

**GENERAL NOTES**

- THESE DOCUMENTS ARE TO BE USED ONLY BY THE PARTY WITH WHOM ONE HAS ENTERED INTO A CONTRACT.
- THE USE OF THESE DRAWINGS IS LIMITED TO THAT IDENTIFIED IN THE REVISION COLUMN.
- THE STRUCTURE HAS BEEN DESIGNED IN ACCORDANCE WITH THE REQUIREMENTS OF THE 2012 ONTARIO BUILDING CODE LATEST EDITION INCLUDING ALL THE LATEST STANDARDS REFERENCED THEREIN, AND ANY APPLICABLE ACTS OF AUTHORITY. CONSTRUCTION PRACTICES SHALL BE ACCORDING TO THE SAME. USE THE LATEST VERSIONS OF STANDARDS AND CODES LISTED BELOW.
- DO NOT SCALE THESE DRAWINGS. ERRORS MADE BECAUSE OF SCALING THESE DRAWINGS ARE RESPONSIBILITY OF THE PARTY WHO USED THE DRAWINGS.
- WHERE DISCREPANCIES EXIST, THE MOST STRINGENT SHALL PREVAIL. NOTIFY THE ENGINEER BEFORE PROCEEDING WITH THE WORK.
- STRUCTURAL DRAWINGS TO BE USED TOGETHER WITH ALL OTHER SPECIFICATIONS AND CONTRACT DOCUMENTS.
- REFER TO ARCHITECTURAL, MECHANICAL AND ELECTRICAL DRAWINGS FOR LOCATIONS AND SIZES OF HOLES, SLUMP PITS, TRENCHES, CURBS, BOLTS, SLEEVES, OPENINGS, ETC.
- THE CONTRACTOR SHALL BECOME FAMILIARIZED WITH THE PROJECT ON SITE, INCLUDING EXISTING CONSTRUCTION. ANY ALTERATIONS FROM ASSUMED IN THE DRAWINGS MUST BE REPORTED TO THE ENGINEER BEFORE PROCEEDING WITH THE WORK.
- THE ENGINEER MUST APPROVE SUBSTITUTIONS FOR SPECIFIED PRODUCTS AND MATERIALS.
- ALL WORK IS TO BE PERFORMED IN ACCORDANCE WITH THE OCCUPATIONAL HEALTH AND SAFETY ACT AND REGULATIONS FOR CONSTRUCTION PROJECTS - OREG 213/91.
- THE CONTRACTOR SHALL PROVIDE DESIGN AND CONSTRUCTION OF HORIZONTAL AND VERTICAL SHORING AND TEMPORARY BRACING AS PER OREG 213/91. THE CONTRACTOR SHALL PROVIDE BRACING, SHORING, SHEET PILING ETC. TO PROTECT EXISTING OR ADJACENT STRUCTURES AFFECTED BY THIS WORK.
- AN INDEPENDENT INSPECTION AND TESTING COMPANY SHALL PROVIDE TESTS TO PROVE THAT CONSTRUCTION IS IN ACCORDANCE WITH THE DRAWINGS AND SPECIFICATIONS. REQUIRED TESTING SHALL BE AS PER THE INSPECTION TABLE BELOW.
- DOT/CH & P/LD ENGINEERING WILL PROVIDE GENERAL REVIEW OF CONSTRUCTION. DOT/CH & P/LD ENGINEERING WILL REVIEW SHOP DRAWINGS FOR GENERAL CONFORMANCE WITH THE CONTRACT DOCUMENTS PREPARED BY DOT/CH & P/LD. THE CONTRACTOR IS SOLELY RESPONSIBLE FOR PERFORMANCE OF THE WORK IN ACCORDANCE WITH THE CONTRACT DOCUMENTS. DOT/CH & P/LD IS NOT RESPONSIBLE FOR THE FAILURE OF THE CONTRACTOR TO CARRY OUT THE WORK IN ACCORDANCE WITH THE CONTRACT DOCUMENTS. REVIEWED SHOP DRAWINGS DO NOT RELIEVE CONTRACTOR FROM RESPONSIBILITY FOR THEIR MISTAKES.
- SHOP DRAWINGS MUST BE SEALED BY PROFESSIONAL ENGINEER BEFORE BEING SUBMITTED TO DFE FOR REVIEW U.N.O.
- THE OWNER AND THE CONTRACTOR SHALL NOTIFY THE ENGINEER OF CONSTRUCTION PROGRESS, AND THEY SHALL INVITE THE ENGINEER TO COMPLETE GENERAL REVIEWS.

**TESTING AND INSPECTION**

- THE FOLLOWING ITEMS REQUIRE TESTING OR INSPECTION BY A CERTIFIED INDEPENDENT TESTING OR INSPECTION AGENCY UNLESS NOTED OTHERWISE. THE AGENCY SHALL SEND COPIES OF ALL STRUCTURAL TESTING AND INSPECTION REPORTS TO THE ENGINEER FOR REVIEW.

ITEM	REQD	COMMENTS
SOIL BEARING CAPACITY	YES	BY SOILS ENGINEER
SOIL COMPACTION	YES	BY SOILS ENGINEER
REINFORCING STEEL PLACEMENT	YES	INSPECT FINAL PLACEMENT
CONC. COMPRESSIVE TESTS	YES	MIN. 2 SETS PER 100 CUBIC METRES
CONCRETE SLUMP	YES	
STRUCTURAL STEEL BOLTING	YES	
STRUCTURAL STEEL WELDING	YES	INSPECT ALL FIELD WELDS
MORTAR CUBES	YES	

- IT IS THE RESPONSIBILITY OF BOTH THE OWNER AND THE CONTRACTOR TO NOTIFY THE ENGINEER OF CONSTRUCTION PROGRESS AND WRITE THE ENGINEER TO COMPLETE GENERAL REVIEWS.

- STRUCTURAL CONSULTANTS WILL PROVIDE GENERAL REVIEW OF CONSTRUCTION TO DETERMINE WHETHER THE CONSTRUCTION OF THAT WORK SHOWN ON THE DRAWINGS IS IN GENERAL CONFORMANCE WITH THE PLANS, SPECIFICATIONS, DRAWINGS, AND SPECIFICATIONS FORMING PART OF THE CONTRACT DOCUMENTS. THE CONTRACTOR IS SOLELY RESPONSIBLE FOR QUALITY CONTROL AND THE PERFORMANCE OF THE WORK IN ACCORDANCE WITH THE CONTRACT. STRUCTURAL CONSULTANTS SHALL NOT BE RESPONSIBLE FOR THE ACTS OR OMISSIONS OF THE CONTRACTOR, SUB-CONTRACTOR, OR ANY OTHER PERSON PERFORMING ANY OF THE WORK OR FOR THE FAILURE OF ANY OF THEM TO CARRY OUT THE WORK IN ACCORDANCE WITH THE CONTRACT DOCUMENTS.

**REQUIRED SUBMITTALS**

- THE FOLLOWING ITEMS SHALL BE SUBMITTED TO THE ENGINEER FOR REVIEW PRIOR TO FABRICATION WHERE APPLICABLE.
- REVIEW OF THE SHOP DRAWINGS IS FOR THE SOLE PURPOSE OF ASCERTAINING CONFORMANCE WITH THE GENERAL DESIGN CONCEPT AND IS NOT AN APPROVAL OF THE DETAIL DESIGN INHERENT IN THE SHOP DRAWINGS. RESPONSIBILITY FOR WHICH SHALL REMAIN WITH THE CONTRACTOR. APPROVING THEM, SUCH REVIEW SHALL NOT RELIEVE THE CONTRACTOR OF THEIR RESPONSIBILITY FOR ERRORS AND OMISSIONS IN THE SHOP DRAWINGS OR FOR MEETING ALL REQUIREMENTS OF THE CONTRACT DOCUMENTS. THE CONTRACTOR IS SOLELY RESPONSIBLE FOR INFORMATION PERTAINING TO THE FABRICATION PROCESS, TECHNIQUES OF CONSTRUCTION AND INSTALLATION AND FOR COORDINATION OF THE WORK OF ALL SUB-TRADES.
- THE APPROVAL OF SHOP DRAWINGS DOES NOT RELIEVE THE CONTRACTOR FROM THE RESPONSIBILITY OF THE FITTING OF BUILDING COMPONENTS. ANY DISCREPANCIES IN THE SHOP DRAWINGS ARE THE RESPONSIBILITY OF THE CONTRACTOR.

ITEM	REQD SUBMITTALS?	ENGINEER'S STAMP REQ'D?	NOTES
REBAR SHOP DRAWINGS	YES	NO	INCL CONC BLOCK REIN
CONCRETE MIX DESIGNS	YES	NO	
MASONRY GROUT MIX DESIGN	YES	NO	
BLOCK MILL REPORT	YES	NO	
STRUCTURAL STEEL SHOP DRAWINGS	YES	YES	FOR CONNECTIONS ONLY
MISCELLANEOUS STEEL SHOP DRAWINGS	YES	YES	STAMP FOR STAIRS, LADDERS AND GUARDS
STEEL DECK SHOP DRAWINGS	YES	YES	
COLD FORMED STEEL FRAMING SHOP DWGS	YES	YES	
FALL ARREST ANCHORS	YES	YES	

**COLD FORM STEEL FRAMING [BY OTHERS]**

- ALL COLD FORMED STEEL FRAMING SHALL BE DESIGNED BY CFS SUPPLIER IN CONFORMANCE WITH THE REQUIREMENTS OF CSA S136.
- DESIGN ALL COLD FORMED STEEL FRAMING MEMBERS FOR THE GRAVITY AND LATERAL LOADINGS INDICATED ON THE DRAWINGS AND IN ACCORDANCE WITH THE 2006 OBC.
- CONFORM TO THE DEFLECTION REQUIREMENTS OF CSA S304.1 FOR STUDS SUPPORTING MASONRY VENEER.
- SHOP DRAWINGS FOR ALL COLD FORMED STRUCTURAL STEEL FRAMING INCLUDING CONNECTION BRACING AND BRIDGING DETAILS SHALL BE SUBMITTED TO THE ENGINEER FOR REVIEW BEFORE FABRICATION.
- SHOP DRAWINGS FOR ALL COLD FORMED STRUCTURAL STEEL FRAMING SHALL SHOW BOTH DESIGN AND INSTALLATION REQUIREMENTS. RETAIN A LICENSED PROFESSIONAL ENGINEER OF THE PROVINCE OF ONTARIO TO PREPARE, SEAL AND SIGN ALL SHOP DRAWINGS, AND TO PERFORM FIELD REVIEW.
- STEEL SHALL MEET THE REQUIREMENTS OF ASTM A663 STANDARD SPECIFICATION FOR STEEL SHEET, ZINC COATED (GALVANIZED) BY THE HOT-OP PROCESS. STRUCTURAL (PHYSICAL) QUALITY STEEL STUDS 18 ga. AND LIGHTER SHALL HAVE MINIMUM YIELD STRENGTH OF 230MPa (33ksi). HEAVIER STUDS SHALL HAVE MINIMUM YIELD STRENGTH OF 350MPa (50ksi).

**FOUNDATIONS**

- GEOTECHNICAL DATA HAS BEEN OBTAINED FROM THE SOIL INVESTIGATION PERFORMED BY TERRAPROBE INC AS REPORTED IN THEIR SOIL REPORT 1113-3165, Revised, Oct. 09, 2014.
- ALL FOOTINGS SHALL BEAR DIRECTLY ON NATURALLY CONSOLIDATED, UNDISTURBED SOIL, WITH A MINIMUM SOIL BEARING CAPACITY OF 250 kPa (SL5) AND 375 kPa (UL5) AT MIN. 1.2m BELOW GRAOUND.
- BOTTOM OF THE FOOTINGS SHALL BE BELOW THE LEVEL OF FREEZING DEPTH, BUT A MINIMUM 1200 mm (4'-0") BELOW FINISHED EXTERIOR GRADE, UNLESS NOTED OTHERWISE.
- PROTECT ALL SOIL FROM FREEZING ADJACENT TO AND BELOW ALL FOUNDATIONS DURING CONSTRUCTION.
- 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.
- THE BEARING SOIL HAS MUST BE APPROVED BY THE GEOTECHNICAL ENGINEER BEFORE POURING THE FOOTINGS.
- ALL ORGANIC TOPSOIL AND LOOSE FILL TO BE REMOVED FROM THE SITE BEFORE CONSTRUCTION.
- WHERE APPROVED, GRANULAR FILL UNDER ALL FOOTINGS ON GRADE SHALL BE COMPACTED IN 150 mm (6") LAYERS TO SPECIFIED IN THE SOILS REPORT STANDARD PROCTOR MAXIMUM DRY DENSITY (SM/D).
- PLACE BOTTOM OF NEW FOOTINGS AT THE SAME ELEVATION AS THE EXISTING ADJACENT FOOTINGS, UNLESS NOTED OTHERWISE. THE LINE OF SLOPE BETWEEN ADJACENT FOOTINGS OR ALONG STEPPED FOOTINGS SHALL NOT EXCEED 1 VERT. TO 2 HOR. (COORD. W/ SOILS CONSULTANT), AND MAX HEIGHT OF ONE STEP TO BE 600mm.
- SLABS ON GRADE
  - PLACE SLABS ON GRADE ON MATERIAL CAPABLE OF SAFELY SUPPORTING 25 kPa WITHOUT SETTLEMENT RELATIVE TO THE BUILDING FOUNDATIONS.
  - PROOF-ROLL EXISTING FILL MATERIAL. REMOVE ANY LOOSE OR SOTTENED AREAS BENEATH SLAB-ON-GRADE BEFORE PLACING GRANULAR FILL.
  - APPROVED GRANULAR FILL UNDER ALL SLABS ON GRADE SHALL BE COMPACTED IN 150 mm (6") LAYERS TO 100% STANDARD PROCTOR MAXIMUM DRY DENSITY (SM/D).
  - BEFORE CASTING THE SLAB PLACE 200 mm (8") OF 19 mm (3/4") CLEAR CRUSHED STONE OVER THE SLAB BASE AND THOROUGHLY ROLL AND CONSOLIDATE TO THE LEVELS REQUIRED.
- FOUNDATION WALLS WITH BACKFILL ON BOTH SIDES TO BE BACKFILLED SYMMETRICALLY UNLESS TEMPORARY SHORING FOR THE WALL IS PROVIDED.
- ANY HORIZONTAL CONSTRUCTION JOINTS IN FOUNDATION WALLS TO BE APPROVED BY THE ENGINEER.
- DO NOT PLACE BACKFILL AGAINST WALLS RETAINING EARTH (OTHER THAN CANTILEVERED RETAINING WALLS) UNTIL THE WALLS AND THE FLOOR CONSTRUCTION AT THE TOP AND BOTTOM OF THE WALLS HAVE BEEN CAST AND HAVE ATTAINED 100% OF THEIR DESIGN STRENGTH.

**CAST-IN-PLACE CONCRETE AND REINFORCING**

- ALL CONCRETE WORK TO CONFORM TO THE LATEST REQUIREMENTS OF CSA STANDARDS A23.1, A23.2 & A23.3.

CONCRETE MIX PROPERTIES TABLE					
CONCRETE	MIN. 28 DAYS STRENGTH (MPa)	SLUMP mm	AIR CONTENT (%)	MAX AGGREGATE SIZE (mm)	EXPOSURE CLASS
EXPOSED FOUNDATION WALLS, RETAINING WALLS, CAISSONS	25	80 (±30)	4.7	3/4"	F-2
INTERIOR COLUMNS, WALLS/PILE CAPS, FOUNDATION WALLS/BEAMS	35	80 (±30)	0	3/4"	N
INT. S.O.G.	25	80 (±30)	0	3/4"	N
FREEZE THAW EXPOSURE	25	80 (±30)	4.7	3/4"	F-2
EXTERIOR SLAB (UNREINFORCED)	32	80 (±30)	5.8	3/4"	C-2
EXTERIOR SLAB (REINFORCED)	35	80 (±30)	5.8	3/4"	C-1
NON-SHRINKABLE GROUT	30	AS PER MANUF. RECOMMEND.	0	-	N
LEAN MIX CONCRETE	4	80 (±30)	0	-	N
SPREAD FOOTINGS	25	80 (±30)	4.7	3/4"	N
STRIP FOOTINGS, MATT PADS	25	80 (±30)	4.7	3/4"	N

CONCRETE MIX PROPERTIES TABLE FOR PARKING AREA				
ELEMENT	MIN. 28 DAYS STRENGTH (MPa)	EXPOSURE CLASS	NOTES	
FOOTINGS	35	N	C1 FOR FTGS WITH TOP REINFORCING	
S.O.G. REINFORCED	35	C-1		
RETAINING/ EXTERIOR FOUNDATION WALLS ADJACENT TO DRIVE ASILES	35	C-1		
RETAINING/ EXTERIOR FOUNDATION WALLS (ALL OTHER LOCATIONS)	35	F-2		
ALL OTHER INTERIOR CONCRETE (COLUMNS, WALLS, SLABS AND STAIRS)	35	C-1		

- WELDED WIRE FABRIC SHALL CONFORM TO CAN/CSA G30.5 WITH A MINIMUM YIELD STRENGTH OF Fy = 450 MPa. WELDED WIRE FABRIC SHEETS SHALL BE LAPPED A MINIMUM OF 150mm (6") AT JOINTS (U.N.O.).
- REINFORCING BARS SHALL CONFORM TO CAN/CSA G30.18 GRADE 400W FOR REINFORCING STEEL WITH MINIMUM YIELD STRENGTH OF Fy = 400 MPa.
- INSTALLATION OF THE REINFORCING STEEL SHALL CONFORM TO THE REINFORCING STEEL INSTITUTE OF CANADA "MANUAL OF STANDARD PRACTICE".
- ALL REINFORCING LAP SPLICES SHALL CONFORM TO THE LATEST CSA STANDARD A23.3 AND ALL BAR SPLICES SHALL BE CLASS "B" TENSION SPLICES (U.N.O.).
  - NO BAR SPLICES SHALL BE LESS THAN IN THE TABLE BELOW.
  - INCREASE HORIZONTAL SPLICE LENGTHS IN THE TABLE BY 1.3 WHERE MORE THAN 300mm (12") OF FRESH CONCRETE IS CAST BELOW THE SPLICE.

REBAR SIZE	TENSION SPLICE			COMPRESSION SPLICE
	25 MPa	30 MPa	35 MPa	
10M	400 (16")	400 (16")	400 (16")	450 (18")
15M	600 (24")	600 (24")	600 (24")	450 (18")
20M	800 (32")	800 (32")	800 (32")	600 (24")
25M	1200 (48")	1100 (44")	1000 (40")	750 (30")
30M	1400 (56")	1300 (52")	1200 (48")	900 (36")
35M	1650 (65")	1500 (60")	1400 (56")	1050 (42")

- EMBEDMENT OF DOWELS SHALL BE MIN. EQUAL TO TENSION SPLICE LENGTH, UNLESS NOTED OTHERWISE.
- REINFORCING BARS TO BE SYMMETRIC OVER SUPPORTS AND SYMMETRIC IN SPANS, UNLESS NOTED OTHERWISE.
- REINFORCING STEEL SHALL BE FIXED IN PLACE DURING PLACEMENT OF CONCRETE. BAR SUPPORTS SHALL SHALL BE STEEL, CONCRETE OR PLASTIC.
- THE REINFORCING STEEL SHALL BE CLEANED FROM OIL, GREASE, RUST AND DEBRIS BEFORE PLACEMENT OF CONCRETE.
- CONCRETE PROPERTIES:
  - ALL CONCRETE SHALL HAVE A 28 DAY MINIMUM COMPRESSIVE STRENGTH OF 35MPa UNLESS OTHERWISE SPECIFIED.
- THE SLUMP SHOWN IN THE TABLE MAY BE INCREASED WHEN SUPER-PLASTICIZERS IS USED.
- DO NOT ADD WATER TO CONCRETE UNLESS WRITTEN APPROVAL GIVEN BY THE ENGINEER. IF HIGHER SLUMP CONCRETE IS DESIRED, CONCRETE SUPPLIER SHALL DESIGN AND SUPPLY ACCORDINGLY.
- CONCRETE FORMWORK TOLERANCES SHALL CONFORM TO CSA STANDARD A23.1, UNLESS NOTED OTHERWISE.

**CONCRETE AND REINFORCING (cont'd)**

- CURING OF CONCRETE SHALL BE IN ACCORDANCE WITH CSA A23.1 SECTION 7.4.
- VIBRATE ALL CONCRETE AT THE TIME OF POURING.
- CONTROL JOINTS IN SLABS ON GRADE SHALL BE MIN. 1/3 (SEE TYP. DETAIL), MAX. DISTANCE BETWEEN CONTROL JOINTS IN SLABS-ON-GRADE SHALL BE LESS THAN THE GREATER OF 25 x 4' OR 300 mm (11'-0") UNLESS NOTED OTHERWISE.
- SUPPLY AND SET ANCHOR BOLTS, P.C. CONNECTIONS, SLEEVES, PIPE HANGERS, JOISTS AND OTHER INSERTS AND OPENINGS AS INDICATED OR SPECIFIED ELSEWHERE FOR BEAMS AND COLUMNS. NO SLEEVES, DUCTS, PIPES OR OTHER OPENINGS SHALL PASS VERTICALLY OR HORIZONTALLY EXCEPT WHERE EXPRESSLY DETAILED ON STRUCTURAL DRAWINGS OR WHERE APPROVED IN ADVANCE BY ENGINEER FOR SLABS AND WALLS. ALL SLEEVES AND OPENINGS GREATER THAN 100 mm (4") IN ANY DIMENSION OR REQUIRING THE CUTTING OF ANY REINFORCEMENT AND NOT INDICATED ON STRUCTURAL DRAWINGS MUST BE APPROVED BY THE ENGINEER FOR MULTIPLE OPENINGS OR SLEEVES. IF WITHIN 100mm (4") OF EACH OTHER CONSULT ENGINEER FOR DIRECTION. DO NOT MAKE HOLES IN SLABS CLOSER THAN 2" TO EDGE OF COLUMN.
- CAST IN ANCHOR BOLTS SHALL CONFORM TO THE LATEST CSA STANDARD G40.21 OR ASTM F1554 WITH A MINIMUM YIELD STRENGTH OF 250 MPa AND SHALL BE SET TRUE AS TO LOCATION, ELEVATION AND PROTECTION TO THE FOLLOWING TOLERANCES: ANCHOR BOLT LOCATION ± 3mm (1/8") ANCHOR BOLT PROJECTION ± 5mm (1/4")
- CONSTRUCTION JOINTS FOR WALLS ARE BASED UPON VERTICAL JOINTS AT A MAXIMUM SPACING OF 1000mm (39'-0") UNLESS CONTROL JOINTS ARE PROVIDED AS PER TYPICAL DETAIL. TOTAL LENGTH OF POUR TO BE DISCUSSED WITH ENGINEER PRIOR TO PROCEEDING.
- CONSTRUCTION JOINTS FOR WALLS, SLABS, AND BEAMS NOT SHOWN ON THE DRAWINGS SHALL BE APPROVED BY THE STRUCTURAL CONSULTANT BEFORE CONSTRUCTION. GENERALLY, JOINTS IN SLABS SHALL BE AT RIGHT ANGLES TO THE SPANS, AT MID SPAN IF POSSIBLE AND BE CLEAR OF SUPPORTS AND POINT LOADS.
- INSERTS, FRAME OUTS, SLEEVES, BRACKETS, CONDUITS AND FASTENING DEVICES, SHALL BE INSTALLED AS REQUIRED BY THE DRAWINGS AND SPECIFICATIONS IN A MANNER THAT SHALL NOT IMPAIR THE STRUCTURAL STRENGTH OF THE SYSTEM. BE SO INSTALLED THAT THEY SHALL NO REQUIRE THE CUTTING, BENDING, OR DISPLACEMENT OF THE REINFORCING OTHER THAN AS SHOWN ON THE TYPICAL DETAILS.
- ELECTRICAL CONDUITS SHALL NOT PASS THROUGH A COLUMN. SHALL NOT BE LARGER IN OUTSIDE DIAMETER THAN 1/2 SLAB THICKNESS OR WALL OR BEAM WHICH IT IS EMBEDDED, SHALL NOT BE SPACED CLOSER THAN 3 DIAMETERS ON CENTER UNLESS APPROVED AND HAVE A MINIMUM CONCRETE COVER OF 25mm (1") AND UNLESS SPECIFICALLY PERMITTED OTHERWISE, SHALL NOT RUN HORIZONTALLY IN A CONCRETE WALL.
- CONFORM TO THE CONCRETE COVER REQUIREMENTS OF CSA A23.1 AND THE FOLLOWING, UNLESS NOTED OTHERWISE:
  - FOR CONCRETE CAST AGAINST EARTH AND PERMANENTLY EXPOSED TO EARTH - 75mm

- NOTES:
- THE SLAB COVERS IN TABLE 1, 2 & 3 ARE FOR CONCRETE NOT PROTECTED BY A MEMBRANE OR A CORROSION INHIBITOR FOR PARKING GARAGE SLABS. SEE TABLE 4.
  - FOR COLUMN COVERS (TO MAIN REINFORCEMENT) EXCEEDING 63mm WITH 4 HOUR FIRE RATING PROVIDE WIRE MESH USING 1.57mm @ 100mm EA WAY.
  - THE COVER FOR A BUNDLE OF BARS SHALL BE THE SAME AS THAT FOR A SINGLE BAR WITH AN EQUIVALENT AREA.
  - PROVIDE COVER FOR MINIMUM 2 HOURS FIRE RATING UNLESS OTHERWISE NOTED.
  - REINFORCED CONCRETE WALLS WHICH MAY BE EXPOSED TO FIRE ON BOTH SIDES SIMULTANEOUSLY SHALL HAVE THE MINIMUM COVER REQUIREMENTS FOR COLUMNS.

TABLE 1 MINIMUM CONCRETE COVER FOR ELEMENTS NOT EXPOSED TO CHLORIDES NOR FREEZING AND THAWING (mm)					
ELEMENTS	COMMENTS	BAR SIZE	FIRE RATING		
			e+2	3	4
WALLS	NOT CAST AGAINST CONC. FORMWORK (CAST AGAINST LAGGING, CAISSON, WALL)	ALL BAR SIZES	50		
		Ø e+ 25M	25		
		30M	30		
		35M	35		
COLUMNS	COLUMNS	Ø e+ 30M	40	55	
		35M	55		
SLABS AND BEAMS	SLABS	Ø e+ 25M	25	35	40
		30M	30		
		35M	35		
		Ø e+ 25M	30		
		30M	35		
BEAMS	BEAMS	35M	35		
		45M	45		

TABLE 2 MINIMUM CONCRETE COVER FOR ELEMENTS EXPOSED TO FREEZING AND THAWING (mm)					
ELEMENTS	COMMENTS	BAR SIZE	FIRE RATING		
			e+3	4	
WALLS	FOUNDATION WALLS, RETAINING WALLS	ALL BAR SIZES	50		
		Ø e+ 25M	40		
		30M	45		
		35M	55		
COLUMNS	COLUMNS	Ø e+ 30M	45	55	
		35M	55		
SLABS AND BEAMS	SLABS AND BEAMS	Ø e+ 25M	40		
		30M	45		
		35M	55		
		45M	70		

TABLE 3 MINIMUM CONCRETE COVER FOR ELEMENTS EXPOSED TO CHLORIDES (mm)					
ELEMENTS	COMMENTS	BAR SIZE	FIRE RATING		
			e+4		
WALLS	FOUNDATION WALLS, SHEAR WALLS AND MISC. WALLS (a)	Ø e+ 25M	50		
		30M	60		
		35M	70		
		45M	90		
COLUMNS	COLUMNS	Ø e+ 30M	60		
		35M	80		
		55M	105		
SLABS AND BEAMS	SLABS AND BEAMS	Ø e+ 25M	60		
		30M	70		
		45M	90		

TABLE 4 MINIMUM CONCRETE COVER FOR ELEMENTS OF PARKING GARAGE PROTECTED BY MEMBRANE AND CORROSION INHIBITOR "M"						
ELEMENTS	COMMENTS	BAR SIZE	TOP COVER		BOT. COVER	
			NORM./SEVERE	NORM./SEVERE	FIRE RATING	
					e+4	e+2
SLABS AND BEAMS	SLAB AND BEAMS	Ø e+ 20M	40	30	35	40
		25M		40		
		30M	45			
		35M	55			

**STRUCTURAL STEEL**

- ALL STRUCTURAL STEEL AND JOIST DESIGN CONNECTIONS AND DETAILS SHALL BE IN ACCORDANCE WITH THE LATEST CSA STANDARD S16
  - REFER ALSO TO NOTES UNDER PLANS.
- STRUCTURAL STEEL SHALL CONFORM TO CAN/CSA G40.20 AND CAN/CSA G40.21
  - GRADE 50W CLASS C FOR H.S.S.
  - GRADE 50W FOR W. SHAPES, S. SHAPES, AND TEES.
  - GRADE 30W FOR CHANNELS, ANGLES, PLATES, ROOF.
- BOLTED CONNECTIONS SHALL USE ASTM A325 BOLTS. ALL BOLTS, NUTS AND WASHERS SHALL CONFORM TO THE REQUIREMENTS OF ASTM A325. ANCHOR BOLTS SHALL BE FABRICATED FROM STEEL, ROLL CONFORMING TO CSA STANDARD G40.21 GRADE 300M.
- SHEAR STUDS TO CONFORM ASTM A108.
- WELDING MATERIALS TO CONFORM TO CSA W48.
- WELDING OF STRUCTURAL STEEL SHALL CONFORM TO THE REQUIREMENTS OF CSA STANDARD W59.
- FIELD WELDS SHALL BE 6mm (1/4") MIN. U.N.O. BOLTS SHALL BE A225 19mm (3/4") MIN. U.N.O. BOLTED CONNECTIONS SHALL HAVE MIN. OF TWO BOLTS IN EACH CONNECTED PECE. BOLTED CONNECTIONS SHALL BE DESIGNED AS BEARING CONNECTIONS U.N.O.
- STEEL COATINGS - STRUCTURAL STEEL SHALL BE CLEANED AND PREPARED TO CONFORM TO CSA STANDARD S16:
  - INTERIOR STRUCTURAL STEEL SHALL BE PRIMED AND PAINTED AS PER CSA CAN S-16.
  - EXPOSED STEEL TO BE HOT DIP GALVANIZED IN ACCORDANCE TO CAN/CSA S-164. TOUCH UP OF WELDS AND CUTS OF GALVANIZED MEMBERS TO BE DONE WITH A MINIMUM OF 3 COATS OF ZINC RICH PAINT.
  - INTERIOR STEEL MEMBERS THAT ARE TO BE PROTECTED BY A CEMENTITIOUS FIRE PROOFING SHALL BE CLEANED AND UNCOATED.
- FABRICATOR SHALL DESIGN CONNECTIONS IN ACCORDANCE WITH THE 2012 OBC FOR THE FORCES SHOWN ON THE DRAWINGS. BEAM CONNECTIONS SHALL BE DESIGNED FOR A MINIMUM OF 50% OF THE BEAM SHEAR CAPACITY IF FACTORED DESIGN FORCES ARE NOT SHOWN ON THE DRAWINGS.
- MOMENT FRAMES CONNECTIONS TO BE CONTINUOUS COLUMN / INTERRUPTED BEAM TYPE U.N.O.
- WHERE MOMENT CONNECTIONS ARE CALLED FOR BUT VALUES ARE NOT INDICATED, DESIGN CONNECTIONS FOR 100% SECTION CAPACITY OF THE SMALLER MEMBER JOINED.
- COLUMN CAP PLATES TO BE MIN. 16mm (5/8") THICK U.N.O. COLUMN BASE PLATES TO BE MIN. 20mm (3/4") THICK U.N.O. HSS COLUMNS TO HAVE MIN. 10mm (3/8") THICK CAP PLATE WELDED ALL AROUND U.N.O.
- ALL BEAMS CANTILEVERED OR CONTINUOUS OR SUPPORTED OVER A COLUMN OR OTHER SUPPORT, AND BEAMS SUPPORTING POINTS OF CONCENTRATED LOAD, SHALL HAVE A MIN. OF 2-10mm (3/8") STIFFENERS EACH SIDE OF WEB U.N.O.
- TOP OF COLUMNS WHICH ARE NOT BRACED BY JOISTS OR BEAMS SHALL BE BRACED DIAGONALLY TO THE ROOF OR FLOOR BY A MINIMUM OF 4:1.76 x 76 x 6.4 mm (1.3 x 3 x 1/4") ANGLES FOR INTERIOR COLUMNS. A MINIMUM 2:1.76 x 76 x 6.4 mm (1.3 x 3 x 1/4") ANGLES FOR EXTERIOR COLUMNS. BRACING SHALL BE BETWEEN TOP OF COLUMN AND TOP CHORD OF JOISTS.
- COLUMNS BUILT INTO MASONRY, ABUTTED BY, OR FACED WITH MASONRY WALLS SHALL HAVE ADJUSTABLE ANCHORS AT 400 mm (16") O.C. SPACED VERTICALLY WHERE STEEL PROVIDES LATERAL BRACING ONLY TO MASONRY. ANCHORS SHALL ALLOW VERTICAL MOVEMENT BETWEEN STEEL MEMBERS AND MASONRY.
- BEARING PLATES ARE TO BE CENTRED BELOW ALL BEAMS OR LITELS U.N.O. ON THE DRAWINGS. WELD TO BEARING PLATE WITH A MINIMUM 50 mm x 5mm (2" x 3/16") FILLET ON BOTH SIDES OF BEAM.
- STEEL BEAMS AND LITELS SHALL HAVE 200 mm (8") MINIMUM END BEARING ON MASONRY AND 65 mm (2 1/2") MINIMUM BEARING ON STEEL UNLESS INDICATED OTHERWISE.
- WHERE BACK-TO-BACK ANGLES ARE USED AS LITELS OR SUPPORTS, STITCH WELD TOGETHER AT A MAXIMUM SPACING OF 300mm (12") O.C.
- ALL ROOF OPENINGS TO BE REINFORCED BY FRAMES PER TYP. DETAIL UNLESS NOTED OTHERWISE. MAXIMUM SPAN 2000 mm (6'-4"). FOR LARGER OPENING CONSULT STRUCTURAL ENGINEER. COORDINATE WITH MECHANICAL, ELECTRICAL AND SUB-TRADES TO AVOID INTERFERENCE WITH STRUCTURAL MEMBERS.
- PROVIDE TEMPORARY BRACING TO KEEP STRUCTURE SAFE AND PLUMB UNTIL PERMANENT BRACING SHOWN ON DRAWINGS INCLUDING FLOORS AND ROOFS IS CONSTRUCTED.

**METAL DECK**

- DESIGN METAL DECK IN CONFORMANCE WITH THE REQUIREMENTS OF CSA S136 FOR THE LOADS INDICATED ON THE DRAWINGS.
- UNLESS NOTED OTHERWISE, ROOF DECK SHALL BE 38 mm x 0.91 mm (1.5" x .036") VIC WEST STEEL INC. RD 938 (OR APPROVED EQUAL), MINIMUM 3 SPANS CONTINUOUS.
- UNLESS NOTED OTHERWISE, FLOOR DECK SHALL BE 38 mm x 0.76 mm (1.5" x .030") VIC WEST STEEL INC. #8938 (OR APPROVED EQUAL), MINIMUM 3 SPANS CONTINUOUS.
- METAL DECK SHALL BE LIGHT ZINC COATED STRUCTURAL STEEL SHEET DESIGNATED AND ERECTED IN ACCORDANCE WITH CSSBI 101M, CAN/CSA S136, AND CSSBI 101M. THE MINIMUM ZINC COATING DESIGNATION SHALL BE ZF70/5 U.N.O.
- DECK SHALL OVERLAP A MINIMUM OF 50 mm (2") AT ALL END JOINTS AND HAVE A MINIMUM BEARING LENGTH OF 50 mm (2") ON ALL STRUCTURAL STEEL.
- DECK HAS BEEN DESIGNED FOR DIAPHRAGM ACTION AND SHALL BE FASTENED AS FOLLOWS U.N.O.: WELD DECK TO SUPPORTING STEEL WITH 20 mm (3/4") DIAMETER PLUG WELD AT TRANSVERSE WELD SPACING = 300 mm (12") O.C. PERIMETER WELD SPACING = 400 mm (12") O.C. SIDE LAP BUTT JUNCTIONS = 300 mm (12") O.C. LONGITUDINAL WELD SPACING = 300 mm (12") O.C.
- DECK WELDS SHALL BE TOUCHED UP WITH APPROVED PAINT BY THE DECK ERECTOR.
- STEEL DECK WORK SHALL INCLUDE THE SUPPLY AND INSTALLATION OF ALL SHEET STEEL ANGLES, COVER PLATES, CLOSURES, STIFFENERS AND ANY OTHER ACCESSORIES REQUIRED.
- CUT OPENINGS AND REINFORCE EDGES AS REQUIRED FOR PIPES, DUCTS, ETC.
  - THE MAXIMUM SIZE OF AN UNREINFORCED OPENING IS 150 mm (6").
  - REINFORCE ALL OPENINGS LARGER THAN 150mm (6"), BUT NOT EXCEEDING 450 mm (18"), AS INDICATED BY THE METAL DECK SUPPLIER.
  - FOR OPENINGS GREATER THAN 450mm (18") NOT SHOWN ON THE DRAWINGS, CONTACT ENGINEER FOR DIRECTION.
- HANGER WIRE FOR SUSPENDED CEILINGS SHOULD PERCE BOTH SIDES OF THE FLUTE AND BE LOOPED AROUND AND TIED.

**OPEN WEB STEEL JOISTS**

- OPEN WEB STEEL JOISTS (OWS) SHALL CONFORM TO CSA STANDARDS S16 AND CAN/CSA S16.
- WELDING OF STRUCTURAL STEEL SHALL CONFORM TO THE REQUIREMENTS OF CSA STANDARD W59 AND SHALL BE UNDERTAKEN BY A FABRICATOR AND DIRECTOR FULLY APPROVED BY THE GRANULAR WELDING SPECIAL TO THE REQUIREMENTS OF CSA STANDARD W61 DIVISION 1 AND DIVISION 2. FABRICATOR TO SUPPLY CERTIFICATION OF FUSION WELDING AND WELDING MAY ONLY BE



**MASONRY**

- CONCRETE MASONRY UNITS SHALL CONFORM TO THE CSA CAN/CSA A166 AND SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 15MPa BASED ON NET CROSS SECTIONAL AREA.
- REINFORCING BARS SHALL CONFORM TO CAN/CSA C22.18 GRADE 400W FOR REINFORCING STEEL WITH MINIMUM YIELD STRENGTH OF FY = 400 MPa.
- TYPE S MORTAR SHALL BE USED THROUGHOUT FOR LOAD BEARING BLOCK. TYPE N MORTAR SHALL BE USED FOR BRICK VENEER OR DECORATIVE NON-LOAD BEARING BLOCK.  
MORTAR TYPE S - MIN. COMPRESSIVE STRENGTH- 12.0 MPa  
MORTAR TYPE N - MIN. COMPRESSIVE STRENGTH- 7.5 MPa  
GROUT SHALL CONFORM TO CAN/CSA A179  
GROUT MIN. COMPRESSIVE STRENGTH- 20 MPa
- ALL MASONRY CONSTRUCTION SHALL CONFORM TO THE REQUIREMENTS OF CSA STANDARDS CAN/CSA-A307, CAN/CSA-A371 AND CSA S304.1.
- ALL MASONRY WALLS SHALL BE HORIZONTALLY REINFORCED. MINIMUM REQUIREMENTS WITH (4.75 mm Ø) HEAVY DUTY "JACOBY" TYPE JOINT REINFORCEMENT (OR APPROVED EQUAL) AND CONTINUOUS REINFORCEMENT AT EVERY SECOND COURSE (400 mm/16").  
a. ALL JOINT REINFORCEMENT SHALL BE HOT DIPPED GALVANIZED.  
b. REINFORCEMENT SHALL BE LAPPED A MINIMUM OF 300mm (12") AT ALL JOINTS.  
c. PREFABRICATED CORNER AND TEE REINFORCEMENT SHALL BE USED AT ALL WALL INTERSECTIONS.  
d. REINFORCEMENT SHALL BE PLACED AS TO PROVIDE 16 mm (5/8") MORTAR COVER ON THE EXTERIOR FACE OF WALL AND 12 mm (1/2") COVER ON THE INTERIOR FACE OF WALL.
- UNLESS NOTED OTHERWISE, PROVIDE CONTINUOUS BOND BEAMS (REINFORCED WITH 1-19M) AT UNDERSIDE OF EACH FLOOR, ROOF AND AT TOP OF PARAPETS. ALSO PROVIDE BOND BEAMS AT TOP AND BOTTOM OF OPENINGS AND EXTEND 600mm PAST CORNERS. REINFORCE BOTTOM BOND BEAM WITH 1-19M. REINFORCE TOP BOND BEAM AS FOLLOWS:  
- SPANS LESS THAN 1500 mm  
- 200mm DEEP BOND BEAM c/w 1-19M FULL LENGTH  
- SPANS 1500 mm TO 3000 mm  
- 400mm DEEP BOND BEAM c/w 2-19M FULL LENGTH
- IN SEISMIC ZONES, IN ADDITION TO NOTE # 6 PROVIDE CONTINUOUS BOND BEAMS (REINFORCED WITH 1-19M) AT MAXIMUM VERTICAL INTERVALS OF 2400 mm O.C.
- ALL TIES FOR MASONRY VENEER SHALL BE DESIGNED AND SUPPLIED BY THE MASONRY CONTRACTOR IN ACCORDANCE WITH CSA STANDARDS S304.1 AND CAN/CSA-A370.
- ALL BLOCK MASONRY UNITS SHALL BE CONSTRUCTED WITH FULL HEAD JOINTS, AND FULL BED JOINTS UNDER THE FULL BEARING AREAS OF THE FACE SHELLS, AND UNDER WEBS SURROUNDING THOSE CELLS TO BE FILLED WITH GROUT.
- WHERE MASONRY THICKNESS CHANGES, GROUT 100% SOLID MIN. 200mm (8") THE LOWER/THICKER PORTION OF THE WALL.
- GROUT 100% SOLID BLOCKS AT PARAPETS.
- THE INTERSECTION OF ALL MASONRY WALLS SHALL BE TOOTHED OR CONTINUOUSLY REINFORCED WITH JOINT REINFORCEMENT.
- ALL MASONRY BENEATH CONCENTRATED LOADS (SUCH AS BEAMS, LINTELS AND JOISTS) SHALL BE SOLID BLOCKS OR 100% GROUTED BLOCKS FOR A MINIMUM DEPTH OF 400 mm (16") OR 3 TIMES THE LENGTH OF BEARING AND PROJECTING A MINIMUM OF 200 mm (8") ON THE LENGTH OF BEARING BEYOND EACH EDGE OF BEARING, UNLESS OTHERWISE NOTED OR SHOWN.
- MAINTAIN SUPPORT OF MASONRY LINTELS FOR A MINIMUM OF SEVEN DAYS OR UNTIL SUFFICIENT STRENGTH IS GAINED TO SAFELY SUPPORT LOADS IMPPOSED.
- WHERE STEEL BEARING PLATES ARE SHOWN ON THE DRAWINGS, THEY SHALL BE ANCHORED WITH A MINIMUM OF TWO 15M x 300mm LONG x 75mm HOOKED ANCHOR RODS WELDED TO THE PLATES AND EMBEDDED INTO GROUT FULL AS NOTED ABOVE.
- SEE PLANS AND SCHEDULES REGARDING LINTEL SIZES FOR MASONRY WALLS AND VENEER.  
FOR ALL OPENINGS OR RECESSES IN MASONRY NOT SHOWN ON DRAWINGS GREATER THAN 300mm (12") AND UP TO 1200mm (4FT), INCLUDING THOSE FOR MECHANICAL OR ELECTRICAL SERVICES OR EQUIPMENT, PROVIDE ONE L8x8x9x4 (L3 1/2 x 3 1/2 x 1 1/4) ANGLE FOR EACH 100mm (4") THICKNESS OF WALL.
- ALL MASONRY WALLS SHALL BE ADEQUATELY BRACED DURING CONSTRUCTION UNTIL ADEQUATE DIAPHRAGM ACTION CAN BE DEVELOPED BY INSTALLED FLOOR AND ROOF STRUCTURAL COMPONENTS.
- REFER TO ARCHITECTURAL DRAWINGS FOR LOCATIONS OF MASONRY CONTROL JOINTS. SPACING OF CONTROL JOINTS IN ALL WALLS SHALL BE CONSTRUCTED AS PER PLAN BUT SHALL NOT EXCEED 7200 mm (25'-0"). ALL REINFORCING TO BE DISCONTINUED AT CONTROL JOINTS. CONTROL JOINTS SHALL BE CALKED WITH FOAM BACKER ROD AND SHALL NOT BE FILLED WITH MORTAR.
- REINFORCED MASONRY:  
a. CELLS TO BE REINFORCED SHALL BE KEPT CLEAN OF MORTAR.  
b. GROUT FOR REINFORCED CELLS BOND BEAMS, LINTELS AND CELLS CONTAINING DOWELS, ANCHOR BOLTS AND INSERTS PER NOTE #3.  
c. PROVIDE MINIMUM 2-19M VERTICALS FULL HEIGHT AT ALL WALL ENDS, CORNERS, INTERSECTIONS AND OPENINGS UNLESS OTHERWISE NOTED ON DRAWINGS.  
d. PROVIDE 1-19M VERTICAL FULL HEIGHT EACH SIDE OF MOVEMENT JOINTS.  
e. DOWELS FROM FOUNDATIONS TO MATCH VERTICAL REINFORCEMENT IN WALL.  
f. PROVIDE THE FOLLOWING LAPS FOR THE REINFORCEMENT INDICATED:  
- 10M BARS = 450 mm (18")  
- 19M BARS = 600 mm (24")  
- 20M BARS = 900 mm (36")  
EMBEDDED TIES ARE NOT TO INTERFERE WITH THE INTEGRITY OF THE MASONRY WALL OR LOCATION OF REINFORCEMENT. PROVIDE FULLY GROUTED LINTEL BEAM FOR CONDUITS AND PIPES RUNNING HORIZONTALLY WITHIN WALL.
- PROVIDE COLD WEATHER PROTECTION AS REQUIRED BY CAN/CSA-A371.

**BRICK VENEER LINTEL SCHED.**  
(max 4" thickness)

MAX. CLEAR SPAN	SIZE	REMARKS
UP TO 1200 (4'-0")	L8x8x9x7.9 L3 1/2' x 3 1/2' x 5/16"	
1201 TO 1800 (4'-0" TO 6'-0")	L127x89x8 (LLV) L5' x 3 1/2' x 5/16" (LLV)	
1801 TO 2400 (6'-0" TO 8'-0")	L152x89x8 (LLV) L6' x 3 1/2' x 5/16" (LLV)	

**NOTES:**  
1. LINTEL BEARING LENGTH TO BE MIN. 6".  
2. ALL STRUCTURAL STEEL MEMBERS TO BE HOT DIPPED GALVANIZED.  
3. SEE ARCHITECTURAL DRAWINGS FOR SPANS.

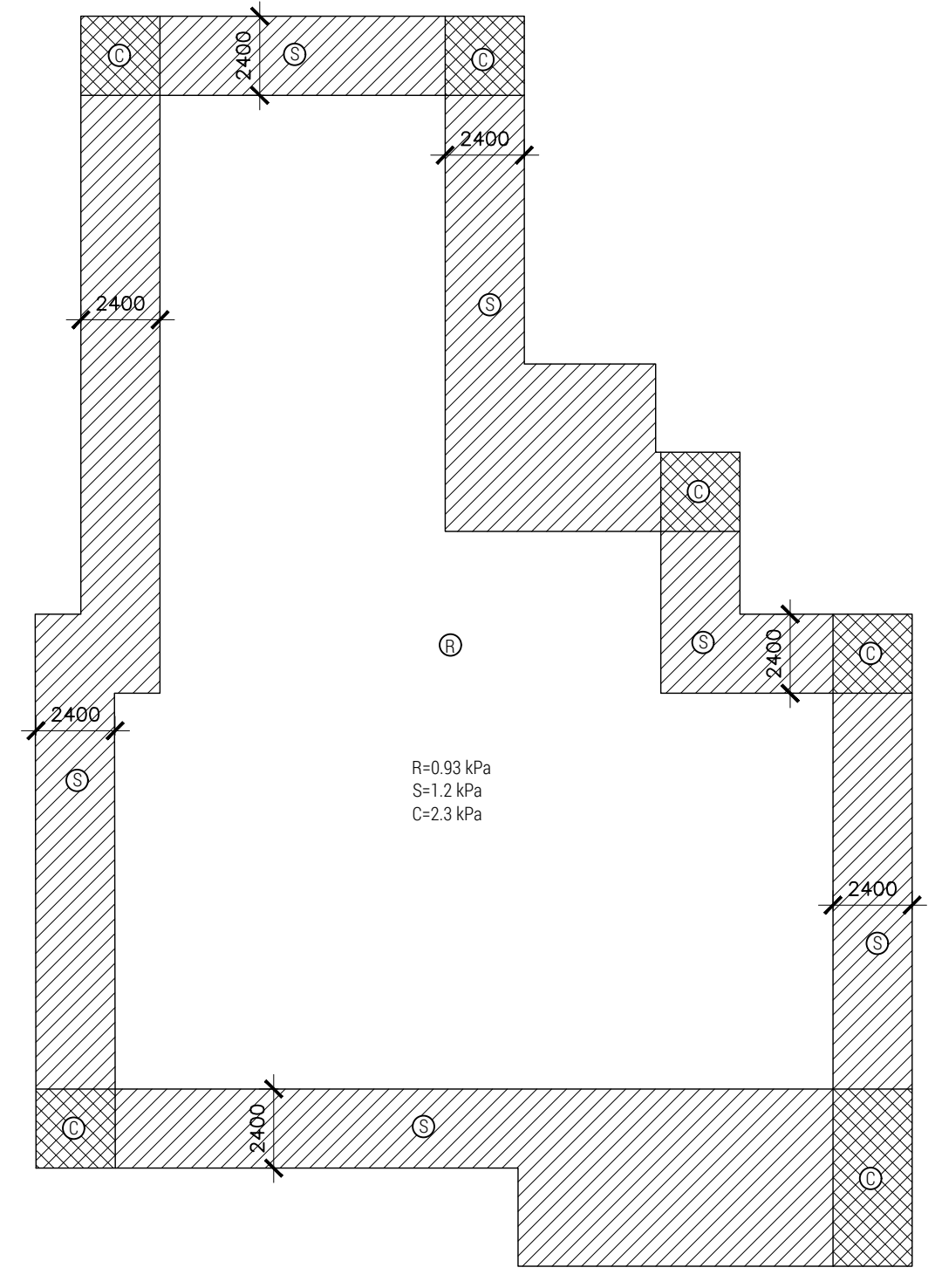
CONSTRUCTION DETAIL	MIN. LENGTH OF NAILS mm (")	MIN. NUMBER OR SPACING OF NAILS
FLOOR / CEILING JOIST TO PLATE	82 (3 1/4)	2
BUILT UP HEADERS / LINTELS - ALONG LENGTH - SPACING OF ROWS	76 (3)	300mm (12") O.C. 64mm (2 1/2") O.C.
STUD TO WALL PLATE - END NAIL - TOE NAIL	82 (3 1/4) 64 (2 1/2")	2 4
DOUBLE STUDS AT OPENINGS, OR STUD WALLS	76 (3)	750mm (30" O.C.)
BOTTOM WALL PLATE TO JOISTS OR BLOCKING	82 (3 1/4)	400mm (16") O.C.
LINTELS TO STUDS - EA. END	82 (3 1/4)	50mm (2") O.C. VERT. EACH DI V
ROOF RAFTER / TRUSS TO PLATE	82 (3 1/4)	3
ROOF RAFTER TO RIDGE BOARD - TOE OR END NAIL	82 (3 1/4)	3
COLLAR TIE TO RAFTER (U.N.O.)	76 (3)	3
WALL SHEATHING TO STUDS - ALONG EDGES - INTERMEDIATE SUPPORTS	51 (2) 51 (2)	150mm (6") O.C. 300mm (12") O.C.

**ABBREVIATIONS**

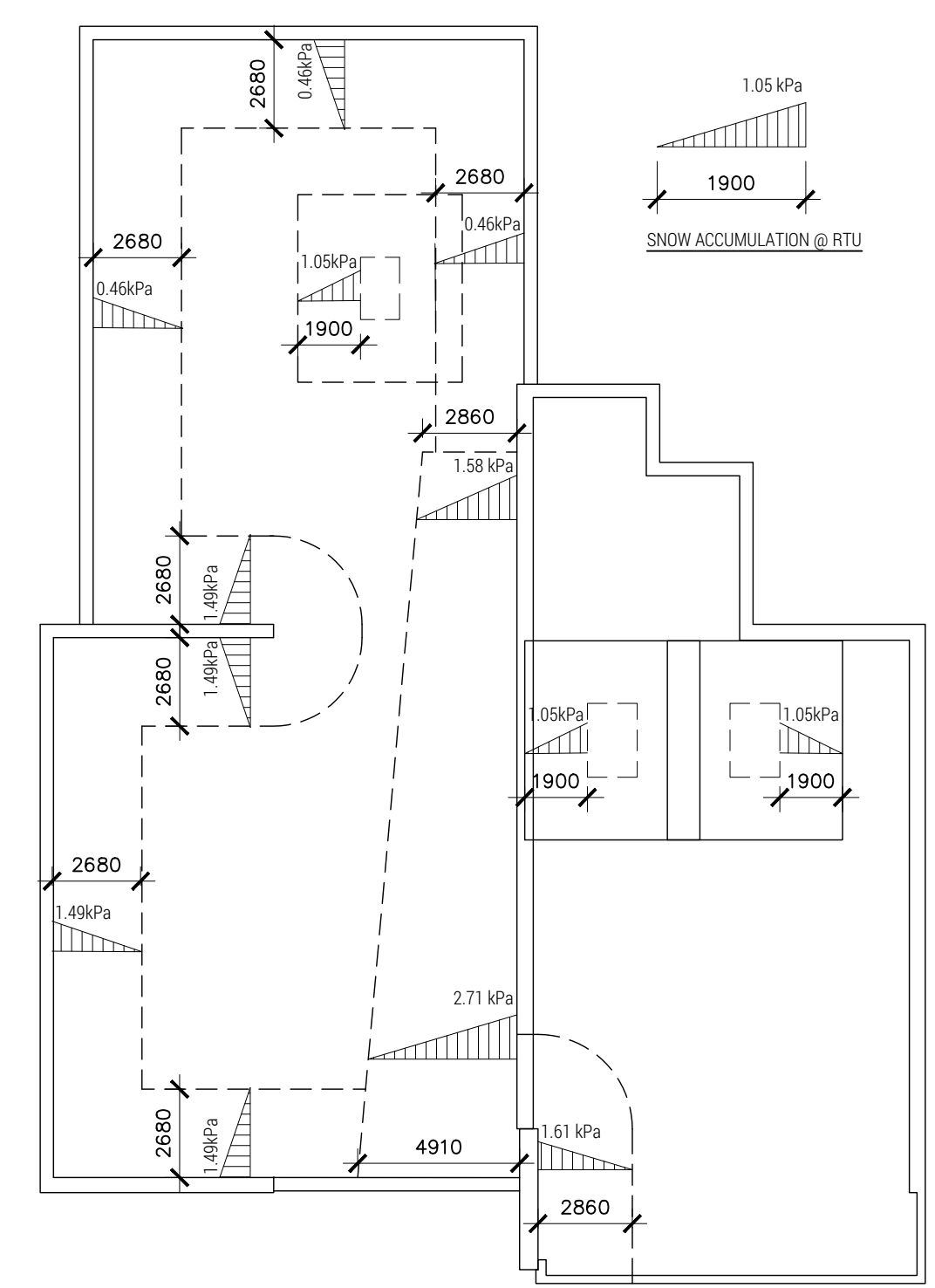
A.B	ANCHOR BOLT	HD	HOOKED
ALT.	ALTERNATE	I.D.	INSIDE DIAMETER
ALUM.	ALUMINUM	kn	KILONEWTON
ANCHS	ANCHORS	kgPa	KILOPASCAL
APPROX	APPROXIMATELY	°	ANGLE
ARCH.	ARCHITECTURAL	L.L.H.	LONG LEG HORIZONTAL
B/P	BOTTOM FACE	L.L.V.	LONG LEG VERTICAL
B.PL	BASE PLATE	L.P.	LOW POINT
BLK	BLOCK	LG	LONG
BM	BEAM	MAX	MAXIMUM
BOT.	BOTTOM	MECH	MECHANICAL
BRG.	BEARING	METAL	METAL
BT.PL	BENT PLATE	MM	MMIMUM
C/W	COMPLETE WITH	MSC	MISCELLANEOUS
C/C	CENTRE TO CENTRE	m	METRE
C.J.	CONTROL JOINT	mm	MILLIMETRE
CLG.	CEILING	MPa	MEGAPASCAL
COL.	COLUMN	N/C	NOT IN CONTRACT
CONC.	CONCRETE	N.T.S.	NOT TO SCALE
CONN.	CONNECTION	No.	NUMBER
CONSTRN	CONSTRUCTION	O.C.	ON CENTRE
CONT.	CONTINUOUS	O.D.	OUTSIDE DIAMETER
DEM.	DEMOLITION	OH	OVERHEAD
DET.	DETAIL	OPEN	OPEN
DIA.	DIAMETER	PARTN	PARTITION
DIM.	DIMENSION	PL	PLATE
DTTO	DITTO	R.C.	REINFORCED CONCRETE
DEP.	DEEP	R.D.	ROUGH OPENING
DWG.	DRAWING	R.O.	ROUGH OPENING
DWL	DOWEL	REF.	REFERENCE
E.F.	EACH FACE	REINFC	REINFORCED
E.E.	EXPANSION JOINT	REQD	REQUIRED
ELEC.	ELECTRICAL	S.C.	SAW CUT
EMBED	EMBEDMENT	S.D.F.	STEP DOWN FOOTING
E.S.	EACH SIDE	SECT.	SECTION
E.W.	EACH WAY	S.L.H.	SHORT LEG HORIZONTAL
EA	EACH	S.L.V.	SHORT LEG VERTICAL
EL.	ELEVATION	S.O.G.	SLAB ON GRADE
EQ.	EQUAL	STL	STEEL
EX'G	EXISTING	STIFF.	STIFFENER
F.F.	FACE TO FACE	STRUCT.	STRUCTURAL
FIN.	FINISHED	T/O	TOP OF
FLR.	FLOOR	T.L.L.	TOP LOWER LAYER
FNDR.	FOUNDATION	T.U.L.	TOP UPPER LAYER
FTG.	FOOTING	TYP.	TYPICAL
GA.	GAUGE	U.N.	UNLESS NOTED OTHERWISE
GA.LV.	GALVANIZED	US.	UNDRSIDE
GRD.	GRADE	VERT.	VERTICAL
H.D.	HEAVY DUTY	V.E.F.	VERTICAL EACH FACE
H.D.G.	HOT DIPPED GALVANIZED	V.I.F.	VERTICAL INSIDE FACE
H.E.F.	HORIZONTAL EACH FACE	V.O.F.	VERTICAL OUTSIDE FACE
H.O.F.	HORIZONTAL OUTSIDE FACE	W.P.	WORKING POINT
HORIZ.	HORIZONTAL	W.W.M.	WELDED WIRE MESH
H.P.	HIGH POINT	@	SPACED AT
HSS	HOLLOW STRUCTURAL STEEL		

**DESIGN DATA TABLE**

BUILDING IMPORTANCE	NORMAL	
FLOOR AND ROOF DESIGN LIVE LOADS ARE NOTED ON DRAWING PLANS		
SPECIFIED SNOW LOADS		
RAIN LOADING DESIGN DATA (I/S)	24h RAIN	108mm
SNOW LOADING DESIGN DATA (I/S)	Sa	1.3 kPa
	Sl	0.4 kPa
BASIC ROOF SNOW LOAD	S	1.44 kPa
ADDITIONAL SNOW ACCUMULATION IS SHOWN ON THE DRAWINGS		
SPECIFIED WIND LOADS		
HOURLY WIND PRESSURE DESIGN DATA (I/S)		0.43 kPa
WIND DESIGN CATEGORY	T/O	CATEGORY 2
TERRAIN TYPE		OPEN
SPECIFIED EARTHQUAKE LOADS		
SEISMIC LOADING DESIGN DATA	Sa (0.2)	0.191
	Sa (0.5)	0.103
	Sa (1.0)	0.054
	Sa (2.0)	0.026
	Sa (5.0)	0.0064
SITE CLASS TO BE CONFIRMED BY GEOTECHNICAL ENGINEER	Sa (10.0)	0.0025
	SITE CLASS	D
SEISMIC FORCE MODIFICATION FACTORS FOR SEISMIC FORCE RESISTING SYSTEM	Rd	1.5
	Ro	1.5
SEISMIC HAZARD INDEX	IpfSa (0.2)	0.24
<b>NOTES:</b> 1. THE FOUNDATION WALLS HAVE BEEN DESIGNED ASSUMING THAT THEY ARE NOT SUBJECT TO HYDROSTATIC PRESSURE. G.C. TO PROVIDE PROPER DRAINAGE IF UNDERGROUND WATER EXISTS.		



**GROSS SPECIFIED WIND UPLIFT**



**SNOW ACCUMULATION DIAGRAM**

**NOTE TO CONTRACTOR:**  
DO NOT SCALE DRAWINGS. CONTRACTORS MUST CHECK AND VERIFY ALL DIMENSIONS AND REPORT ANY DISCREPANCIES TO THE ENGINEER BEFORE PROCEEDING WITH THE WORK. ALL DRAWINGS REMAIN THE PROPERTY OF THE ENGINEER AND SHALL NOT BE REPRODUCED OR REUSED WITHOUT THE ENGINEER'S WRITTEN PERMISSION.  
  
THE OWNER/ARCHITECT/CONTRACTOR IS ADVISED THAT D.F. ENGINEERING INC. CANNOT CERTIFY ANY COMPONENT OF THE SITE WORKS NOT INSPECTED DURING CONSTRUCTION. IT IS THE RESPONSIBILITY OF THE GENERAL CONTRACTOR TO NOTIFY D.F. ENGINEERING INC. PRIOR TO COMMENCEMENT OF CONSTRUCTION TO ARRANGE FOR INSPECTION.

