BORTOLOTTO

ADDENDUM #3

Project	Pope Francis Elementary School	**Project #**	pf1701
Location	387 Balsam Street North Timmins, Ontario	**Date**	June 9, 2017
		Pages	1 of 4

The Following information supplements and/or supersedes the bid documents: drawings dated May 17, 2017. This addendum forms part of the contract documents and is to be read, interpreted and coordinated with all other parts. The cost of all contained herein is to be included in the contract sum. The following revisions supersede the information contained in the original drawings and specifications issued for the above-named project to the extent referenced and shall become part thereof. Acknowledge receipt of this Addendum by inserting its number and date on the Tender Form. Failure to do so may subject bidder to disqualification.

Included in Addendum #2 are the following:

• Architectural Addendum #3, dated June 9th, 2017	4 pages
• Architectural Sketches ADD-1 through ADD-5, dated June 9th, 2017, attached	5 pages
• Structural Addendum – S01, dated May 25, 2017, attached.	35 pages
• Structural Addendum – S02, dated June 5, 2017, attached.	8 pages
• Structural Addendum – S03, dated June 8, 2017, attached.	3 pages
• Geotechnical Investigation, dated April 21, 2017, attached.	47 pages
• Mechanical & Electrical Addendum #1, dated June 9, 2017, attached.	14 pages
Total:	116 pages

General

1. Cash allowances:
   a. Contractor shall provide a $20,000.00 cash allowance for garbage enclosure for two 4 cubic yard trash bins. Refer to Drawing A1.1.

2. Contractor shall provide Window Shades for the following window types (excluding Rooms X120. X121, X123):
   a. W1, W4, W9

3. Contractor shall provide conform to all items identified in Section 01 31 19 of the Architectural Specifications, specifically:
   a. Record of meeting minutes. Include significant proceedings and decisions. Identify actions by parties.

4. Contractor shall provide conform to all items identified in Section 01 51 00 – Temporary Utilities of the Architectural Specifications, specifically:
   a. Item 1.7.9 - Pay costs for maintaining temporary heat, when using permanent heating system. Owner will pay utility charges when temporary heat source is existing building equipment.
   b. Item 1.8.1 – the existing building service may be used for 120 volt devices only. Any equipment requiring 240volt or greater power requirements shall be fed with generators provided by the contractor.

5. Contractor shall consider all sprinkler head locations on drawings for reference only. Mechanical Contractor to provide stamped New Sprinkler System Design to consultant for review. Window Sprinkler Protection is to be contained in Foyer 105 including the portion of Bridge 201 that intersects the space.

ADDENDUM #3

Project	Pope Francis Elementary School	**Project #**	pf1701
Location	387 Balsam Street North Timmins, Ontario	**Date**	June 9, 2017
		Pages	2 of 4

Architectural Specifications	1. Revise specification section 00 21 13 – Instructions to Bidders: 1.1. Item 1.2. – Invited sub-contractors: 1.1.1. Revise item 1.2.1.4 to read as follows: *Guy's Custom Cabinets* 1.2. Item 1.3. – Invitation: 1.2.1. Revise item 1.3.1.2 – Bid Call to read as follows: *Submit bids only to the address of the Northeastern Catholic District School Board Office at 383 Birch Street North, Timmins, Ontario. Bids submitted to the address of Bortolotto Design Architect Inc. will not be opened and will be declared informal.* 2. Revise specification section 00 30 20 – Bid Supplementary form: 1.1. Revise Submittal address to read as follows: *To: Northeastern Catholic District School Board Office* *383 Birch Street North,* *Timmins, Ontario.* 3. Revise specification section 09 65 99 – Resilient Flooring as follows: 1.1. Revise Item 2.1 – Resilient Tile Flooring Materials to read as follows: *.1 Vinyl composition tile to ASTM F 1066, Composition 1 – non asbestos; 24"x24" tile; Johnsonite iQ; colours as follows:* *.1 RF#1: #3077263 'Outland Trails CB'* *.2 RF#2: #3242259 'Ruby Firestone'* *.3 RF#3: #3242244 'Darkened Oasis B'* *.4 RF#4: #3242205 'Summer Moon W'* *.5 RF#5: #3242824 'Yellow Mustard'*
Architectural Drawings	1. Sheet A0.2 – Room Finish & Door Schedules & Notes 1.1. Door Schedule – Level 1 Existing; 1.1.1. Revise DX117a Door Material to read 'WD' 1.1.2. Revise DX120 Door Material to read 'ALUM.' 1.1.3. Revise DX212 Door Material to read 'WD' and Finish to read 'CF' 1.1.4. Revise DX102 Panel Quantity to read '1' 2. Sheet A0.3 – Assembly, Door & Frame Type Schedules 2.1. Drawing 2/A0.3 – Window Type Schedule; 2.1.1. Revise W10 title to read 'Window Type 10' 2.1.2. Revise W11 title to read 'Window Type 11' 2.1.3. Add 'W15 – Window Type 15 – Double glazed Aluminum Curtain wall system w/ capped and cappless mullions. Similar to W@. Refer to Section Drawing 2/A6.2 for height.' 2.2. Drawing 4/A0.3 – Door Type Schedule;

ADDENDUM #3

Project	Pope Francis Elementary School	**Project #**	pf1701
Location	387 Balsam Street North Timmins, Ontario	**Date**	June 9, 2017
		Pages	3 of 4

2.2.1. Revise Door Type 4 description to read 'Solid Core Single Glazed 44 mm Thick w/ window shade'
2.2.2. Revise Door Type 12 description to read 'Solid Core Single Glazed 44 mm Thick 45 minute fire rating resistance rating w/ window shade'

3. Sheet A1.1 – Site Plan
   3.1. Drawing 1/A1.1 – Site Plan;
      3.1.1. Revise the note 'Siamese Connection located 45m from closest unobstructed fire hydrant' to read 'Standalone Siamese Connection located 45m from closest unobstructed fire hydrant mounted 300mm away from existing exterior gymnasium wall.
4. Sheet A3.1 – Demolition Plan
   4.1. Revise Demolition Plan Drawing Notes #15 to read:
      Patch and make good any voids in milldeck ceiling, as a result of junction box demolition with matching material, dimension and finish.

5. Sheet A4.2 – Ground Floor Plan - Reno
   5.1. Drawing 1/A4.2 – Ground Floor Plan - Reno;
      5.1.1. Revise the note under Room Title Child Care X109 to read:
      Unobstructed Floor Area 53m2 / 570 sqft
      19 Infants/Toddler/Pre-school
      5.1.2. Revise the note under Room Title Child Care X112 to read:
      Unobstructed Floor Area 32m2 / 344 sqft
      11 Infants/Toddler/Pre-school
      5.1.3. Revise the note under Room Title Child Care X120 to read:
      Unobstructed Floor Area 50m2 / 538 sqft
      18 Infants/Toddler/Pre-school
      5.1.4. Revise the note under Room Title Child Care X121 to read:
      Unobstructed Floor Area 32m2 / 344 sqft
      11 Infants/Toddler/Pre-school

6. Sheet A4.2 – Ground Floor Plan - Reno
   6.1. Drawing 1/A4.2 – Ground Floor Plan - Reno;
      6.1.1. Revise the title of floor finish RF to RF1

7. Sheet A4.3 – Ground Floor Plan - Addition
   7.1. Drawing 1/A4.3 – Ground Floor Plan - Addition;
      7.1.1. Revise the title of floor finish RF to RF1
      7.1.2.

8. Sheet A4.4 – Second Floor Plan - Reno
   8.1. Drawing 1/A4.4 – Second Floor Plan - Reno;
      8.1.1. Revise the title of floor finish RF to RF1

9. Sheet A4.5 – Second Floor Plan - Addition
   9.1. Drawing 1/A4.5 – Second Floor Plan - Addition;
      9.1.1. Revise the title of floor finish RF to RF1

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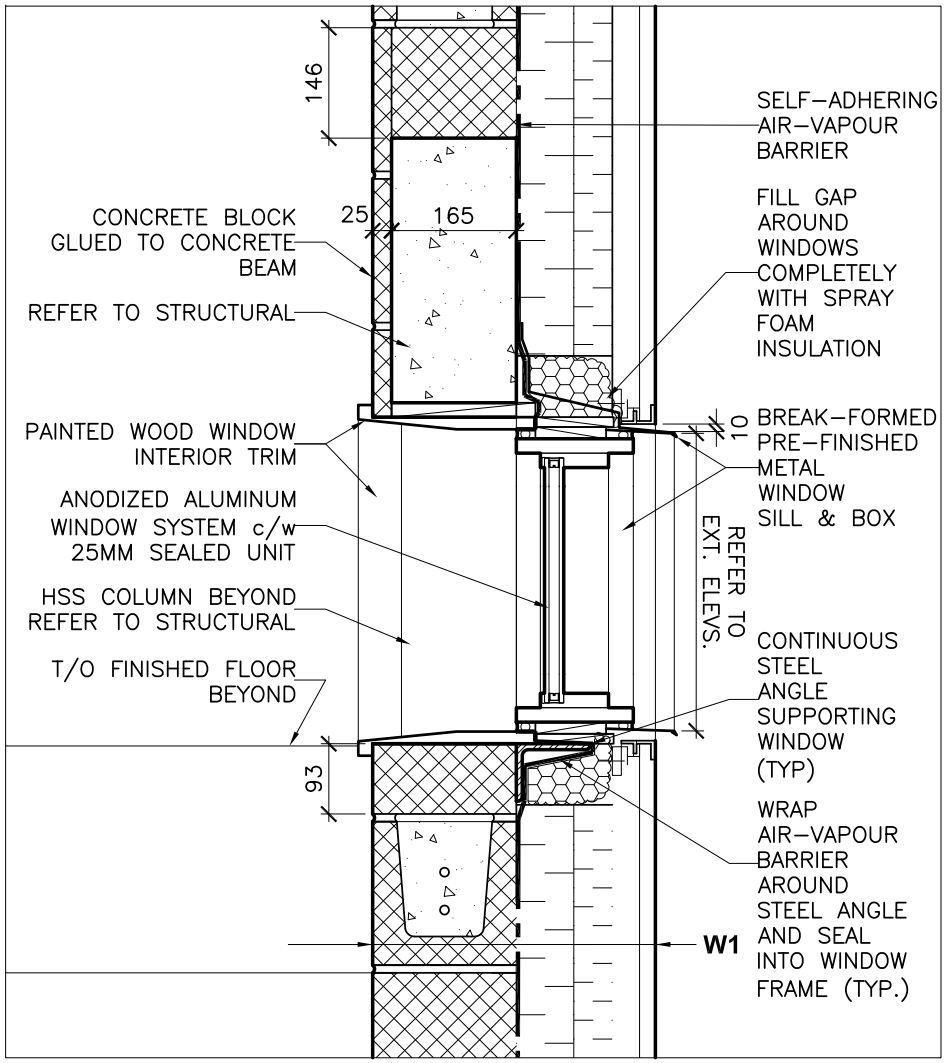
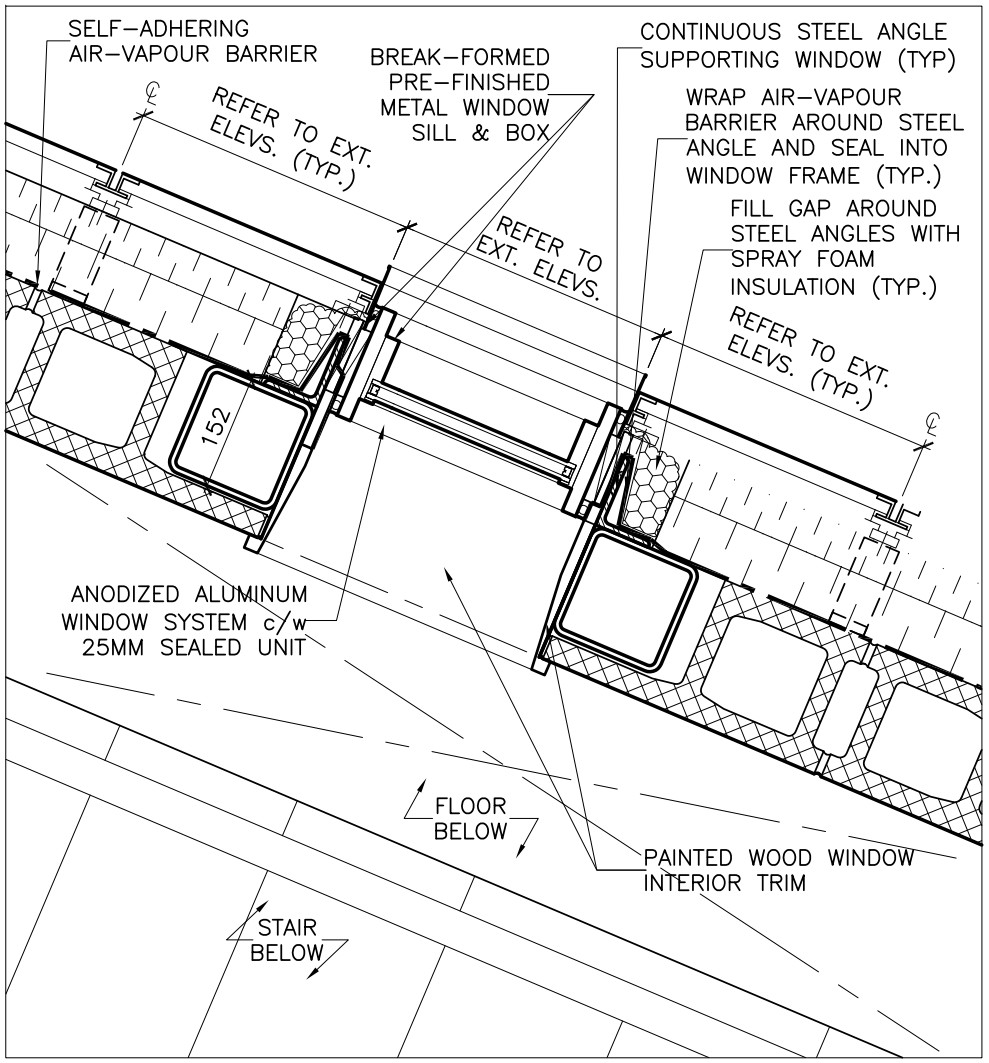
Location	387 Balsam Street North Timmins, Ontario	**Date**	June 9, 2017
		Pages	4 of 4

	9.1.2. Revise W3 to read 'W2 Similar' 10. Add Sketch ADD-1 W8 Details @ Stair 122 11. Add Sketch ADD-2 W5 Window film pattern @ Foyer 105 12. Add Sketch ADD-3 Resilient Flooring Pattern @ Library 206 13. Add Sketch ADD-4 Window box flashing axonometric 14. Add Sketch ADD-5 Structural columns @ Foyer 100
Structural Addendum	Refer to Structural Addendum – S01 through S03 Attached. Refer to Geotechnical Investigation Attached. 1. Contractor shall refer to Structural Drawings general notes for specifications on concrete, concrete reinforcing and piles.
Mechanical Addendum	Refer to Mechanical Addendum #1 Attached.
Electrical Addendum	Refer to Electrical Addendum #1 Attached.

END OF ADDENDUM # 3



2 ADD-1 SECTION DETAIL 1:10



1 ADD-1 PLAN DETAIL 1:10

POPE FRANCIS ELEMENTARY
ADDITION & RENOVATION
PROJECT#R121

387 BALSAM STREET NORTH
TIMMINS, ONTARIO

REV	DESCRIPTION	DATE
1	ADD#1	17.06.09

ONTARIO ASSOCIATION OF ARCHITECTS
TANIA BORTOLOTTO
LICENCE
5374

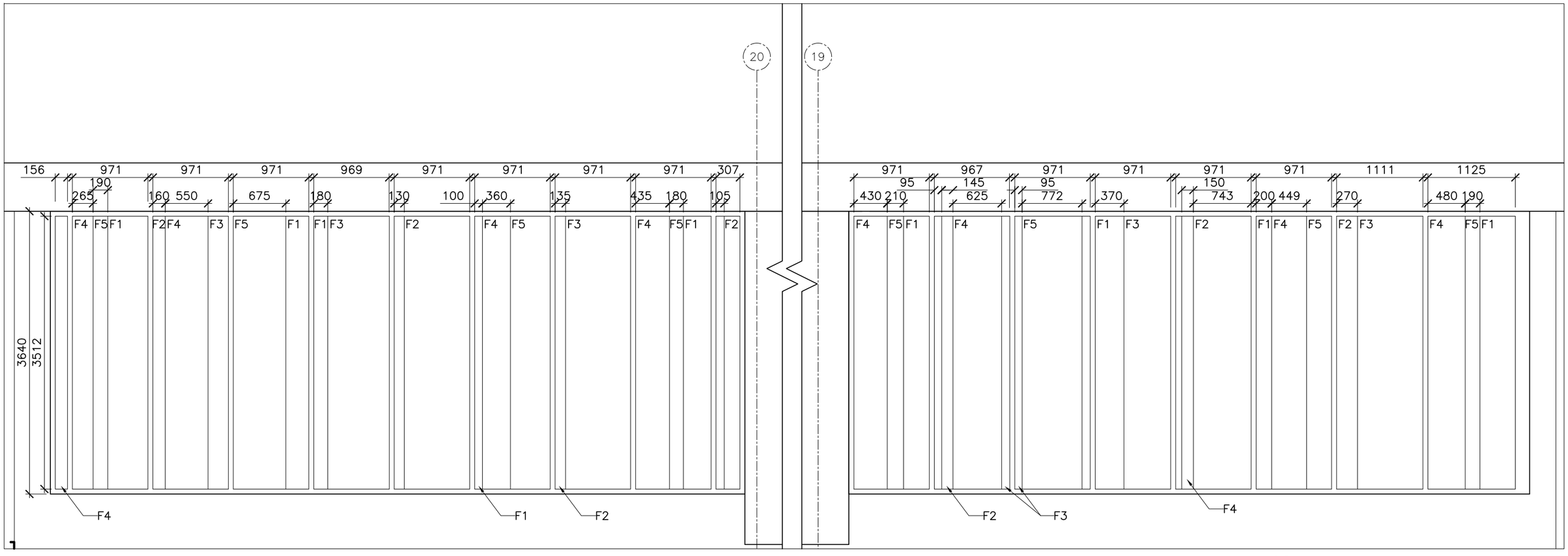
PROJECT NUMBER	pf1701
DATE	17.05.31
SCALE	1:10
DRAWN BY	BM

W8 DETAILS @ STAIR 122

BORTOLOTTO 533 College Street / Suite 401 / Toronto ON M6G 1A8 / Tel 416 324 9951 / alex@bortolotto.com

ADD-1

GENERAL LEGEND	
F1	BRIMSTONE YELLOW SXP–025 UV
F2	LIGHT RED SXP–032 UV
F3	TELEMAGENTA SXP–077 UV
F4	ICE BLUE SXP–056 UV
F5	AZURE BLUE SXP–052 UV



1 / ADD-2 ELEVATION
1:50

POPE FRANCIS ELEMENTARY
ADDITION & RENOVATION
PROJECT#R121

387 BALSAM STREET NORTH
TIMMINS, ONTARIO

REV	DESCRIPTION	DATE
1	ADD#2	17.06.09

BORTOLOTTO 533 College Street / Suite 401 / Toronto ON M6G 1A8 / Tel 416 324 9951 / alex@bortolotto.com

ONTARIO ASSOCIATION OF ARCHITECTS
TANIA BORTOLOTTO
LICENCE
5374

PROJECT NUMBER
pf1701

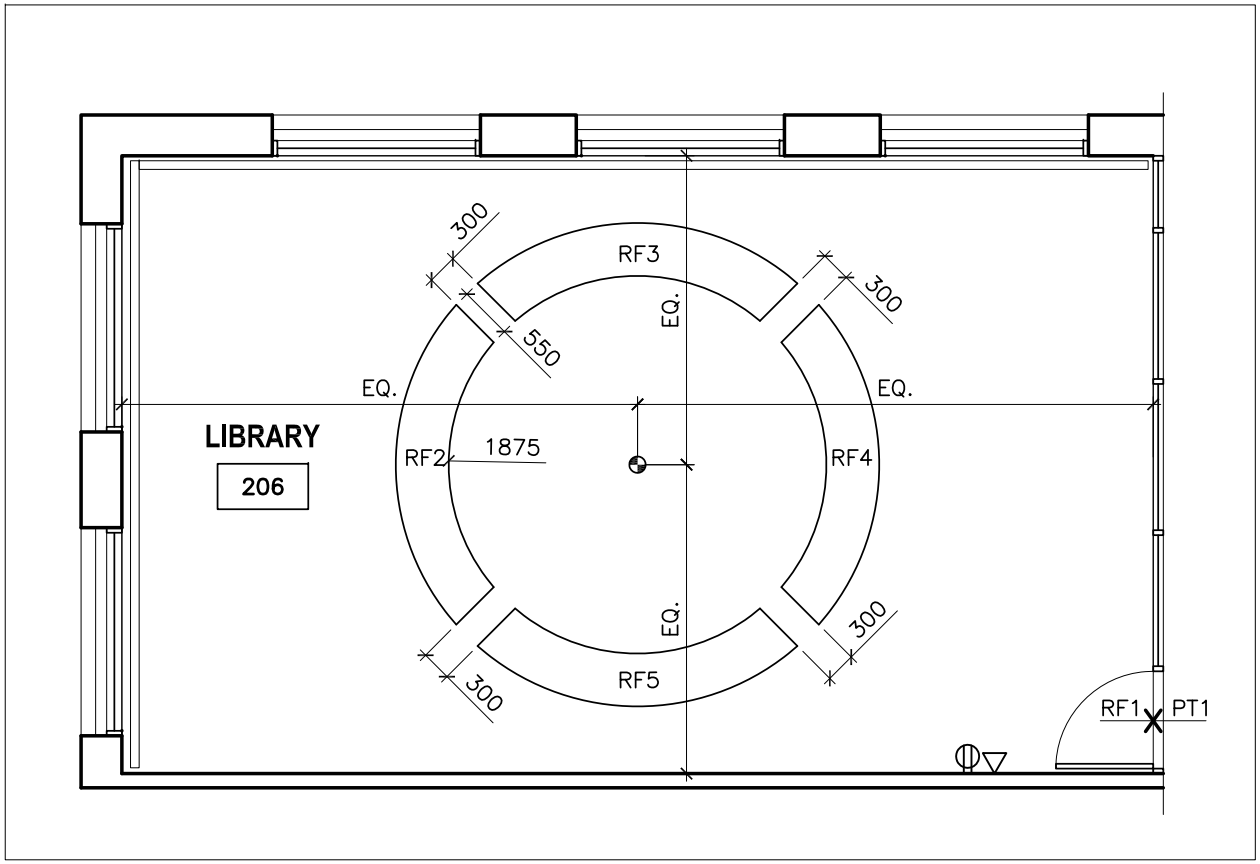
DATE
17.05.31

SCALE
1:50

DRAWN BY
BM

W5 WINDOW FILM PATTERN @ FOYER 105

ADD-2



1 / ADD-3 PLAN DETAIL

1:75

POPE FRANCIS ELEMENTARY
ADDITION & RENOVATION
PROJECT#R121

387 BALSAM STREET NORTH
TIMMINS, ONTARIO

REV	DESCRIPTION	DATE
1	ADD#3	17.06.09

ONTARIO ASSOCIATION OF ARCHITECTS
TANIA BORTOLOTTO
LICENCE
5374

PROJECT NUMBER	pf1701
DATE	17.05.31
SCALE	1:10
DRAWN BY	BM

RESILIENT FLOORING PATTERN @ LIBRARY 206

ADD-3

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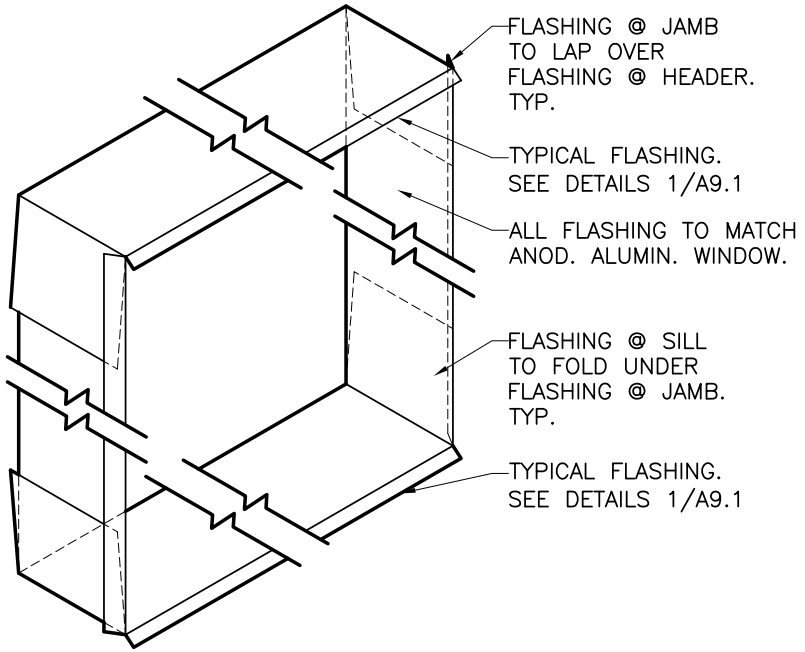

1
ADD-4

WINDOW BOX FLASHING AXONOMETRIC
NTS

POPE FRANCIS ELEMENTARY
ADDITION & RENOVATION
PROJECT#R121

387 BALSAM STREET NORTH
TIMMINS, ONTARIO

REV	DESCRIPTION	DATE
1	ADD#4	17.06.09

ONTARIO ASSOCIATION OF ARCHITECTS
TANIA BORTOLOTTO
LICENCE
5374

PROJECT NUMBER
pf1701

DATE
17.05.31

SCALE
NTS

DRAWN BY
BM

WINDOW BOX FLASHING AXONOMETRIC

ADD-4

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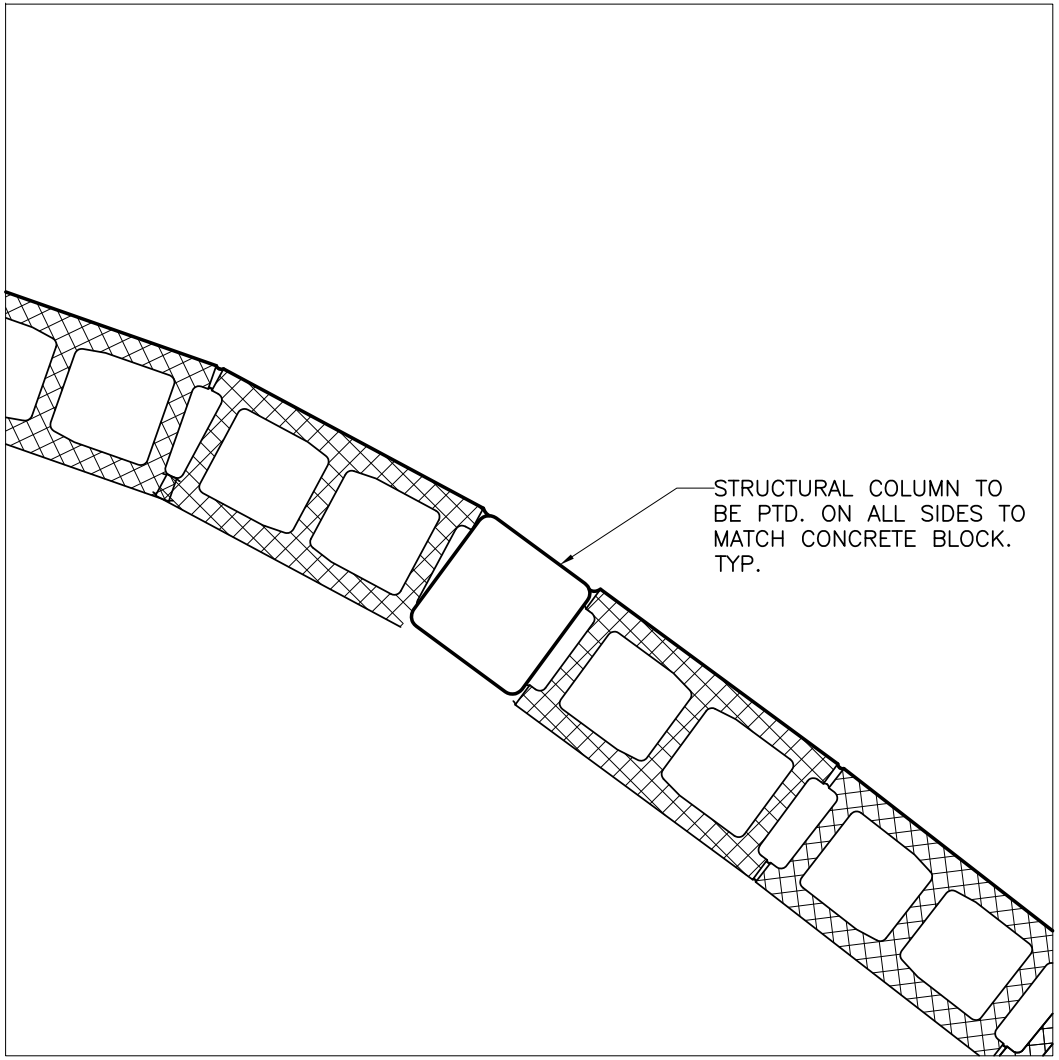

1 / ADD-5 STRUCTURAL COLUMNS @ FOYER 100, TYP.

1:10

POPE FRANCIS ELEMENTARY
ADDITION & RENOVATION
PROJECT#R121

387 BALSAM STREET NORTH
TIMMINS, ONTARIO

REV	DESCRIPTION	DATE
1	ADD#5	17.06.09

ONTARIO ASSOCIATION OF ARCHITECTS
TANIA BORTOLOTTO
LICENCE
5374

PROJECT NUMBER	pf1701
DATE	17.05.31
SCALE	NTS
DRAWN BY	BM

STRUCTURAL COLUMNS @ FOYER 100

ADD-5

BORTOLOTTO 533 College Street / Suite 401 / Toronto ON M6G 1A8 / Tel 416 324 9951 / alex@bortolotto.com

engineeringlink
building envelope & structure

207 Adelaide St. E., Suite 200
Toronto, ON M5A 1M8
b: 416-599-LINK (5465)
www.engineeringlink.ca

STRUCTURAL ADDENDUM - S01

17-1079

PTA No.: **S01**
Date: May 25, 2017

To: Bortolotto
533 College St., Suite 401
Toronto, ON M6G 1A
Attn: Brian Muthaliff

Re: 387 Balsam St. N., Timmins, ON
Pope Francis Elementary School Renovations/Additions

The following instruction is a clarification of the Structural Contract Documents. Should the Contractor hold that these instructions involve a change in the contract intent or amount, the Contractor shall notify the Architect in writing and shall not proceed with any work until directed by a change order or field order.

Drawings Issued

Drawing No.	Drawing Title	Revision	Date
S1.1	General Notes	4	May 25, 2017
S2.1	Foundation Plan	4	May 25, 2017
S2.2	Second Floor Framing Plan	4	May 25, 2017
S2.3	Roof Framing Plan	4	May 25, 2017
S2.4	Roof Diaphragm & Second Floor Diaphragm Connection Plan:	4	May 25, 2017
S4.1	Sections and Details	4	May 25, 2017
S4.2	Sections and Details	4	May 25, 2017
S4.2B	Sections and Details	4	May 25, 2017
S4.3	Sections and Details	4	May 25, 2017
S5.1	Elevations	4	May 25, 2017

Description of Work

S1.1 – General Notes:

1. Revise general notes as shown bubbled.

S2.1 – Foundation Plan:

1. 1/S2.1: revise plans as shown bubbled.

S2.2 – Second Floor Framing Plan:

1. 1/S2.2: revise plans as shown bubbled.

S2.3 – Roof Framing Plan:

1. 1/S2.3: revise plans as shown bubbled.

S2.4 – Roof Diaphragm & Second Floor Diaphragm Connection Plan:

1. A/S2.4: revise plans as shown bubbled.
2. B/S2.4: revise plans as shown bubbled.

S4.1 – Sections and Details:

1. 1/S4.1: revise section as shown bubbled.
2. 3/S4.1: revise section as shown bubbled.
3. 4/S4.1: revise section as shown bubbled.
4. 5/S4.1: revise section as shown bubbled.
5. 6/S4.1: revise section as shown bubbled.
6. 7/S4.1: revise section as shown bubbled.
7. 8/S4.1: revise section as shown bubbled.
8. 9/S4.1: revise section as shown bubbled.
9. 11/S4.1: revise section as shown bubbled.
10. 12/S4.1: revise section as shown bubbled.
11. 13/S4.1: revise section as shown bubbled.
12. 14/S4.1: revise section as shown bubbled.
13. 16/S4.1: revise section as shown bubbled.
14. 17/S4.1: revise section as shown bubbled.

S4.2 – Sections and Details:

1. 1/S4.2: revise section as shown bubbled.
2. 2/S4.2: revise section as shown bubbled.
3. 3/S4.2: revise section as shown bubbled.
4. 5/S4.2: revise section as shown bubbled.
5. 6/S4.2: revise section as shown bubbled.
6. 7/S4.2: revise section as shown bubbled.
7. 9/S4.2: revise section as shown bubbled.
8. 10/S4.2: revise section as shown bubbled.
9. 12/S4.2: revise section as shown bubbled.
10. 13/S4.2: revise section as shown bubbled.
11. 17/S4.2: revise section as shown bubbled.

S4.2B – Sections and Details:

1. 19/S4.2B: revise section as shown bubbled.
2. 24/S4.2B: incorporate section as shown bubbled.

S4.3 – Sections and Details:

1. 1/S4.3: revise section as shown bubbled.
2. 2/S4.3: revise section as shown bubbled.

3. 3/S4.3: revise section as shown bubbled.
4. 4/S4.3: revise section as shown bubbled.
5. 5/S4.3: revise section as shown bubbled.
6. 6/S4.3: revise section as shown bubbled.
7. 9/S4.3: revise section as shown bubbled.
8. 13/S4.2B: incorporate section as shown bubbled.

S5.1 – Elevations:

1. A/S5.1: revise elevation as shown bubbled.
2. B/S5.1: revise elevation as shown bubbled.

Specifications:

1. Incorporate specification 05 12 00 Structural Steel.
2. Incorporate specification 31 62 00 Structural Steel.

END OF SA-S01

Regards,
Engineering Link Incorporated

Per: Craig Nicoletti, P.Eng.
Associate
B: 416-599-5465 x128
E: Craig.Nicoletti@englink.ca

To: Brian Muthaliff brian@bortolotto.com
Cc: Alex Horber alex@bortolotto.com

GENERAL NOTES

1.0 GENERAL NOTES

1.1 CONSTRUCTION SHALL CONFORM TO THE REQUIREMENTS OF ONTARIO REGULATION 332/12 (THE BUILDING CODE), AS AMENDED, AND ANY APPLICABLE ACTS OF AUTHORITY HAVING JURISDICTION.

1.2 READ STRUCTURAL DRAWINGS IN CONJUNCTION WITH THE SPECIFICATIONS AND ALL OTHER CONTRACT DOCUMENTS.

1.3 BEFORE PROCEEDING WITH THE WORK THE CONTRACTOR SHALL CHECK ALL DIMENSIONS SHOWN ON THE STRUCTURAL DRAWINGS WITH THE ARCHITECTURAL, MECHANICAL, AND ELECTRICAL DRAWINGS, AND AGAINST EXISTING SITE CONDITIONS. REPORT ANY DISCREPANCIES TO THE CONSULTANT(S). PRIOR TO PROCEEDING WITH ANY WORK.

1.4 STRUCTURAL DRAWINGS MUST NOT BE SCALED.

1.5 REFER TO THE ARCHITECTURAL, MECHANICAL AND ELECTRICAL DRAWINGS FOR THE SIZE AND LOCATION OF ALL TRENCHES, PITS, SUMPS, SLOPES, EQUIPMENT, DEPRESSIONS, GROOVES AND CHAMFERS NOT INDICATED ON THE STRUCTURAL DRAWINGS. WHERE SHOWN ON THE STRUCTURAL DRAWINGS ALL ABOVE LISTED ITEMS ARE ONLY APPROXIMATELY NOTED IN TERMS OF SIZE AND LOCATIONS AND MUST BE CO-ORDINATED WITH THE ARCHITECTURAL, MECHANICAL AND ELECTRICAL DRAWINGS.

1.6 REFER TO THE ARCHITECTURAL, MECHANICAL AND ELECTRICAL DRAWINGS FOR THE SIZE AND LOCATION OF ALL OPENINGS AND SLEEVES NOT SHOWN ON THE STRUCTURAL DRAWINGS. HOWEVER, OBTAIN APPROVAL FROM THE STRUCTURAL CONSULTANT PRIOR TO CUTTING/ INSTALLING ANY OPENINGS, SLEEVES, ETC, WHICH ARE NOT SHOWN ON THE STRUCTURAL DRAWINGS.

1.7 TYPICAL STRUCTURAL DETAILS, NOTES UNDER PLANS, AND SCHEDULES ON THE STRUCTURAL DRAWINGS GOVERN THE WORK. IF DETAILS, NOTES, ETC. DIFFER ON THE DRAWINGS THE MOST STRINGENT SHALL GOVERN.

1.8 THE CONTRACTOR SHALL PROVIDE ALL LABOUR, MATERIALS, TOOLS, AND EQUIPMENT REQUIRED TO CARRY OUT THE WORK.

1.9 IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO PROVIDE ALL TEMPORARY WORKS, INCLUDING, BUT NOT LIMITED TO SHORING AND BRACING, REQUIRED TO COMPLETE THE WORK. IT SHALL ALSO BE THE RESPONSIBILITY OF THE CONTRACTOR TO PROVIDE ALL NECESSARY BRACING, SHORING, SHEET PILING OR OTHER TEMPORARY SUPPORTS REQUIRED TO SAFEGUARD WORKERS, THE GENERAL PUBLIC, AND ALL EXISTING OR ADJACENT STRUCTURES AFFECTED BY THE WORK.

2.0 FOUNDATIONS

2.1 A COPY OF THE SOILS REPORT, PREPARED BY EXP SERVICES LTD. IN THEIR REPORT NUMBER SUD-000146596-AG AND DATED APRIL 21, 2017, IS AVAILABLE FROM THE CONSULTANT(S). READ AND BECOME THOROUGHLY FAMILIAR WITH THE REPORT AND ITS FINDINGS.

2.2 FOUND ALL FOOTINGS AND UNDERPINNING ON UNDISTURBED SOIL CAPABLE OF SUSTAINING AN ULTIMATE LIMIT STATE / SERVICE LIMIT STATE BEARING VALUE (ULS/ SLS) OF 125 KPA / 75 KPA. SOIL AT THE UNDERSIDE OF THE FOOTINGS AND UNDERPINNING IS TO BE INSPECTED AND APPROVED BY A REPRESENTATIVE OF THE GEOTECHNICAL CONSULTANT BEFORE PLACING CONCRETE.

2.3 FOUND ALL END-BEARING STEEL PILES ON SOUND, UNDISTURBED BEDROCK.

2.4 ALL EXTERIOR GRADE BEAMS AND FOOTINGS AND ANY OTHER FOOTINGS EXPOSED TO FREEZING IN THE FINISHED BUILDING SHALL BE FOUNDED AT A MINIMUM OF 200 MM BELOW FINISHED GRADE, UNLESS OTHERWISE NOTED. GRADE BEAMS AND FOOTINGS EXPOSED TO FROST ACTION DURING CONSTRUCTION SHALL BE PROTECTED BY A MINIMUM OF 2000 MM OF EARTH OR ITS EQUIVALENT TO PREVENT FREEZING.

2.5 THE LINE OF SLOPE BETWEEN ADJACENT EXCAVATIONS FOR FOOTINGS OR ALONG STEPPED FOOTINGS SHALL NOT EXCEED A RISE OF 7 IN A RUN OF 10. A MAXIMUM STEP OF 600 MM IS PERMITTED FOR STEPPED FOOTINGS.

2.6 DO NOT PLACE BACKFILL AGAINST WALLS RETAINING EARTH (OTHER THAN CANTILEVER WALLS) UNTIL THE FLOOR CONSTRUCTION AT THE TOP AND BOTTOM OF THE WALLS IS POURED AND HAS ATTAINED 70% OF ITS SPECIFIED 28-DAY STRENGTH.

2.7 CARRY OUT BACKFILLING AGAINST FOUNDATION WALLS WHERE THERE IS GRADE ON BOTH SIDES IN A MANNER SUCH THAT THE LEVEL OF BACKFILLING ON ONE SIDE OF THE WALL IS NEVER MORE THAN 500 MM DIFFERENT FROM THE LEVEL ON THE OTHER SIDE OF THE WALL.

2.8 KEEP EXCAVATIONS CONTINUOUSLY DRY BEFORE CONCRETE IS PLACE. IF THE SOIL IS SOFTENED BY WATER OR FOOT TRAFFIC, THE EXCAVATION SHALL BE EXTENDED BELOW THE SOFTENED MATERIAL AND THE BOTTOM OF THE FOOTINGS LOWERED TO SUIT.

2.9 PROVIDE FOOTINGS BELOW ALL LOAD BEARING MASONRY WALLS AND ALL NON-LOAD BEARING MASONRY WALLS THICKER THAN 190 MM AS PER TYPICAL DETAILS. ALL NON-LOAD BEARING MASONRY WALLS 190 MM THICK OR LESS SHALL BE SUPPORTED ON A THICKENING OF THE SLAB-ON-GRADE AS PER TYPICAL DETAILS.

3A.0 END-BEARING STEEL PILES

3A.1 STRUCTURAL STEEL DESIGN DETAILS AND CONNECTIONS SHALL CONFORM TO CSA S16 AND SHALL BE DESIGNED BY A LICENSED PROFESSIONAL ENGINEER EXPERIENCED IN THIS TYPE OF WORK.

3A.2 WELDING SHALL CONFORM TO CSA W59 AND BE PERFORMED BY A FABRICATOR CERTIFIED TO CSA W47.1.

3A.3 MATERIALS

3.3.1 HP SHAPES - CONFORM TO THE REQUIREMENTS OF CSA G40.21 GRADE 350W

3.3.2 ALL OTHER - CONFORM TO THE REQUIREMENTS OF CSA G40.21 GRADE 300W

3A.4 DESIGN AND EXECUTION

3A.4.1 REFER TO SPECIFICATIONS 31 62 00.

3B.0 HELICAL PIERS

3B.1 MATERIALS

3B.1.1 PILE SYSTEM SHALL BE ONE OF THE FOLLOWING:

3B.1.1.1 CHANCE HELICAL PIERS AS MANUFACTURED BY AB CHANCE COMPANY, A SUBSIDIARY OF HUBBELL POWER SYSTEMS.

3B.1.1.2 ROUND SHAFT HELICAL PIERS AS MANUFACTURED BY PIER TECH SYSTEMS.

3B.1.1.3 TECHNO METAL POSTS AS MANUFACTURED BY TECHNO PIEUX THETFORD MINES INC.

3B.1.1.4 HELICAL TORQUE ANCHORS, AS SUPPLIED BY EARTH CONTACT PRODUCTS (E.C.P.).

3B.1.2 CONFORM TO THE MANUFACTURER'S RECOMMENDATIONS.

3B.1.3 HOT DIP GALVANIZING: GALVANIZE ALL STEEL TO CAN/CSA G164-M92 (R1998), MINIMUM ZINC COATING OF 600 G/M2.

3B.1.4 STEEL PILES, INCLUDING SPLICES, SHOES AND CAPS: CONFORM TO CSA STANDARD G40.20/G40.21; GRADE 300W.

3B.2 EXECUTION

3B.2.1 INSTALL PILES TO SAFELY DEVELOP THE DESIGN LOADS SHOWN.

3B.2.2 KEEP A RECORD COVERING EACH PILE INSTALLED, PILE NUMBER AND ID AS TO LOCATION, CUT-OFF ELEVATION AND LENGTH AND LENGTH OF PILE, FINAL TORQUE, PLUMBNESS, AND REMARKS CONCERNING DRIVING CONDITIONS.

3B.2.3 CONFORM TO THE MANUFACTURER'S RECOMMENDATIONS.

3B.2.4 AT THE TERMINATION OF INSTALLATION OF EACH PILE, TAKE READINGS OF THE ELEVATION OF THE TOP OF THE PILE. ON THE COMPLETION OF ALL PILING IN A CLUSTER OR NEARBY CLUSTERS, TAKE ELEVATION READINGS AGAIN TO DETERMINE WHETHER ANY HEAVING HAS OCCURRED. IF HEAVING HAS OCCURRED, RE-INSTALL THE PILE TO THE PROPER RESISTANCE OR PROCEED AS THE CONSULTANT DIRECTS.

4.0 SLAB-ON-GRADE

4.1 PLACE SLAB-ON-GRADE ON SUB GRADE MATERIAL CAPABLE OF SUSTAINING A MINIMUM SERVICE LIMIT STATE (SLS) BEARING CAPACITY OF 25 KPA WITHOUT SETTLEMENT RELATIVE TO THE BUILDING FOOTINGS.

4.2 PRIOR TO PLACING SLAB-ON-GRADE PLACE 200 MM OF 20 MM MAXIMUM SIZE CLEAR CRUSHED STONE OVER THE SUB-GRADE. THOROUGHLY ROLL AND CONSOLIDATE TO THE LINES AND LEVELS REQUIRED.

5.0 CONCRETE

5.1 MATERIALS

5.1.1 CONCRETE

i) CONFORM TO THE REQUIREMENTS OF CSA STANDARD A23.1 AND THE FOLLOWING FOR STRENGTH, SLUMP, WATER-TO-CEMENTING MATERIALS CONTENT AND AIR CONTENT.

ii) NOMINAL MAXIMUM SIZE OF AGGREGATE SHALL BE 20 MM (3/4"). USE SMALLER AGGREGATES AS APPROPRIATE IN AREAS OF CONGESTED REINFORCING STEEL OR TO IMPROVE WORKABILITY. MODIFY MIX DESIGNS TO SUIT.

STRUCTURAL ELEMENT AND EXPOSURE	EXPOSURE CLASS PER CSA A23.1	CONCRETE STRENGTH f'c (MPa)	SLUMP (mm)	MAX W/C RATIO	AIR CONTENT
FOOTINGS AND CAPS		25	80		
GRADE BEAMS FOUNDATION WALLS ADJACENT TO PAVING	C-1	35	80	0.40	5%-8%
SLABS-ON-GRADE NOT EXPOSED TO CHLORIDES OR FREEZING		25	40*	0.45	
FRAMED SLABS AND BEAMS		30	80		
FRAMED SLABS AND BEAMS EXPOSED TO DE-ICING CHEMICALS	C-1	35	80	0.40	5%-8%
INTERIOR WALLS		30	80		
TOPPINGS ON CONCRETE		25	40*		
SLAB ON METAL DECK		25	60		
EXTERIOR PAVING	C-2	32	60	0.45	5%-8%
SLAB ON GRADE IN PARKING GARAGE	C-4	25	60	0.55	4%-7%

TOLERANCE FOR SLUMP SHALL BE +/-20MM FOR SPECIFIED SLUMP LESS THAN 80MM AND +/- 30MM FOR SPECIFIED SLUMP BETWEEN 80MM AND 170MM

* SPECIAL CONCRETE HANDLING AND PLACING METHODS OR THE USE OF A SUPER PLASTICIZER WILL BE REQUIRED TO PLACE THIS CONCRETE. FINAL PLASTICIZED SLUMP SHALL BE +/- 125MM.

** WHERE AGGREGATES SMALLER THAN 14MM ARE USED, INCREASE AIR CONTENT BY 1%

*** CONCRETE EXPOSED TO DE-ICING CHEMICALS SHALL HAVE DCI CORROSION INHIBITOR @ 11L/M^3 DOSAGE OR APPROVED EQUIVALENT.

5.1.2 REINFORCEMENT

i) CONFORM TO THE REQUIREMENTS OF CSA G30 SERIES.

ii) REINFORCING BARS SHALL HAVE A MINIMUM YIELD STRENGTH FY = 400 MPA.

iii) WELDED WIRE FABRIC SHALL HAVE A MINIMUM YIELD STRENGTH FY = 386 MPA. SUPPLY IN FLAT SHEETS.

5.2 EXECUTION

5.2.1 CONCRETE MIXING, TRANSPORTATION, HANDLING AND PLACING SHALL CONFORM TO CSA A23.1.

5.2.2 DOWELS

i) PROVIDE DOWELS TO WALLS AND COLUMNS SIMILAR IN NUMBER, SIZE, AND SPACING TO THE VERTICAL STEEL IN THE WALL OR COLUMN EXCEPT WHERE NOTED OTHERWISE.

ii) ALL DOWELS SHALL HAVE A MINIMUM EMBEDMENT EQUIVALENT TO THE STRAIGHT TENSION EMBEDMENT LENGTH CORRESPONDING TO THE SIZE OF BAR. DOWELS FROM WALLS TO SLABS SHALL HAVE A MINIMUM EMBEDMENT OF 600 MM INTO WALLS AND SLABS UNLESS OTHERWISE NOTED OR SHOWN.

5.2.3 CONSTRUCTION JOINTS

i) HORIZONTAL CONSTRUCTION JOINTS SHALL NOT BE MADE IN BEAMS OR JOISTS UNLESS SHOWN OR REVIEWED BY THE CONSULTANT(S).

ii) VERTICAL CONSTRUCTION JOINTS MAY BE MADE ONLY AT MID-SPAN OF BEAMS, JOISTS, AND SLABS UNLESS OTHERWISE SHOWN OR DIRECTED AND SHALL BE CLEAR OF SUPPORTS AND POINT LOADS. ALL SUCH JOINTS SHALL BE REVIEWED BY THE CONSULTANT(S) PRIOR TO CONCRETING.

iii) PROVIDE 38 X 89 KEYS AT CONSTRUCTION JOINTS UNLESS OTHERWISE NOTED.

iv) CONSTRUCTION JOINTS FOR WALLS ARE BASED UPON VERTICAL JOINTS AT A MAXIMUM SPACING OF 10000MM.

5.2.4 OPENINGS, SLEEVES, EMBEDDED SERVICES, INSERTS

i) DO NOT PLACE SLEEVES OR OPENINGS THROUGH STRUCTURAL ELEMENTS WITHOUT APPROVAL BY THE CONSULTANT(S).

ii) NO OPENINGS SHALL BE PLACED VERTICALLY OR HORIZONTALLY THROUGH BEAMS UNLESS REVIEWED AND APPROVED BY THE CONSUL8709TANT(S).

iii) NO OPENINGS SHALL BE MADE IN FLAT SLAB OR FLAT PLATE COLUMN STRIPS UNLESS SHOWN OR TYPICAL DETAILS OR PLANS OR UNLESS REVIEWED BY THE CONSULTANT(S).

iv) INSERTS, FRAME-OUTS, SLEEVES, BRACKETS, CONDUITS AND FASTENING DEVISES SHALL BE INSTALLED AS REQUIRED BY THE DRAWINGS AND SPECIFICATIONS IN A MANNER THAT SHALL NOT IMPAIR THE STRUCTURAL STRENGTH OF THE SYSTEM. INSTALL ITEMS SUCH THAT THEY SHALL NOT REQUIRE THE CUTTING, BENDING OR DISPLACEMENT OF THE REINFORCING OTHER THAN AS SHOWN ON THE TYPICAL DETAILS.

v) ELECTRICAL CONDUIT SHALL NOT PASS THROUGH A COLUMN NOR SHALL IT PASS HORIZONTALLY IN A CONCRETE WALL. CONDUIT SHALL NOT BE LARGER IN OUTSIDE DIAMETER THAN 1/3 OF THE THICKNESS OF THE SLAB, WALL, OR BEAM IN WHICH IT IS EMBEDDED. IT SHALL NOT BE SPACED CLOSER THAN 3 DIAMETERS ON CENTRE UNLESS APPROVED BY THE CONSULTANT. ALL CONDUIT SHALL HAVE A MINIMUM CONCRETE COVER OF 25 MM (1") UNLESS APPROVED BY THE CONSULTANT.

5.2.5 MINIMUM CONCRETE COVER TO REINFORCEMENT: CONFORM TO THE REQUIREMENTS OF CSA STANDARD A23.1 AND THE FOLLOWING FOR COVER TO REINFORCING. ALL COVER VALUES ARE IN MM.

i) NOT EXPOSED (N) AND FOR FIRE RATING

LOCATION AND STRUCTURAL ELEMENT	FIRE RATING (HOURS) UP TO 1	1.5	2	3	4
BEAMS, GIRDERS, PILES (PRINCIPAL REINFORCING) 35M AND SMALLER	40	40	40	40	50
SLABS 25M AND SMALLER	25	25	25	35	40
SLABS 30M	30	30	30	35	40
COLUMNS (VERTICAL REINFORCING) 35M AND SMALLER	40	40	50	50	63
WALLS 25M AND SMALLER	25	40	50	50	63
WALLS 30M	30	40	50	50	63
STIRRUPS AND TIES	30				

ADDITIONAL CONCRETE COVER REQUIREMENTS AS APPLICABLE. THE CONDITION WITH THE GREATER COVER REQUIREMENT SHALL GOVERN.

ii) ALL CONCRETE CAST AGAINST AND PERMANENTLY EXPOSED TO EARTH OR ROCK:

(1) 35M BARS AND SMALLER = 75MM
(2) 45M BARS AND LARGER = 2X THE NOMINAL BAR DIAMETER

iii) CONCRETE EXPOSED TO CHLORIDES (C-1, C-3):

(1) 30M BARS AND SMALLER = 60MM
(2) 35M BARS AND LARGER = 2X THE NOMINAL BAR DIAMETER

iv) EXPOSED TO EARTH AND WEATHER (F-1, F-2)

(1) 25M BARS AND SMALLER = 40MM
(2) 30M BARS AND LARGER = 1.5X THE NOMINAL BAR DIAMETER

5.2.6 FINISHING

i) REFER TO ARCHITECTURAL DRAWINGS AND SPECIFICATIONS FOR THE REQUIRED FINISH TO EXPOSED CONCRETE. ALL HONEYCOMBING SHALL BE CUT OUT AND FILLED. FLOOR FINISHES SHALL BE AS REQUIRED BY THE ARCHITECTURAL DRAWINGS AND SPECIFICATIONS AND SHALL CONFORM TO CSA A23.1 (CLASS A FINISH UNLESS NOTED OTHERWISE).

5.2.7 WHERE ONE-WAY SLABS ARE PARALLEL TO AND INTEGRAL WITH BEAMS OR WALLS, PROVIDE 10M AT 250 MM C/C TOP REINFORCING PERPENDICULAR TO THE SPAN OF THE BEAM OR WALL UNLESS NOTED OTHERWISE ON PLAN. THIS TOP REINFORCEMENT IS TO PROJECT 0.30 TIMES THE CLEAR SPAN OF THE ONE-WAY SLAB OR A MINIMUM OF 900 MM BEYOND BOTH SIDES OF THE BEAM OR WALL. AT A DISCONTINUOUS EDGE OF SLAB, HOOK TOP REINFORCEMENT DOWN INTO OUTER FACE OF BEAM OR WALL.

5.2.8 IN HOUSEKEEPING PADS AND FLOATING SLABS PROVIDE 10M AT 250 MM C/C MIDDLE EACH WAY UNLESS OTHERWISE NOTED ON PLAN OR TYPICAL DETAILS. SEE ARCHITECTURAL, MECHANICAL AND ELECTRICAL DRAWINGS FOR LOCATION AND SIZE OF PADS.

5.2.9 PROVIDE CAMBER TO SLABS AND BEAMS AS NOTED ON PLANS AND/OR DETAILS. CAMBER BOTH UNDERSIDE AND TOP OF CONCRETE TO MAINTAIN THE SLAB AND BEAM DEPTH SHOWN ON THE DRAWINGS UNLESS SHOWN AND NOTED OTHERWISE.

5.2.10 PROVIDE INSERTS AND ANCHOR BOLTS IN ELEVATOR PITS AND SHAFTS AS REQUIRED.

6.0 PRECAST CONCRETE DECK

6.1 MATERIALS

6.1.1 CONFORM TO THE ONTARIO BUILDING CODE REGULATION 419, CSA A251M, AND CAN-A23.4M.

6.1.2 CONFORM TO THE OTHER REQUIREMENTS OF THESE GENERAL NOTES, INCLUDING CONCRETE AND REINFORCING.

6.2 DESIGN AND EXECUTION

6.2.1 DESIGN DECK, INCLUDING REINFORCING, STRAND, OPENINGS, JOINT CONNECTIONS, SUPPORT CONNECTIONS, CONCRETE, GROUT AND THE LIKE IN ACCORDANCE WITH THE ONTARIO BUILDING CODE 2006, FOR THE FORCES SHOWN ON THE DRAWINGS.

6.2.2 CONFORM TO THE OTHER REQUIREMENTS OF THESE GENERAL NOTES, INCLUDING CONCRETE AND REINFORCING.

6.2.3 DESIGN DECK FOR THE NET UPLIFT SHOWN BUT NOT LESS THAN 1.0 KPA.

6.2.4 DESIGN DECK FOR THE DIAPHRAGM SHEAR SHOWN BUT NOT LESS THAN 7.0 KN/M.

6.2.5 INDICATE OPENINGS AND REINFORCEMENT FOR OPENINGS ON THE SHOP DRAWINGS. COOPERATE WITH OTHER TRADES IN ORDER TO OBTAIN ALL INFORMATION NECESSARY TO LOCATE OPENINGS EITHER SHOWN OR IMPLIED.

6.2.6 MAINTAIN A SET OF PLANT RECORDS, AND PROVIDE COPIES TO THE CONSULTANT.

6.2.7 PROVIDE MINIMUM 90MM FULL BEARING ON SUPPORTS.

6.2.8 PROVIDE LATERAL SUPPORT TO THE TOPS OF SUPPORTING BEAMS.

6.2.9 PREPARE THE DECK TOP SURFACE AS APPROPRIATE FOR THE INTENDED FINAL FINISH OR TREATMENT. SEE ARCHITECTURAL DRAWINGS FOR FINISHES.

6.2.10 EXERCISE PARTICULAR CARE WHERE DECK IS EXPOSED TO VIEW IN THE FINISHED BUILDING, SO THAT THE EXPOSED SURFACE IS LEFT CLEAN WITHOUT DEFECTS.

7.0 STRUCTURAL STEEL

7.1 STRUCTURAL STEEL DESIGN DETAILS AND CONNECTIONS SHALL CONFORM TO CSA S16 AND SHALL BE DESIGNED BY A LICENSED PROFESSIONAL ENGINEER EXPERIENCED IN THIS TYPE OF WORK.

7.2 WELDING SHALL CONFORM TO CSA W59 AND BE PERFORMED BY A FABRICATOR CERTIFIED TO CSA W47.1.

7.3 MATERIALS

7.3.1 WIDE FLANGE SHAPES - CONFORM TO THE REQUIREMENTS OF CSA G40.21 GRADE 350W

7.3.2 HSS MEMBERS - CONFORM TO THE REQUIREMENTS OF CSA G40.21 GRADE 350W, CLASS C.

7.3.3 BOLTS, NUTS AND WASHERS - ASTM A490.

7.3.4 ANCHOR RODS - CONFORM TO THE REQUIREMENTS OF ASTM A490.

7.3.5 ALL OTHER - CONFORM TO THE REQUIREMENTS OF CSA G40.21 GRADE 300W

7.3.6 STEEL DECK - CONFORM TO THE REQUIREMENTS OF CAN/CSA-S136

7.4 EXECUTION

7.4.1 FABRICATION, HANDLING AND ERECTION SHALL CONFORM TO CSA S16.

7.4.2 CO-ORDINATE WITH MECHANICAL AND ELECTRICAL CONSULTANTS AND SUB-TRADES WHOSE WORK MAY AFFECT DETAILING, FABRICATION, AND ERECTION OF THE STEEL STRUCTURE.

7.4.3 PROVIDE A MINIMUM BEARING OF 200 MM FOR ALL STEEL BEAMS BEARING ON MASONRY AND A MINIMUM OF 100 MM ON STRUCTURAL STEEL, UNLESS NOTED OTHERWISE.

7.4.4 CENTRE BEARING PLATES UNDER BEAMS, OR AS NOTED.

7.4.5 BEARING PLATE DIMENSION GIVEN FIRST INDICATES SIDE PARALLEL TO BEAM WEB.

7.4.6 WALL PLATE DIMENSION GIVEN FIRST INDICATES THE VERTICAL DIMENSION OF THE PLATE.

7.4.7 NO STRUCTURAL STEEL SHALL BE CUT WITHOUT THE PERMISSION OF THE CONSULTANT.

7.4.8 WHERE MOMENT CONNECTIONS ARE REQUIRED, BUT DESIGN VALUES ARE NOT NOTED, DESIGN CONNECTIONS FOR THE FULL MOMENT CAPACITY OF THE SMALLEST MEMBER.

7.4.9 SPLICES SHALL BE DESIGNED TO DEVELOP THE FULL CAPACITY OF THE MEMBERS AT THE POINT OF THE SPLICE. MEMBERS SHALL NOT BE SPLICED AT POINTS OF MAXIMUM STRESS OR IN THE VICINITY OF POINT LOADS. NO SPLICES SHALL BE MADE UNLESS SHOWN ON THE DRAWINGS OR REVIEWED AND APPROVED BY THE CONSULTANT(S).

7.4.10 ALL STRUCTURAL STEEL EXPOSED TO THE ELEMENTS SHALL BE FULLY GALVANIZED IN ACCORDANCE WITH CSA G164 TO A MINIMUM ZINC COATING OF 600G/SQ.M.

7.4.11 WHERE COLUMNS ARE STABILIZED BY WALLS PROVIDE COLUMN ANCHORS AT ABUTTING WALLS. PROVIDE TEMPORARY BRACING UNTIL WALLS ARE BUILT TIGHT TO COLUMNS.

7.4.12 PROVIDE FRAMING AROUND ALL OPENINGS IN STEEL DECK AS SPECIFIED. REFER TO TYPICAL DETAIL FOR DETAILS. SEE ARCHITECTURAL, MECHANICAL AND ELECTRICAL DRAWINGS FOR OPENINGS NOT SHOWN ON THE STRUCTURAL DRAWINGS.

7.4.13 PROVIDE FULL HEIGHT WEB STIFFENERS AT ALL BEAMS BEARING ON COLUMNS AND ALL BEAMS SUPPORTING COLUMNS. WEB STIFFENERS SHALL BE OF THE SAME SIZE AND THICKNESS AS THE COLUMN FLANGES AND SHALL ALIGN WITH THE FLANGES OF THE SUPPORTING COLUMN.

7.4.14 COORDINATE THE SHAPE AND SIZE OF GUSSET PLATES TO ENSURE THAT THEY DO NOT INTERFERE WITH ARCHITECTURAL FINISHES, MECHANICAL SERVICES, AND THE LIKE.

7.4.15 PROVIDE ANCHOR BOLTS AND CAST-IN-PLATES WITH ANCHORS AND ANCHORS REQUIRED TO CONNECT STRUCTURAL STEEL TO CAST-IN-PLACE CONCRETE.

7.4.16 LENGTH OF ANCHOR BOLTS AND SIMILAR DEVICES IS GIVEN FOR THE STRAIGHT LENGTH WITHOUT HOOK. PROVIDE A WELDED 64X64X13 (THICK) PLATE WITH WASHER AND NUT AT BOTTOM OF ALL ANCHOR BOLTS UNLESS NOTED OTHERWISE.

7.4.17 CONNECT ALL COLUMNS TO THE BASE PLATES FOR THE LARGER OF THE FOLLOWING FORCES IN ADDITION TO ANY OTHER FORCES SHOWN:

i) AT BRACING FOR THE FACTORED HORIZONTAL COMPONENTS FROM THE BRACE.

ii) FOR 3% OF THE FACTORED VERTICAL COLUMN LOAD APPLIED HORIZONTALLY.

8.0 STEEL DECK

8.1 MATERIALS

8.1.1 ALL STEEL DECK SHALL BE AS PER PLAN AND SHALL CONFORM TO CAN/CSA-S136 AND THE FOLLOWING;

i) CSSBI 10M FOR ROOF DECKING.

ii) CSSBI 12M FOR FLOOR DECKING

8.1.2 THE COMPOSITE FLOOR STRUCTURE DESIGN HAS BEEN BASED ON THE FOLLOWING PROPERTIES OF COMPOSITE STEEL DECK;

i) 38 MM DECK = HB 938INV BY VICWEST STEEL INC

j) 76 MM DECK = HB 308INV BY VICWEST STEEL INC

8.1.3 THE ROOF STRUCTURE DESIGN HAS BEEN BASED ON THE FOLLOWING PROPERTIES OF COMPOSITE STEEL DECK;

i) 38 MM DECK = RD 938 BY VICWEST STEEL INC

j) 76 MM DECK = RD 308 BY VICWEST STEEL INC

8.1.4 ALTERNATE TYPES OF STEEL DECK, WITH SIMILAR PROPERTIES, MAY BE ACCEPTABLE, SUBJECT TO REVIEW BY THE CONSULTANT(S).

8.1.5 PROVIDE COMPOSITE DECK IN ALL ROOF OR FLOOR AREAS WHICH WILL RECEIVE A CONCRETE TOPPING.

8.1.6 MINIMUM ZINC COATING OF Z275 FOR EXTERIOR DECKING AND DECKING EXPOSED TO VIEW.

8.1.7 MINIMUM ZINC COATING OF ZF75 FOR INTERIOR DECKING NOT EXPOSED TO VIEW.

8.1.8 MINIMUM 1.22MM STEEL CONFORMING TO ABOVE STANDARDS FOR COVER PLATES, CELL CLOSURES, WEB STIFFENERS, EDGE STRIPS, AND FLASHING.

8.1.9 FORM ROOF DECK WITH INTEGRAL RIBS OF A SHAPE TO MATCH EXISTING DECK WHERE REPAIR/REPLACEMENT OF EXISTING DECK IS REQUIRED.

8.2 EXECUTION

8.2.1 STEEL DECK DESIGN DETAILS AND CONNECTIONS SHALL CONFORM TO THE REQUIREMENTS OF ONTARIO REGULATION 322/12, (THE BUILDING CODE), AS AMENDED, AND SHALL BE DESIGNED BY A LICENSED PROFESSIONAL ENGINEER EXPERIENCED IN THIS TYPE OF WORK.

8.2.2 REFER TO PLANS FOR DESIGN LOADS ON STEEL DECK.

8.2.3 DESIGN, PROVIDE, AND CONNECT METAL EDGE AND CLOSURE STRIPS, METAL SCREEDS, FLASHINGS AND THE LIKE.

8.2.4 DESIGN FRAMING FOR 450MM OR SMALLER OPENINGS IN ROOF DECK, AND 300MM OR SMALLER OPENINGS IN FLOOR DECK. FOR ROOF OPENINGS GREATER THAN 450MM AND FLOOR OPENINGS GREATER THAN 300MM INSTALL REINFORCING IN ACCORDANCE WITH THE STRUCTURAL FRAMING DETAILS SHOWN ON PLANS OR TYPICAL DETAILS.

8.2.5 WHENEVER STRUCTURAL FRAMING PERMITS ALL STEEL DECK SHALL BE DESIGNED AND FABRICATED TO SPAN CONTINUOUSLY OVER AT LEAST 4 SUPPORTS (3 SPANS). PROVIDE AN ADEQUATE INCREASE IN THICKNESS OF METAL TO COMPENSATE FOR CONTINUITY WHENEVER FEWER SUPPORTS OCCUR.

8.2.6 LAP ENDS OF NON-COMPOSITE DECK UNITS A MINIMUM OF 50MM AND ONLY OVER SUPPORTING MEMBERS.

8.2.7 SUPPLY AND INSTALL STEEL PACKING AS REQUIRED TO PRODUCE AN EVEN BEARING PRESSURE AT SUPPORTS.

8.2.8 MAKE FUSION WELDS TO SUPPORTING MEMBERS WELL WITHIN BEARING WIDTH OF SUPPORT MEMBERS.

8.2.9 AS A MINIMUM, WELD DECK TO SUPPORTS AND PERIMETER ELEMENTS WITH HILTI X-EDN19 SCREWS IN A 36/4 PATTERN.

8.2.10 AS A MINIMUM, FASTEN SIDE JOINTS OF DECK UNITS BETWEEN SUPPORTS BY CLINCHING AT 600MM INTERVALS OR WITH #10 SCREWS T 300MM INTERVALS.

8.2.11 PAINT WELDS AND REPAIR DAMAGED COATING WITH GALVACON COATING.

8.2.12 DO THE FOLLOWING WHERE DECKING IS EXPOSED TO VIEW;

i) LAP ENDS OF DECK UNITS ONLY OVER SUPPORTING MEMBERS. NO SEAMS ARE PERMITTED WITHIN SPANS.

ii) KEEP DECK FREE OF DIRT, SCALE, FOREIGN MATTER, DENTS OR DEFORMATIONS.

iii) KEEP FUSION WELDS WELL WITHIN THE BEARING WIDTH OF SUPPORTING MEMBERS.

iv) AVOID WELD DAMAGE TO THE DECK OR ITS SUPPORTS.

8.2.13 THE SUSPENSION OF ELEMENTS INCLUDING, BUT NOT LIMITED TO: ARCHITECTURAL FINISHES, MECHANICAL AND ELECTRICAL PIPING, DUCTWORK, CONDUIT, ETC. FROM ROOF DECK IS NOT PERMITTED.

9.0 LIGHT GAUGE STEEL

9.1 MATERIALS

9.1.1 ALL COLD FORMED STEEL STUDS/SILLS/FRAMING SHALL CONFORM TO CAN/CSA-S136-01, CAN/CSA S304.1-04 & CAN/CSA-A370-04 AND ARE BASED UPON MEMBERS PRODUCED BY BAILEY METAL PRODUCTS OR APPROVED EQUIVALENT.

9.1.2 STEEL SHALL MEET THE REQUIREMENTS OF ASTM A653 STANDARD SPECIFICATION FOR SHEET METAL, ZINC COATED (GALVANIZED) BY THE HOT-DIP PROCESS, STRUCTURAL (PHYSICAL) QUALITY. MINIMUM GRADES ARE:

i) GRADE A 228 MPA MINIMUM YIELD FOR 1.146MM MATERIAL AND THINNER

ii) GRADE D 345 MPA MINIMUM YIELD FOR 1.438MM MATERIAL AND THICKER.

9.1.3 SECTION PROPERTIES SHALL BE COMPUTED ON THE BASIS OF THE BLACK METAL THICKNESS' SHOWN. THE UNDER-RUN IN THICKNESS PERMITTED BY ASTM A653 IS NOT ACCOUNTED FOR IN THE DESIGN CALCULATIONS.

9.1.4 ERECTION TOLERANCES:

i) PLUMB: NOT TO EXCEED L/500TH OF MEMBER LENGTH.

ii) CAMBER: NOT TO EXCEED L/1000TH OF MEMBER LENGTH.

iii) SPACING: NOT MORE THAN 3.175MM FROM DESIGN SPACING.

iv) GAP BETWEEN END OF STUD AND TRACK WEB: NOT MORE THAN 4.8MM.

9.1.5 DEFLECTION:

i) LIVE LOAD DEFLECTION BASED UPON L/360

9.2 EXECUTION

9.2.1 REFER TO ARCHITECTURAL DRAWINGS FOR EXACT OPENING LOCATIONS AND DIMENSIONS.

9.2.2 ALL SHEET METAL SCREWS (SMS) ARE TO BE SELF-DRILLING, SELF-TAPPING NO. 10-16 BY BUILDEX TEKS UNLESS OTHERWISE NOTED.

9.2.3 TEMPORARY BRACING SHALL BE PROVIDED UNTIL THE WORK IS PERMANENTLY SECURED.

9.2.4 SPLICING OF STUDS/JOISTS IS NOT PERMITED (EXCEPT TOP AND BOTTOM TRACKS).

9.2.5 ALL FRAMING, BRIDGING, NAILING, PROTECTION, HARDWARE AND OTHER FRAMING DETAILS ARE TO BE IN ACCORDANCE WITH PART 9 OF THE ONTARIO BUILDING CODE, LATEST EDITION.

9.2.6 WIND LOADS SHALL BE IN ACCORADNCE WITH THE ONTARIO BUILDING CODE. PROVIDE FRAMING ANCHORS TO RESIST UPLIFT AT EACH END OF EACH ROOF JOIST. ANCHORS TO HAVE A WORKING CAPACITY OF 0.5 KN.

9.2.7 UNLESS SPECIFICALLY NOTED OTHERWISE ON THE DRAWINGS, THE CONTRACTOR SHALL PROVIDE STANDARD SIMPSON STRONG TIE HARDWARE OR APPROVED EQUIVALENT FOR ALL JOIST HANGERS, BEAM HANGERS, BEAM SEATS, POST ANCHORS, ETC.

9.2.8 MAKE ADEQUATE PROVISIONS FOR ERECTION STRESSES AND FOR SUFFICIENT TEMPORARY BRACING TO KEEP THE STRUCTURAL FRAME PLUMB AND IN TRUE ALIGNMENT UNTIL THE COMPLETION OF THE ENTIRE FRAMING INCLUDING INSTALLATION OF THE FLOOR AND WALL SHEATHING.

9.2.9 PROVIDE SOLID BLOCKING, MATCHING JOIST MEMBER SIZE, UNDER ALL LOADBEARING WALLS OFFSET FROM THE SUPPORTS BELOW FOR FLOOR JOISTS SPANNING PERPENDICULAR TO THE WALL.

9.2.10 PROVIDE MINIMUM BEARING OF 75 MM FOR ALL JOISTS.

9.2.11 PROVIDE MINIMUM BEARING OF 100 MM FOR ALL BEAMS.

10.0 MASONRY

10.1 MATERIALS

10.1.1 ALL MASONRY UNITS SHALL COMPLY WITH THE REQUIREMENTS OF CSA STANDARD A371-04, MINIMUM NET AREA COMPRESSIVE STRENGTH, 15 MPA (ALL OF SECOND FLOOR), 20 MPa (ALL OF GROUND FLOOR U/N), 25 MPa (ALONG GRID LINE G).

10.1.2 GROUT FILL - MINIMUM 28-DAY COMPRESSIVE STRENGTH, 15 MPA (ALL OF SECOND FLOOR), 20 MPa (ALL OF GROUND FLOOR U/N), 25 MPa (ALONG GRID LINE G).

10.1.3 MORTAR - CONFORM TO THE REQUIREMENTS OF CSA STANDARD A179-04, TYPE N.

10.2 EXECUTION

10.2.1 COMPLY WITH MORTAR MANUFACTURER'S WRITTEN RECOMMENDATIONS, INCLUDING PRODUCT TECHNICAL BULLETINS, DATASHEETS, HANDLING, STORAGE, AND INSTALLATION INSTRUCTIONS.

