES	DIV 23	YES	NO	NO	COMPLETE WITH REMOTE THERMOSTAT. COMPLETE WITH LOW-AMBIENT TEMPERATURE KIT FOR HEATING OPERATION.		

## AIR COOLED CONDENSER SCHEDULE (OUTDOOR UNIT)

REFERENCE	DESCRIPTION	ROOF	SERVING	WEIGHT (LBS)	REFRIGERANT	HEATING CAPACITY (KW)	COOLING CAPACITY (KW)	MANUFACTURER	MODEL	POWER SUPPLY					STARTER			CONTROLS			OTHER REQUIREMENTS			REMARKS:	NOTES:
										MCA	MOP	VOLTS	PHASE	EMERGENCY	LS	NLS	SUPPLIED BY:	INSTALLED BY:	TYPE	MANUAL	AUTO.	INTERLOCK BY:	DISC. AT MOTOR		
CU-1	AIR-COOLED CONDENSER	ROOF	FCU-1	-	R410A	-	2.8	LG	LSU93HLV3	23	30	208	1	-	YES	DIV. 20	DIV. 20	PKG	-	YES	DIV. 20	-	YES	-	C/W LOW AMBIENT KIT FOR COOLING OPERATION. TO BE PLACED ON ISOLATED ROOF STANDS.
CU-2	AIR-COOLED CONDENSER	ROOF	VRF SYSTEM - OFFICE SPACE	527	R410A	7.60	3.40	LG	ARJUM96CTE5	16.4	25.5	600	3	-	YES	DIV. 20	DIV. 20	PKG	-	YES	DIV. 20	-	YES	-	C/W LOW AMBIENT KIT FOR HEATING. SERVING FCU2/3/4/5/6/8. C/W LOW AMBIENT KIT FOR COOLING OPERATION. TO BE PLACED ON ISOLATED ROOF STANDS.
CU-3	AIR-COOLED CONDENSER	ROOF	FCU-7	-	R410A	-	1.30	LG	LUU189HV	20	30	208	1	-	YES	DIV. 20	DIV. 20	PKG	-	YES	DIV. 20	-	YES	-	C/W LOW AMBIENT KIT FOR COOLING OPERATION. TO BE PLACED ON ISOLATED ROOF STANDS.

## VRF FCU BRANCH SELECTOR SCHEDULE

REFERENCE	DESCRIPTION	SERVING	LOCATION	SOUND PRESSURE (dBA)	WEIGHT (LBS)	MANUFACTURER	MODEL	POWER SUPPLY							STARTER			CONTROLS			OTHER REQUIREMENTS			REMARKS:	NOTES:		
								FLA	MCA	MCOP	VOLTS	PHASE	EMERGENCY		SUPPLIED BY:	INSTALLED BY:	TYPE	MANUAL	AUTO.	INTERLOCK BY:	W.P. DISC. AT MOTOR	DISC. AT MOTOR	F.A. SHUT.				
SB-1	BRANCH CONTROL BOX FOR VRF SYSTEM	CU-2	MECHANICAL ROOM	38	60	LG	PRH063A	-	1.0	15	208	1	<div>8</div> <div>EMERGENCY</div> <div>LSNLS</div>		DIV. 20	DIV. 20	PKG	-	YES	DIV. 20	-	YES	-	YES	-	CW DISCONNECT SWITCH	

HEAT TRACING AND INSULATION IN EXPOSED BELOW GRADE PARKING AREAS

PIPING SYSTEM	HEAT TRACE	INSULATE	REMARKS:	NOTES:
POTABLE WATER SYSTEMS				REFER TO SECTION 230533 FOR FURTHER DETAILS
DOMESTIC COLD WATER	YES	YES		
DOMESTIC HOT WATER	NO	YES		
DOMESTIC HOT WATER RECIRCULATION	NO	YES		
FIRE PROTECTION SYSTEMS				
WET SYSTEM PIPE	YES	YES		
DRY SYSTEM PIPE	NO	NO		
HVAC PIPING SYSTEMS				
CHILLED WATER PIPES (4 PIPE SYSTEM)	YES	YES		
HEATING WATER PIPES (4 PIPE SYSTEM)	NO	YES		
HEATING & COOLING WATER PIPES (2 PIPE CHANGEOVER)	NO	YES		
HEATING & COOLING WATER PIPES (HEAT PUMP SYSTEM)	NO	YES		
DRAINAGE SYSTEMS				
STORM	NO	YES		
SANITARY	NO	YES		

EXCEPTIONS:

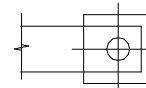
\* HEAT TRACE AND INSULATE ANY WET PIPING & DRAINAGE PIPING WITHIN 5 METER RADIUS FROM A PARKING INLET OR EXHAUST AIR VENTILATION SHAFT.  
\* ALL PIPING INSTALLED WITHIN A SOFFIT SHALL BE HEAT TRACED AND INSULATED.

REGISTERS, GRILLES AND DIFFUSERS SCHEDULE

REFERENCE	FUNCTION	CONFIGURATION	MODEL NUMBER	MOUNTING TYPE	REMARKS:
A	SUPPLY AIR	SQUARE PLAQUE	UNI-600x600	T-BAR CEILING	REFER TO PLANS FOR NECK SIZE
B	SUPPLY AIR	LOUVERED FACE GRILLE	610H-O	DRYWALL / SIDEWALL	REFER TO PLANS FOR SIZE
C	RETURN / EXHAUST / TRANSFER AIR	LOUVERED FACE GRILLE	6149A-O	DRYWALL / SIDEWALL	REFER TO PLANS FOR SIZE
D	SUPPLY AIR	1" SLOT LINEAR	S310-1219mm x1Slot	EXPOSED	C/W PLENUM & DCG CABLE OPERATED DAMPER

\* FOR SUITE FAN AND R/A GRILLES REFER TO MANUFACTURER

SYMBOL CLARIFICATION



C-600x600-500

C - DIFFUSER/GRILLE TYPE  
600x600 - GRILLE SIZE  
500 - AIR QUANTITY L/S

NOTES:

1 - PROVIDE OPPOSED BLADE DAMPER  
2 - PROVIDE CABLE OPERATED BALANCING DAMPER

SELECTION BASED ON

NAILOR INDUSTRIES

600V, 3 PHASE MOTOR SIZING DATA FOR STARTER

MOTOR		COMBINATION MAGNETIC STARTER					VFD	UNF. DISC. SW. AT MOTOR AMPS	FEEDER & WIRING				REMARK	NOTES
HP	FLA	SIZE	TYPE	CLASS 'J' TIME DELAY FUSE AMPS	BREAKER AMPS (HCCR RATED)	FAST ACTING SWITCH / FUSE SIZE AMPS	POWER FEEDER		MIN. CONDUIT SIZE					
							MIN. AMPS		MIN. WIRE SIZE	(INCH)	(mm)			
1/2	0.8	1	FVNR	30/15	15		30	15	3 # 12	1/2"	12			
3/4	1.1	1	FVNR	30/15	15		30	15	3 # 12	1/2"	12			
1	1.4	1	FVNR	30/15	15		30	15	3 # 12	1/2"	12			
1 1/2	2.0	1	FVNR	30/15	15		30	15	3 # 12	1/2"	12			
2	2.7	1	FVNR	30/15	15		30	15	3 # 12	1/2"	12			
3	3.9	1	FVNR	30/15	15		30	15	3 # 12	1/2"	12			
5	6.1	1	FVNR	30/15	15		30	15	3 # 12	1/2"	12			
7 1/2	9	1	FVNR	30/15	20		30	15	3 # 12	1/2"	12			
10	11	1	FVNR	30/15	30		30	15	3 # 12	1/2"	12			
15	17	2	FVNR	30/25	40		30	22	3 # 10	1/2"	12			
20	22	2	FVNR	60/35	50		60	28	3 # 10	1/2"	12			
25	27	2	FVNR	60/45	70		60	34	3 # 8	3/4"	20			
30	32	3	FVNR	60/50	80		60	40	3 # 8	3/4"	20			
40	41	3	FVNR	100/70	100		100	52	3 # 6	1"	25			
50	52	3	FVNR	100/90	125		100	65	3 # 6	1"	25			
60	62	4	RVNR	200/110	150		200	78	3 # 4	1"	25			
75	77	4	RVNR	200/150	175		200	97	3 # 3	1 1/4"	30			
80	82	4	RVNR	200/125	200		200	103	3 # 2	1 1/4"	30			
100	99	4	RVNR	200/175	250		200	124	3 # 1	1 1/4"	30			

GENERAL NOTES:

1. SIZE OF FUSE BASED ON BUSSMAN CLASS 'J' DUAL ELEMENT TIME DELAY FUSES.  
2. PROVIDE MANUAL STARTERS FOR ALL 120V MOTORS TO SUIT.  
3. ALL STARTERS AND/OR DISCONNECT SWITCHES LOCATED IN PARKING LEVELS SHALL BE MOUNTED BEHIND A LOCKABLE, KEYED ALIKE, SEE-THROUGH COVER. PROVIDE A MINIMUM 10 KEYS.

STARTER TYPES:

FVNR - FULL VOLTAGE NON REVERSING  
RVNR - REDUCED VOLTAGE NON REVERSING  
PCK - PACKAGES SUPPLIED WITH EQUIPMENT  
2SSW - TWO (2) SPEED SINGLE WINDINGS  
NOTE: PROVIDE 6 WIRES ON THE LOAD SIDE OF THE STARTER  
SSMC - SOFT START MOTOR CONTROLLERS  
RV-SS - DENOTES REDUCED VOLTAGE / SOFT START STARTERS

208 VOLT, 3 PHASE MOTOR SIZING DATA FOR FULL VOLTAGE STARTING

MOTOR		COMBINATION MAGNETIC STARTER				VFD  FAST ACTING SWITCH / FUSE SIZE AMPS	UNF. DISC. SW. AT MOTOR AMPS	FEEDER & WIRING				REMARK	NOTES
HP	FLA	SIZE	TYPE	CLASS "J" TIME DELAY FUSE AMPS	BREAKER (HCCR RATED)			POWER FEEDER		MIN. CONDUIT SIZE			
								MIN. AMPS	MIN. WIRE SIZE	(INCH)	(mm)		
1/2	2.2	1	FVNR	30/15	15		30	15	3 # 12	1/2"	12		
3/4	3.1	1	FVNR	30/15	15		30	15	3 # 12	1/2"	12		
1	4.0	1	FVNR	30/15	15		30	15	3 # 12	1/2"	12		
1 1/2	5.7	1	FVNR	30/15	15		30	15	3 # 12	1/2"	12		
2	7.5	1	FVNR	30/15	20		30	15	3 # 12	1/2"	12		
3	10.6	1	FVNR	30/15	25		30	15	3 # 12	1/2"	12		
5	16.7	1	FVNR	30/ 25	40		30	22	3 # 10	3/4"	20		
7 1/2	24.2	1	FVNR	60/ 40	60		60	30	3 # 8	3/4"	20		
10	30.8	2	FVNR	60/ 50	80		60	40	3 # 8	3/4"	20		
15	46.2	2	FVNR	100/ 80	110		100	58	3 # 6	1"	25		
20	59.4	2	FVNR	100/ 100	150		100	75	3 # 4	1"	25		
25	74.8	3	FVNR	200/ 125	175		200	95	3 # 3	1 1/4"	32		
30	88.0	3	FVNR	200/ 150	200		200	110	3 # 2	1 1/4"	32		
40	114.4	4	FVNR	200/ 200	250		200	144	3 #1 0	1 1/2"	38		
50	143.0	4	FVNR	400/ 200	350		400	181	3 #3 0	2"	50		

GENERAL NOTES:

1. SIZE OF FUSE BASED ON BUSSMAN CLASS 'J' DUAL ELEMENT TIME DELAY FUSES.  
2. PROVIDE MANUAL STARTERS FOR ALL 120V MOTORS TO SUIT.  
3. ALL STARTERS AND/OR DISCONNECT SWITCHES LOCATED IN PARKING LEVELS SHALL BE MOUNTED BEHIND A LOCKABLE, KEYED ALIKE, SEE-THROUGH COVER. PROVIDE A MINIMUM 10 KEYS.

STARTER TYPES:

FVNR - FULL VOLTAGE NON REVERSING  
RVNR - REDUCED VOLTAGE NON REVERSING  
PCK - PACKAGES SUPPLIED WITH EQUIPMENT  
2SSW - TWO (2) SPEED SINGLE WINDINGS  
NOTE: PROVIDE 6 WIRES ON THE LOAD SIDE OF THE STARTER  
SSMC - SOFT START MOTOR CONTROLLERS  
RV-SS - DENOTES REDUCED VOLTAGE / SOFT START STARTERS



Project Team:

Prime Consultant  
GEC ARCHITECTURE

Structural Consultant  
ENTUITIVE

Mechanical Consultant  
MCW CONSULTANTS LTD.

Electrical Consultant  
MCW CONSULTANTS LTD.

Civil Consultant  
PLANMAC ENGINEERING

Passive House Consultant  
PEEL PASSIVE HOUSE

LEED Consultant  
MCW CONSULTANTS LTD.

Client

YORK REGION



Seal & Permit

PRELIMINARY -  
NOT FOR  
CONSTRUCTION



8	ISSUED FOR ADDENDUM #4	2025/07/18
7	REISSUED FOR TENDER	2025/05/23
6	ISSUED FOR TENDER	2025/04/22
5	ISSUED FOR BUILDING PERMIT	2024/11/27
4	ISSUED FOR PRE-TENDER REVIEW	2024/10/31
3	ISSUED FOR 60% CD	2024/05/02
2	ISSUED FOR 100% DD	2024/02/29
1	ISSUED FOR 60% DD	2024/01/25

NO. ISSUED FOR DATE

Drawing History

Scale: N.T.S. Checked By: NL

Region of York Project Number: 22046 Region of York Building Code: G013-B

Project: YORK REGION NORTH ROADS OPERATIONS CENTRE

6525 BASELINE RD.SUTTON WEST, ON L0E 1R0

Drawing Title

EQUIPMENT SCHEDULES #3

Project Number: 23137 Drawing Number: ME-03



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Toronto, Ontario M5J 1A7  
Phone 416-598-2920 Fax 416-598-5394  
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Date: July 18, 2025

Project Name: York Region North Roads Operations Centre

Client: York Region

To: GEC Architecture

Attention: Angela Ng [angela.ng@gecarchitecture.com](mailto:angela.ng@gecarchitecture.com)

From: Brandon Marshall [bmarshall@mcw.com](mailto:bmarshall@mcw.com)

Distribution: Tyson Bolduc – HOK [tyson.bolduc@gecarchitecture.com](mailto:tyson.bolduc@gecarchitecture.com)

Shivam Bhojak – MCW [SBhojak@mcw.com](mailto:SBhojak@mcw.com)

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Julia Kreynin – MCW [JKreynin@mcw.com](mailto:JKreynin@mcw.com)

Vytautas Stasiulevicius – MCW [VStasiulevicius@mcw.com](mailto:VStasiulevicius@mcw.com)

Project #: 23137

ADD #: TE-001

Page #: 1 of 3

+ Attachment

In accordance with the drawings and specifications, provide in the tender all costs required to complete the work including items as listed below.

Title: Electrical & ICAT Tender Addendum TE-001
Reason for Change: Electrical & ICAT Design Clarifications

## Electrical Drawings:

Drawing #	Revisions
E0-11	<ul style="list-style-type: none"> <li>Added notes 13-18.</li> <li>Clarified drawing scale.</li> </ul>
E0-21	<ul style="list-style-type: none"> <li>Provided power connections for new exit sign.</li> <li>Provided power connections for fuel tank monitoring sensor.</li> <li>Added panel P2S3.</li> <li>Clarified circuiting for all power connections on the site.</li> <li>Revised generator size.</li> <li>Added ductbank for generator feeds.</li> <li>Revised notes 7, 13.</li> <li>Added notes 21-29.</li> <li>Revised detail numbering.</li> <li>Added detail 6.</li> <li>Deleted Relay Panel Schedule.</li> <li>Clarified drawing scale.</li> </ul>
E1-01	<ul style="list-style-type: none"> <li>Clarified demolition scope of existing entrance gate.</li> <li>Clarified scope of temporary trailer power.</li> <li>Added notes 7-11.</li> </ul>



**Electrical Drawings:**

Drawing #	Revisions
E1-02A	<ul style="list-style-type: none"><li>• Revised electrical distribution system to be backed on emergency power.</li><li>• Revised distribution equipment ratings.</li><li>• Revised feeder and feeder breaker ratings.</li><li>• Revised emergency generator sizing.</li><li>• Provide reference breakers for digital metering.</li><li>• Added panel P2S3.</li><li>• Provided power connections for generator shore power, block heater &amp; battery charger.</li><li>• Clarified distribution equipment identification.</li><li>• Deleted non-life safety power and consolidated with normal power.</li><li>• Added notes 23-24.</li><li>• Revised note 1, 10, 13, 15.</li></ul>
E1-02B	<ul style="list-style-type: none"><li>• Provided feeder and feeder breakers for added mechanical equipment.</li><li>• Revised distribution equipment ratings.</li><li>• Revised feeder and feeder breaker ratings.</li><li>• Revised panel designations in digital metering diagram.</li></ul>
E1-03	<ul style="list-style-type: none"><li>• Added note to clarify lighting control scope.</li><li>• Added Relay Panel Schedule.</li></ul>
E1-06	<ul style="list-style-type: none"><li>• Clarified intrusion detection system.</li></ul>
E2-01	<ul style="list-style-type: none"><li>• Revised note 2.</li><li>• Added note 3.</li></ul>
E3-11	<ul style="list-style-type: none"><li>• Clarified circuiting for all electrical connections.</li><li>• Revised circuit grouping for receptacles.</li><li>• Revised power requirements and connections for mechanical equipment.</li><li>• Revised electrical room equipment layout.</li><li>• Provided locations of distribution equipment added in drawing E1-02A.</li><li>• Provided connections for generator.</li><li>• Clarified generator size.</li><li>• Clarified distribution equipment identification.</li><li>• Revised electrical room layout.</li></ul>
E3-12	<ul style="list-style-type: none"><li>• Revised power requirements and connections for mechanical equipment.</li><li>• Added existing mechanical equipment to be reconnected.</li><li>• Revised note 2,3.</li></ul>
E4-01	<ul style="list-style-type: none"><li>• Clarified distribution equipment identification.</li><li>• Revised note 5.</li></ul>
E4-11	<ul style="list-style-type: none"><li>• Clarified door types.</li><li>• Clarified camera elevations.</li><li>• Added cameras.</li><li>• Relocated master intercom station.</li><li>• Relocated gate release switch.</li><li>• Added notes 12,13.</li></ul>





**Electrical Drawings:**


Drawing #	Revisions
E5-01	<ul style="list-style-type: none"><li>• Clarified circuiting for all electrical connections.</li><li>• Clarified power requirements and connections for mechanical equipment.</li><li>• Clarified panel electrical parameters.</li><li>• Clarified panel space requirements.</li><li>• Clarified panel names.</li><li>• Added panel M22.</li><li>• Deleted MN21.</li></ul>
E5-02	<ul style="list-style-type: none"><li>• Clarified circuiting for all electrical connections.</li><li>• Clarified panel electrical parameters.</li><li>• Clarified panel space requirements.</li><li>• Clarified panel names.</li><li>• Added panel P22A and P22B.</li><li>• Added panel P2S3.</li></ul>
E7-01	<ul style="list-style-type: none"><li>• Revised door hardware schedule.</li><li>• Revised door hardware details.</li></ul>

**Electrical & ICAT Specifications:**

Specification #	Revisions
26 00 00	<ul style="list-style-type: none"><li>• Deleted section 26 80 00 – Electric Vehicle Charger</li></ul>
26 05 00	<ul style="list-style-type: none"><li>• Revised wording.</li></ul>
26 05 01	<ul style="list-style-type: none"><li>• Deleted section 26 80 00 – Electric Vehicle Charger</li></ul>
Light Fixture Schedule	<ul style="list-style-type: none"><li>• Revised descriptions for S1A, S1B, S2A, S3A, S4B</li></ul>

End of ADD # TE-001

	 <p>Project Team:</p> <p>Prime Consultant GEC ARCHITECTURE</p> <p>Structural Consultant ENTUITIVE</p> <p>Mechanical Consultant MCW CONSULTANTS LTD.</p> <p>Electrical Consultant MCW CONSULTANTS LTD.</p> <p>Civil Consultant PLANMAC ENGINEERING</p> <p>Passive House Consultant PEEL PASSIVE HOUSE</p> <p>LEED Consultant MCW CONSULTANTS LTD.</p> <p>Client</p> <p>YORK REGION</p>  <p>Seal &amp; Permit</p>	
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11	REISSUED FOR TENDER	2025/05/23
10	ISSUED FOR TENDER	2025/04/22
9	ISSUED FOR SITE PLAN AGREEMENT	2025/01/09
8	ISSUED FOR BUILDING PERMIT	2024/11/27
7	ISSUED FOR SPA 2ND RESUBMISSION	2024/11/22
6	ISSUED FOR PRE-TENDER REVIEW	2024/10/31
5	ISSUED FOR SPA 1ST RESUBMISSION	2024/09/23
4	ISSUED FOR 60% CD	2024/05/02
3	ISSUED FOR SPA SUBMISSION	2024/04/12
2	ISSUED FOR 100% DD	2024/02/29
1	ISSUED FOR 60% DD	2024/01/25
NO.	ISSUED FOR	DATE

**Drawing History**

Scale	<b>N.T.S.</b>	Checked By <b>S.B.</b>
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Region of York Project Number

22046

Region of York Building Code

G013-B

Project

YORK REGION NORTH ROADS  
OPERATIONS CENTRE

3525 BASELINE RD. SUTTON WEST, ON L9E 1R0

Drawing Title

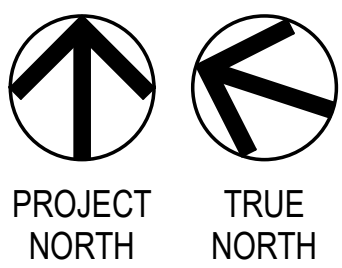
ELECTRICAL & ICAT SYMBOL  
LEGEND, DRAWING LIST &  
GENERAL NOTES





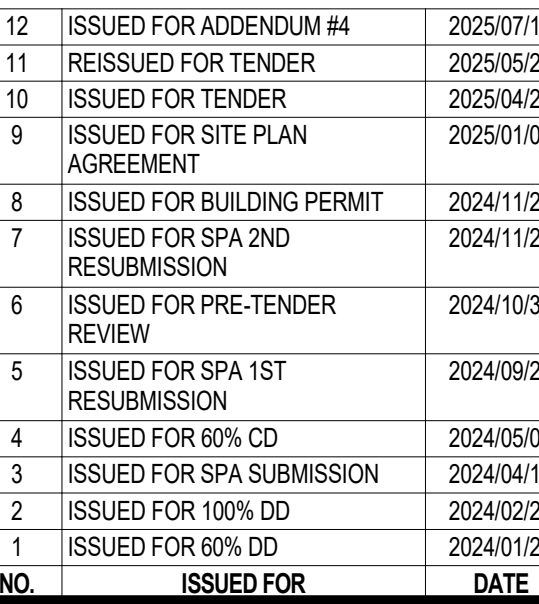
1  
E0-11





1  
E0-21

E0-21 N.T.S.



Region of York Project Number      Region of York Building Code

2046 G013-B

Project

YORK REGION NORTH ROADS  
OPERATIONS CENTRE

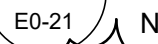
525 BASELINE RD.SUTTON WEST, ON L0E 1R0

Drawing Title

## SITE PLAN - ELECTRICAL & ICAT NEW WORKS

Project Number **E0-21**

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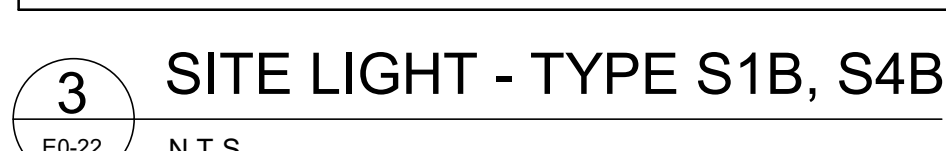
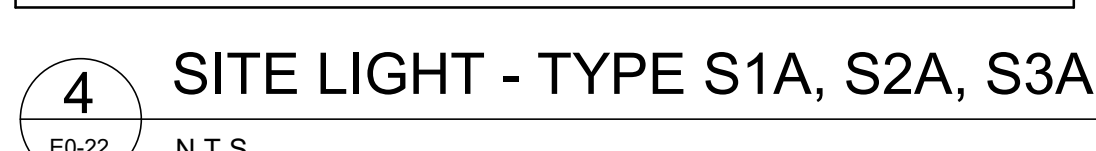




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Luminaire Schedule								
Symbol	Label	Arrangement	Description	LF	Luminaire Lumens	Luminaire Watts	Total Watts	BUG Rating
○	S1A	Single	GALN-SA4C-740-U-T4FT	0.912	27751	213	426	B3-U0-G4
⦿	S1B	Back-Back	GALN-SA4C-740-U-T4FT	0.912	27751	213	426	B3-U0-G4
○	S2A	Single	GALN-SA4C-740-U-T4FT-HSS	0.912	20027	213	426	B2-U0-G4
○	S3A	Single	GALN-SA4C-740-U-T3-HSS	0.912	20419	213	426	B2-U0-G3
⦿	S4B	Back-Back	GALN-SA4C-740-U-5M/Q	0.912	29169	213	1278	B5-U0-G3
○	C1	Single	LD4C15D010 EX4C159040 4LBHN	0.912	980	216	284.4	B2-U0-G0
⦿	W1	Single	XTORAB-W	0.912	4205	217	1017.9	B2-U0-G0
⦿	E-POLE	Single	EXISTING BACK LED 60C 1000 40K RA...	0.8	20692	216	1728	B3-U0-G4

Project Team:

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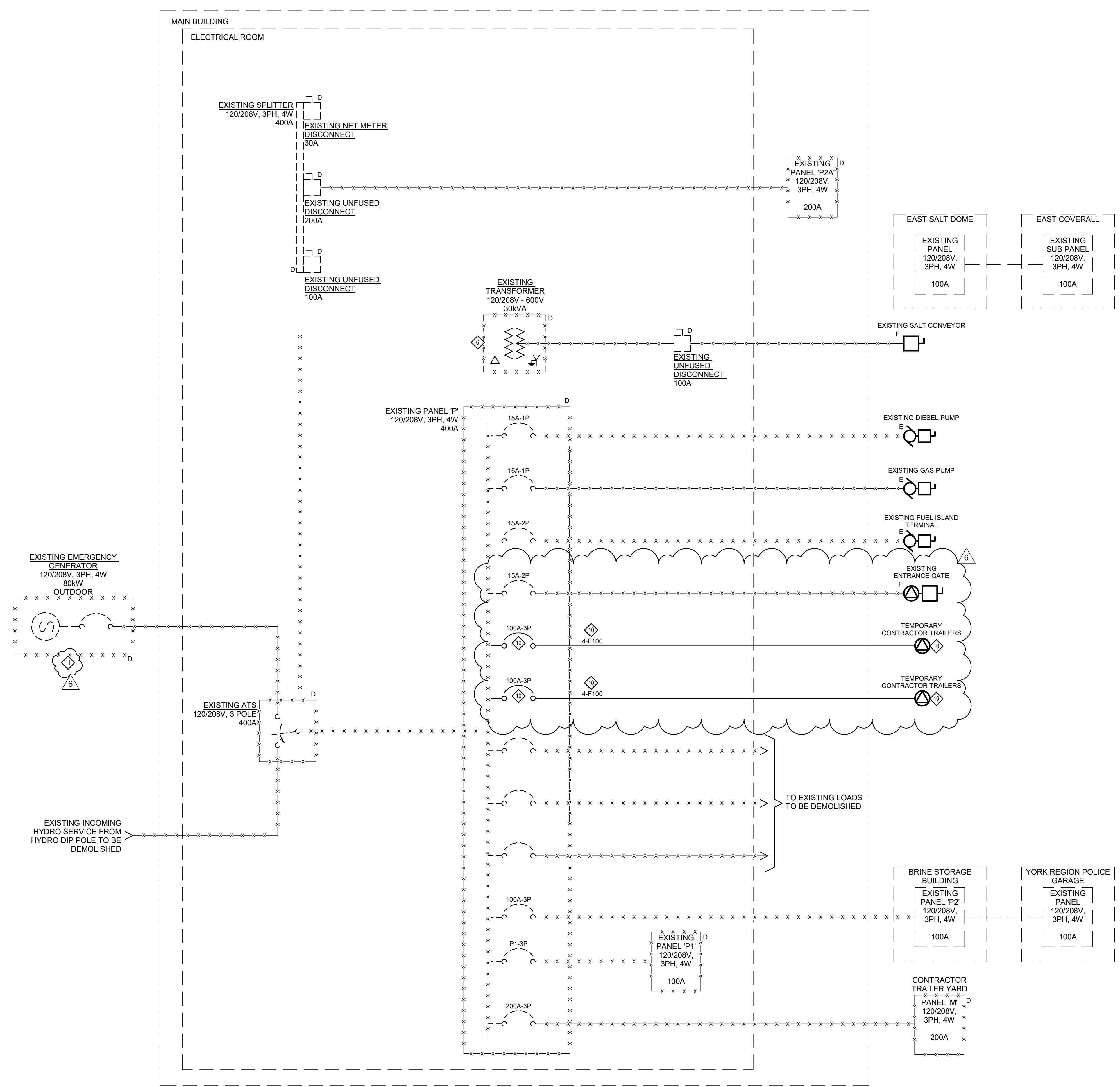
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- NOTES:**
- ALL EQUIPMENT AND DEVICES SHOWN ON THE DEMOLITION DRAWINGS ARE SHOWN FOR REFERENCE ONLY. CONTRACTOR SHALL COMPLETE THOROUGH SITE SURVEYS AND LOCATES TO VERIFY EXISTING CONDITIONS FOR PRICING AND SCOPE PRIOR TO COMMENCEMENT OF DEMOLITION WORKS.
  - EXISTING HIGH VOLTAGE POWER AND LOW VOLTAGE INCOMING SERVICES (POWER, COMMUNICATIONS, ETC.) INTO THE EXISTING BUILDING SHALL BE DEMOLISHED. CONTRACTOR SHALL DEMOLISH THE FULL LENGTH OF THE SYSTEMS CABLEING. VERIFY EXISTING INCOMING SERVICES ON SITE AND COORDINATE WITH OWNER PRIOR TO ANY SHUT DOWNS, INTERRUPTIONS TO SERVICES, AND DEMOLITION WORKS.
  - EXISTING EQUIPMENT, DEVICES AND CIRCUITING INFRASTRUCTURE IN EXISTING BUILDINGS OUTSIDE OF SCOPE OF WORK AREA SHALL BE EXISTING TO REMAIN UNLESS OTHERWISE NOTED IN CONTRACT DOCUMENTS.
  - EXISTING DISTRIBUTION POWER FEEDERS FROM THE EXISTING MAIN BUILDING TO THE OTHER BUILDINGS AND AREAS OF THE SITE SHALL BE DEMOLISHED. SEE PHASING DRAWINGS FOR PROPOSED SEQUENCE OF WORK AND COORDINATE ALL INSTALLATIONS TO MINIMIZE INTERRUPTIONS TO OWNERS EXISTING OPERATIONS AND DURATION OF CHANGE OVER TO NEW SERVICES.
  - DURING ISOLATION AND DISCONNECTION PROCEDURES CONTRACTOR SHALL USE DANGER TAGS TO IDENTIFY ANY FEEDERS OR EQUIPMENT REMAINING ENERGIZED TO ACCOMMODATE NEW CONSTRUCTION.
  - CONTRACTOR SHALL INCLUDE FOR DEMOLITION OF PRIMARY CONNECTIONS TO EXISTING TRANSFORMER. VERIFY EXACT ROUTING AND PRIMARY CONNECTION OF EXISTING TRANSFORMER ON SITE.
  - WHEN RELOCATING OR REMOVING EQUIPMENT, SHOULD ANY CIRCUITS BE ABANDONED. THE CONTRACTOR SHALL ENSURE CONDUCTORS TO THESE CIRCUITS MUST BE REMOVED OR PROPERLY TERMINATED, AS PER LATEST REQUIREMENTS IN THE ONTARIO ELECTRICAL SAFETY CODE (OESC).
  - THIS DRAWING IS ISSUED TO SHOW SCOPE OF WORK ONLY. THE CONTRACTOR SHALL PERFORM A SITE INSPECTION (INCLUDING CEILING SPACES) DURING THE TENDER PERIOD AND ENSURE THAT ALL WORK THAT IS VISIBLE IS INCLUDED IN THE DEMOLITION SCOPE OF WORK. ALL EXISTING SERVICES THAT PASS THROUGH THE RENOVATION AREA, UNLESS OBSOLETE, ARE TO BE MAINTAINED AND/OR RELOCATED TO SUIT THE SCOPE OF WORK NOTED ON THE DRAWINGS.
  - SEE ELECTRICAL SPECIFICATIONS FOR PROPOSED PHASING PLAN AND DETAILS, AND COORDINATE ALL WORK TO SUIT THE FINAL CONSTRUCTION PLAN PREPARED BY THE CONTRACTOR.
  - CONTRACTOR SHALL PROVIDE NEW BREAKER, FEEDER CABLEING AND ASSOCIATED INFRASTRUCTURE FROM EXISTING PANEL P TO THE TEMPORARY TRAILERS DURING THE DEMOLITION WORKS OF THE BASE BUILDING. ONCE FINAL PERMANENT SERVICES ARE INSTALLED AND ONLINE, CONTRACTOR SHALL DISCONNECT AND DEMOLISH CABLEING AND CONDUIT CONNECTIONS TO TEMPORARY TRAILERS.
  - EXISTING GENERATOR SHALL BE DECOMMISSIONED, DEMOLISHED AND HANDED OVER TO THE OWNER.

6	ISSUED FOR ADDENDUM #4	2025/07/18
5	REISSUED FOR TENDER	2025/05/23
4	ISSUED FOR TENDER	2025/04/22
3	ISSUED FOR BUILDING PERMIT	2024/11/27
2	ISSUED FOR PRE-TENDER REVIEW	2024/10/31
1	ISSUED FOR 60% CD	2024/05/02
NO.	ISSUED FOR	DATE

Scale	Checked By
N.T.S.	S.B.

Region of York Project Number	Region of York Building Code
22046	G013-B

Project  
YORK REGION NORTH ROADS OPERATIONS CENTRE

3525 BASELINE RD. SUTTON WEST, ON L0E 1R0

Drawing Title  
ELECTRICAL SINGLE LINE DIAGRAM - DEMOLITION

Project Number  
23137

Drawing Number  
E1-01

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7	ISSUED FOR ADDENDUM #4	2025/07/18
6	ISSUED FOR TENDER	2025/04/22
5	ISSUED FOR BUILDING PERMIT	2024/11/27
4	ISSUED FOR PRE-TENDER REVIEW	2024/10/31
3	ISSUED FOR 60% DD	2024/05/02
2	ISSUED FOR 100% DD	2024/02/29
1	ISSUED FOR 60% DD	2024/01/25
NO.	ISSUED FOR	DATE

Scale	Checked By
<b>N.T.S.</b>	<b>S.B.</b>

Region of York Project Number  
**22046**

Region of York Building Code  
**G013-B**

Project  
**YORK REGION NORTH ROADS  
OPERATIONS CENTRE**

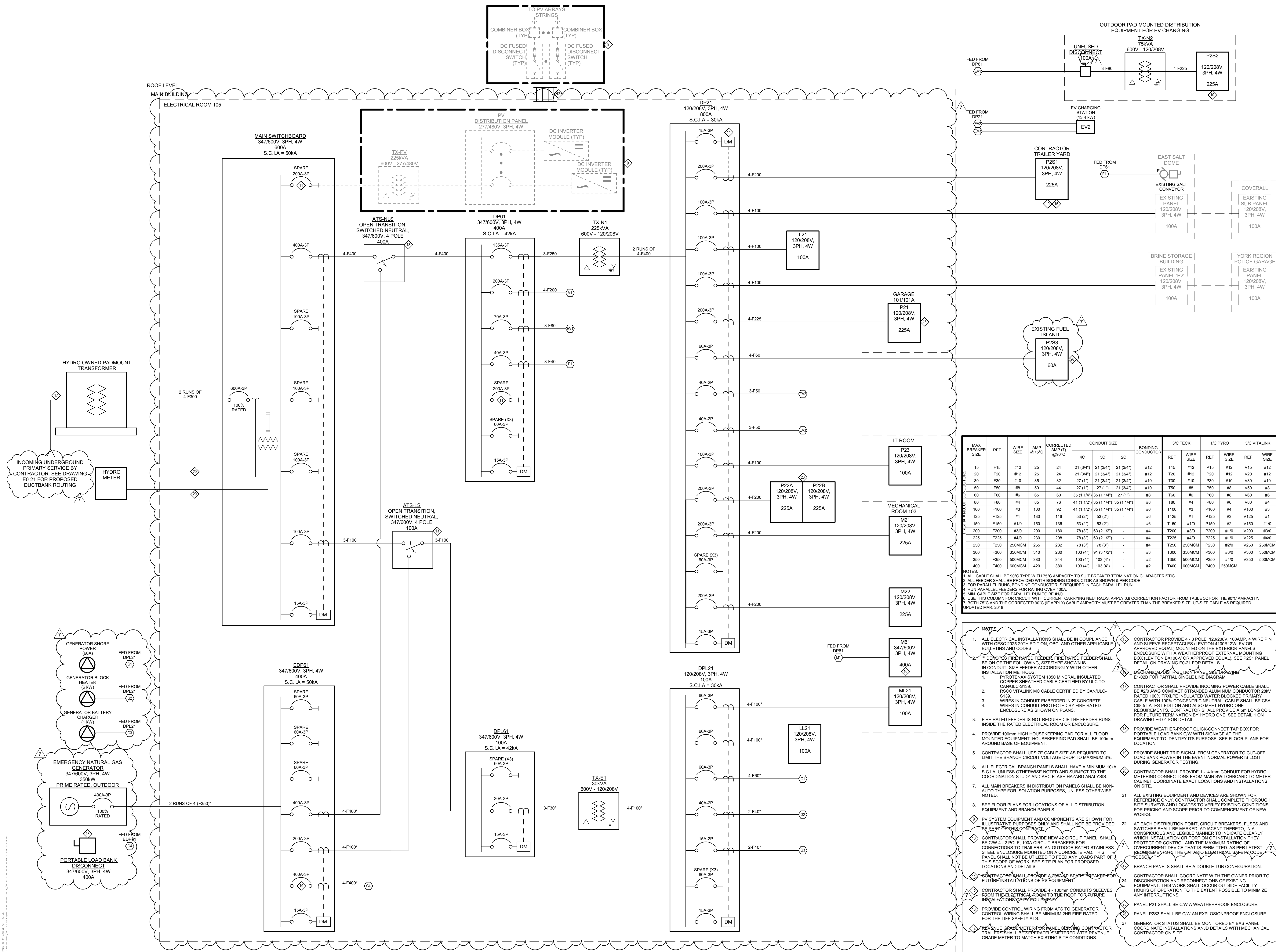
3525 BASELINE RD. SUITON WEST, ON L0E 1R0

Drawing Title  
**ELECTRICAL SINGLE LINE DIAGRAM  
- NEW WORKS - SHEET 1**

Project Number  
**23137**

Drawing Number  
**E1-02A**

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5	ISSUED FOR TENDER ADDENDUM #2	2025/07/10
4	ISSUED FOR TENDER	2025/04/10
3	ISSUED FOR BUILDING PERMIT	2024/11/10
2	ISSUED FOR PRE-TENDER REVIEW	2024/10/10
1	ISSUED FOR 60% CD	2024/05/10
<b>NO.</b>	<b>ISSUED FOR</b>	<b>DATE</b>

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ProjectYORK REGION NORTH ROADS

OPERATIONS CENTRE

3525 BASELINE RD. SUTTON WEST, ON L0E 1R0Drawing TitleELECTRICAL SINGLE LINE DIAGRAM

ELECTRICAL SINGLE LINE DIAGRAM  
- NEW WORKS - SHEET 2

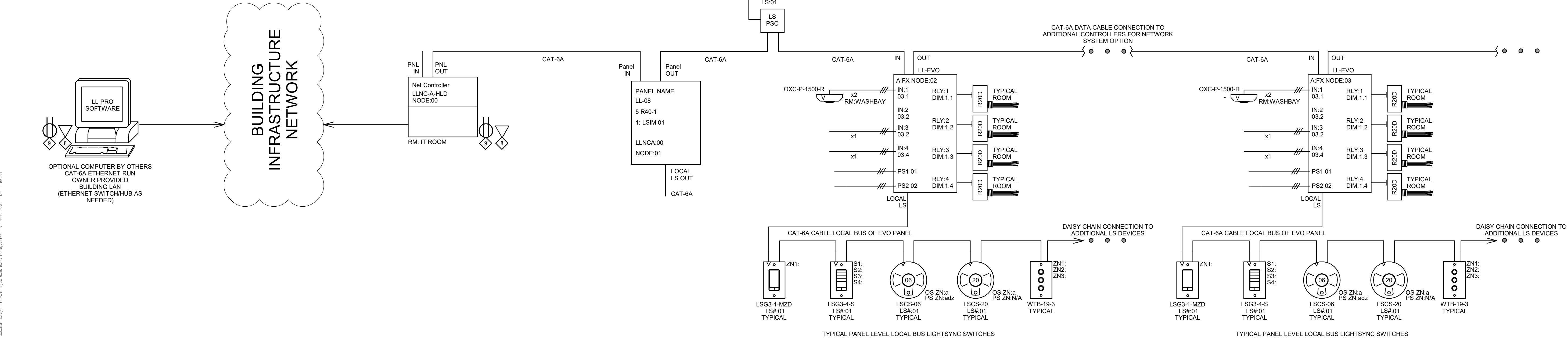
- NEW WORKS - SHEET 2

Project Number	Drawing Number
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23137 E1-02B

YORK REGION NORTH ROADS OPERATION CENTRE - LIGHTING CONTROL SCHEDULE																	
TYPE	AREA	TIME SCHEDULE	CONTINUOUS DIMMING CONTROL	PROGRAMMABLE SCENE CONTROL	BI-LEVEL DIMMING/ CONTROL	WALL SWITCH (LOCAL OVERRIDE)	SCENE CONTROL SWITCH	OCCUPANCY/ VACCANCY SENSOR	DAYLIGHT SENSOR	SENSOR ON 100%	SENSOR ON 50% MANUAL ON 50%	SENSOR OFF 100%	SENSOR OFF 50%/DIM 50%	STAND ALONE CONTROL	50% AUTOMATIC RECEPTACLE CONTROL	PROPOSED SEQUENCE OF OPERATIONS	COMMENTS
LC1	LUNCH ROOM, SHARED OFFICE, DISTRICT MANAGER OFFICE, ENCLAVE		Y			Y		Y	SEE FLOOR PLAN		Y	Y				1. LIGHTING SHALL AUTOMATICALLY ON TO 50% WHEN OCCUPANCY DETECTED WITHIN THE SPACE. 2. REMAINING 50% OF LIGHTING SHALL MANUALLY ON TO 100% BY THE CONTINUOUS DIMMER SWITCH. 3. LIGHTING SHALL AUTOMATICALLY OFF 100% AFTER 20 MINUTES OF VACANCY. 4. CONTINUOUS DIMMER SWITCH SHALL BE CAPABLE OF MANUALLY OVERRIDING LIGHTING TO EITHER 100% ON/100% OFF/CONTINUOUS DIM SETTING.	
LC2	MEETING ROOM		Y	Y		Y	Y	Y	SEE FLOOR PLAN		Y	Y				1. ALL LIGHTING SHALL AUTOMATICALLY ON TO 50% WHEN OCCUPANCY DETECTED WITHIN THE SPACE. 2. REMAINING 50% OF ALL LIGHTING SHALL MANUALLY ON TO 100% BY THE SCENE CONTROL SWITCH. 3. ALL LIGHTING SHALL AUTOMATICALLY OFF 100% AFTER 20 MINUTES OF VACANCY. 4. SCENE CONTROL SWITCH SHALL BE CAPABLE OF MANUALLY OVERRIDING ALL LIGHTING TO EITHER 100% ON/100% OFF/CONTINUOUS DIM SETTING. SCENE 1: LINEAR FIXTURE ON 100%, DOWNLIGHT FIXTURES SHALL DIM TO 50%. SCENE 2: LINEAR FIXTURE ON 50%, DOWNLIGHT FIXTURES SHALL BE AUTOMATICALLY OFF 100%. SCENE 3: DOWNLIGHT FIXTURES ON 100%, LINEAR FIXTURE SHALL DIM TO 50%. SCENE 4: DOWNLIGHT FIXTURES ON 50%, LINEAR FIXTURE SHALL BE AUTOMATICALLY OFF 100%.	
LC3	JANITOR ROOM, EQUIPMENT ROOM, FIRST AID ROOM, UNIVERSAL WASHROOM				Y	Y		Y	SEE FLOOR PLAN		Y	Y				1. LIGHTING SHALL AUTOMATICALLY ON TO 50% WHEN OCCUPANCY DETECTED WITHIN THE SPACE. 2. REMAINING 50% OF LIGHTING SHALL MANUALLY ON TO 100% BY THE BI-LEVEL DIMMER SWITCH. 3. LIGHTING SHALL AUTOMATICALLY OFF 100% AFTER 20 MINUTES OF VACANCY. 4. BI-LEVEL DIMMER SWITCH SHALL BE CAPABLE OF MANUALLY OVERRIDING LIGHTING TO EITHER 100% ON/100% OFF/BI-LEVEL DIM SETTING.	
LC4	MECHANICAL ROOM, ELECTRICAL ROOM, IT ROOM					Y			SEE FLOOR PLAN					Y (LINE VOLTAGE)		1. WALL SWITCH SHALL BE CAPABLE OF MANUALLY CONTROLLING LIGHTING TO EITHER 100% ON/100% OFF.	
LC5	CORRIDORS, VESTIBULES, OPEN OFFICE AREA	Y			Y			Y	SEE FLOOR PLAN	Y			Y			1. LIGHTING SHALL REMAIN ON 100% WHEN SPACE IS SCHEDULED OCCUPIED. 2. LIGHTING SHALL AUTOMATICALLY ON 100% WHEN OCCUPANCY DETECTED WITHIN THE SPACE BY OCCUPANCY SENSOR WHEN SPACE IS SCHEDULED UNOCCUPIED. 3. LIGHTING SHALL AUTOMATICALLY DIM TO 50% AFTER 20 MINUTES OF VACANCY WHEN SPACE IS SCHEDULED UNOCCUPIED.	
LC6	CHANGE ROOMS, GARAGE, WASH BAY, SIGN GARAGE	Y			Y	Y		Y	SEE FLOOR PLAN		Y	Y				1. LIGHTING SHALL REMAIN ON 100% WHEN SPACE IS SCHEDULED OCCUPIED. 2. LIGHTING SHALL AUTOMATICALLY DIM TO 50% AFTER 20 MINUTES OF VACANCY WHEN SPACE IS SCHEDULED OCCUPIED. 4. LIGHTING SHALL AUTOMATICALLY ON 50% WHEN OCCUPANCY DETECTED WITHIN THE SPACE BY THE OCCUPANCY SENSOR WHEN SPACE IS SCHEDULED UNOCCUPIED. 5. REMAINING 50% OF LIGHTING SHALL MANUALLY ON TO 100% BY THE BI-LEVEL DIMMER SWITCH. 6. LIGHTING SHALL AUTOMATICALLY OFF 100% AFTER 20 MINUTES OF VACANCY WHEN SPACE IS SCHEDULED UNOCCUPIED. 7. BI-LEVEL DIMMER SWITCH SHALL BE CAPABLE OF MANUALLY OVERRIDING LIGHTING TO EITHER 100% ON/100% OFF/BI-LEVEL DIM SETTING.	
LC7	SITE LIGHTING, EXTERIOR CANOPIES	Y							Y							1. LIGHTING SHALL BE AUTOMATICALLY OFF 100% DURING DAYLIGHT HOURS OR PROGRAMMED TIME SCHEDULE. 2. LIGHTING SHALL BE AUTOMATICALLY ON 100% DURING NIGHTTIME HOURS OR PROGRAMMED TIME SCHEDULE.	
NOTES: 1. SEE FLOOR PLANS FOR EXACT QUANTITIES AND LOCATIONS OF LIGHTING CONTROL DEVICES. 2. ELECTRICAL CONTRACTOR SHALL FOLLOW MANUFACTURER'S RECOMMENDATIONS TO PROVIDE APPROPRIATE TYPE AND QUANTITIES FOR FULL COVERAGE OF THE INTENDED CONTROLLED AREA. 3. ELECTRICAL CONTRACTOR TO PROVIDE A FULLY FUNCTIONAL LIGHTING CONTROL SYSTEM BASED ON THE CONTROL SCHEDULE, PANEL SCHEDULES, RISER DIAGRAMS, WIRING DIAGRAMS, PLANS, AND SPECIFICATIONS. 4. ALL SPACES TYPES OR FUNCTIONAL SPACES MAY NOT NECESSARILY BE REPRESENTED IN THIS SCHEDULE. SEE FLOOR PLANS FOR LIGHTING CONTROL TYPES.																	

LOW VOLTAGE RELAY SCHEDULE							
PANEL ID: LVP-1A							
LOCATION ELECTRICAL 105							
CIRCUIT #	RELAY #	DESCRIPTION	LOCAL SWITCH	MASTER SWITCH	TIC GROUP	PIC GROUP	COMMENTS
L21-7	1	WALLPACKS / EXTERIOR CANOPY			Y	Y	
L21-8	2	WALLPACKS / EXTERIOR CANOPY			Y	Y	
L21-9	3	SITE LIGHTING			Y	Y	
L21-10	4	SITE LIGHTING			Y	Y	
SPARE	5	ALLOCATED FOR EXISTING SITE LIGHTING			Y	Y	
SPARE	6	ALLOCATED FOR EXISTING SITE LIGHTING			Y	Y	
SPARE	7	SPARE					
SPARE	8	SPARE					



**LIGHTING CONTROL SYSTEM SHALL BE PROVIDED BY MECHANICAL CONTRACTOR. SEE MECHANICAL SPECIFICATIONS SECTION 25 56 26 FOR DETAILS.**

**NOTES:**

1. BASE LIGHTING CONTROL SYSTEM SHOWN ON DRAWING IS LIGHTED. CONTRACTOR SHALL PROVIDE A COMPLETE AND FUNCTIONAL LIGHTING CONTROL SYSTEM PER DRAWING OR APPROVED EQUAL.
2. THIS SCHEMATIC DRAWING IS SHOWN FOR ILLUSTRATIVE PURPOSES ONLY TO DEMONSTRATE GENERAL SYSTEM CONNECTIVITY. PROVIDE ALL NECESSARY COMPONENTS INCLUDING, BUT NOT LIMITED TO, NODES, BRIDGES, RELAY PACKS AND PANELS, CABLING, AND MANAGEMENT HUBS, PER MANUFACTURER RECOMMENDATIONS AND FLOOR PLANS FOR A COMPLETE FUNCTIONAL SYSTEM.
3. PROVIDE UL924 LISTED RELAY FOR CONTROL OF ALL EMERGENCY LIGHT FIXTURES. ALL EMERGENCY LIGHTS SHALL BE "ON" AND FULL BRIGHTNESS DURING LOSS OF NORMAL POWER.
4. THE LIGHTING CONTROL SYSTEM SHALL ACCEPT AN INTERFACE SIGNAL FROM THE BUILDING AUTOMATION SYSTEM.
5. SEE LIGHTING CONTROL SCHEDULE ON DRAWING FOR LIGHTING CONTROL TYPES AND SEQUENCE OF OPERATION OF THE LIGHTING CONTROL SYSTEM.
6. UPON INSTALLATION OF LIGHTING CONTROL SYSTEM, CONTRACTOR SHALL CONDUCT FUNCTIONAL TESTING OF SYSTEM IN COMPLIANCE WITH ASHRAE 90.1 SECTION 9.4.3.
7. ALLOW FOR RE-PROGRAMMING OF LIGHTING CONTROL SYSTEM ONE ADDITIONAL TIME FOLLOWING FINAL INSTALLATIONS AND COMMISSIONING, INCLUDING ALL NECESSARY MATERIALS AND LABOUR.

DATA DROP FOR CONNECTION OF LIGHTING CONTROL SYSTEM COMPONENTS TO BUILDING NETWORK INFRASTRUCTURE. SEE DRAWING E4-01 FOR DATA DROP LOCATIONS AND DETAILS.

RECEPTACLE FOR 120V/1PH POWER CONNECTION FOR LIGHTING CONTROL PANEL. SEE DETAIL 1 ON DRAWING E4-01 FOR RECEPTACLE LOCATION AND DETAILS.

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3	ISSUED FOR BUILDING PERMIT	2024/11/27
2	ISSUED FOR PRE-TENDER REVIEW	2024/10/31
1	ISSUED FOR 60% CD	2024/05/02

Drawing History

Scale: **N.T.S.** Checked By: **S.B.**

Region of York Project Number: **22046** Region of York Building Code: **G013-B**

Project: **YORK REGION NORTH ROADS OPERATIONS CENTRE**

6525 BASELINE RD SUITON WEST, ON L0E 1R0

Drawing Title: **LIGHTING CONTROL SYSTEM RISER DIAGRAM**

Project Number: **23137** Drawing Number: **E1-03**

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4	ISSUED FOR PRE-TENDER REVIEW	2024/10/31
3	ISSUED FOR 60% CD	2024/05/02
2	ISSUED FOR 100% DD	2024/02/29
1	ISSUED FOR 60% DD	2024/01/25
NO.	ISSUED FOR	DATE

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22046 G013-B

Project

YORK REGION NORTH ROADS  
OPERATIONS CENTRE

6525 BASELINE RD. SUTTON WEST, ON L0E 1R0

Drawing Title

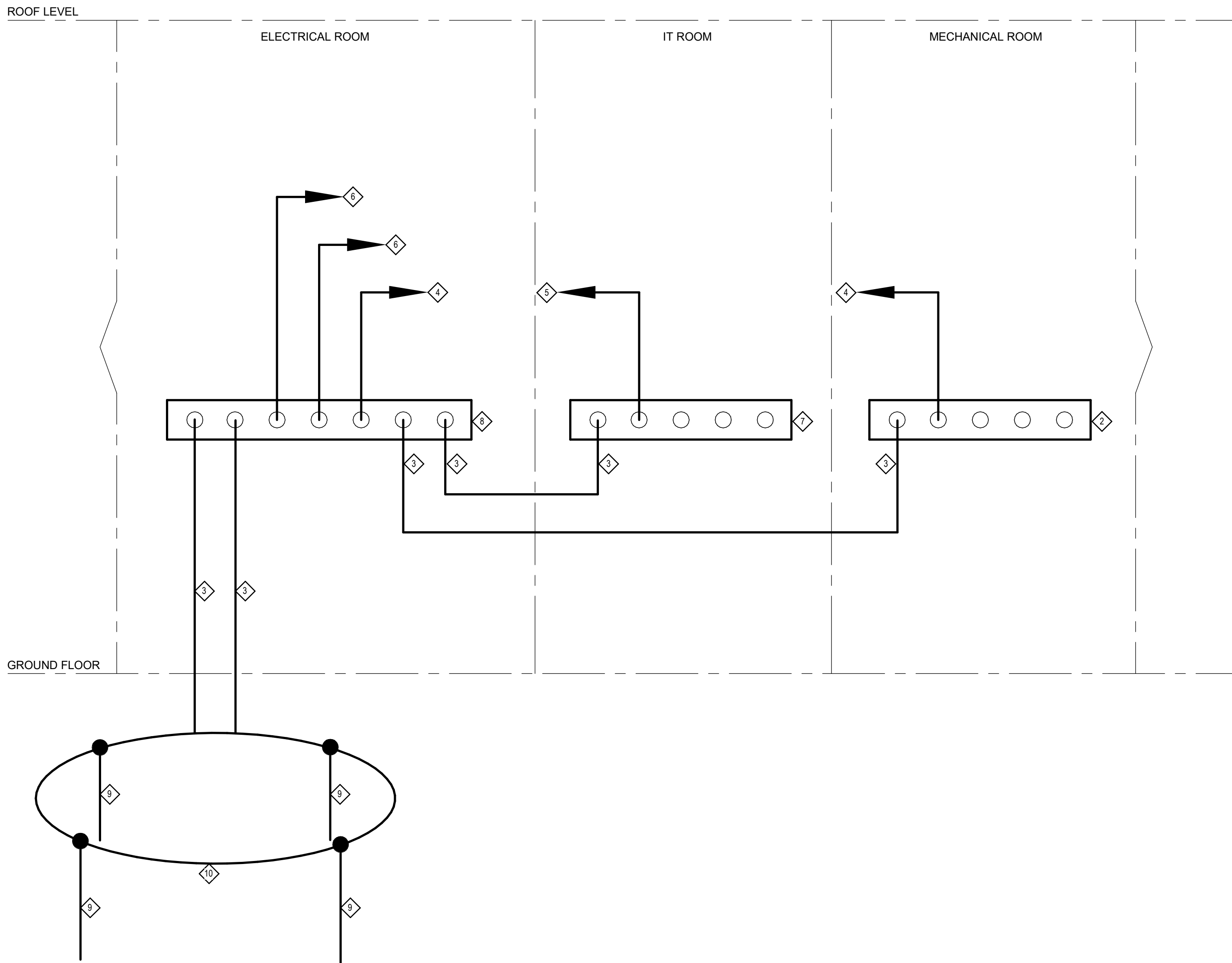
**GROUNDING & BONDING SYSTEM  
SINGLE LINE DIAGRAM**

Project Number

23137

Drawing Number

**E1-04**

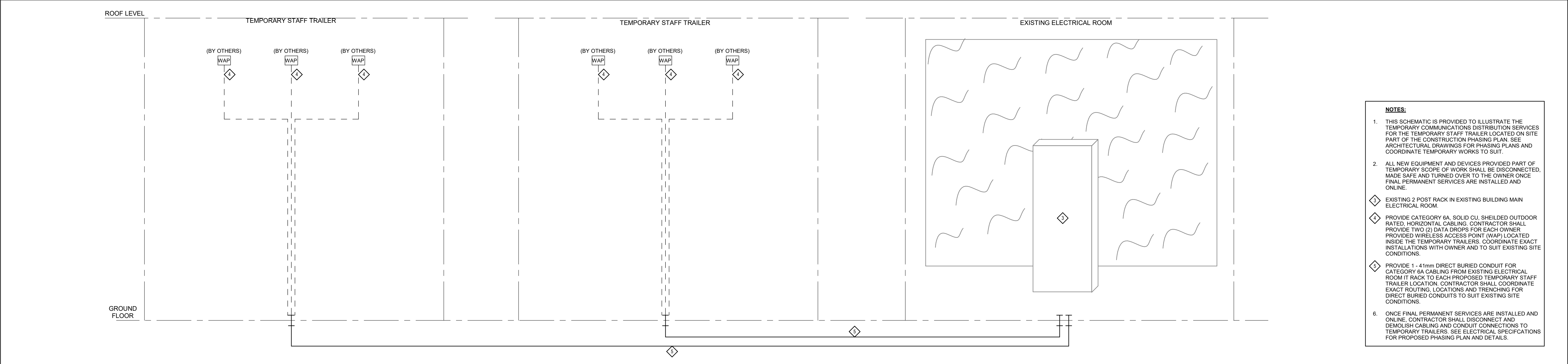


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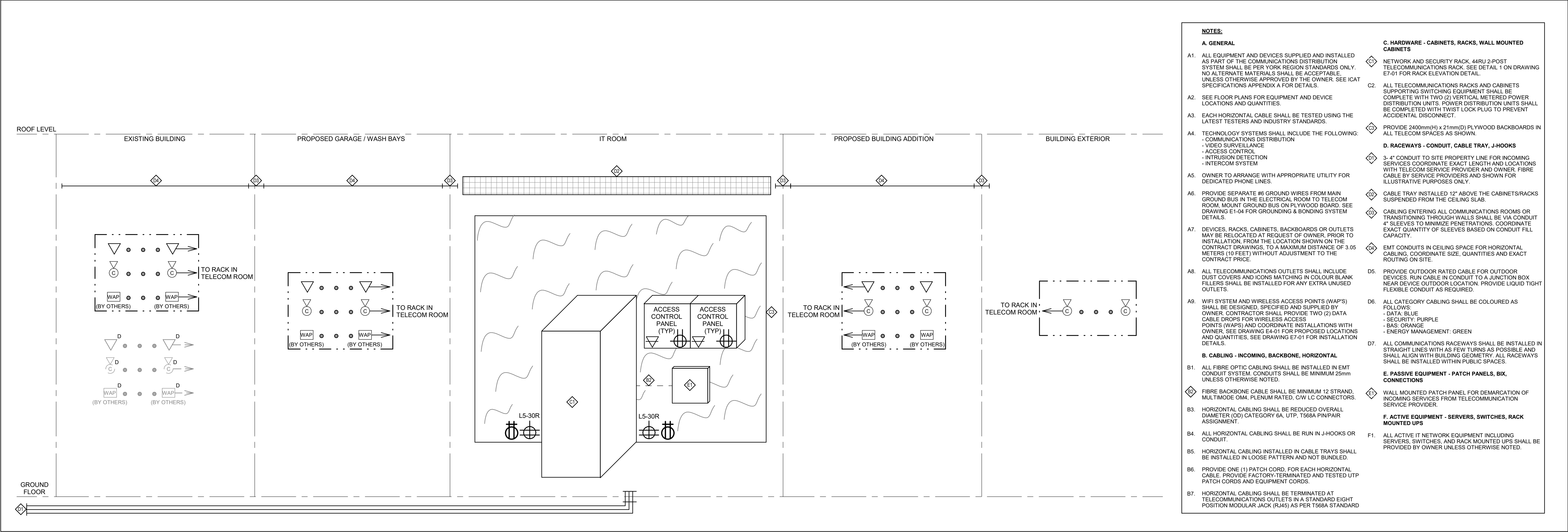
- GROUNDING AND BONDING FOR COMMUNICATION SYSTEM SHALL FOLLOW RECOMMENDATIONS IN BICSI TDDMM 14TH EDITION AND ANSI/TIA-607-C.
- COPPER GROUND BUS BAR C/W PRE-DRILLED HOLES AND INSULATOR, MIN 610mm(L) x 50mm(H) x 6mm(D).
- GROUND CONDUCTORS SHALL BE #2/0 INSULATED STRANDED COPPER CONDUCTOR UNLESS OTHERWISE NOTED.
- TO ALL ELECTRICAL ENCLOSURES AND NON-ELECTRICAL METALLIC PARTS.
- GROUND ALL EQUIPMENT MOUNTED IN RACKS OR CABINETS. BOND ALL RACKS AND CABINETS MEMBERS TO THE TGB (TELECOMMUNICATIONS GROUNDING BUSBAR) USING #6 INSULATED COPPER CONDUCTOR. PROVIDE BONDING HARDWARE TO ALL PANELS, EQUIPMENT SHELVES, CABLE TRAYS, CONDUITS, ETC. TO ENSURE ELECTRICAL CONTINUITY BETWEEN METALLIC COMPONENTS AND THE GROUNDED RACK AND CABINET.
- RUN MIN #2/0 GROUND CONDUCTOR TO THE TWO ENDS OF THE MAIN SWITCHBOARD GROUND BUS.
- PROVIDE TGB (TELECOMMUNICATIONS GROUNDING BUSBAR) /SBB (SECONDARY BONDING BUSBAR) IN EACH TR (TELECOM ROOM), MIN. 300mm(L)x25mm(H)x6mm(D). CONNECT VARIOUS TGB WITH TSB (TELECOMMUNICATIONS BONDING BACKBONE) AND GE (GROUNDING EQUALIZER) /BGC (BACKBONE BONDING CONDUCTOR) AS SHOWN.
- MAIN COPPER GROUND BUS IN MAIN ELECTRICAL ROOM, MINIMUM 500mm(L) x 100mm(H) x 6mm(D).
- MIN. 3m LONG, 19mm DIAMETER, COPPER GROUND ROD FOR ELECTRICAL GROUND GRID. PROVIDE MIN 4 RODS INSTALLED IN ACCORDANCE WITH CODE REQUIREMENTS.
- #2/0 BARE STRANDED COPPER CONDUCTOR.
- CONTRACTOR SHALL PROVIDE NEW GROUNDING AND BONDING FOR ALL EXISTING EQUIPMENT TO REMAIN.

CONDUIT TRADE SIZE	5mm (0.2")	6mm (0.24")	7mm (0.28")	8mm (0.31")
	CAT 5E	CAT 6	REDUCED OD CAT 6A	CAT 6A
	3/4"	3	1	1
1"	6	5	3	3
1-1/4"	10	8	6	5
1-1/2"	12	10	8	7
2	20	20	14	10
2-1/2"	30	30	20	15
3"	50	45	30	25
3-1/2"	65	60	40	35
4	85	80	50	45

	ELECTRICAL	COMMUNICATIONS	ELECTRONIC SECURITY	AUDIO VISUAL	OWNER
PATHWAY (DUCTS, CABLE TRAYS, CONDUITS, WIREMOLD, POLES ETC) AND ROUGH-IN (PULL BOXES, BACK BOXES, PULL STRING ETC)	✓				
COMMUNICATION DISTRIBUTION SYSTEMS		✓			
SECURITY SYSTEMS			✓		
AUDIO VISUAL SYSTEMS AND CABLING					✓
COMMUNICATIONS HORIZONTAL CABLING		✓			
ACTIVE IT NETWORK EQUIPMENT (SERVERS, SWITCHES, CABINET/RACK MOUNTED UPS)					✓
AC POWER RECEPTACLES FOR CABINETS/ RACKS	✓				
TELECOMMUNICATIONS GROUNDING & BONDING INCLUDING TMGB & TGB	✓				
TELECOMMUNICATIONS GROUNDING & BONDING FROM TMGB & TGB TO COMMUNICATIONS EQUIPMENT		✓			
TELECOMMUNICATIONS GROUNDING & BONDING FROM TMGB & TGB TO SECURITY EQUIPMENT			✓		



2 COMMUNICATIONS SYSTEMS SCHEMATIC DIAGRAM - TEMPORARY WORKS  
E1-05 N.T.S.



1 COMMUNICATIONS SYSTEMS SCHEMATIC DIAGRAM - NEW WORKS  
E1-05 N.T.S.



Project Team:  
Prime Consultant  
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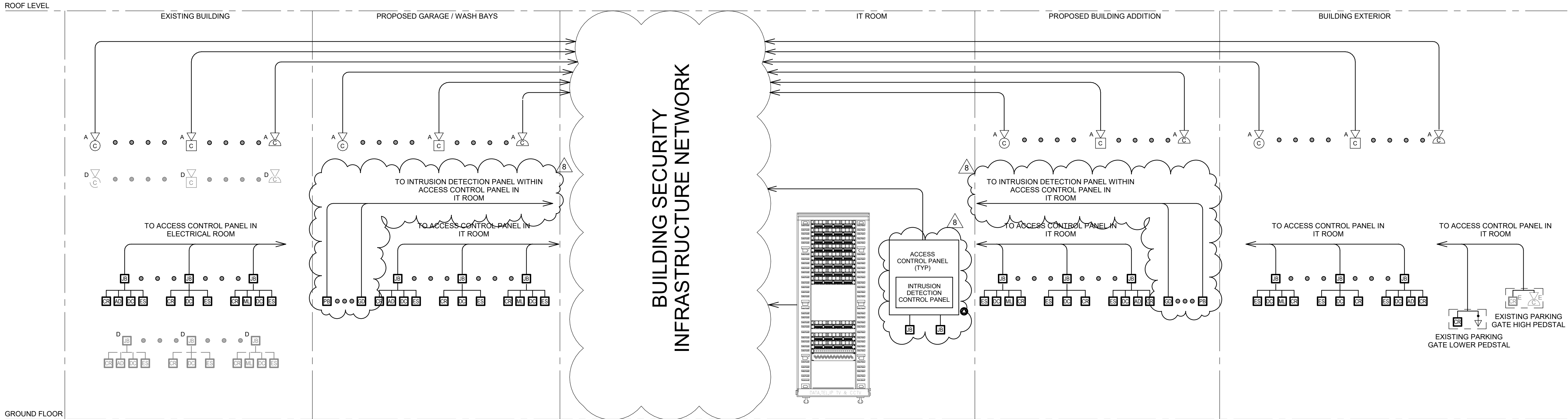
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6525 BASELINE RD SUITON WEST, ON L0E 1R0	
Drawing Title	
COMMUNICATIONS SYSTEM SINGLE LINE DIAGRAM	
Project Number	Drawing Number
23137	E1-05

CAMERA SCHEDULE											
TYPE	MANUFACTURER/MODEL	FORMAT	HORIZONTAL FOV (DEGREE)	VERTICAL FOV (DEGREE)	IR LED	VIDEO RESOLUTION	VIDEO COMPRESSION & STREAMING	EDGE ANALYTICS	IP/IK RATING	PoE POWER CONSUMPTION	APPLICATION AREAS
A	AXIS P3267-LVE	DOME	104-40	74-29	YES	5 MP	H.265, ZIPSTREAM, WDR	YES	IP66 / IK10	TYPE 1 (CLASS 3) MAX: 12.1W, TYP: 6.4W	OUTDOOR, GARAGE
B	AXIS P3737-PL-E	DOME	99-37	70-28	YES	4 X 5MP	H.265, ZIPSTREAM, WDR	YES	IP66 / IK09	TYPE 2 (CLASS 4) MAX: 23.3W, TYP: 13.25W	MULTI-SENSOR 360 PANORAMIC, BUILDING EXTERIOR CORNER, SELECTED AREAS
C	AXIS P4707-PLVE	DOME	98-36	69-27	YES	2 X 5MP	H.265, ZIPSTREAM, WDR	YES	IP66 / IK10	TYPE 2 (CLASS 4) MAX: 17.5W, TYP: 7.9W	DUAL-SENSOR 360 PANORAMIC, EXTERIOR CANOPY

DOOR HARDWARE RESPONSIBILITY MATRIX

DOOR HARDWARE ACCESSORY	SUPPLY	INSTALL	WIRING	COMMISSION
CARD READER / KEYPAD (ON THE WALL)	DIV 28 - ELECTRONIC SECURITY	DIV 28 - ELECTRONIC SECURITY	DIV 28 - ELECTRONIC SECURITY	SHARED
CARD READER / ELECTRIC LOCK COMBO	DIV 28 - ELECTRONIC SECURITY	DIV 28 - ELECTRONIC SECURITY	DIV 28 - ELECTRONIC SECURITY	SHARED
AUTOMATIC DOOR OPERATOR	DIV 8 - DOOR HARDWARE	DIV 8 - DOOR HARDWARE	DIV 26 - ELECTRICAL	SHARED
AUTOMATIC DOOR ACTUATOR (PUSH BUTTON / WAVE TO OPEN)	DIV 8 - DOOR HARDWARE	DIV 8 - DOOR HARDWARE	DIV 26 - ELECTRICAL	SHARED
REQUEST TO EXIT PUSH BUTTON	DIV 28 - ELECTRONIC SECURITY	DIV 28 - ELECTRONIC SECURITY	DIV 28 - ELECTRONIC SECURITY	SHARED
REQUEST TO EXIT MOTION DETECTOR (ON THE WALL)	DIV 28 - ELECTRONIC SECURITY	DIV 28 - ELECTRONIC SECURITY	DIV 28 - ELECTRONIC SECURITY	SHARED
REQUEST TO EXIT MOTION DETECTOR (ON DOOR FRAME)	DIV 8 - DOOR HARDWARE	DIV 8 - DOOR HARDWARE	DIV 28 - ELECTRONIC SECURITY	SHARED
DOOR HOLD OPEN DEVICE	DIV 26 - ELECTRICAL	DIV 26 - ELECTRICAL	DIV 26 - ELECTRICAL	DIV 26 - ELECTRICAL
DOOR CONTACT	DIV 28 - ELECTRONIC SECURITY	DIV 28 - ELECTRONIC SECURITY	DIV 28 - ELECTRONIC SECURITY	SHARED
ELECTRIC STRIKE	DIV 8 - DOOR HARDWARE	DIV 8 - DOOR HARDWARE	DIV 28 - ELECTRONIC SECURITY	SHARED
ELECTRIC LOCK	DIV 8 - DOOR HARDWARE	DIV 8 - DOOR HARDWARE	DIV 28 - ELECTRONIC SECURITY	SHARED
ELECTRIFIED LATCH RETRACTION	DIV 8 - DOOR HARDWARE	DIV 8 - DOOR HARDWARE	DIV 28 - ELECTRONIC SECURITY	SHARED
ELECTRIC HINGE / POWER TRANSFER	DIV 8 - DOOR HARDWARE	DIV 8 - DOOR HARDWARE	DIV 28 - ELECTRONIC SECURITY	SHARED
MAGNETIC LOCK	DIV 28 - ELECTRONIC SECURITY	DIV 28 - ELECTRONIC SECURITY	DIV 28 - ELECTRONIC SECURITY	SHARED
MAGLOCK KEY SWITCH	DIV 28 - ELECTRONIC SECURITY	DIV 28 - ELECTRONIC SECURITY	DIV 28 - ELECTRONIC SECURITY	SHARED
UNIVERSAL WASHROOM KIT	DIV 8 - DOOR HARDWARE	DIV 8 - DOOR HARDWARE	DIV 26 - ELECTRICAL	SHARED
BARRIER FREE WASHROOM KIT	DIV 8 - DOOR HARDWARE	DIV 8 - DOOR HARDWARE	DIV 26 - ELECTRICAL	SHARED
LOW VOLTAGE POWER SUPPLY	DIV 28 - ELECTRONIC SECURITY	DIV 28 - ELECTRONIC SECURITY	DIV 28 - ELECTRONIC SECURITY	DIV 28 - ELECTRONIC SECURITY
ACCESS CONTROL DOOR CONTROLLER	DIV 28 - ELECTRONIC SECURITY	DIV 28 - ELECTRONIC SECURITY	DIV 28 - ELECTRONIC SECURITY	DIV 28 - ELECTRONIC SECURITY
ROUGH-INS - CONDUITS, JUNCTION BOXES ETC.	DIV 26 - ELECTRICAL	DIV 26 - ELECTRICAL	N/A	N/A
ALL 120VAC CONNECTIONS	DIV 26 - ELECTRICAL	DIV 26 - ELECTRICAL	DIV 26 - ELECTRICAL	DIV 26 - ELECTRICAL
ALL FIRE ALARM CONNECTIONS	DIV 26 - ELECTRICAL	DIV 26 - ELECTRICAL	DIV 26 - ELECTRICAL	DIV 26 - ELECTRICAL



**NOTES:**

- ALL EQUIPMENT AND DEVICES SUPPLIED AND INSTALLED AS PART OF THE SECURITY SYSTEMS SHALL BE PER YORK REGION STANDARDS ONLY. NO ALTERNATE MATERIALS SHALL BE ACCEPTABLE, UNLESS OTHERWISE APPROVED BY THE OWNER. SEE ICAT SPECIFICATIONS APPENDIX B FOR DETAILS.
- SECURITY AND TECHNOLOGY DEVICES SHOWN ON THIS DRAWING ARE TYPICAL. SEE FLOOR PLANS FOR ACTUAL DEVICES, DOOR TYPES AND DOOR ELEVATION DETAILS. COORDINATE WITH ELECTRICAL AND DOOR HARDWARE SUB-TRADES PRIOR TO ORDER AND INSTALLATION.
- SECURITY CONTRACTOR TO PROVIDE THE REQUIRED LENSEL CAMERA INTEGRATION LICENSES AND PROGRAM THE CAMERAS TO A REMOTE MILESTONE RECORDING SERVER AS PER OWNER SPECIFICATIONS.
- VIDEO SURVEILLANCE CAMERAS SHALL BE AXIS ONLY, NO ALTERNATES SHALL BE ACCEPTABLE, UNLESS OTHERWISE CONFIRMED BY OWNER.
- VIDEO MANAGEMENT SYSTEM (VMS) SHALL BE MILESTONE ONLY. NO ALTERNATES SHALL BE ACCEPTABLE, UNLESS OTHERWISE CONFIRMED BY OWNER.
- ACCESS CONTROL SYSTEMS SHALL BE LENSEL ONLY. NO ALTERNATES UNLESS OTHERWISE CONFIRMED BY OWNER.
- CARD READERS SHALL BE HID ONLY. NO ALTERNATES UNLESS OTHERWISE CONFIRMED BY OWNER.
- INTRUSION DETECTION SYSTEM SHALL BE BOSCH ONLY. NO ALTERNATES UNLESS OTHERWISE CONFIRMED BY OWNER.
- ALL UNIVERSAL WASHROOMS AND BARRIER-FREE WASHROOMS PANIC BUTTONS SHALL BE CONNECTED TO SECURITY SYSTEM AND INTEGRATED WITH AN OFF-SITE 3RD PARTY ALARM MONITORING SYSTEM PER OWNER SPECIFICATIONS.
- EXISTING SECURITY SYSTEMS SHALL REMAIN FUNCTIONAL AS REQUIRED BY STAFF AS LONG AS REQUIRED FOR DAILY OPERATIONS. COORDINATE PHASING OF WORKS TO SUIT.
- ALL EXISTING CAMERAS SHALL BE DEMOLISHED AND RETURNED TO OWNER.
- ALL NEW CAMERA LOCATIONS SHALL BE CONFIRMED WITH OWNER ON SITE PRIOR TO PROCEEDING WITH ANY REWORKING OR INSTALLATIONS ON SITE.
- PROVIDE ALL REQUIRED LICENSES FOR VIDEO SURVEILLANCE SYSTEM, VIDEO MANAGEMENT SYSTEM (VMS), AND CAMERA LICENSES. CONTRACTOR SHALL ADD/PROGRAM CAMERAS TO VMS SERVER.
- THE FOLLOWING SYSTEMS SHALL BE INTEGRATED TOGETHER ON A SINGLE COMMON IP NETWORK VIA RESPECTIVE SERVERS, CONTROLLERS, AND COMMON DATA SWITCH FOR A COMPLETE AND FUNCTIONAL SECURITY SYSTEM:
  - ACCESS CONTROL SYSTEM AND VIDEO SURVEILLANCE SYSTEM
  - ACCESS CONTROL SYSTEM AND INTRUSION DETECTION SYSTEM
  - VIDEO SURVEILLANCE SYSTEM AND INTRUSION DETECTION SYSTEM

SEE DRAWING E4-11 FOR PROPOSED LOCATION AND NOTE 2 FOR INTRUSION DETECTION CONTROL PANEL DETAILS.



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8	ISSUED FOR ADDENDUM #4	2025/07/18
7	REISSUED FOR TENDER	2025/05/23
6	ISSUED FOR TENDER	2025/04/22
5	ISSUED FOR BUILDING PERMIT REVIEW	2024/11/27
4	ISSUED FOR PRE-TENDER REVIEW	2024/10/31
3	ISSUED FOR 60% CD	2024/05/02
2	ISSUED FOR 100% DD	2024/02/29
1	ISSUED FOR 60% DD	2024/01/25

Drawing History	
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<b>N.T.S.</b>	<b>S.B.</b>

Region of York Project Number  
**22046**

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Project  
**YORK REGION NORTH ROADS  
OPERATIONS CENTRE**

6525 BASELINE RD SUITON WEST, ON L0E 1R0

Drawing Title  
**SECURITY & TECHNOLOGY  
SYSTEMS SINGLE LINE DIAGRAM**

Project Number <b>23137</b>	Drawing Number <b>E1-06</b>
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5	ISSUED FOR BUILDING PERMIT	2024/11/27/28
4	ISSUED FOR PRE-TENDER REVIEW	2024/10/31
3	ISSUED FOR 60% CD	2024/05/02
2	ISSUED FOR 100% DD	2024/02/29
1	ISSUED FOR 60% DD	2024/01/25
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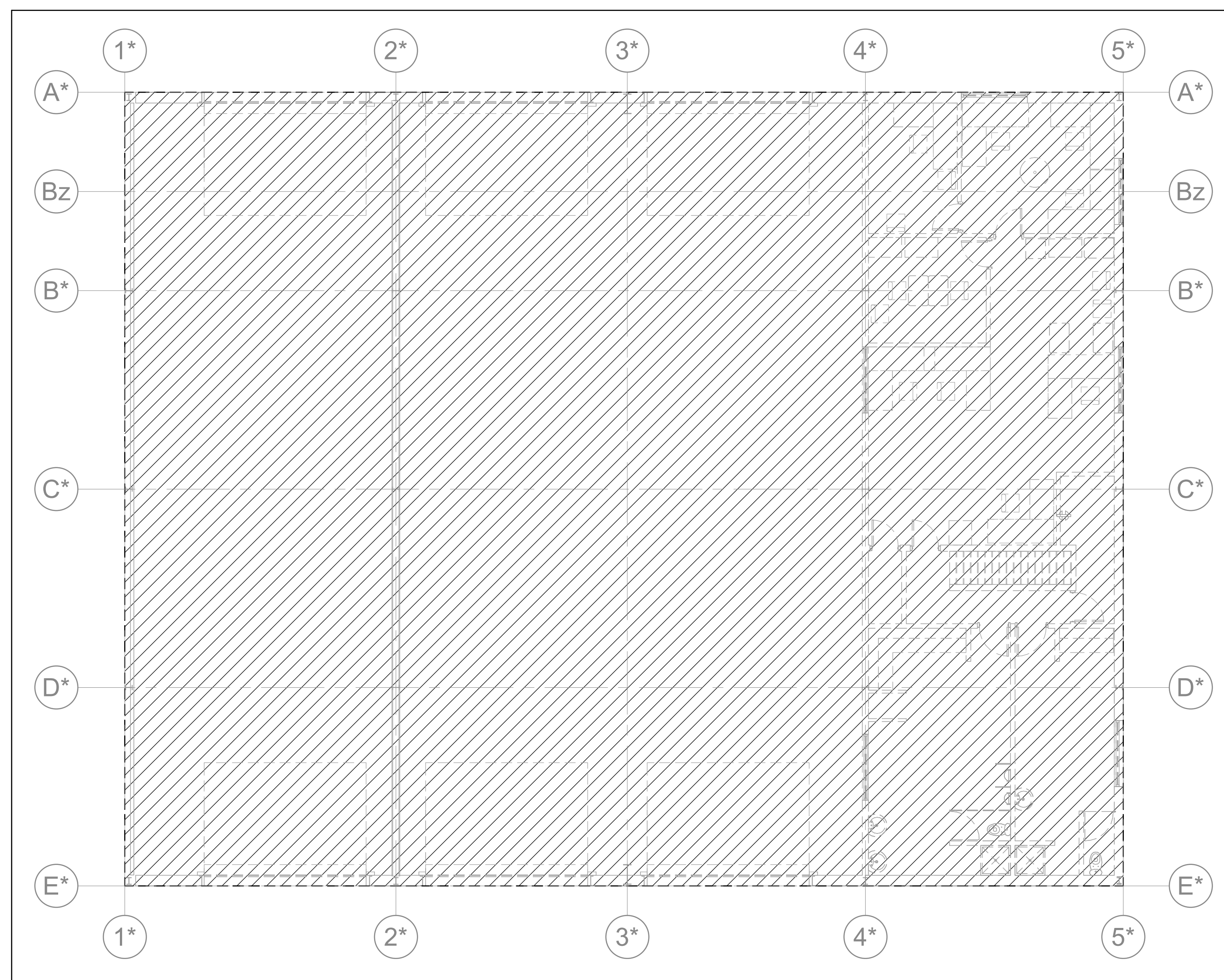
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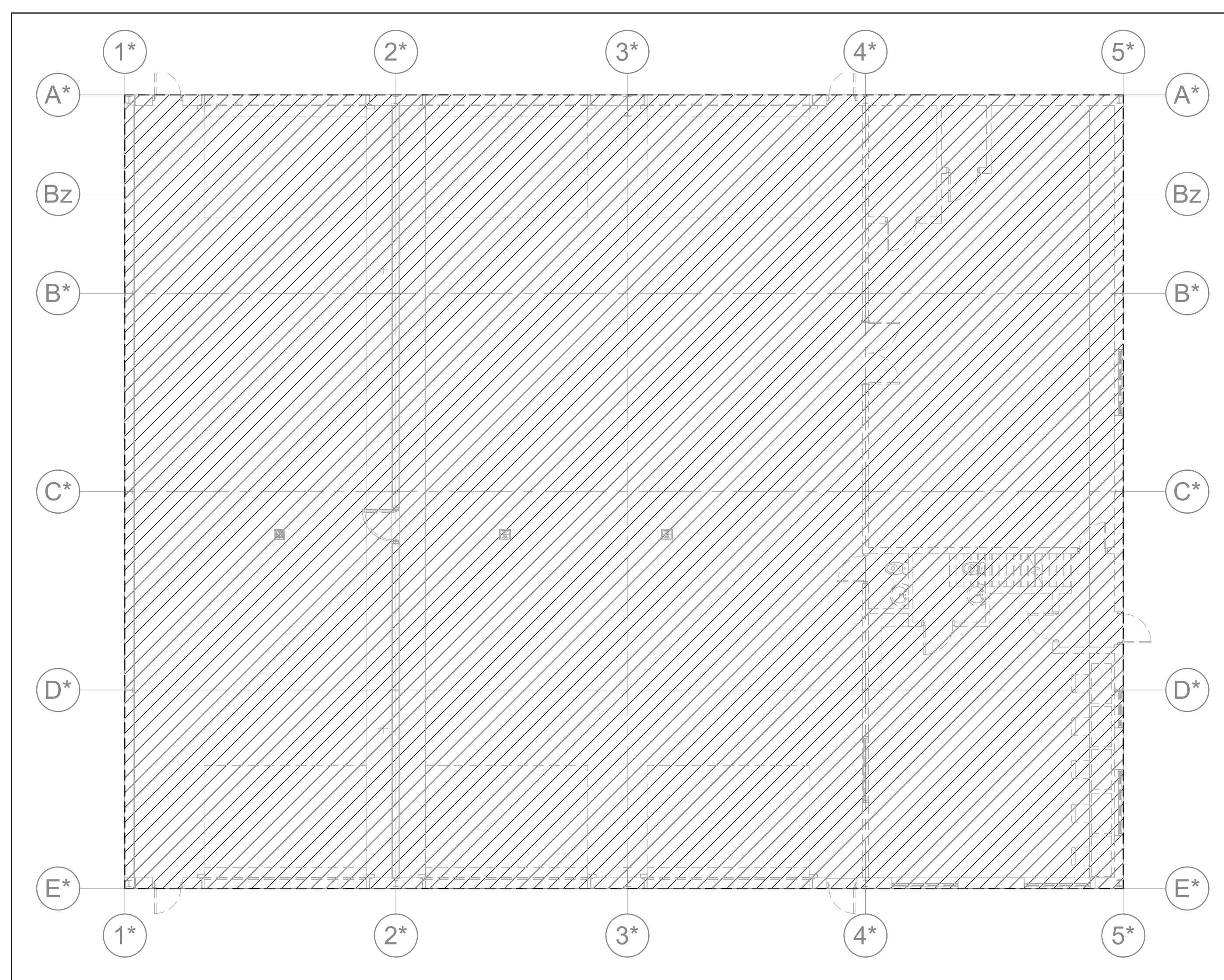
GROUND FLOOR PLAN -  
ELECTRICAL & ICAT - DEMOLITION

Project Number	Drawing Number
23137	E2-01

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2 LEVEL 2 - ELECTRICAL & ICAT - DEMOLITION  
E2-01 1 : 100



**1** LEVEL 1 - ELECTRICAL & ICAT - DEMOLITION

SOME MECHANICAL EQUIPMENT WITHIN THE WASHBAY AND GARAGE AREA SHALL BE EXISTING TO REMAIN. THE POWER CONNECTIONS TO THE EXISTING EQUIPMENT SHALL BE DISCONNECTED AND THE EXISTING CIRCUITING INFRASTRUCTURE BE DEMOLISHED AND PROVIDED WITH NEW ELECTRICAL WORKS SCOPE. COORDINATE DEMOLITION OF POWER CONNECTIONS SUPPLYING MECHANICAL EQUIPMENT WITH MECHANICAL CONTRACTOR PRIOR TO COMMENCING DEMOLITION. SEE MECHANICAL DRAWINGS FOR EXISTING EQUIPMENT LOCATIONS AND DETAILS.





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5	ISSUED FOR BUILDING PERMIT	2024/11/01
4	ISSUED FOR PRE-TENDER REVIEW	2024/10/01
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2	ISSUED FOR 100% DD	2024/02/01
1	ISSUED FOR 60% DD	2024/01/01
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3525 BASELINE RD.SUTTON WEST, ON L0E 1R0

Drawing Title	
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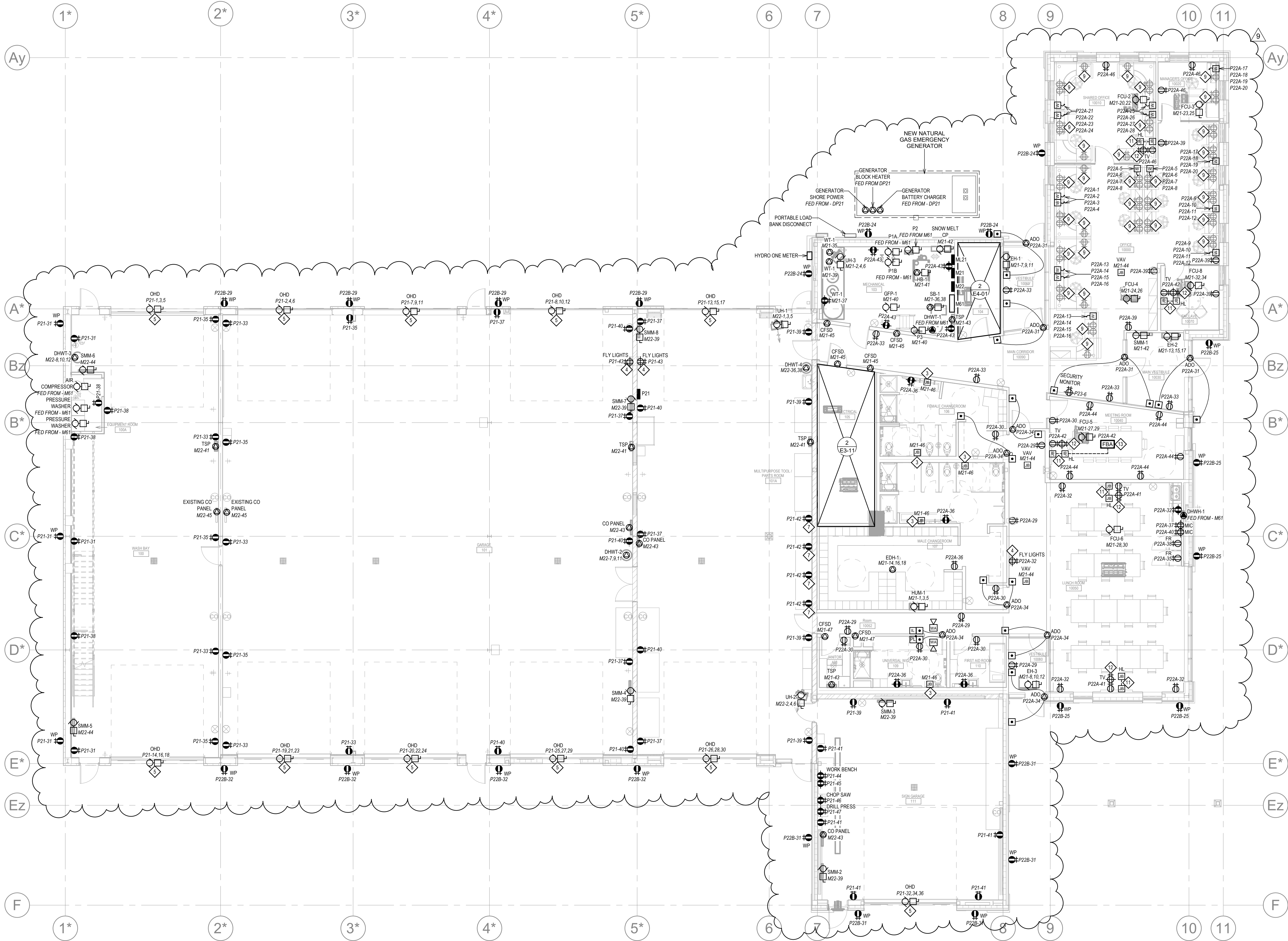
GROUND FLOOR PLAN - LIGHTING

GROUND FLOOR PLAN - LIGHTING

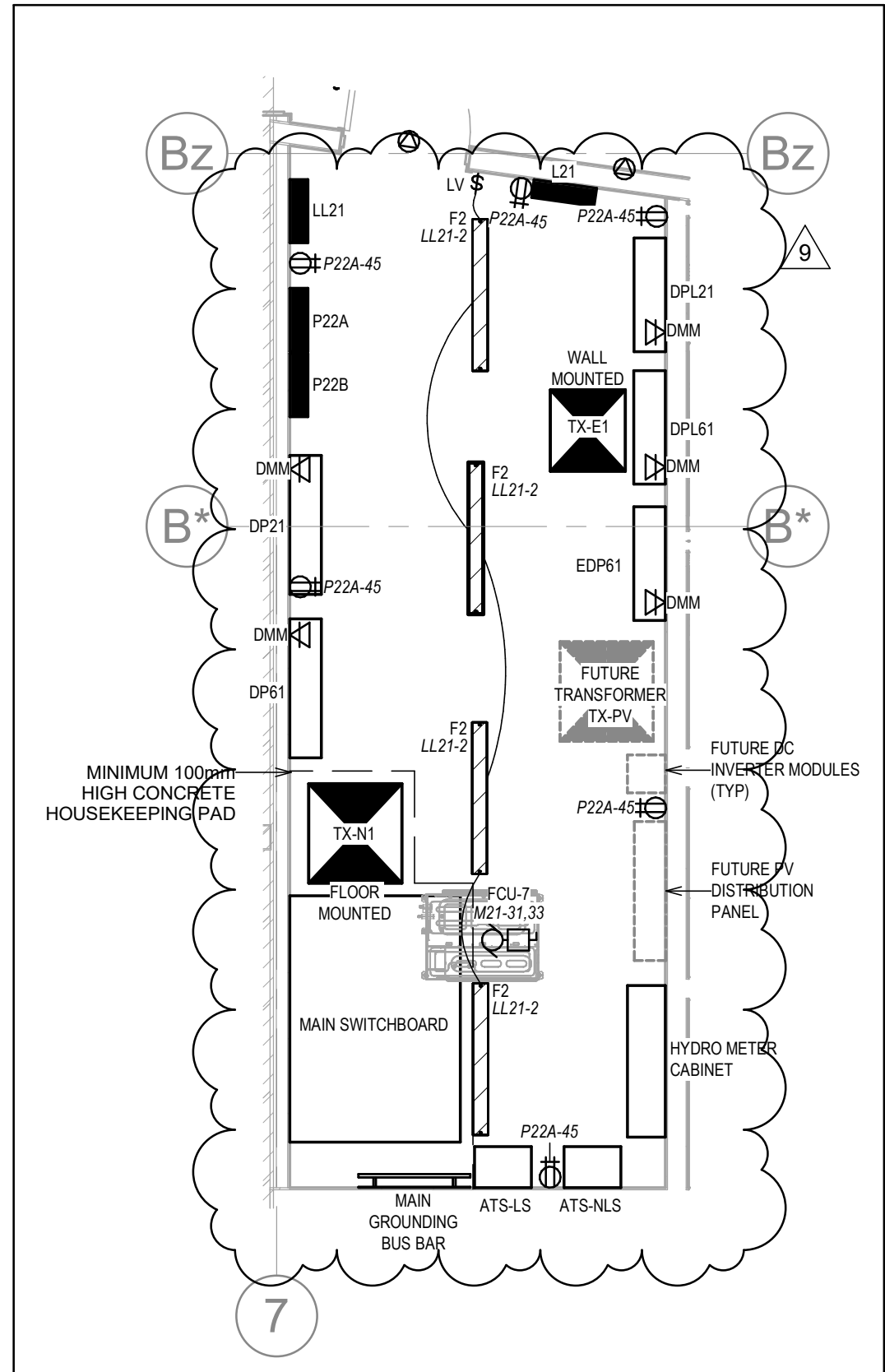
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23137	E3-01

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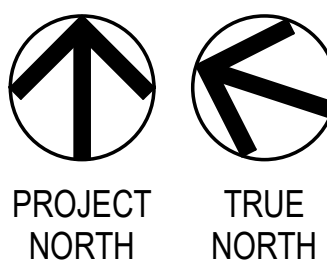


1 LEVEL 1 - POWER & FIRE ALARM  
1 : 100



2 LEVEL 1 - ELECTRICAL ROOM  
1 : 50

- NOTES:**
- SEE SINGLE LINE DIAGRAMS ON DRAWINGS E1-02A AND E1-02B FOR POWER DISTRIBUTION SYSTEM DETAILS.
  - SEE DRAWINGS ME-01 - ME-03 FOR MECHANICAL EQUIPMENT SCHEDULES. CONTRACTOR SHALL COORDINATE ALL POWER CONNECTIONS TO MECHANICAL EQUIPMENT WITH MECHANICAL CONTRACTOR ON SITE PRIOR TO INSTALLATIONS.
  - RECESSED JUNCTION BOX FOR PLUMBING FIXTURES COORDINATE EXACT LOCATIONS OF JUNCTION BOX WITH MECHANICAL CONTRACTOR ON SITE.
  - RECEPTACLES FOR FLY LIGHT FIXTURES PROVIDED AND INSTALLED BY OWNER. CONTRACTOR SHALL INSTALL RECEPTACLES A MINIMUM OF 1524mm (5') AFF. COORDINATE EXACT LOCATIONS AND INSTALLATIONS ON SITE.
  - LOCATIONS OF POWER CONNECTIONS FOR OVERHEAD DOORS SHOWN FOR REFERENCE ONLY. CONTRACTOR SHALL COORDINATE EXACT LOCATIONS OF POWER CONNECTIONS ON SITE WITH OVERHEAD DOOR INSTALLER PRIOR TO INSTALLATIONS.
  - ALL RECEPTACLES WITHIN GARAGES & WASHBAY SHALL BE GFCI RATED, WATERTIGHT, DUST AND MOISTURE RESISTANT AND PROVIDED WITH A PROTECTIVE GASKET COVER.
  - RECEPTACLES FOR EQUIPMENT RACK PROVIDED BY OWNER. CONTRACTOR SHALL COORDINATE EXACT LOCATIONS OF RECEPTACLES ON SITE WITH OWNER PRIOR TO INSTALLATIONS.
  - AUTOMATIC DOOR OPERATOR (ADO) PUSH BUTTON LOCATIONS SHOWN FOR APPROXIMATE LOCATIONS ONLY. SEE ARCHITECTURAL DRAWINGS FOR LOCATIONS AND PUSH BUTTON TYPES. COORDINATE INSTALLATIONS TO SUIT.
  - RECEPTACLES SHOW SHALL BE PRE-FABRICATED AND PROVIDED WITH THE SYSTEM FURNITURE AND ARE SHOWN FOR ILLUSTRATIVE PURPOSES ONLY.
  - COORDINATE ALL ROUGH-INS FOR AV SYSTEM WITH AV SYSTEM INSTALLER ON SITE PRIOR TO INSTALLATIONS. SEE DRAWING E7-04 FOR AV ROUGH-IN DETAILS.
  - CONTRACTOR SHALL PROVIDE 4 GANG BACKBOX, C/W 2 - 35mm EMPTY CONDUIT BETWEEN EACH JUNCTION BOX AND STUBBED UP INTO CEILING SPACE FOR FUTURE AV CONNECTION. SEE DRAWING E7-04 FOR AV ROUGH-IN DETAILS.
  - RECEPTACLES SHALL BE INSTALLED PART OF A 4 GANG BACKBOX AT THIS WALL LOCATION. COORDINATE INSTALLATIONS WITH AV SYSTEM INSTALLER ON SITE AND SEE DRAWING E7-04 FOR AV ROUGH-IN DETAILS.
  - FOR FLOORBOX TYPE AND CONDUIT ROUGH-IN REQUIREMENTS SEE FLOORBOX SCHEDULE ON DRAWING E0-01. SEE DRAWING E6-03 FOR FLOORBOX DETAIL.