ISSUED FOR TENDER	2	2023-05-31
ISSUED FOR BUILDING PERMIT	1	2023-05-26

**DFE**  
**DOYTSCH & FILO ENGINEERING INC.**  
Structural Engineers

  
 T. N. DOYTSCH  
 100113262  
 2023-05-26  
 PROVINCE OF ONTARIO

Phones: (947) 836-4805 • (905) 719-1482

PROJECT  
**HOLY FAMILY CEMETERY  
CREMATORIUM BUILDING**

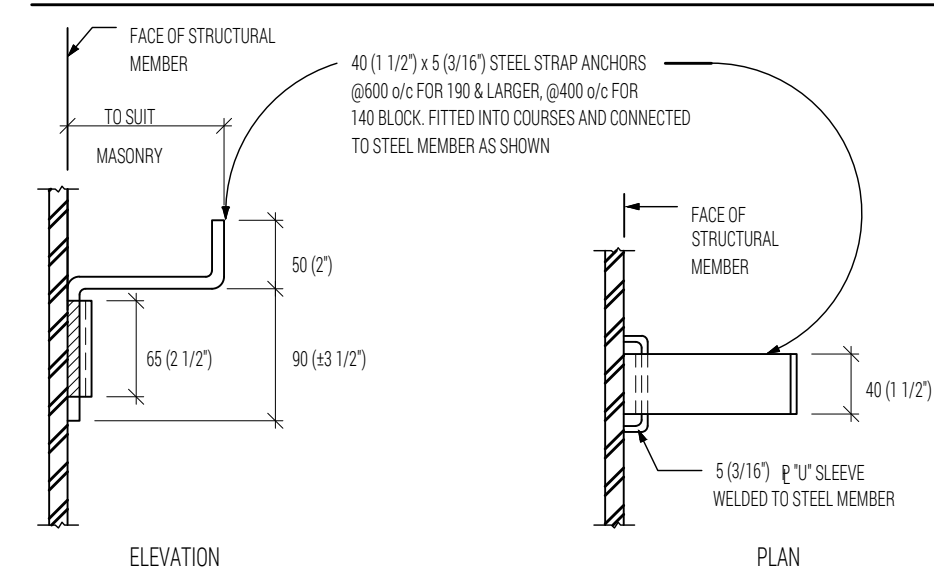
2523 LOWER BASE LINE ROAD, MILTON, ON

DRAWING  
**GENERAL NOTES**

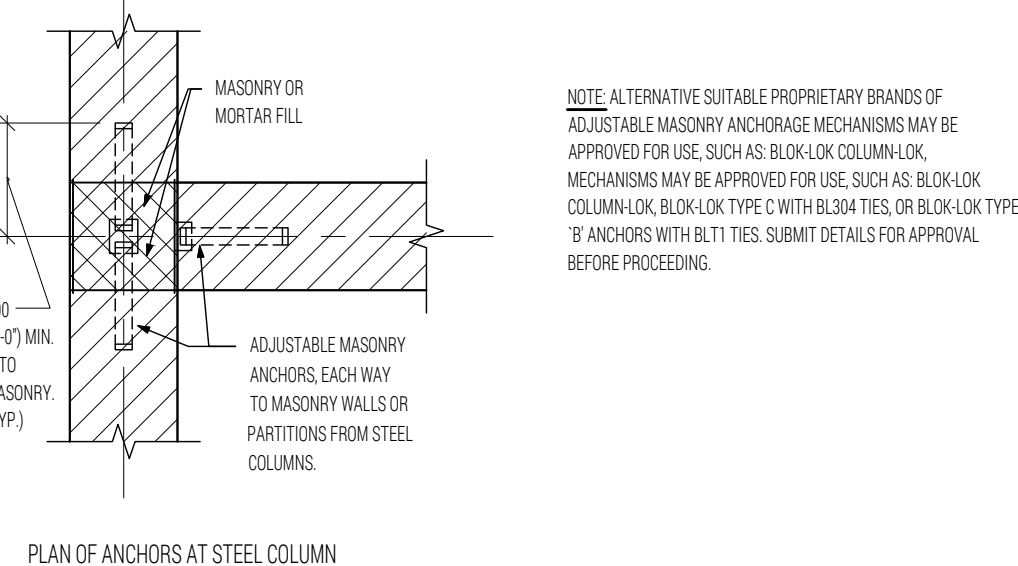
Design By:	TD/AF	Date:	2021-09-16
Drawn By:	AF	Project No.:	21091001
Scale:	AS NOTED	Drawing No.:	<b>S0.1</b>



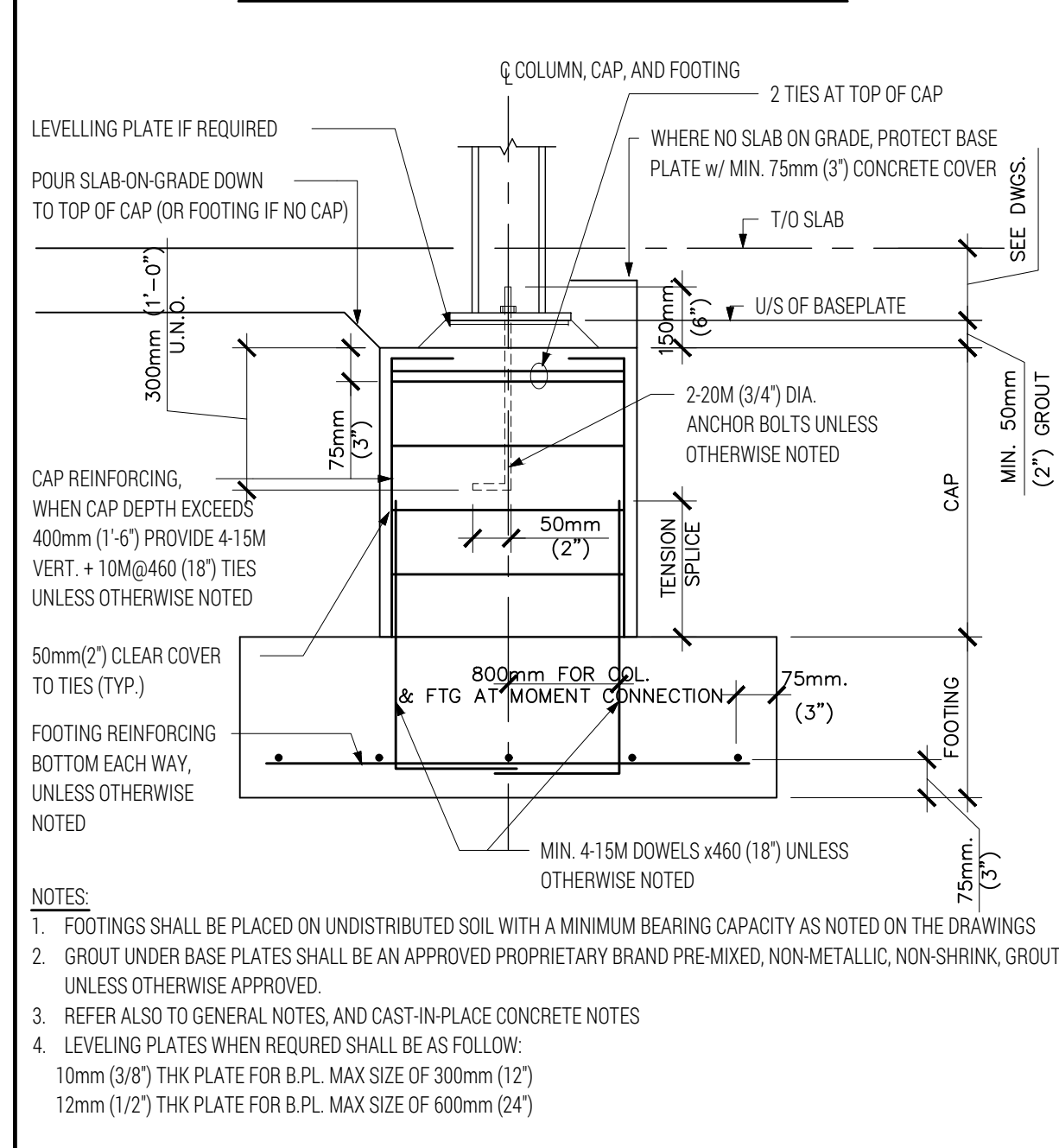
**ADJUSTABLE MASONRY ANCHORS TO STRUCTURAL STEEL**



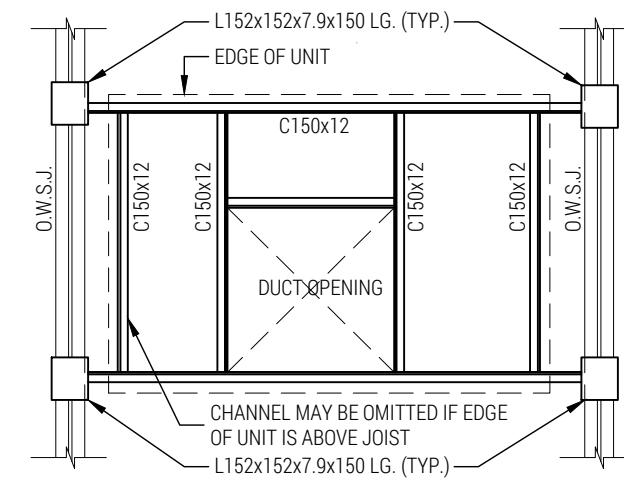
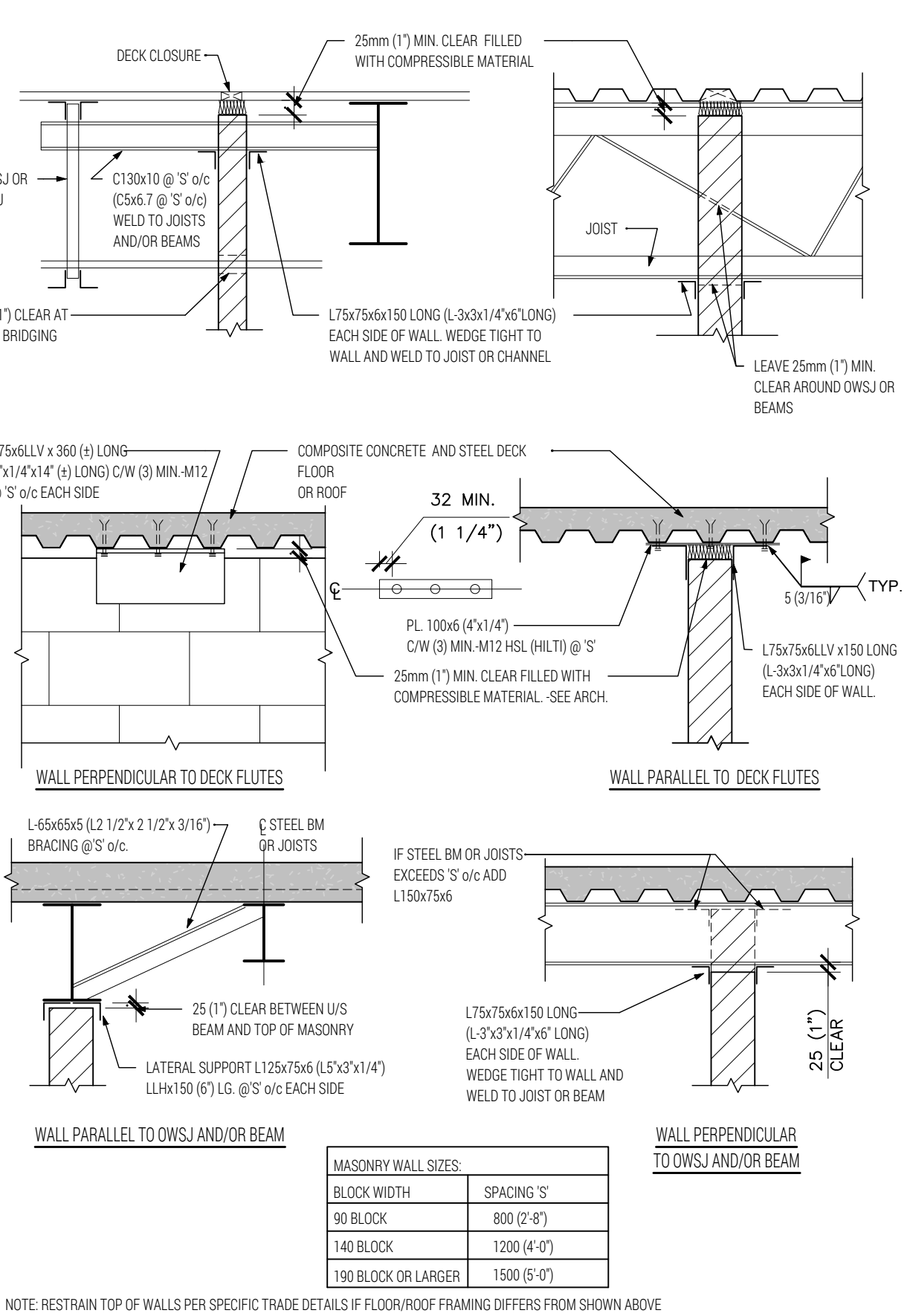
**MASONRY ANCHOR DETAILS**



**TYPICAL STEEL COLUMN FOUNDATION**

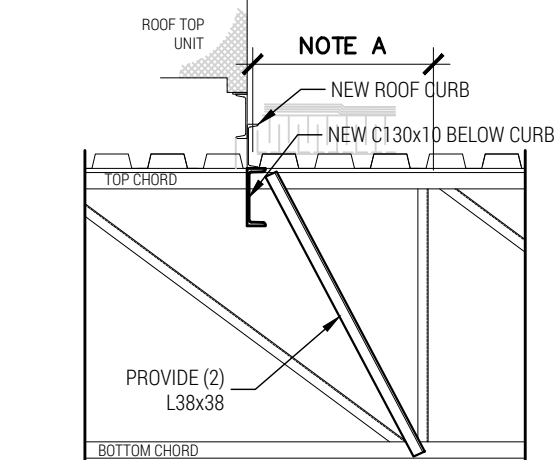


**LATERAL SUPPORT AT TOP OF NON-LOADBEARING MASONRY WALLS**



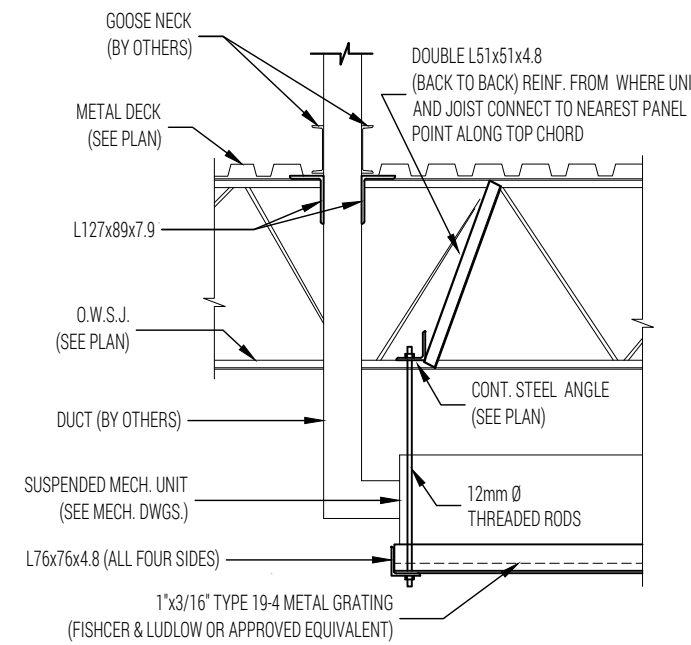
**TYP. FRAMING PLAN DETAIL**

FOR MECHANICAL UNITS ABOVE DECK AND FRAMING AROUND OPENINGS N.T.S.

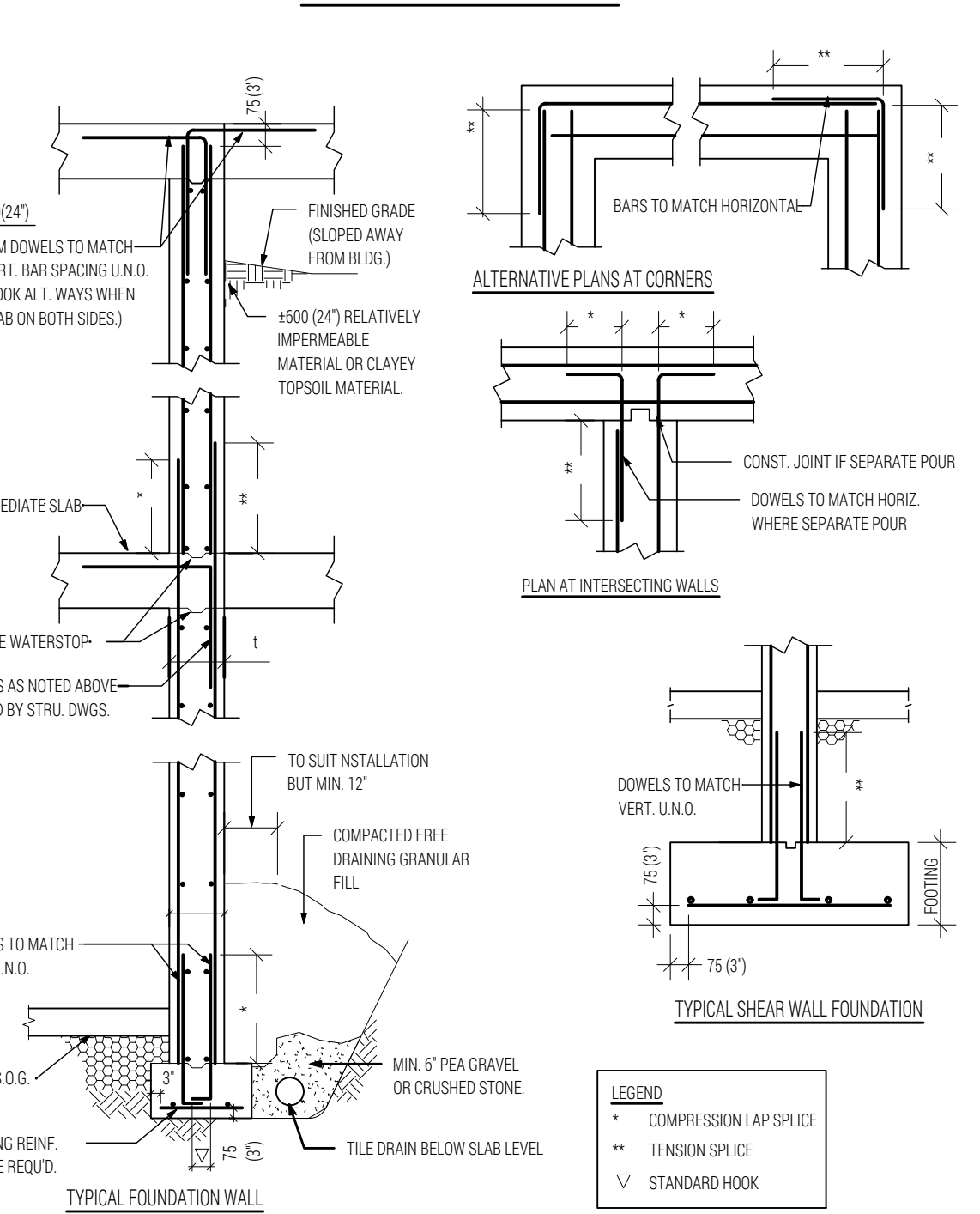


**TYP. SECTION DETAIL**

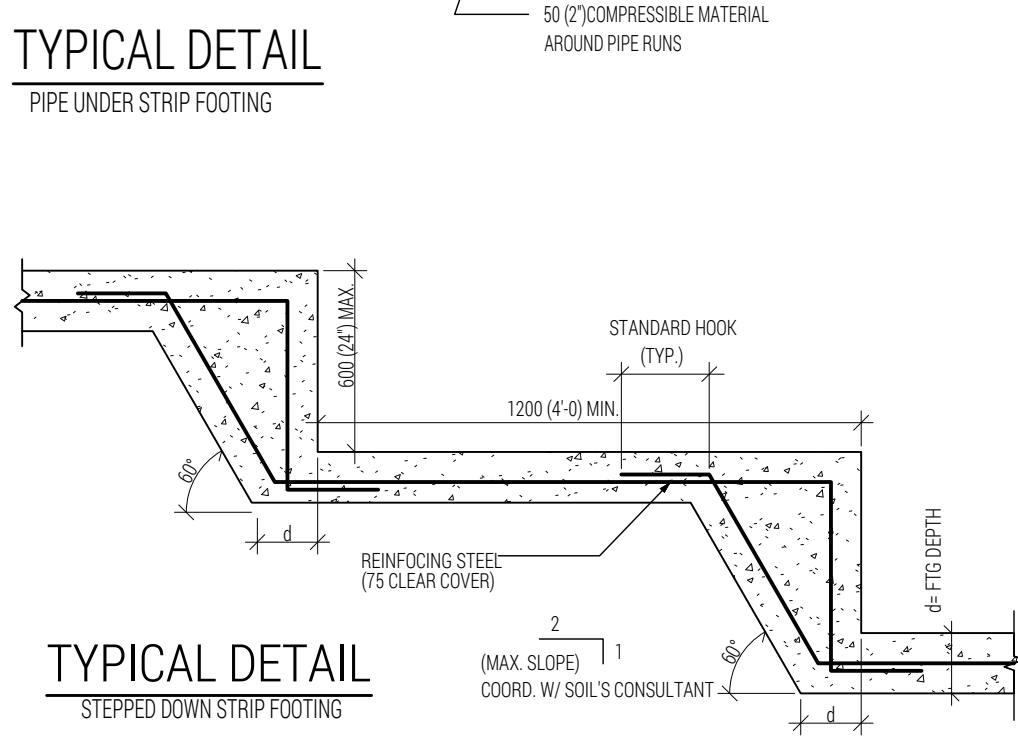
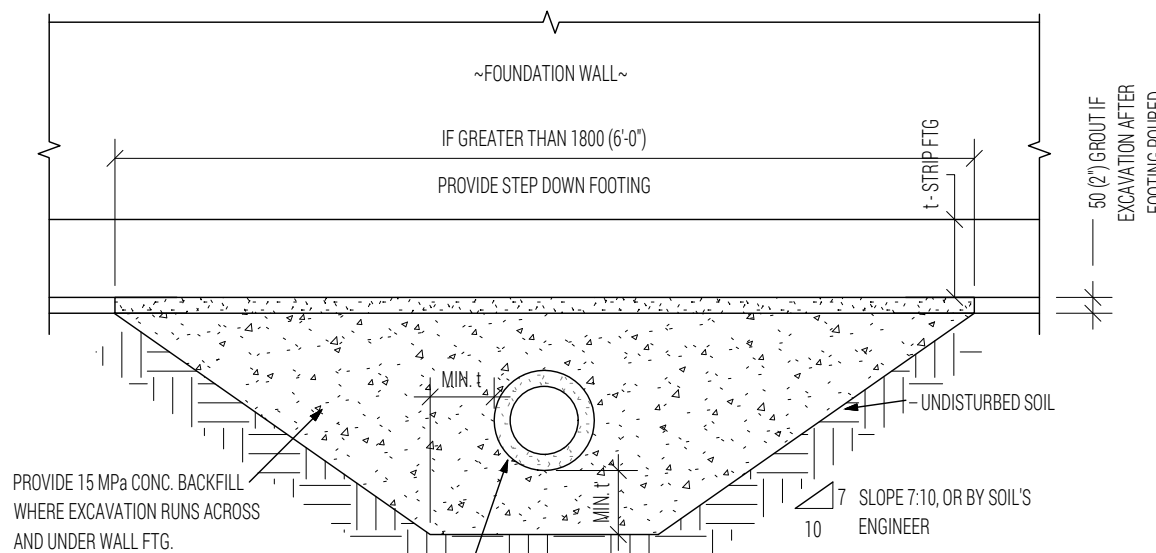
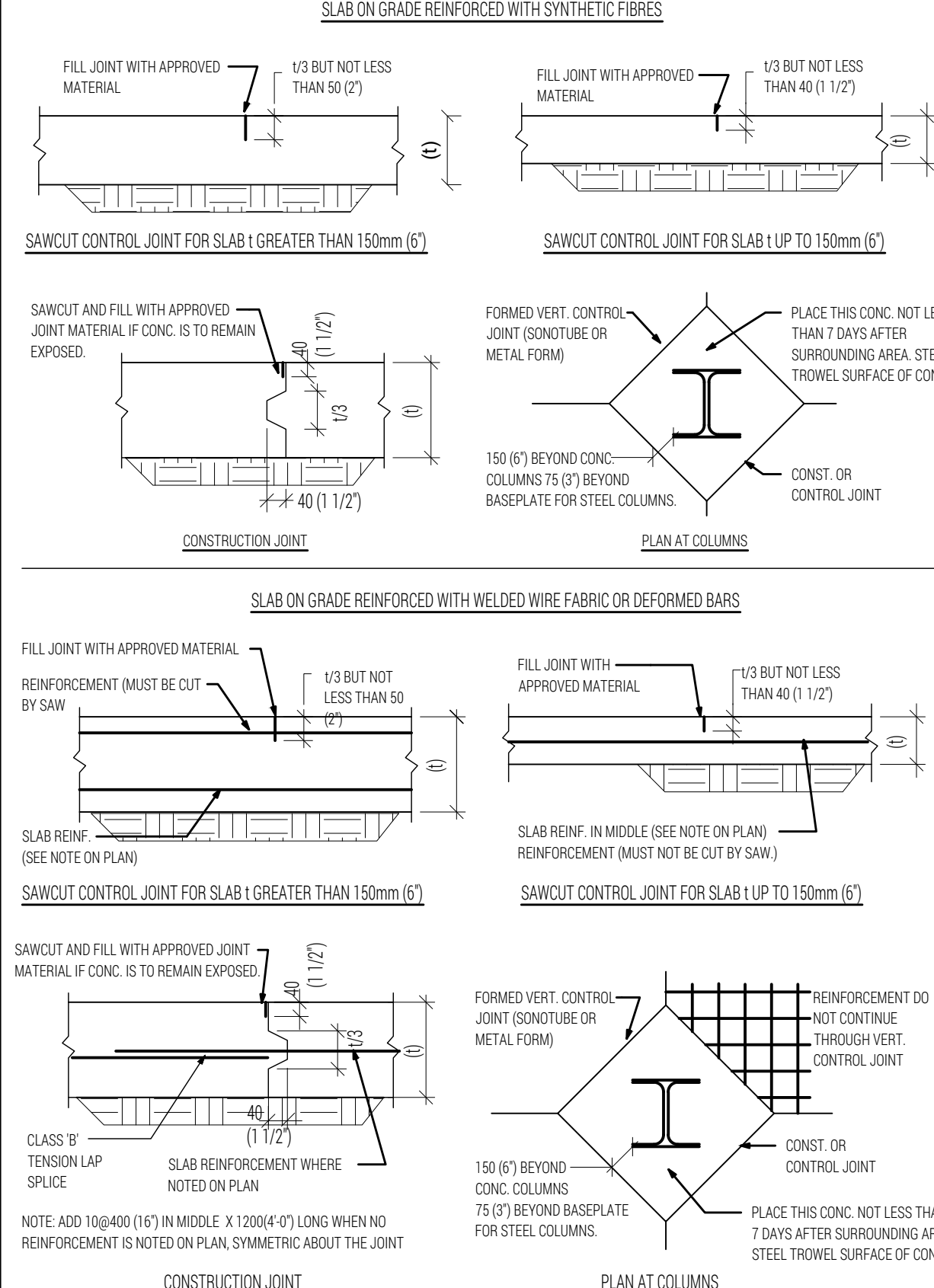
FOR UNITS SUSPENDED BELOW JOISTS N.T.S.



**CONCRETE WALLS**



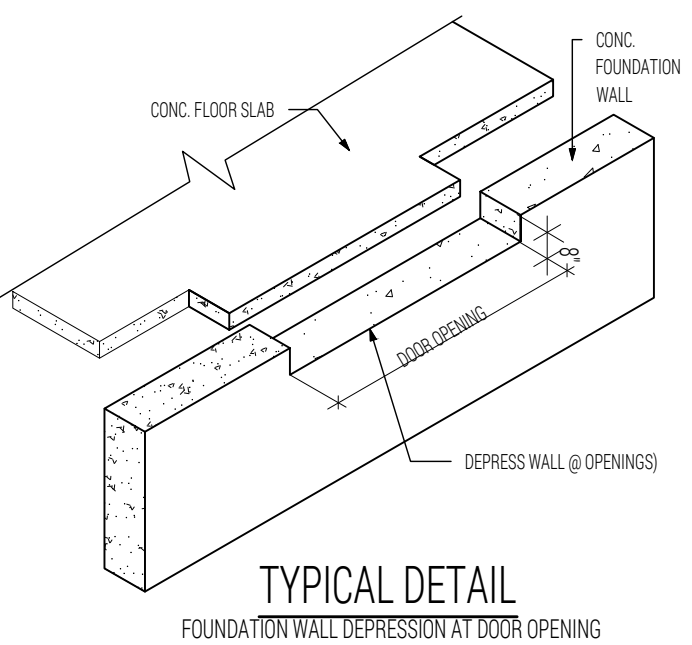
**TYPICAL SLAB ON GRADE DETAILS**



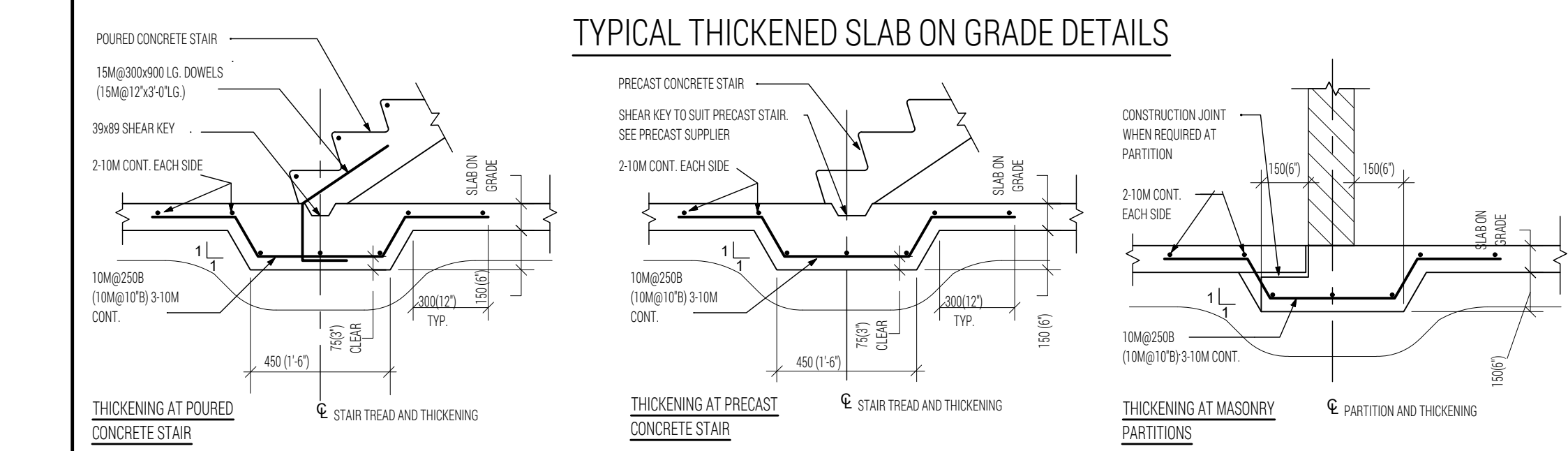
**NON-LOAD BEARING BLOCK LINTEL SCHED.**

WIDTH	<1220 (4'-0")		~1830 (6'-0")		~2440 (8'-0")		~3080 (10'-1 1/8")		~3660 (12'-0")		SECTION DETAIL
	VER 1	VER 2	VER 1	VER 2	VER 1	VER 2	VER 1	VER 2	VER 1	VER 2	
100 (4")	(1) L8x8x6 (1) L3.12x3.12x1/4	(2) L5.4x4x6 (2) L3.3x4.3x3/16 (1) L3.3x4.3x3/16	(1) L8x8x6 (L.L.V.) (1) L3.12x3.12x1/4 (L.L.V.)	(2) L5.4x4x6 (L.L.V.) (2) L3.3x4.3x3/16 (L.L.V.) (1) L3.3x4.3x3/16 (L.L.V.)	(1) L8x8x6 (L.L.V.) (1) L3.12x3.12x1/4 (L.L.V.)	(2) L5.4x4x6 (L.L.V.) (2) L3.3x4.3x3/16 (L.L.V.) (1) L3.3x4.3x3/16 (L.L.V.)	(1) L8x8x6 (L.L.V.) (1) L3.12x3.12x1/4 (L.L.V.)	(2) L5.4x4x6 (L.L.V.) (2) L3.3x4.3x3/16 (L.L.V.) (1) L3.3x4.3x3/16 (L.L.V.)	(1) L8x8x6 (L.L.V.) (1) L3.12x3.12x1/4 (L.L.V.)	(2) L5.4x4x6 (L.L.V.) (2) L3.3x4.3x3/16 (L.L.V.) (1) L3.3x4.3x3/16 (L.L.V.)	
150 (6")	(1) L125x86x6 (L.L.V.) (1) L5.83x125x1/4 (L.L.V.)	(2) L5.83x65x6 (2) L2.72x125x1/4 (1) L5.83x65x6 (L.L.V.)	(1) L125x86x6 (L.L.V.) (1) L5.83x125x1/4 (L.L.V.)	(2) L5.83x65x6 (L.L.V.) (2) L2.72x125x1/4 (L.L.V.) (1) L5.83x65x6 (L.L.V.)	(1) L125x86x6 (L.L.V.) (1) L5.83x125x1/4 (L.L.V.)	(2) L5.83x65x6 (L.L.V.) (2) L2.72x125x1/4 (L.L.V.) (1) L5.83x65x6 (L.L.V.)	(1) L125x86x6 (L.L.V.) (1) L5.83x125x1/4 (L.L.V.)	(2) L5.83x65x6 (L.L.V.) (2) L2.72x125x1/4 (L.L.V.) (1) L5.83x65x6 (L.L.V.)	(1) L125x86x6 (L.L.V.) (1) L5.83x125x1/4 (L.L.V.)	(2) L5.83x65x6 (L.L.V.) (2) L2.72x125x1/4 (L.L.V.) (1) L5.83x65x6 (L.L.V.)	
200 (8")	(1) L158x86x6 (1) L5.83x158x1/4	(2) L5.83x102x1/4 (2) L5.83x102x1/4 (L.L.V.)	(1) L158x86x6 (L.L.V.) (1) L5.83x158x1/4 (L.L.V.)	(2) L5.83x102x1/4 (L.L.V.) (2) L5.83x102x1/4 (L.L.V.)	(1) L158x86x6 (L.L.V.) (1) L5.83x158x1/4 (L.L.V.)	(2) L5.83x102x1/4 (L.L.V.) (2) L5.83x102x1/4 (L.L.V.)	(1) L158x86x6 (L.L.V.) (1) L5.83x158x1/4 (L.L.V.)	(2) L5.83x102x1/4 (L.L.V.) (2) L5.83x102x1/4 (L.L.V.)	(1) L158x86x6 (L.L.V.) (1) L5.83x158x1/4 (L.L.V.)	(2) L5.83x102x1/4 (L.L.V.) (2) L5.83x102x1/4 (L.L.V.)	
250 (10")	(1) L192x86x6 (1) L5.83x192x1/4	(2) L5.83x124x1/4 (2) L5.83x124x1/4 (L.L.V.)	(1) L192x86x6 (L.L.V.) (1) L5.83x192x1/4 (L.L.V.)	(2) L5.83x124x1/4 (L.L.V.) (2) L5.83x124x1/4 (L.L.V.)	(1) L192x86x6 (L.L.V.) (1) L5.83x192x1/4 (L.L.V.)	(2) L5.83x124x1/4 (L.L.V.) (2) L5.83x124x1/4 (L.L.V.)	(1) L192x86x6 (L.L.V.) (1) L5.83x192x1/4 (L.L.V.)	(2) L5.83x124x1/4 (L.L.V.) (2) L5.83x124x1/4 (L.L.V.)	(1) L192x86x6 (L.L.V.) (1) L5.83x192x1/4 (L.L.V.)	(2) L5.83x124x1/4 (L.L.V.) (2) L5.83x124x1/4 (L.L.V.)	
300 (12")	(1) L226x86x6 (1) L5.83x226x1/4	(2) L5.83x156x1/4 (2) L5.83x156x1/4 (L.L.V.)	(1) L226x86x6 (L.L.V.) (1) L5.83x226x1/4 (L.L.V.)	(2) L5.83x156x1/4 (L.L.V.) (2) L5.83x156x1/4 (L.L.V.)	(1) L226x86x6 (L.L.V.) (1) L5.83x226x1/4 (L.L.V.)	(2) L5.83x156x1/4 (L.L.V.) (2) L5.83x156x1/4 (L.L.V.)	(1) L226x86x6 (L.L.V.) (1) L5.83x226x1/4 (L.L.V.)	(2) L5.83x156x1/4 (L.L.V.) (2) L5.83x156x1/4 (L.L.V.)	(1) L226x86x6 (L.L.V.) (1) L5.83x226x1/4 (L.L.V.)	(2) L5.83x156x1/4 (L.L.V.) (2) L5.83x156x1/4 (L.L.V.)	

NOTES:  
1. STRUCTURAL STEEL SHALL BE G40.21.  
2. BEARING LENGTH = 6" AT EACH END.  
3. CONNECT ANGLES @ 24" o/c BY WELDING OR BOLTING FOR ANGLES WITH A TOTAL LENGTH OF 6'-0" OR MORE.



**TYPICAL THICKENED SLAB ON GRADE DETAILS**



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ISSUED FOR TENDER	2	2023-05-31
ISSUED FOR BUILDING PERMIT	1	2023-05-26

**DFE**  
**DOYTCHE & FILO ENGINEERING INC.**  
Structural Engineers

PROFESSIONAL ENGINEER  
T.N. DOYTCHEV  
10013262  
2023-05-26  
PROVINCE OF ONTARIO

Phones: (647) 836-4805 • (905) 719-1482

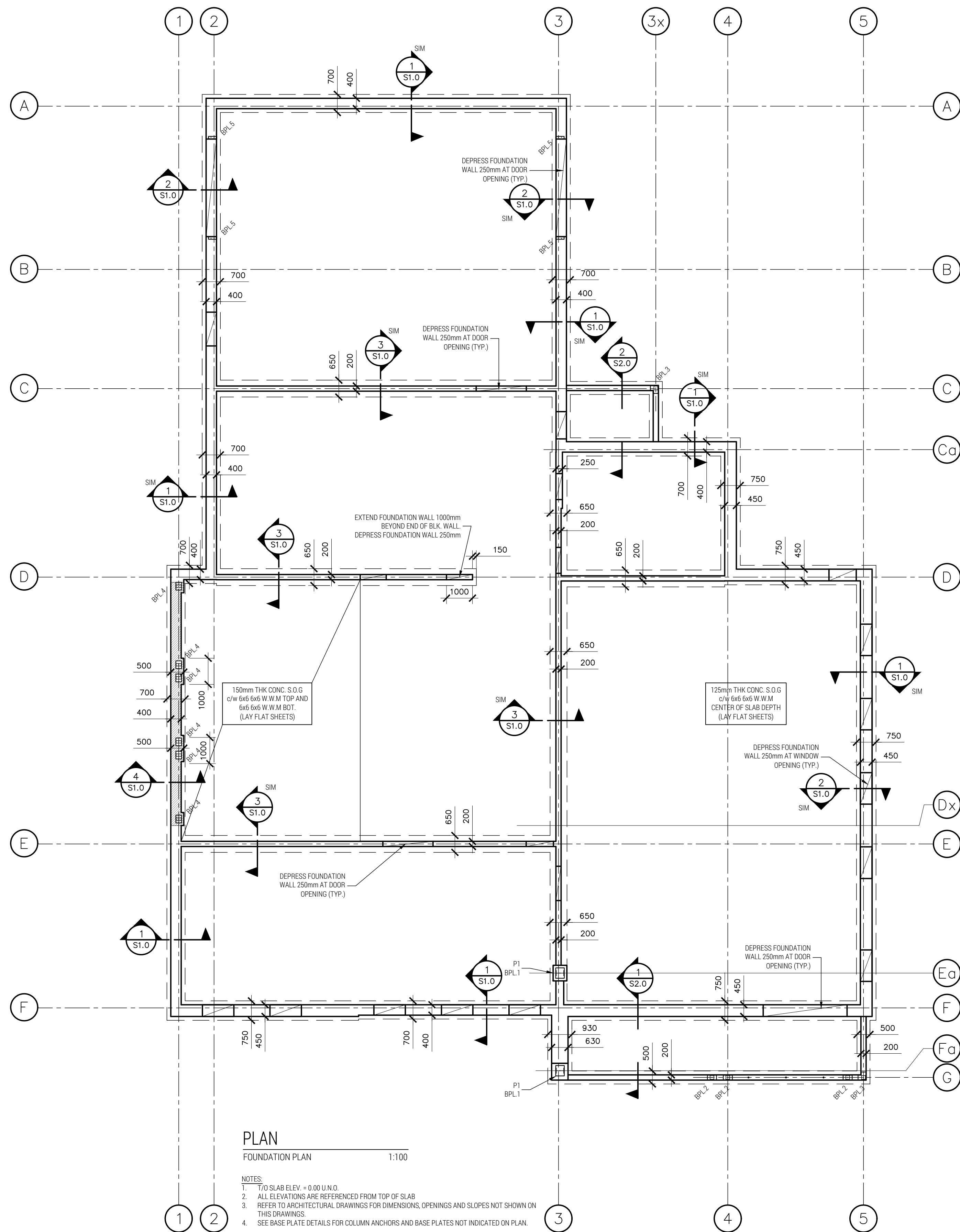
PROJECT  
**HOLY FAMILY CEMETERY  
CREMATORIUM BUILDING**

2523 LOWER BASE LINE ROAD, MILTON, ON

DRAWING  
**TYPICAL DETAILS**

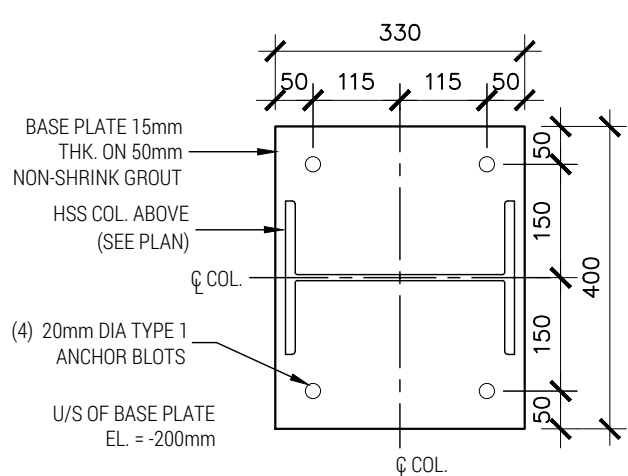
Design By: TD/AF Date: 2021-09-16  
Project No.: 21091001  
Drawn By: AF Drawing No.:  
Scale: AS NOTED **S0.2**



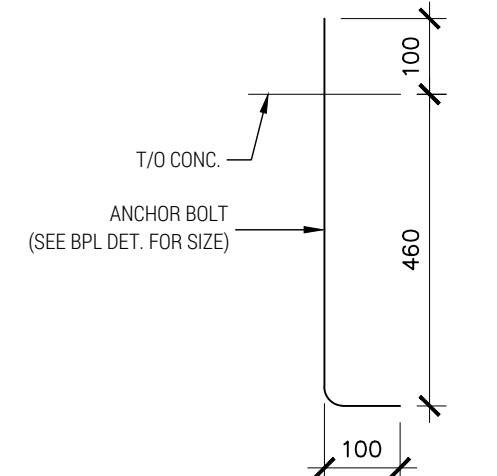


PLAN  
FOUNDATION PLAN  
1:10

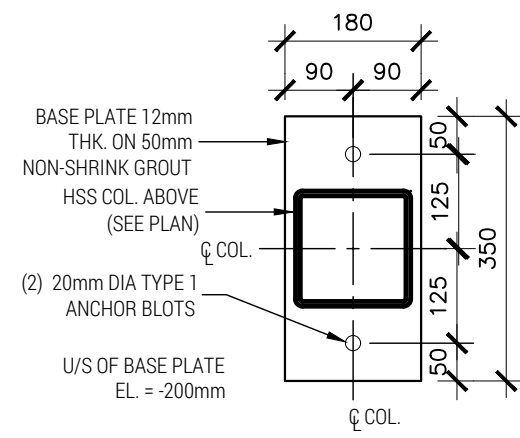
- NOTES:
1. TO SLAB ELEV. - 0.00 U.N.O.
  2. ALL ELEVATIONS ARE REFERENCED FROM TOP OF SLAB.
  3. REFER TO ARCHITECTURAL DRAWINGS FOR DIMENSIONS, OPENINGS AND SLOPES NOT SHOWN ON THIS DRAWING.
  4. SEE BASE PLATE DETAILS FOR COLUMN ANCHORS AND BASE PLATES NOT INDICATED ON PLAN.



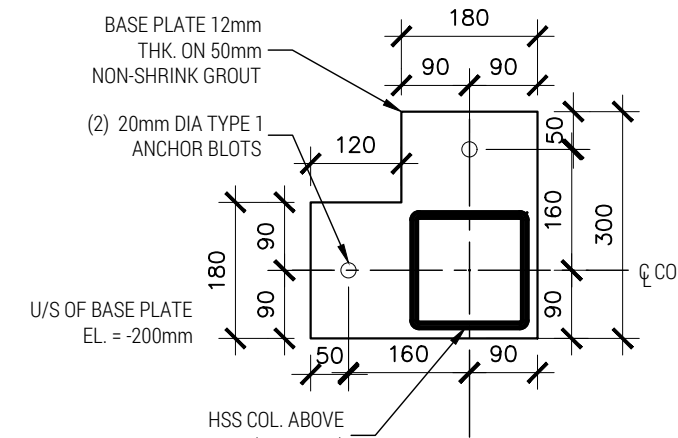
BASE PLATE 'BPL.1' PLAN  
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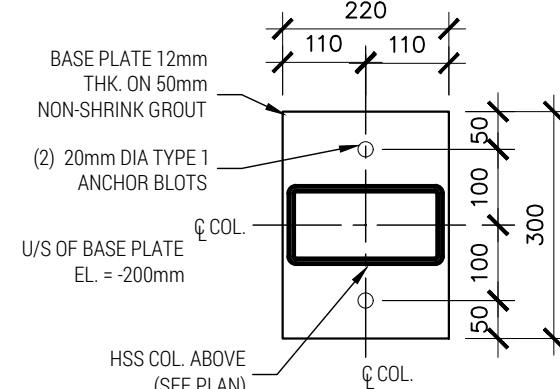
TYPE 1 ANCHOR BOLT  
1:10



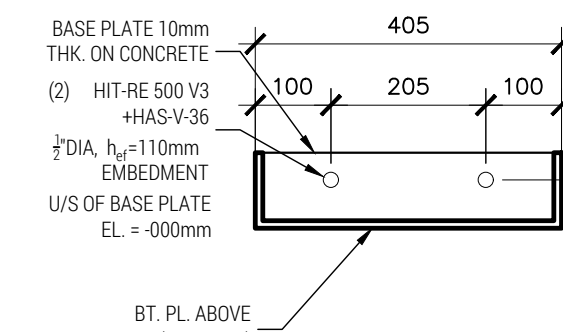
BASE PLATE 'BPL.2' PLAN  
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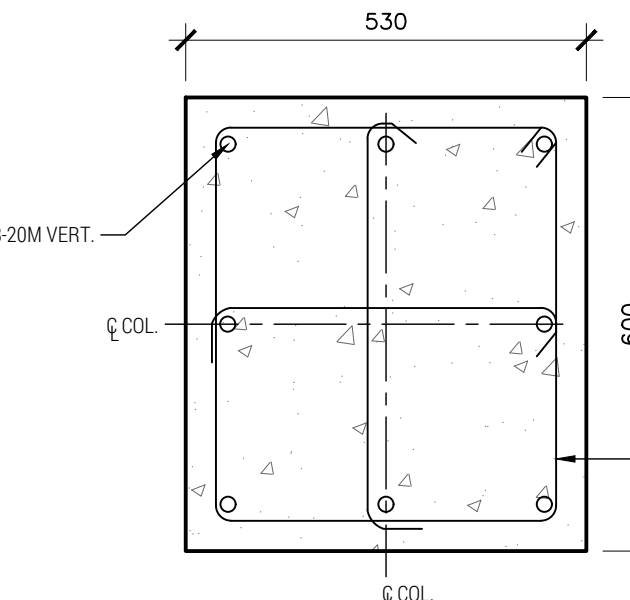
BASE PLATE 'BPL.3' PLAN  
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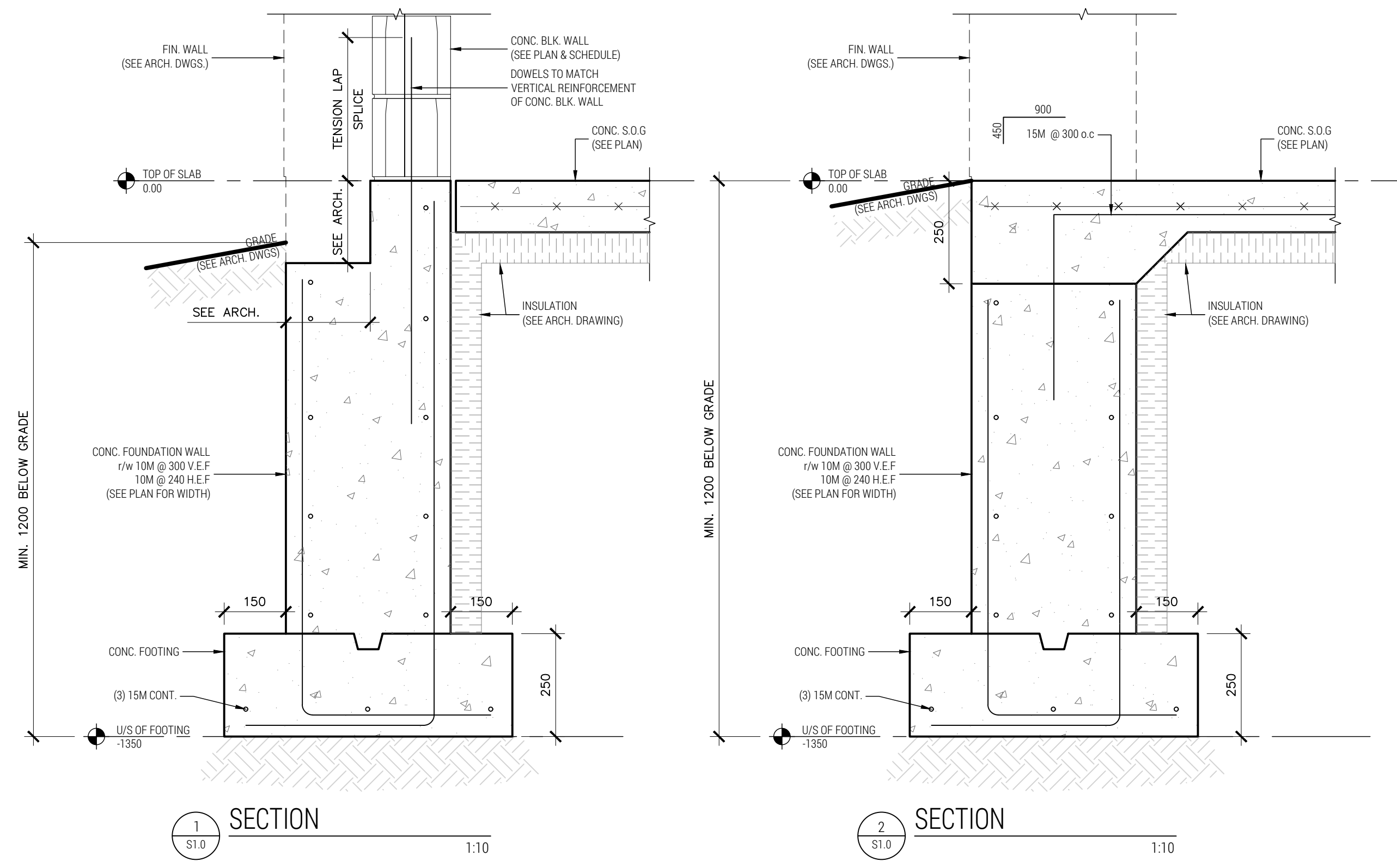
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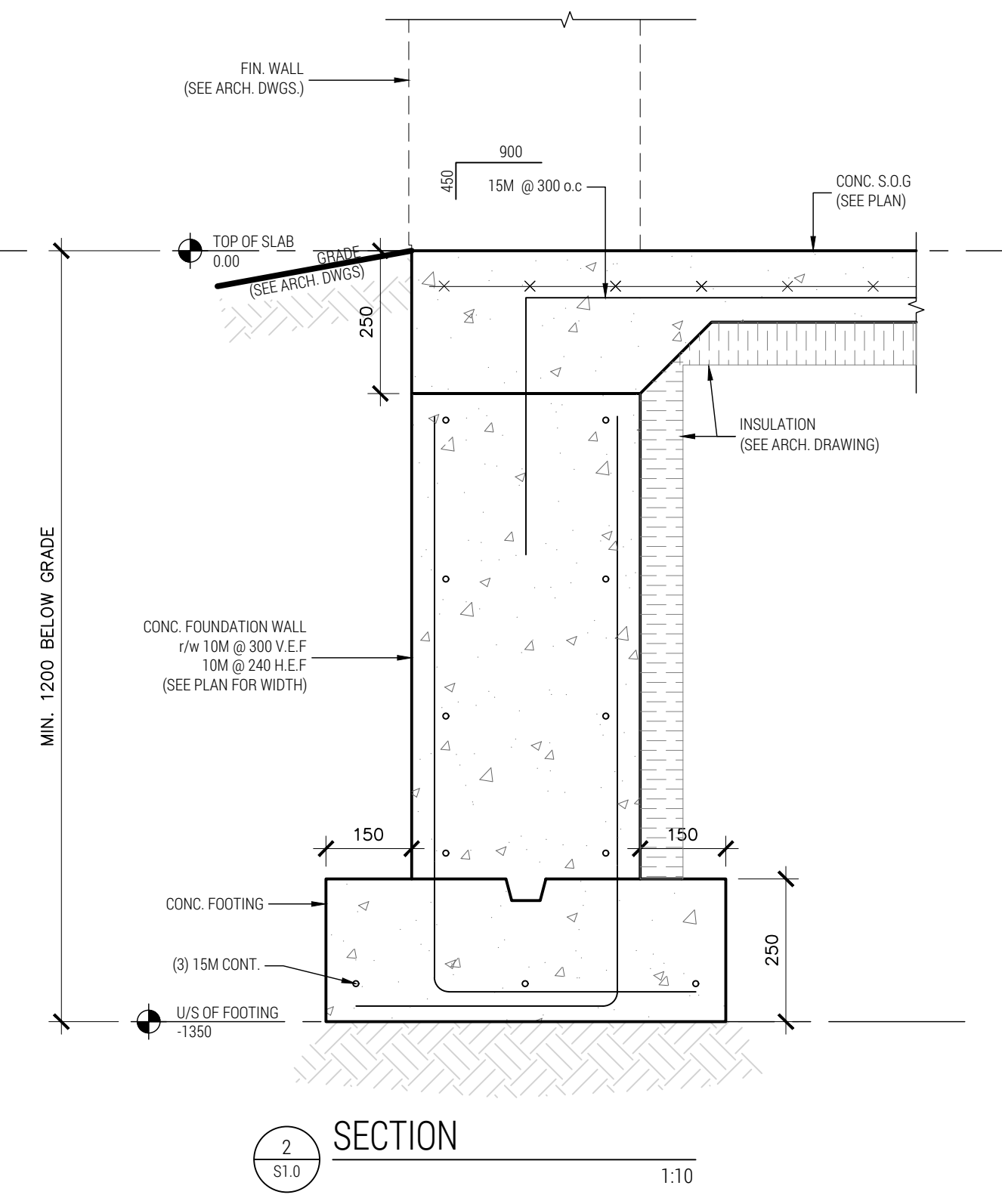
BASE PLATE 'BPL.5' PLAN  
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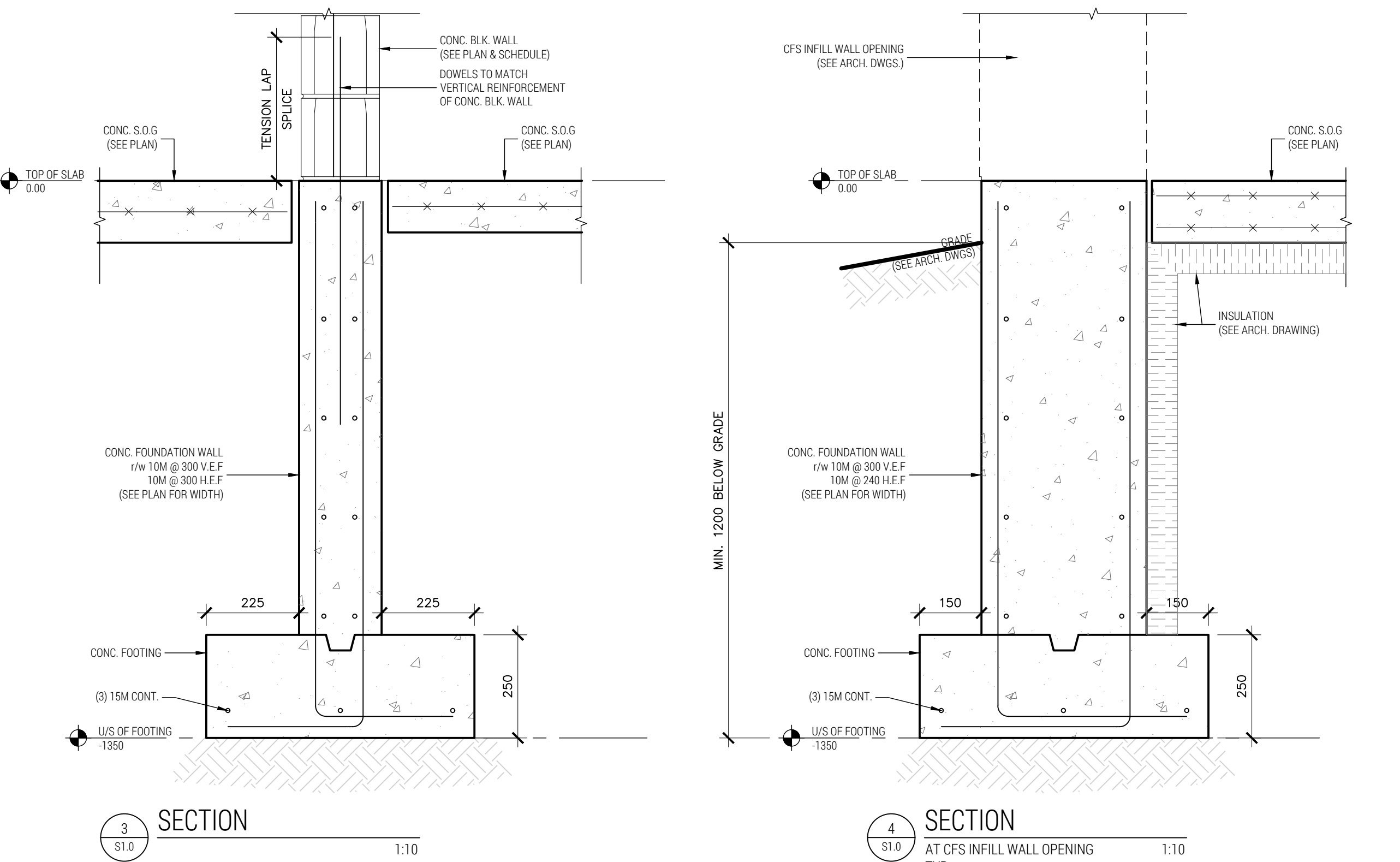
PIER '1' PLAN  
1:10



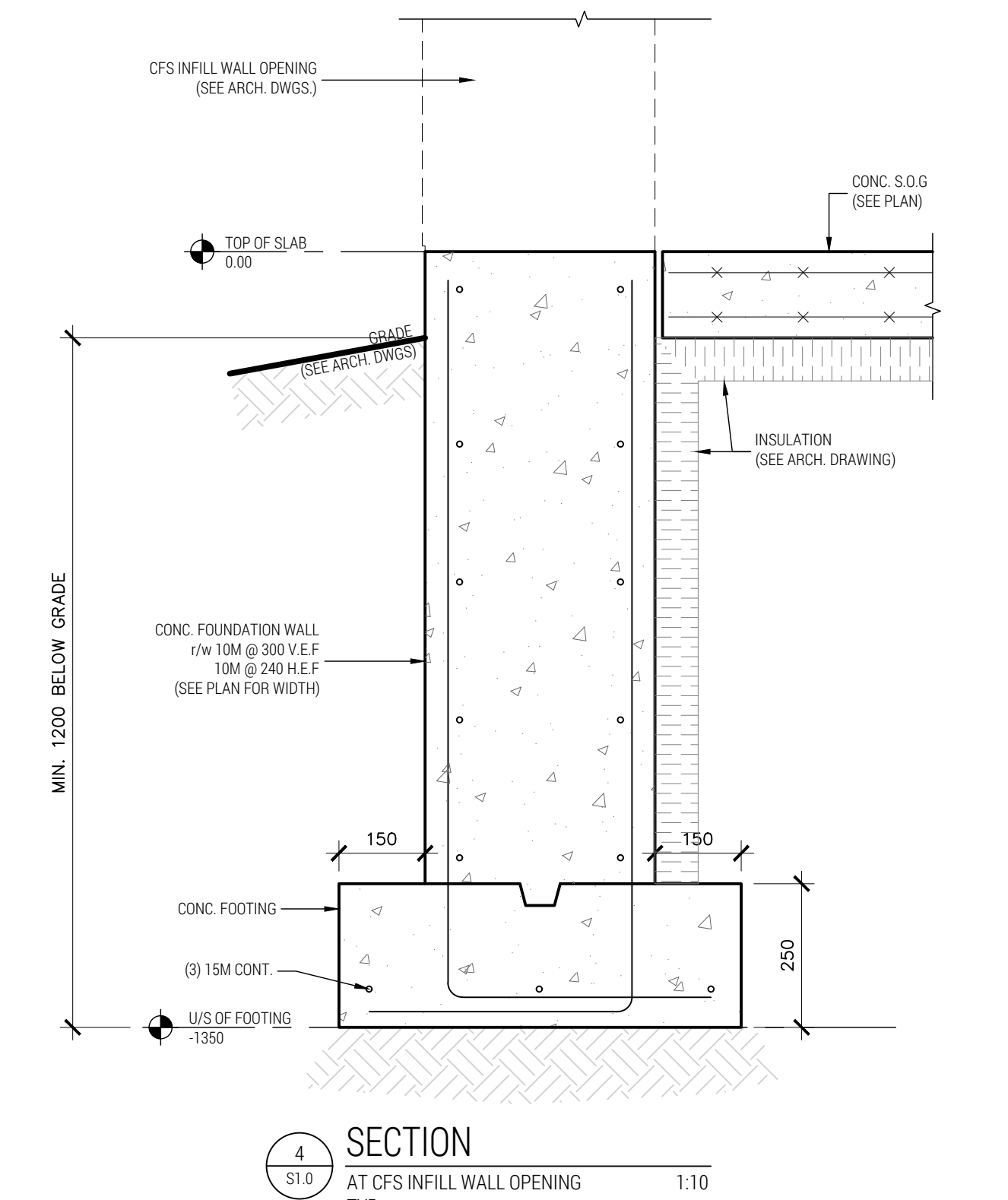
SECTION 1  
1:10



SECTION 2  
1:10



SECTION 3  
1:10



SECTION 4  
1:10  
AT CFS INFILL WALL OPENING  
TYP.