10.2.2 SUPPLY AND INSTALL MASONRY CONNECTORS AND REINFORCEMENT IN ACCORDANCE WITH CSA A370, CSA A371, CSA A23.1 AND CSA S304.1.

10.2.3 TIE MASONRY VENEER TO BACKING IN ACCORDANCE WITH ONTARIO REGULATION 332/12 (THE BUILDING CODE) AS AMENDED, CSA A371, CSA A304.1 AND AS INDICATED IN THE ARCHITECTURAL DRAWINGS AND SPECIFICATIONS.

10.2.4 WHERE REINFORCING BARS, DOWELS, ANCHOR BOLTS, ETC. ARE SHOWN EMBEDDED IN MASONRY, BUILD THESE TIGHT INTO MASONRY VOIDS WITH GROUT FILL IN ACCORDANCE WITH CSA A371, CSA A179 AND CSA S304.1. PROVIDE SUPPORT DURING POSITIONING OF REINFORCING BARS.

10.2.5 BENEATH STEEL AND CONCRETE BEAMS AND COLUMNS, PROVIDE A MINIMUM DEPTH OF 400 MM OF 100% SOLID MASONRY UNITS OR HOLLOW MASONRY UNITS FILLED SOLID, PROJECTING A MINIMUM OF 200 MM BEYOND THE EDGES OF BEARING PLATES, EXCEPT AS NOTED OTHERWISE.

10.2.6 BENEATH SLABS, METAL OR TIMBER DECK, AND STEEL OR TIMBER JOISTS, PROVIDE A MINIMUM DEPTH OF 200 MM OF 100% SOLID MASONRY UNITS OR HOLLOW MASONRY UNITS FILLED SOLID.

10.2.7 BENEATH STEEL, CONCRETE OR REINFORCED MASONRY LINTELS PROVIDE A MINIMUM LENGTH OF 200 MM AND A MINIMUM DEPTH OF 200 MM OF 100% SOLID MASONRY UNITS OR HOLLOW MASONRY UNITS FILLED SOLID.

10.2.8 BUILD MASONRY TIGHT INTO WEBS OF ALL WALL BEARING STEEL BEAMS AT THEIR POINTS OF BEARING.

10.2.9 BUILD MASONRY TIGHT INTO WEBS OF ALL STEEL COLUMNS.

10.2.10 WHERE 100% SOLID MASONRY UNITS ARE NOTED, THE MASONRY SHALL BE SET WITH FULLY FILLED JOINTS USING TYPE MORTAR AS DEFINED IN CSA STANDARD A179-04.

10.2.11 REINFORCING SHALL NOT BE CONTINUOUS ACROSS MOVEMENT JOINTS UNLESS NOTED OTHERWISE.

10.2.12 DO NOT FIELD BEND REINFORCEMENT AND CONNECTORS EXCEPT WHERE INDICATED OR APPROVED BY THE CONSULTANT.

10.2.13 REPLACE ALL REINFORCING BARS AND CONNECTORS THAT DEVELOP CRACKS AND/OR SPLITS.

11.0 LINTELS

11.1 PROVIDE LINTELS OVER ALL OPENINGS OR RECESSES IN MASONRY WALLS, INCLUDING THOSE FOR MECHANICAL OR ELECTRICAL SERVICE OR EQUIPMENT. SEE ARCHITECTURAL, MECHANICAL AND ELECTRICAL DRAWINGS FOR OPENINGS NOT SHOWN ON THE STRUCTURAL DRAWINGS.

11.2 ALL LINTELS SHALL BEAR ON A MINIMUM OF 200MM (8") DEEP SOLID MASONRY AT EACH END UNLESS OTHERWISE SHOWN.

11.3 SEE TYPICAL DETAILS FOR LINTEL SIZES AND DETAILS UNLESS NOTED OTHERWISE

12.0 POST-INSTALLED ANCHORS

12.1 MATERIALS:

12.1.1 EXCEPT WHERE INDICATED ON THE DRAWINGS, POST-INSTALLED ANCHORS SHALL CONSIST OF THE FOLLOWING ANCHOR TYPES AS PROVIDED BY HILTI (CANADA) CORPORATION. CONTACT HILTI AT (800) 363-4458 FOR PRODUCT RELATED QUESTIONS.

12.2 EXECUTION

12.2.1 ANCHORAGE TO CONCRETE

i) ADHESIVE ANCHORS FOR CONCRETE USE:

(1) HILTI HIT-HY 200 SAFE SET SYSTEM WITH HILTI HIT-Z ROD FOR FAST CURE APPLICATIONS
(2) HILTI HIT-HY 200 SAFE SET SYSTEM WITH HILTI HOLLOW DRILL BIT SYSTEM FOR FAST CURE APPLICATIONS
(3) HILTI HIT-RE 500-SD EPOXY ADHESIVE ANCHORING SYSTEM FOR SLOW CURE APPLICATIONS
(4) HILTI HIT-RE 500 EPOXY ADHESIVE ANCHORING SYSTEM FOR SLOW CURE APPLICATIONS
(5) STEEL ANCHOR ELEMENT SHALL BE HILTI HIS-N INTERNALLY THREADED INSERTS, HILTI HAS-E CONTINUOUSLY THREADED ROD, OR CONTINUOUSLY DEFORMED STEEL REBAR.

ii) MEDIUM DUTY MECHANICAL ANCHORS FOR CONCRETE USE:

(1) HILTI KWIK HUS EZ AND KWIK HUS EZ-I SCREW ANCHORS
(2) HILTI KWIK BOLT-TZ EXPANSION ANCHORS
(3) HILTI KWIK BOLT 3 EXPANSION ANCHORS

iii) HEAVY DUTY MECHANICAL ANCHORS FOR CONCRETE USE:

(1) HILTI HDA UNDERCUT ANCHORS
(2) HILTI HSL-3 EXPANSION ANCHORS

12.2.2 REBAR DOWELING INTO CONCRETE

i) ADHESIVE ANCHORS FOR CRACKED AND UNCRACKED CONCRETE USE:

(1) HILTI HIT-HY 200 SAFE SET SYSTEM WITH HILTI HOLLOW DRILL BIT SYSTEM WITH CONTINUOUSLY DEFORMED REBAR
(2) HILTI HIT-RE 500-SD EPOXY ADHESIVE ANCHORING SYSTEM WITH CONTINUOUSLY DEFORMED REBAR
(3) HILTI HIT-RE 500 EPOXY ADHESIVE ANCHORING SYSTEM WITH CONTINUOUSLY DEFORMED REBAR

12.2.3 ANCHORAGE TO SOLID GROUTED MASONRY

i) ADHESIVE ANCHORS USE:

(1) HILTI HIT-HY 70 MASONRY ADHESIVE ANCHORING SYSTEM
(2) STEEL ANCHOR ELEMENT SHALL BE HILTI HAS-E CONTINUOUSLY THREADED ROD OR CONTINUOUSLY DEFORMED STEEL REBAR.

ii) MECHANICAL ANCHORS USE:

(1) HILTI KWIK HUS-EZ SCEW ANCHOR
(2) HILTI KWIK BOLT-3 EXPANSION ANCHORS

12.2.4 ANCHORAGE TO HOLLOW / MULTI-WYTHE MASONRY

i) ADHESIVE ANCHORS USE:

(1) HILTI HIT-HY 70 MASONRY ADHESIVE ANCHORING SYSTEM
(2) STEEL ANCHOR ELEMENT SHALL BE HILTI HAS-E CONTINUOUSLY THREADED ROD OR CONTINUOUSLY DEFORMED STEEL REBAR
(3) THE APPROPRIATE SIZE SCREEN TUBE SHALL BE USED PER ADHESIVE MANUFACTURER'S RECOMMENDATION

12.2.5 ANCHOR CAPACITY USED IN DESIGN SHALL BE BASED ON THE TECHNICAL DATA PUBLISHED BY HILTI OR SUCH OTHER METHOD AS APPROVED BY THE STRUCTURAL ENGINEER OF RECORD. SUBSTITUTION REQUESTS FOR ALTERNATE PRODUCTS MUST BE APPROVED IN WRITING BY THE STRUCTURAL ENGINEER OF RECORD PRIOR TO USE. CONTRACTOR SHALL PROVIDE CALCULATIONS DEMONSTRATING THAT THE SUBSTITUTED PRODUCT IS CAPABLE OF ACHIEVING THE PERFORMANCE VALUES OF THE SPECIFIED PRODUCT. SUBSTITUTIONS WILL BE EVALUATED FOR COMPLIANCE WITH THE RELEVANT BUILDING CODE FOR SEISMIC USES, LOAD RESISTANCE, INSTALLATION CATEGORY, AND AVAILABILITY OF COMPREHENSIVE INSTALLATION INSTRUCTIONS. ADHESIVE ANCHOR EVALUATION WILL ALSO CONSIDER CREEP, IN-SERVICE TEMPERATURE AND INSTALLATION TEMPERATURE.

12.2.6 INSTALL ANCHORS PER THE MANUFACTURER INSTRUCTIONS, AS INCLUDED IN THE ANCHOR PACKAGING.

12.2.7 OVERHEAD ADHESIVE ANCHORS MUST BE INSTALLED USING THE HILTI PROFI SYSTEM.

12.2.8 THE CONTRACTOR SHALL ARRANGE AN ANCHOR MANUFACTURER'S REPRESENTATIVE TO PROVIDE ONSITE INSTALLATION TRAINING FOR ALL OF THEIR ANCHORING PRODUCTS SPECIFIED. THE STRUCTURAL ENGINEER OF RECORD MUST RECEIVE DOCUMENTED CONFIRMATION THAT ALL OF THE CONTRACTOR'S PERSONNEL WHO INSTALL ANCHORS ARE TRAINED PRIOR TO THE COMMENCEMENT OF INSTALLING ANCHORS.

12.2.9 ANCHOR CAPACITY IS DEPENDANT UPON SPACING BETWEEN ADJACENT ANCHORS AND PROXIMITY OF ANCHORS TO EDGE OF CONCRETE. INSTALL ANCHORS IN ACCORDANCE WITH SPACING AND EDGE CLEARANCES INDICATED ON THE DRAWINGS.

12.2.10 EXISTING REINFORCING BARS IN THE CONCRETE STRUCTURE MAY CONFLICT WITH SPECIFIC ANCHOR LOCATIONS. UNLESS NOTED ON THE DRAWINGS THAT THE BARS CAN BE CUT, THE CONTRACTOR SHALL REVIEW THE EXISTING STRUCTURAL DRAWINGS AND SHALL UNDERTAKE TO LOCATE THE POSITION OF THE REINFORCING BARS AT THE LOCATIONS OF THE CONCRETE ANCHORS, BY HILTI FERROSCAN, HILTI PS 1000, GPR, X-RAY, CHIPPING OR OTHER MEANS.

13.0 ALTERATION AND/OR CONNECTION TO EXISTING STRUCTURE

13.1 ALL DETAILS SHOWN ARE BASED ON INFORMATION AVAILABLE FROM BASE BUILDING DRAWINGS ONLY AND WERE PREPARED BASED ON THE FOLLOWING ASSUMPTIONS:

13.1.1 THE WORKMANSHIP AND MATERIAL EMPLOYED ON THE EXISTING BUILDING WERE OF GOOD QUALITY AND THE STRUCTURE HAS NOT EXPERIENCED DETERIORATION OF AN EXTENT THAT WOULD AFFECT ITS PERFORMANCE.

13.1.2 ALL EXISTING FRAMING, INCLUDING BEARING WALLS, STRUCTURAL STEEL, STRUCTURAL CONCRETE, TIMBER FRAMING, ETC., IS REASONABLY TRUE AND PLUMB.

13.2 THE PROPOSED SCHEDULE OF WORK TO BE COORDINATED WITH ALL SUB TRADES, THE CONSULTANT(S) AND OWNER.

13.3 INVESTIGATE THE EXISTING BUILDING TO DETERMINE THE ACTUAL FIELD CONDITIONS. TAKE FIELD DIMENSIONS AND PERFORM OTHER INSPECTION NECESSARY TO CARRY OUT DESIGN OF SHORING, BRACING, AND THE LIKE, TO SCHEDULE THE SEQUENCE OF OPERATIONS, AND TO PREPARE SHOP DRAWINGS AND DETAILS.

13.4 PRIOR TO PROCEEDING WITH THE WORK, DETERMINE THE EXACT FOUNDING ELEVATIONS OF EXISTING FOOTINGS ADJACENT TO THE NEW WORK. REPORT THESE FINDINGS TO THE CONSULTANT(S).

13.5 PRIOR TO FABRICATION OF STRUCTURAL STEEL, OPEN UP ALL AREAS WHERE CONNECTIONS ARE TO BE MADE TO EXISTING WORK AND TAKE FIELD MEASUREMENTS. MODIFY METHODS FOR CONNECTING TO SUIT SITE CONDITIONS FOUND AND TO THE APPROVAL OF THE CONSULTANT(S). CARRY OUT LOCAL REPAIRS TO THE EXISTING WORK AS NECESSARY AND AS DIRECTED BY THE CONSULTANT(S).

13.6 SHORE EXISTING WORK AS REQUIRED UNTIL ALL NEW WORK HAS BEEN COMPLETED AND REVIEWED BY THE CONSULTANT(S).

13.7 SHORE FLOORS AS REQUIRED TO SUPPORT CRANES, HOISTS AND OTHER CONSTRUCTION EQUIPMENT.

13.8 DESIGN SHORING, BRACING, NEEDLING, SCAFFOLDING, AND THE LIKE, IN ACCORDANCE WITH THE REQUIREMENTS OF ONTARIO REGULATION 332/12, THE BUILDING CODE AS AMENDED. DESIGN SUCH TEMPORARY ELEMENTS SUCH THAT LOADS APPLIED TO THEM WILL BE SAFEY CARRIED. SUPERIMPOSED LIVE LOADS, CONSTRUCTION LOADS, AND WIND LOADS SHALL BE TAKEN INTO ACCOUNT AND THE LATERAL STABILITY OF THE ELEMENTS SUPPORTED AND THE SHORING AND NEEDLING SHALL BE INSURED.

13.9 PREPARE AND COORDINATE THE DESIGN OF SHORING AND THE LIKE, IN COOPERATION WITH OTHER TRADES SUCH THAT NEW WORK MAY BE INSTALLED AS REQUIRED.

13.10 PROVIDE SLOTTED HOLES AND FRICTION TYPE BOLTED CONNECTIONS TO CONNECT NEW STEEL TO EXISTING WORK.

13.11 DO NOT CUT CONCRETE REINFORCEMENT UNLESS REVIEWED AND APPROVED BY THE CONSULTANT.

13.12 WHERE REQUIRED TO AVOID CUTTING EXISTING REINFORCEMENT, MODIFY THE LAYOUT OF NEW THROUGH BOLTS, EXPANSION ANCHORS AND OTHER ANCHORING DEVICES.

13.13 MAKE GOOD THE EXISTING WORK.

14.0 CUTTING AND CORING OF EXISTING STRUCTURE

14.1 PRIOR TO CUTTING AND CORING ANY OPENINGS IN THE EXISTING BUILDING, PROVIDE THE CONSULTANT WITH A SLEEVING DRAWING INDICATING THE SIZE AND LOCATION OF OPENINGS RELATIVE TO BUILDING GRIDLINES. EXISTING OPENINGS IN THE VICINITY OF THE NEW OPENING MUST ALSO BE SHOWN.

14.2 ALL DIMENSIONS PROVIDED TO THE CONSULTANT(S) ARE TO BE CONFIRMED WITH THE APPROPRIATE CONTRACTOR (MECHANICAL OR ELECTRICAL) PRIOR TO CUTTING/CORING.

14.3 ANY REVISIONS TO THE DIMENSIONS BY THE CONSULTANT(S) MUST BE REVIEWED BY THE APPROPRIATE CONTRACTOR PRIOR TO CUTTING/CORING.

14.4 THE CONSULTANT MAY IDENTIFY AREAS WHERE EXISTING REINFORCEMENT AND EMBEDDED SERVICES MUST BE LOCATED PRIOR TO CUTTING/CORING. THIS REINFORCEMENT IS TO BE LOCATED BY A POSITIVE MEANS, (I.E. X-RAYING, LOCAL CHIPPING OF SLAB- WHERE PERMITTED BY THE CONSULTANT-, USE OF COVER METER).

14.5 AFTER REINFORCEMENT AND EMBEDDED SERVICES HAVE BEEN LOCATED IN THESE AREAS, NOTIFY THE CONSULTANT(S) WHO WILL REVIEW AND APPROVE OF LOCATION PRIOR TO CUTTING/CORING. MAKE ANY NECESSARY ADJUSTMENTS TO THE HOLE LOCATION AS DIRECTED BY THE CONSULTANT(S).

14.6 FOR ANY OPENINGS WHICH ARE TO BE SAW CUT INTO THE EXISTING STRUCTURE, PRE-DRILL THE CORNERS USING A 100 MM DIAMETER CORE DRILL. DO NOT OVERCUT CORNERS OF OPENING.

14.7 ALL PRICES FOR CUTTING/CORING ARE TO INCLUDE ANY COSTS ASSOCIATED WITH X-RAYING, CHIPPING, ETC.

14.8 FOR ANY AREAS WHERE REINFORCEMENT IS CUT, THE CONTRACTOR SHALL INDICATE THE DIRECTION AND LAYER OF REINFORCEMENT ON THE AS-BUILT SLEEVING DRAWINGS.

15.0 SUBMITTALS

15.1 SUBMIT FOR REVIEW BY THE VARIOUS CONSULTANTS, DETAILED SHOP DRAWINGS FOR ALL TEMPORARY AND PERMANENT STRUCTURAL WORK. THIS INCLUDES BUT IS NOT LIMTED TO:

15A.1 SUBMIT FOR REVIEW BY THE VARIOUS CONSULTANTS, DETAILED SHOP DRAWINGS FOR ALL TEMPORARY AND PERMANENT STRUCTURAL WORK. THIS INCLUDES BUT IS NOT LIMITED TO:

15A.1.1 END-BEARING STEEL PILES

i) SUBMIT ERECTION AND FABRICATION DRAWINGS STAMPED AND SIGNED BY A QUALIFIED PROFESSIONAL ENGINEER LICENSED IN PROVINCE OF ONTARIO.

ii) SUBMIT SHOP, ERECTION, AND SETTING DRAWINGS FOR REVIEW BY THE CONSULTANT(S).

iii) REFER TO SPECIFICATION FOR FURTHER REQUIREMENTS.

15B.1.1 HELICAL PIERS

I) DESIGN PILE SYSTEM WITH A CONFIGURATION AND SAFE CAPACITY IN ACCORDANCE WITH THE ASSUMPTIONS AND LOADS INDICATED IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS AND THE FINDINGS AND RECOMMENDATIONS IN THE GEOTECHNICAL REPORT.

II) DESIGN BEARING PLATES OR OTHER CONNECTIONS BETWEEN THE PILES TO TRANSMIT THE FACTORED LOADS SHOWN OR IMPLIED BY THE DRAWINGS. BEARING ASSEMBLIES SHALL ENSURE THAT THE MAXIMUM BEARING STRESSES IN CAN/CSA A23.3 ARE NOT EXCEEDED.

III) DESIGN SHALL BE DONE BY A PROFESSIONAL ENGINEER LICENSED TO PRACTICE IN THE PROVINCE OF ONTARIO

IV) SUBMIT ERECTION AND FABRICATION DRAWINGS FOR REVIEW BY THE CONSULTANT.

15.1.2 CONCRETE AND REINFORCEMENT

i) SUBMIT CONCRETE MIX DESIGNS ALONG WITH A BRIEF DESCRIPTION OF WHERE EACH MIX WILL BE USED FOR REVIEW BY THE CONSULTANT(S).

ii) SUBMIT REINFORCING PLACING DRAWINGS AND BAR LISTS FOR REVIEW BY THE CONSULTANT(S).

iii) PROVIDE TEST CYLINDERS IN ACCORDANCE WITH CAN3-A23.1 BUT A MINIMUM OF 3 CYLINDERS FROM EACH LOAD OF CONCRETE, TO BE TESTED; 1 AT 7 DAYS AND 2 AT 28 DAYS.

15.1.3 PRECAST CONCRETE DECK

i) DESIGN DETAILS, CONNECTIONS, AND THE LIKE IN ACCORDANCE WITH THE ONTARIO BUILDING CODE FOR THE FORCES SHOWN ON THE DRAWINGS.

ii) SUBMIT SKETCHES AND DESIGN CALCULATIONS STAMPED AND SIGNED BY A QUALIFIED PROFESSIONAL ENGINEER LICENSED IN PROVINCE OF ONTARIO FOR NON STANDARD CONNECTIONS.

iii) SUBMIT SHOP, ERECTION, AND SETTING DRAWINGS FOR REVIEW BY THE CONSULTANT(S).

iv) ENSURE FABRICATOR DRAWINGS SHOWING DESIGNED ASSEMBLIES, COMPONENTS AND CONNECTIONS ARE STAMPED AND SIGNED BY QUALIFIED PROFESSIONAL ENGINEER LICENSED IN THE PROVINCE OF ONTARIO.

v) AT THE REQUEST OF THE CONSULTANT SUBMIT CALCULATIONS BEARING THE SIGNATURE AND SEAL OF A PROFESSIONAL ENGINEER LICENSED IN THE PROVINCE OF ONTARIO.

15.1.4 STRUCTURAL STEEL

i) DESIGN DETAILS, CONNECTIONS, AND THE LIKE IN ACCORDANCE WITH THE ONTARIO BUILDING CODE FOR THE FORCES SHOWN ON THE DRAWINGS.

ii) SUBMIT SKETCHES AND DESIGN CALCULATIONS STAMPED AND SIGNED BY A QUALIFIED PROFESSIONAL ENGINEER LICENSED IN PROVINCE OF ONTARIO FOR NON STANDARD CONNECTIONS.

iii) SUBMIT SHOP, ERECTION, AND SETTING DRAWINGS FOR REVIEW BY THE CONSULTANT(S).

iv) ENSURE FABRICATOR DRAWINGS SHOWING DESIGNED ASSEMBLIES, COMPONENTS AND CONNECTIONS ARE STAMPED AND SIGNED BY QUALIFIED PROFESSIONAL ENGINEER LICENSED IN THE PROVINCE OF ONTARIO.

15.1.5 METAL DECK

i) DESIGN DECK, INCLUDING CONNECTIONS TO SUPPORTING MEMBERS, IN CONFORMANCE WITH THE REQUIREMENTS OF CAN/CSA-S136, FOR THE FORCES SHOWN ON THE DRAWINGS.

ii) SUBMIT SHOP DRAWINGS STAMPED AND SIGNED BY A QUALIFIED PROFESSIONAL ENGINEER LICENSED IN THE PROVINCE OF ONTARIO.

15.1.6 LIGHTWEIGHT STEEL FRAMING

i) SUBMIT SHOP AND ERECTION DRAWINGS BEARING THE SEAL OF A PROFESSIONAL ENGINEER LICENSED IN THE PROVINCE OF ONTARIO, FOR REVIEW BY THE CONSULTANT(S).

15.2 THE CONTRACTOR SHALL ALLOW FOR A OF 5 WORKING DAYS TURNAROUND TIME FOR THE SHOP DRAWINGS BY THE STRUCTURAL CONSULTANT.

15.3 OUR REVIEW OF THE SHOP DRAWINGS IS ONLY FOR GENERAL CONFORMITY WITH STRUCTURAL CONTRACT DOCUMENTS AND SPECIFICATIONS. COMMENTS MADE ON THE SHOP DRAWINGS DURING THIS REVIEW DO NOT RELIEVE THE CONTRACTOR FROM COMPLIANCE WITH THE REQUIREMENTS OF THE STRUCTURAL CONTRACT DOCUMENTS AND SPECIFICATIONS, NOR DO THEY AUTHORIZE ANY CHANGES TO THE CONTRACT. REVIEW OF A SPECIFIC ITEM SHALL NOT INCLUDE REVIEW OF AN ASSEMBLY OF WHICH THE ITEM IS A COMPONENT. THE CONTRACTOR'S RESPONSIBILITIES INCLUDE ALL QUANTITIES, DETAIL DIMENSIONS, FIELD MEASUREMENTS, FABRICATION PROCESS, MEANS, METHODS, SEQUENCES AND PROCEDURES OF CONSTRUCTION, COORDINATION OF WORK WITH ALL TRADES AND PERFORMING ALL WORK IN A SAFE AND SATISFACTORY MANNER. THE REVIEW OF SHOP DRAWINGS DOES NOT IMPLY ANY CHANGE IN ANY OTHER CONSULTANTS' OR PROFESSIONALS' RESPONSIBILITY RELATED TO DESIGN OF SPECIFIC ITEMS AS OUTLINED BY THE SPECIFICATIONS (SUCH AS STRUCTURAL STEEL CONNECTIONS, STEEL JOISTS, PRECAST ELEMENTS, ETC.). AFTER REVIEW, THE DRAWINGS WILL BE STAMPED AND RETURNED TO SHOW ONE OF THE FOLLOWING:

NOT REVIEWED SHOWS WORK WHICH IS NOT WITHIN THE SCOPE OF STRUCTURAL CONSULTING SERVICES.

REVIEWED NO DEVIATIONS FROM THE CONTRACT DOCUMENTS NOTED.

NOTED WE HAVE MADE COMMENTS, TO BE REVIEWED/INCORPORATED. SUBMIT RECORD PRINT.

RESUBMIT REVISE AND RESUBMIT FOR REVIEW.

16.0 QUALITY CONTROL

16.1 GENERAL

16.1.1 PROVIDE A SYSTEM OF QUALITY CONTROL TO ENSURE THAT THE MINIMUM STANDARDS SPECIFIED HEREIN ARE ATTAINED.

16.1.2 BRING TO THE ATTENTION OF THE CONSULTANT(S) ANY DEFECTS IN THE WORK OR DEPARTURES FROM THE CONTRACT DOCUMENTS, WHICH MAY OCCUR DURING CONSTRUCTION. THE CONSULTANT(S) WILL DECIDE UPON CORRECTIVE ACTION AND GIVE RECOMMENDATIONS IN WRITING.

16.1.3 THE CONSULTANT'S GENERAL REVIEW DURING CONSTRUCTION AND INSPECTION AND TESTING BY INDEPENDENT INSPECTION AND TESTING AGENCIES REPORTING TO THE CONSULTANT(S) ARE BOTH UNDERTAKEN TO INFORM THE OWNER/CLIENT OF THE CONTRACTOR'S PERFORMANCE AND SHALL IN NO WAY AUGMENT THE CONTRACTOR'S QUALITY CONTROL OR RELIEVE THE CONTRACTOR OF CONTRACTUAL RESPONSIBILITY.

16.2 NOTIFICATION

16.2.1 PRIOR TO COMMENCING SIGNIFICANT SEGMENTS OF THE WORK, GIVE THE CONSULTANT(S) AND INDEPENDENT INSPECTION AND TESTING COMPANIES APPROPRIATE NOTIFICATION (MINIMUM 24 HOURS) SO AS TO AFFORD THEM REASONABLE OPPORTUNITY TO REVIEW THE WORK. FAILURE TO MEET THIS REQUIREMENT MAY BE CAUSE FOR THE CONSULTANT(S) TO CLASSIFY THE WORK AS DEFECTIVE.

16.3 INSPECTION AND TESTING

16.3.1 THE CONSULTANT(S) WILL APPOINT AN INDEPENDENT INSPECTION AND TESTING COMPANY TO MAKE INSPECTIONS OR PERFORM TESTS AS THE CONSULTANT(S) DIRECTS. THE INDEPENDENT INSPECTION AND TESTING COMPANIES SHALL BE RESPONSIBLE ONLY TO THE CONSULTANT(S) AND SHALL MAKE ONLY SUCH INSPECTIONS OR TESTS AS THE CONSULTANT(S) MAY DIRECT.

16.4 DEFECTIVE MATERIALS AND WORK

16.4.1 WHERE EVIDENCE EXISTS THAT DEFECTIVE WORK HAS OCCURRED OR THAT WORK HAS BEEN CARRIED OUT INCORPORATING DEFECTIVE MATERIALS, THE CONSULTANT(S) MAY HAVE TESTS, INSPECTIONS OR SURVEYS PERFORMED, ANALYTICAL CALCULATIONS OF STRUCTURAL STRENGTH MADE, AND THE LIKE, IN ORDER TO HELP DETERMINE WHETHER THE WORK MUST BE CORRECTED OR REPLACED. TESTS, INSPECTIONS OR SURVEYS OR CALCULATIONS CARRIED OUT UNDER THESE CIRCUMSTANCES WILL BE MADE AT THE CONTRACTOR'S EXPENSE, REGARDLESS OF THEIR RESULTS, WHICH MAY BE SUCH THAT, IN THE CONSULTANT'S OPINION, THE WORK MAY BE ACCEPTABLE.

16.4.2 ALL TESTING SHALL BE CONDUCTED IN ACCORDANCE WITH THE REQUIREMENTS OF ONTARIO REGULATION 332/12 (THE BUILDING CODE) AS AMENDED, EXCEPT WHERE THIS WOULD, IN THE CONSULTANT'S OPINION, CAUSE UNDUE DELAY OR GIVE RESULTS NOT REPRESENTATIVE OF THE REJECTED MATERIAL IN PLACE. IN THIS CASE, THE TESTS SHALL BE CONDUCTED IN ACCORDANCE WITH THE STANDARDS GIVEN BY THE CONSULTANT(S).

16.4.3 MATERIALS OR WORK, WHICH FAILS TO MEET SPECIFIED REQUIREMENTS, MAY BE REJECTED BY THE CONSULTANT(S) WHENEVER FOUND AT ANY TIME PRIOR TO FINAL ACCEPTANCE OF THE WORK REGARDLESS OF PREVIOUS INSPECTION. IF REJECTED, DEFECTIVE MATERIALS OR WORK SHALL BE PROMPTLY REMOVED AND REPLACED OR REPAIRED TO THE SATISFACTION OF THE CONSULTANT(S), AT NO EXPENSE TO THE OWNER.

DESIGN NOTES:

1.0 GENERAL

1.1 THE STRUCTURE HAS BEEN STRUCTURAL ALTERATIONS HAVE BEEN DESIGNED IN ACCORDANCE WITH THE REQUIREMENTS OF ONTARIO REGULATION 332/12 (THE BUILDING CODE) AS AMENDED.

1.2 STRUCTURAL STEEL ELEMENTS HAVE BEEN DESIGNED IN ACCORDANCE WITH CAN/CSA S16, LIMITS STATES DESIGN OF STRUCTURAL STEEL.

1.3 REINFORCING CONCRETE ELEMENTS HAVE BEEN DESIGNED IN ACCORDANCE WITH CSA A23.3, DESIGN OF CONCRETE STRUCTURES.

1.4 LOAD BEARING MASONRY ELEMENTS HAVE BEEN DESIGNED IN ACCORDANCE WITH CSA STANDARD CAN3-S304.1, DESIGN FOR MASONRY STRUCTURES.

1.5 COLD FORMED STRUCTURAL STEEL ELEMENTS ARE DESIGNED IN ACCORDANCE WITH S136, COLD FORMED STEEL STRUCTURAL MEMBERS.

1.6 ALL CODES, MANUALS, STANDARDS, AND SPECIFICATIONS REFERRED TO SHALL BE THE LATEST EDITIONS INCLUDING ALL REVISIONS AND ADDENDA.

2.0 IMPORTANCE FACTOR

2.1 THE BUILDING HAS BEEN DESIGNED BASED ON A NORMAL HIGH IMPORTANCE FACTOR.

2.2 LOAD IMPOSED ON BUILDING HAVE BEEN BASED ON THE FOLLOWING IMPORTANCE FACTORS:

SNOW:	IULS = 1.15	ISLS = 0.9
WIND:	IULS = 1.15	ISLS = 0.75
SEISMIC:	IULS = 1.3	ISLS = 1.0

3.0 LIVE LOADS ON ROOFS

3.1 ALL ROOF AREAS HAVE BEEN DESIGNED TO RESIST THE WORST CASE LOADING DUE TO SNOW, RAIN, AND WIND AS PER REQUIREMENTS OF THE ONTARIO BUILDING CODE. THE DESIGN PARAMETERS FOR THESE LOADS ARE AS FOLLOWS:

3.1.1 SNOW LOADS

i) THE 1-IN-50 YEAR GROUND SNOW LOAD, SS, OF 3.1, AND THE ASSOCIATED 1-IN-50 YEAR RAIN LOAD, SR, OF 0.3, HAVE BEEN CONSIDERED IN THE DESIGN OF THE ROOF STRUCTURE, RESULTING IN A BASIC ROOF SNOW LOAD OF 3.20 KPA.

ii) ADDITIONAL SNOW ACCUMULATION ADJACENT TO HIGHER WALLS, ROOFS, MECHANICAL UNITS, AND OTHER OBSTRUCTIONS HAVE BEEN CONSIDERED AND ARE INDICATED ON PLANS WHERE APPLICABLE.

3.1.2 RAIN LOADS

i) DESIGN OF THE ROOF STRUCTURE IS BASED ON THE ASSUMPTION THAT CONTROL FLOW ROOF DRAINS SATISFY ALL REQUIREMENTS OF THE NATIONAL PLUMBING CODE OF CANADA.

ii) THE TOTAL LOAD ASSOCIATED WITH THE 24 HOUR RAINFALL IS EQUIVALENT TO 108 MM OF WATER OVER THE ENTIRE ROOF AREA.

iii) THE DISTRIBUTION OF THE RAIN LOAD HAS BEEN MODIFIED TO ACCOUNT FOR THE ACTUAL ROOF SLOPES AND PROFILE.

3.1.3 WIND UPLIFT LOADS

i) ROOF ELEMENTS SUCH AS ROOF DECKING, TRUSSES, JOISTS, BEAMS, ETC. AND THEIR CONNECTIONS ARE DESIGNED FOR UPLIFT PRESSURE DUE TO WIND AS PER THE KEY PLAN SHOWN ON DRAWING TYPICAL DETAIL TD-G02.

4.0 LATERAL LOADS ON FOUNDATION WALLS

4.1 WALLS RETAINING EARTH ARE DESIGNED TO SAFELY WITHSTAND A HORIZONTAL PRESSURE P IN KPA (PSF) AT ANY DEPTH H IN M (FT) GIVEN BY THE EXPRESSION:

P = K (GH + Q)

WHERE:

SOIL PRESSURE COEFFICIENT (K) = 0.35

UNIT WEIGHT OF SOIL (G) = 21 KN/M3

SURCHARGE (Q) = 4.8 KPA

4.2 THE WALLS HAVE BEEN DESIGNED ASSUMING FREE DRAINING BACKFILL WHICH DOES NOT PERMIT THE BUILD-UP OF HYDROSTATIC PRESSURE.

4.3 THE WALLS HAVE BEEN DESIGNED TO RESIST LATERAL PRESSURES ASSOCIATED WITH DYNAMIC BEHAVIOUR DURING A SEISMIC EVENT BASED ON THE REQUIREMENTS OF CLAUSE 4.1.8.16 (4) OF THE ONTARIO BUILDING CODE.

5.0 LATERAL LOADS ON STRUCTURAL FRAME

5.1 THE STRUCTURE HAS BEEN DESIGNED TO RESIST THE WORST CASE LOADING DUE TO WIND AND SEISMIC ACTIVITY AS PER REQUIREMENTS OF THE ONTARIO BUILDING CODE. THE DESIGN PARAMETERS FOR THESE LOADS ARE AS FOLLOWS:

5.1.1 WIND LOADS

ii) THE 1-IN-50 YEAR WIND LOADING FOR TIMMINS IS Q 1/50 = 0.35 KPA.

iii) EXPOSURE FACTOR: CE BASED ON OPEN TERRAIN CONDITION

iv) CP AND CG BASED ON FIGURE I-7 OF THE USER'S GUIDE - NBC 2005 STRUCTURAL COMMENTARIES.

v) DESIGN BASE SHEAR DUE TO WIND (V):

NORTH-SOUTH DIRECTION = XXX KN.

EAST-WEST DIRECTION = XXX KN.

5.1.2 SEISMIC LOADS

i) SEISMIC FORCES HAVE BEEN CALCULATED IN ACCORDANCE WITH THE EQUIVALENT STATIC FORCE PROCEDURE AS DETAILED UNDER CLAUSE 4.1.8.11 OF THE 2012 ONTARIO BUILDING CODE.

ii) DESIGN GROUND MOTION VALUES FOR TIMMINS ARE:

SA(0.2) = 0.140

SA(0.5) = 0.090

SA(1.0) = 0.054

SA(2.0) = 0.018

PGA = 0.056

iii) SITE CLASSIFICATION FOR SEISMIC RESPONSE = E

iv) ACCELERATION AND VELOCITY COEFFICIENTS:

FA = 2.1

FV = 2.1

v) THE SEISMIC FORCE RESISTING SYSTEM (SFRS): CONVENTIONAL CONSTRUCTION MASONRY SHEAR WALLS

RD = 1.5 RO = 1.5

vi) DESIGN BASE SHEAR DUE TO SEISMIC LOADS (V):

NORTH-SOUTH DIRECTION = XXX KN.

EAST-WEST DIRECTION = XXX KN.

6.0 FUTURE EXTENSIONS

6.1 THE STRUCTURE HAS NOT BEEN DESIGNED FOR FUTURE EXTENSION.

LIST OF STRUCTURAL DRAWINGS

SHEET No.	SHEET TITLE	SHEET No.	SHEET TITLE
S1.1	GENERAL NOTES	S3.1	SCHEDULES
S1.2	TYPICAL DETAILS		
S1.3	TYPICAL DETAILS	S4.1	SECTIONS AND DETAILS
S1.4	TYPICAL DETAILS	S4.2	SECTIONS AND DETAILS
S1.5	TYPICAL DETAILS	S4.2B	SECTIONS AND DETAILS
S1.6	TYPICAL DETAILS	S4.3	SECTIONS AND DETAILS
S2.1	FOUNDATION PLAN	S5.1	ELEVATIONS
S2.2	FLOOR FRAMING PLAN	S5.2	ELEVATIONS
S2.3	ROOF FRAMING PLAN		

POPE FRANCIS ELEMENTARY
ADDITION & RENOVATION
PROJECT#R121

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Northeastern Catholic District SCHOOL BOARD

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REV	DESCRIPTION	DATE
4	ISSUED FOR SA No. S1	2017.05.24
3	ISSUED FOR PERMIT	2017.05.19
2	ISSUED FOR TENDER	2017.05.16
1	100% REVIEW	2017.05.10

BORTOLOTTO

PROJECT NUMBER
PF1701

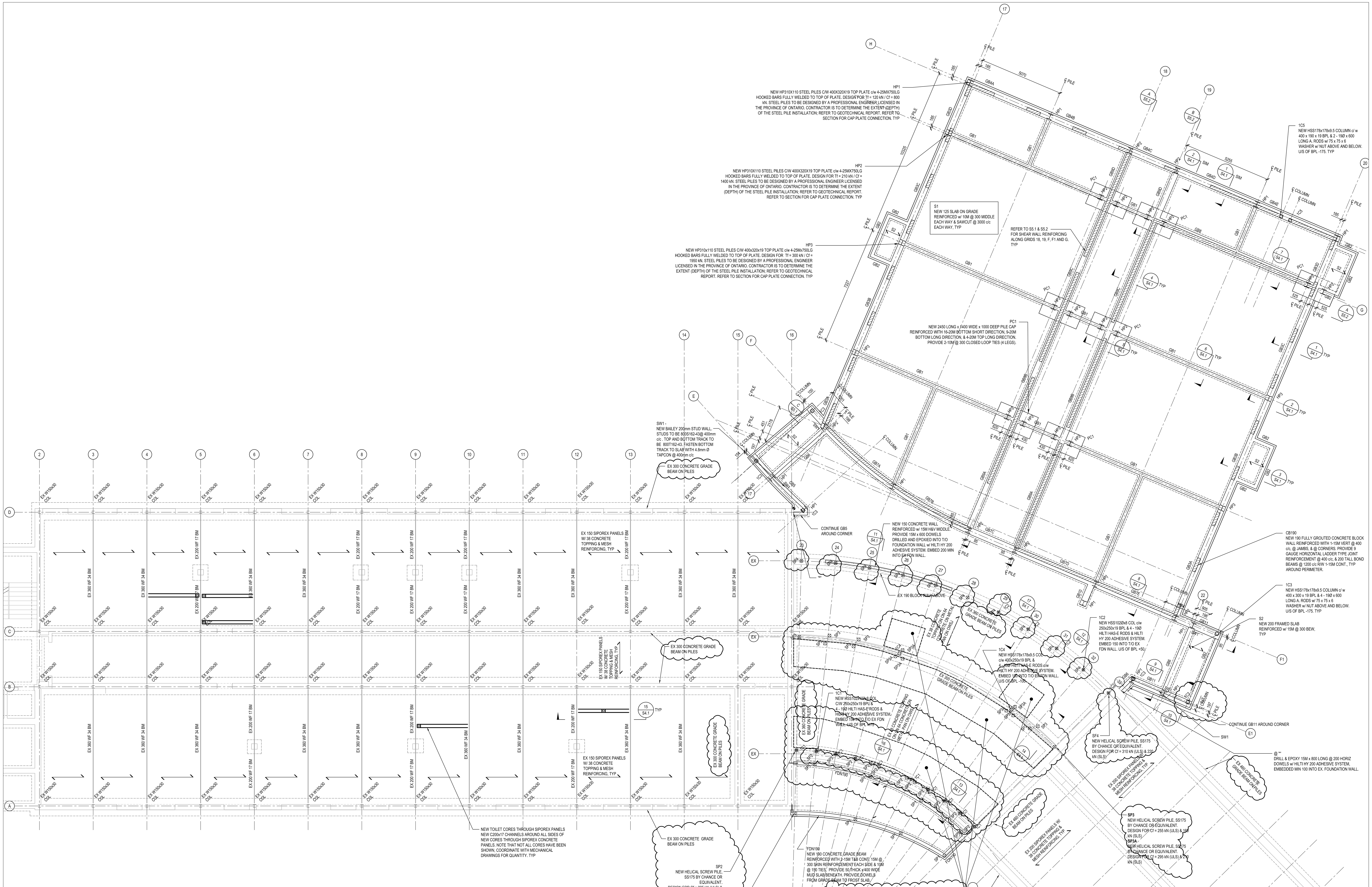
DATE
17.05.24

SCALE
AS NOTED

DRAWN BY
KOC/NAZ

GENERAL NOTES

S1.1



FOUNDATION & GROUND FLOOR FRAMING PLAN

1 / S2.1 — 1:75

1. TOP OF CONCRETE SLAB TO BE 0 MM BELOW 1ST FLOOR ELEVATION 0 MM EXCEPT AS CROSSED AND NOTED. AREAS CROSSED AND NOTED TO BE READ FROM 1ST FLOOR ELEVATION 0 MM.
2. UNDERSIDE OF COLUMN FOOTINGS TO BE AT ELEVATION -2590 MM UNLESS OTHERWISE NOTED.
3. UNDERSIDE OF GRADE BEAM TO BE AT ELEVATION -2200 MM UNLESS OTHERWISE NOTED.
4. UNDERSIDE OF COLUMN BASEPLATES TO BE AT ELEVATION NOTED ON PLAN.
5. CENTRE LINES OF COLUMNS, CAPS AND FOOTINGS ARE COINCIDENT UNLESS OTHERWISE NOTED.
6. ALL STRUCTURAL STEEL COLUMNS TO HAVE 8MM CAP PLATES.
7. JOIST SHOES ARE TO BE 100 MM DEEP UNLESS OTHERWISE NOTED.
8. LIVE LOADS ARE AS FOLLOWS, UNLESS NOTED OTHERWISE ON PLAN:

CLASSROOMS	2.4 KPA
LIBRARY/BOOK ROOM	2.9 KPA
KITCHENS	4.8 KPA
STAIRS AND CORRIDORS	4.8 KPA

9. SUPERIMPOSED DEAD LOADS ARE:

PARTITION ALLOWANCE	1.0 KPA
FLOOR FINISH	0.2 KPA
SUSPENDED CEILING AND MECHANICAL	0.5 KPA
CONCRETE TOPPING	1.2 KPA

10. SEE ARCHITECTURAL DRAWINGS FOR SLOPES ETC. MAINTAIN SLAB THICKNESSES SHOWN.
11. PROVIDE SLAB DEPRESSIONS AND SLOPES, OTHER THAN THOSE SHOWN ON THE STRUCTURAL DRAWINGS, AS REQUIRED BY THE ARCHITECTURAL AND MECHANICAL DRAWINGS AND SPECIFICATIONS.
12. SEE ARCHITECTURAL DRAWINGS FOR SLOPES TO DRAIN. MAINTAIN SLAB THICKNESSES SHOWN.
13. REFER TO GENERAL NOTES FOR REQUIRED SOIL BEARING CAPACITY.

POPE FRANCIS ELEMENTARY
ADDITION & RENOVATION
PROJECT#R121

387 Balsam Street North
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REV	DESCRIPTION	DATE
4	ISSUED FOR SA No. S1	2017.05.24
3	ISSUED FOR PERMIT	2017.05.19
2	ISSUED FOR TENDER	2017.05.16
1	100% REVEW	2017.05.10

BORTOLOTTO

PROJECT NUMBER PF1701

DATE 17.05.24

SCALE 1:75

DRAWN BY KOC

FOUNDATION PLAN

S2.1

POPE FRANCIS ELEMENTARY
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PROJECT#2121

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REV	DESCRIPTION	DATE
4	ISSUED FOR SUNLIT	2017.05.24
3	ISSUED FOR PERMIT	2017.05.19
2	ISSUED FOR TENDER	2017.05.16
1	70% REVIEW	2017.05.10

BORTOLOTTO

PROJECT NUMBER
1702

STATE
ISSUED FOR SUNLIT

DATE
17.05.24

SCALE
1:75

DRAWN BY
ADC

SECOND FLOOR
FRAMING PLAN

S2.2

SECOND FLOOR FRAMING PLAN

1/S2.2 — 1:75

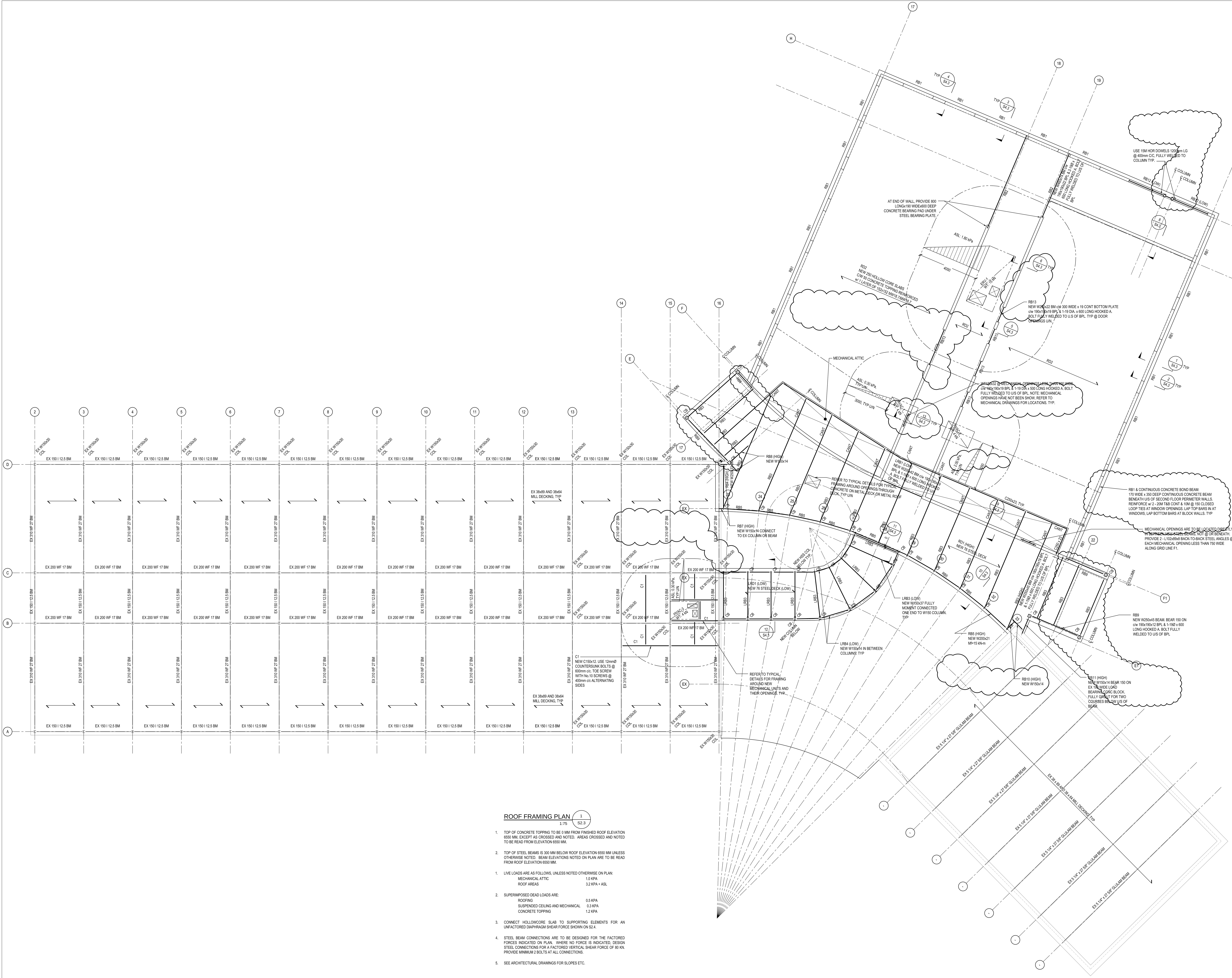
1. TOP OF CONCRETE TOPPING TO BE 89 MM FROM TOP OF FOUNDATION WALL EXCEPT AS CROSSED AND NOTED. AREAS CROSSED AND NOTED TO BE READ FROM 2ND FLOOR ELEVATION 3300 MM.
2. TOP OF STEEL BEAMS ARE TO BE 300 MM BELOW 2ND FLOOR ELEVATION 3300 MM, UNLESS NOTED +/-0.0 ON PLAN. BEAM ELEVATIONS NOTED ON PLAN ARE TO BE READ FROM 2ND FLOOR ELEVATION 3300 MM.
3. LIVE LOADS ARE AS FOLLOWS, UNLESS NOTED OTHERWISE ON PLAN:

CLASSROOMS	2.4 KPA
LIBRARY/BOOK ROOM	7.2 KPA
KITCHENS	4.8 KPA
STAIRS AND CORRIDORS	4.8 KPA
LOW ROOF	3.2 KPA + ASL

4. SUPERIMPOSED DEAD LOADS ARE:

PARTITIONS / CEILING	1.0 KPA
FLOOR FINISH	0.2 KPA
SUSPENDED CEILING AND MECHANICAL	0.5 KPA
CONCRETE TOPPING	1.2 KPA

5. CONNECT HOLLOW CORE SLAB TO SUPPORTING ELEMENTS FOR AN UNFACTORED DIAPHRAGM SHEAR FORCE SHOWN ON S2.4.
6. STEEL BEAM CONNECTIONS ARE TO BE DESIGNED FOR THE FACTORED FORCES INDICATED ON PLAN. WHERE NO FORCE IS INDICATED, DESIGN STEEL CONNECTIONS FOR A FACTORED VERTICAL SHEAR FORCE OF 80 KN. PROVIDE MINIMUM 2 BOLTS TO ALL CONNECTIONS.
7. SEE ARCHITECTURAL DRAWINGS FOR SLOPES ETC. MAINTAIN SLAB THICKNESS SHOWN.



ROOF FRAMING PLAN

1 / S2.3

1:75

1. TOP OF CONCRETE TOPPING TO BE 0 MM FROM FINISHED ROOF ELEVATION 6550 MM, EXCEPT AS CROSSED AND NOTED. AREAS CROSSED AND NOTED TO BE READ FROM ELEVATION 6550 MM.

2. TOP OF STEEL BEAMS IS 300 MM BELOW ROOF ELEVATION 6550 MM UNLESS OTHERWISE NOTED. BEAM ELEVATIONS NOTED ON PLAN ARE TO BE READ FROM ROOF ELEVATION 6550 MM.

1. LIVE LOADS ARE AS FOLLOWS, UNLESS NOTED OTHERWISE ON PLAN:

MECHANICAL ATTIC	1.0 KPA
ROOF AREAS	3.2 KPA + ASL

2. SUPERIMPOSED DEAD LOADS ARE:

ROOFING	0.5 KPA
SUSPENDED CEILING AND MECHANICAL	0.3 KPA
CONCRETE TOPPING	1.2 KPA

3. CONNECT HOLLOWCORE SLAB TO SUPPORTING ELEMENTS FOR AN UNFACTORED DIAPHRAGM SHEAR FORCE SHOWN ON S2.4.

4. STEEL BEAM CONNECTIONS ARE TO BE DESIGNED FOR THE FACTORED FORCES INDICATED ON PLAN. WHERE NO FORCE IS INDICATED, DESIGN STEEL CONNECTIONS FOR A FACTORED VERTICAL SHEAR FORCE OF 80 KN. PROVIDE MINIMUM 2 BOLTS AT ALL CONNECTIONS.

5. SEE ARCHITECTURAL DRAWINGS FOR SLOPES ETC.

POPE FRANCIS ELEMENTARY
ADDITION & RENOVATION
PROJECT#R121

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2	ISSUED FOR TENDER	2017.05.16
1	100% REVEW	2017.05.10

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PROJECT NUMBER
PF1701

DATE
17.05.24

SCALE
1:75

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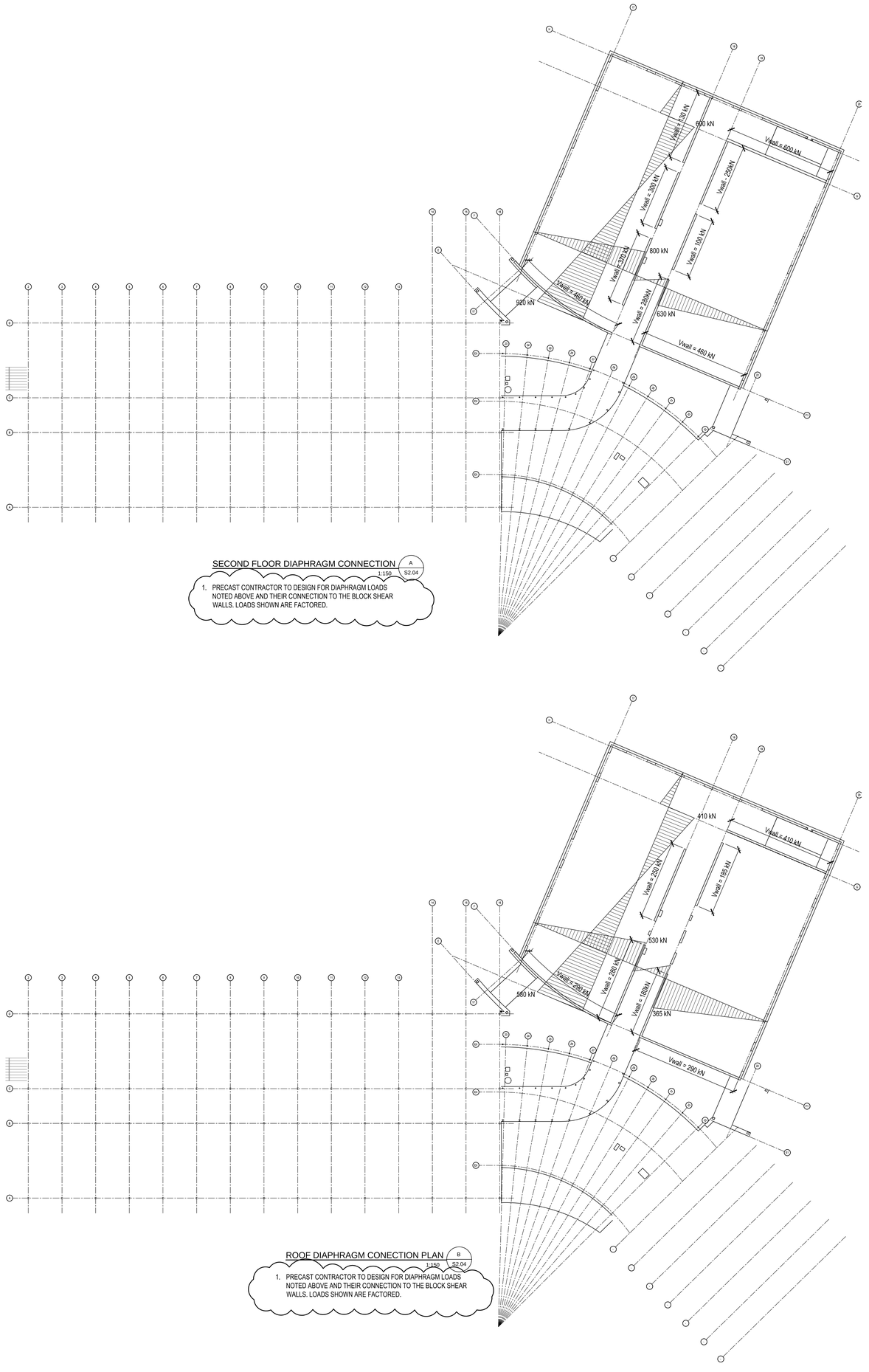
ROOF FRAMING PLAN

S2.3



SECOND FLOOR DIAPHRAGM CONNECTION (A / S2.04)
1:150

1. PRECAST CONTRACTOR TO DESIGN FOR DIAPHRAGM LOADS NOTED ABOVE AND THEIR CONNECTION TO THE BLOCK SHEAR WALLS. LOADS SHOWN ARE FACTORED.

ROOF DIAPHRAGM CONECTION PLAN (B / S2.04)
1:150

1. PRECAST CONTRACTOR TO DESIGN FOR DIAPHRAGM LOADS NOTED ABOVE AND THEIR CONNECTION TO THE BLOCK SHEAR WALLS. LOADS SHOWN ARE FACTORED.

POPE FRANCIS ELEMENTARY
ADDITION & RENOVATION
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1	100% REVIEW	2017.05.10

BORTOLOTTO

PROJECT NUMBER
PF1721

DATE
17.05.24

SCALE
AS NOTED

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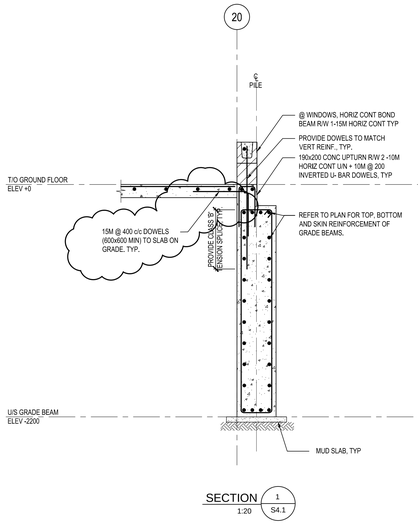
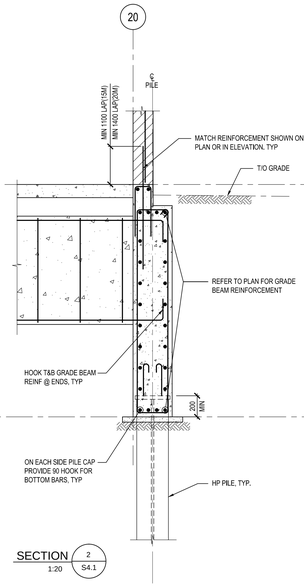
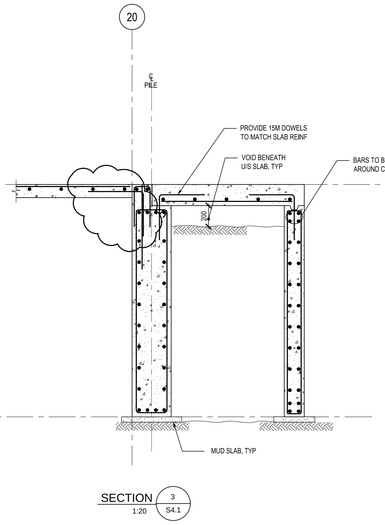
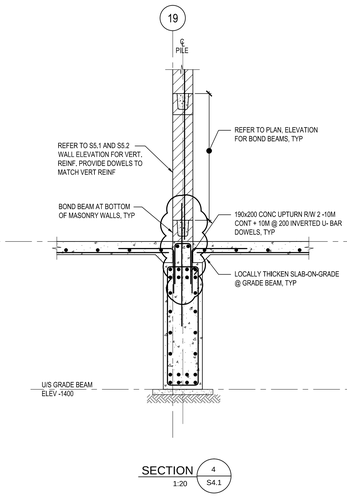
ROOF DIAPHRAGM & SECOND FLOOR DIAPHRAGM CONNECTION PLAN

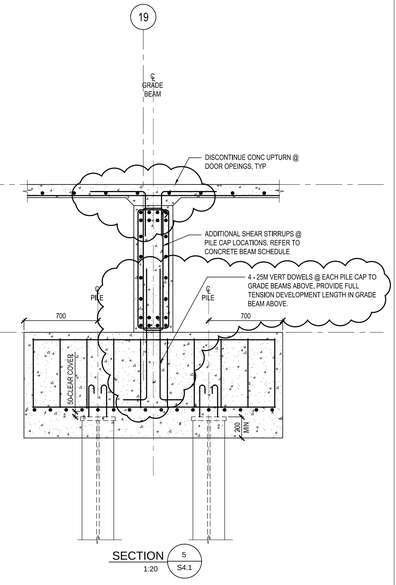
S2.4

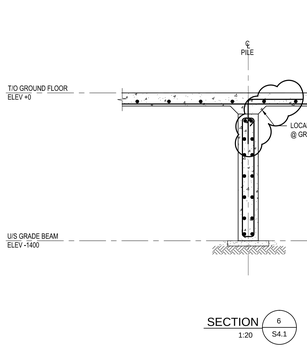


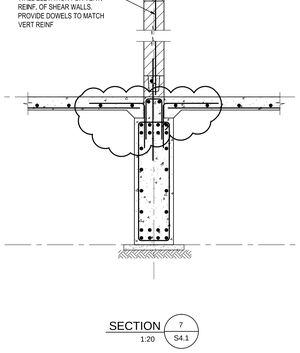


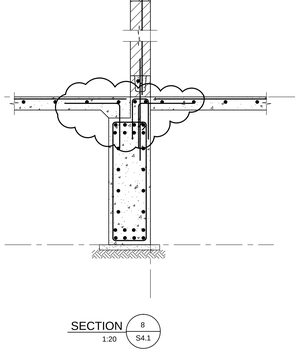


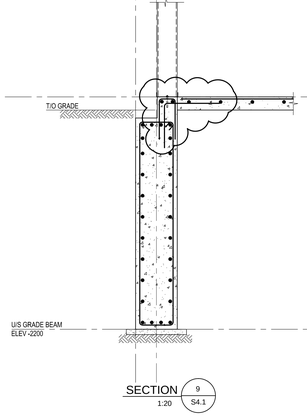


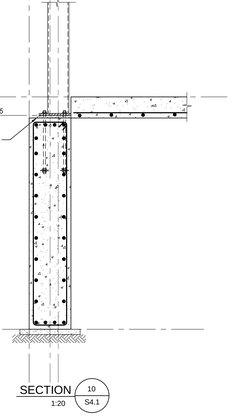


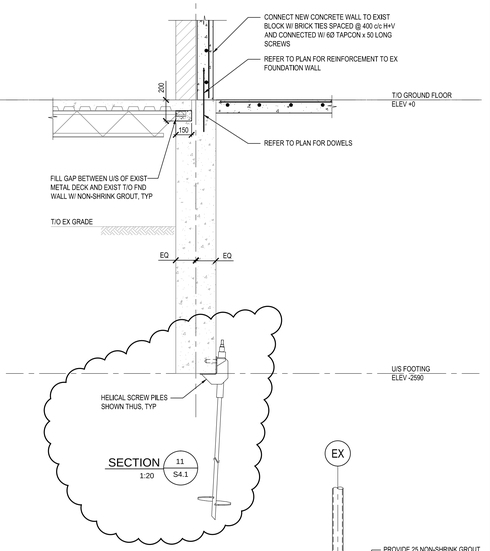


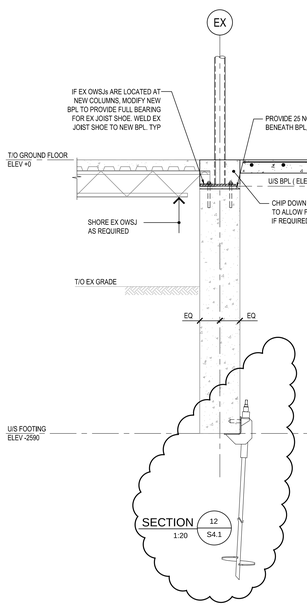


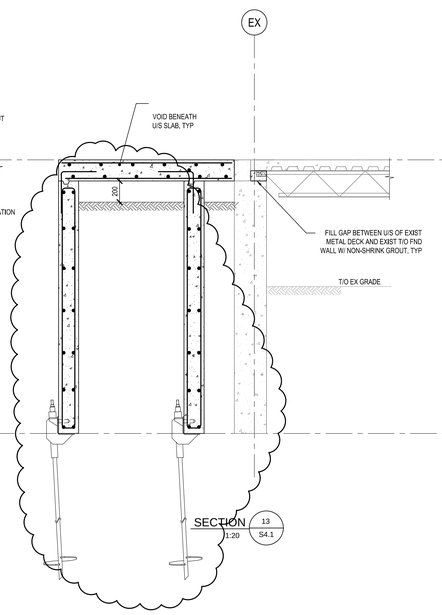


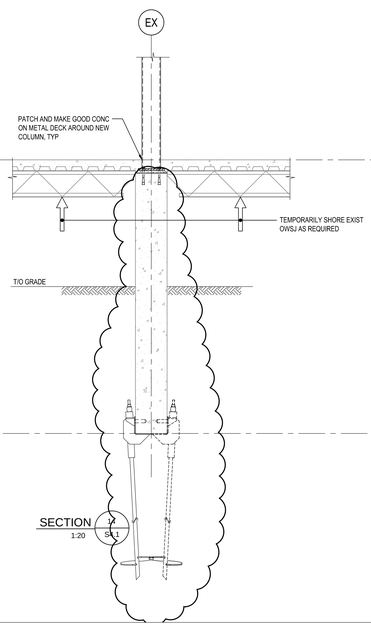


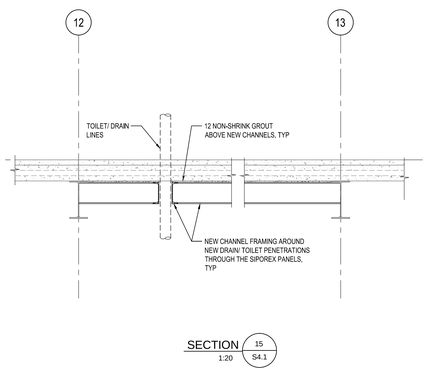


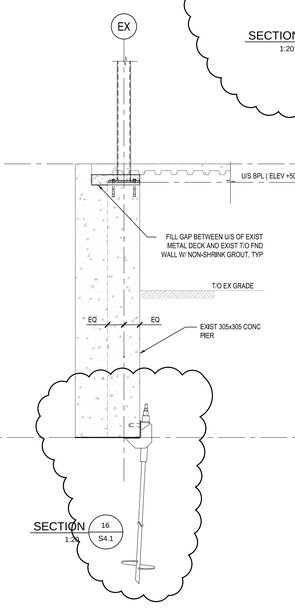


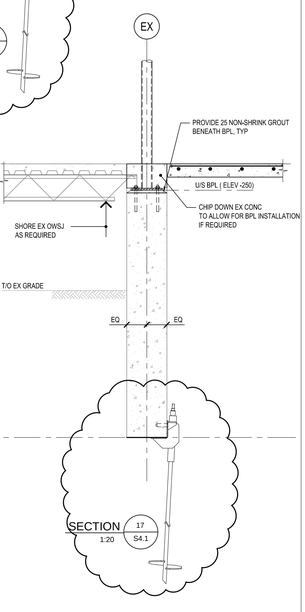












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ADDITION & RENOVATION
PROJECTR121

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REV	DESCRIPTION	DATE
4	ISSUED FOR SA No. S1	2017.05.24
3	ISSUED FOR PERMIT	2017.05.19
2	ISSUED FOR TENDER	2017.05.16
1	100% REVIEW	2017.05.10

BORTOLOTTO

PROJECT NUMBER
PF1701

DATE
17.05.24

SCALE
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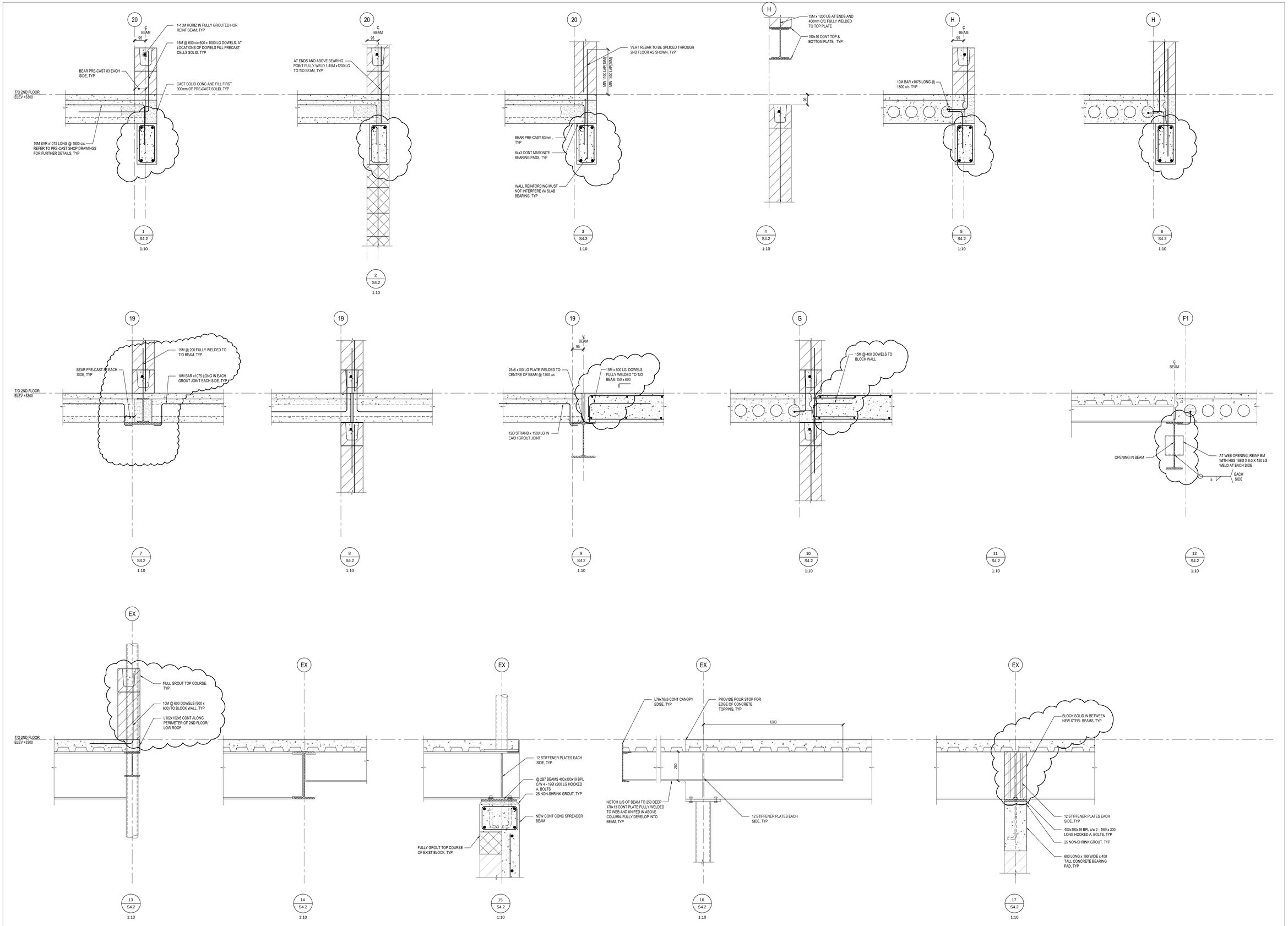
NAZ

SECTIONS AND DETAILS

S4.1



POPE FRANCIS ELEMENTARY ADDITION & RENOVATION
PROJECT#121

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2	ISSUED FOR TENDER	2017.05.16
1	100% REVIEW	2017.05.10

BORTOLOTTO

PROJECT NUMBER #P1701
DATE 17.05.24
SCALE 1:10
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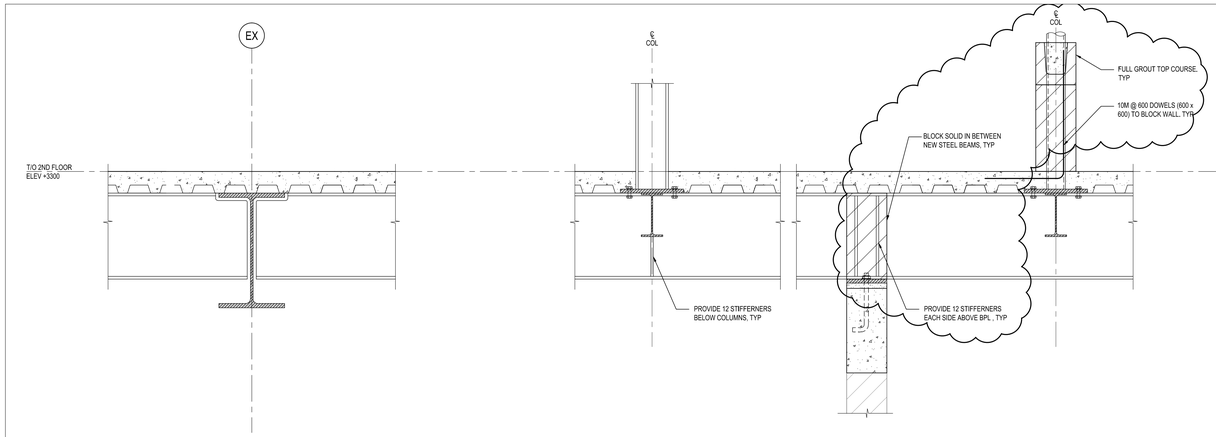
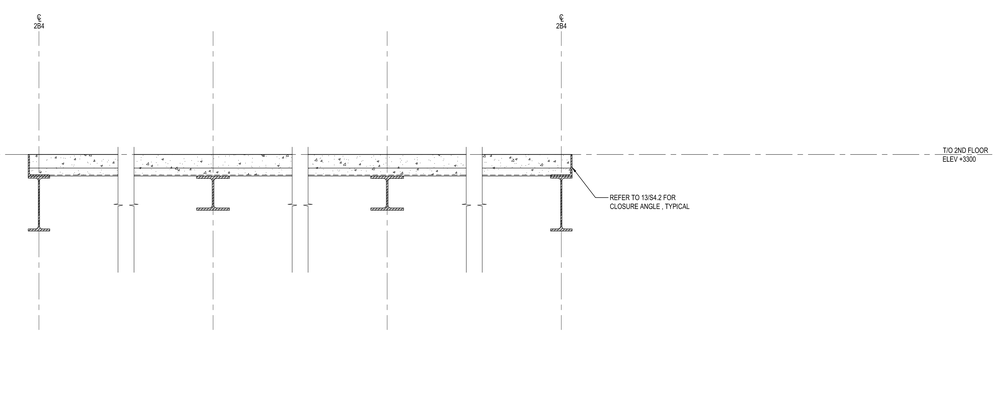
SECTIONS AND DETAILS