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8	REISSUED FOR TENDER	2025/05/23
7	ISSUED FOR TENDER	2025/04/22
6	RE-ISSUED FOR BUILDING PERMIT	2025/03/13
5	ISSUED FOR BUILDING PERMIT	2024/11/27
4	ISSUED FOR PRE-TENDER	2024/10/31
3	ISSUED FOR 60% CD	2024/05/02
2	ISSUED FOR 100% DD	2024/02/29
1	ISSUED FOR 60% DD	2024/01/25
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Drawing History  
Scale  
**As indicated**  
Region of York Project Number  
**22046**  
Region of York Building Code  
**G013-B**

Project  
**YORK REGION NORTH ROADS  
OPERATIONS CENTRE**

6525 BASELINE RD. SUTTON WEST, ON L0E 1R0

Drawing Title  
**GROUND FLOOR PLAN - POWER**

Project Number  
**23137**  
Drawing Number  
**E3-11**

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3	ISSUED FOR 60% CD	2024/05/02
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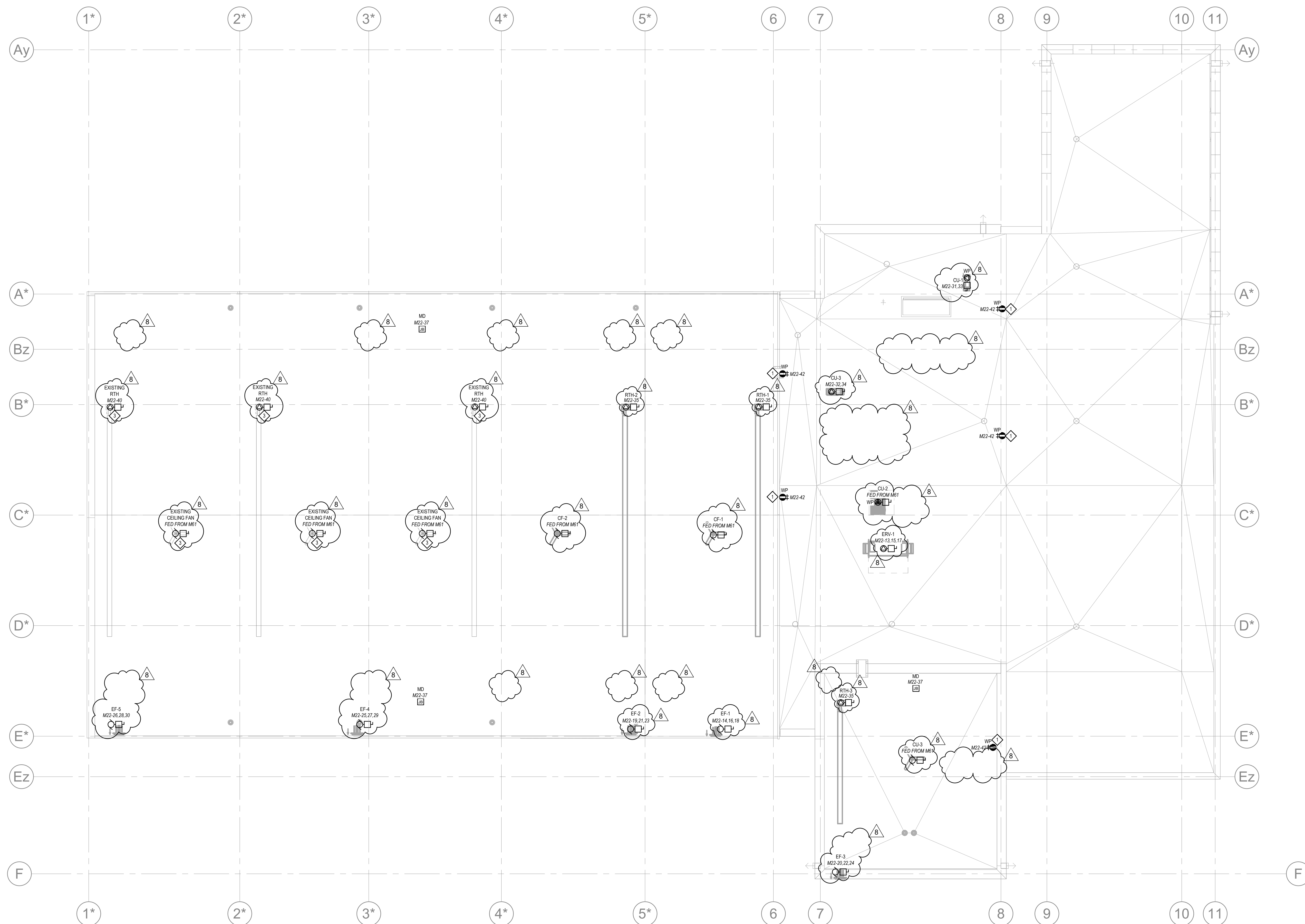
Drawing Title

ROOF LEVEL PLAN - POWER

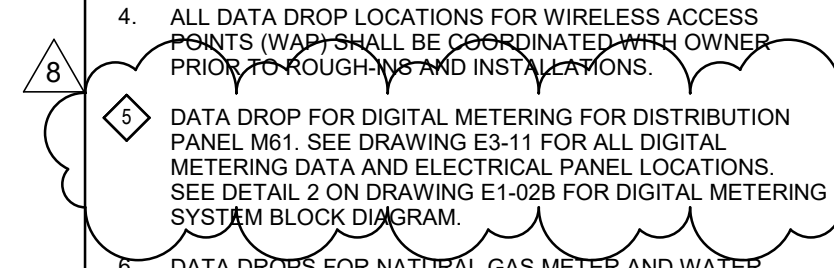
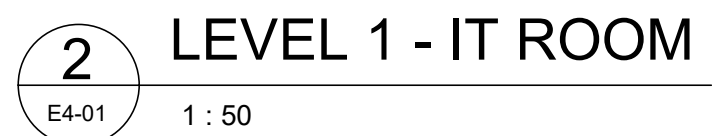
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23137

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**E3-12**

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- NOTES:**
- 1 RECEPTACLES FOR SERVICING OF ROOF MOUNTED MECHANICAL EQUIPMENT RECEPTACLES SHALL BE INSTALLED WITHIN 7.5m OF MECHANICAL EQUIPMENT AND AT 750mm ABOVE FINISHED ROOF. COORDINATE EXACT LOCATIONS ON SITE.
  - 2 ALL ELECTRICAL CONNECTIONS FOR RADIANT TUBE HEATING, CEILING FANS, EXHAUST FANS, AND MOTORIZED DAMPERS WILL BE LOCATED ON INSIDE OF THE BUILDING ON THE CEILING. ELECTRICAL CONTRACTOR SHALL COORDINATE EXACT LOCATIONS AND INSTALLATIONS WITH MECHANICAL CONTRACTOR ON SITE.
  - 3 ELECTRICAL CONTRACTOR SHALL PROVIDE NEW ELECTRICAL CONNECTIONS TO EXISTING CEILING MOUNTED MECHANICAL EQUIPMENT TO REMAIN. COORDINATE EXACT LOCATIONS AND INSTALLATIONS ON SITE.



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8	ISSUED FOR TENDER ADDENDUM #2	2025/07/04
7	REISSUED FOR TENDER	2025/05/21
6	ISSUED FOR TENDER	2025/04/22
5	ISSUED FOR BUILDING PERMIT	2024/11/21
4	ISSUED FOR PRE-TENDER REVIEW	2024/10/31
3	ISSUED FOR 60% CD	2024/05/06
2	ISSUED FOR 100% DD	2024/02/29
1	ISSUED FOR 60% DD	2024/01/23
NO.	ISSUED FOR	DATE

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Drawing History		
date	As indicated	Checked By S.B.

Region of York Project Number	Region of York Building Code
2046	G013-B

YORK REGION NORTH ROADS  
OPERATIONS CENTRE

525 BASELINE RD.SUTTON WEST, ON L0E 1R0

GROUND FLOOR PLAN -  
COMMUNICATIONS SYSTEMS

Project Number  
23137





Project Team:  
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**ENTUITIVE**  
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1	ISSUED FOR 60% DD	2024/01/25

Drawing History

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Region of York Project Number  
**22046**

Region of York Building Code  
**G013-B**

Project

**YORK REGION NORTH ROADS  
OPERATIONS CENTRE**

6525 BASELINE RD. SUTTON WEST, ON L0E 1R0

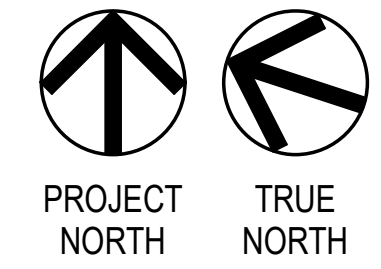
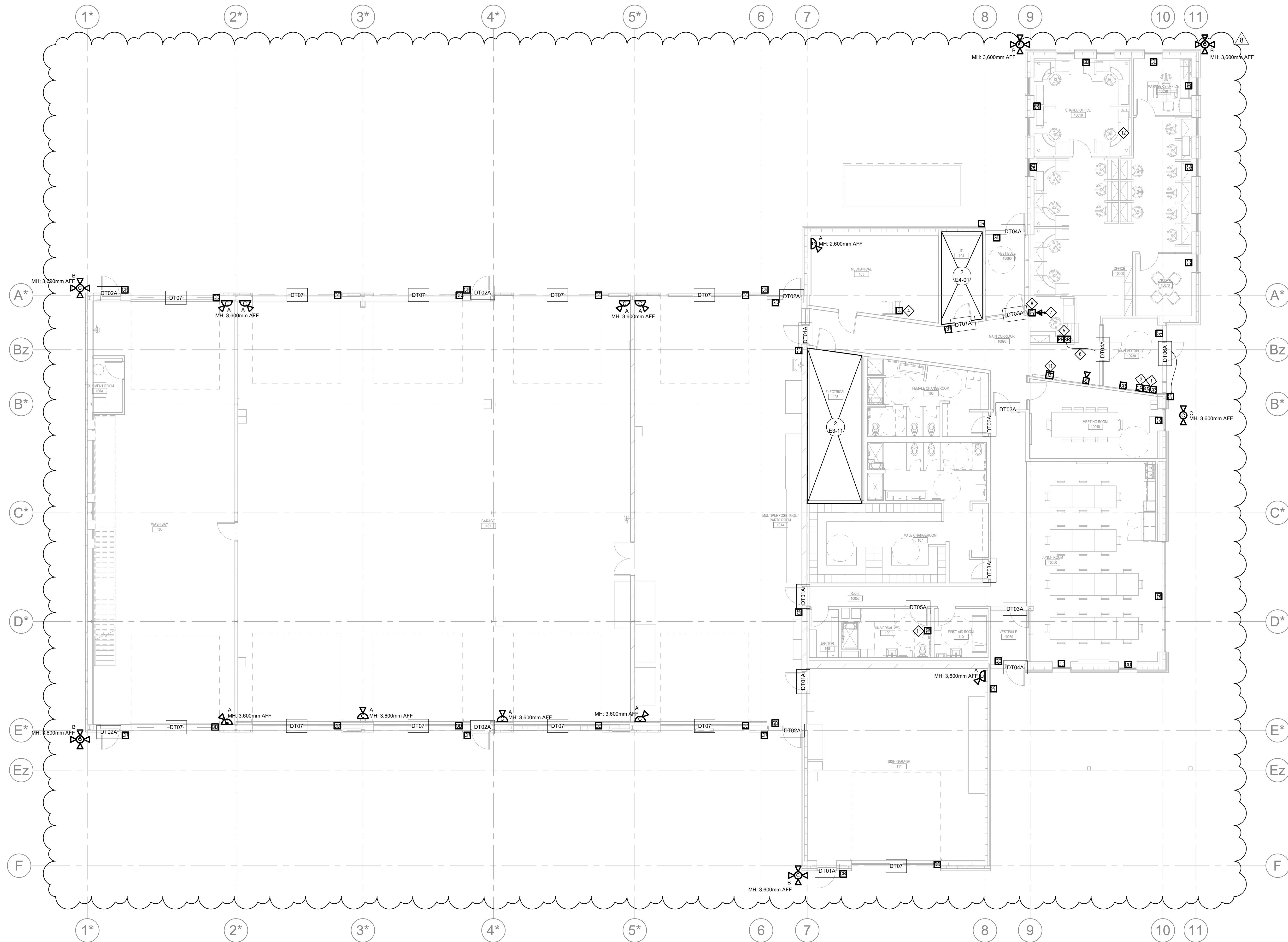
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**GROUND FLOOR PLAN - SECURITY  
SYSTEMS**

Project Number  
**23137**

Drawing Number  
**E4-11**

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- NOTES:**
- CARD READER AND ARMING PUSH BUTTON SHALL BE USED IN CONJUNCTION ONLY FOR ACTIVATION OF THE FACILITIES INTRUSION DETECTION SYSTEM.
  - INTRUSION DETECTION SYSTEM CONTROL PANEL C/W TOUCH SCREEN KEY PAD TO ACTIVATE, MONITOR, DISPLAY AND ANNUNCIATE THE STATUS OF THE FACILITIES INTRUSION DETECTION SYSTEM. CONTROL PANEL SHALL BE BOSCH B8512G. KEYPAD SHALL BE BOSCH B842 TOUCH SCREEN KEYPAD AS PER OWNER SPECIFICATIONS.
  - SEE DRAWING E1-06 FOR SECURITY AND TECHNOLOGY SYSTEMS SINGLE LINE DIAGRAM, DOOR HARDWARE RESPONSIBILITY MATRIX, CAMERA SCHEDULE, AND SECURITY SYSTEM DETAILS.
  - OVERHEAD DOOR CONTACT SHALL BE INSTALLED AT THE ROOF ACCESS HATCH OPENING COORDINATE EXACT INSTALLATIONS ON SITE.
  - PANIC BUTTON AND SECURITY RELEASE BUTTON SHALL BE MOUNTED UNDERNEATH STAFF DESK AND CONTACTED COORDINATE EXACT INSTALLATIONS ON SITE.
  - CONTRACTOR SHALL PROGRAM SECURITY RELEASE BUTTON WITH DOOR CONTROLLER SUCH THAT UPON ACTIVATION OF THE SECURITY RELEASE BUTTON THE CONTROLLED DOOR SHALL MOMENTARILY RELEASE TO GRANT ENTRY INTO THE MAIN CORRIDOR.
  - MASTER INTERCOM STATION. CONTRACTOR SHALL PROVIDE ZENITEL ITSU-2 INTERCOM STATION AS PER OWNER SPECIFICATIONS. LOCATION SHOWN FOR INDICATIVE PURPOSES ONLY. CONTRACTOR SHALL COORDINATE EXACT LOCATION ON SITE AND WITH OWNER PRIOR TO INSTALLATIONS.
  - GATE RELEASE BUTTON. CONTRACTOR SHALL PROVIDE 20 AMP ROCKER STYLE SWITCH CONNECTED TO THE SECURITY SYSTEM AND BE CAPABLE OF OPERATING THE PROPERTY ENTRANCE GATE. SEE DRAWING E0-21 FOR LOCATION OF ENTRANCE GATE.
  - ALL CAMERA LOCATIONS SHALL BE COORDINATED AND CONFIRMED WITH THE OWNER ON SITE PRIOR TO ANY INSTALLATIONS.
  - PANIC BUTTON SHALL BE CONNECTED TO SECURITY SYSTEM AND INTEGRATED WITH AN OFF-SITE 3RD PARTY ALARM MONITORING SYSTEM PER OWNER SPECIFICATIONS.
  - SECURITY MONITOR. CONTRACTOR SHALL PROVIDE A 42" WALL MOUNTED MONITOR SCREEN INSTALLED MINIMUM 1830mm AFF C/W AN AXIS D1110 VIDEO ENCODER. CONTRACTOR SHALL CONNECT TO SECURITY SYSTEM AND PROGRAM TO BE CAPABLE OF MONITORING THE PROPERTY ENTRANCE GATE. SEE DRAWING E0-21 FOR LOCATION OF ENTRANCE GATE. SEE DRAWING E3-11 FOR ELECTRICAL REQUIREMENTS AND DRAWING E4-01 FOR DATA REQUIREMENTS.
  - CONTRACTOR SHALL CONNECT DIGITAL DISPLAY (BY OTHERS) WITHIN ROOM TO SECURITY SYSTEM AND PROGRAM TO BE CAPABLE OF MONITORING THE PROPERTY ENTRANCE GATE.
  - CONTRACTOR SHALL INTEGRATE AND PROVIDE A INTEGRATION SEQUENCING BOARD AT ALL DOOR OPENINGS THAT CONTAIN A CARD READER AND AUTOMATIC DOOR OPERATOR.

2025/07/18 11:51 AM  
Drawing Title: GROUND FLOOR PLAN - SECURITY SYSTEMS  
Project: YORK REGION NORTH ROADS OPERATIONS CENTRE  
Scale: 1:100  
Author: GEC  
Checked: S.B.  
Status: ISSUED FOR TENDER

Branch Panel: L21																											
Location: ELECTRICAL 105						Volts: 120/208 Wye						A.I.C. Rating: 10kA															
Supply From: DP21						Phases: 3						Mains Type: MLO															
Mounting: Surface						Wires: 4						Mains Rating: 100															
Enclosure: Type 1						No. Circuits 42																					
Notes:																											
CKT	Circuit Description							Trip	Poles	A		B		C		Poles	Trip	Circuit Description							CKT		
1	LTG - WASHBAY 100, EQUIPMENT ROOM 100A							20	1	1005	1624							1	20	LTG - GARAGE 101							2
3	LTG - MULTIPURPOSE TOOL/PARTS ROOM 101A, SIGN GARAGE 111							20	1			1197		773				1	20	LTG - CHANGEROOM 106, 107							4
5	LTG - ROOM, 100, 100A, 101, 101A							20	1							938	527	1	20	LTG - LUNCHROOM 10050							6
7	LTG - EXTERIOR CANOPY, WALLPACKS							20	1	685	647							1	20	LTG - EXTERIOR CANOPY, WALLPACKS							8
9	LTG - SITE LIGHTING							30	1			1917		1704				1	30	LTG - SITE LIGHTING							10
11																											12
13																											14
15																											16
17																											18
19																											20
21																											22
23																											24
25																											26
27																											28
29																											30
31																											32
33	SPARE							20	1			0		0				1	20	SPARE							34
35	SPARE							20	1							0	0	1	20	SPARE							36
37	SPARE							20	1	0	--							1	--	SPACE							38
39	SPACE							--	1			--		--				1	--	SPACE							40
41	SPACE							--	1							--	--	1	--	SPACE							42
								Total Load:	3961 VA		5591 VA		1466 VA														
								Total Amps:	36.2		49.8		12.2														
Legend:																											
Panel Totals																											
Total Conn. Load: 11018 VA																											
Total Est. Demand: 11018 VA																											
Total Conn. Current: 30.6																											
Total Est. Demand Current: 30.6																											

Branch Panel: M21																																					
Location: MECHANICAL 103				Volts: 120/208 Wye				A.I.C. Rating: 10kA																													
Supply From: DP21				Phases: 3				Mains Type: MCB																													
Mounting: Surface				Wires: 4				Mains Rating: 225																													
Enclosure: Type 1				No. Circuits 60				MCB Rating: 225																													
Notes:																																					
CKT	Circuit Description							Trip	Poles	A			B			C			Poles	Trip	Circuit Description							CKT									
1										1116			3333																		2						
3	PWR - HUM-1 - MALE CHANGEROOM 107							30	3				1116			3333						3	40	PWR - UH-3 - MECHANICAL ROOM 103							4						
5																1116			3333												6						
7										2000			2000																		8						
9	PWR - EH-1 - VESTIBULE 10060							30	3							2000			2000			3	30	PWR - EH-3 - VESTIBULE 10080							10						
11																			2000			2000												12			
13										2000			3667																		14						
15	PWR - EH-2 - MAIN VESTIBULE 10030							30	3							2000			3667						3	40	PWR - EDH-1 - MALE CHANGEROOM 107							16			
17																						2000			3667												18
19										146			83									2	20	PWR - FCU-2 - SHARED OFFICE							20						
21	PWR - FCU-1 - IT 104							20	2							146			83															22			
23	PWR - FCU-3 - DISTRICT MANAGER OFFICE 10020							20	2													50	146	2	20	PWR - FCU-4 - OFFICE 10000							24				
25										50			146																					26			
27	PWR - FCU-5 - MEETING ROOM 10040							20	2							146			146						2	20	PWR - FCU-6 - LUNCH ROOM 10050							28			
29																			146			146												30			
31	PWR - FCU-7 - ELECTRICAL 105							20	2	146			146												2	20	PWR - FCU-8 - ENCLAVE 10070							32			
33																146			146															34			
35	PWR - WT-1 (UV WATER STERILIZER) - MECHANICAL 103							20	1										402			1248			2	20	PWR - SB-1 - MECHANICAL 103							36			
37	REC - WT-1 (DUPEX WATER SOFTENER & BRINE TANK) - MECHANICAL 103							20	1	240			1248												2	20								38			
39	PWR - WT-1 (UV WATER STERILIZER) - MECHANICAL 103							20	1							403			300						1	20	PWR - GFP-1, P3 - MECHANICAL 103							40			
41	PWR - HB-1 - MECHANICAL 103							20	1										1152			528			1	20	PWR - SMM-1, SNOW MELT CP - ROOMS 103, 10030							42			
43	PWR - TSPs - ROOMS 103, 108							20	1	480			642												1	20	PWR - VAV - CORRIDOR, OFFICE 10000							44			
45	PWR - CFSDs - ROOM 1090							20	1							960			900						1	20	PWR - PLUMBING FIXTURES JB - ROOMS 106, 107, 109							46			
47	PWR - CFSD - JANITOR 108							20	1													480			0			2	20	PWR - HEAT TRACING (GFCI BREAKER)							48
49													0																								50
51																			0			0			2	30	PWR - HEAT TRACING (GFCI BREAKER)							52			
53	PWR - HEAT TRACING (GFCI BREAKER)							30	2																									54			
55										0			0												1	20	SPARE							56			
57	SPARE							20	1							0			0						1	20	SPARE							58			
59	SPARE							20	1										0			0			1	20	SPARE							60			
Total Load:								43004 VA			42200 VA			40925 VA																							
Total Amps:								360			353.3			341																							
Legend:																																					
Panel Totals																																					
Total Conn. Load: 126129 VA																																					
Total Est. Demand: 117444 VA																																					
Total Conn. Current: 350.1																																					
Total Est. Demand Current: 326																																					

Branch Panel: M22													
Location: MECHANICAL 103										Volts: 120/208 Wye			
Supply From: M21										Phases: 3			
Mounting: Surface										Wires: 4			
Enclosure: Type 1										No. Circuits 60			
A.I.C. Rating: 10KA													
Mains Type: MLO													
Mains Rating: 225													
MCB Rating: 225													
Notes:													
CKT	Circuit Description	Trip	Poles	A		B		C		Poles	Trip	Circuit Description	CKT
1				3333	3333								2
3	PWR - UH-1 - MULTIPURPOSE TOOL / PARTS ROOM 101A	40	3			3333	3333			3	40	PWR - UH-2 - MULTIPURPOSE TOOL / PARTS ROOM 101A	4
5								3333	3333				6
7				3000	3000								8
9	PWR - DHWT-2 - GARAGE 101	40	3			3000	3000			3	40	PWR - DHWT-3 - WASH BAY 100	10
11								3000	3000				12
13				3823	333								14
15	PWR - ERV-1 - ROOF LEVEL	40	3			3823	333			3	20	PWR - EF-1 - MULTIPURPOSE TOOL / PARTS ROOM 101A	16
17								3823	333				18
19				333	333								20
21	PWR - EF-2 - GARAGE 101	20	3			333	333			3	20	PWR - EF-3 - SIGN GARAGE 111	22
23								333	333				24
25				333	333								26
27	PWR - EF-4 - GARAGE 101	20	3			333	333			3	20	PWR - EF-5 - WASH BAY	28
29								333	333				30
31	PWR - CU-1 - ROOF LEVEL	30	2	1914	1664					2	30	PWR - CU-3 - ROOF LEVEL	32
33						1914	1664						34
35	PWR - RTH-1, 2, 3 - GARAGE	20	1					936	1500	2	20	PWR - DHWT-4 - MULTIPURPOSE TOOL / PARTS ROOM 101A	36
37	PWR - MOTORIZED DAMPERS - GARAGES	20	1	720	1500					1	20	PWR - EXISTING RTHS - GARAGES	38
39	PWR - SMM-2,3,4,7,8 - ROOMS 101, 101A, 111	30	1			1320	936			1	20	PWR - EXISTING RTHS - GARAGES	40
41	PWR - TSP - ROOMS 101A, 101, 100	20	1					720	1200	1	20	REC - MECHANICAL EQUIPMENT - ROOF LEVEL	42
43	PWR - CO PANEL - ROOMS 101, 101A, 111	20	1	1080	528					1	20	PWR - SMM-5,6 - WASH BAY 100	44
45	PWR - EXISTING CO PANEL - ROOMS 100, 101	20	1			720							46
47													48
49					0					2	30	PWR - HEAT TRACING (GFCI BREAKER)	50
51						0	0						52
53	PWR - HEAT TRACING (GFCI BREAKER)	30	2					0	0				54
55	SPARE	20	1	0	0					2	30	PWR - HEAT TRACING (GFCI BREAKER)	56
57	SPARE	20	1			0	0			1	20	SPARE	58
59	SPARE	20	1					0	0	1	20	SPARE	60
Total Load:				25662 VA		24710 VA		22513 VA					
Total Amps:				215.8		208.7		187.6					
Legend:													
Panel Totals													
Total Conn. Load: 72785 VA													
Total Est. Demand: 67235 VA													
Total Conn. Current: 202													
Total Est. Demand Current: 186.6													



Branch Panel: P21													
Location: MULTIPURPOSE TOOL / PAR...				Volts: 120/208 Wye				A.I.C. Rating: 22kA					
Supply From: DP21				Phases: 3				Mains Type: MCB					
Mounting: Surface				Wires: 4				Mains Rating: 225					
Enclosure: Type 4 (Weather Proof)				No. Circuits: 60				MCB Rating: 225					
Notes:													
CKT	Circuit Description	Trip	Poles	A		B		C		Poles	Trip	Circuit Description	CKT
1				552	552								2
3	PWR - OVERHEAD DOOR - WASH BAY 100	20	3			552	552			3	20	PWR - OVERHEAD DOOR - GARAGE 101	4
5								552	552				6
7				552	552								8
9	PWR - OVERHEAD DOOR - GARAGE 101	20	3			552	552			3	20	PWR - OVERHEAD DOOR - GARAGE 101	10
11								552	552				12
13				552	552								14
15	PWR - OVERHEAD DOOR - MULTIPURPOSE TOOL / PARTS ROOM 101A	20	3			552	552			3	20	PWR - OVERHEAD DOOR - WASH BAY 100	16
17								552	552				18
19				552	552								20
21	PWR - OVERHEAD DOOR - GARAGE 101	20	3			552	552			3	20	PWR - OVERHEAD DOOR - GARAGE 101	22
23								552	552				24
25				552	552								26
27	PWR - OVERHEAD DOOR - GARAGE 101	20	3			552	552			3	20	PWR - OVERHEAD DOOR - MULTIPURPOSE TOOL / PARTS ROOM 101A	28
29								552	552				30
31	REC (GFCI) - EXTERIOR, WASH BAY 100	20	1	1440	552								32
33	REC (GFCI) - ROOMS 101, 100	20	1			1440	552			3	20	PWR - OVERHEAD DOOR - SIGN GARAGE 111	34
35	REC (GFCI) - ROOMS 101, 100	20	1					1440	552				36
37	REC (GFCI) - ROOMS 101, 101A	20	1	1440	960					1	20	REC - ROOMS 100, 100A	38
39	REC - ROOMS 101A, 111	20	1			1200	1440			1	20	REC (GFCI) - ROOMS 101A, 101	40
41	REC SIGN GARAGE 111	20	1					1440	960	1	20	REC - EQUIPMENT RACK - MULTIPURPOSE TOOL / PARTS ROOM 101A	42
43	REC - FLY LIGHTS - ROOMS 101, 101A	20	1	480	1200					1	20	REC - WORKBENCH - SIGN GARAGE 111	44
45	REC - WORKBENCH - SIGN GARAGE 111	20	1			1200	1675			1	20	REC - CHOP SAW - SIGN GARAGE 111	46
47	REC - DRILL PRESS - SIGN GARAGE 111	20	1					552					48
49													50
51							0			1	20	SPARE	52
53								0		1	20	SPARE	54
55				--						1	--	SPACE	56
57	SPACE	--	1			--	--			1	--	SPACE	58
59	SPACE	--	1					--	--	1	--	SPACE	60
Total Load:				11592 VA		13027 VA		10464 VA					
Total Amps:				98		110		87.2					
Legend:													
Panel Totals													
Total Conn. Load: 35083 VA													
Total Est. Demand: 30860 VA													
Total Conn. Current: 97.4													
Total Est. Demand Current: 85.7													

Branch Panel: P22A													
Location: ELECTRICAL 105				Volts: 120/208 Wye				A.I.C. Rating: 10kA					
Supply From: DP21				Phases: 3				Mains Type: MLO					
Mounting: Surface				Wires: 4				Mains Rating: 225					
Enclosure: Type 1				No. Circuits 60									
Notes:													
CKT	Circuit Description	Trip	Poles	A		B		C		Poles	Trip	Circuit Description	CKT
1	PWR - FURNITURE WHIP - OFFICE 10000	20	1	1440	1440					1	20	PWR - FURNITURE WHIP - OFFICE 10000	2
3	PWR - FURNITURE WHIP - OFFICE 10000	20	1			1440	1440			1	20	PWR - FURNITURE WHIP - OFFICE 10000	4
5	PWR - FURNITURE WHIP - OFFICE 10000	20	1					1440	1440	1	20	PWR - FURNITURE WHIP - OFFICE 10000	6
7	PWR - FURNITURE WHIP - OFFICE 10000	20	1	1440	1440					1	20	PWR - FURNITURE WHIP - OFFICE 10000	8
9	PWR - FURNITURE WHIP - OFFICE 10000	20	1			720	1440			1	20	PWR - FURNITURE WHIP - OFFICE 10000	10
11	PWR - FURNITURE WHIP - OFFICE 10000	20	1					1440	1440	1	20	PWR - FURNITURE WHIP - OFFICE 10000	12
13	PWR - FURNITURE WHIP - OFFICE 10000	20	1	1440	1440					1	20	PWR - FURNITURE WHIP - OFFICE 10000	14
15	PWR - FURNITURE WHIP - OFFICE 10000	20	1			1440	720			1	20	PWR - FURNITURE WHIP - OFFICE 10000	16
17	PWR - FURNITURE WHIP - OFFICE 10000, DISTRICT MANAGER OFFICE 10020	20	1					1440	1440	1	20	PWR - FURNITURE WHIP - OFFICE 10000, DISTRICT MANAGER OFFICE 10020	18
19	PWR - FURNITURE WHIP - OFFICE 10000, DISTRICT MANAGER OFFICE 10020	20	1	1440	1440					1	20	PWR - FURNITURE WHIP - OFFICE 10000, DISTRICT MANAGER OFFICE 10020	20
21	PWR - FURNITURE WHIP - SHARED OFFICE 10010	20	1			1440	1440			1	20	PWR - FURNITURE WHIP - SHARED OFFICE 10010	22
23	PWR - FURNITURE WHIP - SHARED OFFICE 10010	20	1					1440	1440	1	20	PWR - FURNITURE WHIP - SHARED OFFICE 10010	24
25	PWR - FURNITURE WHIP - SHARED OFFICE 10010	20	1	1440	1440					1	20	PWR - FURNITURE WHIP - SHARED OFFICE 10010	26
27	PWR - FURNITURE WHIP - SHARED OFFICE 10010	20	1			1440	1440			1	20	PWR - FURNITURE WHIP - SHARED OFFICE 10010	28
29	REC CORRIDOR - SOUTH	20	1					1200	1440	1	20	REC - HSKP - ROOMS 10040, 110, 108, 107, 106, 109	30
31	PWR - ADO - ROOMS 10030, 10060,	20	1	400	1200					1	20	REC - LUNCH ROOM 10050	32
33	REC - ROOMS 10030, 10060	20	1			1200	600			1	20	PWR - ADO - CORRIDOR, ROOMS 106, 107, 109	34
35	REC LUNCH ROOM 10050	20	1					720	1200	1	20	REC - ROOMS 106, 107, 109, 110	36
37	REC - MICROWAVE - LUNCH ROOM 10050	20	1	600	720					1	20	REC - FRIDGE - LUNCH ROOM 10050	38
39	REC - OFFICE 10000	20	1			1200	600			1	20	REC - MICROWAVE - LUNCH ROOM 10050	40
41	REC - TV - LUNCH ROOM 10050	20	1					960	1200	1	20	REC - TV'S, FLOORBOX - ROOMS 10040, 10070	42
43	REC (GFCI) - MECHANICAL 103	20	1	960	1200					1	20	REC - MEETING ROOM 10040	44
45	REC - ELECTRICAL 105	20	1			1440	1200			1	20	REC - TV & CONVENIENCE - ROOMS 10010, 10020	46
47													48
49													50
51	SPARE	20	1			0	0			1	20	SPARE	52
53	SPARE	20	1					0	0	1	20	SPARE	54
55	SPARE	20	1	0	--					1	--	SPACE	56
57	SPACE	--	1		--	--				1	--	SPACE	58
59	SPACE	--	1					--	--	1	--	SPACE	60
Total Load:				24760 VA	21920 VA	22640 VA							
Total Amps:				207.3	182.7	189.6							
Legend:													
Panel Totals													
Total Conn. Load: 69320 VA													
Total Est. Demand: 52880 VA													
Total Conn. Current: 192.4													
Total Est. Demand Current: 146.8													

Branch Panel: P2S2															
Location:				Volts: 120/208 Wye				A.I.C. Rating: 22kA							
Supply From: TX-N2				Phases: 3				Mains Type: MCB							
Mounting: Surface				Wires: 4				Mains Rating: 225							
Enclosure: Type 1				No. Circuits 42				MCB Rating: 225							
Notes:															
CKT	Circuit Description	Trip	Poles	A		B		C		Poles	Trip	Circuit Description	CKT		
1	PWR - EV CHARGING STATION PORT 1	40	2	3350	3350					2	40	PWR - EV CHARGING STATION PORT 2	2		
3														4	
5	SPARE ALLOCATED FOR FUTURE EV CHARGING STATION	40	2			3350	3350			2	40	SPARE ALLOCATED FOR FUTURE EV CHARGING STATION	6		
7				3350	3350										8
9	SPARE ALLOCATED FOR FUTURE EV CHARGING STATION	40	2			3350	3350			2	40	SPARE ALLOCATED FOR FUTURE EV CHARGING STATION	10		
11								3350	3350						12
13	SPARE ALLOCATED FOR FUTURE EV CHARGING STATION	40	2	3350	3350					2	40	SPARE ALLOCATED FOR FUTURE EV CHARGING STATION	14		
15						3350	3350								16
17	SPARE ALLOCATED FOR FUTURE EV CHARGING STATION	40	2					3350	3350	2	40	SPARE ALLOCATED FOR FUTURE EV CHARGING STATION	18		
19				3350	3350										20
21	REC - EXTERIOR EV DISTRIBUTION PAD	20	1			240							22		
23													24		
25													26		
27													28		
29													30		
31													32		
33	SPARE	20	1			0	0			1	20	SPARE	34		
35	SPARE	20	1					0	0	1	20	SPARE	36		
37	SPARE	20	1	0	--					1	--	SPACE	38		
39	SPACE	--	1			--	--			1	--	SPACE	40		
41	SPACE	--	1					--	--	1	--	SPACE	42		
Total Load:				26800 VA		20340 VA		20100 VA							
Total Amps:				223.6		169.8		167.5							
Legend:															
Panel Totals															
Total Conn. Load: 67240 VA															
Total Est. Demand: 67180 VA															
Total Conn. Current: 186.6															
Total Est. Demand Current: 186.5															

Branch Panel: P22B											
Location: ELECTRICAL 105						Volts: 120/208 Wye			A.I.C. Rating: 10kA		
Supply From: P22A						Phases: 3			Mains Type: MLO		
Mounting: Surface						Wires: 4			Mains Rating: 225		
Enclosure: Type 1						No. Circuits: 42					
Notes:											
CKT	Circuit Description	Trip	Poles	A	B	C	Poles	Trip	Circuit Description	CKT	
1	REC - BLOCK HEATER - EXTERIOR PARKING	20	1	240	240		1	20	REC - BLOCK HEATER - EXTERIOR PARKING	2	
3	REC - BLOCK HEATER - EXTERIOR PARKING	20	1		240	240	1	20	REC - BLOCK HEATER - EXTERIOR PARKING	4	
5	REC - BLOCK HEATER - EXTERIOR PARKING	20	1			240	240	1	20	REC - BLOCK HEATER - EXTERIOR PARKING	6
7	REC - BLOCK HEATER - EXTERIOR PARKING	20	1	240	240		1	20	REC - BLOCK HEATER - EXTERIOR PARKING	8	
9	REC - BLOCK HEATER - EXTERIOR PARKING	20	1		240	240	1	20	REC - BLOCK HEATER - EXTERIOR PARKING	10	
11	REC - BLOCK HEATER - EXTERIOR PARKING	20	1			240	240	1	20	REC - BLOCK HEATER - EXTERIOR PARKING	12
13	REC - BLOCK HEATER - EXTERIOR PARKING	20	1	240	240		1	20	REC - BLOCK HEATER - EXTERIOR PARKING	14	
15	REC - BLOCK HEATER - EXTERIOR PARKING	20	1		240	240	1	20	REC - BLOCK HEATER - EXTERIOR PARKING	16	
17	REC - BLOCK HEATER - EXTERIOR PARKING	20	1			240	240	1	20	REC - BLOCK HEATER - EXTERIOR PARKING	18
19	REC - BLOCK HEATER - EXTERIOR PARKING	20	1	240	240		1	20	REC - BLOCK HEATER - EXTERIOR PARKING	20	
21	PWR - EXISTING ENTRANCE GATE - EXTERIOR	20	2		1040	240	1	20	PWR - NEW SIGNAGE - EXTERIOR	22	
23						1040	960	1	20	REC (GFCI) - EXTERIOR	24
25	REC (GFCI) - EXTERIOR	20	1	1200							26
27											28
29	REC (GFCI) - EXTERIOR, GARAGE 101	20	1			960					30
31	REC (GFCI) - EXTERIOR	20	1	1200	960		1	20	REC (GFCI) - EXTERIOR, GARAGE 101	32	
33											34
35											36
37											38
39											40
41											42
Total Load:				5280 VA		2720 VA		4400 VA			
Total Amps:				46.2		22.7		38.8			
Legend:											
Panel Totals											
Total Conn. Load: 12400 VA											
Total Est. Demand: 9680 VA											
Total Conn. Current: 34.4											
Total Est. Demand Current: 27.4											

Project Team:

Prime Consultant  
**GEC ARCHITECTURE**

Structural Consultant  
**ENTUITIVE**

Mechanical Consultant  
**MCW CONSULTANTS LTD.**

Electrical Consultant  
**MCW CONSULTANTS LTD.**

Civil Consultant  
**PLANMAC ENGINEERING**

Passive House Consultant  
**PEEL PASSIVE HOUSE**

LEED Consultant  
**MCW CONSULTANTS LTD.**

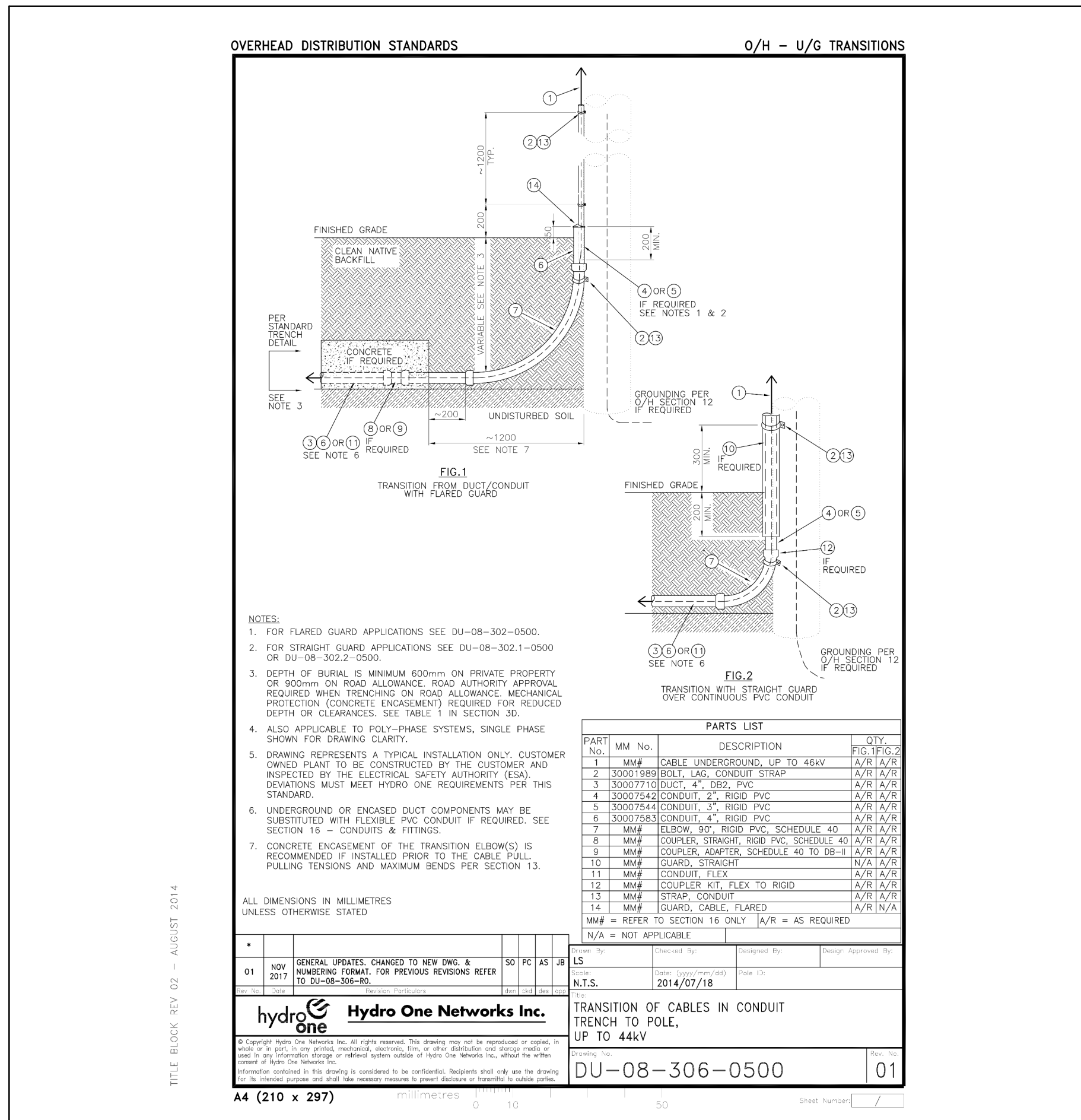
Client

**YORK REGION**

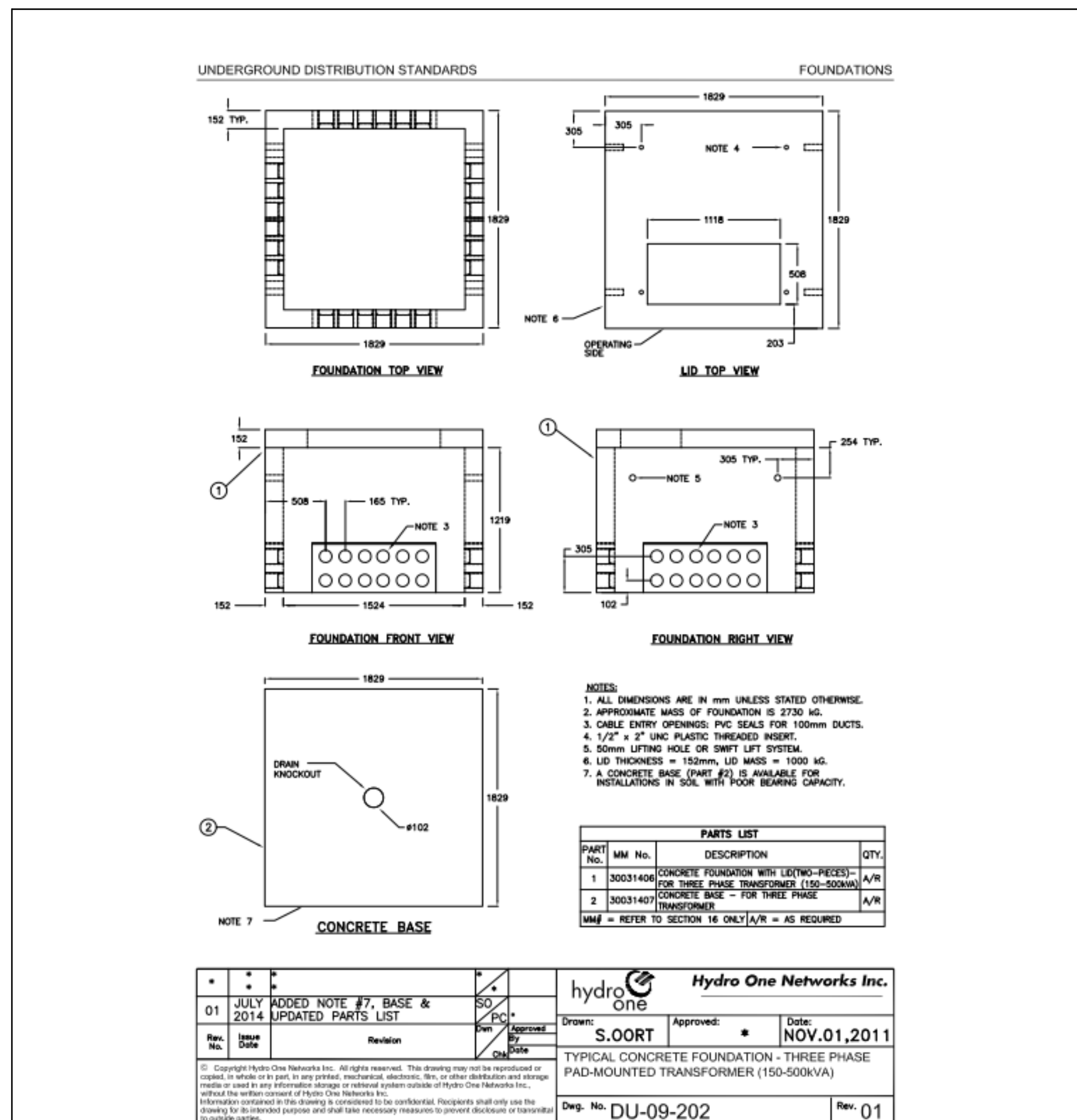


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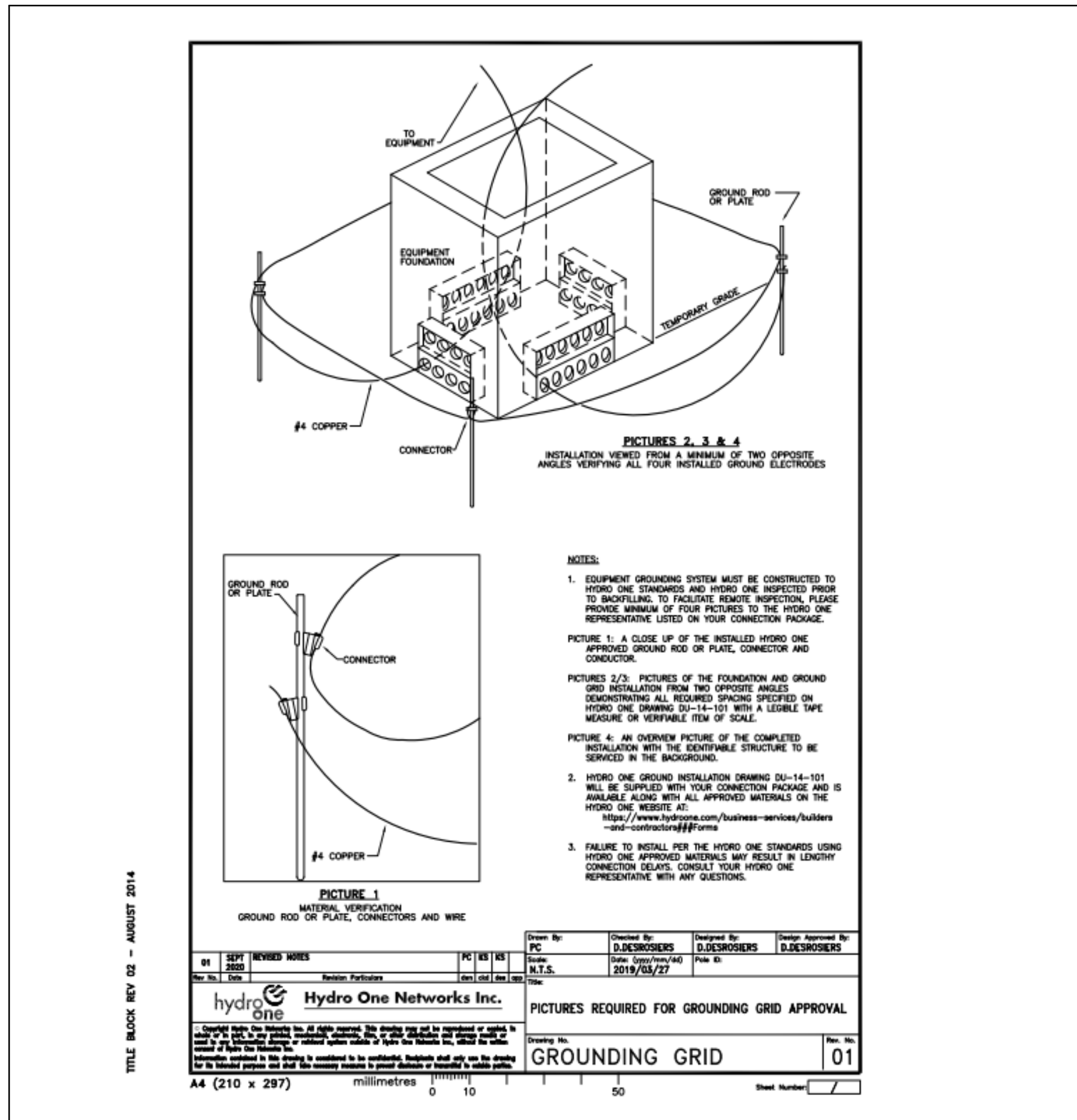
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NOT FOR  
CONSTRUCTION**



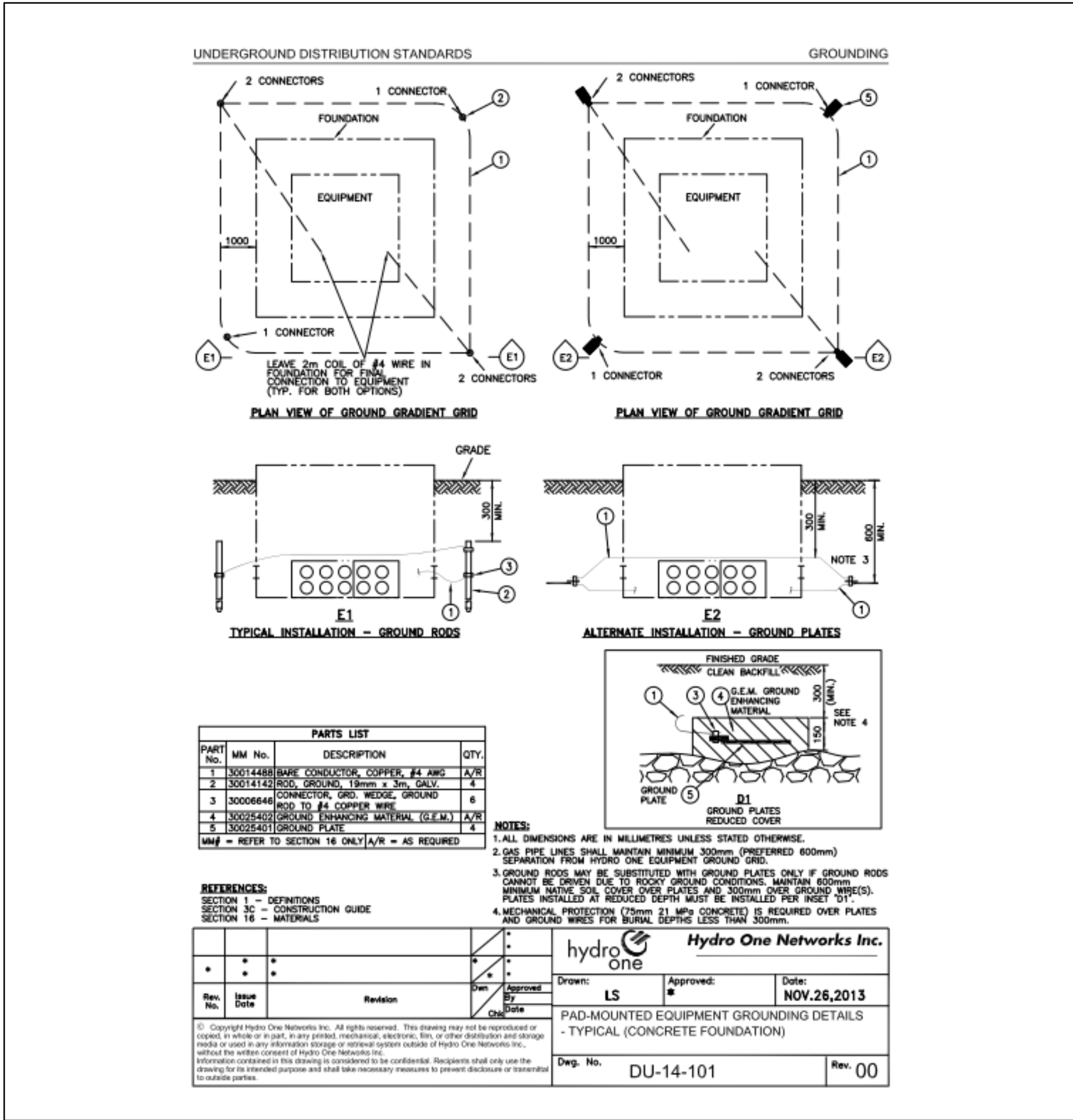
**6** **HYDRO DETAIL #6 - CABLE TRANSITION DETAIL**  
E6-01 N.T.S.



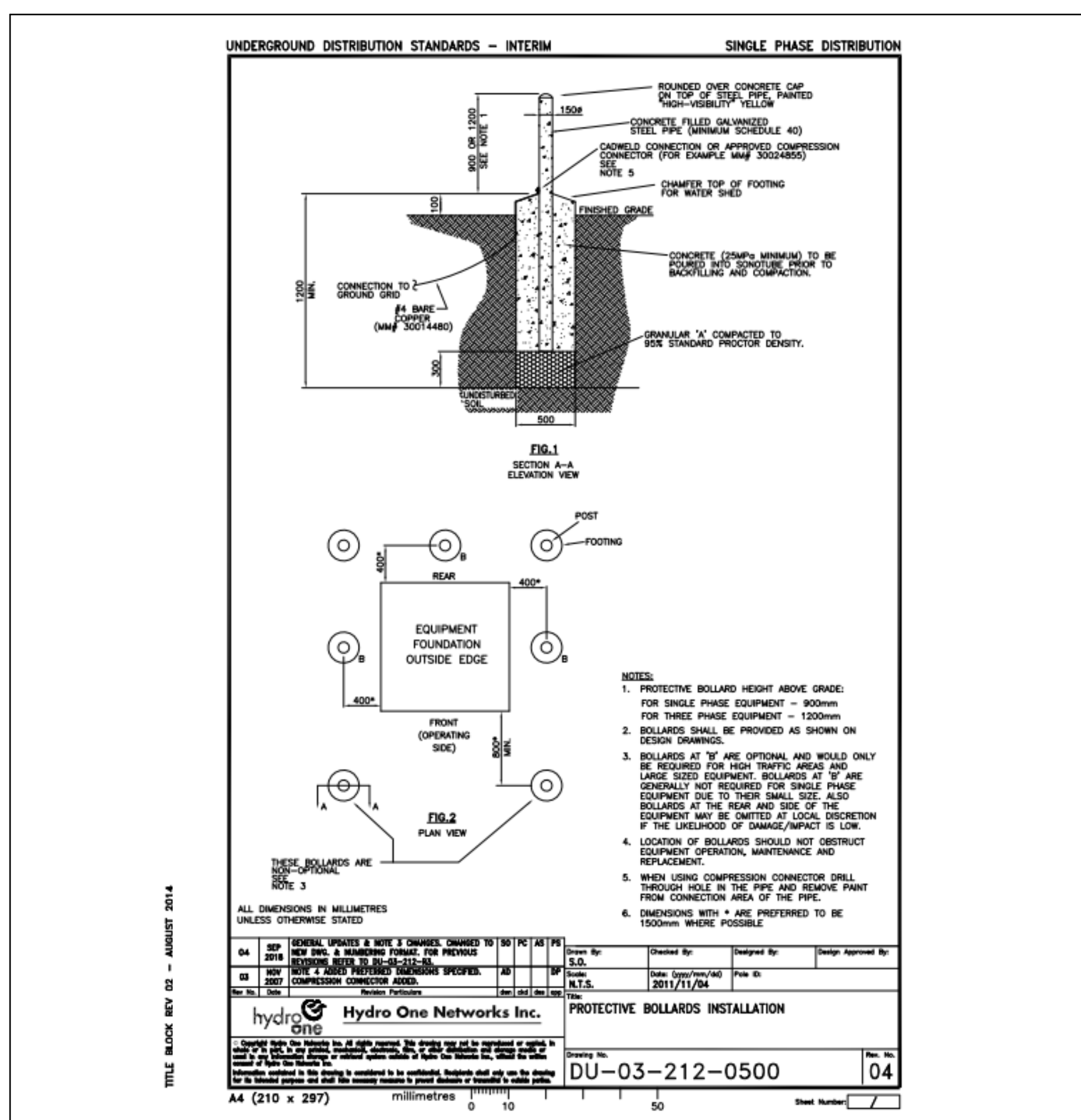
**5** **HYDRO DETAIL #5 - TYPICAL CONCRETE FOUNDATION**  
E6-01 N.T.S.



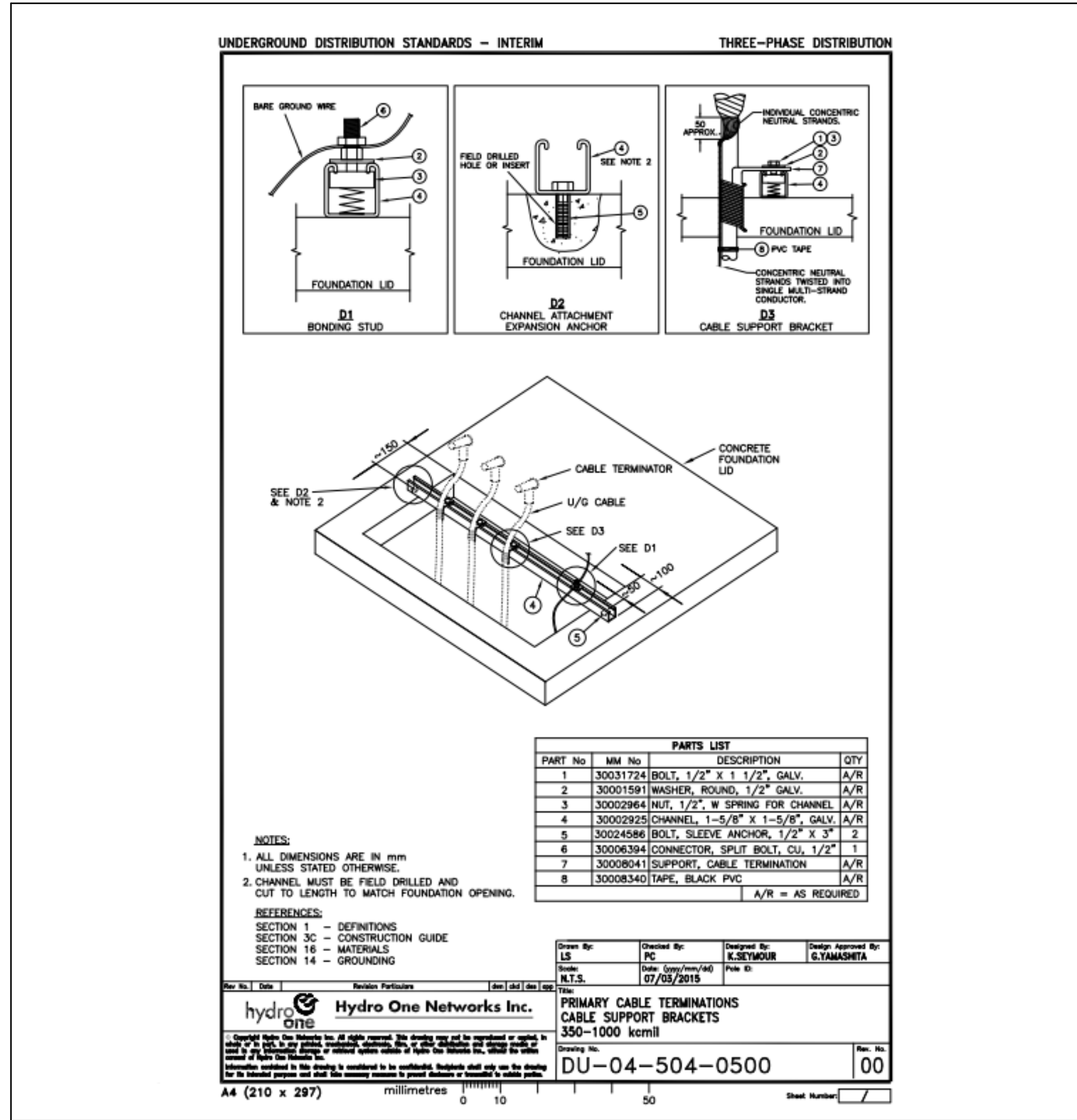
**4** **HYDRO DETAIL #4 - GROUNDING GRID DETAIL**  
E6-01 N.T.S.



**3** **HYDRO DETAIL #3 - PAD-MOUNTED GROUNDING DETAIL**  
E6-01 N.T.S.



**2** **HYDRO DETAIL #2 - PROTECTIVE BOLLARDS**  
E6-01 N.T.S.



**1** **HYDRO DETAIL #1 - PRIMARY CABLE TERMINATION**  
E6-01 N.T.S.

5	REISSUED FOR TENDER	2025/05/23
4	ISSUED FOR TENDER	2025/04/22
3	ISSUED FOR BUILDING PERMIT	2024/11/27
2	ISSUED FOR PRE-TENDER REVIEW	2024/10/31
1	ISSUED FOR 60% CD	2024/05/02
NO.	ISSUED FOR	DATE

Scale	N.T.S.	Checked By	S.B.
Region of York Project Number	22046	Region of York Building Code	G013-B

Project	YORK REGION NORTH ROADS OPERATIONS CENTRE
3525 BASELINE RD. SUITON WEST, ON L0E 1R0	
Drawing Title	ELECTRICAL DETAILS - SHEET 1

Project Number	23137	Drawing Number	E6-01
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4	REISSUED FOR TENDER	2025/05/
3	ISSUED FOR TENDER	2025/04/
2	ISSUED FOR BUILDING PERMIT	2024/11/
1	ISSUED FOR PRE-TENDER REVIEW	2024/10/

Revised	Issued For	Date
Drawing History		
Scale	Checked By	
N.T.S.	S.B.	

Region of York Project Number      Region of York Building Code

22046 G013-B

ProjectYORK REGION NORTH ROADS

YORK REGION NORTH ROADS  
OPERATIONS CENTRE

OPERATIONS CENTRE

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3525 BASELINE RD.SUTTON WEST, ON L0E 1R0Drawing Title

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ELECTRICAL DETAILS - SHEET 2

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Project Number	Drawing Number
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00427 E6-02

Project Team:

Prime Consultant  
GEC ARCHITECTURE

Structural Consultant  
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MCW CONSULTANTS LTD.

Electrical Consultant  
MCW CONSULTANTS LTD.

Civil Consultant  
PLANMAC ENGINEERING

Passive House Consultant  
PEEL PASSIVE HOUSE

LEED Consultant  
MCW CONSULTANTS LTD.

Client

YORK REGION



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NOT FOR  
CONSTRUCTION**



5	REISSUED FOR TENDER	2025/05/23
4	ISSUED FOR TENDER	2025/04/22
3	ISSUED FOR BUILDING PERMIT	2024/11/27
2	ISSUED FOR PRE-TENDER REVIEW	2024/10/31
1	ISSUED FOR 60% CD	2024/05/02
NO.	ISSUED FOR	DATE

Drawing History  
Scale: As indicated  
Checked By: S.B.

Region of York Project Number: 22046  
Region of York Building Code: G013-B

Project: YORK REGION NORTH ROADS OPERATIONS CENTRE

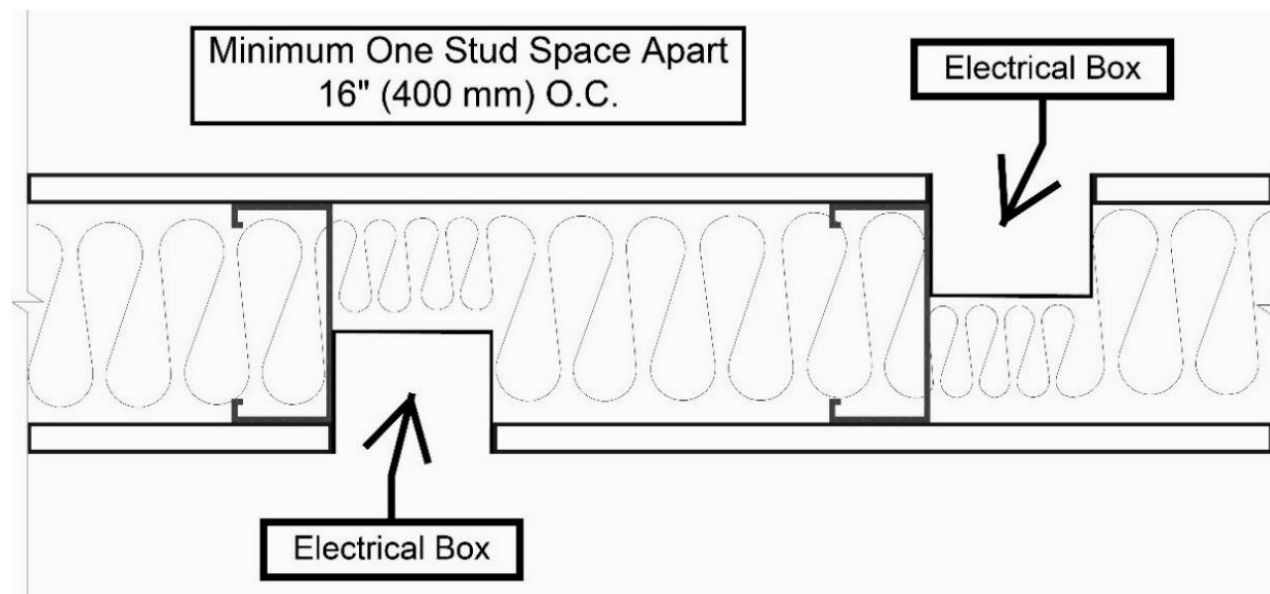
6525 BASELINE RD SUITON WEST, ON L0E 1R0

Drawing Title

ELECTRICAL DETAILS - SHEET 3

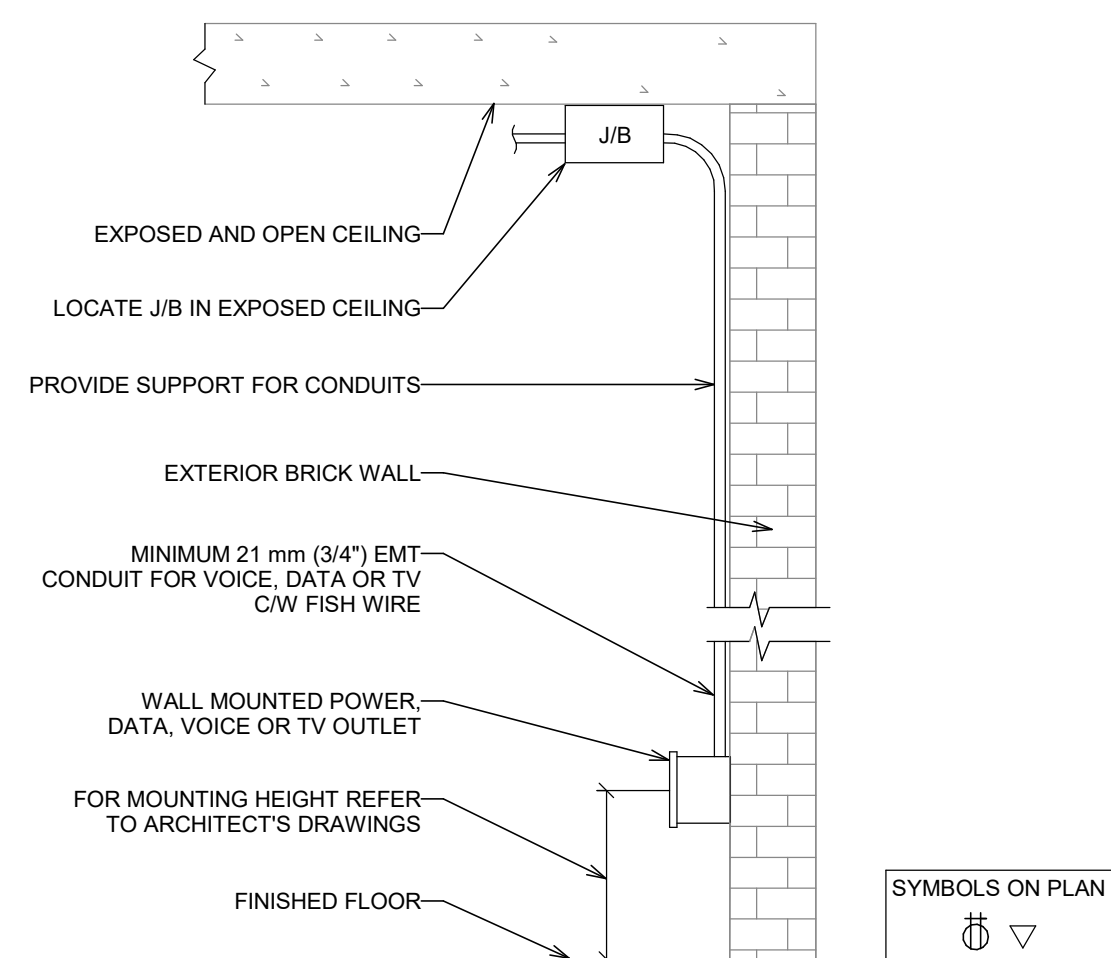
Project Number: 23137  
Drawing Number: E6-03

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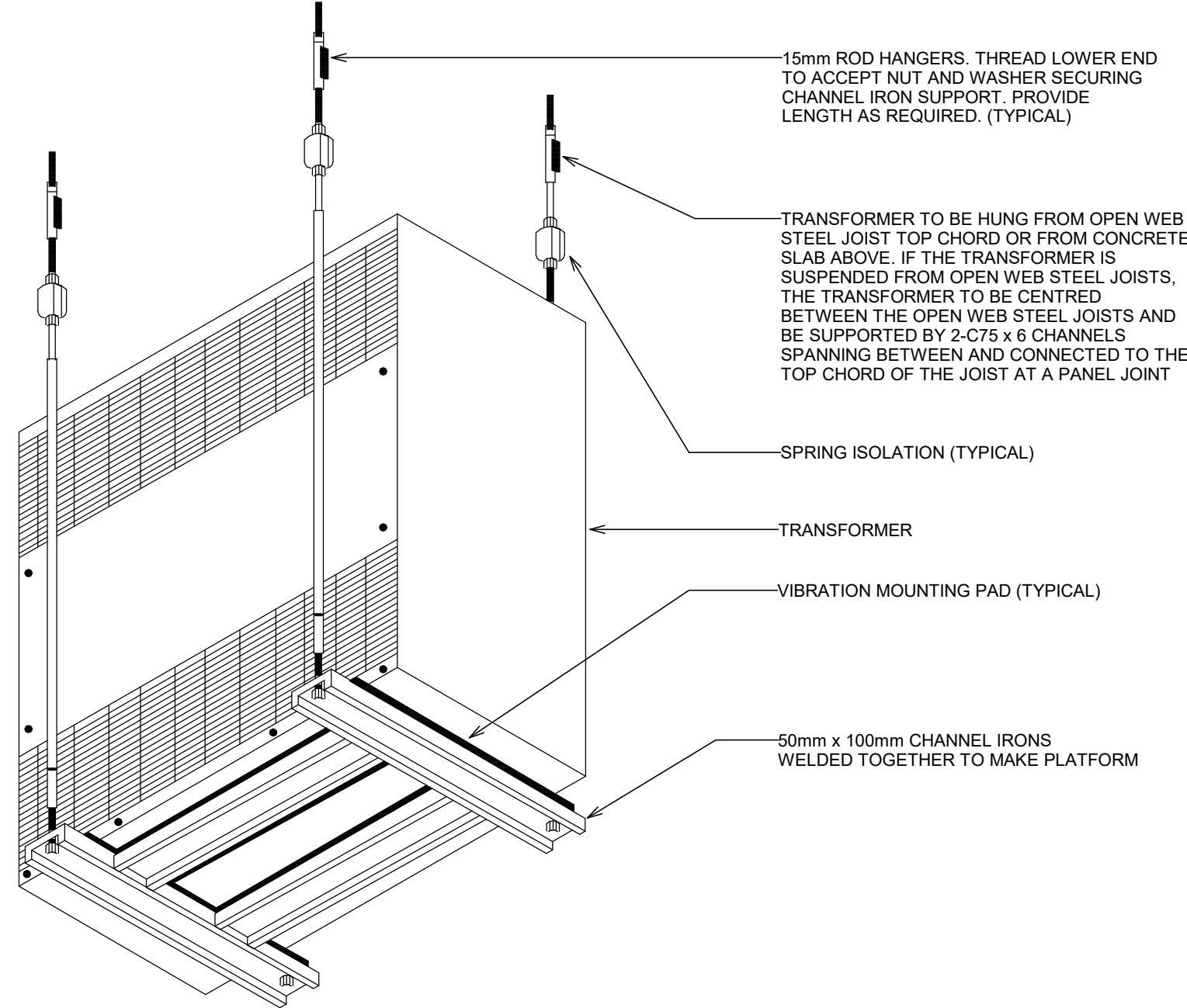
## 6 BACKBOX SPACING - TYPICAL

E6-03 N.T.S.



## 3 WALL MOUNTED OUTLET BOX

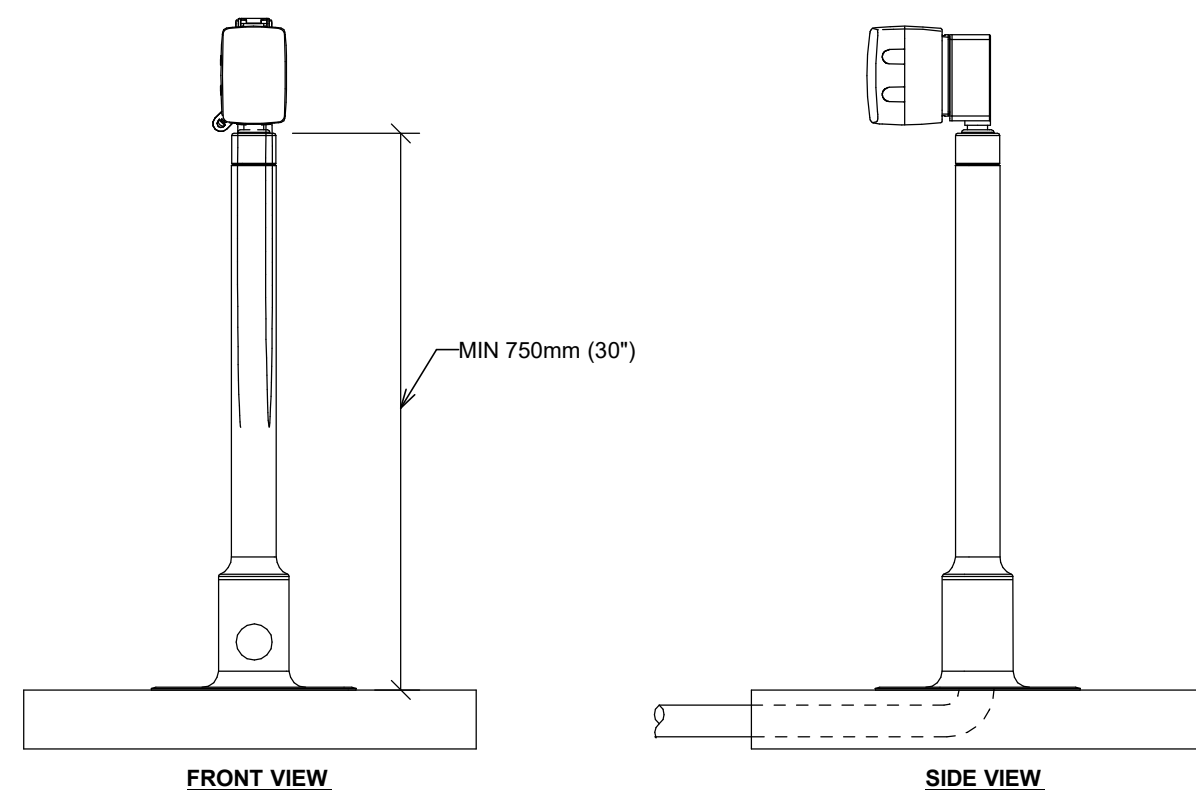
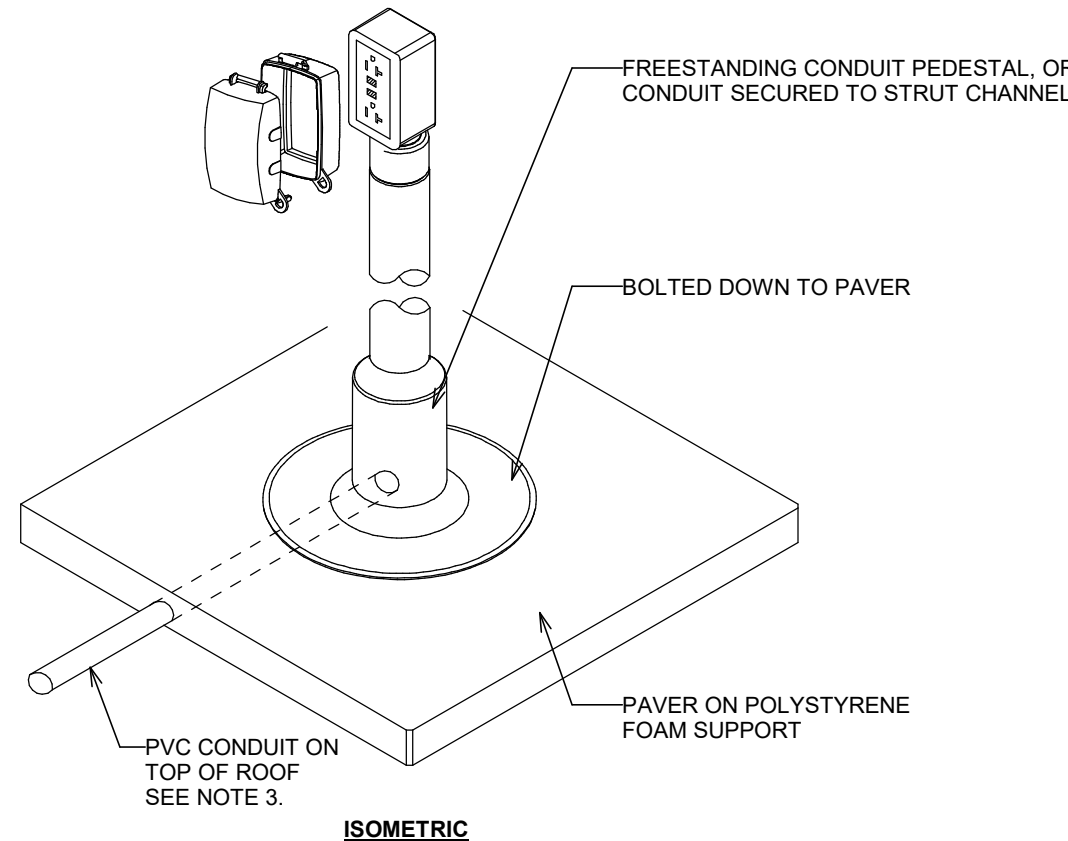
E6-03 N.T.S.



- NOTES:
- SPACE CHANNEL IRONS SO THAT TRANSFORMER IS PROPERLY SUPPORTED.
  - ALLOW ADEQUATE ACCESS SPACE BETWEEN RODS AND TRANSFORMER FOR REMOVAL OF FRONT COVER.
  - COORDINATE TRANSFORMER LOCATION AND MOUNTING WITH BASE BUILDING STRUCTURE ENGINEER PRIOR TO START OF WORK.
  - PROVIDE FLEXIBLE CONDUIT FOR PRIMARY AND SECONDARY CONNECTIONS TO THE TRANSFORMER.

## 8 TRANSFORMER SUSPENSION DETAIL - TYPICAL

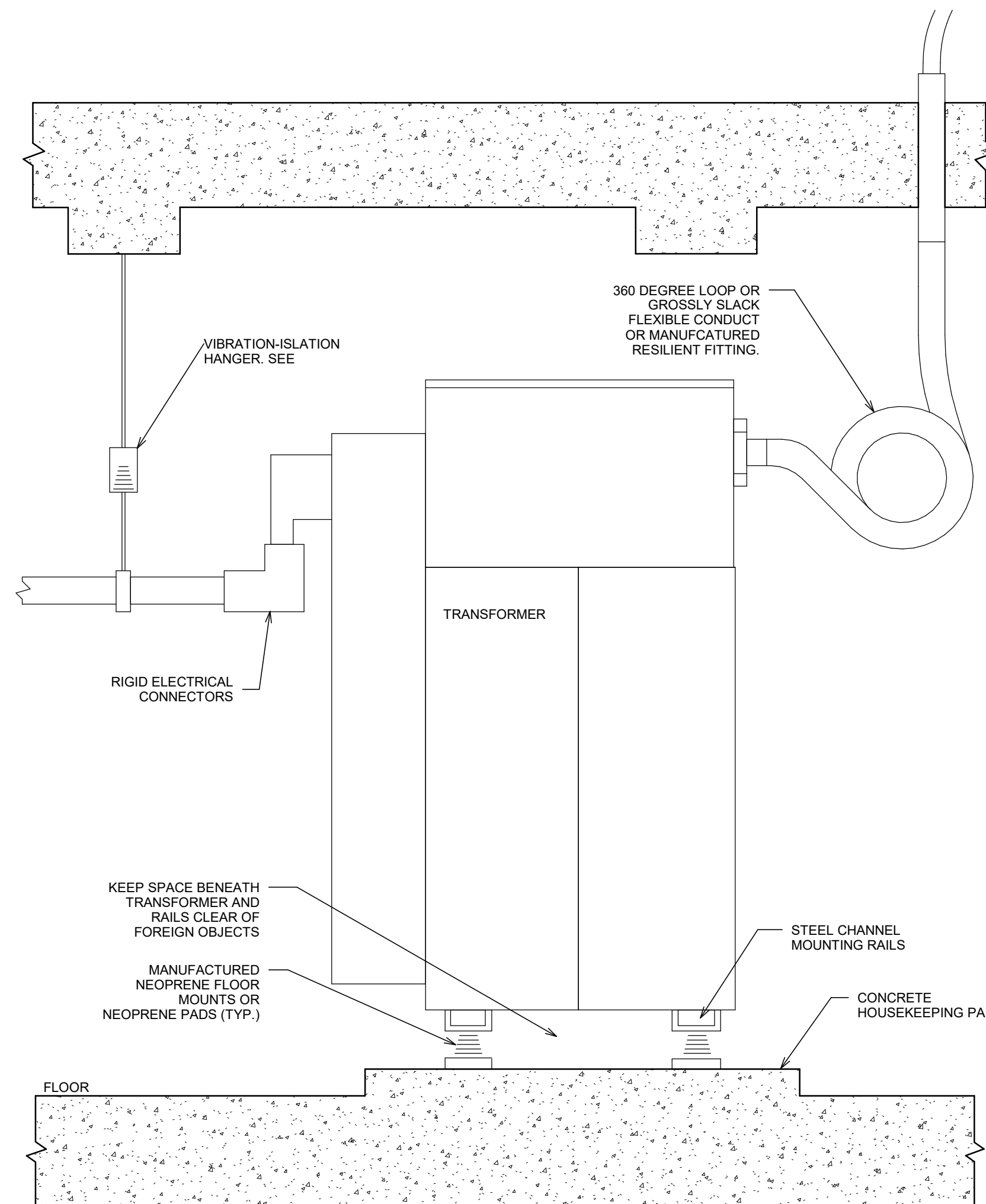
E6-03 N.T.S.



- NOTES:
- PROVIDE WP GFCI 5-20R @ 750mm (30") ABOVE FINISHED ROOF LEVEL C/W WET LOCATION COVER PLATE. TYPICAL. LOCATE WITHIN 750mm (25") OF NEW HVAC EQUIPMENT, AND AT LEAST 1800mm (6') AWAY FROM ROOF LINE. COVER PLATE TO BE MARKED "EXTRA DUTY". SEE LATEST ONTARIO ELECTRICAL SAFETY CODE (OESC) FOR REQUIREMENTS AND DETAILS.
  - LABEL RECEPTACLE WITH PHENOLIC (LAMACOID) NAMEPLATE WITH PANELBOARD ID, CIRCUIT NUMBER, AND PANELBOARD LOCATION.
  - PROVIDE CONDUIT SUPPORTS ON ROOF. MOUNT CONDUITS ON SUPPORT BASE. BASIS OF DESIGN THOMAS & BETTS SUPERSTRUT SERIES ADJUSTABLE UNIVERSAL SUPPORT, OR APPROVED EQUAL. SUPPORT CONDUITS MINIMUM 2435mm (8') ON CENTRE.

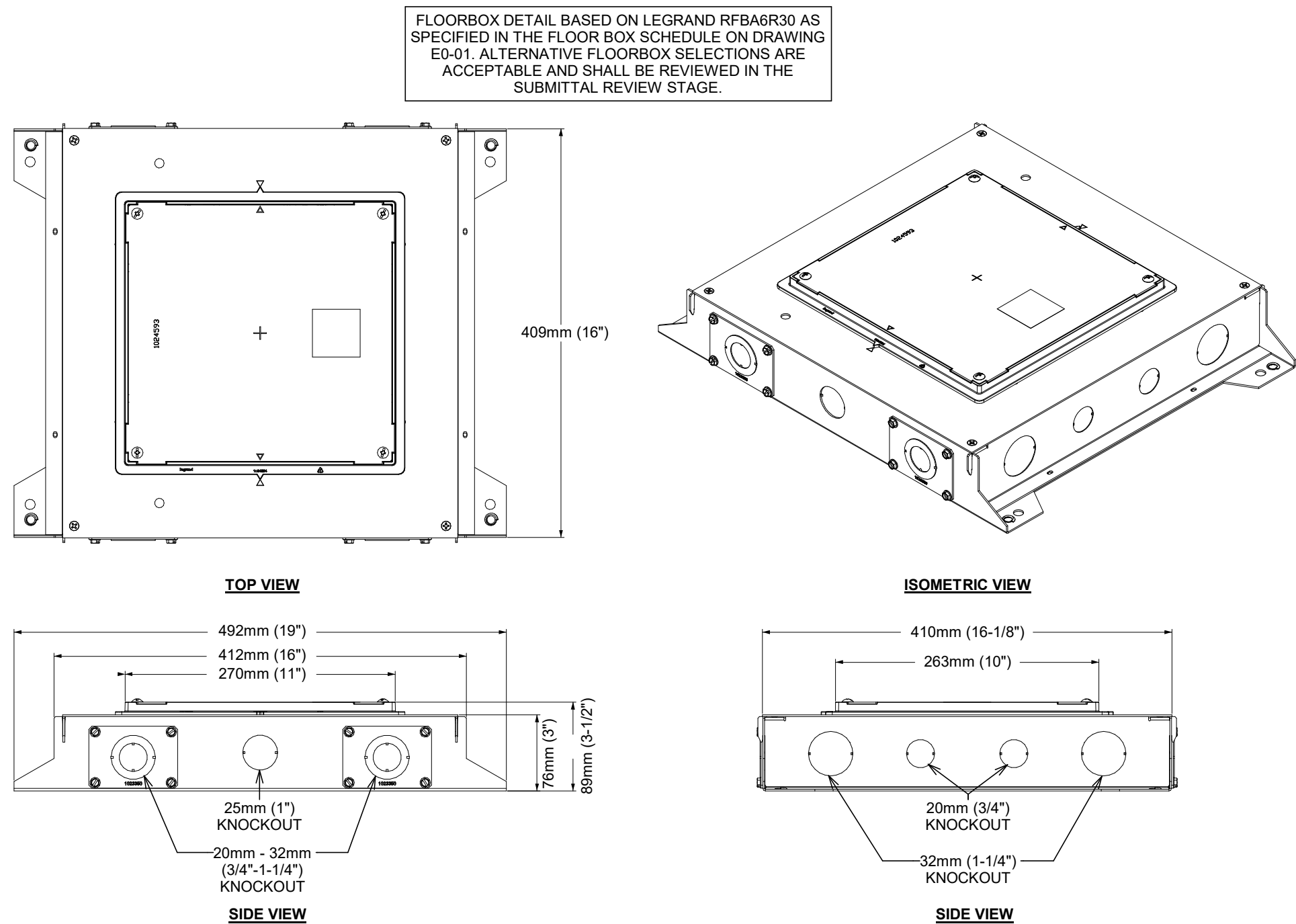
## 5 MAINTENANCE RECEPTACLE FOR ROOF MOUNTED HVAC EQUIPMENT

E6-03 N.T.S.



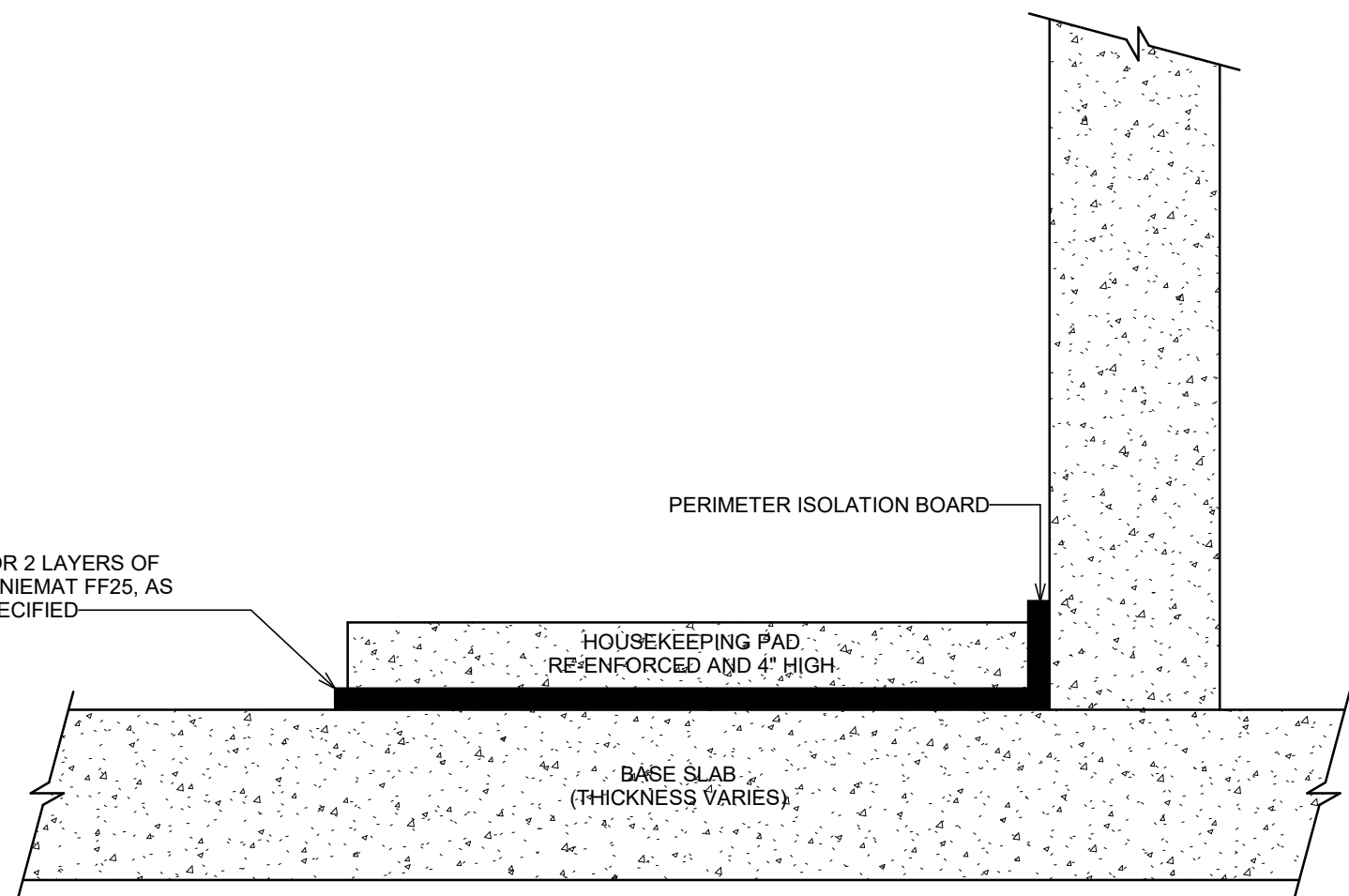
## 2 TRANSFORMER VIBRATION ISOLATION - TYPICAL

E6-03 N.T.S.



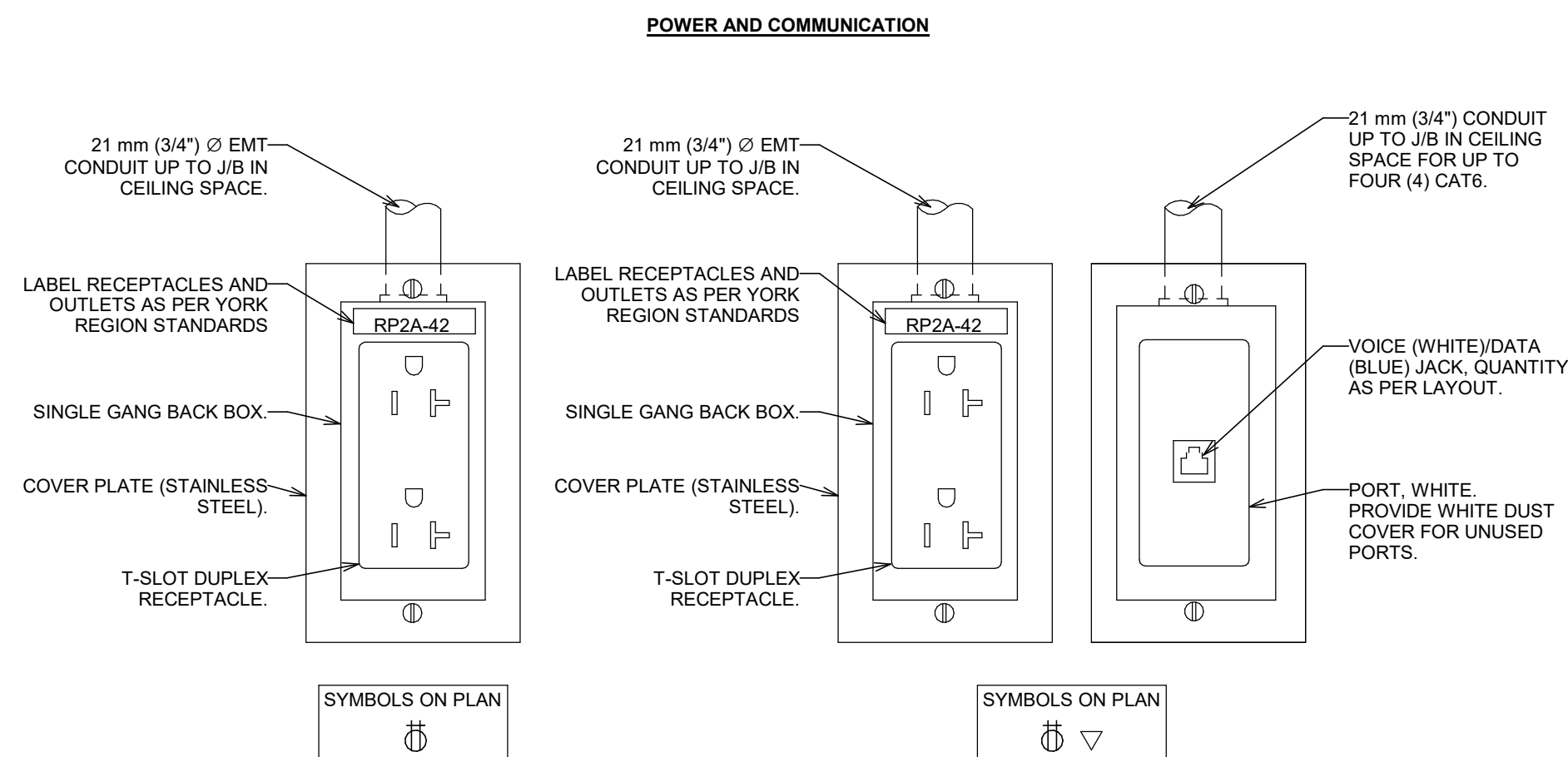
## 7 TYPICAL FLOOR BOX DETAIL

E6-03 N.T.S.



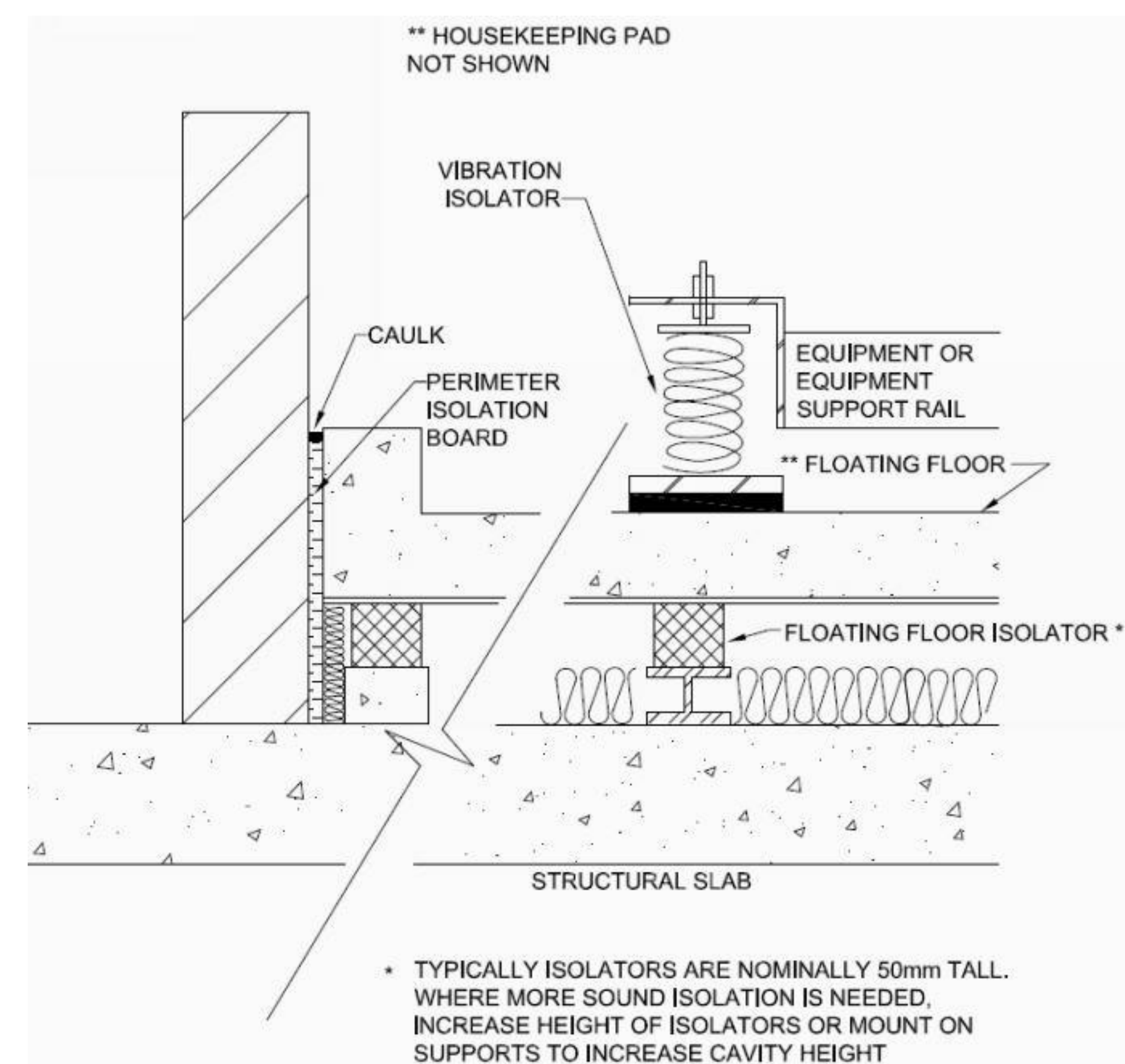
## 4 ISOLATED HOUSEKEEPING PAD

E6-03 N.T.S.

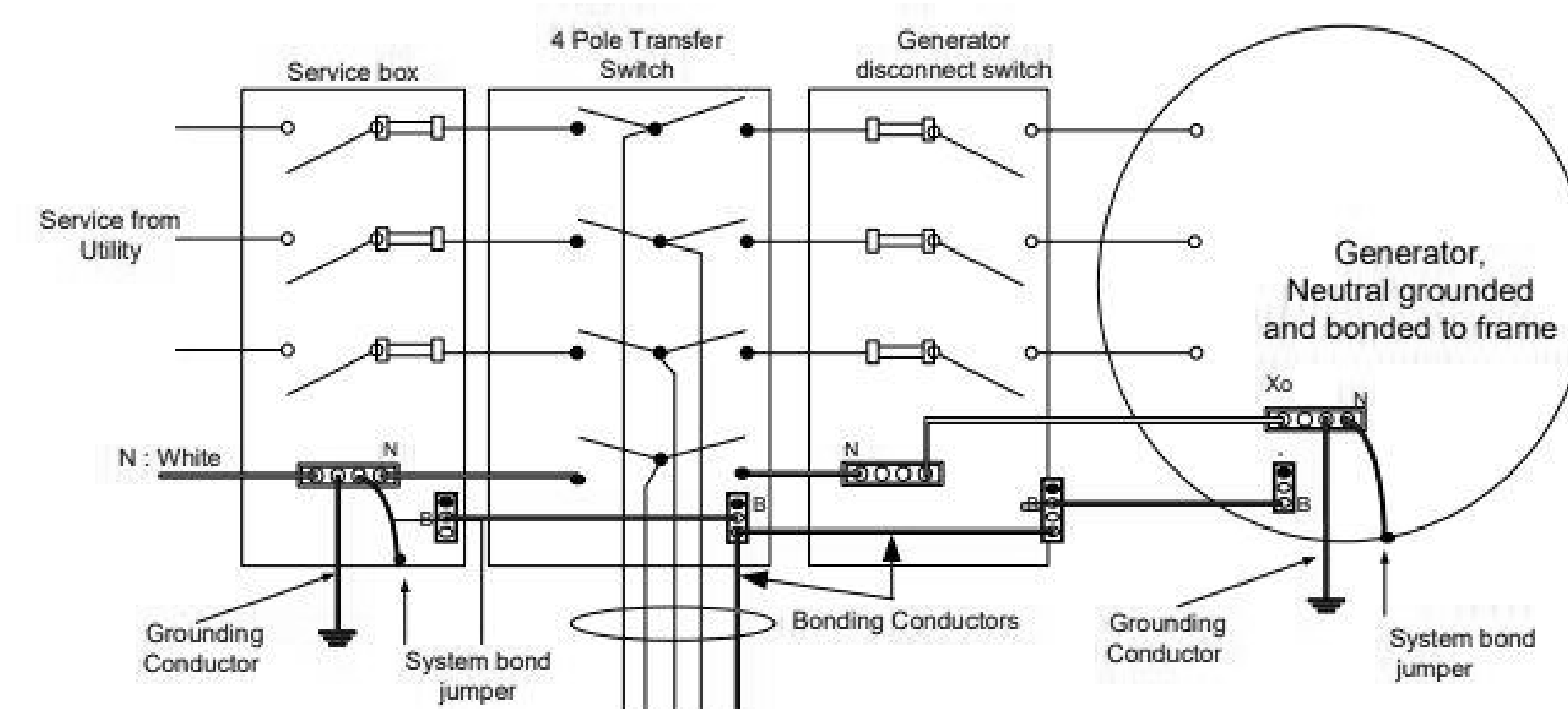


## 1 TYPICAL POWER AND COMM OUTLETS

E6-03 N.T.S.