NOTE TO CONTRACTOR:  
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ISSUED FOR BUILDING PERMIT	1	2023-05-26

**DFE**  
**DOYTCHE & FILO ENGINEERING INC.**  
Structural Engineers  
T. N. DOYTCHEV  
100113262  
2023-05-26  
PROVINCE OF ONTARIO  
Phone: (647) 836-4805 ; (905) 719-1482

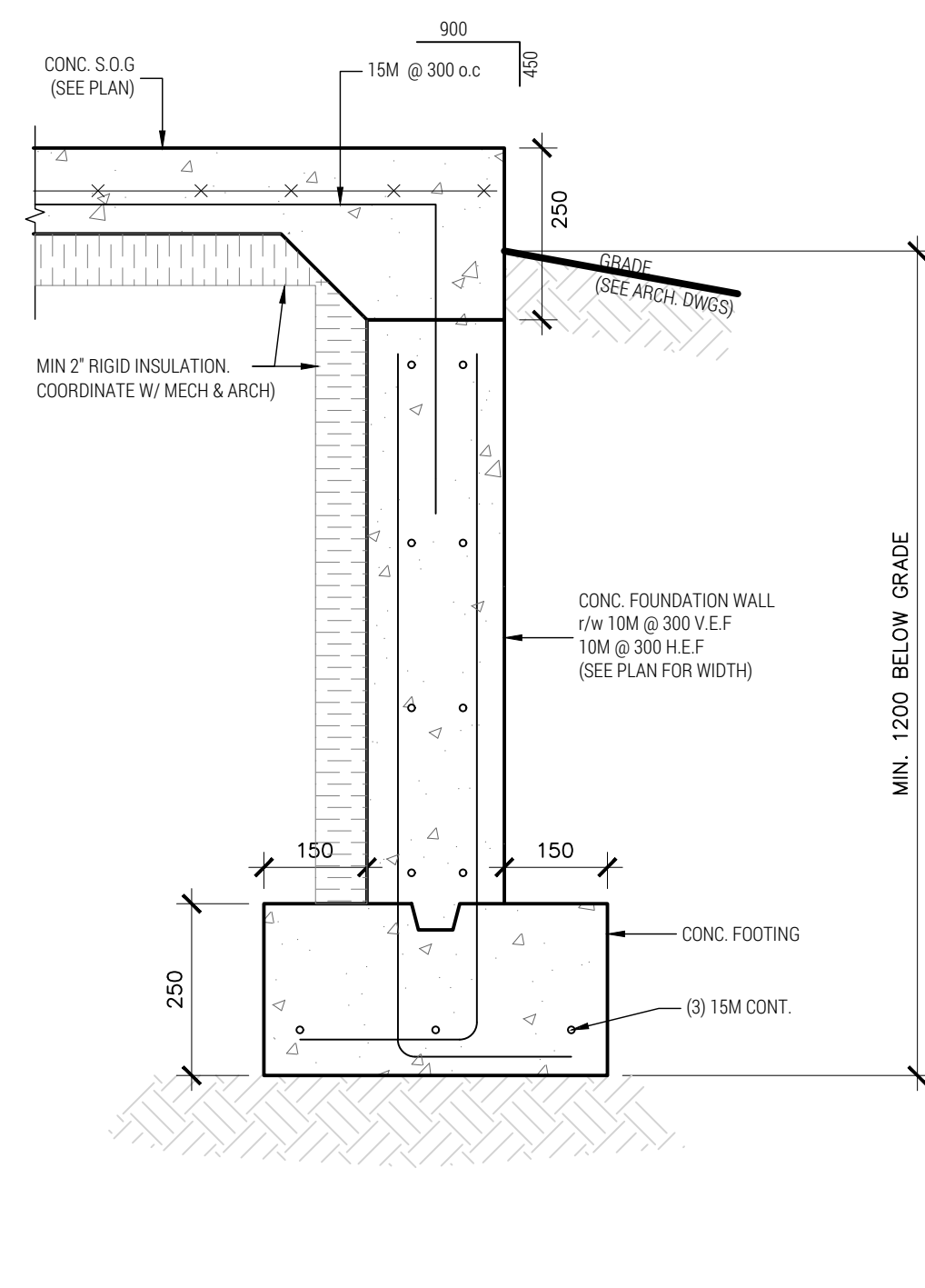
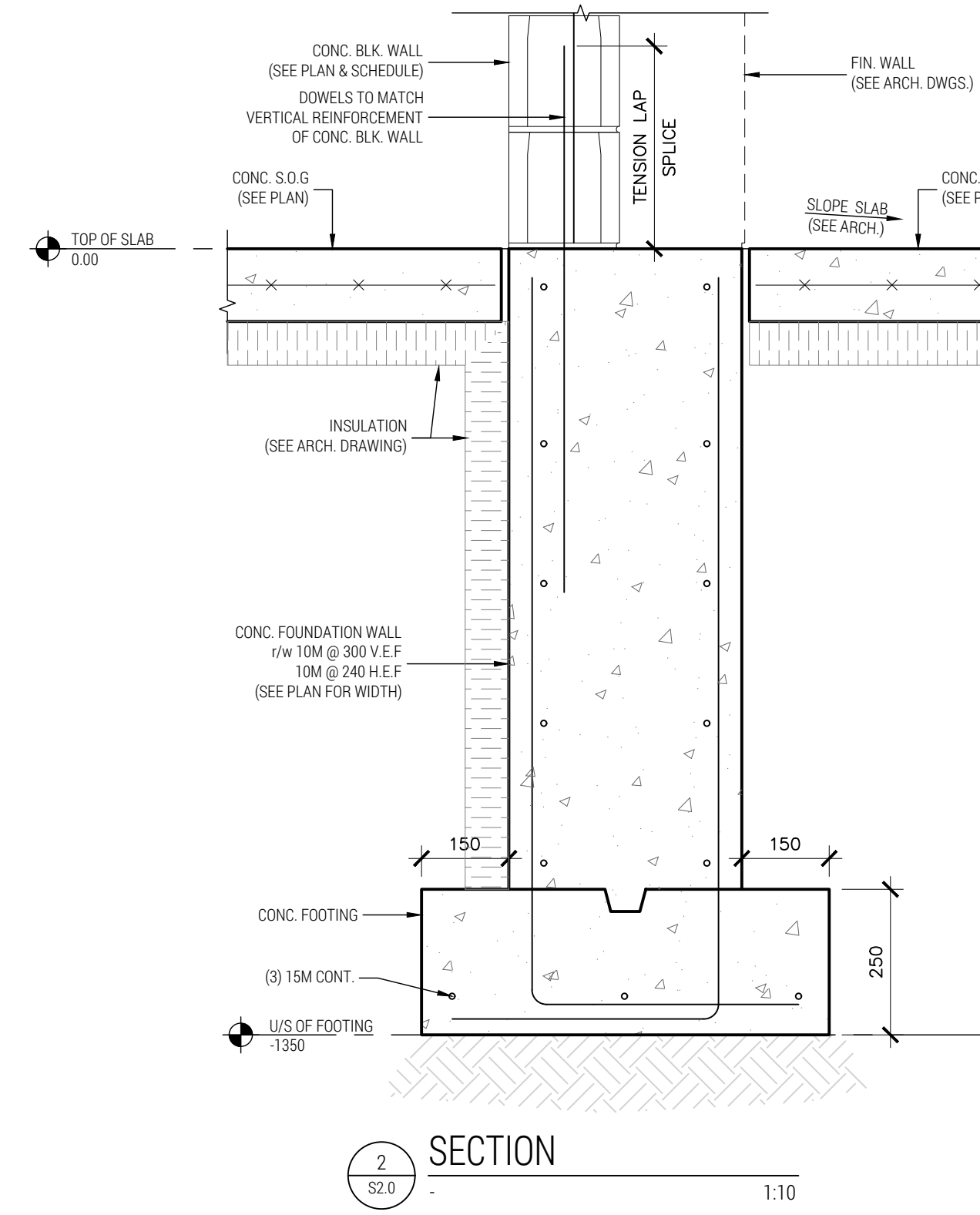
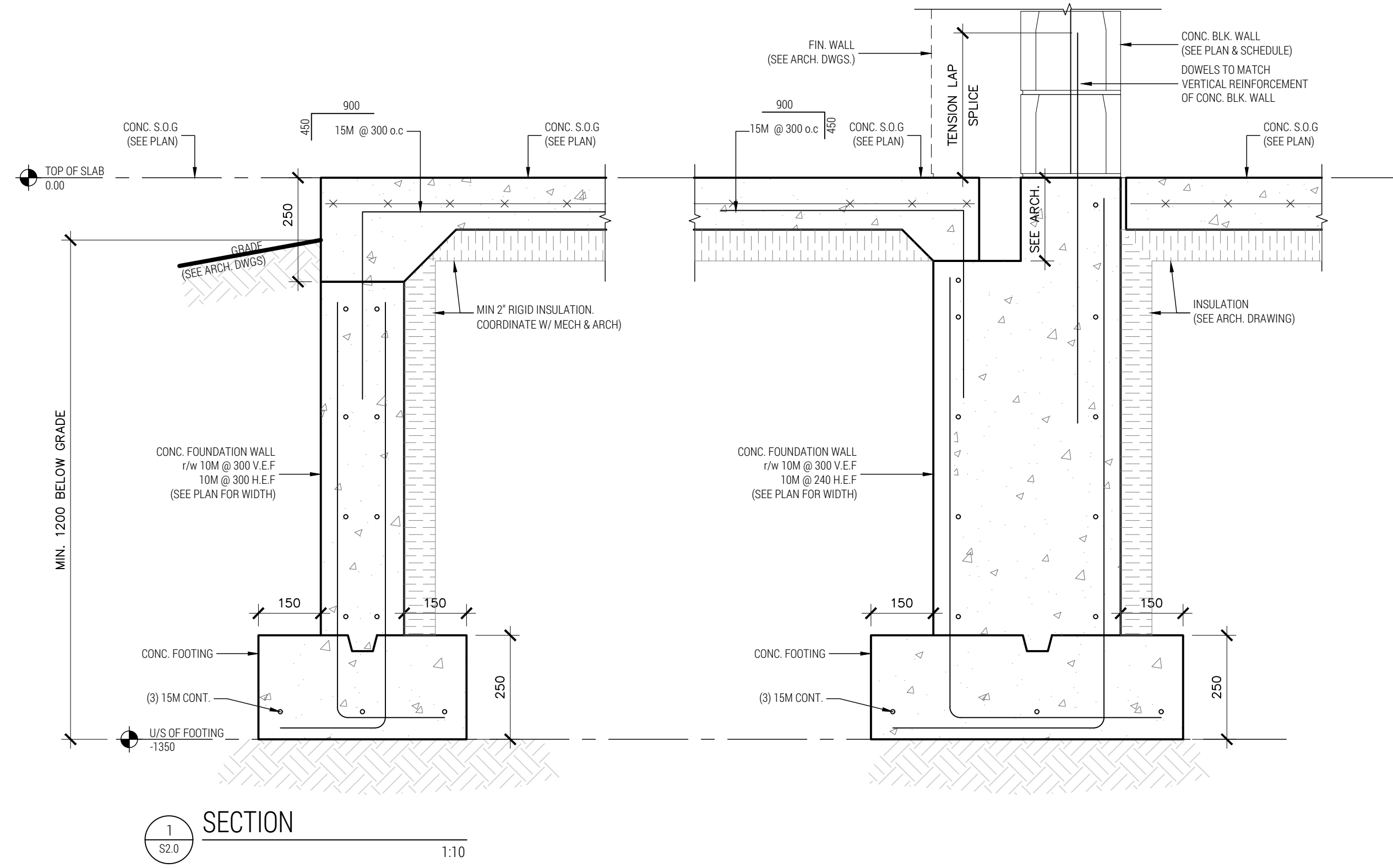
PROJECT  
**HOLY FAMILY CEMETERY  
CREMATORIUM BUILDING**  
2523 LOWER BASE LINE ROAD, MILTON, ON  
DRAWING  
**FOUNDATION PLANS,  
AND  
SECTIONS**  
Design By: TD/AF Date: 2021-09-16  
Project No.: 21091001  
Drawn By: AF Drawing No.:  
Scale: AS NOTED **S1.0**



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ISSUED FOR BUILDING PERMIT	1	2023-05-26

**DFE**  
**DOYTCH & FILO ENGINEERING INC.**  
 Structural Engineers

**PROFESSIONAL ENGINEER**  
 T. N. DOYTCHEV  
 100113262  
 2023-05-26  
 PROVINCE OF ONTARIO

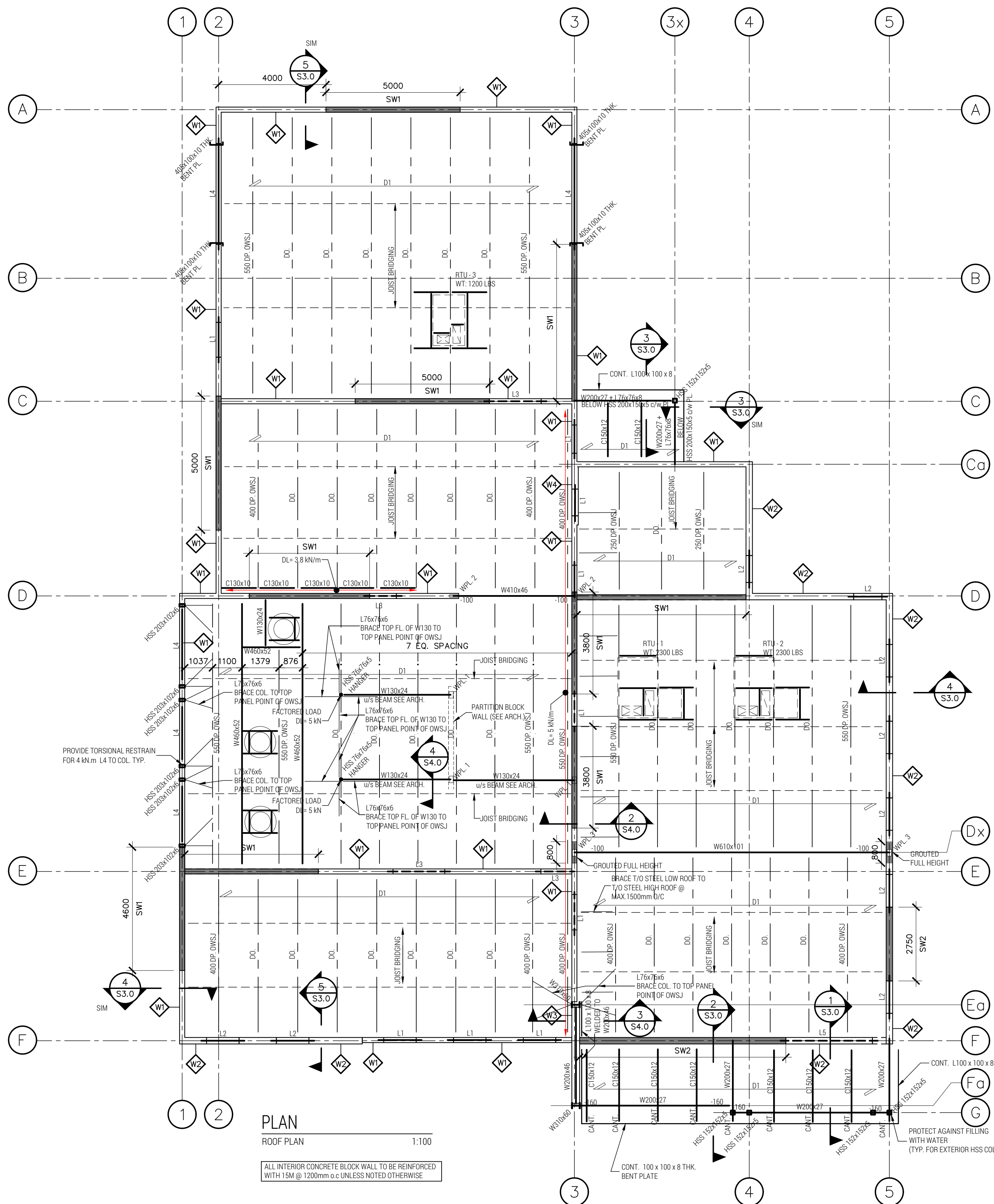
Phones: (647) 836-4805 ; (905) 719-1482

PROJECT  
**HOLY FAMILY CEMETERY  
 CREMATORIUM BUILDING**  
 2523 LOWER BASE LINE ROAD, MILTON, ON

DRAWING  
**SECTIONS**

Design By:	TD/AF	Date:	2021-09-16
Drawn By:	AF	Project No.:	21091001
Scale:	AS NOTED	Drawing No.:	<b>S2.0</b>





**PLAN**  
ROOF PLAN  
1:100

ALL INTERIOR CONCRETE BLOCK WALL TO BE REINFORCED WITH 15M @ 1200mm c/c UNLESS NOTED OTHERWISE

**NOTES:**

- u/s ROOF DECK EL. (SEE ARCH. DWGS.)
- ELEVATIONS ON PLAN ARE REFERENCED FROM TOP u/s ROOF DECK.
- REFER TO ARCHITECTURAL DRAWINGS FOR DIMENSIONS, OPENINGS AND SLOPES NOT SHOWN ON THIS DRAWING.
- SEE BASE PLATE DETAILS FOR COLUMN ANCHORS AND BASE PLATES NOT INDICATED ON PLAN.
- PROVIDE WPL1 U.N.O. FOR ALL JOISTS BEARING ON MASONRY WALLS.
- LOCATION OF MECHANICAL EQUIPMENT AND MECHANICAL EQUIPMENT LOADS ARE TO BE CONFIRMED BY MECHANICAL CONTRACTOR BEFORE STRUCTURAL STEEL IS FABRICATED. REFER TO MECHANICAL DRAWINGS. MECHANICAL EQUIPMENT AND PIPING MUST BE HUNG FROM O.W.S.J. PANEL POINTS.
- FRAME ALL ROOF OPENINGS AND MECHANICAL UNITS AS SHOWN ON TYPICAL DETAIL U.N.O.

D1 - 3840.76mm L2C 'R0938 VICWEST' METAL DECK (3 SPAN CONT.)

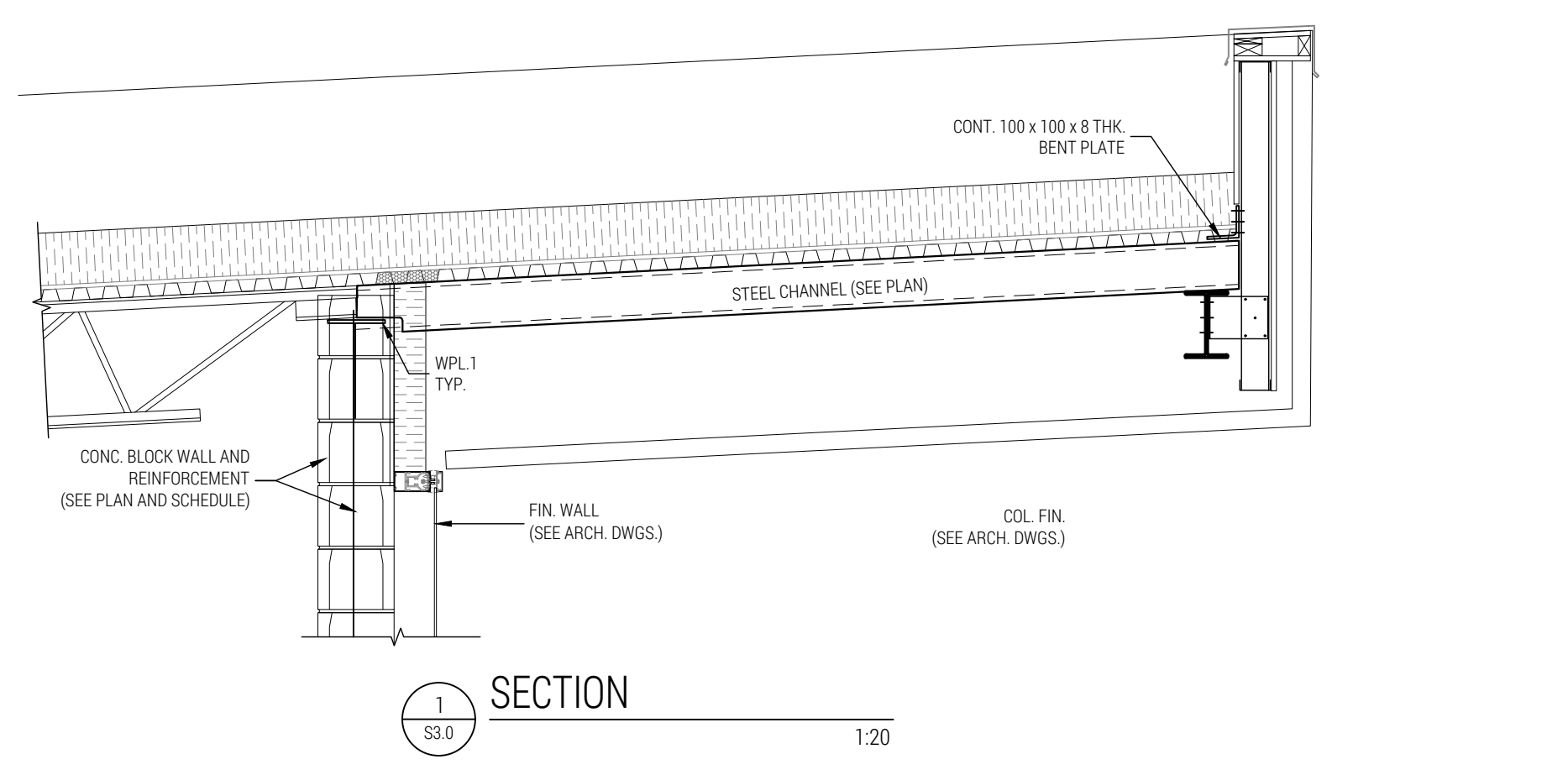
**LEGEND:**

☒ DENOTES LOCATION OF ROUGH OPENING NOT SHOWN AND CO-ORDINATE ALL FLOOR OPENINGS WITH MECH. CONTRACTOR.

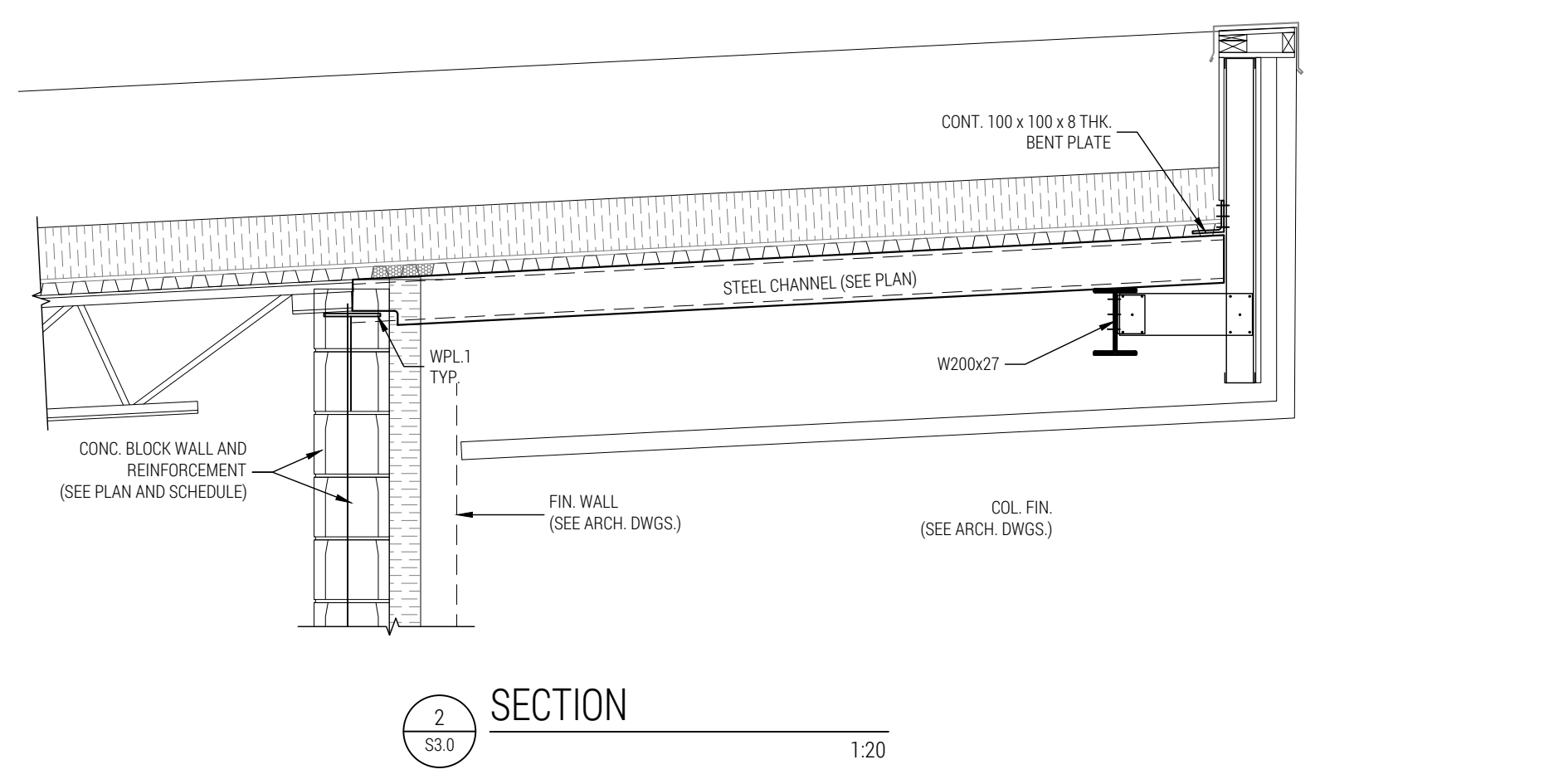
**DESIGN LOADS:**

ROOF DEAD LOAD = 1.30 kPa  
ROOF SNOW LOAD = 1.44kPa + SNOW ACCUMULATION (REFER TO DWG S0.1)  
REFER TO MECHANICAL DRAWINGS FOR ROOF TOP UNIT WEIGHTS AND LOCATIONS.

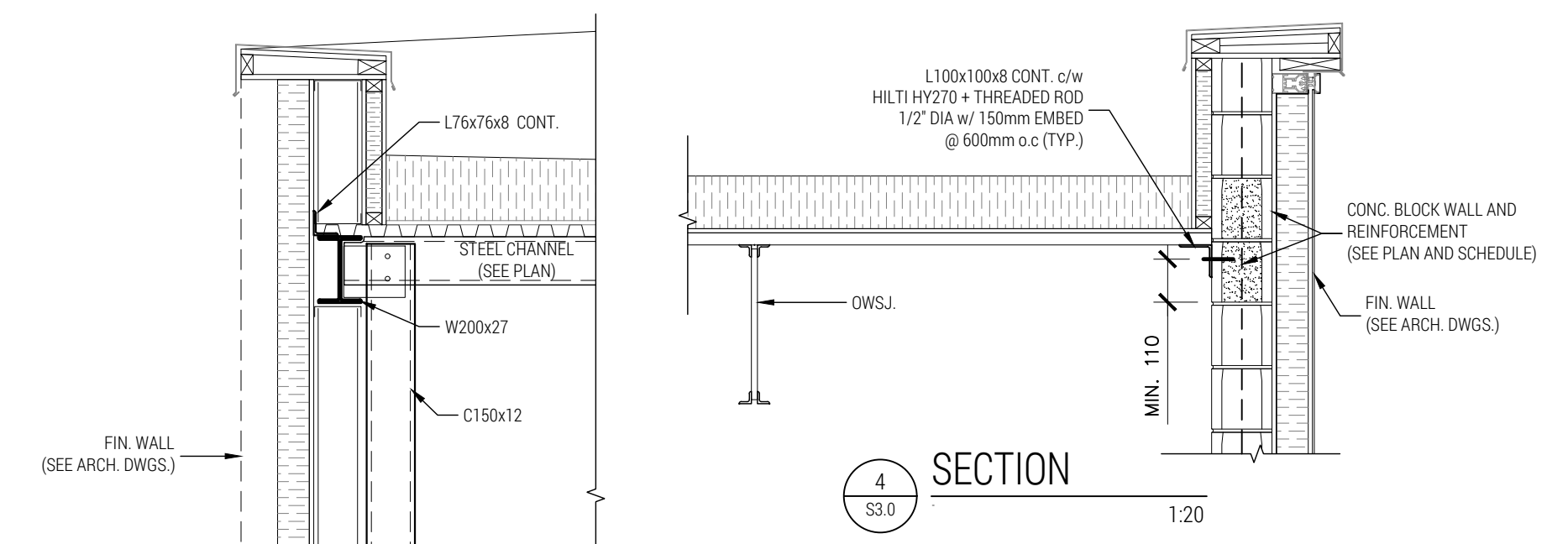
LINTEL SCHEDULE			
MARK	SIZE	BEARING	DETAIL
L1	2-Ls 127x89x8 LLBB		
L2	2-Ls 152x102x8 LLBB		
L3	W200x27 + PL 175x8 THK. BOT.	W PL 180 x 12 x 200 c/w 2-15M ROD 300' LG.	
L4	HSS 203x102x10 LSV + 10mm PL + 8mm STIFF. @ 600 c/c	W PL 180 x 12 x 200 c/w 2-15M ROD 300' LG.	SEE DETAIL 1-1 at BENT PLATE LOCATION
L5	HSS 203x152x8 LSV + 10 mm PL	W PL 180 x 12 x 200 c/w 2-15M ROD 300' LG.	WELD WALL REINF. TO LINTEL



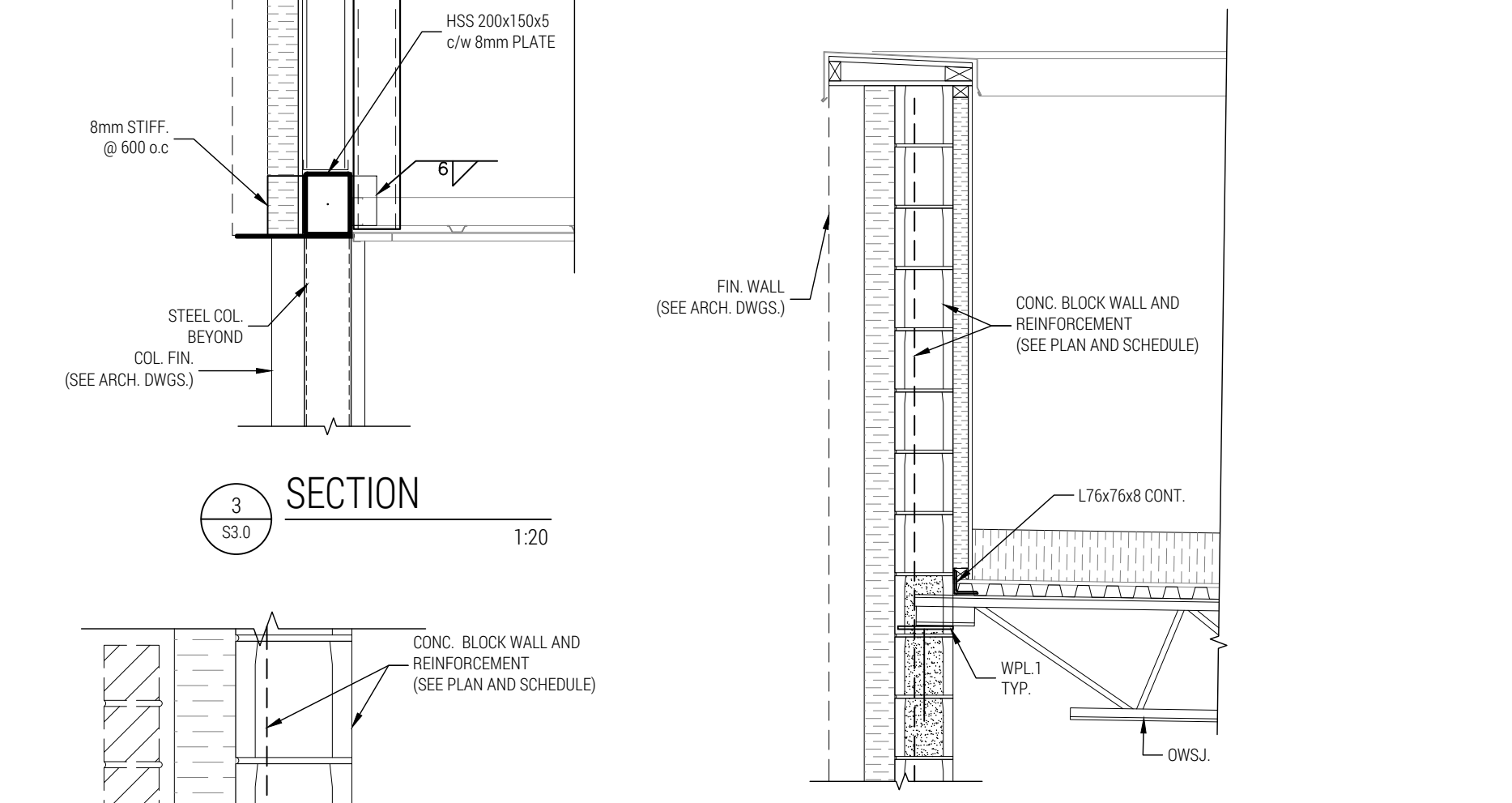
**SECTION 1**  
S3.0  
1:20



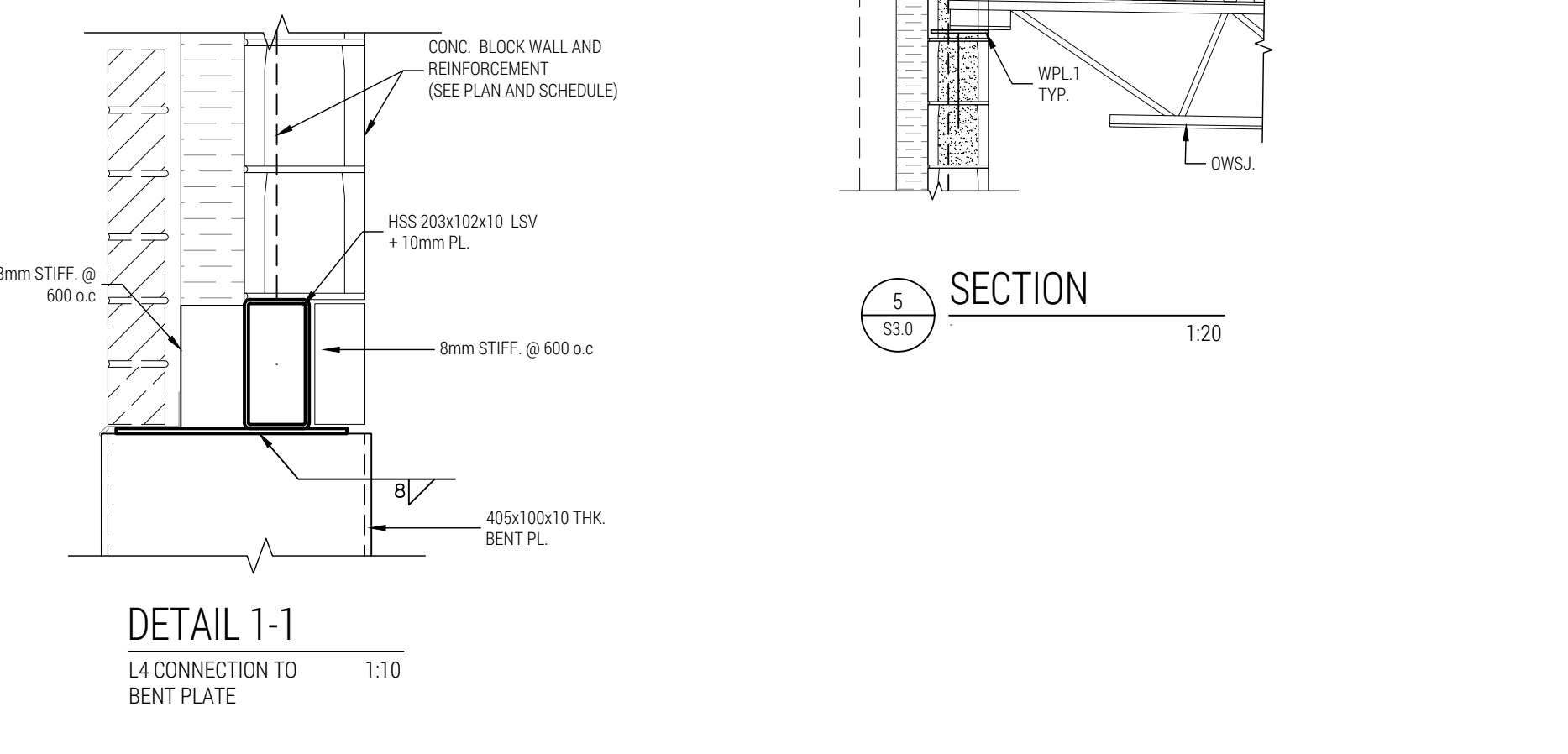
**SECTION 2**  
S3.0  
1:20



**SECTION 3**  
S3.0  
1:20



**SECTION 4**  
S3.0  
1:20

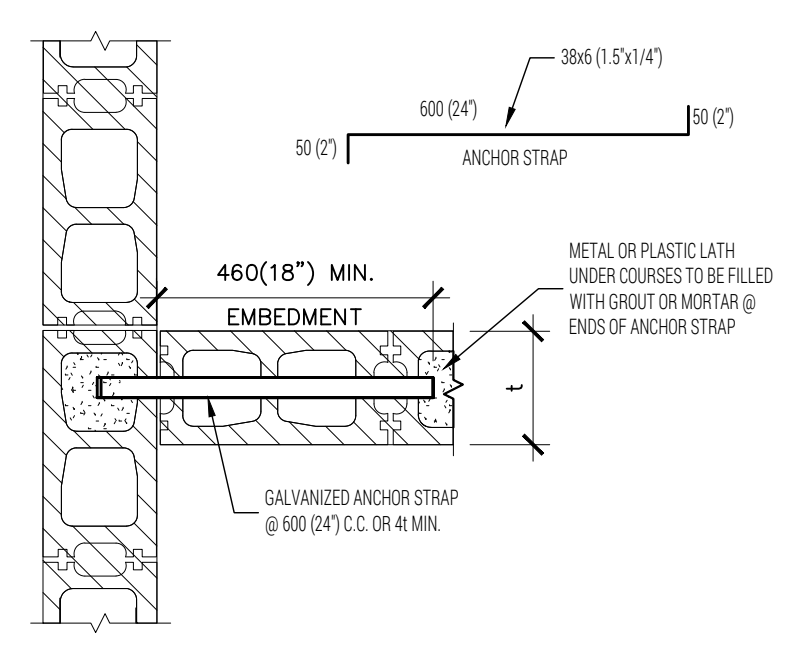


**DETAIL 1-1**  
L4 CONNECTION TO BENT PLATE  
1:10

CONCRETE BLOCK WALL SCHEDULE	
MARK	DESCRIPTION
W1	- 190mm CONCRETE BLOCK - BLOCK COMP. STRENGTH = 15 MPa - 15M @ 600 VERT. - HEAVY DUTY BLOCK LOCK TRUSS / LADDER AT EVERY SECOND COURSE
W2	- 240mm CONCRETE BLOCK - BLOCK COMP. STRENGTH = 15 MPa - 15M @ 600 VERT. - HEAVY DUTY BLOCK LOCK TRUSS / LADDER AT EVERY SECOND COURSE
W3	- 290mm CONCRETE BLOCK - BLOCK COMP. STRENGTH = 15 MPa - 15M @ 600 VERT. - HEAVY DUTY BLOCK LOCK TRUSS / LADDER AT EVERY SECOND COURSE
W4	- 240mm CONCRETE BLOCK (FULLY GROUTED) - BLOCK COMP. STRENGTH = 15 MPa - 15M @ 600 VERT. - HEAVY DUTY BLOCK LOCK TRUSS / LADDER AT EVERY SECOND COURSE
SW1	- 190mm CONCRETE BLOCK (FULLY GROUTED) - BLOCK COMP. STRENGTH = 15 MPa - 15M @ 600 VERT. - HEAVY DUTY BLOCK LOCK TRUSS / LADDER AT EVERY SECOND COURSE
SW2	- 240mm CONCRETE BLOCK (FULLY GROUTED) - BLOCK COMP. STRENGTH = 15 MPa - 15M @ 600 VERT. - HEAVY DUTY BLOCK LOCK TRUSS / LADDER AT EVERY SECOND COURSE

**NOTES:**

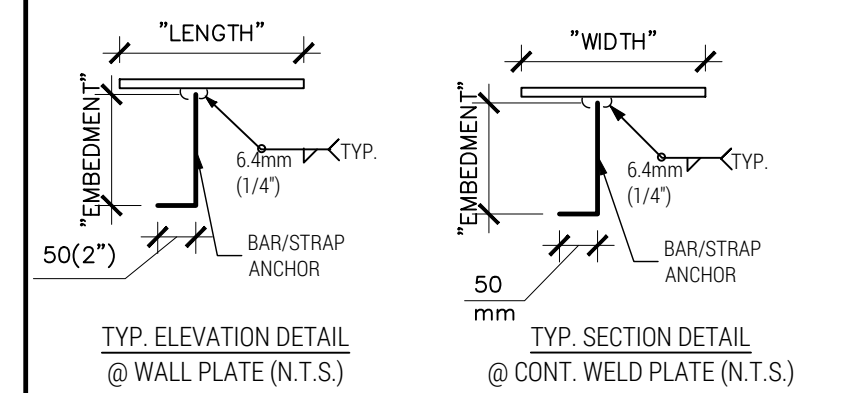
- FULLY GROUT ALL REINFORCED COPIES.
- ALL WALLS NOTED FULLY GROUTED ARE TO BE 100% FILLED WITH GROUT.
- CO-ORDINATE ALL WALL OPENINGS WITH ARCH. DWGS. AND MECHANICAL CONTRACTOR.
- PROVIDE ADDITIONAL BARS MATCHING WALL REINF. SIZE, FULL HEIGHT @ ALL WALL ENDS, INTERSECTIONS AND OPENINGS UNLESS OTHERWISE NOTED ON DRAWINGS.
- PROVIDE STANDARD TENSION SPICES FOR ALL HORIZONTAL AND VERTICAL WALL REINFORCEMENT.
- ALL BARS CONNECTING BETWEEN FLOORS TO BE TIED TOGETHER (REFER TO SECTION DETAILS).
- SOLID FILLED JOISTS TO BE MADE WITH 20MPa FLOWABLE GROUT (MORTAR FILL NOT PERMITTED).
- PROVIDE DOWELS FROM THE FOOTING TO WALLS ABOVE TO MATCH VERTICAL WALL REINFORCEMENT.



WALL PLATE SCHED.	
MARK	DESCRIPTION
WPL.1	10mm THK. x 180 LG. x 180 WIDE c/w (2) 15mm x 300 EMBEDMENT ANCHOR ROD FULLY GROUT (2) MASONRY COURSES 600mm LG. (SEE GENERAL NOTES)
WPL.2	15mm THK. x 180 LG. x 180 WIDE c/w (2) 15mm x 300 EMBEDMENT ANCHOR ROD (SEE GENERAL NOTES FOR GROUTING)
WPL.3	20mm THK. x 200 LG. x 280 WIDE c/w (4) 15mm x 300 EMBEDMENT ANCHOR ROD (SEE GENERAL NOTES FOR GROUTING)

**NOTES:**

- CONCRETE FILL (3) MASONRY COURSES MIN. BENEATH ALL BEARING PLATES.
- PLATE DIMENSION NOTED AS 'LENGTH' TO BE PARALLEL WITH BEAM WEB.
- FIELD WELD BEAM TO BEARING PLATE w/(2) 6.4mmx40mm LG. FILLET WELDS (EACH SIDE)



BRICK VENEER LINTEL SCHEDULE (MAX. 4" THICKNESS)			
MAX. CLEAR SPAN	SIZE	REMARKS	
UP TO 1200 (4'-0")	L89x89x7.9	L3 1/2" x 3 1/2" x 5/16"	
1201 TO 1800 (4'-0" TO 6'-0")	L127x89x7.9 (LLV)	L5' x 3 1/2" x 5/16" (LLV)	
1801 TO 2400 (6'-0" TO 8'-0")	L52x89x7.9 (LLV)	L6' x 3 1/2" x 5/16" (LLV)	

**NOTES:**

- LINTEL BEARING LENGTH TO BE MIN. 6"
- ALL STRUCTURAL STEEL MEMBERS TO BE HOT DIPPED GALVANIZED
- SEE ARCHITECTURAL DRAWINGS FOR SPANS.

**NOTE TO CONTRACTOR:**

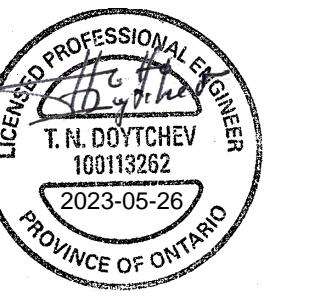
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ISSUED FOR BUILDING PERMIT

**DFE**  
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Structural Engineers



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PROJECT  
**HOLY FAMILY CEMETERY CREMATORIUM BUILDING**

2523 LOWER BASE LINE ROAD, MILTON, ON

DRAWING  
**ROOF FRAMING PLANS, SCHEDULES, AND DETAILS**

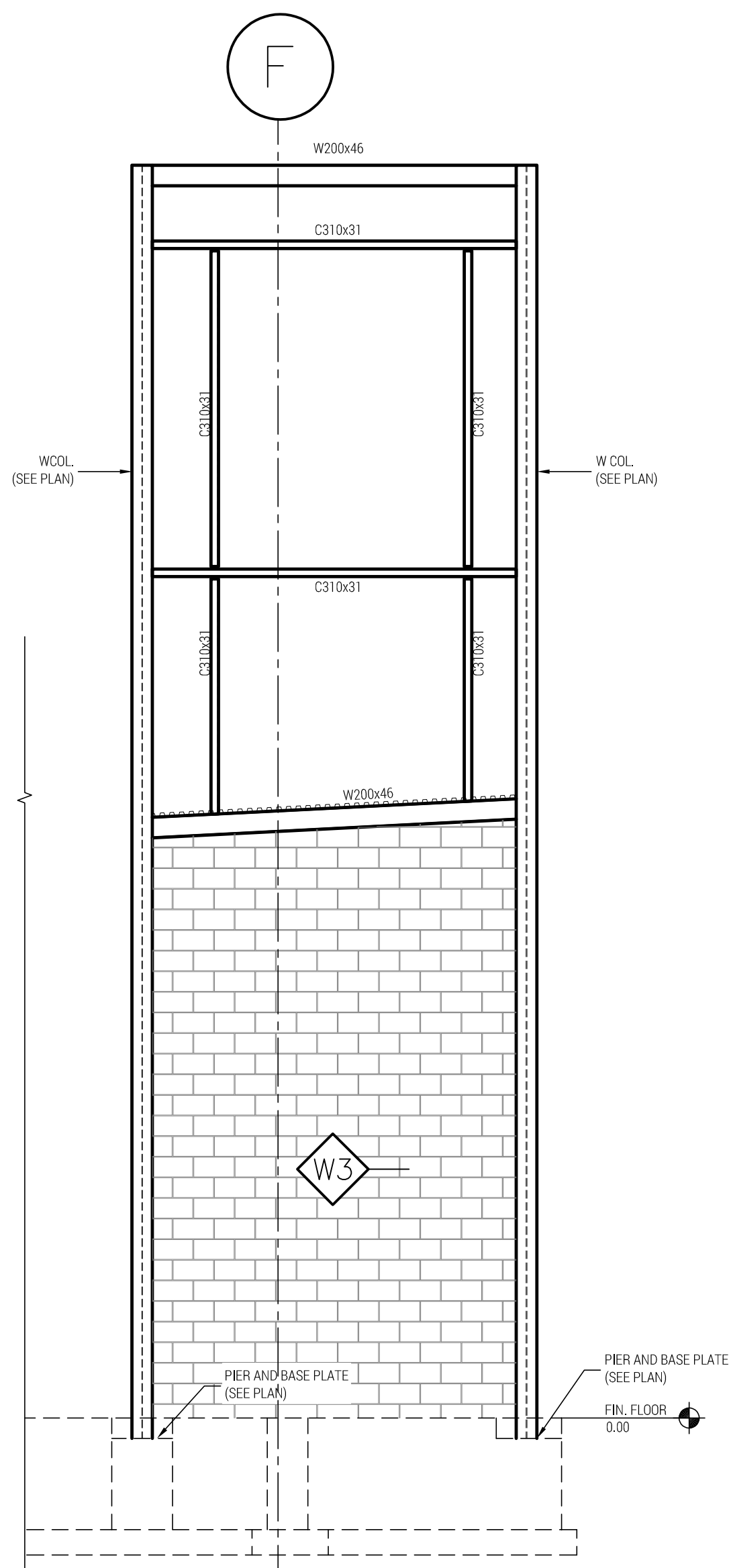
Design By: TD/AF Date: 2021-09-16

Project No.: 21091001

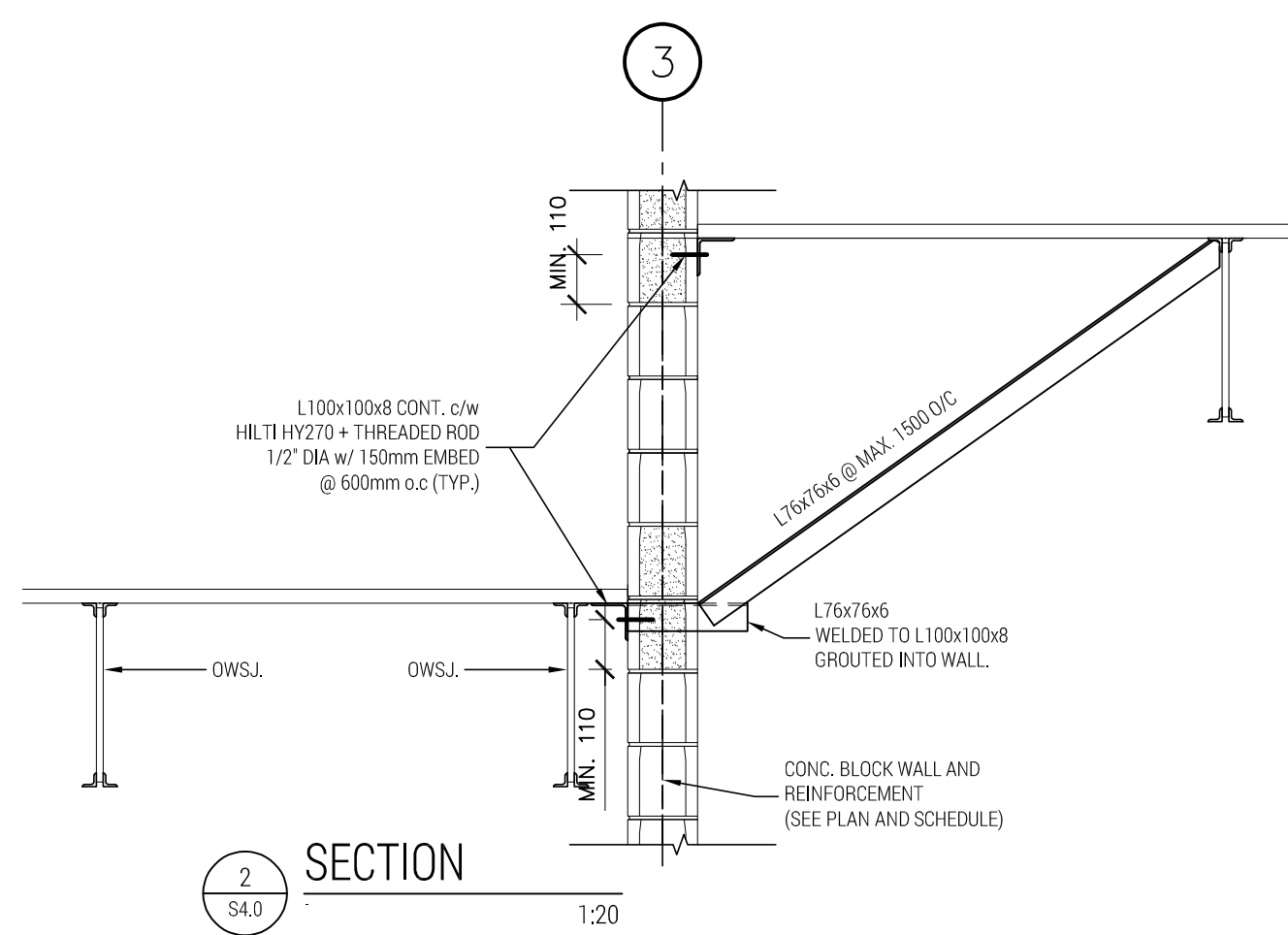
Drawn By: AF Drawing No.:

Scale: AS NOTED **S3.0**

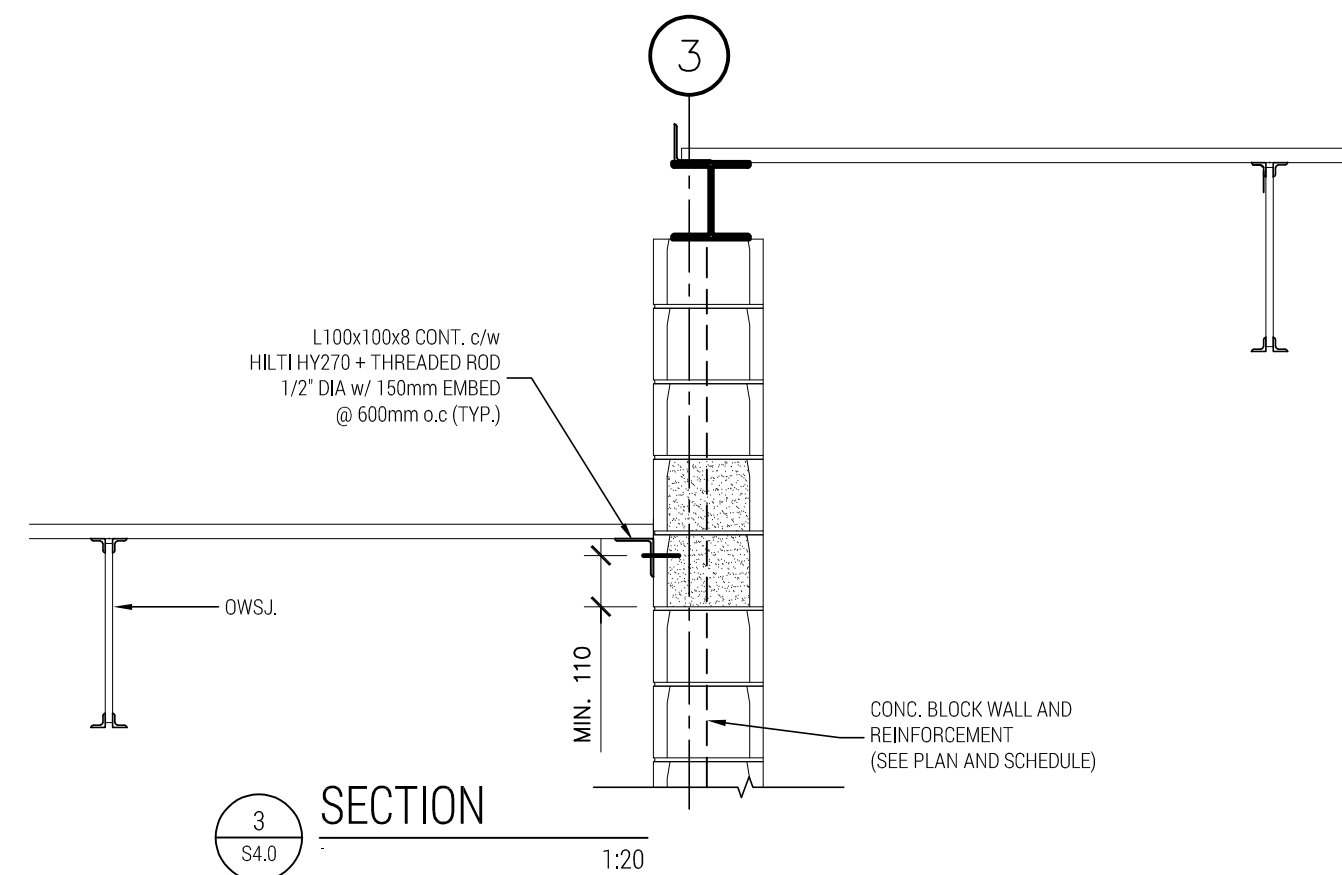




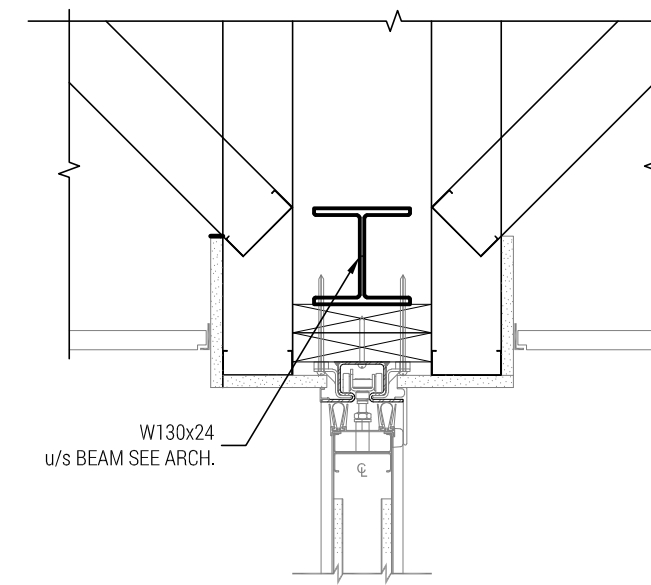
1 ELEVATION  
S4.0 ALONG (3) 1:50



2 SECTION  
S4.0 1:20



3 SECTION  
S4.0 1:20



4 DETAIL  
S4.0 AT ACCORDION DOOR 1:10

NOTE TO CONTRACTOR:

DO NOT SCALE DRAWINGS. CONTRACTORS MUST CHECK AND VERIFY ALL DIMENSIONS AND REPORT ANY DISCREPANCIES TO THE ENGINEER BEFORE PROCEEDING WITH THE WORK. ALL DRAWINGS REMAIN THE PROPERTY OF THE ENGINEER AND SHALL NOT BE REPRODUCED OR REUSED WITHOUT THE ENGINEER'S WRITTEN PERMISSION.

THE OWNER/ARCHITECT/CONTRACTOR IS ADVISED THAT D.F. ENGINEERING INC. CANNOT CERTIFY ANY COMPONENT OF THE SITE WORKS NOT INSPECTED DURING CONSTRUCTION. IT IS THE RESPONSIBILITY OF THE GENERAL CONTRACTOR TO NOTIFY D.F. ENGINEERING INC. PRIOR TO COMMENCEMENT OF CONSTRUCTION TO ARRANGE FOR INSPECTION.

ISSUED FOR TENDER	2	2023-05-31
ISSUED FOR BUILDING PERMIT	1	2023-05-26

**DFE**  
DOYTCH & FILO ENGINEERING INC.  
Structural Engineers

PHONES: (647) 838-4805 ; (905) 719-1482

PROJECT  
HOLY FAMILY CEMETERY  
CREMATORIUM BUILDING  
2523 LOWER BASE LINE ROAD, MILTON, ON

DRAWING  
SECTIONS  
AND  
DETAILS

Design By:	TD/AF	Date:	2021-09-16
		Project No.:	21091001
Drawn By:	AF	Drawing No.:	
Scale:	AS NOTED		S4.0



EQUIPMENT SCHEDULE BY DIVISION 15000														SUPPLIED AND INSTALLED BY DIVISION 16																			
NEW EQUIPMENT	EQUIP. ID	DESCRIPTION	MODEL NUMBER	MANUFACTURER	EQUIV. MANUFACTURER	FLOW (CFM)	PRESS. (IN)	COOLING CAP. (MBH)	HEATING CAP. (MBH)	SPEED (RPM)	VOLT.	LOAD	CONTROLS BY DIVISION 15900	ACCESSORIES	APPROX. WEIGHT (LBS)	VFD BY DIV. 15000	SYSTEM DUCT CLEANING	W.P. DISC - WEATHER PROOF DISCONNECT COMB. MS. COMBINATION MAGNETIC STARTER															
																		W.P. DISC.	DISC.	CONTACTORS	VFD CW BYPASS	COMB. M.S./H.O.A.	REBOTE S/S	M.S.P.L.	AUX. CONTACTS	CODE	CONTROLS	COMMENTS					
●	HVAC-1	ROOFTOP HVAC UNIT	48HCTA07A2M1-DT300-8E01	CARRIER	LENNOX, TRANE	2245	0.8	90 TC 75.3 SC	150 IN 120 OUT	---	208V/3ϕ	45 MCA 60 MOCP	C1	SEE NOTE 'A'. VERTICAL S/A. VERTICAL R/A. ERV	2000	---	●	●	---	---	---	---	---	---	---	---	---	---	---	---	5	DIV. 15900	WIRE POWER
●	HVAC-2	ROOFTOP HVAC UNIT	48HCTA07A2M1-DT300-8E01	CARRIER	LENNOX, TRANE	2440	0.8	90 TC 75.3 SC	150 IN 120 OUT	---	208V/3ϕ	45 MCA 60 MOCP	C1	SEE NOTE 'A'. VERTICAL S/A. VERTICAL R/A. ERV	2000	---	●	●	---	---	---	---	---	---	---	---	---	---	---	---	5	DIV. 15900	WIRE POWER
●	HVAC-3	ROOFTOP HVAC UNIT	48FCTA07A3M1-6B300-8E01	CARRIER	LENNOX, TRANE	2400	0.8	74.4 TC 57.7 SC	150 IN 120 OUT	---	208V/3ϕ	45 MCA 60 MOCP	C1	SEE NOTE 'B'. VERTICAL S/A. VERTICAL R/A	900	---	●	●	---	---	---	---	---	---	---	---	---	---	---	---	5	DIV. 15900	WIRE POWER
●	CD-1 & CD-2	CONDENSING UNIT	PUY-A36NH44	MTSUBISHI	---	---	---	36 TC	---	---	208V1ϕ	25 MCA 30 MOCP	WIRE CONTROL	ULTRALOW-40° F AMBIENT CONTROL	250	---	---	●	---	---	---	---	---	---	---	---	---	---	---	5	---	WIRE POWER	
●	FC-1 & FC-2	FAN COIL UNIT	PKA-A36KA	MTSUBISHI	---	---	---	36 TC	---	---	---	---	WIRE FAN CONTROL, INTERLOCK WITH CD-1, CD-2	WALL MOUNT, TOUCH CONTROL	50	---	---	●	---	---	---	---	---	---	---	---	---	---	---	5	---	WIRE POWER	
●	P-1 & P-2	DOMESTIC WATER PUMP	HJS100S-1	PENTAIR MYERS	---	15 USGPM	50 PSI	---	---	---	208V1ϕ	1 HP	---	BRASS IMPELLER, PRESSURE SWITCH	200	---	---	●	---	---	---	---	---	---	---	---	---	---	---	5	---	WIRE POWER	
●	EF-1	WASHROOM EXHAUST FAN	Z8H-TDA	PENN	---	200	0.25	---	---	---	1550	120V1ϕ	5 AMP	IN-LINE FAN, HANG FROM STRUCTURE	---	---	---	---	---	---	---	---	---	---	---	---	---	---	5	6 BUTTON TIMER CONTROL	WIRE POWER		
●	EF-2, 3, 4	WASHROOM EXHAUST FAN	Z5H-RA	PENN	---	100	0.25	---	---	---	1550	120V1ϕ	5 AMP	CEILING GRILLE, HANG FROM STRUCTURE	---	---	---	---	---	---	---	---	---	---	---	---	---	---	5	6 BUTTON TIMER CONTROL	WIRE POWER		
●	EF-5	GARAGE EXHAUST FAN	Z102S	PENN	---	690	0.25	---	---	---	1550	120V1ϕ	10 AMP	CEILING GRILLE, HANG FROM STRUCTURE, INTERLOCK WITH CO/NO & INTAKE DAMPER	---	---	---	●	---	---	---	---	---	---	---	---	---	---	5	---	WIRE POWER		
●	EF-6, 7, 8	RETORT EXHAUST FAN	DX14B	PENN DOMEX	---	2500	0.38	---	---	---	1120	208V3ϕ	1/2 HP	CLG TSTAT DAMPER INTERLOCK, C5, C6	BACKDRAFT DAMPER	150	---	●	---	---	---	---	---	---	---	---	---	---	5	---	WIRE POWER, WIRE B.D.D.		
●	EF-9	HOLDING ROOM EXHAUST FAN	DX08B	PENN DOMEX	---	600	0.38	---	---	---	1135	120V1ϕ	1/4 HP	INTERLOCK DAMPER	BACKDRAFT DAMPER	100	---	●	---	---	---	---	---	---	---	---	---	---	5	---	WIRE POWER, WIRE B.D.D.		
●	UH-1	GARAGE UNIT HEATER	UDAS-60	REZTOR	---	770	---	---	60 IN 50 OUT	---	1550	120V1ϕ	5 AMP	SEPARATED COMBUSTION, HORIZ. VENT KIT, TSTAT, 409 ST. ST. HEAT EXCHANGER	100 LBS	---	---	●	---	---	---	---	---	---	---	---	---	---	5	---	WIRE POWER		
●	COINOX	CARBON MONOXIDE & NOX DETECTOR	FC8-8	CRITICAL ENVIRONMENTAL SYSTEMS	---	---	---	---	---	---	120V1ϕ	2 AMP	C4, WIRE CONTROLS & INTERLOCK	WALL MOUNTED	---	---	---	---	---	---	---	---	---	---	---	---	---	---	6	---	WIRE POWER		
●	DWH-1	DOMESTIC WATER HEATER	HE45-100	RHEEM	---	45 GAL	---	---	100 IN	---	120V1ϕ	10 AMP	---	T&P VALVE, VENT & COMBUSTION AIR OUT THROUGH ROOF, DRAIN PAN	200 LBS	---	---	●	---	---	---	---	---	---	---	---	---	---	5	---	WIRE POWER		
●	CP-1	DOMESTIC CIRC. PUMP	ASTRO 50B	ARMSTRONG	---	5 GPM	16 FT	---	---	---	120V1ϕ	2 AMP	---	MOUNT IN-LINE	---	---	---	---	---	---	---	---	---	---	---	---	---	---	5	---	WIRE POWER		
●	DH-1	ELECTRIC DUCT HEATER	REHEAT COIL	P.M. WRIGHT	---	---	0.1	---	1 KW	---	208V1ϕ	1 KW	C5, C7	CONTROL RELAY	---	---	---	●	●	---	---	---	---	---	---	---	---	---	5	---	WIRE POWER		
●	DH-2	ELECTRIC DUCT HEATER	REHEAT COIL	P.M. WRIGHT	---	---	0.1	---	7.5 KW	---	208V3ϕ	7.5 KW	C4, C5	PROVIDE SCR CONTROLLER	---	---	---	●	●	---	---	---	---	---	---	---	---	---	5	---	WIRE POWER		
●	EXP-1	DOMESTIC WATER EXPANSION TANK	WQ350	AMTROL	---	44 GAL	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
●	SF-1	HOLDING ROOM SUPPLY FAN	ZEPHYR Z8H-TDA	PENN	---	300	0.5	---	---	---	1550	120V1ϕ	5 AMP	IN-LINE	50	---	---	---	●	---	---	---	---	---	---	---	---	---	---	5	---	WIRE POWER	
●	BPB	BYPASS TERMINAL UNIT	LGB BYPASS TERMINAL UNIT	E.H. PRICE	---	---	---	---	---	---	120V1ϕ	5 AMP	WIRE CONTROLS, C4	REFER TO SCHEDULE	200	---	---	---	---	---	---	---	---	---	---	---	---	---	---	5	---	WIRE POWER, PROVIDE J.B.	

NOTE 'A': Unit Mounted Energy ERV with Frost Protection and ECM Exhaust & Fresh Air Motors that Adjust FIA & EIA/CFM Based on R/A CO2 (DCV), ComfortLink Control Microprocessor, Co / A Condenser Coil with Louvered Hall Guard, Stainless Steel Heat Exchanger, Full Enthalpy Economizer, Power Exhaust, Hinged Access Doors, Non-fused Disconnect Switch, Single Point Line Voltage Power Connection, Non-Powered Convenience 20-Amp GFI Outlet (field installed), 24" Roof Curb, R/A CO2 Sensor or (field installed), "Edge" Programmable Thermostat, 5 Year Parts warranty On The Complete Rooftop Unit, 6th to 15th Year Heat Exchanger Parts Warranty.