S4.2



18
S4.2B
1:10

19
S4.2B
1:10



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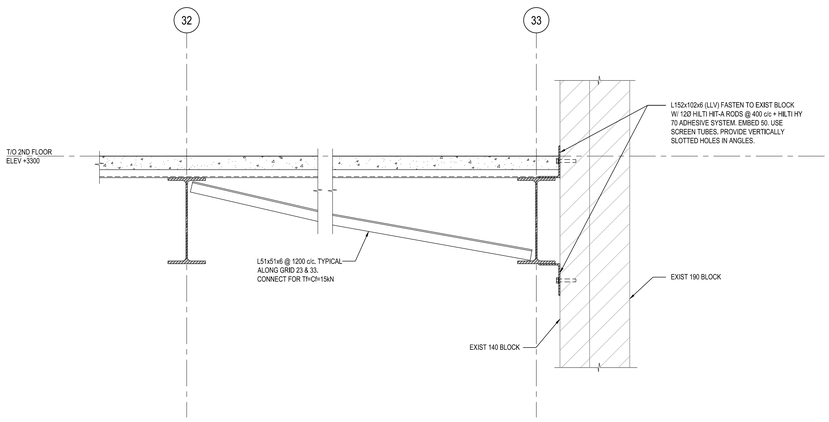

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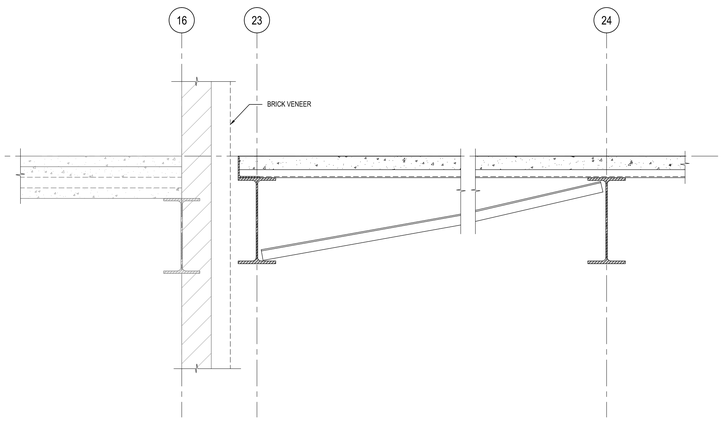

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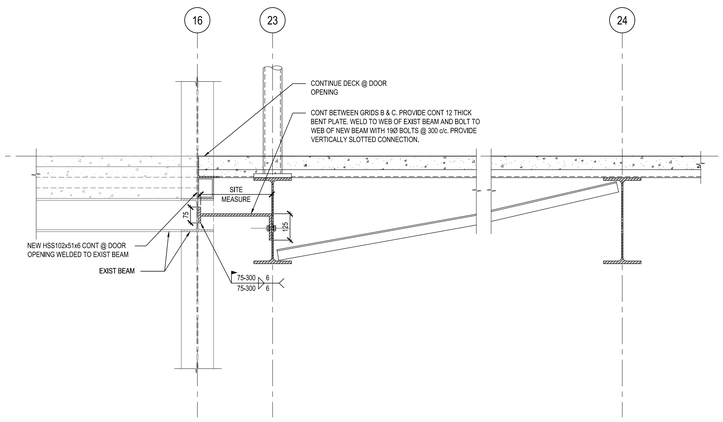

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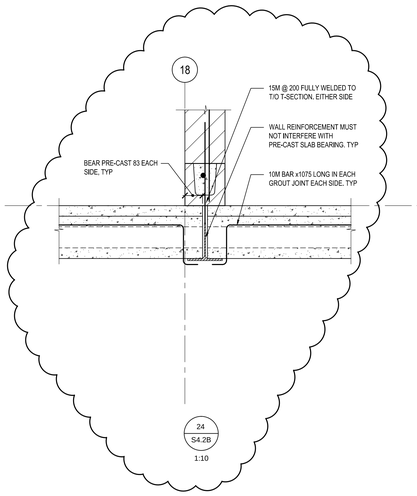

24
S4.2B
1:10

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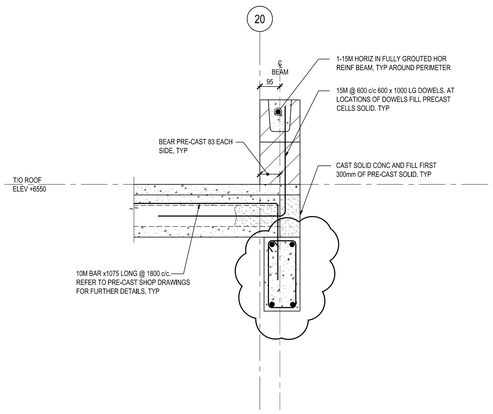
NAZ

SECTIONS AND DETAILS

S4.2B



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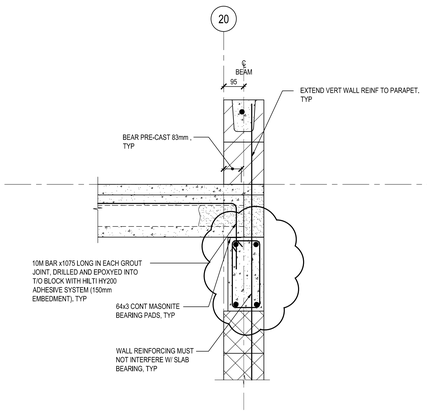

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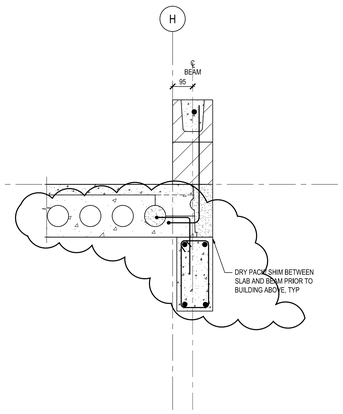
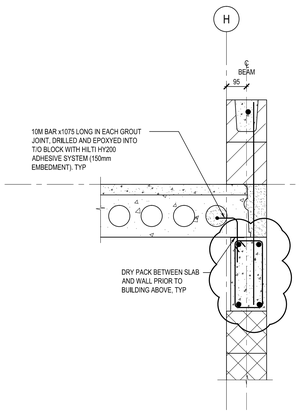


3 S4.3 1:10



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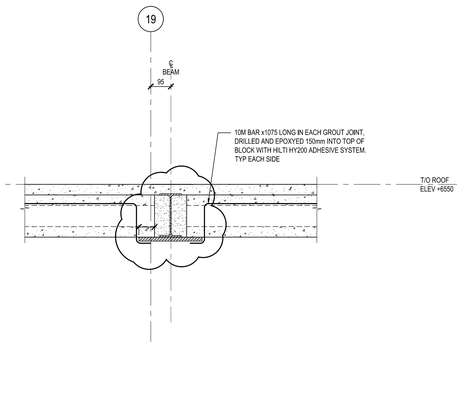

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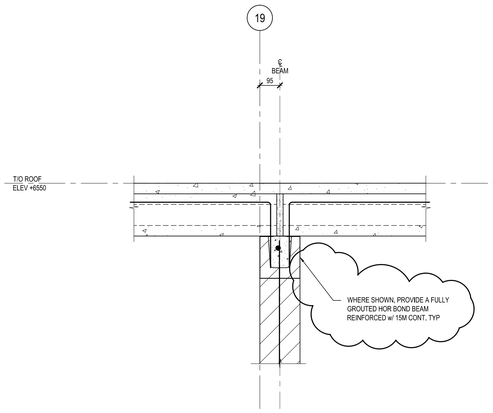

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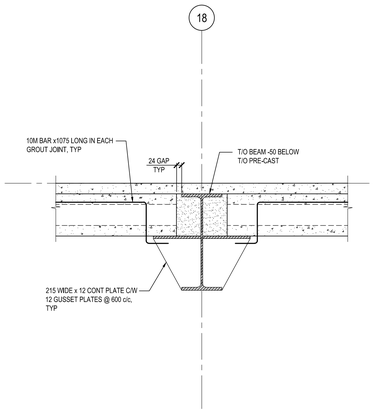

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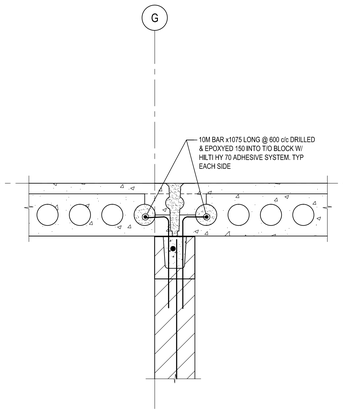

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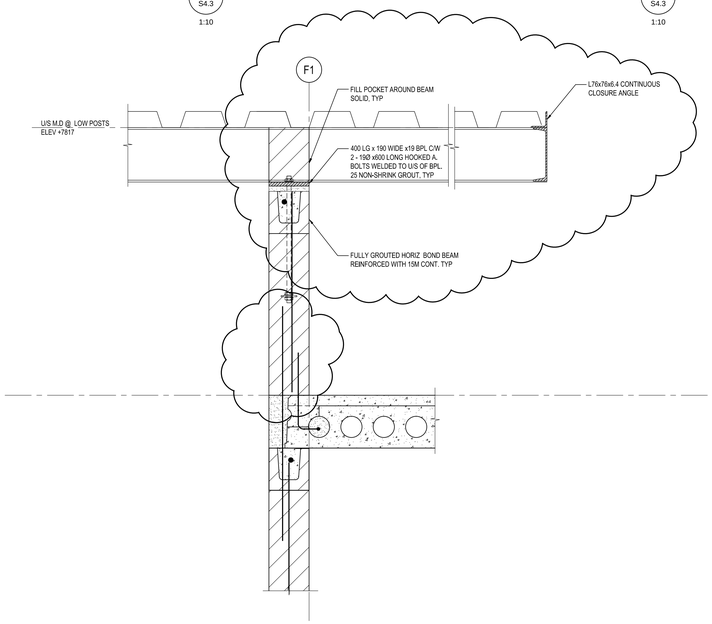

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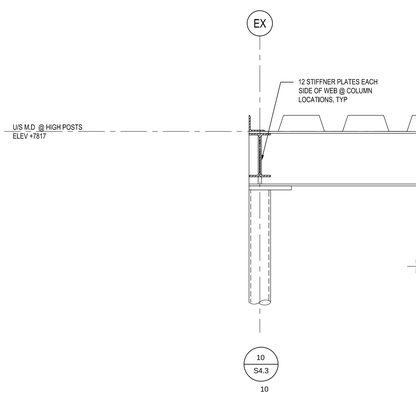

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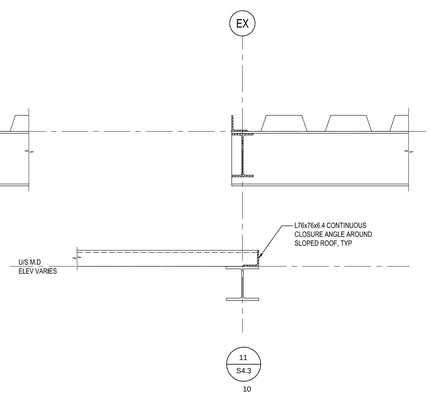

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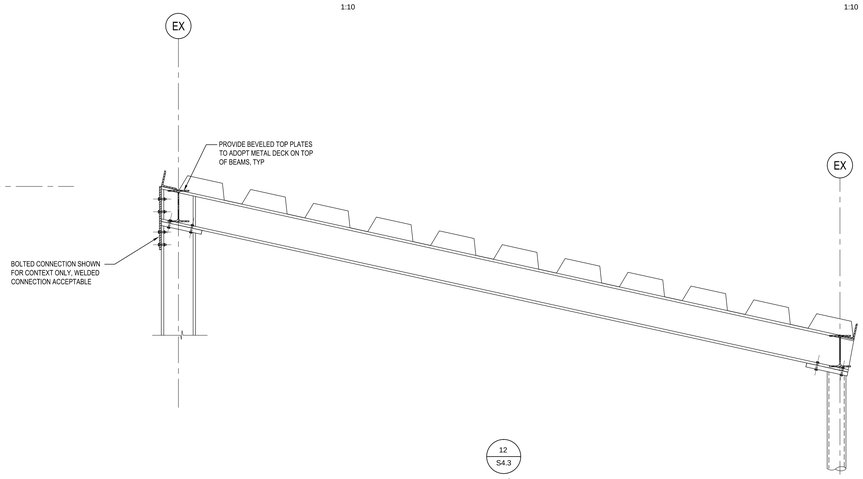

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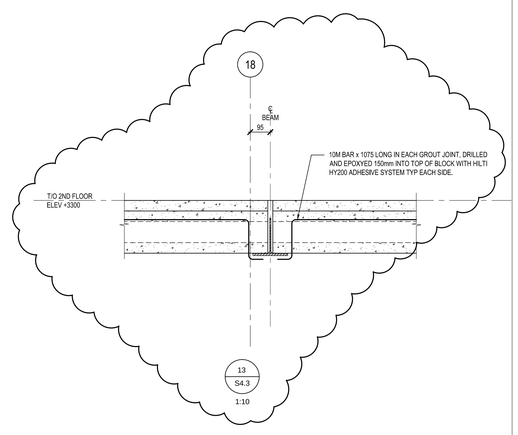

POPE FRANCIS ELEMENTARY ADDITION & RENOVATION PROJECT#R121

387 Balsam Street North
Timmins, Ontario

Northeastern Catholic District SCHOOL BOARD

CONSULTANT TEAM

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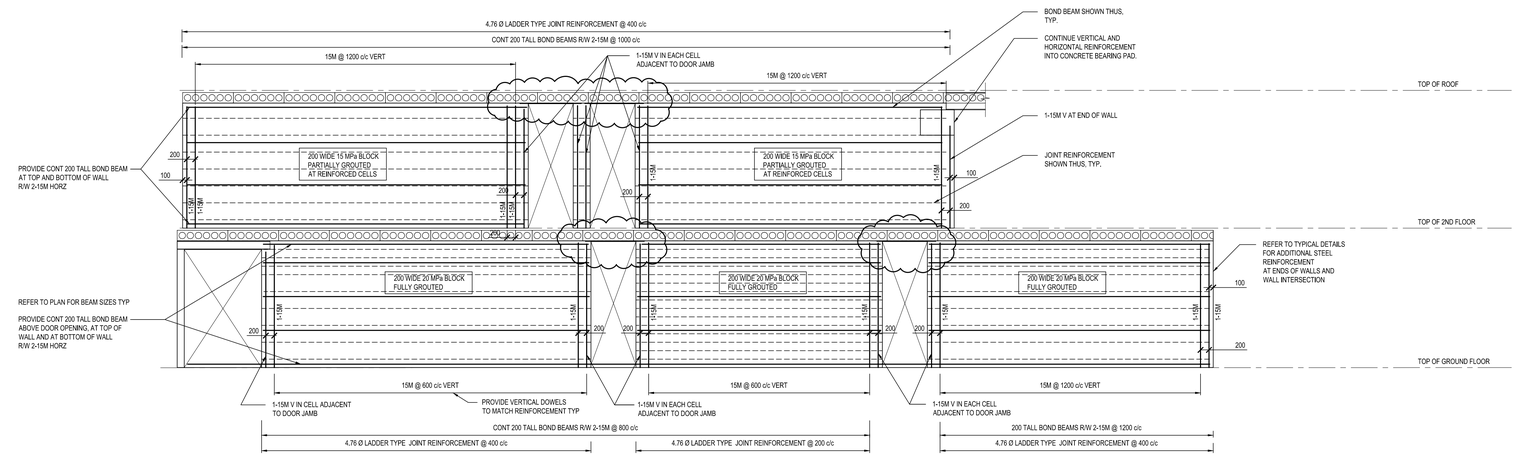
REV	DESCRIPTION	DATE
4	ISSUED FOR SA No. S1	2017.05.24
3	ISSUED FOR PERMIT	2017.05.19
2	ISSUED FOR TENDER	2017.05.16
1	100% REVIEW	2017.05.10

BORTOLOTTO

PROJECT NUMBER PF1701
DATE 17.05.24
SCALE 1:10
DRAWN BY NAZ

SECTIONS AND DETAILS

S4.3



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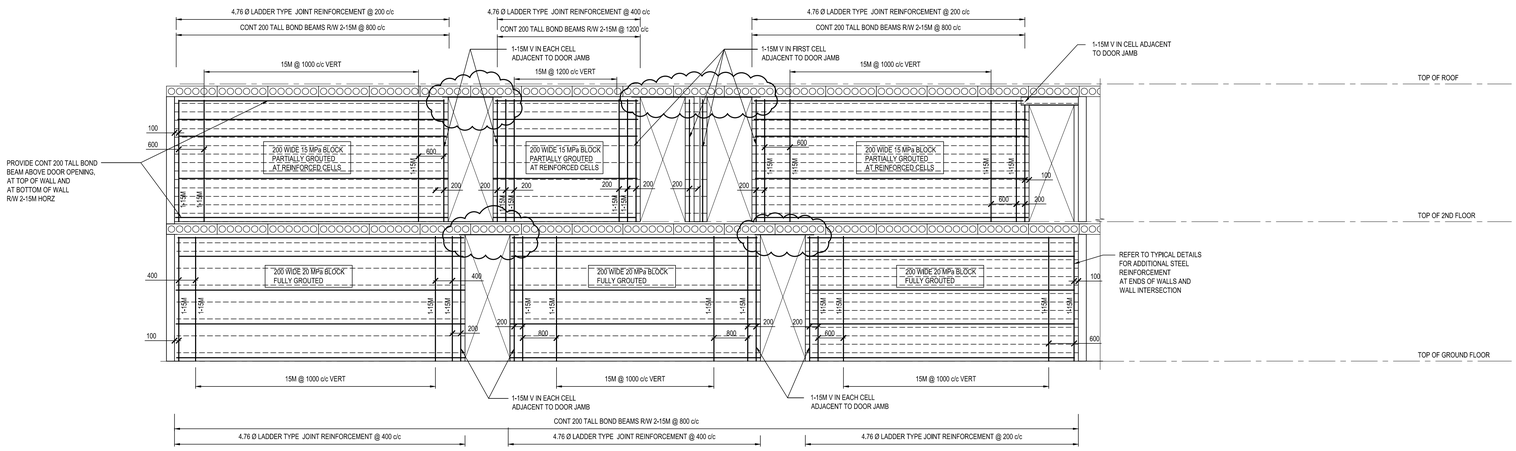
1:50



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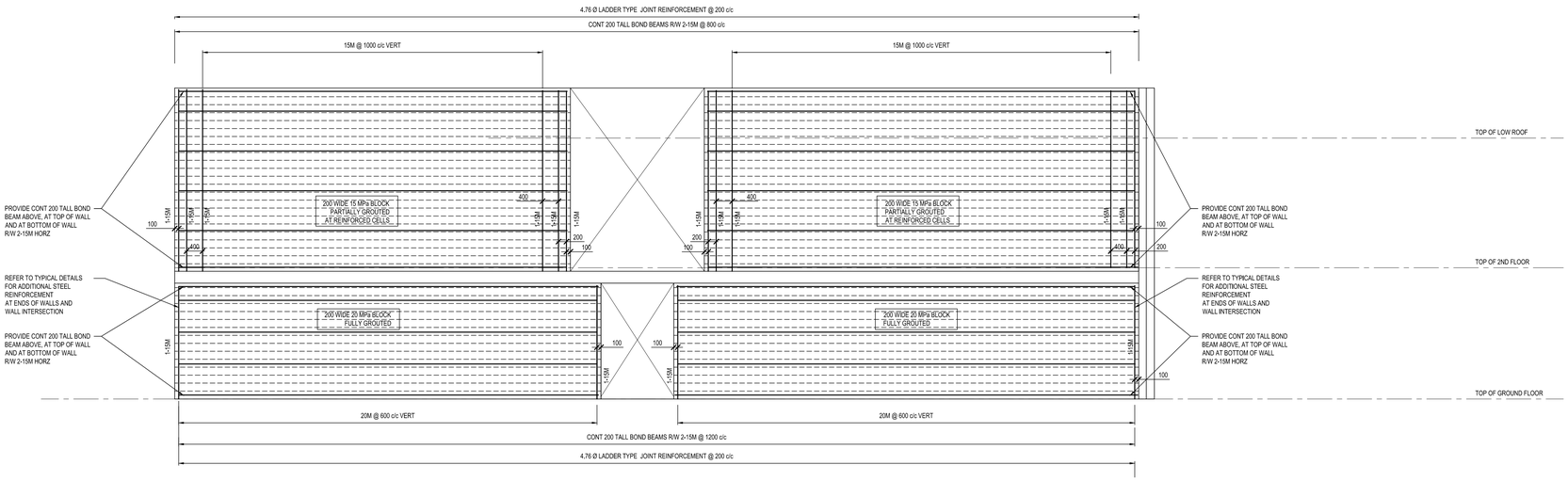

ELEVATION ALONG GRID LINE F (C / S5.1)
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POPE FRANCIS ELEMENTARY
ADDITION & RENOVATION
PROJECT#P121

387 Balsam Street North
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BORTOLOTTO

PROJECT NUMBER
PF1701

DATE
17.05.24

SCALE
AS NOTED

DRAWN BY
JRP

ELEVATIONS AND DETAILS

S5.1

PART 1: GENERAL

1.1 GENERAL REQUIREMENTS

.1 Provide all material and labour required for the completion of the Contract. Breakdown of Work by Section is for guidance only and is not necessarily complete.

.2 Work Furnished and Installed:

i. Structural steel work, including steel joists and bridging.

.3 Related Work Specified Elsewhere:

i. Loose and embedded material for architectural precast concrete: Section 03 45 00 .

ii. Reinforcing edges of openings in metal deck that are not larger than 450mm in roof deck and 300mm in floor deck.

.4 Work Furnished but not Installed:

i. Anchor bolts, bearing assemblies and other structural steel connections to be cast into concrete.

ii. Shelf angles and related connections to be built into concrete to receive masonry.

iii. Bearing plates and related connections for metal deck to be built into masonry or concrete.

iv. Loose lintels, shelf angles and plates to be built into masonry.

1.2 STANDARDS, CODES AND ACTS

.1 Conform with the Ontario Building Code 2006 under Ontario Regulation 350/06 and any applicable acts of any authority having jurisdiction and the following:

i. CAN/CSA-S16-01 - Limits States Design of Steel Structures, ; S16S1-05, Supplement #1; and replacement pages issued June 2003 and December 2003 as Update #1 and Update #2 Canadian Standards Association.

ii. CAN/CSA-G164-M92 (R2003) - Hot Dip Galvanizing of Irregularly Shaped Articles, Canadian Standards Association.

iii. CAN/CSA-S136-01 - North American Specifications for the Design of Cold Formed Steel Structural Members (using the Appendix B provisions applicable to Canada)

iv. CSA-W47.1-03 - Certification of Companies for Fusion Welding of Steel Structures, Canadian Standards Association.

v. CISC/CPMA 1-73a - Performance Specification for Shop Primer, Canadian Institute of Steel Construction.

vi. CISC/CPMA 2-75 - A Quick-Drying Primer for use on Structural Steel, Canadian Institute of Steel Construction.

vii. SSPC-SP2, Hand Tool Cleaning, The Society for Protective Coatings

viii. SSPC-SP6/NACE No. 3, Commercial Blast Cleaning, The Society for Protective Coatings

ix. ASTM D6386, Preparation of Zinc (Hot-Dip Galvanized) Coated Iron and Steel Product and Hardware Surfaces for Painting

.2 Where there are differences between the specifications, drawings, standards, codes or acts, the most stringent shall govern.

1.3 TOLERANCES

.1 Conform to erection tolerances specified in CAN/CSA-S16.1 Clause 28.7 and as follows:

.2 Interfacing tolerances may not be compatible with the above. Review and coordinate interfacing tolerances so that the various elements come together properly.

1.4 QUALIFICATIONS

.1 Be certified under the requirements of Division 1, or Division 2.1 of CSA Standard W47.1.

1.5 DESIGN

.1 General

i. Design connections and the like in accordance with the requirements of CSA Standard S16 and the following for the loads shown or implied.

ii. Design calculations shall be carried out by a professional engineer licensed to practice in the Province of Ontario.

.2 Connections

i. Use types of shop or field connection shown, or in absence of such indication, use most appropriate type of connection.

ii. Design of connections shall include not only those between columns, beams, girders, trusses and braces, but also between such members as spandrel angles and beams, hangers, stiffeners, etc., and their supporting members (be they steel or concrete).

iii. Design connections to safely withstand the combined effects of shear, moment and torque at applicable design stresses.

iv. Do not weld galvanized members without the Consultant’s approval.

v. Design bracing member connections for positive adjustability.

vi. Design connections that are exposed to weather so that moisture, dirt and the like cannot gain entry to the interior of hollow built-up members.

vii. Design and detail connections so as not to interfere with architectural clearance lines or finishes.

viii. Where connections between beams and columns and the like result in loss of bearing to the metal deck, precast, or the like, design and provide support as required.

ix. Design and provide end bearing connections of inclined members such that the bearing plane between them and their supporting members is horizontal.

x. Design connections that are to be cast into concrete to provide for the maximum deviation that can occur in erection and based on the following:
- Specified steel erection tolerances.
- Maximum permissible tolerances in the location of inserts cast into concrete of plus or minus 15 mm in any direction.

.3 Bearing Assemblies

i. The configuration, loads to be transmitted and movements to be permitted are shown. Design the bearings so that they can safely transmit the loads or permit the movements noted.

1.6 SUBMITTALS

.1 Connection Details, Erection Diagrams, Shop Details, Erection Procedures, Field Work Details and Joist Details

i. Submit connection details, erection diagrams, shop details, erection procedures, field work details and joist details for review by the Consultant.

ii. Do not reproduce the structural drawings to serve as erection or setting drawings without the Consultant's approval.

.2 Connection Design Details

i. Connection design details shall be prepared before the preparation of shop details and submitted to the Consultant for review that the intent of the design is met.

ii. Connection design details shall bear the signature and stamp of a qualified professional engineer licensed to practice in the Province of Ontario

iii. Connection design details shall provide details of standard and non-standard connections and other data necessary for the preparation of shop details. Connection design details shall be referenced to the design documents or the erection drawings, or both.

.3 Erection Diagrams

i. Erection diagrams shall be submitted to the Consultant for review.

ii. Amongst other items show the following:
- General arrangement of the structure including all steel load-resisting elements essential to the integrity of the completed structure
- Principal dimensions of the structure
- Piece marks
- Sizes of the members
- Connection details.
- Bearing details.
- Holes.

- Finishes.
- Grades of steel.
- Size and type of bolts and bolt installation requirements
- Shop and field welds
- Elevations of column bases
- All necessary dimensions and details for setting anchor rods
- Sliding expansion joint bearing pad details, including materials, size and thickness of pads, setting out dimensions and load capacity.
- Required clearances and other details to receive correlative items
- Any other information necessary for the assembly of the structure

iii. Show necessary dimensions and details for setting structural steel bearings, anchorages, assemblies and the like where they interface with other building components.

iv. Co-ordinate with shop drawings of cast-in-place concrete, masonry, miscellaneous metal work, metal deck and other interfacing work.

.4 Shop Details

i. Shop details shall be prepared before fabrication and submitted to the Consultant for review.

ii. Shop details shall provide complete information for the fabrication of various members and components of the structure, including the required material and product standards; the location, type, and size of all mechanical fasteners; bolt installation requirements; and welds.

.5 Erection Procedures

i. Erection procedures shall be prepared before erection and submitted to the Consultant for review.

ii. Erection procedures shall outline the construction methods, erection sequence, temporary bracing requirements, and other engineering details necessary for shipping, erecting, and maintaining the stability of the steel frame.

iii. Drawings and sketches that identify the location of permanent and temporary load-resisting elements essential to the integrity of the partially completed structure shall supplement erection procedures.

iv. Submit details of method proposed to apply and verify the magnitude of tension to bracing members within the specified tolerances.

v. Submit procedures proposed when erection is carried out at temperatures greatly differing from 20 degrees C.

.6 Fieldwork Details

i. Fieldwork details shall be submitted for review by the Consultant whenever modifications to the approved structural details are required.

ii. Fieldwork details shall provide complete information for modifying fabricated members in the shop or on the job site. All operations required to modify the member shall be shown on the fieldwork details.

.7 Calculations

i. Submit calculations bearing the signature and stamp of a qualified professional engineer licensed to practice in the Province of Ontario and such further proof as may be necessary to show that non-standard connections and the like conform to the requirements set forth herein.

.8 Substitution

i. If the Contractor wishes to make substitutions for steel materials or sizes indicated, submit proposals with the tender with necessary calculations for review of the Consultant.

.9 Drawings for Inspection Company

i. Furnish inspection company with a copy of erection diagrams, shop details, erection procedures and fieldwork details bearing the Consultant's reviewed stamp.

.10 As-Built Drawings

i. Mark on one complete set of final drawings any changes, additions or deletions that occur during the construction as a result of the Contractor's work, change orders or for any other reason.

.11 Mill Test Reports

i. Submit copies of mill test reports properly correlated to the materials available to the Consultant.

PART 2: PRODUCTS

2.1 MATERIALS

.1 Rolled Wide Flange Sections: Conform to CAN/CSA-G40.21-04350W, unless otherwise noted.

.2 Rolled channels and angles: Conform to CAN/CSA-G40.21-04300W, unless otherwise noted.

.3 Steel plate, bars and rods: Conform to CAN/CSA-G40.21-04300W, unless otherwise noted.

.4 *Hollow Structural Sections: Conform to CAN/CSA-G40.21-04 Grade 350W, Class C.

.5 Bolts, nuts and washers: ASTM A325 M-00, galvanized when used with galvanized material.

.6 Headed stud: Conform to CSA W59 Appendix H and with a tensile strength of 450 MPa and yield strength of 350 MPa.

.7 Shop paint primer: Type 1 - Water borne: Low VOCs, and not to be manufactured or formulated with aromatic solvents, formaldehyde, halogenated solvents, mercury, lead, cadmium, hexvalent chromium and their compounds. Devguard 4020 by ICI Devoe Coatings or approved equivalent. Contractor to verify compatibility of primer with finished paint including intumescent paint where applicable.

.8 Primer for steel to receive Cafco Intumescent coating: Devguard 4160 structural primer by ICI Devoe Coatings or approved equivalent.

.9 Reinforced Inorganic Zinc Primer - Catha-coat 302H by ICI Devoe Coatings or approved Equivalent

.10 Alkyl Silicate Inorganic Zinc Coating - Catha-coat 304 by ICI Devoe Coatings or approved equivalent.

.11 Intumescent Coating: Interchar 1120 by ICI Devoe Coatings or approved equivalent.

.12 Costing of intumescent Coat: top coat with UV protection coating by ICI Devoe coatings or approved equivalent. Architect to select colour.

PART 3: EXECUTION

3.1 WORKMANSHIP AND FABRICATION

.1 Conform to CAN/CSA-S16-01 and the following:

.2 Camber

i. Provide camber to beams and girders in a manner that will not reduce the safe load carrying capacity of the members.

ii. Unless otherwise noted, provide a nominal camber of 0.002 of the span.

.3 Provide holes to 15mm in diameter indicted at any time before shop drawings are reviewed, as required to permit the attachment of other materials.

.4 Plates and shelf angles supporting masonry shall be continuous and extend full length of masonry openings. At splices, grind welds smooth where exposed to view.

.5 Unless noted or required otherwise, provide a minimum 6mm thick cap plate on all HSS and other closed column sections.

.6 Openings

i. Conform to requirements shown for location, size, reinforcing and cutting of openings through structural members.

ii. Obtain written permission of Consultant prior to field cutting or altering of structural members not shown on the drawings.

.7 Galvanized Steel

i. Detailed and fabricated steel such that it will not trap the galvanizing material.

ii. Detailed so that welding of galvanized material is not required.

iii. Provided with vent holes as required.

iv. Cleaned of all weld slag prior to galvanizing.

v. Upon completion of erection, touched up with zinc rich primer at all locations where galvanizing is damaged.

3.2 PROTECTION

.1 Steel ST-2

i. This steel type applies to all structural steel concealed from view in the finished building and not exposed to weather or high humidity environments including:

- High roof steel, second floor hidden columns as a minimum. Refer architectural drawings for confirmation.

ii. Clean structural steel in accordance with SSPC SP2, Hand Tool Cleaning

iii. Within one hour following cleaning, apply one coat of paint conforming to CISC/CPMA 1-73a

.2 Steel ST-3

i. This steel type applies to all structural steel which is to be encased in spray applied fire proofing or concrete including:

- Areas encompassed by grid lines A to F & 23 to 33: ground floor columns, second floor beams, bridge beams as a minimum. Refer architectural drawings for confirmation.

ii. Clean structural steel in accordance with SSPC SP2, Hand Tool Cleaning to remove loose mill scale, rust, and other detrimental foreign matter.

iii. No painting is required for this steel type.

.3 Steel ST-5

i. This steel type applies to all interior structural steel which is exposed to view in the finished building, whether or not it is to receive a finish coat of paint, and designated as “architectural steel” including:

- Main foyer stairs, second floor columns for bridge and hallway, second floor columns along new window glazing as a minimum. Refer architectural drawings for confirmation.

ii. Clean structural steel in accordance with SSPC SP6, Commercial Blast Cleaning.

iii. Within one hour following cleaning, apply one coat of intumescent coating.

iv. Follow with one coat of UV protectant top coat.

.4 Steel ST-7

i. This steel type applies to all structural steel which is exposed to weather or moisture in the finished building but is not designated as “architectural” such as steel within the cavity of cavity walls, not protected by a vapour barrier including:

- lintels
- shelf angles
- plates, hangers, braces etc. outside the building envelope
- exterior beams
- exterior columns
- connection materials and inserts associated with the above.

ii. Fully galvanize, in accordance with CSA Standard G164 to a minimum zinc coating of 600 g/m^2.

.5 Except for steel which is to be left uncoated, upon completion of erection, apply primer to welds, bolts and at locations where original primer is damaged. Primer to match the primer of the base steel. For galvanized steel, touch up with zinc rich coating.

.6 Protect all steel from damage during storage, transportation and erection.

.7 For steel designated as “architectural” sand areas where the coating has been damaged and “feather” into the surrounding field prior to touching up.

.8 Protect weep holes at base of closed column sections that have base plates, but no cap plates.

.9 During cold weather, protect members from damage due to water freezing in confined areas.

.10 Provide drain holes in closed sections to prevent water build-up during erection.

3.3 ERECTION

.1 General

i. Conform to requirements of CAN/CSA-S16.1 and the following:

ii. Bracing members and anchor bolts shown are for the finished structure and may not be adequate to resist forces present during construction.

iii. Maintain temporary bracing until completion of entire structure including floor and roof decks, slabs, masonry walls and other elements which are part of the wind resisting system.

iv. Carry out erection operations, including installation of any temporary guying and shoring required, without loading portions of the existing structure already constructed in excess of its safe load carrying capacity.

v. During erection, forces or reactions in the steel frame members and their connections may exceed those on which the design is based.

vi. Determine the magnitude of such forces and reactions and take such measures as are necessary to ensure that the safety and stability of the structure is maintained until the entire structure, including floor and roof slabs is complete.

vii. Splices, other than those shown, shall not be permitted in members without the Consultant's approval. If approval is given to permit welded splices, they shall be non-destructively tested at no extra cost to the Owner.

viii. Nuts on ordinary bolts ASTM A307 shall be prevented from working loose by use of lock washers, lock nuts, jam nuts, thread burring or other approved methods.

ix. Report to the Consultant where members cannot be erected within the specified tolerances without modification or special procedures. Take corrective measures to the Consultant's approval.

.2 Bearing on Concrete or masonry

i. Set steel bases and bearing assemblies true and level at the proper elevation so that upon grouting, they will have full bearing.

ii. Unless a specific method is shown, leveling devices or steel shimming may be used to support bases prior to grouting. Subsequent to grouting, loosen the leveling devices so that all loads pass only through the bases, or remove the steel shims so that the resulting voids can be fully grouted.

iii. Lift grouted bases so that the adequacy of grouting can be examined. Conform with the requirements of the local building by-laws, but in any event, lift at least three bases selected by the Consultant. If defects are found, more bases will have to be raised.

.3 Lintels

i. Unless a reinforced block or concrete lintel is noted, provide loose steel lintels, as shown, over openings and recesses in masonry walls or partitions including those for mechanical or electrical services.

.4 Openings

i. Conform to the requirements shown for location, size, reinforcing and cutting of openings through structural members.

ii. No openings through structural steel members will be permitted without the Consultant's approval.

.5 New Steel Work to the Existing Building

i. Before proceeding with any work at the existing building, verify that existing members are of the size and in the location indicated on the drawings. If not, do not proceed until the Consultant has given instructions.

ii. Make site measurements as required to verify dimensions of existing work before proceeding with the work. The Contractor shall be responsible for extra costs incurred due to proceeding without verifying site dimensions.

iii. Adequately shore the existing structure until the permanent structure shown is installed, to ensure that no movements or damage occurs.

3.4 EXPOSED STEEL

.1 General

i. The following applies to all steel which is left exposed to view in the completed building,

.2 Fabrication

i. All exposed edges of plates shall be universal mill or guided flame cut. Exposed cut edges of beam flanges shall be guided flame cut. Cut surfaces shall be equal in smoothness to a mill finish.

ii. Where bolted connections are shown, ensure that connections are neatly arranged with tight joints.

iii. Remove mill marks, identification and surface imperfections by grinding smooth and flush with adjacent surfaces.

.3 Welding

i. Continuously weld joints exposed to view.

ii. Grind smooth all welds that are within the reach of the public.

.4 Galvanizing

i. Ensure that the galvanizing process leaves a smooth and uniform surface.

ii. During galvanizing, use procedures to ensure that members do not deform excessively.

.5 Do not use marking paint, crayons or other marking materials on exposed surfaces.

3.5 ARCHITECTURALLY EXPOSED STRUCTURAL STEEL (AESS)

.1 General

i. Architecturally exposed steel (AESS) is all steel which is left exposed to view in the completed building.

ii. This section applies to any structural steel members noted on the contract drawings as AESS. All AESS members must also be identified by their Category.

iii. This section pertains to the appearance, surface preparation and integration of AESS. Refer to the preceding sections for all technical requirements.

.2 Submittals

i. Shop Drawings detailing fabrication of AESS components:

- Provide erection drawings clearly indicating which members are considered as AESS members and their Category
- Include details that clearly identify all of the requirements listed in subsections .5 “Fabrication” and .9 “Erection” of this section. Provide connections for AESS consistent with concepts, if shown on the Structural Design Documents
- Indicate welds by standard CWB symbols, distinguishing between shop and field welds, and show size, length and type of each weld. Identify grinding, finish and profile of welds as defined herein
- Indicate type, finish of bolts. Indicate which side of the connection bolt heads should be placed
- Indicate any special tolerances and erection requirements.

.3 Quality Assurance

i. Fabricator Qualifications: In addition to those qualifications listed in other subsections of Division 5 “Structural Steel” Section, engage a firm competent in

fabricating AESS similar to that indicated for this Project with sufficient production capacity to fabricate the AESS elements

ii. Erector Qualifications: In addition to those qualifications listed in other Subsections of Division 5 “Structural Steel” Section, engage a competent Erector who has completed comparable AESS work.

iii. Comply with applicable provisions of the following specifications and documents:

- CISC Code of Standard Practice, latest edition

iv. Visual Samples when specified may include any of the following:

- 3-D Rendering of specified element;

.4 Delivery, Storage, and Handling

i. Ensure that all items are properly prepared, handled and/or packaged for storage and shipping to prevent damage to product.

ii. Erect finished pieces using softened slings or other methods such that they are not damaged. Provide padding as required to protect while rigging and aligning member’s frames. Weld tabs for temporary bracing and safety cabling only at points concealed from view in the completed structure or where approved by the architect.

.5 Fabrication

i. For the special fabrication characteristics, see Table 1 – AESS Category Matrix.

ii. Fabricate and assemble AESS in the shop to the greatest extent possible. Locate field joints in AESS assemblies at concealed locations or as approved by the Architect.

iii. Fabricate AESS with surface quality consistent with AESS Category and visual samples, if applicable.

iv. Perform fabrication with special care and necessary straightening to maintain the condition of the material as described herein.

v. Show clearly the required fabrication tolerances on shop drawings. Show the required tolerances for setting embedded items on erection drawings.

vi. Make copes, mitres and butt cuts in surfaces exposed to view within the closest possible tolerances consistent with structural shop equipment and practice. Plan erection sequence so that these tolerances can be maintained.

vii. Where the fit-up of adjacent members is such that permissible tolerances specified above may result in any unsightly joint, take special care to obtain a visual plane on the exposed surfaces. If both surfaces are exposed, detail joints in such a way as to minimize these unavoidable variations.

viii. All exposed edges of plates shall be universal mill or guided flame cut. Exposed cut edges of beam flanges shall be guided flame cut. Cut surfaces shall be equal in smoothness to a mill finish.

ix. Where bolted connections are shown, ensure that connections are neatly arranged with tight joints.

.6 Shop Connections

i. Bolted Connections: Make in accordance with Section 05 12 00 . Provide bolt type and finish as specified and place bolt heads as indicated on the approved shop drawings.

ii. Welded Connections: Comply with CSA W59-03 and Section 05 12 00 . Appearance and quality of welds shall be consistent with the category and visual samples if applicable. Assemble and weld built-up sections by methods that will maintain alignment of members to the tolerance of this subsection.

.7 Field Connections

i. Bolted Connections: Make in accordance with this section. Provide bolt type and finish as specified and place bolt heads as indicated on the approved shop drawings.

ii. Welded Connections: Comply with CSA W59-03 and Section 05 12 00 . Appearance and quality of welds shall be consistent with the Category and visual samples if applicable. Assemble and weld built-up sections by methods that will maintain alignment of members to the tolerance of this Subsection.

- Assemble and weld built-up sections by methods that will maintain alignment of axes. Verify that weld sizes, fabrication sequence, and equipment used for AESS will limit distortions to allowable tolerances.

.8 Welding

i. Form and weld all joints exposed to weather to exclude water by the use of "seal" welds.

ii. Exposed welds, except f filler welds and concealed welds, where clearances or fit of other items may so necessitate, shall be ground smooth and otherwise finished flush and even with adjacent surfaces. Grinding is not required for well formed fillet welds.

iii. Grind bevel welds smooth, forming neat, well-made corners.

.9 Erection

i. Set AESS accurately in locations and to elevations indicated, and according to CSA S16-01.

ii. In addition to the special care used to handle and erect AESS, employ the proper erection techniques to meet the requirements of the specified AESS Category:

- AESS Erection tolerances: Erection tolerances shall meet the requirements of standard frame tolerances for structural steel per CSA S16-01, unless noted otherwise.

- Bolt Head Placement: All bolt heads shall be placed as indicated on the structural design. Where not noted, the bolt heads in a given connection shall be placed to one side

- Removal of field connection aids: Run-out tabs, erection bolts and other steel members added to connections to allow for alignment, fit-up and welding in the field shall be removed from the structure. Welds at run-out tabs shall be removed to match adjacent surfaces and ground smooth. Holes for erection bolts shall be plug welded and ground smooth where specified;

- Filling of connection access holes: Filling shall be executed with proper procedures to match architectural profile, where specified;

- Field Welding: Weld profile, quality, and finish shall be consistent with Category and visual samples, if applicable, approved prior to fabrication.

.10 Painting

i. After inspection and before leaving the shop, clean all steel work exposed in the finished work by grit-blasting of all mill scale, rust, weld slag or flux deposit, oil, dirt and other foreign matter, to a "Commercial Bright" finish.

ii. Remove mill marks, identification and surface imperfections by grinding smooth and flush with adjacent surfaces.

iii. Immediately after cleaning, apply a shop coat paint to all steel work, except as follows, to dry surfaces by spray, to a minimum dry film thickness of 2 mils. Allow to dry in dust free areas.

iv. Do not paint metal items that are to be encased in concrete and surfaces that are to have concrete placed against them.

v. Apply 1 additional shop coat of paint as specified to parts of shop coated steel surfaces that will be inaccessible after erection.

vi. Clean surfaces within 50 mm of any field weld location of materials that would prevent proper welding or produce objectionable fumes while welding is being done.

vii. After erection and immediately after grinding welds, etc. touch up and paint with 1 coat of same paint as shop coat, all damaged and abraded spots, including any unpainted areas. Completely remove anti-spatter coating, if used before field touch-up painting.

.11 Galvanizing

i. Ensure that the galvanizing process leaves a smooth and uniform surface.

ii. During galvanizing, use procedures to ensure that members do not deform excessively.

.12 Rusted Steel

i. Where indicated, treat exposed faces of the structural steel to obtain a rusty brown appearance

ii. The appearance shall conform to the colour and texture of samples available for inspection at the office of the Consultant. In addition to these samples, colour photographs may be obtained on request from the Consultant.

iii. Shot blast the exposed faces of the steel to be of rusty appearance to remove the major mill scale, but leaving about 10% of the mill scale on the surfaces.

iv. In order to accelerate the rusting process, the following method is suggested:
- Spray surfaces with saltwater as many times as required after fabrication.
- Thoroughly wash down the salt before application of the final protective coating specified.

v. No erection markings are permitted on the exposed faces. Use tags for markings.

vi. Take care to avoid soiling of the exposed faces with foot prints, tire marks, oil patches, etc. which when wiped off may leave patches of a different colour on the exposed surfaces.

vii. Provide suitable protection to all work adjacent to or below steel framing with rusty surfaces to prevent staining of other exposed construction. Make good any stained surfaces to the Consultant's approval.

.13 Architectural Review

i. The Architect shall review the AESS steel in place and determine acceptability based on the Category and visual samples (if applicable). The Fabricator/Erector will advise the consultant the schedule of the AESS work.

.14 Adjusting and cleaning

i. Provide suitable protection to all work adjacent to or below steel framing with rusty surfaces to prevent staining of other exposed construction. Make good any stained surfaces to the Consultant's approval.

ii. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A780.

.15 Protection

i. Prevent staining of architecturally exposed steel by concrete, mortar, plaster, oils, paints or other foreign substances.

ii. Do not use marking paint, crayons or other marking materials on exposed surfaces.

Table 1 – AESS Category Matrix

Category **Characteristics**	AESS C *Custom Elements*	AESS 4 *Showcase Elements*	AESS 3 *Feature Elements* **Viewed at a Distance ≤ 6 m**	AESS 2 *Feature Elements* **Viewed at a Distance > 6 m**	AESS 1 *Basic Elements*	SSS *Standard Structural Steel* **CSA S16**
1.1 Surface Preparation to SSPC-SP 6		X	X	X	X	
1.2 Sharp Edges ground smooth		X	X	X	X	
1.3 Continuous weld appearance		X	X	X	X	
1.4 Standard Structural bolts		X	X	X	X	
1.5 Weld spatters removed		X	X	X	X	
2.1 Visual Samples						
2.2 One-half standard fabrication tolerances		X	X	X		
2.3 Fabrication marks not apparent		X	X	X		
2.4 Welds uniform and smooth		X	X	X		
3.1 Mill marks removed		X	X			
3.2 Butt and plug welds ground smooth and filled		X	X			
3.3 HSS weld seam oriented for reduced visibility		X	X			
3.4 Cross sectional abutting surface aligned		X	X			
3.5 Joint gap tolerances minimized		X	X			
3.6 All welded connections						
4.1 HSS seam not apparent		X				
4.2 Welds contoured		X				
4.3 Surfaces filled and sanded		X				
4.4 Weld show-through minimized		X				
C.1						
C.2						
C.3						
C.4						
C.5						

Notes

1.1 Prior to blast cleaning, any deposits of grease or oil are to be removed by solvent cleaning, SSPC-SP 1.

1.2 Rough surfaces are to be deburred and ground smooth. Sharp edges resulting from flame cutting, grinding and especially shearing are to be softened.

1.3 Intermittent welds are made continuous, either with additional welding, caulking or body filler. For corrosive environments, all joints should be seal welded. Seams of hollow structural sections shall be acceptable as produced.

1.4 All bolt heads in connections shall be on the same side, as specified, and consistent from one connection to another.

1.5 Weld spatter, slivers, surface discontinuities are to be removed. Weld projection up to 2 mm is acceptable for butt and plug welded joints.

2.1 Visual samples are either a 3-D rendering, a physical sample, a first off inspection, a scaled mock-up or a full-scale mock-up, as specified in Contract Documents.

2.2 These tolerances are required to be one-half of those of standard structural steel as specified in CSA S16.

2.3 Members marked with specific numbers during the fabrication and erection processes are not to be visible.

3.1 All mill marks are not to be visible in the finished product.

3.2 Caulking or body filler is acceptable.

3.3 Seams shall be oriented away from view or as indicated in the Contract Documents.

3.4 The matching of abutting cross-sections shall be required.

3.5 This characteristic is similar to 2.2 above. A clear distance between abutting members of 3 mm is required.

3.6 Hidden bolts may be considered.

4.1 HSS seams shall be treated so they are not apparent.

4.2 In addition to a contoured and blended appearance, welded transitions between members are also required to be contoured and blended.

4.3 The steel surface imperfections should be filled and sanded.

4.4 The backface of the welded element caused by the welding process can be minimized by hand grinding the backside of the weld. The degree of weld-through is a function of weld size and material.

END OF SECTION 05 12 00

PART 1: GENERAL

1.1 GENERAL REQUIREMENTS

.1 Provide all material and labour required for the completion of the Contract. Breakdown of Work by Section is for guidance only and is not necessarily complete.

.2 Work Furnished and Installed:

i. Helical Piers

.3 Related Work Specified Elsewhere

i. Structural Steel, Section 05 12 00 .

1.2 STANDARDS, CODES AND ACTS

.1 Conform with the Ontario Building Code 2006 under Ontario Regulation 350/06 and any applicable acts of any authority having jurisdiction and the following:

i. CSA Standards A23.1-04 - Concrete Materials and Methods of Concrete Construction, Canadian Standards Association.

ii. CAN/CSA-G30.18-M92 - Billet-Steel Bars for Concrete Reinforcement, Canadian Standards Association.

iii. CSA-G40.20-M98 - General Requirements for Rolled or Welded Structural Quality Steel, Canadian Standards Association.

iv. CSA-G40.21-04 - Standard Quality Steel, Canadian Standards Association.

.2 Where there are differences between the specifications, drawings, codes, standards or acts, the most stringent shall govern.

1.3 TOLERANCES

.1 Install piles within the following tolerances:

i. Out of plumb - 2 degrees variation from design alignment..

ii. Location at cut-off - maximum 75 mm from position shown on plan.

iii. Cut-off elevation - maximum 25 mm from elevation shown.

iv. Material sizes shall not be less than the sizes specified.

.2 These tolerances are acceptable with regard to structural requirements. Interfacing tolerances may not be compatible with the above. Review and coordinate interfacing tolerances so that the various elements come together properly.

1.4 QUALIFICATIONS AND CERTIFICATION

.1 The organization and personnel undertaking the design and installation of the helical pier foundation system shall be:

i. Trained and experienced in the proper methods for the design and installation of helical screw piles.

ii. Experienced in performing work on similar projects to that required for this project.

iii. Certified by the manufacturer of the helical pier foundation system.

.2 Provide written evidence of experience and certification to the Consultant. Provide names of on-site personnel materially involved with the work.

1.5 QUALITY ASSURANCE

.1 All HSP shall be installed in the presence of a designated representative of the Owner unless said representative informs the Contractor otherwise. The designated representative shall have the right of access to any and all field installation records and test reports.

1.6 GEOTECHNICAL INVESTIGATION

.1 Soils investigation(s) of the site has been made by EXP Services Ltd. in their report number SUD-000146596-AG. Their report dated April 17, 2017 is available from the Consultant. Read this report, visit the site and thoroughly familiarize yourself with surface and subsurface conditions.

.2 This information is given solely as a guide. No responsibility is accepted by the Owner or Consultant for its correctness nor shall its accuracy affect the provisions of the Contract.

1.7 DESIGN OF PILES

.1 The drawings indicate:

i. Assumed pile layout.

ii. Design loads for piles.

iii. Assumed details of interface between piles and the supported structure.

.2 Design pile system with a configuration and safe capacity in accordance with the assumptions and loads indicated in accordance with the manufacturer's recommendations and the findings and recommendations in the geotechnical report.

.3 Design bearing plates or other connections between the piles to transmit the factored loads shown or implied by the drawings. Bearing assemblies shall ensure that the maximum bearing stresses in CAN/CSA A23.3 are not exceeded.

.4 Design shall be done by a Professional Engineer Licensed to practice in the Province of Ontario

1.8 ALTERNATIVE PROPOSALS

.1 If the Contractor wishes to provide an alternative pile type or vary number and/or location of the piles, he shall provide the Consultant with a complete proposal, including calculations for review.

.2 Any variation to pile caps or grade beams required thereby shall be designed and provided by the Contractor at Contractor's expense and the design shall be submitted to the Consultant for approval along with the information noted above.

.3 Alternative pile types will not necessarily be approved by the Consultant.

.4 The Contractor shall state in tender the type of pile upon which his tender is based.

.5 The cost of reviewing the proposed alternate will be billed directly to the subcontractor on an hourly basis.

1.9 SUBMITTALS

.1 Erection and Fabrication Drawings

i. Submit erection and fabrication drawings for review by the Consultant.

ii. The structural drawings shall not be reproduced, in whole or in part, for use as erection and fabrication drawings without the Consultant’s approval.

iii. Amongst other items, show the following:

Fully dimensioned layout of piles;

Cut-off elevations;

Assumed founding elevations;

Design load of each pile and installation criteria;

Pile type, materials and sizes of all components.

Splice and tip details.

Bearing plate and other connection details between pile and building structure

iv. In advance of construction, provide complete installation procedures for the Consultant's review.

v. All submittals shall be stamped and signed by the Licensed Professional Engineer responsible for its design.

.2 Certificates

i. Provide certification from an approved Independent Inspection and Testing Company that materials used for the piling work meet, as a minimum, the values stated in the pile design calculations reviewed by the Consultant. The cost of certification of materials shall be borne by the Contractor.

PART 2: PRODUCTS

2.1 MATERIALS

.1 Pile System shall be one of the following:

i. Chance Helical Piers as manufactured by AB Chance Company, a subsidiary of Hubbell Power Systems.

ii. Round Shaft Helical Piers as manufactured by Pier Tech Systems.

iii. Techno Metal Posts as manufactured by Techno Pieux Thetford Mines Inc.

iv. Helical Pipe Piles, as manufactured by Geosolv Canada.

v. Helical Torque Anchors, as supplied by Earth Contact Products (E.C.P.).

.2 Notwithstanding the above, the pile system shall be recognized and approved by the CCMC

.3 Conform to the manufacturer's recommendations.

.4 Hot dip galvanizing: Galvanize all steel to CAN/CSA G164-M92 (R1998), minimum zinc coating of 600 g/m2.

.5 Steel Piles, including Splices, Shoes and Caps: Conform to CSA Standard G40.20/G40.21; Grade 300W.

PART 3: EXECUTION

3.1 LAYOUT

.1 Lines and levels shall be supplied by the Contractor. Check the lines and levels supplied and after checking, this Sub-Contractor shall be responsible for their correctness and for their correct observance. Responsibility for the correctness of reference lines and benchmarks shall rest with the Contractor.

.2 From the reference lines and benchmarks established for this contract, locate each pile and establish its elevation in order to complete the piling to the lines and levels shown on the drawings and to the specified tolerances.

.3 Commencement of installation of each pile shall be construed as acceptance of the line and level supplied.

3.2 LOAD TESTS

.1 General

i. Perform load tests on at least 2 piles of each type or as otherwise required to confirm the capacity of the piles.

- Where piles are driven into dissimilar bearing materials, provide tests for each type of bearing material.

ii. The first load test shall be performed in order to prove the theoretical pile design capacity by testing one of the first six piles installed. The piles to be tested will be chosen by the Consultant.

iii. If the test pile does not meet the stipulated design capacity, install piles with a suitably higher torque (or deeper penetration) or use a lower pile design capacity and thereby increase the number of piles or employ such other alternatives such that the design loads will be safely supported by the pile system. Any additional costs to grade beams and/or pile caps and redesign of same, shall be the

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STRUCTURAL ADDENDUM - S02

17-1079

PTA No.: **S02**

Date: June 5, 2017

To: Bortolotto
533 College St., Suite 401
Toronto, ON M6G 1A
Attn: Brian Muthaliff

Re: 387 Balsam St. N., Timmins, ON
Pope Francis Elementary School Renovations/Additions

The following instruction is a clarification of the Structural Contract Documents. Should the Contractor hold that these instructions involve a change in the contract intent or amount, the Contractor shall notify the Architect in writing and shall not proceed with any work until directed by a change order or field order.

Drawings Issued

Drawing No.	Drawing Title	Revision	Date
S2.1	Foundation Plan	5	June 5, 2017
S2.2	Second Floor Framing Plan	5	June 5, 2017
S2.3	Roof Framing Plan	5	June 5, 2017
S4.1	Sections and Details	5	June 5, 2017
S4.2	Sections and Details	5	June 5, 2017
S4.3	Sections and Details	5	June 5, 2017

Description of Work

S2.1 – Foundation Plan:

1. 1/S2.1: revise plans as shown bubbled.

S2.2 – Second Floor Framing Plan:

1. 1/S2.2: revise plans as shown bubbled.

S2.3 – Roof Framing Plan:

1. 1/S2.3: revise plans as shown bubbled. Please note that the bubbles from SA No. S1 not shown correctly. We have included the bubbles from SA No. S1 in this issue.

S4.1 – Sections and Details:

1. 9/S4.1: revise section as shown bubbled.
2. 10/S4.1: revise section as shown bubbled.

S4.2 – Sections and Details:

1. 2/S4.2: revise section as shown bubbled.
2. 4/S4.2: revise section as shown bubbled.

S4.3 – Sections and Details:

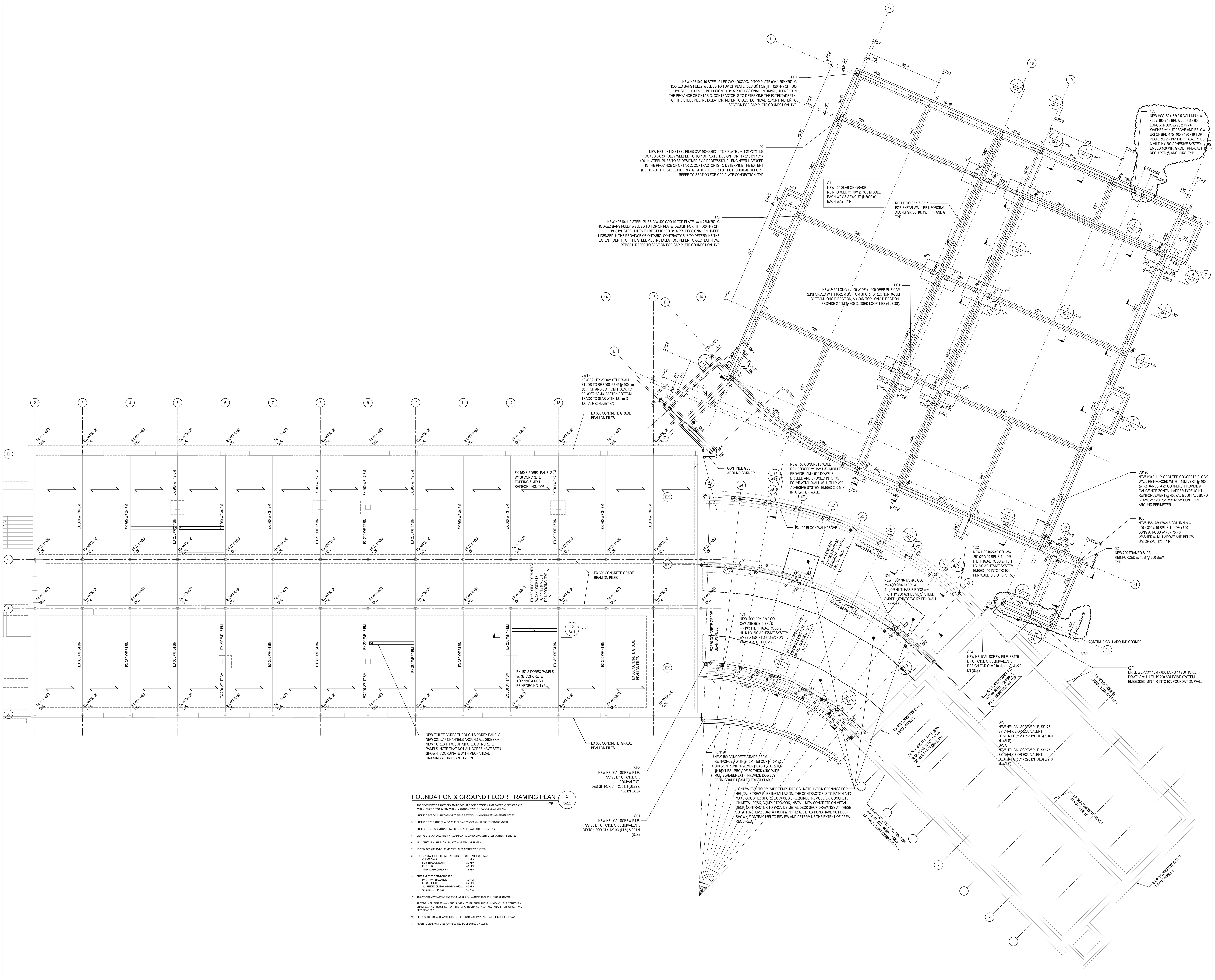
1. 2/S4.3: revise section as shown bubbled.
2. 4/S4.3: revise section as shown bubbled.

END OF SA-S02

Regards,
Engineering Link Incorporated

Per: Craig Nicoletti, P.Eng.
Associate
B: 416-599-5465 x128
E: Craig.Nicoletti@englink.ca

To: Brian Muthaliff brian@bortolotto.com
Cc: Alex Horber alex@bortolotto.com



FOUNDATION & GROUND FLOOR FRAMING PLAN

1:75 — 1 / S2.1

1. TOP OF CONCRETE SLAB TO BE 0 MM BELOW 1ST FLOOR ELEVATION 0 MM EXCEPT AS CROSSED AND NOTED. AREAS CROSSED AND NOTED TO BE READ FROM 1ST FLOOR ELEVATION 0 MM.
2. UNDERSIDE OF COLUMN FOOTINGS TO BE AT ELEVATION -2590 MM UNLESS OTHERWISE NOTED.
3. UNDERSIDE OF GRADE BEAM TO BE AT ELEVATION -2200 MM UNLESS OTHERWISE NOTED.
4. UNDERSIDE OF COLUMN BASEPLATES TO BE AT ELEVATION NOTED ON PLAN.
5. CENTRE LINES OF COLUMNS, CAPS AND FOOTINGS ARE COINCIDENT UNLESS OTHERWISE NOTED.
6. ALL STRUCTURAL STEEL COLUMNS TO HAVE 8MM CAP PLATES.
7. JOIST SHOES ARE TO BE 100 MM DEEP UNLESS OTHERWISE NOTED.
8. LIVE LOADS ARE AS FOLLOWS, UNLESS NOTED OTHERWISE ON PLAN:
   - CLASSROOMS 2.4 KPA
   - LIBRARY/BOOK ROOM 2.9 KPA
   - KITCHENS 4.8 KPA
   - STAIRS AND CORRIDORS 4.8 KPA
9. SUPERIMPOSED DEAD LOADS ARE:
   - PARTITION ALLOWANCE 1.0 KPA
   - FLOOR FINISH 0.2 KPA
   - SUSPENDED CEILING AND MECHANICAL 0.5 KPA
   - CONCRETE TOPPING 1.2 KPA
10. SEE ARCHITECTURAL DRAWINGS FOR SLOPES ETC. MAINTAIN SLAB THICKNESSES SHOWN.
11. PROVIDE SLAB DEPRESSIONS AND SLOPES, OTHER THAN THOSE SHOWN ON THE STRUCTURAL DRAWINGS, AS REQUIRED BY THE ARCHITECTURAL AND MECHANICAL DRAWINGS AND SPECIFICATIONS.
12. SEE ARCHITECTURAL DRAWINGS FOR SLOPES TO DRAIN. MAINTAIN SLAB THICKNESSES SHOWN.
13. REFER TO GENERAL NOTES FOR REQUIRED SOIL BEARING CAPACITY.

POPE FRANCIS ELEMENTARY
ADDITION & RENOVATION
PROJECT#R121

387 Balsam Street North
Timmins, Ontario

Northeastern Catholic District SCHOOL BOARD

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REV	DESCRIPTION	DATE
5	ISSUED FOR SA No. S2	2017.06.05
4	ISSUED FOR SA No. S1	2017.05.24
3	ISSUED FOR PERMIT	2017.05.19
2	ISSUED FOR TENDER	2017.05.16
1	100% REVEW	2017.05.10

BORTOLOTTO

PROJECT NUMBER PF1701

DATE 17.06.05

SCALE 1:75

DRAWN BY KOC

FOUNDATION PLAN

S2.1

POPE FRANCIS ELEMENTARY
ADDITION & RENOVATIONS
PROJECT #2121

30 Room Stretton
Timmins, Ontario

Northeastern Catholic District School Board

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REV	DESCRIPTION	DATE
5	ISSUED FOR BALTender	2017.08.25
4	ISSUED FOR BALTender	2017.08.24
3	ISSUED FOR PERMIT	2017.05.15
2	ISSUED FOR TENDER	2017.05.15
1	10% REVIEW	2017.05.15

BORTOLOTTO

PROJECT NUMBER
1702

STATE
17.08.25

SCALE
1:75

DRAWN BY
ADC

SECOND FLOOR
FRAMING PLAN

S2.2

SECOND FLOOR FRAMING PLAN

1 S2.2 1:75

1. TOP OF CONCRETE TOPPING TO BE 89 MM FROM TOP OF EX. FLOOR SLAB ELEVATION 3300 MM, EXCEPT AS CROSSED AND NOTED. AREAS CROSSED AND NOTED TO BE READ FROM 2ND FLOOR ELEVATION 3300 MM.
2. TOP OF STEEL BEAMS ARE TO BE 300 MM BELOW 2ND FLOOR ELEVATION 3300 MM, UNLESS NOTED +/-0.0 ON PLAN. BEAM ELEVATIONS NOTED ON PLAN ARE TO BE READ FROM 2ND FLOOR ELEVATION 3000MM.
3. LIVE LOADS ARE AS FOLLOWS, UNLESS NOTED OTHERWISE ON PLAN:

CLASSROOMS	2.4 KPA
LIBRARY/BOOK ROOM	7.6 KPA
KITCHENS	4.8 KPA
STAIRS AND CORRIDORS	4.8 KPA
LOW ROOF	3.2 KPA + ASL

4. SUPERIMPOSED DEAD LOADS ARE:

PARTITIONS / MILLWORK	1.0 KPA
FLOOR FINISH	0.2 KPA
SUSPENDED CEILING AND MECHANICAL	0.5 KPA
CONCRETE TOPPING	2.4 KPA

5. CONNECT HOLLOW CORE SLAB TO SUPPORTING ELEMENTS FOR AN UNFACTORED DIAPHRAGM SHEAR FORCE SHOWN ON S2.4.
6. STEEL BEAM CONNECTIONS ARE TO BE DESIGNED FOR THE FACTORED FORCES INDICATED ON PLAN. WHERE NO FORCE IS INDICATED, DESIGN STEEL CONNECTIONS FOR A FACTORED VERTICAL SHEAR FORCE OF 80 KN. PROVIDE MINIMUM 3 BOLTS TO ALL CONNECTIONS.
7. SEE ARCHITECTURAL DRAWINGS FOR SLOPES ETC. MAINTAIN SLAB THICKNESS SHOWN.

ROOF FRAMING PLAN

1 / S2.3

1:75

1. TOP OF CONCRETE TOPPING TO BE 0 MM FROM FINISHED ROOF ELEVATION 6550 MM, EXCEPT AS CROSSED AND NOTED. AREAS CROSSED AND NOTED TO BE READ FROM ELEVATION 6550 MM.

2. TOP OF STEEL BEAMS IS 300 MM BELOW ROOF ELEVATION 6550 MM UNLESS OTHERWISE NOTED. BEAM ELEVATIONS NOTED ON PLAN ARE TO BE READ FROM ROOF ELEVATION 6550 MM.

1. LIVE LOADS ARE AS FOLLOWS, UNLESS NOTED OTHERWISE ON PLAN:

MECHANICAL ATTIC	1.0 KPA
ROOF AREAS	3.2 KPA + ASL

2. SUPERIMPOSED DEAD LOADS ARE:

ROOFING	0.5 KPA
SUSPENDED CEILING AND MECHANICAL	0.3 KPA
CONCRETE TOPPING	1.2 KPA

3. CONNECT HOLLOWCORE SLAB TO SUPPORTING ELEMENTS FOR AN UNFACTORED DIAPHRAGM SHEAR FORCE SHOWN ON S2.4.

4. STEEL BEAM CONNECTIONS ARE TO BE DESIGNED FOR THE FACTORED FORCES INDICATED ON PLAN. WHERE NO FORCE IS INDICATED, DESIGN STEEL CONNECTIONS FOR A FACTORED VERTICAL SHEAR FORCE OF 80 KN. PROVIDE MINIMUM 2 BOLTS AT ALL CONNECTIONS.