2 GENERATOR VIBRATION ISOLATOR -TYPICAL  
E6-04 N.T.S.



1 PERMANENT GENERATOR GROUNDING AND BONDING SCHEME  
E6-04 N.T.S.

5	REISSUED FOR TENDER	2025/05/23
4	ISSUED FOR TENDER	2025/04/22
3	ISSUED FOR BUILDING PERMIT	2024/11/27
2	ISSUED FOR PRE-TENDER REVIEW	2024/10/31
1	ISSUED FOR 60% CD	2024/05/02
NO.	ISSUED FOR	DATE

NO.	ISSUED FOR	DATE
Drawing History		
Scale	Checked By	
As indicated	S.B.	

Region of York Project Number	Region of York Building Code
22046	G013-B

Project  
YORK REGION NORTH ROADS

3525 BASELINE RD. SUTTON WEST, ON L0E 1R0

Drawing TitleELECTRICAL DETAILS - SHEET 4

Project Number	Drawing Number
23137	E6-04





6	ISSUED FOR ADDENDUM #4	2025/07/10
5	ISSUED FOR TENDER ADDENDUM #2	2025/07/10
4	REISSUED FOR TENDER	2025/05/14
3	ISSUED FOR TENDER	2025/04/14
2	ISSUED FOR BUILDING PERMIT	2024/11/14
1	ISSUED FOR PRE-TENDER REVIEW	2024/10/14

## Drawing History

Scale	Checked By
N.T.S	S.B.

Region of York Project Number      Region of York Building Code

Project

YORK REGION NORTH ROADS  
OPERATIONS CENTRE

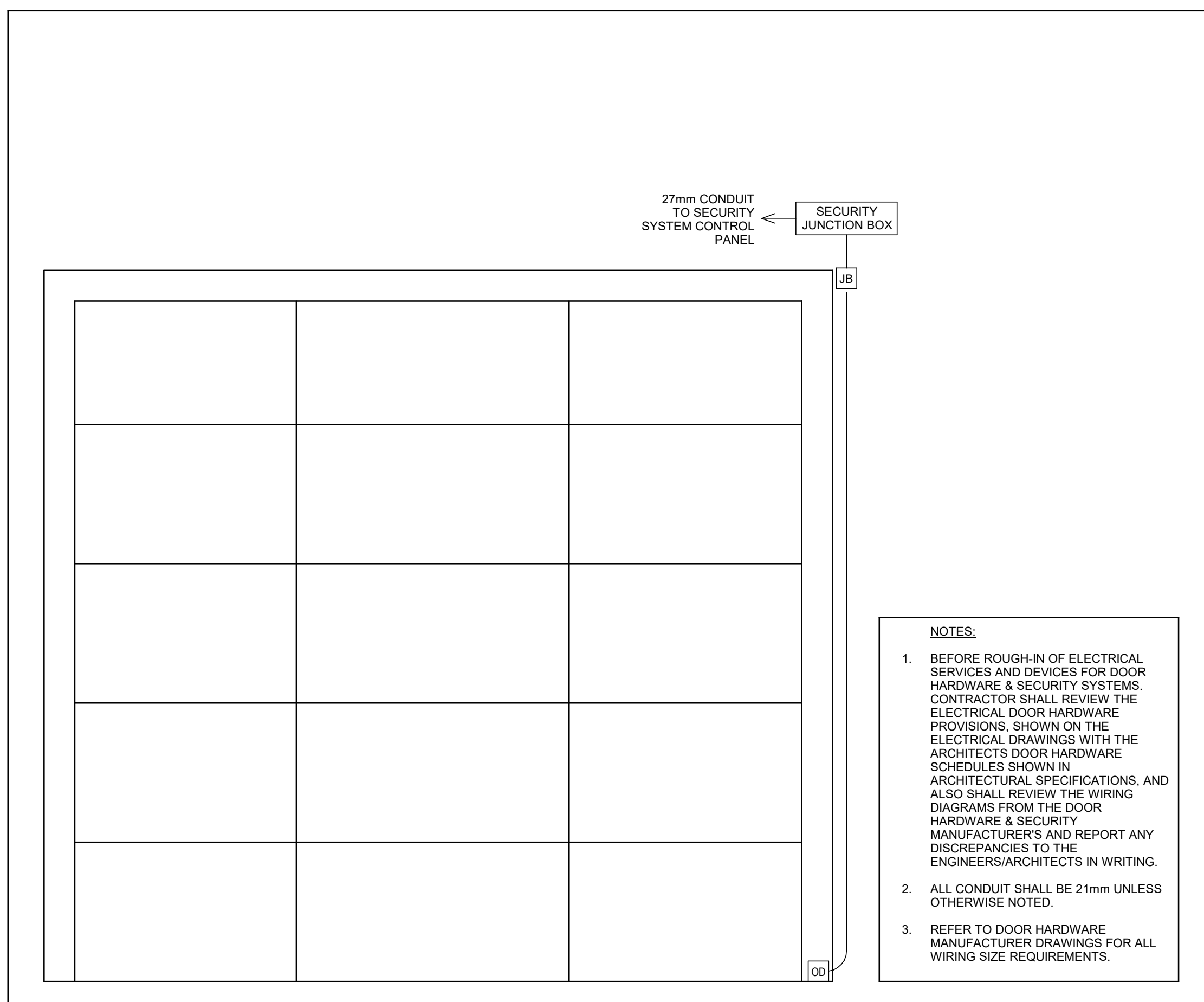
3525 BASELINE RD. SUTTON WEST, ON L0E 1R0

Drawing Title

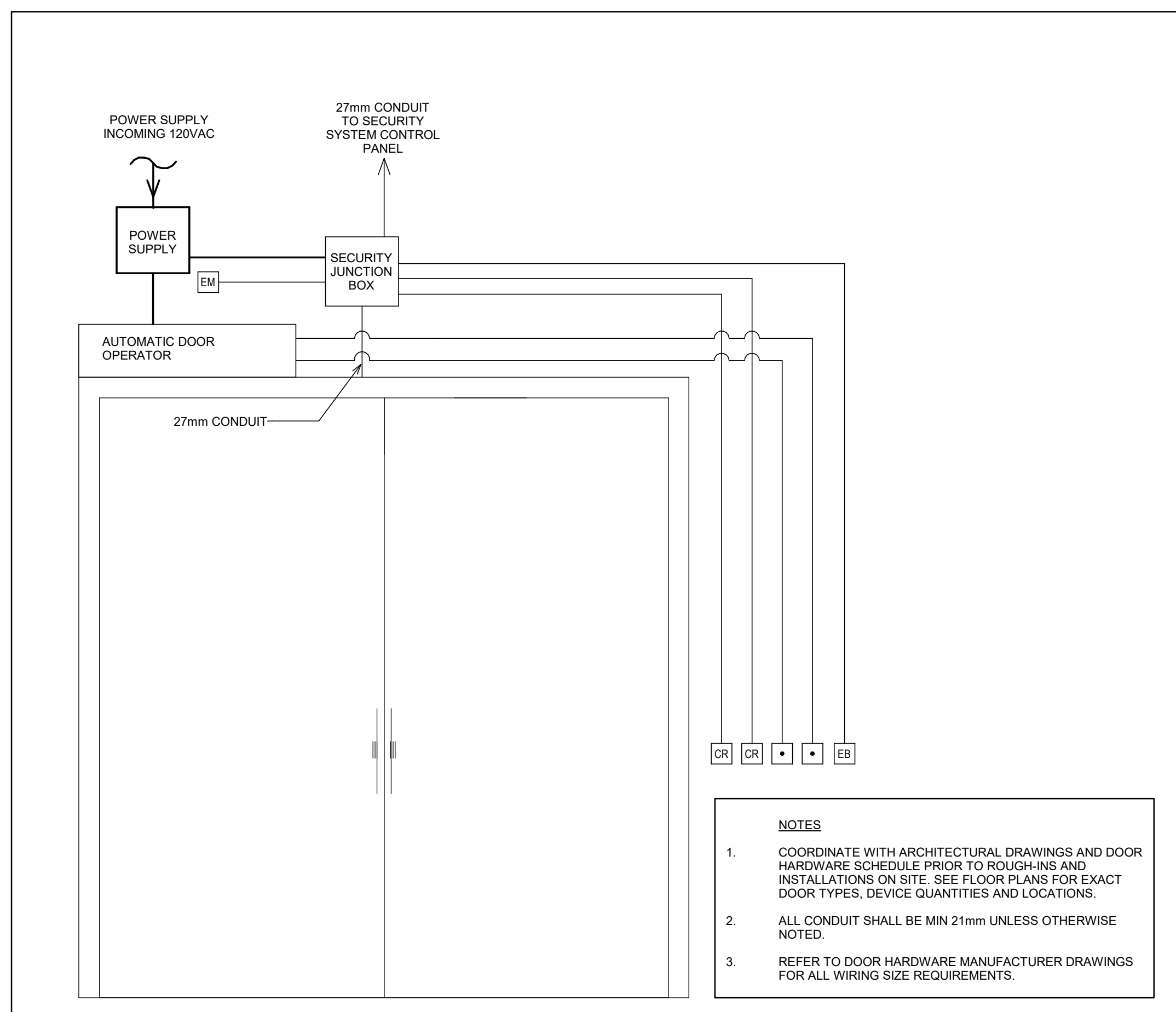
ICAT DETAILS - SHEET 2

Project Number	Drawing Number
23137	E7-02

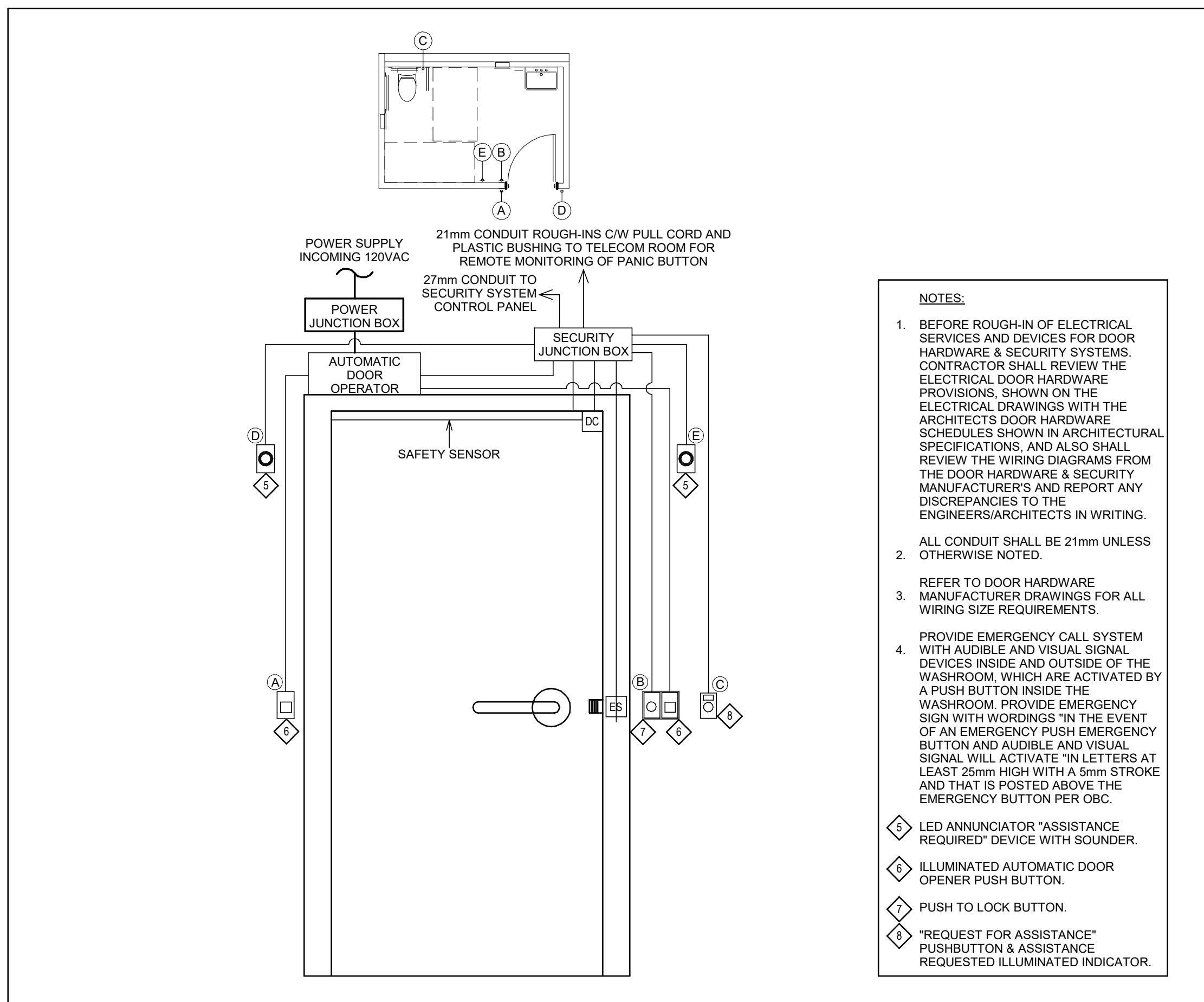
DOOR TYPE	CARD READER	INTRUSION DETECTION KEYPAD	INTRUSION DETECTION ARMING CARD READER	INTRUSION DETECTION ARMING BUTTON	REQUEST TO EXIT BUTTON	REQUEST TO EXIT MOTION DETECTOR	ELECTRIC STRIKE	ELECTRIC HINGE	ELECTRIC LATCH RETRACTION	DOOR CONTACT	AUTOMATIC DOOR OPERATOR	PUSH TO LOCK	IN-USE LIGHT	COMMENTS
DT-01A	1					1 (ON DOOR FRAME)	1			1				
DT-02A	1					1 (EXIT HARDWARE BY OTHERS)	1	1	1	1				
DT-03A										1				
DT-04A	1					1 (ON DOOR FRAME)	1	1	1	1	1			
DT-05A							1			1	1	1	1	UNIVERSAL WASHROOM KIT
DT-06A	1	1	1	1		1 (ON DOOR FRAME)				1	1			MAIN ENTRANCE DOOR W/ INTRUSION DETECTION
DT-07										1				OVERHEAD DOOR CONTACT



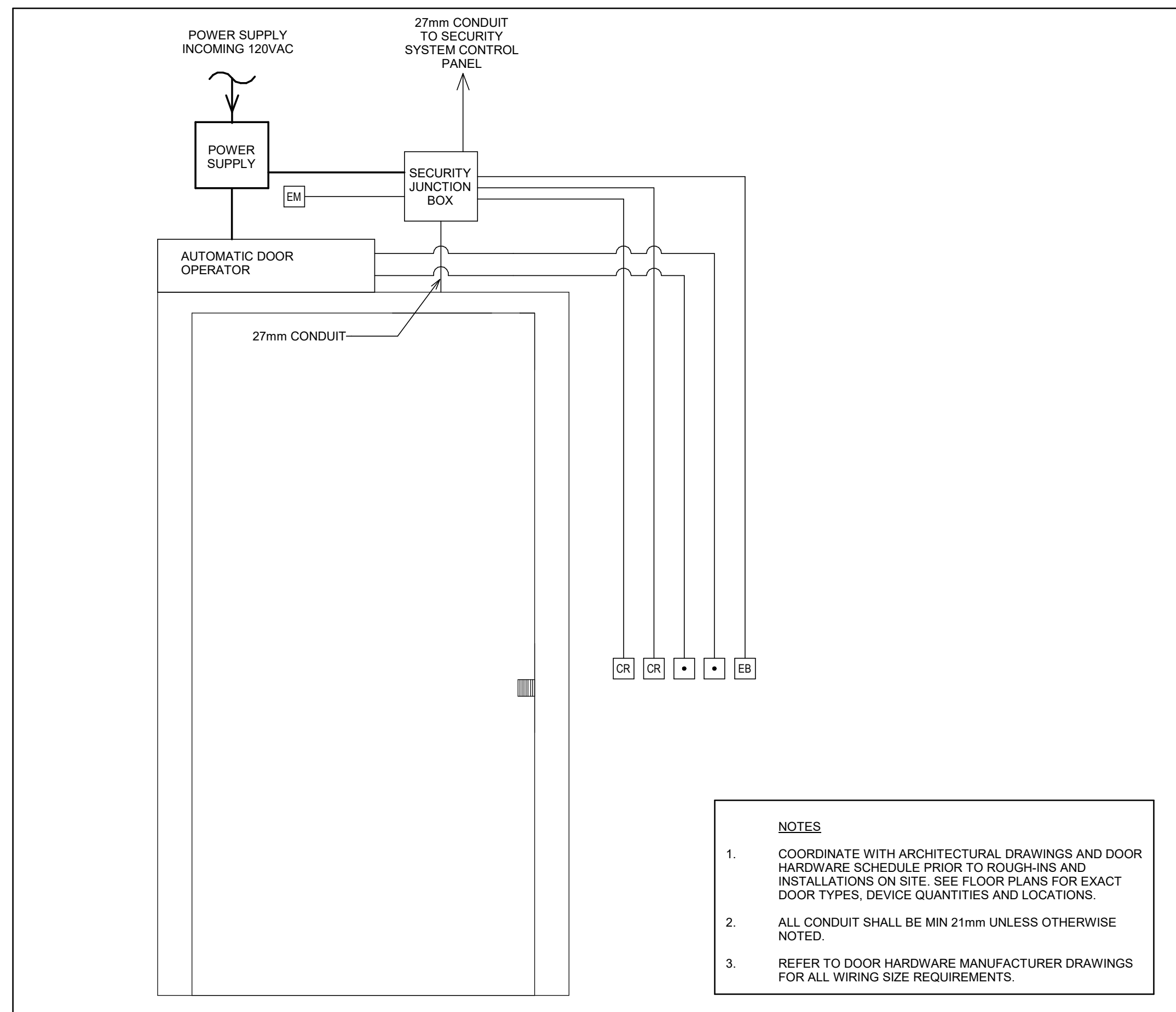
5 TYPICAL GARAGE DOOR DETAIL  
E7-02 N.T.S.



2 TYPICAL DOUBLE DOOR - DETAIL  
E7-02 N.T.S.



3 TYPICAL UNIVERSAL WASHROOM DOOR DETAIL  
E7-02 N.T.S.



1 TYPICAL SINGLE DOOR - DETAIL  
E7-02 N.T.S



- NOTES:
1. DETERMINE EXACT LOCATION AND MOUNTING HEIGHT OF BACK BOX ONSITE PRIOR TO ANY INSTALLATION.
  2. ELECTRICAL CONTRACTOR TO PROVIDE ALL CONDUIT C/W PULLSTRING, WIRING AND BACK BOXES. COMMUNICATIONS CONTRACTOR SHALL PROVIDE ALL NETWORK CABLING.
  3. ALL CONDUITS SHALL BE 21mm, UNLESS OTHERWISE NOTED.
  4. ALL CONDUITS SHALL BE MARKED CLEARLY AT BOTH ENDS.
  5. PROVIDE ALL MOUNTING BRACKETS AND ACCESSORIES AS REQUIRED.
  6. ADJUST CAMERA LENS TO OBTAIN OPTIMUM FIELD OF VIEW.
  7. COORDINATE WITH ARCHITECTURAL DOCUMENTS FOR EXACT MOUNTING HEIGHTS AND LOCATIONS
  8. SEE DRAWING E1-06 FOR SURVEILLANCE CAMERA SCHEDULE.

E7-03 N.T.S

<b>CONTENTS</b>	
<b>SECTION</b>	<b>TITLE</b>
26 05 00	ELECTRICAL GENERAL REQUIREMENTS
26 05 01	SHOP DRAWINGS, PRODUCT DATA AND SAMPLES
26 05 03	ELECTRICAL SYSTEMS COMMISSIONING
26 05 05	BASIC MATERIALS AND METHODS
26 05 08	FIRESTOPPING
26 05 10	ELECTRICAL IDENTIFICATION
26 05 11	TESTING AND COORDINATION STUDY OF DISTRIBUTION
26 05 12	ARC FLASH HAZARD STUDY
26 05 14	WORK IN EXISTING FACILITY
26 05 21	WIRE AND CABLE UP TO 600 VOLTS
26 05 27	GROUNDING AND BONDING
26 05 29	HANGERS AND SUPPORTS
26 05 31	SPLITTER TROUGH
26 05 33	RACEWAYS AND BOXES
26 09 23	DIGITAL METERING SYSTEM
26 11 10	ELECTRICAL HIGH VOLTAGE SERVICE
26 12 16	LOW VOLTAGE DRY TYPE TRANSFORMERS
26 24 01	SERVICE ENTRANCE LV SWITCHBOARD
26 24 16	PANELBOARDS
26 27 26	WIRING DEVICES
26 28 13	FUSES
26 28 23	SAFETY SWITCHES
26 28 33	QUICK CONNECT SWITCHES
26 29 01	AC CONTACTORS
26 32 13	GAS GENERATOR (SU)
26 36 23	AUTOMATIC TRANSFER SWITCHES
26 50 00	LIGHTING LUMINAIRES
<b>26 80 00</b>	<b>ELECTRIC VEHICLE CHARGER</b>
APPENDIX A	YRND – LIGHTING STANDARD
APPENDIX B	YRND – RECEPTACLE AND CIRCUIT LABELLING STANDARD
APPENDIX C	YRND – ELECTRICAL POWER MONITORING STANDARD
APPENDIX D	YRND – ELECTRICAL & ICAT WORKS PROPOSED PHASING
APPENDIX E	YRND – PROPOSED PHASING

**END OF SECTION**

**Part 1 General**

**1.1 GENERAL REQUIREMENTS**

- .1 In case of discrepancy of the specifications details, the Owner's standards and requirements attached in the Appendices shall take precedence.**
- .2 Comply with the requirements of Division 1 and all documents referred to therein.

**1.2 APPLICATION**

- .1 This Section applies to and is a part of all Sections of Division 26.

**1.3 DEFINITIONS**

- .1 Wherever the term "This Sub-Contractor" is used in the Division 26 Drawings and Specifications, it means the firm having a subcontract with the "Contractor" to perform, supervise and co-ordinate all work of this Division.
- .2 Wherever the term "install" (and tenses of "install") is used in the Division 26 Drawings and Specifications, it means install and connect complete.
- .3 Wherever the term "supply" is used in the Division 26 Drawings and Specifications, it means supply only.
- .4 Wherever the term "Provide" or "Provision of" are used in relationship to equipment and other materials specified for the Work of Division 26 it means "Supply, Install and Connect". Wherever the terms "Provide" or "Provision of" are used in connection with services such as testing, start-up and commissioning for any part of the Work of Division 26, it means procure, supervise, take responsibility and pay for these services.
- .5 Whenever "Drawings and Specifications" are referred to herein, it means "the Contract Documents".
- .6 Wherever the terms "Authorities" or "Authorities having jurisdiction" are used in the Division 26, Drawings and Specifications, it shall mean any and all current laws and/or by-laws of any Federal, Provincial or local authorized agencies having jurisdiction over the sum total or parts of the work including, but not restricted to the Municipal Planning and Building Department, Municipal Fire Department, the Construction Safety Act, Municipal Public Works Department, Federal and/or Provincial Fire Marshall, the Gasoline Handling Act, the Ontario Electrical Safety Code and other codes in effect at the time of construction.
- .7 Wherever the term "Work" is used in the Division 26 Drawings and Specifications, it means all equipment, permits, materials and labour to provide a complete electrical installation as required and detailed in the Drawings and Specifications.
- .8 Wherever the term "Acceptable" is used in the Division 26 Drawings and Specifications it means acceptable to the Consultant.

**1.4 WORK INCLUDED**

- .1 Sections of Division 26 are not intended to delegate functions nor to delegate work and supply to any specific trade and the Work shall include all labour, materials, equipment and tools required for a complete and working installation as described, but not necessarily limited to items in the following Sections:



Section 26 05 00	Electrical General Requirements
Section 26 05 01	Shop Drawings, Product Data and Samples
Section 26 05 03	Electrical Systems Commissioning
Section 26 05 05	Basic Materials and Methods
Section 26 05 08	Firestopping
Section 26 05 10	Electrical Identification
Section 26 05 11	Testing and Coordination Study of Distribution
Section 26 05 12	Arc Flash Hazard Study
Section 26 05 14	Work In Existing Facility
Section 26 05 21	Wire and Cable Up To 600 Volts
Section 26 05 27	Grounding and Bonding
Section 26 05 29	Hangers and Supports
Section 26 05 31	Splitter Trough
Section 26 05 33	Raceways and Boxes
Section 26 09 23	Digital Metering System
Section 26 11 10	Electrical High Voltage Service
Section 26 12 16	Low Voltage Dry Type Transformers
Section 26 24 01	Service Entrance LV Switchboard
Section 26 24 16	Panelboards
Section 26 27 26	Wiring Devices
Section 26 28 13	Fuses
Section 26 28 23	Safety Switches
Section 26 28 33	Quick Connect Switches
Section 26 29 01	AC Contactors
Section 26 32 13	Gas Generator (SU)
Section 26 36 23	Automatic Transfer Switches
Section 26 50 00	Lighting Luminaires
Section 26 80 00	Electric Vehicle Charger
Appendix A	YRND – Lighting Standard
Appendix B	YRND – Receptacle and Circuit Labelling Standard
Appendix C	YRND – Electrical Power Monitoring Standard
Appendix D	YRND – Electrical & ICAT Works Proposed Phasing
Appendix E	YRND – Proposed Phasing

## 1.5 PERMITS, FEES AND INSPECTIONS

- .1 Apply for, obtain, and pay for all permits, licenses, inspections, examinations and fees required for Work of Division 26. If the municipality is structured as a "single permit jurisdiction", the Contractor will apply, pay for and obtain the municipal building permit. In this case, the Division 26 contractor has no financial obligation for permit application except for permits not covered in the "single permit".
- .2 Arrange for inspection of all Work by the Authorities having jurisdiction over the Work. On completion of the Work, present to the Consultant the final unconditional certificate of approval of the inspecting Authorities.
- .3 Comply with the requirements of the latest edition of the applicable CSA standards, the requirements of the Authorities, Federal, Provincial and Municipal Codes, the applicable standards of the Underwriters' Association and all other Authorities having jurisdiction. These codes and regulations constitute an integral part of these specifications.

- .4 In case of conflict, the codes take precedence over the Contract Documents. In no instance reduce the standard or scope of work or intent established by the drawings and specifications by applying any of the codes referred to herein.
- .5 Before starting any work, submit the required number of copies of drawings and specifications to the Authorities for their approval and comments. Comply with any changes requested as part of the contract, but notify the Consultant immediately of such changes. Prepare and furnish any additional drawings, details or information as may be required.

## **1.6 CONTRACT DRAWINGS**

- .1 The Drawings for Electrical work are performance drawings, diagrammatic, intended to convey the scope of work and indicate general arrangement and approximate location of apparatus, fixtures and conduit runs. The Drawings do not intend to show architectural and structural details.
- .2 Do not scale Drawings. Obtain information involving accurate dimensions from dimensions shown on Architectural and Structural drawings, and by site measurement.
- .3 Make, at no additional cost, any changes or additions to materials, and/or equipment necessary to accommodate structural conditions (conduits around beams, columns, etc.)
- .4 Alter, at no additional cost, the locations of materials and/or equipment as directed, that do not necessitate additional material.
- .5 Install ceiling mounted components (e.g., light fixtures, speakers, heat or smoke detectors) in accordance with reflected ceiling drawings.
- .6 Confirm on the site the exact location and mounting elevation of outlets and fixtures as related to Architectural and Structural details.

## **1.7 EXAMINATION OF SITE AND DOCUMENTATIONS**

- .1 Prior to submitting tender, carefully examine conditions at the site which could affect the Work. Refer to and examine all contract documents.
- .2 Be responsible for any damage done to existing underground services caused by neglect to determine and mark out the location of such services prior to excavation work commencing.
- .3 Refer to room finish schedules to determine finished, partially finished and unfinished areas of the building.
- .4 Ensure that materials and equipment are delivered to the site at the proper time and in such assemblies and sizes so as to enter into the building and to be moved into the spaces where they are to be located without difficulty. Be responsible for any cutting and patching involved in getting assemblies into place.

## **1.8 CO-ORDINATION DRAWINGS**

- .1 Prepare drawings in conjunction with all trades concerned, showing sleeves and openings for passage through structure, and all inserts, equipment bases, and supports, and relate these to suitable grid lines and elevation datum.

- .2 When requested, provide weights of major items of equipment.
- .3 Prepare interference and co-ordination drawings for all areas where the work of this Division could conflict with and/or obstruct the work of other trades and/or other Sections of this Division. Submit drawings for review by the Consultant.

## **1.9 RECORD DRAWINGS**

- .1 The drawings for this Project have been prepared using Revit/BIM 360. For the purpose of exchanging model and producing record (as-built) drawings, a model file will be made available to the trade for a cost of \$850+HST. Edit Note: Price for model should be based on actual # of output drawings, example:

For 1 to 10 files	\$550.00
For 11 to 20 files	\$650.00
For 21 to 50 files	\$850.00
For 51 to 100 files	\$1,350.00
For greater than 100 files, charge \$10.00 per file + \$350.00.	

In using the model from the Consultant to produce record drawings, the Contractor is deemed to have agreed to take full responsibility for any and all information on the drawings.

- .2 Obtain a set of white prints as the job progresses, mark this set to accurately indicate installed work. Show location by dimension from walls or columns for all buried services as well as invert depths. Have these white prints available for inspection at the site at all times, and present for scrutiny at each job meeting.
- .3 At completion of the project, transfer all information from the white prints to the CAD files, and provide one CD with updated CAD files to the Consultant as part of the close out documents.
- .4 The contractor is responsible for all cost associated with the production and services required, such as recreating, plotting and printing to produce "as-built" drawings.

## **1.10 PRODUCT STANDARDS AND ALTERNATIVES**

- .1 Provide new material and equipment as specified and to the acceptance of the Consultant.
- .2 Manufacturer's names are listed as the "Basis of Design" and to set a standard of quality, performance, capacity, appearance and serviceability. Other acceptable manufacturers where listed may be used in the submission of the Electrical bid, however it is the bidders responsibility to ensure the equipment will perform and fit the available space used in the design.
- .3 Where no other acceptable manufacturers are indicated, provide the exact make specified. Requests for acceptance of manufacturers not listed must be submitted not less than seven working days prior to closing date of the tender, and submissions must bear proof of acceptance by the Consultant if used in the tender.
- .4 Assume full responsibility for ensuring that when providing other acceptable manufacturers all space, weight, connections, power and wiring requirements, etc., are considered, and costs therefore included in the tender. Equipment

requiring greater than specified energy requirements or unduly limiting service space requirements will not be accepted.

- .5 All electrical equipment, material, wiring and devices to conform to the Ontario Electrical Safety Code for the purpose for which they are to be used and bear the approval of CSA or other acceptable testing agency, alternately the equipment must bear special approval of the inspection authority.

#### **1.11 PATENTS**

- .1 Pay all royalties and licence fees, and defend all suits or claims for infringement of any patent rights, and save the Owner and Consultant harmless of loss or annoyance on account of suit, or claims of any kind for violation or infringement of any letters, patent or patent rights, by this Subcontractor or anyone directly or indirectly employed by him or by reason of the use by him or them of any part, machine, manufacture or composition of matter on the work, in violation or infringement or such letters, patent or rights.

#### **1.12 RIGHTS RESERVED**

- .1 Rights are reserved to furnish any additional detail drawings, which in the judgement of the Consultant may be necessary to clarify the work, and such drawings shall form a part of this contract.

#### **1.13 EQUIPMENT NAMEPLATES**

- .1 Provide apparatus with proper nameplates affixed thereto, showing the size, name of equipment, serial number and all information usually provided, which also includes voltage, cycle, phase, horsepower of motors and the name and address of the manufacturer.

#### **1.14 EXPEDITING AND DELIVERY**

- .1 Continuously check and expedite delivery of equipment and materials. If necessary, inspect at the source of manufacture.
- .2 Continuously check and expedite the flow of necessary information to and from all parties involved.
- .3 Immediately inform the Consultant in case information is required from him.
- .4 Provide delivery records updated monthly.

#### **1.15 SUPERINTENDENCE**

- .1 Maintain at the job site, at all times, qualified personnel and supporting staff, with proven experience in erecting, supervising, testing and adjusting projects of comparable nature and complexity.
- .2 The supervising personnel and their qualifications are subject to the approval of the Consultant.

#### **1.16 WORKMANSHIP**

- .1 Install equipment, conduit and cables in a workmanlike manner to present a neat appearance to function properly to the satisfaction of the Consultant. Install runs parallel and perpendicular to building lines, in chases, behind furring or above

ceilings, where such concealment is possible. In areas where systems are to be exposed install neatly and group to present a tidy appearance.

- .2 Install equipment and apparatus requiring maintenance, adjustment or eventual replacement with due allowance therefore.
- .3 Include in the work all requirements of manufacturers shown on the shop drawings or manufacturers installation instructions.
- .4 Replace work unsatisfactory to the Consultant without extra cost.
- .5 Make provision to accommodate future plant and equipment indicated on drawings.
- .6 Protect from damage all equipment delivered to the site and during installation. Any damage or marking of finished surfaces shall be made good to the satisfaction of the Consultant.

#### **1.17 TRIAL USAGE AND TESTS**

- .1 The Owner has the privilege of the trial usage of Electrical Systems or parts thereof for the purpose of testing and learning the operational procedures.
- .2 Assist in trial usage over a length of time as deemed reasonable by the Consultant at no extra cost and do not waive any responsibility because of trial usage.
- .3 Trial usage shall not be construed as Substantial Completion of the Work, or acceptance by the Owner.
- .4 Provide and pay for all testing required on the system components where, in the opinion of the Consultant, manufacturers ratings or specified performance is not being achieved.

#### **1.18 CLEANING**

- .1 Before energizing any systems, inspect and clean the inside of panel boards, switchgear and cabinets to ensure that they are completely free from dust and debris.
- .2 Clean all polished, painted and plated work bright. Clean all lighting fixtures.
- .3 Remove all debris, surplus material and all tools.
- .4 Carry out additional cleaning operating of systems as specified in other sections of the specification.

#### **1.19 COMPLETION**

- .1 Leave electrical work in specified working order.

#### **1.20 WARRANTIES**

- .1 Provide warranty certificates, wherever given or required, in excess of the normal warranty period showing the name of the firm giving the warranty, dated and acknowledged, on specific equipment and systems.



## **1.21 INSTRUCTION TO OWNERS**

- .1 Instruct the Owner's representatives in all aspects of the operation of systems and equipment.
- .2 Arrange for and pay for services of service engineers and other manufacturers' representatives required for instruction on specialized portions of the installation.
- .3 Submit to the Consultant at the time of final inspection a complete list of systems stating for each system:
  - .1 Date instructions were given to the Owner's staff.
  - .2 Duration of instruction.
  - .3 Name of persons instructed.
  - .4 Other parties present (manufacturer's representative, consultants, etc.).
- .4 Signatures of the Owner's staff stating that they properly understood the system installation, operation and maintenance requirements.

## **1.22 DOCUMENTATION AND SYSTEMS ACCEPTANCE**

- .1 Assemble three (3) copies of operating and instruction manuals in three ring binders with index tabs each containing this subcontractor's and suppliers names and telephone numbers.
- .2 Each manual shall contain the following data:
  - .1 A set of as-built prints.
  - .2 Letters of Owner's Instructions
  - .3 Final ESA Certificate.
  - .4 A copy of each "reviewed" shop drawing.
  - .5 Complete explanation of operation principles and sequences.
  - .6 Complete part lists with numbers.
  - .7 Recommended maintenance practices and precautions.
  - .8 Complete wiring and connections diagrams.
  - .9 Certificate of warranty.
  - .10 Representative certificates for:
    - .1 Fire Alarm System
    - .2 Generator Assemblies
- .3 Ensure that operating and maintenance instructions are specific and apply to the models and types of equipment provided.

## **1.23 OWNER'S RIGHT TO RELOCATE ELECTRICAL ITEMS**

- .1 The Owner reserves the right to relocate electrical outlets at a later date, but prior to installation, without cost, assuming that the relocation per outlet does not exceed 3000 mm from the original location. No credits shall be anticipated where relocation per outlet of up to and including 3000 mm reduces materials, products and labour.
- .2 Should relocations per outlet exceed 3000 mm from the original location the Contract Price will be adjusted accordingly.

- .3 Necessary changes, due to lack of co-ordination, and as required and when approved, shall be made at no additional cost, to accommodate structural and building conditions. The location of conduits and other equipment shall be altered without charge to the Owner, if approved, provided the change is made before installation.

#### **1.24 ELECTRICAL LIST OF MANUFACTURERS, SUBTRADES AND PRICES**

- .1 At the time of tender closing, list the names of manufacturers or subtrades carried (one per item), the total cost of the Electrical Works, any separate, unit and alternative prices where indicated.
- .2 If this Subcontractor neglects to list the specified or acceptable manufacturers or lists more than one manufacturer per item, or lists manufacturers not specified, the Consultant will have the option of making the selection of the manufacturer.
- .3 There will be no substitutions of named manufacturers or subtrades after tender close except as approved by the Consultant.

#### **1.25 PHASING AND SCHEDULING OF WORK**

- .1 Refer to Scope of work for a detailed description of the phasing and scheduling of the work. Execute work in accordance with the phasing and construction schedule. Provide all necessary temporary connections and equipment to provide functional, operational systems during construction period when part of the building will be occupied and construction is still continuing in other portions.

#### **1.26 MATERIALS FURNISHED BY OTHERS**

- .1 Where materials are furnished by others for installation under this Division, the Sub-Contractor shall notify the supplier of dates he will be ready for delivery as specified in the General Conditions. The Sub-Contractor shall receive, unload, handle, store, protect and insure the material until ready for actual installation. Upon receipt of material furnished by others, the Sub-Contractor shall spot-check or check the entire shipment and promptly advise the Consultant in writing of any damage and/or missing components. Any material which is subsequently lost or damaged due to negligence on the part of the Sub-Contractor shall be promptly replaced (or repaired to the satisfaction of the Owner) at the Sub-Contractor's expense.

#### **1.27 CONNECTIONS TO EQUIPMENT FURNISHED BY OTHERS.**

- .1 Where the Drawings indicated equipment to be furnished by others, provide Electrical rough-in for each unit pursuant to its shop drawings, and make final connections, disconnect switches and other electrical facilities for a complete installation.

#### **1.28 ELECTRICAL LEGEND & SCHEDULES**

- .1 Refer to Electrical Drawings for Legend and Schedules

**Part 2        Products**

**2.1        NIL**

**Part 3        Execution**

**3.1        NIL**

**END OF SECTION**

**Part 1 General**

**1.1 REFERENCES**

- .1 Comply with Section 26 05 00, Electrical General Requirements and all documents referred to therein.
- .2 Designate in the Construction Schedule, or in a separate coordination schedule, dates for submission and dates that reviewed Shop Drawings, Product Data and Sample will be required. Give due consideration for review time required by the Consultant, with a minimum of fifteen (15) working days required. The submission of Appendix 'X' will be considered an acceptable submittal schedule.
- .3 All data and dimensions on shop drawings, product data and sample information to be based on units (Imperial or Metric) as shown on the contract documents.
- .4 Shop Drawings with errors or omissions and deviations will be returned "Not Reviewed".
- .5 The Contractor's responsibility for deviations in submission from the requirements of Contract Documents is not relieved by the Consultant's review of submittals, unless a deviation on the submittal is noted as such in writing and has been accepted by the Consultant.
- .6 Keep one (1) reviewed copy of each submission on site.

**1.2 SHOP DRAWINGS**

- .1 Review and stamp Shop Drawings, Product Data and Samples prior to submission to the Consultant. Confirm that necessary requirements have been determined and verified and that each submittal has been checked and coordinated with requirements of the Work and the Contract Documents. Submittals not stamped, signed, dated and identified as to the specific project, will be returned without being examined and shall be re-submitted when completed.
- .2 Submit drawings in a clear and thorough manner:
  - .1 Identify details by reference to drawing No. and detail, schedule or room numbers as shown on Contract Documents.
  - .2 Minimum sheet size and larger sheets to be multiples of 8½" x 11".
  - .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. Indicate cross references to design drawings and specification.
  - .4 Adjustments to shop drawings by the Consultant do not change the cost of the work. If adjustments affect the cost of Work, advise through normal channels in writing prior to proceeding with the Work.
  - .5 Make changes in shop drawings as directed by the Consultant. Resubmit and note any revisions other than those requested.
  - .6 If only minor adjustments are made, shop drawings to be returned and fabrication and installation of work to proceed.

- .3 Determine and verify:
  - .1 Field measurements.
  - .2 Field construction criteria.
  - .3 Catalogue numbers and similar data.
  - .4 Conformance with Specifications.
- .4 Co-ordinate each submittal with requirements of the Contract documents.
- .5 Each Shop Drawing will be stamped by the Consultant in the following format:
  - ☐ NOT REVIEWED                      ☐ REVIEWED
  - ☐ RESUBMIT                              ☐ REVIEWED AS MODIFIED
  - ☐ NOT SPECIFIED BY MCW, REVIEWED FOR MEP ONLY
- .6 This review by the Consultant is for the sole purpose of ascertaining conformance with the general design concept. This review shall not mean that the Consultant approved the detail design inherent in the shop drawings, responsibility for which shall remain with this Subcontractor submitting same, and such review shall not relieve this Subcontractor of his responsibility for errors or omissions in the shop drawings or of his responsibility for meeting all requirements of the contract documents. The Contractor is responsible for dimensions to be confirmed and correlated at the job site, for information that pertains solely to fabrication.
- .7 Products not specified by MCW are reviewed to confirm compliance with services provided only. Any changes required between provided services and shop drawing requirements will be identified for coordination between trades.
- .8 Shop drawings shall be accompanied by a complete copy of the attached "Shop Drawing Submittal Sheet" Section 26 05 01, Appendix 'X'.
- .9 Begin no fabrication or work which requires submittals until return of submittals reviewed by Consultant.

### 1.3 **PRODUCT DATA**

- .1 Where specified, Manufacturer's standard schematic drawings, catalogue sheets, diagrams, schedules, performance charts, illustrations and other standard descriptive data is acceptable provided there is conformance with the following:
  - .1 Clearly identify pertinent products or models.
  - .2 Show performance characteristics and capacities.
  - .3 Show dimensions and clearances required.
  - .4 Show wiring or piping diagrams and controls.
- .2 Manufacturer's standard schematic drawings and diagrams may require modifications to drawings and diagrams to provide information applicable to the Work.
- .3 Provide information specifically applicable to the Work.

### 1.4 **SAMPLES**

- .1 Samples to be labelled, of sufficient size and quantity to clearly illustrate:
  - .1 Functional characteristics integrally related parts and attachment devices.



- .2 Full range of colour, texture and pattern.
- .2 Field Samples and mock-ups:
  - .1 Erect, at the project site and in location acceptable to the Consultant.
  - .2 Fabricate each sample and mock-up complete and finished.
  - .3 Remove mock-ups at conclusion of Work or as specified by the Consultant.

#### 1.01 SUBMISSION REQUIREMENTS

- .3 Submit promptly to approved schedule and in sequence to prevent submission delay in the Work.
- .4 Submission requirements:
  - .1 Shop Drawings: Acceptable submissions are: Submit shop drawings electronically as agreed to during the kick off meeting with the Consultant.
  - .2 Product Data: Submit a copy for each O & M Manual.
  - .3 Samples: Submit as specified, or as requested during the shop drawing review period.

#### 1.5 RESUBMISSION REQUIREMENTS

- .1 Make corrections or changes to the submittals noted by the Consultant and resubmit.
- .2 Shop Drawings and Product Data:
  - .1 Revise drawings or data, and resubmit as noted on the initial submittal.
  - .2 Indicate any changes which have been made other than those noted by the Consultant.
- .3 Samples: Submit new samples as required for initial submittal as soon as possible after notification of the rejection of the original submission and mark "resubmitted samples".

#### 1.6 DISTRIBUTION

- .1 Distribute reproductions of Shop Drawings and copies of Product Data which carry the Consultant's stamp to all parties as specified by Division One General Requirements.
  - .1 Job site file
  - .2 Project record document file
  - .3 Other affected contractors
  - .4 Subcontractors
  - .5 Supplier or fabricator (as applicable)
  - .6 Operations Manual

**Part 2          Products**

**2.1            NIL**

**Part 3          Execution**

**3.1            NIL**

**END OF SECTION**

# SHOP DRAWING SUBMITTAL SHEET

Project: North Roads Operations Centre Date: \_\_\_\_\_

Project No. 23137 Submittal No. \_\_\_\_\_

Section: \_\_\_\_\_

Equipment Description	Quantity	Unit Price	Total Price
1. 1000W Laser Cutter	1	\$1200	\$1200
2. 500W Laser Cutter	2	\$800	\$1600
3. 200W Laser Cutter	3	\$400	\$1200
4. 100W Laser Cutter	4	\$200	\$800
5. 50W Laser Cutter	5	\$100	\$500
6. 25W Laser Cutter	6	\$50	\$300
7. 12.5W Laser Cutter	7	\$25	\$175
8. 6.25W Laser Cutter	8	\$12.5	\$100
9. 3.125W Laser Cutter	9	\$6.25	\$56.25
10. 1.5625W Laser Cutter	10	\$3.125	\$31.25
11. 781.25W Laser Cutter	11	\$1.5625	\$17.1875
12. 390.625W Laser Cutter	12	\$0.78125	\$9.375
13. 195.3125W Laser Cutter	13	\$0.390625	\$5.15625
14. 97.65625W Laser Cutter	14	\$0.1953125	\$2.734375
15. 48.828125W Laser Cutter	15	\$0.09765625	\$1.464375
16. 24.4140625W Laser Cutter	16	\$0.048828125	\$0.78125
17. 12.20703125W Laser Cutter	17	\$0.0244140625	\$0.4140625
18. 6.103515625W Laser Cutter	18	\$0.01220703125	\$0.20703125
19. 3.0517578125W Laser Cutter	19	\$0.006103515625	\$0.103515625
20. 1.52587890625W Laser Cutter	20	\$0.0030517578125	\$0.0517578125
21. 0.762939453125W Laser Cutter	21	\$0.00152587890625	\$0.02587890625
22. 0.3814697265625W Laser Cutter	22	\$0.000762939453125	\$0.012939453125
23. 0.19073486328125W Laser Cutter	23	\$0.0003814697265625	\$0.0064697265625
24. 0.095367431640625W Laser Cutter	24	\$0.00019073486328125	\$0.00323486328125
25. 0.0476837158203125W Laser Cutter	25	\$0.000095367431640625	\$0.001617431640625
26. 0.02384185791015625W Laser Cutter	26	\$0.0000476837158203125	\$0.0008087158203125
27. 0.011920928955078125W Laser Cutter	27	\$0.00002384185791015625	\$0.00040435791015625
28. 0.0059604644775390625W Laser Cutter	28	\$0.000011920928955078125	\$0.000202178955078125
29. 0.00298023223876953125W Laser Cutter	29	\$0.0000059604644775390625	\$0.0001010894775390625
30. 0.001490116119384765625W Laser Cutter	30	\$0.00000298023223876953125	\$0.00005054473876953125
31. 0.0007450580596923828125W Laser Cutter	31	\$0.000001490116119384765625	\$0.000025272369384765625
32. 0.00037252902984619140625W Laser Cutter	32	\$0.0000007450580596923828125	\$0.0000126361846923828125
33. 0.000186264514923095703125W Laser Cutter	33	\$0.00000037252902984619140625	\$0.00000631809234619140625
34. 0.0000931322574615478515625W Laser Cutter	34	\$0.000000186264514923095703125	\$0.000003159046173095703125
35. 0.00004656612873077392578125W Laser Cutter	35	\$0.0000000931322574615478515625	\$0.0000015795230865478515625
36. 0.000023283064365386962890625W Laser Cutter	36	\$0.00000004656612873077392578125	\$0.00000078976154327392578125
37. 0.0000116415321826934814453125W Laser Cutter	37	\$0.000000023283064365386962890625	\$0.000000394880771636962890625
38. 0.00000582076609134674072265625W Laser Cutter	38	\$0.0000000116415321826934814453125	\$0.0000001974403858184814453125
39. 0.000002910383045673370361328125W Laser Cutter	39	\$0.00000000582076609134674072265625	\$0.00000009872019290924072265625
40. 0.0000014551915228366851806640625W Laser Cutter	40	\$0.000000002910383045673370361328125	\$0.000000049360096454620361328125
41. 0.00000072759576141834259033203125W Laser Cutter	41	\$0.0000000014551915228366851806640625	\$0.0000000246800482273101806640625
42. 0.000000363797880709171295166015625W Laser Cutter	42	\$0.00000000072759576141834259033203125	\$0.00000001234002411365509033203125
43. 0.0000001818989403545856475830078125W Laser Cutter	43	\$0.000000000363797880709171295166015625	\$0.000000006170012056827545166015625
44. 0.00000009094947017729282379150390625W Laser Cutter	44	\$0.0000000001818989403545856475830078125	\$0.0000000030850060284137725830078125
45. 0.000000045474735088646411895751953125W Laser Cutter</			

Contractor:

Sub-Contractor: \_\_\_\_\_

Suppliers Name: \_\_\_\_\_








Manufacturer:

Catalogue No.: \_\_\_\_\_

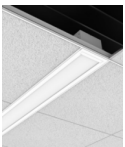




## Variations From Tender Documents




Engineer: MCW Consultants Ltd.  
207 Queen's Quay West, Suite 615  
Toronto, Ontario  
M5J 1A7



SECTION 26 05 01 – APPENDIX 'X' PROJECT: North Roads Operations Centre		SHOP DRAWING SUBMITTAL SCHEDULE						Page 1	
PROJECT No: 23137		DIVISION 26						Date: October 25, 2024	
SECTION	DESCRIPTION (List Equipment Example only Edit to Suit)	MANUFACTURER	SHOP DRAWING				DELIVERY		COMMENTS
			SUBMITTED		RETURNED		SCHED	ACTUAL	
			SCHED	ACTUAL	SCHED	ACTUAL			
26 05 08	Firestopping								
26 05 11	Testing and Coordination Study of Distribution								
26 05 12	Arc Flash Hazard Study								
26 05 14	Work in Existing Building								
26 05 31	Splitter Trough								
26 09 23	Digital Metering System								
26 12 16	Low Voltage Dry Type Transformers								
26 24 01	Service Entrance LV Switchboard								
26 24 16	Panelboards								
26 27 26	Wiring Devices								
26 28 13	Fuses								
26 28 23	Safety Switches								
26 28 33	Quick Connect Switches								
26 29 01	AC Contactors								
26 32 13	Gas Generator (SU)								
26 36 23	Automatic Transfer Switches								
26 50 00	Lighting Luminaires								
26-80-00	Electric Vehicle Charger								

TYPE		DESCRIPTION					BALLAST / DRIVER		CRI	MANUFACTURER CAT. NO. (BASE)	ALTERNATE MANUFACTURERS	IMAGE (REFERENCE ONLY)	COMMENTS / USE (SEE DRAWINGS)
			WATTS	LUMENS	TYPE	COLOR TEMP	VOLTS	TYPE					
C 1		4" RECESSED ROUND LED DOWNLIGHT, 45° BEAM ANGLE MEDIUM DISTRIBUTION, SELF FLANGED SPUN ALUMUNIUM REFLECTOR WITH SEMI-SPECULAR CLEAR FINISH, RATED 50,000 HRS @L70, TRIM SUITED FOR INSTALLATION IN EXTERIOR SOFFIT, IP64 RATED, WET LOCATION RATED, ARCHITECT TO CONFIRM FINISH.	17W	1500	LED	4000K	120	0-10V	70+	COOPER LIGHTING PORTFOLIO LD4C15D010 EX4C159040 MD1H	APPROVED EQUAL		EXTERIOR CANOPY
C 2		4" RECESSED ROUND LED DOWNLIGHT, 60° BEAM ANGLE MEDIUM DISTRIBUTION, GALVANIZED STEEL PLASTER FRAME, SELF FLANGED SPUN ALUMUNIUM REFLECTOR WITH SPECULAR CLEAR FINISH, RATED 50,000 HRS @L70, IP64 RATED, DAMP LOCATION RATED, ARCHITECT TO CONFIRM FINISH.	15W	1500	LED	4000K	120	0-10V	85+	COOPER LIGHTING HALO COMMERCIAL HC410D010-HM40525940- 41MDC	APPROVED EQUAL		CHANGE ROOM WASHROOM CORRIDOR
C 3		4" RECESSED ROUND LED SHOWER DOWNLIGHT, CANLESS MODULAR CONSTRUCTION, REGRESSED FLAT ACRYLIC LENS, RATED 50,000 HRS @L70, IP64 RATED, WET LOCATION RATED, ARCHITECT TO CONFIRM FINISH.	13W	1200	LED	4000K	120	0-10V	85+	COOPER LIGHTING HALO LCR412RD9FSE010MW	APPROVED EQUAL		CHANGE ROOM SHOWER
C 4		4" PENDANT CYLINDER LED DOWNLIGHT, 61° BEAM ANGLE MEDIUM DISTRIBUTION, SPUN ALUMINUM HOUSING, SELF-FLANGED SPUN ALUMINUM CONICAL REFLECTOR WITH SPECULAR-CLEAR FINISH, RATED 50,000 HRS @L70, DAMP LOCATION RATED, C/W PENDANT MOUNTING KIT TO SUIT APPLICATION, ARCHITECT TO CONFIRM FINISH.	10W	1000	LED	4000K	120	0-10V	85+	COOPER LIGHTING HALO COMMERCIAL HCC4S10D010SL- HCC8P36SL-HM40525940- 41WDC	APPROVED EQUAL		CORRIDOR
C 5		2" SUSPENDED SHALLOW ROUND CYLINDER LED DOWNLIGHT, 40° BEAM ANGLE FLOOD DISTRIBUTION, SPUN ALUMINUM RIMLESS REFLECTOR WITH SPECULAR CLEAR FINISH, SELF-FLANGED SPUN ALUMINUM REFLECTOR, RATED 50,000 HRS @L70, DAMP LOCATION RATED, C/W AIRCRAFT SUSPENSION CABLE TO SUIT APPLICATION, COORDINATE EXACT SUSPENSION LENGTH ON SITE, ARCHITECT TO CONFIRM FINISH.	11W	1000	LED	4000K	120	0-10V	85+	COOPER LIGHTING PORTFOLIO LSR2B10WFL559040D010 2LBD LI	APPROVED EQUAL		ENTRY CORRIDOR
E 1		DIE-CAST ALUMINUM EDGE-LIT EXIT SIGN, CSA APPROVED, UNIVERSAL MOUNT, UNIVERSAL DIE-CAST BACKBOX FOR SURFACE/SEMI- RECESSED MOUNTING, FIXTURES, SINGLE OR DOUBLE FACE GREEN RUNNING MAN PICTOGRAM AND DIRECTIONAL INDICATOR TO SUIT APPLICATION, ARCHITECT TO CONFIRM FINISH.	2.5W	N/A	LED	N/A	120	N/A	N/A	EMERGI-LITE EDE SERIES	APPROVED EQUAL		CORRIDORS VESTIBULES OPEN OFFICE SPACE CHANGE ROOMS
E 2		WET LOCATION RATED EXIT SIGN, CSA APPROVED, UNIVERSAL MOUNT, SINGLE OR DOUBLE FACE GREEN RUNNING MAN PICTOGRAM AND DIRECTIONAL INDICATOR TO SUIT APPLICATION, SEALED VANDAL- RESISTANT POLYCARBONATE FACEPLATE, FULLY GASKETED NEMA-4X RATED POLYMERIC ENCLOSURE, ARCHITECT TO CONFIRM FINISH.	2.5W	N/A	LED	N/A	120	N/A	N/A	EMERGI-LITE SURVIVE ALL EN SERIES	APPROVED EQUAL		EXTERIOR DOORS GARAGES



TYPE		DESCRIPTION					BALLAST / DRIVER		CRI	MANUFACTURER CAT. NO. (BASE)	ALTERNATE MANUFACTURERS	IMAGE (REFERENCE ONLY)	COMMENTS / USE (SEE DRAWINGS)
			WATTS	LUMENS	TYPE	COLOR TEMP	VOLTS	TYPE					
F 1		4" WIDE CUSTOM LENGTH RECESSED LED LINEAR, CUSTOMIZABLE RUN LENGTHS TO THE NEAREST 1", ALUMINUM HOUSING, FLUSH SATIN LENS, COLD-ROLLED STEEL REFLECTOR, SUITABLE FOR INSTALLATIONS IN DRYWALL CEILING, RATED 400,000 HRS @L70, DAMP LOCATION RATED, ARCHITECT TO CONFIRM FINISH.	7W/ft	750lm/ft	LED	4000K	120	0-10V	85+	COOPER LIGHTING SQ4R SQ4R-F-075D-940-1-UNV-STD-W-4	APPROVED EQUAL		LUNCH ROOM MEETING ROOM OFFICE
F 2		4' LONG SUSPENDED/SURFACE MOUNTED FLAT LED STRIPLIGHT, DIE-FORMED COLD ROLLED STEEL HOUSING, FROSTED DIFFUSED ACRYLIC LENS, RATED 60,000 HOURS AT L70, DAMP LOCATED RATED, C/W SUSPENSION CABLE KIT AND WIRE GUARD WHERE REQUIRED TO SUIT APPLICATION, ARCHITECT TO CONFIRM FINISH.	26W	4100lm	LED	4000K	120	0-10V	85+	COOPER LIGHTING SNX LENSED 4SNX-41SL-FDL-UNV-L940-CD	APPROVED EQUAL		ELECTRICAL ROOM MECHANICAL ROOM IT ROOM FIRST AID ROOM JANITOR ROOM
F 3A		4' LONG SUSPENDED VAPOUR TIGHT LED LINEAR, IMPACT PROTECTED FIBERGLASS HOUSING, WATERTIGHT USING POLYURETHANE GASKETING, FULL METAL FIXTURE LINER, FROSTED LENS WITH 15% DR HIGH IMPACT ADDITIVE FOR IMPACT RESISTANCE, RATED 60,000 HOURS AT L90, WET LOCATION RATED, IK06 RATED LENS AND HOUSING, C/W CHAIN SUSPENSION KIT TO SUIT APPLICATION, ARCHITECT TO CONFIRM FINISH.	58W	8000	LED	4000K	120	0-10V	85+	COOPER LIGHTING VAPORLITE LED 4VT2-LD5-8-FR50-UNV-L840-CD1-WL-U	APPROVED EQUAL		SIGN GARAGE GARAGE WASH BAY
F 3B		4' LONG WALL/SURFACE MOUNTED VAPOUR TIGHT LED LINEAR, IMPACT PROTECTED FIBERGLASS HOUSING, WATERTIGHT USING POLYURETHANE GASKETING, FULL METAL FIXTURE LINER, FROSTED LENS WITH 15% DR HIGH IMPACT ADDITIVE FOR IMPACT RESISTANCE, RATED 60,000 HOURS AT L90, WET LOCATION RATED, IK06 RATED LENS AND HOUSING, ARCHITECT TO CONFIRM FINISH.	58W	8000	LED	4000K	120	0-10V	85+	COOPER LIGHTING VAPORLITE LED 4VT2-LD5-8-FR50-UNV-L840-CD1-WL-U	APPROVED EQUAL		GARAGE WASH BAY
S 1A		22" LENGTH X 22" WIDTH, SINGLE HEAD EXTERIOR AREA POLE LIGHT, DIE-CAST ALUMINUM HOUSING, ALUMINUM POLE MOUNT ARM SUITABLE FOR INSTALLATION ON SQUARE POLE, TYPE IV FORWARD THROW DISTRIBUTION, 5 YEAR WARRANTY, WET LOCATION RATED, DARK SKY COMPLIANT, ARCHITECT TO CONFIRM FINISH.  PROVIDE A 8m (24') LONG, BLACK PAINTED, SQUARE GALVANIZED STEEL POLE TO MATCH EXISTING LIGHT POLES (DYNAPOLE SSS4-24 OR APPROVED EQUAL). LIGHT HEAD SHALL BE INSTALLED ON THIS LIGHT POLE.  PROVIDE A PRECAST CONCRETE BASE MINIMUM 900mm (3') HIGH, 600mm DIAMETER, C/W STEEL ANCHOR BOLTS AND WASHERS AS REQUIRED BY YORK REGION STANDARDS. LIGHT POLE SHALL BE INSTALLED ON THIS CONCRETE BASE.	213W	27750	LED	4000K	120	0-10V	70+	COOPER LIGHTING SOLUTIONS GALN-SA4C-740-U-T4FT	APPROVED EQUAL		EXTERIOR SITE

TYPE		DESCRIPTION					BALLAST / DRIVER		CRI	MANUFACTURER CAT. NO. (BASE)	ALTERNATE MANUFACTURERS	IMAGE (REFERENCE ONLY)	COMMENTS / USE (SEE DRAWINGS)
			WATTS	LUMENS	TYPE	COLOR TEMP	VOLTS	TYPE					
S	1B	22" LENGTH X 22" WIDTH, DOUBLE HEAD EXTERIOR AREA POLE LIGHT, DIE-CAST ALUMINUM HOUSING, ALUMINUM POLE MOUNT ARM SUITABLE FOR INSTALLATION ON SQUARE POLE, TYPE IV FORWARD THROW DISTRIBUTION, 5 YEAR WARRANTY, WET LOCATION RATED, DARK SKY COMPLIANT, ARCHITECT TO CONFIRM FINISH.  PROVIDE A 8m (24') LONG, BLACK PAINTED, SQUARE GALVANIZED STEEL POLE TO MATCH EXISTING LIGHT POLES (DYNAPOLE SSS4-24 OR APPROVED EQUAL). LIGHT HEAD SHALL BE INSTALLED ON THIS LIGHT POLE.  PROVIDE A PRECAST CONCRETE BASE MINIMUM 900mm (3') HIGH, 600mm DIAMETER, C/W STEEL ANCHOR BOLTS AND WASHERS AS REQUIRED BY YORK REGION STANDARDS. LIGHT POLE SHALL BE INSTALLED ON THIS CONCRETE BASE.	426W	55500	LED	4000K	120	0-10V	70+	COOPER LIGHTING SOLUTIONS GALN-SA4C-740-U-T4FT	APPROVED EQUAL		EXTERIOR SITE
	2A	22" LENGTH X 22" WIDTH, SINGLE HEAD EXTERIOR AREA POLE LIGHT, DIE-CAST ALUMINUM HOUSING, ALUMINUM POLE MOUNT ARM SUITABLE FOR INSTALLATION ON SQUARE POLE, TYPE IV FORWARD THROW DISTRIBUTION, 5 YEAR WARRANTY, WET LOCATION RATED, DARK SKY COMPLIANT, C/W BACKLIGHT SHIELDING, ARCHITECT TO CONFIRM FINISH.  PROVIDE A 8m (24') LONG, BLACK PAINTED, SQUARE GALVANIZED STEEL POLE TO MATCH EXISTING LIGHT POLES (DYNAPOLE SSS4-24 OR APPROVED EQUAL). LIGHT HEAD SHALL BE INSTALLED ON THIS LIGHT POLE.  PROVIDE A PRECAST CONCRETE BASE MINIMUM 900mm (3') HIGH, 600mm DIAMETER, C/W STEEL ANCHOR BOLTS AND WASHERS AS REQUIRED BY YORK REGION STANDARDS. LIGHT POLE SHALL BE INSTALLED ON THIS CONCRETE BASE.	213W	20030	LED	4000K	120	0-10V	70+	COOPER LIGHTING SOLUTIONS GALN-SA4C-740-U-T4FT-HSS	APPROVED EQUAL		EXTERIOR SITE
S	3A	22" LENGTH X 22" WIDTH, SINGLE HEAD EXTERIOR AREA POLE LIGHT, DIE-CAST ALUMINUM HOUSING, ALUMINUM POLE MOUNT ARM SUITABLE FOR INSTALLATION ON SQUARE POLE, TYPE 3 DISTRIBUTION, 5 YEAR WARRANTY, WET LOCATION RATED, DARK SKY COMPLIANT, C/W BACKLIGHT SHIELDING, ARCHITECT TO CONFIRM FINISH.  PROVIDE A 8m (24') LONG, BLACK PAINTED, SQUARE GALVANIZED STEEL POLE TO MATCH EXISTING LIGHT POLES (DYNAPOLE SSS4-24 OR APPROVED EQUAL). LIGHT HEAD SHALL BE INSTALLED ON THIS LIGHT POLE.  PROVIDE A PRECAST CONCRETE BASE MINIMUM 900mm (3') HIGH, 600mm DIAMETER, C/W STEEL ANCHOR BOLTS AND WASHERS AS REQUIRED BY YORK REGION STANDARDS. LIGHT POLE SHALL BE INSTALLED ON THIS CONCRETE BASE.	213W	20420	LED	4000K	120	0-10V	70+	COOPER LIGHTING SOLUTIONS GALN-SA4C-740-U-T3-HSS	APPROVED EQUAL		EXTERIOR SITE

TYPE		DESCRIPTION					BALLAST / DRIVER		CRI	MANUFACTURER CAT. NO. (BASE)	ALTERNATE MANUFACTURERS	IMAGE (REFERENCE ONLY)	COMMENTS / USE (SEE DRAWINGS)
			WATTS	LUMENS	TYPE	COLOR TEMP	VOLTS	TYPE					
S	4B	22" LENGTH X 22" WIDTH, DOUBLE HEAD EXTERIOR AREA POLE LIGHT, DIE-CAST ALUMINUM HOUSING, ALUMINUM POLE MOUNT ARM SUITABLE FOR INSTALLATION ON SQUARE POLE, TYPE V SQUARE WIDE DISTRIBUTION, 5 YEAR WARRANTY, WET LOCATION RATED, DARK SKY COMPLIANT, ARCHITECT TO CONFIRM FINISH	426W	58340	LED	4000K	120	0-10V	70+	COOPER LIGHTING SOLUTIONS GALN-SA4C-740-U-5WQ	APPROVED EQUAL		EXTERIOR SITE
		PROVIDE A 8m (24') LONG, BLACK PAINTED, SQUARE GALVANIZED STEEL POLE TO MATCH EXISTING LIGHT POLES (DYNAPOLE SSS4-24 OR APPROVED EQUAL). LIGHT HEAD SHALL BE INSTALLED ON THIS LIGHT POLE.											
		PROVIDE A PRECAST CONCRETE BASE MINIMUM 900mm (3') HIGH, 600mm DIAMETER, C/W STEEL ANCHOR BOLTS AND WASHERS AS REQUIRED BY YORK REGION STANDARDS. LIGHT POLE SHALL BE INSTALLED ON THIS CONCRETE BASE.											
W	1	7" LENGTH X 4" DEPTH X 8" HEIGHT, EXTERIOR WALL PACK LIGHT, DIE-CAST ALUMINUM HOUSING, ONE-PIECE SILICONE GASKET FOR WATER TIGHT SEAL, ANODIZED RELECTOR, IMPACT-RESISTANT TEMPERED GLASS LENS, RATED 72,000 HOURS AT L90, WET LOCATION RATED, DARK SKY COMPLIANT, ARCHITECT TO CONFIRM FINISH.	38W	1020	LED	4000K	120	0-10V	70+	COOPER LIGHTING SOLUTIONS XTOR4B-W	APPROVED EQUAL		EXTERIOR SITE

Notes:	1. Submit photometric calculations for alternate manufacturers. Div 26 to carry all additional related costs to meet performance of based manufacturer.
	2. Coordinate housing requirements for each recessed installation, and provide appropriate housing.
	3. Provide insulated housing where the fixture may become in contact with insulation.
	4. All lensed LED fixtures shall have hinged frames.
	5. Except RUNNING MAN signs, all LED fixtures shall be tested to IESNA LM79-2008 & LM80. Lifetime shall be based on L70.
	6. All exterior luminaires shall be Dark Sky Friendly.

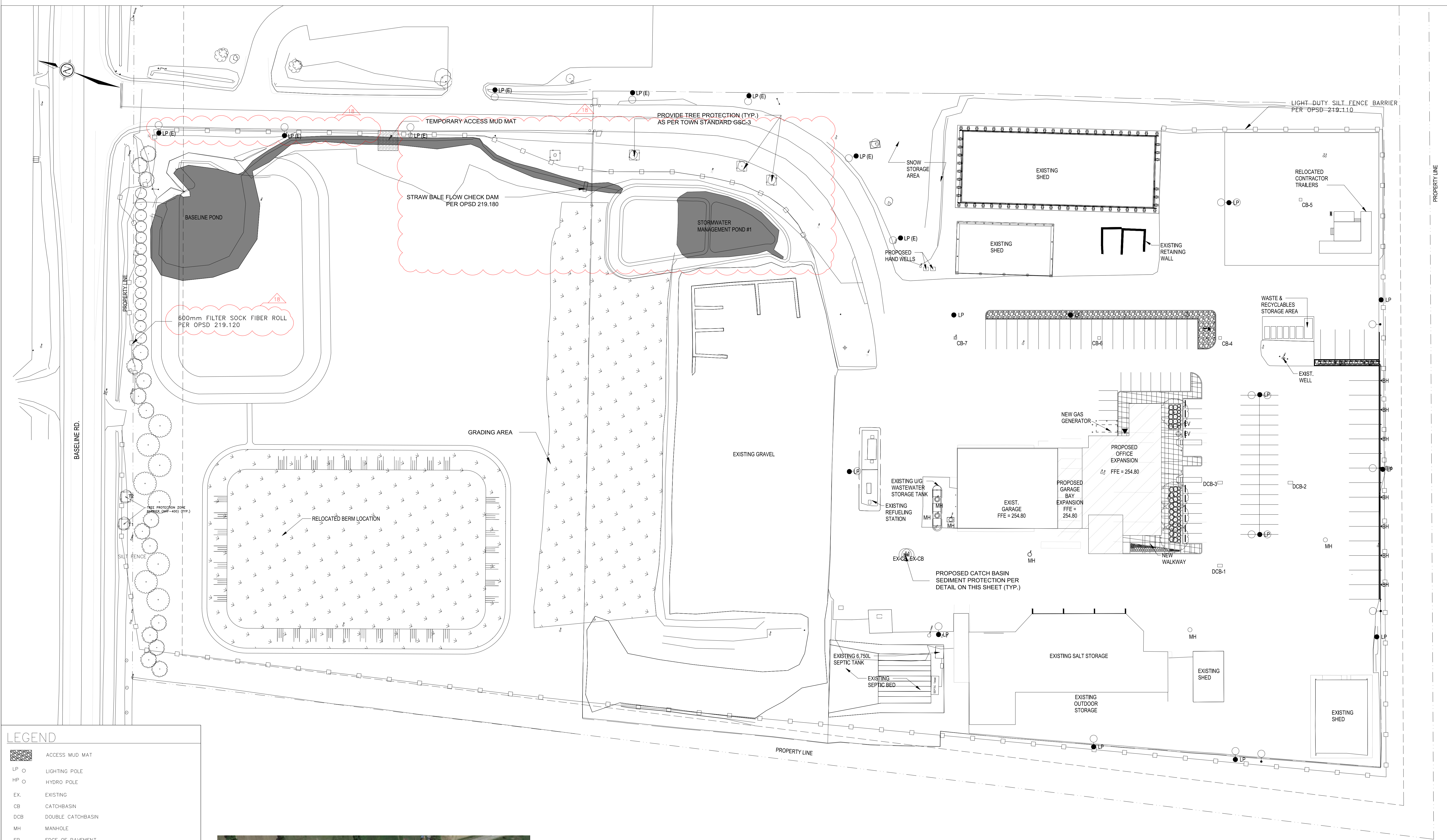


19.	ISSUED FOR ADDENDUM 4	2025-07-18
18.	ISSUED FOR ADDENDUM 2	2025-07-04
17.	REISSUED FOR TENDER	2025-05-23
16.	ISSUED FOR TENDER	2025-04-25
15.	ISSUED FOR 100% CD R5	2025-04-11
14.	ISSUED FOR SITE PLAN AGREEMENT	2025-01-09
13.	ISSUED FOR BUILDING PERMIT	2024-11-27
12.	ISSUED FOR SPA 2nd RESUBMISSION	2024-11-22
11.	ISSUED FOR 100% CD R4	2024-11-12
10.	PRE-TENDER REVIEW	2024-10-31
9.	ISSUED FOR SPA 1ST RESUBMISSION	2024-10-07
8.	ISSUED FOR 100% CD R3	2024-08-02
7.	ISSUED FOR 100% CD R2	2024-07-15
6.	ISSUED FOR 100% CD R1	2024-06-30
5.	ISSUED FOR 100% CD	2024-06-03
4.	ISSUED FOR 80% CD R1	2024-05-02
3.	ISSUED FOR 80% CD	2024-04-24
2.	ISSUED FOR SPA SUBMISSION	2024-04-12
1.	ISSUED FOR 100% DD	2024-03-19

NO.	ISSUED FOR	DATE
AS INDICATED	J.H.	
Region of York Project Number	Region of York Building Code	
22046	G013-B	

Project  
**YORK REGION NORTH ROADS OPERATIONS CENTRE**  
3525 BASELINE RD. SUTTON WEST, ON, L0E 1R0  
Drawing Title  
**EROSION AND SEDIMENT CONTROL PLAN**

Project Number  
**6016**  
Drawing Number  
**ESC-01**



- LEGEND**
- ACCESS MUD MAT
  - LP ○ LIGHTING POLE
  - HP ○ HYDRO POLE
  - EX. EXISTING
  - CB CATCHBASIN
  - DCB DOUBLE CATCHBASIN
  - MH MANHOLE
  - EP EDGE OF PAVEMENT
  - SW SIDEWALK
  - FILTER SOCK FIBER ROLL



AGRICULTURAL LANDS

**1**  
ESC-01  
**EROSION AND SEDIMENT CONTROL PLAN**  
SCALE: 1:500

POINT NAME	EASTING	NORTHING	ELEVATION	DESCRIPTION
100 CC	426194.8100	4905065.7629	254.875	
101 CC	426205.2390	4904998.8198	255.388	
102 CC	426071.2807	4905037.0840	254.606	
103 CC	426158.7004	4905056.0514	252.246	
268 NL	426053.8544	4905040.2967	253.787	

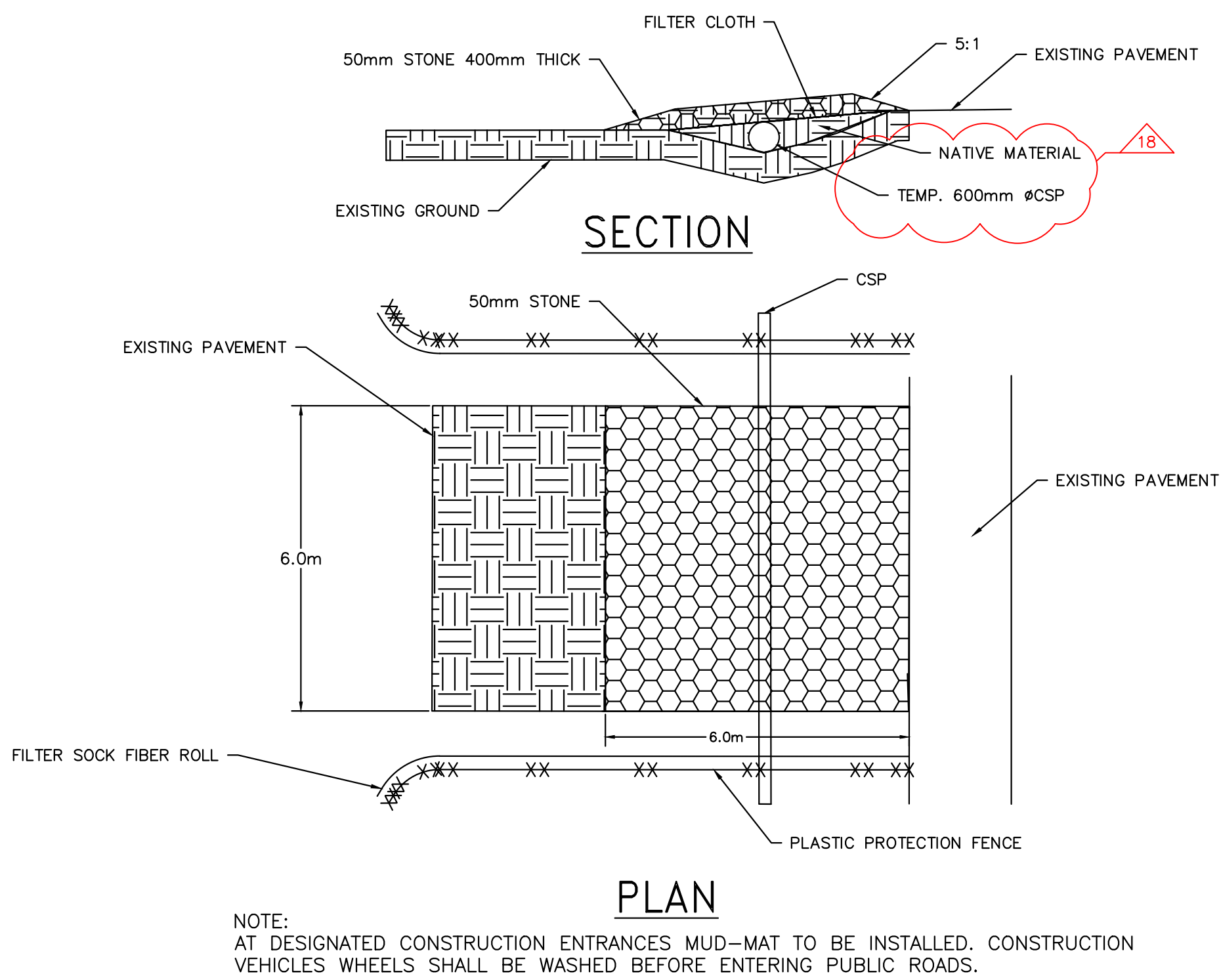
NOTE:  
SURVEY COMPLETED BY PLANMAC ENGINEERING INC. ON NOV 14, 2023.  
VERTICAL AND HORIZONTAL CONTROL ESTABLISHED USING LEICA SMARTNET RTK.  
COORDINATE SYSTEM: UTM 17 NAD 83, CGVD 1928.



1. ALL WORKS ARE TO BE COMPLETED UNDER DRY WEATHER CONDITIONS.
2. REFER TO THE SWM POND MODIFICATIONS PROCEDURE NOTES ON THIS DRAWING
3. DURING DREDGING OPERATIONS, TURBIDITY AT THE OUTFALL SHALL BE VISUALLY MONITORED DAILY.
4. THE CONTRACTOR SHALL PREVENT CONSTRUCTION RELATED SEDIMENT FROM IMPACTING AQUATIC RESOURCES AND OTHER NATURAL FEATURES
5. ALL SURFACES ARE TO BE RESTORED TO ORIGINAL APPROVED ENGINEERING AND LANDSCAPING SPECIFICATIONS IF DISTURBED
6. THE PROPONENT MUST COMPLY WITH ALL APPLICABLE MUNICIPAL BY-LAWS AND REGULATION 360 (SPILLS) OF THE ENVIRONMENTAL PROTECTION ACT, R.S.O., 1990.
7. AN AFTER HOURS CONTACT NUMBER IS TO BE VISIBLY POSTED ON-SITE FOR EMERGENCIES. ALL PLANS SHOULD HAVE NAME AND CONTACT INFO OF THE PERSON RESPONSIBLE FOR ESC MEASURES
8. ANY SEDIMENT SPILL FROM THE SITE SHOULD BE REPORTED TO MINISTRY OF ENVIRONMENT (SPILL ACTION CENTER) AT 1-800-268-6060
9. FOLLOWING COMPLETION OF WORKS, STREET SWEEPING WILL BE PERFORMED IF REQUIRED

1. COMPLETE MODIFICATIONS TO MCMINNOWS POND FIRST BEFORE BASELINE POND.
2. THE SWM PONDS MAY HAVE ATTRACTED WILDLIFE SUCH AS AMPHIBIANS AND REPTILES, RESCUE AND SALVAGE OF THESE WILDLIFE SPECIES SHOULD BE CONDUCTED DURING CONSTRUCTION. REFER TO THE FISH AND WILDLIFE SALVAGE PLAN KNOWN TO THE DISTRICT ENGINEERS.
3. DURING A PERIOD OF DRY WEATHER, REMOVE THE POOLED WATER AND DEPOSITED SEDIMENT FROM THE SWM PONDS AS PER OPSS 180.
4. COMPLETE POND MODIFICATIONS INCLUDING GRADING, REMOVAL AND ABANDONMENT OF EXISTING STRUCTURES AND INSTALLATION OF NEW STRUCTURES AS SHOWN ON THE DRAWINGS.
5. IF SEEDING OF THE EXPOSED SLOPES DOES NOT BEGIN WITHIN THE SUBSEQUENT 30 DAYS, STABILIZE THE SLOPES WITH EROSION CONTROL BLANKETS

1. SEDIMENT REMOVAL AND POND MODIFICATIONS SHOULD OCCUR PRIOR TO THE FALL PERIOD TO ENSURE THAT REPTILES AND AMPHIBIANS DO NOT COMMENCE OVERWINTERING (IN WHICH THEY BURY THEMSELVES IN THE MUD BELOW THE WATER), AS PER MNRF'S BEST MANAGEMENT PRACTICES, POND CLEAN-OUT/REMOVAL WILL GENERALLY BE PERMITTED BETWEEN APRIL 15<sup>TH</sup> AND SEPTEMBER 30<sup>TH</sup>.
2. DURING WATERING ACTIVITIES, A QUALIFIED BIOLOGIST SHOULD BE PRESENT TO COLLECT ANY REPTILES OR AMPHIBIANS OBSERVED WITHIN OR ADJACENT TO THE POND. COLLECTION AND RELOCATION PROTOCOLS SHOULD BE DEVELOPED IN ACCORDANCE WITH GUIDELINES, BEST MANAGEMENT PRACTICES AND, WHERE APPLICABLE IN ACCORDANCE WITH ONTARIO MINISTRY OF NATURAL RESOURCES AND FORESTRY (MNRF) REQUIREMENTS. THE REPTILES AND AMPHIBIANS SHOULD BE TRANSFERRED TO A PRE-APPROVED SUITABLE LOCATION IN THE LOCAL AREA.
3. THE PLAN SHOULD INCLUDE THE PROCEDURES FOR HANDLING AND RELOCATING NATIVE SPECIES, NON-NATIVE SPECIES AND SPECIES AT RISK. FOR SPECIES AT RISK THE MNRF'S - SPECIES AT RISK HANDLING MANUAL: FOR ENDANGERED SPECIES AND SPECIES AT RISK (REVISED 1996) SHOULD BE REFERRED TO.
4. IN THE EVENT THAT FISH ARE PRESENT WITHIN THE SWM POND, THE FISH AND WILDLIFE SALVAGE PLAN SHOULD INCLUDE A FISH SALVAGE CONTINGENCY PLAN. THIS MAY BE WAIVED SHOULD SUITABLE FISHERIES SURVEYS BE COMPLETED IN ADVANCE OF CONSTRUCTION WITH THE RESULTANT CONFIRMATION THAT FISH ARE NOT PRESENT. THE PLAN SHALL INCLUDE PROTOCOLS FOR COLLECTION, TRANSPORTATION AND RELEASE OF FISH TO A SUITABLE LOCATION, FOR NATIVE SPECIES, NON-NATIVE SPECIES AND SPECIES AT RISK.
5. WHEN PUMPING WATER FROM THE POND, IT IS RECOMMENDED THAT THE OUTLET BE DIRECTED THROUGH VEGETATIVE BUFFER ZONE. THE PUMP SHOULD BE EQUIPPED WITH A FILTER SOCK AND A SIMILAR SEDIMENTATION MEASURE. FURTHERMORE, A SCREEN SHOULD BE INSTALLED IN THE INTAKE TO ENSURE THAT FISH AND WILDLIFE ARE NOT CAUGHT IN THE PUMP AND THE PUMPING BE MONITORING TO REMOVE ANY FISH OR WILDLIFE CAUGHT IN THE SCREEN.



**18**

PRIOR TO CONSTRUCTION

NOTE: a) CONTRACTOR TO INSTALL LITTATRAP ON ALL EXISTING AND PROPOSED CATCHBASINS WHERE SHOWN. LITTATRAP ON PROPOSED INFRASTRUCTURE TO BE INSTALLED IMMEDIATELY WITH INSTALLATION OF FRAME AND GRATE.

b) LITTATRAP SHALL BE MAINTAINED THROUGHOUT THE CONSTRUCTION PERIOD AND EMPTIED FOLLOWING EVERY RAINFALL EVENT, IF REQUIRED.

CATCH BASIN FRAME & COVER

SEDIMENT TRAP ("LITTATRAP" OR APPROVED EQUIVALENT) TO BE HUNG FROM CATCHBASIN GRATE AS PER MANUFACTURER'S RECOMMENDATIONS

CATCH BASIN OR CATCH BASIN/MANHOLE

OUTLET PIPE

PUMP TO NO. 80 US SIEVE DEWATERING BAG UNDERLAIN WITH GEOTEXTILE & SURROUNDED BY STAKED SILT SOCK

GRAVEL LINED DEWATERING SUMP OR PUMP IN POND WITH ADEQUATE CAPACITY

DISCHARGE HOSE

STREAM FLOW

**LITTATRAP SEDIMENT CONTROL DETAIL**

NOTE:  
DISCHARGE FROM DEWATERING MUST BE DISPERSED FROM THE  
BAG THROUGH VEGETATED AREA, MINIMUM 15m FROM EXISTING  
DITCH.

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19.	ISSUED FOR ADDENDUM 4	2025-07-18
18.	ISSUED FOR ADDENDUM 2	2025-07-04
17.	REISSUED FOR TENDER	2025-05-23
16.	ISSUED FOR TENDER	2025-04-25
15.	ISSUED FOR 100% CD R5	2025-04-11
14.	ISSUED FOR SITE PLAN AGREEMENT	2025-03-09
13.	ISSUED FOR BUILDING PERMIT	2024-12-27
12.	ISSUED FOR SPA 2ND RESUBMISSION	2024-11-11
11.	ISSUED FOR 100% CD R4	2024-11-12
10.	PRE-TENDER REVIEW	2024-10-31
9.	ISSUED FOR SPA 1ST RESUBMISSION	2024-10-07
8.	ISSUED FOR 100% CD R3	2024-08-06
7.	ISSUED FOR 100% CD R2	2024-07-11
6.	ISSUED FOR 100% CD R1	2024-06-30
5.	ISSUED FOR 100% CD	2024-06-03
4.	ISSUED FOR 60% CD R4	2024-05-02
3.	ISSUED FOR 60% CD	2024-04-24
2.	ISSUED FOR SPA SUBMISSION	2024-04-12
1.	ISSUED FOR 100% DD	2024-03-19

NO.	ISSUED FOR	DATE
Drawing History		

Scale <b>AS INDICATED</b>	Checked By <b>J.H.</b>
Region of York Project Number	Region of York Building Code

Project	
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YORK REGION NORTH ROADS  
OPERATIONS CENTRE

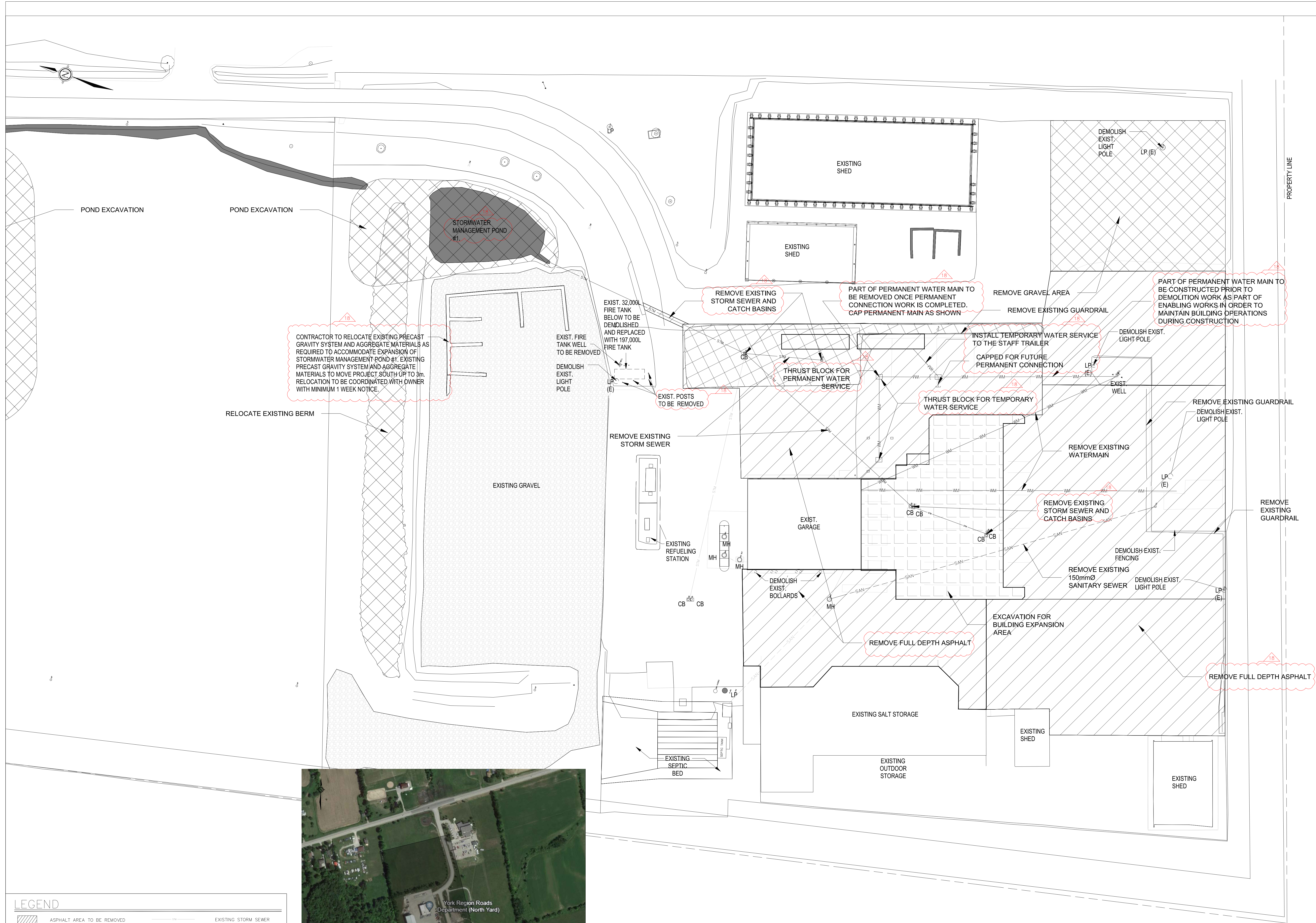
3525 BASELINE RD. SUTTON WEST, ON, L0E 1R0

Drawing Title

## REMOVAL PLAN

Project Number	Drawing Number
6016	<b>C-01</b>

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POINT NAME	EASTING	NORTHING	ELEVATION	DESCRIPTION
100 CO	626181.6120	4905083.7929	234.875	
101 CO	626063.2380	4904996.8188	255.368	
102 CO	626071.2807	4905037.0460	254.606	
103 CO	626159.7604	4905234.0516	252.544	
368 M	626225.6544	4905040.2567	253.787	

NOTE:  
SURVEY COMPLETED BY PLANMAC ENGINEERING INC. ON NOV 14, 2023.  
VERTICAL AND HORIZONTAL CONTROL ESTABLISHED USING LEICA SMARTNET RTK  
COORDINATE SYSTEM: UTM 17 NAD 83, CGVD 1928.





1. ISSUED FOR 100% DD		2024-03-19
<b>NO.</b>	<b>ISSUED FOR</b>	<b>DATE</b>
Drawing History		
Scale <b>AS INDICATED</b>		Checked By <b>J.H.</b>
Region of York Project Number		Region of York Building Code
<b>22046</b>		<b>G013-B</b>

## GRADING PLAN

Drawing Number  
**C-02**

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NOTE:  
SURVEY COMPLETED BY PLANMAC ENGINEERING INC. ON NOV 14, 2023.  
VERTICAL AND HORIZONTAL CONTROL ESTABLISHED USING LEICA SMARTNET RTK.  
COORDINATE SYSTEM: UTM 17 NAD 83, CGVD 1928.





19.	ISSUED FOR ADDENDUM 4	2020-05-18
18.	ISSUED FOR ADDENDUM 2	2020-07-04
17.	REISSUED FOR TENDER	2020-05-23
16.	ISSUED FOR TENDER	2020-04-25
15.	ISSUED FOR 100% CD R5	2020-05-09
14.	ISSUED FOR SITE PLAN AGREEMENT	2020-01-11
13.	ISSUED FOR BUILDING PERMIT	2021-01-27
12.	ISSUED FOR SpA 2nd RESUBMISSION	2021-01-22
11.	ISSUED FOR 100% CD R4	2021-01-12
10.	PRE-TENDER REVIEW	2021-03-31
9.	ISSUED FOR SpA 1ST RESUBMISSION	2021-07-07
8.	ISSUED FOR 100% CD R3	2021-08-02
7.	ISSUED FOR 100% CD R2	2021-07-30
6.	ISSUED FOR 100% CD R1	2021-05-05
5.	ISSUED FOR 100% CD R0	2021-04-03
4.	ISSUED FOR 80% CD R1	2021-05-26
3.	ISSUED FOR 80% CD	2021-04-24
2.	ISSUED FOR SpA SUBMISSION	2021-04-12
1.	ISSUED FOR 100% CD	2021-04-19

NO.	ISSUED FOR	DATE
Drawing History		
Scale <b>AS INDICATED</b>		Checked By <b>J.H.</b>
Region of York Project Number		Region of York Building Code

Project

YORK REGION NORTH ROADS  
OPERATIONS CENTRE

3525 BASELINE RD. SUTTON WEST, ON. L0E 1R0

Drawing Title

## SERVICING PLAN

Project Number	6016
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Drawing Number  
**C-03**



19.	ISSUED FOR ADDENDUM 4	2025-07-18
18.	ISSUED FOR ADDENDUM 2	2025-07-04
17.	REISSUED FOR TENDER	2025-05-23
16.	ISSUED FOR TENDER	2025-04-25
15.	ISSUED FOR 100% CD R5	2025-04-11
14.	ISSUED FOR SITE PLAN AGREEMENT	2025-01-09
13.	ISSUED FOR BUILDING PERMIT	2024-11-27
12.	ISSUED FOR SPA 2nd RESUBMISSION	2024-11-22
11.	ISSUED FOR 90% CD R4	2024-11-12
10.	PRE-TENDER REVIEW	2024-10-31
9.	ISSUED FOR SPA 1ST RESUBMISSION	2024-10-07
8.	ISSUED FOR 100% CD R3	2024-08-02
7.	ISSUED FOR 100% CD R2	2024-07-15
6.	ISSUED FOR 100% CD R1	2024-06-30
5.	ISSUED FOR 100% CD	2024-06-03
4.	ISSUED FOR 80% CD R1	2024-05-02
3.	ISSUED FOR 80% CD	2024-04-24
2.	ISSUED FOR SPA SUBMISSION	2024-04-12
1.	ISSUED FOR 100% DD	2024-03-19

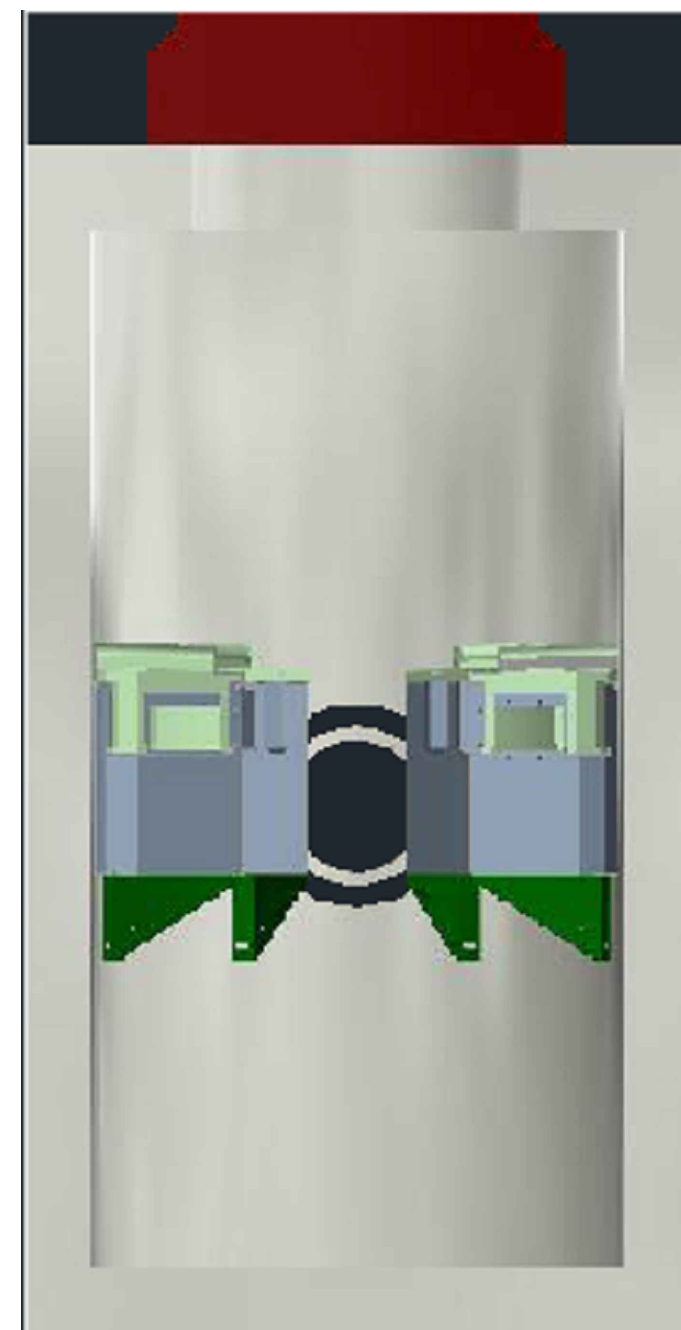
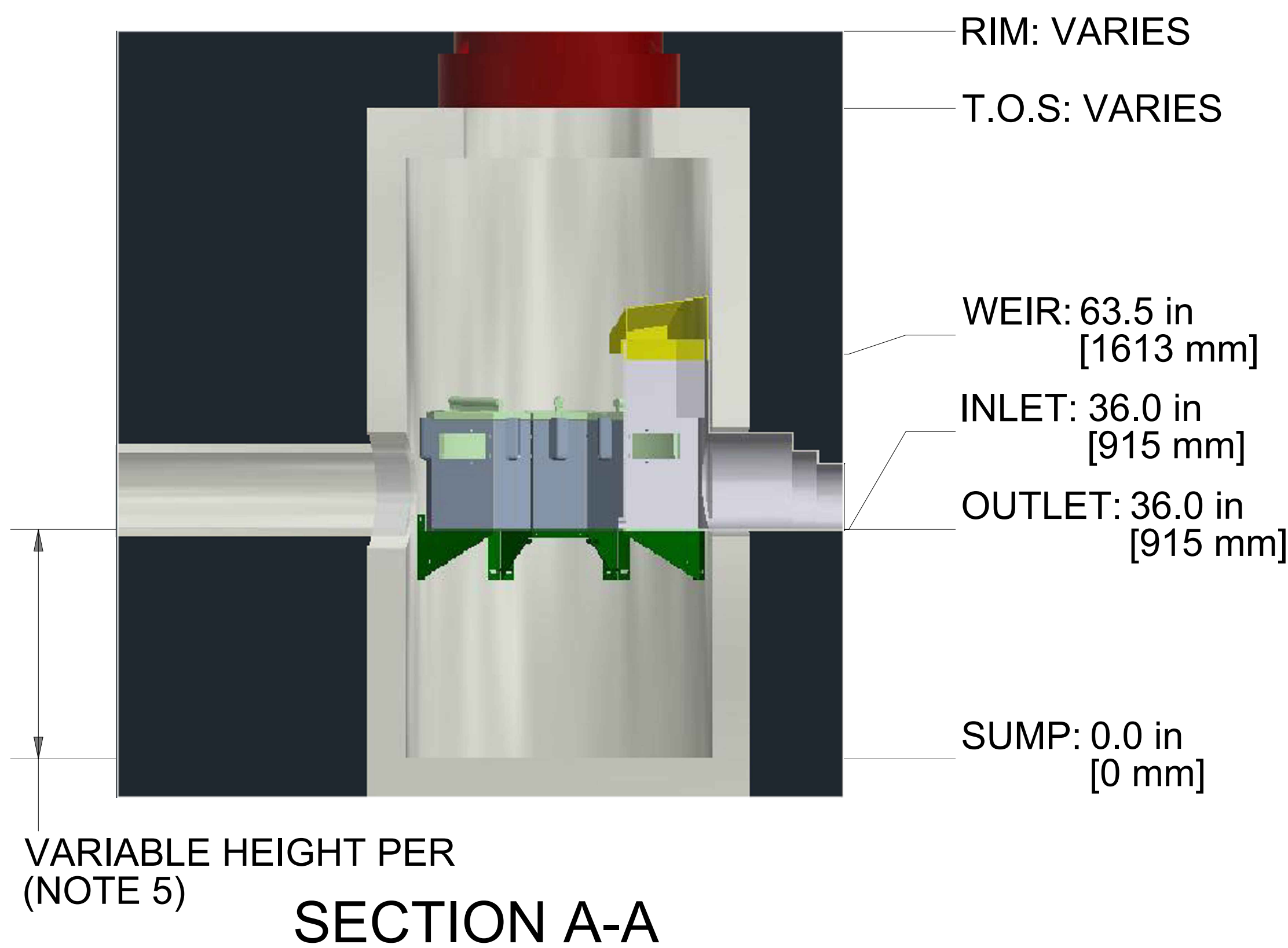
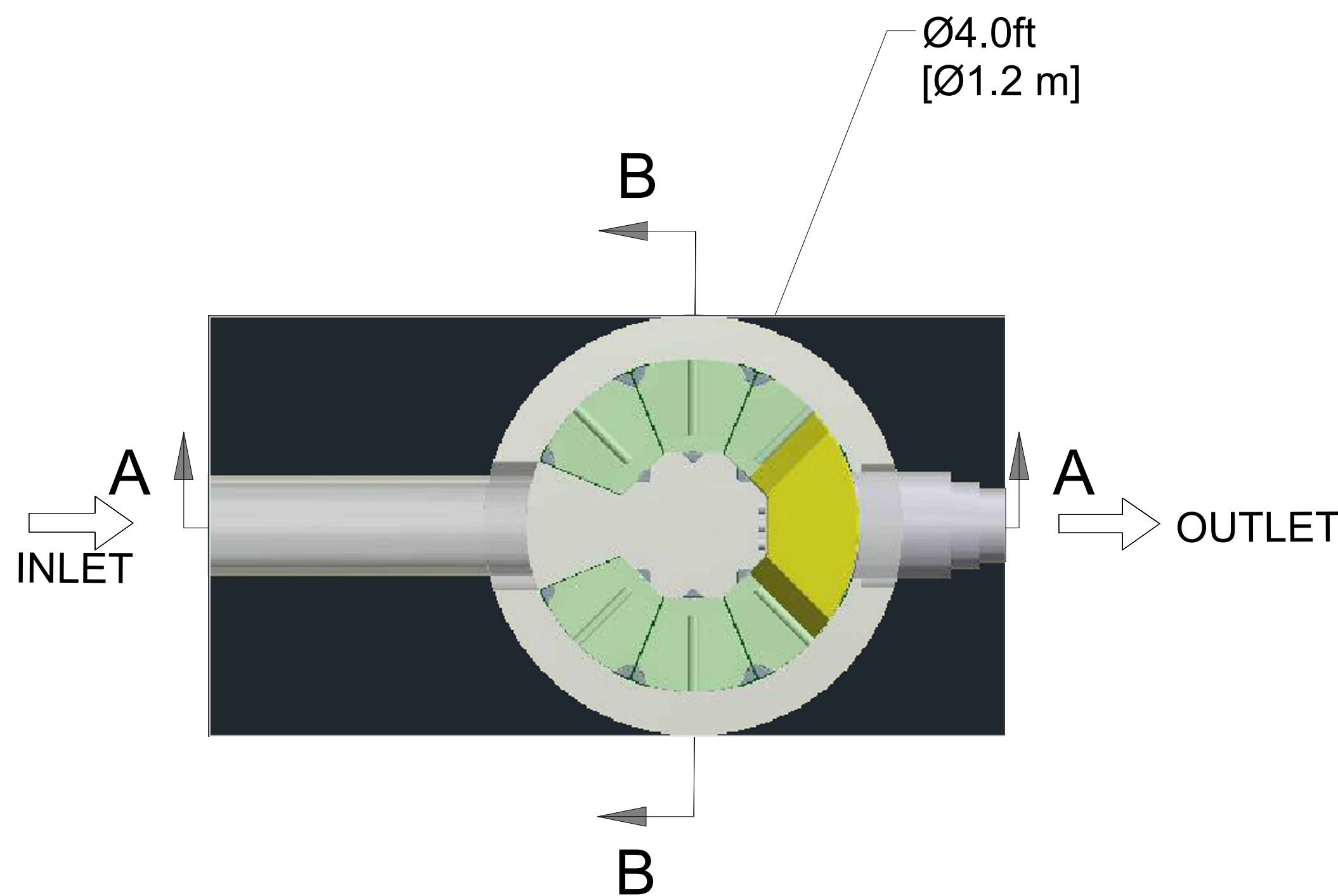
Drawing History	
Scale	Checked By
AS INDICATED	J.H.
Region of York Project Number	Region of York Building Code
22046	G013-B

Project  
**YORK REGION NORTH ROADS  
OPERATIONS CENTRE**  
  
3525 BASELINE RD. SUTTON WEST, ON, L0E 1R0  
Drawing Title

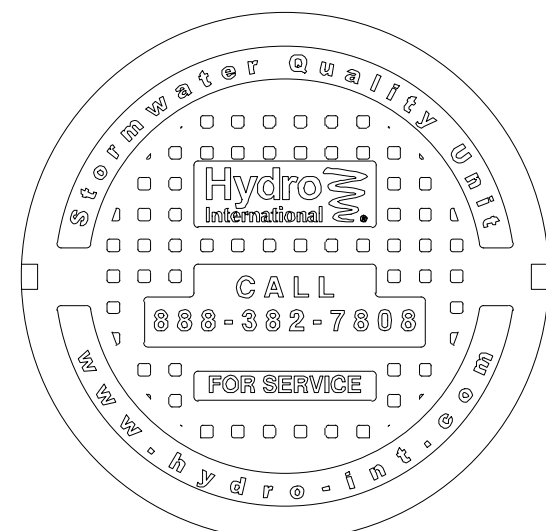
**UP FLO FILTER  
DETAIL**

Project Number  
**6016**

Drawing Number  
**C-04**



SECTION B-B



#### CAPACITIES:

- Minimum performance: 80% removal. Washington DOE/NJCAT verified at the peak treatment flow.
- Peak treatment flow:
  - .033 CFS (0.9 LPS) (15 GPM) per module (Ribbons)
  - .022 CFS (0.6 LPS) (10 GPM) per module (Long Ribbons)
  - .056 CFS (1.6 LPS) (25 GPM) per module (CPZ)
- Maximum number of ribbon modules per outlet module: 36
- Maximum number of CPZ modules per outlet module: 18 (contract Hydro if more are required)

#### ADDITIONAL DESIGN INFORMATION:

- Normal operating W.S.E. is 26-30" (660-762mm) above the outlet invert
- Media Types Available: Ribbons, CPZ

ANY WARRANTY GIVEN BY HYDRO INTERNATIONAL WILL APPLY ONLY TO THOSE ITEMS SUPPLIED BY IT. ACCORDINGLY HYDRO INTERNATIONAL CANNOT ACCEPT ANY RESPONSIBILITY FOR ANY STRUCTURE, PLANT, OR EQUIPMENT, (OR THE PERFORMANCE THERE OF) DESIGNED, BUILT, MANUFACTURED, OR SUPPLIED BY ANY THIRD PARTY. HYDRO INTERNATIONAL HAVE A POLICY OF CONTINUOUS DEVELOPMENT AND RESERVE THE RIGHT TO AMEND THE SPECIFICATION. HYDRO INTERNATIONAL CANNOT ACCEPT LIABILITY FOR PERFORMANCE OF ITS EQUIPMENT, (OR ANY PART THEREOF), IF THE EQUIPMENT IS SUBJECT TO CONDITIONS OUTSIDE ANY DESIGN SPECIFICATION. HYDRO INTERNATIONAL OWNS THE COPYRIGHT OF THIS DRAWING, WHICH IS SUPPLIED IN CONFIDENCE. IT MUST NOT BE USED FOR ANY PURPOSE OTHER THAN THAT FOR WHICH IT IS SUPPLIED AND MUST NOT BE REPRODUCED, IN WHOLE OR IN PART, WITHOUT PRIOR PERMISSION IN WRITING FROM HYDRO INTERNATIONAL.