NOTE 'B': Slaged Air Volume, Cu Tube / A Fin Coils, Non-Fused Disconnect Switch, Stainless Steel Heat Exchanger, Louvered Condenser Coil Hall Guard, Hinged Access Doors, High Static ECO-BLUE Direct Drive ECM Direct Drive Axial Fan, Bottom Return Economizer, Power Exhaust, 24-inch Roof Curb, Field Installed Un-Powered GFI Outlet, "Edge" Programmable Thermostat, 5 Year Parts warranty On The Complete Rooftop Unit, 2nd to 5th Year Compressor Parts Warranty.

DIVISION 16 CODE NOTES:

DISCONNECT POWER AND CONTROLS FROM EXISTING 1 SOURCE. REMOVE ALL OBSOLETE DEVICES AND WIRING.

2 DISCONNECT EXISTING POWER EXISTING STARTER TO BE REUSED. EXTEND EXISTING POWER TO NEW LOCATION. TERMINATE.

DIVISION 16 TO WIRE POWER TO NEW CONTROL 4 PANEL (PANEL BY DIV. 15). MAKE ALL POWER TERMINATIONS TO POWER NEW EQUIPMENT.

DIVISION 16 TO PROVIDE CONDUCTORS, EMT, DISCONNECT AND STARTER DEVICES. MAKE ALL TERMINATIONS TO POWER NEW EQUIPMENT.

6 PROVIDE FOR 120V1ϕ CONTROL VOLTAGE

**CONTROL WIRING NOTES (DIV. 15900)**

C1 DIVISION 15900 TO PROVIDE ALL CONTROL WIRING AND CONTROL DEVICES FOR ROOFTOP HVAC UNIT OPERATION.

C2 DIVISION 15900 TO PROVIDE DAMPERS AND CONTROL WIRING. INTERLOCK WITH CO/NOX DETECTOR AND EF-5.

C3 THERMOSTAT SUPPLIED WITH UNIT. CONTROL WIRING BY DIVISION 15.

C4 CONTROL WIRING BY DIVISION 15.

C5 THERMOSTAT AND CONTROL WIRING BY DIVISION 15900. PROPOSED NEW

C6 MOTORIZED DAMPERS SHALL BE EQUIPPED WITH END SWITCHES. DIVISION 15900 SHALL WIRE THE END SWITCHES, INTERLOCK FOR STARTING SUPPLY AND EXHAUST FANS.

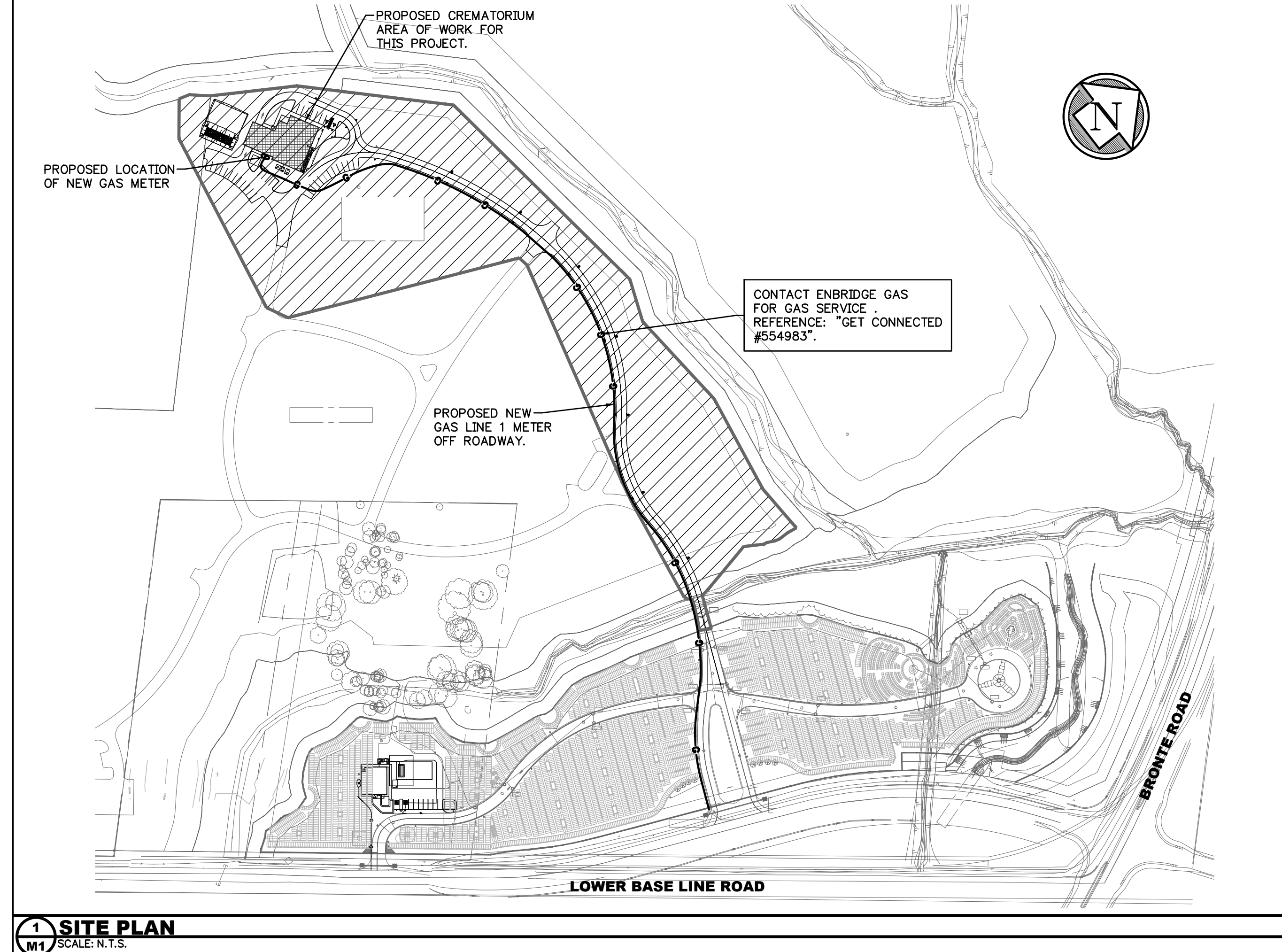
C7 CONTROL BY BYPASS BOX CONTROL SYSTEM, PROVIDE RELAY AND MAXIMUM 12VA CONTROL RELAY.

C8 WIRE CONTROL, SF-1 TO START WITH EF-9, OPEN DAMPER, DAMPER END SWITCH TO START SF-1. DUCT HEATER DH-2 TO CYCLE ON SUPPLY AIR TEMPERATURE. PROVIDE DUCT STAT.

ABBREVIATIONS		ABBREVIATIONS	
A	AFF ARCH	G	GAL GALV
B	BEAM	H	HTR
BM	BRITISH THERMAL UNIT	HP	HOT WATER
BTU	BTU	IN	INCH
BRZ	BRONZE	IN INV.	INVERT ELEVATION
BLDG	BUILDING	J	JANITOR SINK
BY	BY	K	KILOGRAM
C	CAP	KW	KILOWATT
CTR	CENTER	L	LAB
CRS	CROSS SECTION	LAV	LAVATORY
CU FT	CUBIC FOOT	LAVH	LAVATORY (BARRIER-FREE)
CFM	CUBIC FEET PER MINUTE	LT	LEFT
CS	COUNTER SINK	LH	LEFT HAND
CB	CATCH BASIN	LS	LAB SINK
CAO	COMPRESSED AIR OUTLET	LT	LAUNDRY TUB
COND	CONDENSATE	M	MANHOLE
C/W	COMPLETE WITH	MFR	MANUFACTURER
CSFD	COMBINATION SMOKE/FIRE DAMPER	MECH	MECHANICAL
D	DEGREE	MEZZ	MEZZARDINE
DEG	DOUBLE	MV	MIXING VALVE
DN	DOWN	N	NORTH
DR	DRAWING	NE	NORTHEAST
DF	DRINKING FOUNTAIN	NW	NORTHWEST
DW	DOOR	NTS	NOT TO SCALE
DO	DOOR GRILLE	No or #	NUMBER
E	EASB	N.O.	NORMALLY OPEN
ELEV	ELEVATOR	N.C.	NORMALLY CLOSED
EMER	EMERGENCY SHOWER	O	OVERALL DIAMETER
ENGR	ENGINEER	OD	OVERALL
EWS	EYE WASH STATION	OBV. ELEV.	OBVERT ELEVATION
EXH	EXHAUST	O/A	OUTDOOR AIR
E/A	EXISTING EXHAUST AIR	P	PARALLEL
EXIST	EXISTING	PERM	PERMETER
EMV	EXISTING RELOCATED EMERGENCY MIXING VALVE	PLYWD	PLYWOOD
F	FEET (FOOT)	PVC	POLYVINYL CHLORIDE
FT	FEET PER MINUTE	# or LB	POUNDS PER CUBIC FOOT
FD	FLOOR DRAIN	PCF	POUNDS PER SQUARE FT.
FD	FIRE DAMPER	PSI	POUNDS PER SQUARE IN.
FH	FUME HOOD	PREFAB	PREFABRICATED
FB	FIRE BLANKET	FAB	PROFESSIONAL ENGINEER
FE	FIRE EXTINGUISHER	PV	PLUMBING VENT

DRAWING LIST	
M1	SCHEDULES, LEGENDS AND SITE PLAN
M2	DRAINAGE AND PLUMBING PLANS
M3	HVAC AND ROOF PLANS
M4	SCHEDULES AND DETAILS
M5	SECTIONS
M6	MECHANICAL SPECIFICATIONS
M7	MECHANICAL SPECIFICATIONS

MECHANICAL LEGEND	
<b>LINES</b>	<b>PIPING</b>
NEW	BALL VALVE
EXISTING TO REMAIN	GLOBE VALVE
EXISTING TO BE REMOVED	PNEUMATIC 2-WAY CONTROL VALVE
TEMPORARY WORK	PNEUMATIC 3-WAY CONTROL VALVE
CONNECT TO EXISTING	MOTORIZED 2-WAY CONTROL VALVE
DOMESTIC COLD WATER	MOTORIZED 3-WAY CONTROL VALVE
DOMESTIC HOT WATER	PRESSURE REDUCING VALVE
DOMESTIC RECIRCULATED WATER	SAFETY RELIEF VALVE
STORM ABOVE GRADE	AV
SANITARY ABOVE GRADE	BUTTERFLY VALVE
STORM BURIED	GATE VALVE
SANITARY BURIED	CHECK VALVE
VENT LINE	STRAINER
DRAIN LINE	UNION
GAS LINE	CIRCUIT BALANCING VALVE
FIRE LINE	FLANGED CONNECTION
HOT WATER SUPPLY	CONCENTRIC REDUCER
HOT WATER RETURN	ECCENTRIC REDUCER
CHILLED WATER SUPPLY	PLUG CAP
CHILLED WATER RETURN	CLEANOUT
TRAP SEAL PRIMER LINE	ELBOW DOWN
CONDENSATE	ELBOW UP
PUMPED CONDENSATE	BACKFLOW PREVENTOR
<b>HVAC</b>	<b>CONTROLS SYSTEM</b>
PNEUMATIC THERMOSTAT	RESISTANCE BULB TEMPERATURE SENSING ELEMENT C/W WELL
ELECTRIC THERMOSTAT	TEMPERATURE CONTROL VALVE
HEATING COIL	FLOW CONTROL VALVE
SILENCER	FLOW SWITCH
ACOUSTIC INSUL FLEX DUCT	PRESSURE INDICATOR
ACOUSTICALLY LINED DUCT	VARIABLE FREQUENCY SPEED DRIVE
DUCT OFFSET	PRESSURE SENSOR
MOTORIZED DAMPER	TEMPERATURE CONTROLLER
BALANCE DAMPER	TEMPERATURE INDICATOR (DIV. 15)
BACK DRAFT DAMPER	TEMPERATURE SENSOR
FIRE DAMPER	
COMBINATION SMOKE & FIRE DAMPER	
FIRE STOP FLAP	
SPLITTER DAMPER	
SUPPLY DUCT	
EXHAUST/RETURN DUCT	
FLEXIBLE RIGID DUCT	
CAPPED END DUCT	
DUCT REDUCER/ENLARGER	
DUCT TRANSITION	
SMACTA DUCTWORK WORKING PRESSURE IN. WG. (N=NEGATIVE)	
AIR FLOW	
EX1 250-200 GEN. EXHAUST AIR DUCT	
EX2 350-300 GEN. EXHAUST AIR DUCT	
TA-1 TRANSFER AIR SLEEVE 1 SQ.FT. FREE AREA	
TA-2 TRANSFER AIR SLEEVE 2 SQ.FT. FREE AREA	



**1 SITE PLAN**  
SCALE: N.T.S.

NO	REVISIONS	DATE
7	REVISED	8/30/23
6	ISSUED FOR TENDER	6/08/23
5	ISSUED FOR PERMIT	5/26/23
4	ISSUED FOR PERMIT & TENDER	5/11/23
3	ISSUED FOR COORDINATION	8/26/22
2	ISSUED FOR COMMENT	4/21/22
1	ISSUED FOR COMMENT	10/30/21

**Filer Engineering Ltd.**

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Burlington, Ontario  
L7T 1V1  
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FEL PROJECT #1334

PROFESSIONAL ENGINEER  
O.S. FILER  
15/11/23  
PROVINCE OF ONTARIO

**HOLY FAMILY CEMETERY  
CREMATORIUM**  
2523 LOWER BASE LINE ROAD  
MILTON, ONTARIO

**SCHEDULES, LEGENDS  
AND SITE PLAN**

**GRGURIC  
ARCHITECTS  
INCORPORATED**

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STONE CREEK, ONTARIO, L8G 1J8  
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Web: www.2gai.com

SCALE AS NOTED	PROJECT
DATE SEPT. 2021	<b>2019-08</b>
DRAWN ARC	DRAWING
CHECKED BR/DSF	<b>M1</b>
PRINT DATE	PRINTDATE
CAD FILE	CADFILE







**F1334 ASHRAE 62.1 - 2016 Ventilation Summary** (- HVAC Economizer operation set for minimum flows as indicated)

HVAC Tag	Zone	Area (ft <sup>2</sup> )	Ashrae 62.1 #people	cfm/ft <sup>2</sup>	cfm/p	Ventilation (CFM)	Required Voz=Vbz/Ez Ez=0.8	Required Vov=Vbv/Ev Ev=1.0	Energy Recovery Ventilator (CFM)	Economizer Ventilation Provided (CFM)
1	Chapel and Viewing Room	1435	156	0.06	5	866.1	1,082.63	1,082.63	1,100	---
2	Chapel	1097	140	0.06	5	765.82	957.28	957.28	960	---
3	Support Areas	3583	32	0.06	5	374.98	468.73	468.73	---	500
						<b>TOTAL CFM:</b>	<b>2,508.63</b>	<b>2,060</b>	<b>500</b>	

**TERMINAL UNIT SCHEDULE**

BASED ON E.H. PRICE SUPPLY UNITS: LBS BYPASS  
 - C/W FOIL LINING  
 - 36" ATTENUATOR WITH FOIL LINING  
 - ELECTRONIC MODULATING CONTROLS  
 - ELECTRIC REHEAT COIL

ROOM NUMBER	TAG	SIZE	CFM	DISCHARGE DUCT			LOAD (MBH)	USGPM	# ROWS	CONNECTION SIZE	COMMENTS
				2nd	4th	6th					
104	BPB-1	6	130	45	42	25	2800	1 KW	---	---	ELECTRIC HEATING COIL
109	BPB-2	8	500	47	42	28	---	---	---	---	---
105	BPB-3	6	170	45	42	25	2800	1 KW	---	---	ELECTRIC HEATING COIL

**VENTILATION NOTES** ALL NOTES APPLY SPECIFICALLY WHERE INDICATED AND IN GENERAL WHERE APPLICABLE.

(M1) SUPPLY AND INSTALL BYPASS BOX, REFER TO SCHEDULE.

(M2) DUCT EXHAUST FAN: OUT THROUGH ROOF COMPLETE WITH THALER FLASHING AND WEATHER CAP.

(M3) SUPPLY AND INSTALL DUCT HEATER. WIRE ALL CONTROLS, PROVIDE DUCT TRANSITIONS AS REQUIRED.

(M4) CONSTRUCT TRANSFER AIR SLEEVE THROUGH WALL IN CEILING SPACE.

(M5) SUPPLY AND INSTALL ANODIZED 6063-T5 ALUMINUM LOUVRE, PRICE MODEL No. K638X. LOUVRE SHALL BE COATED WITH DURANAR-XL COATING IN CUSTOM COLOUR. COLOUR TO BE SELECTED BY ARCHITECT.

(M6) CONSTRUCT COMBUSTION AIR INTAKE FOR RETORT, 800x800 LOUVRE COMPLETE WITH INSULATED 800x600 PLENUM, SEAL BOTTOM AND SLOPE TO EXTERIOR. CONSTRUCT INSULATED 12" DUCT TO RETORT AND CONNECT, CONFIRM EXACT CONNECTION POINT. PROVIDE TRANSITION.

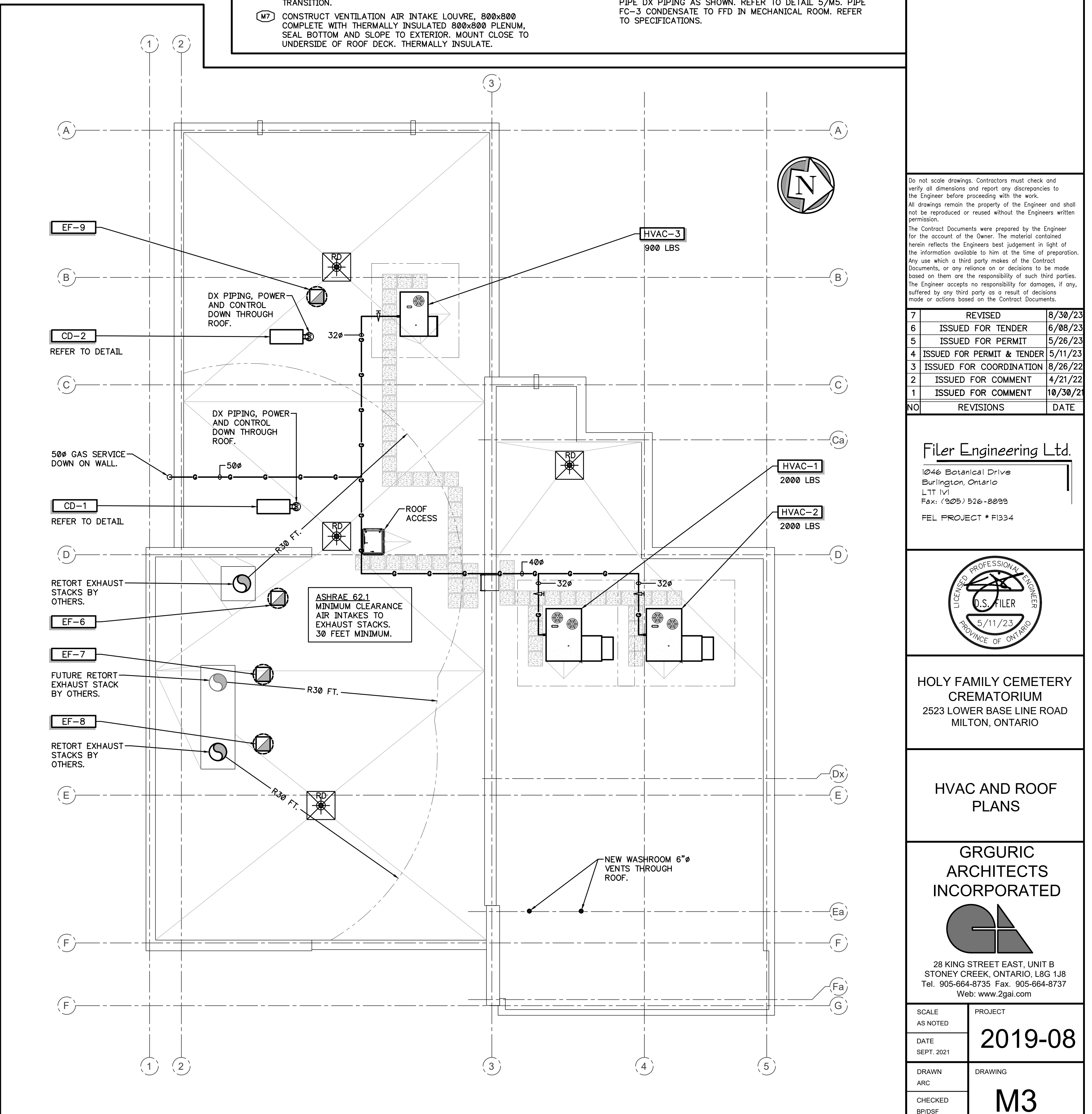
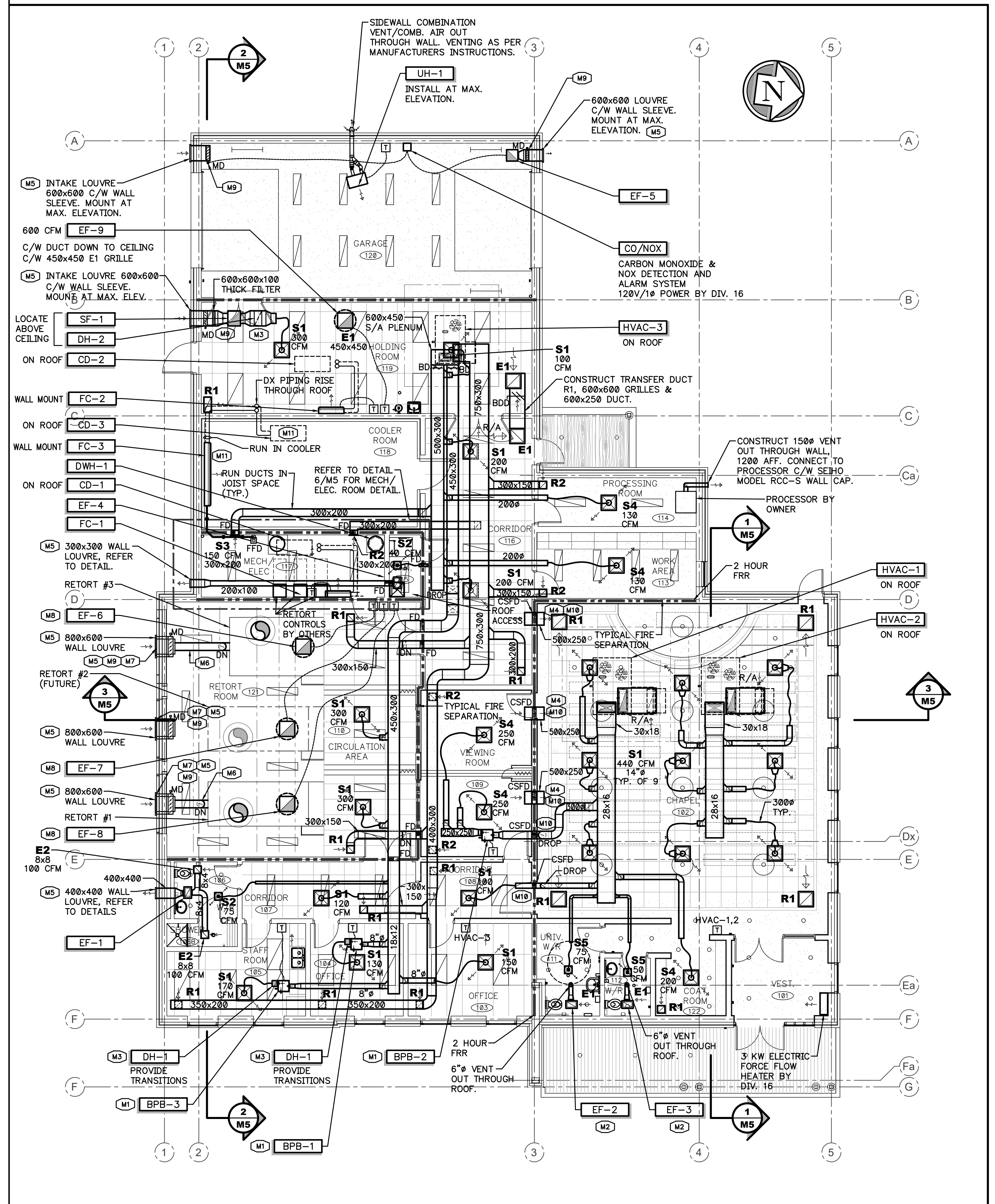
(M7) CONSTRUCT VENTILATION AIR INTAKE LOUVRE, 800x800 COMPLETE WITH THERMALLY INSULATED 800x600 PLENUM, SEAL BOTTOM AND SLOPE TO EXTERIOR. MOUNT CLOSE TO UNDERSIDE OF ROOF DECK. THERMALLY INSULATE.

(M8) DIV. 15900 TO PROVIDE COOLING THERMOSTAT CONTROL FOR EACH FAN/DAMPER COMBINATION FOR RETORTS: EF-6, EF-7, EF-8. BELIMO DAMPER MOTOR TO OPEN WITH FAN START ON TEMPERATURE RISE.

(M9) TAMCO SERIES 9000 DAMPER. BELIMO #LF24-S-US BY DIV. 15900, POWER BY DIV. 16, 120V/1Ø.

(M10) SUPPLY AND INSTALL U.L.C. RATED NAILOR COMBINATION SMOKE/FIRE DAMPERS. VEE-GROOVE BLADE DAMPERS, 24 VAC ACTUATOR, CLASS II, FOR 250° C, MAXIMUM 2000 FPM, 16 GAUGE FRAME, MAXIMUM LEAKAGE 18 CFM/SQ.FT. AT 4.0" WC. 1 1/2 HOUR RATING. INSTALL AS INDICATED WHERE THE CSFD TAGS ARE INDICATED. DIV. 16 TO WIRE POWER AND SMOKE DETECTORS. SMOKE DETECTORS BY DIV. 16 REQUIRED ON BOTH SIDES OF AIR TRANSFER DUCTS AND DUCT TYPE SMOKE DETECTORS DOWNSTREAM OF DAMPERS IN DUCTED SYSTEMS. DAMPERS TO BE NORMALLY OPEN UNTIL SMOKE DETECTORS TRIP AND CLOSE THE DAMPERS. DAMPER SIZES AS INDICATED.

(M11) CONSTRUCT COOLER REFRIGERATION SYSTEM. MOUNT FC-3 ON WALL OF COOLER BOX. MOUNT CONDENSER ON ROOF. PIPE DX PIPING AS SHOWN. REFER TO DETAIL 5/M5. PIPE FC-3 CONDENSATE TO FFD IN MECHANICAL ROOM. REFER TO SPECIFICATIONS.



Do not scale drawings. Contractors must check and verify all dimensions and report any discrepancies to the Engineer before proceeding with the work. All drawings remain the property of the Engineer and shall not be reproduced or reused without the Engineer's written permission.

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NO	REVISIONS	DATE
7	REVISED	8/30/23
6	ISSUED FOR TENDER	6/08/23
5	ISSUED FOR PERMIT	5/26/23
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**Filer Engineering Ltd.**  
 1046 Botanical Drive  
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 FEL PROJECT # F1334



**HOLY FAMILY CEMETERY  
 CREMATORIUM**  
 2523 LOWER BASE LINE ROAD  
 MILTON, ONTARIO

**HVAC AND ROOF  
 PLANS**

**GRGURIC  
 ARCHITECTS  
 INCORPORATED**

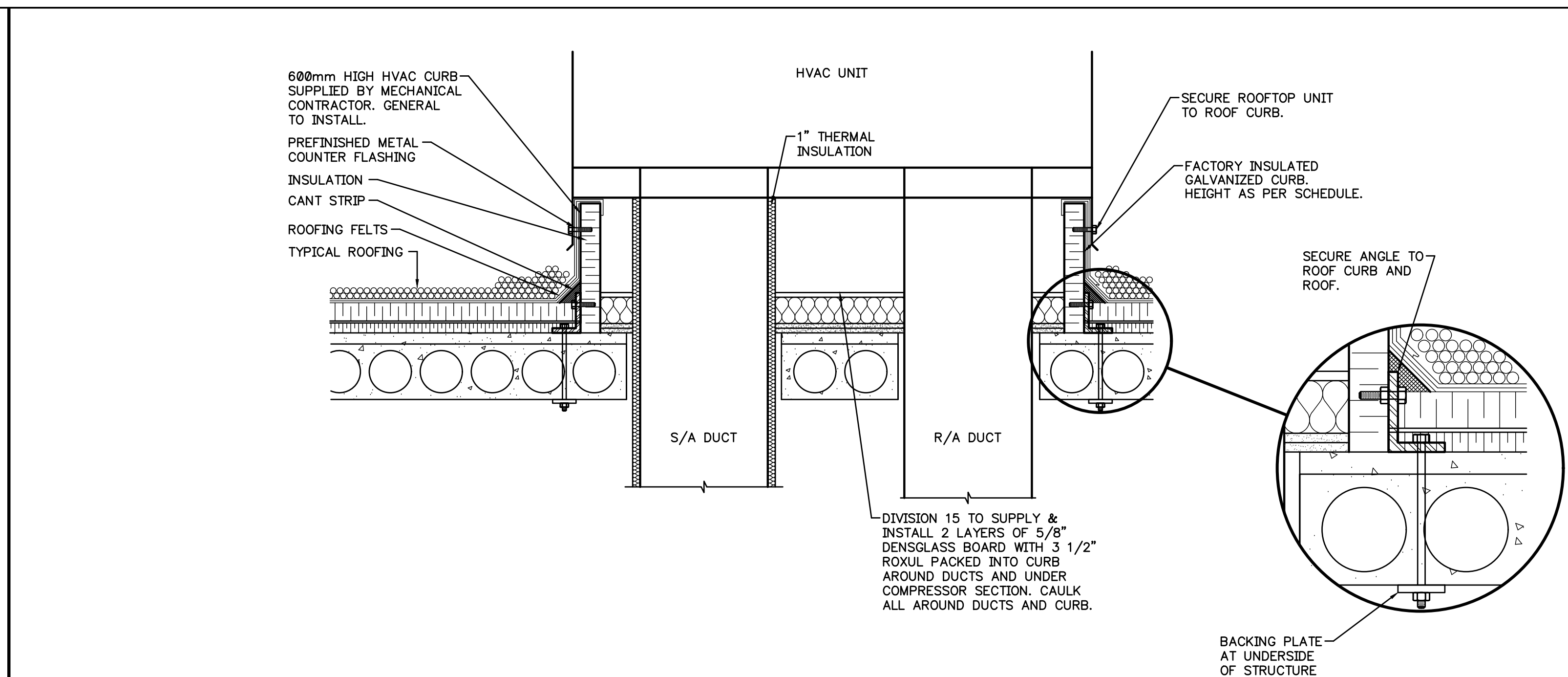
28 KING STREET EAST, UNIT B  
 STONEY CREEK, ONTARIO, L8G 1J8  
 Tel. 905-664-8735 Fax. 905-664-8737  
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SCALE	PROJECT
AS NOTED	2019-08
DATE	DATE
SEPT. 2021	
DRAWN	DRAWING
ARC	M3
CHECKED	PRINT DATE
BR/DSF	
PRINT DATE	PRINT DATE
CAD FILE	CADFILE

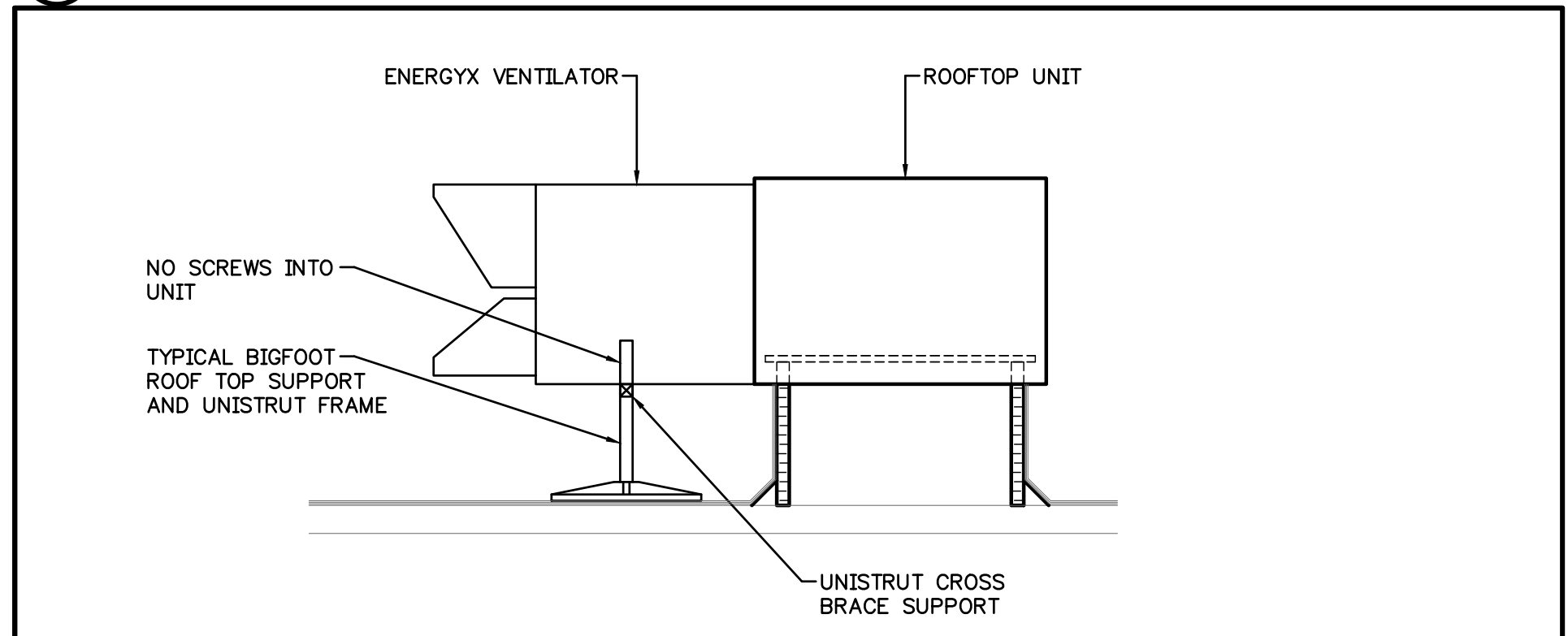


PLUMBING FIXTURE SCHEDULE										
FIXT. TYPE	TAG	MODEL No.	ALTERNATE MANUFACTURER	MOUNTING HEIGHT	HW	CW	WASTE	VENT	WORK BY DIV. 16000	
WATER CLOSET	WC-1	AMERICAN STANDARD MADERA 4.8 LITRE FLOWWISE 3451.128	- FLOOR MOUNTED, VITREOUS CHINA (FLUSH VALVE) - 380mm TO TOP OF BOWL, SIPHON JET, ELONGATED RIM - FLUSH VALVE - SLOAN ROYAL #111-1.28 FLUSHMETER 4.8 LPF, CHROME PLATED SOLID BRASS, C/W 1" CHROME SUPPLY & FIXTURE DOWN TUBE - SEAT - OPEN FRONT, SOLID PLASTIC LESS COVER WITH STAINLESS STEEL CHECK HINGE & STAINLESS STEEL POST & HARDWARE. COLOUR BY ARCHITECT, OLSONITE No: 95SSC	KOHLER	RIM HEIGHT 15" (380mm)	---	25	80	40	---
WATER CLOSET	WCH-1	AMERICAN STANDARD MADERA 4.8 LITRE FLOWWISE 3461.001	- BARRIER FREE, FLOOR MOUNTED, VITREOUS CHINA (FLUSH VALVE) - 420mm TO TOP OF BOWL, SIPHON JET, ELONGATED RIM - FLUSH VALVE - SLOAN ROYAL #111-1.28 FLUSHMETER 4.8 LPF, CHROME PLATED SOLID BRASS, C/W 1" CHROME SUPPLY & FIXTURE DOWN TUBE - SEAT - OPEN FRONT, SOLID PLASTIC LESS COVER WITH STAINLESS STEEL CHECK HINGE & STAINLESS STEEL POST & HARDWARE. COLOUR BY ARCHITECT, BEMIS No: 195SSCT - BACKREST, FROST #1028 - LOCATE FLUSH VALVE ON ACCESS SIDE	KOHLER	TOP OF SEAT 400 - 460mm	---	25	80	40	---
LAVATORY	LAV-1	AMERICAN STANDARD CADET UNIVERSAL ACCESS #8494 001	- BARRIER FREE COUNTER BASIN - FAUCET: DELTA #22C 551, HOT LIMIT STOP, (LEAD FREE FAUCET, <0.25% LEAD BY WEIGHT) - MAX FLOW 1.9 LITRE/MIN - OFFSET CHROME PLATED BRASS "P" TRAP - DRAIN FITTINGS, OFFSET GRID DRAIN - MIXING VALVE - WATTS #LFUSG-B - STAINLESS STEEL BRAIDED FLEX SUPPLIES, OFFSET, CHROME PLATED, BRASS STOPS	KOHLER	AS PER ARCH	13	13	40	32	---
LAVATORY	LAVH-1	AMERICAN STANDARD MURRO UNIVERSAL DESIGN 0954 004	- BARRIER FREE WALL HUNG BASIN - VITREOUS CHINA - FAUCET: DELTA #22C 551, HOT LIMIT STOP, MAX. FLOW 1.9 LITRE/MIN, LEAD FREE FAUCET, <0.25% LEAD BY WEIGHT - OFFSET CHROME PLATED BRASS "P" TRAP - DRAIN FITTINGS, OFFSET GRID DRAIN - MIXING VALVE - WATTS #LFUSG-B - CONCEALED FLOOR MOUNTED ARM CARRIER, ZURN MODEL TO MATCH - STAINLESS STEEL BRAIDED FLEX SUPPLIES, OFFSET, CHROME PLATED, BRASS STOPS	KOHLER	AS PER ARCH	13	13	40	32	---
COUNTER SINK (LEDGE BACK)	CS-1	KINDRED LBD6407-1	- DOUBLE BOWL STAINLESS STEEL (790mm x 520mm x 180mm) - 40mm CAST BRASS "P" TRAP - BALL VALVE STOPS, FLEX SUPPLIES - TRIM FAUCET - DELTA TECK #26C3-153, 8" SWING SPOUT (LEAD FREE FAUCET, <0.25% LEAD BY WEIGHT) - MAX. FLOW 1.9 LITRE/MIN - MIXING VALVE - WATTS #LFUSG-B	AMI WATTS VALVE	AS PER ARCH	13	13	40	32	---
HAND WASH SINK	HWS-1	FRANKE MODEL No: S4206-1	- WALL HUNG, STAINLESS STEEL (430mmx420mmx150mm) - FAUCET: AMERICAN STANDARD CERAMIX #2000-100 (LEAD FREE FAUCET, <0.25% LEAD BY WEIGHT) MIXING VALVE - WATTS #LFUSG-B - 40mm CAST BRASS "P" TRAP, BALL VALVE STOPS, FLEX SUPPLIES	---	---	13	13	40	40	---
SERVICE SINKS	SS-1	FIAT MODEL No: MSB-2424	- (600mm x 600mm x 250mm) - SUPPLY VALVE FITTINGS - #830AA CHROME PLATED W/VACUUM BREAKER, ADJUSTABLE WALL BRACE & PAIL HOOK - STAINLESS STEEL WALL GUARD - HOSE & BRACKET - 750mm LONG HEAVY DUTY FLEXIBLE #632AA - MOP HANGER - #889-CC - DRAIN FITTING - #1453-BB FLAT GRATE	STERNSON	FLOOR MOUNTED	13	13	75	40	---
SHOWER	SHH-1	BRADLEY MODEL No: S59-1005HD BARRIER FREE	- EQUA-FLO HD PRESSURE BALANCING VALVE - STAINLESS STEEL & BRASS CONSTRUCTION, STAINLESS STEEL BALANCING PISTON, TAMPER RESISTANT BRASS LIMIT STOP, LEVER HANDLE, 1/2" CHROME PLATED BRASS STEM - MAX. FLOW 4.7 LITRE/MIN - BRADLEY HAND SHOWER, MODEL #B24, 60" FLEX HOSE, CHROME PLATED BRASS SUPPLY ARM, VACUUM BREAKER, 1.5 GPM FLOW CONTROL WITH #824 24" METAL SLIDE BAR WITH HAND SHOWER - KOHLER, SHOWER BASE, MODEL "ARCHER" #K-9396, 36"x36", LOW THRESHOLD, ACRYLIC, CENTRE DRAIN LOCATION	AMERICAN STANDARD SYMMONS	CENTRE OF OUTLET: MENS 6'-10" (2080) WOMENS 6'-6" (1980)	13	13	75	40	---
SHOWER BASE	SB-1	KOHLER #K-9396	- KOHLER, SHOWER BASE, MODEL "ARCHER" #K-9396, 36"x36", LOW THRESHOLD, ACRYLIC, CENTRE DRAIN LOCATION	STERN WILLIAMS	---	---	---	50	---	---
FLOOR DRAIN	FD	WATTS No: FD-100-C	- NICKEL BRONZE TOP - MEMBRANE CLAMP	ZURN	---	---	10	80	40	---
FUNNEL FLOOR DRAIN	FFD	WATTS # FD-200-ER	- NICKEL BRONZE TOP, TRAP SEAL PRIMER CONNECTION - NICKEL BRONZE FUNNEL - EXTENDED RIM	ZURN	---	---	10	80	40	---
CLEAN OUT	CO	WATTS No: CO-100-C-R	- NICKEL BRONZE TOP	ZURN	---	---	10	80	40	---
SHOWER DRAIN	SD	WATTS FD-100-C-A5-1	- NICKEL BRONZE TOP - MEMBRANE CLAMP	ZURN	---	---	10	80	40	---
ROOF DRAINS	RD	THALER RD-4C	- SIZE AS REQUIRED - THALER RD-4C, COPPER DRAIN BODY AND BASE, WITH CAST AL-DOME - STAINLESS STEEL SCREWS, BRONZE STABILIZER RING - SPECIAL 400 LONG TALENCE - CAST ALUMINUM CLAMPING RING	NO SUBSTITUTE	---	---	---	---	---	---
NON FREEZE HOSE BIBB	NFHB	WATTS HY-725-K	- ENCASED RECESSED NON-FREEZE WALL HYDRANT - WITH NPS 3/4" HOSE OUTLET, REMOVABLE OPERATING KEY - POLISHED BRONZE FINISH WITH VACUUM BREAKER	ZURN	---	---	20	---	---	---
EMERGENCY EYE WASH	EW-1	BRADLEY MODEL No: S19-224-0A1-ABAA-00	- EMERGENCY EYE / FACE WASH UNIT - PLASTIC BOWL, PLASTIC DUST COVER - STAINLESS STEEL HANDLE - HALO EYEWASH	HAWS	---	---	---	50	40	---
EMERGENCY MIXING VALVE (FOR EYE WASH)	EMV-1	BRADLEY NAVIGATOR No: S19-2000	- EMERGENCY MIXING VALVE, C.S.A. CERTIFIED - SINGLE FIXTURE - 1/2" INLET AND OUTLET - C/W BALL VALVE STOPS	---	---	20	20	---	---	---
TRAP SEAL VALVE	TSP-1	PRECISION PLUMBING PRODUCTS PT-132S	- ELECTRONIC FLUSH MOUNT TRAP PRIMING ASSEMBLY - ATMOSPHERIC VACUUM BREAKER, PRE-SET 24 HR. CLOCK, MANUAL OVER RIDE SWITCH, 120V SOLENOID VALVE, CALIBRATED MANIFOLD FOR EQUAL WATER DISTRIBUTION	---	---	---	20	---	---	●
BACKFLOW PREVENTOR	BFP-1	WATTS LF009 SERIES UP TO 50 SIZE	- BACKFLOW PREVENTERS, INSTALL WHERE SHOWN ON DRAWINGS, WHERE REQUIRED BY CODE OR WHERE POTABLE WATER CONNECTIONS ARE MADE TO MECHANICAL EQUIPMENT - BACKFLOW PREVENTERS ARE TO BE C.S.A. APPROVED FOR REDUCED PRESSURE PROTECTION - STRAINERS 777-C-SI VENT FUNNEL - LEAD FREE FIXTURE, <0.25% LEAD BY WEIGHT	---	---	---	---	---	---	---

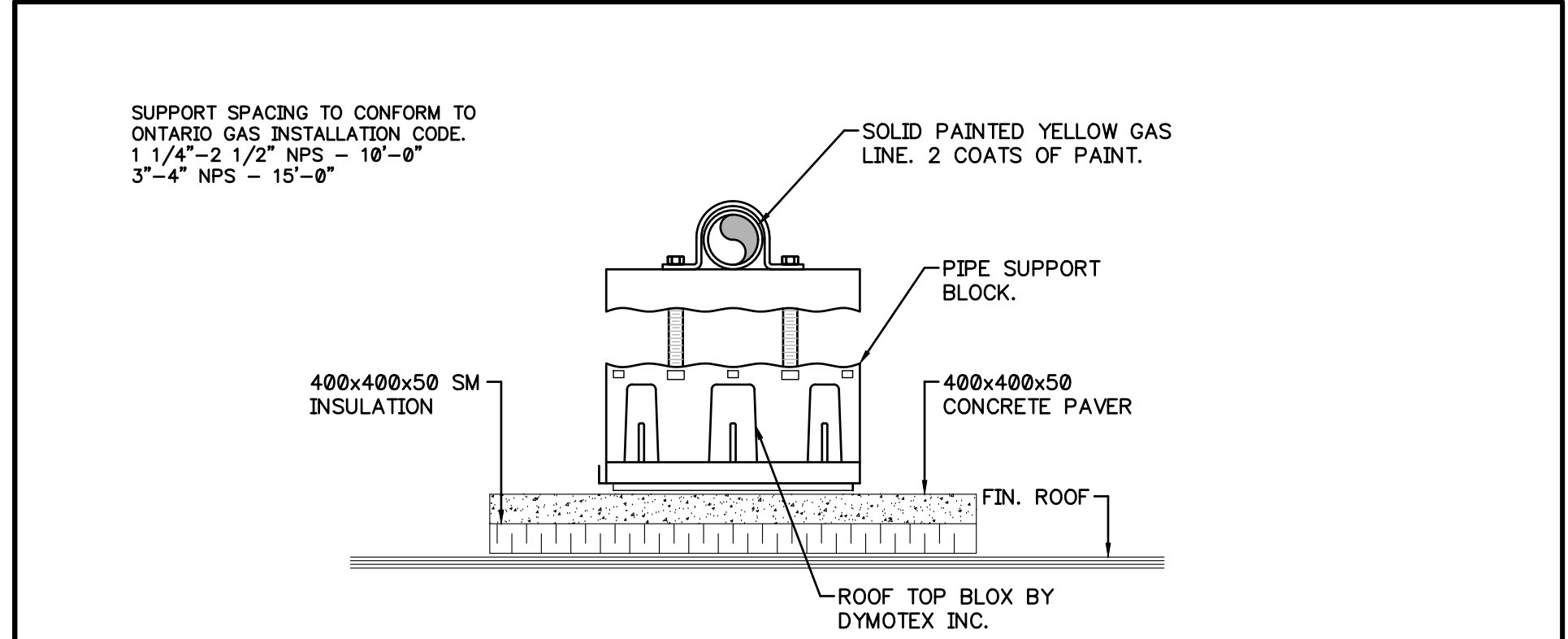
GRILLE AND DIFFUSER SCHEDULE						
- BASED ON E.H. PRICE PRODUCTS						
TYPE	TAG	MODEL	MOUNT	SIZE	FINISH OPTIONS	
SUPPLY	S1	24x24 SCD4	T-BAR	NECK:	B-12 FINISH	
SUPPLY	S2	12x12 SCD4	T-BAR	UP TO 100 CFM - 6"Ø		
SUPPLY	S4	24x24 SCD4	DRYWALL	101 TO 150 CFM - 7"Ø		
SUPPLY	S5	12x12 SCD4	DRYWALL	151 TO 250 CFM - 8"Ø		
SUPPLY	S6	RCDA		251 TO 300 CFM - 10"Ø		
				301 TO 400 CFM - 12"Ø		
				401 TO 500 CFM - 14"Ø		
SUPPLY	S3	NT22	FRAME	AS SHOWN	B-12 FINISH, OBD	
RETURN	R1	TB80	T-BAR	50 TO 400 CFM - 12"x12"	B-12 FINISH, OBD	
RETURN	R2	NT80	DRYWALL	401 TO 700 CFM - 12"x24"		
				701 TO 1400 CFM - 24"x24"		
EXHAUST	E1	TB80	T-BAR	50 TO 100 CFM - 6"x6"	B-12 FINISH, OBD	
EXHAUST	E2	NT80	DRYWALL	101 TO 200 CFM - 8"x8"		
				201 TO 300 CFM - 10"x10"		
				301 TO 400 CFM - 12"x12"		



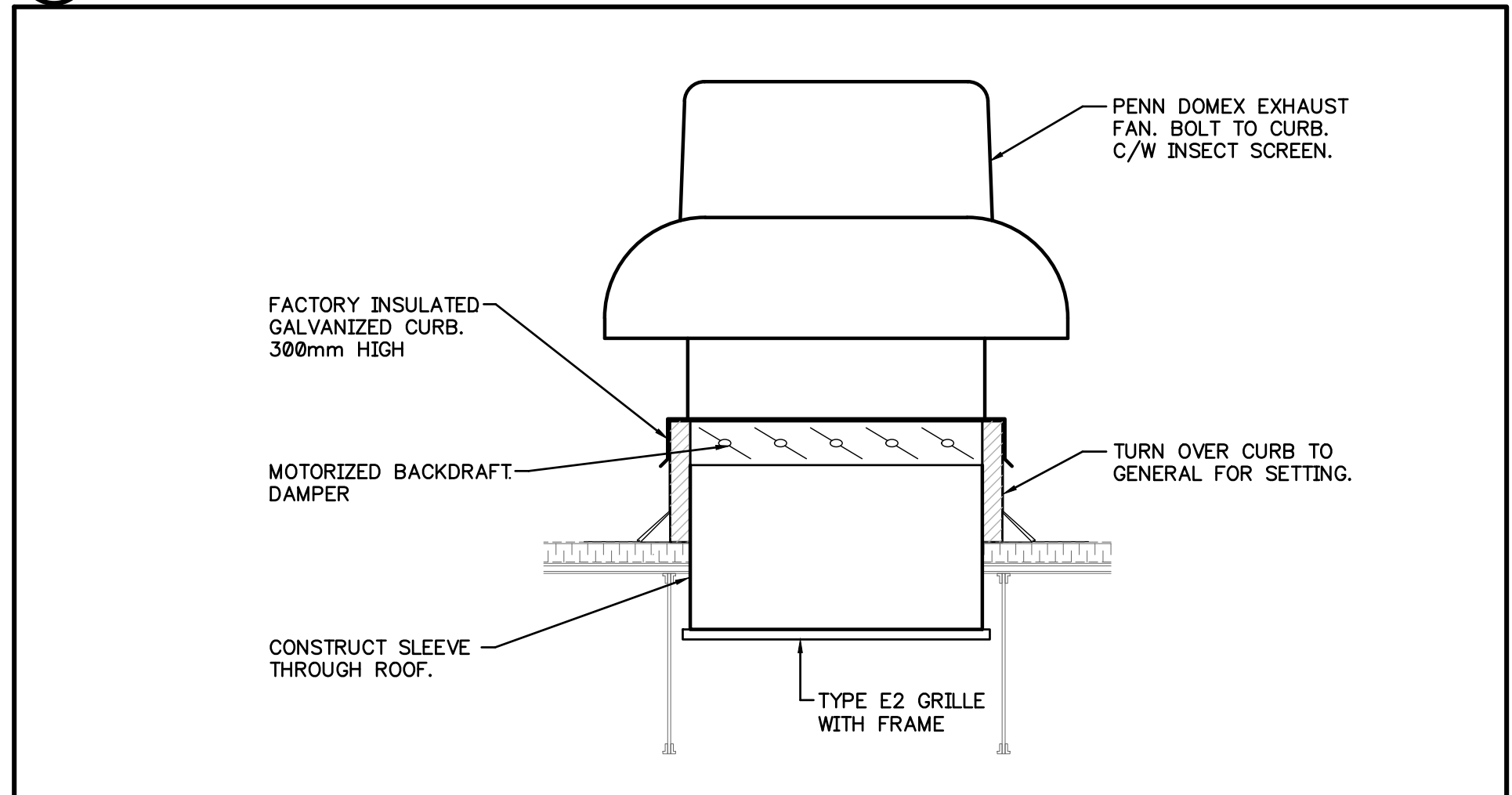
1 PACKAGED ROOF TOP CURB DETAIL  
SCALE: N.T.S.



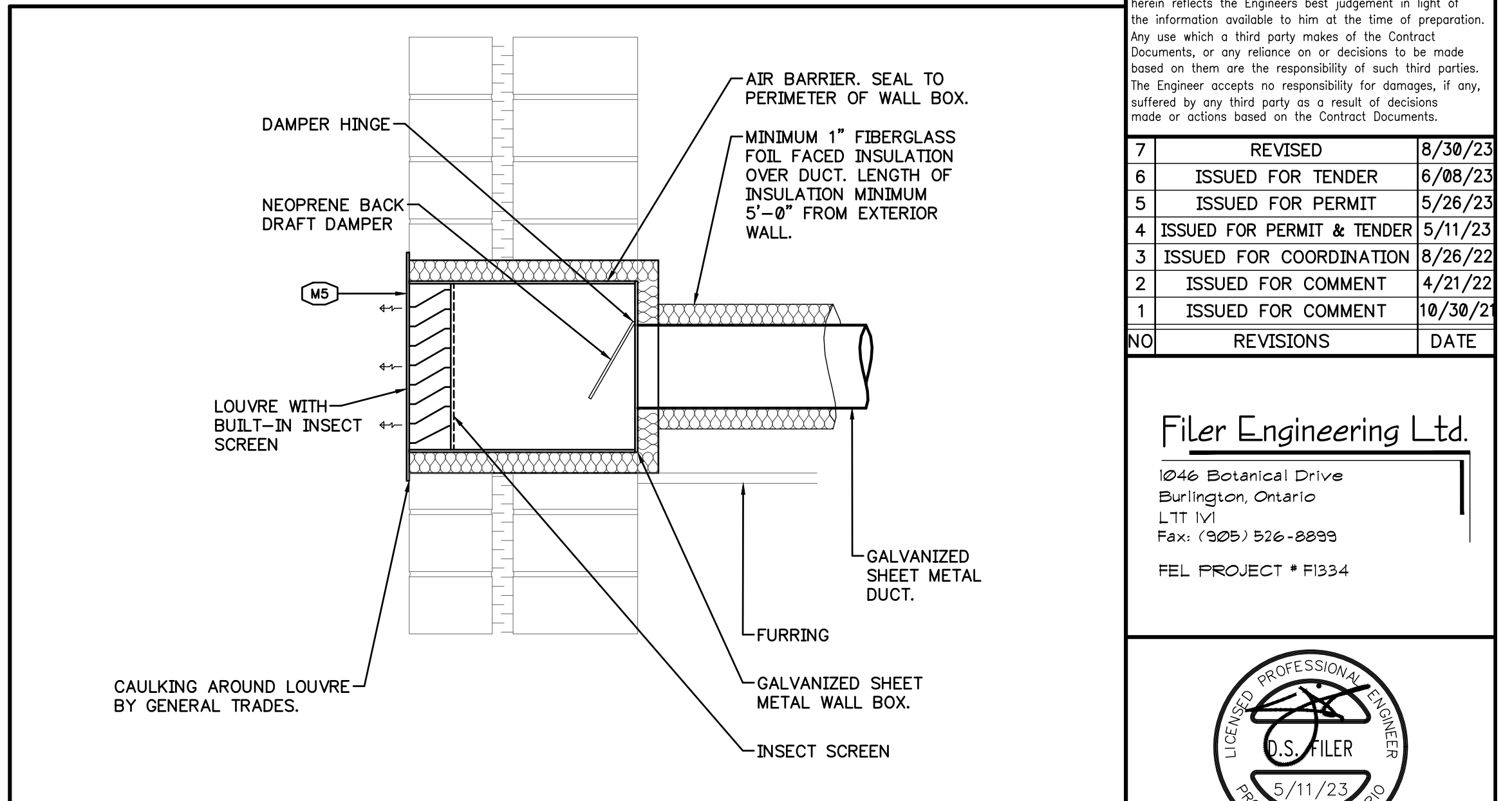
3 ERV SUPPORT DETAIL  
SCALE: N.T.S.



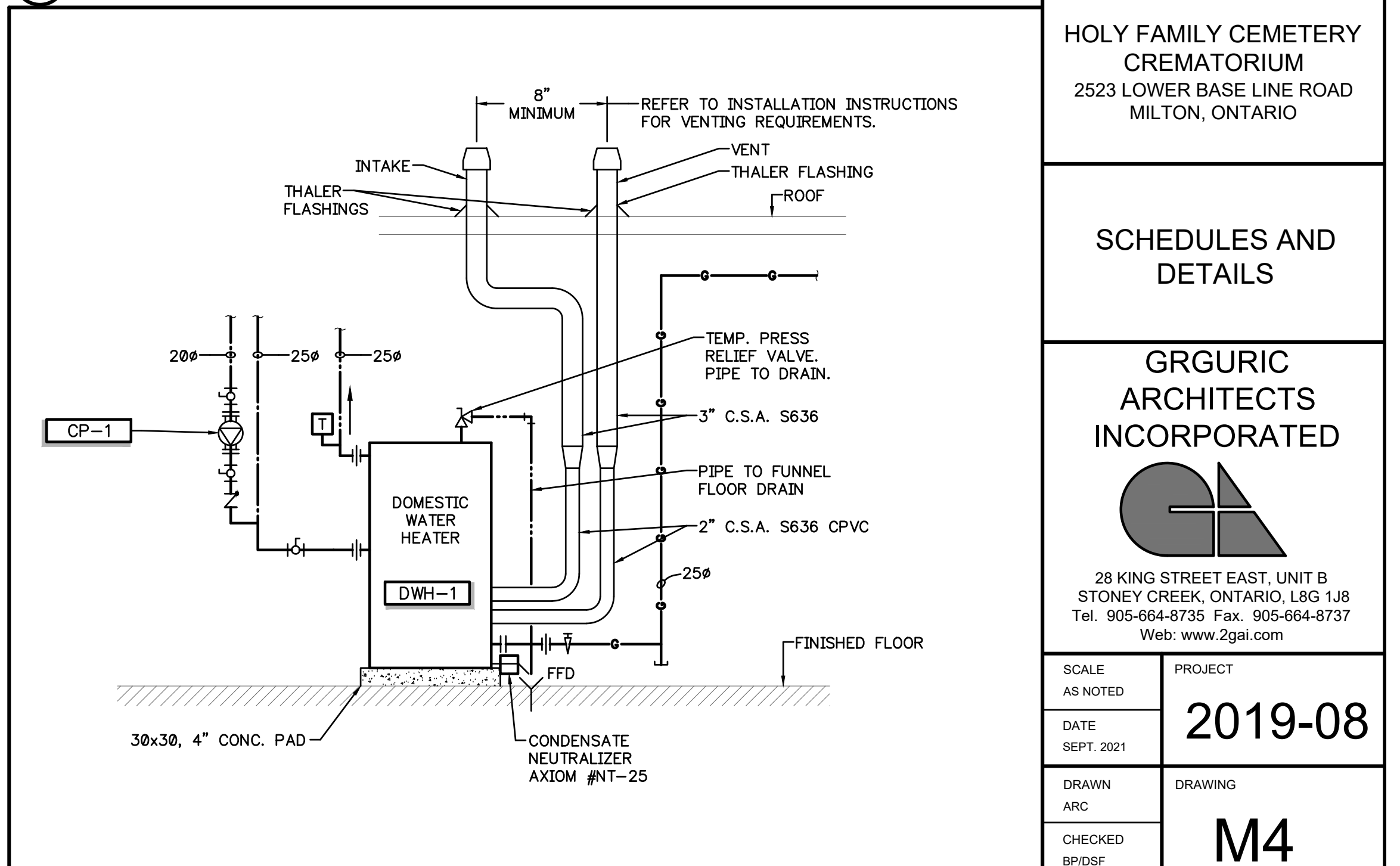
4 GAS PIPING SUPPORT DETAIL  
SCALE: N.T.S.



5 EXHAUST FAN DETAIL (EF-6, EF-7, EF-8)  
SCALE: N.T.S.



2 EXHAUST DISCHARGE WALL BOX DETAIL  
SCALE: N.T.S.



6 DOMESTIC WATER HEATER DETAIL  
SCALE: N.T.S.

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The Contract Documents were prepared by the Engineer for the account of the Owner. The material contained herein reflects the Engineers best judgment in light of the information available to him at the time of preparation. Any use which a third party makes of the Contract Documents, or any reliance on or decisions to be made based on them are the responsibility of such third parties. The Engineer accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on the Contract Documents.