5. SEE ARCHITECTURAL DRAWINGS FOR SLOPES ETC.

POPE FRANCIS ELEMENTARY
ADDITION & RENOVATION
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2	ISSUED FOR TENDER	2017.05.16
1	100% REVEW	2017.05.10

BORTOLOTTO

PROJECT NUMBER
PF1701

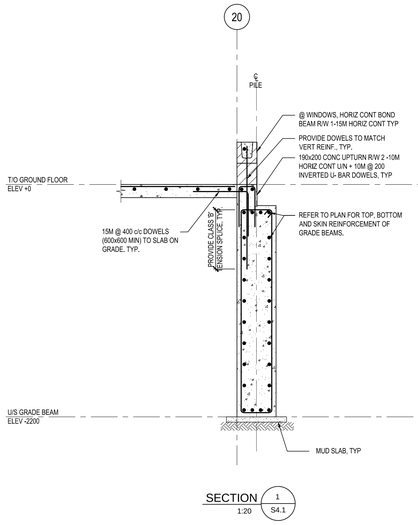
DATE
17.06.05

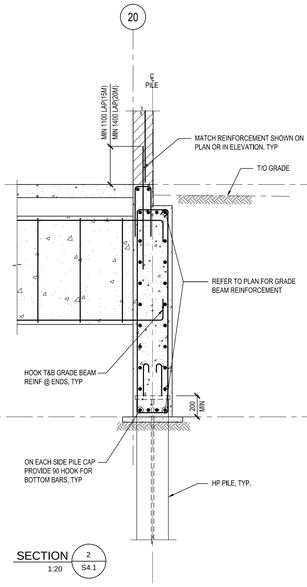
SCALE
1:75

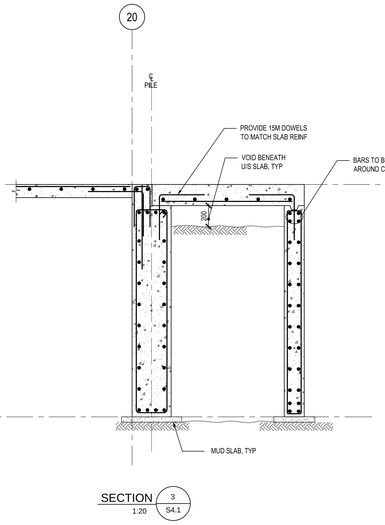
DRAWN BY
KOC

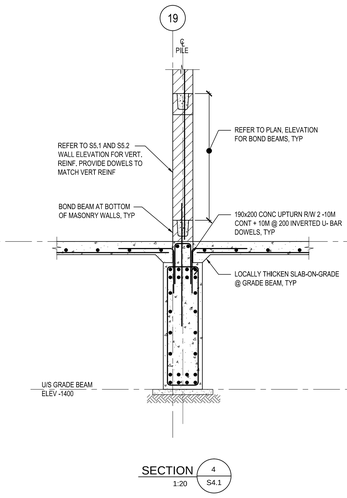
ROOF FRAMING PLAN

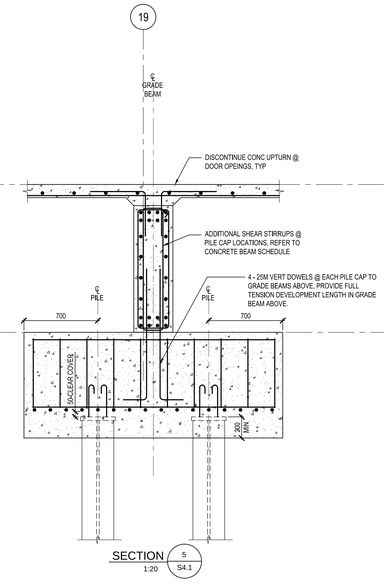
S2.3

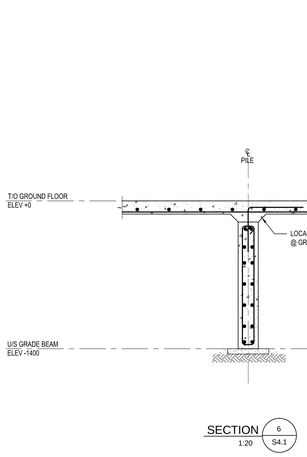


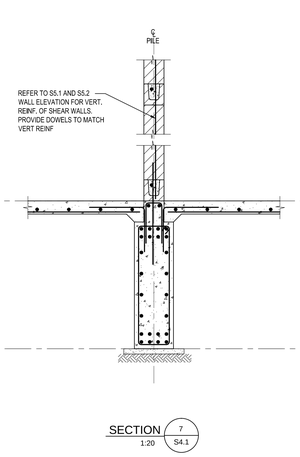


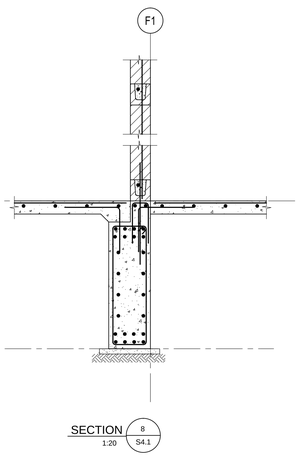


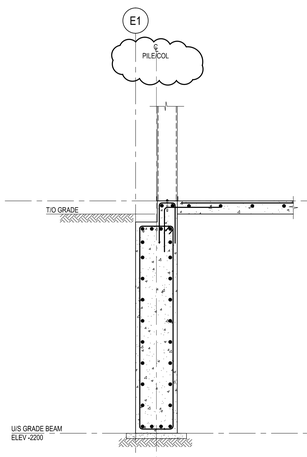


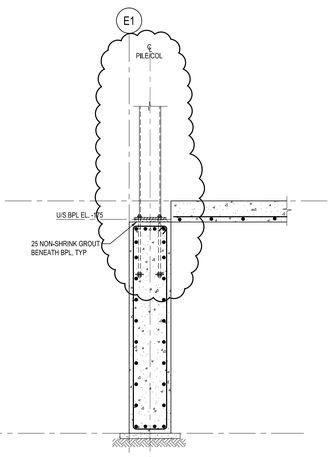


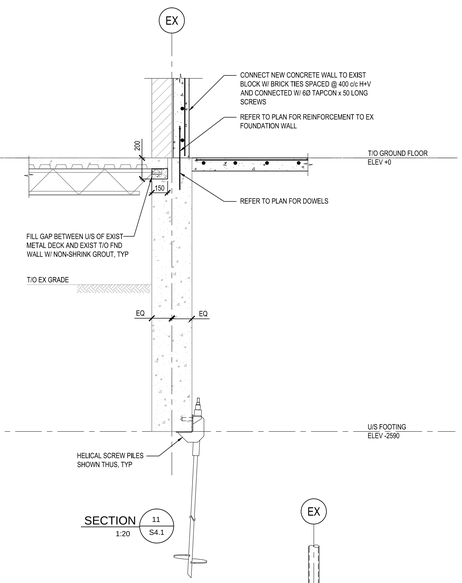


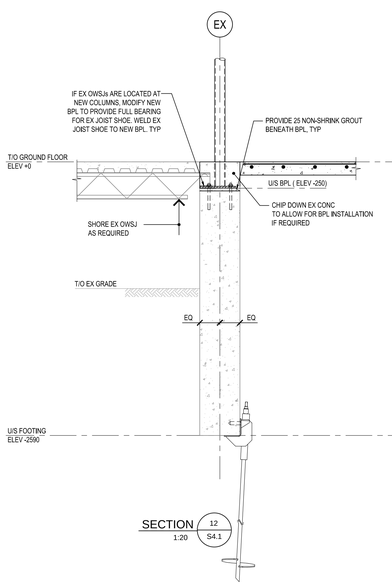


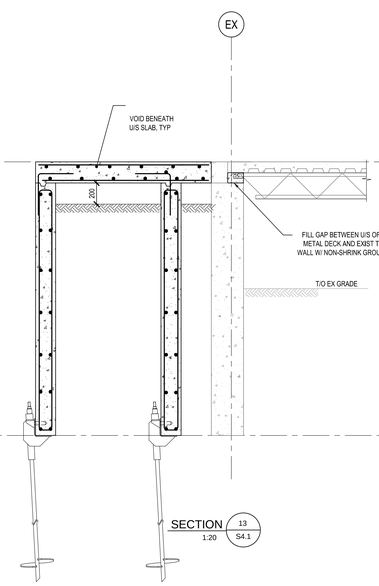


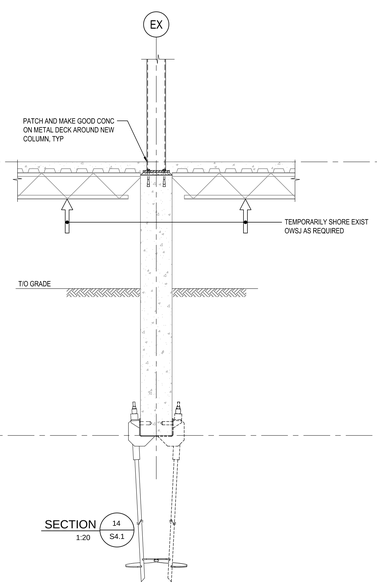


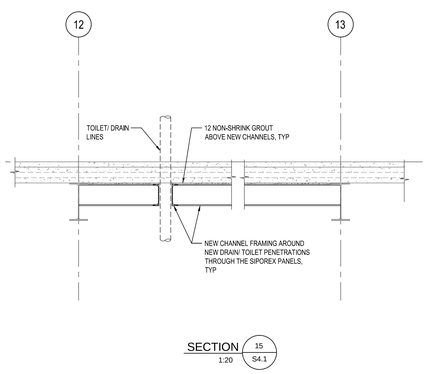


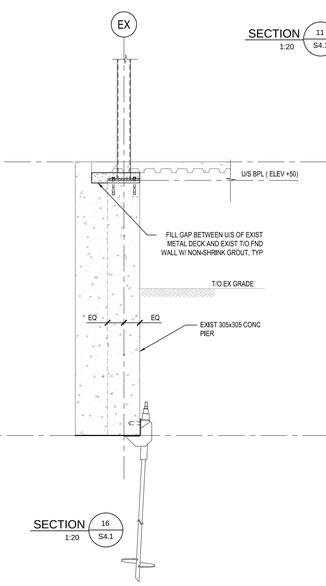


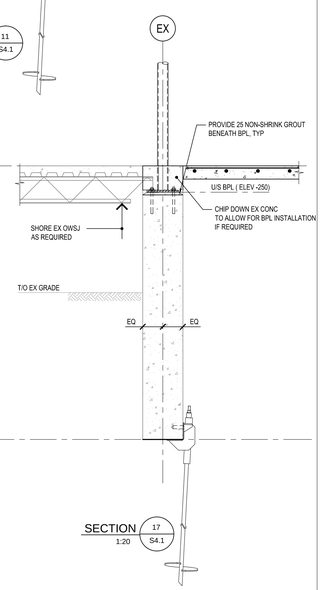












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1	100% REVIEW	2017.05.10

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PROJECT NUMBER PF1701
DATE 17.06.05
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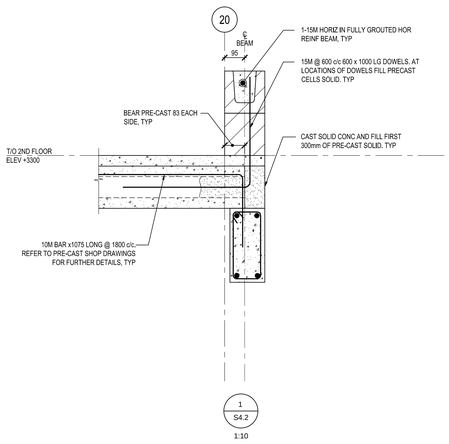
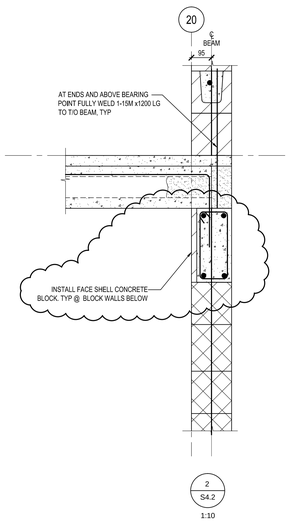
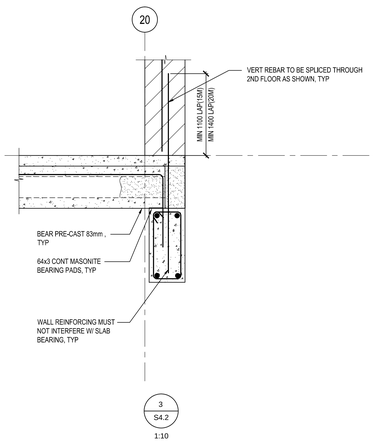
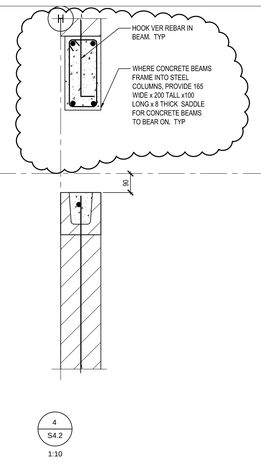
SECTIONS AND DETAILS

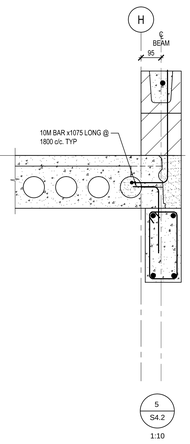
S4.1

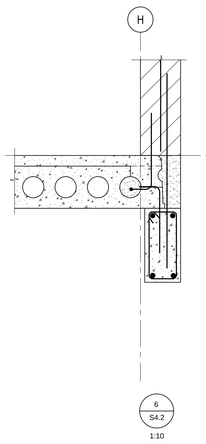


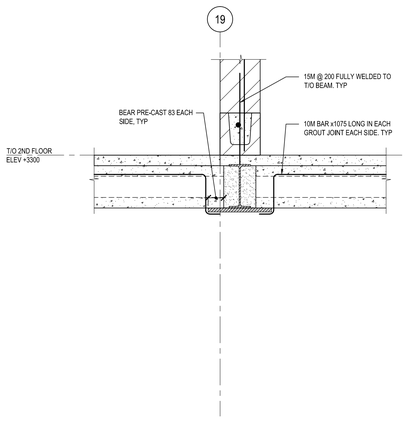


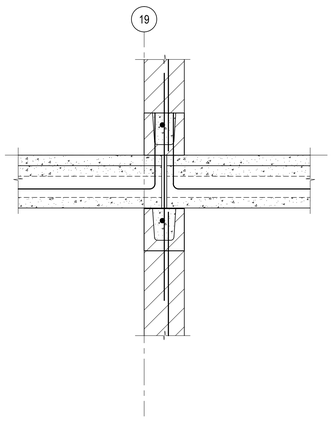


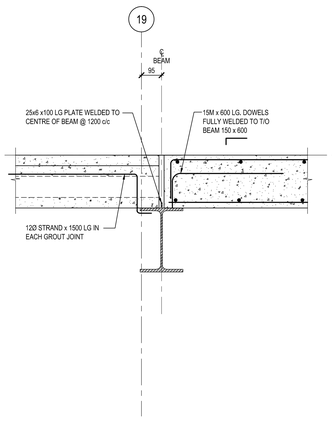


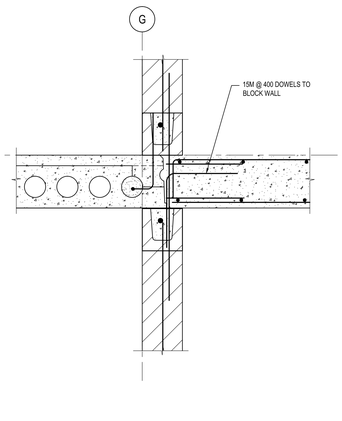


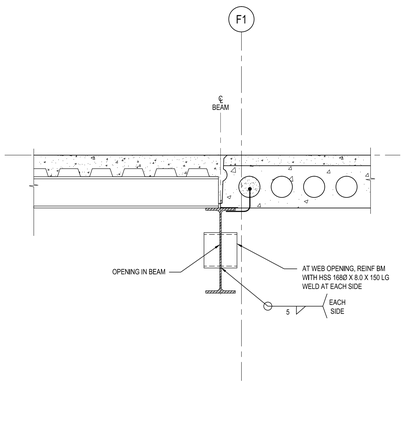


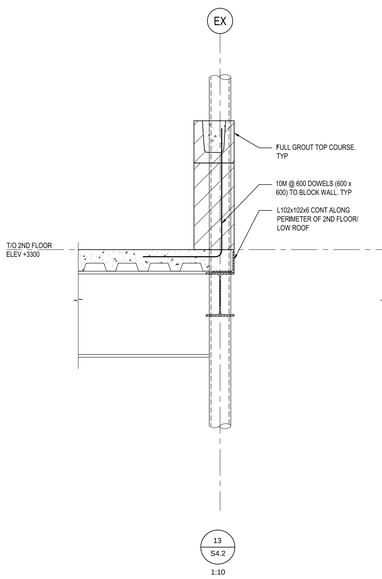


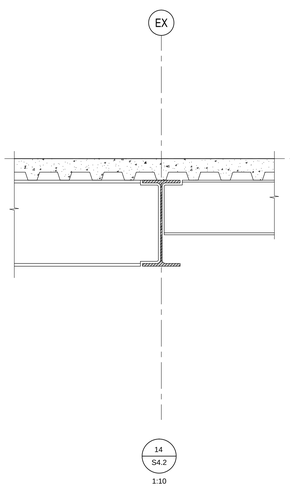


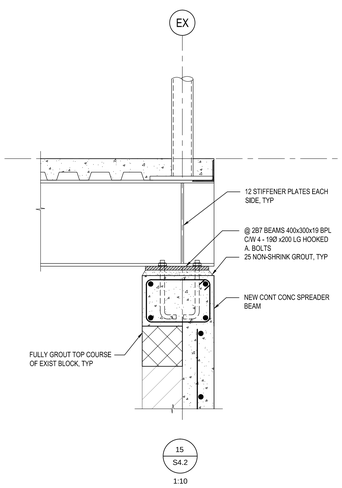


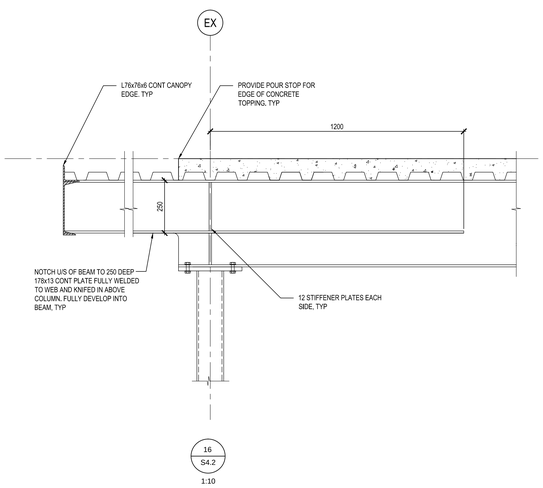


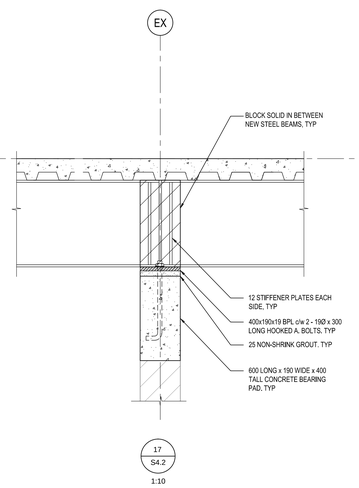












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1	100% REVIEW	2017.05.10

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PROJECT NUMBER #P1701
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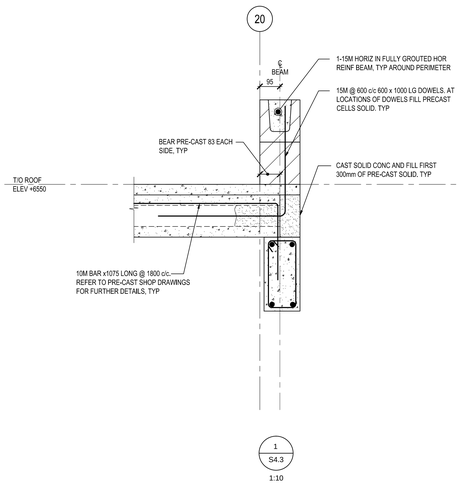
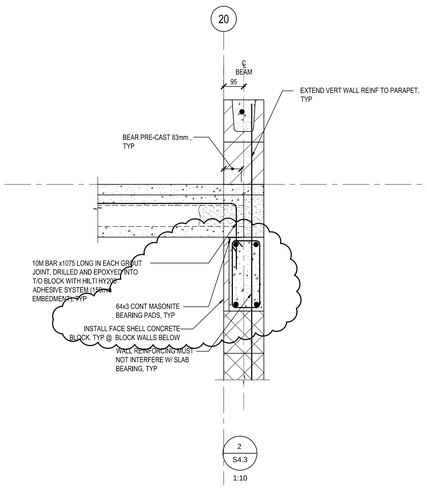
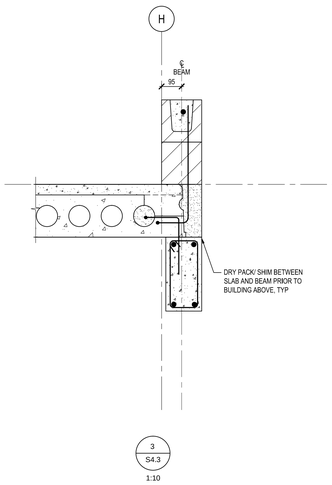
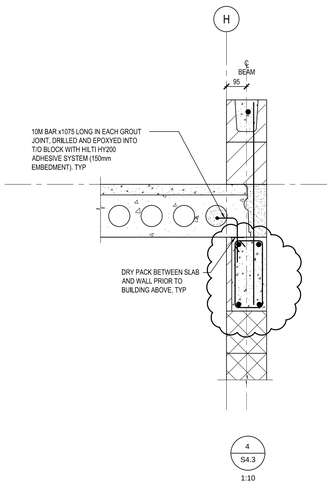
SECTIONS AND DETAILS

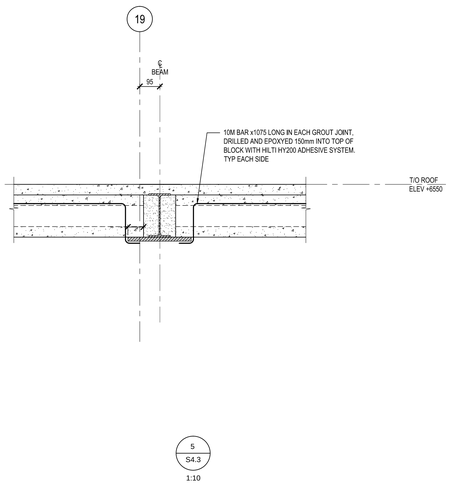
S4.2

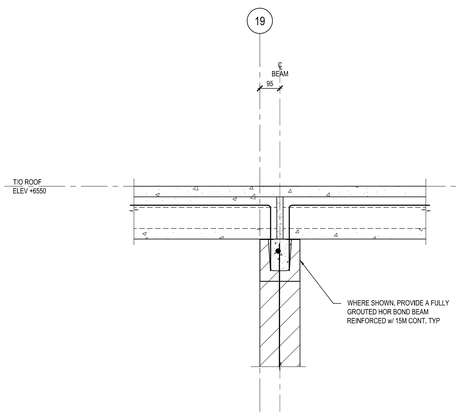


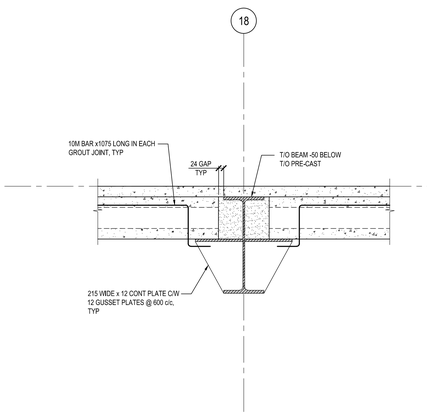


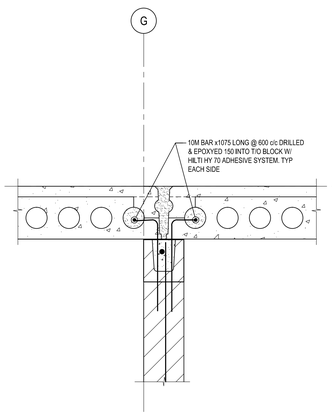


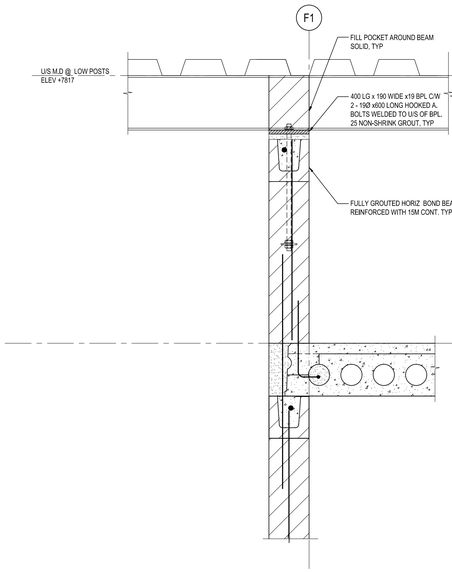


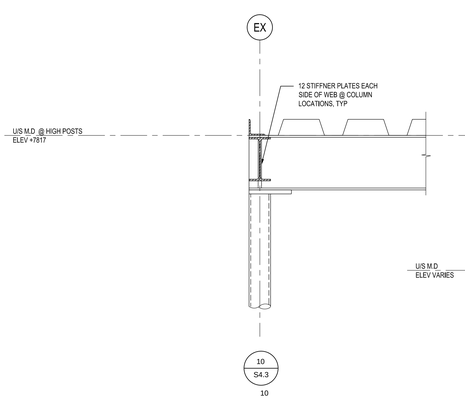


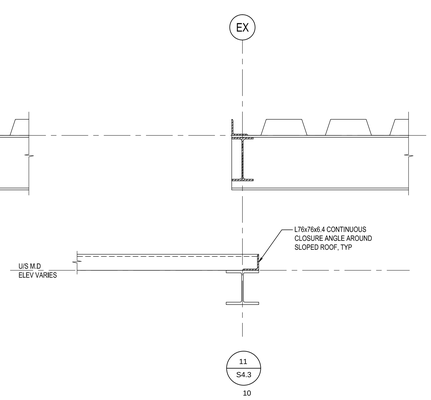


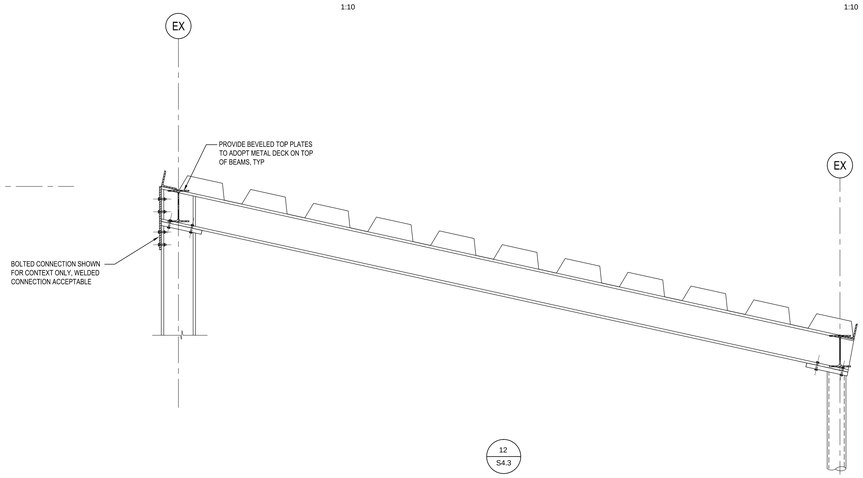


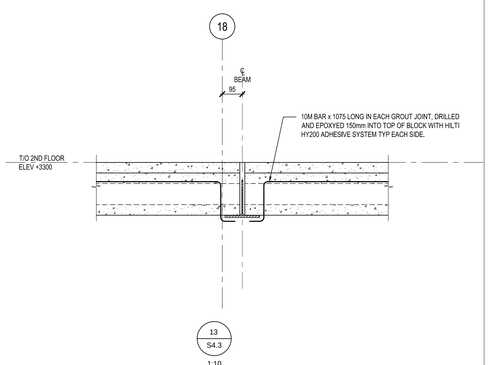












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PROJECT NUMBER
PF1701

DATE
17.06.05

SCALE
1:10

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NAZ

SECTIONS AND DETAILS

S4.3

responsibility of the Contractor. After the design capacity of piles has been proven and as pile driving proceeds, the Consultant will select the second pile to be tested.

iv. If a pile load test is not successful, carry out one or more additional load tests until the test is successful. Additional load tests required due to test failure shall be at the Contractor's expense.

.2 Acceptance Criteria

i. Acceptance criteria shall be as agreed with the geotechnical engineer. As a minimum, should results of any test pile show net settlement in excess of 0.25 mm per tonne of test load, a further test shall be carried out by reloading the pile gradually to a test load which will produce a maximum net settlement not in excess 0.25 mm per tonne of test load.

ii. The allowable working load of the type of pile involved shall then be established at ½ the last test load and additional piles shall be installed at the Contractor's cost as directed by the Consultant wherever required to make up for the reduced allowable working load.

3.3 INSTALLATION

.1 General

i. Install piles to safely develop the design loads shown.

ii. Conform to the manufacturer’s recommendations.

iii. Install all piles to at least the same criteria as that determined as being sufficient to develop the design load on the test pile.

iv. Install individual piles in pile clusters in such a way as to minimize the generation of increased driving resistance by compaction and displacement of the soil.

v. At the termination of installation of each pile, take readings of the elevation of the top of the pile. On the completion of all piling in a cluster or nearby clusters, take elevation readings again to determine whether any heaving has occurred. If heaving has occurred, re-install the pile to the proper resistance or proceed as the Consultant directs.

vi. The Contractor shall be responsible for additional cost of pile caps or grade beams arising out of misplaced piles which the Consultant may accept as load carrying.

vii. Note the location of piles close to adjacent existing construction. Use equipment, which can install the piles in these locations without damaging the existing construction.

.2 Obstructions

i. As indicated on the soil investigation report, the till contains a certain percentage of boulders. The Contractor shall remove these boulders or drill through them in order to install the piles.

ii. In a case where an obstruction is encountered above the bearing stratum, an attempt shall be made to drive through such obstruction.

iii. If the Consultant is satisfied that a pile cannot be installed to the required criteria because of obstructions and if the Consultant is not satisfied that the specified capacity has been obtained, the pile may be abandoned at the Consultant's discretion and shall be paid for as a contract pile.

iv. Quote a price for each complete additional pile. This price shall form the basis for extras should it be found necessary to add piles because of obstructions encountered.

3.4 FIELD RECORDS

.1 Keep a record covering each pile installed. The record shall be jointly certified by the Contractor and the inspection company.

.2 Records shall indicate the following:

i. Pile number and identification as to location;

ii. Tip elevation, cut - off elevation and length of pile, as installed;

iii. Final torque or other installation criteria.;

iv. Elevation readings of butt end at completion of installation and subsequent to installing adjacent piles. A record of re-installation, if necessary;

v. Record of pile plumbness, position relative to designated position and verification that these are within tolerable limits;

vi. Remarks concerning unusual driving conditions, obstructions, damage to piles caused by driving or other similar data

END OF SECTION 31 62 00

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STRUCTURAL ADDENDUM - S03

17-1079

PTA No.: **S03**

Date: June 8, 2017

To: Bortolotto
533 College St., Suite 401
Toronto, ON M6G 1A
Attn: Brian Muthaliff

Re: 387 Balsam St. N., Timmins, ON
Pope Francis Elementary School Renovations/Additions

The following instruction is a clarification of the Structural Contract Documents. Should the Contractor hold that these instructions involve a change in the contract intent or amount, the Contractor shall notify the Architect in writing and shall not proceed with any work until directed by a change order or field order.

Drawings Issued

Drawing No.	Drawing Title	Revision	Date

Description of Work

S1.1 – General Notes:

1. Revise the following sections of the General Notes:
    a. 2.0 Foundations
        i. 2.2: delete line.
        ii. 2.3: Add note: "All piles, including helical screw piles, are to be end bearing."
    b. 5.0 Lateral Loads on Structural Frame
        i. 5.1.1.v) Wind Loads
            1. North-south direction: 155 kN
            2. East-west direction: 155 kN
        ii. 5.1.2.vi) Seismic Loads
            1. North-south direction: 1250 kN
            2. East-west direction: 1250 kN
        iii. 5.1.2.vii) Add "Seismic Hazard Index: IeFaSa(0.2) = 1.3 x 2.1 x 0.140 = 0.382.

S2.1 – Foundation Plan:

1. 1/S2.1: revise plans as per the following:
    a. SW1: revise to include the following line "refer to architectural drawings for stud wall locations, typ."
    b. Front entry frost slab to be an S2 slab.
    c. Front lobby area: existing ground floor is framed as follows: 64 concrete on 38 metal deck on 12" open web steel joists.
    d. 1C5: revise to include 4 anchor bolts per column.
    e. Revise section mark A/S5.2 to be A/S5.1.

f. Revise section mark B/S5.2 to be B/S5.1.
g. 1C2: revise u/s of baseplate to be between -150 to -250.

S2.2 – Second Floor Framing Plan:

1. 1/S2.2: revise plans as per the following:
    a. 2B10: connect for Vf = 125 kN.
    b. 2C3: connection for Mf = 40 kN-m at the base.
    c. Similar to 1/S2.1, add elevation marks A/S5.1, B/S5.1, C/S5.1 & A/S5.2.
    d. Revise RSC1 to be 2S1. "2S1: 300 concrete slab reinforced with 15M @ 300 top & bottom, each way. Lap bottom bars over beams/walls; lap top bars at midspan."

S2.3 – Roof Framing Plan:

2. 1/S2.3: revise plans as per the following:
    a. Similar to 1/S2.1, add elevation marks A/S5.1, B/S5.1, C/S5.1 & A/S5.2.
    b. Refer to architectural drawings for top of high roof steel beams.
    c. 2C3: connection for Mf = 60 kN-m at the top to LRB3 beams.

S4.1 – Sections and Details:

1. 1/S4.1: add the following notes: "provide horizontal continuous bond beam reinforced with 1-15M at bottom of walls, typical."
2. 2/S4.1: similar to 1/S4.1.
3. 13/S4.1: revise drawings to show new metal deck where the existing metal deck is to be removed in order to install the helical screw piles.
4. 14/S4.1: similar to 13/S4.1.
5. 16/S4.1: similar to 13/S4.1.

S4.2 – Sections and Details:

1. 1/S4.2: add the following notes: "provide horizontal continuous bond beam reinforced with 1-15M at bottom of walls, typical."
2. 2/S4.2: similar to 1/S4.2.
3. 3/S4.2: similar to 1/S4.2.
4. 5/S4.2: similar to 1/S4.2.
5. 6/S4.2: similar to 1/S4.2.

END OF SA-S03

Regards,
Engineering Link Incorporated

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SUD-00014596-AG

Submitted: April 21, 2017

Geotechnical Investigation

Proposed Addition for Pope Francis Elementary School, 387 Balsam Street N Timmins, Ontario

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Northeastern Catholic District School Board
c/o Bortolotto

Geotechnical Investigation
Proposed Addition for Pope Francis Elementary School
387 Balsam Street N
Timmins, Ontario

Type of Document:
Report

Project Number:
SUD-00014596-AG

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Legal Notification

This report was prepared by **exp** Services Inc. for the account of the **Northeastern Catholic District School Board, c/o Bortolotto Architects.**

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Further to our proposal 17-010-GP, dated February 10, 2017, your written authorization to proceed, and subsequent scope modification approvals, **exp** Services Inc. (**exp**) has completed the field investigation and geotechnical engineering evaluation for the above noted project. Our comments and recommendations, based on the results of the field investigation and our understanding of the project scope, are provided in this report.

1 Introduction

It is understood by **exp** that the Northeastern Catholic District School Board (NCDSB) is proposing to construct a new building addition adjacent to the existing St. Paul School located at 387 Balsam Street in Timmins, Ontario. The school is to be renamed Pope Francis Elementary School after renovations to the existing school and the building of a new addition located to the northwest of the existing school. The school yard site is located to the north of 9th Avenue between Balsam Street on the east and Birch Street to the west. The proposed addition is to consist of a two storey, 592.0 m^2 building along with a 92.0 m^2 Atrium connecting the new building with the existing single storey section. A new parking area with 43 parking spots is to be constructed on undeveloped land directly to the north of the existing school. To assist with the design of the new buildings and parking lot, **exp** has completed a geotechnical investigation with the results of the investigation and design recommendations included within this report. The proposed building footprint and parking area are shown on Dwg. No. A-1, included in Appendix A.

2 Field Investigation

The field investigation for this project consisted of the advancement of a total of eight (8) sampled boreholes, designated as BH-1 to BH-8, inclusive. The boreholes were advanced on March 14th to 16th, 2017 and were located in the field by an **exp** representative based on a proposed site and borehole location plan prepared by Engineering Link Incorporated. The borehole locations are shown on Dwg. No. A-1, included in Appendix A. The advancement of the boreholes was supervised on a full time basis by **exp**'s geotechnical representative.

The sampled boreholes were advanced using 200 mm diameter Hollow Stem Augers (HSA) to depths of 2.1 m for the 4 boreholes in the proposed parking area (BH-5 to BH-8) and to depths ranging from 6.7 m to 14.0 m for the 4 boreholes located at the four corners of the proposed building (BH-1 to BH-4). The results of the boreholes are shown on the attached borehole logs (Figures B-2 to B-9 in Appendix B). Soil samples were obtained using a 51 mm (2 inch) outside diameter split spoon sampler in conjunction with Standard Penetration Tests (ASTM D1586), at depths noted on the attached borehole logs in Appendix B. The Standard Penetration Test (SPT) "N" values were recorded and used to provide an assessment of the in-situ compactness condition and inferred consistency of the overburden soils. Field shear vane tests were also carried out at intervals between sample locations. It was originally intended to advance the 4 boreholes at the building corners to depths of approximately 6.1 m, as described in our proposal. However, after completing the first borehole (BH-1) to 6.7 m depth and encountering significant depths of very soft silty clay, our field technician was advised by this office to continue the borehole by driving a dynamic cone through the soft material to determine the extent of the soft material and the depth to competent material. The dynamic cone was terminated upon refusal at a depth of approximately 11.9 m. At this point, Bortolotto and Mr. David Horton of the NCDSB was advised of the poor soil conditions encountered and it was recommended that the subsequent 3 boreholes be extended to refusal depth and that at least one borehole be core drilled at refusal depth to confirm the presence of bedrock or very dense till material. The additional work was agreed to by Mr. Horton.

Boreholes BH-2, BH-3 and BH-4 were completed to depths of 9.1 m, 9.0 m, and 10.7 m, respectively, and were terminated upon encountering refusal to sampling or to advancement of the dynamic cone. Borehole BH-4 was continued beyond refusal depth for an additional 3.3 m by rock coring in NQ core size through weathered bedrock.

The groundwater level was measured within the open boreholes prior to backfilling. The boreholes were then backfilled with auger cuttings and sealed with Bentonite upon completion. Borehole BH-3 was fitted with a 50 mm (2") diameter plastic standpipe with a well screen to enable longer term groundwater level measurements.

The retained samples were logged in the field and then carefully packaged and transported to our Sudbury laboratory for detailed examination and testing.

The borehole locations and local elevations were surveyed in the field using both a hand held GPS unit and an engineering survey level. The borehole elevations are referenced to the elevation of the existing school floor slab, which was assigned a local elevation of 100.00 m. The survey information should be considered accurate only to the degree implied by the method used.

3 Laboratory Testing

A laboratory testing program was performed on representative soil samples and consisted of moisture content determinations on all samples, two (2) grain size analyses, and one (1) Atterberg Limits test. The laboratory moisture content and Atterberg Limits test results are provided on the attached borehole logs in Appendix B. The results of the grain size analysis and the Atterberg Limits test results are shown graphically on Figures C-1 and C-2, respectively, in Appendix C.

In addition to geotechnical test parameters, selected samples were also submitted to an accredited laboratory for Corrosivity Testing, O.Reg. 558 and O.Reg. 153 for metals and inorganics. The test results will be submitted under separate cover.

4 Subsurface Conditions

Details of the soils encountered during the field investigation are summarized on the attached borehole logs in Appendix B. The logs include textural descriptions of the subsoils encountered and indicate the soil boundaries inferred from non-continuous sampling and observations during the field investigation. These boundaries reflect approximate transition zones for the purposes of geotechnical design and should not be interpreted as exact planes of geological change. When reading this report, the explanatory notes and definitions provided in Figures B-1A and B-1B in Appendix B should be referenced.

In general, the boreholes advanced at the site encountered a surficial layer of generally granular fill overlying a deposit of stiff to firm, brown silty clay overlying a very soft, dark grey silty clay deposit. One borehole (BH-3) encountered layers of silt, silty sand, and gravelly sand beneath the very soft silty clay layer. A deposit of clayey silt was encountered in Boreholes BH-7 and BH-8 at the far end of the proposed parking area at the north end of the site. Probable bedrock was encountered at depths ranging from 9 m to 12 m in the vicinity of the proposed addition. The presence of bedrock was confirmed by rock coring at Borehole BH-4. The soil materials encountered are described in further detail below.

4.1 Fill

Fill materials were encountered at surface in all boreholes except for Boreholes BH-7 and BH-8. At Boreholes BH-1 and BH-2, a 25 mm thick layer of asphalt was encountered at surface overlying sand and silty sand fill materials, which extended to 1.2 m and 0.6 m depths, respectively. The fill materials encountered at surface in Boreholes BH-3 to BH-6 consisted of silty sand to silty sand and gravel fill materials that extended to depths of approximately 0.6 m. A second lower fill deposit, consisting of silty clay fill with some organics, was encountered beneath the silty sand fill at BH-5 and extended to a depth of 1.2 m. The fill deposits were generally frozen to approximately 0.9 to 1.2 m depth, and thus, only auger samples could be obtained.

4.2 Topsoil

Topsoil was encountered at surface at the far north end of the site in Boreholes BH-7 and BH-8. Topsoil thickness varied from 50 mm to 150 mm. Topsoil thickness could further vary between the completed boreholes.

4.3 Silty Clay

The predominant soil material encountered at the site consisted of a deposit of stratified silty clay consisting of a stiff to firm to occasionally soft upper crust of predominantly brown silty clay followed by a deeper deposit of typically very soft, dark grey silty clay.

4.3.1 Brown Silty Clay

The upper crust of brown silty clay was encountered beneath the fill deposits in Boreholes BH-1 to BH-6 at depths ranging from 0.6 m to 1.2 m and extended to depths of approximately 2.3 m to 2.7 m, where fully penetrated. The brown silty clay was also encountered beneath the topsoil layer at Borehole BH-7 and extended to a depth of 1.2 m. Boreholes BH-5 and BH-6 were terminated within the brown silty clay at depths of 2.1 and 1.8 m, respectfully. The brown silty clay was found to be in a moist condition and was moderately plastic with alternating brown silty clay layers and thinner grey silt seams or lenses. Uncorrected SPT "N" values within the brown silty clay ranged from 9 to 1 blows per 300 mm inferring a stiff to very soft consistency, with the lower N values of 1 and 2 obtained at depths below 2.0 m near the interface with the lower dark grey silty clay material. Moisture content values within the brown silty clay layer ranged from 23% to 32%.

4.3.2 Dark Grey Silty Clay

The dark grey silty clay was encountered in Boreholes BH-1 to BH-4 and extended to depths ranging from 4.3 m at Borehole BH-3 to approximately 10.5 m at Borehole BH-4. A dynamic cone test carried out from the base of Borehole BH-1 from 6.7 m depth to 11.9 m depth infers that the very soft silty clay material probably extends to a depth of about 11.0 m at this location.

Uncorrected SPT "N" values within the dark grey silty clay material generally ranged from "zero" to 2 blows per 300 mm inferring a generally very soft consistency (typically "zero" blows indicates that the split spoon sampler fully penetrated 600 mm into the silty clay material under the weight of the rods and hammer only). One higher N value of 10 was recorded at approximately 9 m depth in Borehole BH-4. However, upon examination of the recovered sample, the sample contained a relatively thick compact silt lense, which would account for the higher N value. Field vane tests performed within the silty clay indicated apparent undrained shear strength values ranging from approximately 31 to 64 kPa. However, these relatively high shear strength results are not considered to be representative based on tactile examination of recovered samples as the measured shear strengths were probably influenced by the presence of the silt layers and seams within the soil.

Moisture content values within the dark grey silty clay ranged from 27% to 62%, with values generally greater than 50% in samples where "N" values of "zero" were obtained.

One Atterberg Limits test was carried out on a representative sample from Borehole BH-1 (Sample 5 from 2.7 to 3.1m depth) and indicated a Liquid Limit of 47%, a Plastic Limit of 21%, and a corresponding Plasticity Index of 26 (see Fig C-2 in Appendix C). A grain size analysis carried out on the same sample indicated that the sample contained approximately 2% sand, 23% silt, and 75% clay sized particles, as shown on Fig No. C-1 in Appendix C. Based on the results of the laboratory testing, the material is classified as being a silty clay with medium/intermediate plasticity (CI). It should be noted that the moisture content values for most of the recovered samples of the dark grey silty clay were typically above the liquid limit value, which is typical of a very soft material.

Overall, the dark grey silty clay is considered to have a very soft to soft consistency based on an assessment of the field vane test results, the low SPT "N" values, and the laboratory testing.

4.4 Clayey Silt

A deposit of stratified clayey silt was encountered beneath the brown silty clay layer at 1.2 m depth in Borehole BH-7 and directly beneath the topsoil layer in Borehole BH-8. Both boreholes were terminated within the clayey silt at depths of 1.8 m. The clayey silt material was stratified with predominantly grey clayey silt layers and thin alternating brown silty clay layers.

The clayey silt was found to be in a moist condition with slight plasticity. Uncorrected SPT "N" values within the clayey silt ranged from 7 to 18 blows per 300 mm inferring a firm to very stiff consistency/loose to compact compactness condition. Moisture content values within the clayey silt layer ranged from 25% to 33%.

4.5 Silt

A deposit of predominantly silt was encountered underlying the dark grey silty clay at approximately 5.8 m depth in Borehole BH-2 and at 4.3 m depth at Borehole BH-3. Sampling in Borehole BH-2 was terminated at 6.7 m depth while still within the silt material. The silt in Borehole BH-3 extended to 5.8 m depth. The silt was wet, and grey in colour with a trace of clay and a trace of sand. Uncorrected SPT "N" values of 7 and 11 blows per 300 mm were measured within the silt stratum classifying the silt as being generally loose to compact in compactness condition. Moisture contents within the silt ranged from 24% to 26%.

4.6 Silty Sand

A layer of silty sand was encountered underlying the silt stratum in Borehole BH-3 between depths of approximately 5.8 m and 7.3 m. The silty sand was wet, and grey in colour, with a trace of gravel. An Uncorrected SPT "N" value of 17 blows per 300 mm was measured, classifying the silty sand as being in a compact compactness condition. A moisture content value of 20% was obtained.

4.7 Sand

A layer of sand was encountered underlying the silty sand stratum in Borehole BH-3 between depths of approximately 7.3 m and 9.0 m. The sand was wet, and grey in colour, with some gravel and some silt. Uncorrected SPT "N" values of 17 and 50 blows per 300 mm were measured, classifying the sand as being in a compact to very dense compactness condition. A moisture content value of 17% was obtained.

A grain size analysis carried out on the recovered material indicated that the sample contained approximately 19% gravel, 68% sand, and about 13% silt sized particles, as shown on Fig No. C-1 in Appendix C.

4.8 Dynamic Cone Results

A dynamic cone was advanced from the bottom of the sampled depths of Boreholes BH-1 and BH-2 to provide additional information on the inferred consistency/compactness condition of the overburden soils and to establish the depth to competent soils or probable bedrock. The cone test in Borehole BH-1 inferred probable very soft to soft silty clay material extending to approximately 11 m depth after which more competent material (possibly compact silt or silty sand) was encountered to 11.9 m depth, where refusal on possible bedrock or very dense sand was encountered. The cone test in Borehole BH-2 inferred probable compact silt or silty sand below about 7.0 m depth with refusal at 9.1 m depth on possible bedrock or very dense sand.

4.9 Bedrock

Bedrock was core drilled at Borehole BH-4 following auger refusal at approximately 10.7 m depth. The bedrock was cored in NX core size from 10.7 m depth to 14.0 m depth for a total length of 3.3 m. Core recovery was poor with recovery measured at 66.7%, 62.5% and 75% for Run Numbers 1, 2 and 3, respectively. Corresponding RQD values were 16.7%, 24.0%, and 62.5%, indicating completely weathered to moderately weathered rock quality.

Table 4.1 below provides a summary of the refusal depths and confirmed bedrock contact depths and corresponding local elevations.

Table 4-1: Depths to Refusal on Confirmed Bedrock and on Assumed Bedrock or Very Dense Till

Borehole No.	Local Surface Elevation (m)	Depth to Refusal or Confirmed Bedrock (m)	Local Refusal Elevation (m)
BH-1	99.62	11.9	87.7
BH-2	99.09	9.1	90.0
BH-3	99.59	9.0	90.6
BH-4	99.65	10.7	89.0 (B/R confirmed)

4.10 Groundwater

Groundwater level readings measured following completion at Boreholes BH-1 and BH-2 and Boreholes BH-5 to BH-8 were all dry to the bottom of the respective boreholes. A monitoring well (50 mm diameter with two 1.5 m lengths of well screen) was installed near the bottom of Borehole BH-3 at a depth of approximately 8.5 m. A groundwater level reading of 2.9 m depth was measured on March 15, 2017, a day after completion of the monitoring well. Based on the gradation of the sand layer where the well screen was located in Borehole BH-3, the observed groundwater level is considered to probably be close to the stabilized level at approximately local elevation 96.7 m. The change in colour of the silty clay material from brown to grey and increased moisture content of the recovered samples below about 2.3 m depth infers that the groundwater table may range from approximately 2.3 m to 2.7 m depth.

Seasonal variations in the water table should be anticipated, with higher levels occurring during wet weather conditions (spring thaw and late fall) and lower levels occurring during dry weather and winter conditions.

5 Foundation Recommendations

The presence of the very soft dark grey silty clay encountered below approximately 2.3 m depth in the 4 boreholes located at the 4 corners of the proposed two storey building addition is a foundation concern, especially for shallow footings. With any shallow foundation system, long term consolidation settlement of the deposit of very soft silty clay, which varies in thickness from approximately 2.0 m to 6.7 m, is a significant concern at this site. Consideration must be given to the potential long term consolidation settlement that could occur prior to choosing the final foundation option.

Exp should be retained to review the final design and specifications to confirm that we are in general agreement with the assumptions on which our recommendations are based. If not accorded the privilege of making this review, **exp** will assume no responsibility for interpretation of the recommendations in this report.

5.1 Strip or Spread Footings Bearing on Native Stiff-Firm Silty Clay

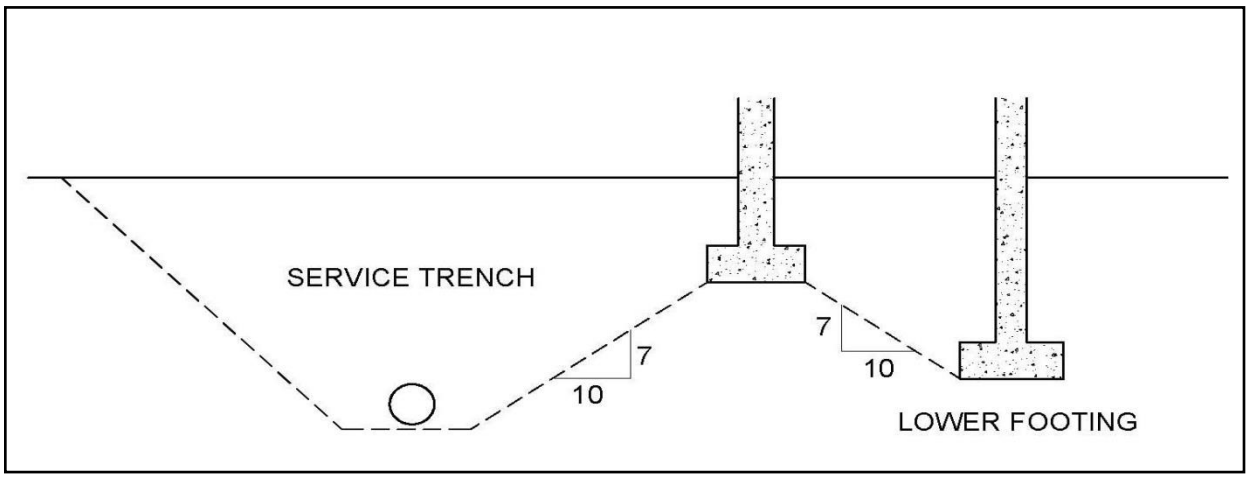
The proposed structure could be founded on conventional strip or spread footings bearing on the upper crust of native firm to stiff, brown silty clay or on engineered fill overlying the upper native brown silty clay soil. The footings should be established at a depth no deeper than 1.5 m below existing grade to avoid overstressing the underlying soft to very soft grey silty clay deposits. Localized deeper excavations may be necessary should some areas of the upper silty clay be deemed unacceptable following geotechnical review. Prior to the placement of the footings, any fill materials, organics and any other deleterious material must be removed down to the undisturbed, firm to stiff

native brown silty clay soils. The exposed subgrade should then be inspected by a representative from **exp** prior to placing any engineered fill or concrete.

Footings founded on the undisturbed native silty clay can be designed with a factored geotechnical resistance at Ultimate Limit States (ULS) of 125 kPa using a geotechnical resistance factor of 0.5. A bearing pressure at Serviceability Limit States (SLS) of 75 kPa may be used. Provided site grades are not raised (or light weight fill is incorporated as described below), our settlement analyses indicate that the footings designed with the recommendations contained herein are expected to settle between 18 mm and 35 mm total but less than 20 mm differential, provided the loadings on the footings are uniform. It must be noted, however, that the settlement calculations were estimated based on the results of a consolidation test performed on a sample of soft silty clay with similar moisture content, gradation and liquid limit characteristics from another project site in Timmins completed by **exp**. There is a potential for actual settlements to be twice our predicted magnitudes.

Foundations, which are to be placed at different elevations in soils or near service trenches, should be located such that the footings are set below a line drawn up at 10 horizontal to 7 vertical from the near edge of a lower foundation or bottom of a service trench, as indicated on Figure 5.1 below. However, as discussed above, the footings should be established no lower than 1.5 m depth below existing grade.

Figure 5.1: Footings near Service Trenches or at Different Elevations



These foundation recommendations assume the structures are lightly loaded and do not account for loadings from heavy machinery or vibrations. Strip and spread footing widths must comply with the Ontario Building Code and/or the National Building Code of Canada's minimum requirements.

5.2 Thickened Edge Slab-on-Grade (Raft) Overlying Native subsoils.

Assuming there will be no significant grade raising at the site, the proposed building addition could be founded on a thickened edge slab-on-grade foundation overlying the undisturbed native brown silty clay subsoil, provided excavations do not extend below 1.5 m depth. This type of foundation system is also recommended if the site grades are to be raised using engineered fill, including LWF (light weight fill) to reduce the uniform distributed loading on the underlying soft compressible silty clay soils.

Thickened edge foundations on the native brown silty clay should be designed as a raft with a reduced distributed loading, including the weight of the raft, no greater than 25 kPa. A factored geotechnical resistance at Ultimate Limit States (ULS) of 75 kPa is acceptable, however, the lower geotechnical reaction at Serviceability Limit States (SLS) of 25 kPa is required to minimize long term consolidation settlement. A geotechnical resistance factor of 0.5 was utilized for the ULS values. With a geotechnical reaction at SLS of 25 kPa and no grade raises, the long term total settlement is still estimated to be approximately 25 mm with differential settlement not

expected to exceed about 15 mm, provided loadings on the slab and the surrounding grade are relatively uniform across the building site.

5.3 Subgrade Preparation

The exposed native brown silty clay subgrade should be scraped clean with a smooth-edged bucket and inspected by a representative from **exp**. Any soft or disturbed areas encountered below the footing locations or any areas that are subject to softening/loosening when exposed to water and construction activities should be excavated down to firm subgrade and replaced with Granular "A" or Granular "B" Type II in accordance with Ontario Provincial Standards and Specifications (OPSS) 1010. In no case should the excavation for foundations exceed 1.5 m depth. If wet soil conditions are present during construction, a non-woven geotextile separator (Terrafix 270R or equivalent) should be placed between the subgrade soils and the overlying soil materials (i.e., clean sand, Granular "A" or Granular "B" Type II materials) to stabilize the native soils.

5.4 Engineered Fill

5.4.1 Engineered Fill for Standard Footings and Beneath Slab-on-Grade (with No Grade Raise)

If there will be no significant grade raises, and total settlements ranging from 25 mm to ~50 mm can be tolerated, the engineered fill if required beneath footings and/or the floor slab should consist of Granular "B" Type I or Granular "B" Type II. To protect the footing base from construction activity or inclement weather, a 150 mm thick layer of Granular "A" material (OPSS 1010) can be placed directly below the footings and should extend laterally a minimum of 300 mm on either side of the footing edge and slope down at 1H:1V, and must be reviewed under the full time supervision of this office. In-lieu of the Granular "A", a lean mix concrete base can be poured. The lean mix concrete should extend a minimum of 300 mm on either side of the footings. Note that the footing base should not be left exposed beyond the day of excavation and it is recommended that it be covered immediately after inspection and approval.

5.4.2 Engineered Fill for Thickened Edge Slab-on-Grade with No Grade Raise

Assuming the top of the thickened slab would be at or slightly above existing grade, it is anticipated that the upper 0.6 m to 1.2 m of existing fill and possibly disturbed silty clay would need to be removed. This material should be replaced with Granular A up to the underside of the slab.

5.5 Raft Foundation

A raft foundation may be feasible that would require the removal of sufficient soil below and beyond the building footprint to create a void, which can be filled with light weight foam. The weight of raft and supported structure and surrounding soils would have to be equivalent to the weight of the soils removed, such that there would be zero net loading on the underlying compressible silty clay soils.

5.6 Pre-Loading

Should the above options not be feasible and it is a requirement to either raise site grades and or minimize consolidation settlement, it may be feasible to pre-load the site to induce settlements prior to construction of the building addition. This would require importing a significant amount of fill on site, stockpiling the material within and surrounding the building footprint, and monitoring the settlement over time. Note that this option would likely require significant time, probably between 6 months and 1 year, prior to being able to start construction.

5.7 Additional Settlement Analyses

Additional engineering and possible additional field investigation would be required should either the raft or pre-loading options be envisioned. **Exp** should be contacted for further design input. As well, if a more accurate assessment of potential consolidation settlement of the silty clay material is required, a laboratory consolidation test should be carried out on a representative undisturbed sample of the silty clay

material underlying the site at depth. This would require an additional borehole to obtain the undisturbed sample(s) of the material for testing.

6 Piled Foundations

If the use of shallow foundations and the projected magnitude of consolidation settlement is unacceptable or considered too high risk, the conservative approach would be to support the structure on deep piled foundations, consisting of either driven steel piles or Micropiles. Driven steel piles, end bearing on bedrock, would likely be the most feasible option. Micropiles drilled and embedded into the bedrock or very dense till could also be utilized as an alternative to driven piles.

6.1 Standard Piled Foundations

The preferred and generally most economic pile type for the soil and suspected bedrock conditions at the site will probably consist of heavy walled, open end steel pipe piles. It is recommended that the minimum outside diameter pipe for this project should be 244 mm, as smaller diameter pipes tend to bend during driving. They should have a wall thickness of 13 mm or greater to minimize the damage during driving. Alternatively, steel H piles may be used.

The factored Ultimate Limit State (ULS) and Serviceability Limit State (SLS) loads that may be used for design purposes are given in Tables 6-1 and 6-2 below. A factor of 0.4 has been used for the ULS values noted. The resistance at Serviceability Limit States (SLS) allows for 25 mm of compression of the pile and founding medium. For piles end-bearing on bedrock, the bedrock is considered to be a non-yielding material and the design is not expected to be governed by settlement criteria, since the loading required to produce an appreciable deformation of the pile and/or bedrock is much larger than the factored resistance at ULS.

Table 6-1: Factored ULS and SLS Loads for Piles End-Bearing on Very Dense Till

Designation	ULS Factored Axial Resistance	SLS Axial Resistance
244 mm O.D. by 13.0 mm wall thickness	131 kN	87 kN
324 mm O.D. by 13.0 mm wall thickness	176 kN	117 kN
HP 310x79	139 kN	93 kN
HP 310x110	196 kN	130 kN

Table 6-2: Factored ULS Loads for Piles End-Bearing on Bedrock

Designation	ULS Factored Axial Resistance
244 mm O.D. by 13.0 mm wall thickness	1,220 kN
324 mm O.D. by 13.0 mm wall thickness	1,640 kN
HP 310x079	1,400 kN
HP 310x110	1,970 kN

The lateral resistance of the vertical piles is typically derived from the soil surrounding the piles; The upper stiff to firm upper layer of silty clay may be sufficient to provide lateral resistance depending on the elevation of the pile cap. Lateral loading can also be supported by installing the piles at a batter. The axial loading parameters for the battered pile are the same as for vertical piles. For piles on sloping bedrock the pile tip should be fitted with a rock point to prevent pile slippage along the bedrock profile.

The driving criteria for a particular hammer-pile system must be established at the beginning of the project. This may be achieved with a pile driving analysis and wave equation (WEAP) analysis, which considers the entire system of pile, hammer and subsurface conditions. A number of test piles must be monitored with the Pile Driving Analyzer during the initial driving and restriking at the beginning of the project. This monitoring will allow for the evaluation of transferred energy into the pile from the hammer, determination of driving criteria, and an evaluation of the bearing capacity of the piles.

A minimum centre-to-centre spacing of three times the pile diameter should be used for group piles. During the driving of piles in a group, the vertical elevation of the piles should be monitored. If more than 5 mm of heaving occurs during the driving of adjacent piles, the heaved piles should be re-driven to the established penetration resistance.

Any settlements induced by the above recommended pile loads are expected to be within the normally tolerated limits of 25 mm total and 20 mm differential movements.

The installation of the piles at the site should be monitored on a full time basis by a geotechnical technician working under the direction and supervision of a qualified geotechnical engineer to verify that the piles are driven in accordance with the project specifications. **Exp** should be retained to perform this installation monitoring. Should **exp** not be retained, **exp** will assume no responsibility for the performance of the piled foundation.

6.2 Micropiles

Micropile foundations extending into the underlying bedrock or very dense soils can be utilized to support the proposed addition.

For micropile foundations, a specialized contractor should be retained to design and install the micropiles. Although several contractors are capable of designing and installing micropiles, a contractor with experience in the Timmins area should be utilized. **Exp** can be contacted to provide a recommendation for a qualified contractor.

The micropiles will need to be socketed into the bedrock in order to achieve their capacity as the micropiles derive their capacity from the friction between the grout and the surrounding weathered bedrock or sound bedrock with a central reinforcement (Dywidag Bar) to transfer the load. As such, the available capacity is a function of the drill hole diameter and the bond length within the soil/bedrock. On previous projects, one diameter drill hole is typically used and the embedment length is varied to obtain various required capacities. However, if loading will vary considerably, a different diameter drill hole could be used. Micropile diameters typically range from 150 to 300 mm. A summary of typical grout-to-ground bond values has been included in Appendix D.

Lateral loading may be resisted by installing the micropiles on a batter.

The installation and testing of Dywidag micropiles must be monitored under full time supervision by **exp** during installation to confirm the design. The actual design must be discussed with the specialized contractor.

6.3 Structural Floor Slab

For structures founded on deep foundations, it is typically recommended that the floor slab be structurally designed and incorporated into the structure and that any services and/or piping below the floor slab be supported by hangers or similar equipment. However, as discussed below, a slab-on-grade floor slab may be considered feasible.

6.4 Slab-on-Grade Floor Slab

Floor slab-on-grade construction is considered feasible with the structure founded on piles provided that all fill, organics and other deleterious materials are removed down to the competent native brown silty clay soil. The exposed subgrade soil should be scraped clean with a smooth-edged bucket and gently proof-rolled with a smooth drum roller in the presence of exp prior to placing the under-floor fill. Any soft areas encountered during proof-rolling should be excavated and replaced with a Granular "A" or Granular "B" Type II (OPSS 1010) material. Once the native ground surface is prepared, all required up-fill material is to consist of a Granular "B" Type I or Type II (OPSS 1010) material. A non-woven geotextile separator (Terrafix 270R or equivalent) is to be used between the subgrade soils and the Granular "A" or Granular "B" Type II.

A final 300 mm thick layer of 19 mm minus Clear Stone (OPSS 1004) or Granular "A" (OPSS1010) should be placed directly below the floor slab combined with an appropriate moisture barrier, such as a polyethylene membrane.

All fill material should be placed in maximum 150 mm thick lifts and be compacted to 98% of the SPMDD within 2.0% of the optimum moisture content.

6.5 Backfill

All imported backfill material used for the foundations or pile caps should consist of Granular "A", Granular "B" Type I, or Granular "B" Type II (OPSS 1010) material, with a maximum aggregate size not exceeding 120 mm. The granular material used against the foundations must be placed in lifts no greater than 150 mm in thickness and must be compacted to 98% of the Standard Proctor Maximum Dry Density (SPMDD). Care must be taken to ensure over compaction and damage to the foundations does not occur.

6.6 Lateral Earth Pressure

Any foundation walls, pile caps, and any retaining structures should be designed to resist lateral earth pressure. The expression for calculating lateral earth pressure "p" at any depth "h" is given by the following:

$$p = K(\gamma h + q) + \gamma_w h_w$$

where

p = Lateral earth pressure (kPa)

K = Coefficient of earth pressure

γ = Unit weight of backfill (kN/m^3)

γ_w = Unit weight of water (kN/m^3)

h = Depth to point of interest (m)

h_w = Depth of water above point of interest (m)

q = Surcharge load acting adjacent to the wall at the ground surface (kPa)

Table 6-3 lists various earth pressure properties for given materials.

Table 6-3: Material Types and Earth Pressure Parameters

Material	Friction Angle ø´ (unfactored)	Coefficient of Active Earth Pressure (k_a)	Coefficient of Passive Earth Pressure (k_p)	Coefficient of Earth Pressure at Rest (k_o)	Unit Weight γ (kN/m^3)
Granular "A"	38º	0.24	4.2	0.38	22
Granular "B" Type I	35º	0.27	3.7	0.43	21
Granular "B" Type II	38º	0.24	4.2	0.38	21

Note: Values given for horizontal earth pressures are for horizontal backfill. For sloping backfill, the design requirements outlined in the Canadian Foundation Engineering Manual should be used.

The mobilization of full active or passive resistance requires a measurable and perhaps significant wall movement or rotation. Therefore, unless the structural element can tolerate these deflections, the at-rest earth pressure should be used in design.

The effects of compaction surcharge should be taken into account in the calculations of active and at rest earth pressures. The lateral pressure due to compaction should be taken as at least 12 kPa at the surface, and its magnitude should be assumed to diminish linearly with depth to zero at the depth where the active (or at rest) pressure is equal to 12 kPa. This pressure distribution should be added to the calculated active (or at rest) pressure. Notwithstanding, lighter compaction equipment and smaller lifts should be used adjacent to walls to prevent overstressing.

7 Frost Considerations

The freezing index in the Timmins area is approximately 1,750 C degree-days. There is potential for up to 2.5 m of frost penetration to occur over the winter months in unprotected, unheated areas and 2.0 m for heated structures. The existing native silty clay is considered to be moderately to severely frost susceptible, especially with the groundwater level and associated capillary rise being within the depth of frost penetration.

As such, foundations and/or grade beams for unheated structures should be provided with a minimum of 2.5 m of earth cover frost protection and heated structures should be provided with 2.0 m of earth cover frost protection. Note that to be considered a heated structure; the building must be maintained continuously at a minimum temperature of 18°C. If this will not occur, the building shall be considered unheated.

Since the footing base depths are limited to 1.5 m, sufficient earth cover cannot be provided and thus, insulation will be required to provide the additional frost protection. Insulation should consist of rigid extruded polystyrene, have a minimum compressive strength of 275 kPa, and an R-Value of 5 for every 25.4 mm of thickness, (i.e. Styrofoam HI 40). Any exposed insulation is to be protected against sunlight and physical damage. A rough estimate for cost evaluation purposes can be made by assuming that 25.4 mm (1 inch) of rigid insulation designed for below grade installation is equivalent to 300 mm of soil cover. As such, for shallow foundations constructed at 1.5 m depth in the stiff to firm brown silty clay, at least 50 mm of insulation should be provided. Note that insulation for heated structures should be placed both horizontally and vertically along the outside edge of the foundation. Insulation for unheated structures must extend below the entire foundation.

Detailed insulation recommendations can be provided by **exp,** if necessary, once the final foundation designs have been determined.

8 Site Classification for Seismic Site Response

The 2012 Ontario Building Code (OBC) has adopted the National Building Code of Canada requirements for seismic design considerations. Should the proposed structure fall under the building code requirements, the Site Classification for Seismic Response will be required.

The Site Classification for Seismic Response has been estimated based on the boreholes advanced as deep as approximately 14 m below existing grades. Bedrock is expected below approximately 14 m depth to below 30 m depth. The Site Classification for Seismic Response is based on the average conditions in the upper 30 m. Based on the very soft silty clay encountered above the bedrock, a Site Class E is considered appropriate to be used as per the OBC clause 4.1.8.4, Site Properties and Table 4.1.8.4 A, Site Classification for Seismic Response.

These earthquake/seismic design parameters should be reviewed in detail by the structural engineer and incorporated into the design as required. If a precise Site Classification is required based on shear wave velocity testing, **exp** can provide a quote to perform the necessary testing. Shear wave velocity testing by means of Multi-channel Analysis of Surface Waves (MASW) utilizing surface geopohones over an area of 30 m in diameter would suffice to provide a precise Site Classification.

9 Excavations and Dewatering

9.1 Excavations

The existing topsoil and silty clay materials can be excavated by standard soil excavation equipment. As discussed in Section 5, it is recommended that foundations be placed no lower than 1.5 m depth to avoid encountering the soft to very soft silty clays. Therefore, with the exception of possible building services to be installed at greater depths, excavations are expected to be shallow and no deeper than 1.5 m below existing grades.

The existing silty clay materials should be considered as Type 3 soils above the groundwater table and above 2.3 depth. Below approximately 2.3 m depth, the soft to very soft silty clay soils should be considered as Type 4 soils in conformance with the Ontario Occupational Health and Safety Act (OHSA). Excavation side slopes in Type 3 soils should remain stable at a slope of 1H:1V. Excavation side slopes in Type 4 soils should remain stable at a slope of 3H:1V. The need to excavate flatter side slopes if excessively wet or soft/loose materials, or concentrated seepage zones are encountered, should not be overlooked. Groundwater seepage problems are anticipated at this site, for any deep excavations below 2.3 m depth.

Water (i.e. surface water runoff) should not be permitted to enter and/or pond within the construction area.
All excavations must be completed in accordance with the most recent regulations in the Ontario Occupational Health and Safety Act for both Construction Sites and for Mining Sites. The contractor should be aware that slope height, slope inclination, or excavation depths, should in no case, exceed those specified in local, provincial or federal safety regulations. Such regulations are strictly enforced and, if not followed, the owner, the contractor or earthwork or utility subcontractor could be liable for substantial penalties.

It is important to note that soils encountered in the construction excavations may vary significantly across the site. Our preliminary soil classifications are based solely on the materials encountered in widely spaced explorations. The contractor should verify that similar conditions exist throughout the proposed area of excavation. If different subsurface conditions are encountered at the time of construction, we recommend that **exp** be contacted immediately to evaluate the conditions encountered.

9.2 Dewatering

Based on the completed boreholes and field observations, shallow excavations should not require dewatering, other than controlling any perched groundwater or ponded surface water. Any potential perched or ponded water should be possible to remove using conventional construction pumps installed in strategically located sumps.

Based on the laboratory analysis completed on the silty clay, the permeability can be estimated to be less than 1.0 x 10^{-6} cm/sec.

Dewatering requirements will be governed by the time of the year the construction is performed. It is the responsibility of the Contractor to propose a suitable dewatering system based on the time of construction and groundwater levels. The dewatering method is the responsibility of the Contractor and the Contractor should submit his proposal to the Prime Consultant for review and approval prior to construction.

10 Parking Area Recommendations

The recommended pavement structure designs for both light traffic and heavy traffic (i.e. truck traffic and entrance/exit areas) areas are provided in Table 10-1 below. Given the location of the site, a gravel surfaced pavement structure may be an option and the design has been included in Table 10-2. The roadway granular base and sub-base materials must be placed in maximum 150 mm lifts and compacted to 100% of the Standard Proctor Maximum Dry Density (SPMDD) at a moisture content within 1.5% of the optimum moisture content. The recommended pavement structures outlined below assume adequate provisions for drainage.

Table 10-1: Recommended Asphalt Surfaced Pavement Structures

Layer	Light Traffic or Parking Areas	Heavy Traffic or Loading Areas
Asphalt	50 mm HL4 Surface Course	40 mm HL4 Surface Course 50 mm HL4 or HL8 Binder Course 90 mm Total Thickness
Base	150 mm Granular “A”	150 mm Granular “A”
Subbase	300 mm Granular “B” Type II or 450 mm Granular “B” Type I	450 mm Granular “B” Type II or 600 mm Granular “B” Type I

A design life of ten years was used in evaluating the layer thicknesses. This represents the number of years to the first rehabilitation, assuming regular maintenance is completed.

Table 10-2: Recommended Gravel Surfaced Structures

Layer	Light Traffic or Parking Areas	Heavy Traffic or Loading Areas
Base	250 mm Granular “A”	290 mm Granular “A”
Subbase	300 mm Granular “B” Type II or 450 mm Granular “B” Type I	450 mm Granular “B” Type II or 600 mm Granular “B” Type I

The long-term performance of roadways and parking areas is highly dependent upon the sub-grade support conditions. Stringent construction control procedures should be maintained to ensure that uniform sub-grade moisture and density conditions are achieved. In addition, the need for adequate drainage cannot be overemphasized. The finished surface and underlying sub-grade must be sloped to provide effective drainage. Surface water should not be allowed to pond along the outside edges of paved areas. Sub-drains should be installed to intercept excess subsurface moisture and prevent sub-grade softening.

Additional comments on the construction of the roadways are as follows:

- A 600 mm wide shoulder or concrete curbs should be constructed to provide lateral support along the edges of any paved area.
- Any ditches adjacent to the pavement structure should have an invert of at least 300 mm below the bottom of the subbase.
- Where buried service trenches intercept traveled areas, it is normal practice in Northern Ontario to use existing fill or native soil as backfill in the upper frost zone. This is to ensure compatibility with adjacent subgrade soils to minimize annual differential frost heaving effects.
- Permanent subdrains leading to and between catch basins should be provided around the perimeter and within the interior of the parking and other paved areas, with subdrain pipe inverts located below the subgrade surface. The catch basins should discharge to a suitable outlet.
- The areas surrounding the catch basins should be backfilled with free draining granular material to limit frost action. The backfill material should be compacted to 98% SPMDD using smaller sized tamping equipment to avoid damaging the subdrain piping and catch basin structure.
- The most severe loading conditions on the native pavement subgrade usually occur during construction. Consequently, special provisions, such as additional granular subbase, may be required, especially if construction is completed during unfavourable weather conditions. Where the subgrade soils are wet, it may be necessary to place a non-woven geotextile, such as Terrafix 270R or approved equivalent, prior to any fill placement.

11 Buried Service Recommendations

Recommendations for proposed buried services are included in the following sections:

11.1 Settlement Concerns with Gravity Sewers

It is recommended that allowances for settlement be incorporated in the design of the new building sewer for the new building addition. Pressurized waterline services, gas, and power should not be adversely affected by settlement of the building provided connections are flexible.

11.2 Frost Protection

Protection against freezing is an integral part of a sewer and water system design. The standard solution calls for burying the top of the utility lines in the ground below the anticipated frost penetration depth (2.5 m in Timmins). Where this cannot be achieved, an alternate solution involves incorporating rigid polystyrene insulation (i.e. Styrofoam HI 40), which can be used to reduce the depth of trench required. The two design configurations frequently used are horizontal placement, and the inverted “U”. Both of these methods require suitable design, as well as correct construction procedures. Installing insulation does not alter conventional utility line construction practice to an appreciable extent. However, in some cases, a wider trench may be required to accommodate the horizontal layer of insulation. Another option is to use pre-insulated pipe.

A rough estimate for cost evaluation can be made by assuming that 25 mm of rigid insulation designed for below grade installation is equivalent to 300 mm of soil cover. This and any other design values should, however, be confirmed with the insulation manufacturer.

Maintaining compatibility with adjacent subgrade conditions should minimize the annual differential frost heaving where the buried services cross access roads. The existing native silty clay soils are considered to have a medium to high frost susceptibility and there is risk of frost heaving. Frost tapers may be required as outlined in OPSD drawings located in Appendix D.

Based on past experience, backfilling with excavated material is the most cost effective method for treating service trenches, however, some conditioning of the soils (i.e. drying) may be required to achieve adequate compaction.

11.3 Excavations

All excavations for service trenches must be completed in accordance with the most recent guidelines of the Ontario Occupational Health and Safety Act. Excavations above the prevailing groundwater table should remain stable at a slope of 1H:1V. Some seepage may occur from infiltration of surface water. Where excavations below the groundwater table are required, considerable problems may occur with construction and installation of the underground utilities due to unstable slope conditions.

If the temporary excavations below the groundwater table are left unsupported, the side slopes are expected to be stable initially, if cut back at a temporary slope of 3H:1V. If the excavation remains open, however, for an extended period, the sides will tend to “slough” back to flatter slopes and the trench base could become unstable. Therefore, it is recommended that the excavations be supported if there are any deep excavations left open for an extended period of time. Water (i.e. surface water runoff) should not be permitted to enter and/or pond within the construction area.

If the groundwater is not controlled during construction for excavations in excess of 300 to 600 mm below the groundwater level, the base and sidewalls will be unstable, leading to difficulties in excavating and placement of the pipe. Where deeper excavations are required, temporary sheet piles may be required in conjunction with dewatering.

Stockpiles should be placed well away from the edge of the excavation and their height should be controlled so they do not surcharge the sides of the excavations. Surface drainage should be controlled to prevent flow or surface water into the excavations. The safety of excavations and stability of temporary construction slopes and lateral support systems are the contractor’s responsibility. A detailed support system design should be provided by

the contractor if necessary, based on the encountered soil and groundwater conditions at the time of the excavations.