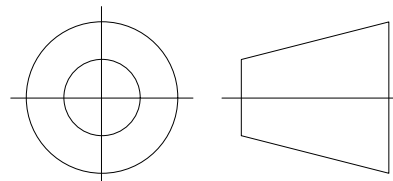
©2019 HYDRO INTERNATIONAL

#### DO NOT SCALE DRAWING

UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN INCHES.

TOLERANCES ARE:  
FRACTIONS 1/16  
DECIMALS:  
X.X 0.06  
X.XX 0.03  
X.XXX 0.015  
ANGLES: 0.5

#### PROJECTION



#### COMMENTS:

- STRUCTURE WALL AND SLAB THICKNESSES ARE NOT TO SCALE
- CONTACT HYDRO INTERNATIONAL FOR A BOTTOM OF STRUCTURE ELEVATION PRIOR TO SETTING THE STRUCTURE
- NOT FOR CONSTRUCTION CONTACT HYDRO FOR SITE SPECIFIC DRAWING
- NOT ALL SIZES AVAILABLE IN ALL AREAS
- SUMP DEPTH AVAILABLE IN 24" (610mm) CPZ, RIBBONS AND 36" (914mm) LONG RIBBONS DEPTH

#### REVISION HISTORY

REV	BY	DESCRIPTION	DATE
-	ER	FIRST RELEASE	6/17/2019

DATE: 6/17/2019  
SCALE: NTS

DRAWN BY: ER  
CHECKED BY:  
APPROVED BY:

Title  
UP-FLO FILTER  
4ft Manhole

6 MODULES MAX

#### Sizing Tool

**Hydro International**

94 Hutchins Drive  
Portland, ME 04102  
Tel: +1 (207) 756-6200  
Fax: +1 (207) 756-6212  
hydro-int.com

WEIGHT: N/A  
MATERIAL:

NEXT ASSEMBLY:  
4 MH-1

DRAWING NO.:  
4 MH-UFF-1

SHEET SIZE: B  
SHEET: 1 OF 1  
Rev: -



1. SINGLE-WALL FIBERGLASS REINFORCED PLASTIC (FRP) UNDERGROUND STORAGE TANK.
2. TANK SHALL BE MANUFACTURED WITH 100% RESIN AND GLASS-FIBRE REINFORCEMENT WITH NO SAND FILLERS
3. TANKS SHALL TO CONFORM TO ANSI/AWWA D120-02, AND ULC STANDARD S-615
4. TANKS SHALL BE INSTALLED ACCORDING TO THE ONTARIO BUILDING CODE AND MANUFACTURER MANUAL AND INSTRUCTIONS.
5. TANKS SHALL HAVE A MINIMUM COVER OF 1.5m OR SHALL BE INSULATED TO PREVENT FREEZING.
6. TANKS SHALL BE DESIGNED TO WITHSTAND 5-PSI AIR-PRESSURE TEST WITH 5:1 SAFETY FACTOR AND H-20 AXLE LOADS AFTER INSTALLATION.
7. TANKS SHALL BE FILLED WITH WATER PRODUCTS ONLY.
8. TANKS SHALL BE VENTED TO ATMOSPHERIC PRESSURE AND THE VENT SHALL BE COVERED TO PREVENT INSECTS AND DEBRIS FROM THE TANKS.
9. TANK OPENINGS SHALL BE FLANGED AND SEALED COMPLETE WITH GASKET, BOLTING HARDWARE AND COVER.

GENERAL NOTES:

## CLASS OF CONCRETE

CLASS OF CONCRETE ..... 35  
UNLESS OTHERWISE NOTED

CLEAR COVER TO REINFORCING STEEL

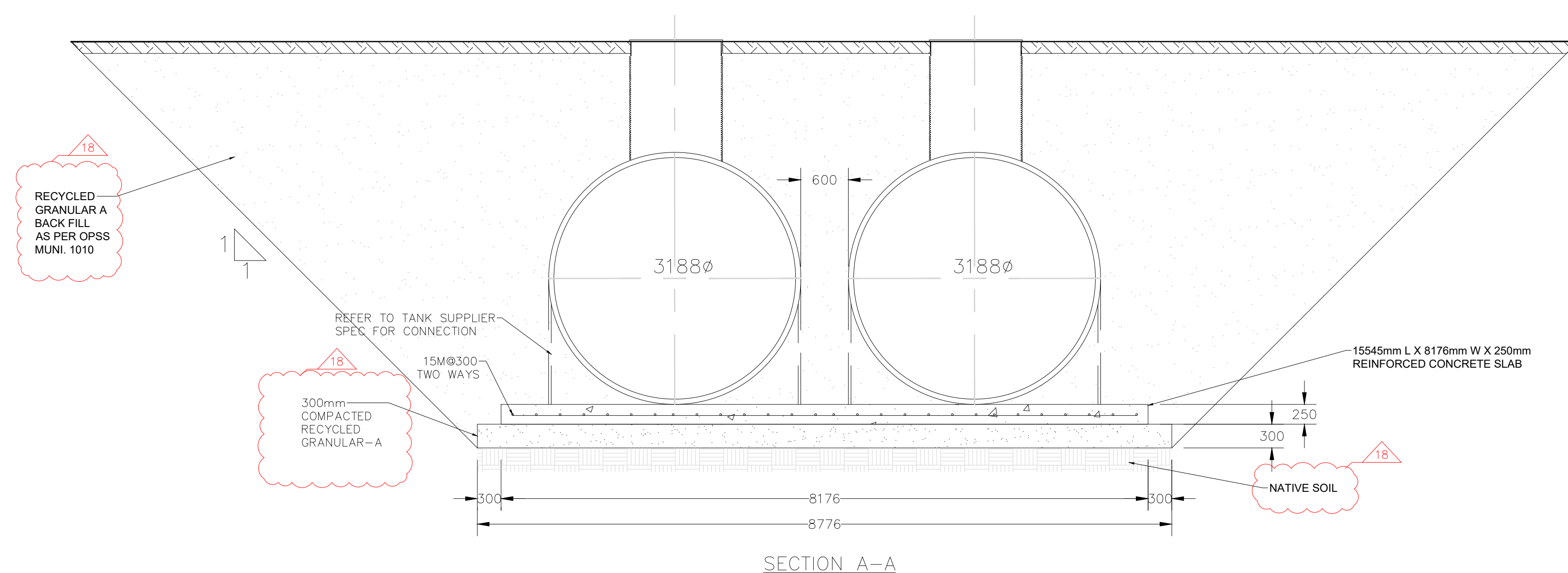
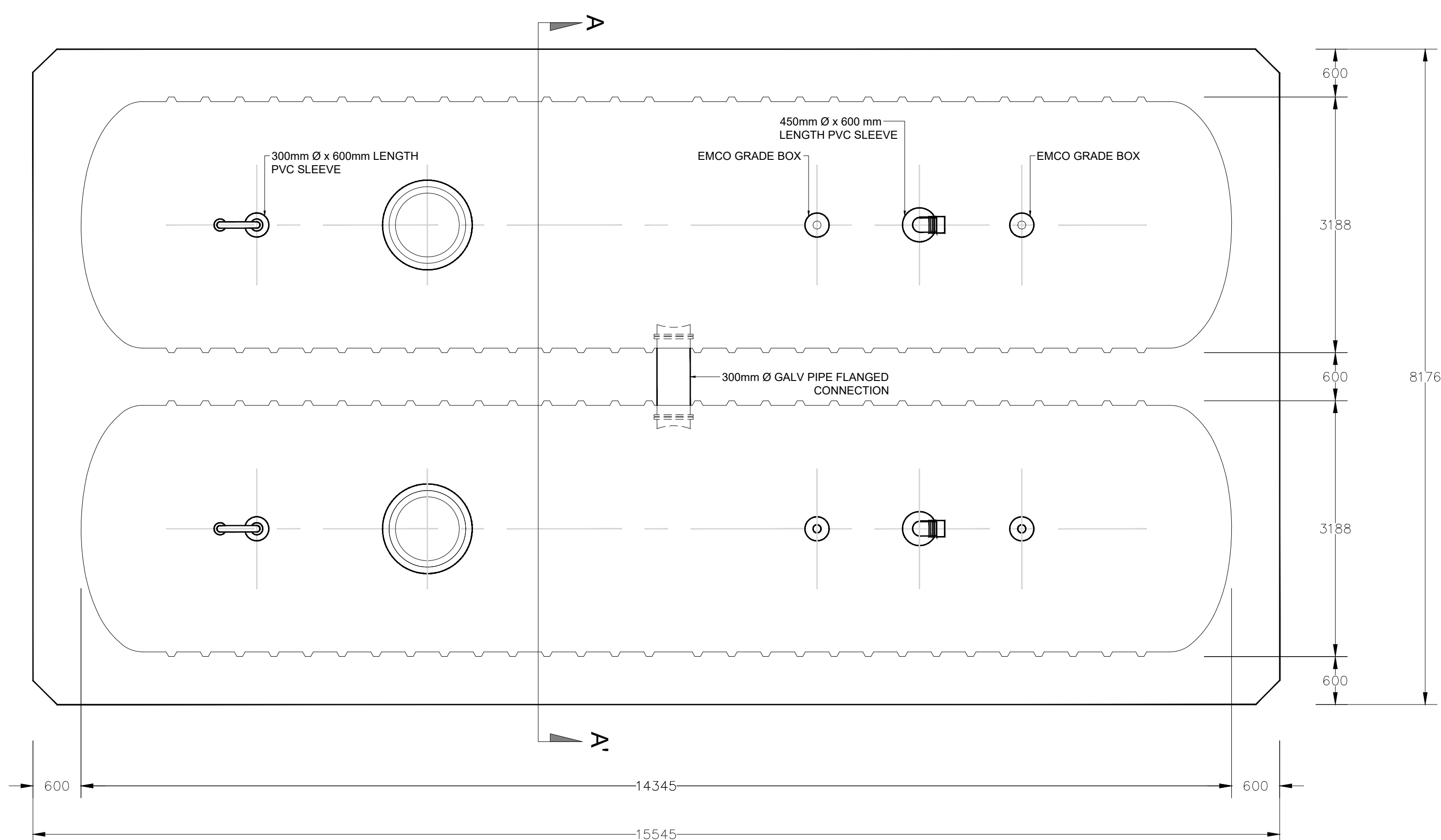
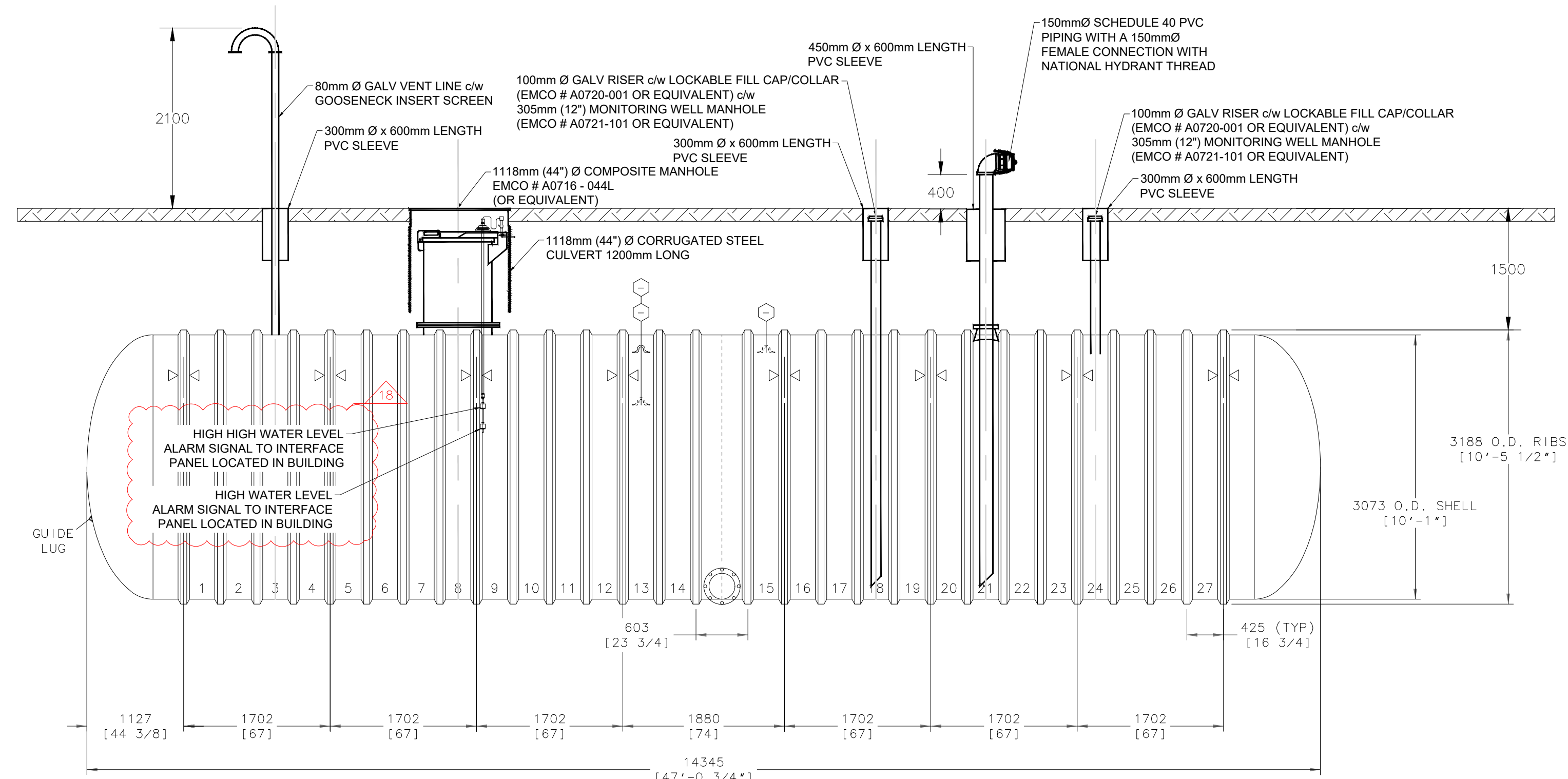
BOTTOM.....70±10

## REINFORCING STEEL

1. REINFORCING STEEL SHALL BE GRADE 400W UNLESS OTHERWISE SPECIFIED.
2. UNLESS SHOWN OTHERWISE, TENSION LAP LENGTHS NOT INDICATED ON CONTRACT DRAWINGS SHALL BE CLASS B.

## SOIL CONDITION

THE BEARING SOIL CAPACITY HAS BEEN CONSIDERED 150kPA (SLS).



19.	ISSUED FOR ADDENDUM 4	2025-07-18
18.	ISSUED FOR ADDENDUM 2	2025-07-04
17.	REISSUED FOR TENDER	2025-05-23
16.	ISSUED FOR TENDER	2025-04-25
15.	ISSUED FOR 100% CD R5	2025-04-11
14.	ISSUED FOR SITE PLAN AGREEMENT	2025-03-09
13.	ISSUED FOR BUILDING PERMIT	2024-11-27
12.	ISSUED FOR SPA 2D RESUBMISSION	2024-11-22
11.	ISSUED FOR 100% CD R4	2024-11-11
10.	PRE-TENDER REVIEW	2024-09-31
9.	ISSUED FOR SPA 1ST RESUBMISSION	2024-09-07
8.	ISSUED FOR 100% R3	2024-08-29
7.	ISSUED FOR 100% CD R2	2024-07-15
6.	ISSUED FOR 100% CD R1	2024-06-30
5.	ISSUED FOR 100% CD	2024-06-03
4.	ISSUED FOR 60% CD R1	2024-05-02
3.	ISSUED FOR 60% CD	2024-04-24
2.	ISSUED FOR SPA SUBMISSION	2024-04-12
1.	ISSUED FOR 100% CD	2024-03-19

<b>NO.</b>	<b>ISSUED FOR</b>	<b>DATE</b>
Drawing History		
Scale <b>AS INDICATED</b>		Checked By <b>J.H.</b>
Region of York Project Number		Region of York Building Code
<b>22046</b>		<b>G013-B</b>

Project

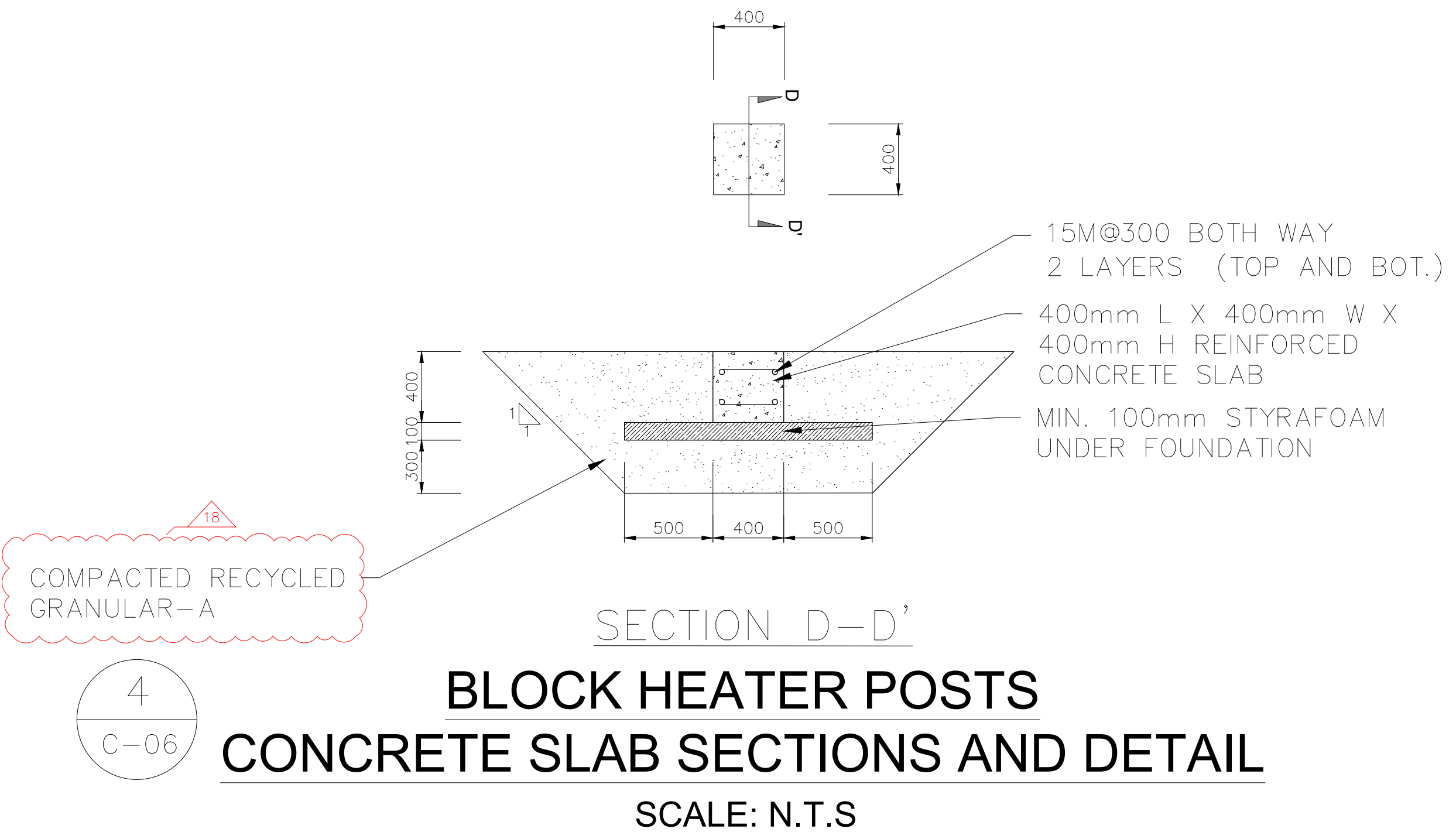
YORK REGION NORTH ROADS  
OPERATIONS CENTRE

3525 BASELINE RD. SUTTON WEST, ON, L0E 1R0
Drawing Title

### FIRE TANK DETAIL

Project Number	Drawing Number
6016	<b>C-05</b>

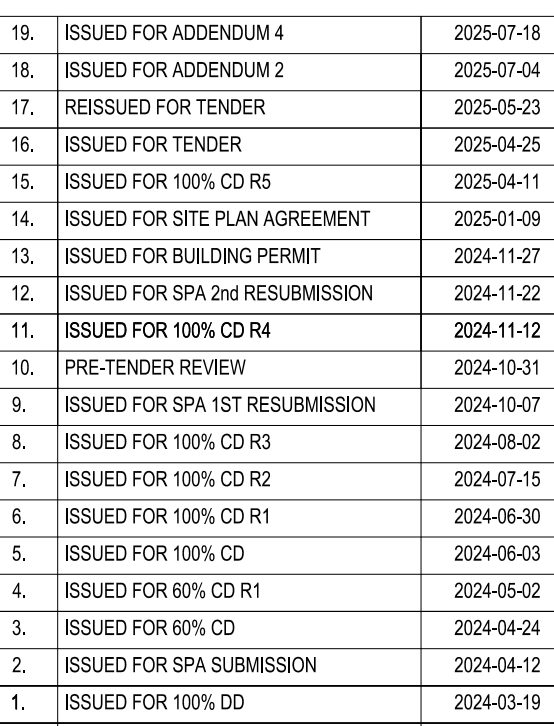




BOTTOM.....70±10

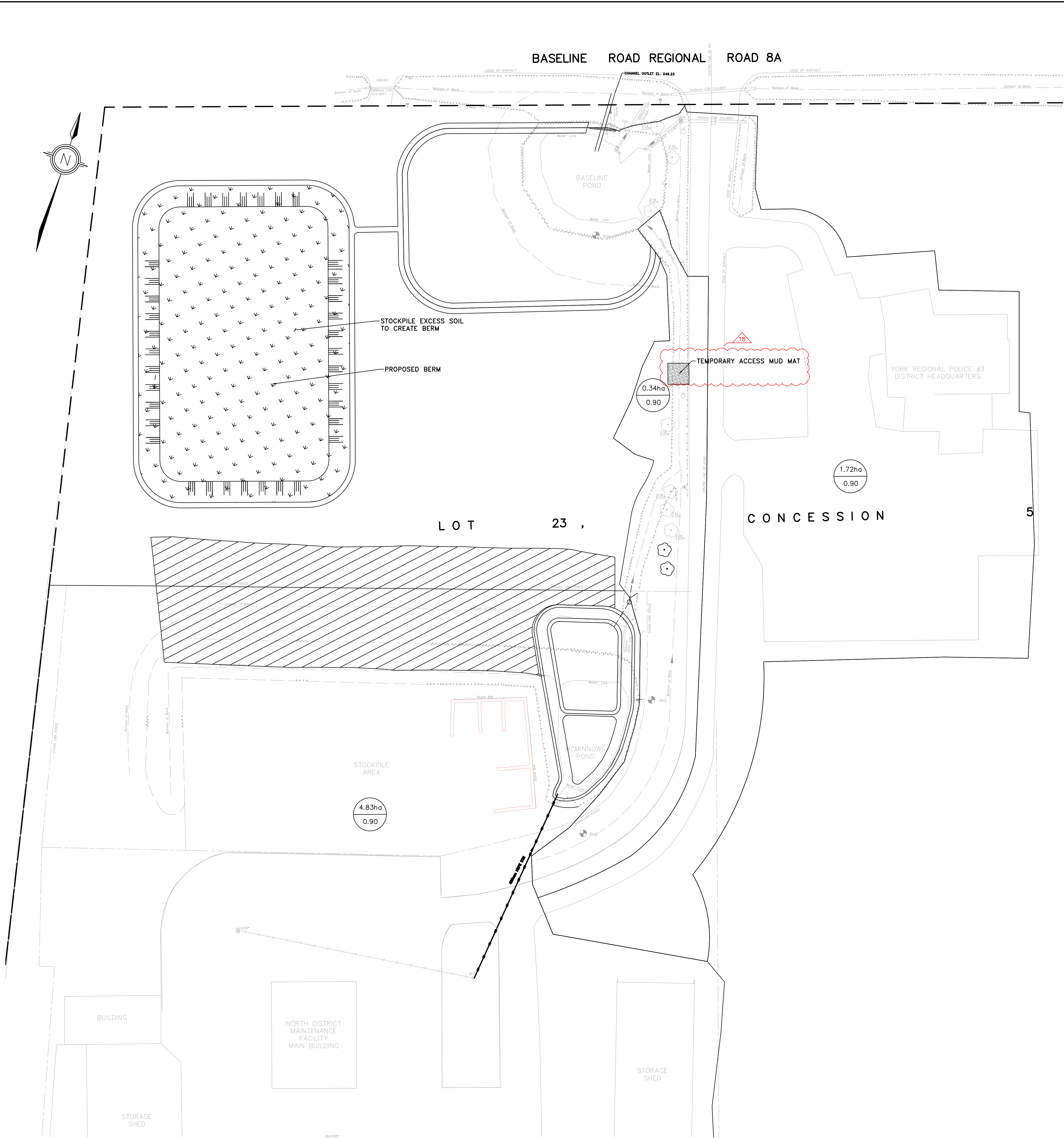
1. REINFORCING STEEL SHALL BE GRADE 400W UNLESS OTHERWISE SPECIFIED.
2. UNLESS SHOWN OTHERWISE, TENSION LAP LENGTHS NOT INDICATED ON CONTRACT DRAWINGS SHALL BE CLASS B.
3. BAR HOOKS SHALL HAVE STANDARD HOOK DIMENSION USING MINIMUM BEND DIAMETERS WHILE STIRRUPS AND TIES SHALL HAVE MINIMUM HOOK DIMENSIONS. ALL HOOKS SHALL BE IN ACCORDANCE WITH THE STRUCTURAL STANDARD DRAWINGS .

THE BEARING SOIL CAPACITY HAS BEEN CONSIDERED 150kPa (SLS).

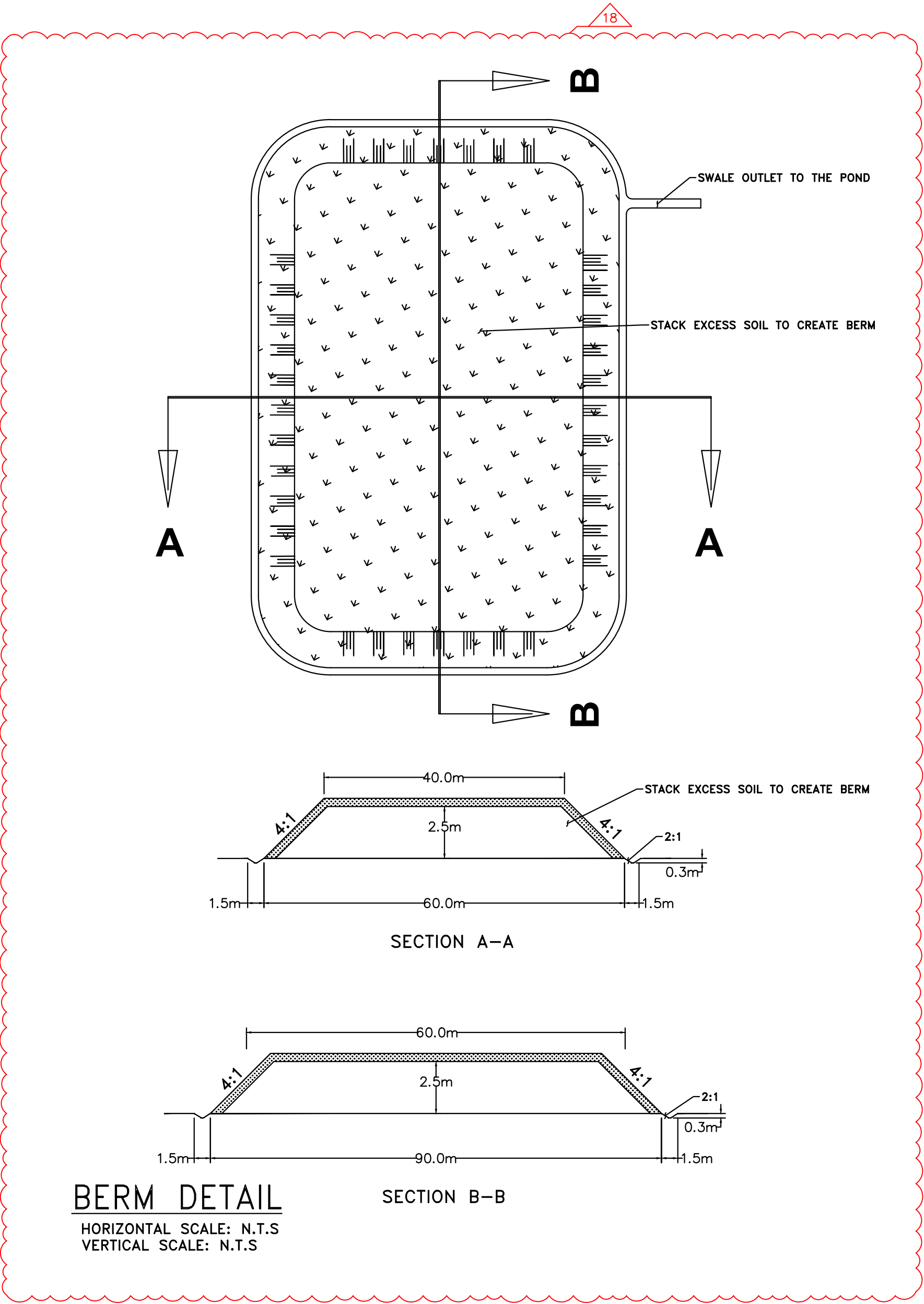


NO.	ISSUED FOR	DATE
Drawing History		Checked By <b>J.H.</b>
File <b>S INDICATED</b>		
Region of York Project Number	Region of York Building Code	
<b>2046</b>	<b>G013-B</b>	
Project		
<b>YORK OPERATIONS NORTH ROADS OPERATIONS CENTRE</b>		
<b>25 BASILINE RD. SUTTON WEST, ON, L0E 1R0</b>		
Drawing Title		
<b>EQUIPMENT CONCRETE SLAB DETAIL</b>		
Project Number	Drawing Number	
<b>5016</b>	<b>C-06</b>	





NOTES:  
THE LOCATION OF UTILITIES IS APPROXIMATE ONLY. CONSULT THE RESPECTIVE MUNICIPAL AUTHORITIES AND UTILITY COMPANIES TO DETERMINE THE EXACT LOCATION OF THEIR UTILITIES. THE CONTRACTOR SHALL VERIFY THE LOCATION OF UTILITIES AND SHALL ADEQUATELY PROTECT AND SUPPORT THEM DURING CONSTRUCTION.



**BENCH MARK**  
ELEVATIONS ARE GEODETIC AND ARE REFERRED TO THE BM NO 0011961U3344 ELEVATION 244.699

**SCALE**  
HORIZONTAL 1:1000

Project Team:  
Prime Consultant  
GEC ARCHITECTURE  
Structural Consultant  
ENTUITIVE  
Mechanical Consultant  
MCW CONSULTANTS LTD  
Electrical Consultant  
MCW CONSULTANTS LTD  
Civil Consultant  
PLANMAC ENGINEERING  
Passive House Consultant  
PEEL PASSIVE HOUSE  
LEED Consultant  
MCW CONSULTANTS LTD



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19.	ISSUED FOR ADDENDUM 4	2025-07-18
18.	ISSUED FOR ADDENDUM 2	2025-07-04
17.	REISSUED FOR TENDER	2025-05-23
16.	ISSUED FOR TENDER	2025-04-25
15.	ISSUED FOR 100% CD R5	2025-04-11
14.	ISSUED FOR SITE PLAN AGREEMENT	2025-01-09
13.	ISSUED FOR BUILDING PERMIT	2024-11-27
12.	ISSUED FOR SPA 2nd RESUBMISSION	2024-11-22
11.	ISSUED FOR 100% CD R4	2024-11-12
10.	PRE-TENDER REVIEW	2024-10-31
9.	ISSUED FOR SPA 1ST RESUBMISSION	2024-10-07
8.	ISSUED FOR 100% CD R3	2024-08-02
7.	ISSUED FOR 100% CD R2	2024-07-15
6.	ISSUED FOR 100% CD R1	2024-06-30
5.	ISSUED FOR 100% CD	2024-06-03
4.	ISSUED FOR 80% CD R1	2024-05-02
3.	ISSUED FOR 80% CD	2024-04-24
2.	ISSUED FOR SPA SUBMISSION	2024-04-12
1.	ISSUED FOR 100% DD	2024-03-19

Drawing History	Checked By
Scale	J.H.
AS INDICATED	
Region of York Project Number	Region of York Building Code

22046 G013-B

Project  
YORK REGION NORTH ROADS  
OPERATIONS CENTRE

3525 BASELINE RD. SUTTON WEST, ON, L0C 1R0  
Drawing Title

**SITE PLAN AND  
DRAINAGE AREA  
MAP**

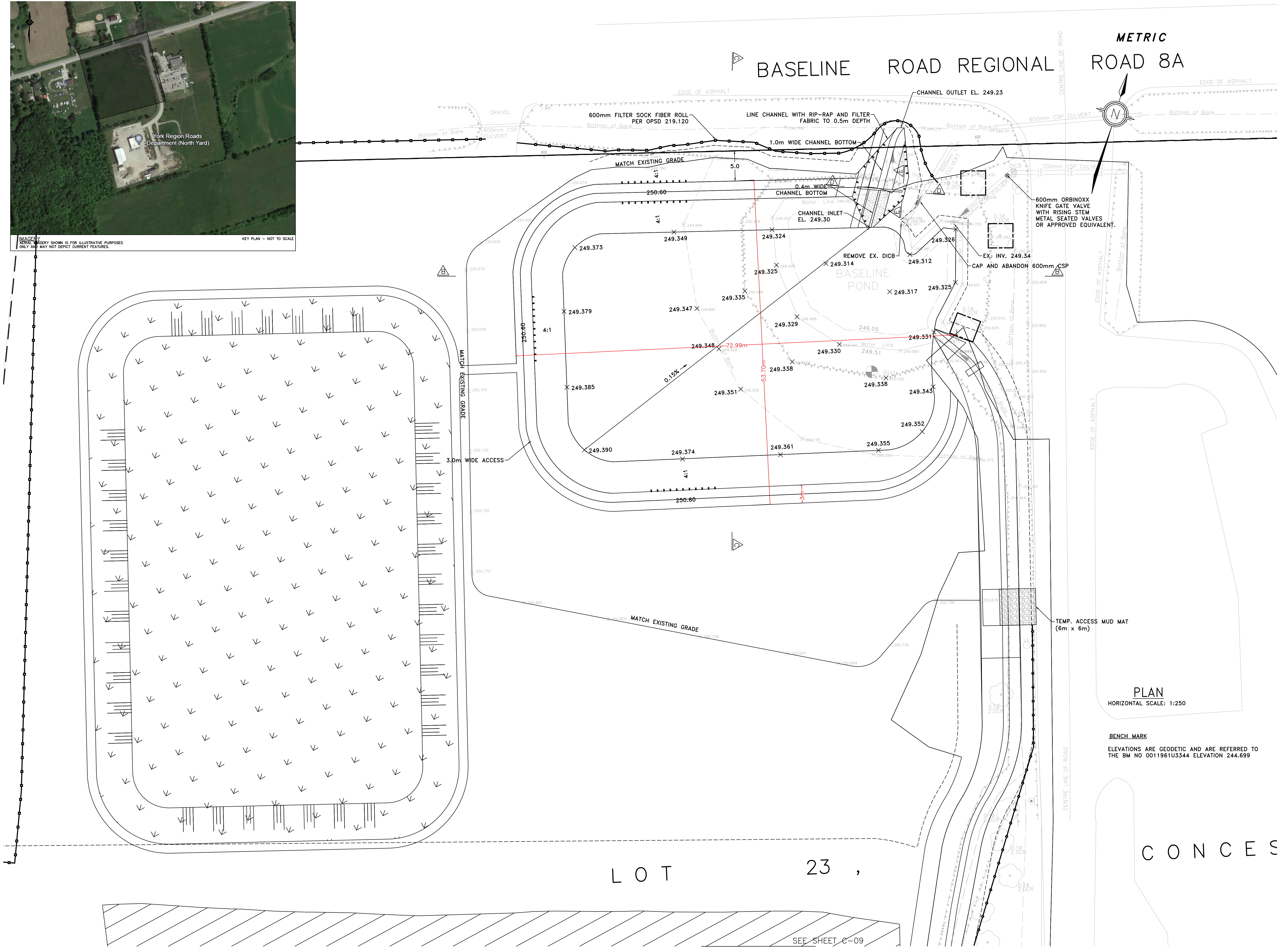
Project Number  
6016  
Drawing Number  
C-07  
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KEY PLAN - NOT TO SCALE



NOTES:  
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DURING CONSTRUCTION.

SEE SHEET C-09

Project Team:  
Prime Consultant  
GEC ARCHITECTURE  
Structural Consultant  
ENTUITIVE  
Mechanical Consultant  
MCW CONSULTANTS LTD  
Electrical Consultant  
MCW CONSULTANTS LTD  
Civil Consultant  
PLANMAC ENGINEERING  
Passive House Consultant  
PEEL PASSIVE HOUSE  
LEED Consultant  
MCW CONSULTANTS LTD

Client



Seal & Permit



19.	ISSUED FOR ADDENDUM 4	2025-07-18
18.	ISSUED FOR ADDENDUM 2	2025-07-04
17.	REISSUED FOR TENDER	2025-05-23
16.	ISSUED FOR TENDER	2025-04-25
15.	ISSUED FOR 100% CD R5	2025-04-11
14.	ISSUED FOR SITE PLAN AGREEMENT	2025-01-09
13.	ISSUED FOR BUILDING PERMIT	2024-11-27
12.	ISSUED FOR SPA 2nd RESUBMISSION	2024-11-22
11.	ISSUED FOR 100% CD R4	2024-11-12
10.	PRE-TENDER REVIEW	2024-10-31
9.	ISSUED FOR SPA 1ST RESUBMISSION	2024-10-07
8.	ISSUED FOR 100% CD R3	2024-08-02
7.	ISSUED FOR 100% CD R2	2024-07-15
6.	ISSUED FOR 100% CD R1	2024-06-30
5.	ISSUED FOR 100% CD	2024-06-03
4.	ISSUED FOR 80% CD R1	2024-05-02
3.	ISSUED FOR 80% CD	2024-04-24
2.	ISSUED FOR SPA SUBMISSION	2024-04-12
1.	ISSUED FOR 100% DD	2024-03-19

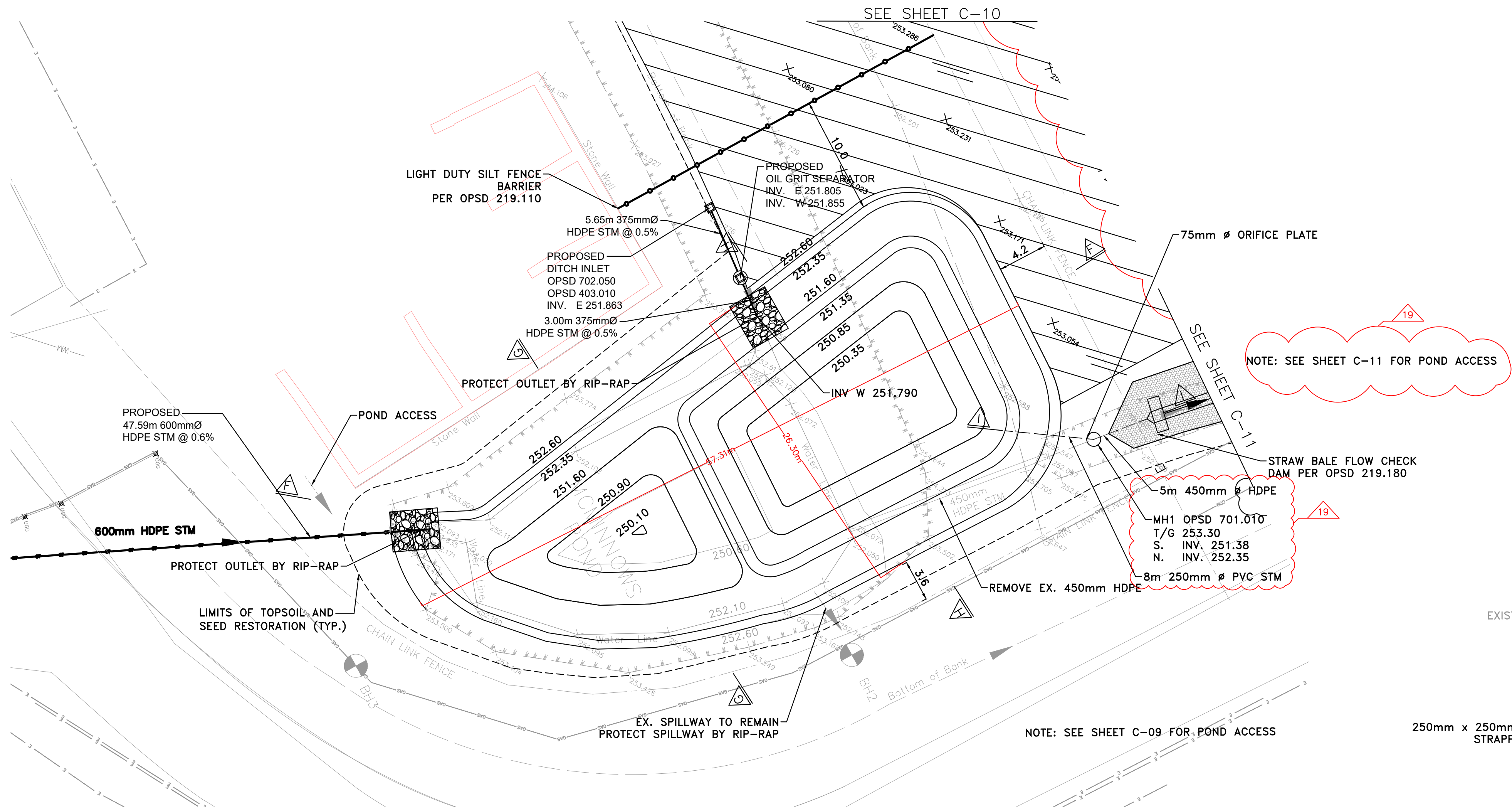
Drawing History	Checked By
AS INDICATED	J.H.
Region of York Project Number	Region of York Building Code
22046	G013-B

Project  
YORK REGION NORTH ROADS  
OPERATIONS CENTRE  
3525 BASELINE RD. SUTTON WEST, ON, L0E 1R0  
Drawing Title

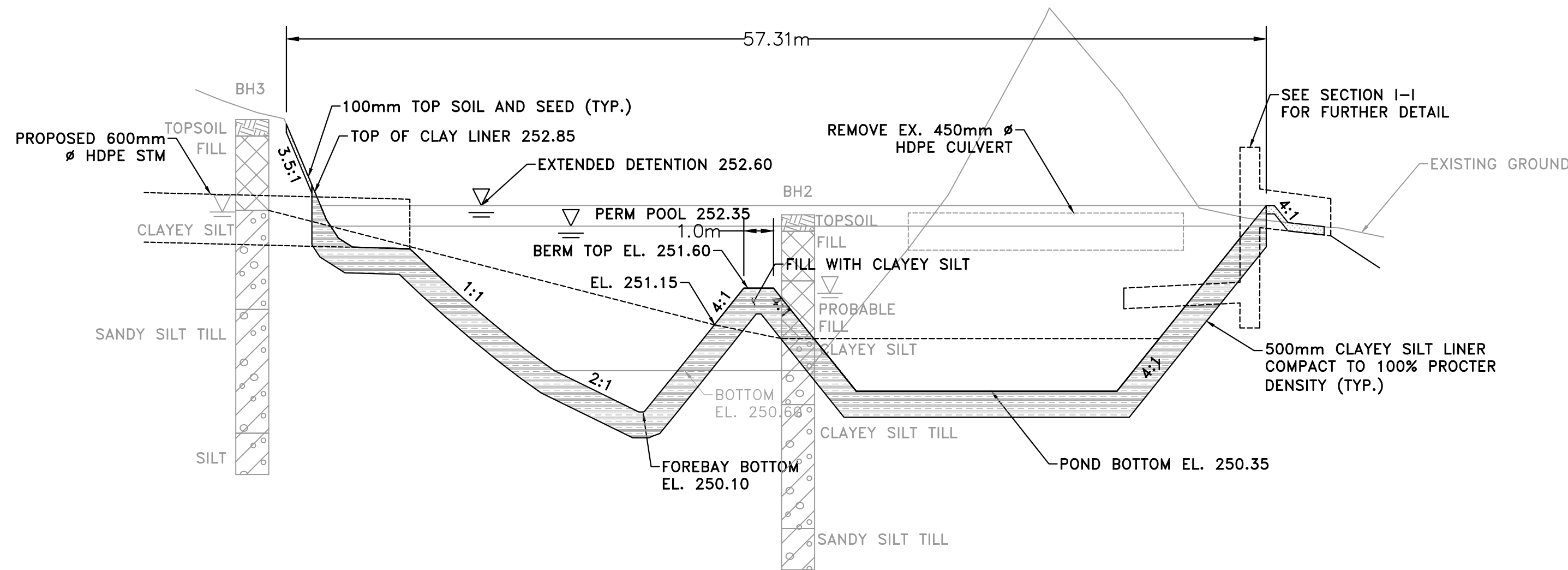
BASELINE POND  
MODIFICATIONS

Project Number	Drawing Number
6016	C-08

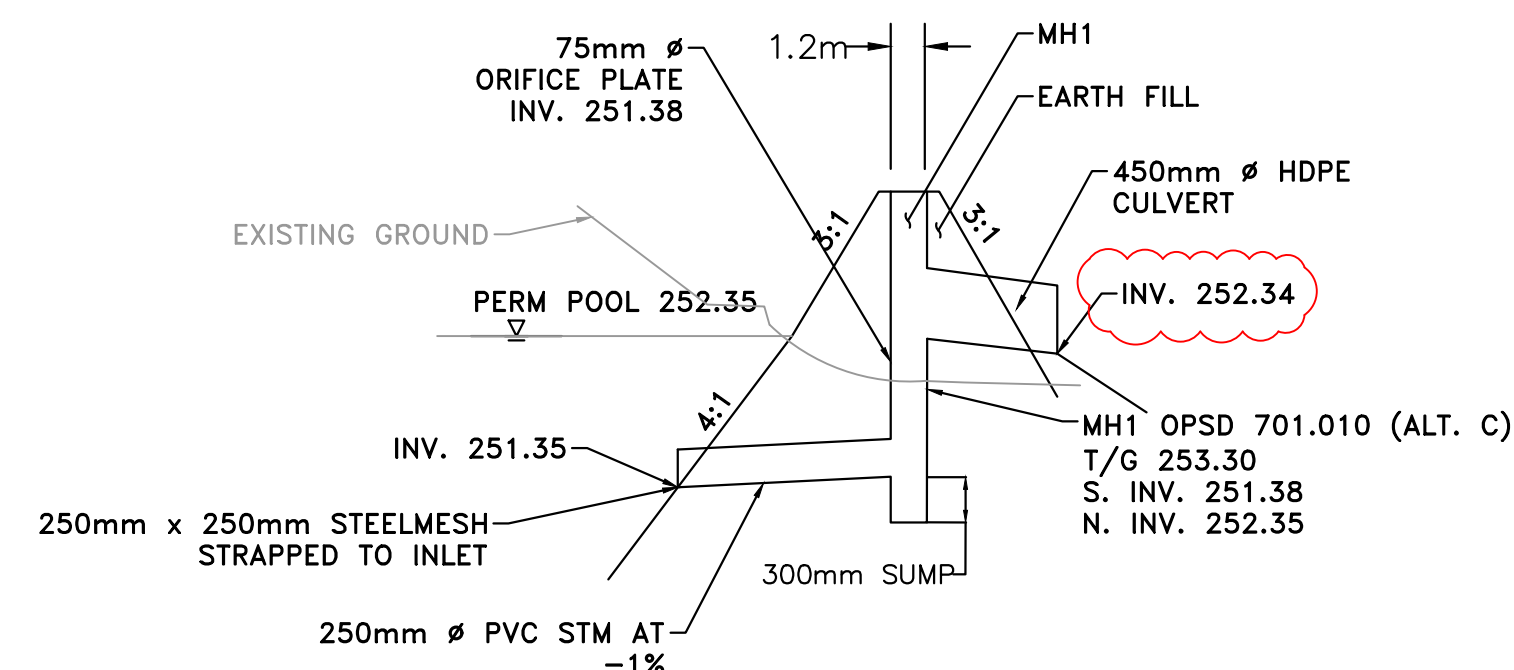
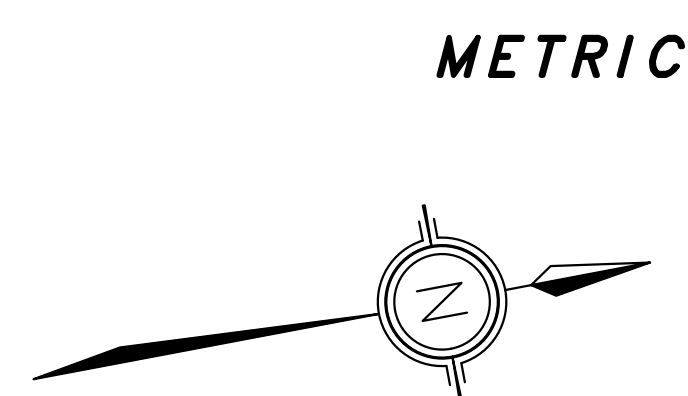




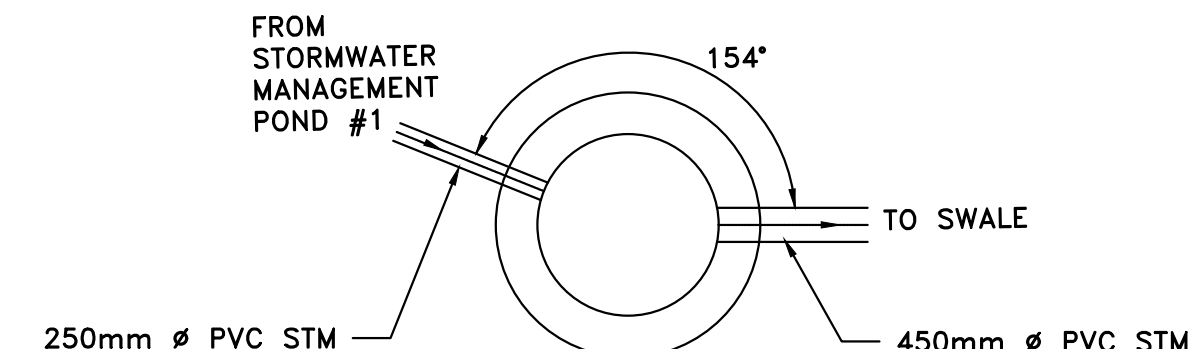
PLAN  
HORIZONTAL SCALE: 1:250



SECTION F-F  
HORIZONTAL SCALE: 1:250  
VERTICAL SCALE: 1:50



SECTION I-I  
HORIZONTAL SCALE: 1:250  
VERTICAL SCALE: 1:50



MH1 (1.2m, OPD 701.010)  
HORIZONTAL SCALE: 1:100

BENCH MARK

ELEVATIONS ARE GEODETIC AND ARE REFERRED TO THE BM NO 0011961U3344 ELEVATION 244.699

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Project Team:  
Prime Consultant  
GEC ARCHITECTURE  
Structural Consultant  
ENTUITIVE  
Mechanical Consultant  
MCW CONSULTANTS LTD  
Electrical Consultant  
MCW CONSULTANTS LTD  
Civil Consultant  
PLANMAC ENGINEERING  
Passive House Consultant  
PEEL PASSIVE HOUSE  
LEED Consultant  
MCW CONSULTANTS LTD

Client



Seal & Permit



19.	ISSUED FOR ADDENDUM 4	2025-07-18
18.	ISSUED FOR ADDENDUM 2	2025-07-04
17.	REISSUED FOR TENDER	2025-05-23
16.	ISSUED FOR TENDER	2025-04-25
15.	ISSUED FOR 100% CD R5	2025-04-11
14.	ISSUED FOR SITE PLAN AGREEMENT	2025-01-09
13.	ISSUED FOR BUILDING PERMIT	2024-11-27
12.	ISSUED FOR SPA 2nd RESUBMISSION	2024-11-22
11.	ISSUED FOR 90% CD R4	2024-11-12
10.	PRE-TENDER REVIEW	2024-10-31
9.	ISSUED FOR SPA 1ST RESUBMISSION	2024-10-07
8.	ISSUED FOR 100% CD R3	2024-08-02
7.	ISSUED FOR 100% CD R2	2024-07-15
6.	ISSUED FOR 100% CD R1	2024-06-30
5.	ISSUED FOR 100% CD	2024-06-03
4.	ISSUED FOR 80% CD R1	2024-05-02
3.	ISSUED FOR 80% CD	2024-04-24
2.	ISSUED FOR SPA SUBMISSION	2024-04-12
1.	ISSUED FOR 100% DD	2024-03-19

NO.	ISSUED FOR	DATE
AS INDICATED	J.H.	
Region of York Project Number	Region of York Building Code	
22046	G013-B	

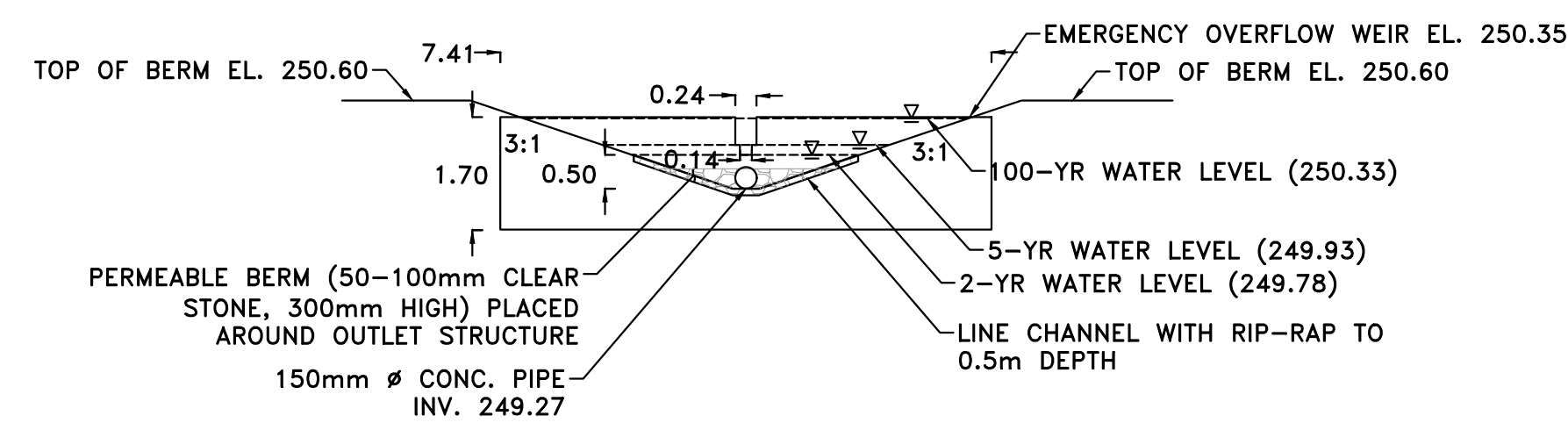
Project  
YORK REGION NORTH ROADS  
OPERATIONS CENTRE

3525 BASELINE RD. SUTTON WEST, ON, L0E 1R0

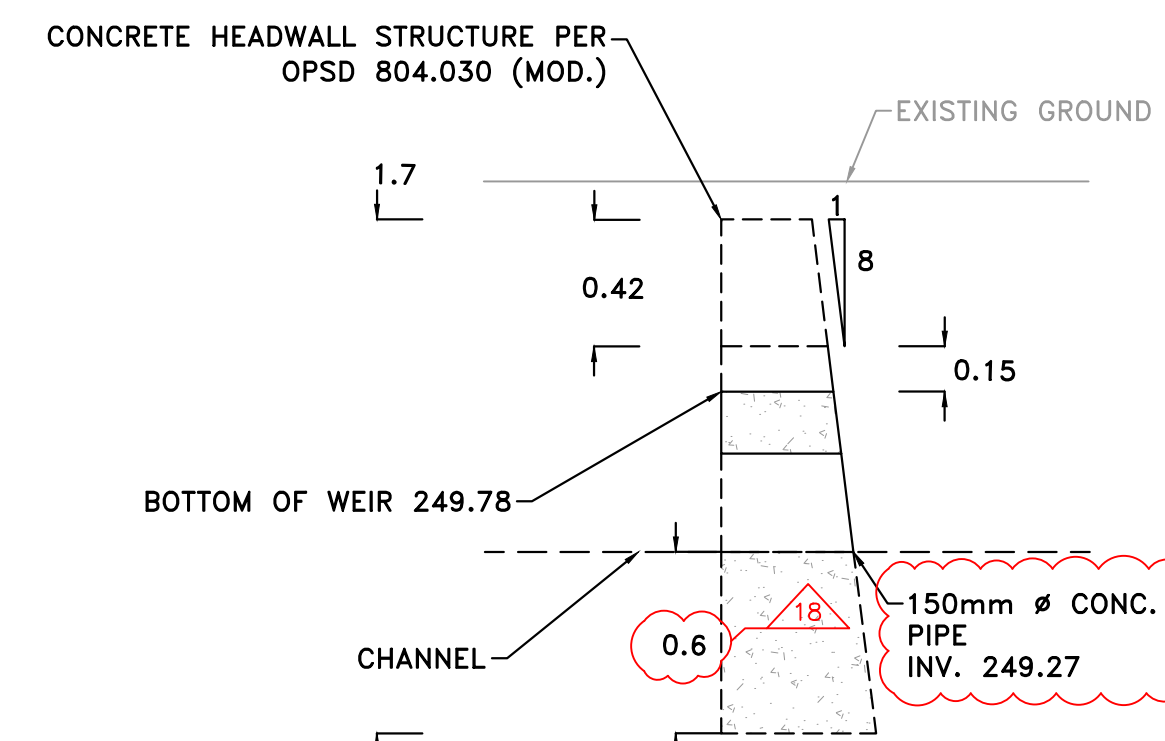
Drawing Title  
**STORMWATER  
MANAGEMENT  
POND #1  
MODIFICATIONS**

Project Number	Drawing Number
6016	C-09



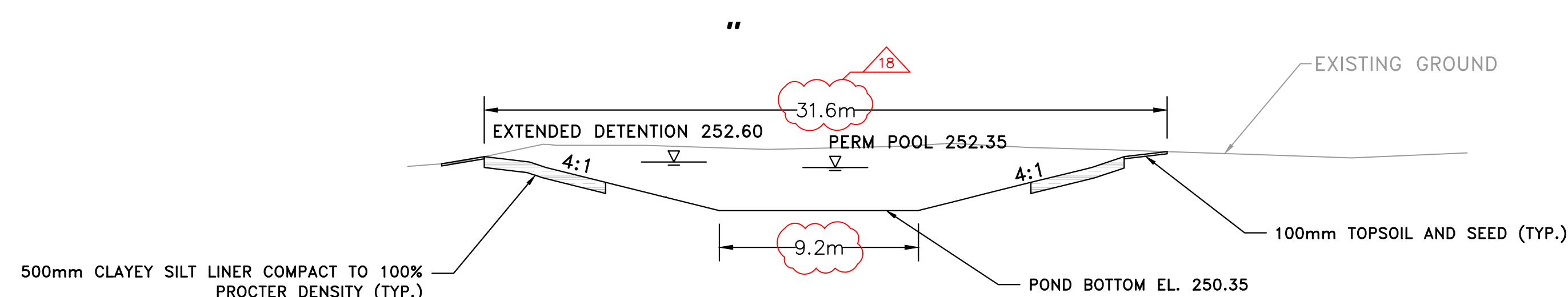


SECTION D-D  
HORIZONTAL SCALE: 1:100  
VERTICAL SCALE: 1:100



SECTION E-E  
HORIZONTAL SCALE: 1:25  
VERTICAL SCALE: 1:25

BASELINE POND SECTION C-C  
HORIZONTAL SCALE: 1:250  
VERTICAL SCALE: 1:250



STORMWATER MANAGEMENT POND #1  
SECTION H-H  
HORIZONTAL SCALE: 1:200  
VERTICAL SCALE: 1:200

STORMWATER MANAGEMENT POND #1  
SECTION G-G  
HORIZONTAL SCALE: 1:200  
VERTICAL SCALE: 1:200

19.	ISSUED FOR ADDENDUM 4	2007-07-18
18.	ISSUED FOR ADDENDUM 2	2007-07-04
17.	REISSUED FOR TENDER	2005-05-23
16.	ISSUED FOR TENDER	2004-04-26
15.	ISSUED FOR 10% CD R5	2003-04-11
14.	ISSUED FOR SITE PLAN AGREEMENT	2003-01-09
13.	ISSUED FOR BUILDING PERMIT	2001-11-27
12.	ISSUED FOR SPA 2nd RESUBMISSION	2001-11-22
11.	ISSUED FOR 10% CD R4	2001-11-12
10.	PRE-TENDER REVIEW	2001-10-31
9.	ISSUED FOR SPA 1ST RESUBMISSION	2001-08-07
8.	ISSUED FOR 10% CD R3	2001-04-02
7.	ISSUED FOR 10% CD R2	2001-07-15
6.	ISSUED FOR 10% CD R1	2001-03-01
5.	ISSUED FOR 10% CD	2000-06-03
4.	ISSUED FOR 60% CD R1	2000-04-02
3.	ISSUED FOR 60% CD	2000-04-02
2.	ISSUED FOR SPA SUBMISSION	2000-04-12
1.	ISSUED FOR 10% DD	1999-03-19

NO.	ISSUED FOR	DATE
Drawing History		
Scale	Checked By	
AS INDICATED	J.H.	
Region of York Project Number	Region of York Building Code	

Region of Form Project Number	Region of Form Issuing Office
22046	G013-B
Project	

YORK REGION NORTH ROADS  
OPERATIONS CENTRE

3525 BASELINE RD. SUTTON WEST, ON, L0E 1R0

## POND SECTIONS

\_\_\_\_\_

Project Number	Drawing Number
----------------	----------------

6016 **C-10**





Project Team:  
Prime Consultant  
GEC ARCHITECTURE  
Structural Consultant  
ENTUITIVE  
Mechanical Consultant  
MCW CONSULTANTS LTD  
Electrical Consultant  
MCW CONSULTANTS LTD  
Civil Consultant  
PLANMAC ENGINEERING  
Passive House Consultant  
PEEL PASSIVE HOUSE  
LEED Consultant  
MCW CONSULTANTS LTD



Seal & Permit



19.	ISSUED FOR ADDENDUM 4	2025-07-18
18.	ISSUED FOR ADDENDUM 2	2025-07-04
17.	REISSUED FOR TENDER	2025-05-23
16.	ISSUED FOR TENDER	2025-04-25
15.	ISSUED FOR 100% CD R5	2025-04-11
14.	ISSUED FOR SITE PLAN AGREEMENT	2025-01-09
13.	ISSUED FOR BUILDING PERMIT	2024-11-27
12.	ISSUED FOR SPA 2nd RESUBMISSION	2024-11-22
11.	ISSUED FOR 100% CD R4	2024-11-12
10.	PRE-TENDER REVIEW	2024-10-31
9.	ISSUED FOR SPA 1ST RESUBMISSION	2024-10-07
8.	ISSUED FOR 100% CD R3	2024-08-02
7.	ISSUED FOR 100% CD R2	2024-07-15
6.	ISSUED FOR 100% CD R1	2024-06-30
5.	ISSUED FOR 100% CD	2024-06-03
4.	ISSUED FOR 80% CD R1	2024-05-02
3.	ISSUED FOR 80% CD	2024-04-24
2.	ISSUED FOR SPA SUBMISSION	2024-04-12
1.	ISSUED FOR 100% DD	2024-03-19

NO.	ISSUED FOR	DATE
19.	ISSUED FOR ADDENDUM 4	2025-07-18
18.	ISSUED FOR ADDENDUM 2	2025-07-04
17.	REISSUED FOR TENDER	2025-05-23
16.	ISSUED FOR TENDER	2025-04-25
15.	ISSUED FOR 100% CD R5	2025-04-11
14.	ISSUED FOR SITE PLAN AGREEMENT	2025-01-09
13.	ISSUED FOR BUILDING PERMIT	2024-11-27
12.	ISSUED FOR SPA 2nd RESUBMISSION	2024-11-22
11.	ISSUED FOR 100% CD R4	2024-11-12
10.	PRE-TENDER REVIEW	2024-10-31
9.	ISSUED FOR SPA 1ST RESUBMISSION	2024-10-07
8.	ISSUED FOR 100% CD R3	2024-08-02
7.	ISSUED FOR 100% CD R2	2024-07-15
6.	ISSUED FOR 100% CD R1	2024-06-30
5.	ISSUED FOR 100% CD	2024-06-03
4.	ISSUED FOR 80% CD R1	2024-05-02
3.	ISSUED FOR 80% CD	2024-04-24
2.	ISSUED FOR SPA SUBMISSION	2024-04-12
1.	ISSUED FOR 100% DD	2024-03-19

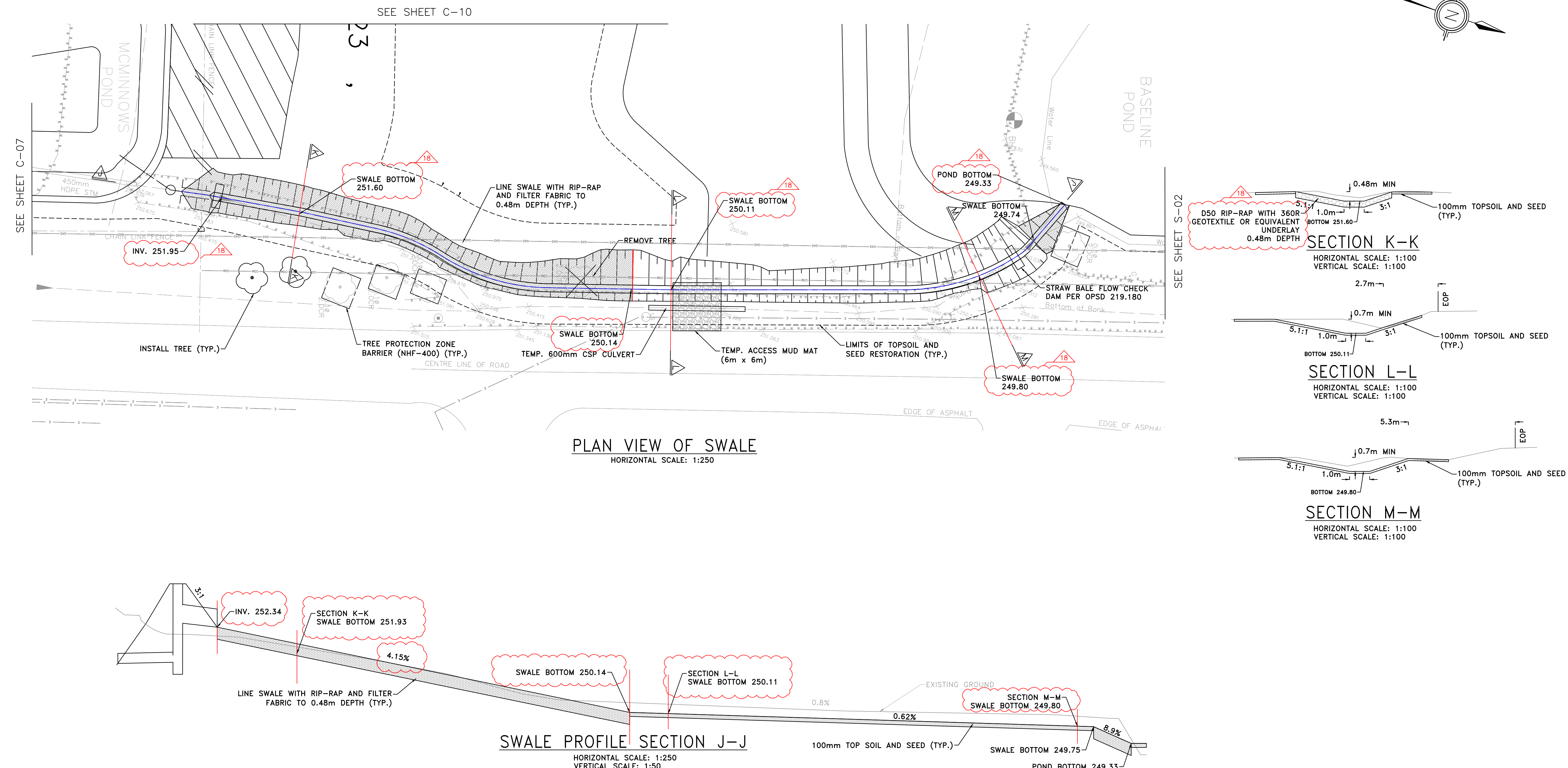
Project  
YORK REGION NORTH ROADS  
OPERATIONS CENTRE

3525 BASELINE RD. SUTTON WEST, ON, L0E 1R0

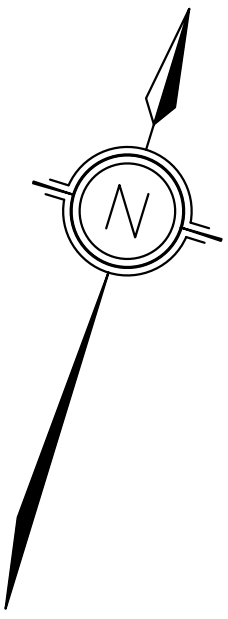
Drawing Title  
**SWALE  
MODIFICATIONS**

Project Number  
6016  
Drawing Number  
**C-11**

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Project Team:  
Prime Consultant  
GEC ARCHITECTURE  
Structural Consultant  
ENTUITIVE  
Mechanical Consultant  
MCW CONSULTANTS LTD  
Electrical Consultant  
MCW CONSULTANTS LTD  
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PEEL PASSIVE HOUSE  
LEED Consultant  
MCW CONSULTANTS LTD



Seal & Permit



19.	ISSUED FOR ADDENDUM 4	2025-07-18
18.	ISSUED FOR ADDENDUM 2	2025-07-04
17.	REISSUED FOR TENDER	2025-05-23
16.	ISSUED FOR TENDER	2025-04-25
15.	ISSUED FOR 100% CD R5	2025-04-11
14.	ISSUED FOR SITE PLAN AGREEMENT	2025-01-09
13.	ISSUED FOR BUILDING PERMIT	2024-11-27
12.	ISSUED FOR SPA 2nd RESUBMISSION	2024-11-22
11.	ISSUED FOR 100% CD R4	2024-11-12
10.	PRE-TENDER REVIEW	2024-10-31
9.	ISSUED FOR SPA 1ST RESUBMISSION	2024-10-07
8.	ISSUED FOR 100% CD R3	2024-08-02
7.	ISSUED FOR 100% CD R2	2024-07-15
6.	ISSUED FOR 100% CD R1	2024-06-30
5.	ISSUED FOR 100% CD	2024-06-03
4.	ISSUED FOR 80% CD R1	2024-05-02
3.	ISSUED FOR 80% CD	2024-04-24
2.	ISSUED FOR SPA SUBMISSION	2024-04-12
1.	ISSUED FOR 100% DD	2024-03-19

NO.	ISSUED FOR	DATE
19.	ISSUED FOR ADDENDUM 4	2025-07-18
18.	ISSUED FOR ADDENDUM 2	2025-07-04
17.	REISSUED FOR TENDER	2025-05-23
16.	ISSUED FOR TENDER	2025-04-25
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5.	ISSUED FOR 100% CD	2024-06-03
4.	ISSUED FOR 80% CD R1	2024-05-02
3.	ISSUED FOR 80% CD	2024-04-24
2.	ISSUED FOR SPA SUBMISSION	2024-04-12
1.	ISSUED FOR 100% DD	2024-03-19

Project  
YORK REGION NORTH ROADS  
OPERATIONS CENTRE  
3525 BASELINE RD. SUTTON WEST, ON, L0E 1R0  
Drawing Title

**BERM  
MODIFICATIONS**

Project Number  
6016  
Drawing Number  
C-12

NOTES:  
THE LOCATION OF UTILITIES IS APPROXIMATE ONLY.  
CONSULT THE RESPECTIVE MUNICIPAL AUTHORITIES  
AND UTILITY COMPANIES TO DETERMINE THE EXACT  
LOCATION OF THEIR UTILITIES. THE CONTRACTOR  
SHALL VERIFY THE LOCATION OF UTILITIES AND  
SHALL ADEQUATELY PROTECT AND SUPPORT THEM  
DURING CONSTRUCTION.

EX. BERM TO REMAIN

EX. DITCH TO REMAIN

STOCKPILE  
AREA

LOT 23

PLAN  
HORIZONTAL SCALE: 1:250

NOTE: SEE SHEET C-09 FOR POND ACCESS

SEE SHEET C-09

SEE NOTE 1

SEE SHEET C-07

EXCAVATE TO REMOVE BERM

PROPOSED GROUND

EXISTING

REMOVE, SALVAGE, AND REINSTALL  
CHAIN LINK FENCE PER OPSD 972.130

SECTION N-N  
HORIZONTAL SCALE: 1:250  
VERTICAL SCALE: 1:50

CONSTRUCTION NOTES

- CHAINLINK FENCE AT SWALE CROSSING TO HAVE 200mm  
MIN. CLEARANCE FROM BOTTOM WIRE TO DITCH BOTTOM

BENCH MARK

ELEVATIONS ARE GEODETIC AND ARE REFERRED TO  
THE BM NO 0011961U3344 ELEVATION 244.699







Project Team:

Prime Consultant  
GEC ARCHITECTURE

Structural Consultant  
ENTUITIVE

Mechanical Consultant  
MCW CONSULTANTS LTD

Electrical Consultant  
MCW CONSULTANTS LTD

Civil Consultant  
PLANMAC ENGINEERING

Passive House Consultant  
PEEL PASSIVE HOUSE

LEED Consultant  
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Client



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7.	ISSUED FOR 100% CD R2	2024-07-15
6.	ISSUED FOR 100% CD R1	2024-06-30
5.	ISSUED FOR 100% CD	2024-06-03
4.	ISSUED FOR 60% CD R1	2024-05-02
3.	ISSUED FOR 60% CD	2024-04-24
2.	ISSUED FOR SPA SUBMISSION	2024-04-12
1.	ISSUED FOR 100% DD	2024-03-19