NO	REVISIONS	DATE
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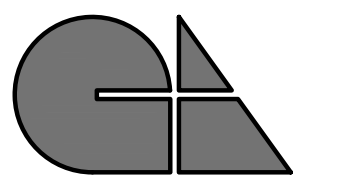
Filer Engineering Ltd.  
1046 Botanical Drive  
Burlington, Ontario  
L7T 1V1  
Fax: (905) 526-8899  
TEL PROJECT # F1334



HOLY FAMILY CEMETERY CREMATORIUM  
2523 LOWER BASE LINE ROAD  
MILTON, ONTARIO

SCHEDULES AND DETAILS

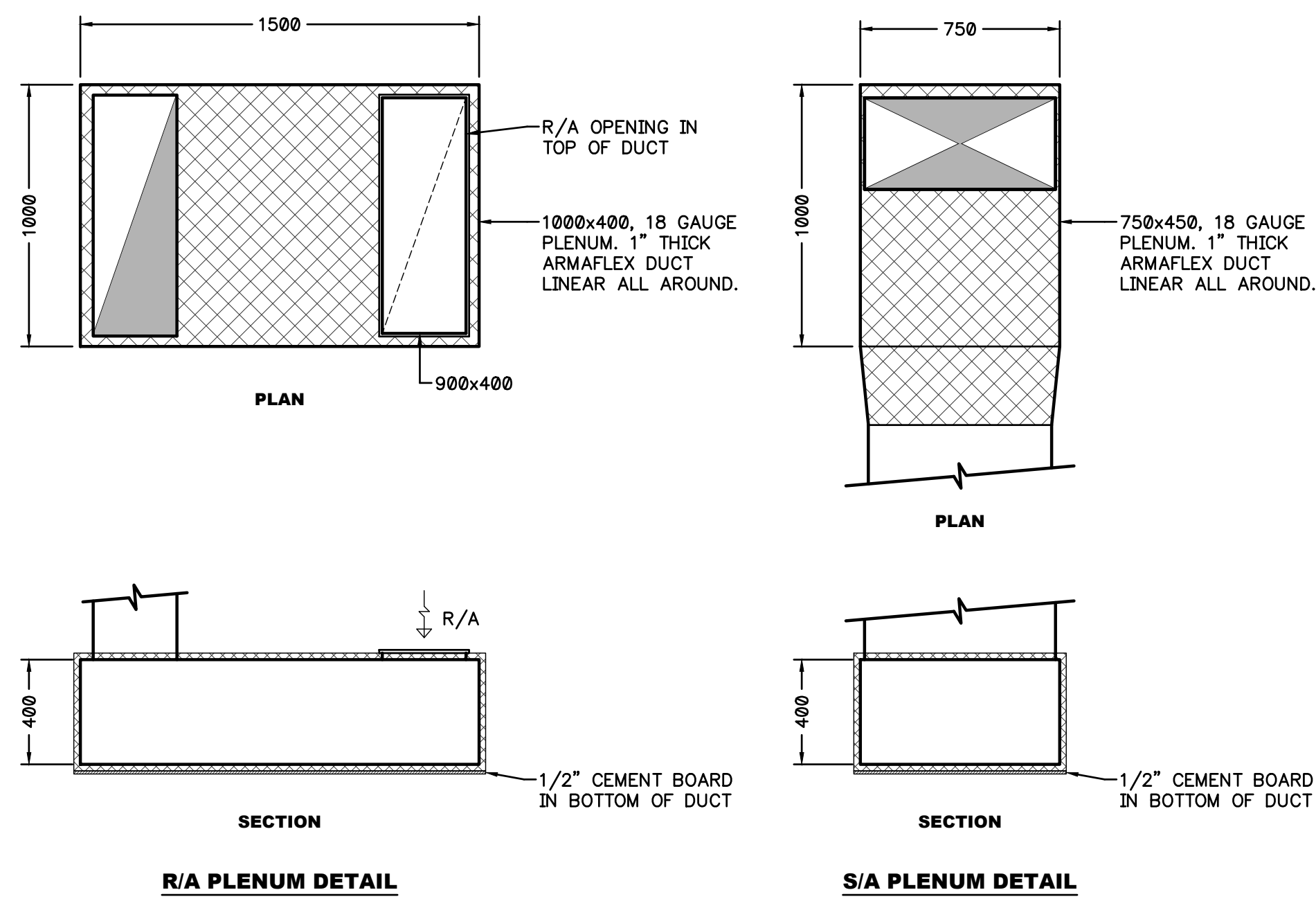
GRGURIC ARCHITECTS INCORPORATED



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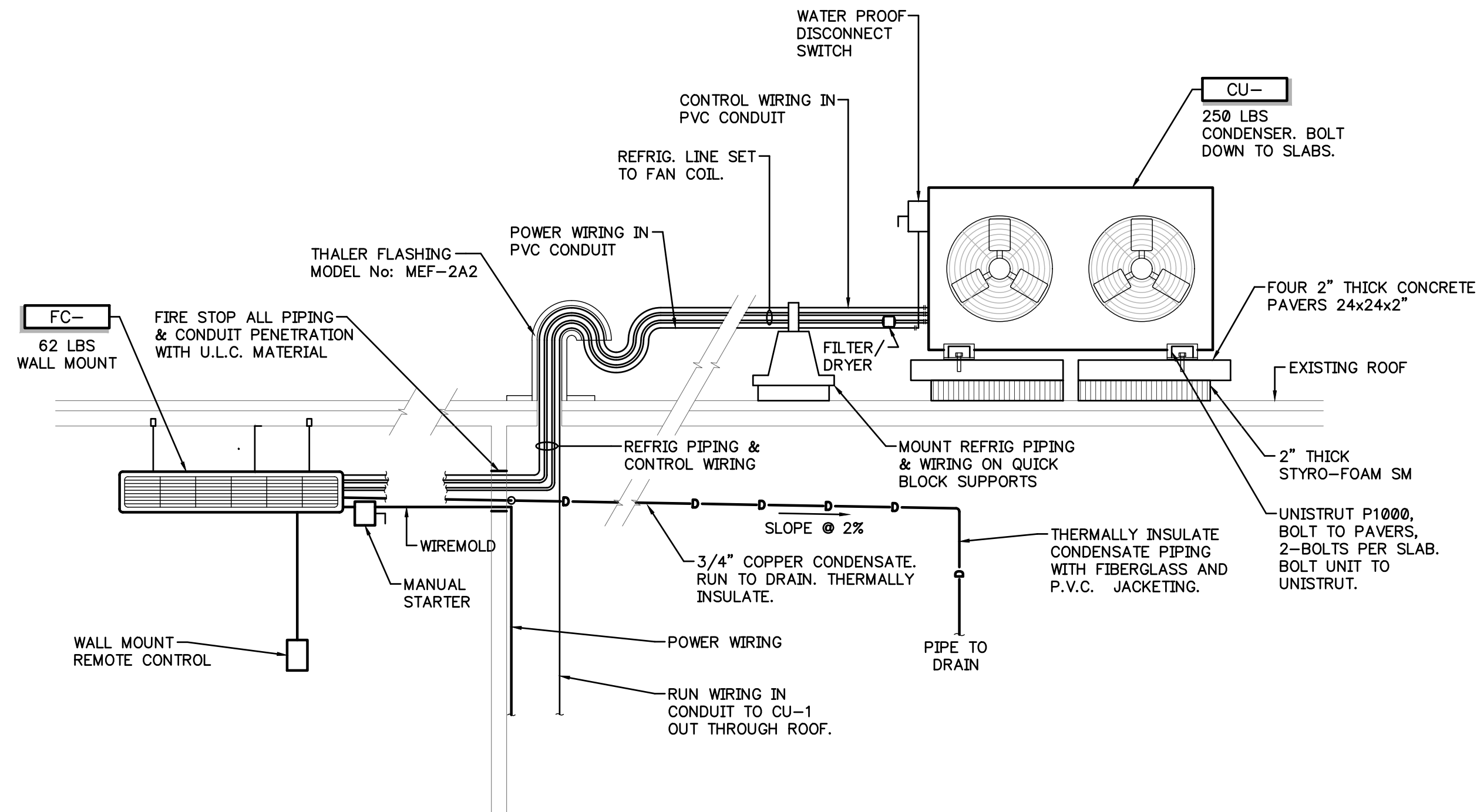
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**4 HVAC-1 & HVAC-2 PLENUM DETAILS**

M5 SCALE: 1:20



**5 TYPICAL FAN COIL / CONDENSER ARRANGEMENT**

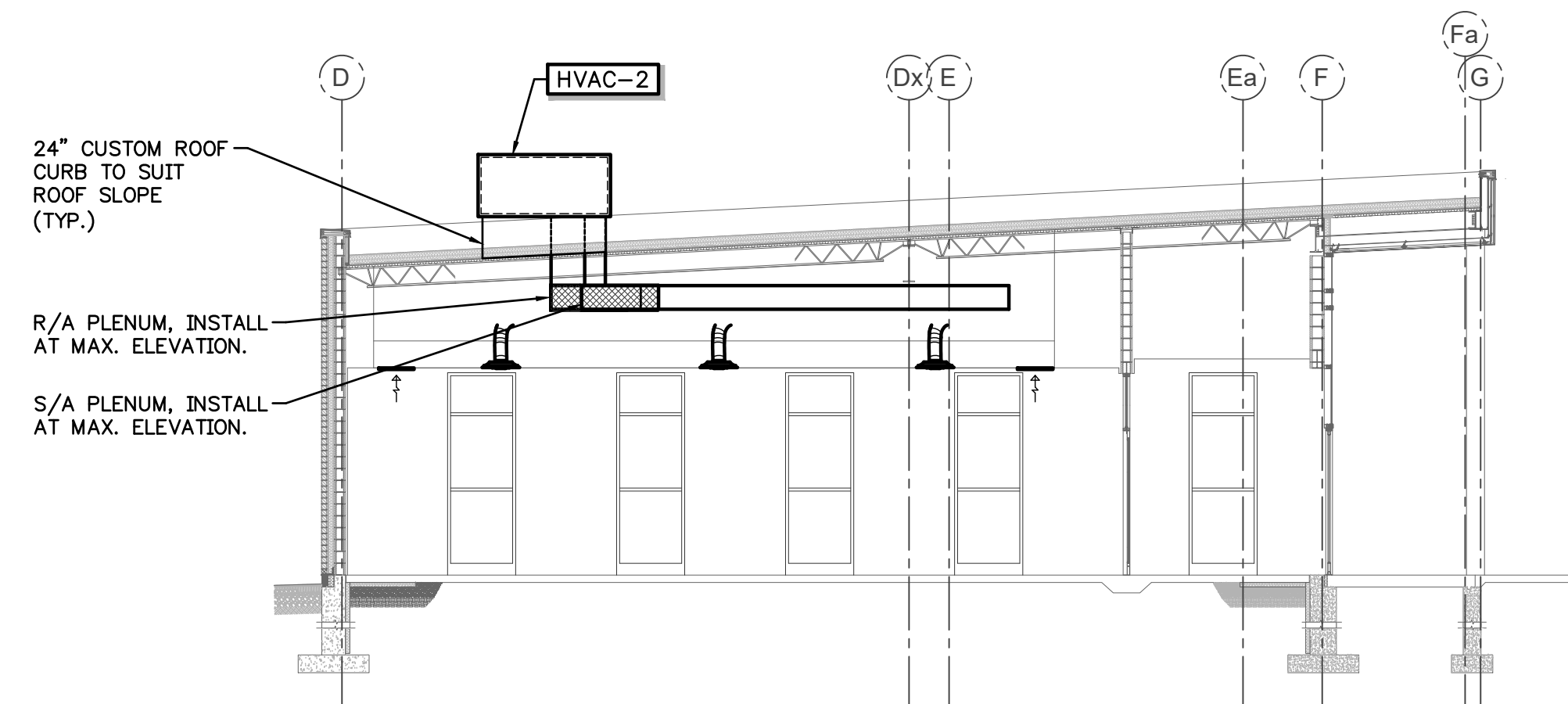
M5 SCALE: N.T.S.

**ELECTRICAL EQUIPMENT LEGEND**

- |                          |                            |
|--------------------------|----------------------------|
| ① MAIN DISCONNECT        | ⑦ TEL/FIBRE/CATV BACKBOARD |
| ② PANEL BOARD PP-2       | ⑧ CEM SYSTEM #1            |
| ③ 150 kVA TRANSFORMER T3 | ⑨ CEM SYSTEM #2            |
| ④ PANEL BOARD LP-C       | ⑩ CEM SYSTEM #3            |
| ⑤ PANEL BOARD LP-M       | ⑪ TSP-1                    |
| ⑥ SECURITY PANEL         |                            |

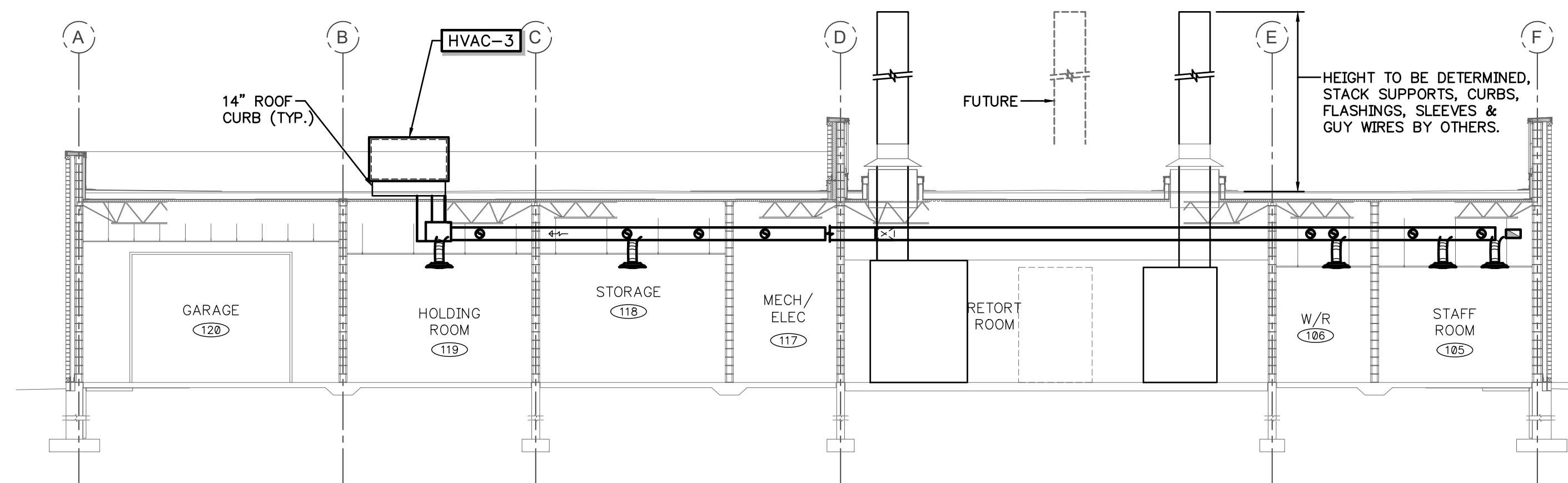
**6 MECHANICAL/ELECTRICAL ROOM ARRANGEMENT**

M5 SCALE: 1:25



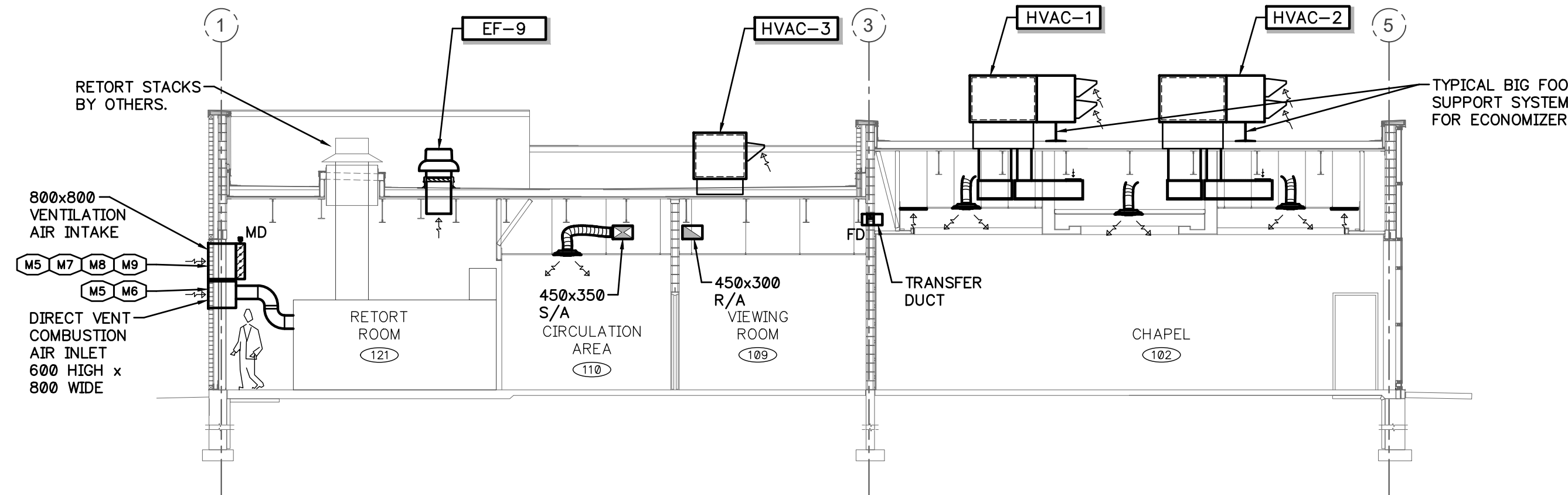
**1 SECTION**

M5 SCALE: 1:100



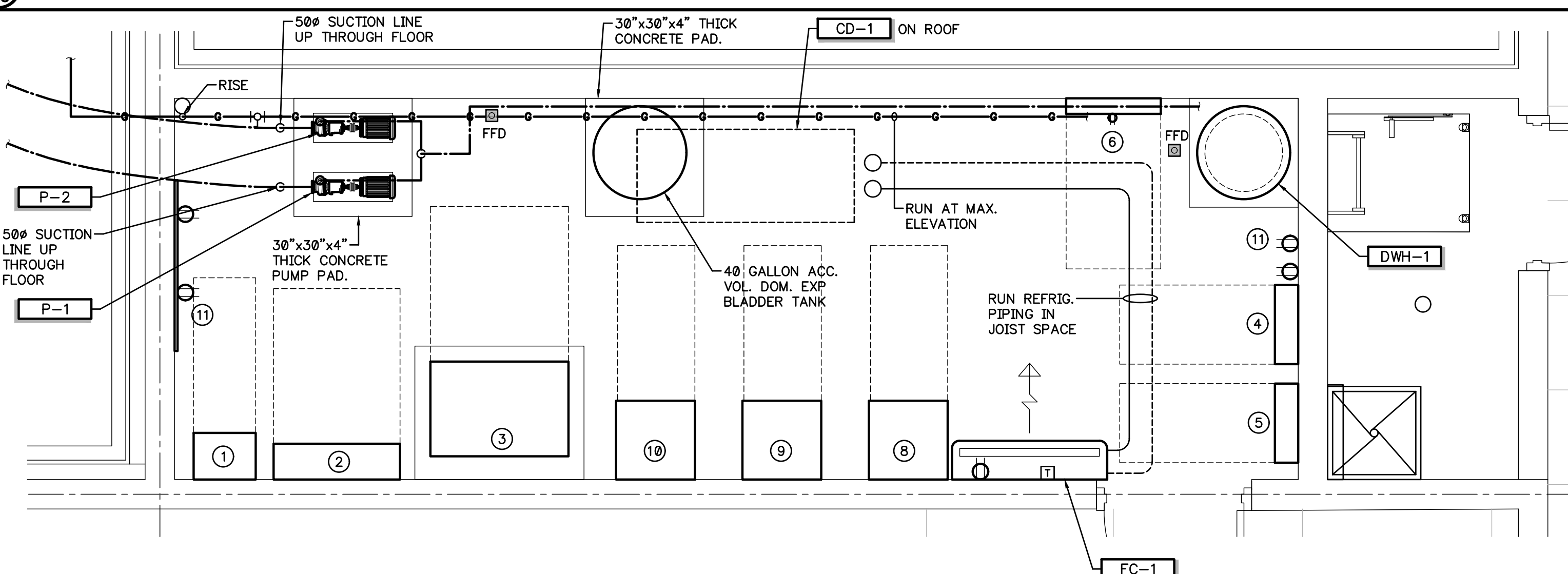
**2 SECTION**

M5 SCALE: 1:100



**3 SECTION**

M5 SCALE: 1:100



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Filer Engineering Ltd.

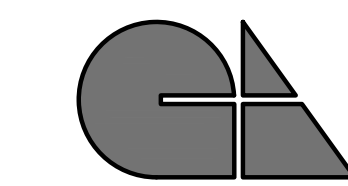
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SCALE AS NOTED	PROJECT
DATE SEPT. 2021	2019-08
DRAWN ARC	DRAWING
CHECKED BR/DSF	M5
PRINT DATE	PRINTDATE
CAD FILE	CADFILE



## GENERAL MECHANICAL SPECIFICATION

### SCOPE OF WORK

DIVISION 15 SHALL FURNISH ALL LABOUR, MATERIALS AND EQUIPMENT NECESSARY FOR THE PROPER AND TIMELY COMPLETION OF THE MECHANICAL SYSTEMS AS SHOWN ON THE DRAWINGS AND/OR AS SPECIFIED.

THE SPECIFICATIONS SHALL BE CONSIDERED AS AN INTEGRAL PART OF THE PLANS WHICH ACCOMPANY THEM, NEITHER THE PLANS NOR THE SPECIFICATIONS SHALL BE USED ALONE. ANY ITEMS OR SUBJECT OMITTED FROM ONE, BUT WHICH IS MENTIONED OR REASONABLY IMPLIED IN THE OTHER, SHALL BE CONSIDERED AS PROPERLY AND SUFFICIENTLY SPECIFIED, AND MUST THEREFORE, BE PROVIDED. MISINTERPRETATIONS OF EITHER THE PLANS OR THE SPECIFICATIONS SHALL NOT RELIEVE THIS DIVISION OF RESPONSIBILITY.

IT IS THE INTENT THAT THE DRAWINGS AND SPECIFICATIONS DESCRIBE COMPLETE MECHANICAL SYSTEMS, ALL MATERIALS AND EQUIPMENT AND THE FURNISHING OF ALL LABOUR REASONABLY IMPLIED BY THESE DRAWINGS AND/OR THE SPECIFICATIONS SHALL BE INCLUDED TO PROVIDE SYSTEMS READY FOR SATISFACTORY OPERATION. REFER TO ALL OTHER TRADE DRAWINGS AND SPECIFICATIONS TO FULLY CO-ORDINATE THE INSTALLATION OF THE WORK.

MECHANICAL CONTRACTOR TO BE AWARE THAT ANY WORK REQUIRED TO BE PREFORMED IN THE BUILDING IS TO BE CAREFULLY AND CLOSELY COORDINATED WITH THE EXISTING OCCUPANTS. THE AREAS TO BE AFFECTED BY THE NEW PIPING WORK AND DEMOLITION TO BE IDENTIFIED PRIOR TO COMMENCING CONSTRUCTION AS SOON AS POSSIBLE AFTER AWARD OF CONTRACT. THE DRAWINGS SHOW PIPING IN A GENERAL ARRANGEMENT. THE ACTUAL PIPE AND DUCT LAYOUT IS TO BE DETERMINED PRIOR TO FABRICATION ONLY AFTER CLOSE EXAMINATION OF THE EXISTING CONDITIONS SUCH AS STRUCTURAL SYSTEMS, CEILING SYSTEMS, LIGHT FIXTURES, FAN COIL UNITS, PIPING, AND DUCTWORK.

### STANDARD OF ACCEPTANCE

THE ITEM NAMED AND SPECIFIED BY MODEL OR CATALOGUE NUMBER FORMS PART OF SPECS AND SHALL BE INSTALLED IN ACCORDANCE WITH STANDARD REGARDING PERFORMANCE, QUALITY OF MATERIAL AND WORKMANSHIP.

TENDER PRICES SHALL BE BASED ON THE SPECIFIED EQUIPMENT LISTED AS ACCEPTABLE PRODUCT OR AS BASE BID. ALL ALTERNATES OF LISTED EQUIPMENT MUST BE LISTED SEPARATELY ON THE TENDER FORM WITH COST SAVINGS. THE OWNERS AND THE CONSULTANT HAVE THE OPTION OF ACCEPTING OR REJECTING ALTERNATE EQUIPMENT.

THE USE OF ALTERNATE EQUIPMENT SUCH AS HEATING / COOLING UNITS, FANS, COMPRESSOR/CHILLER UNITS WILL REQUIRE THE SUBMISSION OF DETAILED SHOP DRAWINGS OF PROPOSED DETAILS INCLUDING ALL MATERIALS INCLUDING DUCTWORK, PIPING, ELECTRICAL, STRUCTURAL CONNECTIONS, LOADS AND SERVICE CLEARANCES.

ANY EQUIPMENT SUBMITTED MUST NOT EXCEED SPACE OR SERVICING REQUIREMENTS (INCLUDING ELECTRICAL AND CONTROLS AND WEIGHT) ALLOCATED ON THE DRAWINGS.

ALL OF THE MATERIALS REQUIRED FOR THE PERFORMANCE OF THE WORK SHALL BE NEW AND THE BEST OF THEIR RESPECTIVE KIND AND OF A UNIFORM PATTERN THROUGHOUT THE WORK.

### CASH ALLOWANCES

THE MECHANICAL CONTRACTOR SHALL CARRY THE FOLLOWING CASH ALLOWANCES WITHIN THE MECHANICAL TENDER COST.

THE CASH ALLOWANCES ARE CONSIDERED TO BE FOR WORK THAT IS NOT DEFINED OR DETAILED WITHIN THE DRAWINGS AND SPECIFICATIONS.

EXPEND CASH ALLOWANCES ONLY ON CONSULTANT'S WRITTEN INSTRUCTIONS.

INCLUDE THE CONTRACTOR'S CHARGES FOR OVERHEAD AND PROFIT ON ACCOUNT OF CASH ALLOWANCES IN THE CONTRACT PRICE IN ACCORDANCE WITH THE GENERAL CONDITIONS.

INCLUDE APPLICABLE TAXES IN EACH EXPENDITURE FROM CASH ALLOWANCES AS SPECIFIED IN THE GENERAL CONDITIONS.

CREDIT THE OWNER WITH UNUSED PORTION OF THE CASH ALLOWANCES IN THE STATEMENT FOR THE FINAL PAYMENT.

INCLUDE IN THE TENDER PRICE QUOTED, THE CASH ALLOWANCES LISTED BELOW:

DESCRIPTION	CASH ALLOWANCE AMOUNT	
1. FOR MECHANICAL SYSTEMS	SEVEN THOUSAND DOLLARS	\$ 7,000.00
2. TOTAL DIV. 15 CASH ALLOWANCE	SEVEN THOUSAND DOLLARS	\$ 7,000.00

### CODES, REGULATIONS AND PERMITS

ALL MECHANICAL WORK SHALL BE INSTALLED, INSPECTED AND TESTED IN ACCORDANCE WITH GOVERNING CODES, RULES AND REGULATIONS OF THE MUNICIPALITY IN WHICH THE WORK IS PERFORMED AND ALSO OF PROVINCIAL AND FEDERAL AUTHORITIES HAVING JURISDICTION.

THE DIVISION 15 CONTRACTOR SHALL OBTAIN ALL PERMITS REQUIRED FOR THE INSTALLATION OF MECHANICAL WORK, ARRANGE FOR INSPECTIONS AND TESTS AND PAY ALL FEES AND COSTS FOR THE PERMITS AND INSPECTIONS. ALL NECESSARY PERMITS SHALL BE OBTAINED IMMEDIATELY AFTER NOTIFICATION OF AWARD OF CONTRACT.

IN ADDITION TO THE FOREGOING, THE DIVISION 15 CONTRACTOR SHALL PERFORM SUCH OTHER INSPECTIONS AND TESTS AS MAY BE DEEMED NECESSARY BY THE PRIME CONSULTANT.

THE ONTARIO BUILDING CODE AND THE APPLICABLE REQUIREMENTS OF C.S.A., A.S.T.M. ANS I, U.L.C., AND NFPA STANDARDS INCLUDING THEIR LATER AMENDMENTS, AS WELL AS PROVINCIAL AND MUNICIPAL BY-LAWS AND REGULATIONS SHALL BE CONSIDERED PART OF THIS SPECIFICATION. LACK OF POSSESSION OF ANY CODE OR STANDARD REQUIRED FOR PROPER COMPLETION OF THE WORK SHALL NOT CONSTITUTE SUFFICIENT REASON FOR DEVIATION THEREFROM.

### RECORD DRAWINGS

CLEARLY RECORD ALL CONTRACT CHANGES AND DEVIATIONS FROM THE CONTRACT DRAWINGS ON A SET OF DRAWINGS AVAILABLE FROM THE GENERAL CONTRACTOR FOR THIS PURPOSE AND FORWARDED TO THE GENERAL CONTRACTOR AT THE COMPLETION OF THE PROJECT.

TRANSFER ALL "AS-BUILT" DATA TO AUTOCAD DRAWINGS FILES AND PROVIDE DIGITAL COPIES OF "AS-BUILT" DOCUMENTS.

THE FINAL CERTIFICATE OF ACCEPTANCE WILL NOT BE ISSUED UNTIL SATISFACTORY RECORD DRAWINGS ARE FILED WITH THE CONSULTANT.

### SITE VISIT

THIS CONTRACTOR SHALL VISIT THE SITE AND EVALUATE ALL EXISTING SITE CONDITIONS AS THEY MAY AFFECT THIS WORK. NO EXTRAS WILL BE ALLOWED FOR ANY EFFECTS FROM FAILING TO COMPLETE A COMPREHENSIVE SITE TOUR TO UNDERSTAND AND ACCOUNT FOR THE IMPACT OF EXISTING SITE CONDITIONS ON THE CONTRACT SCOPE OF WORK.

### CUTTING AND PATCHING

THE GENERAL CONTRACTOR SHALL BE RESPONSIBLE FOR AND PAY FOR ALL CUTTING AND PATCHING REQUIRED IN THE SCOPE OF WORK AS DEFINED IN THE GENERAL CONDITIONS. ALL NEW FINISHES SHALL BE EQUAL TO THOSE OF SURROUNDING SURFACES FOR MATERIALS, COLOUR, TEXTURE AND WORKMANSHIP. THIS DIVISION SHALL CLEARLY MARK OUT ALL OPENINGS REQUIRED AND REVIEW WITH THE GENERAL CONTRACTOR BEFORE CUTTING PROCEEDS. THIS DIVISION SHALL INSTALL ALL OPENING FRAMES, SLEEVES, DUCTWORK AND PIPING, LOUVRES, ETC., INTO THE BUILDING STRUCTURE AS CONSTRUCTION PROGRESSES. ANY ITEMS MISSED DURING CONSTRUCTION THAT MUST BE ADDED WILL BE THE RESPONSIBILITY OF THIS DIVISION AND BE CO-ORDINATED WITH THE GENERAL TRADES.

### CO-ORDINATION

CONFER AND COOPERATE WITH OTHER TRADES IN ORDER TO ELIMINATE ANY UNNECESSARY DELAYS TO THE CONSTRUCTION SCHEDULE. WHERE DOUBT EXISTS REGARDING OTHER TRADES, CONFER WITH THE SUPERINTENDANT WITHOUT DELAY FOR DETAILED INSTRUCTIONS CONCERNING HOW TO PROCEED WITH THE WORK. EXPEDITE DELIVERY OF ALL EQUIPMENT AND MATERIALS TO MEET CONSTRUCTION SCHEDULE.

ANY INTERFERENCE ISSUES THAT ARISE SHALL BE BROUGHT TO THE ATTENTION OF THE ENGINEER PRIOR TO DUCTWORK FABRICATION.

### COMMISSIONING

ENSURE THAT ALL EQUIPMENT AND SYSTEMS ARE OPERABLE AND SAFE FOR NORMAL OPERATION, ALL TESTING, ADJUSTING, BALANCING WORK AND RECORD KEEPING SHALL BE PERFORMED PRIOR TO COMMISSIONING. OPERATIONAL TESTS ON EQUIPMENT, DUCTWORK, PIPING AND CONTROL SYSTEMS SHALL BE PERFORMED PRIOR TO COMMISSIONING TO VERIFY THAT PRESSURE AND FLOW RATES MEET DESIGN REQUIREMENTS.

### INTERRUPTION AND DEMOLITION OF EXISTING SERVICES

ARRANGE, SCHEDULE AND PERFORM WORK WITH MINIMUM DISTURBANCE TO EXISTING FACILITIES AND SERVICES.

SUBMIT A COMPLETE SCHEDULE OF SERVICE INTERRUPTIONS AND CHANGE-OVERS WITH APPROXIMATE DATES REQUIRED, DURATIONS AND TIMES OF DAY, FOR APPROVAL BEFORE PROCEEDING.

NOTIFY OWNER IN WRITING AT LEAST 7 DAYS IN ADVANCE OF PLANNED INTERRUPTION TO EXISTING SERVICES.

INTERRUPTION OF SERVICES MUST OCCUR AT THE TIMES AND FOR THE DURATION STIPULATED BY THE OWNER.

KEEP SERVICE INTERRUPTION DURATION TO AN ABSOLUTE MINIMUM. CARRY OUT ALL PREPARATORY WORK, MEASUREMENTS, PREFABRICATION, ETC., WITHOUT INTERRUPTION OF EXISTING SERVICES.

IF SERVICE INTERRUPTIONS ARE REQUIRED BY THE OWNER DURING THE NIGHT OR ON WEEKENDS, ETC., PREMIUM TIME SHALL BE INCLUDED IN THE CONTRACT PRICE. NO EXTRA CHARGES WILL BE ALLOWED AT A LATER DATE FOR FAILURE TO INCLUDE SAME.

REFER TO THE REFERENCE DRAWINGS SHOWING EXISTING MECHANICAL SYSTEMS FOR THE BUILDING. NOTE THAT THIS CONTRACTOR IS RESPONSIBLE FOR DETERMINING EXACT FIELD CONDITIONS TO ESTABLISH THE FULL SCOPE OF DEMOLITION WORK TO THE BUILDING.

DEMOLISH AND REMOVE ALL EXISTING COMPONENTS AND MATERIALS AS NOTED. RELOCATE COMPONENTS AND MATERIALS INDICATED. EXERCISE CARE IN TAKE-DOWN WORK SO THAT MECHANICAL OR PHYSICAL DAMAGE DOES NOT OCCUR TO ITEMS WHICH ARE TO BE RELOCATED AND RE-USED. PROTECT RELOCATED ITEMS UNTIL BUILT INTO NEW LOCATION. WHERE POSSIBLE, LIMIT REMOVAL OF SUCH COMPONENTS AND MATERIALS TO SMALLEST AREA POSSIBLE. MAKE GOOD ALL DISTURBED WORK.

### SHOP DRAWINGS

SHOP DRAWINGS AND DATA SHEETS FOR EQUIPMENT INTENDED FOR INSTALLATION UNDER THIS CONTRACT SHALL BE SUBMITTED FOR REVIEW. AFTER CHECKING AND WHEN REVIEWED, COPIES WILL BE RETURNED TO THE CONTRACTOR.

SAMPLES, DRAWINGS, CATALOGUES, SPECIFICATIONS, ETC. SUBMITTED FOR APPROVAL, SHALL BE PROPERLY LABELLED INDICATING SPECIFIED SERVICES FOR WHICH MATERIAL OR EQUIPMENT IS TO BE USED. THE DRAWINGS AND INFORMATION SHALL INDICATE THE PROJECT NAME AND THE ARTICLE NUMBER OF SPECIFICATIONS RELATING TO SHOP DRAWINGS. THE CONTRACTOR'S NAME AND CONTRACTOR'S SIGNATURE SHALL APPEAR ON ALL COPIES INDICATING THAT THE DRAWINGS HAVE BEEN CHECKED BY THE CONTRACTOR. DRAWINGS NOT SO DESIGNATED WILL BE RETURNED FOR CORRECTION. FAX OR ELECTRONIC COPIES OF SHOP DRAWINGS ARE NOT ACCEPTABLE. PROVIDE COMPLETE, DETAILED WIRING AND CONTROL DIAGRAMS FOR ALL MECHANICAL EQUIPMENT FOR THIS PROJECT. THESE DRAWINGS SHALL BE SUBMITTED AT THE TIME OF SHOP DRAWING REVIEW. EQUIPMENT SHOP DRAWINGS WILL BE REJECTED UNLESS COMPLETE WIRING AND CONTROLS INFORMATION IS SUBMITTED.

SUBMIT 8 HARD COPIES OF ALL SHOP DRAWINGS. NO ELECTRONIC SUBMISSIONS WILL BE REVIEWED.

### EXCAVATION AND BACKFILLING

THIS DIVISION SHALL COMPLETE ALL EXCAVATING AND BACKFILLING WORK REQUIRED TO INSTALL THE MECHANICAL SYSTEMS. ALL SUCH WORK SHALL CONFORM STRICTLY TO THE REQUIREMENTS OF MUNICIPAL STANDARDS AND PROVINCIAL CODES AND REGULATIONS.

WHERE PIPES ARE LOCATED NEAR OR BELOW FOOTINGS, THE PIPES SHALL BE SLEEVED, AND 1500 LB. CONCRETE BACKFILL SHALL BE INSTALLED TO UNDERSIDE OF FOOTINGS.

EXCAVATIONS SHALL BE MAINTAINED FREE OF WATER WHILE UNDERGROUND PIPING IS BEING INSTALLED AND UNTIL BACKFILL WORK IS COMPLETED. ALL TESTS FOR UNDERGROUND PIPING SHALL BE CONDUCTED AND ACCEPTED BEFORE JOINTS ON SUCH PIPING ARE BACKFILLED.

PROTECT ALL EXCAVATIONS WITH SAFETY FENCING, SIGNAGE, SHORING OR BRACING. PROVIDE TRAFFIC CONTROL PERSONNEL WHEN REQUIRED BY THE MUNICIPALITY. RESTORE ALL PAVEMENT, SODDING AND LANDSCAPING TO PRE-CONSTRUCTION CONDITION TO MEET THE MUNICIPALITY STANDARDS.

TRENCHES SHALL BE EXCAVATED TO A DEPTH WHICH SHALL ALLOW FOR A MINIMUM OF 150MM OF HAND PLACED BEDDING MATERIAL, THOROUGHLY COMPACTED. THE BEDDING SHALL BE REMOVED AT PIPE HUBS OR COUPLINGS TO PROVIDE CONTINUOUS SUPPORT OVER EACH LENGTH OF PIPE.

BACKFILL TO 300 MM ABOVE THE PIPING SHALL BE HAND PLACED IN 100 MM LAYERS AND COMPACTED SIMULTANEOUSLY ON BOTH SIDES OF THE PIPING. ALL ADDITIONAL BACKFILL SHALL BE PLACED IN APPROXIMATELY 150 MM LAYERS AND MAY BE MECHANICALLY PLACED.

BEDDING AND BACKFILL MATERIALS TO 300 MM ABOVE TOP OF PIPE SHALL BE CLEAN GRANULAR MATERIAL OF NON-ORGANIC NATURE. THIS APPLIES TO AREAS BOTH INSIDE AND OUTSIDE OF BUILDING LINES. BACKFILL MATERIAL FOR TRENCHES WITHIN THE BUILDING FROM 300 MM ABOVE TO GRADE SHALL BE NEW GRANULAR MATERIAL CONFORMING TO DHO GRANULAR "B" MATERIAL. BACKFILL MATERIAL FOR TRENCHES OUTSIDE OF THE BUILDING BUT UNDER ROADWAYS, PAVED OR CONCRETE PARKING AREAS, RAMPS, WALKWAYS, ETC. FROM 300MM ABOVE TOP OF PIPE TO GRADE SHALL BE NEW GRANULAR MATERIAL CONFORMING TO DHO GRANULAR "B" MATERIAL.

ALL BEDDING AND BACKFILLING SHALL BE MECHANICAL TAMPED IN THE SPECIFIED LAYER AND THOROUGHLY COMPACTED. USE A STANDARD PROCTOR OF 95X OUTSIDE OF THE BUILDING AND 100% FOR INTERIOR TRENCHES FOR TESTING DENSITY. ALL BEDDING AND HAUNCHING TO THE CENTRELINE OF P.V.C. PIPING SHALL BE COMPACTED TO 95% PROCTOR DENSITY.

### ENERGY EFFICIENCY

ALL EQUIPMENT SUPPLIED FOR THIS CONTRACT SHALL MEET OR EXCEED THE 2012 ENERGY EFFICIENCY TARGETS STATED WITHIN THE FOLLOWING:  
- ASHRAE 90.1-2010 AND  
- ONTARIO BUILDING CODE 2006 AS AMENDED JANUARY 1, 2012 WITH SUPPLEMENTARY STANDARD SB-10.

### SPARE PARTS

DIVISION 15 SHALL FURNISH SPARE PARTS AS FOLLOWS:  
ONE (1) SET OF V-BELTS FOR EACH PIECE OF MACHINERY.  
THREE (3) SETS OF MERV-13 FILTERS FOR EACH FILTER BANK INSTALLED.

IDENTIFY SPARE PARTS CONTAINERS AS TO CONTENTS MATCHING EQUIPMENT NUMBER AND REPLACEMENT PART NUMBER.

PROVIDE ONE SET OF SPECIAL TOOLS REQUIRED TO SERVICE EQUIPMENT AS RECOMMENDED BY MANUFACTURERS.

UPON COMPLETION OF THE PROJECT AND IMMEDIATELY BEFORE HAND-OVER, REPLACE ALL AIR HANDLER FILTERS. TURN REMAINING TWO (2) SETS OF FILTERS OVER TO THE OWNER.

### LAYOUT

THE DRAWINGS SHOW THE ARRANGEMENTS, GENERAL DESIGN, AND EXTENT OF THE DUCT AND PIPING AND OTHER SYSTEMS, SUITABLY OUTLINED WITH REGARD TO SIZES, LOCATIONS, GENERAL ARRANGEMENTS, AND INSTALLATION DETAILS. THE MAINS AND CONNECTIONS THERETO ARE SHOWN MORE OR LESS IN DIAGRAM, EXCEPT WHERE IN CERTAIN CASES THE DRAWINGS MAY INCLUDE DETAILS GIVING THE EXACT LOCATIONS AND ARRANGEMENTS REQUIRED. MAKE NECESSARY CHANGES OR ADDITIONS TO THE RUNS TO ACCOMMODATE STRUCTURAL OR OTHER PHYSICAL CONDITIONS, TO PROVIDE PROPER ACCESS TO EQUIPMENT, OR TO PROVIDE MINIMUM 8'-0" HEAD CLEARANCE OVER WALKWAY WITHOUT ADDITIONAL CHARGE OR EXPENSE TO THE OWNER. NOTIFY THE CONSULTANT IMMEDIATELY AND SECURE HIS AUTHORITY IN WRITING FOR SUCH REVISIONS BEFORE PROCEEDING WITH THE WORK.

### ARRANGEMENT OF PIPING AND DUCTWORK

CONCEAL PIPING AND DUCTWORK WHEREVER POSSIBLE BY RUNNING IT IN PIPE SPACES, DUCT SHAFTS, CHASES, CEILING SPACES AND FURRED OUT SECTIONS OF WALLS AND COLUMNS. DO NOT RUN PIPING OR DUCTWORK EXPOSED IN FINISHED AREAS WITHOUT OBTAINING PERMISSION OF THE ENGINEER.

DO NOT SCALE THE DRAWINGS FOR EXACT PIPE OR DUCT LOCATIONS. COORDINATE DIFFUSER AND GRILLE LOCATIONS WITH LIGHT FIXTURES AND OTHER FIXTURES SHOWN. THE PIPING, DUCTWORK AND EQUIPMENT LAYOUT AS SHOWN ON THE DRAWINGS IS TO BE THE GENERAL METHOD OF INSTALLATION. MODIFY AS NECESSARY WITHOUT CHANGING THE INTENT OF THE DESIGN TO AVOID OTHER EQUIPMENT, STRUCTURAL ELEMENTS OR WORK INSTALLED BY OTHER TRADES.

PIPING OR OTHER EQUIPMENT OR DEVICES IN RETURN AIR PLENUMS SHALL HAVE FLAME SPREAD AND SMOKE DEVELOPMENT RATINGS FOR THAT APPLICATION.

### TESTING

DIVISION 15 SHALL PERFORM TESTS ON ALL PIPING AND EQUIPMENT SYSTEMS AS OUTLINED IN VARIOUS SECTIONS OF THESE SPECIFICATIONS AND SHALL PROVIDE ALL NECESSARY PUMPS, COMPRESSORS, GAUGES, RECORDERS AND TEMPORARY CONNECTIONS TO THE PIPING AND EQUIPMENT.

ALL TESTS ON PIPING AND EQUIPMENT SHALL BE CONDUCTED BEFORE CONCEALMENT AND BEFORE THE APPLICATION OF PAINT AND INSULATION. AMPLE NOTICE OF THE SCHEDULING OF SUCH TESTS SHALL BE GIVEN TESTS SHALL BE CONDUCTED IN THE PRESENCE OF THE AUTHORITIES HAVING JURISDICTION.

EQUIPMENT NOT DESIGNED TO WITHSTAND SPECIFIED TEST PRESSURES SHALL BE DISCONNECTED FROM THE SYSTEM DURING THE PERFORMANCE OF THE TESTS. NOT WITHSTANDING THE REQUIREMENTS OUTLINED HEREIN, ALL SERVICES SHALL BE SUBJECTED TO THE REQUIREMENTS OF TESTING AS OUTLINED BY LOCAL UTILITIES OR BY JURISDICTIONS HAVING AUTHORITY.

WHEN THE MECHANICAL SYSTEMS ARE READY TO BE TURNED OVER, THE CONTRACTOR SHALL CONDUCT AT HIS OWN EXPENSE, PERFORMANCE TESTS ON ALL EQUIPMENT, MATERIALS, AND SYSTEMS FOR A CONTINUOUS PERIOD OF NOT LESS THAN 24 HOURS. THESE TESTS SHALL CONFIRM THAT ALL MECHANICAL SYSTEMS ARE OPERATING PROPERLY, ARE PROPERLY BALANCED AND ADJUSTED, AND MEET SPECIFIC ENGINEERING DESIGN REQUIREMENTS FOR THIS PROJECT.

### ELECTRIC EQUIPMENT AND CONTROLS

ELECTRICAL WORK SHALL CONFORM TO DIVISION 16 REQUIREMENTS INCLUDING THE FOLLOWING:

- SUPPLIER AND INSTALLER RESPONSIBILITY IS INDICATED IN THE EQUIPMENT SCHEDULE ON MECHANICAL DRAWINGS.
- CONTROL WIRING, ALL CONTROL DEVICES, CONDUIT AND CONNECTIONS BELOW 50V WHICH ARE RELATED TO CONTROL SYSTEMS, ARE A NECESSARY COMPONENT OF THE CONTROL SYSTEM SPECIFIED IN DIVISION 15 OR SHOWN ON MECHANICAL DRAWINGS SHALL BE INSTALLED BY DIVISION 15.

### V-BELT DRIVES

TENSION BELTS TO MANUFACTURER'S RECOMMENDATIONS BEFORE START-UP AND AFTER FIRST 100 HOURS OF OPERATION USING CALIBRATED BELT TENSIONING GAUGE.

FOR MOTORS FROM 1/2 HP TO 20 HP USE STANDARD ADJUSTABLE PITCH DRIVE SHEAVES, HAVING 10% RANGE. USE MID-POSITION OF SHAFT FOR SPECIFIED RPM. FOR MOTORS OVER 20 HP SHEAVE WITH SPLIT TAPERED BUSHING AND KEYWAY HAVING FIXED FITCH UNLESS SPECIFICALLY REQUIRED FOR ITEMS CONSIDERED. PROVIDE SHEAVE OF CORRECT SIZE TO SUIT FINAL BALANCING. MINIMUM DRIVE RATING IS 1.5 TIMES NAMEPLATE RATING ON MOTOR. SHEAVE SIZE AND TYPE TO MATCH MANUFACTURER'S DESIGN REQUIREMENTS.

### ACCESS DOORS

SUPPLY ACCESS DOORS FOR FURRED CEILINGS OR SPACES FOR SERVICING EQUIPMENT AND FOR ACCESS TO ALL NECESSARY CONTROL DEVICES AND/OR OPERATING DEVICES. SUPPLY STAINLESS STEEL ACCESS DOORS FOR TILED, MARBLE, TERRAZZO OR SPECIAL SURFACES. STANDARD OF ACCEPTANCE: ZURN, AUCOR, ANCON.

ACCESS DOORS SHALL BE FLUSH MOUNTED 600 X 600 MM FOR BODY ENTRY AND 450 X 450 MM FOR SERVICE ENTRY UNLESS OTHERWISE NOTED. DOORS SHALL OPEN 180°, HAVE ROUNDED SAFETY CORNERS, CONCEALED HINGES, SCREWDRIVER LATCHES AND ANCHOR STRAPS. STEEL SHALL BE PRIME COATED. ANY ACCESS DOORS IN FIRE RATED ASSEMBLIES OR SEPARATIONS SHALL BE U.L.C. RATED FOR APPROPRIATE SEPARATION RATING.

### MAINTENANCE INSTRUCTIONS

SUPPLY CERTIFIED PERSONNEL TO INSTRUCT OWNERS OPERATING STAFF ON OPERATION OF MECHANICAL EQUIPMENT. SUPPLY MAINTENANCE SPECIALIST PERSONNEL TO INSTRUCT OPERATING STAFF ON MAINTENANCE AND ADJUSTMENT OF MECHANICAL EQUIPMENT AND ANY CHANGES OR MODIFICATIONS IN EQUIPMENT MADE UNDER THE TERMS OF THE GUARANTEE. PROVIDE INSTRUCTION TO OWNERS STAFF DURING REGULAR WORK HOURS PRIOR TO ACCEPTANCE OF THE SYSTEMS FOR REGULAR OPERATION.

SUPPLY AUTOCAD AS-BUILTS AND DIGITAL MANUALS INCLUDING SHOP DRAWINGS, DATA SHEETS AND MAINTENANCE INFORMATION ON ALL SYSTEMS AND EQUIPMENT.

PRIOR TO FINAL ACCEPTANCE OF THE WORK OF THE CONTRACTOR, PROVIDE TO THE TESTING AND BALANCING CONTRACTOR COPIES OF COMPLETE OPERATING AND MAINTENANCE INSTRUCTIONS FOR THE EQUIPMENT FURNISHED UNDER THIS CONTRACT.

UTILIZE THE OPERATION AND MAINTENANCE DATA MANUAL FOR INSTRUCTION PURPOSES. ON COMPLETION OF INSTRUCTIONS, TURN ONE MANUAL OVER TO THE ENGINEER FOR REVIEW AND ACCEPTANCE. PROVIDE THREE (3) COPIES OF OPERATION AND MAINTENANCE MANUALS TO OWNER. THE MAINTENANCE MANUALS SHALL INCLUDE A COMPREHENSIVE OPERATING SECTION WHICH WILL INCLUDE A DETAILED DESCRIPTION OF ALL MECHANICAL EQUIPMENT OPERATION INCLUDING WITHIN THIS CONTRACT. THE MAINTENANCE AND OPERATING INSTRUCTIONS WILL BE ASSEMBLED BY THE CONTRACTOR INTO THREE (3) VOLUMES USING SUITABLE LOOSE LEAF BINDERS AND INCLUDING A COMPLETE INDEX OF CONTENTS. THE INDEX SHALL BE ORGANIZED INTO SECTIONS ACCORDING TO THE NUMERICAL SPECIFICATION SECTIONS.

THE OPERATING INSTRUCTIONS SHALL INCLUDE BUT NOT BE LIMITED TO THE FOLLOWING INFORMATION WHICH SHALL BE INCLUDED IN THE MANUALS.

- LIST OF RECOMMENDED SPARE PARTS AND QUANTITIES TO BE STOCKED.
- COMPLETE PARTS LIST GIVING MANUFACTURER'S NAME AND CATALOGUE NUMBER.
- OPERATING INSTRUCTIONS AND PROCEDURES, INCLUDING START UP AND SHUT DOWN PROCEDURE.
- MAINTENANCE PROCEDURE INCLUDING PREVENTATIVE MAINTENANCE INSTRUCTIONS.
- LIBRATING INSTRUCTIONS AND SCHEDULES FOR ALL MAJOR EQUIPMENT.
- WIRING DIAGRAM OF CONTROL PANELS.

### BUILDING STRUCTURE

INITIATE NO DRILLING, CUTTING OR WELDING OF THE BUILDING STEEL OR CONCRETE CONSTRUCTION FOR THE PURPOSE OF SUPPORTING MATERIALS OR EQUIPMENT WITHOUT PRIOR APPROVAL OF THE PRIME CONSULTANT.

HANGERS TO STEEL SHALL BE BEAM CLAMPS OR FLANGE HANGERS WHERE POSSIBLE. WHERE ATTACHMENT IS PERMITTED, WELDING STUDS OF A SIZE NOT LARGER THAN 1/3MM DIAMETER MAY BE USED. IF LARGER SIZE BOLTS ARE REQUIRED TO SUPPORT THE EQUIPMENT, THESE SHALL BE ATTACHED BY STEEL CLIPS OR BRACKETS, SECURED TO THE BUILDING STEEL BY WELDING OR BOLTING AS APPROVED BY THE ENGINEER.

### PROTECTION

ALL MECHANICAL ITEMS AND EQUIPMENT ON SITE DURING AND FOLLOWING INSTALLATION SHALL BE PROTECTED FROM WEATHER AND OTHER HAZARDS AND MAINTAINED IN AN ORDERLY MANNER. ALL EQUIPMENT INCLUDING PLUMBING FIXTURES OR EQUIPMENT WITH A BAKED ENAMEL FINISH SHALL BE PROTECTED BY SPECIAL MEANS SUCH AS POLYETHYLENE SHEETS AND TARPULAINS. PROTECT PIPE ENDS, VALVES AND OTHER PARTS OF THE SYSTEMS FROM DAMAGE AND FROM THE INTRUSION OF FOREIGN MATTER BY MEANS OF CAPS, PLUGS, BLIND FLANGES, ETC.

### PIPING AND EQUIPMENT IDENTIFICATION

IDENTIFY ALL PIPING SYSTEMS. INDICATE PIPE SIZE, SERVICE AND DIRECTION OF FLOW.

THE LETTERING SHALL BE PROPORTIONAL TO THE OUTSIDE DIAMETER OF THE PIPE OR COVERING RANGING FROM 13 MM HIGH TO 20 MM O.D. PIPE OR COVERING UP TO 100 MM HIGH ON 300 MM O.D. PIPE OR COVERING. BRADLEY PIPE TAGS SHALL BE THE STANDARD OF LABELS. PIPES SMALLER THAN 20 MM O.D. PIPE OR COVERING MAY BE Banded WITH COLOURED PLASTIC TAPE IN LIEU OF PAINT AND THE CONTENTS IDENTIFIED BY MEANS OF "DMO" EMBOSSED PLASTIC LABELS. STENCIL A DIRECTION-OF-FLOW ARROW ON EACH COLOUR BAND. PIPE IDENTIFICATION SHALL BE APPLIED AT EACH HORIZONTAL OR VERTICAL CHANGE IN DIRECTION AND A MAXIMUM OF 12 M. APART.

ALL EQUIPMENT SHALL BE IDENTIFIED WITH 25 MM HIGH LETTERS IN LAMACOID ENGRAVED SELF ADHESIVE NAMEPLATES.

### DUCTWORK SYSTEMS

#### GENERAL INSTRUCTIONS

- READ & BE GOVERNED BY CONDITIONS OF THE CONTRACT & SECTIONS OF DIV.1
- COMPLY WITH MECHANICAL GENERAL REQUIREMENTS, SECTION 15010
- MEET OR EXCEED SMAcNA 2005 "HVAC DUCT CONSTRUCTION STANDARDS"
- CONFORM TO SMAcNA 2012 "HVAC AIR DUCT LEAKAGE TEST MANUAL"

THE DUCTWORK AND ACCESSORIES SHALL BE GALVANIZED STEEL AND SHALL COMPLY WITH THE SCHEDULING OF SUCH TESTS SHALL BE GIVEN TESTS SHALL BE CONDUCTED IN THE PRESENCE OF THE AUTHORITIES HAVING JURISDICTION.

CIRCULAR DUCTWORK SHALL BE FACTORY FABRICATED GALVANIZED SPIRAL SEAM WITH FABRICATED FITTINGS.  
1. ALL BRANCH TAKE-OFFS TO BE 45 DEG. CONICAL LATERALS.  
2. SLEEVE TYPE COUPLING JOINTS ALL SEALED WITH FLEXIBLE MEDIUM PRESSURE DUCT SEALANT AND SCREWS.

FLEXIBLE DUCTWORK SHALL BE U.L.C. LISTED, SMOOTHED WITH VAPOUR BARRIER, FLEXMASTER 1/4A OR EQUIVALENT, MINIMUM LENGTH TO DIFFUSERS 3000 MM UNLESS OTHERWISE INDICATED. FASTEN WITH SCREWS, WASHERS AND FOIL TAPE AT JOINTS. DUCT TAPE SHALL NOT BE USED.

DUCTWORK CLASSIFICATION AS FOLLOWS (REFER TO DUCT PRESSURE CLASSIFICATIONS INDICATED ON THE DRAWINGS):

CLASS	MAX. PRESSURE PA (POSITIVE AND NEGATIVE PRESSURE)	MAX. VELOCITY M/S	SEAL CLASS	LEAKAGE CLASS
I	500 (2" W.C.)	12.5	A	4
II	250 (1" W.C.)	12.5	B	8

#### DUCT LEAKAGE

CONSTRUCT AND TEST DUCTWORK SYSTEMS TO SMAcNA 2012 "HVAC AIR DUCT LEAKAGE TEST MANUAL".  
F=LEAKAGE IN CFM/100 SQ.FT. DUCT SURFACE AREA FOR FULL SUPPLY AIR FLOW  
C<sub>L</sub>=LEAKAGE CLASS  
P=DESIGN STATIC PRESSURE  
F=C<sub>L</sub>(P)<sup>0.65</sup> EXP 0.65

#### CLASSIFICATION

CLASS A: LONGITUDINAL SEAMS AND TRANSVERSE JOINTS, WALL PENETRATIONS AND CONNECTIONS MADE AIRTIGHT WITH SEALING COMPOUND AND TAPE.

CLASS B: LONGITUDINAL SEAMS, AND TRANSVERSE JOINTS AND CONNECTIONS MADE AIR TIGHT WITH SEALING COMPOUND.

#### GALVANIZED STEEL

WITH Z90 DESIGNATION ZINC COATING LOCK FORMING QUALITY: TO ASTM A252M.

THICKNESS, SQUARE AND RECTANGULAR UP TO 300mm (12") - 26 GA.

325mm TO 500mm (13" TO 24") - 24 GA.

525mm TO 1200mm (21" TO 48") - 22 GA.

1225mm (49") AND OVER 20 GA.

SPACING OF JOINTS, REINFORCEMENT CODE AND REINFORCEMENT SPACING OPTIONS TO CONFORM TO SMAcNA 2005 "HVAC DUCT CONNECTIONS STANDARDS"

ALL DUCTWORK BETWEEN HVAC UNITS AND SILENCERS SHALL BE 18 GA.

FABRICATION: TO ASHRAE AND SMAcNA - PITTSBURGH LOCK SEAMS OR BUTTON LOCK. ALL DUCTWORK CROSS BROKEN. MAXIMUM JOINT SPACING IS 10 FEET.

JOINTS: TO ASHRAE & SMAcNA. PROPRIETARY MANUFACTURED FLANGE DUCT JOINT SHALL BE CONSIDERED TO BE A CLASS A SEAL. TRANSVERSE JOINTS UP TO 900mm TO BE SLP TYPE WITH SEALANT & TAPE. OVER 900mm TO BE DUCTMATE 25 JOINTS.

#### HANGERS AND SUPPORTS

STRAP HANGERS: OF SAME MATERIAL AS DUCT BUT NEXT SHEET METAL THICKNESS HEAVIER THAN DUCT.

HANGER CONFIGURATION: TO ASHRAE & SMAcNA. MAXIMUM SIZE DUCT SUPPORTED BY STRAP HANGER: 500mm. TURN ENDS UNDER DUCT & FASTEN WITH SCREWS TO DUCT.

HANGER: BLACK STEEL ANGLE WITH GALVANIZED STEEL RODS TO ASHRAE & SMAcNA OR FOLLOW TABLE:

DUCT SIZE (mm)	ANGLE SIZE (mm)	ROD SIZE (mm)
UP TO 750	25x25x3	6
751 TO 1050	40x40x3	6
1051 TO 1500	40x40x3	10
1501 TO 2100	50x50x3	10
2101 TO 2400	50x50x5	13
2401 AND OVER	50x50x6	13

#### FITTINGS

FABRICATION: TO SMAcNA WITH LONGITUDINAL SEAMS WITH PITTSBURGH LOCK.

RADIUSED ELBOWS: STANDARD RADIUS OR SHORT RADIUS WITH DOUBLE THICKNESS TURNING VANES. TURNING VANES INDICATED ON THE DRAWINGS SHALL BE DOUBLE THICKNESS.

SQUARE ELBOWS: TO 400mm WITH SINGLE THICKNESS VANES.  
SQUARE ELBOWS: OVER 400mm WITH DOUBLE THICKNESS VANES.

#### LOW PRESSURE FLEXIBLE DUCT

FLEXIBLE DUCTS SHALL BE 1/4" A BY FLEXMASTER.

#### INSTALLATION

ALL DUCTWORK SHALL BE KEPT CLEAN DURING INSTALLATION AND STORAGE. COVER ALL ENDS AND OPENINGS WITH PLASTIC TO EXCLUDE DEBRIS. KEEP DUCTWORK CLEAN UNTIL COMMISSIONED. FAILURE TO KEEP DUCTWORK CLEAN SHALL NECESSITATE COMPLETE DUCT CLEANING BY THIS CONTRACTOR.

#### DUCTWORK INSULATION

RECTANGULAR DUCTWORK DESCRIBED IN THE SCOPE OF WORK BELOW SHALL BE INSULATED WITH 25 THICK FIBREGLASS RIGID, EMBOSSED FOIL FACED VAPOUR SEALED DUCT INSULATION APPLIED OVER SPOT WELDED PINS ON 85 MM CENTRES, WITH INSULATION CARPETED WITH SPRING CLIP WASHERS OF 25 DIAMETER. SEAL ALL JOINTS, PUNCTURES AND BREAKS WITH 100 MM WIDE STRIPS OF ALUMINUM FOIL VAPOUR BARRIER TAPE ADHERING WITH SUITABLE FLINTKOTE FIRE RETARDANT ADHESIVE. ROUNDED DUCTWORK SHALL BE INSULATED WITH FLEX 40 THICK FOIL FACED SEALED DUCT INSULATION WITH ALL JOINTS TAPED VAPOUR TIGHT.

SURFACE FINISH OF ALL INSULATION, OTHER THAN THAT WHICH IS CONCEALED IN CEILING SPACES, PIPE SHAFTS AND FURRING, SHALL BE COVERED WITH AN ADDITIONAL LAYER OF 8 OZ. U.L.C. THERMO CANVAS APPLIED WITH A COMPLETE BASE COAT OF BENJ



**PIPE SYSTEMS**

ALL PIPING SYSTEMS SHALL BE INSTALLED IN ACCORDANCE WITH THE ANSI/ASME B31-1, UNLESS OTHERWISE SPECIFIED HEREIN. PROVIDE INSERTS, SLEEVES AND ANCHORS WHERE NECESSARY AND COORDINATE WITH OTHER TRADES TO THE FULLEST EXTENT IN THE PROVISION OF OPENINGS, CHASES, ETC. TO ACCOMMODATE THE PIPING SYSTEMS.

ALL PIPING SHALL BE INSTALLED IN A NEAT AND WORKMANLIKE MANNER WITH STRAIGHT AND DIRECT RUNS. UNLESS OTHERWISE SHOWN, HORIZONTAL LINES SHALL BE INSTALLED PARALLEL TO BUILDING LINES AND AS CLOSE AS POSSIBLE TO CEILINGS, WALLS, PARTITIONS. VERTICAL LINES SHALL BE PLUMB. ADEQUATE SPACE SHALL BE PROVIDED IN ALL CIRCUMSTANCES FOR THE APPLICATION OF PIPE INSULATION AND FOR THE OPERATION AND SERVICING OF VALVES, ETC.

**PIPE GRADES AND SLOPES**

DRAINS AND WASTE PIPING SHALL SLOPE DOWN IN THE DIRECTION OF FLOW AT THE RATE OF 2% PER FOOT FOR 80 SIZE AND UNDER AND 1% PER FOOT FOR 100 SIZE AND LARGER. WHERE SLOPES FOR PIPING SERVICES INDICATED HEREIN ARE LESS THAN THOSE ESTABLISHED BY APPLICABLE CODES AND REGULATIONS, THE LATTER SHALL GOVERN.

ALL WATER SUPPLY PIPING SHALL BE GRADED SO THAT THE SYSTEM MAY BE COMPLETELY DRAINED THROUGH RISERS, DRIPS AND FIXTURES. FOR THIS PURPOSE, DRAIN COCKS SHALL BE PROVIDED AT ALL LOW POINTS OF THE SYSTEM. DOMESTIC HOT AND COLD WATER PIPING SHALL GRADE UP IN THE DIRECTION OF FLOW AT THE RATE OF 2% CIRCULATION PIPING SHALL GRADE DOWN IN THE DIRECTION OF FLOW AT 2%.

**PIPE EXPANSION AND CONTRACTION**

ALL PIPING SHALL BE INSTALLED IN SUCH A MANNER AS TO AVOID UNDUE STRESS AND DISTORTION DUE TO EXPANSION AND CONTRACTION. PROVIDE FOR EXPANSION AND CONTRACTION BY THE USE OF EXPANSION LOOPS FOR OFFSETS. EXPANSION LOOPS SHALL BE INSTALLED IN THE LINE IN A COLD SPRUNG POSITION WITH PROPER ANCHORS AND GUIDES. STAINLESS BRAIDED EXPANSION LOOPS "METRALOOP" BY METRAFLEX INC.

PROVISION FOR EXPANSION AND CONTRACTION SHALL BE MADE ON THE BASIS OF 25 MM PER 30 M OF PIPE PER 38 DEG. C. TEMPERATURE RISE FOR STEEL PIPE AND 40 MM PER 30 M OF PIPE PER 38 DEG. C. TEMPERATURE RISE FOR BRASS OR COPPER PIPE.

**ELEVATIONS**

PROPOSED AND EXISTING ELEVATIONS, LOCATIONS, AND SIZES OF EXISTING SERVICES SHALL BE VERIFIED PRIOR TO STARTING WORK, INCLUDING BUILDING FLOOR, CEILING, AND STRUCTURAL STEEL, CONCRETE, AND WOOD ELEVATIONS.

PROPOSED ELEVATIONS, LOCATIONS AND SIZES OF EXISTING SERVICES INCLUDING BUILDING FLOOR, SITE GRADE, CATCHBASINS AND MANHOLE ELEVATIONS SHALL BE VERIFIED WITH ARCHITECTURAL DRAWINGS AND SITE SUPERINTENDANT PRIOR TO STARTING WORK.

**PIPE HANGERS AND SUPPORTS**

FABRICATE HANGERS, SUPPORTS AND SWAY BRACES IN ACCORDANCE WITH ANSI/ASME B31.1. SUPPORT FROM STRUCTURAL MEMBERS. WHERE STRUCTURAL BEARINGS DO NOT EXIST OR INSERTS ARE NOT IN SUITABLE LOCATIONS, SUSPEND HANGERS FROM STEEL CHANNELS OR ANGLES. DIVISION 15 SHALL PROVIDE SUPPLEMENTARY STRUCTURAL MEMBERS. DO NOT SUSPEND FROM METAL DECK. ANCHORING OF PIPING AND EQUIPMENT SHALL BE TO MANUFACTURER'S RECOMMENDATIONS. SUBMIT ANCHORAGE SYSTEM, ARRANGEMENT AND TYPE OF HANGERS SUPPORTS WITH CALCULATIONS FOR REVIEW.

ADJUSTABLE CLEVIS TYPE HANGER: ON ALL SIZES OF PIPES. USE ROLLER TYPE HANGERS AS REQUIRED WHEN RATIOS BELOW CANNOT BE MAINTAINED. 1. STANDARD OF ACCEPTANCE: MYATT, GRINNELL. 2. RIGID HANGERS: ON DOMESTIC HOT WATER. HOT WATER RECIRCULATION WHEN RATIO OF PIPE EXPANSION TO HANGER ROD LENGTH DOES NOT EXCEED 1:24. MINIMUM ROD LENGTH: 300MM. 3. SWING HANGERS: ON DOMESTIC HOT WATER. HOT WATER RECIRCULATION CHILLED WATER WHEN RATIO OF PIPE EXPANSION TO HANGER ROD LENGTH DOES NOT EXCEED 1:6. MINIMUM ROD LENGTH: 300MM. 4. FOR PIPING EXCEPT AS NOTED ABOVE, MINIMUM ROD LENGTH TO BE 150 MM.