11.4 Pipe Embedment and Bedding

All fill materials, organics and deleterious material are to be removed down to competent native soils prior to placement of the bedding material. Pipe bedding requirements as outlined in the OPSD 802.010 for flexible pipes and OPSD 802.031 and 802.032 for rigid pipes (included in Appendix D) will be sufficient for sanitary, storm and watermain pipes. The pipe bedding should consist of a Clear Stone gravel (OPSS 1004) or Granular “A” material (OPSS 1010) with a minimum thickness of 150 mm beneath the pipe and raised to the pipe springline. The granular bedding should be placed in lifts not exceeding 150 mm and compacted to 98% of the material’s SPMDD. Particular care should be taken when compacting beneath the pipe haunches. The cover material should consist of a compacted sand material with no sizes greater than 25 mm or a Granular “A” material.

Bedding thicknesses may be increased in areas where the native soil base supporting the bedding is wet, or subject to disturbance. Where soft or loose base conditions are encountered below the water table, base stabilization may be required. This may include the placement of crushed stone sub-bedding,

wrapped in a non-woven geotextile, to prevent base disturbance and to allow the removal of water through standard filtered sump and pump methods.

If construction proceeds during the winter months, the base and sides of the trench, as well as all fill materials, should not be allowed to freeze.

11.5 Excavated Soil and Trench Backfill

It is typical practice in Northern Ontario to re-use a portion of the in-situ excavated material as fill within trench utility services, especially where these trenches interrupt traveled sections of a roadway. This is to ensure compatibility with adjacent subgrade soils to minimize annual differential frost heaving.

The non-organic silty clay material from the service trench excavation may be re-used as random fill above the top of the pipe cover material to the underside of the pavement structure subbase materials. All re-used materials must be placed in lifts not exceeding 150 mm and should be compacted to 98% of the SPMDD within 2% of the optimum moisture content. **Exp** cautions that any native material below the groundwater level (if encountered) may not meet the above compaction requirements without significant reworking prior to placement. If stockpiling of trench excavated material for re-use is required, it is recommended that it be covered to prevent exposure to rain and it cannot be allowed to freeze. All unsuitable materials from the trench excavation not re-used must be disposed of off-site.

Any excavated material contaminated with organics, if encountered, must not be re-used as backfill material.

12 Construction Constraints Under Cold Weather Conditions

For all construction activities at this site, the following applies:

- During excavations, all subgrade soils must be maintained at a minimum temperature of 5° C.
- No granular material may be placed under frozen conditions, with all fill material maintained at a minimum temperature of 5° C prior to and during installation. If granular fill is to be placed in freezing conditions, the granular fill must be restricted to Granular “B” Type II material. Since Granular “B” Type II has a larger aggregate size, care should be taken to prevent point loading on the underside of the concrete.
- Soils and granular fill material that is in direct contact with fresh concrete must be at a minimum temperature of 5° C prior to pouring the concrete, and must be free of snow and ice fragments.
- All granular fill, prior to placement of concrete, must be reviewed by this office to ensure it is free of frost, buried ice and snow.
- All reinforcing steel in the concrete forms must be free of ice and snow, and must be maintained at a minimum temperature of 5° C.
- During the placement of concrete in cold weather conditions, a field cured cylinder should be placed beside the heated form for a period of 6 days. The field cured cylinder should be returned to a designated laboratory on the sixth day for 7 day compressive strength testing.
- All heated and tarped areas should be monitored for temperature using a max/min thermometer.
- All concrete is to have a minimum of 4 to 7% air entrainment (or as required to satisfy CSA A23.1-09) to prevent cracking and shall be maintained at a minimum temperature of 10° C for a period of 4 to 7 days.

The 4 to 7% air entrained concrete during cold weather placement is to prevent significant strength loss of concrete as a result of freezing and thawing. The air entrainment will provide the capacity to absorb stresses during freeze/thaw action.

13 Construction Quality Control

Construction quality control of the "earthworks" should be provided throughout the project by a representative of **exp** to verify all design assumptions, recommendations and confirmation of the subsurface soil conditions. This includes inspection of the excavation and subgrade prior to the placement of any structural fill and foundations, to ensure that any and all deleterious materials have been removed and to ensure that the actual conditions are not markedly different than those on which the recommendations made herein are based. Compaction control of structural fill is also recommended as standard practice, as is sampling and testing of aggregates and concrete.

14 Design Review

The recommendations made in this report are in accordance with our present understanding of the project and are provided solely for the design team responsible for the project. If there are any changes, such as relocation of the structures or other features, which may affect our analysis, the information obtained during this investigation may be inadequate and additional field work and reporting may be required. **Exp** Services Inc. should be retained to review the final design and specifications to confirm that we are in general agreement with the assumptions on which our recommendations are based. If not accorded the privilege of making this review, **exp** Services Inc. will assume no responsibility for interpretation of the recommendations in this report.

15 Limitations

A subsurface investigation is a limited sampling of a site. Should any conditions at the site be encountered that differ from those reported at the test locations, we require that we be notified immediately in order to allow reassessment of our recommendations.

Whereas this investigation has estimated the groundwater level at the time of the fieldwork, and commented on general construction problems, the presence of conditions, which would be difficult to establish from our test holes, may affect the type and nature of dewatering procedures which should be used in practice. These conditions include local and seasonal fluctuations in the groundwater table, erratic changes in the soil profile between the tests, and thin layers of soil with large or small permeabilities compared with the general soil mass, etc.

The comments given in this report are intended only for the guidance of the design team responsible for the project. The number of test holes required to determine the localized underground conditions between test holes affecting construction costs, techniques, sequencing, equipment, scheduling, etc. could be greater than has been carried out for design purposes. Contractors bidding on or undertaking the works should, in this light, decide on their own investigations, as well as their own interpretations of the factual test hole results, so that they may draw their own conclusions as to how the subsurface conditions may affect them.

The investigation and comments are necessarily ongoing as new information of underground conditions becomes available. For example, more specific information is available with respect to in-situ subsurface conditions between test locations once construction is underway. Subsurface soil interpretation between test holes, as well as the recommendations of this report, should be verified through field inspections provided by exp to validate the current information for use during the construction stage. Virtually no scope of work, no matter how exhaustive, can identify all contaminants or all conditions above or below ground. For example, conditions elsewhere on the property may differ from those encountered, and conditions may change with time. Therefore, no warranty is provided that the entire site condition is represented by those identified at specific locations.

16 Closure

We trust that these comments provide you with sufficient information to proceed with design. Should you have any questions, please do not hesitate to contact this office.

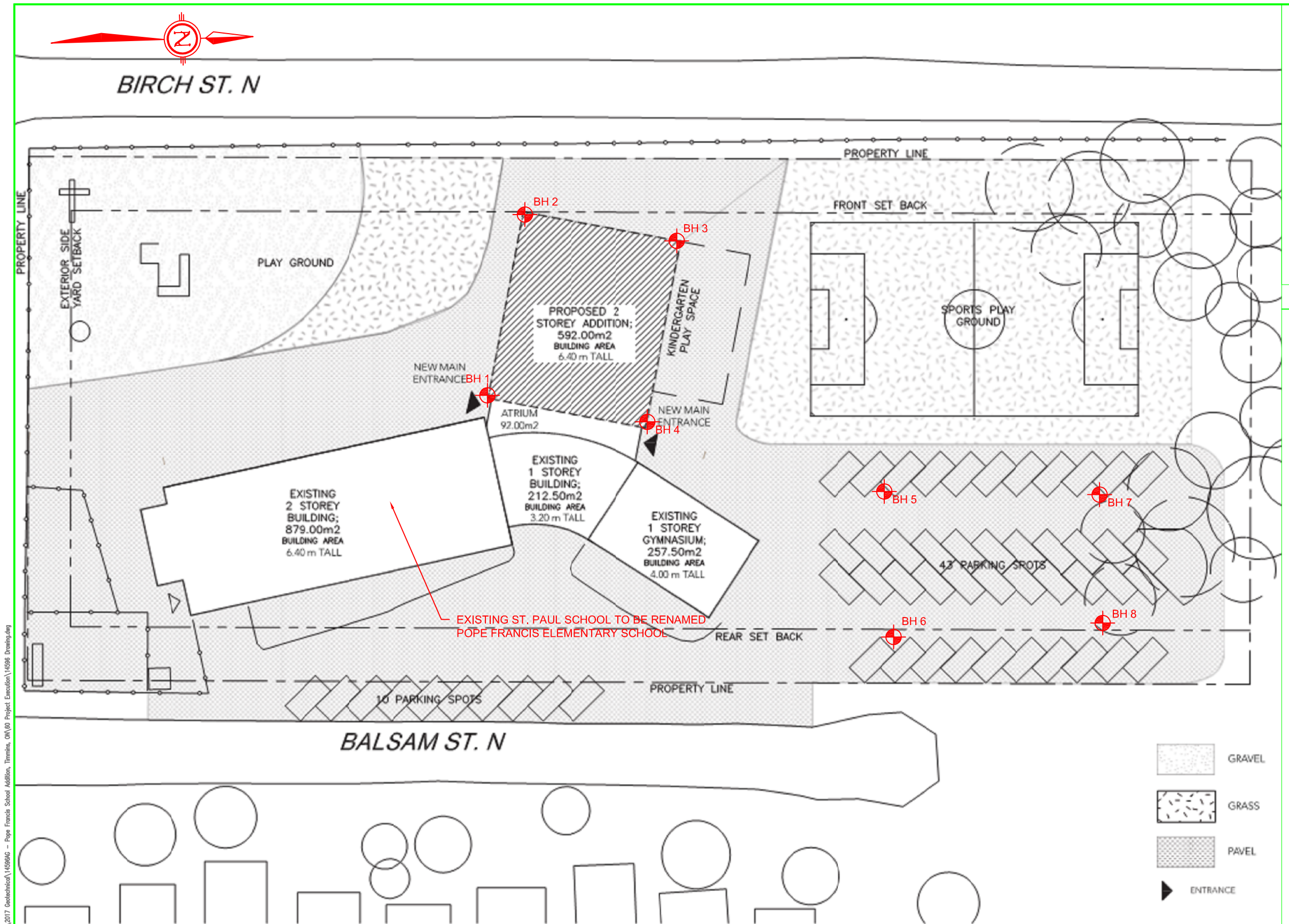
Yours truly,

exp Services Inc.

Andy Schell, M.Sc., P.Eng.
Senior Geotechnical Engineer,
Northeastern Ontario

Yves Beauparlant, P.Eng.
Manager, Earth & Environmental
Northeastern Ontario

Appendix A – Drawing



SITE

KEYPLAN - N.T.S.

LEGEND

exp BOREHOLE

– NOTES –

1) The boundaries and soil types have been established only at Test Hole locations. Between Test Holes, they are assumed and may be subject to considerable error.
2) Do not use Test Hole elevations for design purposes.
3) Soil samples will be retained in storage for 3 month and then destroyed unless client advises that an extended time period is required.
4) Quantities should not be established from the information provided at the Test Hole locations.
5) This drawing forms part of the report, project number as referenced, and should be used only in conjunction with this report.

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REVISIONS		
No.	DESCRIPTION	DATE

CLIENT: NE CATHOLIC DISTRICT SCHOOL BOARD

PROJECT: POPE FRANCIS ELEMENTARY SCHOOL
387 BALSAM STREET N, TIMMINS, ON

PROJECT NO.: SUD-00014596-AG

TITLE: BOREHOLE LOCATION PLAN

DATE	SCALE:	DWG NO.
MARCH, 2017	NTS	A-1

Appendix B – Borehole Logs

Notes on Sample Descriptions

1. All sample descriptions included in this report follow the International Society for Soil Mechanics and Foundation Engineering (ISSMFE), as outlined in the Canadian Foundation Engineering Manual. Note, however, that behavioral properties (i.e. plasticity, permeability) take precedence over particle gradation when classifying soil. Please note that, with the exception of those samples where a grain size analysis has been made, all samples are classified visually. Visual classification is not sufficiently accurate to provide exact grain sizing or precise differentiation between size classification systems.

UNIFIED SOIL CLASSIFICATION

CLAY (PLASTIC) TO	FINE	MEDIUM	CRS.	FINE	COARSE
SILT (NONPLASTIC)	SAND			GRAVEL	

EQUIVALENT GRAIN DIAMETER IN MILLIMETRES

ISSMFE SOIL CLASSIFICATION

CLAY	SILT			SAND			GRAVEL			COBBLES	BOULDERS
	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE		

2. Fill: Where fill is designated on the borehole log it is defined as indicated by the sample recovered during the boring process. The reader is cautioned that fills are heterogeneous in nature and variable in density or degree of compaction. The borehole description may therefore not be applicable as a general description of site fill materials. All fills should be expected to contain obstruction such as wood, large concrete pieces or subsurface basements, floors, tanks, etc., none of these may have been encountered in the boreholes. Since boreholes cannot accurately define the contents of the fill, test pits are recommended to provide supplementary information. Despite the use of test pits, the heterogeneous nature of fill will leave some ambiguity as to the exact composition of the fill. Most fills contain pockets, seams, or layers of organically contaminated soil. This organic material can result in the generation of methane gas and/or significant ongoing and future settlements. Fill at this site may have been monitored for the presence of methane gas and, if so, the results are given on the borehole logs. The monitoring process does not indicate the volume of gas that can be potentially generated nor does it pinpoint the source of the gas. These readings are to advise of the presence of gas only, and a detailed study is recommended for sites where any explosive gas/methane is detected. Some fill material may be contaminated by toxic/hazardous waste that renders it unacceptable for deposition in any but designated land fill sites; unless specifically stated the fill on this site has not been tested for contaminants that may be considered toxic or hazardous. This testing and a potential hazard study can be undertaken if requested. In most residential/commercial areas undergoing reconstruction, buried oil tanks are common and are generally not detected in a conventional geotechnical site investigation.

3. Till: The term till on the borehole logs indicates that the material originates from a geological process associated with glaciation. Because of this geological process the till must be considered heterogeneous in composition and as such may contain pockets and/or seams of material such as sand, gravel, silt or clay. Till often contains cobbles (75 to 200 mm) or boulders (over 200 mm). Contractors may therefore encounter cobbles and boulders during excavation, even if they are not indicated by the borings. It should be appreciated that normal sampling equipment cannot differentiate the size or type of any obstruction. Because of the horizontal and vertical variability of till, the sample description may be applicable to a very limited zone; caution is therefore essential when dealing with sensitive excavations or dewatering programs in till materials.

Notes On Soil Descriptions

4. The following table gives a description of the soil based on particle sizes. With the exception of those samples where grain size analyses have been performed, all samples are classified visually. The accuracy of visual examination is not sufficient to differentiate between this classification system or exact grain size.

Soil Classification		Terminology	Proportion
Clay and Silt	<0.060 mm	"trace" (e.g. Trace sand)	1% to 10%
Sand	0.060 to 2.0 mm	"some" (e.g. Some sand)	10% to 20%
Gravel	2.0 to 75 mm	adjective (e.g. sandy, silty)	20% to 35%
Cobbles	75 to 200 mm	"and" (e.g. and sand)	35% to 50%
Boulders	>200 mm		

The compactness of Cohesionless soils and the consistency of the cohesive soils are defined by the following:

Cohesionless Soil		Cohesive Soil		
Compactness	**Standard Penetration Resistance "N" Blows / 0.3 m**	**Consistency**	**Undrained Shear Strength (kPa)**	**Standard Penetration Resistance "N" Blows / 0.3 m**
Very Loose	0 to 4	Very soft	<12	<2
Loose	4 to 10	Soft	12 to 25	2 to 4
Compact	10 to 30	Firm	25 to 50	4 to 8
Dense	30 to 50	Stiff	50 to 100	8 to 15
Very Dense	Over 50	Very Stiff	100 to 200	15 to 30
		Hard	>200	>30

5. **ROCK CORING**

Where rock drilling was carried out, the term RQD (Rock Quality Designation) is used. The RQD is an indirect measure of the number of fractures and soundless of the rock mass. It is obtained from the rock cores by summing the length of the core covered, counting only those pieces of sound core that are 100 mm or more length. The RQD value is expressed as a percentage and is the ratio of the summed core lengths to the total length of core run. The classification based on the RQD value is given below.

RQD Classification	RQD (%)
Very Poor Quality	<25
Poor Quality	25 to 50
Fair Quality	50 to 75
Good Quality	75 to 90
Excellent Quality	90 to 100

$$\text{Recovery Designation \% Recovery} = \frac{\text{Length of Core Per Run}}{\text{Total Length of Run}} \times 100$$

Log of Borehole BH-1

Project No. SUD-00014596-AG

Figure No. B-2

Project: PROPOSED ADDITION POPE FRANCIS ELEMENTARY SCHOOL

Sheet No. 1 of 2

Location: TIMMINS, ON

475504 m E; 5370150 m N

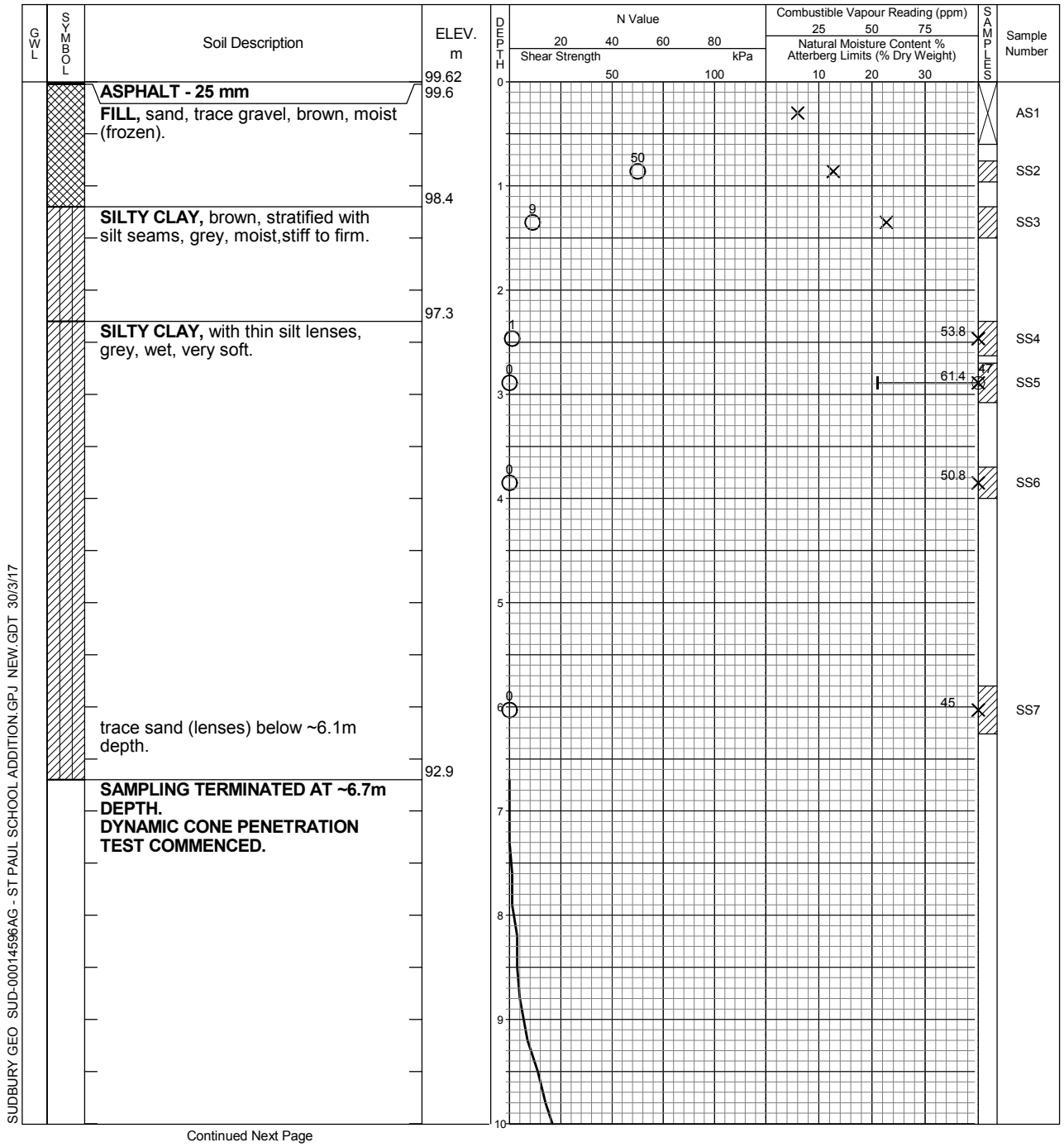
Date Drilled: March 14, 2017

Drill Type: Track Mounted CME 55

Datum: Local (Referenced from existing floor slab)

Auger Sample
SPT (N) Value
Dynamic Cone Test
Shelby Tube
Field Vane Test

Combustible Vapour Reading
Natural Moisture
Plastic and Liquid Limit
Undrained Triaxial at % Strain at Failure
Penetrometer



SUDBURY GEO SUD-00014596AG - ST PAUL SCHOOL ADDITION.GPJ NEW.GDT 30/3/17

Continued Next Page

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Borehole data requires interpretation assistance from **exp** before use by others.

See Figures B-1A and B-1B for Notes on Sample Description

Time	Water Level (m)	Depth to Cave (m)
Upon Completion	Dry	3.7

Log of Borehole BH-1

Project No. SUD-00014596-AG Figure No. B-2

Project: PROPOSED ADDITION POPE FRANCIS ELEMENTARY SCHOOL Sheet No. 2 of 2

GWL	SYMBOL	Soil Description	ELEV. m	DEPTH	N Value / Shear Strength kPa	Combustible Vapour Reading (ppm) / Natural Moisture Content % / Atterberg Limits (% Dry Weight)	SAMPLES	Sample Number
			89.62	10	20 40 60 80 / 50 100	25 50 75 / 10 20 30		
				11				
			87.7					
		DCPT REFUSAL AT ~11.9m DEPTH.						

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See Figures B-1A and B-1B for Notes on Sample Description

Time	Water Level (m)	Depth to Cave (m)
Upon Completion	Dry	3.7

Log of Borehole BH-2

Project No. SUD-00014596-AG | Figure No. B-3

Project: PROPOSED ADDITION POPE FRANCIS ELEMENTARY SCHOOL | Sheet No. 1 of 1

Location: TIMMINS, ON

475474 m E; 5370170 m N

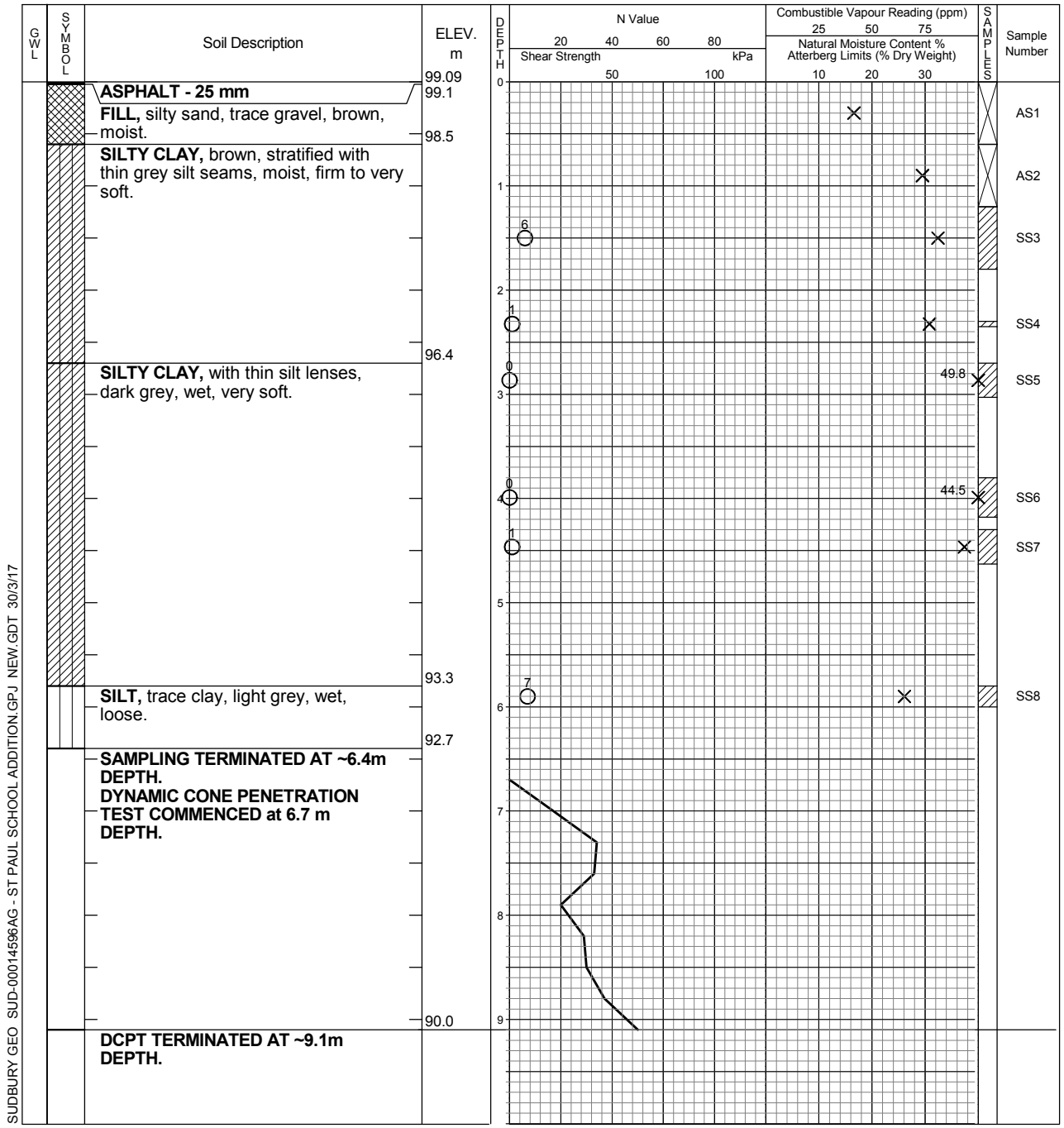
Date Drilled: March 14, 2017

Drill Type: Track Mounted CME 55

Datum: Local (Referenced from existing floor slab)

Auger Sample
SPT (N) Value
Dynamic Cone Test
Shelby Tube
Field Vane Test

Combustible Vapour Reading
Natural Moisture
Plastic and Liquid Limit
Undrained Triaxial at % Strain at Failure
Penetrometer



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See Figures B-1A and B-1B for Notes on Sample Description

Time	Water Level (m)	Depth to Cave (m)
Upon Completion	Dry	4.4

Log of Borehole BH-3

Project No. SUD-00014596-AG

Figure No. B-4

Project: PROPOSED ADDITION POPE FRANCIS ELEMENTARY SCHOOL

Sheet No. 1 of 1

Location: TIMMINS, ON

475483 m E; 5370186 m N

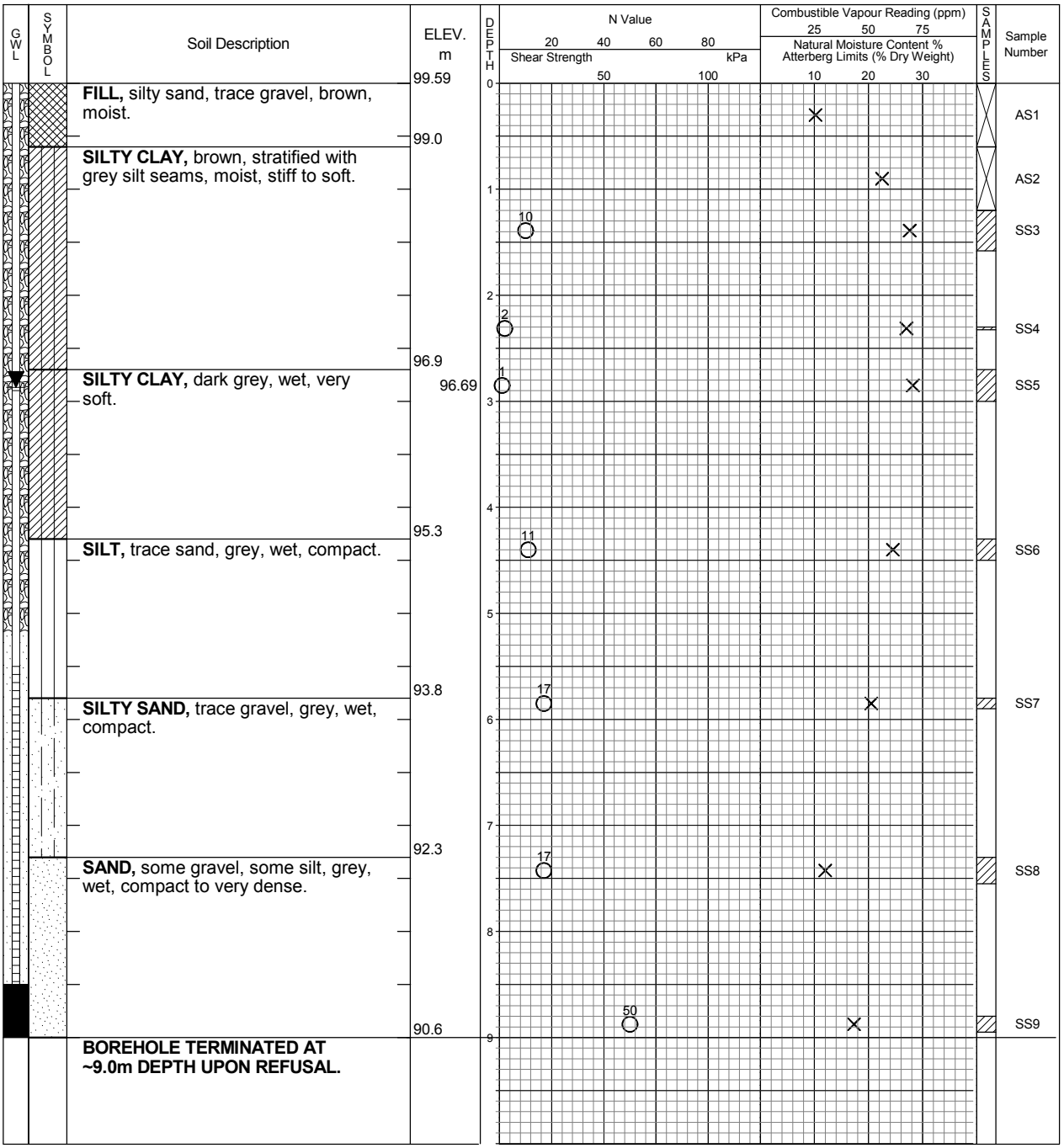
Date Drilled: March 14, 2017

Drill Type: Track Mounted CME 55

Datum: Local (Referenced from existing floor slab)

Auger Sample
SPT (N) Value
Dynamic Cone Test
Shelby Tube
Field Vane Test

Combustible Vapour Reading
Natural Moisture
Plastic and Liquid Limit
Undrained Triaxial at % Strain at Failure
Penetrometer



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See Figures B-1A and B-1B for Notes on Sample Description

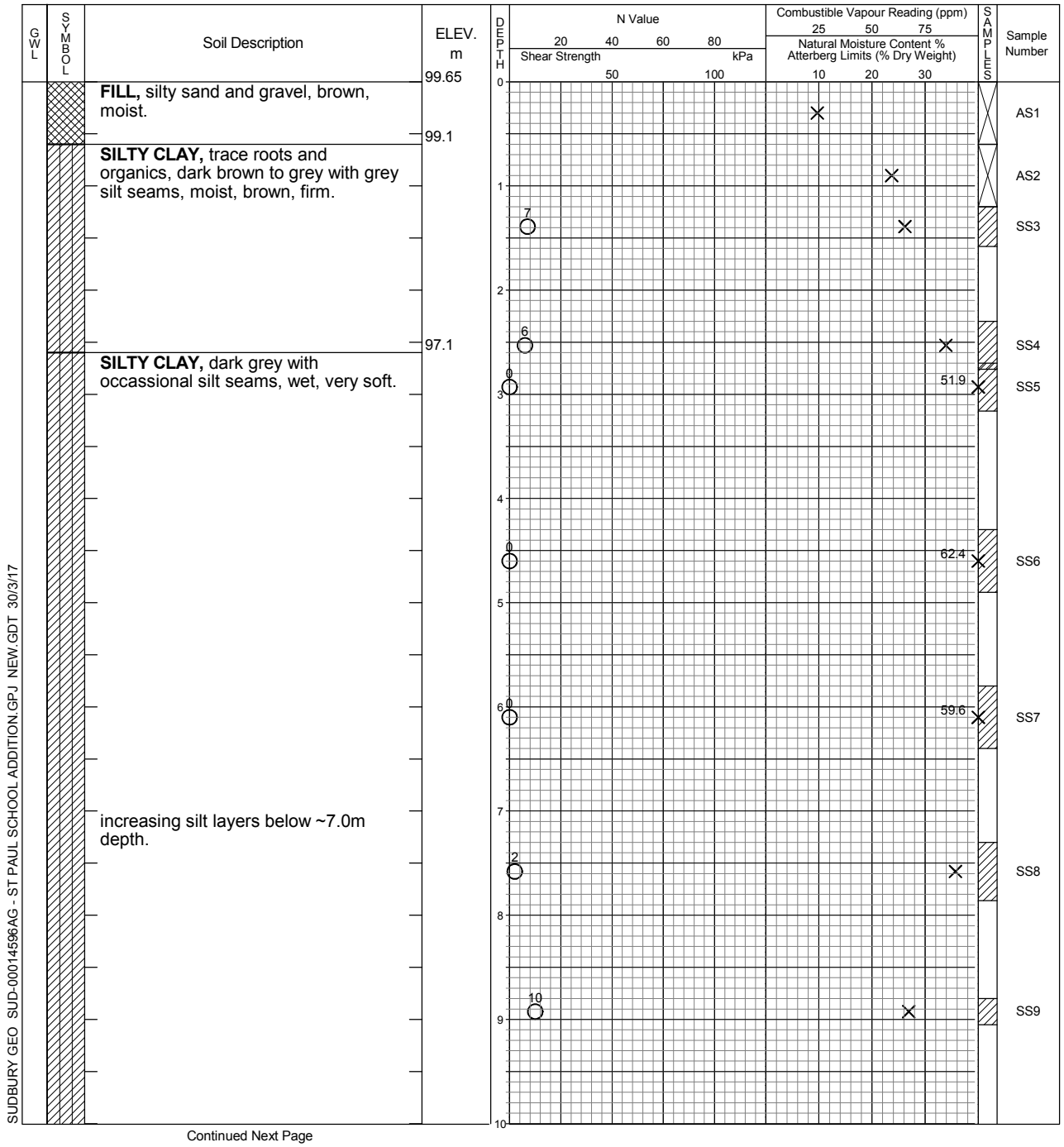
Time	Water Level (m)	Depth to Cave (m)
March 15, 2017	2.9	N/A

Log of Borehole BH-4

Project No. SUD-00014596-AG
Figure No. B-5
Project: PROPOSED ADDITION POPE FRANCIS ELEMENTARY SCHOOL
Sheet No. 1 of 2
Location: TIMMINS, ON
475505 m E; 5370172 m N
Date Drilled: March 15, 2017
Drill Type: Track Mounted CME 55
Datum: Local (Referenced from existing floor slab)

Auger Sample
SPT (N) Value
Dynamic Cone Test
Shelby Tube
Field Vane Test

Combustible Vapour Reading
Natural Moisture
Plastic and Liquid Limit
Undrained Triaxial at % Strain at Failure
Penetrometer



SUDBURY GEO SUD-00014596AG - ST PAUL SCHOOL ADDITION.GPJ NEW.GDT 30/3/17

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Borehole data requires interpretation assistance from **exp** before use by others.

See Figures B-1A and B-1B for Notes on Sample Description

Time	Water Level (m)	Depth to Cave (m)
Upon Completion	N/A	N/A

Log of Borehole BH-4

Project No. SUD-00014596-AG

Figure No. B-5

Project: PROPOSED ADDITION POPE FRANCIS ELEMENTARY SCHOOL

Sheet No. 2 of 2

GWL	SYMBOL	Soil Description	ELEV. m	DEPTH	N Value / Shear Strength kPa	Combustible Vapour Reading (ppm) / Natural Moisture Content % / Atterberg Limits (% Dry Weight)	SAMPLES	Sample Number
			89.65	10	20 40 60 80 / 50 100	25 50 75 / 10 20 30		
		probable coarse sand above bedrock surface.	89.0					
		AUGER REFUSAL AT ~10.7m DEPTH. **CORING COMMENCED.**		11				RUN 1
		BEDROCK						
		Run 1 **Start/End: 10.7 - 11.6 m** **Recovery: 66.7%** **RQD: 16.7%** **Water Colour & Return: N/A, poor (0%)**		12				RUN 2
		Run 2 **Start/End: 11.6 - 12.8 m** **Recovery: 62.5%** **RQD: 24%** **Water Color & Return: N/A, poor (0%)**	85.7	13				RUN 3
		Run 3 **Start/End: 12.8 - 14.0 m** **Recovery: 75.0%** **RQD: 62.5%** **Water Color & Return: N/A, poor (0%)**		14				
		BOREHOLE TERMINATED AT ~ 14.0m DEPTH.						

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See Figures B-1A and B-1B for Notes on Sample Description

Time	Water Level (m)	Depth to Cave (m)
Upon Completion	N/A	N/A

Log of Borehole BH-5

Project No. SUD-00014596-AG

Figure No. B-6

Project: PROPOSED ADDITION POPE FRANCIS ELEMENTARY SCHOOL

Sheet No. 1 of 1

Location: TIMMINS, ON

475529 m E; 5370213 m N

Date Drilled: March 15, 2017

Drill Type: Track Mounted CME 55

Datum: Local (Referenced from existing floor slab)

Auger Sample

SPT (N) Value

Dynamic Cone Test

Shelby Tube

Field Vane Test S

Combustible Vapour Reading

Natural Moisture

Plastic and Liquid Limit

Undrained Triaxial at % Strain at Failure

Penetrometer

GWL	SYMBOL	Soil Description	ELEV. m	DEPTH	N Value / Shear Strength kPa	Combustible Vapour Reading (ppm) / Natural Moisture Content % / Atterberg Limits (% Dry Weight)	SAMPLES	Sample Number
		FILL, silty sand, trace gravel, brown, moist.	99.08	0			AS1	
		FILL, silty clay, some organics, trace sand, trace gravel, dark brown to black, moist.	98.5				AS2	
		SILTY CLAY, brown, stratified with grey silt seams, moist, firm.	97.9	1	5		SS3	
		BOREHOLE TERMINATED AT ~2.1m DEPTH.	97.0	2				

N Value: 20 40 60 80

Shear Strength: 50 100 kPa

Combustible Vapour Reading (ppm): 25 50 75

Natural Moisture Content % Atterberg Limits (% Dry Weight): 10 20 30

SUDBURY GEO SUD-00014596AG - ST PAUL SCHOOL ADDITION.GPJ NEW.GDT 30/3/17

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See Figures B-1A and B-1B for Notes on Sample Description

Time	Water Level (m)	Depth to Cave (m)
Upon Completion	Dry	Open

Log of Borehole BH-6

Project No. SUD-00014596-AG

Figure No. B-7

Project: PROPOSED ADDITION POPE FRANCIS ELEMENTARY SCHOOL

Sheet No. 1 of 1

Location: TIMMINS, ON

475543 m E; 5370212 m N

Date Drilled: March 15, 2017

Drill Type: Track Mounted CME 55

Datum: Local (Referenced from existing floor slab)

Auger Sample

SPT (N) Value

Dynamic Cone Test

Shelby Tube

Field Vane Test

Combustible Vapour Reading

Natural Moisture

Plastic and Liquid Limit

Undrained Triaxial at % Strain at Failure

Penetrometer

GWL	SYMBOL	Soil Description	ELEV. m	DEPTH	N Value / Shear Strength kPa	Combustible Vapour Reading (ppm) / Natural Moisture Content % / Atterberg Limits (% Dry Weight)	SAMPLES	Sample Number
		FILL, sand, some silt, some organics, black to brown, moist.	98.99	0			AS1	
		SILTY CLAY, brown, stratified with grey silt seams, moist to wet, firm.	98.4	1	6		AS2	
							SS3	
		BOREHOLE TERMINATED AT ~1.8m DEPTH.	97.2					

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See Figures B-1A and B-1B for Notes on Sample Description

Time	Water Level (m)	Depth to Cave (m)
Upon Completion	Dry	Open

Log of Borehole BH-7

Project No. SUD-00014596-AG

Figure No. B-8

Project: PROPOSED ADDITION POPE FRANCIS ELEMENTARY SCHOOL

Sheet No. 1 of 1

Location: TIMMINS, ON

475544 m E; 5370241 m N

Date Drilled: March 15, 2017

Drill Type: Track Mounted CME 55

Datum: Local (Referenced from existing floor slab)

Auger Sample
SPT (N) Value
Dynamic Cone Test
Shelby Tube
Field Vane Test

Combustible Vapour Reading
Natural Moisture
Plastic and Liquid Limit
Undrained Triaxial at % Strain at Failure
Penetrometer

GWL	SYMBOL	Soil Description	ELEV. m	DEPTH	N Value / Shear Strength kPa	Combustible Vapour Reading (ppm) / Natural Moisture Content % / Atterberg Limits (% Dry Weight)	SAMPLES	Sample Number
		TOPSOIL ~50 mm THICK	99.16	0	20 40 60 80 / 50 100	25 50 75 / 10 20 30		
		SILTY CLAY, trace rootlets, brown, moist to wet.	99.1					AS1
				1				AS2
			98.0		7			
		CLAYEY SILT, stratified, grey, moist, firm/loose.						SS2
			97.4					
		BOREHOLE TERMINATED AT ~1.8 m DEPTH.						

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Borehole data requires interpretation assistance from **exp** before use by others.

See Figures B-1A and B-1B for Notes on Sample Description

Time	Water Level (m)	Depth to Cave (m)
Upon Completion	Dry	Open

Log of Borehole BH-8

Project No. SUD-00014596-AG

Figure No. B-9

Project: PROPOSED ADDITION POPE FRANCIS ELEMENTARY SCHOOL

Sheet No. 1 of 1

Location: TIMMINS, ON

475553 m E; 5370233 m N

Date Drilled: March 15, 2017

Drill Type: Track Mounted CME 55

Datum: Local (Referenced from existing floor slab)

Auger Sample

SPT (N) Value

Dynamic Cone Test

Shelby Tube

Field Vane Test

Combustible Vapour Reading

Natural Moisture

Plastic and Liquid Limit

Undrained Triaxial at % Strain at Failure

Penetrometer

GWL	SYMBOL	Soil Description	ELEV. m	DEPTH	N Value / Shear Strength kPa	Combustible Vapour Reading (ppm) / Natural Moisture Content % / Atterberg Limits (% Dry Weight)	SAMPLES	Sample Number
		TOPSOIL ~150 mm THICK	99.35	0	11		SS1	SS1
		CLAYEY SILT, grey, stratified with thin brown clay seams, moist, compact.	99.2	1	15		SS2	SS2
					18		SS3	SS3
		BOREHOLE TERMINATED AT ~1.8 m DEPTH.	97.6					

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Borehole data requires interpretation assistance from **exp** before use by others.

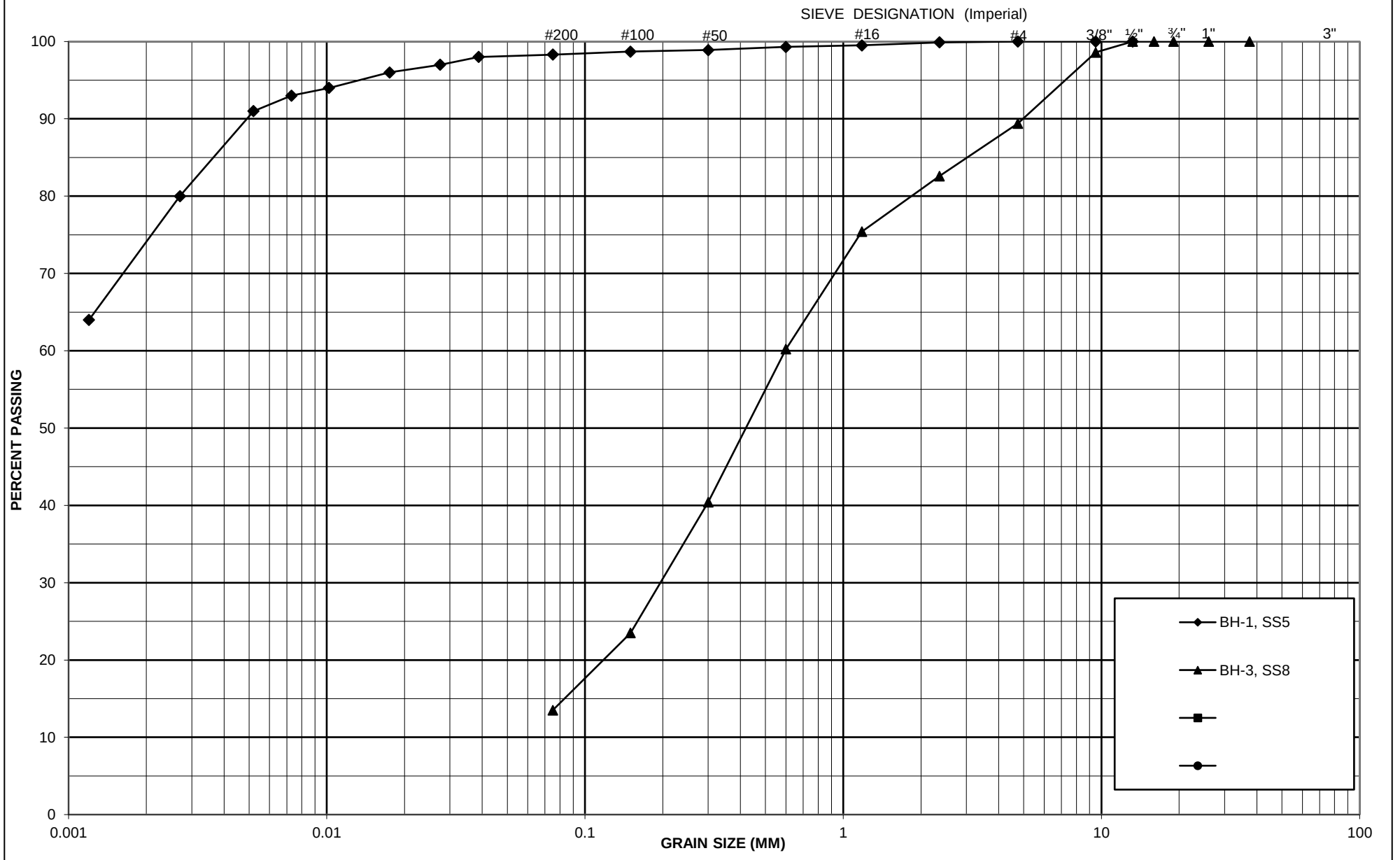
See Figures B-1A and B-1B for Notes on Sample Description

Time	Water Level (m)	Depth to Cave (m)
Upon Completion	Dry	Open

Appendix C – Laboratory Testing

ISSMFE SOIL CLASSIFICATION SYSTEM

CLAY	SILT			SAND			GRAVEL			
	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	



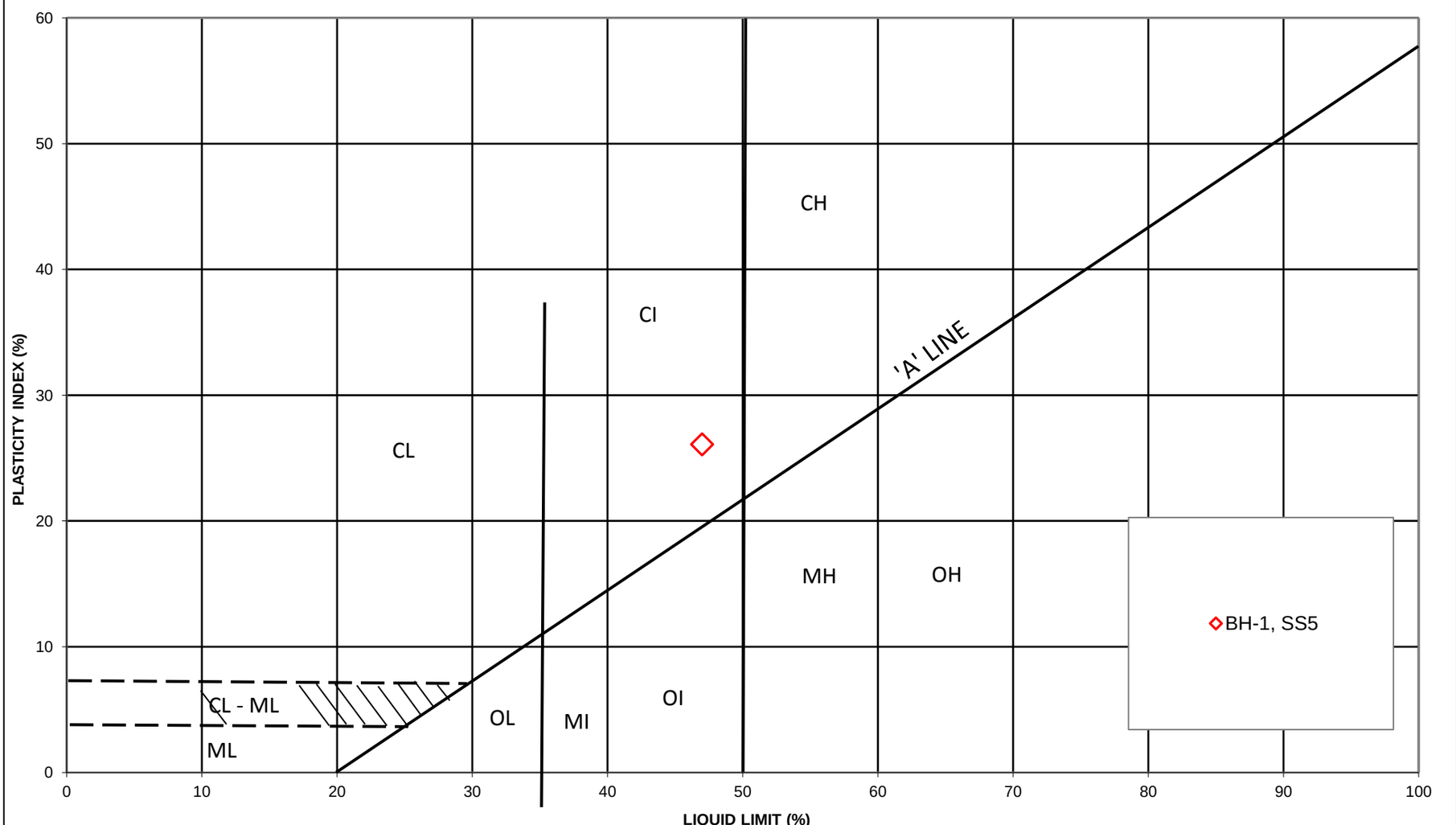
GRAIN SIZE DISTRIBUTION

Geotechnical Investigation - Pope Francis Elementary School
Timmins, Ontario

FIGURE: C-1

PROJECT No: SUD-00014596-AG

DATE: March, 2017



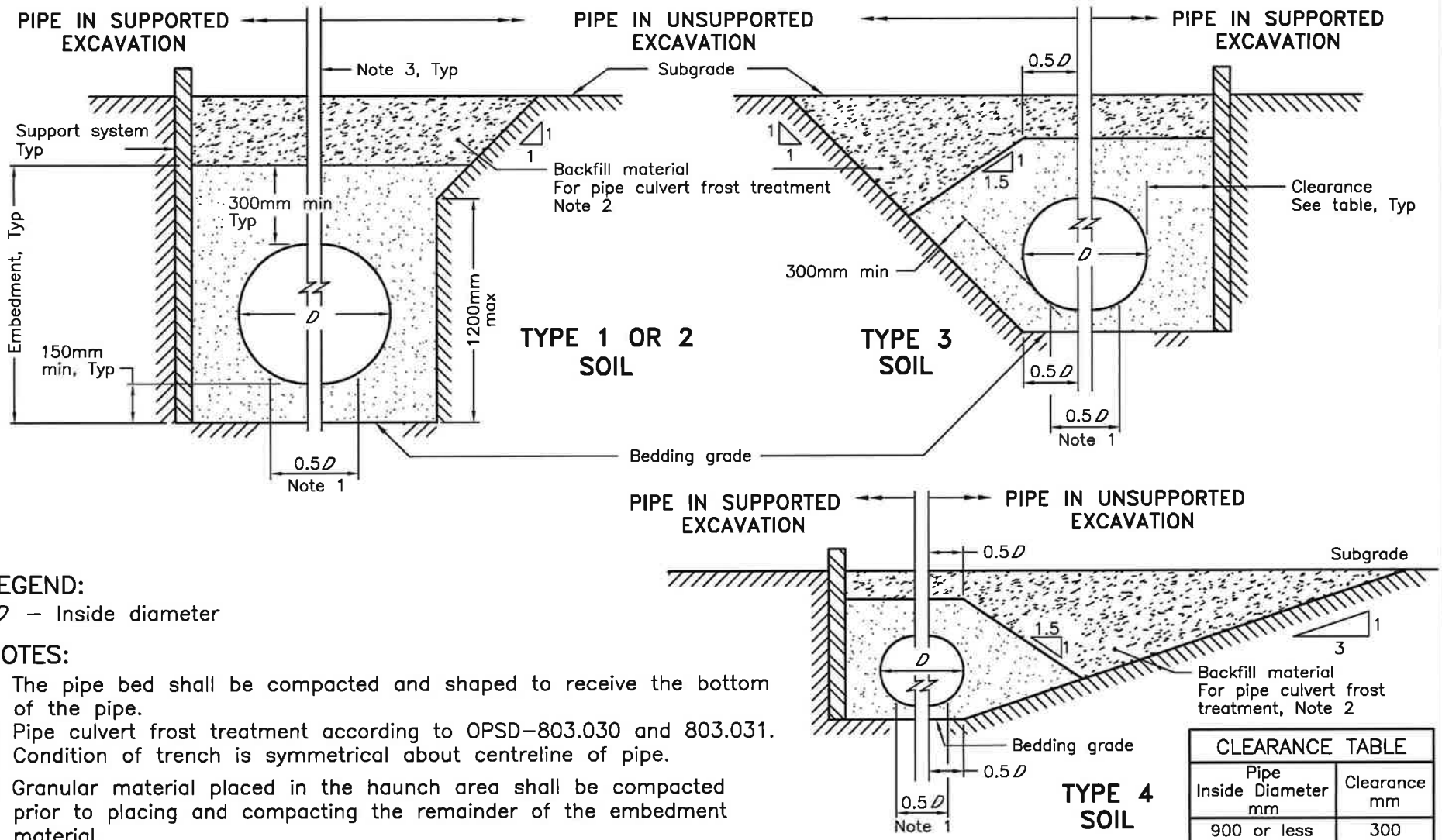
exp.

PLASTICITY CHART

Geotechnical Investigation, Pope Francis Elementary School
Timmins, Ontario

FIGURE: C-2
PROJECT No: SUD-00014596-AG
DATE: March 2017

Appendix D – OPSD Drawings



LEGEND:

D – Inside diameter

NOTES:

1 The pipe bed shall be compacted and shaped to receive the bottom of the pipe.
2 Pipe culvert frost treatment according to OPSD–803.030 and 803.031.
3 Condition of trench is symmetrical about centreline of pipe.

A Granular material placed in the haunch area shall be compacted prior to placing and compacting the remainder of the embedment material.

B Soil types as defined in the Occupational Health and Safety Act and Regulations for Construction Projects.

C All dimensions are in metres unless otherwise shown.

CLEARANCE TABLE	
Pipe Inside Diameter mm	Clearance mm
900 or less	300
Over 900	500

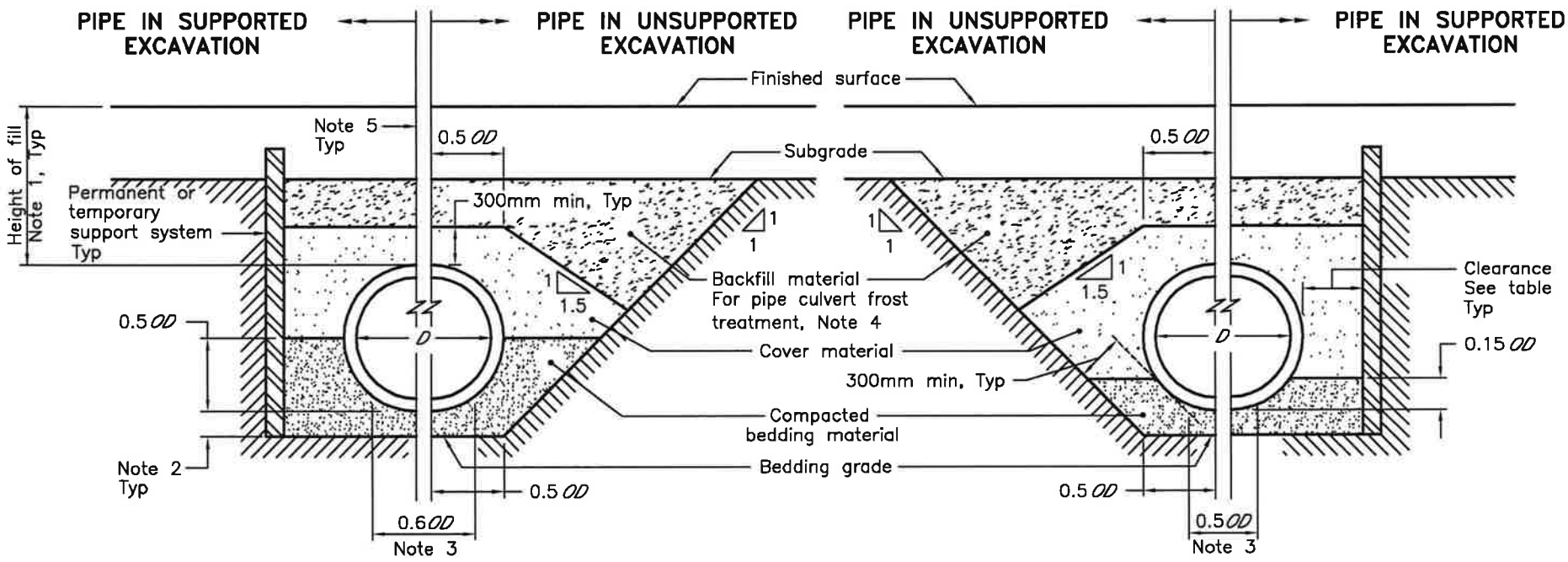
ONTARIO PROVINCIAL STANDARD DRAWING

FLEXIBLE PIPE EMBEDMENT AND BACKFILL EARTH EXCAVATION

Nov 2005 | Rev 1

ONTARIO STANDARD · MUNICIPAL – PROVINCIAL · OPS

OPSD – 802.010



CLASS B BEDDING

CLASS C BEDDING

NOTES:

1 Height of fill is measured from the finished surface to top of pipe.
2 The minimum bedding depth below the pipe shall be 0.15*D*. In no case shall this dimension be less than 150mm or greater than 300mm.
3 The pipe bed shall be compacted and shaped to receive the bottom of the pipe.
4 Pipe culvert frost treatment shall be according to OPSD 803.030 and 803.031.
5 Condition of excavation is symmetrical about centreline of pipe.
A Soil types as defined in the Occupational Health and Safety Act and Regulations for Construction Projects.
B All dimensions are in metres unless otherwise shown.

LEGEND:

D – Inside diameter
OD – Outside diameter

CLEARANCE TABLE	
Pipe Inside Diameter mm	Clearance mm
900 or less	300
Over 900	500

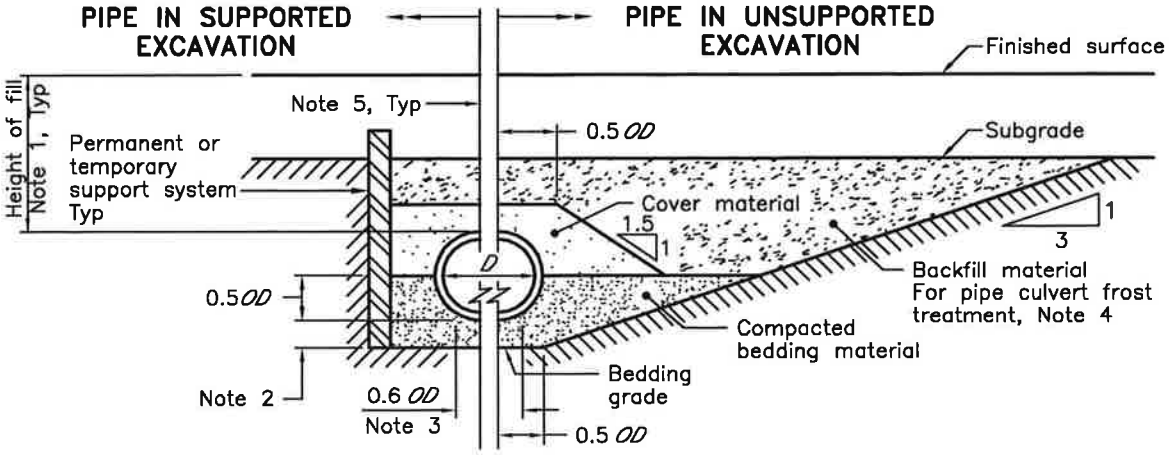
ONTARIO PROVINCIAL STANDARD DRAWING

RIGID PIPE BEDDING, COVER, AND BACKFILL TYPE 3 SOIL – EARTH EXCAVATION

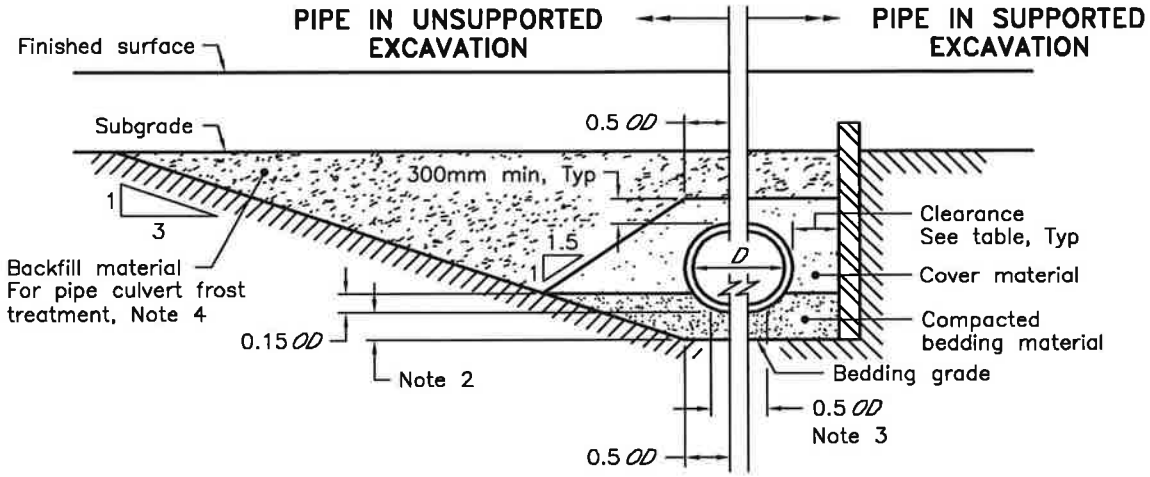
Nov 2010 | Rev 2

ONTARIO STANDARDS MUNICIPAL – PROVINCIAL

OPSD 802.031



CLASS B BEDDING



CLASS C BEDDING

CLEARANCE TABLE	
Pipe Inside Diameter mm	Clearance mm
900 or less	300
Over 900	500

LEGEND:

D – Inside diameter

OD – Outside diameter

NOTES:

1 Height of fill is measured from the finished surface to top of pipe.

2 The minimum bedding depth below the pipe shall be 0.15*D*. In no case shall this dimension be less than 150mm or greater than 300mm.

3 The pipe bed shall be compacted and shaped to receive the bottom of the pipe.

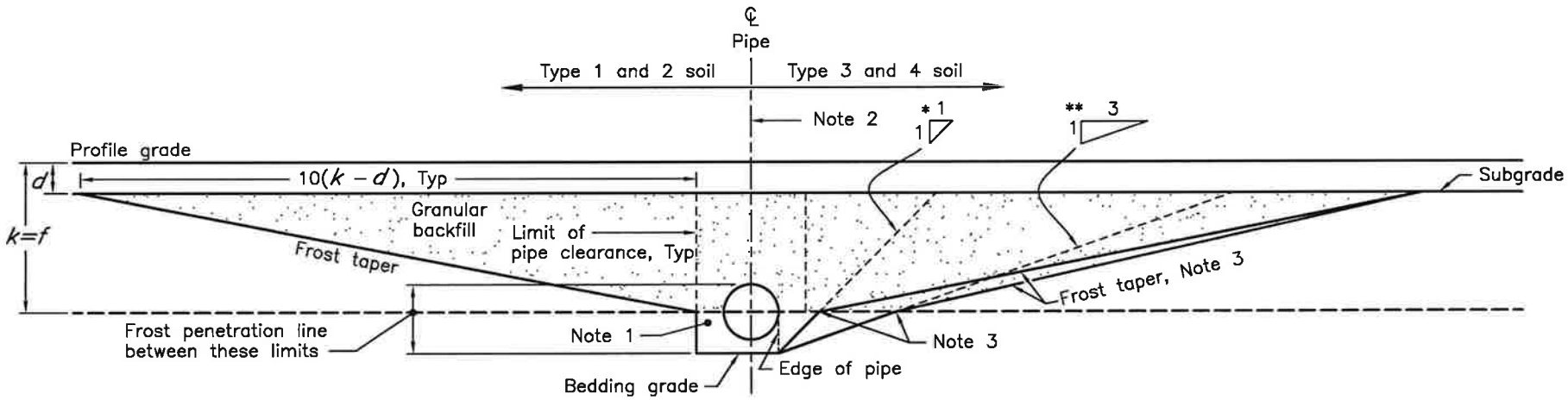
4 Pipe culvert frost treatment shall be according to OPSD 803.030 and 803.031.

5 Condition of excavation is symmetrical about centreline of pipe.

A Soil types as defined in the Occupational Health and Safety Act and Regulations for Construction Projects.

B All dimensions are in metres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2010	Rev	2
RIGID PIPE BEDDING, COVER, AND BACKFILL TYPE 4 SOIL – EARTH EXCAVATION			
	OPSD 802.032		



FROST TREATMENT – RIGID AND FLEXIBLE PIPE

NOTES:

1 Pipe embedment or bedding, cover, and backfill according to:
   a) Flexible – OPSD–802.010, 802.013, 802.014, 802.020, 802.023 and 802.024
   b) Rigid – OPSD–802.030, 802.031, 802.032, 802.033, 802.034, 802.050, 802.051, 802.052, 802.053, and 802.054
2 Condition of frost treatment symmetrical about centreline of pipe.
3 Frost tapers start at the intersection of the 1H:1V or 3H:1V slope and the frost penetration line.

A Frost tapers are not required in rock embankment.

B Frost tapers not required when frost line is above the top of pipe.

C Soil types as defined in the Occupational Health and Safety Act and Regulations for Construction Projects.

LEGEND:

d – depth of roadbed granular
k – depth of frost treatment
f – depth of frost penetration
* – Type 3 soil
** – Type 4 soil

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2005	Rev 2
FROST TREATMENT – PIPE CULVERTS FROST PENETRATION LINE BETWEEN TOP OF PIPE AND BEDDING GRADE		
	OPSD – 803.031	

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Pope Francis Elementary School Addition & Renovation **June 9, 2017**
387 Balsam Street North **JRHE 3203**
Timmins, ON

M&E Addendum No. 1

The following information, amendments and revisions shall form an integral part of the Tender Documents and where applicable, shall supersede requirements of other documents. Please indicate receipt of this addendum on your Bid Form.

1. General

1.1. Refer to the attached drawings E0.1, E0.2, E1.1 and E1.2 for additional information pertaining to the data/IT system layout. These drawings shall replace the original drawings E0.1, E1.1 and E1.2 in the Tender Documents. Drawing E0.2 is a new drawing.

1.2. Refer to the attached drawings M0.1, M0.2, M1.0, M1.1, M2.1, M2.2, M2.3, M2.4 and M2.5 for changes and additional information pertaining to the mechanical layouts. These drawings shall replace the original drawings M0.1, M0.2, M1.0, M1.1, M2.1, M2.2, M2.3, M2.4 and M2.5 in the Tender Documents.

John R Hamalainen, P.Eng., BDS

MECHANICAL SPECIFICATIONS DIV. 23

GENERAL

1. GENERAL NOTES

(A) CONFORM TO THE APPLICABLE PROVISIONS OF THE GENERAL CONDITIONS OF THE CONTRACT.

(B) THE GENERAL MECHANICAL SPECIFICATIONS SHALL APPLY TO AND BE PART OF EACH OF THE SECTIONS COVERING THE MECHANICAL TRADES WORK.

(C) FOR THE PURPOSES OF THIS CONTRACT, THE MECHANICAL CONTRACTOR SHALL TAKE ON THE ROLE AS PRIME CONTRACTOR AND BE RESPONSIBLE FOR RETAINING ALL NECESSARY SUB-TRADES TO COMPLETE ALL HIS MECHANICAL WORK.

(D) AN IMPORTANT REQUIREMENT OF THIS CONTRACT IS TO COORDINATE WORK WITH THE OWNER'S SITE REPRESENTATIVE. THIS CONTRACTOR IS TO SUBMIT HIS PROPOSED PROJECT SCHEDULE TO THE PROJECT MANAGER.

(E) IF DURING THE WORK, ASBESTOS NOT VISIBLE OR UNDISCLOSED PRIOR TO TENDER IS FOUND; STOP WORKING AND INFORM OWNER'S REPRESENTATIVE IMMEDIATELY. CONTRACTOR TO SUBMIT 3 PRICES FROM QUALIFIED ASBESTOS CONSULTANTS EXPERIENCED IN THIS TRADE. APPROVAL OF THIS EXTRA WORK TO BE BY OWNER'S REPRESENTATIVE.

2. EXAMINATION OF INFORMATION

(A) THE CONTRACTOR BEFORE TENDERING, SHALL EXAMINE THE ARCHITECTURAL, STRUCTURAL, MECHANICAL AND ELECTRICAL DRAWINGS AND HE SHALL FAMILIARIZE HIMSELF WITH THE BUILDING CONSTRUCTION AND FINISH IN ORDER THAT HIS TENDER MAY INCLUDE EVERYTHING NECESSARY FOR THE PROPER COMPLETION OF THE WORK.

(B) IT SHALL BE THIS CONTRACTOR'S RESPONSIBILITY THAT MATERIAL AND EQUIPMENT BE BROUGHT INTO THE BUILDING IN SUCH ASSEMBLIES AND SIZES AS TO ENTER INTO THE SPACES WHERE THEY ARE TO BE LOCATED AND TO BE SMALL ENOUGH TO BE HOISTED INTO THE BUILDING WITHOUT DIFFICULTY. ANY CUTTING, PATCHING, ETC, INVOLVED IN GETTING LARGE ASSEMBLIES INTO PLACE SHALL BE THE RESPONSIBILITY OF THIS CONTRACTOR.

(C) IT SHALL BE THIS CONTRACTOR'S RESPONSIBILITY TO VERIFY EXISTING SERVICES NOT LIMITED TO NATURAL GAS TO CONFIRM GAS PRESSURE AVAILABLE & COORDINATE IN ADVANCE WITH UTILITY COMPANY AS REQUIRED TO AVOID ANY DELAYS.

(D) THERE IS A SIGNIFICANT AMOUNT OF DEMOLITION REMOVAL AND RELOCATION WORK THAT IS NOT INDICATED ON THE DRAWINGS. CONTRACTOR SHALL VISIT THE SITE PRIOR TO CLOSE OF TENDERS AND DRAW HIS/HER CONCLUSIONS REGARDING THE WORK INVOLVED AND INCLUDE ALL COSTS.

3. RELATIONSHIP TO OTHER TRADES

(A) THIS CONTRACTOR SHALL CONFER WITH ALL OTHER SUBCONTRACTORS INSTALLING EQUIPMENT, PIPING, ROOFING, FOUNDATIONS, ETC, WHICH MAY AFFECT HIS INSTALLATION, AND HE SHALL ARRANGE HIS EQUIPMENT, PIPING, ETC, IN PROPER RELATION WITH OTHER STRUCTURES, APPARATUS, PLANS AND WITH THE BUILDING CONSTRUCTION OF THE PROJECT AND ORDER EQUIPMENT ACCORDINGLY.

(B) SPECIAL CARE SHALL BE TAKEN IN THE INSTALLATION OF ALL WORK, TO SEE THAT THEY ALL COME WITHIN THE LIMITS ESTABLISHED BY THE FINISH LINES OF ALL WALLS, FLOORS, AND CEILING, ETC.

4. IDENTIFICATION OF EQUIPMENT

(A) PROVIDE THE IDENTIFICATION WORK AS SPECIFIED HEREIN: ALL DUCTWORK SYSTEM, PIPING SYSTEMS, VALVE, CONTROLS AND EQUIPMENT ON THE PROJECT SHALL BE IDENTIFIED AS SPECIFIED HEREIN. ALL MARKS OF IDENTIFICATION SHALL BE EASILY VISIBLE FROM THE FLOOR OR USUAL POINT OF VISION.

(B) IDENTIFICATION OF EQUIPMENT AND PIPING SHALL GENERALLY BE MADE BY STENCIL PAINTING AS HEREINAFTER SPECIFIED, OR MANUFACTURED TAGS BY "SETON BRADY" OR EQUAL.

(C) WHERE APPARATUS IS TOO SMALL FOR STENCILS, USE SMALL BLACK AND WHITE ENGRAVED "LAMACOID" PLASTIC PLATES WITH THE EQUIPMENT IDENTIFICATION AND ATTACH TO THE EQUIPMENT WITH TWO STAINLESS STEEL SELF TAPPING SCREWS.

(D) ALL DUCTWORK SHALL BE IDENTIFIED AS TO THE SERVICE OF THE DUCT AND THE DIRECTION OF FLOW. THE LETTERS SHALL BE AT LEAST TWO INCHES HIGH AND THE FLOW ARROW SHALL BE AT LEAST SIX INCHES LONG. THE LETTERS AND FLOW ARROW SHALL BE MADE BY PRECUT STENCILS AND BLACK OIL BASE PAINT WITH AN AEROSOL CAN. CONCEALED DUCTS NEEED NOT BE IDENTIFIED.

(E) ALL PIPING SHALL BE IDENTIFIED AS TO THE SERVICE OF THE PIPE AND THE NORMAL DIRECTION OF FLOW.