Drawing History

AS INDICATED

22046

G013-B

YORK REGION NORTH ROADS  
OPERATIONS CENTRE

3525 BASELINE RD. SUTTON WEST, ON, L0E 1R0

POND DESIGN  
CROSS SECTION

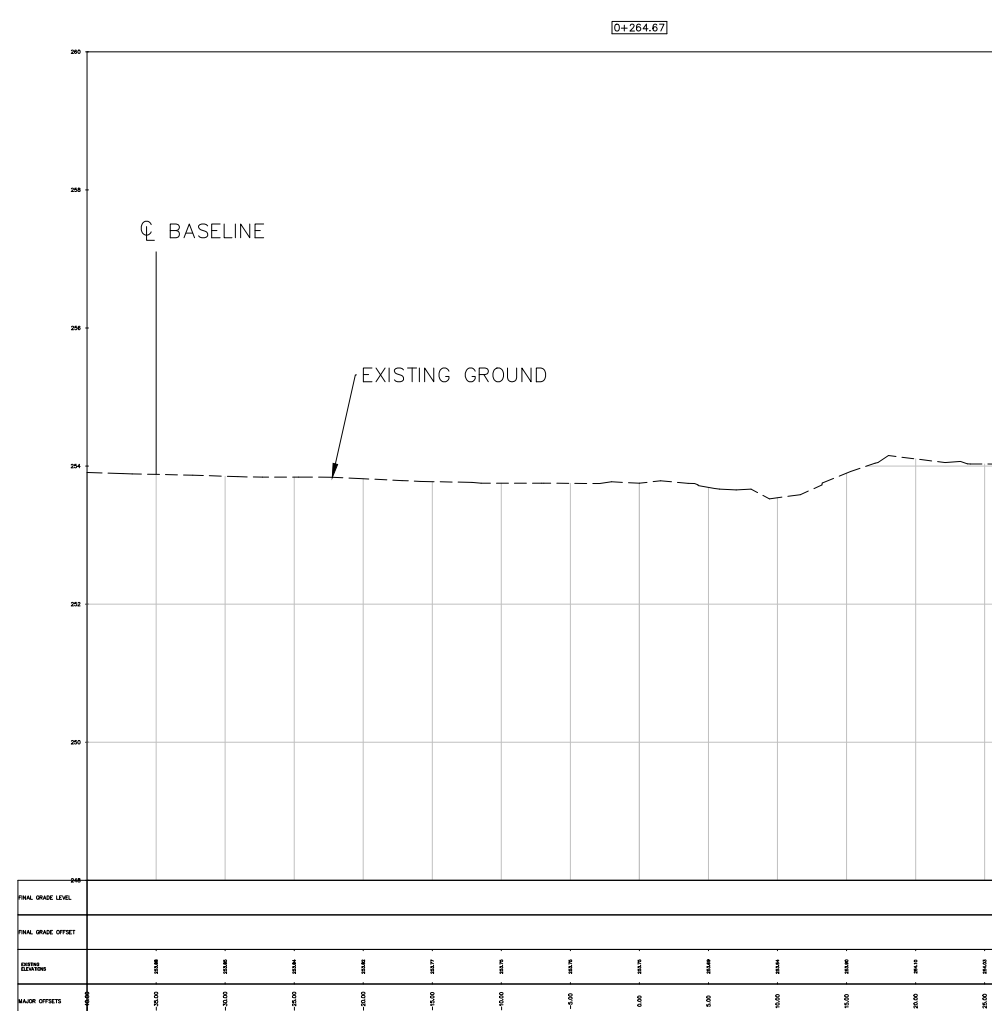
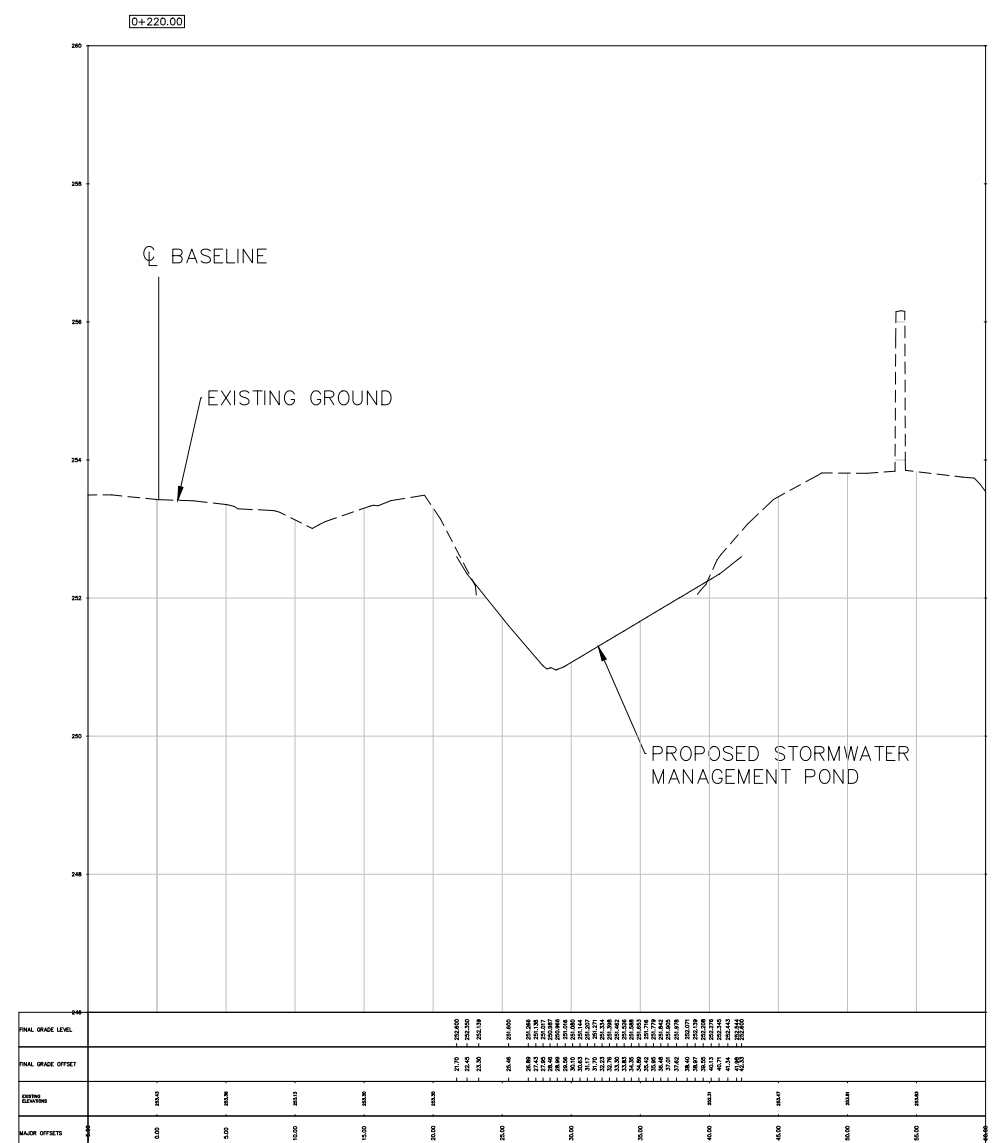
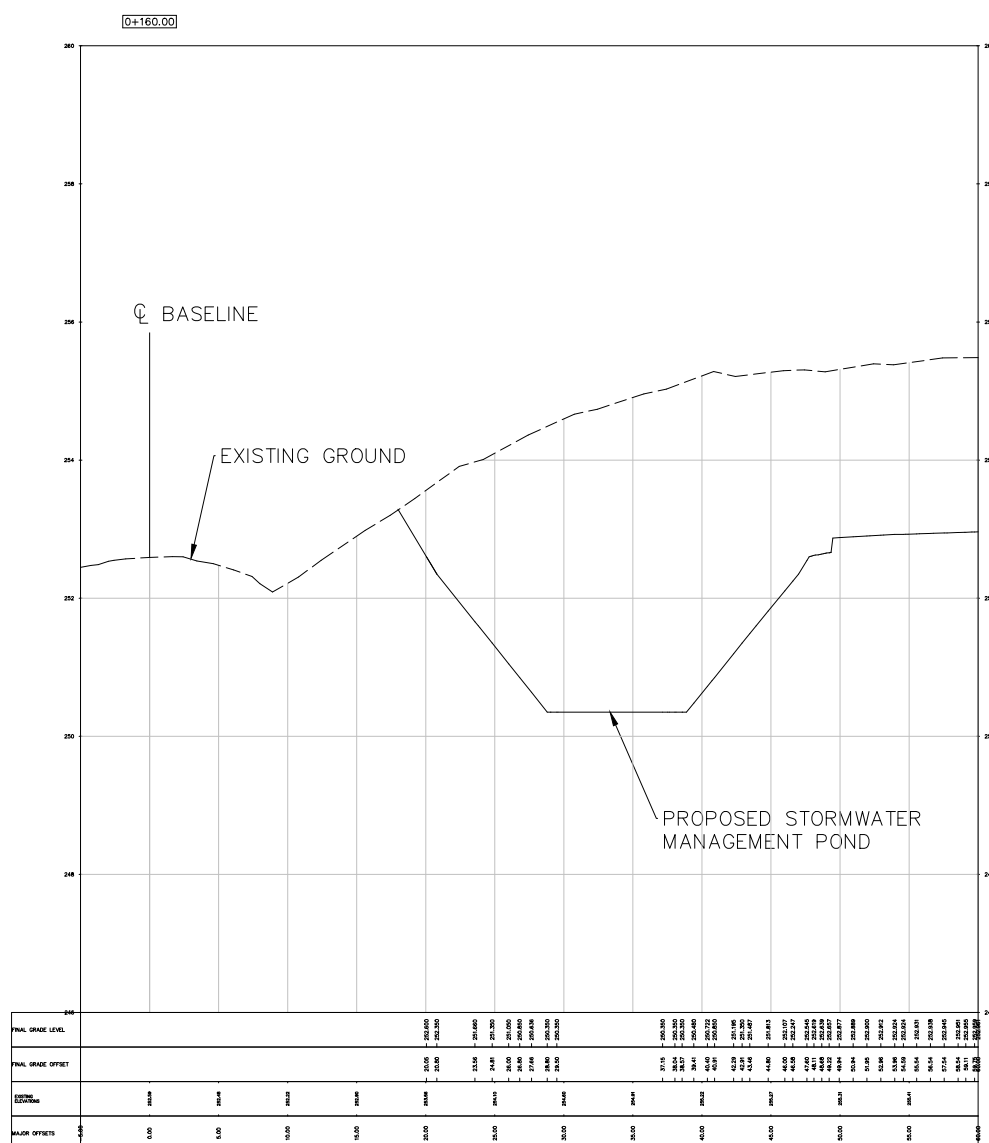
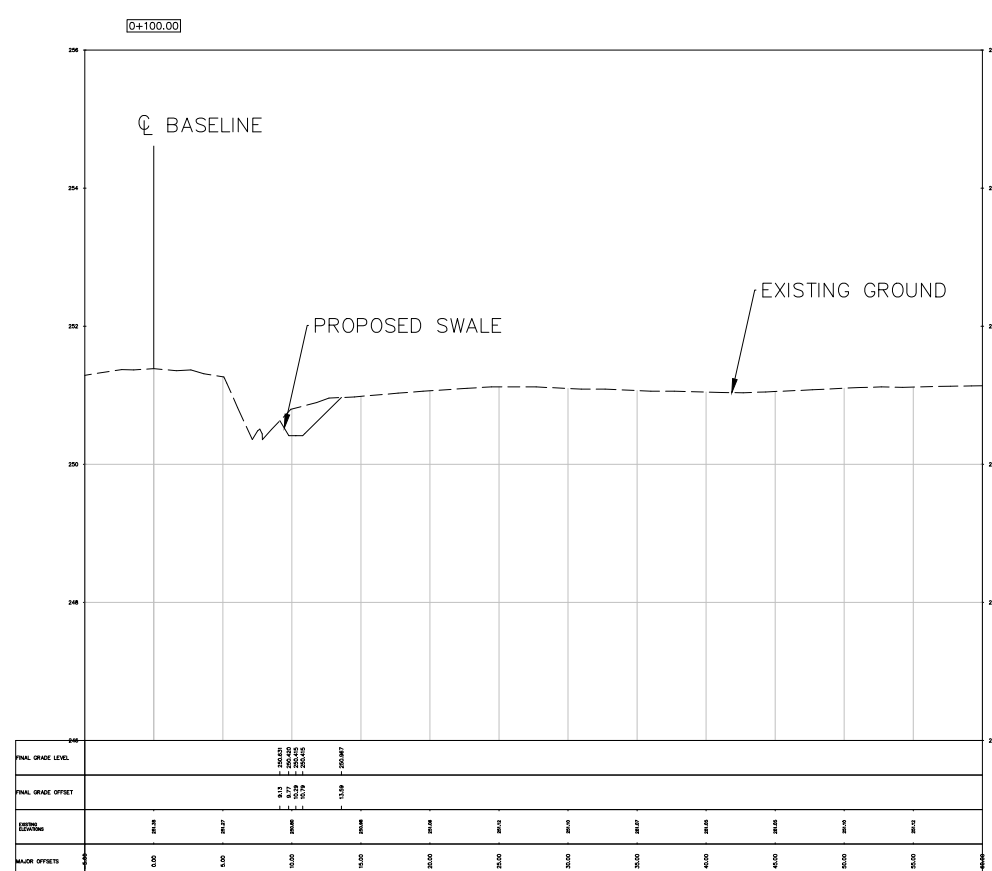
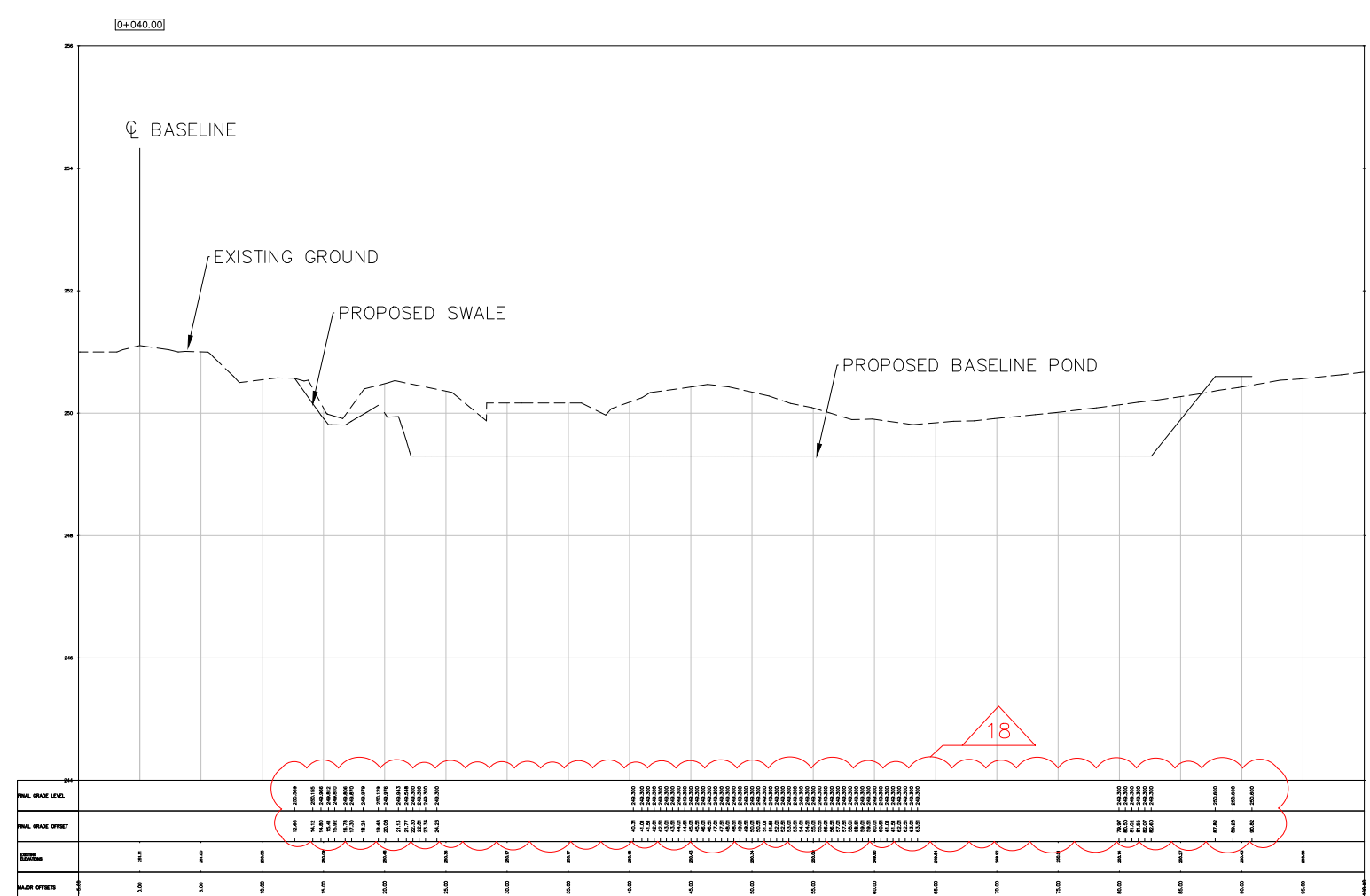
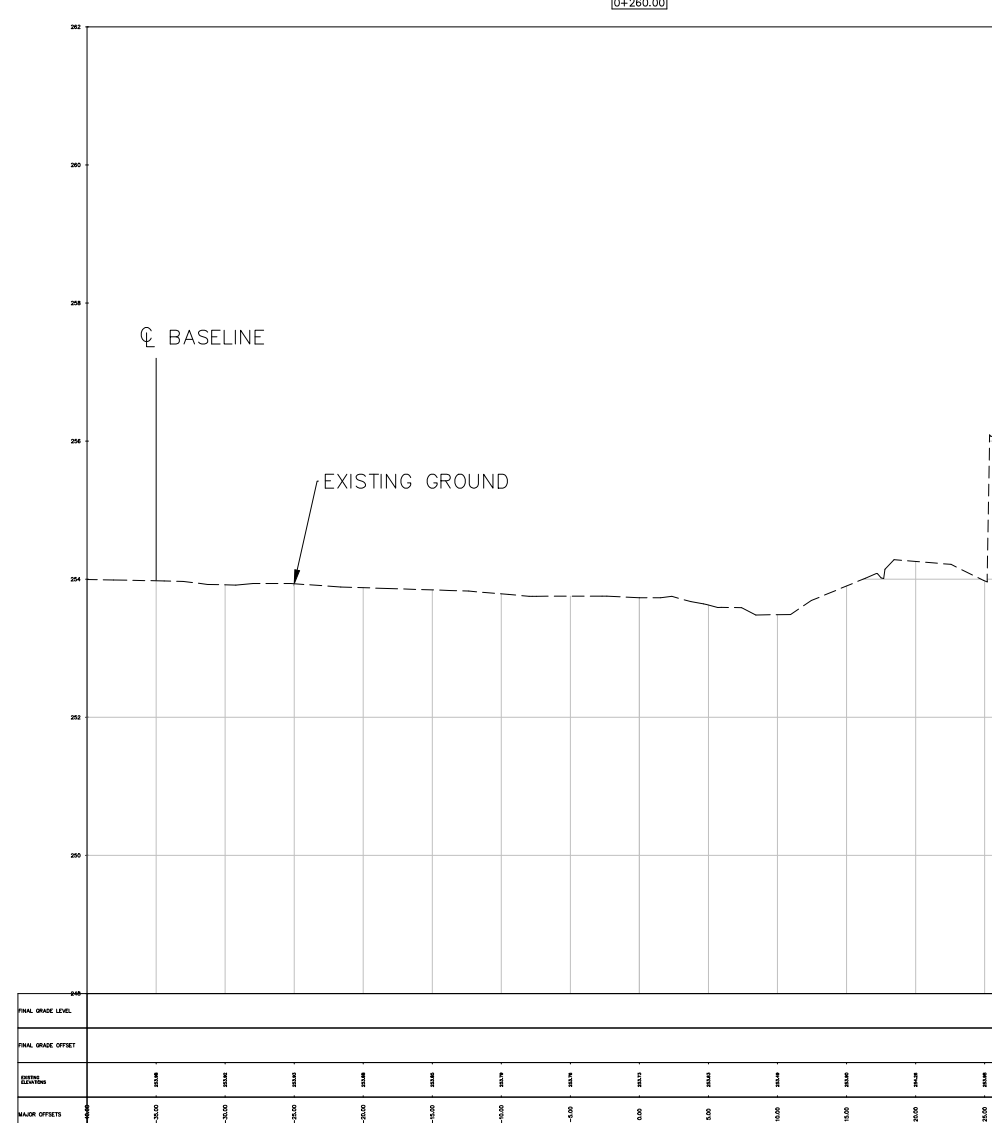
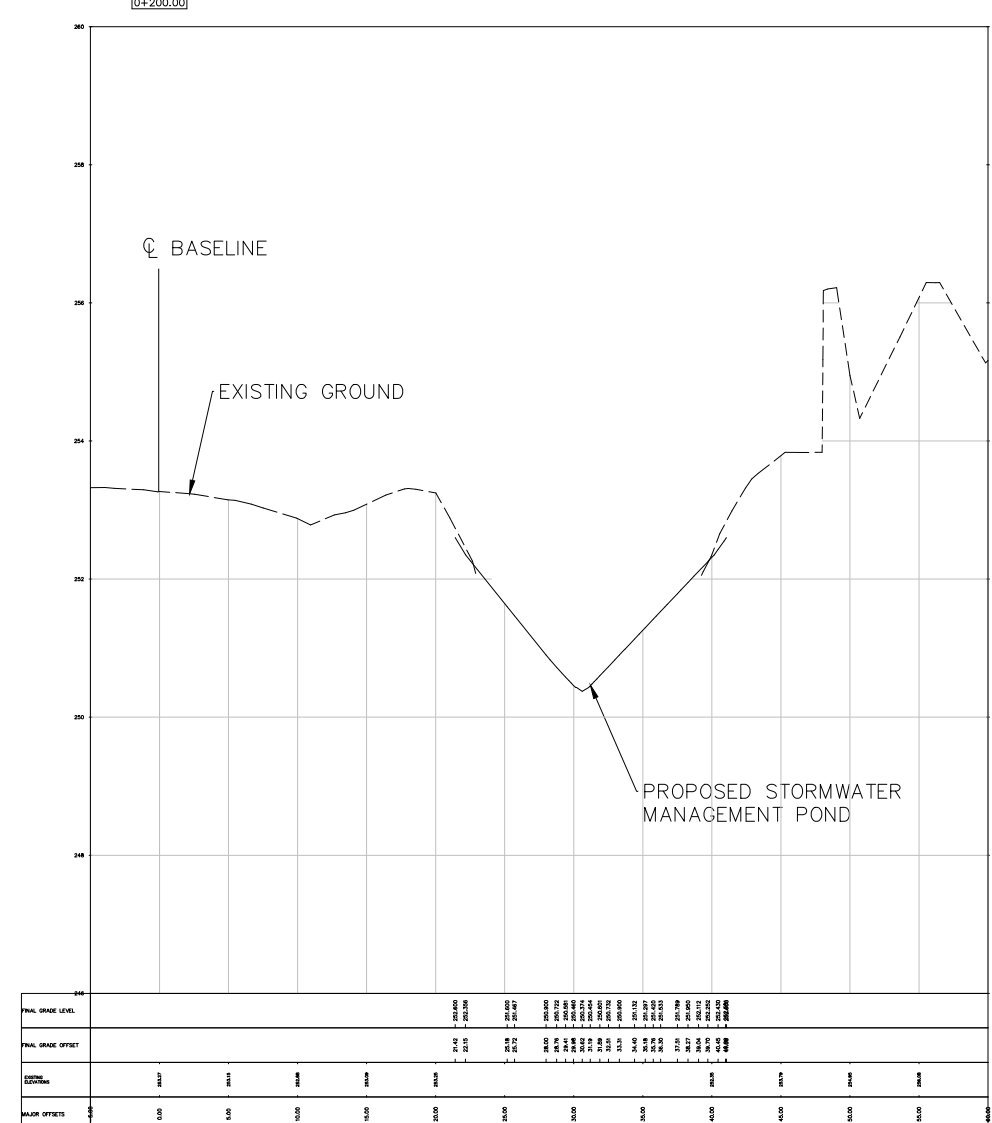
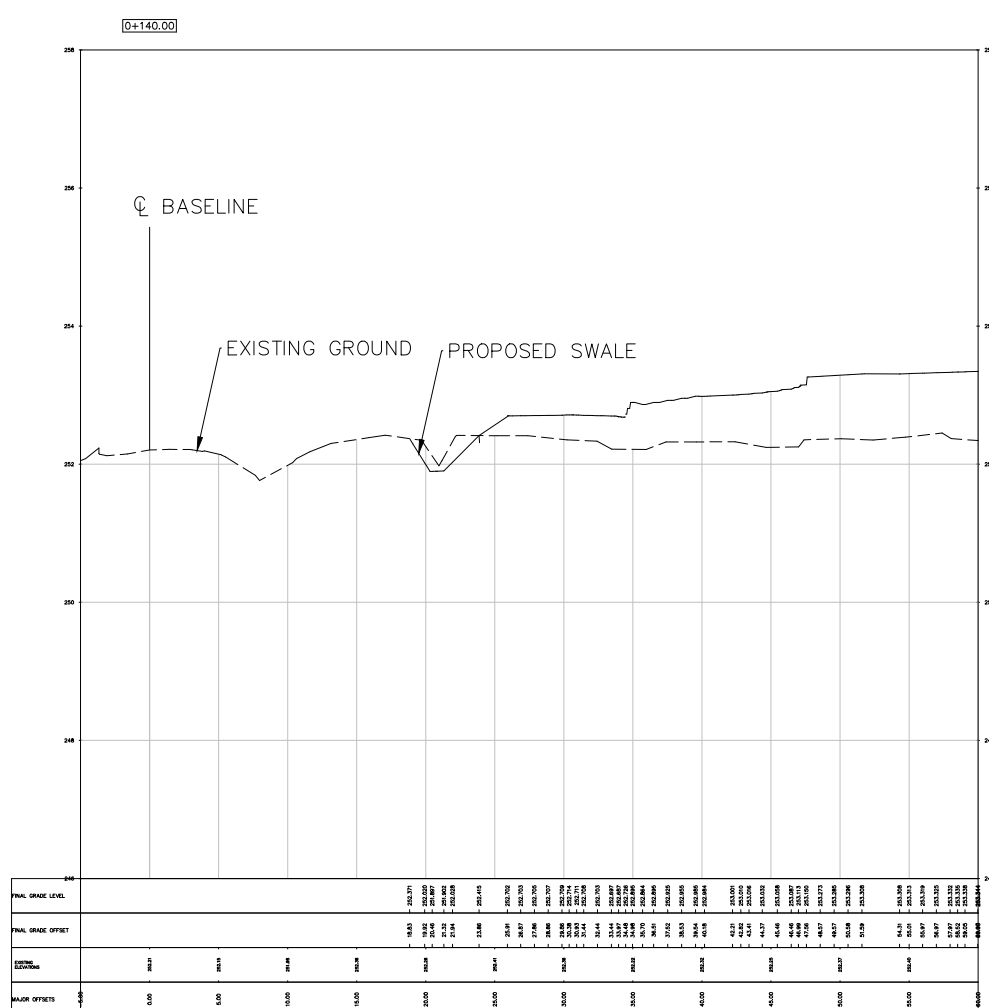
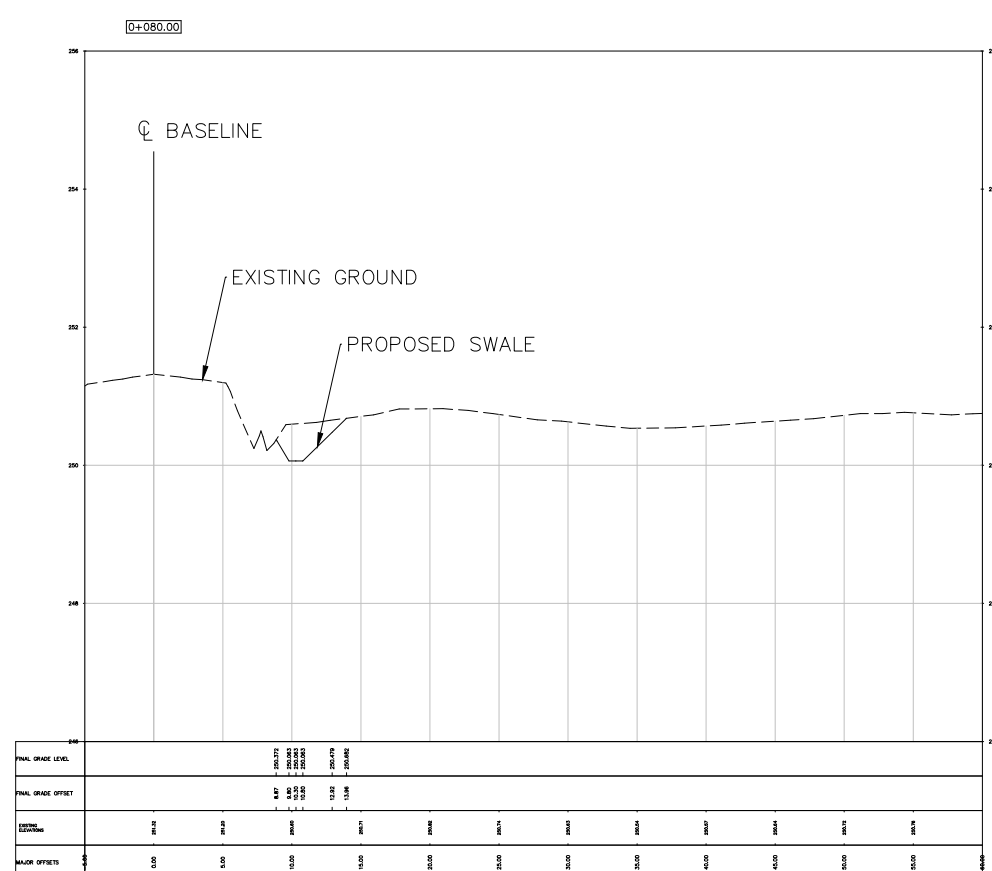
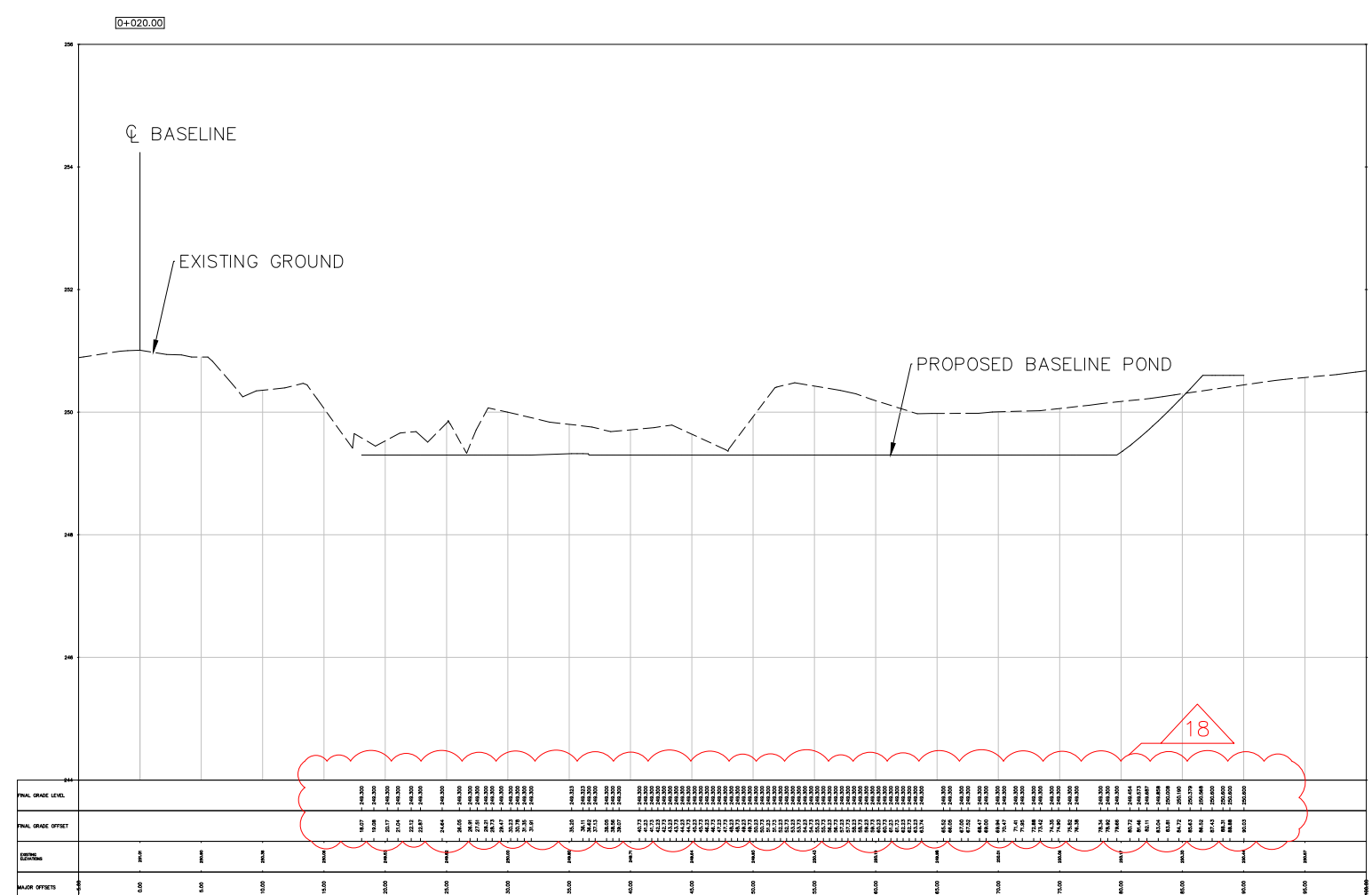
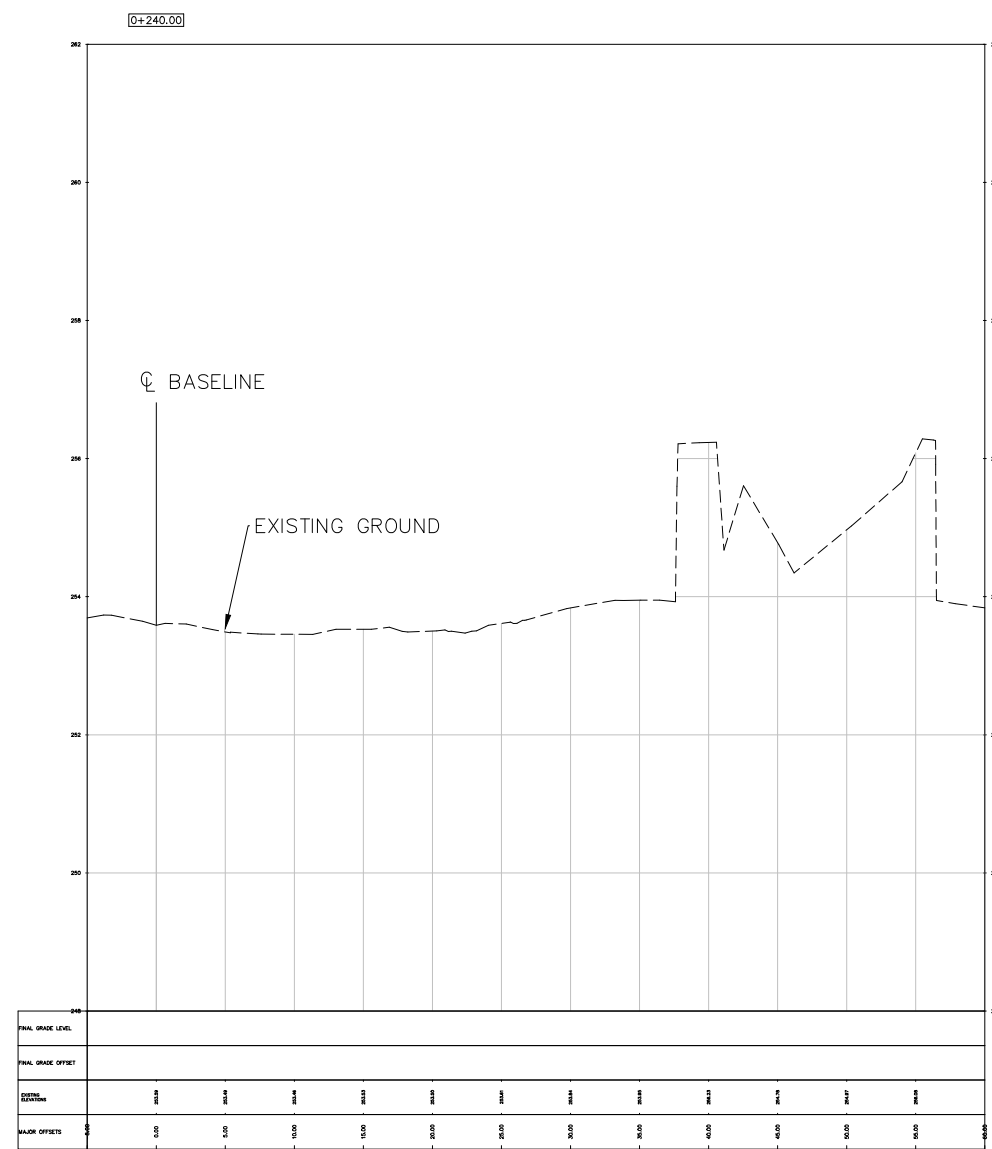
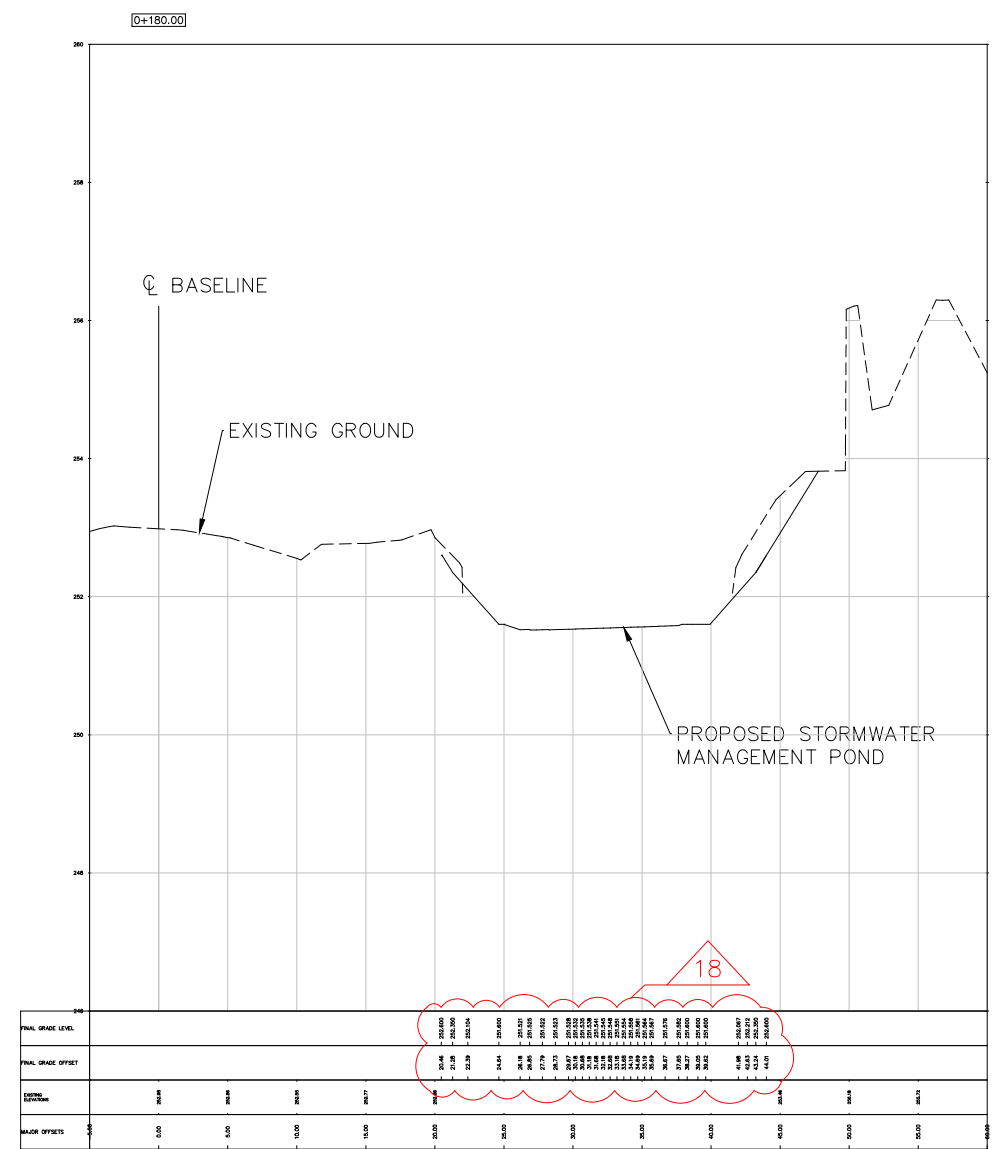
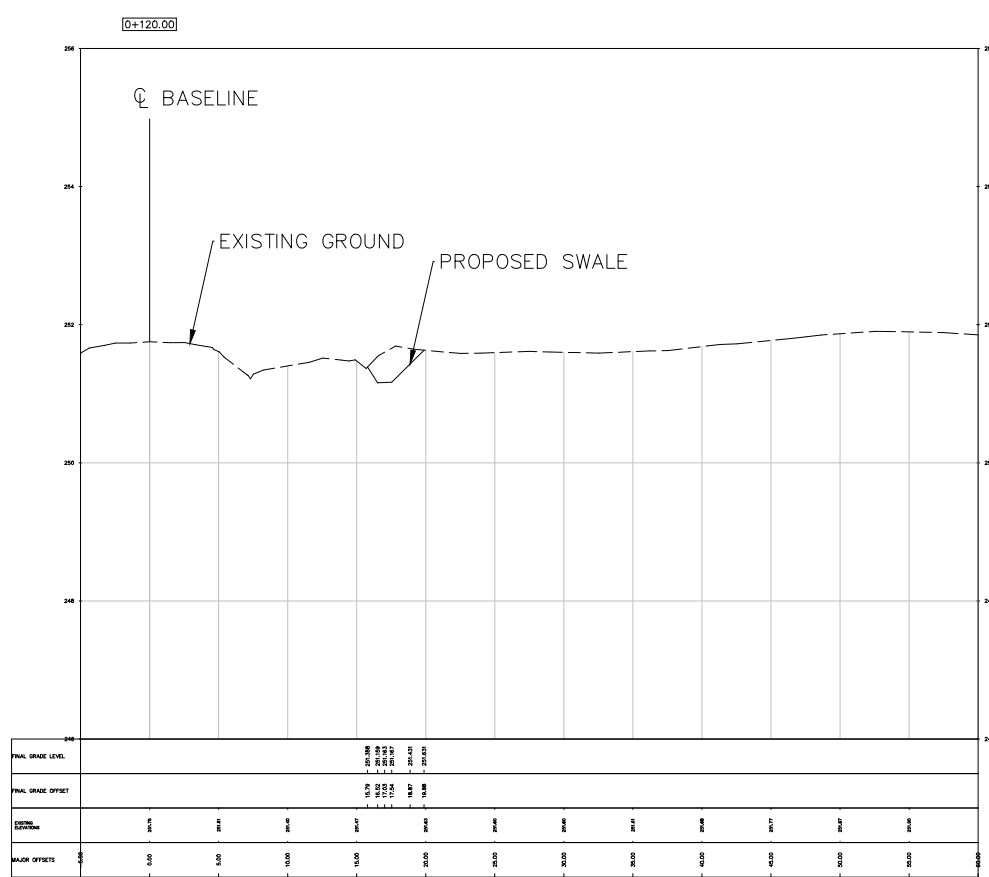
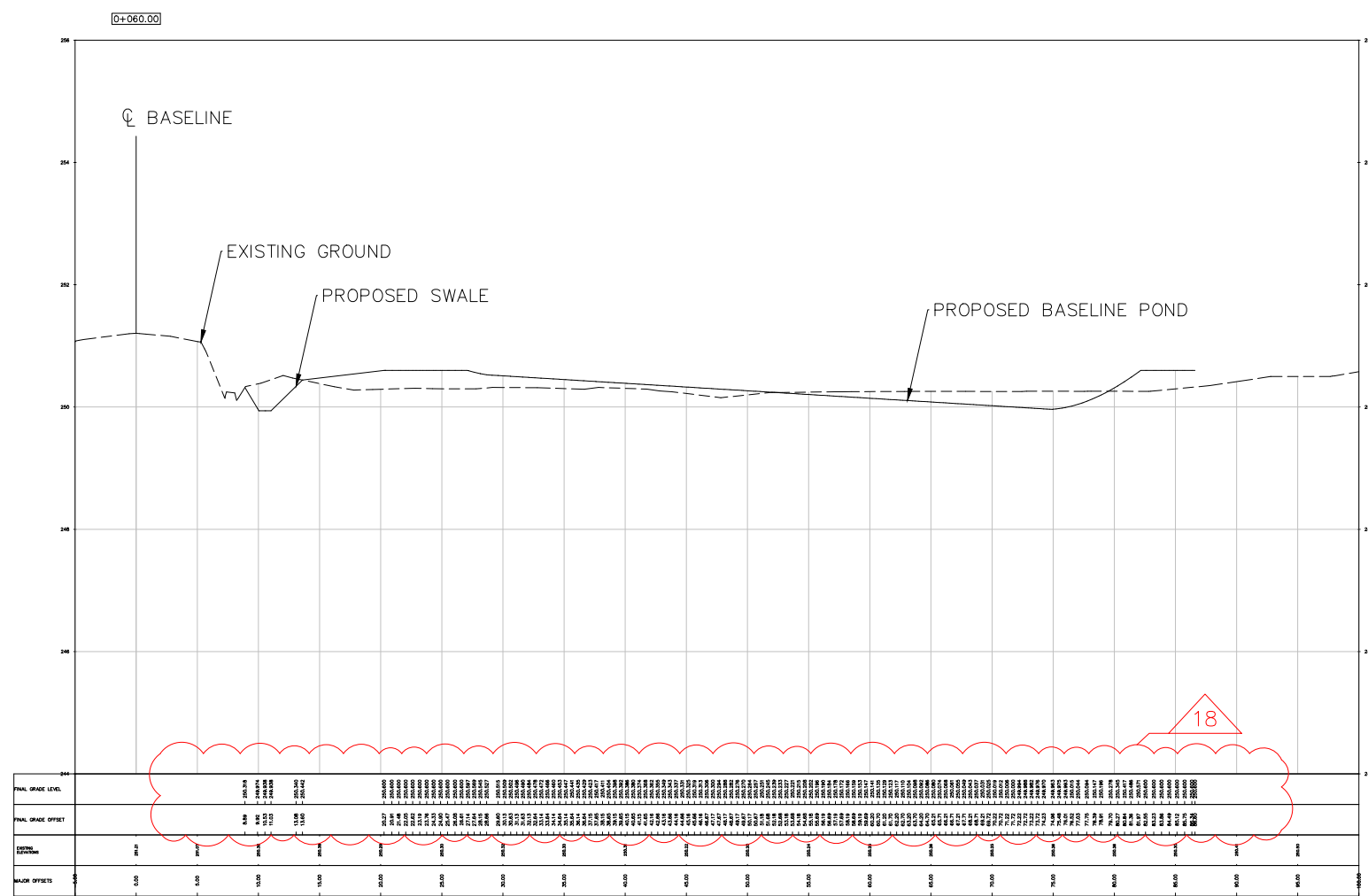
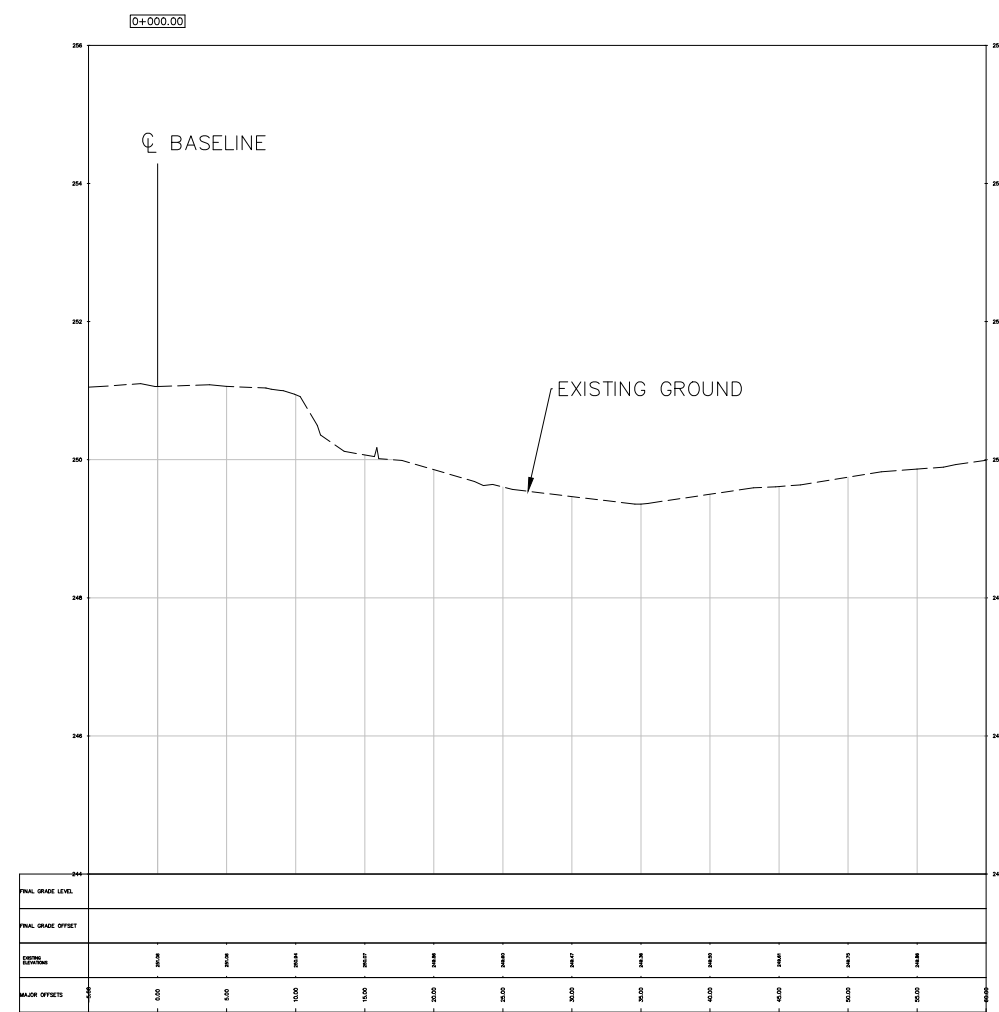
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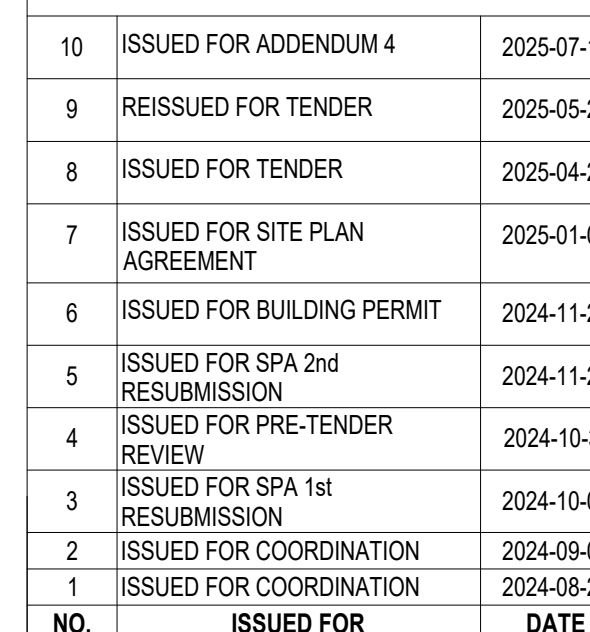
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C-14

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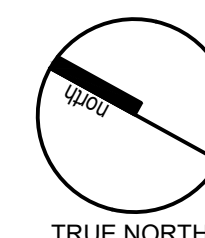
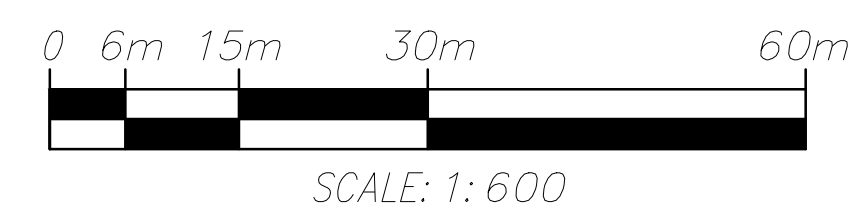




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OPERATIONS CENTRE

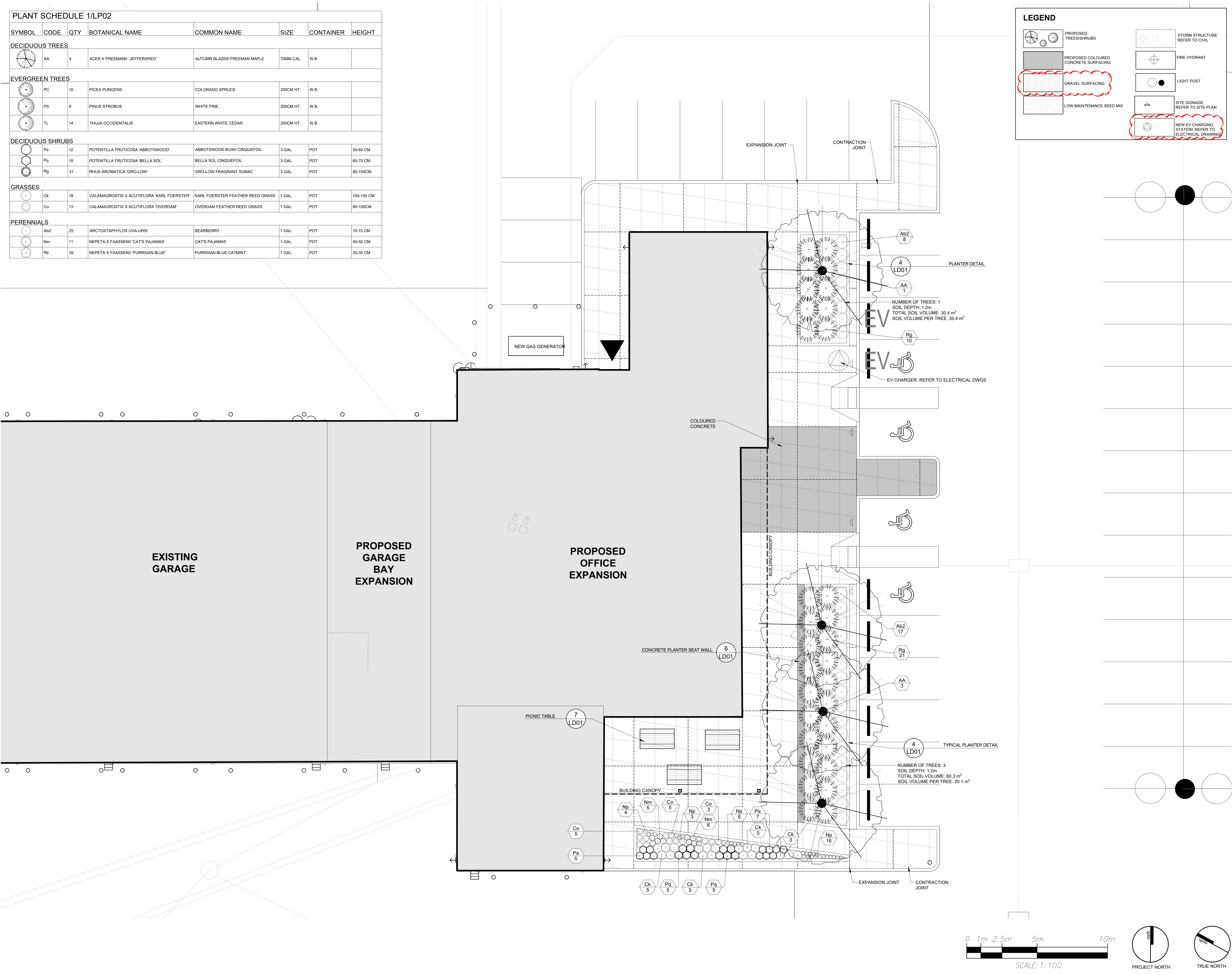
LANDSCAPE PLAN

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PLANT SCHEDULE 1/LP02							
SYMBOL	CODE	QTY	BOTANICAL NAME	COMMON NAME	SIZE	CONTAINER	HEIGHT
DECIDUOUS TREES							
	AA	4	ACER X FREEMANII 'JEFFERSRED'	AUTUMN BLAZE® FREEMAN MAPLE	70MM CAL.	W.B.	
EVERGREEN TREES							
	PC	16	PICEA PUNGENS	COLORADO SPRUCE	200CM HT.	W.B.	
	PS	8	PINUS STROBUS	WHITE PINE	200CM HT.	W.B.	
	TL	14	THUJA OCCIDENTALIS	EASTERN WHITE CEDAR	200CM HT.	W.B.	
DECIDUOUS SHRUBS							
	Pa	12	POTENTILLA FRUTICOSA 'ABBOTSWOOD'	ABBOTSWOOD BUSH CINQUEFOIL	3 GAL.	POT	50-60 CM
	Pt	10	POTENTILLA FRUTICOSA 'BELLA SOL'	BELLA SOL CINQUEFOIL	3 GAL.	POT	60-70 CM
	Rg	31	RHUS AROMATICA 'GRO-LOW'	GRO-LOW FRAGRANT SUMAC	3 GAL.	POT	80-100CM
GRASSES							
	Ck	18	CALAMAGROSTIS X ACUTIFLORA 'KARL FOERSTER'	KARL FOERSTER FEATHER REED GRASS	1 GAL.	POT	100-150 CM
	Co	13	CALAMAGROSTIS X ACUTIFLORA 'OVERDAM'	OVERDAM FEATHER REED GRASS	1 GAL.	POT	80-100CM
PERENNIALS							
	Ab2	25	ARCTOSTAPHYLOS UVA-URSII	SEABERRY	1 GAL.	POT	10-15 CM
	Nm	11	NEPETA X FAASSENII 'CAT'S PAJAMAS'	CAT'S PAJAMAS	1 GAL.	POT	40-50 CM
	Np	29	NEPETA X FAASSENII 'PURRSIAN BLUE'	PURRSIAN BLUE CATMINT	1 GAL.	POT	25-30 CM



PLANNING  
URBAN DESIGN  
& LANDSCAPE  
ARCHITECTURE

Project Team:

Prime Consultant  
**GEC ARCHITECTURE**

Structural and Building Envelope Consultant  
**ENTUITIVE**

Mechanical and Electrical Consultant  
**MCW CONSULTANTS LTD.**

Civil Consultant  
**PLANMAC ENGINEERING**

Passive House Consultant  
**PEEL PASSIVE HOUSE**

LEED Consultant  
**MCW CONSULTANTS LTD.**

Landscape Consultant  
**MHBC**

Client

**YORK REGION**

Seal & Permit

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3	ISSUED FOR SPA 1st RESUBMISSION	2024-10-07
2	ISSUED FOR COORDINATION	2024-09-06
1	ISSUED FOR COORDINATION	2024-08-26

**NO.**   **ISSUED FOR**   **DATE**

Drawing History

Scale  
**AS NOTED**

Checked By  
**EO**

Region of York Project Number  
**22046**

Region of York Building Code  
**G013-B**

Project  
**YORK REGION NORTH ROADS OPERATIONS CENTRE**

3525 BASELINE RD. SUTTON WEST, ON L0E 1R0

Drawing Title  
**LANDSCAPE PLAN ENLARGEMENT**

Project Number  
**24247A**

Drawing Number  
**LP02**

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Project Team:

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Civil Consultant  
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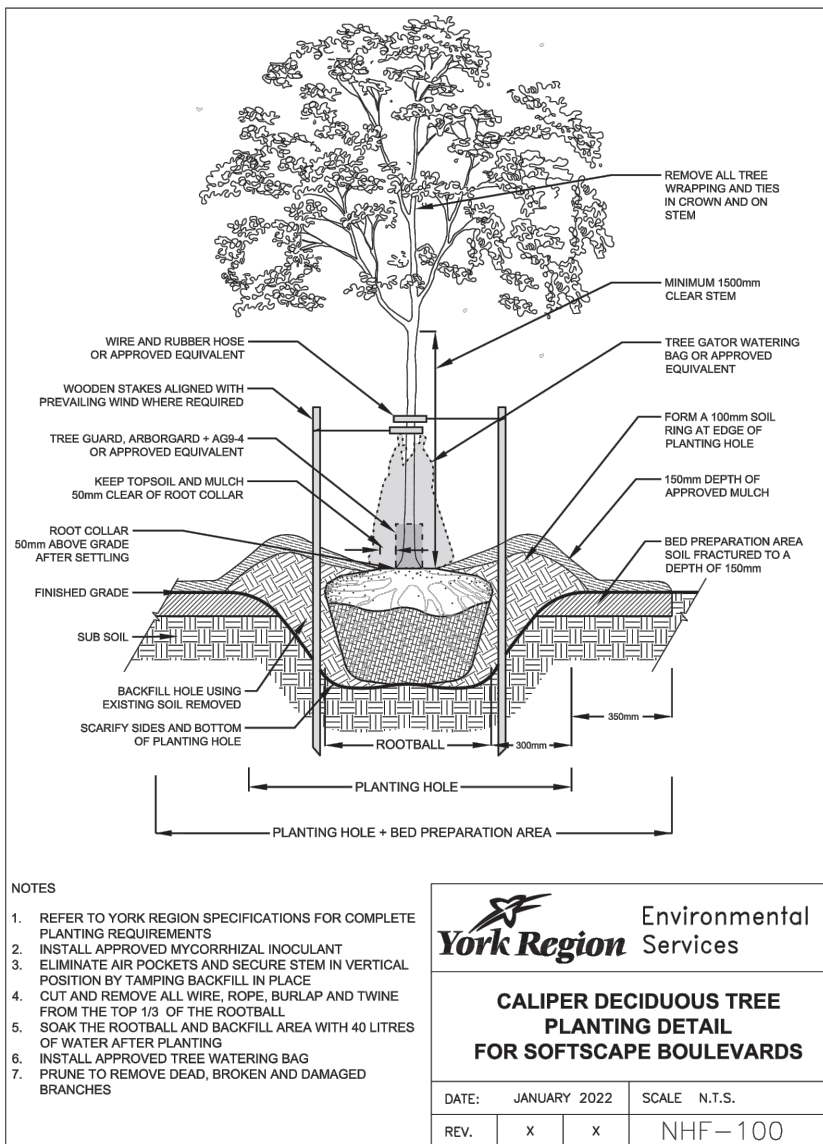
Landscape Consultant  
MHBC

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YORK REGION



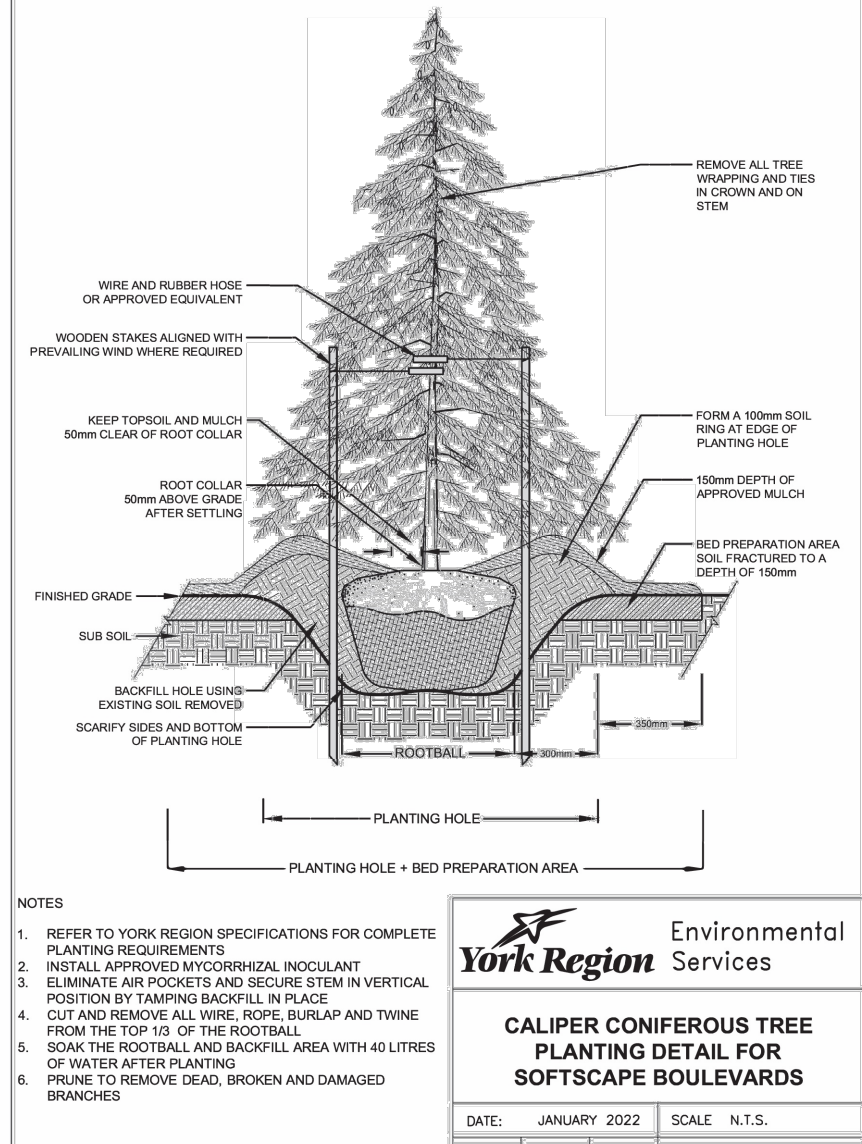
Seal & Permit



## 1 STANDARD DECIDUOUS TREE PLANTING DETAIL

NTS

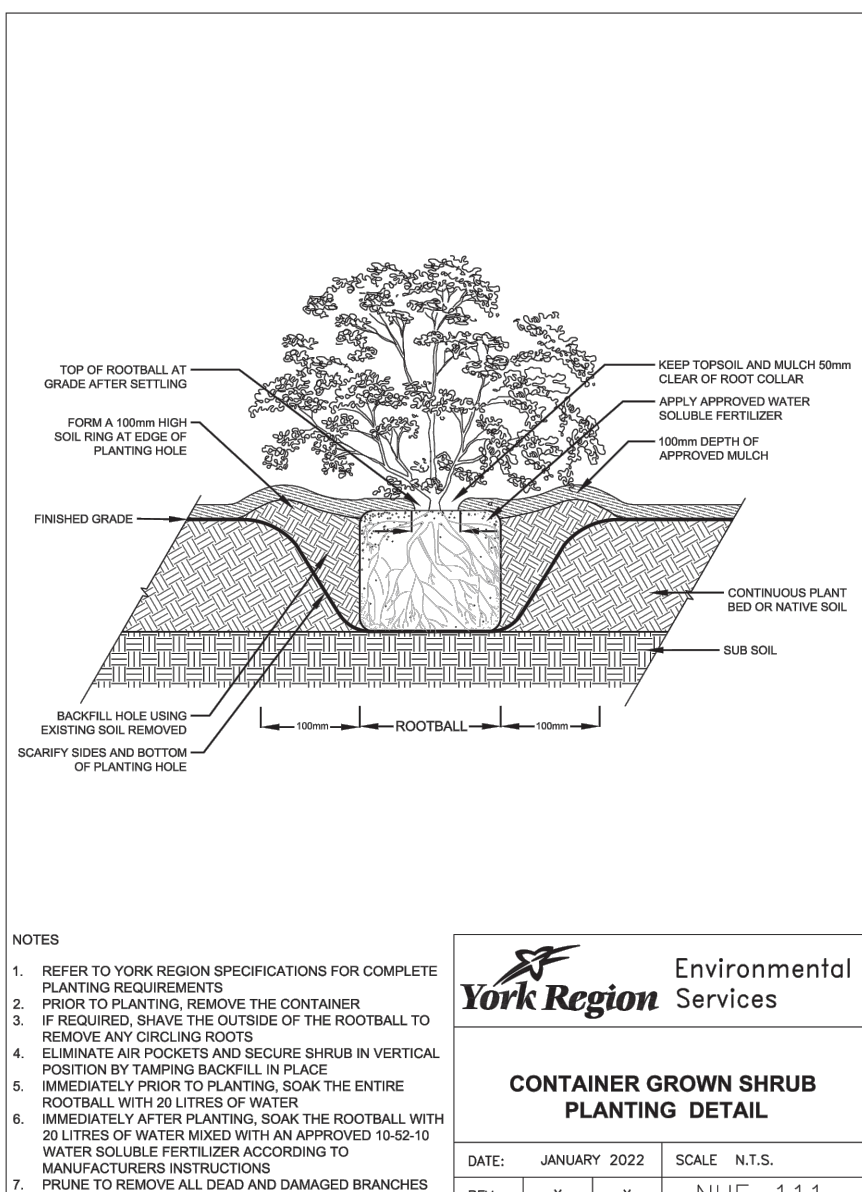
P-KIT-AYO-74



## 2 STANDARD CONIFEROUS TREE PLANTING DETAIL

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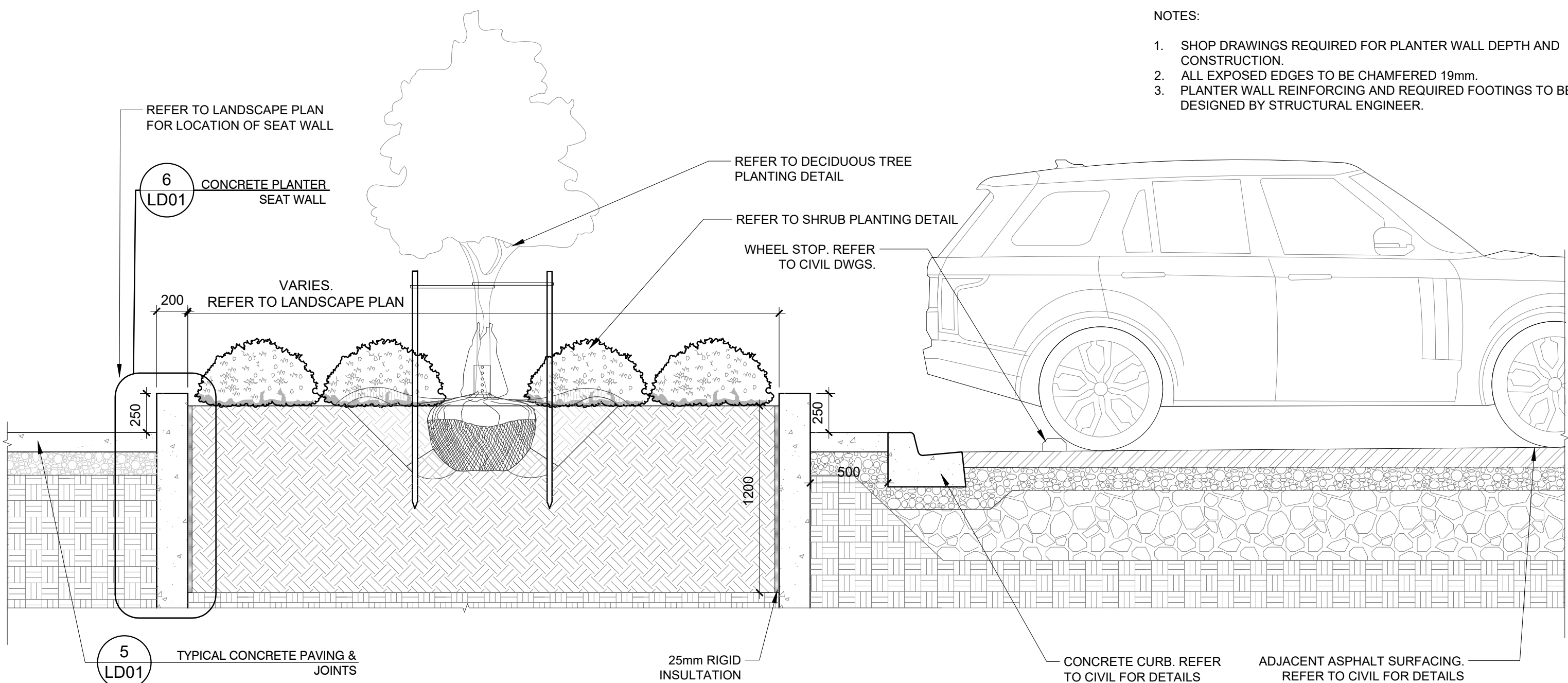
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## 3 STANDARD SHRUB/PERENNIAL PLANTING DETAIL

NTS

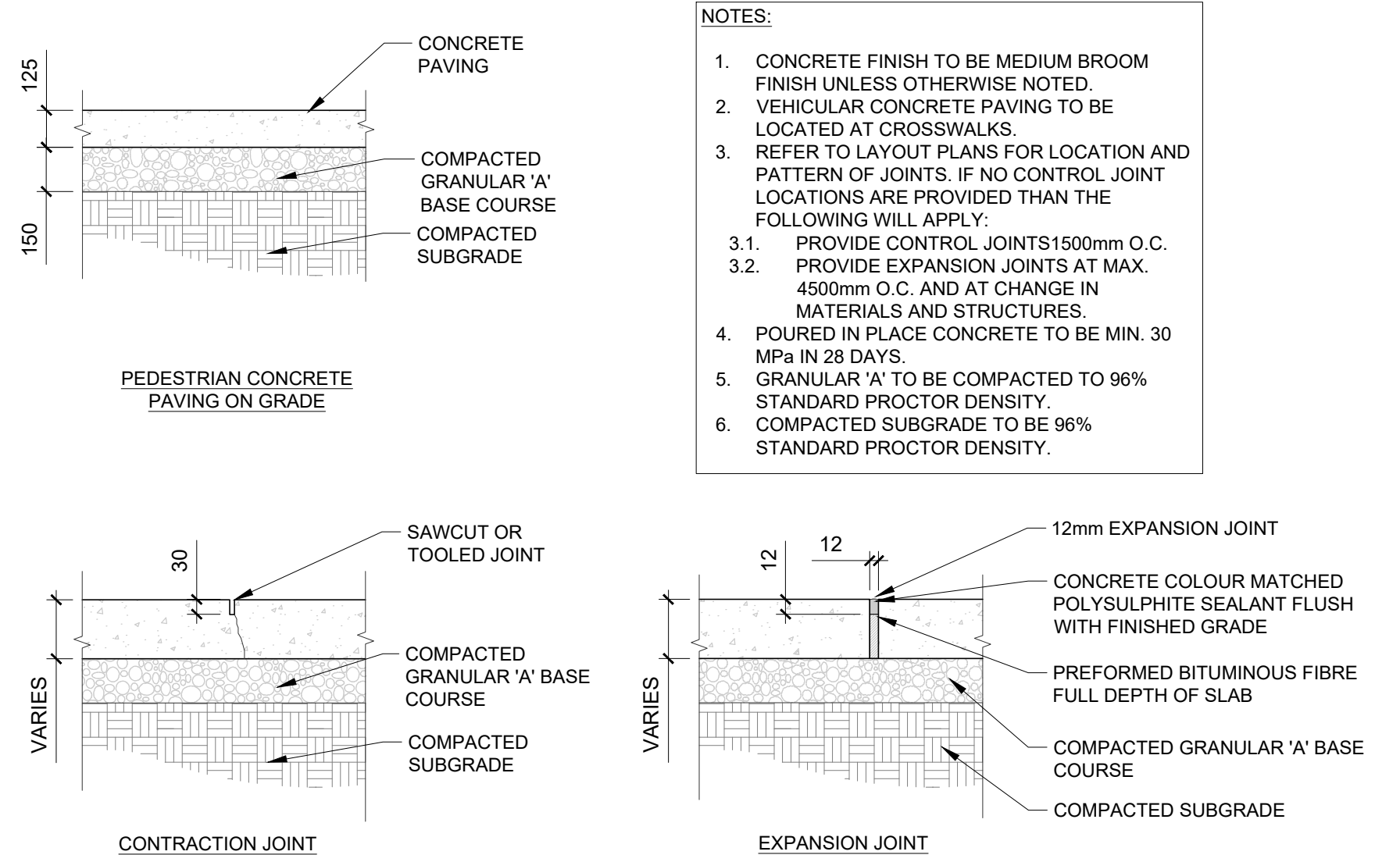
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## 4 TYPICAL PLANTER DETAIL

1:25

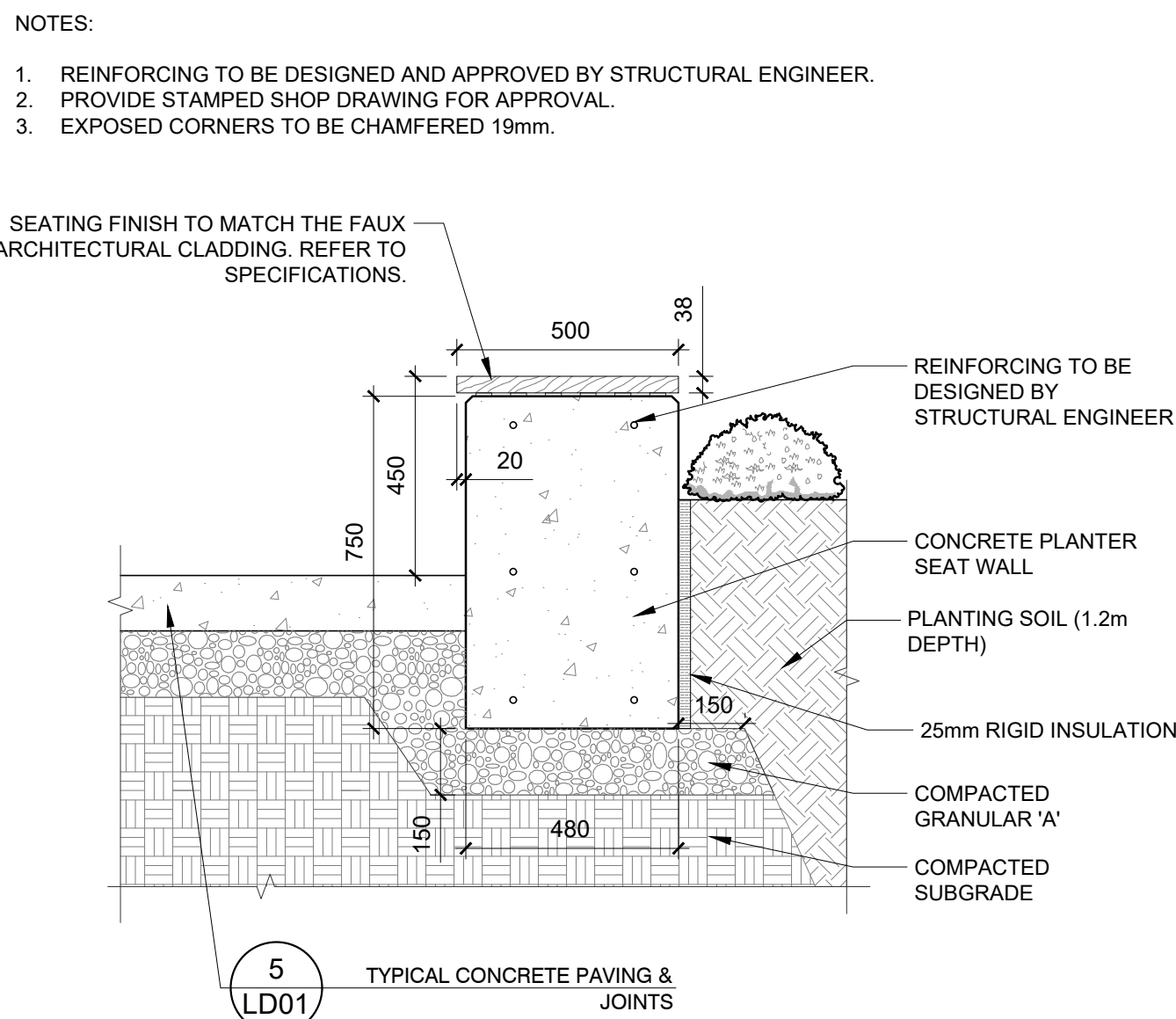
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## 5 TYPICAL CONCRETE PAVING & JOINTS

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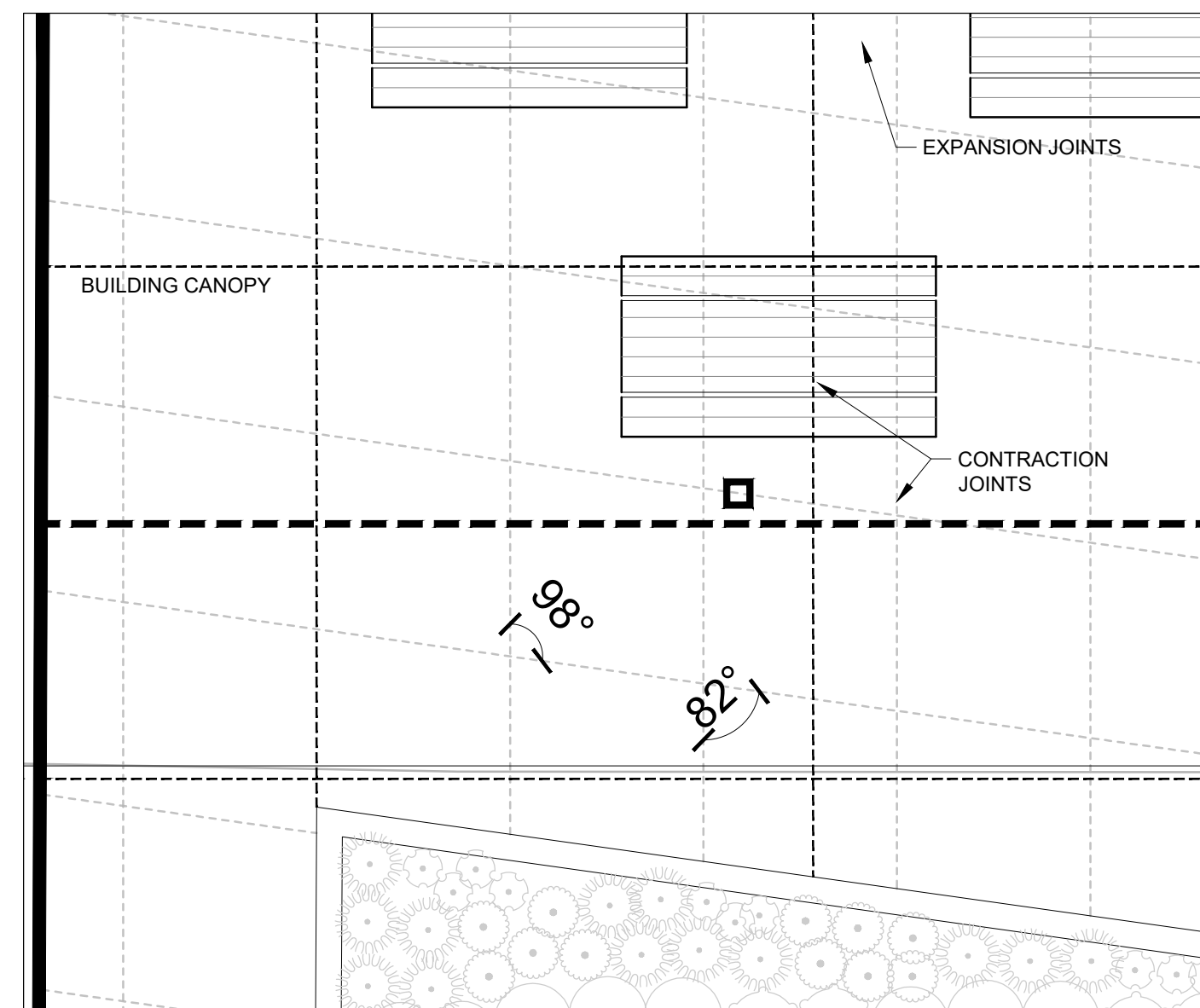
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## 6 CONCRETE PLANTER SEAT WALL

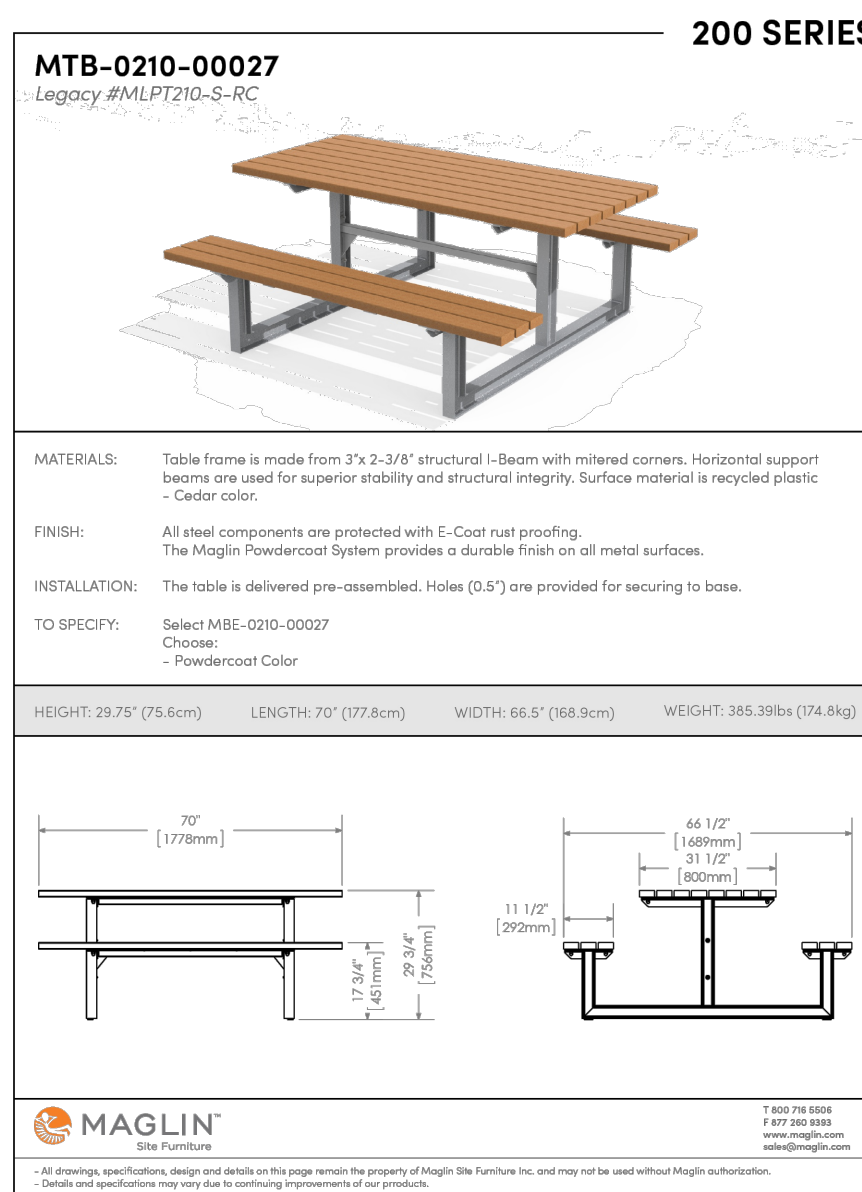
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P-KIT-AYO-78



## 7 CONTRACTION JOINT LAYOUT DETAIL

1:50



## 8 PICNIC TABLE

NTS

P-KIT-AYO-79

10	ISSUED FOR ADDENDUM 4	2025-07-18
9	REISSUED FOR TENDER	2025-05-23
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Drawing History

Scale  
AS NOTED

Region of York Project Number  
22046

Region of York Building Code  
G013-B

Project  
YORK REGION NORTH ROADS OPERATIONS CENTRE

3525 BASELINE RD. SUTTON WEST, ON L0E 1R0

Drawing Title

LANDSCAPE DETAILS

Project Number  
24247A

Drawing Number  
LD01

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Reference: ET23-1438A

July 16, 2025

Angela Ng, M.Arch.  
Intern Architect  
GEC Architect  
430-179 John Street  
Toronto, Ontario  
M5T 1X4

Email: [angela.ng@gecarchitecture.com](mailto:angela.ng@gecarchitecture.com)

Dear Angela:

## **ADDENDUM 4 - Geotechnical Investigation for Maintenance Building Expansion Road Operations Centre at 3525 Baseline Road, Sutton West, Ontario**

### **1 Introduction**

This Addendum has been prepared by Engtec Consulting Inc. ("Engtec") to provide supplemental geotechnical recommendations related to the pavement structure at the Road Operations Centre, as documented in the report titled "*Geotechnical Investigation for Maintenance Building Expansion at Road Operations Centre, 3525 Baseline Road*," submitted on December 4, 2023.

### **2 Background**

In 2023, Engtec was retained by GEC Architecture ("GEC") to conduct a geotechnical investigation in support of the proposed addition to the York Region North District Roads Maintenance Facility. The scope of the initial investigation included ten (10) boreholes advanced to depths ranging from 2.0 m to 4.5 m below existing grade or pavement. Subsurface conditions generally comprised surficial asphalt or gravel materials underlain by compact to very dense sandy silt till. Recommendations were provided for shallow foundations, slab-on-grade construction, excavation and groundwater control, seismic site classification, and preliminary pavement design. This initial report was submitted on December 4, 2023.

Subsequently, in 2024, GEC requested that Engtec undertake a second geotechnical investigation at the site of the existing Storm Water Management Ponds within the same facility. The purpose of the investigation was to support the proposed modification of the ponds to meet stormwater management requirements. Seven (7) boreholes were drilled to depths ranging from 2.0 m to 5.0 m. Subsurface soils encountered consisted of topsoil and fill materials overlying clayey silt till and sandy silt till. The second report, titled "*Geotechnical Investigation for Modification of Ponds at 3525 Baseline Road, Sutton, Ontario*", was submitted on December 6, 2024, and included recommendations related to construction considerations for McMinnows Pond, construction

considerations for Baseline Pond, swale construction and hydro cable installation. This report did not include pavement-related recommendations.

### 3 Revised Pavement Design

Following a site meeting with GEC and review of the proposed grading plan, it is understood that no grade drop is anticipated across the site (except for the grade drop of 150mm to 250mm at catch basins); however, a localized grade increases ranging from approximately 200 mm to 1000 mm (1.0 m) is expected. To accommodate the proposed grade raises and ensure suitable pavement performance, reconstruction options are presented below that are based on the magnitude of the grade increase. In all conditions, the existing asphalt (average thickness of 121 mm) must be fully removed prior to reconstruction.

The applicable reconstruction strategy would then depend on the magnitude of the grade rise:

#### 3.1 Site Condition 1 – Grade Rise is Greater Than 450 mm

- Install OPSS.MUNI 1010 (recycled crushed concrete) Granular B subbase (variable thickness to achieve design grade);
- Install 150 mm of OPSS.MUNI 1010 (recycled crushed concrete) Granular A base;
- Pave with one lift of 80 mm of Superpave SP19 – Cat C base course mix, using PG 58-28;
- Apply tack coat (SS1) to ensure proper bonding between layers as per OPSS.MUNI 1103; and
- Pave with one lift of 40 mm of Superpave SP12.5 – Cat C surface course mix, using PG 58-28.

#### 3.2 Site Condition 2 – Grade Rise is Less Than 450 mm

- Install OPSS.MUNI 1010 (recycled crushed concrete) Granular A base (variable thickness to achieve design grade);
- Pave with one lift of 80 mm of Superpave SP19 – Cat C base course mix, using PG 58-28;
- Apply tack coat (SS1) to ensure proper bonding between layers as per OPSS.MUNI 1103; and
- Pave with one lift of 40 mm of Superpave SP12.5 – Cat C surface course mix, using PG 58-28.

#### 3.3 Site Condition 3 – Grade Drop is Less Than 250 mm

- Remove existing asphalt pavement to full depth thickness.
- Proof-roll the existing granular layer using a 20 MT fully loaded tandem axle truck to identify soft or unstable zones.
- Granular materials in soft areas shall be excavated down to approximately 400 mm. The excavated areas shall be reinstated with compacted OPSS.MUNI 1010 compliant Granular 'A' material, consisting of recycled crushed concrete.
- Install ~50mm of OPSS.MUNI 1010 compliant Granular 'A' material (OPSS.MUNI 1010 compliant Granular 'A' material, consisting of recycled crushed concrete) to fine grade the surface.
- Pave with single lift of 80 mm of Superpave SP19 – Cat C base course mix, using PG 58-28.
- Apply tack coat (SS1) to ensure proper bonding between layers as per OPSS.MUNI 1103.
- Pave with single lift of 40 mm of Superpave SP12.5 – Cat C surface course mix, using PG 58-28.

These recommendations assume subgrade conditions consistent with those encountered during the 2023 geotechnical investigation.

## 4 Reuse of Excavated Granular

The Contractor is expected to salvage the excavated Granular 'A' and Granular 'B' materials and stockpile them on-site for potential reuse. The salvaged materials are expected to be reused as Granular 'B' Type I material, provided they meet the gradation and quality requirements specified in OPSS.MUNI 1010. Compliance testing shall be performed prior to reuse to confirm material suitability.

## 5 Limitations of Addendum

This Addendum is limited to addressing the pavement design implications arising from the revised grading plan. No additional fieldwork or laboratory testing was conducted as part of this update. All other recommendations in the original report remain valid unless otherwise noted. If conditions differ significantly during construction from those described in the original reports, Engtec should be contacted to review and amend the recommendations, if necessary.

## 6 Closure

This Addendum provides supplementary pavement design recommendations to support the proposed grading modifications associated with the Maintenance Building Expansion at 3525 Baseline Road. It is intended to be read in conjunction with the original reports issued on December 4, 2023, and December 6, 2024. All previously stated recommendations remain valid unless modified herein.

We trust that this submission meets your requirements. Should you have any questions, please don't hesitate to contact this office.

Yours truly,



Farid A. Khan, M.Sc., P. Eng.  
Associate  
Engtec Consulting Inc.



Salman Bhutta, Ph.D., P. Eng.  
Principal  
Engtec Consulting Inc.



## **Roadworks Specifications**

## Table of Contents

<b>OPSS 100-SERIES .....</b>	<b>12</b>
<b>Item R101 Disposal of Excavated Ditch Material [Renewal] .....</b>	<b>12</b>
<b>Item R102 Removal and Disposal of Winter Sand [Renewal] .....</b>	<b>12</b>
<b>OPSS 200-SERIES .....</b>	<b>13</b>
<b>Item R201 Roadway Ditching – Terra Seeds [Renewal] .....</b>	<b>13</b>
Item R202 Clearing and Grubbing [New Construction] .....	14
<b>Item R203 Removal of Single Trees [New Construction] .....</b>	<b>17</b>
<b>Item R204 Earth Excavation, Grading [Renewal / New Construction] .....</b>	<b>18</b>
<b>Item R205 Earth Borrow [Renewal / New Construction] .....</b>	<b>20</b>
Item R206 Unsuitable Material Removal, Disposal and Backfill <b>(Provisional)</b> [New Construction]	20
Item R207 Impacted Material Removal, Disposal and Backfill <b>(Provisional)</b> [New Construction] .	21
Item R208 Geogrid for Sub-Excavation Locations <b>(Provisional)</b> [New Construction] .....	23
Item R209 Geotextile for Sub-Excavation Locations <b>(Provisional)</b> [New Construction] .....	23
Item R210 Earth Excavation and Preparation for Boulevard Soil Trench [New Construction] .....	23
Item R211 Pruning of Trees and Woody Vegetation <b>(Cash Allowance)</b> [New Construction] .....	24
Item R212 Tree Root Exploratory Excavation by Hydro-Vac <b>(Provisional)</b> [New Construction] .....	25
Item R213 Services of Qualified Tree Professional <b>(Cash Allowance)</b> [New Construction] .....	26
<b>OPSS 300-SERIES .....</b>	<b>28</b>
<b>Item R300 Plant Produced Trial Batches for Asphalt Mix Design Approval [Renewal / New Construction] .....</b>	<b>28</b>
<b>Item R301 Superpave, Binder Course, Warm Mix Asphalt [Renewal / New Construction] .....</b>	<b>28</b>
<b>Item R302 Superpave, Surface Course, Warm Mix Asphalt [Renewal / New Construction] .....</b>	<b>28</b>
<b>Item R303 Remove and Replace Miscellaneous Superpave Hot Mix Asphalt [Renewal] .....</b>	<b>49</b>
<b>Item R304 Remove and Replace Asphalt Curb and Gutter [Renewal] .....</b>	<b>49</b>
<b>Item R305 Superpave, Surface Course, Hot Mix Asphalt [Renewal] .....</b>	<b>50</b>
<b>Item R306 Remove and Replace Miscellaneous Superpave Hot Mix Asphalt [Renewal] .....</b>	<b>50</b>
<b>Item R307 Remove and Replace Hot Mix Asphalt HL-3HS Surface Course and HL-8 Binder Course [Renewal] .....</b>	<b>52</b>
<b>Item R308 Remove and Replace Miscellaneous Hot Mix Asphalt HL-3 [Renewal] .....</b>	<b>53</b>
<b>Item R309 50 mm Superpave 12.5 Surface Course, PGAC 64-28 XJ, Category 'D' (Provisional) [Renewal] .....</b>	<b>54</b>

Item R310	Asphalt Binder Course Repair (Provisional) [Renewal]	56
Item R310A	Asphalt Binder Course Repair – Asbestos Containing Materials (Provisional) [Renewal]	56
Item R311	Aramid Reinforcing Fibers in WMA [Renewal]	57
Item R312	Geotextile Stabilized Double Chip Seal [Renewal]	58
Item R313	Double Chip Seal [Renewal]	61
Item R314	Fog Seal [Renewal]	62
Item R315	Granular Sealing [Renewal / New Construction]	65
Item R316	Type III Modified Microsurfacing [Renewal]	65
Item R317	Tack Coat [New Construction]	67
Item R317	Tack Coat (Provisional) [Renewal]	67
Item R318	Joint Sealant – Re-Instatement Tape [Renewal / New Construction]	68
Item R319	Joint Sealing Compound [Renewal / New Construction]	68
Item R320	Crack Sealing [Renewal]	69
Item R321	Crack Filling [Renewal]	69
Item R322	Routing, Cleaning and Sealing Cracks in Hot Mix Asphalt Pavement [New Construction]	77
Item R323	Full-Depth Reclamation with Expanded Asphalt Stabilization [Renewal]	79
Item R324	Corrective Aggregate [Renewal]	79
Item R325	Performance Graded Asphalt Cement [Renewal]	79
Item R326	Hydrated Lime [Renewal]	79
Item R327	Granular A – Roadway [New Construction]	81
Item R327	Granular A – Entrances [New Construction]	81
Item R327	Granular A – Boulevard [New Construction]	81
Item R327	Granular A – Shoulders [New Construction]	81
Item R328	Granular B – Roadway [New Construction]	81
Item R328	Granular B – Entrances [New Construction]	81
Item R328	Granular B – Boulevard [New Construction]	81
Item R329	Removal, Preparation and Regrading of Existing Shoulders [Renewal]	83
Item R330	Granular ‘A’ Shoulders and Entrances [Renewal]	84
Item R331	Full Depth Granular Base Repair (Provisional) [Renewal]	86
Item R332	Full Depth Granular Sub-Base Repair (Provisional) [Renewal]	86
Item R333	Temporary Asphalt SP 12.5 Sidewalk and Transit Pads [New Construction]	87

<b>Item R334</b>	<b>Concrete Curb and Gutter – All Types</b> [Renewal / New Construction] .....	88
<b>Item R335</b>	<b>Concrete Sidewalk – All Types</b> [Renewal / New Construction] .....	88
<b>Item R336</b>	<b>Tactile Walking Surface Indicator (TWSI) Plates for Concrete Sidewalk Ramps</b> [Renewal / New Construction] .....	90
<b>Item R337</b>	<b>Concrete Slab Raised Median</b> [Renewal / New Construction] .....	91
<b>Item R338</b>	<b>Concrete Bus Shelter Pad and Passenger Standing Area</b> [New Construction] .....	92
<b>Item R339</b>	<b>Remove and Restore Interlocking Brick Boulevard</b> [Renewal] .....	94
<b>Item R340</b>	<b>Concrete Curb and Gutter Outlets – All Types</b> [Renewal / New Construction] .....	94
<b>OPSS 400-SERIES</b> .....		95
<b>Item R401</b>	<b>Pipe Subdrains</b> [Renewal / New Construction] .....	95
<b>Item R402</b>	<b>Adjust Maintenance Holes, Catch Basins and Valve Chambers</b> [Renewal / New Construction] .....	96
<b>Item R403</b>	<b>Rebuild Maintenance Holes, Catch Basins and Valve Chambers</b> [Renewal / New Construction] .....	96
<b>Item R404</b>	<b>Adjust Water Valves</b> [Renewal / New Construction] .....	97
<b>Item R405</b>	<b>Replace Frames and Grates for Maintenance Holes, Catch Basins and Valve Chambers</b> [Renewal / New Construction] .....	98
<b>Item R406</b>	<b>Supply/Replace and Adjust Rectangular Frame with Two-Piece Cover</b> [Renewal] .....	98
<b>Item R407</b>	<b>Catch Basins including Frame and Grate/Cover</b> [Renewal / New Construction] .....	100
<b>Item R408</b>	<b>Double Catch Basins including Frame and Grate/Cover</b> [Renewal / New Construction] ..	100
<b>Item R409</b>	<b>Ditch Inlets including Frame and Grate/Cover</b> [Renewal / New Construction] .....	100
<b>Item R410</b>	<b>Maintenance Holes including Frame and Grate/Cover</b> [Renewal / New Construction]	100
<b>Item R411</b>	<b>Maintenance Hole Drop Structure</b> [New Construction] .....	101
<b>Item R412</b>	<b>Break into Existing Maintenance Hole, Catch Basin or Sewer</b> [New Construction] ....	102
<b>Item R413</b>	<b>Oil/Grit Separator – Location and Size</b> [New Construction] .....	102
<b>Item R414</b>	<b>Storm Sewer</b> [Renewal / New Construction] .....	105
<b>Item R415</b>	<b>CCTV Inspection of Storm Sewers</b> [New Construction] .....	108
<b>Item R416</b>	<b>Remove and Replace Damaged Storm Sewer Pipe</b> [Renewal] .....	108
<b>Item R417</b>	<b>Flush, Clean and Inspect Existing Storm Sewers</b> [Renewal] .....	110
<b>Item R418</b>	<b>Concrete Headwall for Pipes Less than 900 mm including Grate (OPSD 804.030)</b> [New Construction] .....	111
<b>Item R419</b>	<b>Concrete Headwall with Grate and Chain Link Fence (OPSD 804.040)</b> [New Construction] .....	111
<b>Item R420</b>	<b>Entrance Culverts – 525 mm Dia., Type, Class</b> [New Construction] .....	112



Item R421	Remove and Replace Driveway Culvert [Renewal].....	112
Item R422	Remove and Replace Pipe Culverts [Renewal] .....	113
Item R423	Road Culverts – Size, Type, Class [New Construction] .....	115
Item R424	Reline Pipe Culvert with Fold and Form HDPE Pipe Liners [Renewal] .....	116
Item R425	Reline Pipe Culvert with Snap-Tite HDPE Pipe [Renewal].....	117
OPSS 500-SERIES	.....	118
Item R501	Removal of Asphalt Pavement – Full Depth (100 mm) [New Construction].....	118
Item R501	Removal of Asphalt Pavement – Full Depth (100 mm) [Renewal] .....	118
Item R502	Removal of Asphalt Pavement – Partial Depth (50 mm) [Renewal / New Construction] . .....	120
Item R503	Removal of Asphalt Pavement at New Median – Partial Depth (40 mm) [Renewal]..	122
Item R504	Removal of Asphalt Pavement at Structures – Partial Depth (40 mm) [Renewal].....	122
Item R505	Removal of Asphalt Sidewalk [Renewal / New Construction] .....	123
Item R506	Removal of Concrete Curb and Gutter – All Types [New Construction] .....	123
Item R506	Removal of Concrete Curb and Gutter – All Types [Renewal].....	123
Item R507	Removal of Concrete Sidewalk/Median Island [Renewal].....	124
Item R508	Removal of Concrete Sidewalk [New Construction] .....	124
Item R509	Removal of Median Island [New Construction].....	124
Item R510	Removal of Unit Pavers [New Construction] .....	125
Item R510a	Removal of Unit Paver Crosswalks within Roadway [Renewal].....	125
Item R511	Removal of Concrete Bus Pads [New Construction] .....	126
Item R512	Removal of Pipe Subdrains [New Construction].....	126
Item R513	Removal of Maintenance Holes, Catch Basins and Ditch Inlets [New Construction] ..	126
Item R514	Removal of Pipes and Culverts [Renewal / New Construction] .....	126
Item R515	Abandon Sewers and Laterals [New Construction] .....	127
Item R516	Removal of Concrete – Headwall, Toe Wall [New Construction] .....	127
Item R517	Removal of Rip Rap [New Construction] .....	127
Item R518	Removal of Gabions [New Construction] .....	127
Item R519	Removal of Three-Cable Guide Rail [Renewal / New Construction] .....	128
Item R520	Removal of Anchor Blocks [Renewal / New Construction] .....	128
Item R521	Removal of Steel Beam Guide Rail [Renewal / New Construction].....	128
Item R522	Removal of Energy Attenuators [Renewal / New Construction].....	128
Item R523	Removal of Fence – All Types [New Construction] .....	129

Item R524	Removal of Noise Barriers – All Types [New Construction]	129
Item R525	Relocate Canada Post Super Box on New Concrete Pad [New Construction]	129
Item R526	Rip Rap Stone with Geotextile [Renewal / New Construction]	130
Item R527	River Run Stone [New Construction]	130
Item R528	Removal of Concrete Barrier [Renewal]	132
Item R530	Cold Wet Mill and Disposal of Asphalt Pavement Containing Asbestos – Partial/Full Depth [Renewal]	132
Item R531	Cold Wet Mill and Disposal of Asphalt Pavement Containing Asbestos – Partial/Full Depth [Renewal]	132
OPSS 700-SERIES		136
Item R701	Supply and Install Steel Beam Guide Rail [Renewal / New Construction]	136
Item R702	Steel Beam Guide Rail Structure Connections [Renewal / New Construction]	136
Item R703	Supply and Install Guide Rail End Treatment [Renewal / New Construction]	136
Item R704	Bicycle Railing [New Construction]	138
Item R705	Pedestrian Barricade [Renewal / New Construction]	138
Item R706	Temporary Concrete Barriers [New Construction]	139
Item R707	Temporary Concrete Barriers, Relocation [New Construction]	139
Item R708	Energy Attenuator – Temporary – Type [New Construction]	139
Item R709	Energy Attenuator – Relocation – Type [New Construction]	139
Item R710	Construction Fence [New Construction]	139
Item R711	Highway Fence [New Construction]	140
Item R712	Chain Link Fence [New Construction]	140
Item R713	Chain Link Gate [New Construction]	140
Item R714	Wildlife Fence – Large Animals [New Construction]	141
Item R715	Wildlife Fence – Small Animals [New Construction]	143
Item R716	Cast in Place Concrete Barrier [Renewal]	143
OPSS 800-SERIES		145
Item R801	Restoration of Topsoil and Sod (Provisional) [Renewal]	145
Item R802	Topsoil [New Construction]	145
Item R803	Sodding [New Construction]	146
Item R804	Seeding and Erosion Control Blanket [New Construction]	146
Item R805	Supply and Install Engineered Growing Media for Planting [New Construction]	148
Item R806	Barrier for Tree Protection [New Construction]	156

<b>Item R807</b>	<b>Filter Sock Fiber Rolls – 600 mm</b>	<b>[Renewal / New Construction]</b>	.....	<b>157</b>
<b>Item R808</b>	<b>Filter Sock Fiber Roll Check Dams – 600 mm</b>	<b>[Renewal / New Construction]</b>	.....	<b>157</b>
<b>Item R809</b>	<b>Silt Barrier Socks for Catch Basin Inlet Protection</b>	<b>[Renewal]</b>	.....	<b>160</b>
<b>MISCELLANEOUS</b> .....				<b>160</b>
<b>Item R901</b>	<b>Hydro-Vac Test Holes</b>	<b>(Provisional)</b>	<b>[Renewal]</b> .....	<b>160</b>
<b>Item R902</b>	<b>Expose Existing Utilities by Hydro-Vac</b>	<b>(X m – X m deep)</b>	<b>(Provisional)</b> [New Construction]	<b>160</b>
<b>Item R903</b>	<b>Unshrinkable Fill</b>	<b>(Provisional)</b>	<b>[New Construction]</b> .....	<b>161</b>
<b>Item R904</b>	<b>Insulate Storm Sewer</b>	<b>[New Construction]</b>	.....	<b>161</b>
<b>Item R905</b>	<b>Well Abandonment</b>	<b>[New Construction]</b>	.....	<b>162</b>
<b>Item R906</b>	<b>Remove and Re-Instate Mail and Paper Boxes</b>	<b>[New Construction]</b>	.....	<b>162</b>

## ROADWORKS SPECIFICATIONS – GENERAL

### Abbreviations

When the following abbreviations are used in the Roadworks Specifications, they shall have the following meanings:

AADT	Annual Average Daily Traffic
AASHTO	American Association of State Highway and Transportation Officials
AC	Asphalt Cement
ANSI	American National Standards Institute
ASTM	ASTM International
AWWA	American Water Works Association
BBR	Extended Bending Beam Rheometer Method
DENT	Double Edge Notched Tension Test
C	Celsius
CCTV	Closed-Circuit Television
CD-ROM	Compact Disc, Read -Only -Memory
CEC	Cation Exchange Capacity
CGL	Commercial General Liability
CGSB	Canadian General Standards Board
CHBDC	Canadian Highway Bridge Design Code
cm	centimetre
CSA	Canadian Standards Association (or CSA Group)
CSP	Corrugated Steel Pipe
DBH	Diameter at Breast Height
DFC	Dense Friction Course
DFO	Fisheries and Oceans Canada
DSM	Designated Sources for Materials
EAM	Expanded Asphalt Material
EC	Electrical Conductivity
ESCP	Erosion and Sediment Control Plan
FM	Fineness Modulus



FOB	Freight on Board
GPS	Global Positioning System
GWMP	Ground Water Management Plan
GST/HST	Goods and Services Tax/Harmonized Sales Tax
HDBC	Heavy Duty Binder Course
HDPE	High Density Polyethylene
HEPA	High-Efficiency Particulate Air
HMA	Hot Mix Asphalt
IHSA	Infrastructure Health & Safety Association
ISA	International Society of Arboriculture
ITE	Institute of Transportation Engineers
ITS	Intelligent Transportation System
km	kilometre
kPA	kilopascals
LSRCA	Lake Simcoe Region Conservation Authority
m	metre
mm	millimetre
MASH	AASHTO Manual for Assessing Safety Hardware
MECP	Ministry of Environment, Conservation and Parks (Ontario) (formerly MOECC)
MNRF	Ministry of Natural Resources and Forestry (Ontario)
MOECC	Ministry of the Environment and Climate Change (Ontario)
MOL	Ministry of Labour (Ontario)
MSCR	Multiple Stress Creep Recovery Test
MTO	Ministry of Transportation (Ontario)
N	Newton
NASTT	North American Society for Trenchless Technology
NTCIP	National Transportation Communications for ITS Protocol
NURP	National Urban Runoff Program
OCIP	Owner Controlled Insurance Program
OCPA	Ontario Concrete Pipe Association
OMAFRA	Ministry of Agriculture, Food and Rural Affairs (Ontario)

OPS	Ontario Provincial Standard
OPSD	Ontario Provincial Standard Drawing
OPSS	Ontario Provincial Standard Specification
PG	Performance Graded
PGAC	Performance Graded Asphalt Cement
PE	Polyethylene
PPA	Polyphosphoric Acid
PTTW	Permit to Take Water
PVC	Polyvinyl Chloride
QA	Quality Assurance
RAP	Reclaimed Asphalt Pavement
RCM	Reclaimed Concrete Material
ROW	Right-of-Way
RSC	Revised Statutes of Canada
RSO	Revised Statutes of Ontario
SAR	Sodium Absorption Ratio
SB	Styrene Butadiene
SBR	Styrene Butadiene Radial
SBS	Styrene Butadiene Styrene
SC	Statutes of Canada
SDLC	Synchronous Data Link Control
SDR	Standard Dimension Ratio
SPMDD	Standard proctor maximum dry density
SMA	Stone Mastic Asphalt
SO	Statutes of Ontario
TCP	Traffic Control Persons
TPZ	Tree Protection Zone
TRCA	Toronto and Region Conservation Authority
TSS	Total Suspended Solids
TWSI	Tactile Walking Surface Indicator
USB	Universal Serial Bus

VFA                Voids Filled with Asphalt

WMA              Warm Mix Asphalt

## ROADWORKS SPECIFICATIONS – ITEMS

### DESIGNER NOTES:

Item cross-references are highlighted in blue. Please ensure that all cross-referenced items are included in contract.

Information highlighted in green represent sample language that may need to be revised to suit your contract requirements and/or provides user instructions.

Item names are highlighted to aid in assembly of renewal program specifications.

[Renewal], [Renewal / New Construction] and [New Construction] labels are added to item descriptions to differentiate item use.

### OPSS 100-SERIES

#### **Item R101 Disposal of Excavated Ditch Material [Renewal]**

*This Specification shall be read in conjunction with OPSS.MUNI 180 (Nov 2021).*

This item is for the disposal of excavated ditch material identified as having an exceedance of electrical conductivity and sodium adsorption ratio with respect to O. Reg. 153/04 (Records of Site Condition) and O. Reg. 406/19 (On-Site and Excess Soil Management) under the Ontario *Environmental Protection Act*.

**180.09 MEASUREMENT FOR PAYMENT** is added as follows:

#### **180.09 MEASUREMENT FOR PAYMENT**

Measurement for payment shall be per cubic metre (m<sup>3</sup>) of excavated ditch material disposed of off Site as evidenced by weigh scale tickets.

**180.10 BASIS OF PAYMENT** is amended by the addition of the following:

Payment shall be made at the unit price and shall be full compensation for all labour, equipment and materials necessary to complete the work as specified.

#### **Item R102 Removal and Disposal of Winter Sand [Renewal]**

*This Specification shall be read in conjunction with OPSS.MUNI 180 (Nov 2021).*

At the locations where guide rail is removed, the Contractor shall clean-up and remove all winter sand, debris and other deleterious materials from the Site prior to placing asphalt on the unpaved shoulders and rounding's adjacent to the new guide rail systems under **[Select the applicable item]** Item R303 – Remove and Replace Miscellaneous Superpave Warm Mix Asphalt / Item R306 – Remove and Replace Miscellaneous Superpave Hot Mix Asphalt.

The material removed under this item may have an exceedance of electrical conductivity and sodium adsorption ratio with respect to O. Reg. 153/04 (Records of Site Condition) under the Ontario *Environmental Protection Act*.



In order to prevent the winter sand, debris and deleterious materials from entering any watercourse, the materials shall be removed and disposed of at waste locations as specified in OPSS.MUNI 180.

**180.09 MEASUREMENT FOR PAYMENT** is added as follows:

**180.09 MEASUREMENT FOR PAYMENT**

Measurement for payment shall be per tonne (t) of winter sand, debris and other deleterious materials removed from the Site as evidenced by weigh scale tickets.

**180.10 BASIS OF PAYMENT** is amended by the addition of the following:

Payment shall be made at the unit price and shall be full compensation for all labour, equipment and materials necessary to complete the work as specified.

**OPSS 200-SERIES**

**Item R201 Roadway Ditching – Terra Seeds [Renewal]**

*This Specification shall be read in conjunction with OPSS.MUNI 180 (Nov 2021) and OPSS.MUNI 206 (Apr 2019).*

**206.01 SCOPE** is deleted in its entirety and replaced with the following:

**206.01 SCOPE**

Under this item, the Contractor shall excavate, grade and restore roadway ditches along [Road Name] in accordance with OPSS.MUNI 206.

All exposed ditch areas shall be restored with topsoil and a 50 mm depth of terra seed mix within seven (7) Days of completion of the ditching operations, except for those areas to be restored with sod under **Item R801 – Restoration of Topsoil and Sod**, as identified by the Owner.

Erosion and sediment control measures including, but not limited to, filter sock fiber rolls are required prior to, and during, construction.

All roadway ditching related activities must be completed in accordance with the pending [Conservation Authority] permit.

Unless indicated otherwise in the Contract Documents, all surplus or unsuitable excavated materials shall be disposed of in accordance with O. Reg 406/19 (On-Site and Excess Soil Management) under the Ontario *Environmental Protection Act* and **SC 16 – On-Site and Excess Soil Management of the Supplementary Conditions**.

**206.09 MEASUREMENT FOR PAYMENT** is deleted in its entirety and replaced with the following:

**206.09 MEASUREMENT FOR PAYMENT**

Measurement for payment shall be per square metre (m<sup>2</sup>) of roadway ditching completed.

**206.10 BASIS OF PAYMENT** is deleted in its entirety and replaced with the following:

**206.10 BASIS OF PAYMENT****Roadway Ditching – Item**

Payment shall be made at the unit price and shall be full compensation for all labour, equipment and materials necessary to complete the work as specified. Environmental protection required for this work shall be deemed to be covered under **Item G4 – Environmental Protection**.

**Item R202 Clearing and Grubbing [New Construction]**

*This Specification shall be read in conjunction with OPSS.MUNI 201 (Apr 2019).*

This item is for the clearing of all trees, except for the single trees identified under **Item R203 – Removal of Single Trees**, and the grubbing of all trees removed under the Contract.

**201.07.01 GENERAL** is amended by the addition of the following:

Adjacent property owners may receive timber from cut trees if they request it in advance or at the time of cutting. The Contractor shall cut the timber into eight (8) foot maximum lengths. Cut timber shall be removed from the road allowance and placed near the owner's buildings as soon as possible to avoid theft.

**The following owners have indicated that they want to receive timber from cut trees:**

- **Designer to insert names and location, if applicable**

An owner who has previously requested to receive timber may decide to accept part or none of the timber at a later date. No claims for damages will be considered if an owner changes their initial request.

Any damage caused by the Contractor's operations to adjacent property shall be the responsibility of the Contractor. Any debris, mud or other material deposited on the roadway by the Contractor shall be removed immediately. Any damage to the existing roadway shall be repaired by the Contractor to the satisfaction of the Owner.

**201.07.07 MANAGEMENT OF EXCESSS MATERIAL** is amended by the addition of the following:

All excess materials generated by clearing and grubbing activities shall become property of the Contractor and shall be disposed of outside the Contract limits at no additional cost to the Owner. The Contractor shall be responsible for obtaining all necessary written approvals from the appropriate landowners and various environmental and municipal agencies required for the disposal of such materials.

For individual stumps that are not part of a row or group of trees and where the tree has been cut prior to measuring for clearing or has been removed under **Item R203 – Removal of Single Trees**, the areas provided in Table 1 shall be used for determining the areas for payment.

**TABLE 1**  
**Grubbing Area for Stumps (Based on the Average Area**  
**of Trees of the Same Diameter)**

<b>Dia. (mm)</b>	<b>Area (m<sup>2</sup>)</b>	<b>Dia. (mm)</b>	<b>Area (m<sup>2</sup>)</b>
25	5	800	140
50	10	825	149
75	16	850	157
100	21	875	166
125	25	900	175
150	31	925	184
175	36	950	200
200	42	975	216
225	45	1,000	232
250	47	1,025	248
275	50	1,050	264
300	53	1,075	280
325	57	1,100	292
350	61	1,125	304
375	66	1,150	315
400	70	1,175	327
425	75	1,200	339
450	79	1,225	350
475	82	1,250	360

**TABLE 1**  
**Grubbing Area for Stumps (Based on the Average Area**  
**of Trees of the Same Diameter)**

Dia. (mm)	Area (m <sup>2</sup> )	Dia. (mm)	Area (m <sup>2</sup> )
500	85	1,275	371
525	88	1,300	381
550	91	1,325	391
575	94	1,350	401
600	96	1,375	412
625	102	1,400	422
650	108	1,425	432
675	114	1,450	442
700	120	1,475	452
725	126	1,500	463
750	131	1,525	473
775	136	1,550	483

### **Restrictions on Open Burning**

Open burning is prohibited on this Contract.

### **Federal Migratory Bird Legislation**

The Contractor shall comply with all applicable requirements of the federal *Migratory Birds Convention Act, 1994* when performing the Work under the Contract. Tree clearing is permitted between [specify dates].

### **Measurement for Payment**

Measurement for payment shall be per square metre (m<sup>2</sup>) of area cleared and grubbed.

Grubbing of individual trees removed under **Item R203 – Removal of Single Trees** will be measured for payment.

### **Basis of Payment**



Payment shall be made at the unit price and shall be full compensation for all labour, equipment and materials necessary to complete this work as specified.

### **Item R203    Removal of Single Trees [New Construction]**

*The following Standard Drawings are applicable to the above item: NHF-400, NHF-401, NHF-402, NHF-404 and NHF-405.*

*This Specification shall be read in conjunction with OPSS.MUNI 180 (Nov 2021), OPSS.MUNI 201 (Apr 2019) and OPSS.MUNI 510 (Nov 2018).*

An assessment of the trees impacted by the road improvements was undertaken and documented in [provide name of Arborist report / drawings, consultant, date].

This item is for the removal of trees that meet either of the following criteria:

- Trees individually surveyed and marked for removal on the Drawings and/or as identified in the Arborist Report.
- Street trees irrespective of size, age or species planted within the Owner's road allowance. A street tree may or may not display obvious signs of planting, such as stakes, tree guards, mulch bed or other indicators.

Removal of trees that are equal to, or less than, 150 mm in diameter at breast height and as shown in clearing and grubbing areas on the Drawings is included under **Item R202 – Clearing and Grubbing**.

The Contractor shall implement the following procedures:

- Trees designated for removal must be clearly marked in the field with the letter 'R' using orange or red high-visibility spray paint at DBH height (1.37 m) and at the base of the stem (stump height).
- Tree Protection Zone (TPZ) barriers shall be installed around trees to be protected in advance of tree removal in accordance with NHF-400 unless the barriers would interfere with completion of the approved tree removal. Payment for installation of tree protection barriers will be made under **Item R806 – Barrier for Tree Protection**.
- All work performed within a TPZ requires a Qualified Tree Professional to be on Site during removals. Payment for work performed by Qualified Tree Professional will be made under **Item R213 – Services of Qualified Tree Professional (Cash Allowance)**.
- Root zone compaction protection and tree stem protection shall be installed if vehicles and/or large equipment used for tree removal (e.g. bucket truck, woodchipper, etc.) will encroach upon the minimum required TPZs of trees to be retained, in accordance with NHF-404 and NHF-405.

All reasonable efforts shall be made to minimize the number of trees removed. Removal of additional trees shall not be undertaken without prior written approval from the Owner.

**510.07.10 Management of Excess Material** is amended by the addition of the following:

The disposal of all surplus and/or unsuitable material shall be the responsibility of the Contractor in accordance with OPSS.MUNI 180. No separate payment will be considered for the disposal of the surplus and/or unsuitable material, regardless of the amount.