PROVIDE RISER CLAMPS WHERE REQUIRED. ON UNSULATED COPPER PIPING, USE COPPER HANGERS, OR P.V.C. COATED HANGERS.

PROVIDE SADDLES FOR INSULATED PIPE AND PREFABRICATED INSULATION SHIELDS WITH HIGH DENSITY INSULATION WITH VAPOUR BARRIERS FOR COLD AND CHILLED WATER PIPING. STANDARD OF ACCEPTANCE: MYATT, GRINNELL.

SUPPORT PLUMBING PIPING IN ACCORDANCE WITH MORE STRINGENT REQUIREMENTS OF AUTHORITIES HAVING JURISDICTION. CANADIAN PLUMBING CODE, PROVINCIAL CODE, OR MUNICIPAL CODES.

**SLEEVES AND ESCUTCHEONS**

PIPE SLEEVES: AT POINTS WHERE PIPES PASS THROUGH MASONRY OR CONCRETE. SLEEVES OF: MINIMUM 0.8 MM THICK GALVANIZED SHEET STEEL WITH LOCK SEAM JOINTS. USE CAST IRON SLEEVES OR STEEL PIPE SLEEVES WITH ANNULAR FIN CONTINUOUSLY WELDED AT MIDPOINT. 1. THROUGH FOUNDATION WALLS. 2. WHERE SLEEVE EXTENDS ABOVE FINISHED FLOOR; EXTEND UP 50 MM, CAULK AND SEAL WHEN PIPE IS INSTALLED.

FOR PIPES PASSING THROUGH ROOFS. USE "THALER ROOFING PRODUCTS" INSULATED ALUMINUM CONE FLASHINGS AND FLASHING CLAMP DEVICE WITH TAMPER PROOF VENT TOP. ANCHOR SLEEVES IN ROOF CONSTRUCTION; FASTEN ROOF FLASHING TO CLAMP DEVICE; MAKE WATER-TIGHT DURABLE JOINT.

ESCUTCHEON PLATES: 1. PROVIDE ON PIPES PASSING THROUGH FINISHED WALLS, PARTITIONS, FLOORS AND CEILINGS. USE SS NO. 302 WITH SET SCREWS FOR CEILING OR WALL MOUNTING. INSIDE DIAMETER SHALL FIT AROUND FINISHED PIPE. OUTSIDE DIAMETER SHALL COMPLETELY COVER OPENING OR SLEEVE.

**FIRESTOPPING**

WHERE PIPES AND DUCTS PASS THROUGH FIRE RATED WALLS, FLOORS AND PARTITIONS, PACK SPACE WITH MATERIALS HAVING APPROVAL OF AUTHORITIES HAVING JURISDICTION.

DIVISION 15 TO PROVIDE ALL MATERIALS AND LABOUR TO COMPLETE U.L.C. FIRESTOPPING FOR DIVISION 15 WORK.

**FIRE EXTINGUISHERS**

MULTI-PURPOSE DRY CHEMICAL EXTINGUISHERS MULTI-PURPOSE DRY CHEMICAL EXTINGUISHERS: STORED PRESSURE TYPE WITH HOSE AND SHUT-OFF NOZZLE ULC LABELLED FOR A, B AND C FIRES. WITH WALL BRACKETS. SIZE 10 LB MINIMUM TYPE 4A-38BC.

EXTINGUISHER BRACKETS EXTINGUISHER WALL BRACKETS: TYPE RECOMMENDED BY EXTINGUISHER MANUFACTURER.

EXTINGUISHER CABINETS SEMI-RECESSED WALL CABINETS WITH PLEX BUBBLE WINDOW BY CROWN FIRE MODEL #10SR FOR INSTALLATION IN 4" (100mm) WALL. 304-#4 STAINLESS STEEL DOOR AND PANELS WITH STAINLESS TRIM 14 1/2"x30"x4" DEEP.

INSTALLATION INSTALL EXTINGUISHERS ON BRACKETS PROVIDED BY EXTINGUISHER MANUFACTURER. INSTALL CABINETS WHERE SHOWN IN WALL OPENINGS BY GENERAL TRADES. EXTINGUISHER HEIGHTS ABOVE FLOOR TO NFPA-10 REQUIREMENTS. TOP OF FIRE EXTINGUISHERS SHALL BE 1500mm A.F.F. MAXIMUM, ADJUST DOWN TO SUIT BLOCK COURSING.

**PIPING MATERIALS**

EXT-EXTERIOR BUR-BURIED PIPING INT-INTERIOR A.G-ABOVE GRADE

Table with columns: SERVICE, EXT, INT, BUR, A.G., MATERIAL, CODE, MECH. JOINTS, TARRED GASKET RING JOINTS. Rows include Sanitary Sewers, Storm Sewers, Venting, Cold Water, Domestic Hot Water, Natural Gas, and 65 to 150 DIA.

PIPE HANGER SPACING SCHEDULE Table with columns: SERVICE, HANGER SPACING (FT.), PIPE SIZE (mm). Rows for CW, GAS, DRAINS.

**GAS PIPING AND VALVING**

PIPING ABOVE GRADE

CODE APPROVED, CGA LISTED, NEO BRAD BALL VALVE MODEL 3390, 150 LBS. RATING INSTALLED AT ALL APPLIANCES WITH UNIONS AND DIRT LEGS.

TEST AND PURGE GAS PIPING SYSTEM IN ACCORDANCE WITH CAN 1-8149.

ALL PIPING AND TUBING SHALL BE RUN, SUPPORTED AND PROTECTED IN STRICT ACCORDANCE WITH THE ONTARIO GAS UTILIZATION CODE.

FOR UNRESTRAINED PIPE LENGTHS ON ROOF OVER 100 FEET, PROVIDE EXPANSION CONTROL LOOPS EVERY 100 FEET FOR PIPES 2" AND SMALLER, AND EXPANSION JOINTS FOR LARGER PIPES.

**DIELECTRIC COUPLINGS**

PROVIDE WHEREVER PIPES OF DISSIMILAR METALS ARE JOINED. PROVIDE INSULATING UNIONS FOR PIPE SIZES NPS 2 AND UNDER THE FLANGES FOR PIPE SIZES OVER NPS 2. STANDARD OF ACCEPTANCE: WATTS.

**PIPING INSULATION**

ALL WATER LINES INDICATED IN THE SCOPE OF WORK ITEM .3 BELOW SHALL BE INSULATED WITH 25 MM THICK DUAL TEMPERATURE GLASS FIBRE PIPE INSULATION. INSULATION SHALL BE MANUFACTURED BY FIBREGLASS OF CANADA.

THIS INSULATION SHALL BE SUPPLIED COMPLETE WITH FLAME RETARDANT VAPOUR BARRIER JACKET CONSISTING OF GLASS FIBRE, REINFORCED LAMINATE OF ALUMINUM FOIL AND KRAFT PAPER. LONGITUDINAL SEAMS OF THE VAPOUR BARRIER JACKET SHALL BE SEALED WITH VAPOUR-PROOF ADHESIVE, FLINTKOTE TYPE 32. INSULATE AND TAP ALL VALVES AND FITTINGS. EXPOSED PIPING INSULATION TO BE FINISHED WITH 8 OZ. FATTAL U.L.C. LISTED CANVAS AND CHILDERS LAGGING. NON-U.L.C. LISTED CANVAS WILL NOT BE ACCEPTED.

INSULATE THE FOLLOWING:

- 1. DOMESTIC COLD WATER PIPING
2. DOMESTIC HOT WATER PIPING AND RECIRCULATION
3. INTERNAL RAIN WATER LEADERS ABOVE GRADE

**PLUMBING FITTINGS AND ACCESSORIES**

VALVES GATE VALVES: NPS 2 AND UNDER CRANE 1320 / CRANE 428 OVER NPS 2 CRANE 465 1/2

GLOBE VALVES: NPS 2 AND UNDER CRANE 1310

CHECK VALVES: NPS 2 AND UNDER CRANE 1342 OVER NPS 2 CRANE 373

BALL VALVES: NPS 2 AND UNDER CRANE 9322S

**FLOOR DRAINS**

- 1. FINISHED FLOORS ZURN ZN-211BP, 125BP, 125 MM ROUND NICKEL BRONZE STRAINER
2. UNFINISHED AREAS ZURN ZZN-211AP - IN WATERPROOF MEMBRANE AREAS USE ZZN-401AP NICKEL BRONZE STRAINER
3. CERAMIC TILE AREAS ZURN ZZN-211HP WITH NICKEL BRONZE STRAINER, 150X150 SIZE
4. ANCON DRAINS CONSIDERED EQUAL TO ZURN.

CLEANOUTS CLEANOUT PLUGS (CAST IRON) HEAVY CI MALE FERRULE WITH BRASS SCREWS AND THREADED BRASS OR BRONZE PLUG. SEALING-CAULKED SEAT OR WITH NEOPRENE GASKET. ACCEPTABLE MATERIALS: ZURN Z1450 SERIES, ANCON.

HYDRANTS ENCASED RECESSED NON-FREEZE WALL HYDRANT WITH NPS 3/4" HOSE OUTLET. REMOVABLE OPERATING KEY. POLISHED BRONZE FINISH WITH VAUUM BREAKER. ACCEPTABLE MATERIALS: ZURN ZN-1385VB OR ANCON HY-700-VB

WATER HAMMER ARRESTORS STAINLESS STEEL CONSTRUCTION, BELLOWS TYPE. TO PLUMBING AND DRAINING INSTITUTE STANDARD PDI-WH20-77. ACCEPTABLE MATERIALS: ZURN Z1700 SIZE NO. 100, AMTROL DIATROL 536.

**DOMESTIC WATER SUPPLY PIPING - COPPER**

REFERENCE STANDARDS ALL PLUMBING FITTINGS AND ACCESSORIES SHALL COMPLY WITH ASME A112-18.1 FOR A LIMIT OF WEIGHTED AVERAGE LEAD CONTENT OF LESS THAN OR EQUAL TO 0.25% WHEN TESTED IN ACCORDANCE WITH NSF/ANSI 372.

**PIPING**

DOMESTIC HOT, COLD AND RECIRCULATING PIPING WITHIN THE BUILDING: 1. SIZES 7/8 (3") AND UNDER, ABOVE GROUND: COPPER TUBE, HARD DRAWN TYPE L; ASTM B88M, SIZES 5/8 (2") AND LARGER, ABOVE GROUND: PROVIDE VICTAULIC ROLL GROOVED COPPER, HARD DRAWN TYPE L TO ASTM B88M WITH GROOVED COPPER FITTINGS TO ASTM B-75 ALLOY AND VICTAULIC #607 COUPLINGS AND #641 FLANGE ADAPTERS. 2. BURIED COPPER TUBE, SOFT ANNEALED, TYPE K; TO ASTM B88M OR POLYETHYLENE CSA LABELLED PIPING FOR 128 PSI RATING WHERE INDICATED.

**JOINTS**

SOLDER TO BE "WATER SAFE".

**EQUAL MANUFACTURERS:**

- 1. TUBING STANDARD: COPPER TUBING SHALL CONFORM TO ASTM B 75 OR ASTM B88.
2. PRESS FITTING: COPPER AND COPPER ALLOY PRESS FITTINGS SHALL CONFORM TO MATERIAL REQUIREMENTS OF ASME B16.18 OR ASME B16.22 & PERFORMANCE CRITERIA OF IAPMO PS 117 AND CSA MSE 13.

**BALL VALVES**

BALL VALVES - FOR ISOLATION AND BALANCING SERVICE. 100% LEAD FREE, 2" AND UNDER, RATED 1380KPA, 600WOG, BRASS BODY TO ASTM C49300 (LEAD FREE BRASS), FULL PORT, PIPE SEATS, DOUBLE O-RING PACKING, STEEL PLATED FORCED BRASS C49300 VENTED SOLID BALL, BLOW-OUT PROOF, TEM, LEVER HANDLE. 1. KITZ 858 SCREWED ENDS - 100% LEAD FREE 2. KITZ 859 SOLDER ENDS - 100% LEAD FREE

**BUTTERFLY VALVES**

BUTTERFLY VALVES - FOR ISOLATION AND BALANCING. 1. KITZ 6122L LEVER OPERATED 2. KITZ 6122G GEAR OPERATED

**GATE VALVES**

100% LEAD FREE ONLY, 200 W.O.G.

**SWING CHECK VALVES - BACK FLOW PREVENTION**

- 1. SCREWED ENDS - KITZ 822T
2. SOLDER ENDS - KITZ 823T

**INSTALLATION**

BEFORE BUILDING IS OCCUPIED AND POTABLE WATER SYSTEMS ARE PLACED INTO SERVICE, ALL PIPING SHALL BE CHLORINATED AND FLUSHED TO ENSURE ALL CONTAMINANTS ARE REMOVED FROM THE SYSTEM.

LIQUID CHLORINE SHALL BE INTRODUCED INTO THE SYSTEM, CIRCULATED FOR A PERIOD OF 24 HOURS (USING TEMPORARY PIPING CONNECTIONS IF REQUIRED).

ALL COLD WATER, HOT WATER AND RECIRCULATION PIPING SHALL BE FLUSHED.

ALL FIXTURES ARE TO BE OPERATED AND THE SYSTEM DRAINED OF RESIDUAL CHLORINE, THEN FLUSHED THOROUGHLY WITH FRESH WATER FOR A PERIOD OF FOUR (4) HOURS. REFER TO THE REQUIREMENTS IN SECTION 15188 FOR ASSISTANCE IN DEVELOPING THE METHODOLOGY FOR THIS WORK.

THE GENERAL CONTRACTOR SHALL BE PRESENT FOR ALL OF THE ABOVE TESTS.

INSTALL SHUT-OFF VALVES IN LINE TO EACH GROUP OF FIXTURES AND ON MAIN LINES AS SHOWN. VALVES SHALL BE FULL PIPE SIZE WITH NO REDUCING BUSHINGS. INSTALL ACCESS DOORS IN WALLS OR CEILINGS FOR EACH ISOLATION VALVE.

CONNECT TO FIXTURES AND EQUIPMENT IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS UNLESS OTHERWISE INDICATED.

INSTALL TUBING CLOSE TO BUILDING STRUCTURE TO MINIMIZE FURRING, CONSERVE HEADROOM AND SPACE. GROUP PIPING AND RUN PARALLEL TO WALLS.

CUT SQUARE, REAM AND CLEAN TUBING AND TUBE ENDS, CLEAN RECESSES OF FITTINGS AND ASSEMBLE WITHOUT BINDING.

LAY BURIED TUBING IN ACCORDANCE WITH AWWA CLASS 'B' BEDDING.

ISOLATE EQUIPMENT, FIXTURES AND BRANCHES WITH GATE VALVES.

NO PIPING SHALL BE RUN ON EXPOSED SURFACES WITHOUT THE PERMISSION OF THE ARCHITECT.

**PLUMBING FIXTURES**

FIXTURES ARE NOT TO BE INSTALLED UNTIL DIRECTED BY THE ENGINEER. ALL ROUGH-IN SHALL BE ACCURATELY LAID OUT, AND NO OFFSETS WILL BE ACCEPTED. ALL FIXTURES SHALL BE THE BEST OF THEIR RESPECTIVE KIND, FREE FROM ALL DEFECTS AND ANY FIXTURE WHICH IN THE OPINION OF THE ENGINEER IS DEFECTIVE OR DAMAGED SHALL BE REMOVED AND REPLACED BY A FIXTURE WHICH IS ACCEPTABLE. THE FIXTURES SHALL INCLUDE ALL TRIM, TRAPS AND WASTE WATER CONNECTIONS, TANKS, ETC., USUALLY CLASSED AS FITTINGS AND REQUIRED TO MAKE FIXTURE COMPLETE IN EVERY RESPECT. FIXTURES SHALL BE WHITE. CRANE AND AMERICAN STANDARD FIXTURES ARE CONSIDERED EQUALS.

**GUARANTEE**

THE CONTRACTOR SHALL EXECUTE AND DELIVER TO THE OWNER, BEFORE FINAL PAYMENT, A WRITTEN GUARANTEE IN FORM SATISFACTORY TO THE OWNER THAT ALL LABOUR AND MATERIALS FURNISHED AND WORK PERFORMED BY THE CONTRACTOR ARE IN ACCORDANCE WITH THE CONTRACT CONTRACT DRAWINGS, SPECIFICATIONS AND AUTHORIZED ALTERATIONS AND ADDITIONS THERE TO AND SHOULD ANY DEFECT DEVELOP DURING THE CONTRACT GUARANTEE PERIOD, AS HEREAFTER DEFINED DUE TO IMPROPER MATERIALS, WORKMANSHIP OR ARRANGEMENT, THE SAME TOGETHER WITH ANY OTHER WORK AFFECTED IN CORRECTING SUCH DEFECT SHALL, UPON WRITTEN NOTICE BE MADE GOOD BY THE CONTRACTOR WITHOUT EXPENSE TO THE OWNER.

THE CONTRACTOR'S AFORESAID GUARANTEE SHALL COVER ALL WORK UNDER THE CONTRACT WHETHER OR NOT ANY PORTION OR TRADE HAS BEEN ASSIGNED OR SUBLET. IN THE EVENT ANY PORTION OF THE WORK IS PERFORMED BY ASSIGNEES AND SUBCONTRACTORS THEIR WRITTEN GUARANTEE TO THE OWNER COVERING THEIR RESPECTIVE PORTIONS OF THE WORK FOR THE PERIODS SPECIFIED AND SHALL DELIVER SAME, TOGETHER WITH HIS OWN GUARANTEE, TO THE OWNER. ASSIGNEES' AND SUBCONTRACTORS' GUARANTEES SHALL EXPRESSLY PROVIDE THAT THE SAME SHALL BE ENFORCEABLE DIRECTLY BY THE OWNER AND SHALL RUN CONCURRENTLY WITH THE CONTRACTOR'S GUARANTEE.

**TESTING AND BALANCING**

BALANCE AND TEST AIR AND WATER SYSTEMS AT EACH OUTLET, COIL, FAN AND PUMP SYSTEMS. ISSUE A DRAFT REPORT FOR ISSUE FOR COMMENTS. SUPERVISE OPERATING TESTS IN PREPARATION OF THE FINAL EIGHT (8) HOUR OPERATING TEST TO ENSURE THAT ALL SYSTEMS CONFORM TO THE PLAN AND SPECIFICATIONS. PROVIDE THREE TYPED REPORTS OF SYSTEM BALANCE AND OPERATING CONDITIONS, WITH AIR FLOWS AT EACH POINT SHOWN ON THE DRAWINGS.

INSTRUCT THE OWNER'S REPRESENTATIVE IN THE START-UP AND OPERATION OF THE SYSTEMS INCLUDING ALL THE AIR SYSTEMS AND HEATING SYSTEMS FOR A MINIMUM OF ONE EIGHT (8) HOUR DAY.

THE TESTING COMPANY SHALL PREPARE FIVE (5) COMPLETELY BOUND BROCHURES CONTAINING AN OUTLINE OF THE SYSTEMS OPERATIONS AND A RECOMMENDED MAINTENANCE PROCEDURE SCHEDULE WITH TYPEWRITTEN INSTRUCTIONS AND CONTROL DIAGRAMS OF ALL MECHANICAL SYSTEMS IN THESE BROCHURES. INCLUDE IN THIS MANUFACTURER'S OPERATING AND MAINTENANCE INSTRUCTIONS.

THE TESTING AND BALANCING FIRM SHALL BE EITHER DYNAMIC FLOW BALANCING (905) 338-0808 OR AIR AUDIT INC. (519) 740-0871.

**CLOSE-OUT DOCUMENTS AND INSTRUCTIONS**

- 1. AS-BUILT DRAWINGS.
2. ALL TEST REPORTS.
3. WARRANTIES.
4. ALL APPROVAL AND VERIFICATION CERTIFICATES.
5. THREE (3) COPIES OF MAINTENANCE MANUALS.
6. COPIES OF PANEL BOARD INDEXES.
7. C.S.A. OR SPECIAL HYDRO INSPECTION CERTIFICATES.
8. INSTRUCT OWNER IN THE OPERATION OF ALL EQUIPMENT AND MAKE FAMILIAR WITH SYSTEMS.

**COMMISSIONING AND DEMONSTRATION**

THE COMMISSIONING PROCESS REQUIRES THE COMPLETE PROCESS TO TEST, ADJUST AND BALANCE SYSTEMS TO PERFORM IN ACCORDANCE WITH REQUIREMENTS OF CONTRACT DOCUMENTS AND TO DO ALL OTHER WORK AS SPECIFIED IN THIS SECTION.

THE MECHANICAL CONTRACTOR SHALL ACT AS THE COMMISSIONING AGENT FOR THIS PROJECT.

TO ADJUST AND REGULATE EQUIPMENT AND SYSTEMS SO AS TO MEET SPECIFIED PERFORMANCE REQUIREMENTS AND TO ACHIEVE SPECIFIED INTERACTION WITH ALL OTHER RELATED SYSTEMS UNDER ALL NORMAL AND EMERGENCY LOADS AND OPERATING CONDITIONS. BALANCE SYSTEMS AND EQUIPMENT TO REGULATE FLOW RATES TO MATCH LOAD REQUIREMENTS OVER FULL OPERATING RANGES.

SCHEDULE TIME REQUIRED FOR COMMISSIONING (INCLUDING REPAIRS, RE-TESTING) INTO PROJECT CONSTRUCTION AND COMPLETION SCHEDULE SO AS TO ENSURE COMPLETION BEFORE ACCEPTANCE OF PROJECT. DO COMMISSIONING OF EACH SYSTEM INDEPENDENTLY AND SUBSEQUENTLY, WHERE INTERLOCKED WITH OTHER SYSTEMS, IN UNISON WITH THOSE SYSTEMS.

**PRE-START-UP CHECKS**

- 1. ALL EQUIPMENT WILL BE RENDERED FULLY OPERATIONAL BY THE MECHANICAL CONTRACTOR BEFORE TESTING AND BALANCING COMMENCES. ALL ROTATIONS, LUBRICATION, ALIGNMENTS, CONTROL'S PRESSURE TESTS AND JOG TESTS SHALL BE MADE AND LOGGED ON A PROPER PRE-STARTUP CHECKLIST BEFORE ANY EQUIPMENT IS STARTED. THIS LIST SHALL BE REVIEWED WITH OTHER SUB-TRADES TO CORRECT ANY DEFICIENCIES BEFORE ANY EQUIPMENT IS STARTED FOR ANY REASON OTHER THAN TO CHECK ROTATION.
2. ANY SUPPLIERS CHECKLISTS AND REQUIRED SITE VISITS AND REPORTS MUST BE MADE AT THE TIME BY THE ENGINEER.
3. SUBMIT THE COMPLETED PRE-STARTUP CHECKLIST TO THE ENGINEER.
4. REPLACE DRIVE BELTS AND SHEAVES AS REQUIRED BY THE TESTING AND BALANCING FIRM IN ORDER TO ACHIEVE THE PROPER OPERATING CONDITIONS.

OPERATE SYSTEMS FOR 30 DAY TRIAL TEST AND AS REQUIRED BY THE ENGINEER FOR VERIFICATION OF COMMISSIONING REPORTS.

NOTIFY THE ENGINEER SEVEN (7) DAYS PRIOR TO START OF COMMISSIONING. START COMMISSIONING ONLY WHEN BUILDING SYSTEMS ARE ESSENTIALLY COMPLETED. CHECK AND REPORT ON THE FOLLOWING:

- 1. ALL PRESSURE, LEAKAGE, OTHER TESTS SPECIFIED ELSEWHERE IN DIVISION 15.
2. ALL PROVISIONS FOR TESTING AND BALANCING INSTALLED AND OPERATIONAL.
3. START-UP, VERIFICATION FOR PROPER, NORMAL AND SAFE OPERATION OF ALL MECHANICAL AND ASSOCIATED ELECTRICAL AND CONTROL SYSTEMS AFFECTING SYSTEM COMMISSIONING INCLUDING BUT NOT LIMITED TO:
- 1. PROPER THERMAL OVERLOAD PROTECTION IN PLACE FOR ELECTRICAL EQUIPMENT.
- 2. AIR SYSTEMS:
1. FILTERS IN PLACE, CLEAN.
2. DUCT SYSTEMS CLEAN
3. DUCTS, AIR SHAFTS, CEILING PLENUMS ARE AIRTIGHT TO WITHIN SPECIFIED TOLERANCES.
4. CORRECT FAN ROTATION.
5. FIRE, SMOKE, VOLUME CONTROL DAMPERS INSTALLED AND OPEN.
6. COIL FINS COMBED, CLEAN.
7. ACCESS DOORS, INSTALLED, CLOSED.
8. ALL OUTLETS INSTALLED, VOLUME CONTROL DAMPERS OPEN.
- 3. LIQUID SYSTEMS:
1. FLUSHED, FILLED, VENTED.
2. CORRECT PUMP ROTATION.
3. STRAINERS IN PLACE, BASKETS CLEAN.
4. ISOLATING AND BALANCING VALVES INSTALLED, OPEN.
5. CALIBRATED BALANCING VALVES INSTALLED, AT FACTORY SETTINGS.
6. CHEMICAL TREATMENT SYSTEMS COMPLETE, OPERATIONAL.

SUBMIT FOR CHECKING AND APPROVAL OF ENGINEER PRIOR TO SUBMISSION OF FORMAL COMMISSIONING REPORT, SAMPLE OF ROUGH COMMISSIONING SHEETS.

ALL REPORTED RESULTS SUBJECT TO VERIFICATION BY THE ENGINEER. PROVIDE MANPOWER AND INSTRUMENTATION TO VERIFY UP TO 30% OF ALL REPORTED RESULTS. NUMBER AND LOCATION OF VERIFIED RESULTS TO BE AT DISCRETION OF THE ENGINEER. BEAR COSTS TO REPEAT COMMISSIONING AS REQUIRED TO SATISFACTION OF THE ENGINEER.

AFTER COMMISSIONING IS COMPLETED TO THE SATISFACTION OF THE ENGINEER, REPLACE DRIVE GUARDS, CLOSE ALL ACCESS DOORS, LOCK ALL DEVICES IN SET POSITIONS, ENSURE SENSORS ARE AT REQUIRED SETTINGS. PERMANENTLY MARK ALL SETTINGS TO ALLOW RESTORATION AT ANY TIME DURING LIFE OF FACILITY. MARKINGS NOT TO BE ERADICATED OR COVERED IN ANY WAY.

COMMISSIONING TO BE CONSIDERED COMPLETE ONLY WHEN FINAL COMMISSIONING REPORT RECEIVED AND APPROVED BY THE ENGINEER.

**AUTOMATIC CONTROLS**

(ALSO REFERRED TO AS DIVISION 15000 ON THE DRAWINGS)

SHOP DRAWINGS SUBMIT COMPLETED EQUIPMENT AND CONTROL WIRING DIAGRAMS FOR THE MECHANICAL CONTROL SYSTEMS AT THE TIME OF SHOP DRAWING SUBMITTAL.

MAINTENANCE DATA PROVIDE ALL CONTROL EQUIPMENT WITH DETAILED INFORMATION FOR THE MAINTENANCE MANUALS.

**QUALIFIED FIRMS**

A COMPETENT, QUALIFIED H.V.A.C. CONTROLS SUB-CONTRACTOR SHALL BE RETAINED TO SUPPLY AND INSTALL THE CONTROL SYSTEMS AND WIRING FOR THIS PROJECT. PROVIDE A COMPLETE CONTROL SYSTEM WITH ALL FIELD DEVICES, VALVES, DAMPER MOTORS, AND WIRING TO OPERATE THE SYSTEM AS INTENDED AND AS DESCRIBED WITHIN THIS SPECIFICATION.

QUALIFIED FIRMS: HONEYWELL, JOHNSON, SIEMENS, AND AIRON HVAC AND CONTROL.

INSTALLATION ALL CONTROL WIRING AND CONTROL DEVICES UNDER 50 VOLTS INSTALLED BY CONTROL SYSTEMS DIVISION. ALL CONTROL WIRING WITHIN PLENUMS SHALL BE FT-6 (TO CSA C22.2) RATED PLENUM WIRE. MINIMUM WIRE SIZE TO BE 18 AWG.

THE EXPOSED WIRING SHALL BE RUN IN RIGID E.M.T. CONDUIT WITH FIELD FORMED JUNCTION BOXES, CLAMPS, SWITCHES ALL TO BE ELECTRICAL TRADE GRADE MATERIALS.

PROVIDE ALL 120 VOLT TO 24 VOLT CONTROL POWER TRANSFORMERS AND RELAYS REQUIRED TO POWER THE CONTROL SYSTEMS. NEATLY MOUNT THE TRANSFORMERS AND RELAYS IN CONCEALED AND ACCESSIBLE LOCATIONS. DIVISION 16 SHALL PROVIDE LINE VOLTAGE SUPPLY AT LOCATIONS OF EQUIPMENT AND CONTROL TRANSFORMERS.

FULLY CO-ORDINATE ALL CONNECTIONS, ROUTING AND POWER SUPPLY LOCATIONS WITH THE ELECTRICAL CONTRACTOR.

LABEL ALL CONTROL DEVICES AND CONTROL POINTS WITH LAMACOD NAMEPLATES.

PROVIDE A FULL START-UP COMMISSIONING AND TRAINING SERVICE FOR THE CONTROL SYSTEMS AND ATTEND A WALK THROUGH BRIEFING WITH THE OWNER'S REPRESENTATIVES AT COMPLETION.

**COOLER ROOM NO. 118, REFRIGERATION SYSTEM**

SUPPLY AND INSTALL COMPLETE REFRIGERATION SYSTEM TO COOL ROOM NO. 118, INCLUDING ROOF MOUNTED CONDENSER, IN ROOM EVAPORATOR, SYSTEM CONTROLLER, DX PIPING INCLUDING ALL REQUIRED COMPONENTS. INSTALL COMPLETE SYSTEM AS PER MANUFACTURER'S RECOMMENDATIONS AND RETAIN MANUFACTURER'S REP TO COMMISSION SYSTEM. PROVIDE A COMMISSIONING REPORT. COMPLETE ALL CONTROL WIRING.

BASE BID SHALL BE DAFOSS.

ROOF MOUNTED CONDENSER CD-3: DANFOSS OPTIMA SLM, MODEL No. OF-HNXMO350UWG0000, 134A REFRIGERANT 134A, 208V 3PH, 8 AMP, 300 LBS. LOW AMBIENT CONTROL TO MINUS 30F.

INDOOR EVAPORATOR EC-3: DANFOSS MODEL NO. OPTIMA D4CC RX L084.144/E1 208V 1PH, 1.0 AMP, 85 LBS.

CONTROLLER: DANFOSS MODEL NO. AK-RC251

ALTERNATE ACCEPTABLE SUPPLIERS: KEEPRITE, COPELAND

Do not scale drawings. Contractors must check and verify all dimensions and report any discrepancies to the Engineer before proceeding with the work. All drawings remain the property of the Engineer and shall not be reproduced or reused without the Engineer's written permission.

The Contract Documents were prepared by the Engineer for the account of the Owner. The material contained herein reflects the Engineers best judgment in light of the information available to him at the time of preparation. Any use which a third party makes of the Contract Documents, or any reliance on or decisions to be made based on them are the responsibility of such third parties. The Engineer accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on the Contract Documents.

Revision table with columns: NO, REVISIONS, DATE. Rows 1-7 showing revisions for ISSUED FOR TENDER, PERMIT, COMMENT, etc.

Filer Engineering Ltd.

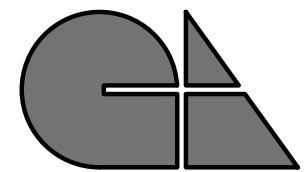
1046 Botanical Drive Burlington, Ontario L7T 1V1 Fax: (905) 526-8899 FEL PROJECT # F1334



HOLY FAMILY CEMETERY CREMATORIUM 2523 LOWER BASE LINE ROAD MILTON, ONTARIO

MECHANICAL SPECIFICATIONS

GRGURIC ARCHITECTS INCORPORATED



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Project information table with columns: SCALE AS NOTED, DATE, DRAWN, CHECKED, PRINT DATE, CAD FILE, PROJECT, DATE, DRAWING, PRINTDATE, CADFILE. Includes date 2019-08 and drawing ID M7.



**ELECTRICAL NOTES:**

- ALL WORK SHALL BE CARRIED OUT IN ACCORDANCE WITH AUTHORITIES HAVING JURISDICTION OVER THE WORK.
- ALL WORK SHALL MEET OR EXCEED THE LATEST REQUIREMENTS OF THE CANADIAN ELECTRICAL CODE C22.1, THE ONTARIO HYDRO SAFETY CODE, THE ONTARIO BUILDING CODE AND THE ONTARIO FIRE CODE.
- ALL EMERGENCY / EXIT LIGHTING EQUIPMENT TO BE INSTALLED AND TESTED TO MEET THE LATEST REQUIREMENTS OF CSA C22.2 NO. 141-M.
- ALL EQUIPMENT AND LABOUR TO BE WARRANTED FOR A PERIOD OF ONE (1) YEAR FROM THE DATE OF FINAL ACCEPTANCE OF THE WORK AS OUTLINED IN CONTRACT DOCUMENTS.
- ALL WIRING SHALL BE RW 90 COPPER WITH 300V OR 600V INSULATION SIZED ACCORDING TO THE APPLICATION, MINIMUM #12 AWG FOR POWER C/W CSA FT6 LABELED PLENUM RATED JACKET IF RUN EXPOSED IN CEILING SPACES.
- ALL WIRING SHALL BE RUN IN CONDUIT OR CABLE TO SUIT THE APPLICATION. CONDUIT SHALL BE EMT C/W STEEL BOXES IN CONCEALED LOCATIONS & SERVICE ROOMS, WHITE WIREMOLD C/W WIREMOLD BOXES IF EXPOSED IN PUBLIC AREAS AND PVC FOR IN-SLAB, WET & UNDERGROUND APPLICATIONS.
- CONCEAL NEW WIRING WHEREVER POSSIBLE. AC TYPE MAY BE USED IN CEILING SPACES, WALL CHASES, ETC. SHORT RUN FROM OUTLET BOX TO DEVICE ONLY. ANY EXPOSED WIRING IN CEILING SPACES SHALL BE CSA FT6 RATED. SURFACE MOUNTED WORK IN ALL AREAS SHALL BE MINIMIZED. SEEK ARCHITECTS AND ENGINEERS APPROVAL.
- SUPPLY AND INSTALL NEW 200A, 347/600V, 3 PHASE, 4 WIRE UNDERGROUND HYDRO SERVICE C/W TRENCHING & BACKFILL, SECONDARY DUCTBANK, SECONDARY CABLING AS SHOWN ALL TO ELECTRICAL SAFETY AUTHORITY AND LOCAL UTILITY CODES, STANDARDS & REQUIREMENTS.
- PROVIDE UNDERGROUND DUCTS FOR FIBRE OPTIC CABLE AND TELEPHONE SERVICE AS SHOWN. ELECTRICAL CONTRACTOR TO COORDINATE REQUIREMENTS WITH ROGERS RCI AND BELL CANADA.
- SUPPLY AND INSTALL NEW CSA APPROVED 347/600V & 120/208V DISTRIBUTION EQUIPMENT, PANEL BOARDS & BREAKERS, SWITCHES, RECEPTACLES, DATA & TELEPHONE OUTLETS, EMERGENCY/EXIT LIGHTING, INTERIOR LIGHT FIXTURES & CONTROLS, EXTERIOR BUILDING, ROADWAY AND PARKING LOT LIGHTING & CONTROLS ALL AS SHOWN ON THE DRAWINGS.
- PROVIDE POWER CONNECTIONS TO ALL HVAC EQUIPMENT AS SUPPLIED AND INSTALLED BY MECHANICAL CONTRACTOR. SUPPLY AND INSTALL WEATHERPROOF DISCONNECTS AND LOCAL MEANS OF ISOLATION AS REQUIRED BY CODE. SUPPLY AND INSTALL CONTROL DEVICES INCLUDING STARTERS, CONTACTORS, RELAYS, MOTOR RATED SWITCHES ETC. INDICATED ON MECHANICAL DRAWINGS AS PROVIDED BY ELECTRICAL CONTRACTOR. INSTALL AND WIRE THERMOSTATS AND CONTROLS SUPPLIED BY MECHANICAL CONTRACTOR. COORDINATE REQUIREMENTS WITH MECHANICAL CONTRACTOR AND EQUIPMENT SUPPLIER(S). REFER TO MECHANICAL EQUIPMENT SCHEDULES ON MECHANICAL DRAWINGS.
- CONTRACTOR TO PROVIDE WRITTEN OPERATING AND MAINTENANCE INSTRUCTIONS FOR BUILDING CARETAKER AND OWNER UPON COMPLETION OF THE WORK.
- CONTRACTOR SHALL PROVIDE IN-SERVICE TRAINING BY ALL EQUIPMENT SUPPLIERS TO INSTRUCT BUILDING CARETAKER AND OWNER DESIGNATED PERSONNEL ON THE CARE, OPERATION, TESTING AND MAINTENANCE OF NEW EQUIPMENT AND SYSTEMS.
- APPROPRIATE ELECTRONIC OR HARD COPY SHOP DRAWINGS TO BE SUBMITTED TO ENGINEER FOR REVIEW AND APPROVAL PRIOR TO ORDER PLACEMENT.
- ALL CUTTING AND PATCHING FOR ELECTRICAL WORK SHALL BE BY THE ELECTRICAL CONTRACTOR. THE REPAIR OF ALL OPENINGS MADE IN FIRE SEPARATIONS SHALL BE THE RESPONSIBILITY OF THE ELECTRICAL CONTRACTOR. FILL ALL OPENINGS WITH APPROPRIATE LISTED FIRE STOP MATERIAL (SPRAY FOAM PRODUCTS NOT ALLOWED). ELECTRICAL CONTRACTOR TO LOCATE AND SIZE ALL OPENINGS REQUIRED. PROVIDE CONDUIT SLEEVES C/W NECESSARY FIRE STOP MATERIAL FROM CORRIDORS INTO ALL OFFICES, ETC. AS REQUIRED FOR VARIOUS SERVICES.
- FIXTURE AND EQUIPMENT LOCATIONS SHOWN ON THE DRAWINGS ARE APPROXIMATE ONLY. ELECTRICAL CONTRACTOR TO VERIFY SITE CONDITIONS PRIOR TO INSTALLATION AND REPORT DISCREPANCIES TO ARCHITECT AND ENGINEER. SEEK APPROVALS FOR DEVIATIONS PRIOR TO INSTALLATION. COORDINATE WORK WITH ALL OTHER TRADES.
- ELECTRICAL CONTRACTOR SHALL ARRANGE AND PAY FOR ALL NECESSARY PERMITS, INSPECTIONS AND VERIFICATIONS AS REQUIRED BY CODE INCLUDING ELECTRICAL SAFETY AUTHORITY INSPECTION, FIRE MARSHALS TESTING AND LOCAL BUILDING DEPARTMENT REVIEW. PROVIDE COPIES OF ALL FINAL REPORTS AND CERTIFICATES INCLUDING THOSE LISTED ABOVE AND EMERGENCY/EXIT LIGHTING TESTING REPORT.
- PROVIDE ACCURATE TYPED INDEX CARDS IN ALL PANEL BOARDS. ALSO PROVIDE A COPY OF EACH INDEX IN THE PROJECT MANUAL. LABEL ALL ELECTRICAL EQUIPMENT WITH MECHANICALLY FASTENED LAMACOID NAMEPLATES, WHITE WITH BLACK LETTERS DEPICTING VOLTAGE, PHASE, FEED BREAKER NUMBER & LOCATION AND DEVICE NAME.
- ELECTRICAL CASH ALLOWANCES: THE ELECTRICAL CONTRACTOR SHALL CARRY THE FOLLOWING CASH ALLOWANCES WITHIN THE ELECTRICAL CONTRACT C/W STANDARD MARKUPS. WRITTEN AUTHORIZATION REQUIRED FROM ENGINEER PRIOR TO THE ELECTRICAL CONTRACTOR UTILIZING ANY AMOUNT OF THESE CASH ALLOWANCES. THE OWNER RESERVES THE RIGHT TO DIRECT ANY ADDITIONAL ELECTRICAL WORK BE CHARGED AGAINST ANY OF THESE CASH ALLOWANCES.

- \$25,000 FOR CONNECTION OF POWER SERVICE
- \$5,000 FOR FIBRE OPTIC CABLE CONNECTION.
- \$5,000 FOR BELL TELEPHONE CABLE CONNECTION.
- \$5,000 FOR COMMISSIONING OF LIGHTING CONTROLS.
- \$10,000 FOR POSSIBLE ADDITIONAL ELECTRICAL WORK.

**ELECTRICAL LEGEND:**

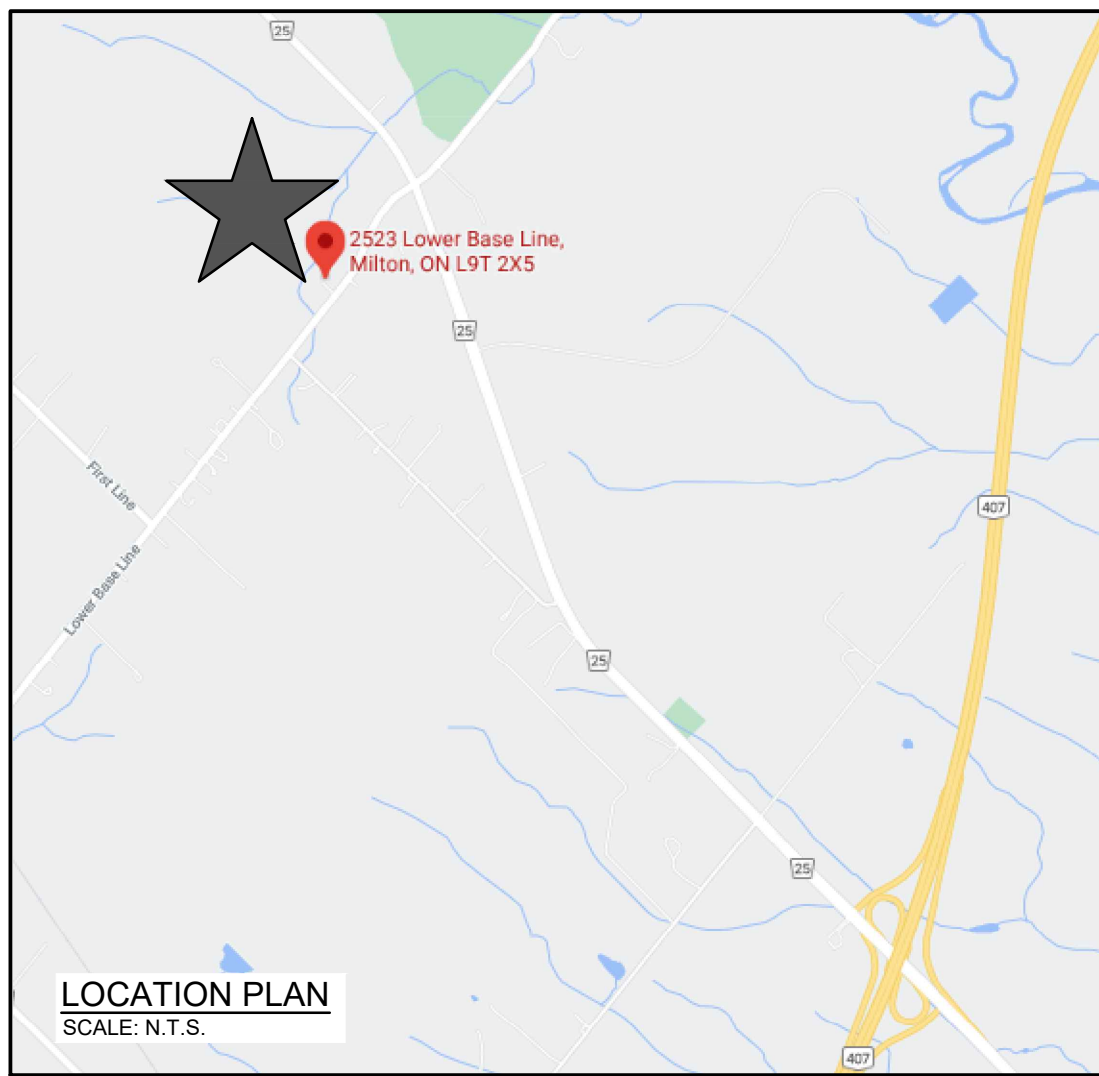
- LED OR FLUORESCENT LIGHT FIXTURE. NL DENOTES NIGHT LIGHT CIRCUIT. LETTER DENOTES TYPE.
  - LED OR INCANDESCENT, FLUORESCENT INTERIOR OR EXTERIOR DOWN LIGHT FIXTURE OR PENDANT LIGHT FIXTURE. LETTER DENOTES TYPE.
  - LED OR METAL HALIDE EXTERIOR WALL PACK OR POLE MOUNT LIGHT FIXTURE. LETTER DENOTES TYPE.
  - ULTRASONIC & INFRARED OCCUPANCY SENSOR FOR LIGHTING CONTROL C/W POWER PACK, AS SPECIFIED ON DRAWINGS. LOCATE, INSTALL AND WIRE PER MANUFACTURES INSTRUCTIONS.
  - 120V OR 347V EXTERIOR WALL MOUNTED PHOTOCELL FOR LIGHTING CONTROL C/W SHIVEL BASE AND LIGHT LEVEL ADJUSTMENT SWITCH. INTERMATIC OR EQUAL. MH = 4572mm (15'-0") AFF.
  - SINGLE POLE LIGHT SWITCH, WHITE TOGGLE STYLE C/W STAINLESS STEEL COVER PLATE. 3 DENOTES 3-WAY. D DENOTES DIMMER. T DENOTES 0 - 60 MIN. TIMER. K DENOTES KEY LEVER ACTUATED TYPE. M DENOTES MOTOR RATED TOGGLE TYPE SWITCH C/W OVERLOAD HEATERS, PILOT LIGHT & LAMACOID NAMEPLATE. SC DENOTES FAN SPEED CONTROL. PB DENOTES PUSH BUTTON FOR BUZZER. PL DENOTES C/W PILOT LIGHT. OS DENOTES PASSIVE INFRARED OCCUPANCY SENSOR TYPE HUBBELL OR EQUAL. MH = 1220mm (4'-0") AFF OR AS NOTED.
  - DUPLX RECEPTACLE, WHITE STANDARD STYLE C/W STAINLESS STEEL COVER PLATE. G DENOTES GROUND FAULT INTERRUPTER TYPE. S DENOTES SPLIT CIRCUIT. T DENOTES 20A T-SLOT TYPE. K DENOTES MOUNTED IN KICK SPACE. WP DENOTES WEATHERPROOF "IN-USE" COVER. TP DENOTES TAMPER PROOF. F DENOTES RECESSED FLOOR MOUNTED. ALL RECEPTACLES TO BE LABELED (DYNO-LABEL) WITH ASSOCIATED PANEL BOARD AND CIRCUIT NUMBER ON COVER PLATE. MH = 460mm (1'-6") AFF AS NOTED.
  - AS ABOVE EXCEPT MH = 150mm (0'-6") ABOVE COUNTER. P DENOTES MOUNTED ON COUNTER IN PEDESTAL BOX.
  - OUTLET FOR MOTOR, MECHANICAL OR PACKAGED EQUIPMENT. MOUNTING TO SUIT EQUIPMENT. VOLTAGE AND CURRENT RATING PER CIRCUIT NUMBER.
  - OUTLET FOR ELECTRIC RANGE OR ELECTRIC CLOTHES DRYER OR OTHER EQUIPMENT. MH = 460mm (1'-6") AFF OR TO SUIT.
  - BREAKER PANEL BOARD, SURFACE WALL MOUNT IN SERVICE ROOMS. RECESSED WALL MOUNT IN PUBLIC AREAS. MH = 1830mm (6'-0") TO TOP AFF.
  - FUSED OR UNFUSED DISCONNECT SWITCH. WP DENOTES WEATHER PROOF. SIZED TO THE APPLICATION. MH = 1525mm (5'-0") AFF OR TO SUIT EQUIPMENT.
  - COMBINATION MAGNETIC MOTOR STARTER (IEC STANDARD) C/W HAND / OFF / AUTO SELECTOR SWITCH AND 2 N.O. & 2 N.C. AUXILIARY CONTACTS. SIZED TO THE APPLICATION. MH = 1525mm (5'-0") AFF OR TO SUIT EQUIPMENT.
  - CONTRACTOR FOR LIGHTING OR MECHANICAL EQUIPMENT CONTROL C/W AUXILIARY CONTACTS. SIZE, VOLTAGE AND # OF POLES TO SUIT APPLICATION.
  - 3000W, 208V, 1 PHASE, ELECTRIC RECESSED FORCED FLOW HEATER C/W INTEGRAL THERMOSTAT BY ELECTRICAL CONTRACTOR. MH = 150mm (0'-6") AFF. CHROMALOX CAT. # F81840031, RFLVD OR EQUAL.
  - THERMOSTAT FOR HVAC EQUIPMENT, SUPPLIED INSTALLED AND WIRED BY MECHANICAL CONTRACTOR. ELECTRICAL CONTRACTOR TO PROVIDE OUTLET BOX AND CONDUIT. MH = 1525mm (5'-0") AFF.
  - 120V, 950W ELECTRIC HAND DRYER C/W AUTOMATIC ACTIVATION WITH 3 SECOND RUN ON TIME. G DENOTES WIRED TO GFI TYPE BREAKER CIRCUIT. WORLD DRYER CAT. # L974 OR EQUAL. MH = 1120mm (3'-8") AFF.
  - TELEPHONE OUTLET BOX C/W 13mm (1/2") DIA. EMT CONDUIT AND PULL CORD TO CORRIDOR CEILING SPACE. TELEPHONE JACKS, CAT. 3 WIRING, TERMINATIONS AND TESTING BY DATA SUBCONTRACTOR. MH = 460mm (1'-6") AFF OR AS NOTED.
  - COMPUTER DATA OUTLET BOX C/W 19mm (3/4") DIA. EMT CONDUIT AND PULL CORD TO CORRIDOR CEILING SPACE. DATA JACKS, CAT. 6 WIRING, TERMINATIONS AND TESTING BY DATA SUBCONTRACTOR. MH = 460mm (1'-6") AFF OR AS NOTED.
  - SECURITY SYSTEM DOOR CONTACT WIRED BACK TO SECURITY PANEL. COORDINATE WITH HARDWARE SUPPLIER AND SECURITY SUBCONTRACTOR. MOUNTING TO SUIT DOOR. CONCEAL ALL WIRING.
  - OUTLET FOR HANDICAPPED DOOR OPERATOR PUSH BUTTON C/W 13mm (1/2") DIA. EMT CONDUIT TO OPERATOR. COORDINATE REQUIREMENTS WITH HARDWARE SUPPLIER. MH=1067mm (3'-6") AFF.
  - 120V SMOKE ALARM UNIT C/W 200VA, 120/24V CONTROL TRANSFORMER, 24V RELAY C/W 24V AUXILIARY CONTACTS. MOUNT ABOVE T-BAR CEILING. ELECTRICAL CONTRACTOR TO WIRE TO ADJACENT SMOKE DAMPER. MIRCROM OR EQUAL.
  - DUCT SMOKE DETECTOR C/W HOUSING 120V SMOKE ALARM UNIT C/W 200VA, 120/24V CONTROL TRANSFORMER, 24V RELAY C/W 24V AUXILIARY CONTACTS. 600mm (2) SAMPLE TUBE AND REMOTE ALARM INDICATOR. MOUNTING TO SUIT HVAC SUPPLY DUCTWORK. ELECTRICAL CONTRACTOR TO WIRE TO ADJACENT SMOKE DAMPER. MIRCROM OR EQUAL.
- MH DENOTES MOUNTING HEIGHT.  
AFF DENOTES ABOVE FINISHED FLOOR LEVEL.

**EMERGENCY/EXIT LIGHTING LEGEND:**

- 120VAC, 12VDC, 2W, BRUSHED ALUMINUM FINISH, EXTRUDED ALUMINUM HOUSING, CEILING OR WALL MOUNT SINGLE FACED GREEN "RUNNING MAN" EXIT LIGHT FIXTURE C/W C860 CERTIFIED LED PANEL. COORDINATE DIRECTION ON-SITE. WIRE DC TO EMERGENCY BATTERY UNIT AS INDICATED. MH = 2438mm (8'-0") AFF OR AS NOTED. BEGHELLI CAT. # FM-RM-L-1-OLR-M-BA
  - 120VAC, 12VDC, 50W, WHITE STEEL WALL OR CEILING MOUNT SINGLE FACED COMBINATION SELF-POWERED EMERGENCY LIGHTING / GREEN "RUNNING MAN" EXIT LIGHT FIXTURE, 30 MINUTE RATED C/W 10 YEAR LIFE SEALED BATTERY, C860 CERTIFIED LED PANEL AND 2 - 6W LED MR16 LAMP HEADS. COORDINATE DIRECTION ON-SITE. C DENOTES WIRE GUARD. MH = 2134mm (7'-0") AFF. BEGHELLI CAT. # FM-RM-PL-L-1-OLR-M-BA, CAT. # FM-RM-PL-L-1-OLR-M-BA-WG (WG DENOTES C/W WIRE GUARD)
  - 120VAC, 12VDC, 50W, WHITE FINISH, STEEL HOUSING, WALL MOUNT DOUBLE HEAD, SELF-POWERED HARD-WIRED EMERGENCY LIGHTING UNIT, 30 MINUTE RATED C/W 10 YEAR LIFE SEALED BATTERY, SOLID STATE CHARGER AND 2-6W LED MR16 INTEGRAL LAMP HEADS. C DENOTES PROVIDE WIRE GUARD. MH = 2438mm (8'-0") AFF OR AS NOTED. BEGHELLI CAT. # NV-12-36-2BTMR-7WLED-WG (WG DENOTES C/W WIRE GUARD)
  - 120VAC, 12VDC, 60W, DIE-CAST ALUMINUM HOUSING, WALL OR CEILING MOUNT DOUBLE HEAD, SELF-POWERED HARD-WIRED EMERGENCY LIGHTING UNIT, 30 MINUTE RATED C/W 10 YEAR LIFE SEALED BATTERY, SOLID STATE CHARGER AND 2-7W LED MR16 INTEGRAL LAMP HEADS. SUITABLE FOR WET LOCATIONS. MH = 2438mm (8'-0") AFF OR AS NOTED. BEGHELLI CAT. # BOL-12V60W-2LED
  - 120VAC, 12VDC, 360W, WHITE FINISH, STEEL HOUSING, WALL MOUNT SINGLE HEAD, SELF-POWERED, CORDED EMERGENCY LIGHTING CENTRAL BATTERY UNIT, 30 MINUTE RATED C/W 10 YEAR LIFE SEALED BATTERIES, SOLID STATE CHARGER, 6 CIRCUIT FUSED DC DISTRIBUTION, MOUNTING SHELF AND 1-6W LED MR16 INTEGRAL LAMP HEAD. # DENOTES UNIT NUMBER. MH = 2438mm (8'-0") AFF OR AS NOTED. BEGHELLI CAT. # NV-12-100-NC-1BTMR-7WLED-WG
  - 12VDC WHITE FINISH, DIE-CAST METAL HOUSING, CEILING MOUNT DOUBLE HEAD DC EMERGENCY LIGHT UNIT C/W 2-6W LED MR16 LAMP HEADS. C DENOTES PROVIDE WIRE GUARD. BEGHELLI CAT. # BTMR2-7WLED-WH, CAT. # 37600037 (WIRE GUARD)
  - 12VDC WHITE FINISH, DIE-CAST METAL HOUSING, CEILING MOUNT SINGLE HEAD DC EMERGENCY LIGHT UNIT C/W 1-6W LED MR16 LAMP HEAD. C DENOTES PROVIDE WIRE GUARD. BEGHELLI CAT. # BTMR1-7WLED-WH, CAT. # 37600037 (WIRE GUARD)
- NOTE: BASE BID EMERGENCY/EXIT LIGHT EQUIPMENT IS BEGHELLI. ACCEPTABLE ALTERNATE EMERGENCY/EXIT LIGHTING MANUFACTURERS ARE STANPRO, HUBBELL, AMLITE, EMERGI-LITE AND LUMACELL.

**Holy Family Cemetery  
Crematorium  
Light Fixture Schedule**

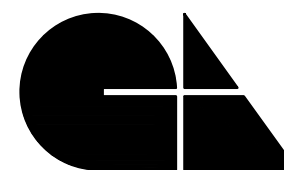
Type	Description	Base Bid	Approved Alternate	Watts
A	610mm x 1220mm (2' x 4'), 120V, LED, 5000 Lumen, 4000K, T-bar recessed mounted Basket Troffer.	Hubbell/Columbia Cat. # LCAT24-40-ML-GED-U	Peerless Electric Cat. # SDL-3-1ACF-24S-52-40K-UM	39
A1	610mm x 1220mm (2' x 4'), 120V, LED, 5000 Lumen, 4000K, Drywall recessed mounted Basket Troffer C/W Flange Kit	Hubbell/Columbia Cat. # LCAT24-40-ML-GED-U C/W FK-24	Peerless Electric Cat. # SDL-3-1ACF-24S-52-40K-UM C/W Flange Kit	39
A2	305mm x 1220mm (1' x 4'), 120V, LED, 5000 Lumen, 4000K, T-bar recessed mounted Basket Troffer.	Hubbell/Columbia Cat. # LCAT14-40-ML-GED-U	Peerless Electric Cat. # SDL-3-1ACF-14S-52-40K-UM	39
B	152mm (6") dia., 120V, LED, 1500 Lumen, 4000K, Recessed T-Bar mounted downlight fixture.	Peercoke Cat. # LTR-6RD-H-SL-FL-DM1 LTR-6RD-T-SL-40K-8-R-S-WC-WT C/W B24	G.E. Cat. # LDXB-6R-0-15-T-40-V1	22
C	1220mm (4'), 120V, LED, 4000 Lumen, 4000K, Surface or suspended mounted Strip fixture.	Hubbell Cat. # CSL4-4040	Peerless Electric Cat. # NSL-RA-4-40-40K	40
C1	1220mm (4'), 120V, LED, 4500 Lumen, 4000K, Surface mounted Vapour Proof Strip fixture.	Columbia Cat. # LXEM-40-LW-RFA-EU	Peerless Electric Cat. # AP2W-4-42-40K-A2-30X-S	40
P	152mm (3") dia., 120V, LED, 2522 Lumen, 4000K, Suspended Decorative Pendant fixture. Diffuser and Finish to be selected by Architect.	SPL Lighting Cat. # AP8178-L36W-XXX-120-27V-4000K-XXXX-DF-ST18-SAM45	No Alternatives Accepted	36
V	120V, LED, 4000K, Recess mounted fixture, for Chapel Valance Lighting	To be selected by Architect	To be selected by Architect	
WP1	120V, LED, 5622 Lumen, 5000K, Cut-off wall pack light fixture to be surface wall mounted MH=(To be determined) AFF to centre.	Hubbell "Rako Wall" Cat. # RWL-1-48L-45-5K-7-3-UNV-XXX	G.E. Cat. # EWS2-0-D3-D1-50-XX-J	60
WP2	120V, LED, 1255 Lumen, 3000K, Black Decorative wall pack.	WAC Lighting Cat. # WS-W52514-BK	TBD	17.5
LS1	Single head, 120V, LED, 5000K, Cut-off light fixture to be pole mounted on 915mm (3'-0") concrete base c/w B-level switching with motion sensor. MH = 914mm (30'-0") AFF to centre. Color to be confirmed by Architect.	Hubbell Cat. # VP-S-48L-110-5K7-3	TBD	110
LS2	Single head, 120V, LED, 5000K, Cut-off light fixture to be pole mounted on 915mm (3'-0") concrete base c/w B-level switching with motion sensor. MH = 914mm (30'-0") AFF to centre. Color to be confirmed by Architect.	Hubbell Cat. # VP-S-48L-110-5K7-4W	TBD	110
BL	120V, LED, 54 Lumen, 5000K, Anchor based Bolland Color to be confirmed by Architect.	Hubbell Cat. # GEM1-18L5K	TBD	21



**DRAWING LIST**

- E01 KEY & LOCATION PLANS - NOTES & LEGENDS
- E02 SITE SERVICES PLAN - NOTES & DETAILS
- E03 GROUND FLOOR PLAN - LIGHTING & LIFE SAFETY POWER & COMMUNICATIONS
- E04 PANEL SCHEDULES & POWER DISTRIBUTION
- E05 DETAILS
- E06 ELECTRICAL SPECIFICATIONS - 1 OF 2
- E07 ELECTRICAL SPECIFICATIONS - 2 OF 2

**GRGURIC ARCHITECTS INCORPORATED**



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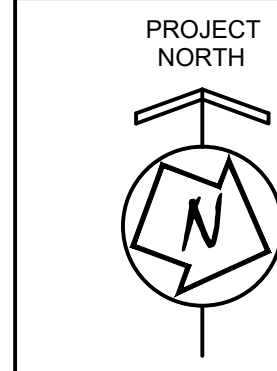
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**DIMENSIONS**

CONTRACTOR SHALL VERIFY AND BE RESPONSIBLE FOR ALL DIMENSIONS. DO NOT SCALE DRAWINGS. CONTRACTOR SHALL REPORT ANY ERRORS OR OMISSIONS TO NRG CONSULTANTS INC. IMMEDIATELY UPON DISCOVERY.