(F) ALL EQUIPMENT, EXCEPT IN FINISHED ROOMS, SHALL BE IDENTFIED BY STENCILING THE TITLE OF THE EQUIPMENT AS TAKEN FROM THE PLANS IN A POSITION THAT IS CLEARLY VISIBLE FROM THE FLOOR.

5. SHOP DRAWINGS AND PRODUCT DATA

(A) SUBMIT 6 SETS OF SHOP DRAWINGS AND PRODUCT DATA FOR ALL MAJOR EQUIPMENT AND FIXTURES.

(B) SHOP DRAWINGS SHALL INDICATE MOUNTING ARRANGEMENTS, OPERATING CLEARANCES, MAINTENANCE CLEARANCES, PROVIDED OPTIONS, CONTROLS AND PERFORMANCE.

(C) NO EQUIPMENT SHALL BE ORDERED PRIOR TO APPROVAL OF SHOP DRAWINGS.

6. PERMIT, FEES AND INSPECTIONS

(A) COMPLY WITH ALL APPLICABLE CODES AND ALL LOCAL MUNICIPAL, PROVINCIAL AND FEDERAL BY-LAWS, RULES AND REGULATIONS. OBTAIN ALL PERMITS REQUIRED AND PAY PERMIT FEES.

(B) BEFORE STARTING ANY WORK, SUBMIT COPIES OF DRAWINGS AND SPECIFICATIONS TO THE INSPECTION AUTHORITY FOR APPROVAL. ANY CHANGES REQUESTED SHALL BE REFERRED TO THE ENGINEER IMMEDIATELY SO THAT PROPER ACTION CAN BE TAKEN.

(C) ARRANGE FOR INSPECTION BY THE AUTHORITY HAVING JURISDICTION UPON COMPLETION. PRESENT THE FINAL CERTIFICATE OF APPROVAL TO SITE REPRESENTATIVE.

(D) COMPLY WITH THE ONTARIO BUILDING CODE ACT. THIS CONTRACTOR TO APPLY AND PAY FOR BUILDING PERMIT IN CONNECTION TO ALL MECHANICAL WORK IN THIS CONTRACT.

HEATING, VENTILATION AND AIR CONDITIONING (HVAC)

1. WORK INCLUDED

(A) THIS CONTRACTOR SHALL DO ALL VENTILATION WORK AS SHOWN ON THE DRAWINGS, INCLUDING DUCTWORK AND PROVISION OF ROOF TOP UNIT(S) INCLUDING THE INDOOR HEATING COIL AND GAS FIRED UNIT(S).

(B) PROVIDE ALL HVAC EQUIPMENT AND CONTROL SYSTEMS AS LISTED ON HVAC EQUIPMENT SCHEDULE AND AS SHOWN ON THE DRAWINGS.

(C) PROVIDE ALL MATERIAL AND LABOUR FOR POWER AND CONTROL WIRING NECESSARY TO COMPLETE THE WORK DESCRIBED ON DRAWINGS.

(D) PROVIDE ALL GAS PIPING, CONTROLS, CONTROL WIRING FOR THERMOSTATS, CONTROL PANEL(S), ETC., AS NOTED.

(E) PROVIDE ALL THERMOSTATS, MOTOR STARTERS AND BREAKERS. PROVIDE UNIT MOUNTED SAFETY DISCONNECT SWITCHES WHERE THEY ARE NOT PART OF THE EQUIPMENT.

(F) PROVIDE ALL DUCT ACOUSTIC LINING WITH PERFORATED METAL COVER, CORROSION RESISTANT, 1 INCH THICK BY 10 FEET LONG FOR SUPPLY AND RETURN DUCT CONNECTIONS AT EACH ROOF TOP UNIT.

(G) PROVIDE UNIT WITH SMOKE DETECTOR. INTERLOCK ROOF TOP UNIT WITH EXISTING FIRE ALARM SYSTEM TO SHUT DOWN UNIT UPON DETECTION OF SMOKE.

2. INSTALLATION

(A) INSTALL HVAC UNIT(S) AS PER MANUFACTURER'S INSTRUCTIONS.

(B) MANUFACTURER'S REPRESENTATIVE TO CERTIFY INSTALLATION, SUPERVISE START-UP AND COMMISSION UNIT(S). PROVIDE TEST REPORTS AND PAY FOR ALL FEES.

(C) ALL WORK TO BE CARRIED OUT BY CONTRACTOR WITH EXPERIENCE IN INSTALLING SYSTEMS BEING USED.

3. DUCTWORK

(A) PROVIDE DUCTWORK AS SHOWN AND REQUIRED, WHERE THIS IS NOT POSSIBLE, CONSULT WITH ENGINEER. ALL METAL DUCTS SHALL BE PRIME-COATED GALVANIZED COLD-ROLLED STEEL AND WITH GAUGES AS PER THE FOLLOWING:

LONGEST SIDE	US GAUGE
UP TO 12"	26
13" TO 30"	24
OUTDOOR PLENUM WITH SOLDERED SEAMS AND PRIME COATED	20

(B) DUCTWORK SHALL BE CONSTRUCTED IN ACCORDANCE WITH GOOD PRACTICE USING STANDING SEAMS WHERE NECESSARY TO PREVENT DRUMMING. DUCTS SHALL BE CONSTRUCTED TO STANDARDS AS PUBLISHED BY SMACNA.

(C) WHERE DUCT IS ACOUSTICALLY LINED, DUCTS SHALL BE INCREASED TO PROVIDE INSIDE DIMENTIONS AS STATED AND/OR SHOWN.

(D) DUCTS SHALL BE ADEQUATELY SUPPORTED USING ANGLE IRON AND THREADED RODS OR 18 GAUGE STRIPS (1" WIDE) FOR SMALLER DUCTS.

(E) ELBOWS SHALL HAVE ROUND THROATS WHERE POSSIBLE WITH ONE DUCT WIDTH RADIUS. WHERE NOT POSSIBLE DUE TO SPACE LIMITATIONS, SQUARE ELBOWS MAY BE USED WITH DURO-DYNE AIRFOIL TURNING VANES.

(F) PROVIDE SPLITTER DAMPERS WITH ROD-TYPE OPERATORS FASTENED AT THE BLADE END. SMALL DAMPERS MAY HAVE LOCKING QUADRANT-TYPE OF OPERATORS.

(G) ALL SUPPLY AND RETURN AIR DUCTS TO BE INSULATED WITH 1" FOIL-FACED FIBRE GLASS INSULATION (24Kg/m3 DENSITY) AND COVERED WITH CANVAS CLOTH, PAINTED WITH 2 COATS OF "DUCT FOSTER 40/20.

(H) PROVIDE FLEXIBLE DUCT CONNECTIONS TO ALL PIECES OF EQUIPMENT, (EG: FANS) FROM DURO-DYNE OR EQUAL AND PROVIDE RAIN SHIELDS FOR OUTSIDE CONNECTIONS.

(I) WHERE FLEXIBLE DUCT SECTIONS ARE USED, THEY SHALL NOT EXCEED 10FT (3M) IN LENGTH. APPROVED FLEX TO BE BY FLEXMASTER, ULC LISTED. ALL FLEXIBLE DUCT TO BE INSULATED WITH 1" FOIL-FACED FIBRE GLASS INSULATION.

(J) ALL EXPOSED DUCT LINES ON ROOF TOP TO BE INSULATED WITH 2" FOIL FACED FIBERGLASS INSULATION (72kg/m3 DENSITY) AND COVERED WITH 22 GAUGE CORRUGATED ALUMINUM CLADDING, PROVIDE WATER PROOF FLASHING FOR ALL DUCTWORK PENETRATE WALL ON ROOFTOP.

4. THERMAL/ACOUSTICAL DUCT LINER INSULATION

A) PROVIDE AND INSTALL DUCT LINER INSULATION AS SHOWN ON DRAWINGS. TYPE AND THICKNESS TO BE AS NOTED ON DRAWINGS:
TYPE I – FLEXIBLE BLANKETS
TYPE II – RIGID BOARDS
B) BOTH TYPES OF DUCT LINER INSULATION SHALL MEET THE PHYSICAL PROPERTY REQUIREMENTS OF ASTM C 1071, STANDARD SPECIFICATION FOR DUCT LINING INSULATION (THERMAL AND SOUND ABSORBING MATERIAL), AND SHALL RESIST CORROSION, HIGH TEMPERATURE, EROSION, ODOR EMISSION AND MOISTURE VAPOUR SORPTION.
C) ALL DUCT LINER INSULATION SHALL BE INSTALLED IN ACCORDANCE WITH THE REQUIREMENTS OF THE NAIMA FIBROUS GLASS DUCT LINER STANDARD OR SMACNA HVAC DUCT CONSTRUCTION STANDARD.
D) ALL DUCT LINER INSULATION SHALL BE ADHERED TO THE DUCT USING ADHESIVES COMPLYING WITH THE PROPERTY REQUIREMENTS OF ASTM C 916, STANDARD SPECIFICATION FOR ADHESIVES FOR DUCT. THERMAL INSULATION, PLUS MECHANICAL FASTENERS DESIGNED SPECIFICALLY FOR THIS PURPOSE.
E) ALL DUCT LINER INSULATION SHALL BE AKOUSTI-LINER OR APPROVED EQUAL.

5. FIRE DAMPERS

(A) FIRE DAMPERS SHALL BE PROVIDED AS SHOWN OR REQUIRED AND SHALL BE ULC APPROVED TYPES AND SHALL BE AT THE FIRE SEPARATION AND INSTALLED PER MANUFACTURER'S INSTRUCTIONS.

(B) CONTRACTOR TO PROVIDE ACCESS DOORS FOR EACH FIRE DAMPER AS REQUIRED. WHERE NECESSARY, THEY SHALL BE ULC RATED.

(C) FIRE STOPPING OF DUCT PENETRATIONS THROUGH FIRE WALLS TO CONSIST OF RETAINING ANGLES ALL AROUND DUCT ON BOTH SIDES OF FIRE SEPARATION. SEAL ANY OPEN AREAS WITH AN APPROVED 'FIRE PROOF' SEALANT THROUGHOUT DEPTH OF FLOOR STRUCTURE.

6. GRILLES AND DIFFUSERS

(A) SUBMIT PRODUCT DATA TO ENGINEER.

(B) SIZES AND RATINGS TO BE AS SHOWN ON DRAWINGS.

(C) MUST BE OF STEEL CONSTRUCTION AND ACCEPTABLE MANUFACTURERS ARE: EH PRICE, NAILOR OR EQUAL.

(D) PROVIDE ALL SUPPLY DIFFUSERS WITH VOLUME CONTROL DAMPERS c/w STRAIGHTENING DEVICES, FRAMES AND GASKETS.

7. GAS PIPING

(A) ALL GAS PIPING SHALL CONFORM TO THE GAS UTILIZATION CODE – LATEST AND AMENDED EDITION.

(B) PROVIDE GAS COCK AND DIRT TRAP. PAINT EXPOSED PIPING TO CODE REQUIREMENTS.

(C) TEST AND ADJUST GAS PRESSURE TO SUIT – MINIMUN 7"wc.

(D) PROVIDE GAS REGULATOR AS REQUIRED.

8. EXHAUST FANS

A) PROVIDE EXHAUST FANS AS SHOWN ON DRAWINGS.
B) EACH FAN SHALL BE COMPLETE WITH BACKDRAFT DAMPER.

9. REFRIGERANT PIPING

(A) ALL REFRIGERANT PIPING SHALL CONFORM TO STM B280, AHSRAE 15, AND ASME B16.22.

(B) PIPE TO BE SEAMLESS COPPER TYPE 'K' OR 'L' PER ASTM B88.

(C) PIPING TO BE CLEANED, DEHYDRATED AND SEALED WHEN DELIVERED ON SITE.

(D) USE SILVER SOLDER AND APPROVED BRAZING COMPOUND AND INSULATE WITH RUBBER FOAM INSULATION TO 1/2" THICK AS PER ASTM C534.

(E) PROVIDE PIPING SUPPORTS, FITTINGS, VALVES, ETC., ON FIELD INSTALLED PIPING AS REQUIRED.

(F) PIPE RATING TO SUIT R-410A.

10. HYDRONIC SPECIALTIES

(A) PIPING TO BE SCHEDULE 40, WELDED BLACK CARBONSTEEL TO ASTM A53 GRADE B WITH THREADED ENDS.

(B) FITTINGS RATED TO CLASS 150 BLACK MALLEABLE IRON SCREW TYPE TO ASTM A197 AND ASME B16.3.

(C) PROVIDE DI-ELECTRIC UNIONS BETWEEN COPPER TUBING AND FERROUS PIPING OR EQUIPMENT.

(D) GATE VALVES TO BE CLASS 125 BRONZE BODY WITH SCREWED ENDS BY JENKINS OR EQUAL.

(E) CHECK VALVES TO BE CLASS 125 BRONZE BODY WITH SCREWED ENDS AND CAPS, HORIZONTAL SWING CHECK, BRONZE DISC AND SEAT BY JENKINS OR EQUAL.

(F) AIR VENTS TO BE BY TACO OR EQUAL.

(G) CIRCUIT BALANCING VALVES BY ARMSTRONG OR EQUAL.

(H) PRESSURE AND TEMPERATURE GAUGES WITH 1%-5% ACCURACY BY ASHCROFT OR EQUAL.

(I) STRAINER 'Y-PATTERN' #125 BRONZE BY CRANE OR EQUAL.

11. TEST, START-UP AND GUARANTEE

(A) PROVIDE BALANCING FOR ALL AIR SYSTEMS AND A REPORT TO THE ENGINEER. ALL AIR BALANCING TO BE DONE BY AN INDEPENDENT CERTIFIED AIR BALANCING COMPANY REGULARLY ENGAGED IN THIS KIND OF WORK. REFERENCES TO BE PROVIDED TO THE ENGINEER IF REQUESTED.

(B) OPERATE ALL SYSTEMS TO THE SATISFACTION OF THE ENGINEER AND OWNER.

(C) LUBRICATE ALL UNITS REQUIRING LUBRICATION AND WASH/REPLACE THE FILTERS IMMEDIATELY PRIOR TO TAKE-OVER.

(D) FURNISH A LETTER OF GUARANTEE TO THE OWNER, COVERING ALL SYSTEMS FOR ONE YEAR FROM DATE OF ACCEPTANCE. INSERT A COPY IN THE OPERATING AND MAINTENANCE (O&M) BINDERS.

(E) THIS WARRANTY DOES NOT TAKE PRECEDENCE OVER OTHER WARRANTIES ON SPECIFIC ITEMS WHICH MAY BE FOR LONGER PERIODS.

(F) DEMONSTRATE TO THE OWNER'S REPRESENTATIVE, THE PROPER OPERATING PROCEDURES AND PROVIDE 2 COPIES OF OPERATING INSTRUCTIONS, SUITABLY BOUND, TITLED AND BEARING THE CONTRACTOR'S COMPANY NAME, ADDRESS AND TELEPHONE NUMBER.

12. ZONE CONTROL SYSTEMS

(A) PROVIDE A SYSTEM 2000 GEN COMMERCIAL ZONING SYSTEM C/W ROOM SENSORS, CONTROL DAMPERS, STATIC PRESSURE SENSOR, SUPPLY AIR TEMPERATURE SENSOR, BY-PASS DAMPER ETC. TO FORM A COMPLETE SYSTEM.

(B) THE CONTROL SYSTEM IS TO BE A COMMERCIAL MODULATING AUTO CHANGE OVER ZONING SYSTEM TO CONTROL A SINGLE HVAC UNIT. PROVIDE ONE SYSTEM FOR EACH HVAC UNIT. (TYPICAL OF THREE).

(C) ALL POWER WIRING IS TO BE 2#16 LUT, MAKE WIRING TERMINATIONS IN ELECTRICAL BOXES.

(D) ALL SENSOR WIRING IS TO BE TWISTED SHIELDED PAIR, MAKE WIRING TERMINATIONS IN ELECTRICAL BOXES.

(E) ALL WIRING IS TO BE CONTROLLER TO CONTROLLER, CONTROLLER TO SENSOR, CONTROLLER TO ACTUATOR. DO NOT SPLICE CABLES.

(F) INSTALL STRICTLY IN ACCORDANCE WITH MANUFACTURER'S INSTALLATION INSTRUCTIONS.

(G) PROVIDE FACTORY TRAINED TECHNICIAN FOR STARTUP AND COMMISSIONING.

(H) PROVIDE AS-BUILT WIRING DRAWINGS.

PLUMBING AND DRAINAGE

1. GENERAL CONDITIONS

(A) THE GENERAL CONDITIONS OF THE CONTRACT AND THE GENERAL REQUIREMENTS FOR MECHANICAL WORK SHALL FORM PART OF THIS DIVISION.

2. WORK INCLUDED

(A) THIS CONTRACTOR SHALL DO ALL PLUMBING AND DRAINAGE WORK AS REQUIRED AND/OR SHOWN ON THE DRAWINGS. ALL PLUMBING AND DRAINAGE WORK SHALL BE INSTALLED, TESTED AND INSPECTED IN ACCORDANCES WITH THE ONTARIO PLUMBING CODE, LATEST AMENDMENT.

(B) PROVIDE THE DOMESTIC HOT WATER SYSTEM AS SHOWN ON DRAWINGS. PROVIDE ALL BEDDING MATERIALS, COMPACTION AND BACKFILL FOR THE WORK INCLUDED IN THIS CONTRACT.

3. DRAINS

(A) FLOOR DRAINS IN STORAGE ROOMS AND OTHER NON-FINISHED AREAS, SHALL BE CAST IRON, ADJUST-TO-LEVEL TYPE WITH DOUBLE DRAINAGE FLANGE AND WEEPHOLES.

(B) FLOOR DRAINS IN FINISHED AREAS SHALL BE AS ABOVE BUT WITH 6" DIAMETER ADJUSTABLE POLISHED BRASS STRAINER.

(C) EQUIVALENT PRODUCTS BY ENPOCO, ZURN, ROTO-TECH-SMITH WILL BE CONSIDERED AS EQUALS.

4. PIPE AND PIPE FITTINGS FOR PLUMBING

(A) ALL BURIED DRAINAGE PIPES SHALL BE ABS OR PVC TYPE SDR-35. ALL AS APPROVED BY THE LOCAL PLUMBING INSPECTOR. WHERE LOCATED ON UNSTABLE GROUND PROVIDE PVC SCHEDULE 40 PATTERN PIPE WITH REINFORCED CONCRETE SUPPORTS.

(B) ALL NON-BURIED DRAINAGE PIPE INSIDE THE BUILDING SHALL BE D.W.V. GRADE COPPER OR DWV PVC WITH FIRESTOP COLLARS.

(C) WATER PIPING SHALL BE TYPE "L" COPPER WITH SOLDERED JOINTS TO ASTM B88-83, SOLDER SHALL BE 95/5 EXCEPT AS NOTED.

(D) UNDERGROUND WATER PIPING SHALL BE TYPE "K" COPPER OR PEX PIPING, CSA APPROVED FOR POTABLE WATER c/w MANUFACTURER SUPPLIED FITTINGS BY WIRSBO, REHAU, SEPTOR, STADLER OR HEATLINK

5. PIPING SUPPORTS

(A) HORIZONTAL PIPING SHALL B SUPPORTED AT INTERVALS AS FOLLOWS:

PIPING SIZES UP TO 3/4	6'-0"
PIPING SIZES 1" TO 3	8'-0"
PIPING SIZES OVER 34	12'-0

(B) VERTICAL PIPING SHALL BE SUPPORTED AT THE FLOOR AND/OR WITH INTERMEDIATE WALL SUPPORTS AT 10FT INTERVALS FOR PIPING 2" AND OVER, AND 6FT INTERVALS FOR SMALLER PIPING. MORE FREQUENT SUPPORTS SHALL BE PROVIDED WHERE NECESSARY TO PREVENT MOVEMENT.

(C) PIPE HANGERS SHALL CONSIST OF GRINNELL #260 CLEVIS HANGERS WITH THREADED RODS AND SUITABLE CLAMPING DEVICES AT TOP END. GRAPPLER STRAP HANGERS ARE NOT ACCEPTABLE.

(D) WHERE NECESSARY, PROVIDE INTERMEDIATE ANGLE IRON OF SUFFICIENT STRENGTH, WELDED TO JOISTS FROM WHICH TO HANG PIPES.

(E) THIS CONTRACTOR SHALL MAKE PROVISIONS FOR THE EXPANSION AND CONTRACTION OF PIPES AND SHALL PROVIDE SIDE AND/OR END ANCHORS TO CONTROL OR LIMIT PIPE MOVEMENT AS REQUIRED. PROVIDE SWING JOINTS ON ALL BRANCH LINES, EXPANSION LOOPS ON ALL STRAIGHT RUNS OF 100FT OR MORE, AND ANCHORS TO LIMIT HORIZONTAL EXPANSION.

(F) PROVIDE DRAINCOCKS AT ALL LOW POINTS IN THE SYSTEM TO ALLOW DRAINAGE OF THE SYSTEM.

(G) BURIED PIPING SHALL BE INSTALLED ON UNDISTURBED SOUL OR COMPACTED GRANULAR WITH 6" SAND BEDDING ALL AROUND AND FOR FULL LENGTH.

6. CLEANOUTS

(A) PROVIDE CLEANOUTS AT EVERY 50FT IN BURIED DRAINAGE PIPE 6" AND SMALLER AND WHEREVER ELSE REQUIRED FOR MAINTENANCE OF THE SYSTEM.

(B) PROVIDE "BARRETT" STYLE CLEANOUTS AT THE BASE OF ALL STACKS.

(C) CLEANOUTS SHALL BE FULL PIPE SIZE UP TO 4" IN PIPE SIZE, FOR THOSE PIPE LARGER THAN 4", CLEANOUTS TO BE 4"MAX.

7. SHOCK ABSORBERS

(A) PROVIDE AIR COLUMN CHAMBERS AT EACH GROUP OF FIXTURES. THESE SHALL BE A 3/4" MINIMUM PIPE WITH CAP, 18" LONG MOUNTED ON THE TOP OF THE SUPPLY HEADERS, HOT AND COLD. WHERE THE HEADER IS LARGER THAN 1", THE COLUMN SHALL BE ONE SIZE LARGER THAN THE HEADER. ALTERNATIVELY, PROVIDE MANUFACTURED SHOCK ABSORBERS, SIZED FOR THE APPLICATION.

8. VALVES

(A) PROVIDE EACH FIXTURE WITH A SHUTOFF VALVE ON HOT AND COLD WATER AND PROVIDE ISOLATING VALVES AT EACH MAIN BRANCH.

(B) VALVES SHALL BE 125LB WATER RATED, GATE PATTERN, BRONZE BODY, RISING STEM AND SHALL BE EMCO, TOYO, JENKINS OR EQUAL.

(C) HOSE BIBBS TO BE AS SHOWN ON DRAWINGS. THEY SHALL BE NON-FREEZE HOSE BIBBS AND EQUIVALENT MANUFACTER'S ARE ZURN, RTS, AND JOSAM. PROVIDE INSIDE SHUTOFF VALVE WITH WASTE FITTING, IF HOSE BIBB IS HIGHER THAN FEED LINE.

(D) WHERE REQUIRED FOR BALANCING, PROVIDE WATTS B-6000 BALL VALVE OR GLOBE PATTERN, RENEWABLE COMPOSITION DISC, RISING STEM BRONZE BODY, 125LB RATED VALVES OF EMCO, TOYO, OR JENKINS MANUFACTURE.

9.. PIPE INSTALLATION

(A) INSULATE ALL COLD WATER LINES WITH 1/2" PRE-FORMED, FOIL-FACED FIBREGLASS PIPE INSULATION. WHERE PIPING IS EXPOSED, COVER WITH 2-PLY CANVAS AND TWO AFTER-COATS OF FIRE-RESISTANT LAGGING ADHESIVE, FLINTKOTE F101 OR EQUAL.

(B) INSULATE ALL EXPOSED HOT WATER LINES IN A SIMILAR MANNER.

(C) ALL INSULATION SHALL BE DONE BY AN INSULATION SPECIALIST.

10. THERMOMETERS AND GAUGES

(A) PROVIDE THERMOMETERS AND PRESSURE GAUGES AS SHOWN ON THE DRAWINGS, AND AS REQUIRED FOR INDICATION OF SYSTEM FUNCTION.

(B) PRESSURE GAUGES SHALL BE "BOURDAN" TYPE WITH A 3" DIAL AND A DAMPENING DEVICE.

(C) THERMOMETERS SHALL BE RED LIQUID TYPE, 6" LONG WITH COMBINATION OF FAHRENHEIT & CELCIUS READINGS.

11. PLUMBING FIXTURES

(A) PROVIDE PLUMBING FIXTURES AS SHOWN ON DRAWINGS AND AS LISTED IN THE PLUMBING FIXTURE SCHEDULE.

12. ACCESS DOORS

(A) THIS CONTRACTOR SHALL PROVIDE AND INSTALL ACCESS DOORS WHERE VALVES, CLEANOUTS, OR OTHER DEVICES ARE CONCEALED IN CEILINGS OR WALLS. ALL ACCESS PANELS IN FIRE-RATED FLOORS, CEILINGS AND WALLS SHALL BEAR A 'ULC' LABEL.

13. PIPE SLEEVES

(A) PROVIDE SCHEDULE 40 IRON PIPE SLEEVES IN ALL MASONARY WALLS WHERE WATER PIPES PASS THROUGH. SLEEVES SHALL BE SIZED TO ACCEPT THE INSULATED PIPE.

SPRINKLER SYSTEM NOTES:

1. PROVIDE NEW SPRINKLER SYSTEM TO COMPLY WITH THE ONTARIO BUILDING CODE AND NFPA 13. ALL WORK SHALL BE CONDUCTED BY A LICENSED FIRE PROTECTION CONTRACTOR NORMALLY ENGAGED IN THIS TYPE OF WORK AND OVERSEEN BY A LICENSED PROFESSIONAL ENGINEER ENGAGED BY THE FIRE PROTECTION CONTRACTOR. SUBMIT STAMPED DRAWINGS TO CONSULTANT FOR REVIEW. SUBMIT CERTIFICATE OF COMPLIANCE FOR COMPLETED INSTALLATION IN ACCORDANCE WITH NFPA 13 SIGNED & SEALED BY A LICENSED PROFESSIONAL ENGINEER.
2. CONTRACTOR TO REFER TO ARCHITECTURAL DRAWINGS FOR ALL FIRE SEPARATIONS AND RAITINGS.
3. ALL SPRINKLER PIPING, MATERIAL, AND INSTALLATION IS TO BE IN ACCORDANCE WITH NFPA 13.
4. THE CONTRACTOR IS TO INSTALL A FIRE DEPARTMENT CONNECTION FOR EACH ALARM VALVE AND A FLOW TEST HEADER FOR THE COMMON WATER SUPPLY IN ACCORDANCE WITH NFPA 13 WITH CHECK VALVES, AND A BALL DRIP FOR EACH ALARM VALVE. ALL MATERIALS ARE TO MEET THE REQUIREMENTS OF CHAPTER 3 OF NFPA 13, AND TABLE 3-1.1.1 PIPE OR TUBE MATERIALS AND DIMENSIONS.
5. ALL PIPING IS TO BE SEAMLESS STEEL PIPING FOR FIRE PROTECTION USE TO ASTM A795. PIPING CAN BE THREATED OR ROLLED GROOVE PIPING.
6. ALL PIPING IS TO BE SLOPED TO DRAIN AT A MINIMUM OF 1 INCH IN 25 FEET. INSTALL 1.25 INCH DIAMETER VALVES WITH A CAPPED OR PLUGGED PIPE AT ALL LOW POINTS FOR DRAINAGE OF THE SYSTEM. INSTALL INSPECTORS TEST AND DRAINS AT THE END OF EACH ZONE WITH A ½" ORIFICE UNION AND 1" VALVE TERMINATED THROUGH THE BUILDING WALL AT 18" AFF, WITH THE VALVE AT 48" AFF, AND ORIFICE IN BETWEEN. INSTALL A PATIO STONE, 24" X 24" ON THE OUTSIDE OF THE BUILDING TO PREVENT EROSION OF SOIL DURING TESTING.
7. USE PIPING HANGERS THAT MEET THE INTENT OF NFPA 13 PARAGRAPH 3-10. HANGERS ARE TO BE CLEVIS TYPE HANGERS SPACED EVERY 10' MINIMUM USING THE THREADED ROD, AND A CENTER LOAD TYPE UPPER ATTACHMENTS ATTACHED TO THE OPEN WEB STEEL JOINTS. IF A HANGER IS REQUIRED TO BE PLACED BETWEEN OWSJ'S THE CONTRACTOR IS TO INSTALL STRUCTURAL STEEL THAT SPANS BETWEEN TWO OWSJS IN ACCORDANCE WITH THE HANGER DETAILS.
8. CONTRACTOR IS TO CONDUCT HYDRANT FLOW TESTS ON THE COMMON WATER SUPPLY FOR THE ALARM VALVES, AND ALSO FOR THE FIRE HYDRANT ADJACENT TO THE BUILDING IN ACCORDANCE WITH NFPA 13.

PLUMBING NOTES:

1. SEE ARCHITECTURAL DRAWINGS FOR ADDITIONAL ACCESSORIES ie: PAPER TOWEL DISPENSERS, SOAP DISPENSERS ETC.
2. USE MANUFACTURERS' SPECIFICATIONS AND TEMPLATES FOR ALL COMPONENTS.
3. ALL HOT AND COLD WATER LINES TO BE INSULATED.
4. PLUMBING LINES ARE SHOWN OUTSIDE OF WALLS FOR CLARITY PURPOSES. LOCATIONS OF PLUMBING LINES SHOW INTENT. LOCATIONS MAY NEED TO BE REVISED TO SUIT SITE CONDITIONS.
5. ALL EXPOSED PIPING, VALVES, TRAPS, FITTINGS, ETC., SHALL BE HEAVILY CHROME PLATED BRASS.
6. ALL COLD AND HOT WATER LINES TO BE TYPE 'L' COPPER PIPING.
7. PROVIDE OFFSET DRAIN, INSULATED P-TRAP AND INSULATED SUPPLY PIPING AT ALL EXPOSED BARRIER FREE SINKS/LAVATORIES.
8. INCLUDE ALL LABOUR, EQUIPMENT, TOOLS AND OTHER INCIDENTALS NECESSARY AND REQUIRED FOR THE COMPLETE INSTALLATION. USE ONLY NEW MATERIALS AND EQUIPMENT.
9. ALL WORK SHALL BE IN ACCORDANCE WITH OBC PART 7, THE LATEST ECITIONS OF LOCAL CODES AND STANDARDS AND WITH THE APPROVAL OF THE AUTHORITIES HAVING JURISDICTION.
10. CONTRACTOR SHALL GIVE ALL NECESSARY NOTICES, OBTAIN ALL REQUIRED PERMITS AND PAY FEES.
11. CONTRACTOR SHALL INSPECT THE PROJECT PRIOR TO TENDER TO REALIZE THE SCOPE OF WORK INVOLVED AND TO FAMILIARIZE HIMSELF WITH THE SITE CONDITIONS. FAILURE TO DO SO WILL NOT RELIEVE THE CONTRACTOR OF RESPONSIBILITY IN THIS REGARD.
12. CONTRACTOR MAY USE EXISTING SANITARY AND DOMESTIC WATER LINES IF SUITABLY SIZED.
13. PLUMBER TO SUPPLY AND INSTALL ALL NECESSARY VALVES AND FITTINGS.
14. PROVIDE SANITARY VENT LINES FOR ALL PLUMBING FIXTURES AS PER OBC PART 7.
15. PROVIDE CLEAN OUTS ON SANITARY DRAIN LINES AS PER OBC PART 7.
16. PROVIDE ⅜"ø TSP FOR ALL FLOOR DRAINS.
17. SEE GENERAL NOTES THIS DRAWING.
18. OBTAIN PLUMBING PERMIT AND INCLUDE ALL COSTS.

MECHANICAL GENERAL NOTES

1. THE ENTIRE PLUMBING INSTALLATION SHALL BE IN ACCORDANCE WITH THE LATEST EDITION OF OWRA PLUMBING CODE ALL LOCAL AUTHORITIES HAVING JURISDICTION.
2. SITE SERVICES SHOWN INDICATE INTENT ONLY. ACTUAL LOCATIONS TO BE DETERMINED ON SITE IN CONSULTATION WITH THOSE AUTHORITIES HAVING JURISDICTION.
3. CONTRACTOR TO VERIFY EXACT LOCATION OF EXISTING SANITARY MAIN AND WATER PIPING BEFORE INSTALLATION.
4. MECHANICAL CONTRACTOR SHALL LAYOUT, SIZE, AND INSTALL SANITARY VENT PER O.B.C.
5. INCOMING WATERMAIN TO BE TYPE SDR-25 C/W DUCTILE IRON ELBOWS AND TRANSITION PIECES.
6. PROVIDE 74" (1880mm) FROST COVERAGE FOR WATER & SANITARY LINES.
7. SLOPE FOR UNDERGROUND DRAIN PIPES SIZING 100ø AND GREATER ARE 1% UNLESS OTHERWISE INDICATED.
8. ALL FLOOR/FUNNEL FLOOR/HUB DRAINS AND/OR RUNNING TRAPS SHALL BE PROVIDED WITH A TRAP SEAL PRIMER AS PER THE PLUMBING CODE. REFER TO THE SPECIFICATIONS FOR TRAP PRIMING DEVICE(S) TO BE PROVIDED AS REQUIRED. ALL THE TRAP SEAL PRIMERS ARE NOT SHOWN ON THE DRAWING. THE DIVISION 23 CONTRACTOR SHALL BE RESPONSIBLE FOR LOCATING THE TRAP SEAL PRIMERS IN JANITORS CLOSETS, STORAGE ROOMS OR MECHANICAL ROOMS AND PROVIDE ALL PIPING AND WIRING FROM THESE LOCATIONS.
9. PROVIDE 3/8"ø (10mm) COPPER TRAP SEAL PRIMERS TO ALL FLOOR AND HOT WATER RETURN DRAINS.
10. EXACT LOCATION OF OVERHEAD SERVICES FOR HOT & COLD WATER, STORM, AND VENT LINES SHALL BE CO-ORDINATED WITH ALL HVAC, FIRE PROTECTION AND ELECTRICAL SERVICES.
11. MAINTAIN MINIMUM CLEARANCE AS REQUIRED FROM OTHER SERVICES.
12. MECHANICAL CONTRACTOR TO PROVIDE ACCESS DOORS FOR VALVES IN CEILING SPACE OR INSIDE WALL.
13. DRAINAGE AND VENT PIPES WITHIN BUILDING TO BE MJ CAST IRON, COPPER OR PVC DWV PIPING.
14. IN THE EXISTING SCHOOL, ALL PENETRATIONS OF THE EXISTING SIPROREX FLOOR IS TO BE COORDINATED WITH STRUCTURAL ENGINEER FOR SUPPORT DUE TO THE BRITTLE NATURE OF THE FLOOR. FLOORS ARE TO BE SCANNED PRIOR TO CUTTING.
15. IN THE NEW ADDITION AND WHERE CEILINGS ARE EXPOSED, ALL CONDUIT/PIPING IS TO ENTER ALL ROOMS AT ONE SINGLE LOCATION AND REDISTRIBUTE NEATLY ALONG PERIMETER WALLS. CONDUIT TO BE RUN 460mm MAX. FROM WALL. VERTICAL CONDUIT/PIPING TO BE RECESSED INTO CONCRETE BLOCK. INSTALLATION TO BE COORDINATED WITH ARCHITECTURAL.
16. PROVIDE VENTS TO ALL PLUMBING FIXTURES, SIZED ACCORDING TO LATEST PLUMBING CODE TO A COMMON 3"ø (75mm) VENT STACK THROUGH ROOF.
17. PROVIDE 'ULC' RATED FIRE STOPS FOR ALL PIPING PENETRATING FIRE RATED STRUCTURES. REFER TO ARCHITECTURAL DRAWINGS FOR FIRE SEPARATIONS.
18. PROVIDE FIRE EXTINGUISHERS AS SHOWN ON PLANS. CONSULT WITH LOCAL FIRE DEPARTMENT TO DETERMINE EXACT NUMBERS AND LOCATIONS. FIRE EXTINGUISHERS TO BE 5LB. ABC TYPE RECESSED IN CABINET.
19. INSTALL ALL DUCTWORK TO THE CURRENT RECOMMENDATIONS OF SMACNA AND ASHRAE STANDARDS OF INSTALLATION.
20. DIMENSIONS FOR LOCATIONS OF DUCTWORK, EQUIPMENT, ETC. ARE SHOWN FOR REFERENCE PURPOSES ONLY. DIVISION 23 TO REFER TO ARCHITECTURAL DRAWINGS FOR EXACT LOCATIONS OF MAJOR MECHANICAL ITEMS.
21. ALL INTERIOR EXPOSED DUCTWORK TO BE ARCHITECTURAL SPIRAL DUCT, PRIMED AND PAINTED TO ARCHITECTS REQUIREMENTS. INSTALL DUCT AT HIGHEST POINT POSSIBLE. REFER TO ARCHITECTURAL DRAWINGS FOR DUCTWORK SUPPORT DETAIL. LOCATE DUCTS AS PER DIMENSIONS. CONSULT ARCHITECT AND ENGINEER PRIOR TO INSTALLATION.
22. ALL EXPOSED EXTERIOR DUCTWORK TO BE INSULATED WITH 2" (50mm) GLASS FIBRE BOARD INSULATION C/W VAPOUR BARRIER COVERED WITH ALUMINUM JACKET, PRIMED AND PAINTED TO ARCHITECTS' REQUIREMENTS.
23. INSTALL FLEXIBLE CONNECTIONS ON ALL DUCTWORK WHERE SHOWN ON THE DRAWINGS.
24. PROVIDE A MINIMUM OF 8' (2.4m) OF FLEXIBLE DUCT AT EVERY DIFFUSER OR GRILLE OUTLET.
25. PROVIDE 1" (25mm)THICK ACOUSTIC DUCT LINING INSULATION WHERE SHOWN ON DRAWINGS.
26. PROVIDE 1" (25mm) THICK FOIL FACED FLEXIBLE THERMAL INSULATION ON DUCTWORK WHERE SHOWN ON DRAWINGS.
27. PROVIDE BALANCING DAMPERS PRIOR TO ALL SUPPLY GRILLES AND VVT BOXES. BALANCE HVAC SYSTEM TO THOSE AIR VOLUMES AS NOTED ON DRAWINGS.
28. PROVIDE ULC RATED FIRE DAMPERS AT ALL FIRE SEPARATIONS. REFER TO ARCHITECTURAL DRAWINGS.
29. REFER TO ARCHITECTS' DRAWINGS FOR EXACT LOCATION OF ALL CEILING DIFFUSERS.
30. ALL HYDRONIC HEATING PIPING TO BE CONCEALED EITHER IN CEILING SPACE OR PIPE CHASES/WALLS WITH THE EXCEPTION OF STORAGE AND UTILITY ROOMS.
31. ALL HOLES THROUGH ROOF AND ASSOCIATED FLASHING TO BE CARRIED OUT BY CERTIFIED ROOFING CONTRACTOR.
32. REFER TO ARCHITECTURAL DRAWINGS FOR ALL BULKHEADS AND CHASES FOR THE PURPOSE OF RUNNING PIPING AND DUCTWORK.
33. MASS EXCAVATION AND BACKFILLING TO BE BY GENERAL CONTRACTOR AND COORDINATED WITH DIVISIONS 23 & 26. DIVISIONS 23 & 26 RESPONSIBLE FOR ALL BEDDING MATERIALS AND COMPACTION.
34. DIVISION 23 TO VISIT SITE PRIOR TO CLOSE OF TENDERING PERIOD TO REVIEW DEMOLITION, REMOVALS, REROUTING AND EXTENSIONS TO ASCERTAIN EXTENT OF WORK. THERE IS SIGNIFICANT DEMOLITION AND REMOVAL COMPONENT TO DIVISION 23's SCOPE OF WORK. SOME OF THIS WORK IS SHOWN ON THE DRAWINGS BUT A SIGNIFICANT AMOUNT IS NOT. CONTRACTOR IS TO INCLUDE ALL COSTS FOR WORK TO BE CARRIED OUT. NO ALLOWANCE WILL BE MADE AFTER CLOSE OF TENDERS.
35. ALL MECHANICAL SERVICES/EQUIPMENT SERVING OTHER PARTS OF THE BUILDING BUT LOCATED IN RENOVATED AREA, SHALL BE PUT BACK INTO SERVICE. THIS WILL INVOLVE REROUTING, EXTENDING OR RELOCATING AS REQUIRED. DIVISION 23/26 RESPONSIBLE FOR ALL SUCH WORK.
36. ALL ABANDONED SERVICES SHALL BE CAPPED OFF AND MADE SAFE. WHERE PRACTICAL, REMOVE ALL SUCH SERVICES.
37. ALL RELOCATIONS, REROUTING AND EXTENSIONS SHALL BE DONE IN A MANNER AS NOT TO BE OBSTRUCTIVE, ie CONCEALED AND HIDDEN IN FURRING OR BULKHEADS EXCEPT IN STORAGE OR UTILITY ROOMS.

PLUMBING FIXTURE CONNECTIONS

FIXTURE	DRAIN SIZE	C.W. SIZE	H.W. SIZE	VENT	DESCRIPTION
WC	3" (75mm)	1/2" (12mm)	–	1 1/2" (38mm)	
LAV	1 1/4" (32mm)	1/2" (12mm)	1/2" (12mm)	1 1/4" (32mm)	
MS	3" (75mm)	1/2" (12mm)	1/2" (12mm)	1 1/2" (38mm)	
FD	3" (75mm)	3/8" (10mm)	–	1 1/2" (38mm)	
KS	1 1/2" (38mm)	1/2" (12mm)	1/2" (12mm)	1 1/4" (32mm)	
WT	1 1/2" (38mm)	1/2" (12mm)	1/2" (12mm)	1 1/4" (32mm)	

GRILLES, DIFFUSERS & REGISTERS SCHEDULE

TAG	MODEL BY NAILOR	NECK SIZE	SUPPLY/RETURN	COMMENTS
A (x6) ATRIUM	61DH-12x8-S AW-A-PF	14"x10" (350x250)	SUPPLY	
B BRIDGE	61DH-12x8-S AW-A-PF	12"x8" (300x200)	SUPPLY	
C	6145H-30x18-S AW-A-PF	30"x18" (750x450)	RETURN	
E	61DH-10x6-S AW-A-PF	10"x6" (250x150)	SUPPLY	
F	6145H-12x8 S-AW-A-PF	12"x8" (300x200)	RETURN	
G	6145H-6x6 S-AW-A-PF	6"x6" (150x150)	EXHAUST	

EXPANSION TANK SCHEDULE

TAG	MODEL BY WATTS	SERVICE	TANK VOLUME	ACCEPTANCE VOLUME	COMMENTS
EX01	ETA 40	NON POTABLE	25.00	10.00	16" DIA x 33" OVERALL HEIGHT 84LBS HUNG FROM STRUCTURE
EX02	ETA 15	NON POTABLE	7.50	2.50	12" DIA x 19" OVERALL HEIGHT 42LBS HUNG FROM STRUCTURE
EX03	DETA 80	POTABLE	60.00	21.00	16" DIA x 34" OVERALL HEIGHT FLOOR MOUNTED 93LBS EMPTY

ROOF MOUNTED HVAC UNIT SCHEDULE

TYPE	MANUFACTURER	MODEL	SERIAL NO.	BLOWER cfm	BLOWER SP	COOLING CAPACITY (BTU/HR)	HEATING CAPACITY (BTU/HR) INPUT \ OUTPUT (MBH INPUT\OUTPUT)	HEATING EFF.	ELECTRICAL	COMMENTS
HVAC-1	CARRIER	48LCTA06E0A5-2R5CO HORIZONTAL DISCHARGE	TBD	2,000	0.75" MAX	59,000	150/117	80%	208V/1/60	UNITS TO BE C/W CO2 SENSOR, BACNET IP CONTROLLER, ENTHALPY ULTRA LOW LEAK ECONOMIZER WITH BAROMETRIC RELIEF, HINGED PANELS, CONVENIENCE OUTLET, NON FUSED DISCONNECT, INSULATED ROOF CURB, 24" HIGH ROOF CURB
HVAC-2	CARRIER	48LCTA06E0A5-2R5CO HORIZONTAL DISCHARGE	TBD	2,000	0.75" MAX	59,000	150/117	80%	208V/1/60	UNITS TO BE C/W CO2 SENSOR, BACNET IP CONTROLLER, ENTHALPY ULTRA LOW LEAK ECONOMIZER WITH BAROMETRIC RELIEF, HINGED PANELS, CONVENIENCE OUTLET, NON FUSED DISCONNECT, INSULATED ROOF CURB, 24" HIGH ROOF CURB
HVAC-3	CARRIER	48LCTA06E0A5-2R5CO BOTTOM DISCHARGE	TBD	2,000	0.75" MAX	59,000	150/117	80%	208V/1/60	UNITS TO BE C/W CO2 SENSOR, BACNET IP CONTROLLER, ENTHALPY ULTRA LOW LEAK ECONOMIZER WITH BAROMETRIC RELIEF, HINGED PANELS, CONVENIENCE OUTLET, NON FUSED DISCONNECT, INSULATED ROOF CURB, 24" HIGH ROOF CURB
HVAC-4	CARRIER	48LCTA06E0A5-2R5CO	TBD	1,600	0.50" MAX	46,500	150/117	80%	208V/1/60	UNITS TO BE C/W CO2 SENSOR, BACNET IP CONTROLLER, ENTHALPY ULTRA LOW LEAK ECONOMIZER WITH BAROMETRIC RELIEF, HINGED PANELS, CONVENIENCE OUTLET, NON FUSED DISCONNECT, INSULATED ROOF CURB, 24" HIGH ROOF CURB

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PLUMBING FIXTURE SCHEDULE

ITEM	DESCRIPTION
WC-1 BARRIER -FREE	AMERICAN STANDARD "MADERA" FLOWISE ELONGATED BARRIER FREE FLOOR MOUNT TOILET, MODEL 3461.001. VITREOUS CHINA, 1.6 GPF/6.0 LPF, FULLY GLAZE 2-1/8" TRAPWAY, WHITE. ZURN AQUASENSE BATTERY POWERED, SENSOR OPERATED WATER CLOSET FLUSH VALVE, MODEL ZTR6200-WS1-LL. 1.6GPF, C/W FILTERED PISTON KIT, MECANICAL OVERRIDE BUTTON, CONTROL STOP, VACUUM BREAKER, CHLORAMINE RESISTANT INTERNAL SEALS, ADJUSTABLE TAILPIECE. REPLACEMENT FOR EXISTING FLUSH VALVE. PROVIDE ALL NECESSARY FITTINGS FOR INSTALLATION AND OPERATION. PROVIDE OPEN FRONT ELONGATED HEAVY DUTY TOILET SEAT WITH COVER.
WC-2	ZURN Z5555-K, 1.28 GPF/4.8 LPF LOW CONSUMPTION, HIGH PERFORMANCE SIPHON-JET FLOOR MOUNT TOILET WITH 3" FLUSH VALVE, 2-1/8" FULLY GLAZED TRAPWAY, ADA COMFORT HEIGHT, ELONGATED RIM, VITREOUS CHINA, WHITE. C/W INSULATED TANK AND VANDAL PROOF LOCKDOWN TANK LID. PROVIDE OPEN FRONT ELONGATED HEAVY DUTY TOILET SEAT, LESS COVER.
EX.UR	ZURN AQUASENSE BATTERY POWERED, SENSOR OPERATED URINAL FLUSH VALVE, MODEL ZTR6203-EWS-LL. 0.5GPF, C/W FILTERED PISTON KIT, MECANICAL OVERRIDE BUTTON, CONTROL STOP, VACUUM BREAKER, CHLORAMINE RESISTANT INTERNAL SEALS, ADJUSTABLE TAILPIECE. REPLACEMENT FOR EXISTING FLUSH VALVE. PROVIDE ALL NECESSARY FITTINGS FOR INSTALLATION AND OPERATION.
EX.WC	ZURN AQUASENSE BATTERY POWERED, SENSOR OPERATED WATER CLOSET FLUSH VALVE, MODEL ZTR6200-WS1-LL. 1.6GPF, C/W FILTERED PISTON KIT, MECANICAL OVERRIDE BUTTON, CONTROL STOP, VACUUM BREAKER, CHLORAMINE RESISTANT INTERNAL SEALS, ADJUSTABLE TAILPIECE. REPLACEMENT FOR EXISTING FLUSH VALVE. PROVIDE ALL NECESSARY FITTINGS FOR INSTALLATION AND OPERATION.
LAV-1	KINDRED MODEL QSL2020/8/3 SINGLE BOWL LEDGEBACK SINK, C/W TEMPLATE AND 3-1/2" BASKET STRAINER ASSEMPLY WITH TAILPIECE AND P-TRAP WITH CLEANOUT. 20"x20-1/2", 8" DEEP. 20 GAUGE, 18-8 STAINLESS STEEL. PROVIDE AMERICAN STANDARD MONTERREY MODEL 6405170 TOP MOUNT FAUCET WITH 5" GOOSENECK SWIVEL SPOUT AND WRISTBLADE HANDLES, 1.25 GPM/5.7 LPM PRESSURE COMPENSATING AERATOR, SOLID BRASS CONSTRUCTION W/ CERAMIC DISC CARTRIDGE, LEAD FREE.
LAV-2	BRADLEY "VERGE" DOUBLE STATION SENSOR ACTIVATED, BATTERY POWERED NATURAL QUARTZ SURFACE WASH BASIN, MODEL LVLD2 IR-DCD NSD TMA. 0.5 GPM/1.9 LPM SPRAY. PROVIDE ALL NECESSARY FITTINGS FOR INSTALLATION AND OPERATION. PROVIDE STRUCTURAL SUPPORT AS REQUIRED BY MANUFACTURER. COLOUR BY ARCHITECT.
LAV-3	AMERICAN STANDARD "MURRO" UNIVERSAL DESIGN WALL-HUNG SINK WITH EVERCLEAN, MODEL 0954 004EC. VITREOUS CHINA, FAUCET HOLES ON 4" CENTERS, REAR OVERFLOW, WHITE, C/W CARRIER SUPPORT AND SHROUD/KNEE CONTACT GUARD 0059 020EC. PROVIDE AMERICAN STANDARD "MONTERREY" TWO-HANDLE CENTERSET LAVATORY FAUCET WITH SWIVEL GOOSENECK SPOUT, MODEL 7500.170, 1.5 GPM/5.7 LPM PRESSURE COMPENSATING AERATOR, SOLID BRASS CONSTRUCTION. PROVIDE 1-1/4" P-TRAP WITH CLEANOUT, SCREW DRIVER STOPS, CHROME BRASS SUPPLIES AND ALL OTHER SUPPLIES AS REQUIRED.
LAV-4 BARRIER-FREE	AMERICAN STANDARD "MURRO" UNIVERSAL DESIGN WALL-HUNG SINK WITH EVERCLEAN, MODEL 0955 001EC. VITREOUS CHINA, CENTER HOLE ONLY, REAR OVERFLOW, WHITE, C/W CARRIER SUPPORT AND SHROUD/KNEE CONTACT GUARD 0059 020EC. PROVIDE AMERICAN STANDARD "SELECTRONIC" ELECTRONIC BATTERY POWERED PROXIMITY LAVATORY FAUCET, MODEL 6055.102. 1.5 GPM/5.7 LPM PRESSURE COMPENSATING VANDAL RESISTANT AERATOR, C/W THERMOSTATIC MIXING VALVE. PROVIDE 1-1/4" DRAIN W/ CLEANOUT, SCREW DRIVER STOPS, CHROME BRASS SUPPLIES AND ALL OTHER SUPPLIES AS NEEDED. INSTALLED PER BARRIER FREE REQUIREMENTS OF OBC.
LAV-5	ELKAY LUSTERTONE 22"x19.5"x5.5" SINGLE BOWL STAINLESS STEEL CLASSROOM SINK C/W FAUCET AND BUBBLER KIT, MODEL DRKAD222055C. 18 GAUGE 304 STAINLESS STEEL, REAR CENTER 3-1/2" DRAIN. PROVIDE P-TRAP WITH CLEANOUT, SCREWDRIVER STOPS, CHROME BRASS SUPPLIES AND ALL OTHER SUPPLIES AS REQUIRED.
MS	FIAT "MOLDED-STONE" 24"x24"x10" MOP SERVICE BASIN, MODEL MSB 2424 c/w SERVICE FAUCET (830-AA), HOSE AND HOSE BRACKET (832-AA), MOP HANGER (889-CC), VINYL BUMPERGAURD (E-77-AA), STAINLESS STEEL WALL GUARD (MSG2424), STAINLESS STEEL DRAIN BODY w/ COMBINATION DOME STRAINER AND LINT BASKET. PROVIDE ALL OTHER SUPPLIES AS NEEDED.
FD	WATTS MODEL FD-200 EPOXY COATED CAST IRON BODY ASSEMBLY WITH ANCHOR FLANGE, WEEP HOLES, 1/2" THICK 127mm (5") DIAMETER POLISHED NICKEL BRONZE STRAINER, FULL 4" THROAT OPENING. PIPE SIZE PER DRAWINGS. OR EQUAL.
RD	WATTS LARGE AREA ROOF DRAIN WITH SUMP RECEIVER, ADJUSTABLE EXTENSION & DECK CLAMP. MODEL RD-100-BED EPOXY COATED CAST IRON BODY WITH DEEP SUMP, WIDE SERRATED FLASHING FLANGE, FLASHING CLAMP DEVICE WITH INTEGRAL GRAVEL STOP AND SELF-LOCKING POLYETHYLENE DOME STRAINER. PIPE SIZE PER DRAWINGS.
CO	CLEANOUT IN-FLOOR. CAST IRON BODY, REMOVABLE POSITIVE GASKET SEAL CLOSURE, 6" ADJUSTABLE ROUND COVER. COVER TO BE NICKEL BRONZE.

PLUMBING LEGEND

4

SYMBOL	DESCRIPTION
	PIPE CAP
	ELBOW TURNED UP
	ELBOW TURNED DOWN
	REDUCER
	UNION
	PUMP
	STRAINER
FD	FLOOR DRAIN; FFD: FUNNEL FLOOR DRAIN; HD: HUB DRAIN
RD	ROOF DRAIN
	BALL VALVE
	GATE VALVE
	CHECK VALVE
PRV	PRESSURE RELIEF VALVE
	POWERED VALVE; M=MOTOR OPERATED
EX	EXPANSION TANK
FS	FLOW SWITCH
PG	PRESSURE GUAGE
	THREEWAY VALVE
AAV	AUTOMATIC AIR VENT
T	THERMOMETER
CO	CLEANOUT BELOW FLOOR
CO	CLEANOUT-IN FLOOR
HWT	HOT WATER TANK
WM	WATER METER
GM	NATURAL GAS METER
NFHB	NON FREEZE HOSE BIB WITH VACUUM BREAKER
	COLD WATER
	HOT WATER
	HOT WATER RECIRCULATION
STM	STORM DRAIN
RWL	RAIN WATER LEADER
SAN	SANITARY DRAIN
GAS	GAS PIPING
HWS	HOT WATER HEATING SUPPLY
HWR	HOT WATER HEATING RETURN

VENTILATION LEGEND

SYMBOL	DESCRIPTION
	SUPPLY AIR DUCT RISER
	RETURN AIR OR EXHAUST DUCT RISER
	CIRCULAR DUCT RISER
E	EXHAUST DUCT RISER
	DIFFUSER
	DIFFUSER, BLANK OFF SIDES AS SHOWN
	RETURN AIR GRILLE
E	EXHAUST FAN GRILLE
1 2 3	DIFFUSER DATA, 1: STYLE; 2: NECK SIZE; 3: CFM
1 2	GRILLE DATA, 1: STYLE; 2: SIZE
EF	EXHAUST FAN
	FLEXIBLE DUCT
	ACOUSTIC LINING ON DUCT
	EXTERNAL INSULATION ON DUCT
T	THERMOSTAT
	DUCT CAP
BD	BALANCING DAMPER
SD	SPLITTER DAMPER
	DIRECTION OF AIR FLOW
	PANEL RADIATOR PERIMETER HEATING
	UNIT HEATER
FD	FIRE DAMPER
DG	DOOR GRILLE
MD	MOTORIZED DAMPER
	MANUAL DAMPER
	EXHAUST FAN THROUGH WALL

ERV SCHEDULE

TAG	MODEL	AIRFLOW (CFM) O/A	AIRFLOW (CFM) E/A	AIRFLOW (CFM) S/A	AIRFLOW (CFM) MIXED	PREHEAT kW	HX SUMMER LAT(°F) DB	HX SUMMER LAT(°F) WB	HX SUMMER EFF(%) SENS	HX SUMMER EFF(%) TOTAL	HX WINTER LAT(°F) DB	HX WINTER LAT(°F) WB	HX WINTER EFF(%) SENS	HX WINTER EFF(%) TOTAL	POST HEATING TYPE	POST HEATING LAT(°F) DB	POST HEATING CAPACITY MBH	SUPPLY (In. W.G.) ISP	SUPPLY (In. W.G.) ESP	SUPPLY (In. W.G.) TSP	EXHAUST (In. W.G.) ISP	EXHAUST (In. W.G.) ESP	EXHAUST (In. W.G.) TSP	SUPPLY	EXHAUST	AMPERAGE UNIT FLA	AMPERAGE UNIT MCA	AMPERAGE UNIT MOP	AMPERAGE VOLTAGE	WEIGHT (LBS)	EATR (%)	OACF	ΔP2P3 (In. W.G.)
ERV	VHC-50	4800	4800	4800	–	0	78.6	65.7	64.2	63.2	36.5	30.6	65.2	63.2	PG	70.0	400.0	1.45	1.00	2.45	1.48	1.00	2.48	3.48	3.48	–	–	–	240/1/60	3340	3.4	1.06	1.50

NOTE: SUPPLY AND RETURN FAN MOTORS ARE TO BE SUPPLY AS 3 PHASE 208 VOLT MOTORS AND SUPPLIED POWER THROUGH VFDs RATED FOR SINGLE PHASE INPUT AND 3 PHASE OUTPUT.

DUCTLESS SPLIT SYSTEM SCHEDULE

4

TAG	INDOOR SYSTEM MODEL BY LG		COOLING kBTUH/h	HEATING kBTUH/h	CONTROLS	COMMENTS	OUTDOOR SYSTEM MODEL BY LG	COOLING kBTUH/h	HEATING kBTUH/h	RATED POWER COOLING	RATED POWER HEATING	ELECTRICAL
AC-1	LMN248HVT	WALL MOUNTED	25.7/24.3	6.8/2.1	WIRELESS REMOTE	R4A10A REFRIGERANT 230 VOLT/SP	LMU540HV	52.5/54.7	58.0/4.6	5.1/2.2 KW	5.4/2.9 KW	230/60/1 40 MOP 29.4 MCA
AC-2	LSN180HSV4	WALL MOUNTED	19.2/18.4	5.3/1.5	WIRELESS REMOTE	R4A10A REFRIGERANT 230 VOLT/SP						
AC-3	LSN180HSV4	WALL MOUNTED	12.8/12.1	3.5/1.0	WIRELESS REMOTE	R4A10A REFRIGERANT 230 VOLT/SP						

DESIGN CONDITIONS FOR PERFORMANCE

SUMMER INDOOR DBT(°F)	SUMMER INDOOR WBT(°F)	SUMMER INDOOR RH(%)	SUMMER OUTDOOR DBT(°F)	SUMMER OUTDOOR RH(%)	WINTER INDOOR DBT(°F)	WINTER INDOOR WBT(°F)	WINTER INDOOR RH(%)	WINTER OUTDOOR DBT(°F)	WINTER OUTDOOR RH(%)
80.6	67	50	84	50.6	68	56.6	50	-18.9	86

NOTES:
REFRIGERATION PIPING IS TO CONFORM TO ASME 31.5-REFRIGERATION PIPING CODE. ALL JOINTS ARE TO BE BRAZED OR SILVER SOLDERED. ALL TRADES PERSONS ARE TO BE QUALIFIED BY TSSA AUTHORIZED INSPECTOR. CONTRACTOR PERFORMING WORK IS TO POSSESS CURRENT CERTIFICATE OF AUTHORIZATION FOR REFRIGERATION PIPING AND PROVIDE CANADIAN REGISTRATION NUMBER AND ALL QUALITY DOCUMENTATION UPON COMPLETION OF PROJECT.

POPE FRANCIS ELEMENTARY
ADDITION & RENOVATION
PROJECT#R121

387 Balsam Street North
Timmins, Ontario

\\SERVER\Projects\pf1701 Pope Francis NECS\current\ocsb-logo.jpg

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REV	DESCRIPTION	DATE
4	REVISED FOR ADDENDUM #1	17.06.09
3	ISSUED FOR PERMIT & TENDER	17.05.17
2	ISSUED FOR CLIENT REVIEW	17.05.08
1	ISSUED FOR CLIENT REVIEW	17.04.28

REGISTERED PROFESSIONAL ENGINEER
2017-05-17
J.R.HAMALAINEN
3203
PROVINCE OF ONTARIO

BORTOLOTTO

PROJECT NUMBER
PF1701
JRHE 3203

DATE
17.05.17

N

SCALE
NTS

DRAWN BY
JD

MECHANICAL NOTES, LEGENDS & SPECIFICATIONS

4 M0.1

Digital Controller Points List
Pope Francis School

Point Description	Analog	Binary	Analog	Binary	Alarm	Non-DDC	Other	Notes
Main Boiler Room	**Input**	**Input**	**Output**	**Output**	**Point***	**Point****	**(specify)**	
Outside Air Sensor #1	X							BAS
Outside Air Sensor #2	X							Boiler Controller
Outside Air Sensor #1 Fail					X			BAS
Outside Air Sensor #2 Fail					X			Boiler Controller
BAS Enable Boilers				X				
Boiler #1 SWT	X							Boiler Controller
Boiler #1 Circulator Start Stop (P-5)				X				Boiler Controller
Boiler #1 Circulator status (P-5) (Current Sensor)		X			X			Boiler Controller
Boiler #1 Circulator Alarm (P-5)					X			Boiler Controller
Boiler #1 Enable - Disable				X				BAS
Boiler #1 Burner Status	X							Boiler Controller
Boiler #1 Target Firing Rate								Boiler Controller
Boiler #1 Actual Firing Rate.								Boiler Controller
Boiler #1 Inlet Water Temp								Boiler Controller
Boiler #1 Outlet Water Temperature								Boiler Controller
Boiler #1 Stack Temp.								Boiler Controller
Boiler #2 SWT	X							Boiler Controller
Boiler #2 Circulator Start Stop				X				Boiler Controller
Boiler #2 Circulator status		X						Boiler Controller
Boiler #2 Circulator Alarm (P-6)					X			Boiler Controller
Boiler #2 Enable - Disable				X				BAS
Boiler #2 Burner Status	X							Boiler Controller
Boiler #2 Target Firing Rate								Boiler Controller
Boiler #2 Actual Firing Rate.								Boiler Controller
Boiler #2 Inlet Water Temp								Boiler Controller
Boiler #2 Outlet Water Temperature								Boiler Controller
Boiler #2 Stack Temp.								Boiler Controller
Boiler #3 SWT	X							Boiler Controller
Boiler #3 Circulator Start Stop				X				Boiler Controller
Boiler #3 Circulator status		X						Boiler Controller
Boiler #3 Circulator Alarm (P-7)					X			Boiler Controller
Boiler #3 Enable - Disable				X				BAS
Boiler #3 Burner Status	X							Boiler Controller
Boiler #3 Target Firing Rate								Boiler Controller
Boiler #3 Actual Firing Rate.								Boiler Controller
Boiler #3 Inlet Water Temp								Boiler Controller
Boiler #3 Outlet Water Temperature								Boiler Controller
Boiler #3 Stack Temp.								Boiler Controller
Heating Supply Water Temperature #1	X				X			Boiler Controller
Heating Supply Water Temperature #2	X				X			BAS
Heating Return Water Temperature Zone #1	X				X			BAS
Heating Return Water Temperature Zone #2	X				X			BAS
Heating Return Water Temperature Common	X				X			BAS
Perimeter Heating Pump P05 Enable/Disable				X				BAS
Perimeter Heating Pump P05 Status		X						BAS
Perimeter Heating Pump P05 Alarm					X			BAS
Perimeter Heating Pump P06 Enable/Disable				X				BAS
Perimeter Heating Pump P06 Status		X						BAS
Perimeter Heating Pump P06 Alarm					X			BAS
DHW Tank Temp	X							Boiler Controller
DHW Priority Call for Heat				X				Boiler Controller
DHW Pump 11 Enable/Disable				X				Boiler Controller
DHW Pump 11 Status		X						Boiler Controller
DHW Pump 11 Alarm					X			Boiler Controller
Atrium Slab Heating Pump P07 Enable/Disable				X				BAS
Atrium Slab Heating Pump P-07 Status		X						BAS
Atrium Slab Heating Pump P07 Alarm					X			BAS
HVAC Unit #1 Energize Blower		X						
HVAC Unit #1 Blower Status				X				
HVAC Unit #1 Return Air Temp.	X							
HVAC Unit #1 Furnace Stage 1		X						
HVAC Unit #1 Furnace Stage 2		X						
HVAC Unit #1 Cooling (Comp)		X						
HVAC Unit #1 Compressor Status				X				
HVAC Unit #1 Dirty Filter		X						
HVAC Unit #1 Fault (Alarm)					X			
HVAC Unit #2 Energize Blower		X						
HVAC Unit #2 Blower Status				X				
HVAC Unit #2 Return Air Temp.	X							
HVAC Unit #2 Furnace Stage 1		X						
HVAC Unit #2 Furnace Stage 2		X						
HVAC Unit #2 Cooling (Comp)		X						
HVAC Unit #2 Compressor Status				X				
HVAC Unit #2 Dirty Filter		X						
HVAC Unit #2 Fault (Alarm)					X			
HVAC Unit #3 Energize Blower		X						
HVAC Unit #3 Blower Status				X				
HVAC Unit #3 Return Air Temp.	X							
HVAC Unit #3 Furnace Stage 1		X						
HVAC Unit #3 Furnace Stage 2		X						
HVAC Unit #3 Cooling (Comp)		X						
HVAC Unit #3 Compressor Status				X				
HVAC Unit #3 Dirty Filter		X						
HVAC Unit #3 Fault (Alarm)					X			
HVAC Unit #4 Energize Blower		X						
HVAC Unit #4 Blower Status				X				
HVAC Unit #4 Return Air Temp.	X							
HVAC Unit #4 Furnace Stage 1		X						
HVAC Unit #4 Furnace Stage 2		X						
HVAC Unit #4 Cooling (Comp)		X						
HVAC Unit #4 Compressor Status				X				
HVAC Unit #4 Dirty Filter		X						
HVAC Unit #4 Fault (Alarm)					X			
HVAC Unit #1 CO	X							
HVAC Unit #1 Fresh Air Damper			X					
HVAC Unit #1 Economizer				X				
HVAC Unit #2 CO	X							
HVAC Unit #2 Fresh Air Damper			X					
HVAC Unit #2 Economizer				X				
HVAC Unit #3 CO	X							
HVAC Unit #3 Fresh Air Damper			X					
HVAC Unit #3 Economizer				X				

Digital Controller Points List
Pope Francis School
Energy Recovery Unit

Point Description	Analog	Binary	Analog	Binary	Alarm	Non-DDC	Other	Notes
Ventilation	**Input**	**Input**	**Output**	**Output**	**Point***	**Point****	**(specify)**	
Outside Air Sensor #1	X							
Outside Air Sensor #2	X							
Outside Air Sensor #1 Fail					X			
Outside Air Sensor #2 Fail					X			
ERV Schedule							Program	
Pump P01 Enable - Disable				X				
Pump P01 Status		X						
Pump P01 Alarm					X			
Pump P02 Enable - Disable				X				
Pump P02 Status		X						
Pump P02 Alarm					X			
Pump P03 Enable - Disable				X				
Pump P03 Status		X						
Pump P03 Alarm					X			
Pump P04 Enable - Disable				X				
Pump P04 Status		X						
Pump P04 Alarm					X			
Glycol Supply Temperature T1	X							
Glycol Supply Temperature T2	X							
Glycol Return Temperature	X							
Modulating Valve Set Point			X					
Modulating Valve % Opened	X							
ERV Supply Fan Enable/Disable				X				
ERV Supply Fan Status		X						
ERV Supply Fan Alarm					X			
ERV Supply Fan Speed Control			X					
ERV Supply Fan Speed Reference	X							
ERV Exhaust Fan Enable/Disable				X				
ERV Exhaust Fan Status		X						
ERV Exhaust Fan Alarm					X			
ERV Exhaust Fan Speed Control			X					
ERV Exhaust Fan Speed Reference	X							
Return Air CO2 Level	X							
Return Air Temperature	X							
Exhaust Air Temperature	X							
Supply Air Temperature	X							
Supply Air Temperature	X							
Outside Air Temperature	X							
Outside Air Humidity	X							
Exhaust Air Damper Open - Close				X				
Exhaust Air Damper Open End Switch				X				
Exhaust Air Damper Closed End Switch		X						
Outside Air Damper Opened-Closed		X		X				
Outside Air Damper End Switch		X						

Wall Fin Radiation Schedule							
TYPE	MODEL BY MODINE		DISCRIPTION	CONDITIONS	OUTPUT	ELECTRICAL	Comments
	ENCLOUSRE	ELEMENT			BTU/HR		
A	S-24-14-N	CP-125-C-2 TEIR	24" SLOPING TOP	160°F AWT	1450	N/A	Wall Hung Bottom Inlet

Cabinet Unit Heater Schedule							
					Output		Comments
Type	Model By Modene	BLOWER CAPACITY	Discription	Conditions	BTU/HR	ELECTRICAL	
CUH01	C006-O-7-A-D-B-L-2-3-1-F-1-0	620 CFM / 370 CFM	WALL MOUNTED	20°F WTD; 6.2 USGPM; 160°F EWT	42340 / 29400	120 Volt Single Phase	Two Stage Blower, PSC motor with plug connector.
CHU02	C002-5-8-A-B-B-L-2-3-1-F-0-0	250 CFM / 140 CFM	CEILING MOUNTED	20°F WTD; 2.4 USGPM; 160°F EWT	16700 /10710	120 Volt Single Phase	Two Stage Blower, PSC motor with plug connector.
CHU03	HC-2-4-S-B-0-1-S-A	370 CFM	HUNG FROM CEILING	20°F WTD; 1.7GPM; 160°F EWT	11,570	120 Volt Single Phase	Horizontal Unit Heater

PUMP SCHEDULE

Tag No.	LOCATION	Serving	Model by Wilo	Type	FLUID	FLOW (USGPM)	Head (Feet)	Pipe Connections	Motor Type & Electrical	NOTES:
P01	BOILER ROOM ADDITION	Heat Exchanger	Stratos - 1.25- 3 x 35	Commercial Wet Rotor Design	WATER	35	20	1 1/4" Flanged Non-ANSI	1/4 HP; 230 Volt; Single Phase; 200 Watts max EMC Motor	Cataphoretic coated Cast Iron Housing, Stainless Steel Shaft, Plastic Impeller, Metal Impregnated carbon bearing, Delta p-v Pressure Differential Variable, factory set
P02	BOILER ROOM ADDITION	Heat Exchanger	Stratos - 1.5- 3 x 35	Commercial Wet Rotor Design	WATER	35	20	1 1/4" Flanged Non-ANSI	1/4 HP; 230 Volt; Single Phase; 200 Watts max EMC Motor	Cataphoretic coated Cast Iron Housing, Stainless Steel Shaft, Plastic Impeller, Metal Impregnated carbon bearing, Delta p-v Pressure Differential Variable, factory set
P03	BOILER ROOM ADDITION	Rooftop Energy Recovery Unit	Stratos - 1.5- 3 x 35	Commercial Wet Rotor Design	50% P.G.	35	20	1 1/4" Flanged Non-ANSI	1/4 HP; 230 Volt; Single Phase; 200 Watts max EMC Motor	Cataphoretic coated Cast Iron Housing, Stainless Steel Shaft, Plastic Impeller, Metal Impregnated carbon bearing, Delta p-v Pressure Differential Variable, factory set
P04	BOILER ROOM ADDITION	Rooftop Energy Recovery Unit	Stratos - 1.5- 3 x 35	Commercial Wet Rotor Design	50% P.G.	35	20	1 1/4" Flanged Non-ANSI	1/4 HP; 230 Volt; Single Phase; 200 Watts max EMC Motor	Cataphoretic coated Cast Iron Housing, Stainless Steel Shaft, Plastic Impeller, Metal Impregnated carbon bearing, Delta p-v Pressure Differential Variable, factory set
P05	BOILER ROOM ADDITION	Addition Hydronic Heating	Stratos - 1.5- 3 x 35	Commercial Wet Rotor Design	WATER	35	20	1 1/4" Flanged Non-ANSI	1/4 HP; 230 Volt; Single Phase; 200 Watts max EMC Motor	Cataphoretic coated Cast Iron Housing, Stainless Steel Shaft, Plastic Impeller, Metal Impregnated carbon bearing, Delta p-v Pressure Differential Variable, factory set
P06	BOILER ROOM ADDITION	Addition Hydronic Heating	Stratos - 1.5- 3 x 35	Commercial Wet Rotor Design	WATER	35	20	1 1/4" Flanged Non-ANSI	1/4 HP; 230 Volt; Single Phase; 200 Watts max EMC Motor	Cataphoretic coated Cast Iron Housing, Stainless Steel Shaft, Plastic Impeller, Metal Impregnated carbon bearing, Delta p-v Pressure Differential Variable, factory set
P07	BOILER ROOM ADDITION	Atrium Slab Heating	Stratos - 1.5- 3 x 20	Commercial Wet Rotor Design	WATER	5	13	1 1/4" Flanged Non-ANSI	1/12 HP; 230 Volt; Single Phase; 65 Watts Max, EMC Motor	Cataphoretic coated Cast Iron Housing, Stainless Steel Shaft, Plastic Impeller, Metal Impregnated carbon bearing, Delta p-v Pressure Differential Variable, factory set
P08	BOILER ROOM ADDITION	Boiler #1	By Boiler MFG						115 Volt; Single Phase	
P09	BOILER ROOM ADDITION	Boiler #2	By Boiler MFG						115 Volt; Single Phase	
P10	BOILER ROOM ADDITION	Boiler #3	By Boiler MFG						115 Volt; Single Phase	

HEAT EXCHANGER SCHEDULE

Tag No.	LOCATION	HEAT TRANSFERRED BTU/H	FLUID	FLOW (USGPM)	ET °F	LT °F	ΔP PSI	FLUID	FLOW (USGPM)	ET °F	LT °F	ΔP PSI	TYPE	NOTES:
HE-1	BOILER ROOM ADDITION	340,000	WATER	34.9	170	150	4.916	50% P.G.	25.1	130	160	2.692	ASME	ALLOY 316, OPERATING WEIGHT 65LBS 5.65 " X 7.52" X 24"

Boiler Schedule

Tag	Manufacture	Model	Natural Gas Input	Net IBR Rating	Efficiency	Comments
B01	Triangle Tube	CPS 1200	1,197,000 Btu/hr.	990,000 Btu/hr. 34 Boiler Horse Power	95%	complete with 3 Prestige Solo 399 Boilers; 3 Boiler Manifold (4" piping) & Structural Support with concrete anchors; 4" Low Loss heater; Flexible Stainless Steel Connectors; BACNet IP Modules; Low Water Cut-off & High Temperature limit manual reset & fittings; Stainless Steel Concentric Vent/Air Side Wall kit for 2 pipe CPVC System; 3 Boiler Common Vent Near Boiler kit; Horizontal Common Vent Termination.
						Contractor is to pay all costs for Factory Trained Techniction for Start up and Commissioning of the System, which is to enclude coordination with Building Automation System for Integration of Graphics.