**201.09.01 Actual Measurement** is amended by the addition of the following:

**Removal of Single Trees**

Measurement for payment shall be a count of each tree removed.

**201.10.01 Basis of Payment** is amended by the addition of the following:

**Removal of Single Trees – Item**

Payment shall be made at the unit price and shall be full compensation for all labour, equipment and materials necessary to complete this work as specified.

**Item R204 Earth Excavation, Grading [Renewal / New Construction]**

*This Specification shall be read in conjunction with OPSS.MUNI 180 (Nov 2021) and OPSS.MUNI 206 (Apr 2019).*

*The Contractor shall comply with the on-site and excess soil requirements of O. Reg. 406/19 (On-Site and Excess Soil Management) under the Ontario Environmental Protection Act and **SC 16 – On-Site and Excess Soil Management of the Supplementary Conditions**.*

**206.07.01.04.01 Tolerances for Earth** is amended by the addition of the following:

A grading tolerance of  $\pm 30$  mm is specified for subgrade construction. As this is a working tolerance only, it is expected that the Contractor will use it as such and not keep the subgrade consistently low to replace granular material paid for by the cubic metre ( $m^3$ ).

The roadway surfaces shall be maintained to the grades, tolerances and densities currently in place until the surfaces are covered with granular materials. Any marks, ruts or indentations in the subgrade caused by vehicles, equipment or any other cause shall be removed/rectified prior to placing granular materials.

**206.07.03.1.03 Excavation Below Subgrade** is amended by deleting the first sentence and replacing it with the following:

All unsuitable materials under the roadway platform and within 1.2 m of the final grade, other than material excavated from swamps, shall be removed below subgrade as indicated by the Owner and disposed of in accordance with the requirements of subsection 206.07.03.05. The roadway platform for an urban section is defined to be from the back of the curb to the back of the curb on the opposite side of the road, and for a rural cross section to be from the edge of the shoulder to the edge of the shoulder on the opposite side of the road.

**206.07.03.05 Management of Excavated Material** is amended by the addition of the following:

Unless indicated otherwise in the Contract Documents, all surplus or unsuitable excavated materials shall be disposed of in accordance with O. Reg 406/19 (On-Site and

Excess Soil Management) under the Ontario *Environmental Protection Act* and **SC 16 – On-Site and Excess Soil Management of the Supplementary Conditions.**

Surplus material placed outside the road allowance shall be placed in a neat and workmanlike manner so as not to cause a nuisance to the Owner, the Local Municipality or private property owners.

**206.07.03.06 Provision for Temporary Cover** is amended by the addition of the following:

Cut or fill slopes that may be left without vegetative cover/erosion control blanket for more than 30 Days shall be treated with temporary hydraulic mulch, erosion control blanket or vegetative cover. No additional payment will be made for this work. All costs associated with this work shall be included in the unit price for this item.

**206.07.04.01.02 Layer Compaction Method** is amended by the addition of the following to the second paragraph:

When the moisture content is too high, it shall be reduced by mixing dry material with the wet material or by drying the wet material by blading, discing or other Owner-approved methods. When the moisture content is too low, it shall be raised to the optimum moisture content by the addition of water.

No additional payment will be made for drying or adding water to embankment construction material.

**206.08 Quality Assurance** is amended by the addition of the following:

The Owner may conduct random quality assurance checks on the completed subgrade using a level and rod. When requested, the Contractor shall provide the services of a person to assist the Owner in checking the grade.

**206.09.01.01 Earth Excavation, Grading** is amended by the addition of the following:

If excavation is carried out without the approval of the Owner, no payment will be made for the additional excavation.

Excavation additions or deletions shall be calculated from field tape measurements/elevations agreed to by the Owner and the Contractor.

No quantities have been, or will be, included for payment for any cut in boulevards for the placement of topsoil and sod and for the placement of sidewalk. Likewise, no reduction has been made in the quantity of fill (borrow where applicable) for boulevards for the placement of sidewalk, topsoil and sod. The Contractor shall make allowance for this work in the appropriate Contract unit prices.

No quantities have been included for any driveway excavation or fill where the difference between the existing driveway grade and the proposed driveway subgrade at the slope limit of the roadway is 30 cm or less and no measurement will be made for such work. The Contractor shall carry out this work and the cost of this work shall be included in the unit price for this item.

When requested by the Owner, the Contractor shall proof roll the subgrade with a heavy, non-vibratory, compaction unit and the cost of this work shall be included in the unit price for this item.

**206.09.02 Plan Quantity Measurement** is amended by the addition of the following:

The Contractor may dispute the quantity which is specified for payment on a plan quantity basis. Where there is a dispute, it shall be supported by calculations, elevations and any other evidence indicating why the plan quantity is believed to be in error. If the plan quantity is found to be in error, payment will be made in accordance with the adjusted plan quantity.

**Item R205 Earth Borrow [Renewal / New Construction]**

*This Specification shall be read in conjunction with OPSS.MUNI 212 (Nov 2019).*

If cut material is not available for use as fill, the Contractor shall supply and place borrow material.

**212.07.01 General** is amended by the addition of the following:

Surplus excavated material from sewer and culvert installations and road excavation may be used for fill at the Contractor's option with the Owner's approval. No quantity has been, or will be, included in the earth balance calculations for such surplus materials.

**212.09.01.01 Earth Borrow and Rock Borrow** is deleted in its entirety and replaced with the following:

**212.09.01.01 Earth Borrow and Rock Borrow**

The quantity of borrow is measured in cubic metres (m<sup>3</sup>) and calculated as follows:

$$\text{Borrow Quantity} = \text{Fill Required} - \text{Available Cut}$$

where

Fill Required = the theoretical volume calculated from the cross-sections and includes embankment fill, driveway fills and fill to replace stripping under fills

Available Cut = the theoretical volume obtained after deductions are made from the total excavation quantity for topsoil, unsuitable material (if any), and any additions to, or deductions from, the theoretical quantities.

No actual measurement will be made of the borrow pit. During construction, if the actual excavation, the amount of topsoil or the quantity of unsuitable material varies from the estimate, then adjustments will be made to account for these variations. When calculating the volume of fill from the theoretical cross-sections, the neat volume will be used and a 15% shrinkage factor will be added. The 30 mm grading tolerance will not apply and will not be used in calculations.

**Item R206 Unsuitable Material Removal, Disposal and Backfill (Provisional) [New Construction]**

*This Specification shall be read in conjunction with OPSS.MUNI 180 (Nov 2021) and OPSS.MUNI 206 (Apr 2019).*



*The Contractor shall comply with the on-site and excess soil requirements of O. Reg. 406/19 (On-Site and Excess Soil Management) under the Ontario Environmental Protection Act and SC 16 – On-Site and Excess Soil Management of the Supplementary Conditions.*

This item is for the excavation, removal, handling and disposal of unsuitable material and replacement with competent fill and/or material specified for road construction, watermain or sewer installation. Identification, delineation and volume of unsuitable material and competent fill will be determined by the Owner and/or the Owner's Geotechnical or Environmental Consultant.

The Contractor shall provide documentation satisfactory to the Owner and the Owner's Geotechnical or Environmental Consultant proving that the replacement competent fill has been adequately tested (as applicable) using a properly certified testing facility, including a statement that the fill is suitable for the intended purpose and does not contain any substances that exceed the applicable generic full depth site condition standards of O. Reg. 153/04 (Records of Site Condition – Part XV.1 of the Act) under the Ontario *Environmental Protection Act*. The Contractor shall submit paid invoices for the fill materials, along with analytical results and certified statements regarding fill quality if provided by the fill source site.

#### **Measurement for Payment**

Measurement for payment shall be per cubic metre (m<sup>3</sup>) of unsuitable material removed, disposed of and backfilled with suitable material. The Contractor and the Owner shall record the volume of the unsuitable material that is excavated and removed off Site and provide the Owner's Geotechnical or Environmental Consultant with supporting documentation.

#### **Basis of Payment**

Payment shall be made at the unit price and shall be full compensation for all labour, equipment and materials necessary to complete the work as specified.

#### **Item R207    Impacted Material Removal, Disposal and Backfill (Provisional) [New Construction]**

*This Specification shall be read in conjunction with OPSS.MUNI 180 (Nov 2021) and OPSS.MUNI 206 (Apr 2019).*

*The Contractor shall comply with the on-site and excess soil requirements of O. Reg. 406/19 (On-Site and Excess Soil Management) under the Ontario Environmental Protection Act and SC 16 – On-Site and Excess Soil Management of the Supplementary Conditions.*

This item is for the excavation, removal, handling and disposal of impacted and suspected impacted material exceeding the applicable generic full depth site condition standards of O. Reg. 153/04 (Records of Site Condition – Part XV.1 of the Act) under the Ontario *Environmental Protection Act* or meeting the definition of a hazardous or subject waste as defined by Reg. 347 (General – Waste Management) under the Ontario *Environmental Protection Act* or waste under Part V of the Ontario *Environmental Protection Act* and replacement with competent fill and/or material specified for road construction, watermain or sewer installation.

Suspected impacted material includes, but is not limited to, soil, water, groundwater and/or sediment which exhibits an unnatural appearance, garbage, debris, staining, sheen or odour that would indicate the possible presence of impacts. Assessment, delineation, treatment and/or removal of impacted or suspected impacted material should take place only under the direction of the Owner and the Owner's Geotechnical or Environmental Consultant. On Site, the Owner and the Owner's Geotechnical or Environmental Consultant will assess, delineate, identify and determine the volume of impacted or suspected impacted material and competent fill.

All sampling and testing shall be performed and paid for by the Contractor under the direction of the Owner's Geotechnical or Environmental Consultant with results issued to the Owner. The sampling and analysis completed must be satisfactory to the Owner and the Owner's Geotechnical or Environmental Consultant.

Excavated hazardous and waste material must be disposed of at an approved, registered waste disposal site capable of receiving the type of hazardous waste or waste as authorized under Part V of the Ontario *Environmental Protection Act*. Proof of the approval issued by the MECP and an agreement with the site to accept the type of material to be disposed of must be provided to the Owner.

Impacted material that exceeds the applicable generic full depth site condition standards of O. Reg. 153/04 (Records of Site Condition – Part XV.1 of the Act) under the Ontario *Environmental Protection Act* may either be (i) disposed of at an approved, registered waste disposal site capable of receiving the type of impacted material as authorized under Part V of the Ontario *Environmental Protection Act* (proof of the approval issued by the MECP and an agreement with the site to accept the type of material to be disposed of must be provided to the Owner); or (ii) used as fill on the this project or another project of the Owner, subject to review and approval by the Owner, if the fill does not exceed the applicable site condition standards that apply to the intended receiving location with the exception of Sodium Absorption Ratio (SAR) and Electrical Conductivity (EC).

The excavated material may need to be separated, stockpiled and tested prior to disposal. Material to be stockpiled shall be placed on a contained impervious surface or surface covering to prevent impacts to underlying or adjacent soils and lands. A waterproof covering or coating shall also be applied over the stockpile(s) to prevent wind and water erosion of materials, minimize dust and prevent run-off transporting excavated materials. Erosion and sediment controls approved by the Owner (e.g. silt fences, straw bales, filter bags, check dams etc.) will be required to prevent run-off from entering any watercourses, along with providing and regular maintenance of settling ponds and sediment basins at all drainage outlets.

The Contractor shall backfill the excavation with competent fill and/or material to the satisfaction of the Owner and the Owner's Geotechnical or Environmental Consultant. The Contractor shall provide documentation satisfactory to the Owner and the Owner's Geotechnical or Environmental Consultant proving the replacement competent fill has been adequately tested (as applicable) using a properly certified testing facility, including a statement that the fill is suitable for the intended purpose and does not contain any substances that

exceed the applicable generic full depth site condition standards of O. Reg. 153/04 (Records of Site Condition – Part XV.1 of the Act) under the Ontario *Environmental Protection Act*. The Contractor shall submit paid invoices for the fill materials, along with analytical results and certified statements regarding fill quality if provided by the fill source site.

### **Measurement for Payment**

Measurement for payment shall be per cubic metre (m<sup>3</sup>) of impacted material removed from the Site. The Contractor and the Owner shall record the volume of the unsuitable material that is excavated and removed off Site and provide the Owner's Geotechnical or Environmental Consultant with supporting documentation.

### **Basis of Payment**

Payment shall be made at the unit price and shall be full compensation for all labour, equipment and materials necessary to complete the work as specified.

**Item R208    Geogrid for Sub-Excavation Locations (Provisional) [New Construction]**

**Item R209    Geotextile for Sub-Excavation Locations (Provisional) [New Construction]**

*This Specification shall be read in conjunction with OPSS.MUNI 206 (Apr 2019).*

These items are for the supply and installation of geogrid and geotextile at sub-excavation locations prior to backfilling, as indicated by the Owner.

Geogrid shall be Terrafix BX2500 or Equivalent.

Geotextile (geosynthetic fabric) shall be Terrafix 360R or Equivalent.

### **Measurement for Payment**

Measurement for payment shall be per square metre (m<sup>2</sup>) of geogrid or geotextile supplied and installed.

### **Basis of Payment**

Payment shall be made at the unit price and shall be full compensation for all labour, equipment and materials necessary to complete the work as specified.

**Item R210    Earth Excavation and Preparation for Boulevard Soil Trench [New Construction]**

*The following Standard Drawings are applicable to the above item: NHF-200, NHF-201, NHF-202 and NHF-204.*

*This Specification shall be read in conjunction with OPSS.MUNI 180 (Nov 2021) and OPSS.MUNI 206 (Apr 2019).*

*The Contractor shall comply with the on-site and excess soil requirements of O. Reg. 406/19 (On-Site and Excess Soil Management) under the Ontario Environmental Protection Act and SC 16 – On-Site and Excess Soil Management of the Supplementary Conditions.*

*This item is for preparation of boulevard soil trench and includes the excavation and removal of the existing soil as shown on the Drawings. Payment for planting media will be made under **Item R805 – Supply and Install Engineered Growing Media for Planting**.*

### **Excavation**

**[Select the paragraph below for projects with boulevard soil trenches]**

A boulevard soil trench shall be excavated to a depth of 500 mm below the final grade.

**[Select the paragraph below for projects with softscape medians]**

A softscape median soil trench shall be excavated to a depth of 1,000 mm below the final grade.

The bottom and sides of the trench shall be scarified. Scarification shall remove all gladding and surface compaction of the exposed soil. The sides of the trench may be scarified with hand tools while the bottom of the trench may be scarified with equipment. If any deficiencies occur, they shall be rectified prior to the installation of the engineered growing media.

Open excavated trenches must be attended to at all times, or other appropriate measures satisfactory to the Owner shall be taken to ensure public safety.

### **Removal and Disposal of Soil**

All trees, stumps, rooting systems, stakes, wire baskets and other existing material within the boulevard soil trenching area shall be removed and disposed of by the Contractor.

Excavated soil shall not be stockpiled on Site. Excavated soil shall become the property of the Contractor and shall be disposed of off Site by the Contractor at its own expense.

The Contractor shall assume all costs associated with the disposal of any earth excavated.

### **Site Restoration**

During the excavation of existing soil, surrounding surfaces shall be kept in a generally clean condition. The Site shall be kept free of litter and refuse to prevent the introduction of contaminants into the soil trenches. Litter shall not be buried on Site.

### **Measurement for Payment**

Measurement for payment shall be per cubic metre (m<sup>3</sup>) of earth excavated in preparation of the boulevard soil trench.

### **Basis of Payment**

Payment shall be made at the unit price and shall be full compensation for all labour, equipment and materials necessary to complete the work as specified.

## **Item R211 Pruning of Trees and Woody Vegetation (Cash Allowance) [New Construction]**

*This Specification shall be read in conjunction with OPSS.MUNI 180 (Nov 2021) and OPSS.MUNI 510 (Nov 2018).*



Under this item, the Contractor shall retain the services of a qualified, skilled and experienced arborist who is a Certified Arborist with the ISA, or an Ontario College of Trades Arborist or Arborist Apprentice; no other trades personnel are permitted to prune trees and other woody vegetation.

The arborist shall undertake all pruning in accordance with the following requirements:

- Arborist Safe Work Practices (current version)
- IHSA Electrical Utility Safety Rules (current version)
- A300 (Tree, Shrub and Other Woody Plant Maintenance – Standard Practices) Part 1 (Pruning) (current version)
- ISA Best Management Practices – Pruning (current version)

Pruning of trees and woody vegetation may be required in any of the following circumstances:

- Where pruning is identified in the **Arborist Report**/Drawings
- Where there is a likelihood of injury of scaffold branches due to contact by construction equipment
- To achieve required 3.0 m vertical clearance in the corridor for vehicular, bicycle and pedestrian traffic
- To achieve the required clearances at reconstructed entrances and private properties

The Contractor shall notify the Owner and a representative from the Owner's Natural Heritage and Forestry division prior to performing any required pruning to determine if a Site walk is necessary to understand all pruning objectives. A minimum of 48 hours' notice is required to arrange the Site walk.

Any damage to surrounding areas resulting from pruning activity shall be restored by the Contractor to a condition equal or better at no additional cost to the Owner.

### **Basis of Payment**

Payment from the cash allowance will be made based on paid invoices from the arborist for the services provided, without any markup or additional fees. Under no circumstances shall the Contractor be entitled to payment in excess of payments actually made to the Arborist, as substantiated by paid invoices.

### **Item R212 Tree Root Exploratory Excavation by Hydro-Vac **(Provisional)** [New Construction]**

*The following Standard Drawings are applicable to the above item: NHF-402 and NHF-403.*

*This Specification shall be read in conjunction with OPSS.MUNI 180 (Nov 2021).*

This item is for root excavation that may be required where potential adverse impacts to tree roots may be difficult to accurately determine prior to excavation and, if required, enables tree roots to be pruned to prevent root damage in the unexcavated area through tearing, fracturing or breakage caused by conventional excavation equipment.

The Contractor shall coordinate exposure of the underground rooting systems of trees using a hydro-vac truck in advance of any conventional excavation as identified in the **Arborist Report**/Drawings and/or as indicated by the Owner.

The Contractor shall coordinate the services of a qualified tree professional associated with this work under **Item R213 – Services of Qualified Tree Professional (Cash Allowance)**.

The Contractor shall arrange a Site walk with the Owner and a representative from the Owner's Natural Heritage and Forestry division prior to performing any root exploratory excavation or potential root pruning. A minimum of 48 hours' notice is required to arrange the Site walk.

The Contractor shall:

- Expose roots for the purpose of exploratory excavation by excavating a trench approximately 200 mm wide and 1.0 m deep (or maximum depth of proposed excavation) in the area of proposed conventional excavation.
- Utilize hydro-vac equipment that is set to a sufficiently low pressure to avoid damage to root bark.
- Arrange for the exposed roots to be examined by the retained qualified tree professional and the Owner. If root pruning is required, the trench shall be set as far from the base of the tree as possible and shall extend, at minimum, along the entire length of the proposed excavation within the minimum required TPZ.

Root pruning shall be completed immediately after exposure by qualified tree professional and be paid under **Item R213 – Services of Qualified Tree Professional (Cash Allowance)**.

### **Measurement for Payment**

Measurement for payment shall be per hour that the hydro-vac truck is used.

### **Basis of Payment**

Payment shall be made at the unit price and shall be full compensation for all labour, equipment and materials necessary to complete the work as specified.

### **Item R213 Services of Qualified Tree Professional (Cash Allowance) [New Construction]**

*The following Standard Drawings are applicable to the above item: NHF-402 and NHF-403.*

The Contractor shall retain the services of a qualified tree professional to perform specialized tree care, reporting requirements and other works identified in the **Arborist Report**/Drawings and/or as indicated by the Owner.

A qualified tree professional is a person who meets at least one (1) of the following requirements:

- Is a Registered Professional Forester (RPF) as described in the *Ontario Professional Foresters Act, 2000*, and registered with the Ontario Professional Foresters Association (OPFA)

- Is a Certified Arborist as certified by the International Society of Arboriculture (ISA)
- Is a Registered Consulting Arborist (RCA) as registered with the American Society of Consulting Arborists (ASCA)

Services to be provided by the qualified tree professional may include but are not limited to:

- Root sensitive excavation and root pruning in accordance with NHF-403
- Assisting with root exploratory excavation under **Item R212 – Exploratory Root Excavation by Hydro-Vac (Provisional)**
- Providing consulting and reporting services related to tree removal, tree protection and other tree care throughout the Contract
- When assisting with the performance of tree root exploratory excavation:
  - Determine if root pruning is required.
  - Submit a written summary and photographic documentation of what was explored, any pruning completed at the time of the exploratory works and prescribe recommendations for areas explored for each tree (e.g. additional root pruning, relocation of works, etc.).
- When performing root pruning:
  - Prune back exposed roots to the face of trench wall to be retained (i.e. the back face of the trench). No roots greater than 60 mm (2.5”) in diameter shall be pruned without authorization of the Owner.
  - Prune all roots with clean and sharp hand tools only. Shovels, picks, or other construction tools shall not be used to prune roots. Wound dressings or pruning paint shall not be used to cover the ends of any cut.
  - Prune roots in a similar fashion as branches, taking care to maintain the integrity of the root bark ridge, where present. Roots should be pruned back to a lateral root at least one-third (1/3) of the diameter; root stubs must not be left upon completion of root pruning.
  - Submit a written summary and photographic documentation of what has been completed to the Owner once root pruning is complete.

### **Basis of Payment**

Payment from the cash allowance will be made based on paid invoices from the Qualified Tree Professional for the services provided, without any markup or additional fees. Under no circumstances shall the Contractor be entitled to payment in excess of payments actually made to the Qualified Tree Professional, as substantiated by paid invoices.

**OPSS 300-SERIES****Item R300 Plant Produced Trial Batches for Asphalt Mix Design Approval [Renewal / New Construction]**

As part of the mix design approval process under **Item R301 – Superpave, Binder Course, Warm Mix Asphalt** and **Item R302 – Superpave, Surface Course, Warm Mix Asphalt**, the Contractor shall provide QA samples of plant produced trial batches.

Each trial batch shall be representative of consistent warm mix production and shall be a minimum of two (2) pugmill batches of the size that will be used during warm mix production for batch plants, or a minimum of five (5) tonnes for drum mixing plants. The Contractor shall be responsible for any costs to dispose of the trial batches. The trial batches shall be produced until a complete laboratory mix compliance check indicates conformance with the design mix proportions and properties for each warm mix type to be used.

Under this item, the Owner will pay for up to two (2) trial batches for each warm mix type. Should more than two (2) trial batches be required for any warm mix type, the Contractor shall be responsible for both the cost of the trial batches and the laboratory mix compliance checks for the additional batches.

If the Contractor elects to use more than two (2) mix plants for the production of a warm mix type, the Contractor shall be responsible for the cost of all the trial batches and all the laboratory mix compliance checks for the additional plant(s). The Contractor should note that only materials from the same sources may be used in a warm mix type produced in more than one (1) plant.

**Measurement for Payment**

Measurement for payment shall be a count of each trial batch produced, up to a maximum of two (2) trial batches per mix type.

**Basis of Payment**

Payment shall be made at the unit price and shall be full compensation for all labour, equipment and materials necessary to complete the work as specified.

**Item R301 Superpave, Binder Course, Warm Mix Asphalt [Renewal / New Construction]****Item R302 Superpave, Surface Course, Warm Mix Asphalt [Renewal / New Construction]**

*This Specification shall be read in conjunction with OPSS.MUNI 310 (Nov 2017) with Appendices 310-B and 310-C invoked, OPSS.MUNI 1003 (Nov 2013) with Appendices 1003-D and 1003-E invoked, OPSS.MUNI 1101 (Nov 2016), OPSS.MUNI 1151 (Apr 2018) and MTO Special Provision No. 103F31 (Oct 2021).*



Under **Item R301 – Superpave, Binder Course, Warm Mix Asphalt**, the Contractor shall supply and place Superpave, Binder Course, WMA in the location(s) and to the depth(s) specified in the Bid Form.

Under **Item R302 – Superpave, Surface Course, Warm Mix Asphalt**, the Contractor shall supply and place Superpave, Surface Course, WMA in the location(s) and to the depth(s) specified in the Bid Form.

## **OPSS.MUNI 310**

**310.02 REFERENCES** is amended by:

- deleting “OPSS 1101 Performance Graded Asphalt Cement” from the list of **Ontario Provincial Standard Specifications, Material** and replacing it with “OPSS.MUNI 1101 Performance Graded Asphalt Cement as modified by these Specifications”
- adding the following to the list of MTO Laboratory Testing Manuals under the heading **Ontario Ministry of Transportation Publications**:
  - LS-227 Determination of Ash Content
  - LS-296 Method of Test for Calibrating, correlating, and Conducting Surface Smoothness Measurements Using an Inertial Profiler
  - LS-299 Determining Asphalt Cement’s Resistance to Ductile Failure Using Double Edge Notched Tension Test (DENT)
  - LS-308 Determination of Performance Grade of Physically Aged Asphalt Cement Using Extended Bending Beam Rheometer (BBR) Method
- adding the following to the list of **American Association of State Highway and Transportation Officials (AASHTO)** standards:
  - M 332-14 Standard Specification for Performance-Graded Asphalt Binder Using Multiple Stress Creep Recovery (MSCR) Test

**310.04 DESIGN AND SUBMISSION REQUIREMENTS** is added as follows:

### **310.04 DESIGN AND SUBMISSION REQUIREMENTS**

#### **310.04.01 Mix Design Requirements – Materials**

The Contractor shall submit all required asphalt mix designs to the Owner for review and acceptance a minimum of 20 Business Days before asphalt paving is scheduled to be undertaken. If for any reason the asphalt material is changed during the performance of the Work, the new mix design must be submitted to the Owner for review and acceptance before the new WMA is incorporated into the Work.

Mix design submissions shall include Hamburg Wheel testing results which comply with the limits outlined in Table B below.

Mix design submissions shall also include trial batch samples for QA testing by the Owner in accordance with **Item R300 – Plant Produced Trial Batches for Asphalt Mix Design Approval**. Mix design approval will be contingent upon performance testing compliance with the thresholds indicated in Table B below and with the volumetrics indicated in OPSS.MUNI 1151.

Superpave asphalt mixes shall be designed to provide a minimum PGAC content as follows:

Mix Type	Minimum PGAC Content
SP 12.5, SP 12.5 FC1 and SP 12.5 FC2	5.0%
SP 19 (mix that is covered up with surface asphalt in the same construction season)	4.8%
SP 19 (mix that is <b>NOT</b> covered up with surface asphalt in the same construction season)	5.0%
SP 25	4.4%

The materials used in the production of WMA shall be in accordance with OPSS.MUNI 1151 for Superpave and SMA mixes.

The aggregates used in the mix design shall comply with the following requirements:

Mix Type and Category	Coarse and Fine Aggregates	Asphalt Sand
SP12.5 FC1 – Category C and D SP19 and SP25 – Category D and E	100% crushed	Not permitted

The RAP content allowed in the various WMA mix types is as follows:

Mix Type	Maximum RAP Percentage Allowed
All Surface Course Mixes	0%
SP 19 and SP 25	15%

The use of recycled shingle tabs in any mix is not permitted.

The use of slag as an aggregate in any mix is not permitted.

The requirements of Appendices 1003-D and 1003-E of OPSS.MUNI 1003 shall apply to this Specification.

#### **310.04.02 Design Requirements for Warm Mix Asphalt**

The Contractor shall comply with the following requirements:

- a. Use any of the following approved WMA additives:
  - i. Advera
  - ii. Evotherm
  - iii. Hyper Therm
  - iv. Rediset LQ

- b. Prepare the mix design and report all testing results in accordance with test method LS-318 – Practice for the Design of Superpave WMA. With respect to LS-318 section 5.3, item 4 is deleted in its entirety and replaced with the following:
  - Rutting resistance using Hamburg Rut Wheel Tester is required.
- c. Ensure that the WMA mix design and the job mix formula are at the anticipated WMA production temperature; both of which shall be according to the requirements of this Specification.
- d. Ensure that the moisture content of the aggregate coming from the dryers does not exceed 0.5%.

Any proposed equivalent WMA technology not listed in a) above shall be subject to review and approval by the Owner.

#### **310.04.03 Submission Requirements for Warm Mix Asphalt**

A minimum of 28 Days prior to paving with WMA, the Contractor shall submit the following information to the Owner in writing:

- a. The name of the supplier and the approved WMA technology selected.
- b. All test results required under LS-318 and any other details on how the requirements of this Specification will be met.
- c. If applicable, the type and dosage of WMA additives, how the additives are to be incorporated to produce the WMA and the WMA technology supplier's established recommendations for usage.
- d. Where a proposed technology is not currently approved, the Contractor shall submit the following information a minimum of 28 Days prior to the proposed paving dates for review and approval:
  - i. Name of the process, manufacturer, type of process and the technology group.
  - ii. Manufacturer's recommendations including:
    - a. Process description and mix design recommendations
    - b. Required plant modification and hauling recommendations
    - c. Mixing and compaction temperatures
    - d. Construction aspects, if there are any differences from conventional HMA paving besides temperature.
  - iii. Projects where the process has been used including:
    - a. Client, including contact information (telephone and email)
    - b. Mix designs
    - c. Date and location of construction
    - d. Performance to date.

In the event that the proposed technology is not approved following review by the Owner, the Contractor shall use an approved technology.

**310.06.02 Paving Equipment** is amended by the addition of the following:

The Contractor shall use a material transfer vehicle that has on-board mixing capabilities and a minimum storage capacity of 25 tonnes. A material transfer system such as a shuttle buggy (Roadtec SB-2500C Shuttle Buggy® or Equivalent) shall be used. There shall be no additional payment for this material transfer vehicle and any and all costs associated with the use of the material transfer system shall be included in the unit price for the asphalt placed.

**[Select the appropriate paragraph]**

Paving shall be done in echelon in order to eliminate the occurrence of cold joints.

In the event echelon paving is not undertaken, joint heaters or an equivalent method approved by Owner shall be used in the construction of longitudinal joints in order to minimize the occurrence of cold joints.

Surface course paving shall be done in echelon and joint heaters (or an equivalent method approved by Owner) shall be used in the construction of longitudinal joints for binder course paving in order to minimize the occurrence of cold joints.

**310.07 CONSTRUCTION** is amended by the addition of the following:

**310.07.16 Adjustments to the Job Mix Formula**

Adjustment to the job mix formula (JMF) to more closely reflect the mix being produced will be permitted. The number of field adjustments to the JMF shall be limited to three (3) for each mix design submitted: one (1) prior to the start of production, one (1) during production and one (1) within five (5) Business Days following production. Field adjustments to the JMF shall be limited in scope to what is identified in Table 8 of OPSS.MUNI 1151 as amended below.

Individual lot JMF adjustments will not be accepted after five (5) Business Days following completion of the lot. The Owner defines lot size as 1,500 tonnes of production.

The adjusted JMF shall be submitted in writing to the Owner. Upon receipt of the JMF adjustment submission, the Owner will give written confirmation of receipt of the adjusted JMF. Within one (1) Business Day of receipt of the JMF adjustment, the Owner will give written notice confirming conformance to the requirements of the Contract Documents or advising of any non-conformance. The revised JMF may be applied to the lot being placed when the JMF adjustment is issued and the previous one (1) lot (comprising a total maximum of 3,000 tonnes) if requested by the Contractor as part of the written submission for a JMF change. If this request is not made, the revised JMF shall only apply to the lot placed after receipt of the revised JMF (i.e. 1,500 tonnes). All JMF adjustments are applicable to future mix production.



**OPSS.MUNI 1151 Table 8 Permitted Field Adjustment to a JMF** is deleted in its entirety and replaced with the following:

**Table 8 – Permitted Field Adjustment to a JMF**

JMF Property	Maximum Field Adjustment <sup>1</sup>
Percent asphalt cement content, all mixes except SMA	Minimum AC Content to remain as indicated in subsection 310.04.01 of OPSS.MUNI 310 (added above).
Percent asphalt cement content, SMA only	± 0.4
Percent RAP	-5.0
Percent passing 26.5 mm, 25.0 mm, 19.0 mm, and 16.0 mm sieves	± 5.0
Percent passing 13.2 mm, 12.5 mm, and 9.5 mm sieves	± 4.0
Percent passing 4.75 mm, 2.36 mm, and 1.18 mm sieves	± 3.0
Percent passing 600 µm, 300 µm, and 150 µm sieves	No limits
Percent passing 75 µm sieve, all mixes except SMA	± 1.0
Percent passing 75 µm sieve, SMA only	± 2.0
Note:  1. No JMF adjustments are allowed beyond the OPSS.MUNI 1151 design limits.	

**310.07.05.01.01 General** is amended by deleting the reference to “OPSS 1101” and replacing it with “OPSS.MUNI 1101 as modified by these Specifications”.

**310.07.05.01.02 Frequency and Location** is deleted in its entirety and replaced with the following:

**310.07.05.01.02 Frequency and Location**

A minimum of one (1) sample shall be randomly chosen for each asphalt cement type used on the Contract. Additional samples shall be provided by the Contractor when requested by the Owner.

**310.07.05.02.01 General** is amended by deleting the first sentence and replacing it with the following:

The Owner will be conducting QA testing, using the requirements of OPSS.MUNI 310, OPSS.MUNI 1101 and OPSS.MUNI 1151 as guidelines. The Contractor shall obtain QA and referee WMA samples using a Quartermaster sample splitter or Equivalent.

**310.07.06.02 Operational Constraints** is amended by the addition of the following:

If the granular base is exposed following grinding (for base repairs and roadways where there is only one (1) lift of asphalt), the granular base shall be fine graded and compacted to the satisfaction of the Owner before any asphalt is placed. All faces of the pavement in the excavated area shall be painted with a thin, uniform and continuous coating of tack coat.

Under no circumstances shall top course asphalt paving take place after November 30<sup>th</sup> unless prior written permission has been received from the Owner. There will be no adjustments to the unit prices for the above item(s) should this work be completed during the next construction season in the event that a winter shutdown is necessary. Any additional work required to prepare the road for winter shutdown shall be completed under **Item G1 – Maintenance of Traffic**.

The placement of the surface course asphalt will not be permitted until all trimming and placement of topsoil, sod and seed is completed.

The temperature of the mixture, as it is discharged from the mixer, shall be adjusted for warm mixes according to the requirements of the mix design.

**310.07.11.01 General** is amended by deleting the second paragraph and replacing it with the following:

Longitudinal and transverse butt or stepped joints between the new WMA pavement and the previously paved pavement shall be constructed by trimming the previously paved pavement edge to a straight, clean, vertical surface of at least 40 mm.

**310.07.11.03 Transverse Joints** is amended by the addition of the following:

All transverse construction joints and mat terminations shall be temporarily ramped to minimize the bump. Transverse joints between new and existing pavement shall be prepared no more than 24 hours in advance of paving tie-ins unless the joint is adequately ramped to the satisfaction of the Owner. Existing paved entrances shall be connected to new construction using an appropriate full depth butt or ground step joint to ensure a smooth transition to the satisfaction of the Owner.

**310.08.01 General** is amended by:

- deleting all references to “OPSS 1101” and replacing them with “OPSS.MUNI 1101 as modified by these Specifications”
- adding the following:

The Owner will be conducting QA testing in accordance with the requirements of OPSS.MUNI 310 and OPSS.MUNI 1151 and the requirements of the Contract Documents.

For the purpose of asphalt acceptance, one (1) lot will be deemed to be 1,500 tonnes of production. A total of three (3) borderline test results for the same attributes representing up to 1,500 tonnes shall result in the work being deemed rejectable.

The Owner will check the Contractor's production of the design mix using one, or both, of the following methods:

- A sample from a trial batch of the proposed mix from the supply plant.
- A production sample of the proposed mix which the Contractor is currently supplying to another site.

#### **Asphalt Plant Control Room Access**

The Contractor shall provide the Owner's QA representative with access to its asphalt plant control room to obtain copies of the batching records and to document/photograph plant operations during the production of WMA for the Contract. The information collected from the Contractor's asphalt control room will be used solely to compare the as-produced mix to the mix design accepted by the Owner. All information collected by the Owner's QA representative will be shared with the Contractor and will be kept in strict confidence by the Owner.

#### **Additional Performance Testing Requirements During Production**

The Owner will undertake performance testing on a random basis. The Owner will also use performance testing to address concerns with mix volumetrics, gradation and tack coat performance. The Contractor will be advised of the results and corrective actions/adjustments will be determined/negotiated as necessary.

The following test methods in Table A below will be used by the Owner to assess WMA performance.

The Contractor is responsible for ensuring that the submitted mix design complies with the thresholds indicated in Table B below.

**Table A – Summary of Performance Tests**

<b>Test Method Description</b>	<b>Specification</b>
Standard Method of Test for Hamburg Wheel-Track Testing of Compacted Warm Mix Asphalt (WMA)	AASHTO T324/LS-335
Standard Method of Test for Determining the Fracture Potential of Asphalt Mixtures Using the Illinois Flexibility Index (I-FIT)	AASHTO T393/LS-334
Standard Test Method for Determining Fracture Energy of Asphalt Mixtures Using the Disk-Shaped Compact Tension (DCT) Geometry	ASTM D7313/LS-336
Standard Method of Test for Determining the Interlayer Shear Strength (ISS) of Asphalt Pavement Layers	AASHTO TP114

Test Method Description	Specification
Standard Method of Test for Determining Dynamic Modulus of Warm Asphalt Mixtures (WMA)	AASHTO T342/T378

**Table B – Performance Testing Acceptable Thresholds**

Test		Category	Unit	Acceptable Limits	
				Min	Max
Interlayer Shear Strength (ISS) – Tack Coat Application		Bond Strength	KPa	275	---
Semi Circular Bending (I-FIT)-(SCB) – Category B, C, D and E only with minimum PG 64-28XJ		Flexibility Index	Unitless	10	---
Disk-Shaped Compact Tension (DCT) – Surface Asphalt SP12.5, SP12.5 FC1 and SP12.5 FC2 – Category B, C, D and E only with minimum PG 64-28XJ		Fracture Energy	J/m <sup>2</sup>	600	---
Disk-Shaped Compact Tension (DCT) – Base Asphalt SP19, SP25 – Category B, C, D and E only with minimum PG 64-28XJ		Fracture Energy	J/m <sup>2</sup>	450	---
Hamburg Double Wheel-Track (HDWT) – Only Applicable to Category D and E Mixes (Surface and Base Asphalt Mixes)	For PG 58-XX at 44°C	Rut Depth	mm	---	12.5
	For PG 64-XX at 50°C			---	12.5
	For PG 70-XX at 50°C			---	10

**310.08.04 Aggregate Gradation and Asphalt Cement Content** is amended by deleting the second paragraph and replacing it with the following:

If the WMA is deemed borderline for aggregate gradation or asphalt cement content according to Table 7, the Contractor shall be notified in writing by the Owner and shall take immediate corrective action through process control at the asphalt plant. A total of three (3) borderline test results for the same attributes representing up to 1,500 tonnes of WMA production shall result in the work being deemed rejectable.

**310.08.05 Hot Mix Asphalt Properties Acceptance** is deleted in its entirety and replaced with the following:

**310.08.05 Warm Mix Asphalt Properties Acceptance**

The production air voids for all WMA mixes shall be evaluated according to Table 9 as amended below. A total of three (3) borderline test results for air voids representing up to 1,500 tonnes of WMA production shall result in the work being deemed rejectable.



Referee samples within the limits of the affected area shall be delivered by the Owner's quality assurance Consultant to a mutually agreed upon third party referee laboratory to verify Superpave compliance tests or air void results, or both. The Contractor can only invoke referee testing within five (5) Business Days of receiving the QA test results.

When the results from the referee samples are deemed borderline or rejectable according to Table 9 as amended below, the WMA pavement shall be removed and replaced with acceptable WMA pavement. Alternatively, the Owner may accept a guaranteed maintenance bond, an increased maintenance period, or a negotiated price adjustment.

**OPSS.MUNI 310 Table 9 Air Void Criteria for Hot Mix Asphalt Types (LS-265)** is deleted in its entirety and replaced with the following:

**Table 9 – Air Void Criteria for Warm Mix Asphalt Types (LS-265)**

Mix	Acceptable %	Borderline %	Rejectable %
All Mixes	3.0 to 5.0	2.0 to 2.9 and 5.1 to 6.0	< 2.0 and > 6.0

**OPSS.MUNI 310 Table 10 Minimum Pavement Compaction Based on Maximum Relative Density** is deleted in its entirety and replaced with the following:

**Table 10 – Minimum Pavement Compaction Based on Maximum Relative Density**

Mix	Minimum Compaction %
All Mixes, except SMA	92.0
SMA	93.0

**310.10.01 BASIS OF PAYMENT** is amended by the addition of the following:

Each course of asphalt shall be placed to the specified thickness. If the specified placement rate is exceeded, payment may be withheld for the excess material placed.

#### **PAYMENT ADJUSTMENT FOR VARIATIONS IN ASPHALT CEMENT IN WMA – BID AC**

##### **Bidding Requirements**

The asphalt cement content of mix designs for bidding purposes shall be those shown in Table C below (Asphalt Cement Content for Bid Purposes (%), or Bid AC).

The minimum asphalt cement content for the mix design must be equal to, or greater than, those shown in Table C below.

The maximum asphalt cement content to be considered for payment adjustment for each mix shall be those shown in Table C below.

The amount of RAP AC will be discounted once the asphalt work is completed (see "Price Adjustments" section below). Therefore, the Contractor should assume only virgin AC is used when calculating its bid prices for all WMA base course asphalt items.

**Table C – Superpave Asphalt Cement Content Bid AC, Minimum AC for Mix Design, and Maximum AC Content for Payment Adjustment**

Mix Type	Asphalt Cement Content for Bid Purposes (%)	Minimum Asphalt Cement Content for Mix Design (%)	Maximum Asphalt Cement Content for Payment Adjustment (%)
SP 9.5	5.5	5.5	6.0
SP 12.5	5.0	5.0	5.5
SP 19	4.8	4.8	5.3
SP 25	4.4	4.4	5.1

### Price Adjustments

The Owner will calculate a payment adjustment based on the actual AC in the WMA. The price used to calculate the payment adjustment shall be based on the actual AC incorporated into the WMA based on the QA results and the applicable AC Bid % specified in Table C above.

**Note:** Payment adjustments to be paid to the Contractor will apply up to the maximum AC content as specified in Table C above.

The payment adjustment calculated using this formula shall be full compensation for any and all PGAC grades specified.

Actual AC shall be defined as the average AC content obtained from QA samples taken during paving operations minus the AC content of the RAP in the asphalt mix design.

The AC Price shall reflect the MTO's PGAC price index appearing monthly in the MTO's Contract Bulletin.

### Actual AC Calculation – Example 1:

Asphalt Specified = SP 12.5 PGAC 64-28

Asphalt Qty = 10,000 tonnes

Average AC content obtained from QA samples = 5.3% of Asphalt Qty = 530 tonnes

Actual AC = Average AC from samples = 530 tonnes

Actual AC % = (530 tonnes/10,000 tonnes) x 100%

Actual AC % = 5.3% of PGAC

### Actual AC Calculation – Example 2:

Asphalt Specified = SP 19 PGAC 64-28

Asphalt Qty = 10,000 tonnes

Asphalt mix design RAP = 15% = 1,500 tonnes

AC Content of RAP = 4% of asphalt mix design RAP = 60 tonnes

Average AC content obtained from QA samples = 5.3% of Asphalt Qty = 530 tonnes

Actual AC = Average AC from samples – AC Content of RAP = 530 – 60 = 470 tonnes

Actual AC % = (470 tonnes/10,000 tonnes) x 100%

Actual AC % = 4.7% of PGAC

WMA Quantity shall be defined as the actual amount of WMA placed and accepted into the Work in tonnes (t).

The Contractor shall bid the WMA item(s) using the content of PGAC specified and should assume only virgin AC is used when calculating its bid prices.

An asphalt payment adjustment will only be considered for those items for which the unit of measurement specified in the Schedule of Prices is “tonne (t)”.

The Owner will use the MTO’s PGAC price index issued the month prior to tender closing to determine the adjustment(s), if any:

$$\text{Payment adjustment}^* = \text{WMA Qty} \times (\text{Actual AC} - \text{Bid AC}) \times \text{AC Price}$$

\*Negative value indicates payment to the Owner.

## **OPSS.MUNI 1101**

**1101.02 REFERENCES** is amended by the addition of the following under **Ontario Ministry of Transportation Publications, Laboratory Testing Manual**:

LS-284 Method of Test for Recovery of Asphalt from Solution by Rotary Evaporator

**1101.03 DEFINITIONS** is amended by deleting the definitions of Low Temperature Performance Grade and Performance Graded Asphalt Cement (PGAC) in their entirety and replacing them with the following:

**Low Temperature Performance Grade (-YY)** means the low temperature performance grade specified elsewhere in the Contract Documents and also referred to as the -YY specified for the performance graded asphalt cement where the PGAC (Performance Graded Asphalt Cement) Grade specified is PG XX-YY, and equal to the minimum design pavement temperature.

**Performance Graded Asphalt Cement (PGAC)** means an asphalt binder that is an asphalt-based cement produced from petroleum residue, modified using polymers, according to the latest version of AASHTO M 320 or M 332 (at the time of bid closing).

**1101.03 DEFINITIONS** is further amended by the addition of the following definition:

**Recovered Performance Graded Asphalt Cement (Recovered PGAC)** means an asphalt binder that has been extracted and recovered from the WMA. Extraction shall use only trichloroethylene (TCE). Fines shall be removed from the solution using a high-speed centrifuge method. Recovery shall be under a nitrogen gas atmosphere according to the Rotavapor method in LS-284 or ASTM D7906-14.

The following recovered PGAC samples are designated by the Owner for acceptance of the WMA: (1) PGAC extracted and recovered from loose WMA quartermaster samples taken during construction of the pavement; or (2) PGAC extracted and recovered from samples saw cut from the finished pavement and tested within a period of 90 Days following the date of Substantial Performance of the Contract. Recovered samples shall

be used in place of rolling thin-film oven (RTFO) residues and only further aged in the pressurized aging vessel (PAV) for the purpose of AASHTO M 320, LS-299 and LS-308 grading.

**1101.04.01.01 PGAC Test Documentation** is deleted in its entirety and replaced with the following:

**1101.04.01.01 PGAC Test Documentation**

For each grade of PGAC specified in the Contract Documents, the Contractor shall supply the following information to the Owner a minimum of 14 Days prior to the first use of each Product, or concurrently with the submission of the asphalt mix design, whichever is earlier:

- a) The PGAC supplier and the facility type and location that the Product will be supplied from.
- b) Test results for the Product demonstrating compliance with the requirements of the Contract Documents.
- c) Applicable mixing and compaction temperatures for the Product. When paving on bridge decks, the information shall include the minimum temperature recommended by the PGAC supplier for WMA immediately after spreading.
- d) Documentation setting out the construction, storage and handling requirements, including the material safety data sheet, recompaction temperature, mix discharge temperature and recommended extraction procedure.
- e) When the PGAC contains any PPA and a liquid anti-stripping additive is incorporated into the PGAC at the PGAC supplier's depot:
  - i) information on how much anti-stripping additive was added to the PGAC; and
  - ii) documentation from the PGAC supplier confirming that the PPA modified PGAC with the liquid anti-stripping additive added at the PGAC supplier's depot will meet all asphalt cement material requirements specified in the Contract Documents and AASHTO M320 for the PGAC grade specified in the Contract Documents.
- f) A two (2) litre sample of the tank asphalt cement for each grade according to Table 2 Sampling Requirements for possible testing by the Owner.
- g) All sampling shall be in accordance with AASHTO T 40 and ASTM D 3665.
- h) A copy of all LS-227 documentation demonstrating that the Product complies with the requirements of the Contract Documents.
- i) Grade and grade loss according to LS-308 along with a copy of all LS-308 documentation demonstrating that the Product complies with the requirements of the Contract Documents.
- j) Average of the critical crack tip opening displacement ( $\delta t$ ) as determined according to LS-299 along with a copy of all of the LS-299 documentation



demonstrating that the Product complies with the requirements of the Contract Documents.

For test documentation required under h), i) and j) above, the independent laboratory conducting the PGAC testing shall have participated in the most recent AASHTO Materials Reference Laboratory proficiency sample correlation program for PGAC and shall have obtained proficiency ratings in the program, satisfactory to the Owner.

All test samples shall be obtained by the Contractor in the presence of the Owner or its representative and in accordance with the asphalt plant's health and safety requirements. The asphalt plant's health and safety plan and procedure for sampling shall be reviewed at the pre-pave meeting.

The Owner will review the test results submitted and provide written confirmation of conformance of the PGAC, or advise the Contractor of any non-conformance, within 10 Business Days from the date of delivery of the samples and test documentation. The mix shall not be placed until the Owner provides written confirmation of conformance of the PGAC to the requirements of the Contract Documents, based on the submitted test results and possible testing by the Owner. The Owner's confirmation of conformance of the submitted PGAC properties does not constitute any guarantee that the mix can be produced, constructed, or both, in accordance with the requirements of the Contract Documents and shall not relieve the Contractor of its responsibility for ensuring the specified quality of materials and workmanship.

For each grade of PGAC specified in the Contract Documents, the Contractor shall supply the following items to the Owner prior to the commencement of the WMA production:

- PGAC documentation from the asphalt cement supplier in the form of a bill of lading and certificate of analysis, confirming the grade of PGAC. The bill of lading and certificate of analysis shall also be supplied for each subsequent delivery of PGAC that will be used for the WMA production.
- Documentation identifying the PGAC storage tank that the PGAC will be supplied from for the WMA production. The Contractor shall notify the Owner and provide updated documentation prior to changing the storage tank that is being used to supply PGAC for the WMA production.

For each grade of PGAC specified in the Contract Documents, the Contractor shall supply to the Owner, from the plant during the production of the WMA, samples of the asphalt cement being used to produce the WMA for additional testing in accordance with the requirements of AASHTO M-320, R-29 and Table 1 of OPSS.MUNI 1101 (amended below).

**1101.08.03 Sampling** is amended by deleting the fourth sentence and replacing it with the following:

All samples shall be obtained in the presence of a representative of the Owner during the production of the asphalt mix at the asphalt mix plant from the storage tank which is

directly feeding the production of the asphalt mix in accordance with AASHTO T 40 and the asphalt plant's health and safety plan.

**1101.08.03 Sampling** is further amended by the addition of the following:

**Recovered PGAC Samples**

The Owner will determine the frequency of sampling and testing based on the WMA tender quantity for each grade of PGAC. The QA and referee quartermaster samples for Owner testing shall be taken at the same time.

WMA samples shall be obtained by the Contractor when notified by the Owner. Samples shall be delivered in a condition suitable for testing and sample containers shall be supplied by the Contractor.

All loose WMA samples shall be obtained directly from the paving equipment during the construction of the pavement.

**1101.08.04 Quality Assurance Testing** is deleted in its entirety and replaced with the following:

**1101.08.04 Quality Assurance Testing for Tank and Recovered Samples**

When the Owner elects to carry out QA testing, one (1) of the samples shall be randomly selected for testing by the QA laboratory and the remaining sealed samples shall be retained by the QA laboratory for possible referee testing. QA testing will be evaluated against the requirements as specified herein. For acceptance criteria, refer to Table 1 as amended below.

Test results for samples that do not comply with the performance grading requirements shall be categorized as borderline or rejectable. PGAC shall be categorized based on its test result's deviation from the individual design maximum or minimum pavement temperature and the sum of the deviations from the design maximum or minimum pavement temperatures as defined below. The actual performance grading that is either higher than the design maximum pavement temperature or lower than the design minimum pavement temperature is not considered a deviation.

**Borderline:** Individual deviations are less than or equal to 3 °C and the sum of deviations is less than or equal to 3 °C.

**Rejectable:** Does not meet the requirements under the 'Borderline' section above.

When a sample does not comply with more than one (1) property attribute and PG grading, acceptance of the WMA shall be dealt with using the property attribute or PG grading selected by the Owner.

For any single day of paving with more than two (2) borderline results for AASHTO M320, LS-299 or LS-308 for two (2) separate samples, the production for the entire day shall be rejectable.

The Owner may conduct elemental testing according to ASTM D7343 or other tests to determine if the asphalt cement meets the material requirements as specified in the Materials section.

**1101.08.05 Disposition of HMA Produced with PGAC Not Conforming with the Requirements of the Contract Documents** is deleted in its entirety and replaced with the following:

**1101.08.05 Disposition of WMA Produced with PGAC (Tank and Recovered) Not Conforming with the Requirements of the Contract Documents**

The Owner will review the test results and determine the disposition of the WMA produced using any PGAC that does not conform to all requirements of the Contract Documents. WMA produced using PGAC for which test results indicate that the product did not conform to the Contract Documents shall be dealt with as follows:

**Borderline:** The WMA shall be accepted at full payment.

**Rejectable:** The WMA shall not be accepted into the Work. The Owner will notify the Contractor in writing within 10 Business Days of receipt of the non-conforming data. The Contractor has the option of either removing the WMA and replacing it with acceptable WMA or invoking referee testing. The Contractor may request a reduced price in lieu of removal of the WMA. Irrespective of the negotiation of a reduced price payment, the warranty provisions of the Contract Documents shall continue to apply.

When test results indicate non-compliance with the Contract Documents, all costs incurred by the Owner to establish the degree and extent of the non-compliance shall be the responsibility of the Contractor.

The Owner's review of the test results to determine disposition of the WMA produced shall include all additional testing requirements for which acceptance requirements have been specified.

**1101.08.06 Referee Testing** is deleted in its entirety and replaced with the following:

**1101.08.06 Referee Testing for Tank and Recovered PGAC Samples**

Referee testing by an independent laboratory may be invoked by the Contractor for any sample of PGAC within five (5) Days of receiving all the QA test results for the sample.

Following the Contractor's written notification to invoke referee testing, the Owner will select a third party referee laboratory acceptable to the Contractor. Referee test samples shall be delivered to the referee testing laboratory from the QA laboratory by the Owner.

The referee testing shall determine the actual performance high and low temperatures, rounded to the nearest 0.5 °C of the PGAC and the properties and attributes shown in Table 1 as amended below.

Test results generated by the referee laboratory shall be used to re-evaluate the PGAC to determine whether the product conforms to the Contract Documents and the disposition of the WMA represented by the sample tested.

Referee testing shall be carried out in the presence of the Owner's designate. The Contractor may observe the testing at no cost to the Owner.

The Contractor and the Owner may send a maximum of two (2) representatives each to observe the referee testing. The Owner will notify the Contractor a minimum of three (3) Business Days in advance of the date of referee testing. Provided that such notice was given, referee testing shall be carried out regardless of the absence of one (1) or more observers.

Observers shall follow the referee laboratory protocols for access to the premises and testing equipment and shall not unnecessarily impede the progress of the testing. Observers shall be permitted to validate sample identification and view sample condition. Subject to safety requirements, test method and equipment limitations, they shall also be permitted to observe test procedures, take notes, view equipment readings, and review completed work sheets while in attendance. The taking of photographs and videos shall not be permitted.

Concerns with sample condition or sample identification shall be made known to all observers prior to commencement of the referee testing. Comments on deviations from the applicable test method shall be made at the time of referee testing. Unresolved concerns shall be specific in nature and submitted in writing to the referee laboratory's designated representative and the other observers present, at the time of testing.

Referee test results shall be binding on both the Owner and the Contractor.

When referee test results show that the PGAC is rejectable, the WMA represented by the test results shall not be accepted. The Contractor shall remove the WMA at no cost to the Owner. The Contractor may request a reduced price in lieu of removal of WMA produced with PGAC with rejectable test results. Irrespective of the negotiation of a reduced price payment, the warranty provisions of the Contract Documents shall continue to apply.

If the referee testing results comply with the PGAC specifications, the Owner will be responsible for the testing costs. If the referee testing results do not comply with the PGAC specifications, the Contractor shall be responsible for the testing costs.

**OPSS.MUNI 1101 Table 1 Additional Asphalt Cement Testing Requirements and Acceptance Criteria for All PG Grades** is deleted in its entirety and replaced with the following:

**Table 1 – Testing Requirements and Acceptance Criteria for All PGAC Grades**

PGAC Grade	Property	Test Method	Acceptance Criteria	Borderline	Rejectable
All Tank Samples	Ash Content, % by mass of residue (%)	LS-227	$\leq 0.6$	$> 0.6$ and $\leq 0.8$	$> 0.8$



PGAC Grade	Property	Test Method		Acceptance Criteria	Borderline	Rejectable
All Recovered Samples	Ash Content, % by mass of residue (%) (See Note 2 for recovered Asphalt)	LS-227		$\leq 1.0$	N/A	$> 1.0$
All Grades Except PG 58-28 and PG 52-34 – Tank and Recovered Samples	PGAC Grade (PG XX-YY)	AASHTO M320		XX $> 64.0$ and YY $< -28$	Individual XX and YY deviations $\leq 3.0$ and the sum of deviations is $\leq 3.0$	Individual XX and YY deviations $> 3.0$ or the sum of deviations $> 3.0$
	Non-recoverable creep compliance at 3.2 kPa ( $J_{nr-3.2}$ ) ( $kPa^{-1}$ )	Multiple Stress Creep and Recovery (MSCR) testing according to AASHTO T350 testing conducted at a temperature of 58°C (Zone 3)		$< 4.5$	N/A	$\geq 4.5$
	Average percent recovery at 3.2 kPa ( $R_{3.2}$ ) (%)	Multiple Stress Creep and Recovery (MSCR) testing according to AASHTO T350 testing conducted at a temperature of 58°C (Zone 3)		$\geq$ the lesser of $[(29.371) (J_{nr-3.2})^{-0.2633}]$ or 55	$<$ the lesser of $[(29.371) (J_{nr-3.2})^{-0.2633}]$ or 55 OR $\geq$ the lesser of $[(29.371) (J_{nr-3.2})^{-0.2633}] - 10$ or 50	$<$ the lesser of $[(29.371) (J_{nr-3.2})^{-0.2633}] - 10$ or 50
All Tank and Recovered Samples	Average critical crack tip opening displacement ( $d_t$ ) (mm)	LS-299	PG 58-28	$\geq 6.0$	$< 6.0$ and $\geq 4.0$	$< 4.0$
			PG XX-28	$\geq 10.0$	$< 10.0$ and $\geq 8.0$	$< 8.0$
	Maximum Grade Loss with reference to the 1-hour results at -YY + 10 (°C)	LS-308, 72-hour results at -YY + 10		$\leq 6.0$	$> 6.0$ and $\leq 7.0$	$> 7.0$
	Maximum Grade Loss with reference to the 1-hour results at -YY + 10 (°C)	LS-308, 72-hour results at -YY + 20		$\leq 4.0$	$> 4.0$ and $\leq 6.0$	$> 6.0$
	Limiting Grade (LTLG) (°C)	LS-308	PG XX-28	$\leq -28$	$> -28$ and $\leq -25$	$> -25$

**Notes:**

- .1 For non-recoverable creep compliance, report results rounded to the nearest 0.01. For all others, report results rounded to the nearest 0.1.
- .2 Acceptance shall be based on the following:
  - (i) PGAC sampled at the asphalt plant storage tank; and
  - (ii) PGAC extracted and recovered from the loose WMA samples taken during construction of the pavement; or
  - (iii) PGAC extracted and recovered from samples saw cut from the finished pavement and tested within a period of 90 Days following the date of Substantial Performance of the Contract. Recovered samples shall be used in place of rolling thin film oven (RTFO) residues and only further aged in the pressure aging vessel (PAV) for the purpose of AASHTO M320, LS-299 and LS-308 grading.
- .3 All recovered PGAC samples shall be obtained by extraction using only trichloroethylene (TCE) from loose WMA or from saw cut samples from the finished pavement. Fines shall be removed from the solution prior to recovery using a high-speed centrifuge method until Ash Content by mass of residue is below or equal 1.0%. Recovery shall be under a nitrogen atmosphere according to the Rotavapor method in LS-284 or ASTM D7906.
- .4 Borderline results allow for testing variability. Acceptance shall be a “simple acceptance” also known as “shared risk” acceptance and measurement uncertainty shall play no role in accept/reject decisions (American Society of Mechanical Engineers. ASME B89.7.3.1:2001 Guidelines for decision rules: Considering measurement uncertainty in determining conformance to specifications. New York, NY, 2001).

Throughout the full duration of the Contract, the Contractor shall provide the Owner with a copy of the Bill of Lading for the WMA additive. The Bill of Lading must clearly indicate the inclusion of the WMA additive to the PGAC.

**OPSS.MUNI 1151**

**1151.02 REFERENCES** is amended by:

- deleting “OPSS 1101 Performance Graded Asphalt Cement” from the list of **Ontario Provincial Standard Specifications, Material** and replacing it with “OPSS.MUNI 1101 Performance Graded Asphalt Cement as modified by these Specifications”.
- adding the following to the list of MTO Laboratory Testing Manuals under the heading **Ontario Ministry of Transportation Publications:**
  - LS-227            Determination of Ash Content
  - LS-299 Determining Asphalt Cement’s Resistance to Ductile Failure Using Double Edge Notched Tension Test (DENT)
  - LS-308 Determination of Performance Grade of Physically Aged Asphalt Cement Using Extended Bending Beam Rheometer (BBR) Method
- adding the following to the list of **American Association of State Highway and Transportation Officials (AASHTO)** standards:

M 332-14 Standard Specification for Performance-Graded Asphalt Binder  
Using Multiple Stress Creep Recovery (MSCR) Test

**1151.05.01 Asphalt Cement** is amended by deleting the reference to “OPSS 1101” in the first sentence and replacing it with “OPSS.MUNI 1101 as modified by these Specifications”.

**OPSS.MUNI 1151 Table 2 Superpave Aggregate Gradation Control Points** is deleted in its entirety and replaced with the following:

**Table 2 – Superpave Aggregate Gradation Control Points**

Hot Mix Asphalt Type	Percentage Passing by Dry Mass of Aggregates									
	Sieve Size mm									
	50.0	37.5	25	19.0	12.5	9.5	4.75	2.36	1.18	0.075
Superpave 4.75	-	-	-	-	100	95-100	90-100	-	30-60	6-12
Superpave 9.5	-	-	-	-	100	90-100	32-90	32-67	-	2-10
Superpave 12.5	-	-	-	100	90-100	28-90	-	28-58	-	2-10
Superpave 12.5 FC1 and 12.5 FC2	-	-	-	100	90-100	45-90	45-55	28-58	-	2-10
Superpave 19.0	-	-	100	90-100	23-90	-	45-55	23-49	-	2-8
Superpave 25.0	-	100	90-100	19-90	-	-	45-55	19-45	-	1-7
Superpave 37.5	100	90-100	15-90	-	-	-	-	15-41	-	0-6

### Surface Smoothness Requirements

Asphaltic concrete surface smoothness shall be in accordance with MTO Special Provision No. 103F31 as amended by the following:

**8.01.02 Surface Smoothness Measurement** is deleted in its entirety and replaced with the following:

#### 8.01.02 Surface Smoothness Measurement

The Owner will measure all through lane pavement surfaces using an MTO approved inertial profiler, with the following exceptions:

- Where the posted speed is 50 km/hr or less.
- Where a single lift is placed on an existing surface.

- c) Within 10 m of the end of a placement where the Contractor is not responsible for the adjoining surface.
- d) Bridge decks and within 10 m of bridge deck expansion joints.
- e) Detours and other temporary pavement that may be removed or overlaid under the Contract.
- f) The first adjacent lane consisting of one (1) or more lifts of newly placed asphalt where the Contractor must match to an existing surface that is not being resurfaced under the Contract.
- g) Within 10 m of any maintenance holes, catch basins and valve chambers or similar structures which are located within the lane or within 1.5 m of the outside edge of the lane.
- h) Lanes less than 100 m in length.
- i) Multi-use trails located in the boulevard(s).

**8.01.02.02 Inertial Profiler Acceptance Testing** is amended by deleting “b) Once within a given calendar year; or” from the first paragraph.

**8.01.02.02 Inertial Profiler Acceptance Testing** is amended by the addition of the following:

For the purposes of surface smoothness requirements, a subplot is defined in accordance with MTO LS-296.

**Average International Roughness Index (IRI)**

Any subplot with an IRI of both wheel paths from a set of three (3) measurements taken by an inertial profiler greater than 2.5 m/km shall be rejected. The Contractor shall repair the rejected subplot(s) in accordance with subsection 8.01.05 such that the 2.5 m/km IRI limit of the Contract is met.

**Average Mean Roughness Index (MRI)**

Any area with a MRI determined from a set of three (3) measurements taken by an inertial profiler run through ProVAL Version 3.4 or 3.5 where the localized roughness is greater than 4.0 m/km shall be rejected. The Contractor shall repair the rejected area(s) in accordance with subsection 8.01.05 such that the 4.0 m/km MRI limit of the Contract is met.

**Surface Tolerance**

The surface tolerances of any pavement surface shall be such that when measured with a 3 m straight edge placed anywhere, including the edge of the pavement, in any direction on the surface, except across the crown or drainage gutters, there shall not be a gap between the bottom of the straight edge and the surface of the pavement:

- a) Greater than 6 mm for all binder courses, levelling courses and padding; or
- b) Greater than 3 mm for all surface courses.



Longitudinal and transverse joints shall be constructed such that the elevation difference across the longitudinal joints shall not exceed 5 mm, when measured with a straight edge placed on the asphalt surface with the higher elevation and overhanging the joint by not more than 50 mm. All joints which exceed the 5 mm tolerance shall be repaired in accordance with subsection 8.01.05 such that the 5 mm surface tolerance limit of the Contract is met.

The Contractor shall provide all traffic control, as required, for the Owner to conduct surface tolerance measurements.

**8.01.05.01 General** is amended by deleting the second paragraph and replacing it with the following:

Any incident of localized roughness shall be repaired.

**10.0 BASIS OF PAYMENT** is deleted in its entirety.

**Item R303 Remove and Replace Miscellaneous Superpave Hot Mix Asphalt**  
**[Renewal]**

**Item R304 Remove and Replace Asphalt Curb and Gutter [Renewal]**

*The following Standard Drawing is applicable to Item R304: OPSPD 601.010 (Nov 2013).*

*This Specification shall be read in conjunction with OPSS.MUNI 310 (Nov 2017), OPSS.MUNI 510 (Nov 2018), OPSS.MUNI 1003 (Nov 2013) with Appendices 1003-D and 1003-E invoked, OPSS.MUNI 1101 (Nov 2016) and OPSS.MUNI 1151 (Apr 2018).*

**Under Item R303 – Remove and Replace Miscellaneous Superpave Hot Mix Asphalt**, the Contractor shall remove existing asphalt and replace it with miscellaneous Superpave 12.5 HMA, PGAC 58-28 or equivalent, as required at existing paved entrances, boulevards and all other areas indicated by the Owner. Superpave 12.5 HMA shall be placed as follows:

- For residential properties – 50 mm
- For commercial properties – 100 mm
- For boulevards, unpaved shoulders and roundings adjacent to new guide rail systems – 50 mm

The Traffic Category shall be 'A'.

**Under Item R304 – Remove and Replace Asphalt Curb and Gutter**, the Contractor shall remove and replace approximately xx m of asphalt curb and gutter on xxx from xxx to xxx. Paving limits will be determined by the Owner on Site. Superpave 12.5 HMA, PGAC 58-28 or equivalent, shall be placed in accordance with the Asphalt Mountable Curb with Wide Gutter detail on OPSPD 601.010. The Traffic Category shall be 'A'.

**310.09 MEASUREMENT FOR PAYMENT** is amended by the addition of the following:

**310.09.01.04 Asphalt Curb and Gutter**

Measurement of asphalt curb and gutter shall be per linear metre (m) of HMA curb and gutter satisfactorily replaced.

### Basis of Payment

No separate payment will be made for removal and disposal work performed under **Item R303 – Remove and Replace Miscellaneous Superpave Hot Mix Asphalt** and **Item R304 – Remove and Replace Asphalt Curb and Gutter**.

**Item R305 Superpave, Surface Course, Hot Mix Asphalt [Renewal]**

**Item R306 Remove and Replace Miscellaneous Superpave Hot Mix Asphalt [Renewal]**

*This Specification shall be read in conjunction with OPSS.MUNI 310 (Nov 2017), OPSS.MUNI 510 (Nov 2018), OPSS.MUNI 1003 (Nov 2013) with Appendices 1003-D and 1003-E invoked, OPSS.MUNI 1101 (Nov 2016) and OPSS.MUNI 1151 (Apr 2018).*

Under **Item R305 – Superpave, Surface Course, Hot Mix Asphalt**, the Contractor shall supply and place Superpave, Surface Course, HMA in one (1) lift from shoulder to shoulder in the location(s) and to the depth(s) specified in the Bid Form.

Under **Item R306 – Remove and Replace Miscellaneous Superpave Hot Mix Asphalt**, the Contractor shall remove existing asphalt and replace it with miscellaneous Superpave **12.5** HMA, PGAC **58-28**, as required at existing paved entrances, boulevards and all other areas indicated by the Owner. Superpave **12.5** HMA shall be placed as follows:

- For residential properties – one (1) 50 mm lift
- For commercial properties – two (2) 50 mm lifts
- For boulevards – one (1) 50 mm lift

The Traffic Category shall be **'A / B / C'**.

**310.04 DESIGN AND SUBMISSION REQUIREMENTS** is added as follows:

#### **310.04 DESIGN AND SUBMISSION REQUIREMENTS**

The Contractor shall submit all required asphalt mix designs to the Owner for review and acceptance a minimum of 10 Working Days before asphalt paving is scheduled to be undertaken. If for any reason the asphalt material is changed during the performance of the Work, the new mix design must be submitted to the Owner for review and acceptance before the new HMA is incorporated into the Work.

All PGAC used in the HMA must be compliant with the requirements outlined in Table 1 of OPSS.MUNI 1101.

Superpave asphalt mixes shall be designed to provide a minimum PGAC content as follows:

Mix Type	Minimum PGAC Content
SP 12.5, SP 12.5 FC1 and SP 12.5 FC2	5.0%
SP 19 (mix that is covered up with surface asphalt in the same construction season)	4.8%

SP 19 (mix that is <b>NOT</b> covered up with surface asphalt in the same construction season)	5.0%
SP 25	4.4%

**310.06.02 Paving Equipment** is amended by the addition of the following:

A shuttle buggy is not required for the paving work. No additional payment will be made to the Contractor should the Contractor chose to use a shuttle buggy.

**310.07.05.01.01 General** is amended by the addition of the following:

The unit prices for the hot mix items shall include the supply of the PGAC.

**310.07.05.01.02 Frequency and Location** is deleted in its entirety and replaced with the following:

**310.07.05.01.02 Frequency and Location**

A minimum of one (1) sample shall be randomly chosen for each asphalt cement type used on the Contract. Additional samples shall be taken if requested by the Owner.

**310.07.06.01 General** is amended by the addition of the following:

If the granular base is exposed following grinding (for base repairs and roadways where there is only one (1) lift of asphalt), the granular base shall be fine graded and compacted to the satisfaction of the Owner before any asphalt is placed. All faces of the pavement in the excavated area shall be painted with a thin, uniform and continuous coating of tack coat.

Under no circumstances shall top course asphalt paving take place after November 30<sup>th</sup> unless prior written permission has been received from the Owner. There will be no adjustments to the unit prices for the above item(s) should this work be completed during the next construction season in the event that a winter shutdown is necessary. Any additional work required to prepare the road for winter shutdown shall be completed under **Item G1 – Maintenance of Traffic**.

**310.07.06.02 Operational Constraints** is amended by the addition of the following:

The placement of the surface course asphalt will not be permitted until all trimming and placement of topsoil, sod and seed is completed.

The temperature of the mixture, as it is discharged from the mixer, shall be controlled within a temperature range of 135°C to 150°C.

**310.07.11.03 Transverse Joints** is amended by the addition of the following:

All transverse construction joints and mat terminations shall be temporarily ramped to minimize the bump. Transverse joints between new and existing pavement shall be prepared no more than 24 hours in advance of paving tie-ins unless the joint is adequately ramped to the satisfaction of the Owner. Existing paved entrances shall be connected to new construction using an appropriate full depth butt or ground step joint to ensure a smooth transition to the satisfaction of the Owner.

**310.08.01 General** is amended by the addition of the following:

The Owner will be conducting QA testing using the requirements of OPSS.MUNI 310 and OPSS.MUNI 1151 (Superpave mixes).

Voids Filled with Asphalt (VFA) shall be within the specified mix design range.

For the purpose of hot mix sampling and testing, one (1) lot will be deemed to be the total of each Day's production.

The Owner will check the Contractor's production of the design mix using one, or both, of the following methods:

- A sample from a trial batch of the proposed mix from the supply plant
- A production sample of the proposed mix which the Contractor is currently supplying to another site

#### **Asphalt Plant Control Room Access**

The Contractor shall provide the Owner's QA representative with access to its asphalt plant control room in order to obtain copies of the batching records and to document/photograph plant operations during the production of HMA for the Contract. The information collected from the Contractor's asphalt control room will be used solely to compare the as-produced mix to the mix design accepted by the Owner. All information collected by the Owner's QA representative will be shared with the Contractor and will be kept in strict confidence by the Owner.

**310.10.02 Hot Mix Asphalt Miscellaneous – Item** is amended by the addition of the following:

#### **Remove and Replace Miscellaneous Superpave Hot Mix Asphalt – Item**

Each course of asphalt shall be placed to the specified thickness. If the specified placement rate is exceeded, payment may be withheld for the excess material placed.

No separate payment will be made for removal and disposal work performed under these items.

#### **Item R307 Remove and Replace Hot Mix Asphalt HL-3HS Surface Course and HL-8 Binder Course [Renewal]**

*This Specification shall be read in conjunction with OPSS.PROV 308 (Apr 2012), OPSS.MUNI 310 (Nov 2017), OPSS.MUNI 510 (Nov 2018), OPSS.MUNI 1101 (Nov 2016) and OPSS.MUNI 1150 (Nov 2020).*

This item is for the removal and restoration of asphalt pavement affected by intersection improvements as noted on the Drawings. The asphalt shall be placed to match existing lift thicknesses up to a depth of 150 mm.

Removals shall be done by saw cutting and excavating, or by cold planning to provide smooth vertical surfaces in the existing asphalt.

Restoration of the existing asphalt shall be carried out no later than twenty-four (24) hours after completion of adjacent intersection improvement work.

The HMA mixes shall have a minimum Marshall Stability of 12,000.



Prior to surface paving, the edges of the existing asphalt shall be ground out 50 mm deep by 300 mm wide to provide a step joint between the existing base asphalt and the new surface asphalt.

The supply and application of tack coat shall be included in the unit price for this item.

**310.07.03.01 Application of Tack Coat** is amended by the addition of the following:

Tack coat shall be applied to all previously paved surfaces, regardless of whether the surfaces have been open to traffic.

#### **Measurement for Payment**

Measurement for payment shall be of the area in square metres (m<sup>2</sup>) in which binder and surface course asphalt is satisfactorily removed and replaced.

#### **Basis of Payment**

Payment shall be made at the unit price and shall be full compensation for all labour, equipment and materials necessary to complete the work as specified.

### **Item R308 Remove and Replace Miscellaneous Hot Mix Asphalt HL-3 [Renewal]**

*This Specification shall be read in conjunction with OPSS.PROV 308 (Apr 2012), OPSS.MUNI 310 (Nov 2017), OPSS.MUNI 510 (Nov 2018), OPSS.MUNI 1101 (Nov 2016) and OPSS.MUNI 1150 (Nov 2018).*

This item is for the removal and restoration of asphalt sidewalks, boulevards and median islands affected by intersection improvements as noted on the Drawings. The new asphalt shall be placed to a depth of 50 mm, and any granular material required for the restoration shall be included in this item.

Removals shall be done by saw-cutting and excavating.

Restoration of the existing asphalt shall be carried out no later than twenty-four (24) hours after completion of the adjacent intersection improvement work.

The HMA mixes shall have a minimum Marshall Stability of 12,000.

#### **Measurement for Payment**

Measurement for payment shall be of the area in square metres (m<sup>2</sup>) in which asphalt is satisfactorily removed and replaced.

#### **Basis of Payment**

Payment shall be made at the unit price and shall be full compensation for all labour, equipment and materials necessary to complete the work as specified.

**Item R309 50 mm Superpave 12.5 Surface Course, PGAC 64-28 XJ, Category 'D'**  
**(Provisional) [Renewal]**

*This Specification shall be read in conjunction with OPSS.MUNI 310 (Nov 2017), OPSS.MUNI 1003 (Nov 2013) with Appendices 1003-D and 1003-E invoked, OPSS.MUNI 1101 (Nov 2016) and OPSS.MUNI 1151 (Apr 2018).*

**310.07.06.01 General** is amended by the addition of the following:

The Contractor shall supply and place 50 mm Superpave 12.5 surface course patching, PGAC 64-28 XJ, Category 'D' in the location(s) identified by the Owner.

The purpose of the patching is to fix deteriorated pavement locations prior to the required microsurfacing treatment. The Owner will identify and mark the patch locations on Site for the Contractor at the commencement of construction.

**310.04 DESIGN AND SUBMISSION REQUIREMENTS** is added as follows:

**310.04 DESIGN AND SUBMISSION REQUIREMENTS**

The Contractor shall submit all required asphalt mix designs to the Owner for review and acceptance a minimum of 10 Working Days before asphalt paving is scheduled to be undertaken. If for any reason the asphalt material is changed during the performance of the Work, the new mix design shall be submitted to the Owner for review and acceptance before the new hot mix asphalt is incorporated into the Work.

**310.06.02 Paving Equipment** is amended by the addition of the following:

A shuttle buggy is not required for the paving work. No additional payment will be made to the Contractor should the Contractor choose to use a shuttle buggy.

**310.07.05.01.01 General** is amended by the addition of the following:

The unit price for this item shall include the supply of the PGAC.

**310.07.05.01.02 Frequency and Location** is deleted in its entirety and replaced with the following:

**310.07.05.01.02 Frequency and Location**

A minimum of one (1) sample shall be randomly chosen for each asphalt cement type used on the Contract. Additional samples shall be taken if requested by the Owner.

**310.07.06.01 General** is amended by the addition of the following:

If the granular base is exposed following grinding (for base repairs and roadways where there is only one (1) lift of asphalt), the granular base shall be fine graded and compacted to the satisfaction of the Owner before any asphalt is placed. All faces of the pavement in the excavated area shall be painted with a thin, uniform and continuous coating of tack coat.

Under no circumstances shall top course asphalt paving take place after November 30<sup>th</sup> unless prior written permission has been received from the Owner. There will be no adjustments to the unit prices for the above item(s) should this work be completed during the next construction season in the event that a winter shutdown is necessary.

Any additional work required to prepare the road for winter shutdown shall be completed under **Item G1 – Maintenance of Traffic**.

Each course of asphalt shall be placed to the specified thickness.

The requirements of Appendices 1003-D and 1003-E of OPSS.MUNI 1003 shall apply to this Specification.

Compaction testing of the placed hot mix will be determined by Nuclear Density Gauge.

**310.07.06.02 Operational Constraints** is amended by the addition of the following:

The placement of the surface course asphalt will not be permitted until all trimming and placement of topsoil, sod and seed is completed.

The temperature of the mixture, as it is discharged from the mixer, shall be controlled within a temperature range of 135°C to 150°C.

**310.07.11.03 Transverse Joints** is amended by the addition of the following:

All transverse construction joints and mat terminations shall be temporarily ramped to minimize the bump. Transverse joints between new and existing pavement shall be prepared no more than 24 hours in advance of paving tie-ins unless the joint is adequately ramped. Existing paved entrances shall be connected to new construction using an appropriate full depth butt or ground step joint to ensure a smooth transition.

**310.08.01 General** is amended by the addition of the following:

The Owner will be conducting QA testing using the requirements of OPSS.MUNI 310 and OPSS.MUNI 1151.

Voids Filled with Asphalt (VFA) shall be within the specified mix design range.

For the purpose of hot mix sampling and testing, one (1) lot will be deemed to be the total of each Day's production.

The Owner will check the Contractor's production of the design mix using one, or both, of the following methods:

- A sample from a trial batch of the proposed mix from the supply plant
- A production sample of the proposed mix which the Contractor is currently supplying to another site

#### **Asphalt Plant Control Room Access**

The Contractor shall provide the Owner's QA representative with access to its asphalt plant control room in order to obtain copies of the batching records and to document/photograph plant operations during the production of asphalt for the Contract. The information collected from the Contractor's asphalt control room will be used solely to compare the as-produced mix to the mix design accepted by the Owner. All information collected by the Owner's QA representative will be shared with the Contractor and will be kept in strict confidence by the Owner.

**OPSS.MUNI 310 Table 10 Minimum Pavement Compaction Based on Maximum Relative Density** is deleted in its entirety and replaced with the following:

**Table 10 – Minimum Pavement Compaction Based on Maximum Relative Density**

Mix	Minimum Compaction %
All Mixes, except SMA	92.0
SMA	93.0

**Item R310 Asphalt Binder Course Repair (Provisional) [Renewal]**

*This Specification shall be read in conjunction with OPSS.MUNI 206 (Apr 2019), OPSS.MUNI 310 (Nov 2017) and OPSS.MUNI 510 (Nov 2018).*

Following asphalt removal operations, the Contractor shall repair all soft spots in the existing asphalt base course in the location(s) indicated by the Owner.

In all areas identified for repair by the Owner, the Contractor shall remove 80 mm of the existing base asphalt and/or granular material and properly place 80 mm of Superpave 19.0, PGAC 64-28 Category 'C'. A shuttle buggy is not required for the asphalt paving performed under this item.

All removed material shall become the property of the Contractor and shall be disposed of off Site by the Contractor at its own expense.

**Measurement for Payment**

Measurement for payment shall be of the area in square metres (m<sup>2</sup>) in which existing base asphalt and/or granular material is satisfactorily removed and replaced.

**Basis of Payment**

Payment shall be made at the unit price and shall be full compensation for all labour, equipment and materials necessary to complete the work as specified.

**Item R310A Asphalt Binder Course Repair – Asbestos Containing Materials (Provisional) [Renewal]**

*This Specification shall be read in conjunction with OPSS.MUNI 206 (Apr 2019), OPSS.MUNI 310 (Nov 2017) and OPSS.MUNI 510 (Nov 2018).*

*The Contractor is advised that the asphalt removed under this item contains asbestos fibres. Accordingly, asphalt removal and disposal under this item shall be completed in accordance with the requirements set out in the Specification for Item R530 – Cold Wet Mill and Disposal of Asphalt Pavement Containing Asbestos – Partial/Full Depth and Item R531 – Cold Wet Mill and Disposal of Asphalt Pavement Containing Asbestos – Partial/Full Depth. For clarity, any asphalt removed and disposed of under this item will be paid for under this item only.*

Following asphalt removal operations, the Contractor shall repair all soft spots in the existing asphalt base course in the location(s) indicated by the Owner.



In all areas identified for repair by the Owner, the Contractor shall remove 80 mm of the existing base asphalt and/or granular material and properly place 80 mm of Superpave 19.0, PGAC 64-28 Category 'B'. A shuttle buggy is not required for the asphalt paving performed under this item.

All removed material shall become the property of the Contractor and shall be disposed of off Site by the Contractor at its own expense.

### Measurement for Payment

Measurement for payment shall be of the area in square metres (m<sup>2</sup>) in which existing base asphalt and/or granular material is satisfactorily removed and replaced.

### Basis of Payment

Payment shall be made at the unit price and shall be full compensation for all labour, equipment and materials necessary to complete the work as specified.

### Item R311 Aramid Reinforcing Fibers in WMA [Renewal]

The Contractor shall use aramid reinforcing fibers in the WMA placed under **[Select the applicable item]** Item R301 – Superpave, Binder Course, Warm Mix Asphalt / Item R302 – Superpave, Surface Course, Warm Mix Asphalt.

The fibers shall be one (1) of the following products:

- Surface Tech Ace XP Fiber ("ACE Fiber") brand, aramid reinforcing fibers (described on the following website: <https://surface-tech.com/asphalt-ace-xp>)

#### Sasobit Coated Aramid Fibers Specifications:

Materials: Sasobit Wax/Aramid

Length: 38 mm (+/- 10%)

Form: Wax Coated Monofilament Fibers

Specific Gravity: 1.44 (Aramid)

Tensile Strength: 2,500 to 3,000 MPa (Aramid)

Melt Temperature: 88°C (Sasobit) and 400 to 450°C for Aramid – Kevlar

Dosage: 0.0065% aramid by mass of total mix

0.0106% for Sasobit treated aramid by mass of total mix

- FORTA-FI Fiber ("FORTA-FI Fiber") brand, aramid reinforcing fibers (described on the website <http://www.jas-hes.com/products/construction/forta-fi-fibers>)

#### Blend of Polyolefin/Aramid Fibers Specifications:

Materials: Polyolefin/Aramid (Kevlar)

Length: ¾" (19 mm)

Form: Serrated Fibers/Monofilament Fibers

Specific Gravity: 0.91/1.44

Acid/Alkali Resistance: Inert

Tensile Strength: up to 70,000 PSI or 480 Mpa (Polyolefin)

400,000 PSI or 2,760 Mpa (Aramid – Kevlar)

Melt Temperature: 130°C for Polyolefin and 427°C for Aramid – Kevlar

Dosage: 0.0065% aramid by mass of total mix  
 0.05% for Polyolefin/Aramid by mass of total mix (0.5 kg/metric ton of total mix)

- Or Equivalent

### Measurement for Payment

Measurement for payment shall be per tonne (t) of WMA with aramid reinforcing fibers placed.

### Basis of Payment

Payment shall be made at the unit price and shall be full compensation for all labour, equipment and materials necessary to complete the work as specified.

## Item R312 Geotextile Stabilized Double Chip Seal [Renewal]

*This Specification shall be read in conjunction with OPSS.MUNI 303 (Nov 2018).*

**303.01 SCOPE** is deleted in its entirety and replaced with the following:

### 303.01 SCOPE

This specification is applicable for the use of paving fabrics, saturated in an emulsified asphalt binder to be used in conjunction with a double seal coat, applied over existing bound or gravel surfaces. The seal can be utilized as an overlay to an existing roadway or as an interlayer where hot mix asphalt is placed on the finished reinforced seal.

The Contractor shall provide a double application of binder and aggregate in accordance with this Specification.

The function of the paving fabric is to act as a waterproofing and stress relieving membrane within the pavement structure.

Paving fabrics are not suitable for cul de sacs, intersections, sharp corners or roadways with maintenance structures. In lieu of paving fabric, these areas shall be overlain with 60 mm of HMA under Item R305 – Superpave, Surface Course, Hot Mix Asphalt, prior to the application of double chip seal.

**303.02 REFERENCES** is amended by the addition of the following:

### ASTM International

ASTM D 4632 Grab strength

ASTM D 4632 Ultimate elongation

ASTM D 5261 Mass per unit area

ASTM D 276 Melting point

### Ontario Ministry of Transportation Publications

Designated Sources for Materials:

DSM list #3.05.25	Aggregates, Coarse for Superpave 12.5 FC1, Superpave 12.5 FC2, SMA, HL1, DFC and OFC; and Aggregates, Fine for Superpave 12.5 FC2, SMA, DFC and OFC
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DSM list #3.05.30      Emulsified Asphalt

MTO Laboratory Testing Manual (Tests)

LS-224                      Coating for Emulsified Asphalts

**303.04.01 Design Requirements** is amended by the addition of the following:

The following information is provided for information purposes:

- Vivian Road from Highway 48 to York/Durham Line – AADT of 1,600, 1% trucks
- Kennedy Road north of Davis Drive – AADT of 170, 6% trucks
- Existing pavement structure – Engtec Consulting Inc. Geotechnical Investigation and Pavement Design Report, of January 27, 2016.

Any reliance on, or use of, this information shall not absolve the Contractor from its responsibility for the design or performance of the geotextile stabilized double chip seal.

The design shall be reviewed and approved for construction, on behalf of the Contractor, by a Professional Engineer qualified in asphalt technology.

**303.04.02.01 Chip Seal Design** is amended by the addition of the following:

Upon completion of the work under this item, the Contractor shall submit a certificate of conformance (the “**Certificate**”) to the Owner confirming compliance with the design and stating the application rates for binder and aggregates. The Certificate shall be reviewed and approved by the Professional Engineer on behalf of the Contractor. The Contractor shall also provide supporting quality control testing and inspection documentation necessary to demonstrate conformance with the requirements of the Contract Documents.

**303.05.02.01 General** is amended by the addition of the following:

Aggregates shall be from the MTO Designated Sources for Materials list #3.05.25.

**303.05.02.03.01 First Application** is amended by the addition of the following:

- c)      The minimum median size shall be 12.5 mm.

**303.05.03 Compatibility of Asphalt Binder and Aggregate** is amended by the addition of the following:

The Contractor shall perform compatibility testing and provide the results to the Owner a minimum of five (5) Working Days prior to commencing the geotextile stabilized double chip sealing.

**303.05 MATERIALS** is amended by the addition of the following:

**303.05.04      Geotextile**

The geotextile shall be a non-woven polypropylene fabric heat bonded on one (1) side and shall meet the physical requirements in the following table:

**Geotextile Properties**

Property	Test Method	Units	Requirements
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Grab strength	ASTM D 4632	N	450
Ultimate elongation	ASTM D 4632	%	≥50
Mass per unit area	ASTM D 5261	g/m <sup>2</sup>	140
Melting point	ASTM D 276	°C	150

**303.06 EQUIPMENT** is amended by the addition of the following:

**303.06.02 Pressure Distributor/Paving Fabric Applicator**

The pressure distributor shall be designed and manufactured to spray binder on the road surface. The pressure distributor shall be capable of applying binder at the specified rates and in a continuous and uniform manner; both longitudinally and transversely for a full lane width.

The emulsion distributor shall be fitted with a paving fabric applicator capable of placing rolls 4.5 m wide. The applicator must be equipped with a tensioning mechanism to ensure that the roll is placed smoothly on the desired surface. The fabric applicator must be mounted to the distributor so that paving fabric is placed immediately onto the sprayed binder.

The applicator shall be fitted with a series of brushes to push the paving fabric evenly across the width of the binder application.

The pressure distributor shall be computerized and capable of applying the emulsion within ±5% of the rate designed by the Contractor in a continuous and uniform manner in both longitudinal and transverse directions.

The emulsion distributor shall be equipped with a rear mounted camera to enable the operator to see the rear of the truck as it is placing the paving fabric.

**303.07 CONSTRUCTION** is amended by the addition of the following:

**303.07.11 Determination of Binder and Aggregate Application Rates**

The application rate for the binder and aggregate shall be determined by a seal coat design methodology, as approved by the Professional Engineer, with the aggregate and binder specified in the Contract Documents.

The Contractor shall demonstrate to the Owner satisfactory compliance to the specified application rates of binder and aggregate. At the Owner's option, this compliance may include a minimum 300 m, one (1) lane width trial section to ensure that the binder and aggregate are applied at the specified rate.

**303.09 MEASUREMENT FOR PAYMENT** is deleted in its entirety and replaced with the following:

**303.09 MEASUREMENT FOR PAYMENT**

**303.09.01 Geotextile Stabilized Double Chip Seal**

Measurement will be by the horizontal area in square metres (m<sup>2</sup>) of geotextile stabilized double chip seal placed in accordance with the Contract Documents.

**303.10 BASIS OF PAYMENT** is deleted in its entirety and replaced with the following:



**303.10 BASIS OF PAYMENT****303.10.01 Geotextile Stabilized Double Chip Seal**

Payment shall be made at the unit price and shall be full compensation for all labour, equipment and materials necessary to complete the work as specified.

The repair, removal, disposal and replacement of any damaged or defective geotextile stabilized double chip seal required prior to the expiration of the warranty period shall be performed by the Contractor at no additional cost to the Owner.

**Item R313 Double Chip Seal [Renewal]**

*This Specification shall be read in conjunction with OPSS.MUNI 303 (Nov 2018).*

**303.02 REFERENCES** is deleted in its entirety and replaced with the following:

**303.02 REFERENCES****Ontario Ministry of Transportation Publications**

Designated Sources for Materials:

DSM list #3.05.25      Aggregates, Coarse for Superpave 12.5 FC1, Superpave 12.5 FC2, SMA, HL1, DFC and OFC; and Aggregates, Fine for Superpave 12.5 FC2, SMA, DFC and OFC

DSM list #3.05.30      Emulsified Asphalt

MTO Laboratory Testing Manual (Tests)

LS-224                      Coating for Emulsified Asphalts

Ontario Ministry of Transportation (MTO), Manual for Condition Rating of Surface Treated Pavement (SP-021)

**303.04.01 Design Requirements** is amended by the addition of the following:

The following information is provided for information purposes only:

- Old Homestead Road – Warden Avenue-Kennedy Road – AADT of 1,442, 2.9% trucks
- Old Homestead Road – McCowan Road-Valley View Drive – AADT of 920, 2.6% trucks
- Pavement Visual Condition Review and Recommendation – Engtec Consulting Inc. Geotechnical Investigation and Pavement Design Report dated May 6, 2021.

Any reliance on, or use of, this information shall not absolve the Contractor from its responsibility for the design or performance of the double chip seal.

The design shall be reviewed and approved for construction, on behalf of the Contractor, by a Professional Engineer qualified in asphalt technology.

**303.04.02.01 Chip Seal Design** is amended by the addition of the following:

Upon completion of the work under this item, the Contractor shall submit a certificate of conformance (the “**Certificate**”) to the Owner confirming compliance with the design

and stating the application rates for binder and aggregates. The Certificate shall be reviewed and approved by the Professional Engineer on behalf of the Contractor. The Contractor shall also provide supporting quality control testing and inspection documentation necessary to demonstrate conformance with the requirements of the Contract Documents.

**303.05.02.01 General** is amended by the addition of the following:

Aggregates shall be from the MTO Designated Sources for Materials list #3.05.25.

Gradation of the aggregate shall comply with the following requirements, at a minimum:

- Base course shall have a median size of not less than 12.5 mm
- The topcoat aggregate shall be no larger than 75% of the base coarse aggregate size

**303.05.02.03.01 First Application** is amended by the addition of the following:

c) The minimum median size shall be 12.5 mm.

**303.05.03 Compatibility of Asphalt Binder and Aggregate** is amended by the addition of the following:

The Contractor shall perform compatibility testing and provide the results to the Owner a minimum of five (5) Working Days prior to commencing the double chip sealing.

**303.07.11 Determination of Binder and Aggregate Application Rates** is added as follows:

**303.07.11 Determination of Binder and Aggregate Application Rates**

The application rate for the binder and aggregate shall be determined by a seal coat design methodology, as approved by the Professional Engineer, with the aggregate and binder specified in the Contract Documents.

The Contractor shall demonstrate to the Owner satisfactory conformance with the specified application rates of binder and aggregate. At the Owner's option, this compliance may include a minimum 300 m, one (1) lane width trial section to ensure that the binder and aggregate are applied at the specified rate.

**Item R314 Fog Seal [Renewal]**

*This Specification shall be read in conjunction with OPSS.MUNI 304 (Nov 2016), OPSS.MUNI 1006 (Nov 2021) and OPSS.MUNI 1103 (Nov 2019).*

**304.01 SCOPE** is deleted in its entirety and replaced with the following:

**304.01 SCOPE**

This Specification covers the requirements for the placement of emulsified asphalt fog seal with the application of cover aggregate (sand) in the location(s) indicated by the Owner.

**304.02 REFERENCES** is amended by the addition of the following:

**Ontario Ministry of Transportation Publications**

Designated Sources for Materials:

DSM list #3.05.30      Emulsified Asphalt

MTO Laboratory Testing Manual (Tests):

LS-224                      Coating for Emulsified Asphalts

**304.03 DEFINITIONS** is amended by the addition of the following:

**Fog Seal** means a light spray application of asphalt binder, with or without aggregate (sand) cover, applied to a weathered hot-mix asphalt surface, an open-graded asphalt mix, or the surface of a surface treatment (chip seal or seal coat) to seal the pavement surface, inhibit weathering/raveling, enrich hardened/oxidized asphalt and/or enhance the colour.

**304.04 DESIGN AND SUBMISSION REQUIREMENTS** is added as follows:

#### **304.04 DESIGN AND SUBMISSION REQUIREMENTS**

##### **304.04.01      Submission Requirements**

At least 14 Days prior to the first placement of fog seal, the Contractor shall submit documentation to the Owner identifying the proposed suppliers of the emulsified asphalt and cover aggregate (sand) and any Subcontractor(s) involved in the fog seal placement operations. This documentation shall include the proposed diluted emulsion application rate and cover aggregate application rate, and test results from a qualified laboratory acceptable to the Owner (typically the supplier), demonstrating that the undiluted emulsified asphalt and the cover aggregate meet the requirements of the Contract Documents. The test results shall include the full MTO LS-224 Coating for Emulsified Asphalts Coating Ability and Water Resistance (ASTM D244) testing for samples of the diluted and undiluted emulsion, and cover aggregate proposed for the Work.

Prior to commencing the first placement of the fog seal, the Contractor shall complete a 200 m<sup>2</sup> trial section of fog seal. The Contractor and the Owner will jointly assess the trial section and the Contractor shall make any necessary adjustments to the materials and application of the fog seal to meet the requirements of the Contract Documents.

**304.05 MATERIALS** is deleted in its entirety and replaced with the following:

#### **304.05 MATERIALS**

##### **304.05.01      Emulsified Asphalt**

The emulsified asphalt SS-1h or CSS-1h shall conform to the requirements of OPSS.MUNI 1103 and shall be obtained from an emulsified asphalt supplier listed on the MTO's DSM list #3.05.30 "Emulsified Asphalt".

##### **304.05.02      Cover Aggregate**

The cover aggregate (sand) shall be dry, hard, durable, free from dust and foreign matter, well graded, and shall conform to the requirements of OPSS.MUNI 1006 for Class 4 aggregate, with the additional gradation requirements of 100% passing 2.36 mm and less than 4% passing 75µm.

**304.07.01 Operational Constraints** is amended by the deleting the third and fourth paragraphs and replacing them with the following:

The Contractor shall make every effort to minimize any disruptions to the accessing of adjacent properties. The Contractor shall notify the property occupants in writing a minimum of 48 hours prior to any potential disruption.

Fog seal shall be applied the same Day, over a new surface treatment, unless weather conditions do not permit it, in which case the fog seal shall be placed on the following Day.

**304.07.02.01 Binder** is amended by the addition of the following:

The Contractor shall provide two (2), full 4-litre samples of both the diluted and undiluted binder to the Owner.

**304.07.02.02 Aggregates** is amended by the addition of the following:

For each Day of the fog seal operation, the Contractor shall provide two (2), 5-kg samples of the cover aggregate to the Owner. The Owner will determine the time and/or location of the sampling.

**304.07.06 Application of Binder** is amended by the addition of the following:

The emulsified asphalt shall be diluted with an equal volume of clean, potable water. The Contractor shall clean the surface to be fog sealed by power brooming in order to remove any loose material, dirt and dust. The diluted emulsion shall then be uniformly applied to the dry clean surface at a rate of approximately 0.60 litres/m<sup>2</sup>, or as indicated by the Owner. The diluted emulsion application rate will be determined through the placement of the fog seal trial section. The emulsion application temperature shall conform to the requirements of OPSS.MUNI 1103. Emulsion application shall be avoided prior to probable rainfall and during rain. The pavement and air temperatures shall be above 10°C and rising. For any applications during hot, dry conditions, care shall be taken to prevent premature breaking of the emulsion.

**304.07.07 Application of Aggregate** is amended by the addition of the following:

Cover aggregate (sand) shall be uniformly applied to the uncured emulsion at a rate of approximately 2.0 kg/m<sup>2</sup>, or as indicated by the Owner. The aggregate application rate will be subject to the results of the fog seal trial section. One (1) to three (3) passes of a light pneumatic-tired roller shall be made over the treated surface to firmly embed the cover aggregate. Any loose cover aggregate that remains after the rolling and curing of the fog seal shall be removed by light power brooming prior to opening the road to traffic.

**304.09 MEASUREMENT FOR PAYMENT** is deleted in its entirety and replaced with the following:

**304.09 MEASUREMENT FOR PAYMENT**

Measurement will be by the horizontal area in square metres (m<sup>2</sup>) of fog seal applied, in accordance with the Contract Documents.

**304.10 BASIS OF PAYMENT** is deleted in its entirety and replaced with the following:



**304.10 BASIS OF PAYMENT**

Payment shall be made at the unit price and shall be full compensation for all labour, equipment and materials necessary to complete the work as specified.

**Item R315 Granular Sealing [Renewal / New Construction]**

*The above item shall be completed in accordance with OPSS.MUNI 305 (Nov 2016).*

**Item R316 Type III Modified Microsurfacing [Renewal]**

*This Specification shall be read in conjunction with OPSS.MUNI 336 (Nov 2018), OPSS.MUNI 1001 (Nov 2021), OPSS.MUNI 1003 (Nov 2013), OPSS.MUNI 1103 (Nov 2019) and OPSS.MUNI 1301 (Nov 2018).*

The Contractor shall remove the existing durable pavement markings prior to commencing the microsurfacing treatment.

**336.04 DESIGN AND SUBMISSION REQUIREMENTS** is amended by the addition of the following:

The Contractor shall provide mix design and testing data to the Owner for review and approval. This submission shall be carried out in accordance with OPSS.MUNI 336 except as noted otherwise in this Specification. The design shall include the stamp of approval of a Professional Engineer.

The timeline for the submissions of mix design and testing data shall conform to OPSS.MUNI 336 unless otherwise approved in writing by the Owner.

Microsurfacing placement will not be permitted until the submitted mix design and testing data have been reviewed and approved by the Owner.

For the purpose of this Contract only, the latest traffic data available, including AADT and percentage of commercial vehicles, is provided in the following table:

RIN	Road Name	From	To	AADT	Per Truck
31-25	Davis Drive	Yonge Street	Main Street	31,220	3.1%
31-26	Davis Drive	Main Street	Prospect Street	33,376	2.1%
31-28	Davis Drive	Prospect Street	Leslie Street	30,314	2.4%
31-29	Davis Drive	Leslie Street	Highway 404	28,304	4.8%
74-26	Mulock Drive	Yonge Street	Bayview Avenue	25,889	3%
74-28	Mulock Drive	Bayview Avenue	Leslie Street	29,472	2.6%
74-30	Mulock Drive	Leslie Street	Highway 404	23,651	3.1%

**336.05.03 Mineral Filler** is amended by the addition of the following:

Mineral filler can also be hydrated lime.

**336.05.04 Water** is deleted in its entirety and replaced with the following:

**336.05.04 Water**

Potable water shall be used in the microsurfacing mix.

**336.06.04 Spreading Equipment** is amended by the addition of the following:

The Contractor may elect to use non-continuous placement equipment with the prior approval of the Owner after the trial area is reviewed by the Owner.