No.	DATE	MADE	DESCRIPTION
2	2023/08/30	G.J.L.	RE-ISSUED FOR TENDER
1	2023/06/16	G.J.L.	ISSUED FOR TENDER
0	2023/05/26	G.J.L.	ISSUED FOR PERMIT
C	2023/05/19	G.J.L.	ISSUED FOR COORDINATION
B	2022/08/08	G.J.L.	ISSUED FOR REVIEW
A	2021/11/05	G.J.L.	ISSUED FOR COMMENTS



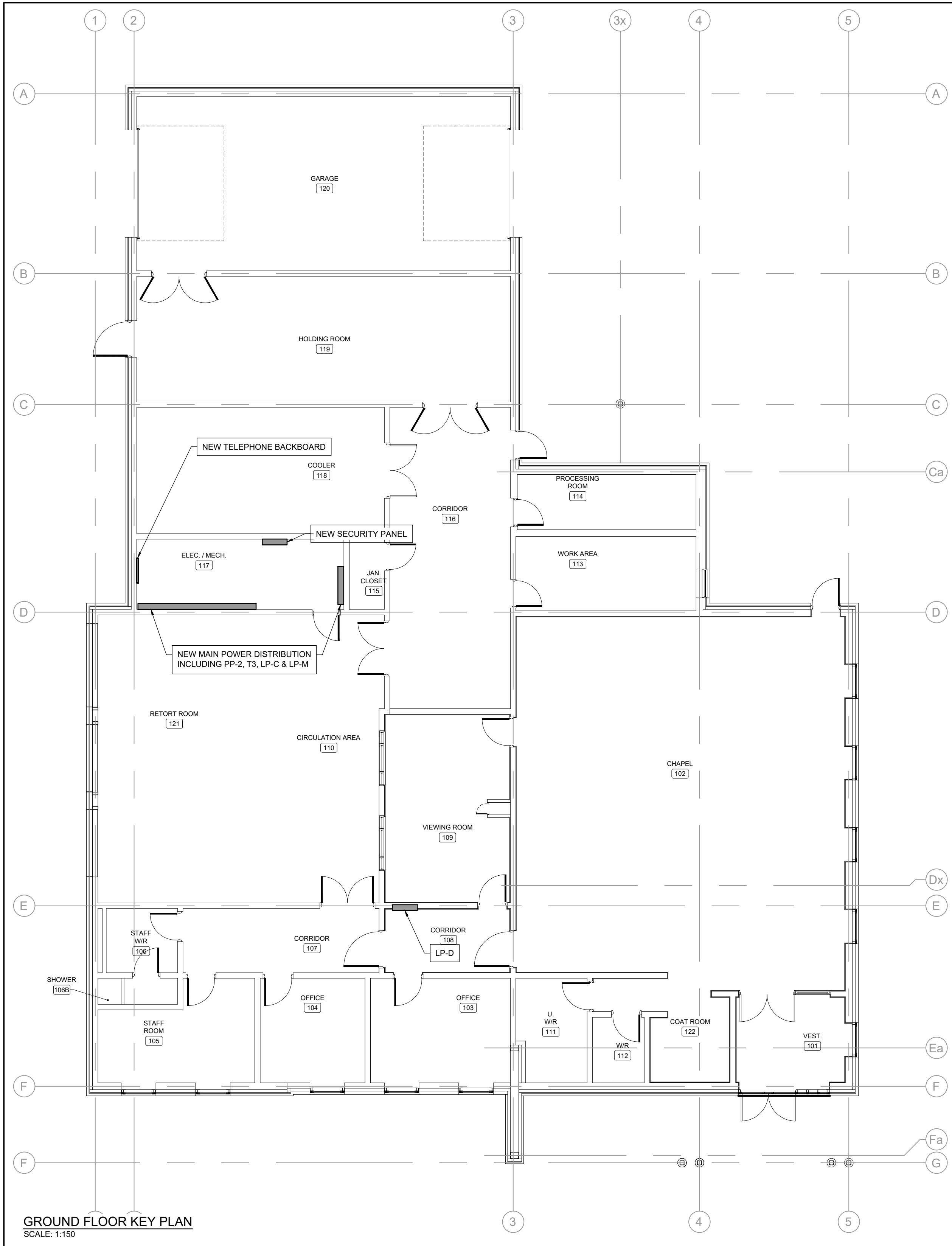
**NRG Consultants Inc.**  
2 Cabrioleet Crescent Ancaster ON L9K 1K6  
Office: (905) 304-0294

**ELECTRICAL**

KEY & LOCATION PLANS - NOTES & LEGENDS

**PROJECT**  
HOLY FAMILY CEMETERY  
CREMATORIUM BUILDING  
2523 LOWER BASE LINE ROAD  
MILTON ONTARIO

SCALE AS SHOWN	DATE 2020/11/01	DRAWN G.J.L.	CHECKED S.C.S.
PROJECT No. 1922A	REV No. 2	DRAWING No. E01	



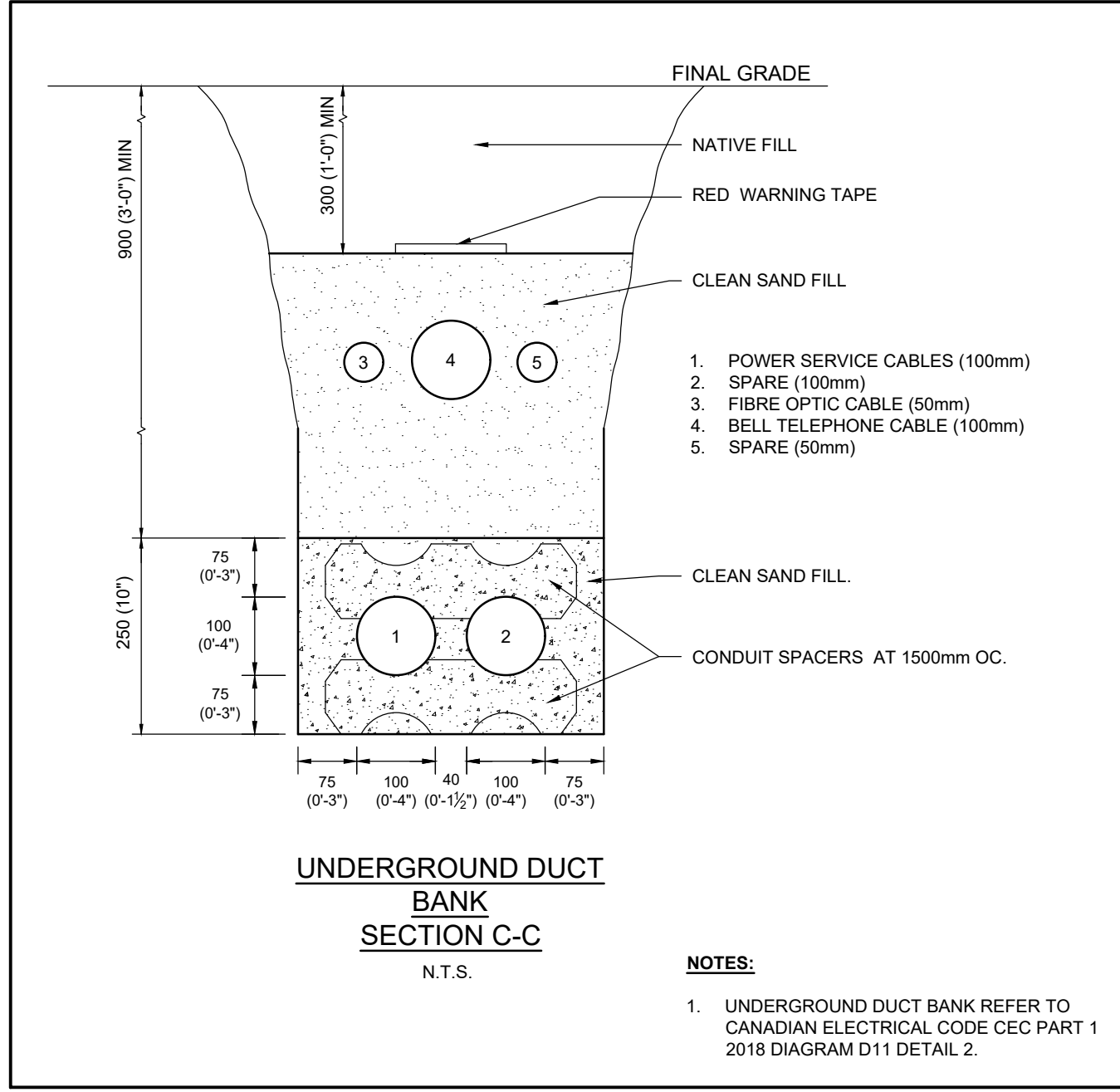


**ELECTRICAL SITE SERVICES NOTES:**

- ALL WORK SHALL BE CARRIED OUT IN ACCORDANCE WITH AUTHORITIES HAVING JURISDICTION OVER THE WORK.
- ALL WORK SHALL MEET OR EXCEED THE LATEST REQUIREMENTS OF THE CANADIAN ELECTRICAL CODE C22.1, THE ONTARIO HYDRO SAFETY CODE, THE ONTARIO BUILDING CODE AND RELEVANT LOCAL HYDRO UTILITY CODES, REGULATIONS AND STANDARDS.
- PROVIDE PRIMARY UNDERGROUND DUCT BANK FROM ADMINISTRATION BUILDING BASEMENT UTILITY ROOM 002 TO CREMATORIUM BUILDING ELECTRICALMECHANICAL ROOM 117 C/W DIRECTIONAL BORE UNDER CREEK BED ALL AS SHOWN ON THE DRAWINGS. MAKE GOOD ALL ROADWAY, SIDEWALK AND GRASSED AREAS TO OWNER, LOCAL MUNICIPAL OR REGIONAL AUTHORITY ROADS DEPARTMENT APPROVAL.
- PROVIDE ALL PRIMARY CABLING, CONNECTIONS, GROUNDING ETC. FOR NEW 200A, 347/600V, 3 PHASE, 4 WIRE UNDERGROUND HYDRO SERVICE AS DIRECTED AND REQUIRED BY LOCAL HYDRO UTILITY.
- PROVIDE UNDERGROUND FIBRE OPTIC CABLE CONDUIT. COORDINATE SERVICE HOOK-UP WITH OWNERS IT DEPARTMENT AND ROGERS / RCI REPRESENTATIVE.
- PROVIDE PARKING LOT AND ROADWAY LIGHTING AS SHOWN C/W POLES, LUMINAIRES, CONCRETE POLE BASES, GROUNDING, UNDERGROUND CONDUITS AND WIRING.
- ELECTRICAL CONTRACTOR SHALL COORDINATE REQUIREMENTS WITH EACH SERVICE PROVIDER AND OTHER SITE TRADES PRIOR TO COMMENCING ANY WORK. PROVIDE UNDERGROUND LOCATES PRIOR TO ANY DIGGING OR TRENCHING.
- ALL EQUIPMENT AND LABOUR SHALL BE WARRANTED FOR A PERIOD OF ONE (1) YEAR FROM THE DATE OF FINAL ACCEPTANCE OF THE WORK.
- APPROPRIATE SHOP DRAWINGS TO BE SUBMITTED ENGINEER AS REQUIRED FOR REVIEW AND APPROVAL PRIOR TO ORDER PLACEMENT.
- ALL CUTTING AND PATCHING SHALL BE BY THE ELECTRICAL CONTRACTOR INCLUDING THE REPAIR OF ALL BUILDING EXTERIOR SURFACES AND OPENINGS.
- DUCTBANK AND EQUIPMENT LOCATIONS SHOWN ON THE DRAWINGS ARE DIAGRAMATIC AND APPROXIMATE ONLY. ELECTRICAL CONTRACTOR TO VERIFY LOCATIONS AND CONDITIONS ON-SITE PRIOR TO COMMENCING ANY INSTALLATIONS. REPORT ANY DISCREPANCIES TO ENGINEER.

**DUCT BANK NOTES**

- BENDS AND TURNS IN A DUCT RUN SHALL BE ACCOMPLISHED BY A GRADUAL SWEEP. ALL 90 DEGREE CHANGES IN DIRECTION SHALL BE MADE OF 1.5m (60") RADIUS ELBOW AND BE LIMITED TO NO GREATER THAN THREE (3) PER RUN. DUCT RUN SHALL BE DESIGNED SUCH THAT CABLE PULLING TENSIONS DO NOT EXCEED SPECIFIED LIMITS.
- DUCT BANKS SHALL BE BURIED WITH A MINIMUM COVER OF 900mm WITH THE EXCEPTION OF ROAD CROSSINGS WHICH SHALL BE BURIED WITH A MINIMUM COVER OF 1200mm. RED CAUTION TAPE SHALL BE INSTALLED APPROXIMATELY HALFWAY BETWEEN THE INSTALLATION AND GRADE LEVEL. TRENCH RESTORATION SHALL BE MADE UP OF CLEAN BACKFILL ON DUCT BANKS INSTALLED UNDER LAWNS AND PARKWAYS. DUCT BANKS ALONG BOULEVARDS OR ACROSS ROADWAYS SHALL HAVE BACKFILL MATERIALS AND TRENCH RESTORATION TO CONFORM WITH THE MUNICIPAL OR REGIONAL AUTHORITY AS REQUIRED.
- CUSTOMER'S DUCT BANK SHALL HAVE A MINIMUM SLOPE OF 1% AWAY FROM THE BUILDING. CONSULT LOCAL HYDRO UTILITY INSPECTOR WHERE THE ABOVE REQUIREMENT CANNOT BE MET. (IE. FRENCH DRAIN REQUIRED)
- THE AREA WITHIN TWO (2) METERS AT EACH END OF A DUCT BANK SHALL BE FREE OF ANY FOREIGN OBJECTS SUCH AS CABLES OR PIPES, FOR BACKHOE DIGGING.
- THE DUCT BANK SHALL BE 100mm (4") OR 50mm (2") DIA. PVC TYPE DB2/ES2 (SOLID WALL ONLY) C/W BELL END AND BE APPROVED AS PER C.S.A. STANDARD C22.2 No. 211.1.
- ALL FITTINGS AND BENDS SHALL BE PVC TYPE DB2/ES2. APPROVED SOLVENT CEMENT SHALL BE USED TO JOIN ALL DUCTS, FITTINGS AND BENDS AT MINIMUM 30 MINUTES PRIOR TO POURING CONCRETE.
- ALL DUCTS AT THE FACE OF THE DUCT BANK SHALL BE ORIENTED AND TERMINATED WITH EITHER BELL ENDS SUPPORTING CABLES OR PLUGS FOR SPARE DUCTS.
- DUCTS SHALL BE SUPPORTED WITH APPROVED SPACERS EVERY 1.5m (5 ft.) AND BE ANCHORED SO AS NOT TO FLOAT DURING CONCRETE POURING.
- WHERE SPECIFIED ON CONSTRUCTION DRAWINGS, ALL DUCT BANKS SHALL BE REINFORCED WITH NON PRE-STRESSED 15mm (5/8") DEFORMED STEEL REINFORCING BARS, GRADE 400 AND CONFORMED WITH C.S.A. G30.12. STEEL REINFORCING BARS SHALL BE INSTALLED CONTINUOUSLY, MINIMUM 300mm OVERLAP AND TIED, AND BE LOCATED AT THE BOTTOM OF THE DUCT BANK.



**Holy Family Cemetery  
Crematorium  
Exterior Light Fixture Schedule**

Type	Description	Base Bid	Approved Alternate	Watts
LS1	Single head, 120V, LED, 5000K. Cut-off light fixture to be pole mounted on 915mm (3'-0") concrete base c/w Bi-level switching with motion sensor. MH = 914mm (30'-0") AFF to centre. Color to be confirmed by Architect.	Hubbell Cat. # VP-S-48L-110-SK7-3	TBD	110
LS2	Single head, 120V, LED, 5000K. Cut-off light fixture to be pole mounted on 915mm (3'-0") concrete base c/w Bi-level switching with motion sensor. MH = 914mm (30'-0") AFF to centre. Color to be confirmed by Architect.	Hubbell Cat. # VP-S-48L-110-SK7-4W	TBD	110
WP1	120V, LED, 5823 Lumen, 5000K. Cut-off wall pack light fixture to be surface wall mounted. MH = (To be determined) AFF to centre.	Hubbell "Ratio Wall" Cat. # RWL1-48L-45-SK7-2-UNV-XXX	G.E. Cat. # EWS2-0-03-D1-50-XX-J	60
WP2	120V, LED, 1255 Lumen, 3000K. Black Decorative wall pack.	WAC Lighting Cat. # WS-W52514-BK	TBD	17.5
BL	120V, LED, 54 Lumen, 5000K, Anchor based Bollard. Color to be confirmed by Architect.	Hubbell Cat. # GEM1-18LSK	TBD	21

**UNDERGROUND CONDUIT SCHEDULE:**

- (A) 50mm (2") DIA. PVC FOR PARKING LOT & ROADWAY LIGHTING.
- (B) 50mm (2") DIA. PVC FOR BOLLARD LIGHTING.

**DRAWING LIST**

- E01 KEY & LOCATION PLANS - NOTES & LEGENDS
- E02 SITE SERVICES PLAN - NOTES & DETAILS
- E03 GROUND FLOOR PLAN - LIGHTING & LIFE SAFETY POWER & COMMUNICATIONS
- E04 PANEL SCHEDULES & POWER DISTRIBUTION
- E05 DETAILS
- E06 ELECTRICAL SPECIFICATIONS - 1 OF 2
- E07 ELECTRICAL SPECIFICATIONS - 2 OF 2

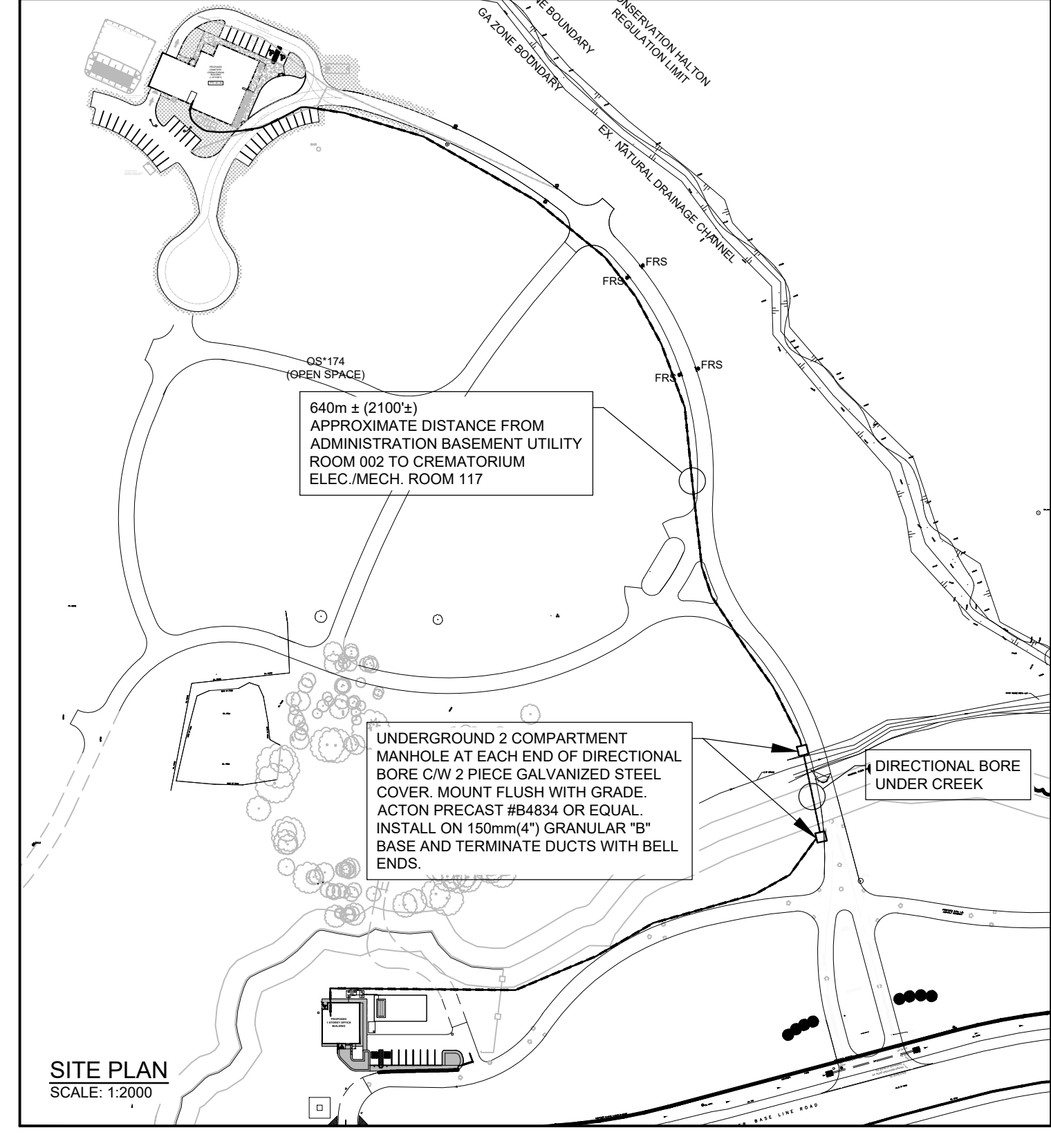
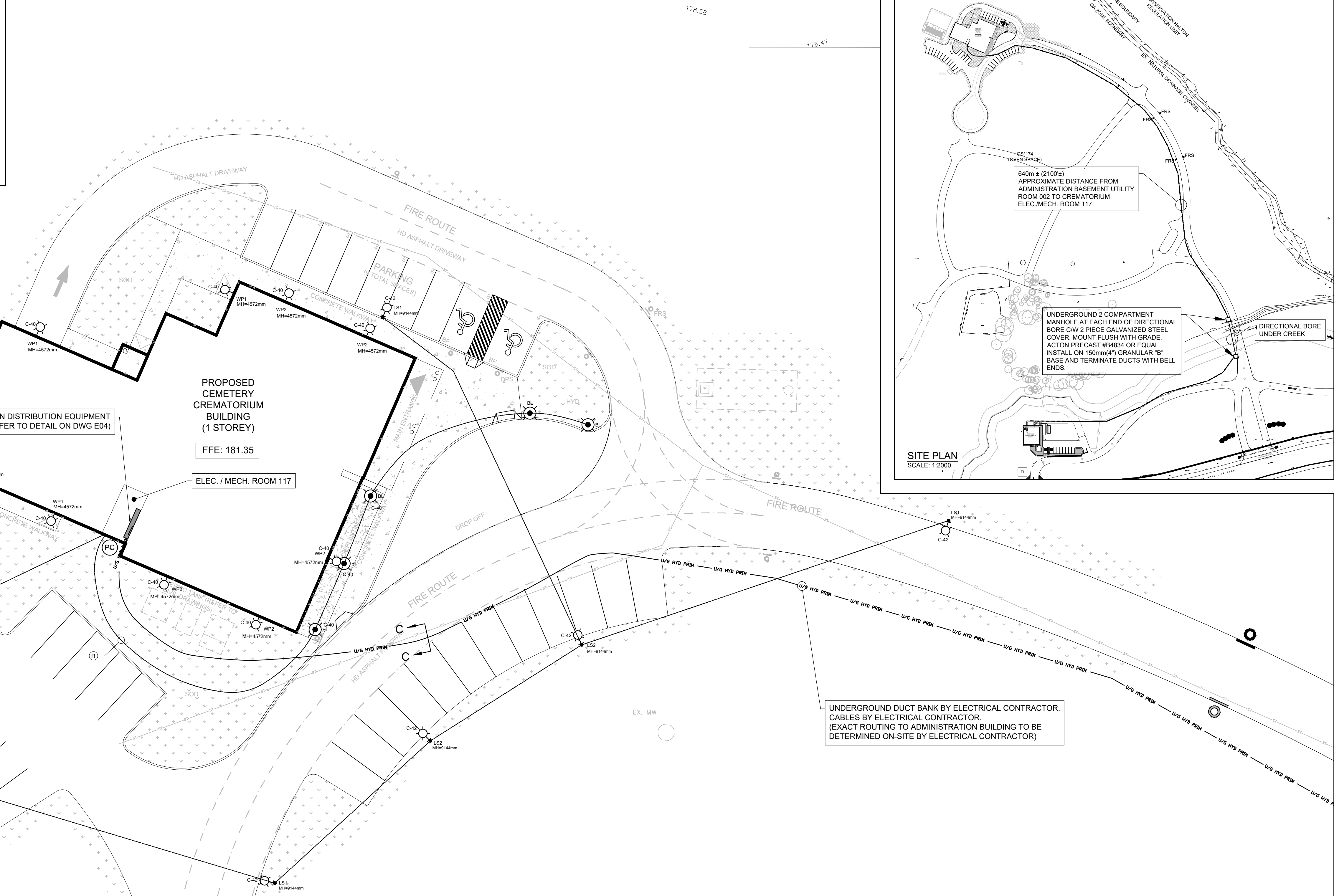
**GRGURIC ARCHITECTS INCORPORATED**

28 KING STREET EAST, UNIT B  
STONEY CREEK, ONTARIO, L6G 1J8  
Tel. 905-664-8735 Fax. 905-664-8737  
Web: www.2gai.com

**CANADIAN ELECTRICAL CODE SECTION 8-210  
LOAD CALCULATIONS:**

Type of Occupancy = OFFICE		
(a) First 930m <sup>2</sup> : 749m <sup>2</sup>	Load: 749 m <sup>2</sup> x 50 W/m <sup>2</sup> =	37.5 kW
Excess of 930m <sup>2</sup> : 0m <sup>2</sup>	Load: 0 m <sup>2</sup> x 50 W/m <sup>2</sup> =	0 kW
(b) Air-conditioning & Power loads		108.4 kW
	<b>Total load =</b>	<b>145.9 kW</b>

\*Demand Factor %:  
Service conductors = 90%  
Feeders = 100%



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B	2022/08/08	G.J.L.	ISSUED FOR REVIEW
A	2021/11/05	G.J.L.	ISSUED FOR COMMENTS

REVISIONS/ADDENDA ISSUED

PROJECT NORTH

**NRG Consultants Inc.**  
2 Cabrioleet Crescent Ancaster ON L9K 1K6  
Office: (905) 304-0294

TITLE  
**ELECTRICAL**

SITE SERVICES PLAN - NOTES & DETAILS

PROJECT  
**HOLY FAMILY CEMETERY CREMATORIUM BUILDING**  
2523 LOWER BASE LINE ROAD  
MILTON ONTARIO

SCALE AS SHOWN	DATE 2020/11/01	DRAWN G.J.L.	CHECKED S.C.S.
PROJECT No. 1922A	REV No. 2	DRAWING No. E02	

**SITE SERVICES PLAN**  
SCALE: 1:400



**NEW LIGHTING & LIFE SAFETY NOTES:**

1. PROVIDE NEW INTERIOR LIGHT FIXTURES AS SHOWN. WIRE TO NEW LOCAL LIGHTING CIRCUITS AS REQUIRED. PROVIDE NEW STANDARD, DIMMING &/OR OCCUPANCY SENSOR CONTROLS AND/OR SWITCHES AS INDICATED.
2. PROVIDE NEW EXTERIOR BUILDING MOUNTED LIGHT FIXTURES AS SHOWN. WIRE TO NEW EXTERIOR LIGHTING CIRCUITS AS INDICATED.
3. PROVIDE NEW EMERGENCY / EXIT "RUNNING MAN" LIGHTING, BATTERY COMBO PACKS AND REMOTE HEAD UNITS AS SHOWN. PROVIDE NEW EMERGENCY LIGHTING CIRCUITS AS INDICATED.

**NEW POWER & COMMUNICATIONS NOTES:**

1. SUPPLY AND INSTALL NEW RECEPTACLES AS SHOWN. WIRE TO NEW BREAKERS IN NEW LOCAL PANEL BOARD. MAXIMUM FOUR (4) RECEPTACLES PER 15A CIRCUIT.
2. PROVIDE RECESSED OUTLET BOXES FOR NEW DATA / TELEPHONE OUTLETS AS SHOWN. RETAIN DATA / TELEPHONE SUBCONTRACTOR TO SUPPLY, INSTALL, TERMINATE AND TEST TELEPHONE JACKS C/W Cat. 3 WIRING AND DATA JACKS C/W Cat. 6 WIRING TO OWNERS STANDARDS.
3. RETAIN ACCESS CONTROL SUBCONTRACTOR TO INSTALL DOOR STRIKE, KEYPAD AND FOB / CARD READER AS SHOWN TO OWNER STANDARDS. WIRE TO ACCESS CONTROL PANEL.
4. PROVIDE NEW POWER FEEDS TO NEW MECHANICAL EQUIPMENT AS REQUIRED. WIRE TO NEW BREAKERS IN NEW LOCAL PANEL BOARD AS INDICATED.

**DRAWING LIST**

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- E02 SITE SERVICES PLAN - NOTES & DETAILS
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- E05 DETAILS
- E06 ELECTRICAL SPECIFICATIONS - 1 OF 2
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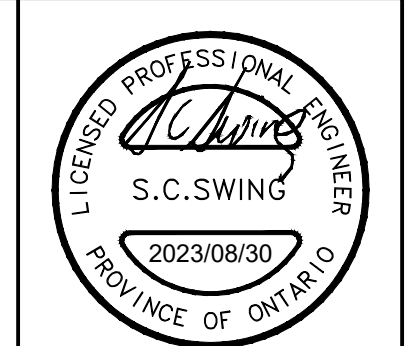
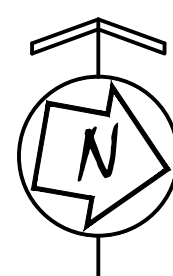
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REVISIONS/ADDENDA ISSUED			

**PROJECT NORTH**



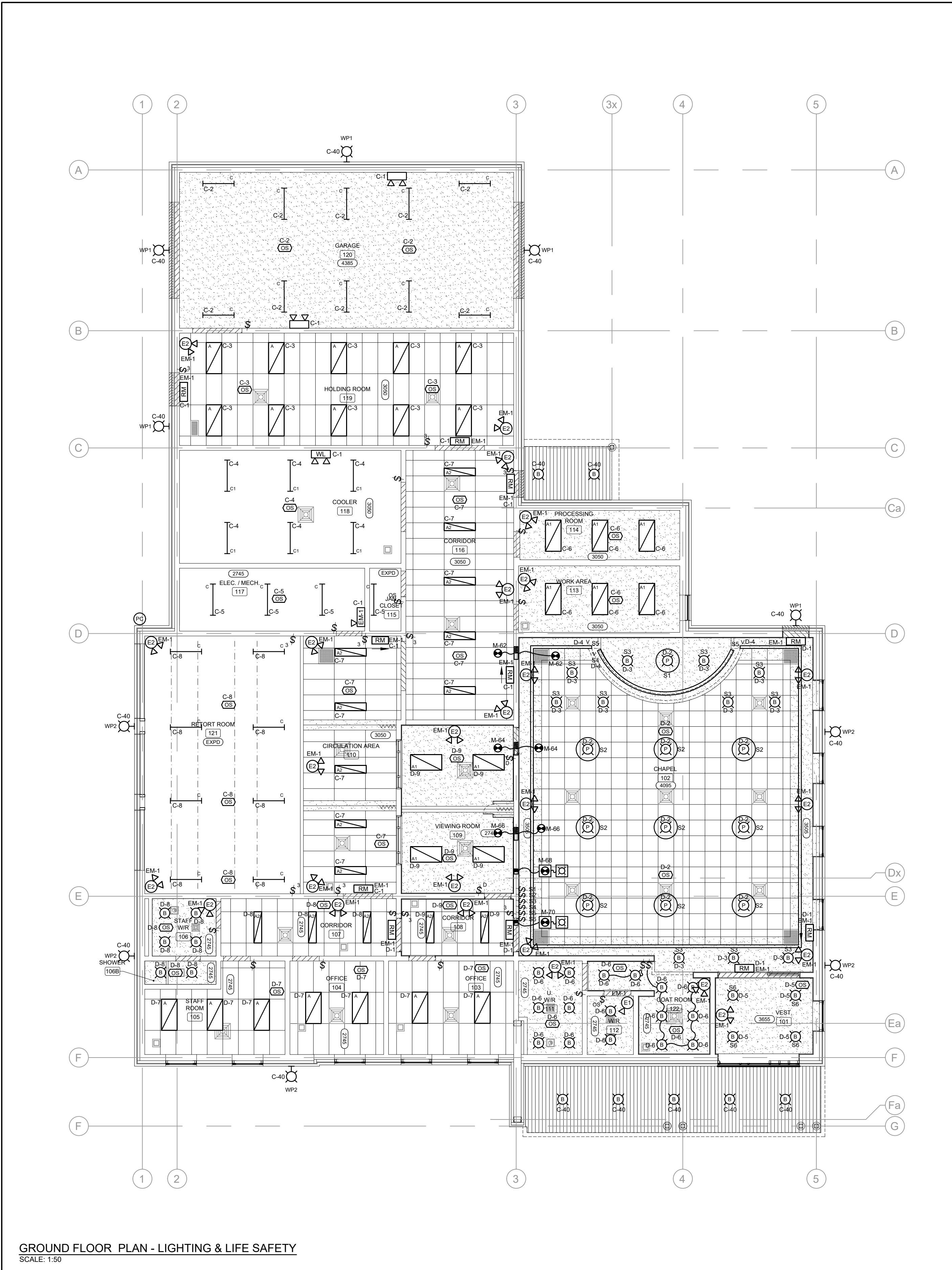
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**ELECTRICAL**

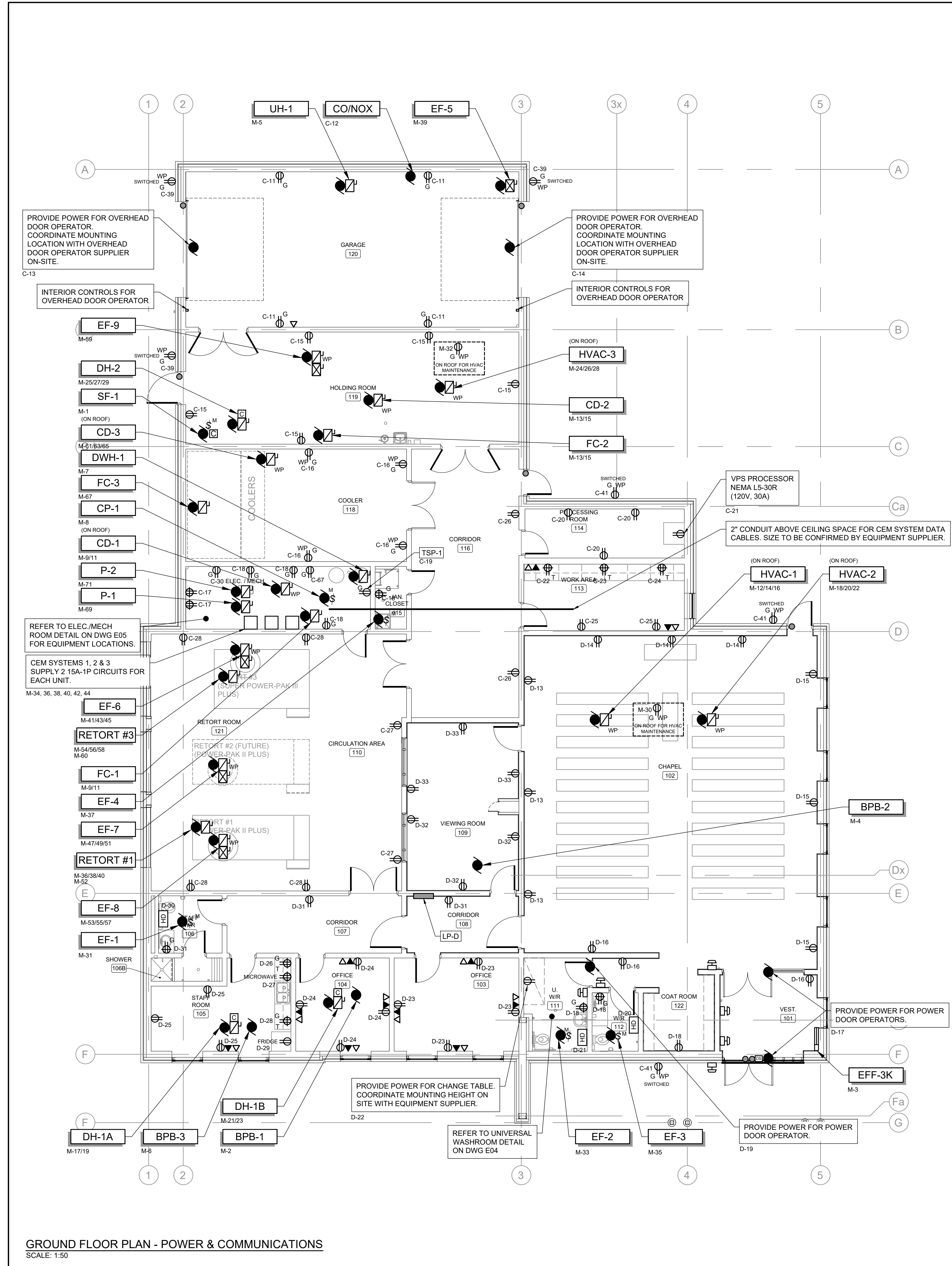
GROUND FLOOR PLAN -  
 LIGHTING & LIFE SAFETY  
 POWER & COMMUNICATIONS

PROJECT  
**FAMILY CEMETERY  
 CREMATORIUM BUILDING**  
 2523 LOWER BASE LINE ROAD  
 MILTON ONTARIO

SCALE	DATE	DRAWN	CHECKED
AS SHOWN	2020/11/01	G.J.L.	S.C.S.
PROJECT No.	REV No.	DRAWING No.	
1922A	2	E03	



GROUND FLOOR PLAN - LIGHTING & LIFE SAFETY  
 SCALE: 1:50



GROUND FLOOR PLAN - POWER & COMMUNICATIONS  
 SCALE: 1:50



ELEC./MECH. ROOM 117

PANEL - PP-2		225A		347/600V		3 PHASE		4 WIRE	
	KW	BREAKER	CIRCUIT	BREAKER	CIRCUIT	KW			
TRANSFORMER T3	129	150		200					SPARE
(LP-C, LP-D & LP-M)			1	2					
			3P	3P					
SPARE		150		100					SPARE
			3	4					
			3P	3P					
SPARE		60		40					SPARE
			5	6					
			3P	3P					
			7	8					
			9	10					
			11	12					
			13	14					
MAX. DEM. LOAD -									KW
TOTAL CONNECTED LOAD -									KW

ELEC./MECH. ROOM 117

PANEL - LP-C		400A		120/208V		3 PHASE		4 WIRE	
	KW	BREAKER	CIRCUIT	BREAKER	CIRCUIT	KW			
EM-1, EE LTG & SIGNS	EE	0.2	15	1	2	15	0.4	GARAGE 120	LTG
HOLDING ROOM 119	LTG	0.4	15	3	4	15	0.3	COOLER 118	LTG
ELEC/MECH 117, JAN 115	LTG	0.2	15	5	6	15	0.3	PROCESS 114, WORK 113	LTG
CORRIDOR 116, CIRC. 110		0.4	15	7	8	15	0.4	RETORT ROOM 121	LTG
SPARE			15	9	10	15		SPARE	
GARAGE 120		0.4	15	11	12	15	0.5	GARAGE 120	CO2/NOX
GARAGE 120	O/H DOOR	0.5	15	13	14	15	0.5	GARAGE 120	O/H DOOR
HOLDING RM 119		1.0	15	15	16	15	0.8	COOLER 118	
ELEC/MECH 117		0.4	15	17	18	15	0.4	ELEC/MECH 117, JAN 115	
ELEC/MECH 117	TSP-1	0.5	15	19	20	15	0.3	PROCESS 114	
PROCESS 114	VPS	3.5	30	21	22	20	0.2	WORK AREA 113	
WORK AREA 113		0.2	20	23	24	20	0.2	WORK AREA 113	
WORK AREA 113		0.2	15	25	26	15	0.2	CORRIDOR 116	
CIRC. AREA 110		0.2	15	27	28	15	0.4	RETORT 121	
SPARE			15	29	30	15	0.5	WATER TREATMENT SYSTEM	
LP-M		98.0	200	31	32	20		SPARE	
				33	34	100	14.0	LP-D	
			3P	35	36				
SECURITY PANEL		0.5	15	37	38	3P			
EXTERIOR SWITCHED		0.6	15	39	40	15	0.8	EXTERIOR BUILDING	LTG
EXTERIOR SWITCHED		0.6	15	41	42	15	1.0	PARKING LOT & ROADWAY	LTG
MAX. DEM. LOAD -								103.0	KW
TOTAL CONNECTED LOAD -								129.0	KW

CORRIDOR 108

PANEL - LP-D		125A		120/208V		3 PHASE		4 WIRE	
	KW	BREAKER	CIRCUIT	BREAKER	CIRCUIT	KW			
EXIT SIGNS	EE	0.5	15	1	2	15	0.4	CHAPEL 102	LTG
CHAPEL 102	LTG	0.3	15	3	4	15	1.0	CHAPEL 102	LTG
VEST. 101	LTG	0.2	15	5	6	15	0.4	COAT 122, WR 111, 112	LTG
OFFICE 103,104, STAFF 105	LTG	0.3	15	7	8	15	0.3	WR 106, CORR. 107	LTG
CORR. 108, VIEWING 109	LTG	0.3	15	9	10	15		SPARE	
SPARE			15	11	12	15		SPARE	
CHAPEL 102		0.5	15	13	14	15	0.5	CHAPEL 102	
CHAPEL 102		0.5	15	15	16	15	0.5	CHAPEL 102, VEST. 101	
VEST. 101	HC DOOR OP.	1.0	15	17	18	15	0.4	WR 111, 112 & COAT 122	
U. WR 111	HC DOOR OP.	0.5	15	19	20	13		WR 112	HAND DRYER
U. WR 111	HAND DRYER	1.3	20	21	22	15	0.5	U. WR 111	CHANGE TABLE
OFFICE 103		0.5	15	23	24	15	0.5	OFFICE 104	
STAFF ROOM 105		0.4	15	25	26	20	0.2	STAFF ROOM 105	
STAFF ROOM 105	MICROWAVE	1.2	15	27	28	20	0.2	STAFF ROOM 105	
STAFF ROOM 105	FRIDGE	1.4	15	29	30	20	1.3	WR 106	HAND DRYER
WR 106, CORR. 107, 108		0.4	15	31	32	15	0.4	VIEWING ROOM 109	
VIEWING ROOM 109		0.4	15	33	34	15		SPARE	
SPARE			15	35	36	15		SPARE	
SPARE			20	37	38	20		SPARE	
MAX. DEM. LOAD -								14.0	KW
TOTAL CONNECTED LOAD -								18.0	KW

\* PROVIDE GFI BREAKER FOR CIRCUIT

ELEC/MECH 117

PANEL - LP-M		225A		120/208V		3 PHASE		4 WIRE	
	KW	BREAKER	CIRCUIT	BREAKER	CIRCUIT	KW			
SF-1	0.6	15	1	2	15	0.6		BPB-1	
EFF-3K	3.0	30	3	4	15	0.6		BPB-2	
UH-1	0.6	15	5	6	15	0.6		BPB-3	
DWH-1	1.2	15	7	8	15	0.3		CP-1	
CD-1	5.2	30	9	10	15			SPARE	
			11	12	60	16.2		HVAC-1	
			12P	13	14				
CD-2	5.2	30	13	14					
			12P	15	16	3P			
DH-1A	1.0	15	17	18	60	16.2		HVAC-2	
DH-1B	1.0	15	21	22	3P				
			12P	23	24	60	16.2	HVAC-3	
DH-2	7.5	30	25	26					
			27	28	3P				
			13P	29	30	0.4		HVAC 1, 2 MAINTENANCE	
EF-1	0.6	15	31	32	20	0.4		HVAC 3 MAINTENANCE	
EF-2	0.6	15	33	34	15	0.5		CEM SYSTEM #1	
EF-3	0.6	15	35	36	15	0.5		CEM SYSTEM #1	
EF-4	0.6	15	37	38	15	0.5		CEM SYSTEM #2	
EF-5	1.2	15	39	40	15	0.5		CEM SYSTEM #2	
EF-6	0.4	15	41	42	15	0.5		CEM SYSTEM #3	
			43	44	15	0.5		CEM SYSTEM #3	
			13P	45	46	40	13.0	RETORT #1	
EF-7	0.4	15	47	48					
			49	50	3P				
			13P	51	52	15	1.0	RETORT #1	
EF-8	0.4	15	53	54	70	22.0		RETORT #3	
			55	56					
			13P	57	58	3P			
EF-9	0.2	15	59	60	15	1.0		RETORT #3	
CD-3	2.9	15	61	62	15	0.5		SMOKE DAMPER	
			63	64	15	0.5		SMOKE DAMPER	
			3P	65	66	15	0.5	SMOKE DAMPER	
FC-3	0.2	15	67	68	15	0.5		DUCT SMOKE ALARM	
P-1	0.8	15	69	70	15	0.5		DUCT SMOKE ALARM	
P-2	0.8	15	71	72					
MAX. DEM. LOAD -								98.0	KW
TOTAL CONNECTED LOAD -								124.0	KW

- DRAWING LIST**
- E01 KEY & LOCATION PLANS - NOTES & LEGENDS
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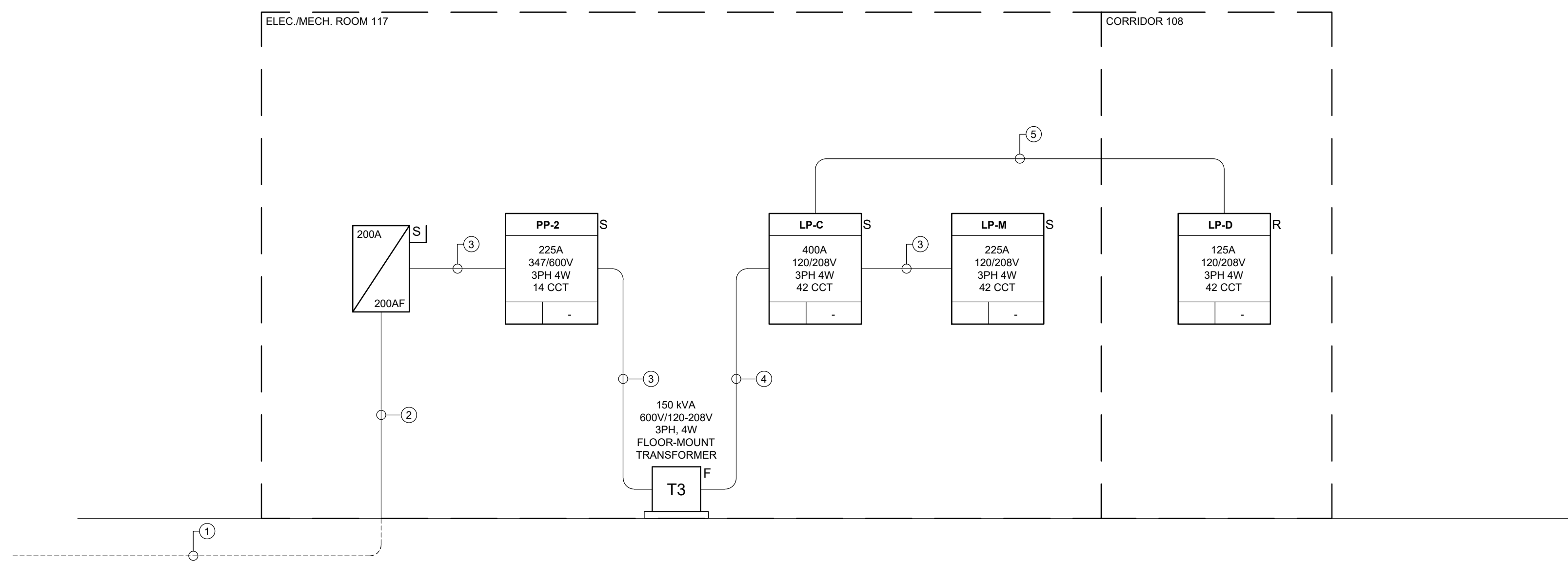
**PANEL SCHEDULES**  
SCALE: N.T.S.

**CONDUIT & WIRE SCHEDULE**

- ① 4 - #350 MCM RWU90 COPPER + GND IN 1 - 100mm (4") DIA. PVC DB-II UNDERGROUND DUCT.
- ② 4 - #350 MCM RWU90 COPPER + GND IN 1 - 76mm (3") DIA. EMT CONDUIT.
- ③ 4 - #4/0 AWG RW90 COPPER + GND IN 1 - 76mm (3") DIA. EMT CONDUIT.
- ④ 8 - #250 MCM RW90 COPPER + GND IN 2 - 76mm (3") DIA. EMT CONDUITS.
- ⑤ 4 - #3 AWG RW90 COPPER + GND IN 1 - 50mm (2") DIA. EMT CONDUIT.

**DISTRIBUTION LEGEND**

- R DENOTES RECESSED MOUNTED.
- S DENOTES SURFACE MOUNTED.
- F DENOTES FLOOR MOUNTED ON 100mm (4") CONCRETE HOUSE KEEPING PAD.



**POWER DISTRIBUTION**  
SCALE: N.T.S.



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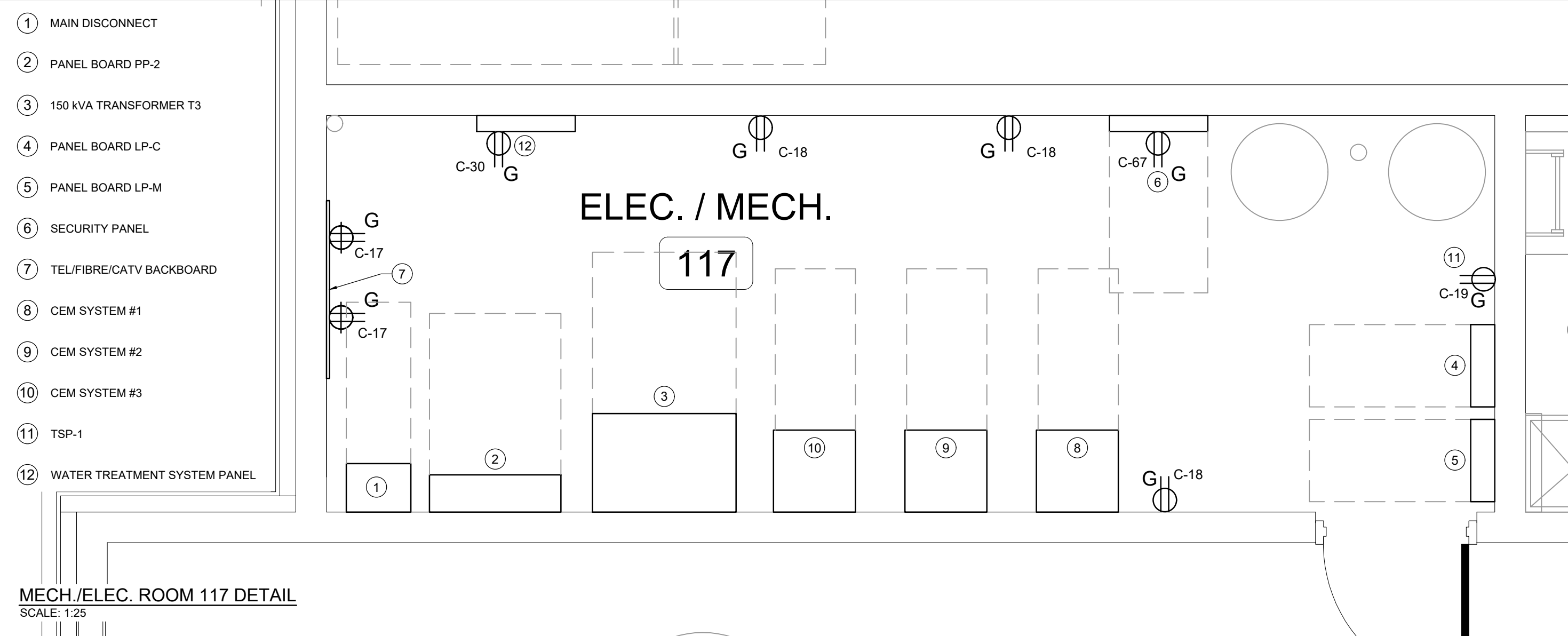
**ELECTRICAL**

**PANEL SCHEDULES & POWER DISTRIBUTION**

**PROJECT**  
HOLY FAMILY CEMETERY  
CREMATORIUM BUILDING  
2523 LOWER BASE LINE ROAD  
MILTON ONTARIO

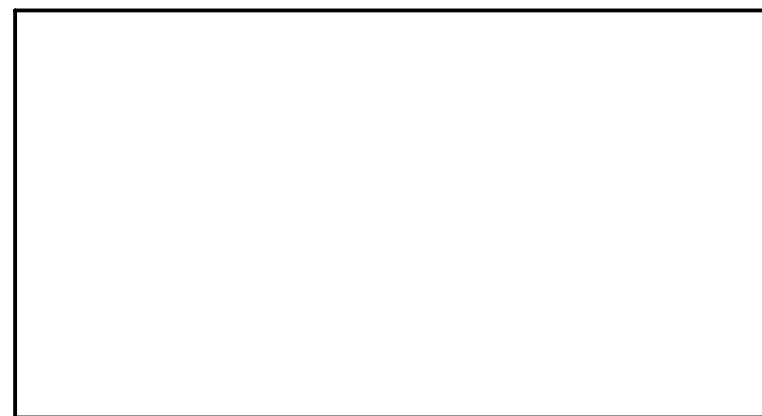
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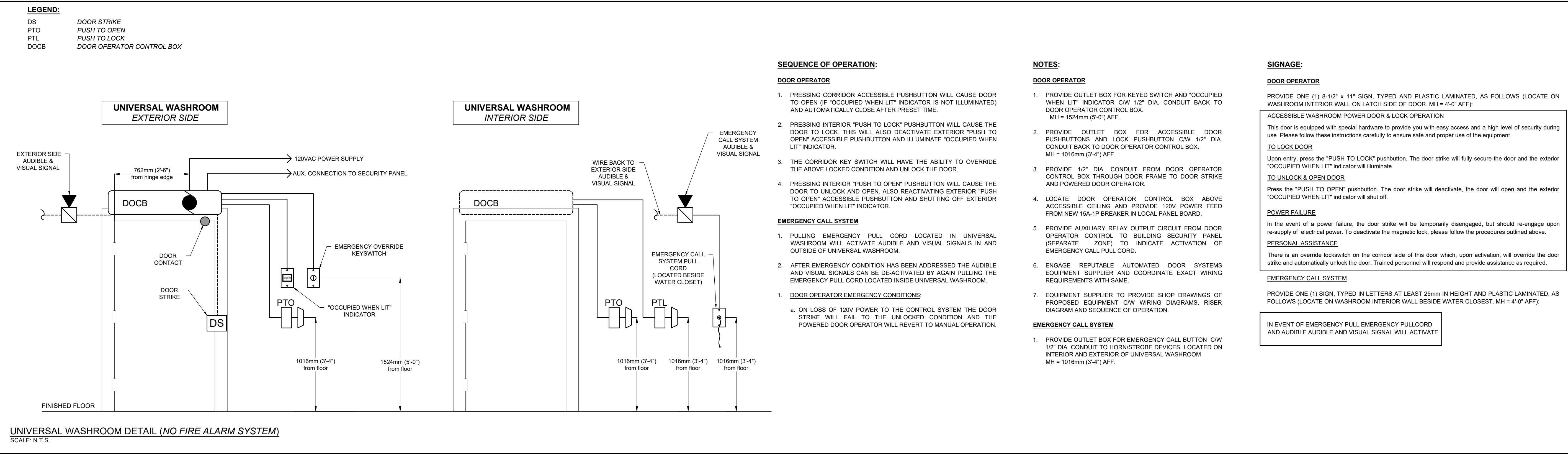
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**NRG Consultants Inc.**

2 Cabrioleet Crescent Ancaster ON L9K 1K6  
Office: (905) 304-0294

TITLE

**ELECTRICAL**

DETAILS

PROJECT

**HOLY FAMILY CEMETERY  
CREMATORIUM BUILDING  
2523 LOWER BASE LINE ROAD  
MILTON ONTARIO**

SCALE	DATE	DRAWN	CHECKED
AS SHOWN	2020/11/01	G.J.L.	S.C.S.
PROJECT No.	REV No.	DRAWING No.	
1922A	2	E05	



## ELECTRICAL SPECIFICATIONS - ELECTRICAL CONTRACTOR (1 OF 2)

### 16000 - ELECTRICAL PROJECT REQUIREMENTS

#### 1.0 SCOPE OF WORK

- DIVISION 16 SHALL FURNISH ALL LABOUR, MATERIALS AND EQUIPMENT NECESSARY FOR THE PROPER AND TIMELY COMPLETION OF THE ELECTRICAL SYSTEMS AS SHOWN ON THE DRAWINGS AND/OR AS SPECIFIED.
- THE SPECIFICATIONS SHALL BE CONSIDERED AS AN INTEGRAL PART OF THE PLANS THAT ACCOMPANY THEM. NEITHER THE PLANS NOR THE SPECIFICATIONS SHALL BE USED ALONE. ANY ITEMS OR SUBJECT OMITTED FROM ONE, BUT WHICH IS MENTIONED OR REASONABLY IMPLIED IN THE OTHER, SHALL BE CONSIDERED AS PROPERLY AND SUFFICIENTLY SPECIFIED, AND MUST, SHALL NOT RELIEVE THIS DIVISION OF RESPONSIBILITY.
- IT IS THE INTENT THAT THE DRAWINGS AND SPECIFICATIONS DESCRIBE COMPLETE ELECTRICAL SYSTEMS, ALL MATERIALS AND EQUIPMENT AND THE FURNISHING OF ALL LABOUR REASONABLY IMPLIED BY THESE DRAWINGS AND SPECIFICATIONS. NECESSARY PERMITS SHALL BE OBTAINED TO PROVIDE SYSTEMS READY FOR SATISFACTORY OPERATION. REFER TO ALL OTHER TRADE DRAWINGS AND SPECIFICATIONS TO FULLY CO-ORDINATE THE INSTALLATION OF THE WORK.
- FURNISH ALL NECESSARY LABOUR AND MATERIALS, MACHINERY, SCAFFOLDING TOOLS, IMPLEMENTS, OR OTHER APPLIANCES TOGETHER WITH ALL PROPER AND REQUIRED FACILITIES FOR MOVING AND TRANSPORTING SAME, SO THAT THE CONTRACT AND ALL WORK TO BE DONE UNDER IT, CAN AND WILL BE CARRIED OUT IN A MANNER, PROPERLY, SATISFACTORILY, CONTINUOUSLY, AND EXPEDITIOUSLY, TO COMPLETION, IN ALL RESPECTS TO THE SATISFACTION OF THE OWNER.

#### 1.2 STANDARD OF ACCEPTANCE

- ITEMS ON THE DRAWINGS AND SUBSEQUENT DIVISIONS OF THESE SPECIFICATIONS ARE LISTED WITH THE NAMES OF SPECIFIC MANUFACTURERS, THE FIRST OF WHICH HAS BEEN USED IN THE DESIGN AND IS THE EQUIPMENT SHOWN ON THE DRAWINGS.
- THE USE OF MATERIALS AND EQUIPMENT WILL REQUIRE SUBMISSION OF DETAILED SCALE SHOP DRAWINGS.
- ANY ALTERNATE NAMES LISTED IN THIS DIVISION HAVE BEEN SELECTED BECAUSE OF THE SIMILARITY OF QUALITY PERFORMANCE. IF THIS SUBCONTRACTOR WISHES TO SUBMIT EQUIPMENT OR MATERIAL OF A MANUFACTURER OTHER THAN THOSE LISTED, APPROVAL MUST BE OBTAINED FROM THE ENGINEER PRIOR TO SUBMISSION OF TENDER. ANY COSTS CAUSED BY THE INSTALLATION OF AN ALTERNATE WILL BE BORNE BY THE CONTRACTOR.
- ALL OF THE MATERIALS REQUIRED FOR THE PERFORMANCE OF THE WORK SHALL BE NEW AND THE BEST OF THEIR RESPECTIVE KIND AND OF A UNIFORM PATTERN THROUGHOUT THE WORK.

#### 1.3 CODES, REGULATIONS AND PERMITS

- ALL ELECTRICAL WORK SHALL BE INSTALLED, INSPECTED AND TESTED IN ACCORDANCE WITH ALL GOVERNING CODES, RULES AND REGULATIONS OF THE MUNICIPALITY IN WHICH THE WORK IS PERFORMED AND ALSO OF PROVINCIAL AND FEDERAL AUTHORITIES HAVING JURISDICTION.
- THE DIVISION 16 CONTRACTOR SHALL OBTAIN ALL PERMITS REQUIRED FOR THE INSTALLATION OF ELECTRICAL WORK, ARRANGE FOR INSPECTIONS AND TESTS AND PAY ALL FEES AND COSTS FOR THE PERMITS AND INSPECTIONS. NECESSARY PERMITS SHALL BE OBTAINED IMMEDIATELY AFTER NOTIFICATION OF AWARD OF CONTRACT.
- IN ADDITION TO THE FOREGOING, THE DIVISION 16 CONTRACTOR SHALL PERFORM SUCH OTHER INSPECTIONS AND TESTS AS MAY BE DEEMED NECESSARY BY THE PRIME CONSULTANT, THE ONTARIO BUILDING CODE AND THE APPLICABLE REQUIREMENTS OF C.S.A., E.M.A.C., U.L.C., AND NFPA STANDARDS INCLUDING THEIR LATEST AMENDMENTS, AS WELL AS PROVINCIAL AND MUNICIPAL BY-LAWS AND REGULATIONS SHALL BE CONSIDERED PART OF THIS SPECIFICATION. LACK OF POSSESSION OF KNOWLEDGE OF ANY CODE OR STANDARD REQUIRED FOR PROPER COMPLETION OF THE WORK SHALL NOT CONSTITUTE SUFFICIENT REASON FOR DEVIATION THERE FROM.

#### 1.4 RECORD DRAWINGS

- CLEARLY RECORD ALL CONTRACT CHANGES AND DEVIATIONS FROM THE CONTRACT DRAWINGS ON A SET OF DRAWINGS AVAILABLE FROM THE GENERAL CONTRACTOR FOR THIS PURPOSE AND FORWARDED TO THE GENERAL CONTRACTOR AT THE COMPLETION OF THE PROJECT.

#### 1.5 SITE VISIT

- THE ELECTRICAL CONTRACTOR SHALL VISIT THE SITE AND EVALUATE ALL EXISTING SITE CONDITIONS AS THEY MAY AFFECT THIS WORK. NO EXTRAS WILL BE ALLOWED FOR ANY EFFECTS FROM FAILING TO COMPLETE A COMPREHENSIVE SITE TOUR TO UNDERSTAND AND ACCOUNT FOR THE IMPACT OF EXISTING SITE CONDITIONS ON THE CONTRACT SCOPE OF WORK.

#### 1.6 CUTTING AND PATCHING

- THE GENERAL CONTRACTOR SHALL BE RESPONSIBLE FOR AND PAY FOR ALL CUTTING AND PATCHING REQUIRED IN THE SCOPE OF WORK AS DEFINED IN THE GENERAL CONDITIONS, ALL NEW FINISHES SHALL BE EQUAL TO THOSE OF SURROUNDING SURFACES FOR MATERIALS, COLOUR, TEXTURE AND WORKMANSHIP. THIS DIVISION SHALL CLEARLY MARK OUT ALL PATCHES REQUIRED AND REVIEW WITH THE GENERAL CONTRACTOR BEFORE CUTTING PROCEEDS. THIS DIVISION SHALL INSTALL ALL OPENING FRAMES, SLEEVES, CONDUITS, OUTLETS, ETC. INTO THE BUILDING STRUCTURE AS CONSTRUCTION PROGRESSES. ANY ITEMS MISSED DURING CONSTRUCTION THAT MUST BE ADDED WILL BE THE RESPONSIBILITY OF THIS DIVISION AND BE CO-ORDINATED WITH THE GENERAL TRADES.
- THE ELECTRICAL CONTRACTOR SHALL SUBMIT TO THE GENERAL CONTRACTORS A COMPLETE INVENTORY OF CUTTING AND PATCHING REQUIREMENTS FOR COMPLETION OF THE SCOPE OF WORK. THIS INVENTORY SHALL BE COMPLETED PRIOR TO TENDER CLOSING TO ALLOW THE GENERAL TRADES TO ASSESS THE WORK REQUIREMENTS.
- IN EACH CASE, TRADESMEN QUALIFIED IN THE WORK BEING CUT AND PATCHED SHALL BE EMPLOYED TO ENSURE THAT IT IS CORRECTLY AND NEATLY DONE.
- TO COMPLETELY PREVENT THE PASSAGE OF AIR, TIGHTLY FIT ALL CONDUIT CONNECTIONS TO CONDUITS, ETC. WHICH PASS THROUGH CONSTRUCTION, PAY PARTICULAR ATTENTION WHERE FIRE SEPARATIONS ARE PENETRATED WITH SUCH OBJECTS, BUT SEPARATIONS TIGHTLY TO MATERIALS PENETRATING SEPARATIONS, OR PROVIDE OTHER MATERIALS FOR PACKING AROUND PERIMETERS, WHICH ARE SPECIFICALLY MANUFACTURED FOR SUCH CONDITIONS. PACKING MATERIALS SHALL BE OF THE EQUIVALENT FIRE RESISTANCE RATINGS OF THE PENETRATED CONSTRUCTION. OBTAIN CONSULTANTS APPROVAL PRIOR TO THE USE OF PACKING MATERIALS.

#### 1.7 SHOP DRAWINGS

- SHOP DRAWINGS AND DATA SHEETS FOR EQUIPMENT INTENDED FOR INSTALLATION UNDER THIS CONTRACT SHALL BE SUBMITTED FOR REVIEW. AFTER CHECKING AND WHEN REVIEWED, COPIES WILL BE RETURNED TO THE CONTRACTOR.
- SAMPLES, DRAWINGS, CATALOGUES, SPECIFICATIONS, ETC. SUBMITTED FOR APPROVAL, SHALL BE PROPERLY LABELED INDICATING SPECIFIED SERVICES FOR WHICH MATERIAL OR EQUIPMENT IS TO BE USED. THE DRAWINGS AND INFORMATION SHALL INDICATE THE PROJECT NAME AND THE ARTICLE NUMBER OF SPECIFICATIONS RELATING TO SHOP DRAWINGS. THE CONTRACTOR'S NAME AND CONTRACTOR'S SIGNATURE SHALL APPEAR ON ALL COPIES INDICATING THAT THE DRAWINGS HAVE BEEN CHECKED BY THE CONTRACTOR. DRAWINGS NOT SO DESIGNATED WILL BE RETURNED FOR CORRECTION. FAX OR ELECTRONIC COPIES OF SHOP DRAWINGS ARE NOT ACCEPTABLE.
- INCORPORATE ONE-DIMENSIONAL SYSTEM UTILIZED FOR DRAWINGS. MAKE SURE CONVERSIONS FROM METRIC SYSTEM TO IMPERIAL, OR VICE VERSA, WHEN REQUIRED FOR INCORPORATION OF UNITS OF ONE-DIMENSIONAL SYSTEM INTO CONSTRUCTION IN THE WORK.
- SHOW ON SHOP DRAWINGS ALL PERTINENT INFORMATION REQUIRED FOR MATERIALS AND INSTALLATION. AND FOR PROPER INTEGRATION OF THIS DIVISION'S WORK WITH THE WORK OF OTHERS.
- DO NOT PROCEED WITH WORK DEFINED ON SHOP DRAWINGS INFORMATION UNTIL FINAL REVIEWED SHOP DRAWINGS HAVE BEEN RETURNED BY THE CONSULTANT.
- THE CONTRACTOR IS RESPONSIBLE FOR THE DETAIL DESIGN, INCLUDING ALL ERRORS / OMISSIONS, DIMENSIONS, INSTALLATION METHODS, CO-ORDINATION, ETC.

#### 1.8 ARRANGEMENT OF EQUIPMENT

- CONCEAL CONDUIT AND WIRING WHEREVER POSSIBLE BY RUNNING IN PIPE SPACES, DUCT SHAFTS, CHASES, CEILING SPACES AND FURRED OUT SECTIONS OF WALLS AND COLUMNS. DO NOT RUN CONDUIT EXPOSED IN FINISHED AREAS WITHOUT OBTAINING PERMISSION OF THE ARCHITECT.
- DO NOT SCALE THE DRAWINGS FOR EXACT CONDUIT LOCATIONS. COORDINATE LIGHT FIXTURES, FIRE ALARM DEVICES, ETC WITH DIFFUSERS, GRILLES AND OTHER FIXTURES SHOWN. MODIFY AS NECESSARY WITHOUT CHANGING THE INTENT OF THE DESIGN TO AVOID OTHER EQUIPMENT, STRUCTURAL ELEMENTS OR WORK INSTALLED BY OTHER TRADES.