Exhaust Fan Schedule

Tag	Manufacture	Model	Capacity	Static Pressure	Electrical	Comments
EF-1	Solar & Palau	FF100	100	1/8" WC	120V SP 1.1 Amps	C/W Time Delay off Switch & Back Draft Damper
EF-2	Soler & Palau	FF200	200	1/8" WC	120V SP 1.8 Amps	C/W Time Delay off switch & Back Draft Damper
EF-3	Soler & Palau	FF250	245	1/8" WC	120V SP 2.1 Amps	LAN Room Controlled by Honeywell T651 Cooling Thermostat
EF-4	Soler & Palau	TD100XS	110	1/8" WC	120V SP 21 Watts	C/W Backdraft Damper & Time Delay Switch (2) Wired in Parallel

ERV SEQUENCE OF OPERATIONS

WINTER MODE OUTSIDE AIR TEMPERATURE BELOW 13°C

UNOCCUPIED

THE SUPPLY AND EXHAUST FANS SHALL REMAIN OFF WITH THE FRESH AIR AND EXHAUST AIR DAMPERS CLOSED. THE GLYCOL HEATING PUMPS FOR THE HRV P03 (P04) SHALL REMAIN OFF. THE HEATING SUPPLY PUMPS FOR THE HEAT EXCHANGER P05 (P06) SHALL REMAIN OFF.

PUMPS P03 (P04) SHALL RUN CONTINUOUSLY WHEN THE OUTSIDE AIR TEMPERATURE IS BELOW 2 DEGREES CELSIUS. EACH WEEK THE LEAD PUMP SHALL ALTERNATE. IF THE LEAD PUMP FAILS, THE BAS SHALL ALARM AND THE LAG PUMP SHALL BE ENERGIZED. IF THE LAG PUMP FAILS, THE BAS SHALL ALARM.
PUMPS P05 (P06) SHALL RUN CONTINUOUSLY WHEN THE OUTSIDE AIR TEMPERATURE IS BELOW 2 DEGREES CELSIUS EACH WEEK THE LEAD PUMP SHALL ALTERNATE. IF THE LEAD PUMP FAILS, THE BAS SHALL ALARM AND THE LAG PUMP SHALL BE ENERGIZED. IF THE LAG PUMP FAILS, THE BAS SHALL ALARM.

THE MODULATING CONTROL VALVE SHALL BE SET AT 10% OPENED DURING THE WINTER UNOCCUPIED PERIOD.

WINTER OCCUPIED

AT THE START OF THE SCHEDULED OCCUPIED PERIOD, THE LEAD HEAT EXCHANGER PUMP AND GLYCOL COIL PUMP SHALL START, AND THE MODULATING VALVE SHALL MODULATE TO MAINTAIN DISCHARGE AIR TEMPERATURE OF 18 DEGREES CELSIUS. THE ENERGY RECOVERY WHEEL DRIVE SHALL START AND RAMP UP TO FULL SPEED. THE FRESH AIR AND EXHAUST AIR DAMPER SHALL BE OPENED, AND WHEN THEY HAVE BEEN PROVEN OPENED, THE FANS SHALL RAMP UP SLOWLY, 600 RPM PER MINUTE TO FULL SPEED, WITH THE HEATING VALVE MODULATING CONSCIOUSLY TO MAINTAIN DISCHARGE AIR TEMPERATURE. THE ENERGY RECOVERY WHEEL DRIVE SHALL MODULATE THE SPEED OF THE ENERGY WHEEL TO MAINTAIN AN EXHAUST TEMPERATURE OF 1 DEGREE CELSIUS FOR FROST PROTECTION.

THE BAS SHALL MONITOR AND DISPLAY ON THE GRAPHIC, THE RETURN CO2 LEVEL IN PPM. THE SUPPLY AND RETURN FANS SHALL MODULATE TO MAINTAIN A CO2 LEVEL IN THE RETURN AIR TO 800 PPM, BUT THE FANS SHALL NOT SLOW DOWN BELOW 50%, NOR SHALL THEY INCREASE ABOVE 100% FAN SPEED.

AT THE END OF THE OCCUPIED PERIOD, THE SUPPLY AND EXHAUST FAN SHALL SLOWLY RAMP DOWN TO ZERO SPEED, AND THEN THE FRESH AIR DAMPER AND THE EXHAUST AIR DAMPER SHALL BE CLOSED. THE GLYCOL PUMP AND THE HEATING PUMP SHALL SHUTDOWN PROVIDED THAT THE OUTSIDE AIR TEMPERATURE IS ABOVE 2 DEGREES CELSIUS.

SUMMER MODE (OUTSIDE AIR TEMPERATURE ABOVE 13°C)

SUMMER UNOCCUPIED.

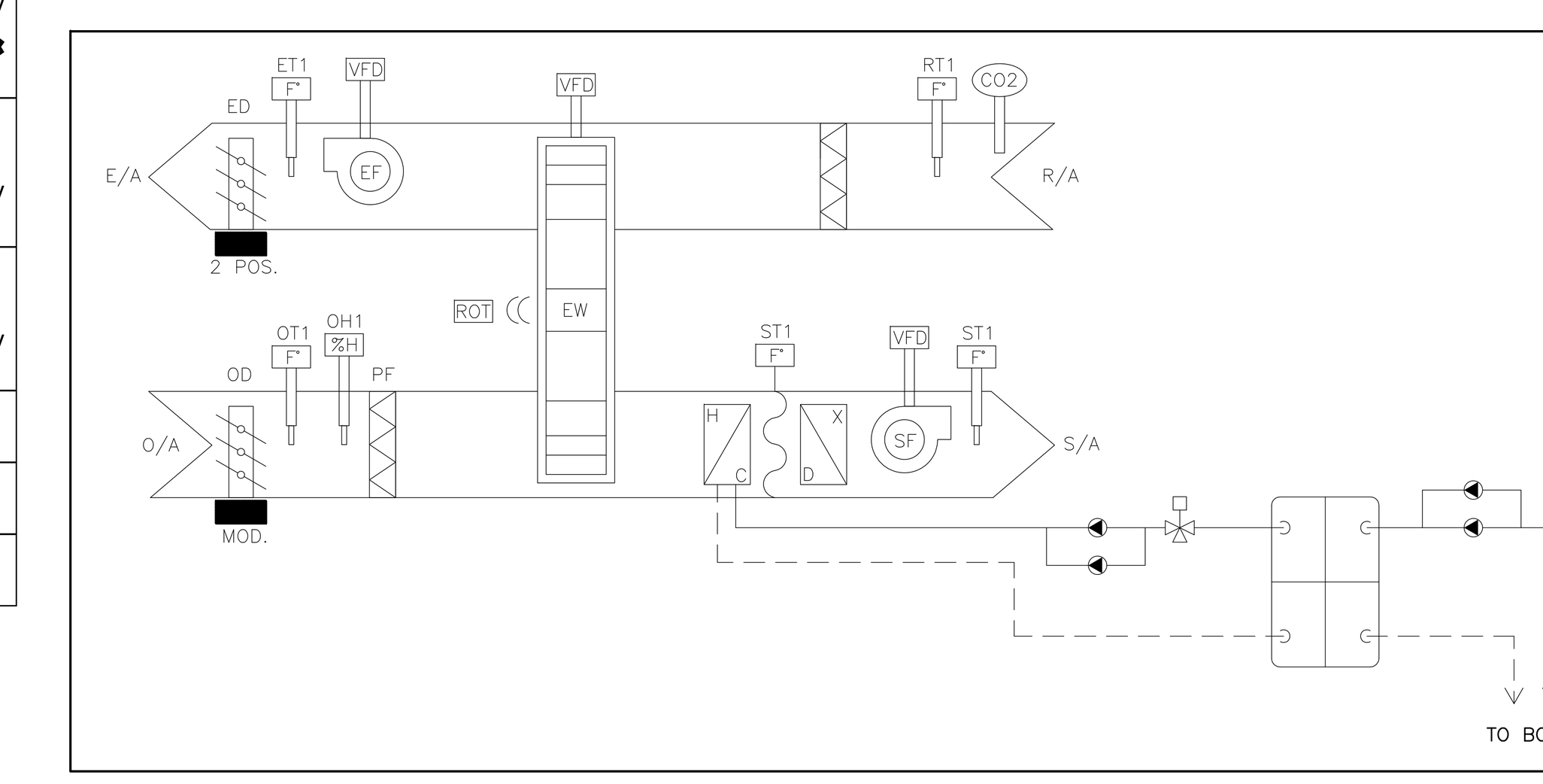
THE SUPPLY AND EXHAUST FANS SHALL REMAIN OFF WITH THE FRESH AIR AND EXHAUST AIR DAMPERS CLOSED. THE GLYCOL HEATING PUMPS FOR THE HRV P03 (P04) SHALL REMAIN OFF. THE HEATING SUPPLY PUMPS FOR THE HEAT EXCHANGER P05 (P06) SHALL REMAIN OFF.

SUMMER OCCUPIED.

AT THE START OF THE OCCUPIED PERIOD, THE ENERGY RECOVERY WHEEL DRIVE SHALL RAMP THE SPEED OF THE ENERGY WHEEL UP TO 100%, THE FRESH AIR AND EXHAUST AIR DAMPERS SHALL OPEN, AND WHEN THE DAMPERS HAVE BEEN PROVEN OPENED, THE SUPPLY AND EXHAUST FANS SHALL RAMP UP TO FULL SPEED AT A RATE OF 600 RPM PER MINUTE.

THE BAS SHALL MONITOR AND DISPLAY ON THE GRAPHIC, THE RETURN CO2 LEVEL IN PPM. THE SUPPLY AND RETURN FANS SHALL MODULATE TO MAINTAIN A CO2 LEVEL IN THE RETURN AIR TO 800 PPM, BUT THE FANS SHALL NOT SLOW DOWN BELOW 50%, NOR SHALL THEY INCREASE ABOVE 100% FAN SPEED.

AT THE END OF THE OCCUPIED PERIOD, THE SUPPLY AND EXHAUST FANS SHALL BE RAMPED DOWN TO ZERO SPEED AT 600 RPM PER MINUTE. ONCE THE FANS ARE AT ZERO SPEED, THE FRESH AIR AND EXHAUST DAMPERS SHALL BE CLOSED, AND THE ENERGY RECOVERY WHEEL SHALL RAMP DOWN TO ZERO SPEED.



1 / M0.2 ENERGY RECOVERY UNIT CONTROL DIAGRAM
N.T.S

SEQUENCE OF OPERATION FOR ATRIUM

EQUIPMENT: HVAC #1; HVAC #2; SLAB HEATING PUMP #7 & MIXING VALVE.

GENERAL

THE INDOOR TEMPERATURE SHALL BE MONITORED BY THE TWO TEMPERATURE SENSORS LOCATED AT THE BOTTOM OF THE STAIRS ON THE NORTH SIDE OF THE ATRIUM, AND ON THE ATRIUM SIDE OF THE WALL OPPOSITE THE SUPPLY AND RETURN MANIFOLD FOR THE SLAB HEATING.

WINTER UNOCCUPIED

HVAC #1 & HVAC #2 WILL REMAIN OFF WITH DAMPERS CLOSED AND BLOWER DE-ENERGIZED.

PUMP P-7 SHALL RUN CONTINUOUSLY WHENEVER THE OUTSIDE AIR TEMPERATURE IS BELOW 13°C.

THE MIXING VALVE SHALL MODULATE TO MAINTAIN SET-BACK ROOM SET POINT TEMPERATURE OF 17°C. THE SUPPLY WATER TEMPERATURE TO THE SLAB SHALL NEVER EXCEED 38°C. IF THIS SHOULD OCCUR, THE BAS SHALL INITIATE A HIGH TEMPERATURE ALARM. THE HEATING RETURN WATER TEMPERATURE FROM THE SLAB SHALL NOT EXCEED 20°C. THE MIXING VALVE SHALL BE CONTROLLED FROM AN AVERAGE OF THE TWO SPACE SENSORS.

WHEN THE ATRIUM IS CALLING FOR HEAT, (ACTUAL TEMPERATURE LESS THAN 17°C) THE MODULATING CONTROL VALVE SHALL MODULATE TO MAINTAIN THE SUPPLY WATER TEMPERATURE AS FOLLOWS.

OUTDOOR AIR TEMPERATURE	HOT WATER SUPPLY (MAIN LOOP)	HOT WATER SUPPLY (SLAB HEATING LOOP)
LOWER THAN -30°C	83°C	36°C
-30°C TO 4°C	83°C TO 60°C	
4°C TO 13°C	60°C	
-30°C TO 13°C		36°C TO 25°C

IF THE ROOM SET POINT IS SATISFIED THE MODULATING CONTROL VALVE SHALL MODULATE TO MAINTAIN THE SLAB HEATING SUPPLY TEMPERATURE AT 1°C HIGHER THAN THE SLAB RETURN WATER TEMPERATURE.

IF THE ROOM SET POINT RISES 1°C HIGHER THAN THE SET POINT, THE MODULATING VALVE SHALL GO TO 100% RECIRCULATION.

IF THE SPACE TEMPERATURE FALLS TO MORE THAN 3°C BELOW SET POINT, THE SUPPLY WATER TEMPERATURE SHALL INCREASE BY 3°C UNTIL SPACE TEMPERATURE IS 1°C BELOW SET POINT.

WINTER OCCUPIED.

HVAC UNITS #1 AND #2 BLOWERS SHALL BE ENERGIZED 15 MINUTES PRIOR TO THE START OF THE OCCUPIED PERIOD. WITH DAMPERS IN THE CLOSED POSITION. 10 MINUTES AFTER THE BLOWERS ARE ENERGIZED, THE BAS SHALL MONITOR THE CO2 LEVEL IN THE RETURN AIR OF EACH OF THE TWO HVAC UNITS, AND MODULATE THE FRESH AIR DAMPER TO MAINTAIN A CO2 LEVEL OF 800 PPM. IF THE SPACE TEMPERATURE IS SATISFIED THE FURNACE SHALL REMAIN OFF.

HEATING MODE – THE SPACE TEMPERATURE SHALL BE MAINTAINED AT AN OCCUPIED SET POINT OF 20°C, THE SLAB HEATING SHALL BE CONSIDERED TO BE 1ST STAGE HEATING AND SHALL BE OPERATED AS BELOW. IF THE SPACE TEMPERATURE FALLS BELOW 20°C WITH THE SLAB HEATING OPERATING AS DESCRIBED, THE 1ST STAGE FURNACE BURNER SHALL BE ENERGIZED. IF AFTER 15 MINUTES THE TEMPERATURE FALLS TO 19°C THE 2ND STAGE OF THE HVAC FURNACE SHALL FIRE. BOTH HVAC UNITS SHALL FUNCTION THE SAME, WITH HVAC #1 CONTROLLED FROM THE SOUTH SENSOR, AND HVAC #2 CONTROLLED FROM THE NORTH SENSOR. IF SPACE TEMPERATURE RISES ABOVE 19°C THE 2ND STAGE BURNER SHALL BE DE-ENERGIZED, IF THE SPACE TEMPERATURE REACHES 20°C THE FURNACE 1ST STAGE SHALL BE DE-ENERGIZED.

PUMP P-7 SHALL RUN CONTINUOUSLY WHENEVER THE OUTSIDE AIR TEMPERATURE IS BELOW 13°C.

THE MIXING VALVE SHALL MODULATE TO MAINTAIN SET-BACK ROOM SET POINT TEMPERATURE OF 20°C 30 MINUTES PRIOR TO THE OCCUPIED PERIOD STARTS. THE SUPPLY WATER TEMPERATURE TO THE SLAB SHALL NEVER EXCEED 38°C. IF THIS SHOULD OCCUR, THE BAS SHALL INITIATE A HIGH TEMPERATURE ALARM. THE HEATING RETURN WATER TEMPERATURE FROM THE SLAB SHALL NOT EXCEED 20°C. THE MIXING VALVE SHALL BE CONTROLLED FROM AN AVERAGE OF THE TWO SPACE SENSORS.

WHEN THE ATRIUM IS CALLING FOR HEAT, (ACTUAL TEMPERATURE 20°C OR LESS) THE MODULATING CONTROL VALVE SHALL MODULATE TO MAINTAIN THE SUPPLY WATER TEMPERATURE AS FOLLOWS.

OUTDOOR AIR TEMPERATURE	HOT WATER SUPPLY (MAIN LOOP)	HOT WATER SUPPLY (SLAB HEATING LOOP)
LOWER THAN -30°C	83°C	36°C
-30°C TO 4°C	83°C TO 60°C	
4°C TO 13°C	60°C	
-30°C TO 13°C		36°C TO 25°C

IF THE ROOM SET POINT IS SATISFIED THE MODULATING CONTROL VALVE SHALL MODULATE TO MAINTAIN THE SLAB HEATING SUPPLY TEMPERATURE AT 1°C HIGHER THAN THE SLAB RETURN WATER TEMPERATURE.

IF THE ROOM SET POINT RISES 1°C HIGHER THAN THE SET POINT, THE MODULATING VALVE SHALL GO TO 100% RECIRCULATION.

SUMMER UN-OCCUPIED.

PUMP P-7 SHALL REMAIN OFF AT ALL TIMES, EXCEPT FOR BEING EXERCISED FOR 20 MINUTES ONCE PER WEEK BETWEEN 1:00 AM AND 1:20 AM ON EACH SUNDAY. THE MODULATING CONTROL VALVE SHALL GO FROM 20% OPENED TO 80% OPENED, THEN BACK TO 20% OPENED.

HVAC #1 AND HVAC #2 SHALL REMAIN OFF UNLESS THE SETBACK TEMPERATURE OF 25°C IS REACHED. AT WHICH TIME THE BLOWER SHALL BE ENERGIZED. IF POSSIBLE THE ECONOMIZER SHALL MODULATE TO COOL THE SPACE TO 20°C. IF CONDITIONS DO NOT ALLOW FOR THE ECONOMIZER TO OPERATE, THE MECHANICAL REFRIGERATION SHALL BE ENERGIZED AND THE UNIT SHALL RUN UNTIL THE SPACE TEMPERATURE IS COOLED TO 24°C, ONCE THE TEMPERATURE IS SATISFIED THE BLOWER SHALL BE DE-ENERGIZED 5 MINUTES AFTER THE MECHANICAL COOLING IS DE-ENERGIZED. ONLY ONE UNIT SHALL RUN AT A TIME, AND THE RUNNING UNIT SHALL ALTERNATE AFTER EACH OPERATION.

SUMMER OCCUPIED.

PUMP P-7 SHALL REMAIN OFF.

HVAC #1 AND HVAC #2 SHALL BE ENERGIZED 20 MINUTES PRIOR TO THE OCCUPIED PERIOD, THE BLOWER SHALL START AND THE DAMPERS SHALL RESPOND TO THE INDOOR TEMPERATURE FOR COOLING. HVAC #1 SHALL BE CONTROLLED FROM THE SOUTH SPACE SENSOR, AND HVAC #2 FROM THE NORTH SPACE SENSOR AS FOLLOWS.

IF THE SPACE TEMPERATURE IS ABOVE SET POINT OF 22°C THE UNIT MECHANICAL COMPRESSOR SHALL BE ENERGIZED, IF THE OUTSIDE TEMPERATURE CONDITIONS ARE SUITABLE FOR THE ECONOMIZER TO RUN, THE MECHANICAL COOLING SHALL BE LOCKED OUT AND THE ECONOMIZER SHALL MODULATE OUTSIDE AIR DAMPERS FOR COOLING.

SEQUENCE OF OPERATION FOR HVAC #3 AND #4

EQUIPMENT: HVAC #3 AND WALL FIN RADIATION CONTROL VALVE; OR HVAC #4 AND INDIVIDUAL ROOM WALL FIN RADIATION CONTROL VALVES.

GENERAL

THE INDOOR TEMPERATURE SHALL BE MONITORED BY THE ROOM TEMPERATURE SENSORS LOCATED IN EACH ROOM OR CORRIDOR. THE 2ND FLOOR CONNECTING CORRIDOR SHALL HAVE ONLY 1 SENSOR CONTROLLING BOTH THE WALL FIN RADIATION AND THE HVAC UNIT. THE 1ST FLOOR HVAC UNIT SHALL BE CONTROLLED BY THE FOYER TEMPERATURE SENSOR, SENSORS IN GYM 101, AND MEETING 102 SHALL BE USED TO CONTROL THE WALL FIN RADIATION.

WINTER UNOCCUPIED

HVAC WILL REMAIN OFF WITH DAMPERS CLOSED AND BLOWER DE-ENERGIZED.

SPACE TEMPERATURE SHALL BE MAINTAINED AT SET-BACK SET-POINT BY MODULATING THE WALL FIN RADIATION CONTROL VALVE OPENED AND CLOSED AS NEEDED. IF TEMPERATURE FALLS BELOW SET-POINT, THE VALVE SHALL MODULATE OPENED, IF SPACE TEMPERATURE RISES ABOVE SET-POINT, THE VALVE SHALL MODULATE CLOSED. UN-OCCUPIED SET-POINT SHALL BE 17°C.

WINTER OCCUPIED

HVAC UNIT BLOWERS SHALL BE ENERGIZED 15 MINUTES PRIOR TO THE START OF THE OCCUPIED PERIOD. WITH DAMPERS IN THE CLOSED POSITION. AFTER 10 MINUTES THE BLOWERS ARE ENERGIZED, THE BAS SHALL MONITOR THE CO2 LEVEL IN THE RETURN AIR OF EACH OF THE TWO HVAC UNITS, AND MODULATE THE FRESH AIR DAMPER TO MAINTAIN A CO2 LEVEL OF 800 PPM. IF THE SPACE TEMPERATURE IS SATISFIED THE FURNACE SHALL REMAIN OFF.

HEATING MODE – THE SPACE TEMPERATURE SHALL BE MAINTAINED AT AN OCCUPIED SET POINT OF 20°C, THE WALL FIN RADIATION HEATING SHALL BE CONSIDERED TO BE 1ST STAGE HEATING AND SHALL BE OPERATED AS BELOW. IF THE SPACE TEMPERATURE FALLS BELOW 20°C WITH THE HEATING CONTROL VALVE AT 100%, THE 1ST STAGE FURNACE BURNER SHALL BE ENERGIZED. IF AFTER 15 MINUTES THE TEMPERATURE FALLS TO 19°C THE 2ND STAGE OF THE HVAC FURNACE SHALL FIRE. IF SPACE TEMPERATURE RISES ABOVE 19°C THE 2ND STAGE BURNER SHALL BE DE-ENERGIZED, IF THE SPACE TEMPERATURE REACHES 20°C THE FURNACE 1ST STAGE SHALL BE DE-ENERGIZED, THEN THE HEATING VALVE WILL MODULATE AS BELOW.

THE FOYER HVAC UNIT WILL NOT HAVE 1ST STAGE HEATING VALVE, 1ST STAGE AND 2ND STAGE HEATING WILL BE FROM THE HVAC UNIT WHICH WILL CYCLE TO MAINTAIN SET POINT.

GYM 101, AND MEETING 102 HEATING CONTROL VALVES SHALL MODULATE TO MAINTAIN SET POINT OF 20°C.

SPACE TEMPERATURE SHALL BE MAINTAINED AT SET-POINT BY MODULATING THE WALL FIN RADIATION CONTROL VALVE OPENED AND CLOSED AS NEEDED. IF TEMPERATURE FALLS BELOW SET-POINT, THE VALVE SHALL MODULATE OPENED, IF SPACE TEMPERATURE RISES ABOVE SET-POINT, THE VALVE SHALL MODULATE CLOSED. OCCUPIED SET-POINT SHALL BE 20°C.

SUMMER UN-OCCUPIED

HEATING CONTROL VALVES SHALL REMAIN CLOSED, HOWEVER ONCE PER WEEK THEY SHALL BE OPENED TO 100% AT 0:30 HRS EACH SUNDAY AND CLOSED TO 0% AT 0:40 EACH SUNDAY.

HVAC UNIT SHALL REMAIN OFF UNLESS THE SETBACK TEMPERATURE OF 25°C IS REACHED. AT WHICH TIME THE BLOWER SHALL BE ENERGIZED. IF POSSIBLE THE ECONOMIZER SHALL MODULATE TO COOL THE SPACE TO 20°C. IF CONDITIONS DO NOT ALLOW FOR THE ECONOMIZER TO OPERATE, THE MECHANICAL REFRIGERATION SHALL BE ENERGIZED AND THE UNIT SHALL RUN UNTIL THE SPACE TEMPERATURE IS COOLED TO 24°C, ONCE THE TEMPERATURE IS SATISFIED THE BLOWER SHALL BE DE-ENERGIZED 5 MINUTES AFTER THE MECHANICAL COOLING IS DE-ENERGIZED. ONLY ONE UNIT SHALL RUN AT A TIME, AND THE RUNNING UNIT SHALL ALTERNATE AFTER EACH OPERATION.

SUMMER OCCUPIED

HEATING CONTROL VALVES SHALL REMAIN CLOSED.

HVAC UNITS SHALL BE ENERGIZED 20 MINUTES PRIOR TO THE OCCUPIED PERIOD, THE BLOWER SHALL START AND THE DAMPERS SHALL RESPOND TO THE INDOOR TEMPERATURE FOR COOLING.

IF THE SPACE TEMPERATURE IS ABOVE SET POINT OF 22°C THE UNIT MECHANICAL COMPRESSOR SHALL BE ENERGIZED, IF THE OUTSIDE TEMPERATURE CONDITIONS ARE SUITABLE FOR THE ECONOMIZER TO RUN, THE MECHANICAL COOLING SHALL BE LOCKED OUT AND THE ECONOMIZER SHALL MODULATE OUTSIDE AIR DAMPERS FOR COOLING.

SEQUENCE OF OPERATIONS FOR VESTIBULE CABINET UNIT HEATERS, AND BOILER ROOM UNIT HEATER.

THESE UNITS SHALL BE CONTROLLED BY LINE VOLTAGE THERMOSTATS THAT WILL ENERGIZE THE BLOWERS WHEN SPACE TEMPERATURE FALLS BELOW SET-POINT. THESE UNITS WILL HAVE HEATING WATER FLOWING THROUGH THEM AT ALL TIMES, NO CONTROL VALVE IS REQUIRED.

4

4

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ADDITION & RENOVATION
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REGISTERED PROFESSIONAL ENGINEER
2017-05-17
J.R.HAMALAINEN
3203
PROVINCE OF ONTARIO

BORTOLOTTO

PROJECT NUMBER
PF1701
JRHE 3203

DATE
17.05.17

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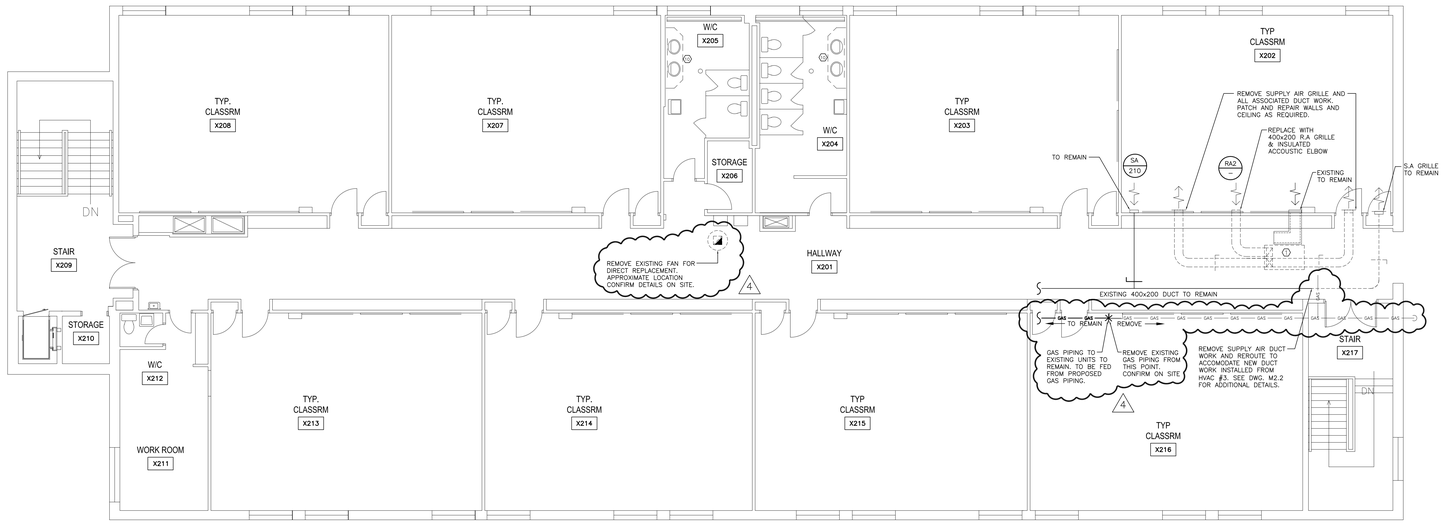
MECHANICAL
NOTES, LEGENDS & POINTS LISTS

4 M0.2

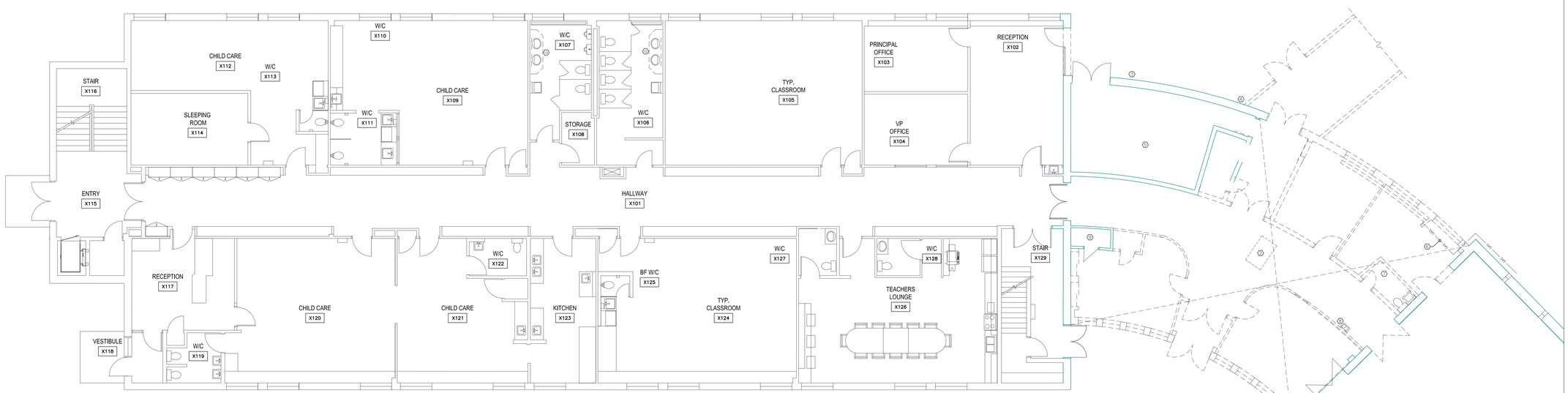


SECOND FLOOR – DEMOLITION PLAN

MECHANICAL DEMOLITION NOTES:

4

1. REMOVE THE EXISTING ROOFTOP AIR CONDITIONER, AND ASSOCIATED DUCT WORK, FROM THE 2ND FLOOR ROOF. FILL IN THE CURB WITH R-20 INSULATION, AND COVER WITH 1B GAUGE 304 STAINLESS STEEL CAP WITH 4 INCH SIDES, WELD SEAMS AT CORNERS, AND SECURE TO CURB WITH SHEET METAL SCREWS OR WOOD SCREWS AS APPROPRIATE.
2. REMOVE THE EXISTING ROOFTOP UNIT FROM THE EXISTING 1 STORY ROOF ABOVE ADMINISTRATION. ALL DUCTWORK, GRILLES AND DIFFUSERS FOR THIS UNIT ARE TO BE REMOVED AND DISCARDED. PROVIDE TEMPORARY PLYWOOD COVER TO MEET OSHA UNTIL ROOF IS REMOVED BY GENERAL CONTRACTOR. **TURN OVER UNIT TO OWNER.**
3. REMOVE THE EXISTING COMBUSTION AND VENTILATION AIR LOUVERS AND DUCTS, REFER TO DRAWINGS FOR REPLACEMENT DUCTS AND ROOF CURB, ETC.
4. REMOVE THE EXISTING RAIN WATER LEADER AND WALL SPOUT FOR STORM DRAINAGE.
5. THE EXISTING ROOF WILL BE ENTIRELY REMOVED AND REPLACED BY THE GENERAL CONTRACTOR. THE MECHANICAL CONTRACTOR IS TO PROVIDE TEMPORARY SUPPORT FOR ALL MECHANICAL DUCTWORK, HEATING SUPPLY AND RETURN PIPING, DOMESTIC WATER HOT, COLD AND RECIRCULATION PIPING, ETC. REMOVE ALL PIPING AND DUCT HANGERS FROM THE CEILING TO FACILITATE THE REMOVAL OF THE ROOF. ONCE THE NEW ROOF HAS BEEN REINSTALLED, THE CONTRACTOR IS TO PROVIDE DUCT HANGERS AND PIPING HANGERS TO SUPPORT ALL DUCTWORK AND PIPING, AND MECHANICAL EQUIPMENT ORIGINALLY SUPPORTED BY THE ROOF STRUCTURE. ALL SERVICES FOR EXISTING BUILDING ARE TO REMAIN OPERATIONAL AT ALL TIMES DURING DEMOLITION AND CONSTRUCTION.
6. THE EXISTING NATURAL GAS PIPING IS TO BE REMOVED FROM THE GAS METER TO THE NATURAL GAS PIPING HEADER TO THE BOILERS AND WATER HEATER. THIS HEADER IS TO BE RESUPPLIED NATURAL GAS AS INDICATED ON THE MECHANICAL CONSTRUCTION DRAWINGS. THE GAS METER SET IS TO BE MODIFIED TO PROVIDE 5 PSIG GAS BY THE UTILITY COMPANY, MECHANICAL CONTRACTOR IS TO COORDINATE WITH THE GAS COMPANY AND PAY ALL COSTS.
7. REMOVE THE EXISTING WASHROOM TOILET AND SINK, EXTEND THE DRAINAGE, HOT WATER, AND COLD WATER PIPING TO THE NEW LOCATION OF THE WASHROOM, AND ROUGH IN THE PLUMBING FOR THE PROPOSED WASHROOM, AND INSTALL FIXTURES AS PER DRAWINGS. REMOVE THE EXHAUST FAN, DUCT, AND CURB, ETC. PLUMBING VENT TO BE COMPLETELY REMOVED, PROVIDE VENT FOR PROPOSED WASHROOM AT THE NEW LOCATION, IN THE REPLACEMENT ROOF.
8. REMOVE EXISTING WATER FOUNTAIN COMPLETELY INCLUDING DOMESTIC WATER, DRAIN WASTE AND VENT CAP IN CRAWL SPACE, REMOVE VENT COMPLETELY.
9. REMOVE EXISTING EXHAUST FAN, DUCT, CURB, ETC. REMOVE THE EXISTING PLUMBING VENT, ALL TO BE PROVIDED AFTER THE REPLACEMENT ROOF HAS BEEN REINSTALLED FOR THE WASHROOM WHICH WILL BE REMAINING.
10. REMOVE EXISTING SINKS FROM MEN'S & WOMEN'S WASHROOMS TO PREPARE FOR INSTALLATION OF NEW SINKS. PATCH AND REPAIR WALLS AND FLOOR AS REQUIRED.



FIRST FLOOR – DEMOLITION PLAN

1 M1.0 MECHANICAL LAYOUT - DEMOLITION PLAN
1:75

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BORTOLOTTO

PROJECT NUMBER
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JRHE 3203

DATE
17.05.17

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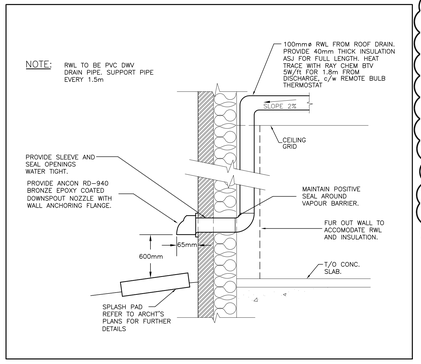
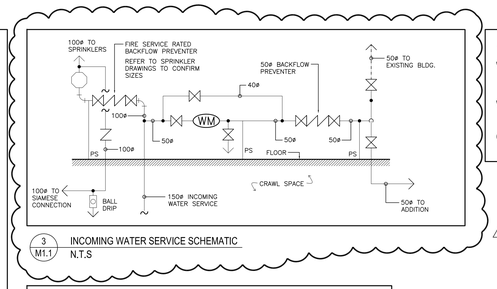
DEMOLITION PLAN
MECHANICAL LAYOUT

4 M1.0



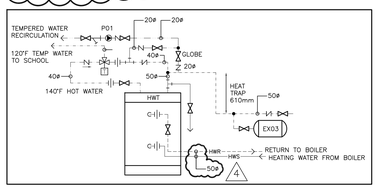
2 M1.1 TYPICAL RAINWATER DISCHARGE DETAIL
N.T.S



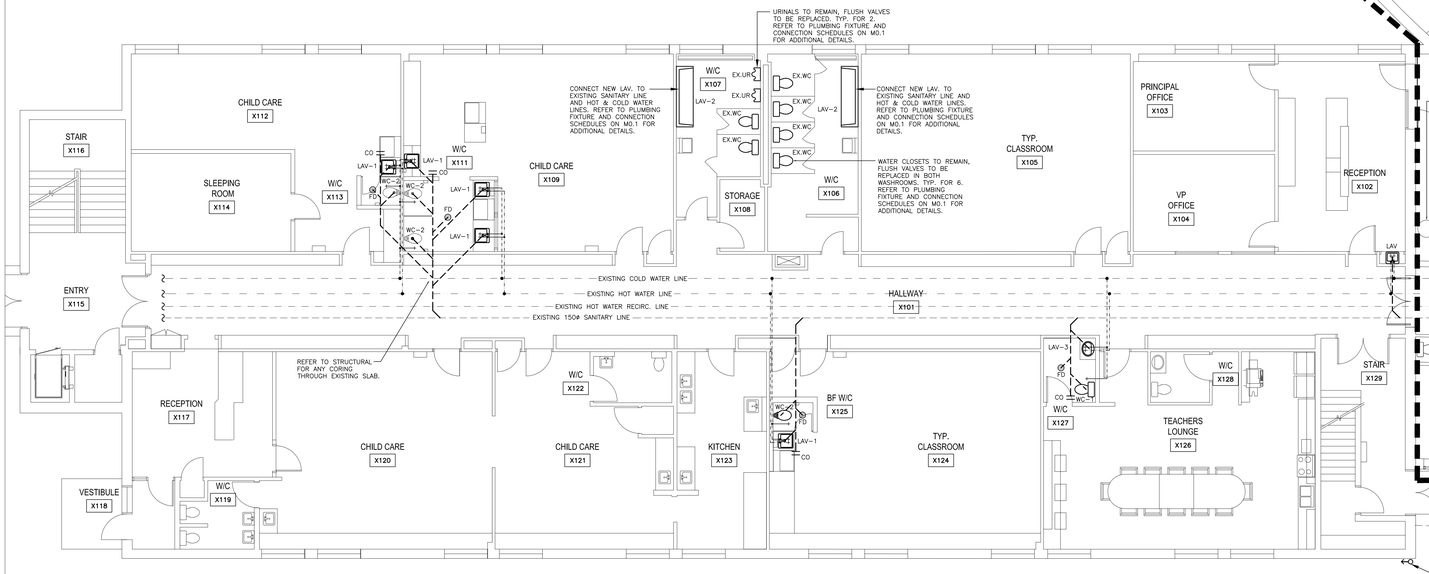
3 M1.1 INCOMING WATER SERVICE SCHEMATIC
N.T.S

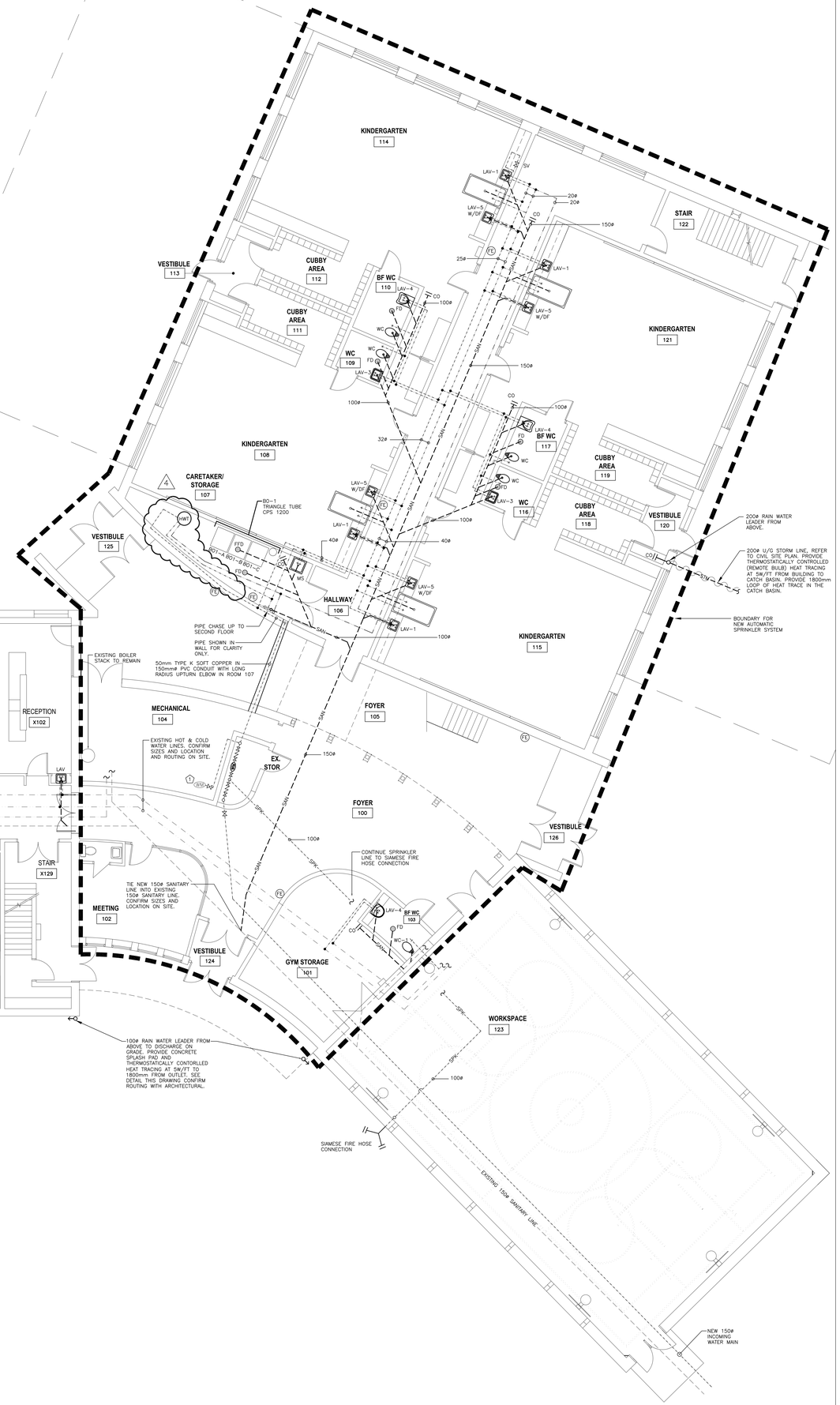
NOTES

1. EXISTING WATER METER TO BE REMOVED. EXISTING PLUMBING SERVICES TO EXISTING SCHOOL TO REMAIN. EXTEND 50ø CW TO NEW METER IN STORAGE ROOM 104a.
2. CONTRACTOR TO CONFIRM LOCATION OF ALL EXISTING PLUMBING PIPING ON SITE AND ADJUST LAYOUT TO SUIT.
FE. RECESSED FIRE EXTINGUISHER CABINET C/W EXTINGUISHER. CONSULT WITH LOCAL FIRE DEPARTMENT TO DETERMINE EXACT NUMBERS AND LOCATIONS.



4 M1.1 DOMESTIC WATER HEATING SCHEMATIC WITH TEMPERED WATER SUPPLY
N.T.S





1 M1.1 PLUMBING LAYOUT - GROUND FLOOR PLAN - RENO
1:75

POPE FRANCIS ELEMENTARY ADDITION & RENOVATION PROJECT#R121

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REGISTERED PROFESSIONAL ENGINEER 2017-05-17 J.R.HAMALAINEN 3203 PROVINCE OF ONTARIO

BORTOLOTTO

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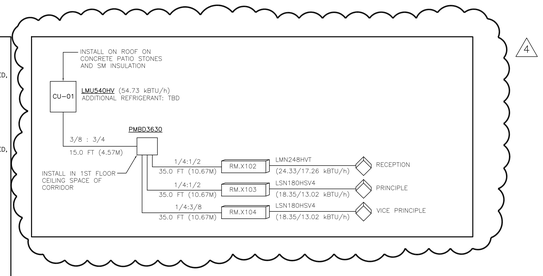
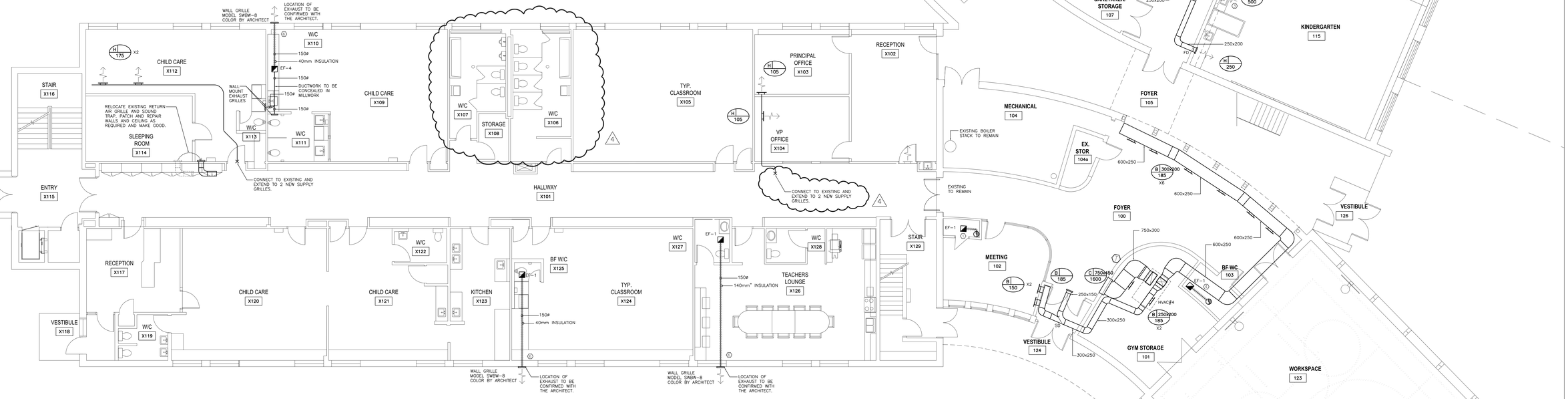
GROUND FLOOR PLAN - RENO
PLUMBING LAYOUT

4 M1.1

HVAC NOTES:

1. PROVIDE 250x250 ROOF CURB, 450mm HIGH, INSULATED, AND A GRAVITY ROOF VENT FOR EXHAUST DISCHARGE.
2. LINEAR SLOT DIFFUSER SUPPLY AIR
3. SUPPLY AND RETURN WALL GRILLES WITH MAIN DUCT RUNNING ABOVE DROP CEILING IN CORRIDOR. TYP.
4. PROVIDE 250x250 ROOF CURB, 450mm HIGH, INSULATED, AND A GRAVITY ROOF VENT FOR EXHAUST DISCHARGE.
5. PANEL RADIATORS FOR PERIMETER HEATING AS SHOWN ON DRAWINGS. RITTLING PR SERIES. ONE CONTROL VALVE FOR EACH ROOM. CONNECT TO NEW THERMOSTATS. CONDUIT FOR CONTROLS TO RUN NEATLY ALONG WALLS AND CEILING AS REQUIRED.
6. NEW EXHAUST FANS IN WASHROOMS TO BE DUCTED OUTSIDE THROUGH WALL AS SHOWN ON DRAWINGS. TYP.
7. PROVIDE NEW LAN ROOM EXHAUST FAN, GEIST CLOSETAIR C/W DUCT KIT. FAN SHALL EXHAUST THROUGH EXTERIOR WALL.
8. 750mm EXPOSED ROUND SPIRAL DUCT WITH SUPPLY AIR DIFFUSERS FROM ROOFTOP HVAC UNIT ALONG ATRIUM GLASS.





1 / M2.1 HVAC LAYOUT - GROUND FLOOR PLAN - RENO
1:75

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ADDITION & RENOVATION
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GROUND FLOOR PLAN - RENO
HVAC LAYOUT

4 M2.1

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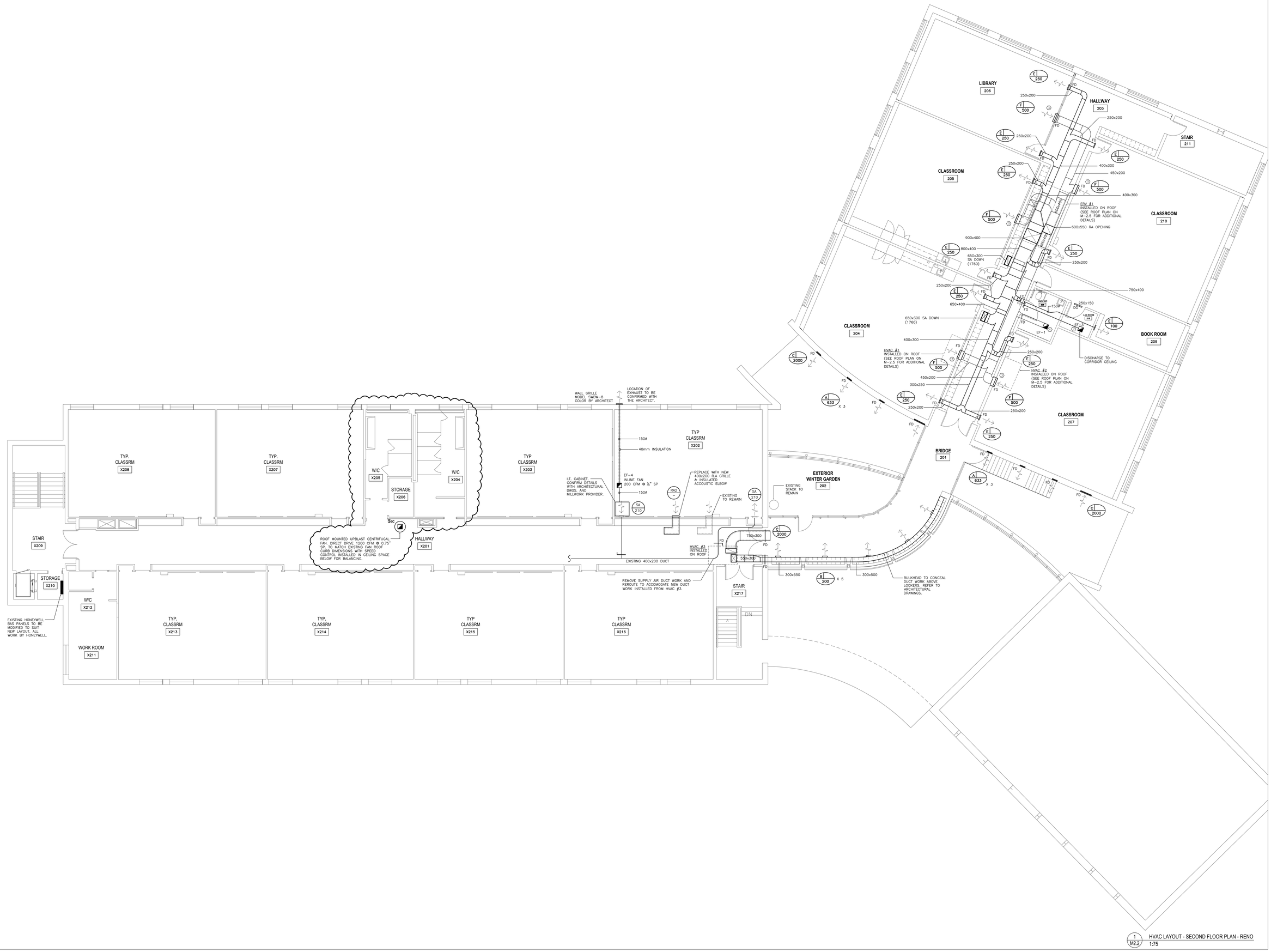

1 / M2.2 HVAC LAYOUT - SECOND FLOOR PLAN - RENO
1:75

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REGISTERED PROFESSIONAL ENGINEER
2017-05-17
J.R.HAMALAINEN
100113
PROVINCE OF ONTARIO

BORTOLOTTO

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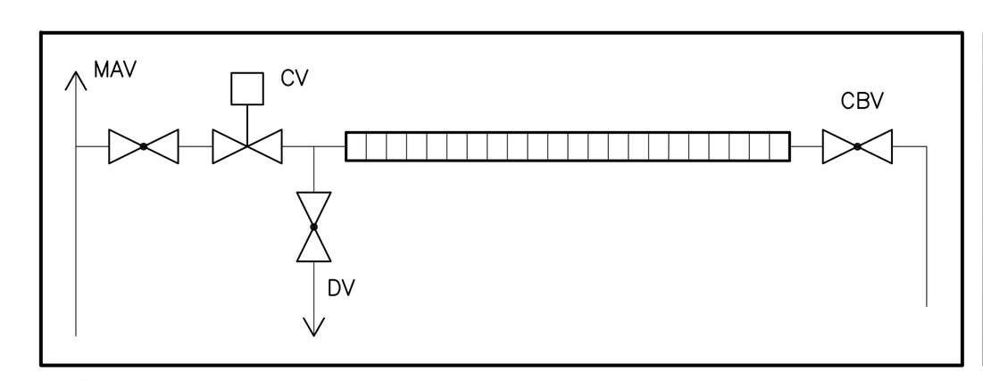
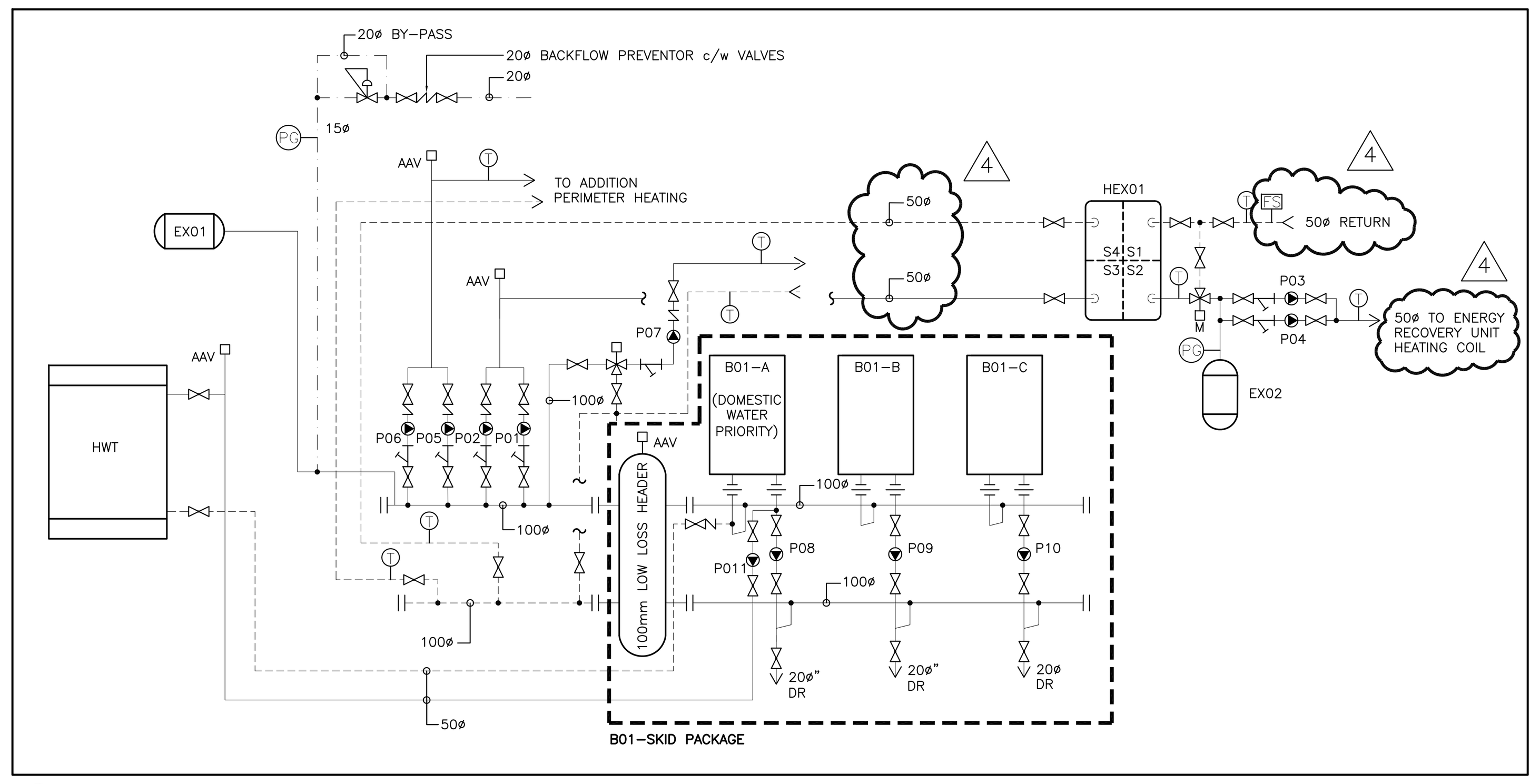
SECOND FLOOR PLAN - RENO
HVAC LAYOUT

M2.2

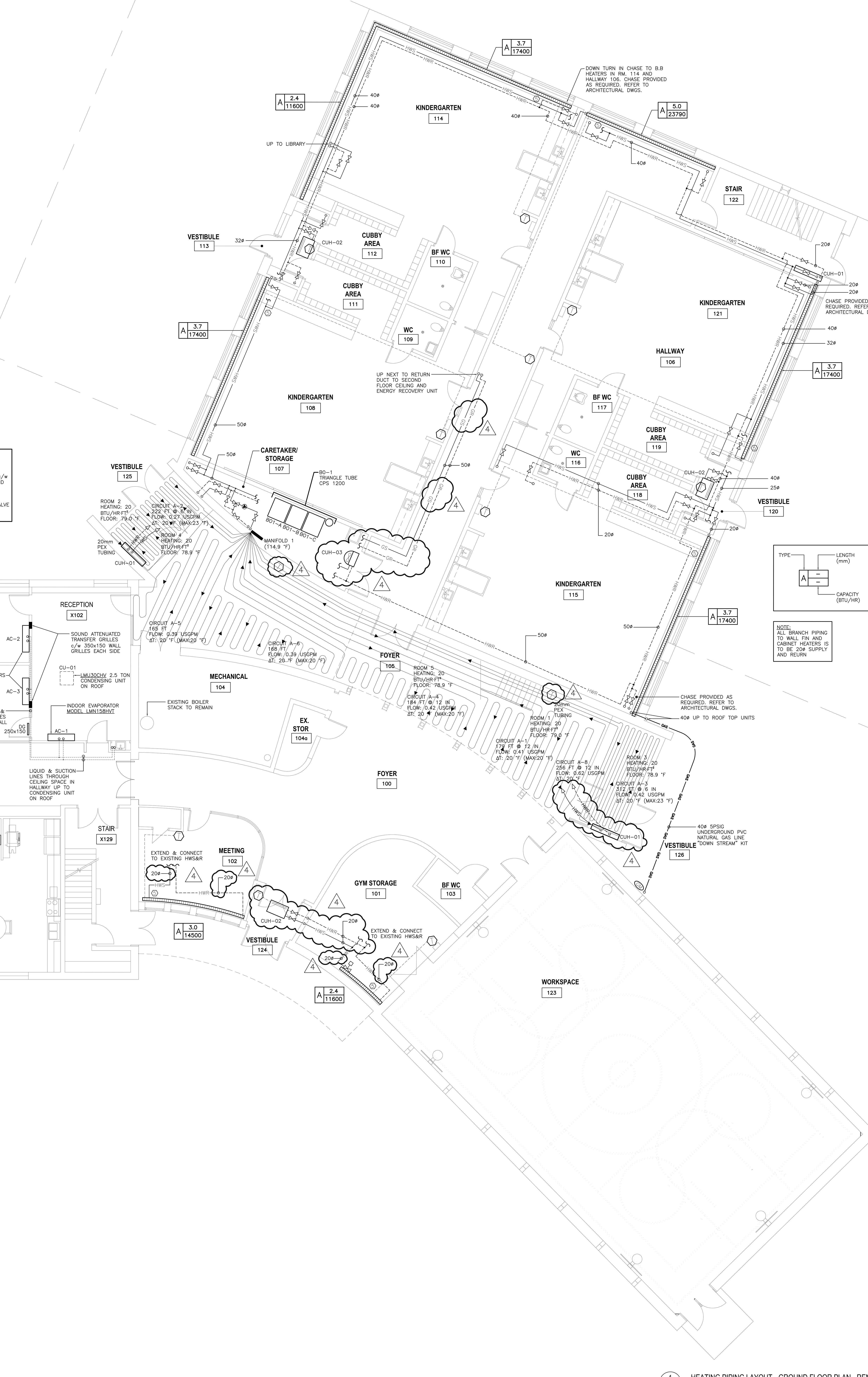
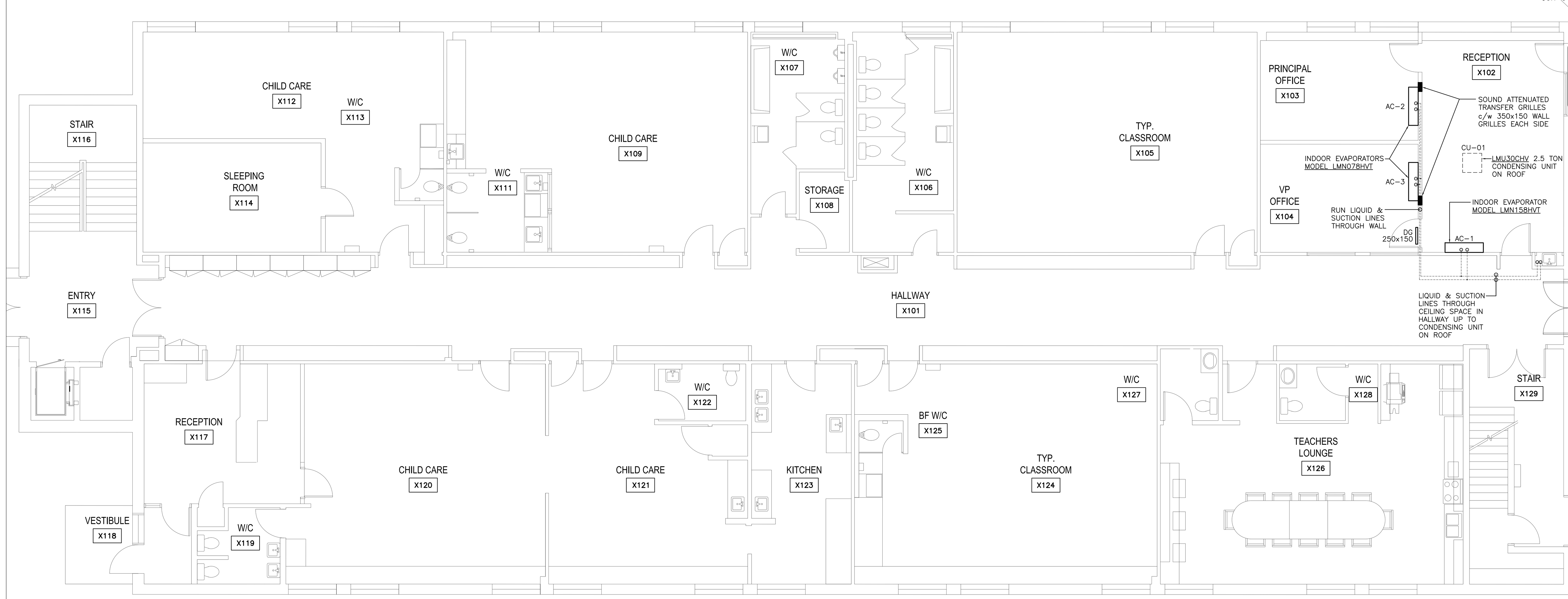


3 TYPICAL WALL FIN RADIATOR SCHEMATIC
M2.3 N.T.S

LEGEND	
MAV	MANUAL AIR VENT
DV	15mm DRAIN VALVE c/w HOSE CONNECTION AND CAP & CHAIN
CV	CONTROL VALVE
CBV	CIRCUIT BALANCING VALVE



2 BOILER SCHEMATIC
M2.3 N.T.S

NOTE:
ALL BRANCH PIPING TO WALL FIN AND CABINET HEATERS IS TO BE 20ø SUPPLY AND REURN

1 HEATING PIPING LAYOUT - GROUND FLOOR PLAN - RENO
M2.3 1:75

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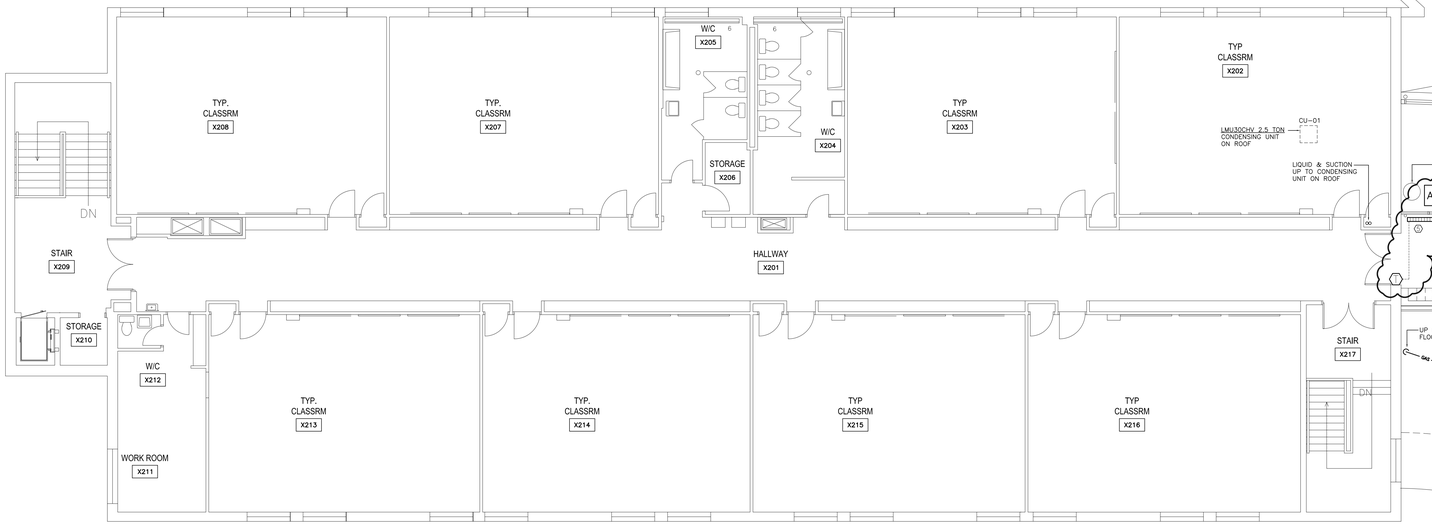
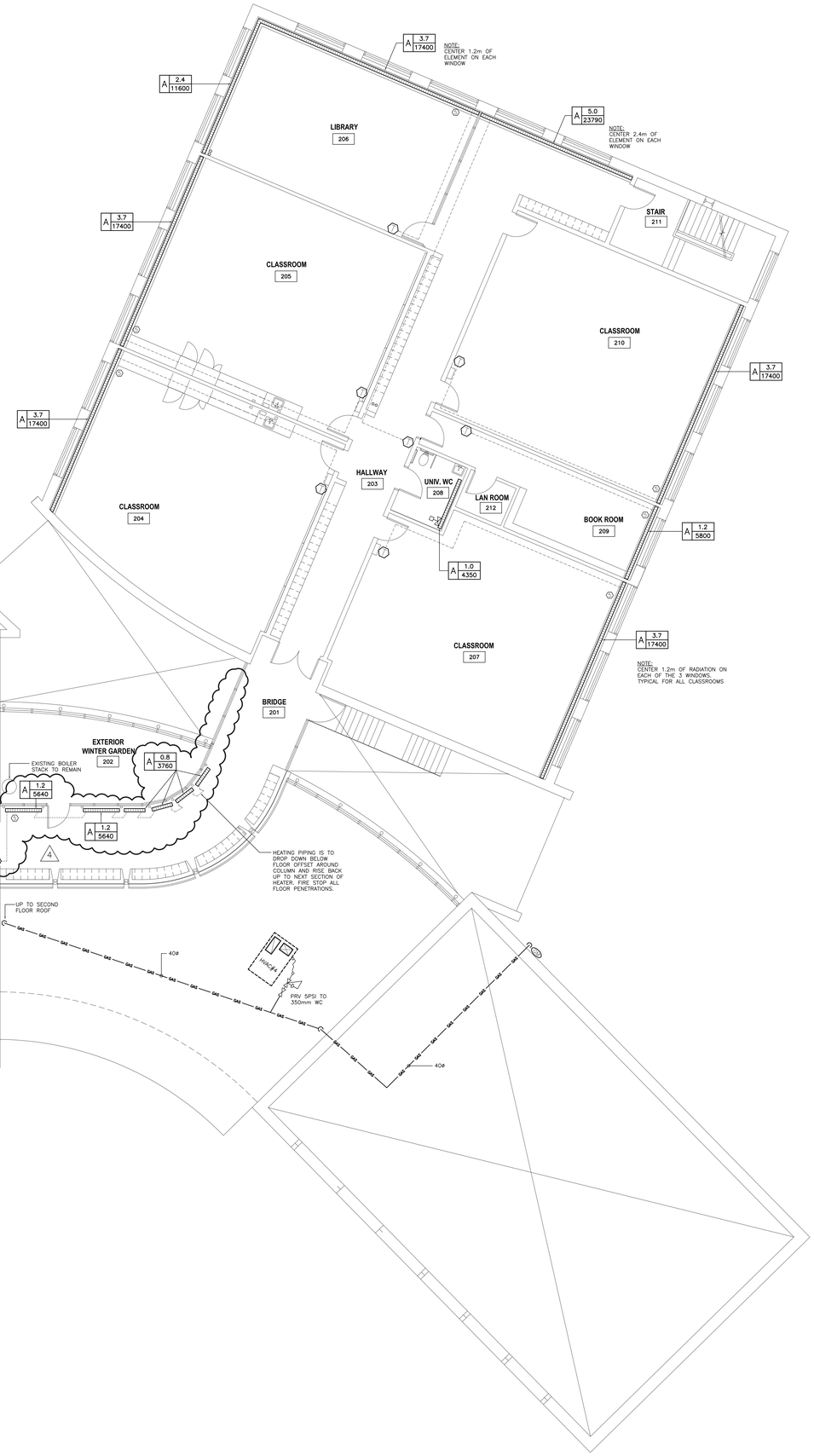
GROUND FLOOR PLAN - RENO
HEATING PIPING LAYOUT

4 M2.3





1 M2.4 HEATING PIPING LAYOUT - SECOND FLOOR PLAN - RENO
1:75

POPE FRANCIS ELEMENTARY
ADDITION & RENOVATION
PROJECT#R121

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REV	DESCRIPTION	DATE
4	REVISED FOR ADDENDUM #1	17.06.09
3	ISSUED FOR PERMIT & TENDER	17.05.17
2	ISSUED FOR CLIENT REVIEW	17.05.08
1	ISSUED FOR CLIENT REVIEW	17.04.28

REGISTERED PROFESSIONAL ENGINEER
2017-05-17
J.R.HAMALAINEN
3203
PROVINCE OF ONTARIO

BORTOLOTTO

PROJECT NUMBER
PF1701
JRHE 3203

DATE
17.05.17

SCALE
1:75

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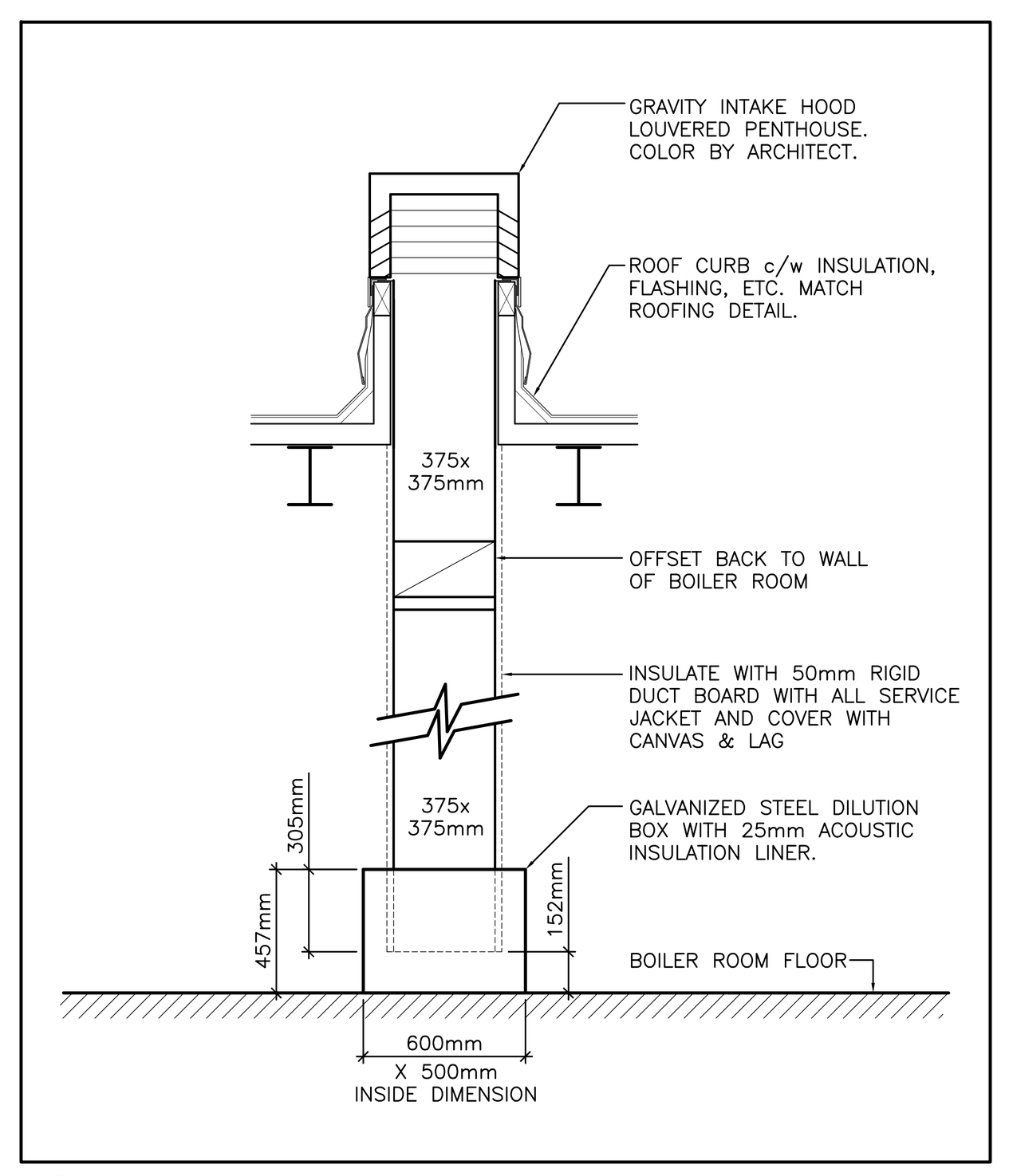
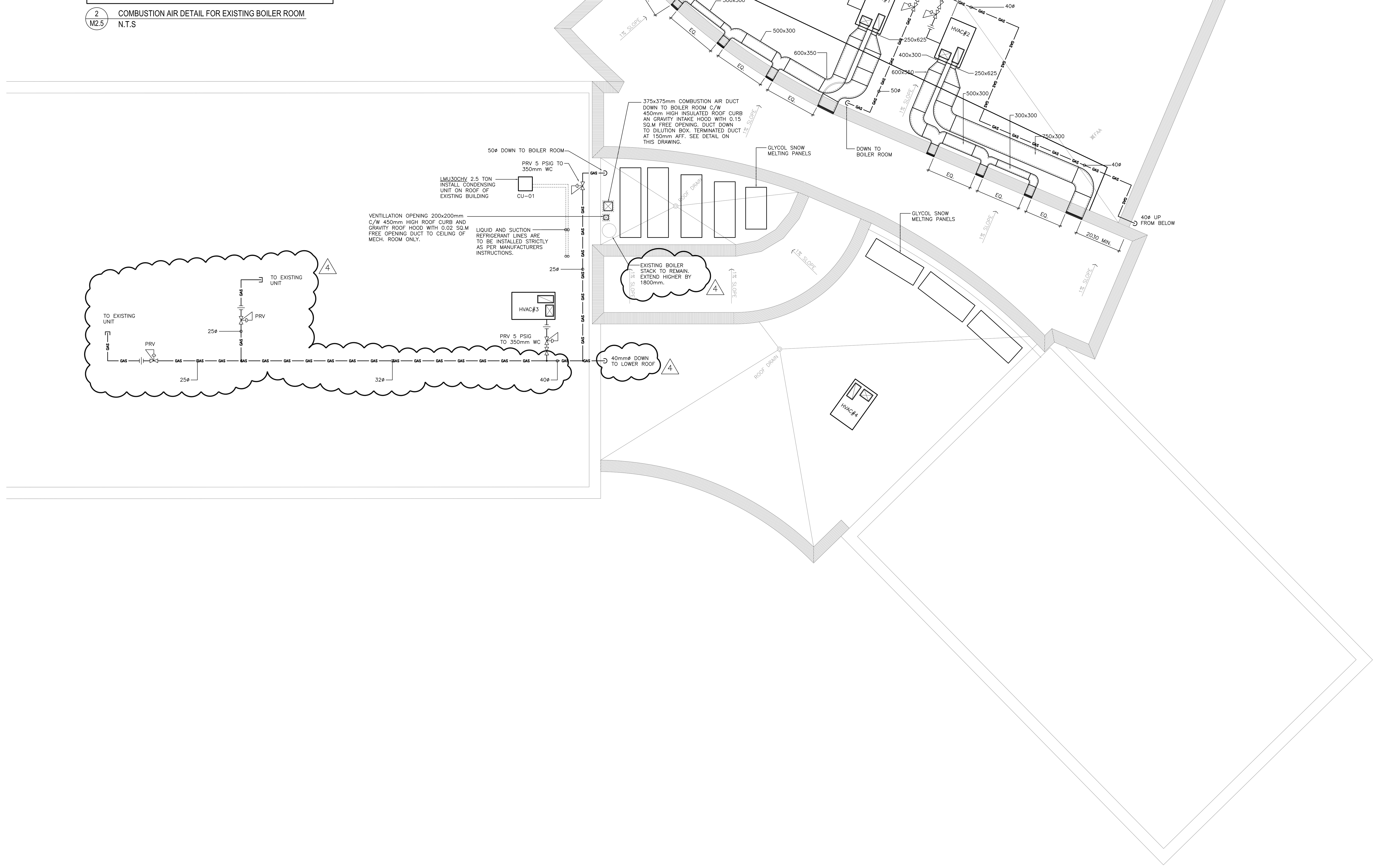
SECOND FLOOR PLAN - RENO
HEATING PIPING LAYOUT

4 M2.4



2 / M2.5 COMBUSTION AIR DETAIL FOR EXISTING BOILER ROOM
N.T.S

1 / M2.5 HVAC LAYOUT - ROOF PLAN
1:75

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ROOF PLAN
HVAC LAYOUT

4 M2.5

ELECTRICAL SPECIFICATIONS DIV. 26

1. GENERAL

A) THE GENERAL CONDITIONS OF THE CONTRACT, SHALL APPLY TO ALL WORK DONE UNDER THIS SECTION.