**336.07.01 Operational Constraints** is amended by the addition of the following:

The Contractor shall surface the road sections with Type III Modified Microsurfacing with scratch coat and surface coat, in accordance with OPSS.MUNI 336. **Refer to the Aerial Photographs for detailed construction limits information.**

The Contractor shall place Type III Modified Microsurfacing on the entire area of the paved roadways, including paved shoulders for rural roads.

**336.07.03 Surface Preparation** is amended by deleting the second paragraph and replacing it with the following:

Deteriorating and debonding crack sealing material shall be removed.

**336.07.03 Surface Preparation** is further amended by deleting the fifth paragraph and replacing it with the following:

Tack coat shall not be required where a scratch coat has been placed.

**336.07.04 Mix Application** is amended by deleting the fifth and sixth paragraphs and replacing them with the following:

Wheel track ruts, 19 mm or greater in depth, shall be filled independently with microsurfacing using a rut-filling spreader box prior to the application of other microsurfacing. Ruts greater than 30 mm in depth shall be reduced by grinding the high points of the ruts to reduce the depth to below 30 mm. All rut-filling material shall cure under traffic for a minimum 24-hour period before additional material is applied. All applications shall be scratch and surface.

**336.08 QUALITY ASSURANCE** is amended by the addition of the following:

The Owner will conduct QA testing to ensure that the microsurfacing mix material satisfies the requirements of OPSS.MUNI 336, OPSS.MUNI 1001, OPSS.MUNI 1003, OPSS.MUNI 1103 and OPSS.MUNI 1301.

For the purpose of material sampling and testing, one (1) lot will be deemed to be the total of each Day's production.

**336.08.01 Sampling and Testing** is amended by the addition of the following:

A material testing consultant retained by the Owner shall be on Site each Day that microsurfacing materials are applied in order to collect samples for testing purposes. The Contractor shall inform the Owner a minimum of three (3) Working Days in advance of the application of any microsurfacing so that the Owner can arrange for the material testing consultant to collect the samples. The Contractor shall fully cooperate with the Owner and the material testing consultant for the required sample collection activities.

**Item R317 Tack Coat [New Construction]**

**Item R317 Tack Coat (Provisional) [Renewal]**

*This Specification shall be read in conjunction with OPSS.PROV 308 (Apr 2012), OPSS.MUNI 310 (Nov 2017) and OPSS.MUNI 1103 (Nov 2019).*

**308.08.01.04 Lot and Sublot Sizes** is deleted in its entirety and replaced with the following:

**308.08.01.04 Lot and Sublot Sizes**

Frequency of sampling shall be one (1) sample per week of paving or at the discretion of the Owner.

**308.08.01.05 Product Acceptance** is deleted in its entirety and replaced with the following:

**308.08.01.05 Product Acceptance**

Tack coat product acceptance shall be based on compliance with results of the residue by distillation test according to LS-216 and residue penetration according to LS-200 on the diluted product.

**308.08.01.06 Referee Testing** is deleted in its entirety and replaced with the following:

**308.08.01.06 Referee Testing**

Referee testing for percent residue and penetration can only be invoked by the Contractor within two (2) Business Days of the Contractor receiving the QA results and if the referee sample received by the laboratory is in a condition suitable for testing.

All referee test results shall replace the respective QA test results for acceptance and shall be binding on both the Owner and the Contractor.

If the referee percent residue test result is less than 27.5% and/or the penetration test results are not within the minimum and maximum range specified in Table 1 of OPSS.MUNI 1103, the Contractor shall be responsible for the cost of the referee testing.

When the results from the referee samples are deemed rejectable, removal and replacement of the tack coat will be at the discretion of the Owner.

**310.07.03.01 Application of Tack Coat** is amended by the addition of the following:

Tack coat shall be applied to all previously paved surfaces regardless of whether the surfaces have been open to traffic.

**Measurement for Payment**

Measurement for payment shall be in square metres (m<sup>2</sup>) of tack coat satisfactorily placed. Tack coat placed at construction joints will not be measured for payment.

**Basis of Payment**

Payment shall be made at the unit price and shall be full compensation for all labour, equipment and materials necessary to complete this work as specified, regardless of the surface type coated.

**Item R318 Joint Sealant – Re-Instatement Tape [Renewal / New Construction]**

Prior to placing the surface course of WMA under *[Select the applicable item]* Item R302 – Superpave, Surface Course, Warm Mix Asphalt / Item R307 – Remove and Replace Hot Mix Asphalt HL-3HS Surface Course and HL-8 Binder Course / Item R305 – Superpave, Surface Course, Hot Mix Asphalt / Item R309 – 50 mm Superpave 12.5 Surface Course, PGAC 64-28 XJ, Category 'D' (Provisional), the Contractor shall install a cold applied, polymer modified, bituminous strip to provide a smooth, lip free and sealed cold joint.

The tape shall be 2 mm x 50 mm Denso North America, Inc. ("Denso") brand reinstatement tape (described on the website noted below) or Equivalent. The Contractor shall install the tape according to the supplier's instructions, which may include the use of special primers and/or special equipment.

The tape shall be placed such that it will be 5 mm to 10 mm proud of the existing asphalt surface.

Denso's instructions can be downloaded at:

<https://www.densona.com/wp-content/uploads/2020/12/Denso-Re-Instatement-Tape.pdf>

Alternate brand product shall meet the requirements of ISO 9001, ISO 14001 and CSA Z245.30-18.

In conjunction with the suppliers' placement instructions, the Contractor shall rake off any large aggregates present on the edge of the repair area prior to the final rolling application. Large aggregates that are raked off shall be removed and disposed of and shall not be placed back on the new asphalt patch. The transverse cold joints created following daily surface asphalt production, and at the Contract paving limits, shall receive this treatment.

**Measurement for Payment**

Measurement for payment shall be per linear metre (m) of joint re-instatement tape supplied and installed.

**Basis of Payment**

Payment shall be made at the unit price and shall be full compensation for all labour, equipment and materials necessary to complete the work as specified.

**Item R319 Joint Sealing Compound [Renewal / New Construction]**

Prior to placing the surface course of WMA under *[Select the applicable item]* Item R302 – Superpave, Surface Course, Warm Mix Asphalt / Item R307 – Remove and Replace Hot Mix Asphalt HL-3HS Surface Course and HL-8 Binder Course / Item R305 – Superpave, Surface



Course, Hot Mix Asphalt / Item R309 – 50 mm Superpave 12.5 Surface Course, PGAC 64-28 XJ, Category 'D' (Provisional), the Contractor shall install a hot applied, polymer modified, bituminous strip to provide a smooth, lip free and sealed cold joint.

The sealant shall be 8 mm x 45 mm Denso North America, Inc. (“**Denso**”) brand hot asphalt joint sealing compound (described on the website noted below) or Equivalent. The Contractor shall install the sealant according to the supplier’s instructions, which may include the use of special primers and/or special equipment.

The sealant shall be placed such that it will be 5 mm to 10 mm proud of the existing asphalt surface.

Denso’s instructions can be downloaded at:

<https://www.densona.com/wp-content/uploads/2020/04/Denso-Band.pdf>

Alternate brand product shall meet the requirements of ISO 9001, ISO 14001 and CSA Z245.30-18.

In conjunction with the suppliers’ placement instructions, the Contractor shall rake off any large aggregates present on the edge of the repair area prior to the final rolling application. Large aggregates that are raked off shall be removed and disposed of, and shall not be placed back on the new asphalt patch. The transverse cold joints created following daily surface asphalt production, and at the Contract paving limits, shall receive this treatment.

### **Measurement for Payment**

Measurement for payment shall be per linear metre (m) of joint sealing compound supplied and installed.

### **Basis of Payment**

Payment shall be made at the unit price and shall be full compensation for all labour, equipment and materials necessary to complete the work as specified.

**Item R320 Crack Sealing [Renewal]**

**Item R321 Crack Filling [Renewal]**

*This Specification shall be read in conjunction with OPSS.MUNI 341 (Nov 2021).*

Under these items, the Contractor shall perform routing and filling of cracks greater than 6 mm but less than 20 mm in width, and filling of cracks 6 mm or less but greater than 3 mm in width, in accordance with OPSS.MUNI 341 as amended herein, on the road sections specified in the Location List appended to the Contract, including all intersections within the specified road sections. Refer to The Regional Municipality of York Road Inventory Network and Ownership by Yard map (the “**Road Identification Network Map**”) appended to the Contract to determine the location of the roads.

For west-east roads, the limit of the work shall be from the stop lines of the eastern leg of the first roadway ('From' Column) noted in the Location List to the stop lines of the western leg of the second roadway ('To' Column) noted in the Location List.

For south-north roads, the limit of the work shall be from the stop lines of the northern leg of the first roadway ('From' Column) noted in the Location List to the stop lines of the southern leg of the second roadway ('To' Column) noted in the Location List.

With the exception of the intersections noting the limits of the Road Identification Network Map, all intersection areas shall be crack sealed through the width of the road and terminate at the end of curb radius of the intersecting roads.

The above-noted limits are shown graphically in the York Region Working Limits Per RIN sketch appended to the Contract.

The Contractor shall follow the Owner's directions on Site regarding the locations and quantities of cracks to be sealed under these items.

All sealant shall be applied with an overband.

**341.05.01 Crack Sealant** is amended by the addition of the following:

The crack sealant compound shall be as specified in ASTM D-6690 Type IV Modified.

**341.05.02 Limestone Screenings** is added as follows:

**341.05.02 Limestone Screenings**

Limestone screenings to be used as a dusting sealant shall have 100% passing through the 1.18 mm sieve and not greater than 25% passing through the 75µm sieve.

**341.05.01 Crack Sealant Barrier Material** is added as follows:

**341.05.01 Crack Sealant Barrier Material**

The crack sealant barrier material to be used for the Work shall be Glenzoil 20 Plus or Equivalent.

**341.06.01 Router** is amended by the addition of the following:

The pavement routing equipment shall be capable of routing all cracks to a minimum width of 20 mm on both sides of the cracks. The minimum depth of routing shall be 20 mm and shall not exceed 25 mm for roads with grades less than, or equal to, 8%.

The pavement routing equipment shall be capable of routing width of cracks to a minimum of 40 mm and reducing the depth to 15 mm on roadways with grades exceeding 8%.

**341.06.02 Heating Kettle** is amended by the addition of the following:

The heating kettle shall meet the requirements of the Technical Standards and Safety Authority.

**341.06.03 Hot-Compressed Air Lance** is amended by the addition of the following:

The hot-compressed air lance shall have an air discharge temperature of approximately 500°C and an air exit velocity of at least 1,000 metres per second. The Contractor shall adhere to the manufacturer's recommendations and safety manuals in operating the equipment.

**341.06.04 Air Compressor** is added as follows:

**341.06.04 Air Compressor**

The air compressor used to supply the hot-compressed air lance shall be equipped with oil and moisture filters and shall provide a minimum pressure of 700 kPa at a minimum air volume of 4.25 cubic metres per minute (150 cubic feet per minute). The Contractor shall closely follow the equipment manufacturer's operational manuals and necessary safety recommendations.

**341.07.01 General** is amended by the addition of the following:

Routing and/or sealing shall not be carried out when the pavement is damp or wet, when water is migrating up into the routs or when the pavement surface temperature is greater than 50°C.

The conditions under which cracks shall be routed and sealed or sealed without routing are specified above and based on the average widths of the cracks at the time the work is being completed.

All work shall be performed during daylight hours only. No work shall be performed if the visibility is less than 700 m. The maximum work area shall be 2 km in length.

Crack sealant shall not be applied when the atmospheric temperature at the Site is below 0°C.

**341.07.02 Crack Routing** is amended by the addition of the following:

Routs shall be square or rectangular and shall be centered over the crack.

**341.07.03 Sealant Preparation** is amended by the addition of the following:

Overheating beyond recommended specified temperature range is not permitted. Overheated material is deemed rejectable and shall be disposed at the Contractor's own expense. Correction of overheated material by blending with new material in any ratio is not permitted under any circumstances.

The Owner shall be informed at least 24 hours prior to the charging of the kettle with sealant compound. The initial charge of sealant shall be placed in an empty kettle at the Site in the presence of the Owner.

The Contractor shall accommodate random sampling of the sealant material for quality assurance purposes.

The Contractor shall be able to provide necessary documentation to verify that all crack sealant delivered and used for the Work is the type and grade specified. Any blending of crack sealants manufactured by different suppliers requires prior approval the Owner.

**341.07.04 Cleaning of Routed and Unrouted Cracks** is amended by the addition of the following:

The Contractor shall take all necessary precautions to prevent the hot compressed air lance from charring or burning the asphalt surface.

**341.07.05 Placing Sealant** is amended by the addition of the following:

Sealant compound shall only be placed if the pavement temperature at the surface is less than, or equal to, 50°C. The placement of the sealant compound shall form a well-defined overband 2 mm to 3 mm above the pavement surface and extending 20 mm to 30 mm on either side of the crack or beyond the edges of the crack. Any excess sealant shall be removed from the pavement surface immediately following application. Removal shall involve use of squeegee, starting from centreline and proceeding to the shoulder.

For all pavement, the Contractor shall ensure that, upon complete cooling to the ambient temperature, the minimum elevation of the sealant compound is at, or above, the adjacent asphalt pavement surface in all cases. If, during construction, the sealant compound is contracting in such a manner that it appears that this requirement is not likely to be met, the Contractor shall “top-up” and strike off the sealant compound as many times as is necessary before it is dusted to meet this requirement.

The Contractor shall anticipate the amount of sealant needed to fill the remaining cracks so that, when leaving the Site at the end of each Day, the Contractor’s kettle melter has been completely drained of any remaining sealant compound. However, the Contractor shall inform the Owner if a situation arises which prevents the sealant from being completely used at the end of the Day (e.g. work is halted due to sudden rain, etc.), then the Owner may require that all remaining sealant be drained from the kettle and the Owner shall be provided with an opportunity to witness when the kettle is drained.

Any work that does not meet the foregoing requirements shall be repaired or reconstructed to the satisfaction of the Owner at the Contractor’s own expense.

Under no circumstances shall the Contractor continuously heat the sealant compound overnight without first discussing this with the sealant’s manufacturer and providing the Owner with a written declaration from the manufacturer clearly stating under what conditions this can be safely done without causing degradation of the sealant. If a written declaration has not been provided to the Owner, and the Contractor’s kettle is not completely empty at the beginning of any Day, then the Owner may require that the Contractor’s kettle be completely drained and that the drained sealant compound be replaced before the Contractor continues with the work.

At least once every hour, the Contractor shall measure the temperature of the sealant compound in the presence of the Owner using a properly calibrated thermometer and record the measurement along with its applicable date and time. The Contractor’s temperature record shall be made available to the Owner at any time, upon request.

If, at any time, the Owner finds that the temperature of the sealant compound is not within the manufacturer’s recommended range, then, at the discretion of the Owner, the Contractor may be required to remove all of the sealant compound that has been placed in the roadway since the last acceptable temperature was verified by the Owner, and any sealant compound remaining in the kettle shall be drained out and replaced with new



sealant. All sealant compound that is rejected shall be removed from the Site and replaced with acceptable material at no additional cost to the Owner.

Sealant compound damaged by the Contractor's operations, including any damage caused by the Contractor opening up the lane to traffic before the sealant has sufficiently cooled, shall be replaced by the Contractor at no additional cost to the Owner.

**341.07.06 Sealant Dusting** is deleted in its entirety and replaced with the following:

**341.07.06 Sealant Dusting**

Where traffic is to be maintained during crack sealing, the surface of the sealant compound shall be dusted with limestone screenings in accordance with the requirements of subsection 341.05.02, in order to eliminate any tackiness, prior to allowing any traffic on the newly crack sealed road surface. This requirement also applies when the traffic includes the travel of the Contractor's own construction control vehicles on the sealed routs or the sealed unrouted cracks. Alternatively, a soap-water solution may be applied. Portland cement shall not be used.

At all locations, the sealant compound shall only be dusted after it has cooled enough so that the minimum elevation of the sealant compound will be at, or slightly above, the pavement surface after it has completely cooled, and a skin has formed that is still tacky enough for dust to stick to. As stated in subsection 341.07.04, this may require that the affected grooves and cracks be topped-up with sealant compound and then struck off one (1) or more additional times before being dusted.

**341.08 Quality Assurance** is amended by the addition of the following:

All crack sealant supplied for the Work shall be subject to inspection, sampling and testing by the Owner. This involves collection of sealant material prior to use (referred to as 'Unheated' or 'Delivered') and/or heated sealant as being placed. The Contractor shall cooperate and comply in the inspection and sampling process.

**341.08.01 Sampling and Testing Sealant Compound** is amended by the addition of the following:

**341.08.01.01 Unheated (as Delivered) Sealant Compound**

When requested by the Owner, the Contractor shall provide samples of batches of sealant compound used for the Work. Each sample shall be approximately four (4) litres in volume. All samples of unheated sealant compound shall be placed in security bags, sealed with security seals in the presence of the Owner and delivered in a suitable box, clearly marked with the sampling identification information, along with the following additional information:

- The designated trade name and designation number of the compound
- The manufacturer
- The manufacturer's batch number
- The size of the applicable batch

Samples shall be delivered to an independent testing lab selected by the Owner.

The Contractor shall supply the Owner with the manufacturer's quality control test results or the Certification of Authorization meeting the Owner's requirements for each batch of crack sealant.

#### **341.08.01.02 Samples During Sealant Placement**

The Contractor, at the direction of and in the presence of the Owner, shall take samples of hot-poured rubberized asphalt joint/crack sealant compound directly from the heating kettle, while the sealant compound is being placed.

A minimum of either three (3) samples at points when approximately  $\frac{1}{4}$ ,  $\frac{1}{2}$  and  $\frac{3}{4}$  of the tender quantity number of linear metres has been placed or a minimum of one (1) sample for each 25,000 linear metres placed, whichever is greater, shall be taken. Additional samples shall be taken when requested by the Owner randomly throughout the duration of the Contract.

Each sample shall be placed in a triple-tight single metal container (e.g. paint can, etc.) with a wire handle and with a minimum volume of 4 litres. The side and top of each metal container shall be clearly marked with the following information:

- The Contract number
- The designated trade name and designation number of the compound
- The manufacturer
- The manufacturer's batch number
- The point during the Contract at which the sample was taken, i.e. the percentage of the Work completed

An accompanying tag shall also be firmly affixed to the wire handle of the metal container showing all of the sampling identification information listed above, as well as the following additional information:

- The station and offset in the roadway where the sample was taken
- The temperature of the sealant compound when the sample was taken
- Weather conditions (ambient temperature and precipitation)

Samples shall be delivered to an independent testing lab selected by the Owner.

**341.08.02 Deficiencies and Repairs during Construction** is amended by the addition of the following:

If any of the deficiencies listed under the various categories in Table 1 are found during construction, then, at the discretion of the Owner, the sealed crack or routed groove shall be repaired by the Contractor as specified.

**Table 1**  
**Deficiencies and Repairs**

Categories	Deficiencies	Repairs
Routed groove	Two (2) intersection sides deviating more than 10° from a right angle.	<ul style="list-style-type: none"> <li>Remove sealant and reroute groove to no more than 50 mm wide, clean and then seal; or</li> <li>Re-route to no more than 50 mm wide, clean and then re-seal.</li> </ul>
	Its centreline is more than 4 mm from the centreline of its associated crack.	
	A width less than 16 mm or more than 44 mm.	
	A depth less than 10 mm or more than 12 mm when the groove is in pavement that is not covered with an asphalt overlay.	
	A depth less than 15 mm or more than 19 mm when the groove is in pavement that is being covered with an asphalt overlay.	
Sealant compound material used	Does not meet the material quality requirements specified in the Contract Documents.	<p>Complete removal and replacement of the sealant compound and pickup and disposal of any debonded or pulled away sealant compound.</p> <p><b>Note:</b> If removal of the sealant damages the rout or deficiencies are identified with the rout cross-section, the Owner may instruct that the crack be re-routed.</p>
	Contains: <ul style="list-style-type: none"> <li>imbedded foreign materials (other than limestone screenings); or</li> <li>entrained bubbles.</li> </ul>	
	Has debonded or pulled away from the routed, unrouted sealed crack.	
	Has been excessively heated.	

**Table 1**  
**Deficiencies and Repairs**

<b>Categories</b>	<b>Deficiencies</b>	<b>Repairs</b>
Pavement not being covered with an asphalt overlay after sealing	Upon complete cooling, sealant compound is no longer above the pavement surface when an overband is specified.	<p>The method of repair for unacceptable contraction of the sealant compound below the elevation of the pavement surface within an unrouted or routed sealed crack shall be at the direction of the Owner and, depending upon the condition of the sealant compound, may involve either:</p> <ul style="list-style-type: none"> <li>• Washing and cleaning of the existing sealant compound of debris from top of the rout with clean water using a low-pressure washer and then topping-up with sealant compound when completely dry; or</li> <li>• Complete removal and replacement of the sealant compound.</li> </ul>
	Upon complete cooling, sealant compound has subsided by more than 1 mm below the adjacent pavement surface when an overband is not specified.	
Pavement being covered with an asphalt overlay after sealing	Upon complete cooling, subsided more than 7 mm below the existing pavement surface.	

For all repairs, the Contractor shall submit a repair proposal to the Owner for approval. The Contractor shall not commence any repairs until it has received approval of the proposal from the Owner.

Any materials, equipment or procedures used in the repair or replacement of routing and sealing shall be the same as those specified for the original work.

### **341.09 MEASUREMENT FOR PAYMENT**

**341.09.01 Actual Measurement** is deleted in its entirety and replaced with the following:

#### **341.09.01 Actual Measurement**

Measurement for payment shall be in metres (m), measured using a measuring wheel in a line generally representative of the path of the routed and sealed crack.

Measurements shall be carried out after the sealant is cured, tack dry and dusted. This is to ensure sealant is topped up, as required.

Measurements shall be completed by the Owner in the presence of the Contractor.



All cracks, regardless of the width or depth, shall be paid for at the applicable unit price per metre.

Any work that deviates from these Specifications shall be considered deficient work and the quantities for the full length of the roadway (as per the Road Identification Network Map) that contains the deficient work will not be paid until the deficiency is corrected to the satisfaction of the Owner.

**Item R322 Routing, Cleaning and Sealing Cracks in Hot Mix Asphalt Pavement [New Construction]**

*The following Standard Drawing is applicable to the above item: OPSD 508.010 (Nov 2015).*

*This Specification shall be read in conjunction with OPSS.MUNI 341 (Nov 2021).*

Under this item, the Contractor shall perform routing and sealing of cracks in accordance with OPSS 341 in the locations deemed appropriate by the Owner. The work shall also be performed in accordance with the Cracks with Asphalt Overlay detail of OPSD 508.010, prior to the overlay.

The Owner will advise the Contractor, on Site, of the locations and quantities of cracks to be routed and sealed under this item.

**341.05.01 Crack Sealant** is amended by the addition of the following:

The crack sealant compound shall be as specified in ASTM D-6690 Type IV Modified.

**341.05.02 Limestone Screenings** is added as follows:

**341.05.02 Limestone Screenings**

Limestone screenings to be used as a dusting sealant shall have 100% passing through the 1.18 sieve and not greater than 25% passing through the 0.075 sieve.

**341.05.03 Crack Sealant Barrier Material** is added as follows:

**341.05.03 Crack Sealant Barrier Material**

The crack sealant barrier material to be used for the Work shall be Glenzoi 20 Plus or Equivalent with prior written authorization from the Owner.

**341.06.02 Heating Kettle** is amended by the addition of the following:

The heating kettle shall meet the requirements of the Technical Standards and Safety Authority.

**341.06.04 Air Compressor** is added as follows:

**341.06.04 Air Compressor**

The air compressor used to supply the hot-compressed air lance shall be equipped with oil and moisture filters and shall provide a minimum pressure of 700 kPa at a minimum air volume of 4.25 cubic metres per minute (150 cubic feet per minute).

**341.07.04 Cleaning of Routed and Unrouted Cracks** is amended by the addition of the following:

The Contractor shall take all necessary precautions to prevent the hot lance from charring or burning the asphalt surface of the cracks.

**341.07.05 Placing Sealant** is amended by the addition of the following:

Sealant compound shall only be placed if the pavement temperature at the surface is less than, or equal to, 50°C.

The Contractor shall anticipate the amount of sealant needed to fill the remaining cracks so that, when leaving the Site at the end of each Day, the Contractor's kettle melter has been completely drained of any remaining sealant compound. If a situation arises which prevents the sealant from being completely used at the end of the Day (e.g. work is halted due to sudden rain, etc.), the Owner may require that all remaining sealant be drained from the kettle. In such case, the Contractor shall inform the Owner when the kettle is to be drained in order to allow the Owner sufficient opportunity to witness the draining.

Under no circumstances shall the Contractor continuously heat the sealant compound overnight without first discussing this with the sealant's manufacturer and providing the Owner with a written declaration from the manufacturer clearly stating under what conditions this can be safely done without causing degradation of the sealant. If this written declaration has not been provided to the Owner and the Contractor's kettle is not completely empty at the beginning of any Day, then the Owner may require that the Contractor's kettle be completely drained and that the drained sealant compound be replaced before the Contractor continues with this work.

At least once every hour, the Contractor shall measure the temperature of the sealant compound in the presence of the Owner using a properly calibrated thermometer and record the measurement along with its applicable date and time. The Contractor's temperature record shall be made available to the Owner at any time, upon request.

If, at any time, the Owner finds that the temperature of the sealant compound is not within the manufacturer's recommended range, then, at the discretion of the Owner, the Contractor may be required to remove all of the sealant compound that has been placed in the roadway since the last acceptable temperature was verified by the Owner, and any sealant compound remaining in the kettle shall be drained out and replaced with new sealant. All sealant compound that is rejected shall be removed from the Site and replaced with acceptable material at no additional cost to the Owner.

Sealant compound damaged by the Contractor's operations, including any damage caused by the Contractor opening up the lane to traffic before the sealant has sufficiently cooled, shall be replaced by the Contractor at no additional cost to the Owner.

**341.07.06 Sealant Dusting** is deleted in its entirety and replaced with the following:

**341.07.06 Sealant Dusting**

Where traffic is to be maintained during crack sealing, the surface of the sealant compound shall be dusted with limestone screenings in accordance with the requirements of subsection 341.05.02, in order to eliminate any tackiness, prior to allowing any traffic to travel over the crack sealed area. This requirement also applies when the traffic includes the Contractor's own construction control vehicles travelling on

the sealed routs or the sealed unrouted cracks. Alternatively, a soap-water solution may be applied. Portland cement shall not be used.

At all locations, regardless of whether or not an overband is being constructed, the sealant compound shall only be dusted after it has cooled enough so that the minimum elevation of the sealant compound will be at, or slightly above, the pavement surface after it has completely cooled and a skin has formed that is still tacky enough for dust to stick to it. As stated in subsection 341.07.04, this may require the affected grooves and cracks to be topped-up with sealant compound and then struck off one (1) or more additional times before being dusted.

**341.09.01 Actual Measurement** is deleted in its entirety and replaced with the following:

**341.09.01 Actual Measurement**

Measurement for payment shall be in metres (m), measured using a measuring wheel in a line generally representative of the path of the routed and sealed crack.

Measurements shall be completed by the Owner in the presence of the Contractor.

All cracks, regardless of the width or depth, shall be paid for at the unit price per metre.

**Item R323 Full-Depth Reclamation with Expanded Asphalt Stabilization [Renewal]**

**Item R324 Corrective Aggregate [Renewal]**

**Item R325 Performance Graded Asphalt Cement [Renewal]**

**Item R326 Hydrated Lime [Renewal]**

*This Specification shall be read in conjunction with OPSS.MUNI 301 (Nov 2018) and OPSS.MUNI 331 (Nov 2016).*

**OPSS.MUNI 331** is amended by the addition of the following:

Under **Item R323 – Full-Depth Reclamation with Expanded Asphalt Stabilization**, the full depth reclamation and expanded asphalt stabilization process shall be completed in two (2) steps. First, the existing asphalt pavement and underlying granular base shall be reclaimed to a minimum depth of **200 mm for Location B and 150 mm for Location C** as specified in the Bid Form and mixed uniformly from shoulder to shoulder (i.e. the entire proposed road width of **11 m**). Under the second step, the Contractor shall stabilize the remaining pulverized material with expanded asphalt to a depth of **200 mm for Location B and 150 mm for Location C** as specified in the Bid Form from shoulder to shoulder (i.e. the entire proposed road width of **11 m**).

The costs to prepare and re-grade the existing shoulders and spread and mix the pulverized material uniformly across the existing paved areas and granular shoulder areas for the preparation of expanded asphalt stabilization shall be included in the unit price for **Item R323 – Full-Depth Reclamation with Expanded Asphalt Stabilization (150 mm / 150 mm)**.

**331.04.01 Design Requirements** is amended by deleting “j) Type, source, and quantity of active filler, if required.” and replacing it with the following:

j) Approximately 1% hydrated lime active filler.

**331.05.03 Performance Graded Asphalt Cement** is amended by the addition of the following:

For each tanker of PGAC, the Contractor shall provide a certificate of analysis to the Owner.

**331.07.01 Operational Constraints** is amended by the addition of the following:

Where the road has been previously crack sealed, the crack sealant shall be removed prior to commencing the full depth reclamation and expanded asphalt stabilization operation. The cost of all labour, material and equipment required to remove the crack sealant shall be included in the unit prices for these items. No additional payment will be made for this work.

The compacted expanded asphalt recycled mix shall be smooth and true to the established crown and grade. The grade and slope of the finished expanded asphalt recycled mix shall meet the requirements of subsection 301.07.03.02 for bituminous surfaces. At existing curb locations, the Contractor shall profile the roadway to allow sufficient depth at the curb edge for the placement of new asphalt layers.

As part of the work of these items, during the curing period of the expanded asphalt stabilization process, the Contractor shall ensure positive drainage off the roadway to the elevation of the stabilized area.

**331.09.01.01 Full-Depth Reclamation with Expanded Asphalt Stabilization** is amended by the addition of the following:

Item R324 – Corrective Aggregate, Item R325 – Performance Graded Asphalt Cement and Item R326 – Hydrated Lime are intended to break out separately the required materials for the expanded asphalt stabilization process in order to fairly compensate the Contractor for the quantities of material used for the expanded asphalt stabilization as calculated on the basis of the approved final mix design.

PGAC, corrective aggregates and hydrated lime will be measured for payment by mass in tonnes. The amount of PGAC, corrective aggregate and hydrated lime shall be as determined by the respective proportions in the approved mix design.

**331.10 BASIS OF PAYMENT** is deleted in its entirety and replaced with the following:**331.10 BASIS OF PAYMENT****331.10.01 Full-Depth Reclamation with Expanded Asphalt Stabilization – Item**

Payment at the unit price for the above tender item shall be full compensation for all labour, equipment and material necessary to complete the work as specified.

Repair of unacceptable EAM shall be carried out at no extra cost to the Owner.

Repair of areas of EAM damaged by traffic shall be completed at no extra cost to the Owner.

Repair, removal, or replacement of an unacceptable trial section shall be completed at no extra cost to the Owner.

**331.10.02 Corrective Aggregate – Item**



Payment at the unit price for the above tender item shall be full compensation for all labour, equipment and material necessary to complete the work as specified.

### **331.10.03 Performance Graded Asphalt Cement – Item**

#### **Liquid AC Cost Adjustment**

**Payment Adjustment for Changes in the MTO Performance Graded Asphalt Cement Price Index shall conform to OPSS.MUNI 310 (Nov 2017) Appendix 310-B, 310.10.04.**

Payment at the unit price for the above tender item shall be full compensation for all labour, equipment and material necessary to complete the work as specified.

### **331.10.04 Hydrated Lime – Item**

Payment at the unit price for the above tender item shall be full compensation for all labour, equipment and material necessary to complete the work as specified.

Item R327	Granular A – Roadway [New Construction]
Item R327	Granular A – Entrances [New Construction]
Item R327	Granular A – Boulevard [New Construction]
Item R327	Granular A – Shoulders [New Construction]
Item R328	Granular B – Roadway [New Construction]
Item R328	Granular B – Entrances [New Construction]
Item R328	Granular B – Boulevard [New Construction]

*The following Standard Drawings are applicable to the above item(s): OPSD 350.010 (Nov 2018) and OPSD 351.010 (Nov 2018).*

*This Specification shall be read in conjunction with OPSS.MUNI 314 (Nov 2023), OPSS.MUNI 1001 (Nov 2021) and OPSS.MUNI 1010 (November 2013).*

### **1010.05.01 General** is amended by the addition of the following:

If the Contractor wishes to use reclaimed concrete material (RCM), it must obtain the Owner's written approval prior to delivery of the material to the Site. The RCM must be in full compliance with the requirements of OPSS.MUNI 1001 and OPSS.MUNI 1010. The Contractor shall submit the following information to the Owner, at a minimum:

- The sources of the reclaimed concrete material
- The production plant
- The stockpile location
- The date of production
- The quantity of material in stockpile
- Test results for RCM in accordance with Table 1 and Table 2 of OPSS.MUNI 1010
- Written confirmation that no deleterious building construction and demolition waste material is present in the stockpile

Submittals shall also include a petrographic analysis of coarse aggregate (in accordance with MTO Laboratory Testing Manual LS-609) and fine aggregate (in accordance with

MTO Laboratory Testing Manual LS-616) with specific emphasis on deleterious building construction and demolition waste materials such as drywall and gypsum.

Approval will be considered on a 'stockpile-basis' only. Additional submittals and approval will be required, should the stockpile(s) or source(s) change.

1010.05.02 Granular A, Granular M, and Granular S and 1010.05.03 Granular B are amended by the addition of the following:

The combined amount of deleterious material shall not exceed a total of 1% by total mass (total of coarse and fine aggregate).

**314.07.01 Granular Subbase, Base, and Surface** is amended by the addition of the following to the first paragraph:

The Contractor shall not use heavy vehicles such as tractor trailers to haul gravel if the subgrade becomes deformed. The subgrade or granular surface shall be shaped and proof rolled to ensure an even and smooth surface free of dips and humps before the subsequent layer of material is placed.

**314.07.03 Edge Ramping of Bituminous Pavement** is amended by the addition of the following:

Where traffic must be maintained, the Contractor shall supply and maintain delineators along the shoulder at intervals of not more than 60 m until the shoulders have been constructed. Delineators shall be weighted in order to prevent them from overturning.

**314.07.04 Shoulders** is amended by the addition of the following:

Normal cross fall for the new shoulder shall be 6% except that on the high side of super-elevated sections it shall be 2%. The width of placement shall be 2.0 m with a 0.5 m rounding, unless indicated otherwise in the Contract Documents.

**314.07.06 Tolerances** is amended by the addition of the following:

The tolerances specified in this Specification are working tolerances only and it is expected that the Contractor will use them as such and not keep the grade consistently high or low to replace other material.

**314.08.01 General** is amended by the addition of the following:

The Contractor shall supply the services of a person to assist the Owner's inspector in checking the grade when requested by the Owner.

**314.09 Measurement for Payment** is amended by the addition of the following:

Measurement by the cubic metre (m<sup>3</sup>) will be made by Plan Quantity (theoretical) as may be revised by Adjusted Plan Quantity and the volumes will be calculated from the end areas of the Granular 'A' and Granular 'B', Type I, sections as shown on the typical cross-sections on the Drawings.

No measurement or payment will be made for water used for compaction or dust control. Payment for water shall be included in the unit price(s) of the Contract item(s) for the material to be placed or the work to be carried out.

Granular material for driveways is normally calculated at 150 mm of Granular 'A' beyond the edge of the shoulder or curb, measured horizontally to the limit of grading shown on the Drawings in accordance with OPSD 350.010 and OPSD 351.010. Any variation from this depth will be shown on the Drawings. The Contractor shall be responsible for any granular material required to maintain access as specified under **Item G1 – Maintenance of Traffic**. As the cubic metre (m<sup>3</sup>) payment for granular materials is based on the theoretical quantity calculated as specified in the Contract Documents, the Contractor shall make its own allowances in its unit prices for any loss of Granular 'A' into the Granular 'B', Type I, and for any Granular 'A' required for maintenance of traffic. The Contractor shall also make allowances in its unit prices for any losses of Granular 'B' during its operations.

**314.10.01 Granular A – Item, Granular A, Stockpiled – Item, Granular A, from Stockpile – Item, Granular B Type I – Item, Granular B Type I, Stockpiled – Item, Granular B Type I, from Stockpile – Item, Granular B Type II – Item, Granular B Type II, Stockpiled – Item, Granular B Type II, from Stockpile – Item, Granular B Type III – Item, Granular B Type III, Stockpiled – Item, Granular B Type III, from Stockpile – Item, Granular M – Item, Granular M, Stockpiled – Item, Granular M, from Stockpile – Item, Granular O – Item, Granular O, Stockpiled – Item, Granular O, from Stockpile – Item, Granular S – Item, Select Subgrade Material, Compacted – Item, RAP Shouldering – Item** is amended by the addition of the following:

The Contractor shall repair or replace any granular material lost through washouts or bladed-off the roadway and no additional payment will be made for this work. The applicable unit prices for Granular 'A' and Granular 'B', Type I, shall apply when additions or deletions requested by the Owner cause changes in the tender quantities.

Any additions or deletions shall be calculated from field tape measurements agreed to by the Owner and the Contractor. If there is no agreement on tape measurements then the cross-sections shall be used to calculate the quantity.

#### **Item R329 Removal, Preparation and Regrading of Existing Shoulders [Renewal]**

*This Specification shall be read in conjunction with OPSS.MUNI 180 (Nov 2021), OPSS.MUNI 314 (Nov 2023) and OPSS.MUNI 510 (Nov 2018).*

**314.07.04 Shoulders** is deleted in its entirety and replaced with the following:

#### **314.07.04 Shoulders**

This item is for the preparation of the existing shoulders to accept the new, wider, hot mix asphalt surface on **[Road Name]**. The existing granular shoulders are between **0.5 m and 1.5 m** in width, and the new hot mix asphalt to be placed under **Item R301 – Superpave, Binder Course, Warm Mix Asphalt** and **Item R302 – Superpave, Surface Course, Warm Mix Asphalt** shall be placed to provide **2.0 m** paved shoulders, where possible.

Prior to commencing the hot mix asphalt paving, the existing granular shoulders shall be removed, reggraded and compacted.

This item also includes the preparation and compaction of the remaining existing granular to receive the additional hot mix asphalt widths.

As part of the work under this item, the Contractor shall ensure that there is positive drainage off the roadway during the performance of the Work and shall ramp down all existing entrances to meet the interim road surface.

The Contractor shall supply and maintain delineators along the shoulder at maximum intervals of 60 m until the shoulders have been constructed. Delineators shall be weighted in order to prevent them from overturning.

No measurement or payment will be made for water used for compaction or dust control. Payment for water shall be included in the unit price(s) of the Contract item(s) for the material to be placed or the work to be carried out.

The Contractor shall salvage as much suitable granular and reclaimed material as possible for reuse in the new granular shoulders. The Owner will determine, on Site, what material is suitable for reuse and will advise the Contractor accordingly. All excess granular/reclaimed material shall become the property of the Contractor and shall be disposed of off Site by the Contractor, at its own expense.

**314.09.01 Actual Measurement** is deleted in its entirety and replaced with the following:

**314.09.01 Actual Measurement**

Measurement for payment shall be by the length in metres (m) of existing granular shoulder removed, prepared and regraded as specified in the Contract Documents.

**314.10 BASIS OF PAYMENT** is deleted in its entirety and replaced with the following:

**314.10 BASIS OF PAYMENT**

Payment shall be made at the unit price and shall be full compensation for all labour, equipment and materials necessary to complete the work as specified.

**Item R330 Granular 'A' Shoulders and Entrances [Renewal]**

*This Specification shall be read in conjunction with OPSS.MUNI 314 (Nov 2023), OPSS.MUNI 1001 (Nov 2021) and OPSS.MUNI 1010 (Nov 2013).*

**314.07.01 Granular Subbase, Base, and Surface** is amended by the addition of the following:

The Contractor shall not use heavy vehicles such as tractor trailers to haul gravel if the subgrade becomes deformed.

The Contractor shall supply, place and compact Granular 'A' material on the existing gravel driveways and shoulders on [Road Name] in accordance with OPSS.MUNI 314, unless specified otherwise in this Specification, so that a smooth transition is provided from the paved road surface to the shoulders and driveway entrances.

Following paving, the Contractor shall supply, place and compact Granular 'A' material on the shoulders in the location(s) indicated by the Owner on Site, to achieve the specified cross falls, in accordance with OPSS.MUNI 314.

**314.07.03 Edge Ramping of Bituminous Pavement** is amended by the addition of the following:



Where traffic must be maintained, the Contractor shall supply and maintain delineators along the shoulder at intervals of not more than 60 m until the shoulders have been constructed. Delineators shall be weighted in order to prevent them from overturning.

**314.07.04 Shoulders** is amended by the addition of the following:

Normal cross fall for the new shoulder is 6% except on the high side of super-elevated sections where it shall be 2%. Width of placement is the available space between the edges of the new pavement and the edge of the existing platform.

**314.07.06 Tolerances** is amended by the addition of the following:

The tolerances specified in this section are working tolerances only and it is expected that the Contractor will use them as such and not keep the grade consistently high or low to replace existing material.

**314.08.01 General** is amended by the addition of the following:

The Contractor shall provide the services of a representative to assist the Owner's inspector in checking the grade when requested by the Owner.

**314.10 BASIS OF PAYMENT** is amended by the addition of the following to the list of Items in **314.10.01**:

**Granular 'A' Shoulders and Entrances – Item**

**314.10.01** is amended by the addition of the following:

The Contractor shall repair or replace any granular material lost through washouts or bladed-off the roadway and no additional payment will be made for this work. The unit price for this item shall apply when additions or deletions requested by the Owner cause changes in the tender quantities.

**1010.04 DESIGN AND SUBMISSION REQUIREMENTS** is added as follows:

**1010.04 DESIGN AND SUBMISSION REQUIREMENTS**

**1010.04.01 Granular Material**

If the Contractor wishes to use RCM, full compliance with OPSS.MUNI 1001 and OPSS.MUNI 1010 is required. The Contractor shall submit the following information, prepared by the producer/supplier of the RCM, to the Owner:

- The source(s) of the RCM
- Written confirmation that no waste materials (e.g. drywall, bricks, wood, etc.) were used in the RCM Granular 'A' production

Submittals shall also include a petrographic analysis of coarse aggregate (in accordance with MTO Laboratory Testing Manual LS-609) and fine aggregate (in accordance with MTO Laboratory Testing Manual LS-616) with specific emphasis on deleterious materials such as drywall and gypsum. Additional approvals may be required should different stockpiles or sources be utilized.

**Item R331 Full Depth Granular Base Repair (Provisional) [Renewal]**

**Item R332 Full Depth Granular Sub-Base Repair (Provisional) [Renewal]**

*This Specification shall be read in conjunction with OPSS.MUNI 180 (Nov 2021), OPSS.MUNI 206 (Apr 2019), OPSS.MUNI 314 (Nov 2023), OPSS.MUNI 510 (Nov 2018), OPSS.MUNI 1001 (Nov 2021) and OPSS.MUNI 1010 (Nov 2013).*

**314.07.01 Granular Subbase, Base, and Surface** is amended by the addition of the following:

The Contractor shall repair those areas identified and marked on Site by the Owner as requiring full depth granular base / sub-base repair.

The Contractor shall not use heavy vehicles such as tractor trailers to haul gravel if the sub grade becomes deformed.

The depth of the repairs shall be as indicated by the Owner on Site, which will be as deep as deemed necessary by the Owner to remove the existing unsuitable materials from the road base. The removed areas shall be filled with Granular 'A' material, compacted and proof rolled to the satisfaction of the Owner. Alternatively, the use of crusher run lime stone in lieu of Granular 'A' material may be permitted at the discretion of the Owner depending on the size of the area to be repaired.

All costs associated with the removal of the existing asphalt pavement shall be included in the unit price(s) for the above item(s) and no additional payment will be made for this work.

Any area opened up for full depth granular base repair must be restored to top course asphalt to match the existing pavement grade within the same Day that the area was opened up and prior to reopening the area to traffic.

All removed material shall become the property of the Contractor and shall be disposed of off Site by the Contractor at its own expense in accordance with OPSS.MUNI 180.

The Contractor shall obtain utility locates clearance prior to the commencement of any base excavation. Any damage to underground utilities shall be repaired to the Owner's satisfaction at the Contractor's own expense.

**314.07.03 Edge Ramping of Bituminous Pavement** is amended by the addition of the following:

Where traffic must be maintained, the Contractor shall supply and maintain delineators along the shoulder at intervals of not more than 60 m until the shoulders have been constructed. Delineators shall be weighted in order to prevent them from overturning.

**314.08.01 General** is amended by the addition of the following:

The Contractor shall provide the services of a representative to assist the Owner's inspector in checking the grade when requested by the Owner.

**314.10 BASIS OF PAYMENT** is amended by the addition of the following to the list of Items in

**314.10.01:**

**Full Depth Granular Base Repair – Item**

**Full Depth Granular Sub-Base Repair – Item**

**1010.04 DESIGN AND SUBMISSION REQUIREMENTS** is added as follows:

**1010.04 DESIGN AND SUBMISSION REQUIREMENTS**

**1010.04.01 Granular Material**

If the Contractor wishes to use RCM, full compliance with OPSS.MUNI 1001 and OPSS.MUNI 1010 is required. The Contractor shall submit the following information, prepared by the producer/supplier of the RCM, to the Owner:

- The source(s) of the RCM
- Written confirmation that no waste materials (e.g. drywall, bricks, wood, etc.) were used in the RCM Granular 'A' production

Submittals shall also include a petrographic analysis of coarse aggregate (in accordance with MTO Laboratory Testing Manual LS-609) and fine aggregate (in accordance with MTO Laboratory Testing Manual LS-616) with specific emphasis on deleterious materials such as drywall and gypsum. Additional approvals may be required should different stockpiles or sources be utilized.

**1010.05.02** and **1010.05.03** are amended in that the combined amount of deleterious material shall not exceed a total of 1% by mass.

**Item R333 Temporary Asphalt SP 12.5 Sidewalk and Transit Pads [New Construction]**

*This Specification shall be read in conjunction with OPSS.MUNI 310 (Nov 2017), OPSS.MUNI 311 (Nov 2018), OPSS.MUNI 314 (Nov 2023) and OPSS.MUNI 1151 (Apr 2018).*

**311.05.01 Hot Mix Asphalt** is deleted in its entirety and replaced with the following:

**311.05.01 Hot Mix Asphalt**

The hot mix asphalt for this work shall be according to OPSS.MUNI 1151 for SP 12.5 and SP 19.0.

**311.07.01 General** is amended by the addition of the following:

Asphalt paving shall be carried out in accordance with OPSS.MUNI 310. Granular placement shall conform to OPSS.MUNI 314 and the requirements specified under **Item R327 – Granular A – Boulevard**.

The temporary asphalt sidewalk and transit pads shall be connected to the drop curb at the intersections, be accessible by wheelchairs and be constructed in accordance with the following requirements:

- Granular base under sidewalk and transit pads shall be a minimum of 150 mm – Granular 'A' material, or as otherwise specified on the Drawings.
- Sidewalk widths shall be a minimum of 1.5 m, or as indicated by the Owner.
- Transit pad widths shall be a minimum of 2.0 m, or as indicated by the Owner.
- Sidewalk and transit pad asphalt thickness shall be a minimum of 50 mm SP 12.5, or as otherwise specified on the Drawings.

If the asphalt sidewalk is a replacement of an existing sidewalk, it shall be ready for use before the existing sidewalk is removed.

All costs associated with earth excavation, removal, disposal of material below the top surface of the temporary asphalt, supply, placement, watering and compaction of all granular materials shall be included in the unit price for this item. The removal of temporary asphalt sidewalk and transit pads shall be included in the unit price for this item.

No measurement will be made of granular material or excavation below the top surface of the temporary asphalt.

**311.09 MEASUREMENT FOR PAYMENT** is deleted in its entirety and replaced with the following:

**311.09 MEASUREMENT FOR PAYMENT**

**311.09.01.01 Temporary Asphalt SP 12.5 Sidewalk and Transit Pads**

Measurement will be by the horizontal area in square metres (m<sup>2</sup>) of temporary asphalt sidewalk and transit pads placed regardless of the thickness specified.

**311.10 BASIS OF PAYMENT** is deleted in its entirety and replaced with the following:

**311.10 BASIS OF PAYMENT**

**311.10.01 Temporary Asphalt SP 12.5 Sidewalk and Transit Pads**

Payment shall be made at the unit price and shall be full compensation for all labour, equipment and materials necessary to complete the work as specified.

**Item R334 Concrete Curb and Gutter – All Types [Renewal / New Construction]**

*The following Standard Drawing is applicable to the above item: OPSD 600.040 (Nov 2012).*

*This Specification shall be read in conjunction with OPSS.MUNI 353 (Nov 2021) and OPSS.MUNI 1350 (Nov 2023).*

This item is for the construction of all types of concrete curb and gutter, including curb required to be replaced under **Item R402 – Adjust Maintenance Holes, Catch Basins and Valve Chambers** and **Item R403 – Rebuild Maintenance Holes, Catch Basins and Valve Chambers**.

Concrete curb and gutter shall tie-in to, and match, the existing concrete curb and gutter cross-sections of all types.

All earth excavation, disposal of excess material, replacement Granular 'A', watering and compaction of all foundation materials and base preparation required to receive the new curb and gutter shall be included in this item.

**Item R335 Concrete Sidewalk – All Types [Renewal / New Construction]**

*The following Standard Drawings are applicable to the above item: OPSD 310.010 (Nov 2019), OPSD 310.020 (Nov 2019), OPSD 310.030 (Nov 2015), OPSD 600.040 (Nov 2012), DS-121, DS-122 and E-2.20, and MR20 and MR21 [Only use for mid-block work in the City of Markham].*

*This Specification shall be read in conjunction with OPSS.MUNI 180 (Nov 2021), OPSS.MUNI 314 (Nov 2023), OPSS.MUNI 351 (Nov 2021) and OPSS.MUNI 1350 (Nov 2023).*



***[The following paragraphs should only be used for mid-block work in the City of Markham]***

Concrete sidewalk shall be constructed according to City of Markham Standard Drawings MR20 and MR21.

The Contractor shall place Granular 'A' as a base course for the sidewalk where specified on City of Markham Standard Drawings MR20 and MR21. Granular 'A' shall be compacted to a minimum of 98% Standard Proctor Density. The minimum thickness of sidewalk shall be 125 mm. The concrete thickness for residential driveways shall be increased to 175 mm. Concrete shall be 32 MPa air entrained.

The Contractor shall construct concrete sidewalk in accordance with OPSD 310.010, OPSD 310.020, OPSD 310.030, DS-121 and the following requirements:

- Sidewalk widths shall be as shown on the Drawings.
- Sidewalk bays shall be 1.5 m to 2.0 m in length, except at ramps for pedestrian crossings, where they shall be 2.0 m in length, or as otherwise shown on the Drawings.
- Granular base under sidewalks shall be a minimum of 75 mm of Granular "A" material, which shall be increased to a minimum of 150 mm for entrances.
- The sidewalk concrete depth shall be increased to 250 mm for the first panel from the curb return at all commercial and industrial entrances.
- Granular "A" shall be compacted to 100% maximum dry density.
- Concrete shall be a minimum of 32 MPa compressive strength at 28 Days with 6.5% ± 1.5% air entrainment.
- Joints shall not be troweled.

All poles and pole bases must be isolated in accordance with Standard Drawing E-2.20.

All costs associated with the required earth excavation, Granular 'A', concrete, concrete excavation and disposal of material below the top surface of the sidewalk, and the supply, placement, watering and compaction of all foundation materials shall be included in the unit price for this item.

No measurement will be made of granular material or excavation below the top surface of the sidewalk.

Concrete sidewalk adjacent to an existing curb shall be set into a 50 mm x 100 mm key at the back of the curb in accordance with OPSD 600.040.

Machine laid sidewalk will not be permitted. New sidewalk shall be formed.

An expansion joint shall be constructed at every fourth bay of sidewalk (i.e. every 4.5 m).

**314.07.10 Management of Excess Material** is amended by the addition of the following:

The disposal of all surplus or unsuitable material shall be the responsibility of the Contractor in accordance with the requirements of OPSS.MUNI 180. No separate payment will be considered for the disposal of surplus or unsuitable material, regardless of the amount.

**351.07.20 Management of Excess Material** is deleted in its entirety and replaced with the following:

**351.07.20 Management of Excess Material**

The disposal of all surplus or unsuitable material shall be the responsibility of the Contractor in accordance with the requirements of OPSS.MUNI 180. No separate payment will be considered for the disposal of surplus or unsuitable material, regardless of the amount.

**351.09.01.01 Concrete Sidewalk** is deleted in its entirety and replaced with the following:

**351.09.01.01 Concrete Sidewalk**

Concrete sidewalk will be measured in square metres (m<sup>2</sup>), regardless of the thickness specified.

Payment for TWSI plates shall be made under **Item R336 – Tactile Walking Surface Indicator (TWSI) Plates for Concrete Sidewalk Ramps.**

**Item R336 Tactile Walking Surface Indicator (TWSI) Plates for Concrete Sidewalk Ramps [Renewal / New Construction]**

*The following Standard Drawings are applicable to the above item: DS-119, DS-121, DS-408, DS-411, DS-412 and E-6.07.*

The Contractor shall supply and install square or rectangular TWSI plates for sidewalk ramps to warn visually impaired pedestrians that they are entering the roadway.

The TWSI plates shall be manufactured by Neenah Enterprises, Inc. (Neenah Foundry), East Jordan Iron Works, Inc. (Duralast), Kinesik Engineered Products Inc. (Advantage Cast Iron), or Equivalent, and shall be bare (cast iron) and not coated with paint or other coating materials. The TWSI plates shall visually contrast with the adjacent walking surface (i.e. light-on-dark or dark-on-light). Castings shall be sound, free from pouring faults, cracks, blowholes and other defects, shall be located at the bottom of the curb ramp and extend the full width of the depressed curb, and shall be set back between 150 mm and 200 mm from the back of curb.

The TWSI plates shall be complete with lock lugs and slots for interconnecting to adjacent plates. If the plates are radius plates, they shall be installed with bolts in accordance with the manufacturer's instructions. The Contractor shall contact the manufacturer a minimum of 21 Days prior to date of installation in order to request the radius plates. The surface of each cast iron plate on both the tops of the truncated domes, and the field between the truncated domes, shall have a minimum wet and dry static coefficient friction of 0.8 when tested in accordance with ASTM C-1028.

The base diameter of the truncated domes shall be a minimum of 22 mm and a maximum of 36 mm. The top diameter shall be a minimum of 50% and a maximum of 65% of the base diameter. The height of the dome shall be 5.1 mm. The centre to centre spacing between the truncated domes shall be a minimum of 41 mm and a maximum of 61 mm. The base edge to edge spacing between the most adjacent domes on a square grid shall be 17 mm.

The initials or trademark of the manufacturer, date of manufacture and country of manufacture shall be distinctly cast and legible in raised letters on the top side of each plate. The Contractor

shall provide a certificate from the manufacturer of the TWSI plates, confirming that the product was manufactured and meets the test requirements in accordance with the manufacturer's quality control standards. The certificate shall include test results from an independent testing laboratory accredited by the Standards Council of Canada and who is otherwise acceptable to the Owner.

The TWSI plates shall be set into wet prepared concrete at each concrete sidewalk ramp in accordance with the Contract Documents and the plate manufacturer's installation instructions. The sidewalk bay(s) that contain TWSI plates shall be bordered by a true expansion joint (rather than a saw-cut joint) where they are adjoining other bays that do not contain TWSI plates. A concrete vibrator shall be used in the construction of the sidewalk bays that contain the TWSI plates.

The TWSI plates shall be installed in the location(s) shown on the Drawings and in accordance with the manufacturer's specifications and Standard Drawings DS-119, DS-121, DS-408, DS-411, DS-412 and E-6.07.

#### **Measurement for Payment**

Measurement for payment shall be a count of each TWSI plate supplied and installed.

#### **Basis of Payment**

Payment shall be made at the unit price and shall be full compensation for all labour, equipment and materials necessary to complete the work as specified.

#### **Item R337 Concrete Slab Raised Median [Renewal / New Construction]**

*The following Standard Drawings are applicable to the above item:*

##### **[Select the applicable drawings]**

- **E-6.03 – Typical Detail for Construction of Concrete Slab Raised Median Islands at Intersections**
- **E-6.05 – Typical Detail for Construction of 1.5 m or Wider Concrete Slab Raised Median Islands at Intersections**
- **E-8.07 – Typical Flexible Delineator Installation in 1.5 m or Wider Concrete Slab Raised Median Island at Intersections**

*This Specification shall be read in conjunction with OPSS.MUNI 351 (Nov 2021) and OPSS.MUNI 1301 (Nov 2018).*

**351.01 SCOPE** is deleted in its entirety and replaced with the following:

#### **351.01 SCOPE**

The Contractor shall construct a concrete slab type raised median in the location(s) shown on the Drawings.

**[Delete the following paragraph for new construction]**

Construction of the new concrete slab raised median shall be carried out no later than twenty-four (24) hours after asphalt removal under **Item R503 – Removal of Asphalt Pavement at New Median – Partial Depth (40 mm)**.

**[Delete the following paragraph if it does not apply]**

Delineators are required on any concrete slab raised median wider than 1.5 m. The Contractor shall install delineators in the location(s) shown on Standard Drawings E-6.05 and E-8.07 under **Item E805 – Supply and Install Flexible Delineator**.

**351.09 MEASUREMENT FOR PAYMENT** is deleted in its entirety and replaced with the following:

**351.09 MEASUREMENT FOR PAYMENT**

Measurement for payment shall be per square metre (m<sup>2</sup>) of concrete slab raised median constructed.

**351.10.01 Concrete Sidewalk – Item** is deleted in its entirety and replaced with the following:

**351.10.01 Concrete Slab Raised Median – Item**

Payment shall be made at the unit price and shall be full compensation for all labour, equipment and materials necessary to complete the work as specified.

**Item R338 Concrete Bus Shelter Pad and Passenger Standing Area [New Construction]**

*The following Standard Drawings are applicable to the above item: OPSD 310.010 (Nov 2019) and YRT Transit Drawings 1.01, 1.02 / 1.02 (B), 1.03 / 1.03(B), 1.04 / 1.04(B) and 1.05.*

*This Specification shall be read in conjunction with OPSS.MUNI 180 (Nov 2021), OPSS.MUNI 351 (Nov 2021), OPSS.MUNI 1010 (Nov 2013) and OPSS.MUNI 1350 (Nov 2023).*

The Contractor shall install all concrete passenger standing areas, shelter and waste pads, links and sidewalks in accordance with OPSS.MUNI 351. The work under this item shall include excavation and disposal of excess excavated material, compaction of sub-grade, and supply and placement of 150 mm of concrete and 300 mm of Granular 'A' in accordance with OPSS.MUNI 1010. In the area of the concrete passenger standing areas and shelter pads, sawed contraction joints shall be used in lieu of dummy joints.

The Contractor shall comply with the following requirements:

- Granular "A" shall be compacted to 100% maximum dry density.
- All sawed contraction joints shall be saw cut within 12 to 24 hours after placement of concrete.
- Sawed contraction joints shall be a minimum of ¼ of the slab depth and no more than 2.0 m apart in each direction.
- Expansion joint material shall be placed abutting all existing concrete surfaces.
- Polyethylene membrane shall be used on subgrade where indicated by the Owner.
- All concrete work shall be constructed with a 2% cross fall (perpendicular to the curb) and consistent with the Ontario *Accessibility for Ontarians with Disabilities Act* (AODA), unless pre-approved by York Region Transit and other municipal authorities.

- All concrete work shall be constructed with a maximum of 8% slope parallel to the curb.
- The pad shall be broom finished (pass a 30 mm smooth edge around the perimeter of the pad) to provide a slip resistant surface.
- Water ponding will not be tolerated; the pad and/or panel shall be removed and replaced.

The Contractor is also responsible for the construction layout of the concrete pads as shown on the YRT Concrete Bus Pad Standard Drawings. The Owner will assist with interpretation of the Standard Drawings, if required.

The Contractor is also responsible for ensuring that the slope of the pad does not exceed 4% of the typical section slope as shown in OPSD 310.010. If the initial layout causes the slope to exceed 4% of the typical section slope, the Contractor shall contact the Owner for instruction and Site review, if necessary, prior to the placement of concrete. Any pad installed which exceeds 4% of the typical section slope shall be removed and replaced at the Contractor's own expense.

Expansion joint material shall be placed abutting all existing concrete surfaces and every three (3) bays (4.5 m). No saw cutting joints will be permitted.

The Contractor shall note that all formwork shall be removed, all debris shall be collected and removed from the Site and all necessary restoration required to eliminate trip hazards shall be completed within 48 hours of the placement of the concrete. A trip hazard will be considered to be eliminated when there is less than a 25 mm grade differential between the concrete and the abutting surface.

The Contractor shall protect the concrete during the curing process and any panels and/or bays marked shall be removed and replaced at the Contractor's own expense. This includes, but is not limited to, graffiti, marks from protective covers and tire marks. Patching and/or parging of concrete will not be accepted.

The Contractor shall provide access to the properties. When working within an entrance, the Contractor shall stage its work accordingly to maintain a minimum 3.8 m wide access through an entrance at all times.

If required, contact York Region Transit within two (2) weeks after construction of the bus shelter pads and passenger standing areas is complete to reinstate shelters and waste/recycling receptacles. Transit dispatch can be contact at [1-905-762-1282 extension 75841](tel:1-905-762-1282) or [OperationsDispatch@york.ca](mailto:OperationsDispatch@york.ca).

**351.09 MEASUREMENT FOR PAYMENT** is deleted in its entirety and replaced with the following:

#### **351.09 MEASUREMENT FOR PAYMENT**

##### **351.09.01.01 Concrete Bus Shelter Pad and Passenger Standing Area**

Measurement will be by the horizontal area in square metres (m<sup>2</sup>) of concrete bus shelter pad and passenger standing area placed.

**351.10 BASIS OF PAYMENT** is deleted in its entirety and replaced with the following:



**351.10 BASIS OF PAYMENT****351.10.01 Concrete Bus Shelter Pad and Passenger Standing Area**

Payment shall be made at the unit price and shall be full compensation for all labour, equipment and materials necessary to complete the work as specified.

**Item R339 Remove and Restore Interlocking Brick Boulevard [Renewal]**

*This Specification shall be read in conjunction with OPSS.MUNI 355 (Nov 2020).*

This item is for the removal, storage and resetting of the existing boulevard paving stones affected by the sidewalk and curb and gutter work under **Item R505 – Removal of Asphalt Sidewalk** and **Item R334 – Concrete Curb and Gutter – All Types**. A representative of the Owner will inform the Contractor, on Site, of the extent of this work and will define the limits of this work with spray paint marks.

The re-installation shall be completed using the existing stones. If the existing stones cannot be used or matched they shall be replaced with new stones of a similar quality and style that are acceptable to the Owner.

This item includes the supply and installation of any additional granular material required to provide a flush grade with the existing boulevard.

**Measurement for Payment**

Measurement for payment shall be in square metres (m<sup>2</sup>) of paving stones removed, stored and restored in the location(s) indicated by the Owner. The restoration limits will be determined by the Owner.

**Basis of Payment**

Payment shall be made at the unit price and shall be full compensation for all labour, equipment and materials necessary to complete this work as specified.

**Item R340 Concrete Curb and Gutter Outlets – All Types [Renewal / New Construction]**

*The following Standard Drawings are applicable to the above item: OPSPD 604.010 (Nov 2012), OPSPD 605.010 (Nov 2012) and 605.030 (Nov 2012).*

*This Specification shall be read in conjunction with OPSS.MUNI 353 (Nov 2021) and OPSS.MUNI 1350 (Nov 2023).*

This item is for the construction of all types of concrete curb and gutter outlets as shown on the Drawings and/or as indicated by the Owner.

**Measurement for Payment**

Measurement for payment shall be a count of each concrete curb and gutter outlet constructed.

**Basis of Payment**

Payment shall be made at the unit price and shall be full compensation for all labour, equipment and materials necessary to complete this work as specified.

## OPSS 400-SERIES

### Item R401 Pipe Subdrains [Renewal / New Construction]

*The following Standard Drawing is applicable to the above item: OPSD 809.010 (Nov 2018).*

*This Specification shall be read in conjunction with OPSS.MUNI 405 (Nov 2017) and OPSS.MUNI 1860 (Nov 2018).*

**405.05.01 General** is amended by deleting the first paragraph and replacing it with the following:

Subdrain pipe shall be perforated, dual wall, polyethylene pipe with a smooth inner surface, having a minimum stiffness of 320 kPa. Subdrains shall also be wrapped in non-woven geotextile as specified in OPSS.MUNI 1860, Table 1 Class II Non-Woven.

**405.07.06.02.02 Marking of Outlets** is deleted in its entirety and replaced with the following:

#### **405.07.06.02.02 Marking of Outlets**

Each outlet location shall be marked by a 2.1 m steel fence post driven 0.6 m to 1.0 m into the ground and painted fluorescent green, paint number CGSB 603-401.

**405.08 Quality Assurance** is amended by the addition of the following:

The selection of the subdrain to be inspected will be identified by the Owner. A minimum of 5% of the entire length of subdrain pipe and 100% of the outlet pipes shall be video inspected and recorded in accordance with OPSS.MUNI 405.07.08.

**405.09.02 Plan Quantity Measurement** is amended by the addition of the following:

The 150 mm diameter pipe subdrain connection into storm structures as specified in OPSD 809.010 shall be included in this item.

**405.10.01 Pipe Subdrain – Item** is amended by deleting the second and third paragraphs and adding the following:

The unit price for this item shall include all costs associated with the excavation and material disposal, Granular 'B', Type I, bedding and backfill, geotextile, video camera inspection, coring into maintenance holes and catch basins where necessary and all other work as specified.

After a random 5% of the entire length of pipe subdrain is inspected and where defective, damaged, or improperly installed pipe subdrain is encountered, the Owner may request that additional CCTV inspection be completed. No separate payment will be considered for this work, regardless of the amount of pipe subdrain inspected.

**Item R402 Adjust Maintenance Holes, Catch Basins and Valve Chambers [Renewal / New Construction]**

*This Specification shall be read in conjunction with OPSS.MUNI 180 (Nov 2021), OPSS.MUNI 408 (Nov 2021) and OPSS.MUNI 1351 (Nov 2019).*

The Contractor shall supply all labour, material and equipment required to properly adjust maintenance holes, catch basins and valve chambers of any size as described herein. All adjustments under this item shall be less than, or equal to, 300 mm in depth. Any maintenance hole, catch basin or valve chamber that requires an adjustment greater than 300 mm shall be rebuilt under **Item R403 – Rebuild Maintenance Holes, Catch Basins and Valve Chambers**.

All maintenance holes, catch basins and valve chambers requiring adjustment will be **identified on Site by the Owner / shown on the Drawings**.

**408.05.05 Adjustment Units** is deleted in its entirety and replaced with the following:

**408.05.05 Adjustment Units**

Precast concrete adjustment units shall be in accordance with OPSS.MUNI 1351. No other alternatives will be accepted.

**408.07.06 Excavating, Backfilling, and Compacting** is amended by the addition of the following:

Compaction of granular backfill material shall be 100% of the maximum dry density.

**408.07.10 Site Restoration** is amended by the addition of the following:

The Contractor shall restore the adjacent areas after completing the work of this item, including removing and replacing existing asphalt pavement as required.

**408.07.12 Management of Excess Material** is amended by the addition of the following:

The disposal of all surplus and unsuitable material shall be the responsibility of the Contractor in accordance with OPSS.MUNI 180. No separate payment will be considered for the disposal of the surplus and unsuitable material, regardless of the amount.

**408.10 BASIS OF PAYMENT** is amended by the addition of the following:

This item does not include the supply and replacement of frames and grates. Payment for frames and grates shall be made under **Item R405 – Replace Frames and Grates for Maintenance Holes, Catch Basins and Valve Chambers**.

**Item R403 Rebuild Maintenance Holes, Catch Basins and Valve Chambers [Renewal / New Construction]**

*This Specification shall be read in conjunction with OPSS.MUNI 180 (Nov 2021), OPSS.MUNI 402 (Nov 2023), OPSS.MUNI 408 (Nov 2021) and OPSS.MUNI 1351 (Nov 2019).*

The Contractor shall supply all labour, material and equipment required to properly rebuild maintenance holes, catch basins and valve chambers of any size as described herein. All adjustments under this item shall be greater than 300 mm in depth. Any maintenance hole,

catch basin or valve chamber that requires an adjustment less than or equal to 300 mm shall be completed under **Item R402 – Adjust Maintenance Holes, Catch Basins and Valve Chambers**.

All maintenance holes, catch basins and valve chambers requiring rebuilding will be **[identified on Site by the Owner / shown on the Drawings]**.

**408.05.05 Adjustment Units** is deleted in its entirety and replaced with the following:

**408.05.05 Adjustment Units**

Precast concrete adjustment units shall be in accordance with OPSS.MUNI 1351. No other alternatives will be accepted.

**408.07.06 Excavating, Backfilling, and Compacting** is amended by the addition of the following:

Compaction of granular backfill material shall be 100% of the maximum dry density.

**408.07.10 Site Restoration** is amended by the addition of the following:

The Contractor shall restore the adjacent areas after completing the work of this item, including removing and replacing existing asphalt pavement as required.

**408.07.12 Management of Excess Material** is amended by the addition of the following:

The disposal of all surplus and unsuitable material shall be the responsibility of the Contractor in accordance with OPSS.MUNI 180. No separate payment will be considered for the disposal of the surplus and unsuitable material, regardless of the amount.

**408.10 BASIS OF PAYMENT** is amended by the addition of the following:

This item does not include the supply and replacement of frames and grates. Payment for frames and grates shall be made under **Item R405 – Replace Frames and Grates for Maintenance Holes, Catch Basins and Valve Chambers**.

**Item R404 Adjust Water Valves [Renewal / New Construction]**

*This Specification shall be read in conjunction with OPSS.MUNI 408 (Nov 2021).*

The Contractor shall supply all labour, material and equipment required to properly adjust existing water valves.

**[Select the paragraph below for renewal projects]**

The Owner will identify the water valves to be adjusted by marking them with spray paint.

**[Select the paragraph below for new construction projects]**

The water valves to be adjusted are shown on the Drawings.

**408.09 MEASUREMENT FOR PAYMENT** is deleted in its entirety and replaced with the following:

**408.09 MEASUREMENT FOR PAYMENT**

Measurement for payment shall be a count of each water valve adjusted.

**408.10 BASIS OF PAYMENT** is deleted in its entirety and replaced with the following:

**408.10 BASIS OF PAYMENT**

**Adjust Water Valves – Item**

Payment shall be made at the unit price and shall be full compensation for all labour, equipment and materials necessary to complete the work as specified.

**Item R405    Replace Frames and Grates for Maintenance Holes, Catch Basins and Valve Chambers [Renewal / New Construction]**

*The following Standard Drawing is applicable to the above item: OPSD 400.110 (Nov 2018).*

*This Specification shall be read in conjunction with OPSS.MUNI 408 (Nov 2021).*

The Contractor shall supply all labour, material and equipment required to properly replace those frames and grates.

**[Select paragraph below for renewal projects]**

The Owner will identify the frames and grates that are to be replaced under this item by marking them with spray paint.

**[Select the paragraph below for new construction projects]**

The frames and grates to be replaced under this item are shown on the Drawings.

The removed frames and grates shall become the property of the Contractor and shall be disposed of outside of the Contract limits at no additional cost to the Owner.

**408.09 MEASUREMENT FOR PAYMENT** is deleted in its entirety and replaced with the following:

**408.09 MEASUREMENT FOR PAYMENT**

Measurement for payment shall be a count of each frame and grate replaced.

**408.10 BASIS OF PAYMENT** is deleted in its entirety and replaced with the following:

**408.10 BASIS OF PAYMENT**

Payment shall be made at the unit price and shall be full compensation for all labour, equipment and materials necessary to complete the work as specified.

Costs associated with adjusting or rebuilding the maintenance holes, catch basins and valve chambers shall not be included in the unit price for this item. Payment for adjusting and rebuilding maintenance holes, catch basins and valve chambers shall be made under **Item R402 – Adjust Maintenance Holes, Catch Basins and Valve Chambers** and **Item R403 – Rebuild Maintenance Holes, Catch Basins and Valve Chambers**, respectively.

**Item R406    Supply/Replace and Adjust Rectangular Frame with Two-Piece Cover [Renewal]**

*The following Standard Drawing is applicable to the above item: OPSD 402.030 (Nov 2019).*

*This Specification shall be read in conjunction with OPSS.MUNI 180 (Nov 2021), OPSS.MUNI 408 (Nov 2021) and OPSS.MUNI 1351 (Nov 2019).*



The Contractor shall supply all labour, material and equipment required to properly supply/replace and adjust rectangular frames with two (2) piece covers in the location(s) identified on Site by the Owner.

**408.05.05 Adjustment Units** is deleted in its entirety and replaced with the following:

**408.05.05 Adjustment Units**

Precast concrete adjustment units shall be in accordance with OPSS.MUNI 1351. No other alternatives will be accepted.

**408.07.06 Excavating, Backfilling, and Compacting** is amended by the addition of the following:

Compaction of granular backfill material shall be 100% of the maximum dry density.

**408.07.10 Site Restoration** is amended by the addition of the following:

The Contractor shall restore the adjacent areas after completing the work of this item, including removing and replacing existing asphalt pavement as required.

**408.07.12 Management of Excess Material** is amended by the addition of the following:

The disposal of all surplus and unsuitable material shall be the responsibility of the Contractor in accordance with OPSS.MUNI 180. No separate payment will be considered for the disposal of the surplus and unsuitable material, regardless of the amount.

**408.09 MEASUREMENT FOR PAYMENT** is deleted in its entirety and replaced with the following:

**408.09 MEASUREMENT FOR PAYMENT**

Measurement for payment shall be a count of each rectangular frame and two-piece cover supplied and adjusted.

**408.10 BASIS OF PAYMENT** is deleted in its entirety and replaced with the following:

**408.10 BASIS OF PAYMENT**

**408.10.01 Supply/Replace and Adjust Rectangular Frame with Two-Piece Cover - Item**

Payment shall be made at the unit price and shall be full compensation for all labour, equipment and materials necessary to complete the work as specified.

**Item R407 Catch Basins including Frame and Grate/Cover** [Renewal / New Construction]

**Item R408 Double Catch Basins including Frame and Grate/Cover** [Renewal / New Construction]

**Item R409 Ditch Inlets including Frame and Grate/Cover** [Renewal / New Construction]

**Item R410 Maintenance Holes including Frame and Grate/Cover** [Renewal / New Construction]

*The following Standard Drawings are applicable to the above item(s):* OPSD 701.010 (Nov 2014), OPSD 701.011 (Nov 2014), 701.012 (Nov 2014), OPSD 701.013 (Nov 2014), OPSD 705.010 (Nov 2019), OPSD 705.020 (Nov 2019), OPSD 705.030 (Nov 2019) and OPSD 809.010 (Nov 2018).

*This Specification shall be read in conjunction with OPSS.MUNI 180 (Nov 2021), OPSS.MUNI 402 (Nov 2023), OPSS.MUNI 407 (Nov 2021), OPSS.MUNI 517 (Nov 2021) and OPSS.MUNI 1010 (Nov 2013).*

**402.05.02.01 General** is amended by the addition of the following:

Backfill material shall be Granular 'B', Type I material conforming to the requirements of OPSS.MUNI 1010.

**402.07.08.03 Over-Excavation** is amended by deleting the words "95% maximum dry density" and replacing them with "100% maximum dry density".

**402.09.01.01 Additional Excavating, Backfilling, and Compacting** is deleted in its entirety and replaced with the following:

**402.09.01.01 Additional Excavating, Backfilling, and Compacting**

*[Select the paragraph below for renewal projects]*

If, due to unsuitable material, the Owner orders additional excavation beyond 150 mm below the design grade, measurement will be made in cubic metres (m<sup>3</sup>) of the excavation. Payment for additional excavation and backfill will be made under **Item R331 – Full Depth Granular Base Repair (Provisional)**.

*[Select the paragraph below for new construction projects]*

If, due to unsuitable material, the Owner orders additional excavation beyond 150 mm below the design grade, measurement will be made in cubic metres (m<sup>3</sup>) of the excavation. Payment for additional excavation and backfill will be made under **Item R206 – Unsuitable Material Removal, Disposal and Backfill (Provisional)**.

**402.07.12 Management of Excess Material** is amended by the addition of the following:

The disposal of all surplus and unsuitable material shall be the responsibility of the Contractor in accordance with OPSS.MUNI 180. No separate payment will be considered for the disposal of the surplus and unsuitable material, regardless of the amount.

**407.07.01 General** is amended by deleting the first paragraph and replacing it with the following:

Structures of the type specified in the Contract Documents shall be installed on 150 mm of Granular 'A' in the locations, and to the elevations, specified in the Contract Documents and shall be constructed plumb and true to alignment.

**407.07.01 General** is further amended by the addition of the following:

A 150 mm diameter perforated pipe shall be installed into main line maintenance holes as shown on OPSPD 809.010. Payment for this work will be made at the unit price under **Item R401 – Pipe Subdrains**.

The above item(s) includes bedding, filter cloth, backfill, installation of all frames and grates or covers, and all work required for the dewatering of excavations in accordance with OPSS.MUNI 517 to allow for construction of the catch basins, ditch inlets and maintenance holes in the dry.

**407.07.10 Precast Structures** is amended by the addition of the following:

Precast concrete maintenance holes, catch basins and ditch inlets shall be placed on a 150 mm thick Granular 'A' mat.

**407.07.11 Installation of Inlet and Outlet Pipes Into Concrete Structures** is amended by the addition of the following:

Connections of sewer pipes and subdrain shall be cored into the structure unless pre-cut holes at the proper locations are available. The Contractor shall place grout on the walls of the connection holes before inserting the pipes and shall parge the inside and outside of the structure.

**407.07.12 Benching and Channeling** is amended by the addition of the following:

All maintenance holes must be benched, except those in gutter lines.

**407.10.01** is deleted in its entirety and replaced with the following:

**407.10.01      Catch Basins including Frame and Grate/Cover – Item**  
**Double Catch Basins including Frame and Grate/Cover – Item**  
**Ditch Inlets including Frame and Grate/Cover – Item**  
**Maintenance Holes including Frame and Grate/Cover – Item**

Payment shall be made at the unit price and shall be full compensation for all labour, equipment and materials necessary to complete the work as specified, including but not limited to excavation, dewatering, bedding, filter cloth and backfill and the installation of all frames with grates or covers as shown on the Drawings.

**Item R411      Maintenance Hole Drop Structure [New Construction]**

*The following Standard Drawings are applicable to the above item: OPSPD 1003.010 (Nov 2016) and OPSPD 1003.020 (Nov 2016)*

*This Specification shall be read in conjunction with OPSS.MUNI 180 (Nov 2021), OPSS.MUNI 407 (Nov 2021), OPSS.MUNI 410 (Nov 2018) and OPSS.MUNI 1350 (Nov 2023).*

**407.07.23 Management of Excess Material** is amended by the addition of the following:

The disposal of all surplus and/or unsuitable material shall be the responsibility of the Contractor in accordance with OPSS.MUNI 180 and **SC 16 – On-Site and Excess Soil Management of the Supplementary Conditions**. No separate payment will be considered for the disposal of the surplus and/or unsuitable material, regardless of the amount.

### **Measurement for Payment**

Measurement for payment shall be a count of each drop structure installed.

### **Basis of Payment**

Payment shall be made at the unit price and shall be full compensation for all labour, equipment and materials necessary to complete this work as specified.

### **Item R412 Break into Existing Maintenance Hole, Catch Basin or Sewer [New Construction]**

*This Specification shall be read in conjunction with OPSS.MUNI 407 (Nov 2021) and OPSS.MUNI 410 (Nov 2018).*

Under this item, the Contractor shall make whatever openings are necessary in the existing maintenance holes, catch basins, ditch inlets, pipe culverts and pipe sewers to install the new pipe sewer and connect it to the existing structure in accordance with OPSS.MUNI 407 and OPSS.MUNI 410. Under this item, the Contractor shall supply all fittings required to make the connection to the existing pipe or structure.

**410.07.15 Breaking into Maintenance Holes, Catch Basins, Ditch Inlets, Pipe Culverts, and Pipe Sewers** is amended by the addition of the following:

Connections of new sewer pipe into existing structure or sewer shall be made by coring. The connections shall be grouted between the pipe and the wall of the structure to the satisfaction of the Owner.

Benching in existing maintenance holes shall be altered to accommodate the flow in the new sewer pipe system.

### **Item R413 Oil/Grit Separator – Location and Size [New Construction]**

*This Specification shall be read in conjunction with OPSS.MUNI 180 (Nov 2021), OPSS.MUNI 402 (Nov 2023), OPSS.MUNI 407 (Nov 2021), OPSS.MUNI 501 (Nov 2017), OPSS.MUNI 517 (Nov 2021), OPSS.MUNI 1010 (Nov 2013) and OPSS.MUNI 1351 (Nov 2019).*

**This item is for the supply and installation of Stormceptor Model Nos. EFO06, EFO08 and EFO12 / Downstream Defender Model Nos. DD6, DD10 and DD12 oil/grit separator structures or Equivalent.**

**[Designer to list oil/grit separator locations and sizes]**

**The oil/grit separator systems shall be precast concrete Stormceptor EFO units by Imbrium Systems Inc. / Downstream Defender units by Hydro International. Equivalent alternative oil/grit separator systems may also be supplied and installed if approved by the [Conservation**

Authority] and the Owner, and provided that all required drawing revisions or requirements are addressed by the Contractor at the Contractor's own expense.

If the Contractor elects to supply and install an Equivalent substitute product and it is approved by the Owner, the Contractor shall be responsible for all costs and delays associated with obtaining re-approval of the [Conservation Authority] Fill, Construction, and Alteration to Waterways Permit. If the amended plan requires a revision in the length of pipe to and from the oil/grit separator as a result of the unit selected, adjustments will be paid for under the respective unit price for the affected pipe.

The separator shall remove oil and sediment from storm water during frequent wet weather events. The separator shall treat a minimum of 75% to 90% of the annual runoff volume and shall be capable of removing 60% of the total suspended sediment load based on ISO 14034 Environmental Technology Verification (ETV) / Canadian ETV particle size distribution and 60% to 95% of the floatable free oil. The separator must be capable of trapping silt and clay size particles in addition to large particles. The separator shall be installed underground as part of the storm sewer system and shall be structurally designed for Canadian Highway Bridge Design Code (CHBDC) traffic loading at the surface. The storage in the separator shall be vertically oriented. The separator shall be maintainable from the surface via one (1) access point without requiring entry into the separator.

The separator shall be capable of holding trapped sediments in storage sump during high flows. Sediment concentration in effluent shall not exceed 10 mg/L during all flows and durations as specified in ISO 14034 ETV / Canadian ETV scour and re-suspension test.

The oil/grit separator system shall be designed to the following specific local conditions:

Location: York Region

Type of Application: Commercial

Rainfall Station: Rainfall Station: Toronto Pearson International Airport, Ontario (1960:2013, HLY03, Toronto Pearson Intl AP, ON, 6158733)

The Total Suspended Solids (TSS) removal and scour and re-suspension performances shall be based upon third party scientific studies that evaluated the unit with a particle size distribution as specified in ISO 14034 ETV / Canadian ETV procedure.

The separator shall be equipped with an internal high flow bypass that is capable of conveying the maximum design flow rate from the treated drainage area with no flow going through the treatment portion of the unit. The bypass area shall be physically separated from the separation area in order to prevent mixing. The separator shall be designed such that captured solids cannot be re-suspended and scoured from the unit during normal operation or bypass conditions.

The separator shall be capable of containing spills of floatable substances such as free oil and not be compromised by temporary backwater conditions (i.e. trapped pollutants should not be re-suspended and scoured from the separator during backwater conditions). The separator shall



be installed with properly placed joint sealing material in order to ensure that the structure is watertight.

The separator shall be circular and constructed from concrete. Internal separation components may be manufactured from fiberglass or 316 stainless steel. The concrete structure shall be produced at a facility that is certified to manufacture the structural components under the Provincial Plant Prequalification Program as administered by OCPA.

The difference between the inlet pipe elevation to the separator and the outlet pipe elevation from the separator shall be in accordance with the Drawings. The separator shall be able to be used as a bend structure in the storm sewer system if specified on the Drawings. The access cover for the separator shall clearly indicate that it is an oil/sediment separator or identify the oil/sediment manufacturer's trade name. Manhole frames and grates shall be as indicated on the Drawings.

Maintenance program for equivalent requests shall match the Stormceptor / Downstream Defender maintenance program, as follows: supplier/manufacturer inspection of unit after installation, 6 months after installation, 12 months after installation, then annually until 5 years after installation, including an inspection report for each inspection.

### Design and Working Drawings

Regardless of the manufacturer of the oil/grit separator system, the Contractor shall submit six (6) copies of detailed design drawings and six (6) copies of working drawings of the oil/grit separator system to the Owner for approval.

The design drawings and working drawings shall be submitted on minimum 8.5" x 11" paper, six (6) weeks prior to the planned construction of the oil/grit separator system.

If an alternative oil/grit separator chamber is proposed for consideration, and if the alternative is not comprised of OPSD specified precast components manufactured by an OCPA prequalified producer, then the alternative unit shall be designed to the requirements of the Canadian Highway Bridge Design Code (CHBDC). The structural design drawings for the alternative shall bear the seal and signature of a Professional Engineer representing the precast manufacturer supplying the components of the oil/grit separator system. The working drawings shall bear the seal and signature of a Professional Engineer representing the Contractor. Process description and methodologies, including supporting testing by third party scientific studies, must be submitted in support of the proposed alternative as outlined above. The Contractor shall be responsible for obtaining the approval of alternative technologies by the [Conservation Authority] and the MECP. Work shall not proceed until the drawings have been approved in writing by [Conservation Authority], MECP and the Owner.

One approved copy of each drawing shall be available at the Site at all times. One (1) approved copy of each drawing shall be provided to the Owner and one (1) approved copy of each drawing shall be provided to the Owner prior to the beginning of construction of the oil/grit separator.

The separator must be installed according to the manufacturer's instructions.

**402.07.08.03 Over-Excavation** is amended by deleting the words “95% maximum dry density” and replacing them with “100% maximum dry density”.

**402.07.09.01 Bedding** is deleted in its entirety and replaced with the following:

**402.07.09.01 Bedding**

A 150 mm layer of granular bedding material shall be placed on the bottom of the excavation and compacted according to OPSS.MUNI 501, or as otherwise specified by the product manufacturer, prior to the placing of a structure.

**402.07.10 Additional Excavation, Backfilling, and Compacting** is amended by the addition of the following:

The disposal of all surplus material shall be the responsibility of the Contractor.

Dewatering and/or shoring required to enable installation of the oil/grit separators shall be the responsibility of the Contractor.

**402.09 Measurement of Payment** is amended by the addition of the following:

No measurement will be made of Granular ‘B’, Type 1, backfill material for structures constructed according to the Drawings.

Payment shall be made at the applicable unit price for each oil/grit separator installed, and shall be full compensation for all labour, equipment and materials necessary to complete the work as specified.

**407.05.05 Adjustment Units** is deleted in its entirety and replaced with the following:

**407.05.05 Adjustment Units**

Only interlocking precast concrete adjustment units on grout shall be used. Precast concrete adjustment units shall be in according to OPSS.MUNI 1351.

**407.07.13 Installation of Inlet and Outlet Pipes into Concrete Structures** is amended by the addition of the following:

Precast concrete manholes shall be placed on a 150 mm thick slab of 20 MPa concrete.

**407.10 Basis of Payment** is amended by the addition of the following:

Payment shall include the supply and placing of the 20 MPa concrete working mat and the Granular ‘B’, Type 1, backfill. The mat shall be a minimum of 150 mm and shall extend beyond the sides of the structure by 300 mm.

Backfill material shall be Granular ‘B’, Type 1, material conforming to the requirements of OPSS.MUNI 1010.

**Item R414 Storm Sewer [Renewal / New Construction]**

*The following Standard Drawings are applicable to the above item: OPSD 708.020 (Nov 2016) and OPSD 802.010 (Nov 2014).*

*This Specification shall be read in conjunction with OPSS.MUNI 180 (Nov 2021), OPSS.MUNI 401 (Nov 2021), OPSS.MUNI 409 (Nov 2023), OPSS.MUNI 410 (Nov 2018), OPSS.MUNI 1010 (Nov*

2013), OPSS.MUNI 1820 (Nov 2020), OPSS.MUNI 1840 (Nov 2019) and OPSS.MUNI 1841 (Nov 2019).

**401.07.13 Management of Excess Material** is amended by the addition of the following:

The disposal of all surplus and unsuitable material shall be the responsibility of the Contractor.

**401.10.01 Trenching, Backfilling, and Compacting** is amended by the addition of the following:

The unit price for this item shall include all costs associated with the restoration of trench cuts as specified under **Item G1 – Maintenance of Traffic**.

**410.05.01.01 General** is amended by the addition of the following:

All storm sewers larger than 1,500 mm in diameter shall be concrete, unless indicated otherwise in the Contract Documents.

For storm sewers 1,500 mm in diameter and smaller, the Contractor is permitted to use concrete or HDPE with a small inside wall of an equivalent size, unless noted otherwise on the Drawings.

Concrete pipe shall be in accordance with OPSS.MUNI 1820.

HDPE shall meet the requirements of OPSS.MUNI 1840. Pre-manufactured tees shall be used for all connections of catch basin leads to the sewer. The minimum pipe class for HDPE pipe shall be Class 320.

The Contractor shall use the same pipe material as the existing pipe when the storm sewer is to be extended.

The bedding materials specified in OPSS.MUNI 401 include Granular 'A' and Granular 'B' in accordance with OPSS.MUNI 1010, with 100% passing the 26.5 mm sieve, and unshrinkable fill.

The bedding, embedment and cover materials shall be placed in layers a maximum of 200 mm thick and compacted to minimum 95% SPMDD or vibrated into a dense state in the case of clear stone type bedding.

**410.05.01.03 Corrugated Steel Pipe Products** is amended by the addition of the following:

CSP outlets discharging from the enclosed storm system shall include a Removable Safety Grate or Equivalent.

Item prices for CSP shall include couplers, gaskets, bolts, nuts, safety grates and all parts reasonably inferred for the completion of the proposed Work.

**410.07.02 Removals** is amended by the addition of the following:

Asphalt pavement and concrete removal, including saw cutting, shall be considered to be part of the work of the above item(s). **[Delete this removal section for new construction projects]**

**410.07.07 Excavation** is amended by the addition of the following:

Embedment material for flexible pipe shall be Granular 'B', Type I.

**410.07.11 Backfilling and Compacting** is amended by the addition of the following:

*[Select the appropriate paragraph]*

Trench backfill and cover material shall be Granular 'B', Type I.

Trench backfill material shall be Granular 'B', Type I. Trenches off the roadway, 2 m or more from the edge of pavement, shall be backfilled with selected native Site material.

**410.07.12.01 General** is amended by the addition of the following:

Sewer shall be installed in conformance with OPSD 802.010 for flexible pipe.

At maintenance hole and catch basin connections, if concrete pipe is used, the Contractor shall use a concrete cradle in accordance with OPSD 708.020.

At catch basin connections, the Contractor shall use a concrete cradle in accordance with OPSD 708.020.

The Contractor shall use the same pipe material as the existing pipe when the storm sewer is to be replaced.

**410.07.15 Breaking into Maintenance Holes, Catch Basins, Ditch Inlets, Pipe Culverts, and Pipe Sewers** is amended by the addition of the following:

Connections of sewer pipe into maintenance holes and catch basins shall be made by coring. The connections shall be grouted between the pipe and the wall of the structure to the satisfaction of the Owner. No separate payment will be made for connecting sewers to the structures.

**410.07.16.06 Closed-Circuit Television (CCTV) Inspection** is deleted in its entirety and replaced with the following:

**410.07.16.06 Closed Circuit Television (CCTV) Inspection**

CCTV video inspection, as specified in OPSS.MUNI 409, shall be completed prior to acceptance of the pipes. A clear image of the pipe interior shall be submitted to the Owner on a portable USB hard drive, or Equivalent, within five (5) Working Days of completion of the CCTV video inspection.

**410.07.17 Cleaning and Flushing of Pipe Sewers** is deleted in its entirety and replaced with the following:

**410.07.17 Cleaning and Flushing of Pipe Sewers**

All pipes shall be cleaned and flushed just prior to inspection and acceptance. Prior to commencing any flushing the Contractor shall submit a Methodology Summary to the Owner for review and approval. The Methodology Summary shall detail the entire operation including the source of water and the method to be employed to capture and deal with the silt, debris and deleterious materials resulting from the flushing operation. Sewer pipes will not be accepted until the CCTV result is satisfactory to the Owner.

**410.09 Measurement for Payment** is amended by the addition of the following:

*[Select the paragraph below for renewal projects]*

If, due to unsuitable material, the Owner orders additional excavation beyond 150 mm below the design grade, measurement will be made in cubic metres (m<sup>3</sup>) of the excavation. Payment for additional excavation and backfill will be made under Item R331 – Full Depth Granular Base Repair (Provisional).

**[Select the paragraph below for new construction projects]**

If, due to unsuitable material, the Owner orders additional excavation beyond 150 mm below the design grade, measurement will be made in cubic metres (m<sup>3</sup>) of the excavation. Payment for additional excavation and backfill will be made under Item R206 – Unsuitable Material Removal, Disposal and Backfill (Provisional).

#### **Item R415 CCTV Inspection of Storm Sewers [New Construction]**

*This Specification shall be read in conjunction with OPSS.MUNI 409 (Nov 2023).*

Close-Circuit Television (CCTV) inspection shall be performed on all mainline storm sewers and on catch basin laterals as indicated by the Owner. The pipeline shall be clean, flushed and pumped dry prior to performing the inspection. No additional payment will be made for cleaning, flushing and pumping. Perform inspection in periods of low flow or in the dry.

**409.07.04.01 General** is amended by the addition of the following:

CCTV shall be performed before surface course asphalt is paved.

**409.07.05.01 Inspection Reporting** is amended by the addition of the following:

Photographs shall be included in the inspection reports.

**409.09.02 Plan Quantity Measurement** is amended by the addition of the following:

In the event of results which are unacceptable to the Owner, the Contractor shall be required to undertake additional CCTV inspection at the Contractor's own expense. CCTV inspections shall be borne by the Contractor.

**409.10.01 CCTV Inspection – Item,** is amended by the addition of the following:

The Contractor shall be responsible for the cost of re-inspection after the repair work is complete.

#### **Item R416 Remove and Replace Damaged Storm Sewer Pipe [Renewal]**

*The following Standard Drawings are applicable to the above item: OPSD 708.020 (Nov 2016) and OPSD 802.010 (Nov 2014).*

*This Specification shall be read in conjunction with OPSS.MUNI 180 (Nov 2021), OPSS.MUNI 401 (Nov 2021), OPSS.MUNI 407 (Nov 2021), OPSS.MUNI 409 (Nov 2023), OPSS.MUNI 410 (Nov 2018) and OPSS.MUNI 1840 (Nov 2019).*

This item is for the removal and replacement of damaged storm sewers in the following location(s):



Pipe Location	Sewer Diameter (mm)	Depth (m)	Length of Repair (m)
191 m east of Kipling Avenue crossing Hwy 7	250	1.5	2.5
234 m east of Kipling Avenue crossing Hwy 7	250	1.5	10
297 m east of Kipling Avenue crossing Hwy 7	250	1.5	10
370 m east of Kipling Avenue south side of Hwy 7	525	1.5	2.5
454 m east of Kipling Avenue crossing Hwy 7	300	1.5	2.5
454 m east of Kipling Avenue south side of Hwy 7	300	1.5	2.5

**401.10.01 Trenching, Backfilling, and Compacting** is amended by the addition of the following:

The unit price for this item shall include all costs associated with the restoration of trench cuts as specified under **Item G1 – Maintenance of Traffic**.

**410.05.01.02 Concrete Pipe** is amended by the addition of the following:

Concrete pipe shall be Class 65D.

**410.05.01.04 Polyethylene Pipe Products** is deleted in its entirety and replaced with the following:

**410.05.10.04 Polyethylene Pipe Products**

The HDPE pipe shall have a smooth inner wall and shall be in accordance with OPSS.MUNI 1840. The minimum pipe class for HDPE pipe shall be Class 320.

**410.07.02 Removals** is amended by the addition of the following:

Asphalt pavement and concrete removal, including saw cutting, shall be considered to be part of the work of this item.

**410.07.11 Backfilling and Compacting** is amended by the addition of the following:

**[Select the appropriate paragraph]**

Trench backfill and cover material shall be Granular 'B', Type I.

Trench backfill material shall be Granular 'B', Type I. Trenches off the roadway, 2 m or more from the edge of pavement, shall be backfilled with selected native Site material.

**410.07.12.01 General** is amended by the addition of the following:

Sewer shall be installed in conformance with OPSD 802.010 for flexible pipe.

At maintenance hole and catch basin connections, if concrete pipe is used, the Contractor shall use a concrete cradle in accordance with OPSD 708.020.

The Contractor shall use the same pipe material as the existing pipe when the storm sewer is to be replaced.

**410.07.15 Breaking into Maintenance Holes, Catch Basins, Ditch Inlets, Pipe Culverts, and Pipe Sewers** is amended by the addition of the following:

Connections of sewer pipe into maintenance holes and catch basins shall be made by coring. The connections shall be grouted between the pipe and the wall of the catch basin structure and grouted between the pipe joints to the satisfaction of the Owner. No separate payment will be made for connecting sewers to the structures.

**410.07.16.06 Closed-Circuit Television (CCTV) Inspection** is deleted in its entirety and replaced with the following:

**410.07.16.06 Closed-Circuit Television (CCTV) Inspection**

CCTV video inspection, as specified in OPSS.MUNI 409, shall be completed prior to acceptance of the pipes. A clear image of the pipe interior shall be submitted to the Owner on a portable USB hard drive, or Equivalent, within five (5) Working Days of completion of the CCTV video inspection.

**410.07.21 Management of Excess Material** is deleted in its entirety and replaced with the following:

**410.07.21 Management of Excess Material**

The disposal of all surplus and unsuitable material shall be the responsibility of the Contractor in accordance with the requirements of OPSS.MUNI 180. No separate payment will be considered for the disposal of the surplus and unsuitable material, regardless of the amount.

**410.10 BASIS OF PAYMENT** is amended by the addition of the following to the list of items in **410.10.01**:

**Replace Damaged Storm Sewer Pipe – Item**

**Item R417 Flush, Clean and Inspect Existing Storm Sewers [Renewal]**

*This Specification shall be read in conjunction with OPSS.MUNI 409 (Nov 2023).*

Under this item, the Contractor shall flush and clean the existing storm sewers identified below:

- [input sewer information]
- [input sewer information]

The Contractor shall:

- Remove heavy sediment within the length of each storm sewer

- Pressure blast, flush and clean pipes to bare metal/concrete/plastic
- Dispose of all retrieved debris and sediment off Site
- Complete CCTV inspection of storm sewers in accordance with OPSS.MUNI 409

Following the flushing and cleaning work, the Contractor shall conduct a CCTV video inspection of the sewers for submission to the Owner, for review and determination as to whether the Work performed is acceptable. The Owner will review the inspection videos within five (5) Days of the submission. All costs associated with the CCTV inspection of the sewers shall be included in the price for this item.

### Measurement for Payment

Measurement for payment shall be per linear metre (m) of storm sewer flushed, cleaned and inspected to the satisfaction of the Owner.

### Basis of Payment

Payment shall be made at the unit price and shall be full compensation for all labour, equipment and materials necessary to complete the work as specified.

**Item R418 Concrete Headwall for Pipes Less than 900 mm including Grate (OPSD 804.030) [New Construction]**

**Item R419 Concrete Headwall with Grate and Chain Link Fence (OPSD 804.040) [New Construction]**

*The following Standard Drawings are applicable to the above item(s):* **OPSD 804.030 (Nov 2017), OPSD 804.040 (Nov 2017), OPSD 804.050 (Nov 2021) and OPSD 972.131 (Nov 2012).**

*This Specification shall be read in conjunction with OPSS.MUNI 180 (Nov 2021), OPSS.MUNI 410 (Nov 2018), OPSS.MUNI 501 (Nov 2017) and OPSS.MUNI 1350 (Nov 2023).*

Under this item(s), the Contractor shall construct concrete headwalls at storm outfalls as shown on Drawings.

**Item R418 – Concrete Headwall for Pipes Less than 900 mm including Grate (OPSD 804.030)**

shall be constructed in accordance with OPSD 804.030, including grate in accordance with OPSD 804.050.

**Item R419 – Concrete Headwall with Grate and Chain Link Fence (OPSD 804.040)** shall be

constructed in accordance with OPSD 804.040, including grate in accordance with OPSD 804.050 and a 1.2 m non-climbable black vinyl chain link in accordance with OPSD 972.131.

The work under this item(s) shall include the excavation of material and backfilling with Granular 'B' Type II, compacted in accordance with OPSS.MUNI 501 to a minimum of 100% maximum dry density.

The disposal of all surplus and/or unsuitable material shall be the responsibility of the Contractor in accordance with OPSS.MUNI 180. No separate payment will be considered for the disposal of surplus and/or unsuitable material, regardless of the amount.

**Measurement for Payment**

Measurement for payment shall be a count of each headwall constructed, including grate and chain link fence.

**Basis of Payment**

Payment shall be made at the unit price and shall be full compensation for all labour, equipment and materials necessary to complete this work as specified.

**Item R420 Entrance Culverts – 525 mm Dia., Type, Class [New Construction]**

*This Specification shall be read in conjunction with OPSS.MUNI 421 (Nov 2018) and OPSS.MUNI 1840 (Nov 2019).*

**421.07.07 Excavation** is amended by the addition of the following:

If, due to unsuitable material, the Owner orders additional excavation beyond 150 mm below the design grade, measurement will be made in cubic metres (m<sup>3</sup>) of the excavation. Payment for additional excavation and backfill will be made under **Item R206 – Unsuitable Material Removal, Disposal and Backfill (Provisional)**.

**421.07.11 Backfilling and Compacting** is amended by the addition of the following:

Pipe bedding and cover material shall be Granular 'B', Type I, except that 100% shall pass the 26.5 mm sieve.

Backfill for culverts shall be Granular 'B', Type I, unless specified otherwise herein.