#### 1.9 TESTING

- DIVISION 16 SHALL PERFORM TESTS ON ALL ELECTRICAL EQUIPMENT AND SYSTEMS AS OUTLINED IN VARIOUS SECTIONS OF THESE SPECIFICATIONS AND SHALL PROVIDE ALL NECESSARY TEST EQUIPMENT AS REQUIRED.

#### 1.10 MECHANICAL EQUIPMENT AND CONTROLS

- SUPPLIER AND INSTALLER RESPONSIBILITY IS INDICATED IN THE EQUIPMENT SCHEDULE ON MECHANICAL DRAWINGS.
- CONTROL WIRING, ALL CONTROL DEVICES, CONDUIT AND CONNECTIONS BELOW 50V WHICH ARE RELATED TO CONTROL SYSTEMS, ARE A NECESSARY COMPONENT OF THE CONTROL SYSTEM SPECIFIED IN DIVISION 15 OR SHOWN ON MECHANICAL DRAWINGS SHALL BE INSTALLED BY DIVISION 15. REVIEW THE MECHANICAL CONTROL SPECIFICATIONS DIVISIONS 15900 AND 15920.

#### 1.11 OPERATING AND MAINTENANCE INSTRUCTIONS

- SUPPLY CERTIFIED PERSONNEL TO INSTRUCT OWNERS OPERATING STAFF ON OPERATION OF ELECTRICAL EQUIPMENT. SUPPLY MAINTENANCE SPECIALIST PERSONNEL TO INSTRUCT OPERATING STAFF ON MAINTENANCE AND ADJUSTMENT OF ELECTRICAL EQUIPMENT AND ANY CHANGES OR MODIFICATIONS IN EQUIPMENT MADE UNDER THE TERMS OF THE GUARANTEE. PROVIDE INSTRUCTION TO OWNERS STAFF DURING REGULAR WORK HOURS PRIOR TO ACCEPTANCE OF THE SYSTEMS FOR REGULAR OPERATION.
- UTILIZE THE OPERATION AND MAINTENANCE DATA MANUAL FOR INSTRUCTION PURPOSES. ON COMPLETION OF INSTRUCTIONS, TURN ONE MANUAL OVER TO THE ENGINEER FOR REVIEW AND ACCEPTANCE. PROVIDE THREE (3) COPIES OF OPERATION AND MAINTENANCE MANUALS TO OWNER. THE MAINTENANCE MANUALS SHALL INCLUDE A COMPREHENSIVE INDEX OF CONTENTS SECTION, WHICH WILL INCLUDE A DETAILED DESCRIPTION OF ALL ELECTRICAL EQUIPMENT OPERATION INCLUDED WITHIN THIS CONTRACT. THE MAINTENANCE AND OPERATING INSTRUCTIONS WILL BE ASSEMBLED BY THE CONTRACTOR IN THREE (3) VOLUMES USING THE FOLLOWING INDEXING SYSTEM: BINDERS AND INCLUDING A COMPLETE INDEX OF CONTENTS. THE INDEX SHALL BE ORGANIZED INTO SECTIONS ACCORDING TO THE NUMERICAL SPECIFICATION SECTIONS.
- THE OPERATING INSTRUCTIONS SHALL INCLUDE BUT NOT BE LIMITED TO THE FOLLOWING INFORMATION, WHICH SHALL BE INCLUDED IN THE MANUALS.
  - LIST OF RECOMMENDED SPARE PARTS AND QUANTITIES TO BE STOCKED.
  - COMPLETE PARTS LIST GIVING MANUFACTURER'S NAME AND CATALOGUE NUMBER.
  - OPERATING INSTRUCTIONS AND PROCEDURES, INCLUDING START UP AND SHUT DOWN PROCEDURE.
  - MAINTENANCE PROCEDURE INCLUDING PREVENTATIVE MAINTENANCE INSTRUCTIONS.
- OPERATION DATA TO INCLUDE:
  - DESCRIPTION OF EACH SYSTEM AND ITS CONTROLS.
  - DESCRIPTION OF OPERATION OF EACH SYSTEM AT VARIOUS LOADS.
  - OPERATION INSTRUCTION FOR EACH SYSTEM AND EACH COMPONENT.
  - DESCRIPTION OF ACTIONS TO BE TAKEN IN EVENT OF EQUIPMENT FAILURE.

#### 1.12 BUILDING STRUCTURE / EQUIPMENT SUPPORTS

- INITIATE NO DRILLING, CUTTING OR WELDING OF THE BUILDING STEEL OR CONCRETE CONSTRUCTION FOR THE PURPOSE OF SUPPORTING MATERIALS OR EQUIPMENT WITHOUT PRIOR APPROVAL OF THE PRIME CONSULTANT.
- HANGERS TO STEEL SHALL BE BEAM CLAMPS OR FLANGE HANGERS WHERE POSSIBLE. WHERE ATTACHMENT IS PERMITTED, WELDING STUDS OF A SIZE NOT LARGER THAN 13mm DIAMETER MAY BE USED. IF LARGER SIZE BOLTS ARE REQUIRED TO SUPPORT THE EQUIPMENT, THESE SHALL BE ATTACHED BY STEEL CLIPS OR BRACKETS.
- EQUIPMENT SUPPORTS SUPPLIED BY EQUIPMENT MANUFACTURERS.
- FLOOR MOUNTED ELECTRICAL EQUIPMENT SUCH AS SWITCHGEAR AND TRANSFORMERS SHALL BE INSTALLED ON A 100mm (4") HIGH CONCRETE HOUSEKEEPING PAD BY THIS DIVISION. EQUIPMENT SUPPORTS NOT SUPPLIED BY EQUIPMENT MANUFACTURER: FABRICATE FROM STRUCTURAL GRADE STEEL TO CSA STANDARD REFERENCE IN G40.21.

#### 1.13 PROTECTION

- ALL ELECTRICAL ITEMS AND EQUIPMENT ON SITE DURING AND FOLLOWING INSTALLATION SHALL BE PROTECTED FROM WEATHER AND OTHER HAZARDS AND MAINTAINED IN AN ORDERLY MANNER. ALL EQUIPMENT INCLUDING LIGHT FIXTURES SHALL BE PROTECTED FROM CONSTRUCTION DUST AND DIRT. PROTECT OUTLETS BOXES FROM DAMAGE AND FROM THE INTRUSION OF FOREIGN MATTER.

#### 1.14 FIRE STOPPING

- WHERE CONDUITS PASS THROUGH FIRE RATED WALLS, FLOORS AND PARTITIONS, PACK SPACE WITH MATERIALS HAVING APPROVAL OF AUTHORITIES HAVING JURISDICTION.
- DIVISION 16 TO PROVIDE ALL MATERIALS AND LABOUR TO COMPLETE U.L.C. FIRE STOPPING FOR DIVISION 16 WORK.

#### 1.15 CO-ORDINATION

- START WORK AND PROCEED AS SOON AS POSSIBLE AFTER THE CONTRACT HAS BEEN LET AND IN ACCORDANCE WITH THE CONSTRUCTION OF THE BUILDING.
- CONFER AND COORDINATE WITH OTHER TRADES IN ORDER TO ELIMINATE ANY UNNECESSARY DELAYS TO THE CONSTRUCTION SCHEDULE. WHERE DOUBT EXISTS REGARDING OTHER TRADES, CONFER WITH THE SUPERINTENDENT WITHOUT DELAY FOR DETAILED INSTRUCTIONS CONCERNING HOW TO PROCEED WITH THE WORK. EXPEDITE DELIVERY OF ALL EQUIPMENT AND MATERIALS TO MEET THE CONSTRUCTION SCHEDULE.
- IDENTIFY AND RESOLVE INTERFERENCE PROBLEMS PRIOR TO INSTALLATION OF EQUIPMENT.
- SUBMIT INTERFERENCE DRAWINGS FOR REVIEW AND RECORD CHANGES.
- EXAMINE THE SITE AND ALL CONTRACT DOCUMENTS PRIOR TO BID SUBMISSION. NO ALLOWANCE WILL BE MADE BY ANY DIFFICULTIES ENCOUNTERED DUE TO ANY FEATURES OF THE BUILDING, METHODS OF CONSTRUCTION, SITE OR SURROUNDING PUBLIC AND PRIVATE PROPERTY WHICH EXISTED UP TO THE BID CLOSE.

#### 1.16 CO-ORDINATION DRAWINGS

- PRIOR TO COMMENCEMENT OF WORK, SUBMIT FOR CONSULTANT REVIEW, CONDUIT AND EQUIPMENT INTERFERENCE DRAWINGS FOR EACH FLOOR LEVEL, AND FOR ALL DIVISION 16 WORK. DRAWINGS MUST BE COORDINATED AND CERTIFIED CORRECT FOR REVIEW.
- COORDINATION DRAWINGS SHALL BE TO A SCALE SUFFICIENT TO SHOW THE NECESSARY DETAILS. SUBMIT FOR REVIEW UNDER THE SAME PROVISIONS AS SPECIFIED FOR SHOP DRAWINGS.
- PREPARE DRAWINGS IN CONJUNCTION WITH OTHER DIVISIONS ESPECIALLY DIVISION 15.
- DIMENSION PROPOSED LOCATION OF DIVISION 16 WORK WITH RESPECT TO BUILDING ELEVATIONS AND ESTABLISHED GRID LINES.
- BASE INFORMATION USED TO PREPARE DRAWINGS ON REVIEWED SHOP DRAWINGS.

#### 1.17 GUARANTEE / WARRANTY

- REFER TO GENERAL CONDITIONS. ANY EXTENDED WARRANTIES FOR EQUIPMENT / WORK ON THIS DIVISION SHALL BE NOTED IN SUBSEQUENT SECTIONS.

#### 1.18 COMMISSIONING

- ENSURE THAT ALL EQUIPMENT AND SYSTEMS ARE OPERABLE AND SAFE FOR NORMAL OPERATION. ALL TESTING, ADJUSTING, BALANCING AND RECORD KEEPING SHALL BE PERFORMED PRIOR TO COMMISSIONING. OPERATIONAL TESTS ON EQUIPMENT, AND SYSTEMS SHALL BE PERFORMED PRIOR TO COMMISSIONING TO VERIFY THAT THEY MEET DESIGN REQUIREMENTS.
- USE QUALIFIED PERSONNEL TO COMMISSION ELECTRICAL EQUIPMENT AND SYSTEMS.
- ENSURE AND CERTIFY THE FOLLOWING DOCUMENTS ARE COMPLETE AND CORRECT:
  - SHOP DRAWINGS AND PRODUCT DATA.
  - TEST REPORTS.
  - VERIFICATION REPORTS AND CERTIFICATES.
  - OPERATION AND MAINTENANCE MANUALS.
  - AS-BUILT DRAWINGS.
- FULLY INSTRUCT AND TRAIN OPERATING AND MAINTENANCE PERSONNEL IN CARE, ADJUSTMENT AND OPERATION OF ELECTRICAL SYSTEMS.

#### 16010 - ELECTRICAL GENERAL REQUIREMENTS

##### 1.2 CODES AND STANDARDS

- ENSURE CORRECT INSTALLATION IN ACCORDANCE WITH CSA C22.1 EXCEPT WHERE SPECIFIED OTHERWISE.
- ABBREVIATIONS FOR ELECTRICAL TERMS: TO CSA Z85.

##### 1.3 CARE AND STARTUP

- INSTRUCT OPERATING PERSONNEL IN THE OPERATION, CARE AND MAINTENANCE OF EQUIPMENT.
- ARRANGE AND PAY FOR SERVICES OF MANUFACTURER'S FACTORY SERVICE ENGINEER TO SUPERVISE START-UP OF INSTALLATION, CHECK, ADJUST, BALANCE AND CALIBRATE COMPONENTS.
- PROVIDE THESE SERVICES TO THE CONTRACTOR FOR AS MANY VISITS AS NECESSARY TO PUT EQUIPMENT IN OPERATION, AND ENSURE THAT OPERATING PERSONNEL ARE CONVERSANT WITH ALL ASPECTS OF ITS CARE AND OPERATION.

##### 1.4 VOLTAGE RATINGS

- OPERATING VOLTAGES: TO CAN3-C235.
- MOTORS, ELECTRIC HEATING, CONTROL AND DISTRIBUTION DEVICES AND EQUIPMENT TO OPERATE SATISFACTORILY AT 60 HZ WITHIN NORMAL OPERATING LIMITS ESTABLISHED BY ABOVE STANDARD EQUIPMENT TO OPERATE IN EXTREME OPERATING CONDITIONS ESTABLISHED IN ABOVE STANDARD WITHOUT DAMAGE TO EQUIPMENT.
- INSULATED GROUNDING CONDUCTORS: TYPE RW90.
- GROUND BUS: COPPER, SIZE 50mm BY 2mm AS INDICATED, SUPPORTS, FASTENINGS, CONNECTORS.
- NON-CORRODING ACCESSORIES NECESSARY FOR GROUNDING SYSTEM, TYPE, SIZE, MATERIAL AS OF WORK.

##### 1.5 PERMITS, FEES AND INSPECTION

- SUBMIT TO ELECTRICAL SAFETY AUTHORITY AND SUPPLY AUTHORITY NECESSARY NUMBER OF DRAWINGS AND SPECIFICATIONS FOR EXAMINATION AND APPROVAL PRIOR TO COMMENCEMENT OF WORK.
- PAY ASSOCIATED FEES.
- ENGINEER WILL PROVIDE DRAWINGS AND SPECIFICATIONS REQUIRED BY ELECTRICAL SAFETY AUTHORITY AND SUPPLY AUTHORITY AND APPROVAL PRIOR TO COMMENCEMENT OF WORK.
- NOTIFY ENGINEER OF CHANGES REQUIRED BY ELECTRICAL SAFETY AUTHORITY PRIOR TO MAKING CHANGES.
- FURNISH CERTIFICATES OF ACCEPTANCE FROM ELECTRICAL SAFETY AUTHORITY AND ALL OTHER AUTHORITIES HAVING JURISDICTION ON COMPLETION OF WORK TO ENGINEER.

##### 1.6 MATERIALS AND EQUIPMENT

- PROVIDE MATERIALS AND EQUIPMENT AS SHOWN ON THE DRAWINGS AND/OR AS SPECIFIED HEREIN.
- EQUIPMENT AND MATERIAL TO BE CSA CERTIFIED, WHERE THERE IS NO ALTERNATIVE TO SUPPLYING EQUIPMENT WHICH IS NOT CSA CERTIFIED, OBTAIN SPECIAL APPROVAL FROM ELECTRICAL SAFETY AUTHORITY.
- FACTORY ASSEMBLE CONTROL PANELS AND COMPONENT ASSEMBLIES.

##### 1.8 ELECTRIC MOTORS, EQUIPMENT AND CONTROLS

- SUPPLIER AND INSTALLER RESPONSIBILITY IS INDICATED IN MOTOR, CONTROL AND EQUIPMENT SCHEDULE ON ELECTRICAL DRAWINGS AND RELATED MECHANICAL RESPONSIBILITY IS INDICATED ON MECHANICAL EQUIPMENT SCHEDULE ON MECHANICAL DRAWINGS.
- CONTROL WIRING AND CONDUIT IS SPECIFIED IN SECTION 16000.

##### 1.9 FINISHES

- SHOP FINISH METAL ENCLOSURE SURFACES BY APPLICATION OF RUST RESISTANT PRIMER INSIDE AND OUTSIDE, AND AT LEAST TWO COATS OF FINISH ENAMEL.
- PAINT OUTDOOR ENCLOSURE EQUIPMENT "EQUIPMENT GREEN" FINISH TO EMMAC Y1-1-1995.
- PAINT INTERIOR SWITCHGEAR AND DISTRIBUTION ENCLOSURES LIGHT GREY TO EMMAC 2V-1-1996.
- CLEAN AND TOUCH UP SURFACES OF SHOP-PAINTED EQUIPMENT SCRATCHED OR MARRED DURING SHIPMENT OR INSTALLATION, TO MATCH ORIGINAL PAINT.
- CLEAN AND PRIME EXPOSED NON-GALVANIZED HANGERS, RACKS AND FASTENINGS TO PREVENT RUSTING.

##### 1.10 EQUIPMENT IDENTIFICATION

- IDENTIFY EQUIPMENT WITH NAMEPLATES AND LABELS AS FOLLOWS:
  - NAMEPLATES:
    - LAMINATED 1/8" (3mm) THICK PLASTIC ENGRAVING SHEET, WHITE FACE, BLACK CORE. MECHANICALLY ATTACHED WITH SELF TAPPING SCREWS.
  - NAMEPLATE SIZES:

SIZE 110 X 50 mm	1 LINE	3 mm HIGH LETTERS
SIZE 212 X 70 mm	1 LINE	5 mm HIGH LETTERS
SIZE 312 X 70 mm	2 LINES	3 mm HIGH LETTERS
SIZE 312 X 90 mm	1 LINE	5 mm HIGH LETTERS
SIZE 520 X 90 mm	2 LINES	5 mm HIGH LETTERS
SIZE 625 X 100 mm	1 LINE	12 mm HIGH LETTERS
SIZE 725 X 100 mm	2 LINES	6 mm HIGH LETTERS

##### 1.11 LABELS

- EMBOSSED PLASTIC LABELS WITH 1/2" (6 mm) HIGH LETTERS UNLESS SPECIFIED OTHERWISE.
- WORDING ON NAMEPLATES AND LABELS TO BE APPROVED BY ENGINEER PRIOR TO MANUFACTURE.
- ALLOW FOR AVERAGE OF TWENTY-FIVE (25) LETTERS PER NAMEPLATE AND LABEL.
- IDENTIFICATION TO BE ENGLISH.
- USE ONE NAMEPLATE OR LABEL FOR EACH LANGUAGE.
- NAMEPLATES FOR TERMINAL, CABINETS AND JUNCTION BOXES TO INDICATE SYSTEM AND/OR VOLTAGE CHARACTERISTICS.
- IDENTIFY EQUIPMENT WITH SIZE 3 LABELS ENGRAVED AS DIRECTED BY ENGINEER.
- DISCONNECTS, STARTERS AND CONTACTORS: INDICATE EQUIPMENT BEING CONTROLLED AND VOLTAGE.
- TERMINAL CABINETS AND PULL BOXES: INDICATE SYSTEM AND VOLTAGE.
- TRANSFORMERS: INDICATE CAPACITY, PRIMARY AND SECONDARY VOLTAGES.
- RECEPTACLES: INDICATE SUPPLY PANELBOARD AND BREAKER NUMBER.

##### 1.11 WIRING IDENTIFICATION

- IDENTIFY WIRING WITH PERMANENT INDELEIBLE IDENTIFYING MARKINGS, EITHER NUMBERED OR COLOURED PLASTIC TAPE, ON BOTH ENDS OF PHASE CONDUCTORS OF FEEDERS AND BRANCH CIRCUIT WIRING.
- MAINTAIN PHASE SEQUENCE AND COLOUR CODING THROUGHOUT.
- COLOUR CODE: TO CSA C22.1.
- VISIBLE AND LEGIBLE AFTER EQUIPMENT IS INSTALLED.

##### 1.12 CONDUIT AND CABLE IDENTIFICATION

- COLOUR CODE CONDUITS, BOXES AND METALLIC SHEATHED CABLES.
- CODE WITH PLASTIC TAPE OR PAINT AT POINTS WHERE CONDUIT OR CABLE ENTERS WALL, CEILING, OR FLOOR, AND AT 5' (1.5 M) INTERVALS.
- COLORS: 1" (25 mm) WIDE PRIME COLOR AND 1/2" (20 mm) WIDE AUXILIARY COLOR.

##### SERVICE

- |                             | PRIME  | AUXILIARY |
|-----------------------------|--------|-----------|
| UP TO 250 V                 | YELLOW | GREEN     |
| UP TO 600 V                 | BROWN  | ORANGE    |
| UP TO 15 KV                 | GREEN  | BLUE      |
| TELEPHONE                   | PURPLE | BLUE      |
| OTHER COMMUNICATION SYSTEMS | PURPLE | BLUE      |
| FIRE ALARM                  | RED    |           |

##### 1.13 WIRING TERMINATIONS

- LUGS, TERMINALS, SCREWS USED FOR TERMINATION OF WIRING TO BE SUITABLE FOR EITHER COPPER OR ALUMINIUM CONDUCTORS.

##### 1.14 MANUFACTURERS AND CSA LABELS

- VISIBLE AND LEGIBLE AFTER EQUIPMENT IS INSTALLED.

##### 1.15 WARNING SIGNS

- AS SPECIFIED AND TO MEET REQUIREMENTS OF ELECTRICAL SAFETY AUTHORITY AND CONSULTANT.
- PORCELAIN ENAMEL SIGNS, MINIMUM SIZE 6" X 10" (175 X 250 mm).

##### 1.16 SINGLE LINE ELECTRICAL DIAGRAMS

- PROVIDE SINGLE LINE ELECTRICAL DIAGRAMS UNDER PLEXIGLASS AS FOLLOWS:
  - ELECTRICAL DISTRIBUTION SYSTEM LOCATE IN MAIN ELECTRICAL ROOM.
  - PROVIDE FIRE ALARM RISER DIAGRAM, PLAN AND ZONING OF BUILDING UNDER PLEXIGLASS AT FIRE ALARM CONTROL PANEL AND ANNUNCIATORS.
- DRAWINGS: 24" X 24" (600 X 600 mm) MINIMUM SIZE.

##### 1.17 LOCATION OF OUTLETS

- LOCATE OUTLETS AS SHOWN ON THE DRAWINGS AND IN ACCORDANCE WITH GENERAL INSTRUCTIONS.
- DO NOT INSTALL OUTLETS BACK-TO-BACK IN WALL; ALLOW MINIMUM 6" (150 mm) HORIZONTAL CLEARANCE BETWEEN BOXES.
- CHANGE LOCATION OF OUTLETS AT AN EXTRA COST OR CREDIT, PROVIDING DISTANCE DOES NOT EXCEED 10' (3000 mm) AND INFORMATION IS GIVEN BEFORE INSTALLATION.
- LOCATE LIGHT SWITCHES ON LATCH SIDE OF DOORS, LOCAL DISCONNECT DEVICES IN MECHANICAL AND ELEVATOR MACHINE ROOMS ON LATCH SIDE OF CENTRELINE.

##### 1.18 MOUNTING HEIGHTS

- MOUNTING HEIGHT OF EQUIPMENT IS FROM FINISHED FLOOR TO CENTRELINE OF EQUIPMENT UNLESS SPECIFIED OR INDICATED OTHERWISE.
- IF MOUNTING HEIGHT OF EQUIPMENT IS NOT SPECIFIED OR INDICATED, VERIFY BEFORE PROCEEDING WITH INSTALLATION.
- INSTALL ELECTRICAL EQUIPMENT AT FOLLOWING HEIGHTS UNLESS INDICATED OTHERWISE.
  - LOCAL SWITCHES: 48" (1200 mm)
  - WALL RECEPTACLES:
    - GENERAL: 18" (455 mm)
    - ABOVE TOP OF CONTINUOUS BASEBOARD: 8" (200 mm)
    - ABOVE TOP OF COUNTERS OR COUNTER FLASH: 8" (150 mm)
    - IN MECHANICAL ROOMS: 48" (1200 mm)
  - PANELBOARDS AS REQUIRED BY CODE: 6' (1800 mm) TO TOP
  - TELEPHONE AND INTERPHONE OUTLETS: 18" (455 mm)

- WALL MOUNTED TELEPHONE AND INTERPHONE OUTLETS: 54" (1370 mm)
- FIRE ALARM PULL STATIONS: 48" (1200 mm)
- FIRE ALARM CALL BELL AND HORNS: 7' (2100 mm)
- FIRE ALARM ANNUNCIATOR PANEL: 5' (1525 mm)
- P/A SPEAKER / CALL STATIONS: 54" (1370 mm)
- DATA OUTLETS: 18" (455 mm)

##### 1.19 LOAD

- MEASURE PHASE CURRENT TO PANEL BOARDS WITH NORMAL LOADS (LIGHTING) OPERATING AT TIME OF ACCEPTANCE. ADJUST BRANCH CIRCUIT CONNECTIONS AS REQUIRED TO OBTAIN BEST BALANCE OF CURRENT BETWEEN PHASES AND RECORD CHANGES.
- MEASURE PHASE VOLTAGE AT LOADS TO ADJUST TRANSFORMER TAPS TO WITHIN 2% OF RATED VOLTAGE OF EQUIPMENT.
- SUBMIT, AT COMPLETION OF WORK, REPORT LISTING PHASE AND NEUTRAL CURRENTS ON PANEL BOARD MANUFACTURERS.
- EXISTING UNDER NORMAL LOAD, STATE HOUR AND DATE ON WHICH EACH LOAD WAS MEASURED, AND VOLTAGE AT TIME OF TEST.

##### 1.20 CONDUIT AND CABLE INSTALLATION

- INSTALL CONDUIT AND SLEEVES PRIOR TO POURING OF CONCRETE. SLEEVES THROUGH CONCRETE: SCHEDULE 40 STEEL PIPE, SIZED FOR FREE PASSAGE OF CONDUIT, AND PROTRUDING 1" ABOVE FINISH SURFACE. SLEEVES AS REQUIRED TO SUPPORT CONDUIT AND CABLE RUNS.
- IF PLASTIC SLEEVES ARE USED IN FIRE RATED WALLS OR FLOORS, REMOVE BEFORE CONDUIT INSTALLATION.
- INSTALL CABLES, CONDUITS AND FITTINGS TO BE EMBEDDED OR PLASTERED OVER, NEATLY AND CLOSE TO BUILDING STRUCTURE SO FURRING CAN BE KEPT TO MINIMUM.

##### 1.21 FIELD QUALITY CONTROL

- CONDUCT AND PAY FOR FOLLOWING TESTS:
  - POWER DISTRIBUTION SYSTEM INCLUDING PHASING, VOLTAGE, GROUNDING AND LOAD BALANCING.
  - CIRCUIT ORIGINATING FROM BRANCH DISTRIBUTION PANELS.
  - LIGHTING AND ITS CONTROL.
  - MOTORS, HEATERS AND ASSOCIATED CONTROL EQUIPMENT INCLUDING SEQUENCED OPERATION OF SYSTEMS WHERE APPLICABLE.
  - SYSTEMS: FIRE ALARM SYSTEM, EMERGENCY EXIT LIGHTING SYSTEM, PIA SYSTEM.
- FURNISH MANUFACTURER'S CERTIFICATE OR LETTER CONFIRMING THAT ENTIRE INSTALLATION AS IT PERTAINS TO EACH SYSTEM HAS BEEN INSTALLED TO MANUFACTURER'S INSTRUCTIONS.
- INSULATION RESISTANCE TESTING:
  - MEGGER CIRCUITS, FEEDERS AND EQUIPMENT UP TO 350 V WITH A 500 V INSTRUMENT.
  - MEGGER 350-600 V CIRCUITS, FEEDERS AND EQUIPMENT WITH A 1000 V INSTRUMENT.
  - CHECK RESISTANCE TO GROUND BEFORE ENERGIZING.
  - CARRY OUT TESTS IN PRESENCE OF ENGINEER.
  - PROVIDE INSTRUMENTS, METERS, EQUIPMENT AND PERSONNEL REQUIRED TO CONDUCT TESTS DURING AND AFTER CONSTRUCTION PROJECT.
- SUBMIT TEST RESULTS FOR ENGINEER'S REVIEW.

##### 1.22 CO-ORDINATION OF PROTECTIVE DEVICES

- ENSURE CORRECTIVE DEVICES SUCH AS OVERCURRENT TRIPS, RELAYS AND FUSES ARE INSTALLED TO REQUIRED VALUES AND SETTINGS.

##### 1.23 COMMISSIONING AND STARTUP

- ENSURE THAT ALL EQUIPMENT AND SYSTEMS ARE TESTED ADJUSTED, OPERABLE AND SAFE PRIOR TO STARTUP.
- INSTRUCT OPERATING PERSONNEL IN THE OPERATION, CARE AND MAINTENANCE OF EQUIPMENT.
- ARRANGE AND PAY FOR SERVICES OF MANUFACTURER'S FACTORY SERVICE ENGINEER TO SUPERVISE START-UP OF INSTALLATION, CHECK, ADJUST, BALANCE AND CALIBRATE COMPONENTS.
- COORDINATE WITH DIVISION 15 REQUIREMENTS AND FORCES.

##### 16020 - GROUNDING SECONDARY

##### 2.1 EQUIPMENT RATING

- CLAMPS FOR GROUNDING OF CONDUCTOR, SIZE AS REQUIRED TO ELECTRICALLY CONDUCTIVE UNDERGROUND METALLIC WATER PIPE.
- COPPER CONDUIT AT LEAST BARE, STRANDED, SELF ANNEALED, SIZE AS INDICATED OR REQUIRED.
- INSULATED GROUNDING CONDUCTORS: TYPE RW90.
- GROUND BUS: COPPER, SIZE 50mm BY 2mm AS INDICATED, SUPPORTS, FASTENINGS, CONNECTORS.
- NON-CORRODING ACCESSORIES NECESSARY FOR GROUNDING SYSTEM, TYPE, SIZE, MATERIAL AS OF WORK.

- GROUNDING AND BONDING BUSINGS:
  - PROTECTIVE TYPE CLAMPS.
  - SOLID TYPE CONDUCTOR CONNECTORS.
  - TERMIT WELDED TYPE CONDUCTOR CONNECTORS.
  - BONDING JUMPERS, STRAPS.
  - PRESSURE WIRE CONNECTORS.

##### 2.2 MANUFACTURERS

- ACCEPTABLE MANUFACTURERS: BURNDY

##### 3.1 INSTALLATION

- INSTALL COMPLETE PERMANENT, CONTINUOUS, SYSTEM AND CIRCUIT, EQUIPMENT, GROUNDING SYSTEMS INCLUDING ELECTRODES, CONDUCTORS, CONNECTORS, ACCESSORIES AS INDICATED, IN ACCORDANCE TO REQUIREMENTS OF ENGINEER, AND LOCAL AUTHORITIES HAVING JURISDICTION OVER INSTALLATION, WHERE EMT IS USED, RUN GROUND WIRE IN CONDUIT.
- INSTALL CONNECTORS IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.
- SUPPLIER AND INSTALLER RESPONSIBILITY IS INDICATED FROM MECHANICAL INJURY.
- MAKE BURIED CONNECTIONS, AND CONNECTIONS TO CONDUCTIVE WATER MAIN, ELECTRODES, AND STEEL STRUCTURE, USING COPPER WELDING BY THERMIT PROCESS, COLDWELD TYPE.
- USE MECHANICAL CONNECTORS FOR GROUNDING CONNECTIONS TO EQUIPMENT PROVIDED WITH LUGS.
- SOLDERED JOINTS ARE NOT PERMITTED.
- INSTALL BONDING WIRE AT LEAST TWO FEET FROM CONDUIT, CONNECTED AT ONE END TO GROUNDING BUSHING, SOLDER LESS LUG, CLAMP OR CUP WASHER AND SCREW, NEATLY CLAMP BONDING WIRE TO EXTERIOR OF FLEXIBLE CONDUIT.
- INSTALL FLEXIBLE GROUNDING STRAPS FOR BUS DUCT ENCLOSURE JOINTS, WHERE SUCH BONDING IS NOT INHERENTLY PROVIDED BY THE EQUIPMENT.
- INSTALL SEPARATE GROUND CONDUCTOR TO OUTDOOR LIGHTING STANDARDS.
- GROUND SECONDARY SERVICE PEDESTALS.

##### 3.2 SYSTEM AND CIRCUIT GROUNDING

- INSTALL SYSTEM AND CIRCUIT GROUNDING CONNECTIONS TO NEUTRAL OF 208V AND 600V SYSTEMS AS REQUIRED.

##### 3.3 EQUIPMENT GROUNDING

- INSTALL GROUNDING CONNECTIONS TO TYPICAL EQUIPMENT INCLUDED IN, BUT NOT NECESSARILY LIMITED TO THE FOLLOWING: SERVICE EQUIPMENT, TRANSFORMERS, SWITCHGEAR, DICT SYSTEMS, FRAMES OF MOTORS, MOTOR CONTROL CENTRES, STARTERS, CONTROL PANELS, BUILDING STEEL WORK, GENERATORS, ELEVATORS AND ESCALATORS, DISTRIBUTION PANELS, OUTDOOR LIGHTING.

##### 3.4 COMPUTER EQUIPMENT ISOLATED GROUNDING

- COMPUTER GROUNDING CONDUCTORS: COPPER, CONTINUOUS, INSULATED, COLOURED GREEN. INSTALLED IN CONDUIT.
- GROUND BUSSET IN DISTRIBUTION PANELS: ISOLATED FROM FRAME.
- GROUNDING CONDUCTORS, SIZE EQUAL TO COMPUTER POWER PHASE CONDUCTORS, FROM COMPUTER ROOM BRANCH CIRCUIT DISTRIBUTION PANEL GROUP BUS, TO COMPUTER EQUIPMENT VIA CONDUIT AND POWER CORD.
- GROUNDING CONDUIT, SIZE AS INDICATED, FROM EACH COMPUTER ROOM BRANCH CIRCUIT DISTRIBUTION PANEL GROUNDING BUS TO MAIN DISTRIBUTION PANEL GROUNDING BUS.

##### 3.5 COMMUNICATION SYSTEMS

- INSTALL CONNECTIONS FOR TELEPHONE, SOUND, FIRE ALARM, SECURITY, INTERCOMMUNICATION SYSTEMS AS FOLLOWS:
  - TELEPHONE: MAKE TELEPHONE GROUNDING SYSTEM IN ACCORDANCE WITH TELEPHONE COMPANY'S REQUIREMENTS.
  - SOUND, FIRE ALARM, SECURITY, INTERCOMMUNICATION SYSTEMS AS REQUIRED.

##### 3.6 TESTS

- PERFORM TESTS IN ACCORDANCE WITH SECTION 16010.
- PERFORM GROUND CONTINUITY AND RESISTANCE TESTS USING METHOD APPROPRIATE TO SITE CONDITIONS AND TO APPROVAL OF ENGINEER AND LOCAL AUTHORITY HAVING JURISDICTION OVER



**ELECTRICAL SPECIFICATIONS - ELECTRICAL CONTRACTOR (2 OF 2)**

- 16141 - WIRING DEVICES**
  - 1.1 SHOP DRAWINGS AND PRODUCT DATA**
    - 1. SUBMIT SHOP DRAWINGS AND PRODUCT DATA FOR ENGINEER REVIEW IN ACCORDANCE WITH GENERAL REQUIREMENTS.
  - 2.1 SWITCHES**
    - 1. 15A SINGLE POLE, THREE-WAY SWITCHES.
    - 2. MANUALLY OPERATED GENERAL PURPOSE AC SWITCHES WITH FOLLOWING FEATURES:
      - 1. TERMINAL HOLES APPROVED FOR NO. 10 AWG WIRE.
      - 2. SILVER ALLOY CONTACTS.
      - 3. UREA OR MELAMINE MOLDING FOR PARTS SUBJECT TO CARBON TRACKING.
      - 4. SUITABLE FOR BACK AND SIDE WIRING.
      - 5. STYLE & COLOUR AS NOTED, SPECIFICATION GRADE.
    - 3. TOGGLE OPERATED FULLY RATED FOR TUNGSTEN FILAMENT AND FLUORESCENT LAMPS, AND UP TO 80% OF RATED CAPACITY OF MOTOR LOADS.
    - 4. SWITCHES OF ONE MANUFACTURER THROUGHOUT PROJECT.
    - 5. ACCEPTABLE MATERIALS: HUBBELL, LEVITON, ARROW HART, PASS & SEYMOUR.
  - 2.2 RECEPTACLES**
    - 1. DUPLEX RECEPTACLES, CSA TYPE 5-15 R, 125 V, 15 A, 0 GROUND, WITH FOLLOWING FEATURES:
      - 1. SUITABLE FOR NO. 10 AWG FOR BACK AND SIDE WIRING.
      - 2. BREAK-OFF LINKS FOR USE AS SPLIT RECEPTACLES.
      - 3. EIGHT BACK WIRED ENTRANCES, FOUR SIDE WIRING SCREWS.
      - 4. TRIPLE WIPE CONTACTS AND RIVETTED GROUNDING CONTACTS.
      - 5. STYLE & COLOUR AS NOTED, SPECIFICATION GRADE.
    - 2. OTHER RECEPTACLES WITH AMPACITY AND VOLTAGE AS INDICATED.
    - 3. RECEPTACLES OF ONE MANUFACTURER THROUGHOUT PROJECT.
    - 4. ACCEPTABLE MATERIALS: HUBBELL, LEVITON, ARROW HART, PASS & SEYMOUR.
  - 2.3 COVER PLATES**
    - 1. COVER PLATES FOR WIRING DEVICES.
    - 2. COVER PLATES FROM ONE MANUFACTURER THROUGHOUT PROJECT.
    - 3. SHEET STEEL UTILITY BOX COVER FOR WIRING DEVICES INSTALLED IN SURFACE-MOUNTED UTILITY BOXES.
    - 4. STAINLESS STEEL, VERTICALLY BRUSHED, 1/32" (1 mm) THICK COVER PLATES, THICKNESS 1/16" (2.5 MM) FOR WIRING DEVICES MOUNTED IN FLUSH-MOUNTED OUTLET BOX.
    - 5. SHEET METAL COVER PLATES FOR WIRING DEVICES MOUNTED IN SURFACE-MOUNTED FS OR FD TYPE CONDUIT BOXES.

- 3.1 INSTALLATION**
  - 1. SWITCHES:
    - 1. INSTALL SINGLE THROW SWITCHES WITH HANDLE IN "UP" POSITION WHEN SWITCH CLOSED.
    - 2. INSTALL SWITCHES IN GANG TYPE OUTLET BOX WHEN MORE THAN ONE SWITCH IS REQUIRED IN ONE LOCATION.
    - 3. MOUNT TOGGLE SWITCHES AT HEIGHT SPECIFIED IN SECTION 16010 - ELECTRICAL GENERAL REQUIREMENTS OR AS INDICATED.
  - 2. RECEPTACLES:
    - 1. INSTALL RECEPTACLES IN GANG TYPE OUTLET BOX WHEN MORE THAN ONE RECEPTACLE IS REQUIRED IN ONE LOCATION.
    - 2. MOUNT RECEPTACLES AT HEIGHT SPECIFIED IN SECTION 16010 - ELECTRICAL GENERAL REQUIREMENTS OR AS INDICATED.
    - 3. WHERE SPLIT RECEPTACLE HAS ONE PORTION SWITCHED, MOUNT VERTICALLY AND SWITCH UPPER PORTION.
  - 3. COVER PLATES:
    - 1. PROTECT STAINLESS STEEL COVER PLATE FINISH WITH PAPER OR PLASTIC FILM UNTIL PAINTING AND OTHER WORK IS FINISHED.
    - 2. INSTALL SUITABLE COMMON COVER PLATES WHERE WIRING DEVICES ARE GROUPED.
    - 3. DO NOT USE COVER PLATES MEANT FOR FLUSH OUTLET BOXES ON SURFACE-MOUNTED BOXES.

- 16412 - MOULDED CASE CIRCUIT BREAKERS**
  - 1.1 PRODUCT DATA**
    - 1. SUBMIT PRODUCT DATA AND SHOP DRAWINGS FOR ENGINEER REVIEW IN ACCORDANCE WITH GENERAL REQUIREMENTS.
    - 2. INCLUDE TIME-CURRENT CHARACTERISTIC CURVES FOR BREAKERS.
  - 2.1 BREAKERS GENERAL**
    - 1. BOLT-ON MOULDED CASE CIRCUIT BREAKER, QUICK-MAKE, QUICK-BREAK TYPE, FOR MANUAL AND AUTOMATIC OPERATION WITH TEMPERATURE COMPENSATION FOR 40° C AMBIENT.
    - 2. PLUG-IN MOULDED CASE CIRCUIT BREAKERS, QUICK-MAKE, QUICK-BREAK TYPE, FOR MANUAL AND AUTOMATIC OPERATION WITH TEMPERATURE COMPENSATION FOR 40° C AMBIENT.
    - 3. COMMON-TRIP BREAKERS WITH SINGLE HANDLE FOR MULTIPLE APPLICATIONS.
    - 4. MAGNETIC INSTANTANEOUS TRIP ELEMENTS IN CIRCUIT BREAKERS TO OPERATE ONLY WHEN VALUE OF CURRENT REACHES SETTING, TRIP SETTINGS ON BREAKERS WITH ADJUSTABLE TRIPS TO RANGE FROM 3-8 TIMES CURRENT RATING.
    - 5. CIRCUIT BREAKERS WITH INTERCHANGEABLE TRIPS AS INDICATED.
  - 2.2 THERMAL MAGNETIC BREAKERS DESIGN A**
    - 1. MOULDED CASE CIRCUIT BREAKER TO OPERATE AUTOMATICALLY BY MEANS OF THERMAL AND MAGNETIC TRIPPING DEVICES TO PROVIDE INVERSE TIME CURRENT TRIPPING AND INSTANTANEOUS TRIPPING FOR SHORT CIRCUIT PROTECTION.
  - 2.3 MAGNETIC BREAKERS DESIGN B**
    - 1. MOULDED CASE CIRCUIT BREAKER TO OPERATE AUTOMATICALLY BY MEANS OF MAGNETIC TRIPPING DEVICES TO PROVIDE INSTANTANEOUS TRIPPING FOR SHORT CIRCUIT PROTECTION.
  - 2.4 FUSED THERMAL MAGNETIC BREAKERS DESIGN C**
    - 1. FUSED THERMAL MAGNETIC BREAKERS WITH CURRENT LIMITING FUSES INTERNALLY MOUNTED, TIME CURRENT LIMITING CHARACTERISTICS OF FUSES COORDINATED WITH TIME CURRENT TRIPPING CHARACTERISTICS OF CIRCUIT BREAKER, COORDINATION TO RESULT IN INTERRUPTION BY BREAKER OF FAULT-LEVEL CURRENTS UP TO INTERRUPTING CAPACITY OF BREAKER, FUSES INDIVIDUALLY REMOVABLE AND INTERLOCKED WITH BREAKER, THE REMOVAL OF FUSE COVER, BLOWING OF A FUSE OR REMOVAL OF A FUSE, TO TRIP BREAKER.
  - 2.5 SOLID STATE TRIP BREAKERS DESIGN D**
    - 1. MOULDED CASE CIRCUIT BREAKER TO OPERATE BY MEANS OF A SOLID-STATE TRIP UNIT WITH ASSOCIATED CURRENT MONITORS AND SELF-POWERED SHUNT TRIP TO PROVIDE INVERSE TIME CURRENT TRIP UNDER OVERLOAD CONDITION, AND LONG TIME SHORT TIME INSTANTANEOUS TRIPPING FOR PHASE GROUND FAULT SHORT CIRCUIT PROTECTION.

- 2.6 OPTIONAL FEATURES**
  - 1. INCLUDE:
    - 1. SHUNT TRIP.
    - 2. AUXILIARY SWITCH.
    - 3. MOTOR-OPERATED MECHANISM C/W TIME DELAY UNIT.
    - 4. UNDER-VOLTAGE RELEASE.
    - 5. ON-OFF LOCKING DEVICE.
    - 6. HANDLE MECHANISM.
- 2.7 ACCEPTABLE MANUFACTURERS**
  - 1. APPROVED MANUFACTURERS ARE CUTLER-HAMMER, SQUARE 'D' CO., ALLEN-BRADLEY CANADA CO., SIEMENS CANADA LTD. AND CANADIAN GENERAL ELECTRIC.
- 3.1 INSTALLATION**
  - 1. INSTALL CIRCUIT BREAKERS AS INDICATED.

- 16414 - DISCONNECT SWITCHES - FUSES AND NON-FUSED**
  - 1.1 PRODUCT DATA**
    - 1. SUBMIT PRODUCT DATA AND SHOP DRAWINGS FOR ENGINEER REVIEW IN ACCORDANCE WITH GENERAL REQUIREMENTS.
  - 2.1 DISCONNECT SWITCHES**
    - 1. FUSIBLE, NON-FUSIBLE DISCONNECT SWITCH IN CSA ENCLOSURE, SIZE AS INDICATED.
    - 2. PROVISION FOR PADLOCKING IN ON-OFF SWITCH POSITION BY THREE LOCKS.
    - 3. MECHANICALLY INTERLOCKED DOOR TO PREVENT OPENING WHEN HANDLE IN ON POSITION.
    - 4. FUSES: SIZE AS INDICATED.
    - 5. FUSEHOLDERS: RELOCATABLE AND SUITABLE WITHOUT ADAPTORS, FOR TYPE AND SIZE OF FUSE INDICATED.
    - 6. QUICK-MAKE, QUICK-BREAK ACTION.
    - 7. ON-OFF SWITCH POSITION INDICATION ON SWITCH ENCLOSURE COVER.
  - 2.2 EQUIPMENT IDENTIFICATION**
    - 1. PROVIDE EQUIPMENT IDENTIFICATION IN ACCORDANCE WITH SECTION 16010 - ELECTRICAL GENERAL REQUIREMENTS.
    - 2. INDICATE NAME OF LOAD CONTROLLED ON SIZE 4 NAMEPLATE.
  - 2.3 ACCEPTABLE MANUFACTURERS**
    - 1. APPROVED MANUFACTURERS ARE CUTLER-HAMMER, SQUARE 'D' CO., ALLEN-BRADLEY CANADA CO., SIEMENS CANADA LTD. AND CANADIAN GENERAL ELECTRIC.
  - 3.1 INSTALLATION**
    - 1. INSTALL DISCONNECT SWITCHES COMPLETE WITH FUSES IF APPLICABLE.

- 16421 - CONTACTORS**
  - 1.1 PRODUCT DATA**
    - 1. SUBMIT PRODUCT DATA AND SHOP DRAWINGS FOR ENGINEER REVIEW IN ACCORDANCE WITH GENERAL REQUIREMENTS.
  - 2.1 CONTACTORS**
    - 1. CONTACTORS: TO EEMAC NO.1CS.
    - 2. ELECTRICALLY HELD CONTROLLED BY PILOT DEVICES AS INDICATED AND RATED FOR TYPE OF LOAD CONTROLLED.
    - 3. BREAKER COMBINATION CONTACTOR AS INDICATED.
    - 4. COMPLETE WITH 2 NORMALLY OPEN AND 2 NORMALLY CLOSED AUXILIARY CONTACTS UNLESS INDICATED OTHERWISE.
    - 5. MOUNT IN CSA ENCLOSURE 1 UNLESS OTHERWISE INDICATED.
    - 6. INCLUDE FOLLOWING OPTIONS IN COVER:
      - 1. RED INDICATING LAMP.
      - 2. STOP-START PUSHBUTTON.
      - 3. HAND-OFF-AUTO SELECTOR SWITCH.
      - 4. ON-OFF SELECTOR SWITCH.
  - 2.2 EQUIPMENT IDENTIFICATION**
    - 1. PROVIDE EQUIPMENT IDENTIFICATION IN ACCORDANCE WITH SECTION 16010 - ELECTRICAL GENERAL REQUIREMENTS.
    - 2. SIZE 4 NAMEPLATE INDICATING NAME OF LOAD CONTROLLED AS INDICATED.
  - 2.3 ACCEPTABLE MANUFACTURERS**
    - 1. APPROVED MANUFACTURERS ARE CUTLER-HAMMER, SQUARE 'D' CO., ALLEN-BRADLEY CANADA CO., SIEMENS CANADA LTD. AND CANADIAN GENERAL ELECTRIC.
  - 3.1 INSTALLATION**
    - 1. INSTALL CONTACTORS AND CONNECT AUXILIARY CONTROL DEVICES.

- 16441 - PANEL BOARDS BREAKER TYPE**
  - 1.1 SHOP DRAWINGS**
    - 1. SUBMIT SHOP DRAWINGS AND PRODUCT DATA FOR ENGINEER REVIEW IN ACCORDANCE WITH GENERAL REQUIREMENTS.
    - 2. DRAWINGS TO INCLUDE ELECTRICAL DETAIL OF PANEL, BRANCH BREAKER TYPE, QUANTITY, AMPACITY AND ENCLOSURE DIMENSION.
  - 2.1 PANEL BOARDS**
    - 1. PANEL BOARDS, PRODUCT OF ONE MANUFACTURER.
      - 1. INSTALL CIRCUIT BREAKERS IN PANEL BOARDS BEFORE SHIPMENT.
      - 2. IN ADDITION TO CSA REQUIREMENTS MANUFACTURER'S NAMEPLATE MUST SHOW FAULT CURRENT THAT PANEL INCLUDING BREAKERS HAS BEEN BUILT TO WITHSTAND.
    - 2. 250 V PANEL BOARDS, BUS AND BREAKERS RATED FOR 22 KA SYMMETRICAL INTERRUPTING CAPACITY.
    - 3. SEQUENCE PHASE BUSSING WITH ODD NUMBERED BREAKERS ON LEFT AND EVEN ON RIGHT, WITH

- EACH BREAKER IDENTIFIED BY PERMANENT NUMBER IDENTIFICATION AS TO CIRCUIT NUMBER AND PHASE.
- 4. PANEL BOARDS: MAINS, NUMBER OF CIRCUITS, AND NUMBER AND SIZE OF BRANCH CIRCUIT BREAKERS AS INDICATED.
- 5. TWO KEYS FOR EACH PANEL BOARD AND KEY PANEL BOARDS ALIKE.
- 6. COPPER BUS WITH NEUTRAL OF SAME AMPERE RATING AS MAINS.
- 7. MAINS: SUITABLE FOR BOLT-ON BREAKERS.
- 8. TRIM WITH CONCEALED FRONT BOLTS AND HINGES.
- 9. TRIM AND DOOR FINISH: BAKED GREY ENAMEL.
- 10. SURFACE PANEL BOARDS TO BE PROVIDED WITH SPRINKLER DRIP-PROOF HOODS.
- 2.2 CUSTOM BUILT PANEL BOARD ASSEMBLIES**
  - 1. 125 MM RELAY SECTION ON ONE SIDE OF PANELS AS INDICATED FOR INSTALLATION OF LOW VOLTAGE REMOTE CONTROL SWITCHING COMPONENTS.
  - 2. DOUBLE STACK PANELS AS INDICATED.
  - 3. CONTACTORS IN MAINS AS INDICATED.
  - 4. FEED THROUGH LUGS AS INDICATED.
  - 5. ISOLATED GROUND BUS.
- 2.3 BREAKERS**
  - 1. BREAKERS: TO SECTION 16412 - MOULDED CASE CIRCUIT BREAKERS.
  - 2. BREAKERS WITH THERMAL AND MAGNETIC TRIPPING IN PANEL BOARDS EXCEPT AS INDICATED OTHERWISE.
  - 3. MAIN BREAKER: SEPARATELY MOUNTED ON TOP OR BOTTOM OF PANEL TO SUIT CABLE ENTRY. WHEN MOUNTED VERTICALLY, DOWN POSITION SHOULD OPEN BREAKER.
  - 4. LOCK-ON DEVICES FOR 10 % OF 15 A BREAKERS INSTALLED AS INDICATED. TURN OVER UNUSED LOCK-ON DEVICES TO OWNER.
  - 5. LOCK-ON DEVICES FOR FIRE ALARM, CLOCK OUTLET, EMERGENCY LIGHTING, INTERCOM, EXIT AND NIGHT LIGHT CIRCUITS.
- 2.4 EQUIPMENT IDENTIFICATION**
  - 1. PROVIDE EQUIPMENT IDENTIFICATION IN ACCORDANCE WITH SECTION 16010 - ELECTRICAL GENERAL REQUIREMENTS.
  - 2. NAMEPLATE FOR EACH PANEL BOARD SIZE 4 ENGRAVED AS INDICATED.
  - 3. NAMEPLATE FOR EACH CIRCUIT IN DISTRIBUTION PANELBOARDS SIZE 2 ENGRAVED AS INDICATED.
  - 4. COMPLETE CIRCUIT DIRECTORY WITH TYPEWRITTEN LEGEND SHOWING LOCATION AND LOAD OF EACH CIRCUIT.
- 2.5 ACCEPTABLE MANUFACTURERS**
  - 1. APPROVED MANUFACTURERS ARE CUTLER-HAMMER, SQUARE 'D' CO., SIEMENS CANADA LTD. AND CANADIAN GENERAL ELECTRIC.

- 3.1 INSTALLATION**
  - 1. LOCATE PANEL BOARDS AS INDICATED AND MOUNT SECURELY, PLUMB, TRUE AND SQUARE, TO ADJOINING SURFACES.
  - 2. INSTALL SURFACE MOUNTED PANEL BOARDS ON PLYWOOD BACKBOARDS, WHERE PRACTICAL, GROUP PANEL BOARDS ON COMMON BACKBOARD.
  - 3. MOUNT PANEL BOARDS TO HEIGHT SPECIFIED IN SECTION 16010 - ELECTRICAL GENERAL REQUIREMENTS OR AS INDICATED.
  - 4. CONNECT LOADS TO CIRCUITS.
  - 5. PROVIDE TWO (2) 1" DIA. SPARE CONDUITS FROM PANEL BOARDS TO CEILING SPACE FOR FUTURE USE.
  - 6. CONNECT NEUTRAL CONDUCTORS TO COMMON NEUTRAL BUS WITH RESPECTIVE NEUTRAL IDENTIFIED.

- 16491 - FUSES - LOW VOLTAGE**
  - 1.1 PRODUCT DATA**
    - 1. SUBMIT PRODUCT DATA AND SHOP DRAWINGS FOR ENGINEER REVIEW IN ACCORDANCE WITH GENERAL REQUIREMENTS.
  - 1.2 SPARE FUSES**
    - 1. PROVIDE SIX (6) SPARE FUSES OF EACH TYPE AND SIZE INSTALLED UP TO AND INCLUDING 600A.
    - 2. PROVIDE THREE (3) SPARE FUSES OF EACH TYPE AND SIZE INSTALLED ABOVE 600A.
  - 1.3 DELIVERY AND STORAGE**
    - 1. SHIP FUSES IN ORIGINAL CONTAINERS.
    - 2. STORE FUSES IN ORIGINAL CONTAINERS IN MOISTURE-FREE LOCATION.
    - 3. OBTAIN RECEIPT FROM OWNER OF FUSE DELIVERY.
  - 2.1 FUSES - GENERAL**
    - 1. HRC FUSES: TO C.S.A. C22.2 NO. 106 TO HAVE INTERRUPTING CAPABILITY OF 200 KA SYMMETRICAL.
    - 2. FUSES: PRODUCT OF ONE MANUFACTURER.
  - 2.2 FUSE TYPES**
    - 1. RATINGS OF 1 TO 600 AMPERES; C.S.A. HRC-I (NON TIME DELAY).
    - 2. RATINGS OF 601 TO 6000 AMPERES; C.S.A. HRC-L (NON TIME DELAY).
    - 3. TIME DELAY FUSES (WHERE INDICATED ON DRAWINGS) SHALL CARRY 500% OF RATED CURRENT FOR 10 SECONDS MINIMUM AND BE CLEARLY LABELED "TIME DELAY".
      - 1. 1-600A HRC-I (TIME DELAY)
      - 2. 601-6000A HRC-L (TIME DELAY)
  - 2.3 APPROVED MANUFACTURERS**
    - 1. BUSSMAN MANUFACTURING
    - 2. GOULD-SHAWMUT COMPANY

- 3.1 INSTALLATION**
  - 1. INSTALL FUSES IN MOUNTING DEVICES IMMEDIATELY BEFORE ENERGIZING CIRCUITS.
  - 2. ENSURE CORRECT FUSES FITTED TO PHYSICALLY MATCHED MOUNTING DEVICES.
  - 3. ENSURE CORRECT FUSES TO ASSIGNED ELECTRICAL CIRCUIT.

- 16826 - WIRING FOR MECHANICAL EQUIPMENT**
  - 1.1 RELATED WORK**
    - 1. ELECTRICAL PROJECT REQUIREMENTS - SECTION 16000.
    - 2. ELECTRICAL GENERAL REQUIREMENTS - SECTION 16010.
    - 3. MOTOR STARTERS TO 800 V - SECTION 16223.
    - 4. DISCONNECT SWITCHES FUSED AND NON-FUSED - SECTION 16414.
    - 5. BUILDING AUTOMATION SYSTEM - SECTION 15900.
  - 1.2 RELATED WORK SPECIFIED ELSEWHERE**
    - 1. DIVISION 15 SPECIFICATIONS AND DRAWINGS: CHECK ALL THESE DRAWINGS AND SPECIFICATIONS FOR DETAILED REQUIREMENTS AND COMPONENTS SUPPLIED.
    - 2. ANY OTHER SPECIALTY DIVISIONS REFER TO THE SCHEDULE ON THE DRAWINGS.
  - 1.3 SCOPE OF WORK**
    - 1. FURNISH, INSTALL AND WIRE ALL ELECTRICAL CONTROL COMPONENTS, ETC., REQUIRED FOR THIS EQUIPMENT.
    - 2. ALL ELECTRIC WIRING AND CONNECTION OF EQUIPMENT TO THE DESIGNATED POWER SUPPLY AND BETWEEN THE ITEMS OF EQUIPMENT SUPPLIED BY THE SUB-CONTRACTORS SHALL BE CARRIED OUT BY THIS SUB-CONTRACTOR EXCEPT FOR:
      - 1. SUPPLY AND INSTALLATION OF ELECTRIC MOTORS AND OTHER ELECTRICAL COMPONENTS THAT WILL BE SUPPLIED BY OTHER TRADES IN ACCORDANCE WITH THE DRAWINGS AND EQUIPMENT SCHEDULES.
      - 2. WIRING OF ANY PACKAGED AND WIRED UNITS, WHICH ARE NORMALLY FACTORY INSTALLED BEYOND THE MAIN DISCONNECT SWITCH SUCH AS BOILERS, ELEVATORS, HOISTS, ETC., EXCEPT WHERE NOTED.
    - 3. SUPPLY AND INSTALL ALL NECESSARY WIRING, DISCONNECT SWITCHES, STARTERS, RELAYS, PUSHBUTTON STATIONS, AND OTHER CONTROL DEVICES LISTED ON THE EQUIPMENT SCHEDULE, THE DRAWINGS OR AS SPECIFIED HEREIN.
  - 1.4 VOLTAGE LEVELS**
    - 1. IN GENERAL, ALL ELECTRICAL MOTORS SHALL BE 575V, 3 PHASE OR 208V, 3 PHASE OR SINGLE PHASE OR 120V SINGLE PHASE 60 CYCLE UNLESS SPECIFICALLY NOTED OTHERWISE ON THE DRAWINGS.
    - 2. VERIFY ALL MOTOR CHARACTERISTICS TO ACTUAL INSTALLATION AND NOTIFY THE ENGINEER AND ALL INTERESTED PARTIES IN WRITING OF ANY DISCREPANCIES BETWEEN THE DESIGN CHARACTERISTICS AND THOSE OF THE EQUIPMENT ACTUALLY DELIVERED TO THE SITE.
  - 1.5 DISCONNECT SWITCHES**
    - 1. WHERE NECESSARY TO PROVIDE A VISIBLE MEANS OF DISCONNECT TO MEET THE LATEST REQUIREMENTS OF THE ONTARIO HYDRO SAFETY CODE, THIS SUB-CONTRACTOR SHALL ACCEPT FULL RESPONSIBILITY TO ENSURE THAT SUCH REGULATIONS ARE MET. ALL DISCONNECT SWITCHES SHALL BE NON-FUSED TYPE, H.P. RATED, HEAVY DUTY TYPE A.
    - 2. WHERE DISCONNECTING MEANS ARE REQUIRED WITH PROTECTION, CIRCUIT BREAKERS ONLY SHALL BE INSTALLED OF A SIZE AND TRIP RATING AS NOTED ON THE DRAWINGS. INSTALL A LOCKABLE WEATHERPROOF DISCONNECT SWITCH AT EACH MECHANICAL UNIT MOUNTED ON THE ROOF AS INDICATED.
  - 1.6 EQUIPMENT SCHEDULE**
    - 1. EQUIPMENT SUPPLIED AND INSTALLED BY OTHER TRADES FOR BUILDING SERVICES SUCH AS HEATING, VENTILATING, AIR CONDITIONING AND/OR PLUMBING, HOIST OR ELEVATORS TO BE WIRED BY THIS SUB-CONTRACTOR ARE SHOWN ON THE DRAWINGS OR NOTED HEREIN.
    - 2. CONTROL COMPONENTS LISTED WITH LOCATIONS TO SAME ARE IN GENERAL SHOWN ON THE DRAWINGS. IT IS THIS SUB-CONTRACTORS RESPONSIBILITY TO VERIFY ALL CONTROL LOCATIONS WITH THE ENGINEER AND/OR SUB-CONTRACTOR INVOLVED.
  - 1.7 NAMEPLATES**
    - 1. ALL DISCONNECT SWITCHES, STARTERS, PUSHBUTTON STATIONS, THERMOSTATS AND ALL OTHER CONTROL DEVICES SHALL BE LABELLED WITH "LAMICOID" NAMEPLATES; REFER TO SECTION 16010. ACTUAL WIRING SHALL BE APPROVED BY THE ENGINEER AND/OR THE RESPECTIVE SUB-CONTRACTOR.

- 2.1 STARTERS**
  - 1. REFER TO SECTION 16223 - MOTOR STARTERS TO 600V.
- 2.2 DISCONNECT SWITCHES**
  - 1. REFER TO SECTION 16414 - DISCONNECT SWITCHES - FUSED AND NON FUSED.
- 2.3 CONTROL DEVICES**
  - 1. REFER TO SECTION 16423 - CONTROL DEVICES.
- 3.1 INSTALLATION**
  - 1. INSTALL AND WIRE ALL STARTERS, DISCONNECT SWITCHES, TIMERS, AND OTHER MISCELLANEOUS CONTROL COMPONENTS AS NOTED ON THE DRAWINGS AND SCHEDULES.
- 3.2 EQUIPMENT SCHEDULE**
  - 1. THE EQUIPMENT SCHEDULES SHOWN ON THE MECHANICAL DRAWINGS INDICATE THE EQUIPMENT TO BE WIRED, TYPE OF CONTROL, CONTROL COMPONENTS, DIVISION OF WORK AND THE TYPE OF EQUIPMENT TO BE WIRED. REFER ALSO TO THE MECHANICAL DRAWINGS AND SPECIFICATIONS.
- 3.3 WIRING DIAGRAMS**
  - 1. BEFORE WIRING ANY OF THIS EQUIPMENT OBTAIN COMPLETE WIRING AND CONNECTION DIAGRAMS FROM THE SUB-CONTRACTORS AND SUPPLIERS.
- 3.4 COMMISSIONING**
  - 1. CHECK OUT ALL CONTROL SYSTEMS AND SCHEDULES ON A DRY-RUN BASIS, BEFORE APPLYING POWER TO THE DRIVES.
  - 2. RETAIN SUPPLIERS ASSISTANCE WITH SPECIAL EQUIPMENT.
  - 3. CHECK THE ROTATION OF THE DRIVES.

DRAWING LIST	
E01	KEY & LOCATION PLANS - NOTES & LEGENDS
E02	SITE SERVICES PLAN - NOTES & DETAILS
E03	GROUND FLOOR PLAN LIGHTING & LIFE SAFETY POWER & COMMUNICATIONS
E04	PANEL SCHEDULES & POWER DISTRIBUTION
E05	DETAILS
E06	ELECTRICAL SPECIFICATIONS - 1 OF 2
E07	ELECTRICAL SPECIFICATIONS - 2 OF 2

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**DIMENSIONS**  
CONTRACTOR SHALL VERIFY AND BE RESPONSIBLE FOR ALL DIMENSIONS. DO NOT SCALE DRAWINGS. CONTRACTOR SHALL REPORT ANY ERRORS OR OMISSIONS TO NRG CONSULTANTS INC. IMMEDIATELY UPON DISCOVERY.

No.	DATE	MADE	DESCRIPTION
2	2023/08/30	G.J.L.	RE-ISSUED FOR TENDER
1	2023/08/16	G.J.L.	ISSUED FOR TENDER
0	2023/05/26	G.J.L.	ISSUED FOR PERMIT
C	2023/05/19	G.J.L.	ISSUED FOR COORDINATION
B	2022/08/08	G.J.L.	ISSUED FOR REVIEW
A	2021/11/05	G.J.L.	ISSUED FOR COMMENTS
REVISIONS/ADDENDA ISSUED			



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TITLE  
**ELECTRICAL**

ELECTRICAL SPECIFICATIONS - 2 OF 2

PROJECT			
<b>HOLY FAMILY CEMETERY CREMATORIUM BUILDING</b> 2523 LOWER BASE LINE ROAD MILTON ONTARIO			
SCALE	DATE	DRAWN	CHECKED
AS SHOWN	2020/11/01	G.J.L.	S.C.S.
PROJECT No.	REV No.	DRAWING No.	
1922A	2		<b>E07</b>