**Measurement for Payment**

Measurement for payment shall be per linear metre (m) of entrance culvert installed.

**Basis of Payment**

Payment shall be made at the unit price and shall be full compensation for all labour, equipment and materials necessary to complete the work as specified.

**Item R421 Remove and Replace Driveway Culvert [Renewal]**

*This Specification shall be read in conjunction with OPSS.MUNI 180 (Nov 2021), OPSS.MUNI 421 (Nov 2018), OPSS.MUNI 510 (Nov 2018) and OPSS.MUNI 1840 (Nov 2019).*

Under this item, the Contractor shall remove and replace the existing driveway culverts in the location(s) indicated by the Owner on Site. The Contractor shall also supply and install 525 mm diameter HDPE culverts under the existing roadside driveway entrances that are indicated by the Owner on Site. These culverts are required in conjunction with the road side ditching operations under **Item R201 – Roadway Ditching – Terra Seeds** in order to provide a continuous roadside drainage system after ditching. The lengths of the driveway culverts to be installed will depend on the width of each driveway and shall be as indicated by the Owner.

The HDPE pipe shall have a smooth wall and shall be in accordance with OPSS.MUNI 1840. The minimum pipe class for HDPE pipe shall be Class 320.

The Contractor will not be permitted to re-use the excavated material for backfilling the culvert work. Unless specified otherwise herein, all surplus and unsuitable excavated materials shall become the property of the Contractor and, accordingly, shall be disposed of off Site at no additional cost to the Owner. The excavated material shall be disposed of as specified in OPSS.MUNI 180. The Contractor shall obtain all necessary written approvals from the appropriate land owners and applicable environmental and municipal agencies for the disposal of such material.

Saw cutting and removal of pavement to facilitate the culvert work shall be considered to be included in the work of this item.

**421.07.07 Excavation** is amended by the addition of the following:

If, due to unsuitable material, the Owner orders additional excavation beyond 150 mm below the design grade, measurement will be made in cubic metres (m<sup>3</sup>) of the excavation. Payment for additional excavation and backfill will be made under **Item R331 – Full Depth Granular Base Repair (Provisional)**.

**421.07.11 Backfilling and Compacting** is amended by the addition of the following:

Pipe bedding and cover material shall be Granular 'B', Type I, except that 100% shall pass the 26.5 mm sieve. Driveway entrance culverts may be installed using suitable native material, unless specified otherwise herein.

Backfill for culverts shall be Granular 'B', Type I, unless specified otherwise herein.

### Measurement for Payment

Measurement for payment shall be per linear metre (m) of driveway culvert removed and replaced to the satisfaction of the Owner.

### Basis of Payment

Payment shall be made at the unit price and shall be full compensation for all labour, equipment and materials necessary to complete the work as specified.

### **Item R422 Remove and Replace Pipe Culverts [Renewal]**

*The following Standard Drawings are applicable to the above item: OPSD 802.010 (Nov 2014), OPSD 803.030 (Nov 2015) and OPSD 803.031 (Nov 2015).*

*This Specification shall be read in conjunction with OPSS.MUNI 180 (Nov 2021), OPSS.MUNI 421 (Nov 2018) and OPSS.MUNI 1840 (Nov 2019).*

The Contractor shall remove and replace the following culverts:

LOCATION	EXISTING SIZE / TYPE	EXISTING COVER	REPLACEMENT SIZE / TYPE	TRCA / LSRCA PERMIT NO.



LOCATION	EXISTING SIZE / TYPE	EXISTING COVER	REPLACEMENT SIZE / TYPE	TRCA / LSRCA PERMIT NO.

**421.01 SCOPE** is amended by the addition of the following:

**Erosion/Sediment Control – Conservation Authority Requirements**

The culvert removal and replacement work under this item shall be performed in accordance with the requirements of the pending TRCA (or) LSRCA permit and accompanying documentation including, but not limited to, the following:

- For wet conditions, the Contractor shall use pea gravel bags to build coffer dams, together with filter sock fiber rolls, on both ends of the culverts to create a work area. A pump with by-pass pipes shall be used to direct water.
- Filter sock fiber rolls are required for dry conditions.
- Topsoil and native seed mix treatment are required to restore disturbed areas associated with the culvert work.

**421.05.01.04 Polyethylene Pipe Products** is deleted in its entirety and replaced with the following:

**421.05.01.04 Polyethylene Pipe Products**

The HDPE pipe shall have a smooth inner wall and shall be in accordance with OPSS.MUNI 1840. The minimum pipe class for HDPE pipe shall be Class 320.

For culvert extensions, the Contractor shall confirm the existing culvert size before ordering material in order to ensure an acceptable fit.

**421.07.02 Removals** is amended by the addition of the following:

If, due to unsuitable material, the Owner orders additional excavation beyond 150 mm below the design grade, measurement will be made in cubic metres (m<sup>3</sup>) of the excavation. Payment for additional excavation and backfill will be made under Item R331 – Full Depth Granular Base Repair (Provisional).

The Contractor shall not be permitted to re-use the excavated material for backfilling the culvert work. Unless specified otherwise herein, all surplus and unsuitable excavated materials shall become the property of the Contractor and, accordingly, shall be disposed of off Site at no additional cost to the Owner. The excavated material shall be disposed of as specified in OPSS.MUNI 180.

**421.07.11 Backfilling and Compacting** is amended by the addition of the following:

Pipe bedding and cover material shall be Granular 'B', Type I, except that 100% shall pass through the 26.5 mm sieve.

Bedding and cover for all road culverts shall be as shown on OPSD 802.010.

Backfill for culverts shall be Granular 'B', Type I, unless specified otherwise herein.

All culverts installed within the frost depth ("f" = 1.2 m) shall have frost tapers (OPSD 803.030 and OPSD 803.031) constructed using Granular 'B', Type I, material.

**421.07.18 Management of Excess Material** is deleted in its entirety and replaced with the following:

**421.07.18 Management of Excess Material**

The disposal of all surplus and unsuitable material shall be the responsibility of the Contractor in accordance with the requirements of OPSS.MUNI 180. No separate payment will be considered for the disposal of the surplus and unsuitable material, regardless of the amount.

**421.09 MEASUREMENT FOR PAYMENT** is deleted in its entirety.

**421.10 BASIS OF PAYMENT** is deleted in its entirety and replaced with the following:

**421.10 BASIS OF PAYMENT**

Any environmental protection and/or traffic control required for the work under this item shall be deemed to be included under **Item G4 – Environmental Protection** and/or **Item G1 – Maintenance of Traffic**, respectively. No additional payment will be made for any related activities including, but not limited to, dewatering, erosion and sediment control, Site restoration and disposal of excess materials.

Payment shall be made at the lump sum price and shall be full compensation for all labour, equipment and materials necessary to complete the work as specified. Payment shall be made in one (1) lump sum payment upon completion of all work under this item to the satisfaction of the Owner.

**Item R423 Road Culverts – Size, Type, Class [New Construction]**

*The following Standard Drawings are applicable to the above item: OPSD 802.010 (Nov 2014), OPSD 803.030 (Nov 2015) and OPSD 803.031 (Nov 2015).*

*This Specification shall be read in conjunction with OPSS.MUNI 180 (Nov 2021), OPSS.MUNI 206 (Apr 2019), OPSS.MUNI 401 (Nov 2021), OPSS.MUNI 421 (Nov 2018) and OPSS.MUNI 517 (Nov 2021).*

**421.05.01.01 General** is amended by the addition of the following:

All road culverts installed within the frost depth ("f" = 1.2 m or **in accordance with the Geotechnical Investigation**) shall have frost tapers (OPSD 803.030 and OPSD 803.031) constructed using Granular 'B', Type I, material.

**421.05.01.03 Corrugated Steel Pipe Products** is amended by the addition of the following:

**CSP culvert couplers shall be annular corrugated bands with bolt and angle attachments.**

**Culvert pipe shall be corrugated steel pipe, either riveted or Loc-Seam Hel-Cor pipe as manufactured by Armtec Inc. or Equivalent. Hel-Cor pipe shall be provided with annular corrugated ends with a minimum of two (2) annular rings at each end. Couplers shall be annular corrugated bands with bolt and angle attachments.**

Culverts in marsh areas shall include clear stone bedding and a geoweb cellular confinement system as required.

Bedding and cover for all CSP culverts shall be as shown on OPSD 802.010, OPSD 803.030 and OPSD 803.031.

Backfill shall be Granular 'B', Type I compacted to 100% of maximum dry density.

**421.05.01.04 Polyethylene Pipe Products** is amended by the addition of the following:

HDPE culverts shall be Class 320 with a smooth inner wall and corrugated outer shell ('Boss 2000' pipe as manufactured by Big 'O' Inc. or Equivalent), complete with watertight joining systems and manufactured fittings.

Embedment and cover material shall be Granular 'B' Type 1 and in accordance with OPSD 802.010, OPSD 803.030 or OPSD 803.031, depending on soil conditions.

Backfill shall be Granular 'B' Type 1 compacted to 100% of maximum dry density.

**421.09 Measurement for Payment** is amended by the addition of the following:

If, due to unsuitable material, the Owner orders additional excavation beyond 150 mm below the design grade, measurement will be made in cubic metres (m<sup>3</sup>) of the excavation. Payment for additional excavation and backfill will be made under **Item R206 – Unsuitable Material Removal, Disposal and Backfill (Provisional)**.

**Item R424 Reline Pipe Culvert with Fold and Form HDPE Pipe Liners [Renewal]**

The Contractor shall reline the following pipe culverts:

LOCATION	EXISTING SIZE	EXISTING DEPTH	LSRCA / TRCA PERMIT NO.

**General**

The Contractor shall monitor weather conditions several Days in advance of the proposed installation date and install the pipe liner when water flow through the pipe is at a minimum in order to avoid unnecessary dewatering. The Contractor shall divert water flow away from the repair area using pea gravel barriers and pumps. All pumped water shall be filtered through

sediment filter bags a minimum of 30 m away from the watercourse and all discharged water from the filter bags shall flow through a well-vegetated area.

The Contractor shall field measure the existing **CSP** pipe diameter and length and select a pipe liner to suit the existing pipe size.

The fold and form HDPE liner, or Equivalent, shall be installed in accordance with the manufacturer's written recommendations.

The Contractor shall submit a product data sheet for the liner to the Owner for review and approval a minimum of 48 hours prior to ordering the liner.

### **Basis of Payment**

Any environmental protection and/or traffic control required for the work under this item shall be deemed to be included under **Item G4 – Environmental Protection** and/or **Item G1 – Maintenance of Traffic**, respectively. No additional payment will be made for any related activities including, but not limited to, dewatering, erosion and sediment control, Site restoration and disposal of excess materials.

Payment shall be made at the lump sum price and shall be full compensation for all labour, equipment and materials necessary to complete the work as specified. Payment shall be made in one (1) lump sum payment upon completion of all work under this item to the satisfaction of the Owner.

### **Item R425 Reline Pipe Culvert with Snap-Tite HDPE Pipe [Renewal]**

The Contractor shall reline the following pipe culverts:

<b>LOCATION</b>	<b>EXISTING SIZE</b>	<b>EXISTING DEPTH</b>	<b>LSRCA / TRCA PERMIT NO.</b>

### **General**

The Contractor shall monitor weather conditions several Days in advance of the proposed installation date and install the pipe liner when water flow through the pipe is at a minimum in order to avoid unnecessary dewatering. The Contractor shall divert water flow away from the repair area using pea gravel barriers and pumps. All pumped water shall be filtered through

sediment filter bags a minimum of 30 m away from the watercourse and all discharged water from the filter bags shall flow through a well-vegetated area.

The Contractor shall field measure the existing **CSP** pipe diameter and length and select a pipe liner to suit the existing pipe size.

The Snap-Tite solid-wall HDPE pipe, or Equivalent, shall be installed in accordance with the manufacturer's written recommendations.

The Contractor shall submit a product data sheet for the liner to the Owner for review and approval a minimum of 48 hours prior to ordering the liner.

### **Basis of Payment**

Any environmental protection and/or traffic control required for the work under this item shall be deemed to be included under **Item G4 – Environmental Protection** and/or **Item G1 – Maintenance of Traffic**, respectively. No additional payment will be made for any related activities including, but not limited to, dewatering, erosion and sediment control, Site restoration and disposal of excess materials.

Payment shall be made at the lump sum price and shall be full compensation for all labour, equipment and materials necessary to complete the work as specified. Payment shall be made in one (1) lump sum payment upon completion of all work under this item to the satisfaction of the Owner.

## **OPSS 500-SERIES**

### **Item R501 Removal of Asphalt Pavement – Full Depth (100 mm) [New Construction]**

*This Specification shall be read in conjunction with OPSS.MUNI 510 (Nov 2019).*

The existing asphalt pavement to be removed is between **150 mm** and **230 mm** thick according to borehole information. The dimensions are representative at the borehole locations only. The Contractor shall carry out its own investigation if deemed necessary.

**510.09.01.16 Cutting Existing Pavement** is deleted in its entirety and replaced with the following:

#### **510.09.01.16 Cutting Existing Pavement**

Saw cutting of existing pavement for removal shall be part of this item and no separate payment will be considered.

### **Item R501 Removal of Asphalt Pavement – Full Depth (100 mm) [Renewal]**

*This Specification shall be read in conjunction with OPSS.MUNI 510 (Nov 2018).*

**510.07.06.04 Removal of Asphalt Pavement, Partial-Depth** is deleted in its entirety and replaced with the following:

#### **510.07.06.04 Removal of Asphalt Pavement, Partial/Full Depth**



Once the Contractor has removed the existing asphalt to an average depth of 50 mm under Item R502 – Removal of Asphalt Pavement – Partial Depth (50 mm), the Contractor shall remove the remaining existing asphalt and underlying granular to a depth of 100 mm on Bayview Avenue from 50 m north of Major Mackenzie Drive to 50 m north of Elgin Mills Road.

The Contractor is advised that following the second stage of asphalt removal under this item, only a very thin layer of existing asphalt will remain and traffic shall not be permitted on this surface. The Contractor shall only remove the remaining 100 mm of asphalt in those areas that can be fine graded and restored with a new WMA driving surface under *[Select the applicable item]* Item R301 – Superpave, Binder Course, Warm Mix Asphalt / Item R302 – Superpave, Surface Course, Warm Mix Asphalt, by the end of the work shift.

On tangent sections, removals shall be carried out to achieve a 2% crossfall from the centre line to the existing curb or shoulder, and on superelevated curves, removals shall be carried out by depth to retain the existing crossfall.

Prior to commencing removal operations, all debris, deleterious material, and existing windrows, including material beyond the theoretical roadway width, shall be removed from the roadway surface to provide positive drainage.

Removed asphalt pavement material shall not remain on the roadway after completion of the Day's operations. Stockpiling of the removed material on Site other than when placed on a bituminous surface prior to its removal off Site shall not be permitted.

Cold planing equipment must be used for the Work.

The equipment shall grind or cut the surface irregularities out of the existing asphalt pavement in order to produce a smooth surface and cut the pavement down to predetermined grades. The finished surface shall be free from gouges, ridges, sooting, oil film and other imperfections of workmanship.

*[Select the appropriate paragraph]*

The ground material that is removed shall become the property of the Contractor and shall be disposed of off Site by the Contractor at its own expense.

The ground material that is removed shall be delivered to the Owner at its North District Yard located at 3525 Baseline Road, Sutton, Ontario.

When the asphalt pavement removal work is completed each Day, normal traffic flow in each direction shall be resumed. In order to restore normal traffic flow, any grade differences between adjacent pavements (existing and milled) in transverse directions shall be ramped with hot mix asphalt. Ramps in the transverse direction shall be sloped at 20:1. The Contractor shall ensure that there are no grade differences between adjacent pavements (existing and milled) in longitudinal directions. The Contractor is advised that prior to opening the road to traffic, temporary hot mix asphalt ramping will be required around catch basins and valve chambers within the roadway after the milling operation has been performed. All temporary ramps around the catch basins and valve chambers shall be completely removed prior to the placement of the new base or surface course asphalt.

### Maintenance Holes

Following all asphalt removal work, and prior to opening the road to traffic, the Contractor shall install temporary maintenance hole safety ramps at all maintenance holes until the surface course of asphalt is placed. The safety ramps shall be “American Highway Products, Limited” brand or Equivalent.

### Equipment

The asphalt removal work shall be performed using a pavement-cutting machine of a type that has performed successfully on other work comparable to that proposed to be done under this Contract. If water is to be used from fire hydrants on the Site, the Contractor shall obtain, at its own expense, the appropriate permits from the Local Municipality. The Contractor shall not draw any water from areas which are considered to be environmentally sensitive.

### Cutting Equipment

The cutting-machine to be used to perform the Work under the Contract shall be designed and built for this type of work, be self-propelled and shall have, in combination, the means for cutting the old surface and blading the cuttings into one (1) windrow.

The machine shall be able to cut flush to all curbs and gutters, maintenance holes, catch basins and valve chambers.

### Item R502 Removal of Asphalt Pavement – Partial Depth (50 mm) [Renewal / New Construction]

*This Specification shall be read in conjunction with OPSS.MUNI 510 (Nov 2018).*

**510.07.06.04 Removal of Asphalt Pavement, Partial-Depth** is deleted in its entirety and replaced with the following:

#### **510.07.06.04 Removal of Asphalt Pavement, Partial/Full Depth**

**[Select the paragraph below for renewal projects]**

The Contractor shall remove the existing asphalt to an average depth of 50 mm on Bayview Avenue from 50 m north of Major Mackenzie Drive to 50 m north of Elgin Mills Road.

**[Select the paragraph below for new construction projects]**

The Contractor shall remove the existing asphalt to the depth and limits identified on the Drawings.

On tangent sections, removals shall be carried out to achieve a 2% crossfall from the centre line to the existing curb or shoulder, and on superelevated curves, removals shall be carried out by depth to retain the existing crossfall.

Prior to commencing removal operations, all debris, deleterious material, and existing windrows, including material beyond the theoretical roadway width, shall be removed from the roadway surface to provide positive drainage.

Removed asphalt pavement material shall not remain on the roadway after completion of the Day's operations. Stockpiling of the removed material on Site other than when placed on a bituminous surface prior to its removal off Site shall not be permitted.

Cold planing equipment must be used for the Work.

The equipment shall grind or cut the surface irregularities out of the existing asphalt pavement in order to produce a smooth surface and cut the pavement down to predetermined grades. The finished surface shall be free from gouges, ridges, sooting, oil film and other imperfections of workmanship.

**[Choose the appropriate paragraph]**

The ground material that is removed shall become the property of the Contractor and shall be disposed of off Site by the Contractor at its own expense.

The ground material that is removed shall be delivered to the Owner at its North District Yard located at 3525 Baseline Road, Sutton, Ontario.

When the asphalt pavement removal work is completed each Day, normal traffic flow in each direction shall be resumed. In order to restore normal traffic flow, any grade differences between adjacent pavements (existing and milled) in transverse directions shall be ramped with hot mix asphalt. Ramps in the transverse direction shall be sloped at 20:1. The Contractor shall ensure that there are no grade differences between adjacent pavements (existing and milled) in longitudinal directions. The Contractor is advised that prior to opening the road to traffic, temporary hot mix asphalt ramping will be required around catch basins and valve chambers within the roadway after the milling operation has been performed. All temporary ramps around the catch basins and valve chambers shall be completely removed prior to the placement of the new base or surface course asphalt.

### **Maintenance Holes**

Following all asphalt removal work, and prior to opening the road to traffic, the Contractor shall install temporary maintenance hole safety ramps at all maintenance holes until the surface course of asphalt is placed. The safety ramps shall be "American Highway Products, Limited" brand or Equivalent.

### **Equipment**

The asphalt removal work shall be performed using a pavement-cutting machine of a type that has performed successfully on other work comparable to that proposed to be done under this Contract. If water is to be used from fire hydrants on the Site, the Contractor shall obtain, at its own expense, the appropriate permits from the Local Municipality. The Contractor shall not draw any water from areas which are considered to be environmentally sensitive.

### **Cutting Equipment**

The cutting-machine to be used to perform the Work under the Contract shall be designed and built for this type of work, be self-propelled and shall have, in combination, the means for cutting the old surface and blading the cuttings into one (1) windrow.

The machine shall be able to cut flush to all curbs and gutters, maintenance holes, catch basins and valve chambers.

**Item R503 Removal of Asphalt Pavement at New Median – Partial Depth (40 mm)**  
**[Renewal]**

*The following Standard Drawing is applicable to the above item: E-6.03 (Typical Detail for Construction of Concrete Slab Raised Median Islands at Intersections) or E-6.05 (Typical Detail for Construction of 1.5 m or Wider Concrete Slab Raised Median Islands at Intersections).*

*This Specification shall be read in conjunction with OPSS.MUNI 510 (Nov 2018).*

This item is for the removal of asphalt pavement prior to the construction of new median slab islands under **Item R337 – Concrete Slab Raised Median**.

**510.07.06.04 Removal of Asphalt Pavement, Partial Depth** is amended by the addition of the following:

Cold planing equipment must be used for the Work.

The equipment shall grind or cut the surface irregularities out of the existing asphalt pavement in order to produce a smooth surface and cut the pavement down to predetermined grades. The finished surface shall be free from gouges, ridges, sooting, oil film and other imperfections of workmanship.

The ground material that is removed shall become the property of the Contractor and shall be disposed of off Site by the Contractor at its own expense.

**Equipment**

The asphalt removal work shall be performed using a pavement-cutting machine of a type that has performed successfully on other work comparable to that proposed to be done under this Contract. If water is to be used from fire hydrants on the Site, the Contractor shall obtain, at its own expense, the appropriate permits from the Local Municipality. The Contractor shall not draw any water from areas which are considered to be environmentally sensitive.

**Cutting Equipment**

The cutting-machine to be used to perform the Work under the Contract shall be designed and built for this type of work, be self-propelled and shall have, in combination, the means for cutting the old surface and blading the cuttings into one (1) windrow.

The machine shall be able to cut flush to all curbs and gutters, maintenance holes, catch basins and valve chambers.

**Item R504 Removal of Asphalt Pavement at Structures – Partial Depth (40 mm)**  
**[Renewal]**

*This Specification shall be read in conjunction with OPSS.MUNI 510 (Nov 2018).*

**510.07.06.05 Removal of Asphalt Pavement from Concrete Surfaces on Structures** is amended by the addition of the following:

Work on any bridge decks within the Contract limits shall be done in such a way that prevents structural damage to the infrastructure.

The Contractor is advised that expansion joints with concrete end dams exist at some of the structure bridge decks. Care must be exercised to prevent damage to structural expansion joints and end dams when milling on, or near, the structure bridge deck; the use of rotary milling machines (including small hand guided milling machines) will not be permitted within 500 mm of the concrete end dams. Care must be exercised to ensure that the teeth of the milling machine shall at no time come into contact with the concrete end dam and cause damage.

Prior to the commencement of the milling operation, the Contractor shall inspect the bridge deck to locate the expansion joints and end dams. As indicated elsewhere in the Contract Documents, the Contractor shall sawcut, for the entire width of the road, 40 mm deep through the top course asphalt offset at 500 mm from the edges of the concrete end dams. The saw-cut line shall stop before hitting the raised concrete median, concrete sidewalk or concrete curb and gutter. The Contractor shall remove the 500 mm width of asphalt adjacent to, and on either side of, the concrete end dams using hand held tools. The rest of the asphalt shall then be removed to a depth of 40 mm by using a rotary milling machine.

In order to restore normal traffic flow, any grade differences between adjacent pavements (existing and milled) in transverse directions shall be ramped with hot mix asphalt.

#### **Item R505    Removal of Asphalt Sidewalk [Renewal / New Construction]**

*This Specification shall be read in conjunction with OPSS.MUNI 180 (Nov 2021) and OPSS.MUNI 510 (Nov 2018).*

The Contractor shall completely remove and dispose of the existing asphalt sidewalk in the location(s) shown on the Drawings and in accordance with OPSS.MUNI 510.

All asphalt removed under this item shall be disposed of at an Owner-approved disposal site outside the limits of the Contract at no additional cost to the Owner.

#### **Item R506    Removal of Concrete Curb and Gutter – All Types [New Construction]**

*The above item shall be completed in accordance with OPSS.MUNI 510 (Nov 2018).*

#### **Item R506    Removal of Concrete Curb and Gutter – All Types [Renewal]**

*This Specification shall be read in conjunction with OPSS.MUNI 510 (Nov 2018).*

The Contractor shall remove concrete curb and gutter in the location(s) shown on the Drawings and/or indicated by the Owner on Site, including all curbs to be removed in connection with Item R334 – Concrete Curb and Gutter, Item R402 – Adjust Maintenance Holes, Catch Basins and Valve Chambers and Item R403 – Rebuild Maintenance Holes, Catch Basins and Valve Chambers. A representative of the Owner will inform the Contractor, on Site, of the extent of this work and will define the limits of this work with spray paint marks.



The Contractor shall saw cut the existing concrete curb and gutter and shall tie-in to, and match, the existing concrete curb and gutter cross-sections.

The Contractor shall remove existing curb and gutter in a manner that does not damage the adjacent roadway pavement, sidewalk, bus pads or adjacent boulevards (asphalt, interlocking brick and sod). Should any damage occur, the Contractor shall reinstate the roadway pavement, sidewalk, bus pads and boulevards to the satisfaction of the Owner at the Contractor's own expense.

The Contractor shall sawcut, remove and dispose of all material off Site at no additional cost to the Owner.

#### **Item R507    Removal of Concrete Sidewalk/Median Island [Renewal]**

*This Specification shall be read in conjunction with OPSS.MUNI 180 (Nov 2021) and OPSS.MUNI 510 (Nov 2018).*

The Contractor shall sawcut, completely remove and dispose of the existing concrete sidewalk/median island in the location(s) shown on the Drawings and in accordance with OPSS.MUNI 510.

All concrete removed under this item shall be disposed of at an Owner-approved disposal site outside the limits of the Contract at no additional cost to the Owner.

**510.09.01.22 Removal of Concrete Sidewalk** is deleted in its entirety and replaced with the following:

##### **510.09.01.22 Removal of Concrete Sidewalk/Median Island**

Measurement of removal of concrete sidewalks and median islands shall be by horizontal area in square metres (m<sup>2</sup>).

#### **Item R508    Removal of Concrete Sidewalk [New Construction]**

*The above item shall be completed in accordance with OPSS.MUNI 510 (Nov 2018).*

#### **Item R509    Removal of Median Island [New Construction]**

*This Specification shall be read in conjunction with OPSS.MUNI 510 (Nov 2018).*

**510.09.01 Actual Measurement** is amended by the addition of the following:

##### **510.09.01.25 Removal of Median Island**

Measurement of removal of median island shall be by square metres (m<sup>2</sup>).

**510.10 BASIS OF PAYMENT** is deleted in its entirety and replaced with the following:

##### **510.10 BASIS OF PAYMENT**

###### **Removal of Median Island – Item**

Payment shall be made at the unit price and shall be full compensation for all labour, equipment and materials necessary to complete the work as specified.

**Item R510 Removal of Unit Pavers [New Construction]**

*This Specification shall be read in conjunction with OPSS.MUNI 510 (Nov 2018).*

**510.09.01 Actual Measurement** is amended by the addition of the following:

**510.09.01.25 Removal of Unit Pavers**

Measurement of removal of unit pavers shall be by square metres (m<sup>2</sup>).

**510.10 BASIS OF PAYMENT** is deleted in its entirety and replaced with the following:

**510.10 BASIS OF PAYMENT****Removal of Unit Pavers – Item**

Payment shall be made at the unit price and shall be full compensation for all labour, equipment and materials necessary to complete the work as specified.

**Item R510a Removal of Unit Paver Crosswalks within Roadway [Renewal]**

*This Specification shall be read in conjunction with OPSS.MUNI 510 (Nov 2018).*

This item is for the removal of existing unit paver crosswalks within the asphalt roadway at the following intersections:

- List location
- List location

The Contractor shall coordinate and completely remove the unit paver crosswalks in advance of asphalt milling operations. There shall be no delay between the unit paver removal work and milling operations that results in an uneven driving or walking surface at the crosswalk locations. If required, the Contractor shall restore the area with temporary asphalt to maintain a smooth driving or walking surface until the milling operations is complete. All costs associated with supplying temporary asphalt shall be included in the unit price for this item. No separate payment will be made for any temporary asphalt work performed.

The Contractor shall ensure that there is no uneven surface as a result of the removal of the unit paver cross walk before, during or after milling or paving operations for the travelling public (vehicles/pedestrians) to traverse. If the asphalt roadway is to be left in a milled state, the Contractor shall restore any elevation variation as a result of the crosswalk removal with use of base course and/or temporary asphalt.

**510.09.01 Actual Measurement** is amended by the addition of the following:

**510.09.01.25 Removal of Unit Pavers**

Measurement of removal of unit pavers shall be by horizontal area in square metres (m<sup>2</sup>).

**510.10 BASIS OF PAYMENT** is deleted in its entirety and replaced with the following:

**510.10 BASIS OF PAYMENT****Removal of Unit Pavers – Item**

Payment shall be made at the unit price and shall be full compensation for all labour, equipment and materials necessary to complete the work as specified.

**Item R511 Removal of Concrete Bus Pads [New Construction]**

*This Specification shall be read in conjunction with OPSS.MUNI 180 (Nov 2021) and OPSS.MUNI 510 (Nov 2018).*

The Contractor shall sawcut, completely remove and dispose of the existing concrete bus pads in the location(s) shown on the Drawings and in accordance with OPSS.MUNI 510.

All concrete removed under this item shall be disposed of at an Owner-approved disposal site outside the limits of the Contract at no additional cost to the Owner.

If shelters and/or waste/recycling receptacles need to be removed to accommodate construction, contact York Region Transit a minimum of two (2) weeks' in advance of commencement of the work. Transit dispatch can be contacted at 1-905-762-1282 extension 75841 or [OperationsDispatch@york.ca](mailto:OperationsDispatch@york.ca).

**510.09 MEASUREMENT FOR PAYMENT** is amended by the addition of the following:

**510.09.01.25 Removal of Concrete Bus Pads**

Measurement of removal of concrete bus pads shall be by horizontal area in square metres (m<sup>2</sup>).

**Item R512 Removal of Pipe Subdrains [New Construction]**

**Item R513 Removal of Maintenance Holes, Catch Basins and Ditch Inlets [New Construction]**

*The above item(s) shall be completed in accordance with OPSS.MUNI 510 (Nov 2018).*

**Item R514 Removal of Pipes and Culverts [Renewal / New Construction]**

*This Specification shall be read in conjunction with OPSS.MUNI 510 (Nov 2018).*

**510.07.01 General** is amended by the addition of the following:

This item includes saw cutting the asphalt pavement, removing the storm sewers and/or culverts, backfilling and restoring the trench cuts to the satisfaction of the Owner.

Backfill material shall be Granular 'B' on the road and unshrinkable backfill within intersections.

Where there is no separate item elsewhere in the Contract Documents, asphalt pavement and concrete removal shall be considered to be included in the work of this item.

**510.07.03.08 Removal of Pipes and Culverts** is amended by the addition of the following:

The openings, resulting from this work, in existing drainage structures that are to be left in service shall be sealed with concrete brick and mortar. Clay brick, stones and rubble shall not be used. The inside wall shall have a smooth mortar finish.

**Item R515    Abandon Sewers and Laterals [New Construction]**

*This Specification shall be read in conjunction with OPSS.MUNI 510 (Nov 2018).*

Under this item, as approved by the Owner, the Contractor shall completely fill abandoned pipe with grout to provide a water tight seal in accordance with OPSS.MUNI 510.

**510.09.01.07 Abandonment of Pipes and Culverts** is deleted in its entirety and replaced with the following:

**510.09.01.07   Abandon Sewers and Laterals**

Measurement for payment shall be by length in metres (m) horizontally along the abandoned pipe.

**510.10 BASIS OF PAYMENT** is deleted in its entirety and replaced with the following:

**510.10 BASIS OF PAYMENT****Abandon Sewers and Laterals**

Payment shall be made at the unit price and shall be full compensation for all labour, equipment and materials necessary to complete the work as specified.

**Item R516    Removal of Concrete – Headwall, Toe Wall [New Construction]**

*This Specification shall be read in conjunction with OPSS.MUNI 510 (Nov 2018).*

**510.09.01 Actual Measurement** is amended by the addition of the following to the list of Items in **510.09.01.20**:

**Removal of Concrete – Headwalls****Removal of Concrete – Toe Walls****Item R517    Removal of Rip Rap [New Construction]**

*This Specification shall be read in conjunction with OPSS.MUNI 510 (Nov 2018).*

**510.09.01 Actual Measurement** is amended by the addition of the following:

**510.09.01.25 Removal of Rip Rap**

Measurement of removal of rip rap shall be by square metres (m<sup>2</sup>).

**510.10 BASIS OF PAYMENT** is deleted in its entirety and replaced with the following:

**510.10 BASIS OF PAYMENT****Removal of Rip Rap – Item**

Payment shall be made at the unit price and shall be full compensation for all labour, equipment and materials necessary to complete the work as specified.

**Item R518    Removal of Gabions [New Construction]**

*The above item shall be completed in accordance with OPSS.MUNI 510 (Nov 2018).*

**Item R519 Removal of Three-Cable Guide Rail [Renewal / New Construction]**

*This Specification shall be read in conjunction with OPSS.MUNI 510 (Nov 2018).*

**510.07.05.02 Removal of Guide Rail Systems** is amended by the addition of the following:

For guide rail installation locations that are referenced from existing guide rail termination locations, as shown on the Drawings, the Contractor shall record the termination reference locations prior to removal to facilitate installation.

All removed materials shall become the property of the Contractor and, accordingly, shall be disposed of outside of the Contract limits at no additional cost to the Owner.

**Item R520 Removal of Anchor Blocks [Renewal / New Construction]**

*This Specification shall be read in conjunction with OPSS.MUNI 510 (Nov 2018).*

**510.07.05.02 Removal of Guide Rail Systems** is amended by the addition of the following:

Anchor blocks at three-cable guide rail locations shall be removed and backfilled with Granular 'A'. The Contractor shall identify the location of each anchor block to be removed. The Contractor shall ensure that the removal of the anchor block does not cause any damage to the paved road surface. If the Contractor determines that the removal of an anchor block may cause damage to the paved road surface, the Contractor shall only remove the anchor block with the prior approval of the Owner.

All removed materials shall become the property of the Contractor and, accordingly, shall be disposed of outside of the Contract limits at no additional cost to the Owner.

**Item R521 Removal of Steel Beam Guide Rail [Renewal / New Construction]**

*This Specification shall be read in conjunction with OPSS.MUNI 510 (Nov 2018).*

**510.07.05.02 Removal of Guide Rail Systems** is amended by the addition of the following:

For guide rail installation locations that are referenced from existing guide rail termination locations, as shown on the Drawings, the Contractor shall record the termination reference locations prior to removal to facilitate installation.

All removed materials shall become the property of the Contractor and, accordingly, shall be disposed of outside of the Contract limits at no additional cost to the Owner.

**Item R522 Removal of Energy Attenuators [Renewal / New Construction]**

*This Specification shall be read in conjunction with OPSS.MUNI 510 (Nov 2018).*

**510.07.05.04 Removal of Energy Attenuators** is amended by the addition of the following:

For guide rail installation locations that are referenced from existing guide rail termination locations, as shown on the Drawings, the Contractor shall record the termination reference locations prior to removal to facilitate installation.

Unless indicated otherwise in the Contract Documents, all removed materials shall become the property of the Contractor and, accordingly, shall be disposed of outside of the Contract limits at no additional cost to the Owner.



**Item R523 Removal of Fence – All Types [New Construction]**

*This Specification shall be read in conjunction with OPSS.MUNI 510 (Nov 2018).*

**510.07.04.01 Removal of Fence** is amended by the addition of the following:

Before removing any fence, the Contractor shall contact the owner or tenant to inquire whether the field is being used to keep animals. If animals are being kept in the field, the Contractor shall erect the new fence before the old fence is removed unless other arrangements are made by the Contractor with the owner or the tenant.

If new fence is being installed, and the owner wants to keep the old fence material that is being removed, the Contractor shall remove the fence and place the old materials in a neat manner near the owner's building(s). If the owner does not want the old fence, the Contractor shall remove and dispose of it at no additional cost to the Owner.

When a board or rail line fence must be removed and the property line intercepts the fence part way along a panel, a new post (or salvaged existing post if suitable for re-use) of the same type as the original post shall be placed on the property line and the boards or rails fastened to it at no additional cost to the Owner. The boards or rails shall be trimmed so as not to extend out onto the road allowance.

Holes left by the removal of fence posts shall be filled with suitable backfill material, thoroughly compacted, so that they will not be a hazard for animals or pedestrians.

**Item R524 Removal of Noise Barriers – All Types [New Construction]**

*This Specification shall be read in conjunction with OPSS.MUNI 510 (Nov 2018).*

**510.07.04.02 Removal of Noise Barriers** is amended by the addition of the following:

Before removing any noise barrier, the Contractor shall contact the owner or tenant to arrange for temporary fence, if required. The Contractor shall erect a temporary fence before the noise barrier is removed unless other arrangements are made by the Contractor with the owner or the tenant.

Holes left by the removal of concrete footing shall be filled with suitable backfill material, thoroughly compacted, so that they will not be a hazard.

**Item R525 Relocate Canada Post Super Box on New Concrete Pad [New Construction]**

*This Specification shall be read in conjunction with OPSS.MUNI 510 (Nov 2018).*

Under this item, the Contractor shall relocate the existing Canada Post Super Box at [location] to accommodate construction, in accordance with the following requirements:

Contact Canada Post a minimum of six (6) weeks in advance to confirm the new Super Box location and to coordinate the work.

1. Excavate and construct a new concrete pad at the approved Canada Post location that meets the following specifications:
  - 2.0 m2 in size

- 200 mm thick concrete pad
- 100 mm thick compacted Granular 'A' base

2. Relocate the Super Box and anchor it to the concrete pad with expansion wedge anchors.

### Measurement for Payment

Measurement for payment shall be a count of each Super Box relocated.

### Basis of Payment

Payment shall be made at the unit price and shall be full compensation for all labour, equipment and materials necessary to complete this work as specified.

### Item R526 Rip Rap Stone with Geotextile [Renewal / New Construction]

The following Standard Drawings are applicable to the above item: **OPSD 810.010 (Nov 2018)** and **OPSD 810.020 (Nov 2018)**.

This Specification shall be read in conjunction with **OPSS.MUNI 511 (Nov 2019)** and **OPSS.MUNI 1860 (Nov 2018)**.

Rip rap stone shall be hand-placed to a depth of 0.3 m and underlain with filter fabric.

Stone shall be angular and contain no deleterious material such as shale, sandstone, argillite, siltstone or similar sedimentary materials. Stone shall be washed and meet the following gradation:

RIP RAP GRADATION	
STONE SIZE	% PASSING
250	100
100	45 to 55
25	30 to 35
19 mm CLEAR STONE	20 (FILL VOIDS)

Filter fabric shall be Terrafix 270R or Equivalent.

### Item R527 River Run Stone [New Construction]

This Specification shall be read in conjunction with **OPSS.MUNI 511 (Nov 2018)**.

**511.01 Scope** is amended by the addition of the following:

Under this item, the Contractor shall supply and install stone substrate through the proposed culvert, inlet and outlet treatments and temporary channel as indicated on the Drawings and/or as indicated by the Owner.

The Contractor shall supply all materials required for this item. Stone substrate should be round (river stone) to subangular, have a gradation as specified on the Drawings, be washed and clean of all fines prior to placement.

The unit price for this item shall be full compensation for the supply of the stone substrate, the hauling and placing of the stone substrate, and all items incidental to the completion of the work as shown on the Drawings and in accordance with these Specifications.

The finished grades of the proposed stone substrate through the culverts shall match the proposed grades of the inlet and outlet treatments as shown on the Contract Documents. At all times the Contractor shall ensure that all proper erosion and sediment controls installed are fully functional.

Work under this item shall also include any necessary excavation, shaping, re-shaping as necessary to satisfy [the relevant conservation authority (LSRCA, TRCA)], and the removal and disposal of any surplus material.

**511.05.01 Rip-Rap, Rock Protection, and Granular Sheeting** is amended by the addition of the following:

The stone placed under this item shall meet the following requirements:

- Be less than 10 times the Leachate Quality Criteria as defined by Schedule 4 in Reg. 347 (General – Waste Management) under the Ontario *Environmental Protection Act*
- Not contain any sulphides
- Have a Neutralization Potential/Acid Potential ratio greater than 5.0
- Be either a limestone, dolomitic-limestone or dolomite containing no deleterious material such as shale, sandstone, argillite, siltstone or other similar sedimentary units
- Be a washed product and free of dirt
- Be composed of graded aggregate between 50 mm and 150 mm in size
- Consist of sound, natural, washed river run stone with a uniform gradation with minimum 50% by volume 150 mm in diameter
- Not be used on slope greater than 2:1

The Contractor shall advise the Owner of the stone source location. The Owner shall inspect and approve the source materials prior to delivery to the Site.

**511.07.02.03 Rock Protection** is amended by the addition of the following:

A low flow channel shall be shaped and created within the river run stone. Stones shall be placed to the neat lines shown on the Drawings.

The Contractor shall coordinate with the Owner and representatives of the [relevant conservation authority (LSRCA, TRCA)] prior to placement of the stone. Stone placement shall be carried out in such a manner that the surface of the finished stone shall have a uniform planar appearance and be without segregation. The top surface of the layer shall be shaped to create a low flow profile as shown on the Drawings. The depth of stone shall be as shown on the Drawings.

**511.09.01.02 Rock Protection** is deleted in its entirety and replaced with the following:

**5.11.09.01.02 River Sun Stone**

Measurement of river run stone shall be by square metres (m<sup>2</sup>).

**511.10 BASIS OF PAYMENT** is deleted in its entirety and replaced with the following:

**511.10 BASIS OF PAYMENT**

**511.10.01 River Run Stone**

Payment shall be made at the unit price and shall be full compensation for all labour, equipment and materials necessary to complete the work as specified.

**Item R528 Removal of Concrete Barrier [Renewal]**

*This Specification shall be read in conjunction with OPSS.MUNI 510 (Nov 2018).*

The Contractor shall sawcut, completely remove and dispose of the existing concrete barrier in the location(s) shown on the Drawings and in accordance with OPSS.MUNI 510.

The Contractor shall remove the existing concrete barrier in a manner that does not damage the adjacent roadway pavement, sidewalk, bus pads or adjacent boulevards (asphalt, interlocking brick, and sod). Should any damage occur, the Contractor shall reinstate the roadway pavement, sidewalk, bus pads and boulevards to the satisfaction of the Owner at the Contractor's own expense.

This item shall also include regrading of the slope behind the concrete barrier after its removal, such that the regraded slope matches the grade of the existing slope and transitions to the existing sidewalk/boulevard elevations. All regraded and exposed slope areas shall be restored with topsoil and sod, as identified by the Owner. Payment for the topsoil and sod restoration will be made under **Item R801 – Restoration of Topsoil and Sod (Provisional)**.

All concrete removed and soil excavated from the regraded slope under this item shall be disposed of at an Owner-approved disposal site outside the limits of the Contract at no additional cost to the Owner.

**Item R530 Cold Wet Mill and Disposal of Asphalt Pavement Containing Asbestos – Partial/Full Depth [Renewal]**

**Item R531 Cold Wet Mill and Disposal of Asphalt Pavement Containing Asbestos – Partial/Full Depth [Renewal]**

The Contractor is advised that asphalt pavement containing asbestos has been identified within the Contract limits. The geotechnical report that has been provided as a reference document shows the exact locations where 0.5 percent or more contents of asbestos was detected. The Contractor shall refer to the geotechnical report for additional information.

The Contractor shall be responsible for determining the actual limits of asbestos-containing asphalt pavement based on the information contained in the geotechnical report. The Drawings identify streets containing asbestos; however, the Contractor shall not rely on the demarcations

shown on the Drawings to determine the limits of asbestos-containing asphalt pavement. Should there be a discrepancy between the Drawings and the geotechnical report, the geotechnical report shall govern. No additional payment will be made in relation to errors caused by the Contractor's sole reliance on the information shown on the Drawings.

Within five (5) Working Days following the date of Contract award notification, the Contractor shall prepare and submit a detailed asbestos-containing asphalt pavement removal and disposal plan to the Owner for review and approval. The plan shall show the detailed procedure, sequence, protection of Site personnel and timing of the removal and disposal work. The Contractor shall not commence any work under this item(s) until the Owner has approved the plan.

The Contractor shall remove the asbestos-containing asphalt pavement to the depth specified in the Bid Form and dispose of it in accordance with the requirements of this Specification.

This Specification also applies to:

- pavement adjacent to the curb and gutter and roadway structures (i.e. entrances, driveways, boulevards, sidewalks and paved medians, etc.) containing asbestos; and
- asbestos removal in the pavement structure within the trench limits.

This Specification does not apply to the non-asbestos-containing streets within the Contract limits.

The standard asphalt pavement removal and the asbestos-containing asphalt pavement removal shall be completed in separate and distinct operations to ensure proper disposal of the waste material. A typical scenario would be to remove all standard surface asphalt first, then remove the surface and base containing asbestos, followed by removal of the standard base asphalt.

The Contractor is advised that following the asphalt removal under **Item R530 – Cold Wet Mill and Disposal of Asphalt Pavement Containing Asbestos – Partial/Full Depth**, only a thin asphalt/granular surface will remain and traffic shall not be permitted on this surface. The Contractor shall only remove asphalt in those areas that can be fine graded and restored with a new WMA driving surface under **Item R301 – Superpave, Binder Course, Warm Mix Asphalt**, by the end of the work shift.

### **The Ministry of Labour Operational Approach**

The Contractor shall comply with O. Reg. 278/05 (Designated Substance – Asbestos on Construction Projects and in Buildings and Repair Operations) under the Ontario *Occupational Health and Safety Act* ("**O. Reg. 278/05**") during the performance of the Work. The Contractor shall further comply with the latest Ministry of Labour operational approach, measures and procedures, as outlined in O. Reg. 278/05, as follows:

- Measures and procedures for Type 2 operations may be applied for operations carried out with power tools if the power tools are attached to dust-collecting devices equipped with HEPA filters or if the asbestos-containing asphalt is wetted to control the spread of dust or fibres.



- For non-classified operations such as scarifying or milling, measures and procedures for Type 2 operations may be applied if the equipment is attached to dust-collecting devices equipped with HEPA filters or if the asbestos-containing asphalt is wetted to control the spread of dust or fibres.
- Measures and procedures for Type 3 operations may be applied for operations carried out with power tools not attached to dust-collecting devices equipped with HEPA filters and where the asbestos-containing asphalt is not wetted to control the spread of dust or fibres.
- For non-classified operations whereby the asbestos-containing material is not wetted to control the spread of dust or fibres and the equipment is not attached to dust-collecting devices equipped with HEPA filters, measures and procedures for Type 3 operations shall continue to apply.

### **Measures and Procedures for Type 2 Operations**

The Contractor shall perform the asbestos-containing pavement removal/milling operations in such a way that the measures and procedures for Type 2 operations can be applied.

In the event a circumstance arises in which the Contractor cannot control dust (through either the attachment of HEPA-filtered dust collecting devices to the equipment or wetting), the Owner shall be notified and Type 3 measures and procedures shall be followed during the performance of the Work.

The Contractor must provide written notice of measures or procedures to be followed when performing the Work to the Contractor's joint health and safety committee/health and safety representative.

The Contractor shall comply with the following requirements:

#### **1. Health and Safety Training**

The Contractor shall ensure that all workers performing work under the Contract are trained in following:

- the hazards of asbestos exposure;
- the use, care and disposal of protective equipment and clothing to be used and worn when performing the Work;
- personal hygiene to be observed when performing the Work; and
- the measures and procedures prescribed by O. Reg. 278/05.

At least seven (7) Days prior to commencing any asbestos-containing asphalt pavement removal work, the Contractor shall provide written confirmation to the Owner of its compliance with the health and safety training requirements above.

#### **2. Respirators**

If a worker requests a respirator, the Contractor shall provide the worker with a respirator in accordance with section 14, paragraph 12 of O. Reg. 278/05. The respirators shall be as described in section 13 and Table 2 of O. Reg. 278/05.

Workers who are using respirators shall follow the instructions described in section 13 of O. Reg. 278/05.

To address heat stress during hot weather, the Contractor shall develop a hot weather plan and ensure the plan is followed.

### 3. *Protective Clothing*

If a worker requests protective clothing, the Contractor shall provide the worker with protective clothing in accordance with section 14, paragraph 13 of O. Reg. 278/05. The protective clothing shall be as described in section 15, paragraph 12 of O. Reg. 278/05.

Workers who are using protective clothing shall follow the instructions provided in section 14, paragraph 14 of O. Reg. 278/05.

### 4. *Eating and Drinking Prohibition*

The Contractor shall advise workers of the prohibition against eating, drinking, chewing or smoking in the work area.

### 5. *Dust Control*

The Contractor shall prevent the spread of dust from the work area by using the following dust suppressant control measures:

- wet down the work area prior to commencing operations;
- continue wetting throughout the duration of the operation by means of the equipment's own wetting-down mechanism, in the case of the milling machine, and an available water truck; and
- frequently and at regular intervals during the performance of the Work and immediately upon completion of the Work, clean up dust and waste, remove it using wet sweeping and place it in a container for asbestos waste.

Under no circumstances shall compressed air be allowed for any dust cleanup.

The Contractor shall prevent slurry from entering the sewers by placing geotextile or similar filters into affected catch basins. Upon completion of the Work, the filters shall be removed from the catch basins and deposited in containers for asbestos waste.

The Contractor shall submit a plan for Site housekeeping to the Owner that ensures efficient removal of the dust from the Site and prevention of dust spreading into the environment.

### 6. *Facilities for Washing*

The Contractor shall have facilities on Site for washing of the hands and face. The Contractor shall advise all workers to use these facilities when leaving the work area.

### 7. *Containers for Dust and Waste*

Dust and waste shall be deposited immediately in a truck covered with a tarpaulin. The truck load shall be identified as asbestos waste, as required by Reg. 347 (General – Waste Management) under the Ontario Environmental Protection Act ("**Reg. 347**").

Transportation and disposal of asbestos waste off Site shall be completed in accordance with item 8 below (Transportation and Disposal of Asbestos Waste). All costs associated with disposal shall be included in the unit price for this item(s).

**8. *Transportation and Disposal of Asbestos Waste***

Blending of asbestos-containing and non-asbestos-containing asphalt waste in a single shipment for transportation and disposal is not permitted.

The transportation and disposal of asbestos waste under shall be managed in accordance with Reg. 347 and the federal Transportation of Dangerous Goods Act.

All asbestos waste shall be disposed of at a site licensed for the acceptance and disposal of asbestos waste. The Contractor shall provide the Owner with the name and address of the waste disposal site at the pre-construction meeting.

**Measurement for Payment**

Measurement for payment shall be per square metre (m<sup>2</sup>) of asbestos-containing asphalt pavement removed and disposed of.

**Basis of Payment**

Payment shall be made at the unit price and shall be full compensation for all labour, equipment and materials necessary to complete the work as specified.

**OPSS 700-SERIES**

**Item R701 Supply and Install Steel Beam Guide Rail [Renewal / New Construction]**

**Item R702 Steel Beam Guide Rail Structure Connections [Renewal / New Construction]**

**Item R703 Supply and Install Guide Rail End Treatment [Renewal / New Construction]**

*The following Standard Drawings are applicable to above item(s):*

**[Select the applicable drawings]**

- OPSD 912.186 (Nov 2016) – Guide Rail System, Steel Beam Type M20 – Adjacent to 2H:1V Slope Installation – Rail at Shoulder
- OPSD 912.188 (Nov 2019) – Guide Rail System, Steel Beam Type M30 – Adjacent to Concrete Curb Installation
- OPSD 912.255 (Nov 2018) – Guide Rail System, Steel Beam Type M20 and M30 Leaving End Treatment Installation
- OPSD 912.531 (Nov 2008) – Guide Rail System, Steel Beam Installation – Entrances and Intersection Roadways
- OPSD 922.165 (Nov 2022) – Energy Attenuator, End Treatment Steel Beam Energy Attenuating Terminal MASH Softstop Terminal System Installation

- **OPSD 922.186 (Nov 2018) – Energy Attenuator, End Treatment Steel Beam Energy Attenuating Terminal MASH Sequential Kinking Terminal System – Installation**

*This Specification shall be read in conjunction with OPSS.MUNI 721 (Apr 2024), OPSS.MUNI 732 (Nov 2019) and MTO Special Provision No. 799S05 (Sep 2023).*

**[Delete the paragraph below for new construction projects]**

**721.07.01 General** is amended by the addition of the following:

The Contractor shall pave all unpaved shoulders and roundings adjacent to new guide rail systems with asphalt under **[Select the applicable item]** Item R303 – Remove and Replace Miscellaneous Superpave Warm Mix Asphalt / Item R306 – Remove and Replace Miscellaneous Superpave Hot Mix Asphalt, unless indicated otherwise by the Owner.

Where underground utilities exist in direct conflict with the proposed guide rail system, the Contractor shall use a hydro-vac truck to facilitate the work.

**721.10 BASIS OF PAYMENT** is amended by the addition of the following to the list of items in 721.10.02:

**Supply and Install Steel Beam Guide Rail**  
**Supply and Install Steel Beam Guide Rail with Channel**  
**Supply and Install Steel Beam Guide Rail – Nu-Guard Assembly**  
**Supply and Install Steel Beam Guide Rail – M20**  
**Supply and Install Steel Beam Guide Rail – M30**  
**Supply and Install Guide Rail End Treatment – Entrances and Intersecting Roadways**  
**Supply and Install Guide Rail End Treatment – Leaving End Treatment**

**732.07.01 General** is amended by the addition of the following:

**[Delete the first paragraph for new construction projects]**

The Contractor shall pave all unpaved shoulders and roundings adjacent to new guide rail systems with asphalt under **[Select the applicable item]** Item R303 – Remove and Replace Miscellaneous Superpave Warm Mix Asphalt / Item R306 – Remove and Replace Miscellaneous Superpave Hot Mix Asphalt, unless indicated otherwise by the Owner.

SoftStop and Sequential Kinking end treatments shall be installed in accordance with OPSD 922.165 and OPSD 922.186 modified as follows:

Steel beam guide rail shall be installed 0.304 m from the shoulder rounding breakpoint.

SoftStop and Sequential Kinking terminals shall be installed on the shoulder rounding breakpoint.

#### **Certification of Safety Items**

Certification for SoftStop and Sequential Kinking end treatments shall be in accordance with MTO Special Provision No. 799S05.

**732.10 BASIS OF PAYMENT** is amended by the addition of the following to the list of items in 732.10.01:

**Supply and Install Guide Rail End Treatment – MASH SoftStop Terminal System****Supply and Install Guide Rail End Treatment – MASH Sequential Kinking Terminal System****Item R704    Bicycle Railing [New Construction]**

**[Designer to use Local Municipality Design Standard Drawings and Specification when applicable]**

*This Specification shall be read in conjunction with OPSS.MUNI 908 (Nov 2022).*

This item is for the supply and installation of bicycle railing in the location(s) shown on the Drawings.

**Materials**

Materials for the steel railing and railing base plate shall be as specified on the Drawings.

**Fabrication and Erection**

Components of the railing shall be joined by means of bolts, screws and welds as called for on the Drawings. Rails and posts shall be erected true to line and level as shown on the Drawings or as required by the Owner.

**Shop Drawings**

The Contractor shall submit Shop Drawings to the Owner for review a minimum of three (3) weeks prior to fabrication. The Contractor shall check the layout detailed on the Drawings and verify all dimensions before preparing the Shop Drawings. Any discrepancies shall be reported for clarification.

**Measurement for Payment**

Measurement for payment shall be in linear metres (m) along the centreline of the installed railing, as measured on Site.

**Basis of Payment**

Payment shall be made at the unit price and shall be full compensation for all labour, equipment and materials necessary to complete this work as specified.

**Item R705    Pedestrian Barricade [Renewal / New Construction]**

**[Designer to use Local Municipality Design Standard Drawings and Specification when applicable]**

*The following Standard Drawing is applicable to the above item: OPSD 980.101 (Nov 2017).*

The Contractor shall supply and install pedestrian barricade, including footings, in the location(s) shown on the Drawings and in accordance with OPSD 980.101.

**Shop Drawings**



The Contractor shall submit Shop Drawings to the Owner for review a minimum of three (3) weeks prior to fabrication. The Contractor shall check the layout detailed on the Drawings and verify all dimensions prior to preparing the Shop Drawings. Any discrepancies shall be reported to the Owner for clarification.

**Measurement for Payment**

Measurement for payment shall be in linear metres (m) along the centreline of the installed barricade, as measured on Site.

**Basis of Payment**

Payment shall be made at the unit price and shall be full compensation for all labour, equipment and materials necessary to complete this work as specified.

**Item R706 Temporary Concrete Barriers [New Construction]**

**Item R707 Temporary Concrete Barriers, Relocation [New Construction]**

*This Specification shall be read in conjunction with OPSS.MUNI 723 (Nov 2021) and OPSS.MUNI 741 (Nov 2021).*

Under this item, the Contractor shall supply, install and remove precast concrete barriers at the location(s) shown on the Construction Staging Plan and/or indicated by the Owner on Site. The Contractor shall relocate temporary concrete barriers as required to set up and to accommodate the change in traffic patterns from one construction phase to the next.

**741.07.01 Temporary Concrete Barrier** is amended by the addition of the following:

The Contractor shall place traffic markers and reflective devices on the temporary concrete barriers where indicated by the Owner. On completion of the Work, the Contractor shall remove all the barriers from the Site.

**741.09.01.01 Temporary Concrete Barrier** is amended by the addition of the following:

Payment shall be made at the unit price per linear metre (m) of barrier installed and removed, as follows:

- 75% of the unit price upon satisfactory installation of the barrier
- 25% of the unit price upon satisfactory removal of the barrier

**Item R708 Energy Attenuator – Temporary – Type [New Construction]**

**Item R709 Energy Attenuator – Relocation – Type [New Construction]**

*The above item(s) shall be completed in accordance with OPSS.MUNI 723 (Nov 2021).*

**Item R710 Construction Fence [New Construction]**

Snow fence shall be installed to delineate the work area from private property and/or to restrict entrance onto private property where indicated by the Owner. The fence shall be a minimum of 1.2 m high and installed with metal T-posts using metal ties to secure the fence to the T-posts.

The Contractor shall erect a construction fence along the property line, grading easement or grading limit at all locations where heavy duty silt fence or tree protection fence is not indicated on the Drawings.

### **Measurement for Payment**

Measurement for payment shall be per linear metre (m) of construction fence erected, maintained and removed.

### **Basis of Payment**

Payment shall be made at the unit price and shall be full compensation for all labour, equipment and materials necessary to complete this work as specified. Payment will be made as follows:

- 40% of the unit price upon satisfactory installation of the fence
- 50% of the unit price for maintaining the fence during construction; the actual amount to be decided by the Owner as described below
- 10% of the unit price upon satisfactory removal of the fence

The Contractor's maintenance activities will be documented to assess the value of payment each month. Failure to maintain the fence to the satisfaction of the Owner may result in less than 100% payment for this item in the event that the Owner deems that the Contractor did not perform adequate maintenance.

### **Item R711 Highway Fence [New Construction]**

*The following Standard Drawing is applicable to the above item: OPSD 971.101 (Apr 2022).*

*This Specification shall be read in conjunction with OPSS.MUNI 771 (Apr 2022).*

This item is for supply and installation of highway fence, complete with brace panels and gate(s), in the location(s) shown on the Drawings and in accordance with OPSD 971.101.

**771.09 MEASUREMENT FOR PAYMENT** is deleted in its entirety and replaced with the following:

#### **771.09 MEASUREMENT FOR PAYMENT**

Measurement of highway fence shall be by length in metres (m) along the contour of the ground for the actual length of highway fence installed and shall include gate openings and brace panels.

**771.10 BASIS OF PAYMENT** is deleted in its entirety and replaced with the following:

#### **771.10 BASIS OF PAYMENT**

Payment shall be made at the unit price and shall be full compensation for all labour, equipment and materials necessary to complete this work as specified.

### **Item R712 Chain Link Fence [New Construction]**

### **Item R713 Chain Link Gate [New Construction]**

*The following Standard Drawings are applicable to the above item(s): OPSD 972.102 (Nov 2012) and OPSD 972.130 (Nov 2012).*

*This Specification shall be read in conjunction with OPSS.MUNI 772 (Apr 2019).*

Chain link fence shall be in accordance with OPSD 972.130 and installed as shown on the Drawings.

Chain link gates shall be 6 m double swing in accordance with OPSD 972.102 and installed as shown on the Drawings.

The Contractor shall coordinate the exact limits of the fence installation with the Owner.

#### **Item R714 Wildlife Fence – Large Animals [New Construction]**

*The following Standard Drawings are applicable to the above item:*

##### **[Select the applicable drawings]**

- OPSD 972.101 (Nov 2012) – Fence, Chain-Link Component – Barbed Wire
- OPSD 972.130 (Nov 2012) – Fence, Chain-Link, Installation, Roadway
- OPSD 972.132 (Nov 2012) – Fence, Chain-Link, Details and Table
- OPSD 973.131 (Nov 2022) – Wildlife Fence, Type A, With Apron of Type B Fence Fabric,
- OPSD 973.140 (Nov 2022) – Wildlife Fence, Steel Post Footing Details
- OPSD 973.142 (Nov 2022) – Wildlife Fence, Miscellaneous Details
- OPSD 973.143 (Nov 2022) – Wildlife Fence, Tie-in at Culverts or Wildlife Crossing Structures

*This Specification shall be read in conjunction with OPSS.MUNI 773 (Nov 2022) and OPSS.MUNI 1540 (Apr 2022).*

This item is for the supply, installation and maintenance of wildlife fences and ungulate gates. The Contractor shall provide the Owner with sample drawings and a sample product list with full details for the Owner's review and approval prior to the Contractor ordering the wild life fence. The Contractor shall obtain written approval from the Owner prior to commencing any work related to this item.

#### **MATERIALS**

Wire fence – 2.4 m knotted joint woven wire fence specifications:

- All wires shall be single strand, galvanized steel wire conforming to CAN/CGSB-138.2-2019.
- Minimum 12 ½ gauge high tensile strength wire.
- Minimum spacing between vertical wires shall be 420 mm.
- Minimum spacing between horizontal wires shall be 230 mm.
- Class 3 galvanization.
- Wire arm shall be in accordance with OPSD 972.101.
- 0.75 m wire mesh made up of galvanized steel in the bottom connected to steel posts.

Steel posts specifications:

- All posts shall be galvanized steel pipe and shall conform to CAN/CGSB-138.2-2019; hot dipped galvanized conforming to the requirements of CAN/CSA-G164-M92(R2003).

- Holes to tie through as required.
- The steel pipe shall not have an outside diameter less than 73 mm. The length of steel pipe may vary between 3,560 mm and 4,500 mm according to installation conditions.
- Any damage to galvanized coatings must be repaired by the Contractor at no additional cost to the Owner. For damaged or cut galvanized steel posts and braces, two (2) coats of an organic, zinc rich paint shall be applied on a thoroughly cleaned surface.
- Steel post footings shall be installed in accordance with OPSD 973.140.
- Steel posts shall be installed with galvanized steel post caps.

Bracing wire must be galvanized and a minimum of 9 gauge.

## CONSTRUCTION

### 2.4 m High Fence Installation

- Fence shall be installed by a contractor experienced in installing high tensile strength wire fences and that is acceptable to the Owner.
- Only steel posts shall be used.
- Fencing shall not cross sensitive watercourses. The following watercourses within the fencing limits contain, or are suspected to contain, fish habitat:
  - <provide name of creek / waterway>
- There shall be no gaps greater than 100 mm between the fence posts and the structures/culverts.
- At the discretion of the Owner, the fence may be discontinued at large rock outcrops, unstable terrain or other barriers that will prevent wildlife from traveling around the fence and into the right-of-way (ROW). In such case, the fence shall be tied into the barrier or angle away from ROW to prevent passage.
- Steel posts shall be spaced 5 m apart, measured horizontally, unless indicated otherwise in the Contract Documents.
- Posts shall be installed plumb, going across slopes, and shall be installed 3 degrees off vertical angle away from the highway.
- Brace posts shall be installed at fence ends and at other stress points where required. The spacing between adjacent, intermediate brace panels and between intermediate brace panels and end post panels shall not be more than 54 m.
- The Contractor shall provide Shop Drawings to the Owner for review and approval. The Contractor shall allow 10 Working Days for the Owner's review process. Approval of the Owner is required prior to the Contractor ordering the wildlife fence.

## MAINTENANCE

The fence shall be maintained in an effective, functioning, stable condition, without holes, tears, and punctures or sagging for a minimum of two (2) years after initial installation, or until the end of the Contract warranty period, whichever is longer. The Contractor shall inspect and repair all fences between April 1 and June 30 of each year following construction. Any major concerns with the integrity of the fence should be communicated to the Owner immediately.

## Measurement for Payment

Measurement for payment will be by Plan Quantity Payment, in metres (m) of fence supplied, installed and maintained.

**Basis of Payment**

Payment shall be made at the unit price and shall be full compensation for all labour, equipment and materials necessary to complete this work as specified, including but not limited to the supply and installation of brace panels. Payment will be made as follows:

- 50% of the unit price upon satisfactory installation of the fence
- 50% of the unit price for maintaining the fence during construction, which will be paid upon completion of the Work

**Item R715 Wildlife Fence – Small Animals [New Construction]**

*This Specification shall be read in conjunction with OPSS.MUNI 501 (Nov 2017) and OPSS.MUNI 1540 (Apr 2022).*

The Contractor shall install wildlife fence for small animals to the limits detailed on the Drawings. The wildlife fence shall be AMX 48 Wildlife Fencing, Semi-Permanent Applications (AMX-SP) as manufactured by Animex International, or Equivalent, and shall be installed in accordance with the manufacturer's instructions.

The Contractor shall design the wildlife fence installation plan and submit it to the Owner for approval prior to installation. The Contractor shall notify the Owner 24 hours prior to installing the wildlife fence.

**Measurement for Payment**

Measurement for payment shall be by length in metres (m) along the actual fence installed.

**Basis of Payment**

Payment shall be made at the unit price and shall be full compensation for all labour, equipment and materials necessary to complete this work as specified. Payment shall be made upon installation of the wildlife fence to the satisfaction of the Owner.

**Item R716 Cast in Place Concrete Barrier [Renewal]**

*The following Standard Drawing is applicable to above item:*

- **OPSD 911.130 (Apr 2021) – Guide Rail System, Concrete Barrier Cast-in-Place, Type A Installation**

*This Specification shall be read in conjunction with OPSS.MUNI 740 (Nov 2021).*

Cast in place concrete barrier shall be installed in the location(s) shown on the Drawings and in accordance with OPSS.MUNI 740.

**Measurement for Payment**



Measurement for payment shall be in linear metres (m) along the centreline of the installed cast in place concrete barrier, as measured on Site.

**Basis of Payment**

Payment shall be made at the unit price and shall be full compensation for all labour, equipment and materials necessary to complete this work as specified.

**OPSS 800-SERIES****Item R801 Restoration of Topsoil and Sod (Provisional) [Renewal]**

*This Specification shall be read in conjunction with OPSS.MUNI 510 (Nov 2018), OPSS.MUNI 802 (Nov 2019) and OPSS.MUNI 803 (Apr 2018).*

This item is for the restoration of topsoil and sod if requested by the Owner. The restoration limits will be determined by the Owner.

**803.09.01.01 Sod** is amended by the addition of the following:

This measurement shall include the supply of topsoil or the disposal of excess topsoil and/or sod necessary to complete the restoration work.

**803.10 BASIS OF PAYMENT** is amended by the addition of the following to the list of items in **803.10.01:**

**Restoration of Topsoil and Sod – Item**

**Measurement for Payment**

Measurement for payment shall be of the area in square metres (m<sup>2</sup>) in which topsoil and sod is restored.

**Basis of Payment**

Payment shall be made at the unit price and shall be full compensation for all labour, equipment and materials necessary to complete this work as specified.

**Item R802 Topsoil [New Construction]**

*This Specification shall be read in conjunction with OPSS.MUNI 802 (Nov 2019).*

**802.05.01 Topsoil** is amended by the addition of the following:

Soil quality must meet the applicable generic full depth site condition standards of O. Reg. 153/04 (Records of Site Condition) under the Ontario *Environmental Protection Act*.

**802.07.03 Placement of Topsoil** is amended by deleting the first paragraph and replacing it with the following:

Only screened topsoil is permitted unless indicated otherwise in the Contract Documents. Topsoil thickness shall be as specified on the Drawings and shall be placed to the mid-point of the shoulder rounding on rural cross-sections.

**802.09.01 Actual Measurement** is deleted and the replaced with the following:

Measurement for payment shall be by volume in cubic metres (m<sup>3</sup>). This volume shall be calculated by multiplying the area measured for payment for seeding and/or sodding and/or erosion control blanket by the depth of topsoil specified in the Contract Documents.

Areas that have been damaged by the Contractor beyond the slope limits shall be restored with topsoil where necessary prior to carrying out sod or seed repairs. No measurement or payment will be made for this repair work. Topsoil will be free of foreign debris and waste of any nature.

#### **Item R803 Sodding [New Construction]**

*This Specification shall be read in conjunction with OPSS.MUNI 803 (Apr 2018).*

**803.07.01 Operational Constraints** is amended by the addition of the following:

Areas where the ground cover has been damaged by the Contractor beyond the slope limits shall be restored at the Contractor's own expense and shall not be included in the area measured for payment.

**803.07.04 Placement of Sod** is amended by the addition of the following:

The Contractor shall roll the sod in front of residential areas and other areas where the grass is cut.

Sod shall be placed to the mid-point of the shoulder rounding on rural cross-sections.

**803.07.05 Maintenance of Completed Sodding** is amended by the addition of the following:

The Contractor shall water the sod as required in order to obtain growth acceptable to the Owner.

If sodding has not been completed by October 1<sup>st</sup> of any year, such areas will not be accepted until the following year when it can be determined that acceptable growth has taken place, unless it is obvious to the Owner that acceptable growth has taken place.

The Contractor shall be responsible for the mowing and protection of all sodded areas. This protection shall include the repair of sodded areas with additional sod, including the restoration of the slope itself and the supply of additional topsoil, until the Total Performance of the Contract.

**803.08 Quality Assurance** is deleted.

**803.09 Measurement for Payment** is amended by the addition of the following:

If the Contractor requests a re-measurement of the sodded area and the re-measured area differs from the area measured for proposed payment, the re-measured area shall be used for payment.

#### **Item R804 Seeding and Erosion Control Blanket [New Construction]**

*This Specification shall be read in conjunction with OPSS.MUNI 804 (Nov 2014).*

**804.05.01 Seed** is amended by the addition of the following:

Seed for all applications under the Contract shall consist of seeded compost material applied to a minimum depth of 5 cm using a pneumatic blower.

[Seed mix and seeding rate to be determined by the York Region Environmental Specialist]

**804.05.04.05 Erosion Control Blanket (ECB)** is amended by the addition of the following:

Erosion control blanket shall contain a fibre density of at least 350 g/m<sup>2</sup> and consist of wood or coconut based fibres/materials. Erosion control blanket shall be free of any synthetic, jute, or straw based fibres or materials. Erosion control blankets shall not be installed over gullies, rills, stones, tree roots or any other foreign objects which protrude from the ground surface.

**804.07 Construction** is amended by the addition of the following:

Topsoil, seed, fertilizer and mulch or erosion control blanket shall be placed to the mid-point of the shoulder rounding on rural cross-sections.

**804.07.05 Cover Applications** is amended by the addition of the following:

Temporary ground cover applied to all areas that may be left without vegetative cover/erosion control blanket for more than 30 Days shall be included under **Item R204 – Earth Excavation, Grading**.

**804.07.05.04 Erosion Control Blanket (ECB) Application** is amended by the addition of the following:

Erosion control blanket shall be provided on all slopes steeper than 2:1 (H:V) and higher than 1.0 m, in accordance with OPSS.MUNI 804 and the Drawings.

Blankets shall be rolled out flat, even and smooth without stretching and be properly anchored to the sub grade. Installation of erosion control blankets shall not take place over snow covered, frozen or saturated soils.

**804.08 Quality Assurance** is deleted in its entirety and replaced with the following:

#### **804.08 Quality Assurance**

Total Performance of the Contract shall not be issued until seeded areas have established growth in accordance with the performance measures and acceptable to the Owner.

Performance Measures at Total Performance of the Contract:

- The specified permanent seed species shall be at an average height of 50 mm in an evenly dispersed, uniform cover.
- There shall not be any significant bare areas, both in terms of quantity and size.
- Non-seeded, non-specified vegetation shall not exceed 20% of the seeded earth area.

The Contractor shall be responsible for the maintenance of seeded areas which shall include the repair of any seeded area with additional seeding, including the repair of the slope itself and the supply of additional topsoil, until Total Performance of the Contract.

For areas that need to be repaired, the following requirement shall be met:

- All slippages and wash-outs must be repaired with acceptable topsoil.
- Surface preparation as specified in subsection 804.07.02 shall be carried out.
- Reseeding must be carried out as indicated in subsections 804.07.04 and 804.07.05.

**804.09.01 Actual Measurement** is deleted in its entirety and replaced with the following:

**804.09.01 Actual Measurement**

Measurement for payment shall be by area in square metres (m<sup>2</sup>). Areas where the original ground cover is damaged by the Contractor beyond the slope limits shall be restored at the Contractor's own expense and shall not be included in the area measured for payment. Areas of overlap shall not be measured for payment.

If the Contractor requests a re-measurement of the seeded area and the re-measured area differs from the area measured for proposed payment, the re-measured area shall be used for payment.

**Item R805 Supply and Install Engineered Growing Media for Planting [New Construction]**

*The following Standard Drawings are applicable to the above item: NHF-200, NHF-201, NHF-202 and NHF-204.*

*This Specification shall be read in conjunction with OPSS.MUNI 180 (Nov 2021).*

The work under this item shall include the supply and installation of engineered growing media for planting in boulevard soil trenches and center medians, boulevard planters, tree grate planters and other planting beds in accordance with the Drawings.

Supply and installation of engineered growing media shall include, but is not limited to, the following:

1. Submitting samples and test results of the engineered growing media mix and its components to the Owner in accordance with the 'Submission of Product and Component Samples and Testing Requirements' section of this Specification.
2. Owner approval of the submitted mix and its components prior to supply and installation on Site.
3. Blending of topsoil, sand and various types of organic matter to create the engineered growing media mix that meets the specifications detailed in the 'Engineered Growing Media Components' section of this Specification and has been manufactured in accordance with the 'Engineered Growing Media Mix Preparation and Manufacture' section of this Specification.
4. Installation of engineered growing media.
5. Compaction and grading of engineered growing media in place.

**Coordination of Related Works**



During the construction of all areas to be supplied and installed with engineered growing media, surrounding surfaces shall be kept in a generally clean condition. The Site shall be kept free of litter and refuse to prevent the introduction of contaminants into the engineered growing media areas for planting. Litter shall not be buried on Site. All excess engineered growing media shall be disposed of off Site.

If significant time delays are expected between the supply and install of engineered growing media for planting and the appropriate material to cover the area (i.e. sodding, plant material and/or mulch products, etc.), during spring, summer and fall months, a suitable temporary method to prevent contamination of the planting areas shall be arranged with the Owner. Payment for placement of topsoil will be made under **Item R802 – Topsoil**. Payment for installation of sodding for applicable trenches will be made under **Item R803 – Sodding**.

### **Engineered Growing Media Components**

The Contractor shall prepare engineered growing media utilizing components in accordance with the following requirements:

#### Topsoil (Imported) Component

Topsoil used to manufacture the engineered growing media shall meet the following requirements:

- Topsoil used in the engineered growing media shall be silt loam, sandy loam or loam, as described in The Canadian System of Soil Classification. Topsoil shall consist of greater than 5% clay but no greater than 20%, 3% to 7% organic matter (by weight) and less than 8% combined gravel content.
- Topsoil pH shall range between 6.0 and 7.8.
- Topsoil cation exchange capacity shall be greater than 5 meq/100g
- Topsoil salinity shall not exceed 2.0 mmhos/cm at 25°C.
- Topsoil shall be free of contaminants and deleterious materials such as litter, construction materials, stones greater than 2.5 mm in diameter, or any other contaminants that may damage or otherwise impair plants or plant growth.
- Plant material including noxious weeds and/or their seeds, tubers, rhizomes, sod, crabgrass, couchgrass, or roots shall not be acceptable in the topsoil.
- A mix of sand, fertilizers, organic matter and/or other component parts assembled to meet the structural, chemical and other requirements of topsoil shall not be substituted for the imported topsoil
- The topsoil source location shall be submitted for approval.

#### Coarse Sand Component

Coarse sand used to manufacture the engineered growing media shall meet the following requirements:

- Sand used in the engineered growing media shall be clean, sharp, coarse grade silica sand with a Fineness Modulus Index (FM) of 2.8 to 3.2, and/or a D90/D10 gradation index of less than 8.
- The presence of limestone, shale and/or slate particles in the sand mixture will result in the rejection of the sand.
- Sand shall consist of less than 0.75% organic matter (by dry weight).
- pH of sand shall be less than or equal to 7.5.
- Calcium carbonate shall range between 0% to 5%.

#### High Lignin Organic Matter Component

High lignin organic matter used to manufacture the engineered growing media shall meet the following requirements:

- High-lignin organic matter shall consist of composted pine, spruce, fir or other conifer bark with a dark brown colour.
- 95% of the total weight of the high lignin organic matter shall be less than 15 mm in particle size.
- pH shall not exceed 6.5.
- Electrical conductivity shall not exceed 2.5 mmhos/cm at 25°C.
- Organic matter content shall be greater than 80% (by dry weight).

#### Compost Component

Compost used as a surface amendment for engineered growing media, or to manufacture organic matter amendment materials, shall meet the following requirements:

- Compost shall conform to standards of Category 'AA' or 'A' compost as outlined in the Ontario Compost Quality Standard, which can be found at the following link:  
<https://www.ontario.ca/page/ontario-compost-quality-standards>.
- Compost shall have a Solvita® Compost Maturity Index of 7 or 8.
- Compost pH shall be less than 8.5.
- Carbon to nitrogen (C:N) ratio shall range between 10:1 and 20:1.
- Compost salinity (electrical conductivity) shall not exceed 4.0 mmhos/cm at 25°C.

#### **Engineered Growing Media Mix Preparation and Manufacture**

The Contractor shall prepare engineered growing media in accordance with the following requirements:

##### Preparation

The engineered growing media mix shall be prepared using the following proportions of the engineered growing media components by volume:

- High-lignin organic matter – 10% +/-2%
- Coarse sand – 50% +/-10%
- Topsoil (imported) 40% +/- 10%

The engineered growing media mix shall meet the following requirements:

- 60 to 80% sand content
- 2 to 11% clay content
- Greater than 3% organic matter content
- 6.0 to 7.8 pH
- Less than or equal to 2.0 mmhos/cm at 25°C for electrical conductivity

#### Manufacture and Storage

The engineered growing media shall be manufactured and stored in accordance with the following requirements:

- Engineered growing media components shall not be blended until all individual components are approved by the Owner.
- Engineered growing media shall be mixed with a front-end loader bucket. Soil blending machines shall not be used and assembled planting soil shall not be screened.
- Sand and required high-lignin organic matter materials shall be mixed prior to the addition of topsoil. Once the sand and high-lignin organic matter is mixed, the topsoil can be mixed in. Care shall be taken to avoid over-mixing and disturbing soil peds and homogenizing soil structure.

#### Chemical Additives

The engineered growing media mix shall be prepared, manufactured and stored in consideration of the following requirements:

- Chemical additives to modify soil fertility shall not be used in the preparation of the engineered growing media.
- Hydrated lime shall not be used to stabilize engineered growing media or promote soil aggregation.
- Due to the difficulty of permanently altering soil pH levels, chemical additives to alter pH shall only be used if approved, in advance, by the Owner.

#### **Submission of Product and Component Samples**

The Contractor shall complete product and mix testing and submit product samples and testing results in accordance with the following requirements:

1. Submit samples and testing results of all engineered growing media components, final engineered growing media mix and organic matter amendment components to the Owner for approval a minimum of 15 Working Days prior to the planned commencement of engineered growing media or organic matter amendment installation.
2. Samples of each component and final engineered growing media mix with accompanying test results shall be submitted to the Owner, including two (2) duplicate samples of each of the following items:

- Topsoil (Imported)
  - Coarse sand
  - High-lignin organic matter
  - Compost
  - Engineered growing media mix
3. Samples shall be comprised of random samples from each component or mix source.
  4. Samples shall be clearly labelled with relevant identifying characteristics including, but not limited to, the type of material, source and stockpile location, and manufacturer contact information. The Contractor is solely responsible for ensuring that the materials comply with all other specifications and requirements.
  5. The engineered growing media mix sample shall be labelled with the percentage of each component material.
  6. Manufacturer product data and literature describing all engineered growing media and organic matter amendment components, and certificates indicating that the materials meet the specification requirements, shall accompany all sample submissions.
  7. All samples of the engineered growing media and organic matter amendment components shall be submitted for review and acceptance at the same time.
  8. The Owner may reject any or all engineered growing media or organic matter amendment components or engineered growing media mix at its sole discretion. No rejected materials shall be installed or used in the manufacture of the engineered growing media or organic matter amendment. Delivered materials shall match the samples provided to, and approved by, the Owner.
  9. All components and the engineered growing media shall be submitted for testing to a testing laboratory accredited by the Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA).
  10. All testing shall be at the expense of the Contractor.
  11. All test reports shall have been completed in the last four (4) months.

### **Testing Requirements for Engineered Growing Media Components and Final Mix**

The Contractor shall complete product and mix testing and submit product samples and testing results in accordance with the following requirements:

#### **Topsoil (Imported) Report**

The topsoil test analysis report shall include the following information, at a minimum:

- pH (1:2 – soil: water ratio)
- Organic matter percentage (Walkley-Black or Loss on Ignition)
- Particle size analysis by ASTM D422 (hydrometer test) or ASTM F1632 (pipette test)
- Electrical conductivity (soluble salt; 1:2 – soil: water ratio). If method deviates from this, the ratio mix between soil and water must be indicated.
- Cation Exchange Capacity (CEC)

### Coarse Sand Report

The coarse sand test analysis report shall include the following information, at a minimum:

- pH (1:2 – soil: water ratio)
- Organic matter percentage (Walkley-Black or Loss on Ignition)
- Particle size analysis by ASTM D422 (hydrometer test) or ASTM F1632 (pipette test)
- Fineness Modulus Index (FM) and/or D90/D10 Gradation Index
- Calcium carbonate test

### High Lignin Organic Matter Report

The high lignin organic matter test analysis report shall include the following information, at a minimum:

- pH (1:2 – soil: water ratio)
- Organic matter percentage (Walkley-Black or Loss on Ignition)
- Particle size analysis by ASTM D422 (hydrometer test) or ASTM F1632 (pipette test)
- Electrical conductivity (soluble salt; 1:2 – soil: water ratio). If method deviates from this, the ratio mix between soil and water must be indicated.

### Compost Report

The compost test analysis report shall include the following information, at a minimum:

- pH (1:2 – soil: water ratio)
- Electrical conductivity (soluble salt; 1:2 – soil: water ratio). If method deviates from this, the ratio mix between soil and water must be indicated.
- C:N ratio
- Solvita® Compost Maturity Index

### Engineered Growing Media Mix Report

The engineered growing media mix test analysis report shall include the following information, at a minimum:

- pH (1:2 – soil: water ratio)
- Organic matter percentage (Walkley-Black or Loss on Ignition)
- Electrical conductivity (soluble salt; 1:2 – soil: water ratio). If method deviates from this, the ratio mix between soil and water must be indicated.
- Particle size analysis by ASTM D422 (hydrometer test) or ASTM F1632 (pipette test)
- Cation Exchange Capacity (CEC)

The Owner may require additional testing of the engineered growing media components or engineered growing media at any time that such samples are deemed necessary to verify conformance to specification requirements.

### **Rejection of Materials**



If the supplied engineered growing media does not meet the required specifications, and if, in the Owner's sole estimation, the supplied engineered growing media differs substantially enough from the required specifications to create a reasonable likelihood that the installed engineered growing media trenches will not function as intended, the supplied materials will be rejected.

Rejected materials shall be removed and replaced with an engineered growing media that meets the required specifications at no addition cost to the Owner.

### **Installation of Engineered Growing Media Mix for Planting**

The Contractor shall install engineered growing media in accordance with the following requirements:

#### **Site Preparation and Grading**

Excavation and preparation of the boulevard soil trenches shall be completed under **Item R210 – Earth Excavation and Preparation for Boulevard Soil Trench**.

For boulevard soil trenches directly adjacent to the roadway, pipe subdrains shall be installed and connected to storm infrastructure and shall be constructed prior to the installation of engineered growing media and constructed under **Item R401 – Pipe Subdrains** in accordance with NHF-200.

***[Include the below sentence for projects with proposed planting in landscaped center median planters, boulevard planters, tree grate planters, or other enhanced planting beds outside of a boulevard soil trench for tree planting]***

**For center medians, boulevard planters, tree grate planters and other planting beds, the Contractor shall be responsible for ensuring that these areas are prepared and constructed in accordance with the Drawing and are approved by the Owner prior to the installation of engineered growing media. If any deficiencies are present, the deficiencies shall be rectified as required prior to installation of the engineered growing media.**

#### **Placement of Engineered Growing Media**

Engineered growing media shall only be installed during periods when mix and subgrade soils are friable. Engineered growing media shall not be installed when saturated, frozen or excessively dry. Engineered growing media shall be installed as soon as the subgrade preparation is completed.

For boulevard soil trench areas, tracked or large-tired equipment shall be used to install the engineered growing media, and repeated passes over areas of soil installation shall be avoided to the greatest extent possible.

For all areas to be installed with engineered growing media, cranes or conveyors shall be used to deliver engineered growing media from stockpiles to the installation area, where possible. Slinger trucks may be used to install engineered growing media. Soil blowers and soil pumps shall not be used to install the engineered growing media.

Engineered growing media shall be installed in lifts as specified below:

- Finished subgrade soil shall be scarified using a toothbar attachment on an excavator or other Owner-approved equivalent equipment to a depth of 100 mm or greater prior to installation of the first lift of the engineered growing media. Scarification will improve the transition between soil types, facilitate movement of water and nutrients, and improve root penetration into lower soil profiles.
- The first lift of the engineered growing media shall be placed to a depth of 25 mm to 50 mm. The first lift shall be tilled into subgrade soil using a toothbar attachment on an excavator or other Owner-approved equivalent equipment in order to provide a gradual transition between the engineered growing media and subgrade soil.
- Remaining engineered growing media shall be installed in multiple lifts of 150 mm to 300 mm. A minimum of two (2) lifts is required.
- Lifts and compaction shall be repeated until the soil depth, including any organic material which has been added, meets the requirements of the final grading.
- The engineered growing media shall be compacted to between 75% and 80% of maximum dry density (Proctor).
- Installation of the engineered growing media shall be suspended if the engineered growing media becomes overly saturated, overly dry or frozen. The engineered growing media shall not be placed on wet or frozen subgrade soil.

#### Addition of Compost into Installed Engineered Growing Media Mix

The Contractor shall till an additional 40 mm of organic matter (compost) into the top layer of the installed engineered growing media to a depth of 60 mm to 90 mm.

As an alternative to tilling, the Contractor may also directly apply a mixture of compost and engineered growing media for the top 60 to 90 mm layer of the trench being installed provided the following requirements are met:

- The quantity of compost utilized is not altered, and is equal to the quantity that would be required for a 40 mm top dressing of compost applied to the entire trench area.
- The finished surface of a boulevard soil trench shall be smooth, uniform and firm, and be 50 to 75 mm higher than the surrounding boulevard to allow for settlement in the first year.
- **[Include this bullet for projects with proposed planting in landscaped center median planters, boulevard planters, tree grate planters, or other enhanced planting beds outside of a boulevard soil trench for tree planting]** The finished surface of the installed engineered growing media for other planting areas shall be 50 to 75 mm higher than the intended finished grade to allow for settlement.

#### Fine Grading and Boulevard Restoration

The engineered growing media shall be fine graded to eliminate rough spots or low areas and to ensure positive drainage and all areas shall be prepared by means of cultivation and subsequent raking.

Finished surfaces shall be 50 mm to 75 mm higher than the final grades to allow for settlement in the first year. All finished grades shall be smooth, uniform and firm against deep foot printing.

Once the installation is complete, the Contractor shall be responsible for the restoration of the area surrounding boulevard soil trenches, with the placement of topsoil and sod in accordance with the Contract.

#### Warranty Period

During the warranty period, or at such other time(s) as the Owner may deem appropriate, the Owner may inspect the engineered growing media sites and identify those areas in which grades have settled below the expected grade. Following the inspection, the Owner will supply the Contractor with a written list of areas which require additional engineered growing media. The Contractor shall remove and dispose of any existing sod or other materials, add soil and restore the area in accordance with the Specifications.

#### **Measurement for Payment**

Measurement for payment shall be in cubic metres (m<sup>3</sup>) of engineered growing media supplied and installed.

#### **Basis of Payment**

Payment shall be made at the unit price and shall be full compensation for all labour, equipment and materials necessary to complete this work as specified.

#### **Item R806    Barrier for Tree Protection [New Construction]**

*The following Standard Drawings are applicable to the above item: NHF-400, NHF-401, NHF-402, NHF-404 and NHF-405.*

*This Specification shall be read in conjunction with OPSS.MUNI 801 (Apr 2018).*

The Contractor shall supply and install a barrier for tree protection, including required signage as shown on Drawings. The minimum height of fence shall be 1.2 m in accordance with NHF-400.

The Contractor shall arrange a Site walk with the Owner and a representative from the Owner's Natural Heritage and Forestry division prior to installing the barrier for tree protection. A minimum of 48 hours' notice is required to arrange the Site walk.

The Contractor shall inspect, repair and maintain tree protection measures on a weekly basis to the satisfaction of the Owner.

**801.10.01 Barrier for Tree Protection – Item** is deleted in its entirety and replaced with the following:

##### **801.10.01    Barrier for Tree Protection – Item**

Payment shall be made at the unit price and shall be full compensation for all labour, equipment and materials necessary to complete the work as specified. Payment will be made as follows:

- 20% of the unit price upon satisfactory construction of the barrier
- 60% of the unit price for repairing and maintaining the barrier during construction; the actual amount to be decided by the Owner as described below
- 20% of the unit price upon satisfactory removal of the barrier

The Contractor's repair and maintenance activities will be documented to assess the value of payment each month. Failure to repair and maintain tree protection measures to the satisfaction of the Owner may result in less than 100% payment for this item in the event that the Owner deems that the Contractor did not perform adequate repairs or maintenance.

**Item R807 Filter Sock Fiber Rolls – 600 mm [Renewal / New Construction]**

**Item R808 Filter Sock Fiber Roll Check Dams – 600 mm [Renewal / New Construction]**

*The following Standard Drawing is applicable to Item R807: OPSD 219.120 (Nov 2021).*

*The following Standard Drawing is applicable to Item R808: OPSD 219.191 (Nov 2021).*

*This Specification shall be read in conjunction with OPSS.MUNI 805 (Nov 2021).*

**805.07.02.03 Light-Duty Fibre Roll Barriers** and **805.07.05.02 Fibre Roll Flow Check Dams** are amended by the addition of the following:

These items are for the supply, installation and maintenance of filter sock fiber rolls and filter sock fiber roll check dams. Filter sock fiber rolls and filter sock fiber roll check dams shall be made from clean filter media contained in a mesh tube that can be used to filter channel flow of sediment-laden runoff.

The Owner will notify the Contractor if any filter sock fiber rolls and/or filter sock fiber roll check dams are to remain as permanent installations. Any installations not deemed to be permanent shall be removed by the Contractor.

If a filter sock fiber roll is to be left as a permanent filter, or part of the natural landscape, it may be seeded at the time of installation for establishment of permanent vegetation.

### **Materials**

The filter sock fiber roll material to be used shall be a Filtrex® SiltSoxx™ or Equivalent. If the Contractor chooses to use an Equivalent product, the Contractor shall submit to the Owner, a minimum of 14 Days prior to delivering the material to the Site, back-up documentation proving its equivalency. The back-up documentation shall include the following sock material composition information, at a minimum:

- Material type (e.g. polypropylene, HDPE, etc.)
- Mesh opening size
- Degradation characteristics (e.g. photodegradable, oxobiodegradable, biodegradable, etc.)
- Tensile strength

- Longevity (expected lifespan of the material)

### Filter Media

Filter media shall be clean, weed free, non-invasive, natural material that, combined with the sock, is capable of meeting the minimum Testing and Performance Characteristics as set out in Table 1 below.

The filter media shall be sized such that 60% of the material is retained by a 9.5 mm sieve.

Testing shall be in accordance with ASTM D-7351-13 and ASTM D-6459-15 and shall be completed by a third-party institution or testing body approved by the Owner.

Sock material and performance characteristics shall be supported by third party scientific testing/studies approved by the Owner.

**Table 1 – Testing and Performance Characteristics**

Parameters	Minimum Requirements
Total Solids Removal	90%
Total Suspended Solids Removal	75%
Turbidity Reduction	60%
Total Silt Removal (0.002 to 0.05 mm)	60%
Total Clay Removal (<0.002 mm)	60%
Hydraulic Flow Through Rate (Per Inch of Filter Sock Diameter)	180 to 228 litres/second
Minimum Functional Longevity	2 years

The Contractor shall also obtain approval of an Equivalent product from the conservation authority, MECP, DFO, MNRF and any other applicable environmental agencies. The Contractor shall also be responsible for updating the permit drawing(s), resubmitting the application(s) and obtaining revised permit(s). Work shall not proceed until the drawings have been approved, in writing, by the Owner, conservation authority, MECP, DFO and MNRF, as applicable. Two (2) copies of the revised permit(s) and associated drawings shall be provided to the Owner within 10 Days of approval for filing and an additional copy shall be provided to the Owner's Site office and be available for viewing at all times.

### Construction

The standard size of filter sock fiber roll for normal protection shall be 600 mm in diameter. Filter sock fiber rolls and filter sock fiber roll check dams shall be constructed of a continuous tubular sock where possible. When breaks are required there must be an overlap at the joints of at least 1 m.

Filter media shall be blown into the sock and the sock shall be constructed in a continuous manner.



The filter sock fiber rolls and filter sock fiber roll check dams shall be anchored to the soil using wooden or T-bar stakes, where required. Stakes should be installed on the opposite side of water flow.

#### **Maintenance**

The Contractor shall maintain filter sock fiber rolls and filter sock fiber roll check dams in a functional condition at all times during construction. The Contractor shall inspect filter sock fiber rolls and filter sock fiber roll check dams before and after all rain or melt events. Maintenance shall include cleaning silt and debris accumulations, and repairing or replacing damaged sections as required at no additional cost to the Owner. The Contractor shall remove sediments collected at the base of the filter sock fiber rolls and filter sock fiber roll check dams when they reach 50% of the exposed height of the fiber roll, or as otherwise indicated by the Owner.

**805.09.01 Actual Measurement** is amended by the addition of the following to the list of Items in **805.09.01.01**:

#### **Filter Sock Fiber Roll – 600 mm**

**805.09.01 Actual Measurement** is amended by the addition of the following to the list of Items in **805.09.01.02**:

#### **Filter Sock Fiber Roll Check Dams – 600 mm**

**805.10 BASIS OF PAYMENT** is deleted in its entirety and replaced with the following:

#### **805.10 BASIS OF PAYMENT**

##### **Filter Sock Fiber Roll – 600 mm – Item**

##### **Filter Sock Fiber Roll Check Dams – 600 mm – Item**

Payment shall be made at the unit price and shall be full compensation for all labour, equipment and materials necessary to complete this work as specified. Payment will be made as follows:

- 20% of the unit price upon satisfactory construction of the item
- 60% of the unit price for cleaning and maintaining the item during construction; the actual amount to be decided by the Owner as described below
- 20% of the unit price upon satisfactory removal of the item (for temporary filter sock locations) or upon completion of the Work (for permanent filter sock locations which are not removed)

The Contractor shall clean out the silt deposits if the control measures become more than 50% full at any time. The Contractor's cleaning and maintenance activities will be documented to assess the value of payment each month. Failure to clean and maintain the control measures to the satisfaction of the Owner may result in less than 100% payment for these items in the event that the Owner deems that the Contractor did not perform adequate cleaning or maintenance.

**Item R809 Silt Barrier Socks for Catch Basin Inlet Protection [Renewal]**

Under this item, the Contractor shall supply, install and maintain water permeable filter media silt socks as indicated by the Owner.

Silt barrier socks, such as Filtrex<sup>®</sup> SiltSoxx<sup>™</sup> (200 mm typical diameter), or an Equivalent product approved by the Owner, shall be installed at all catch basins within the Contract limits to prevent sediment created during construction from entering adjacent watercourses through the storm sewer.

The Contractor shall remove sediments collected at the base of the silt socks when they reach half the height of the silt sock. The silt socks shall be inspected weekly and after all rainfall events to ensure that they are in working order.

When construction is completed, the silt socks shall be removed from the Site and disposed of at the Contractor's own expense.

**Measurement for Payment**

Measurement for payment shall be a count of each catch basin where silt barrier sock is installed.

**Basis of Payment**

Payment shall be made at the unit price and shall be full compensation for all labour, equipment and materials necessary to complete the work as specified.

**MISCELLANEOUS****Item R901 Hydro-Vac Test Holes (Provisional) [Renewal]**

Where underground utilities, sewers or watermain exist that may conflict with the proposed guide rail system or ditching works, the Contractor shall expose the underground utilities using a hydro-vac truck in advance of construction, up to a depth of 4 m. Exposure holes shall be backfilled with compacted native material.

**Measurement for Payment**

Measurement for payment shall be per hour that the hydro-vac truck is used.

**Basis of Payment**

Payment shall be made at the unit price and shall be full compensation for all labour, equipment and materials necessary to complete the work as specified.

**Item R902 Expose Existing Utilities by Hydro-Vac (X m – X m deep) (Provisional) [New Construction]**

If required by the Owner, the Contractor shall carry out the following work in order to locate existing utilities that may conflict with the proposed Work:

- Obtain utility clearances
- Excavate utilities using hydro-vac at the location(s) indicated by the Owner
- Record the location, elevation and other details of the exposures, and provide a written copy to the Owner
- Backfill, temporarily restore and maintain the location of the test pit until the permanent Works have been completed

The Contractor shall be responsible for disposal of the unsuitable excavated material and this work shall be included in the unit price for this item.

#### **Measurement for Payment**

Measurement for payment shall be a count of each utility exposed.

#### **Basis of Payment**

Payment shall be made at the unit price and shall be full compensation for all labour, equipment and materials necessary to complete the work as specified.

#### **Item R903 Unshrinkable Fill (Provisional) [New Construction]**

*This Specification shall be read in conjunction with OPSS.MUNI 1359 (Nov 2016).*

Where adequate backfill and compaction cannot be achieved adjacent to, between or under exposed utilities, flowable fill shall be used. The Contractor shall demonstrate care in controlling volume of fill material required. Use of bond breaker (plastic sheeting) will be required where flowable fill will completely encase any utility, pipe or watermain. Unshrinkable fill shall terminate at the subgrade level.

#### **Measurement for Payment**

Measurement for payment shall be per cubic metre (m<sup>3</sup>) of unshrinkable fill placed.

#### **Basis of Payment**

Payment shall be made at the unit price and shall be full compensation for all labour, equipment and materials necessary to complete this work as specified.

#### **Item R904 Insulate Storm Sewer [New Construction]**

*The following Standard Drawing is applicable to the above item: OPSD 1109.030 (Nov 2020).*

*This Specification shall be read in conjunction with OPSS.MUNI 1605 (Nov 2018).*

The Contractor shall supply and install insulation in the sewer trench above, and along, the sides of the storm sewers in accordance with OPSD 1109.030.

**The insulation materials shall be 50 mm thick, rigid extruded polystyrene foam meeting ASTM 578, Type VI, 60 PSI compressive strength (Grade HI-60 or Equivalent).**

The insulation shall be placed on a well-compacted, smooth graded surface. Pipe embedment and backfill material shall be free from large stones and shall be placed on the insulation in a

manner that prevents damage to the insulation. The Contractor shall store and protect the insulation material from damage at all times during construction. Vibration control may be necessary to prevent damage to the underlying storm sewer and insulation during all stages of the road construction.

**Measurement for Payment**

Measurement for payment shall be by length in linear metres (m) of insulation supplied and installed, measured horizontally over the centerline of the pipe.

**Basis of Payment**

Payment shall be made at the unit price and shall be full compensation for all labour, equipment and materials necessary to complete this work as specified.

**Item R905 Well Abandonment [New Construction]**

This item is for the abandonment of existing water wells located within the Contract limits as indicated by the Owner. The Contractor shall retain the services of a licensed well contractor in accordance with Reg. 903 (Wells) under the *Ontario Water Resources Act*. The MECP's Water Supply Wells: Requirements and Best Practices guide shall be considered a minimum standard for any water well abandonment activities in the Region of York and can be found at the following link: <https://www.ontario.ca/document/water-supply-wells-requirements-and-best-practices>.

The item includes removal of casing 2 m below the final surface. The Site shall be restored to final condition.

The item also includes completion of well abandonment records as required by Reg. 903 (Wells) under the *Ontario Water Resources Act*. The well contractor shall complete the Owner's Well Grouting / Plugging form and submit it to the Owner along with the abandonment record.

**Measurement for Payment**

Measurement for payment shall be a count of each well abandoned.

**Basis of Payment**

Payment shall be made at the unit price and shall be full compensation for all labour, equipment and materials necessary to complete this work as specified.

**Item R906 Remove and Re-Instate Mail and Paper Boxes [New Construction]**

The Contractor shall remove all mail and paper boxes as required for the completion of the Work and shall immediately re-instate them in their permanent locations after the completion of the shouldering. Mail and paper boxes shall be re-instated on new wooden posts similar to the existing. Old wood posts shall become property of the Contractor and shall be disposed of outside the Contract limits at no additional cost to the Owner. The Contractor shall be responsible for any damage that may occur to the mail and paper boxes during construction.

**Measurement for Payment**

Measurement for payment shall be a count of each mail and paper box re-instated. Where the mail and paper boxes share the same post, the measurement shall be considered as one (1) unit.

**Basis of Payment**

Payment shall be made at the unit price and shall be full compensation for all labour, equipment and materials necessary to complete the work as specified. Payment will be made after the mailboxes have been re-instated in their permanent locations.