B) THIS SUBCONTRACTOR SHALL BE FAMILIAR WITH THE WORK OF ALL OTHER TRADES SO THAT HE CAN INCLUDE FOR ALL WORK NECESSARY UNDER THIS CONTRACT.

2. EXAMINATION OF SITE AND DRAWINGS

A) BEFORE TENDERING, THE ELECTRICAL SUBCONTRACTOR SHALL EXAMINE THE SITE, LOCAL CONDITIONS AFFECTING THE WORK OF THIS CONTRACT, WORK OF OTHER TRADES AND SHALL SATISFY HIMSELF THAT THE WORK MAY BE CARRIED OUT IN THE MANNER INDICATED ON THE PLANS AND SPECIFICATIONS. REPORT ANY CONFLICTS OR DISCREPANCIES PRIOR TO CLOSE OF TENDER.

3. STANDARDS OF EQUIPMENT AND MATERIALS

A) MATERIALS AND EQUIPMENT IN THESE SPECIFICATIONS ARE FOR THE PURPOSE OF ESTABLISHING THE STANDARD OF MATERIALS AND WORKMANSHIP. EQUAL PRODUCTS MAY BE USED UPON APPROVAL.

B) ALL MATERIALS SHALL BE NEW AND SHALL BE C.S.A. APPROVED, AND SHALL BEAR THE C.S.A. LABEL. MATERIALS WHICH ARE NOT C.S.A. APPROVED SHALL BE APPROVED BY SPECIAL INSPECTION.

4. PERMITS, FEES AND INSPECTIONS

A) COMPLY WITH ALL APPLICABLE CODES AND ALL LOCAL, MUNICIPAL PROVINCIAL AND FEDERAL BY–LAWS, RULES AND REGULATIONS. OBTAIN ALL PERMITS REQUIRED AND PAY PERMIT FEES.

B) BEFORE STARTING ANY WORK, SUBMIT COPIES OF DRAWINGS AND SPECIFICATIONS TO THE INSPECTION AUTHORITY FOR APPROVAL. ANY CHANGES REQUESTED SHALL BE REFERRED TO THE ENGINEER IMMEDIATELY, SO THAT PROPER ACTION CAN BE TAKEN.

C) ARRANGE FOR INSPECTION BY THE AUTHORITY HAVING JURISDICTION UPON COMPLETION PRESENT TO THE OWNER THE FINAL CERTIFICATE OF APPROVAL.

5. COOPERATION WITH OTHER TRADES

A) CONFER WITH OTHER SUBCONTRACTORS INSTALLING PIPING, OTHER EQUIPMENT, FOUNDATIONS, ETC., WHICH MAY AFFECT THE INSTALLATION AND ARRANGEMENT OF EQUIPMENT. SPECIAL CARE SHALL BE TAKEN IN THE INSTALLATION OF ALL PIPING, DUCTS, ETC., WHERE THE SAME ARE TO BE CONCEALED TO SEE THAT THEY COME WITH THE FINISHED LINES OF THE FLOORS, WALLS AND CEILINGS.

B) FAILURE TO DO THIS MAY NECESSITATE RELOCATION, AS DIRECTED BY THE ENGINEER, AT THE CONTRACTOR'S EXPENSE.

C) NOTIFY THE GENERAL CONTRACTOR OF ALL OPENINGS, FOUNDATION WORK, ANCHORS, HANGERS OR OTHER PROVISION NECESSARY FOR THE INSTALLATION IN AMPLE TIME SO THAT PROPER PROVISION CAN BE MADE FOR THEM. FAILURE TO COMPLY ON THE PART OF THE ELECTRICAL SUB–CONTRACTOR SHALL NOT RELIEVE HIM OF THE COST OF CUTTING AND PATCHING AT A LATER PERIOD.

D) DIV. 26 IS RESPONSIBLE FOR REVIEWING DIV. 23 DRAWINGS AND INCLUDING ALL ELECTRICAL WORK FOR EQUIPMENT SUPPLIED BY DIV. 23. ELECTRICAL DRAWINGS DO NOT SHOW ALL OF THIS WORK.

6. PROTECTION

A) KEEP EQUIPMENT DRY AND CLEAN AT ALL TIMES.

7. CONTRACT DRAWINGS

A) THE DRAWINGS ARE IN GENERAL SMALL SCALE, AND MEASUREMENTS SHALL NOT BE SCALED FROM THESE DRAWINGS. WHERE THERE IS A CONFLICT THAT REQUIRES CHANGES, REFER TO THE ENGINEER FOR RESOLUTION. MINOR RELOCATIONS SHALL BE DONE AT NO EXTRA COST.

8. RECORD DRAWINGS

A) OBTAIN AND PAY FOR SET OF WHITE PRINTS. AS THE JOB PROGRESSES, MARK THESE DRAWINGS TO ACCURATELY INDICATE THE LOCATION OF INSTALLED WORK.

9. SHOP DRAWINGS

A) PRIOR TO ORDERING OF ANY MATERIAL OR EQUIPMENT, PROVIDE (8) COPIES OF SHOP DRAWINGS AND/OR DESCRIPTIVE DATA FOR REVIEW.

10. HANGERS, INSERTS AND SLEEVES

A) PROVIDE AND INSTALL INSERTS, HANGERS, ANCHORS AND SUPPORTS REQUIRED FOR WORK TO BE INSTALLED UNDER THIS SECTION.

11. CUTTING AND PATCHING

A) CUTTING AND PATCHING FOR ELECTRICAL WORK SHALL BE DONE BY THIS SECTION.

B) HOLES IN CONCRETE BLOCK WALLS AND CONCRETE FLOORS FOR CONDUITS OR DUCTS SHALL BE CORE DRILLED WHERE NOT SLEEVED.

12. ACCESS DOORS

A) WHEREVER ANY ELECTRICAL EQUIPMENT REQUIRING MAINTENANCE OR ADJUSTMENT IS "BUILT–IN", DOORS ARE REQUIRED. THE COST OF THESE DOORS SHALL BE THE RESPONSIBILITY OF THE ELECTRICAL TRADE.

13. IDENTIFICATION OF EQUIPMENT

A) ALL EQUIPMENT SUPPLIED SHALL BE IDENTIFIED WITH LAMACOID PLASTIC NAMEPLATES, BLACK BACKGROUND WITH WHITE ETCHED LETTERS 3/8" HIGH.

14. WORKMANSHIP

A) ALL WORK SHALL BE DONE IN A WORKMANLIKE MANNER. ANY WORKMANSHIP UNSATISFACTORY IN THE OPINION OF THE OWNER, SHALL BE REPLACED WITHOUT COST TO THE OWNER.

15. CLEAN–UP

A) DURING THE COURSE OF CONSTRUCTION, KEEP WORK AREA CLEAN AND DO NOT ALLOW AN ACCUMULATION OF DEBRIS RESULTING FROM YOUR WORK. UPON COMPLETION OF THE WORK, REMOVE ALL DEBRIS AND SURPLUS MATERIAL FROM THE SITE, LEAVING THE PREMISES IN A BROOM–CLEAN CONDITION.

16. TESTS

A) ALL EQUIPMENT AND ELECTRICAL SYSTEMS PROVIDED UNDER THIS SECTION SHALL BE TESTED TO ENSURE THAT THEY ARE FUNCTIONING PROPERLY. SUBMIT TO THE ENGINEER, GIVING ALL THE NECESSARY TEST DATA, A STATEMENT CERTIFYING THAT ALL EQUIPMENT IS FUNCTIONING PROPERLY, AND THAT THE WORK SPECIFIED AND/OR REQUIRED HAS BEEN COMPLETED.

17. GUARANTEE

A) SYSTEMS SHALL BE COMPLETE, TESTED AND READY FOR USE WITH ALL EQUIPMENT OPERATING SATISFACTORILY AND ALL FIXTURES LAMPED.

B) PROVIDE A CERTIFICATE OF GUARANTEE OF WORKMANSHIP, MATERIALS AND EQUIPMENT FOR ONE (1) YEAR AFTER SUBSTANTIAL COMPLETION. THIS DOES NOT SUPERSEDE WARRANTIES ON SPECIFIC ITEMS OF EQUIPMENT WHICH MAY BE FOR LONGER PERIODS, AND MANUFACTURER'S WARRANTIES SHALL BEGIN ON THE DATE OF THIS ACCEPTANCE; NOT WHEN THE PRODUCT WAS SHIPPED OR INSTALLED.

C) DEMONSTRATE TO THE OWNER'S REPRESENTATIVE THE PROPER OPERATING PROCEDURES AND PROVIDE TWO (2) COPIES OF OPERATING INSTRUCTIONS SUITABLY BOUND, TITLED AND BEARING THE CONTRACTOR'S COMPANY NAME, ADDRESS AND TELEPHONE NUMBER.

18. GROUNDING

A) ALL GROUNDING SHALL CONFORM TO THE CANADIAN ELECTRIC CODE AND PROVINCIAL REGULATIONS AND IN GENERAL ALL GROUND CONNECTION, COPPER TO COPPER AND COPPER TO STEEL SHALL BE "CADWELD" OR "BURNDY THERMOWELD" WELDED CONNECTIONS, UNLESS SPECIFIED OTHERWISE.

B) THE GROUND CONNECTION TO THE WATER PIPE AND THE GROUND CONDUCTOR SHALL BE BY MEANS OF A GROUND CONNECTOR "BURNDY" TYPE "GAR" SIZED FOR THE WATER PIPE AND THE CONDUCTOR OR HYGROUND FOR CABLE TO CABLE CONNECTIONS. PROVIDE GROUNDING RODS WHERE PLASTIC WATER MAIN IS USED. COMPLY WITH O.E.C. RULE 10–700.

19. WIRE AND CABLE

A) EXCEPT WHERE OTHERWISE SPECIFIED ON THE DRAWINGS, ALL WIRING IN CONCRETE WALLS, FLOORS AND CEILINGS SHALL BE RW90 INSULATED CABLE IN THINWALL CONDUIT WITH APPROVED FITTINGS. ALL BRANCH CIRCUIT WIRING SHALL BE COPPER.

B) BRANCH CIRCUIT WIRING IN FURRED SPACES, DROPPED CEILING SPACES, CONCRETE BLOCK WALLS, DROPPED CEILING SPACES, MAY BE WITH METALLIC ARMOURED CABLE (BX).

C) OUTDOOR WIRING TO HVAC UNITS SHALL BE TECK 90.

D) MINIMUM CABLE SIZE IN CIRCUIT WIRING SHALL BE NO. 12 AWG GAUGE.

E) ALL EXPOSED WIRING (EXCEPT WHERE OTHERWISE SPECIFIED ON THE DRAWINGS) SHALL BE IN THINWALL CONDUIT.

F) WHERE ALUMINUM SHEATHED OR PYROTENAX CABLES ARE USED, THEY SHALL BE INSTALLED IN COMPLETE ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS SO THAT THERE BE NO SHEATH CURRENT FLOWING. ALSO REFER TO CURRENT O.H.E.P.C. BULLETINS FOR DERATING FACTORS IF APPLICABLE.

G) FIRESTOPPING OF ALL CABLE SLEEVES SHALL BE DONE WITH ELECTROVERT 'FLAMESEAL OR DOW CORNING 'FIRESTOP' SEALANT. (H) WHERE EMERGENCY POWER FEEDERS, OR FIRE ALARM FEEDERS ARE INSTALLED IN HAZARDOUS AREA EXPOSED, THESE FEEDERS SHALL BE PROTECTED BY 1 HR. FIRE ENCLOSURE IN ACCORDANCE WITH OBC AND AUTHORITIES HAVING JURISDICTION. AS ALTERNATE TO FIREPROOFING, USE 'PYROTENAX' CABLES.

20. CONDUITS

A) THE CONTRACTOR SHALL FURNISH AND INSTALL ALL RIGID STEEL, EMT, AND FLEXIBLE CONDUIT, AS REQUIRED. RIGID STEEL CONDUIT SHALL BE GALVANIZED. THE CONDUIT SHALL BE G.E. WHITE ZINC–COATED OR TRIANGLE HOT DIP OR EQUAL.

B) MINIMUM SIZE OF 12.7 mm (1/2") CONDUIT SHALL BE USED.

C) CONDUIT PASSING FROM THE INSIDE TO OUTSIDE AREAS SHALL BE SEALED WITH A COMPOUND SIMILAR TO JOHNS–MANVILLE DUXSEAL.

D) BENDS IN EXPOSED CONDUIT RUNS SHALL BE SITE MADE BENDS WHERE POSSIBLE; OTHERWISE JUNCTION BOXES, CONDULETS OR UNILETS SHALL BE USED.

E) CONDUIT FITTINGS SHALL BE GALVANIZED THREADED TYPE FOR RIGID STEEL CONDUITS. ALL CONDUIT WORK SHALL BE CLEANED AND DRIED INSIDE BEFORE THE INSTALLATION OF THE WIRES. NO OIL OR GREASE SHALL BE USED TO EASE DRAWING IN WIRES AND CABLES, OTHER THAN THOSE HAVING A LEAD OR COPPER SHEATH.

F) CONDUIT FITTINGS SHALL BE DRILLED FOR DRAINING WHERE CONDENSATION MAY COLLECT.

G) NO CONDUIT SHALL BE RUN WITHIN 152.4 mm (6") OF HOT WATER PIPES.

(H) CONDUIT RUNS THROUGH BUILDING STRUCTURE SHALL BE SLEEVED. CONTRACTOR SHALL PROVIDE SLEEVES IN ALL FLOORS. ALL SLEEVES SHALL BE SEALED, WITH JOHNS–MANVILLE DUXSEAL OR EQUAL.

I) LINES INDICATED ON DRAWINGS SHOWING CONDUIT RUNS ARE ONLY SCHEMATIC. IT IS THE RESPONSIBILITY OF THIS CONTRACTOR TO DETERMINE EXACT ROUTES OF CONDUITS TO CONFORM WITH STRUCTURAL ELEMENTS. THE EXPOSED CONDUIT SHALL BE NEATLY INSTALLED PARALLEL TO THE LINES OF THE BUILDING AND CLEAN AND FREE FROM KINKS AND IRREGULAR BENDS. FITTINGS SHALL BE USED AROUND CORNERS AND ALL CONDUITS SHALL BE KEPT TIGHT TO CEILINGS, WALLS, ETC.

J) FLEXIBLE CONDUIT SHALL BE USED WHERE THE CONDUIT WORK JOINS PLATFORM STRUCTURES OF MACHINERY, MOTORS, ETC., OR THROUGH EXPANSION JOINTS.

21. TELEPHONE & DATA & ALARM CONDUIT SYSTEMS

A) SUPPLY AND INSTALL A SYSTEM OF EMPTY CONDUIT, OUTLET BOXES AND OVERHEAD CONDUITS FOR TELEPHONE & DATA & ALARM INSTALLATION AS INDICATED ON THE DRAWINGS. PROVIDE FISH LINES IN ALL CONDUITS, UNDERGROUND DUCTS AND RUNS.

B) ALL TELEPHONE & ALARM TERMINALS SHALL BE EQUIPPED WITH 3/4" PLYWOOD BACKBOARDS, SUPPLIED, PAINTED AND INSTALLED UNDER THIS SECTION. PROVIDE A 110 VOLT DUPLEX "U' GROUND RECEPTACLE AT EACH TERMINAL FOR TELEPHONE UTILITY USE, CONNECTED TO ITS OWN CIRCUIT.

C) PROVIDE A GROUND WIRE FROM THE MAIN TELEPHONE & ALARM TERMINAL TO THE NEAREST COLD WATER LINE TO TELEPHONE UTILITY

D) WALL OUTLETS SHALL BE 4" SQUARE OUTLET BOXES, COMPLETE WITH SINGLE GANG COVER PLASTER RING.

E) COORDINATE ENTIRE INSTALLATION WITH VARIOUS PARTIES INVOLVED. SINGLE GANG COVER PLASTER RING.

22. OUTLETS AND JUNCTION BOXES

A) AN OUTLET BOX OF CODE QUALITY AND INDEPENDENTLY SUPPORTED SHALL BE INSTALLED FOR EACH LIGHT, SWITCH, DUPLEX RECEPTACLES, ETC.

B) WITHIN THE FINISHED LINES OF PLASTER. NO UNUSED OPENINGS SHALL BE LEFT IN OUTLET BOXES.

C) MOUNTING HEIGHTS ABOVE FINISHED FLOOR FOR OUTLET BOXES SHALL BE AS FOLLOWS, UNLESS OTHERWISE SHOWN OR REQUIRED BY THE OWNERS:
- TELEPHONES – 12"
- WALL SWITCHES – 48"
- DUPLEX RECEPTACLES – GENERAL AREAS – 12"
- FULL CIRCUIT KITCHEN RECEPTACLES ABOVE COUNTERS.
- THERMOSTATS – 60"
- PULL STATIONS – 48"
- FIRE ALARM BELLS – 84"
- EMERGENCY LIGHTING – 84"

D) ALL OUTLET BOXES SHALL BE CAST TYPE FS.

23. SWITCHES

A) LOCAL SWITCHES S.P.S.T., TOGGLE TYPE, 15A–120V, WHITE SPEC GRADE

24. RECEPTACLES

A) DUPLEX RECEPTACLES SHALL BE WHITE.

B) OUTSIDE WEATHERPROOF RECEPTACLES SPEC. GRADE SHALL HAVE COMMERCIAL GRADE W.P. COVERS, HUBBELL CWP8H, FOR USE WITH FLUSH BOXES AND COMMERCIAL GRADE 5206WO ATTACHMENT TO "F" TYPE BOXES CONTROLLED THROUGH GROUND FAULT CIRCUIT BREAKER IN PANELBOARD.

25. COVER PLATES

A) ALL ABOVE LISTED WIRING DEVICES SHALL HAVE TYPE FS COVER PLATES INSTALLED.

26. MOTORS

A) ALL MOTORS WILL BE SUPPLIED AND INSTALLED BY THE SUB–CONTRACTOR SUPPLYING THE EQUIPMENT DRIVEN BY THESE MOTORS. THE ELECTRICAL CONTRACTOR SHALL MAKE ALL ELECTRICAL CONNECTIONS BETWEEN PANEL BOARD, STARTERS AND MOTORS, EXCEPT WHERE NOTED.

27. MOTOR CONTROL WIRING

A) ALL CONTROL OR INTERLOCK CONTROL WIRING ON EQUIPMENT NECESSARY FOR THE OPERATION OF THE MECHANICAL EQUIPMENT SHALL BE DONE BY DIVISION 23, EXCEPT AS NOTED.

B) ONLY CONTROL WIRING DONE UNDER THE ELECTRICAL CONTRACT SHALL BE LINE VOLTAGE WIRING TO GAS FIRED HEATERS, UNIT HEATERS, HEATING A VENTILATING UNITS AND SMALL FRACTIONAL HORSEPOWER EXHAUST FANS AND A.C. UNIT THERMOSTATS, FAN COILS, ALSO CROSS REFERENCE TO MECHANICAL DESIGN DRAWINGS.

C) FOR GENERAL INFORMATION ONLY, MOTORS SHALL BE AS FOLLOWS, UNLESS SPECIFIED OTHERWISE ELSEWHERE: UP TO AND INCLUDING 1/3 H.P., 120 VOLTS, SINGLE PHASE, 60 CYCLES. 1/2 H.P. AND LARGER, 3 PHASE, 60 CYCLES, VOLTAGE OF THE PROJECT, TO BE CONFIRMED ON SITE WITH LOCAL UTILITY.

28. STARTERS & DISCONNECTS

A) LOCAL MOTOR DISCONNECT SWITCHES SHALL BE SUPPLIED AND INSTALLED AS SHOWN ON THE DRAWINGS AND AS NOTED ELSEWHERE. THE DISCONNECTS SHALL BE OF HORSEPOWER RATED TYPE AND WITH MECHANICAL INTERLOCK SO THAT THE DOORS CANNOT NORMALLY BE OPENED WITH THE HANDLE CLOSED.

B) ALL MOTOR STARTERS WILL BE SUPPLIED BY THE SUBCONTRACTOR SUPPLYING THE MOTORS. LABELS OR NAMEPLATES SHALL BE ENGRAVED PLASTIC AND SECURED TO THE PANEL FOR EACH STARTER. ALL POWER WIRING FOR MOTORS IS PART OF THIS SECTION AND IS GOVERNED BY APPROPRIATE PARAGRAPHS.

29. ELECTRICAL PANELS

A) LIGHTING PANELS SHALL BE TYPE NBA, WITH MAINS AND BREAKERS AS SHOWN COMPLETE WITH DOORS AND KEYED LOCKS.

B) ALL BREAKERS SHALL BE BOLT–ON TYPE FPE, ITE, SIEMENS, 22,000 AIC. SQUARE "D" OR WESTINGHOUSE. NO TANDEM OR DUPLEX BREAKERS SHALL BE USED.

C) A TYPEWRITTEN SCHEDULE SHALL BE INSTALLED ON THE BACK OF THE PANEL DOOR WHICH SHALL DESIGNATE CIRCUITS AND USES.

D) WHERE MODIFICATIONS HAVE TAKEN PLACE, EXISTING PANEL SCHEDULES ARE TO BE UPDATED AS IN NOTE (C).

D) RESIDENTIAL STYLE LOAD CENTERS OR PANELS WITH PLUG IN BREAKERS WILL NOT BE ACCEPTABLE.

30. LIGHTING FIXTURES

A) ELECTRICAL CONTRACTOR SHALL INSTALL AND WIRE ALL LIGHTING FIXTURES INDICATED IN THE SCHEDULE.

B) BEFORE PURCHASING ANY RECESSED LIGHTING FIXTURES, THIS SUBCONTRACTOR SHALL CHECK CEILING STRUCTURE AND ENSURE FIXTURE WILL SUIT TYPE OF CEILING. ADVISE ENGINEER.

C) COORDINATE INSTALLATION OF FIXTURES WITH HVAC CONTRACTOR.

31. FUSES

A) THIS SUBCONTRACTOR SHALL SUPPLY AND INSTALL ALL NECESSARY FUSES AND SPARE FUSES. ONE (1) SET OF EACH SIZE TO BE MOUNTED IN A SUITABLE CABINET IN THE ELECTRICAL ROOM.

B) ALL FUSES IN CIRCUITS UP TO 250 VOLTS AND IN SIZE UP TO AND INCLUDING 600 AMPERES SHALL BE HRC, FORM I, AJT.

32. EMERGENCY LIGHTING

A) EMERGENCY LIGHTING SHALL BE PROVIDED AS SHOWN ON ELECTRICAL DRAWINGS.

B) PROVIDE AND INSTALL COMPLETE EMERGENCY LIGHTING SYSTEM TO COVER ALL PUBLIC AREAS USED AS MEANS OF EGRESS TO MAINTAIN ONE FOOTCANDLE LIGHTING LEVEL AS REQUIRED BY ONTARIO BUILDING CODE, O, REG. 549/84.

C) EMERGENCY BATTERY UNITS SHALL BE AS SHOWN ON DRAWINGS AND SHALL HAVE MINIMUM CAPACITY OF 200W FOR 1/2 HOUR OPERATION. ALL BATTERY UNITS SHALL BE C.S.A. C.22.2 NO. 141 PERFORMANCE STANDARD APPROVED.

D) EMERGENCY LIGHTING UNITS AND REMOTE HEADS AND WIRING SHALL BE PROVIDED BY ELECTRICAL CONTRACTOR. ALL UNITS SHALL BE LUMACELL INC. (SQUARE "D" CO.), EMERGI–LITE, DUAL LITE OR EQUAL APPROVED.

33. FIRE ALARM SYSTEM

A) EXISTING MIRCOM FA–1008K FIRE ALARM PANEL IS TO REMAIN.

B) EXISTING MIRCOM REMOTE ANNUNCIATOR IS TO REMAIN.

C) NEW FIRE ALARM DEVICES ARE TO BE ULC LISTED AND COMPATIBLE WITH THE EXISTING MIRCOM SYSTEM. DEVICES TO CONSIST OF: MANUAL PULL STATIONS – ENGLISH; HEAT DETECTORS (135 DEG. ROR/FT), (135 DEG. FT), (197 DEG. FT); IONIZATION SMOKE DETECTOR; PHOTOELECTRIC SMOKE DETECTOR; HORN/STROBE SIGNAL; MAGNETIC DOOR HOLDERS.

D) PROVIDE END OF LINE RESISTORS FOR BOTH SIGNAL AND ZONE CIRCUITS, MOUNT APPROXIMATELY 4'–11" A.F.F. FOR EASE OF ACCESS.

E) ALL FIRE ALARM WIRING TO BE IN A SEPARATE CONDUIT SYSTEM AND LABELED.

F) PROVIDE POWER FILTER EQUAL TO "TYCOR"

G) PROVIDE 15A BREAKER c/w A LOCK ON DEVICE. PAINT RED AND LABEL WITH A LAMACOID NAMEPLATE.

H) UPON COMPLETION OF INSTALLATION, PRINTED SYSTEM INSTRUCTIONS AND ASBUILT WIRING DRAWINGS SHALL BE FURNISHED TO THE OWNER.

I) FIRE ALARM SYSTEM SHALL BE VERIFIED AND TESTED BY MANUFACTURERS' SERVICE DIVISION.

ELECTRICAL GENERAL NOTES

1. ALL ELECTRICAL WORK TO BE CARRIED OUT IN ACCORDANCE WITH THE ONTARIO BUILDING CODE, THE ELECTRICAL SAFETY CODE, THE CAN/ULC STANDARDS, THE NFPA STANDARDS AND THOSE LOCAL AUTHORITIES HAVING JURISDICTION.
2. DIVISION 16 TO COORDINATE ALL WORK WITH OTHER TRADES PRIOR TO AND DURING INSTALLATION. REPORT ANY CONFLICTS/DISCREPANCIES TO ARCHITECT/ENGINEER FOR RESOLUTION.
3. DIVISION 16 IS RESPONSIBLE FOR ALL POWER WIRING FOR ELECTRICAL EQUIPMENT BEING SUPPLIED BY DIVISION 15. DIVISION 16 TO REVIEW REQUIREMENTS WITH DIVISION 15.
4. DIVISION 16 TO PATCH AND MAKE GOOD ALL SURFACES AFFECTED BY REMOVALS, RELOCATIONS AND MODIFICATIONS OF ALL ELECTRICAL EQUIPMENT AND DEVICES.
5. DIVISION 16 SHALL MAINTAIN ALL ACTIVE SERVICES TO ALL PARTS OF BUILDING DURING CONSTRUCTION IF NECESSARY. DIVISION 16 TO CARRY OUT WORK OUTSIDE OF NORMAL WORKING HOURS TO ACCOMODATE SCHEDULE IF NECESSARY. FIRE ALARM AND OTHER EMERGENCY SYSTEMS MUST BE MAINTAINED AT ALL TIMES. SEE SPECIFICATIONS.
6. ALL SLEEVES, INSERTS, CONCRETE BASES, CURBS, STEEL SUPPORTS, CUTTING & PATCHING, EXCAVATION AND BACKFILLING REQUIRED FOR THE ELECTRICAL INSTALLATION SHALL BE PROVIDED BY THIS CONTRACTOR.
7. IN THE EXISTING SCHOOL, ALL PENETRATIONS OF THE EXISTING SIPROREX FLOOR IS TO BE COORDINATED WITH STRUCTURAL ENGINEER FOR SUPPORT DUE TO THE BRITTLE NATURE OF THE FLOOR. FLOORS ARE TO BE SCANNED PRIOR TO CUTTING.
8. IN THE NEW ADDITION AND WHERE CEILINGS ARE EXPOSED, ALL CONDUIT/PIPING IS TO ENTER ALL ROOMS AT ONE SINGLE LOCATION AND REDISTRIBUTE NEATLY ALONG PERIMETER WALLS. CONDUIT TO BE RUN 460mm MAX. FROM WALL. VERTICAL CONDUIT TO BE RECESSED INTO CONCRETE BLOCK. INSTALLATION TO BE COORDINATED WITH ARCHITECTURAL.
9. GENERALLY ALL WIRING SHALL BE RW90 OR AC90. ALL OUTDOOR WIRING SHALL BE TECK 90 OR EQUAL. MINIMUM SIZE WIRING TO BE 12 AWG.
10. CONTRACTOR TO CONFIRM WALL–TYPE CONSTRUCTION WITH ARCHITEC– TURAL DRAWINGS WHERE ELECTRICAL EQUIPMENT IS TO BE INSTALLED IN BLOCK WALL.
11. ALL OUTDOOR LIGHTING FIXTURES TO BE CONTROLLED BY A PHOTO–CELL AND A TIMECLOCK. REFER TO SPECIFICATIONS FOR MORE DETAILS.
12. LOCATION OF CEILING MOUNTED LIGHTING FIXTURES TO BE VERIFIED WITH REFLECTED CEILING PLAN ON ARCHITECTURAL DRAWING(S). CONFIRM LOCATION OF ALL CEILING MOUNTED LIGHTING FIXTURES WITH ARCHITECT PRIOR TO INSTALLATION.
13. CONTRACTOR IS TO REVIEW EXISTING PANELS FOR CIRCUIT AVAILABILITY ON SITE. REARRANGE OR ADD CIRCUITS AS NEEDED TO SUIT NEW LAYOUT AND ACCORDING TO ELECTRICAL PANEL SCHEDULES AS SHOWN ON THE DRAWINGS.
14. ALL RECEPTACLE CIRCUIT BREAKERS TO BE 15 AMP, LIGHTING TO BE 20 AMP.
15. MOUNTING HEIGHTS AND LOCATIONS FOR EQUIPMENT/DEVICES TO BE CONFIRMED WITH ARCHITECT. ARCHITECTURAL DRAWINGS TO BE REVIEWED FOR EXACT LOCATIONS.
16. DRAWINGS INDICATE INTENT AND PREFERRED LOCATIONS OF ALL DEVICES AND EQUIPMENT. ALL EQUIPMENT/DEVICES TO BE INSTALLED AS PER EACH GOVERNING CODE/STANDARD. SHOULD THERE BE ANY DISCREPANCIES, CONSULT ENGINEER.
17. PROVIDE/REUSE A DESIGNATED 15 AMP EXIT LIGHT BREAKER. PROVIDE A LOCK–ON DEVICE AND A LAMACOID NAMEPLATE.
18. ALL DUPLEX RECEPTACLES FOR BATTERY PAKS TO BE CONNECTED TO SAME BRANCH CIRCUITS WHICH FEEDS THE NORMAL LIGHTING IN THE AREA COVERED BY THAT BATTERY PAK.
19. LETTERS IN BRACKETS (A) INDICATE CONNECTION TO DESIGNATED BATTERY PAK UNIT.
20. LETTER AND NUMBER A(12) INDICATES BREAKER PANEL DESIGNATION AND CIRCUIT BREAKER CONNECTION.
21. ALL FIRE ALARM WIRING TO BE IN A SEPARATE CONDUIT SYSTEM AND LABELLED AS SUCH, UNLESS NOTED OTHERWISE.
22. PROVIDE/REUSE A DESIGNATED 15 AMP FIRE ALARM SYSTEM BREAKER, PROVIDE A LOCK–ON DEVICE, LAMACOID NAMEPLATE AND PAINT RED.
23. ALL END OF LINE RESISTORS TO BE MOUNTED APPROXIMATELY 4FT.– 11 IN. FOR EASE OF ACCESS. EACH RESISTOR TO BE LABELLED ON THE OUTSIDE OF EACH BOX IN A NEAT FASHION. PROVIDE END OF LINE RESISTORS FOR BOTH SIGNAL AND ZONE CIRCUITS.
24. ALL FIRE ALARM HEAT AND SMOKE DETECTORS TO BE MOUNTED WITH A MINIMUM CLEARANCE OF 2 FT. RADIUS FROM THE CENTER OF THE DETECTOR TO ANY AIR OUTLET FROM AN AIR DISTRIBUTING SYSTEM, AND MINIMUM 6 FT. RADIUS FROM ANY DETECTOR TO EDGE OF ANY CEILING MOUNTED DESTRATIFICATION FAN.
25. ALL MANUAL PULL STATIONS TO BE MOUNTED AT 48" (1.2m) ABOVE FINISHED FLOOR LEVEL, ALSO NOT MORE THAN 48" AWAY FROM EDGE OF ANY EGRESS DOOR TO CENTRE OF PULL STATION.
26. ALL FIRE ALARM HORN/STROBES SHALL BE MOUNTED AND SPACED AS PER MANUFACTURER'S INSTRUCTIONS.
27. DURING RETROFITTING AN EXISTING FIRE ALARM SYSTEM, CONTRACTOR TO BRING EXISTING FIRE ALARM EQUIPMENT/DEVICES UP TO CURRENT CODES.
28. DURING DEMOLITION CONSTRUCTION, ALL EXISTING EQUIPMENT/DEVICES TO BE REMOVED AND RELOCATED AS NOTED IN DRAWINGS/SPECS. OR AS SITE DIRECTED. COORDINATE NEW LOCATIONS WITH ARCHITECTURAL DRAWINGS. EXTEND WIRING AS REQUIRED.
29. DIVISION 16 TO VISIT SITE PRIOR TO CLOSE OF TENDERING PERIOD TO REVIEW DEMOLITION, REMOVALS, REROUTING AND EXTENTIONS TO ASCERTAIN EXTENT OF WORK. THERE IS SIGNIFICANT DEMOLITION AND REMOVAL COMPONENT TO DIVISION 16's SCOPE OF WORK. SOME OF THIS WORK IS SHOWN ON THE DRAWINGS BUT A SIGNIFICANT AMOUNT IS NOT. THEREFORE CONTRACTOR IS REQUIRED TO VISIT SITE PRIOR TO TENDER CLOSING DATE TO DRAW HIS OWN CONCLUSIONS AS TO SCOPE OF WORK INVOLVED AND INCLUDE ALL COSTS. NO ALLOWANCE IN FAVOUR OF DIVISION 15/16 WILL BE ALLOWED AFTER CLOSE OF TENDERS.
30. ALL ELECTRICAL SERVICES/EQUIPMENT SERVING OTHER PARTS OF THE BUILDING BUT LOCATED IN RENOVATED AREA, SHALL BE PUT BACK INTO SERVICE. THIS WILL INVOLVE REROUTING, EXTENDING OR RELOCATING AS REQUIRED. DIVISION 15/16 RESPONSIBLE FOR ALL SUCH WORK.
31. ALL ABANDONED SERVICES SHALL BE CAPPED OFF AND MADE SAFE. WHERE PRACTICAL, REMOVE ALL SUCH SERVICES. REDUNDANT ELECTRICAL WIRING SHALL BE DISCONTINUED FROM POWER SOURCE.
32. ALL RELOCATIONS, REROUTING AND EXTENSIONS SHALL BE DONE IN A MANNER AS NOT TO BE OBSTRUCTIVE, ie CONCEALED AND HIDDEN IN FURRING OR BULKHEADS EXCEPT IN STORAGE OR UTILITY ROOMS.

FIRE ALARM/PROTECTION LEGEND

SYMBOL	DESCRIPTION
FACP	FIRE ALARM CONTROL PANEL
RAP	REMOTE ANNUNCIATOR PANEL
	135°F(57°C) RATE OF RISE/FIXED TEMP. HEAT DETECTOR
C	135°F(57°C) RATE OF COMPENSATION HEAT DETECTOR
	135°F(57°C) FIXED TEMPERATURE HEAT DETECTOR
197/92	197° F(92° C) DETECTORS TYPE AS SHOWN
S P	PHOTOELECTRIC TYPE SMOKE DETECTOR
S I	IONIZATION TYPE SMOKE DETECTOR
S SC	SELF CONTAINED SMOKE DETECTOR
6	6" (150mm) FIRE ALARM BELL
	FIRE ALARM HORN (HS DENOTES HORN/STROBE)
	MANUAL PULL STATION
RT	REMOTE TROUBLE STATION
EOL	END OF LINE RESISTOR
	FIREFIGHTERS HANDSET
MH	MAGNETIC DOOR HOLDER
SV	SPRINKLER SYSTEM ELECTRICALLY SUPERVISED VALVE
FS	SPRINKLER SYSTEM FLOW SWITCH ELECTRICALLY MONITORED
FHC	FIRE HOSE CABINET
FE	FIRE EXTINGUISHER
	FIRE SUPPRESSION CYLINDER
	SPRINKLER HEAD
	WALL MOUNTED SPRINKLER HEAD
— SP —	SPRINKLER PIPING
– – – – –	FIRE ALARM ZONE BOUNDARY LINES

ELECTRICAL LEGEND

SYMBOL	DESCRIPTION
A	LED LIGHTING FIXTURE (TYPE AS INDICATED)
B	CEILING MOUNTED LIGHTING FIXTURE (TYPE AS INDICATED)
C	WALL MOUNTED LIGHTING FIXTURE (TYPE AS INDICATED)
X	EXIT LIGHTING
	TRACK LIGHTING FIXTURE (TYPE AS INDICATED)
B NL	LIGHTING FIXTURE ON NIGHT LIGHT CIRCUIT (TYPE AS INDICATED)
S	LIGHTING MOTION SENSOR
PC	LIGHTING PHOTOCELL
	BATTERY PACK, HEADS AS SHOWN
	REMOTE EMERGENCY LIGHTING FIXTURE
X	COMBINATION EXIT/EMERGENCY LIGHTING FIXTURE
	15A DUPLEX RECEPTACLE (F=FLOOR MTD, WP=WEATHERPROOF, TP=TAMPERPPROOF)
	15A DUPLEX RECEPTACLE (MOUNTED ABOVE COUNTER)
IG	15A DUPLEX RECEPTACLE, ISOLATED GROUND
GFI	15A DUPLEX RECEPTACLE ON GROUND FAULT CIRCUIT
	15A DUPLEX RECEPTACLE SPLIT WIRED
	SPECIAL PURPOSE OUTLET AS NOTED
$	20A TOGGLE SWITCH (3,4=3 OR 4 WAY, PL=PILOT LIGHT S=SPEED CONTROL)
$$	20A GANGED TOGGLE SWITCHES
$R	20A REMOTE CONTROL SWITCH
$D	DIMMER SWITCH, WATTAGE AS NOTED
$K	20A KEYED SWITCH
	SPECIAL PURPOSE COMMUNICATION OUTLET AS NOTED
#–RUNS X	DATA CABLE RUN IDENTIFICATION
	CABLE TELEVISION OUTLET
	CONTROL DEVICE (T=THERMOSTAT, R=RELAY, S=SOLENOID)
JB	JUNCTION BOX
1ø or 3ø	SINGLE OR THREE PHASE ELECTRIC MOTOR
	FUSE
HM	HYDRO METER
DO	AUTOMATIC DOOR OPERATOR
	PUSHBUTTON STATION
ES	ELECTRIC STRIKE
CR	CARD READER
DC	DOOR CONTACT
	EMERGENCY INDICATOR LIGHT
	MAGNETIC DOOR HOLDER
	UNFUSED DISCONNECT SWITCH
	FUSED DISCONNECT SWITCH
	MANUAL STARTER (PL=PILOT LIGHT)
	MAGNETIC STARTER
	COMBINATION MAGNETIC STARTER AND FUSED DISCONNECT SWITCH
	ELECTRICAL PANEL OR EQUIPMENT AS NOTED
	TELEPHONE PANEL
	HEATING UNIT (TYPE AS INDICATED)
T	TRANSFORMER (TYPE AS INDICATED)
	ELECTRICAL CIRCUITRY AS NOTED
—E—	ELECTRICAL WIRING AS NOTED
—T—	TELEPHONE CONDUIT C/W PULL ROPE
—TV—	CABLE TELEVISION CONDUIT C/W PULL ROPE
SP	SPEAKER (CEILING MOUNTED)
PA	PUBLIC ADDRESS HORN
CCTV	CCTV CAMERA

LIGHTING FIXTURE SCHEDULE

TYPE	DESCRIPTION	VOLT	LAMPS NUMBER	LAMPS WATTS	LAMPS TYPE	LAMPS COLOR	MOUNTING	ROOM	REMARKS
F1	LUMINUS SYRIOS LED WALL UP/DOWN SY602–L2W28r0–120V	120	–	60	LED	4000K	WALL	EXTERIOR	COLOUR BY ARCHITECT
F2	MARK SLOT 4 LED RECESSED LINEAR SL4L 8FT FLP 80CRI 30K 800LMF	120	–	64	LED	3000K	SUSPENDED	126, 126, 201	–
F3	LITHONIA LED RECESSED DOWNLIGHT LDN4 30/20 L04AR LSS 120	120	–	23	LED	3000K	RECESSED	VARIOUS	–
F4	LITHONIA LED GRAD LINEAR SUSPENDED GRD LLP MSL4 80CRI 30K ID1000LMF 80/20	120	–	32	LED	3000K	SUSPENDED	VARIOUS	CONFIRM MOUNTING AND HEIGHT WITH ARCHITECT
F5	MARK SLOT 2 LED DIRECT PENDANT S2LD 8FT FLP 80CRI 30K 800LMF	120	–	64	LED	3000K	SUSPENDED	105	CONFIRM MOUNTING AND HEIGHT WITH ARCHITECT
F6	LITHONIA LED BLT SERIES RECESSED 2X4 2BLT4 30L ADP 120 LP830	120	–	30	LED	3000K	RECESSED	VARIOUS	–
F7	LITHONIA LED RECESSED DOWNLIGHT LDN4 30/20 L04AR LSS 120 WL	120	–	23	LED	3000K	RECESSED	EXTERIOR CANOPY	C/W WET LOCATION OPTION
F8	LITHONIA LED STRIPLIGHT SURFACE ZL1N L48 5000LM L/LENS 120 30K 80CRI	120	–	42	LED	3000K	COVE	BRIDGE 201	–
XR1	LITHONIA LED STRIPLIGHT SURFACE ZL1N L48 3000LM FST 120 30K 80CRI	120	–	33	LED	3000K	SURFACE	GYM 123	C/W WIRE GUARD
XR2	LITHONIA LED STRIPLIGHT SURFACE ZL1N L48 3000LM FST 120 30K 80CRI	120	–	33	LED	3000K	SURFACE	104, X129 X210	–
XR3	LITHONIA LED BLT SERIES RECESSED 2X4 2BLT4 30L ADP 120 LP830	120	–	30	LED	3000K	RECESSED	X119	C/W DRYWALL FRAME
XR4	LITHONIA LED GRAD LINEAR SUSPENDED GRD LLP MSL4 80CRI 30K ID1000LMF 80/20	120	–	32	LED	3000K	SUSPENDED	X115, X209 X217	CONFIRM MOUNTING AND HEIGHT WITH ARCHITECT
XR5	LITHONIA TRADITIONAL SQUARE VANITY FMVTSL 24IN MVOLT 30K 90CRI BN	120	–	18	LED	3000K	SURFACE	102, X212	–
XR6	LITHONIA TRADITIONAL SQUARE VANITY FMVTSL 48IN MVOLT 30K 90CRI BN	120	–	34	LED	3000K	SURFACE	X108, X206	–
XR7	LUMINUS SYRIOS LED WALL DOWN LTG SY600–L1W30r1–120V	120	–	35	LED	4000K	WALL	EXTERIOR	COLOUR BY ARCHITECT
XR8	LITHONIA LED STRIPLIGHT SURFACE ZL1N L24 1500LM FST 120 30K 80CRI	120	–	18	LED	3000K	SURFACE	X121 STOR.	C/W WIRE GUARD
XR9	LITHONIA LED BLT SERIES RECESSED 2X4 2BLT4 30L ADP 120 LP830	120	–	30	LED	3000K	RECESSED	X126	–
X	LUMACELL LA SERIES EXIT SIGN LA2WU	120	–	2.5	LED	–	WALL/CLG	VARIOUS	CSA 22.2 NO.141 CERTIFIED, 1 OR 2 FACES AS SHOWN.
X	LUMACELL LSC SERIES COMBO EXIT/EMERGENCY LSC1280W2LD9	12	2	–	LED	–	WALL, CLG	VARIOUS	CSA 22.2 NO.141 CERTIFIED, C/W LED HEADS, AUTO–TEST FEATURE, FACES AS SHOWN. WIRE GUARD FOR GYMNASIUM.
	LUMACELL LED REMOTE EMERGENCY HEADS MQM2LD9	12	1 OR 2	5	LED	–	WALL, CLG	VARIOUS	CSA 22.2 NO.141 CERTIFIED, 1 OR 2 HEADS AS SHOWN.
LS	LITHONIA LED AREA LUMINAIRE DSX0 LED 40C 1000 40K T3S MVOLT HS	120	–	138	LED	4000K	POLE	PARKING LOT	PROVIDE 7 DAY PROGRAMMABLE TIMER IN RM 107. COLOUR OF FIXTURE AND POLE BY ARCHITECT.

NOTES:

1: XR (1 THROUGH 9) TYPE FIXTURES DENOTES EXISTING FIXTURES TO BE REPLACED WITH NEW LED FIXTURES. CONNECT TO EXISTING CONTROLS. CONFIRM DETAILS ON SITE.

2: WHERE LIGHT FIXTURES PENETRATE GYPSUM BOARD CEILING, MAINTAIN 1 HR. FIRE RATING.

MOTION SENSOR LEGEND & SCHEDULE

- S — EXTENDED RANGE DUAL TECHNOLOGY CEILING MOUNTED MOTION SENSOR EQUAL TO ACUITY nLIGHT nCM PDT 10.
- S DL — CEILING MOUNTED DAYLIGHT HARVESTING PHOTOCELL EQUAL TO ACUITY nLIGHT nCM PC.
- $M — WALL MOUNTED DUAL TECHNOLOGY DIMMING OCCUPANCY SENSOR EQUAL TO ACUITY nLIGHT nWSX PDT LV DX.
- $D — WALL MOUNTED MECHANICAL SWITCH; DIMMING EQUAL TO ACUITY nLIGHT nPODM DX.
- $ — WALL MOUNTED MECHANICAL SWITCH; EQUAL TO ACUITY nLIGHT nPODM.
- $3 — WALL MOUNTED 3–WAY MECHANICAL SWITCH; EQUAL TO ACUITY nLIGHT nPODM.
- $E — EXISTING LIGHTING CONTROL. CONFIRM LOCATION ON SITE.

ELECTRICAL PANEL SCHEDULE

POWER SUPPLY 120/240 VOLTS AC, 1PH ,3W
PANEL BUS RATING 225 AMPS, MAIN BREAKER 200 AMPS
PANEL REFERENCE ––––> PANEL A

CCT. NO.	DESCRIPTION	CCT BKR AMP	PHASE A B	CCT BKR AMP	DESCRIPTION	CCT. NO.
1	EXISTING CIRCUIT TO REMAIN				EXISTING CIRCUIT TO REMAIN	2
3						4
5						6
7						8
9						10
11						12
13						14
15						16
17						18
19						20
21						22
23	SPACE					24
25	EXISTING CIRCUIT TO REMAIN					26
27	EXISTING CIRCUIT TO REMAIN				SPACE	28
29	SPACE			15	RECEPTACLES CLASSROOM X105	30
31	RECEPTACLES CLASSROOM X124	15		15	EXHAUST FAN W/R X125	32
33	EXHAUST FAN W/R X127	15		15	RECEPTACLES TEACHER'S LOUNGE X126	34
35	RECEPTACLES VP OFFICE X104	15		15	RECEPTACLES PRINCIPAL'S OFFICE X103	36
37	RECEPTACLES RECEPTION X102	15		15	RECEPTACLES RECEPTION DESK X102	38
39						40
41						42

ELECTRICAL PANEL SCHEDULE

POWER SUPPLY 120/240 VOLTS AC, 1PH ,3W
PANEL BUS RATING 225 AMPS, MAIN BREAKER 200 AMPS
PANEL REFERENCE ––––> PANEL E

CCT. NO.	DESCRIPTION	CCT BKR AMP	PHASE A B	CCT BKR AMP	DESCRIPTION	CCT. NO.
1	EXISTING CIRCUIT TO REMAIN				EXISTING CIRCUIT TO REMAIN	2
3						4
5						6
7						8
9						10
11						12
13						14
15						16
17						18
19						20
21						22
23						24
25						26
27						28
29						30
31	RECEPTACLES X202 & X203	15		15	CLASSROOM X202 EXHAUST FAN	32
33	SPACE				SPACE	34
35	RECEPTACLES X207 & X208	15		15	RECEPTACLES X213 & X214	36
37	RECEPTACLES X215 & X216	15				38
39						40
41						42

ELECTRICAL PANEL SCHEDULE

POWER SUPPLY 120/240 VOLTS AC, 1PH ,3W
PANEL BUS RATING 225 AMPS, MAIN BREAKER 200 AMPS
PANEL REFERENCE ––––> EX. PANEL B

CCT. NO.	DESCRIPTION	CCT BKR AMP	PHASE A B	CCT BKR AMP	DESCRIPTION	CCT. NO.
1	EXISTING CIRCUIT TO REMAIN				EXISTING CIRCUIT TO REMAIN	2
3						4
5						6
7						8
9						10
11						12
13						14
15						16
17						18
19						20
21						22
23	DOOR OPERATOR VESTIBULE X118	20				24
25	RECEPTACLES RECEPTION X117	15				26
27	RECEPTACLES CHILD CARE X112 & SLEEP ROOM X114	15				28
29	RECEPTACLES CHILD CARE X112 & CHILD CARE X109	15		15	EXHAUST FAN X109 & X113	30

ELECTRICAL PANEL SCHEDULE

POWER SUPPLY 120/240 VOLTS AC, 1PH ,3W
MAIN BREAKER 210 AMPS
PANEL REFERENCE ––––> EX. PANEL D (GYM)

CCT. NO.	DESCRIPTION	CCT BKR AMP	PHASE A B	CCT BKR AMP	DESCRIPTION	CCT. NO.
1	EXISTING CIRCUIT TO REMAIN				EXISTING CIRCUIT TO REMAIN	2
3						4
5						6
7						8
9						10
11						12
13						14
15						16
17						18
19						20
21						22
23						24
25						26
27						28
29				15	RECEPTACLES MEETING ROOM 102	30
31	DOOR OPERATOR VESTIBULE 124	20		15	RECEPTACLES GYM STORAGE 101	32
33	DOOR OPERATOR VESTIBULE 124	20		15	RECEPTACLES FOYER 100	34
35	DOOR OPERATOR W/R 103	20		15	CABINET UNIT HEATER VESTIBULE 124	36

ELECTRICAL PANEL SCHEDULE

POWER SUPPLY 120/240 VOLTS AC, 1PH ,3W
PANEL BUS RATING 225 AMPS, MAIN BREAKER 200 AMPS
PANEL REFERENCE ––––> P–1

CCT. NO.	DESCRIPTION	CCT BKR AMP	PHASE A B	CCT BKR AMP	DESCRIPTION	CCT. NO.
1	DOOR OPERATOR VESTIBULE 125	20		20	DOOR OPERATOR VESTIBULE 125	2
3	DOOR OPERATOR VESTIBULE 126	20		20	DOOR OPERATOR VESTIBULE 126	4
5	CABINET UNIT HEATERS VESTIBULE 125 & 126	15		15	RECEPTACLES FOYER 105	6
7	RECEPTACLES HALLWAY 106	15		15	RECEPTACLES KINDERGARTEN 108	8
9	RECEPTACLES KINDERGARTEN 108	15		20	DOOR OPERATOR VESTIBULE 113	10
11	DOOR OPERATOR VESTIBULE 113	20		15	CABINET UNIT HEATER VESTIBULE 113	12
13	DOOR OPERATOR W/R 110	20		15	RECEPTACLES W/R'S 109, 110 & KINDERGARTEN 114	14
15	RECEPTACLES KINDERGARTEN 114	15		15	RECEPTACLES KINDERGARTEN 114	16
17	CABINET UNIT HEATER STAIR 122	15		15	RECEPTACLES KINDERGARTEN 121	18
19	RECEPTACLES KINDERGARTEN 121	15		20	DOOR OPERATOR W/R 117	20
21	DOOR OPERATOR VESTIBULE 120	20		20	DOOR OPERATOR VESTIBULE 120	22
23	CABINET UNIT HEATER VESTIBULE 120	15		15	RECEPTACLES W/R'S 116, 117 & KINDERGARTEN 115	24
25	RECEPTACLES KINDERGARTEN 115	15		15	RECEPTACLES KINDERGARTEN 115	26
27	LIGHTS FOYER & ATRIUM	20		20	LIGHTS HALLWAY 106	28
29	LIGHTS CARETAKER 107	20		20	LIGHTS CLASSROOMS 108 & 114	30
31	LIGHTS STAIRWELL 122	20		20	LIGHTS CLASSROOMS 115 & 121	32
33	EXIT LIGHTS	15				34
35						36
37						38
39						40
41						42

ELECTRICAL PANEL SCHEDULE

POWER SUPPLY 120/240 VOLTS AC, 1PH ,3W
PANEL BUS RATING 225 AMPS, MAIN BREAKER 200 AMPS
PANEL REFERENCE ––––> P–2

CCT. NO.	DESCRIPTION	CCT BKR AMP	PHASE A B	CCT BKR AMP	DESCRIPTION	CCT. NO.
1	RECEPTACLES BRIDGE 201 & HALLWAY 203	15		15	RECEPTACLES CLASSROOM 204	2
3	RECEPTACLES CLASSROOM 204	15		15	RECEPTACLES CLASSROOM 205	4
5	RECEPTACLES CLASSROOM 205	15		15	RECEPTACLES LIBRARY 206	6
7	RECEPTACLES LIBRARY 206	15		15	RECEPTACLES CLASSROOM 207	8
9	RECEPTACLES CLASSROOM 207	15		20	DOOR OPERATOR W/R 208	10
11	RECEPTACLES W/R 208	15		15	EXHAUST FAN W/R 208	12
13	EXHAUST FAN LAN ROOM 212	15		30	RECEPTACLES LAN ROOM 212	14
15	RECEPTACLES BOOK ROOM 209	15		15	RECEPTACLES CLASSROOM 210	16
17	RECEPTACLES CLASSROOM 210	15		15	RECEPTACLE WINTER GARDEN 202	18
19	LIGHTS BRIDGE 201	20		20	LIGHTS HALLWAY 203	20
21	LIGHTS CLASSROOM 204 & 205	20		20	LIGHTS LIBRARY 206	22
23	LIGHTS CLASSROOM 207 & 210	20		20	LIGHTS BOOKROOM 207, LAN RM 212 & W/R 208	24
25	EXIT LIGHTS	15				26
27						28
29						30
31						32
33						34
35						36
37						38
39						40
41						42

ELECTRICAL PANEL SCHEDULE

POWER SUPPLY 120/240 VOLTS AC, 1PH ,3W
MAIN BREAKER 125 AMPS
PANEL REFERENCE ––––> P–3

CCT. NO.	DESCRIPTION	CCT BKR AMP	PHASE A B	CCT BKR AMP	DESCRIPTION	CCT. NO.
1	BOILER B01–A & BOILER PUMP	15		15	PUMPS #1,3,5	2
3	BOILER B01–B & BOILER PUMP	15				4
5	BOILER B01–C & BOILER PUMP	15		15	PUMPS #2,4,6	6
7	PUMP #7	15				8
9				60	HVAC #1	10
11	HVAC #2	60				12
13				60	HVAC #3	14
15	HVAC #4	60				16
17				15	CARETAKER ROOM UNIT HEATER	18
19	CARETAKER ROOM RECEPTACLES	15				20
21						22
23						24

POPE FRANCIS ELEMENTARY
ADDITION & RENOVATION
PROJECT#R121
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REV	DESCRIPTION	DATE
4	REVISED FOR ADDENDUM #1	17.06.09
3	ISSUED FOR PERMIT & TENDER	17.05.17
2	ISSUED FOR CLIENT REVIEW	17.05.08
1	ISSUED FOR CLIENT REVIEW	17.04.28

J.R. HAMALAINEN

BORTOLOTTO

PROJECT NUMBER PR1701 JRHE 3203
DATE 17.05.17
SCALE NTS
DRAWN BY CR

ELECTRICAL NOTES, LEGENDS & SPECIFICATIONS

4 E0.1

Pope Francis Elementary School –ICT Notes

Manager of ICT –Glen Nakashoji ...gnakashoji@ncdsb.on.ca ... 705–288–1137
Senior Technician –Marc Lavoie ...malavoie@ncdsb.on.ca ... 705–360–3117
May 12, 2017

a. 10'(d) x 18'(w) standard millwork...central ICT for Standard Classroom
   Customer will provide:
   Speakers
   Call Buttons
   Clock
   Telephone Sets
   CJ688TGWH – Category 6A, RJ45, 8–position, 8–wire universal module. White.
   RCA to 3.5mm Speaker Cable

   Contractor will:
   Provide Network Cable Cat6A
   terminate ends w/ Quick Connect (White) use –B–STANDARD
   Test and Label terminated Cable (both ends)
   no jack box required inside Mill Work 8'slack request 10'x18'box end
   Install 15–30amp power outlet 1 from top of the 10'x18'box (inside)

b. Smart Panels (White Boards) –Standard Classroom
   Customer will provide:
   Smart Panel
   Smart Panel Mount
   CJ688TGWH – Category 6A, RJ45, 8–position, 8–wire universal module. White.
   Wall Surface Jacks
   RCA to 3.5mm Speaker Cable

   Contractor will:
   Provide Network Cable Cat6A
   Terminate ends w/ Quick Connect (White) use –B–STANDARD
   Install surface jack
   Test and Label terminated Cable (both ends)
   Install RCA to 3.5mm Speaker Cable from surface Jack to 10'x 18'Standard Millwork –Slack at this end
   Install the Smart Panel "MOUNT"

c. Ceiling wires for Speakers
   Customer will provide:
   Ceiling Speakers
   CJ688TGWH – Category 6A, RJ45, 8–position, 8–wire universal module. White.

   Contractor will:
   Terminate ends w/ Quick Connect (White) use –B–STANDARD
   no jack box required inside ceiling –8'slack request (speaker end)
   Test and Label terminated Cable (both ends)

e. Outside Horns (Speakers)
   Customer will provide:
   Outside Horn (Speaker)
   CJ688TGWH – Category 6A, RJ45, 8–position, 8–wire universal module. White.

   Contractor will:
   Terminate ends w/ Quick Connect (White) use –B–STANDARD
   no jack box required on outside of building –4'slack request (horn/speaker end)
   Test and Label terminated Cable (both ends)

f. Outside Cameras
   Customer will provide:
   Outside Camera
   CJ688TGWH – Category 6A, RJ45, 8–position, 8–wire universal module. White.

   Contractor will:
   terminate ends w/ Quick Connect (White) use –B–STANDARD
   no jack box required on outside of building –4'slack request (camera end)
   Test and Label terminated Cable (both ends)

g. Switching Room REF 1.1 (Old Mechanical Room)
   Customer will provide:
   CJ688TGWH – Category 6A, RJ45, 8–position, 8–wire universal module. White.

   Contractor will:
   Terminate ends w/ Quick Connect (White) use –B–STANDARD
   no jack box required –8'slack request (mechanical room end)
   Test and Label terminated Cable (both ends)

h. Switching Room REF 1.2 (Classroom x102) 4'x2'x8 Millwork
   Customer will provide:
   18u Rack
   CJ688TGWH – Category 6A, RJ45, 8–position, 8–wire universal module. White.
   CP24BLY –24 PORT ALL METAL MODULAR PATCH PANEL 1U

   Contractor will:
   Mount Rack inside 4'x2'x8 Millwork
   Install Patch Panel –Reference Rack Diagram for Spacing Direction
   terminate ends w/ Quick Connect (White) use –B–STANDARD
   Test and Label terminated Cable (both ends)

j. Switching Room REF 1.3 (LAN ROOM 212)
   Customer will provide:
   Free Standing Rack
   CJ688TGWH – Category 6A, RJ45, 8–position, 8–wire universal module. White.
   CP24BLY –24 PORT ALL METAL MODULAR PATCH PANEL 1U

   Contractor will:
   Place Rack in LAN Room –Secure to Floor
   Install Patch Panel –Reference Rack Diagram for Spacing Direction
   Terminate ends w/ Quick Connect (White) use –B–STANDARD
   Test and Label terminated Cable (both ends)

k. New Offices –new wall construction
   Customer will provide:
   CJ688TGWH – Category 6A, RJ45, 8–position, 8–wire universal module. White.
   Wall Jack Plates

   Contractor will:
   terminate ends w/ Quick Connect (White) use –B–STANDARD
   Jack –Use electrical box required (contractor provided)
   Install Wall Plate
   Test and Label terminated Cable (both ends)

Rack 1.2		
24 port Panduit	1U	All Ty go to this panel
Tmark (fiber converter)	1U	
24 port Panduit	1U	
48 Port Cisco 2960X	1U	
24 port Panduit	1U	
24 port Panduit	1U	
48 Port Cisco 2960X	1U	
24 port Panduit	1U	
24 port Panduit	1U	
48 Port Cisco 2960X	1U	
24 port Panduit	1U	
	1U	
	1U	
	1U	
	1U	
	1U	
UPS 200VA - 2U	1U	
UPS 200VA - 2U	1U	

Rack 1.2 Room 202
18U Rack Wall mount

Rack 1.3		
	1U	
24 port Panduit	1U	All Ty go to this panel
Juniper Router - SRX240b	1U	
Juniper CORE Switch EX2200	1U	
Phone Router	1U	
	1U	
	1U	
	1U	
	1U	
24 port Panduit	1U	
48 Port Cisco 2960X	1U	
24 port Panduit	1U	
24 port Panduit	1U	
48 Port Cisco 2960X	1U	
24 port Panduit	1U	
	1U	
UPS 200VA - 2U	1U	
UPS 200VA - 2U	1U	

Rack 1.3 Room 212
42U Rack midle of floor

CONFIGURATION FOR RACKS 1.2 AND 1.3

DATA CABLE RUN TABLE

New Cable runs for Pope Francis Catholic Elementary

Jack ID	From Location	Room #	Patch panel ID	To Location	Room #	ID	Cable Category	Type	Lookup Code	Maximum run length Length in Meters	Description/device Proposed device
[illegible]	[illegible]	[illegible]	[illegible]	Rack 1.2	202	[illegible]	Cat6A	UTP	[illegible]	Max = 70m	[illegible]

Jack ID	From Location	Room #	Patch ID	To Location	Room #	Cable Category	Maximum run length Length in Meters	Description/device Proposed device
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Premium 3.5mm Stereo Male to 2RCA Male (GHMS) Cable	[illegible]	Smart Board to Speaker

POPE FRANCIS ELEMENTARY
ADDITION & RENOVATION
PROJECT#R121

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Consulting Engineers

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4	REVISED FOR ADDENDUM #1	17.06.09
3	ISSUED FOR PERMIT & TENDER	17.05.17
2	ISSUED FOR CLIENT REVIEW	17.05.08
1	ISSUED FOR CLIENT REVIEW	17.04.28

J.R. HAMALAINEN

BORTOLOTTO

PROJECT NUMBER
PR1707
JRHE 3203

DATE
17.05.17

SCALE
NTS

DRAWN BY
CR

DATA SYSTEMS
NOTES & SCHEDULES

E0.2

GENERAL NOTES

1. NEW PA/SCHOOL BELL/VIDEO CAMERA/CARD ACCESS SYSTEM SERVING ENTIRE SCHOOL.
2. REMOVE EXISTING I.T. EQUIPMENT FROM MECHANICAL ROOM. VOICE AND DATA CABLING FOR THE EXISTING SCHOOL TO BE TERMINATED IN CARETAKER ROOM 107. NEW I.T. RACK TO BE PROVIDED. PROVIDE POWER AND DATA AS REQUIRED BY I.T. PROVIDER.
3. COORDINATE CARD READER, DOOR BUZZER AND AUTO DOOR OPERATOR BUTTON LOCATIONS WITH ARCHITECT. TYPICAL ALL LOCATIONS.
4. EXISTING EXHAUST FAN TO BE REPLACED. REUSE EXISTING POWER. REFER TO MECHANICAL DRAWINGS.
5. PA SPEAKER, CLOCK AND DATA TO BE LOCATED IN PA SYSTEM ENCLOSURE. SUPPLY AND INSTALL 15-30A AMP DUPLEX RECEPTACLE, WALL MOUNTED ON FRONT FACE OF PA SYSTEM ENCLOSURE 12" BELOW FINISHED CEILING. AT ALL PA ENCLOSURE LOCATIONS, IT DATA WIRING TO BE IN EXCESS OF 8'-0" IN LENGTH. SPEAKER, CLOCK, DATA BY NCDSB, ROUGH IN ONLY. TYPICAL AT ALL PA SYSTEM ENCLOSURES. POWER OUTLETS TO BE SUPPLIED AND INSTALLED BY CONTRACTOR. REFER TO ICT NOTE "5", DWG E0.2.
6. ALL AUTOMATIC DOOR OPERATORS TO BE STANLEY MAGIC FORCE OR EQUAL. TYPICAL THROUGHOUT. COORDINATE LOCATIONS OF ALL PUSH BUTTONS WITH ARCHITECT.
7. REPLACE EXISTING ELECTRIC HAND DRYER WITH NEW. DYSON AIRBLADE AB14. COLOUR BY ARCHITECT. REUSE EXISTING POWER.
8. EXISTING FIRE ALARM CONTROL PANEL AND REMOTE ANNUNCIATOR PANEL TO REMAIN. EXISTING FACP IS MIRCOM MODEL FA-1008K.
9. REPLACE EXISTING RECEPTACLES WITH TAMPERPROOF RECEPTACLES. CONFIRM NUMBER AND LOCATIONS ON SITE.
10. ALL CCTV CAMERAS AND PA HORNS TO BE MOUNTED AT 3.6m (12'-0") ABOVE GRADE. TYPICAL.

DATA NOTES:

1. ALL DATA RUN IDENTIFICATIONS SHOWN ON THIS DRAWING ARE TO BE INSTALLED ACCORDING TO THE NOTES, RACK LAYOUTS AND CABLE RUN TABLE LOCATED ON DRAWING E0.2.
2. ALL JACKS AND PATCH PANEL ENDS ARE TO BE LABELLED USING THE DATA IDENTIFICATION NUMBERS. REFER TO DATA CABLE RUN TABLE ON DWG E0.2.
3. CONTRACTOR IS TO ENSURE THAT THE EXISTING FIBER OPTIC CABLE RUNNING BETWEEN EXISTING MECHANICAL ROOM 104 AND CLASSROOM X102 IS NOT DAMAGED DURING CONSTRUCTION. ANY DAMAGES SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR. COORDINATE DETAILS ON SITE.

1.1 NOTES: (READ ICT NOTES g. DWG E0.2)

1. NCDSB TO PROVIDE RACK
2. NCDSB TO PROVIDE PATCH PANEL (BY PANDUIT) QUICK CONNECT STANDARD. TERMINATIONS, B=STANDARD BY CONTRACTOR
3. CONTRACTOR TO PROVIDE 1" PLYWOOD BACKBOARD AND POWER. CONFIRM EXACT LOCATION ON SITE.

1 / E1.1 POWER, DATA & FIRE ALARM LAYOUT - GROUND FLOOR PLAN - RENO
1:75

POPE FRANCIS ELEMENTARY
ADDITION & RENOVATION
PROJECT#R121

387 Balsam Street North
Timmins, Ontario

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1	ISSUED FOR CLIENT REVIEW	17.04.28

REGISTERED PROFESSIONAL ENGINEER
2017-05-17
J.R.HAMALAINEN
100128
PROVINCE OF ONTARIO

BORTOLOTTO

PROJECT NUMBER
P1701
JRHE 3203

DATE
17.05.17

SCALE
1:75

DRAWN BY
CR

GROUND FLOOR PLAN - RENO
POWER, DATA &
FIRE ALARM LAYOUT

4 E1.1

GENERAL NOTES

1. PA SPEAKER, CLOCK AND DATA TO BE LOCATED IN PA SYSTEM ENCLOSURE. SUPPLY AND INSTALL 15-30A AMP DUPLEX RECEPTACLE, WALL MOUNTED ON FRONT FACE OF PA SYSTEM ENCLOSURE 12" BELOW FINISHED CEILING. AT ALL PA ENCLOSURE LOCATIONS, IT DATA WIRING TO BE IN EXCESS OF 8'-0" IN LENGTH. SPEAKER, CLOCK, DATA BY NCDSB. ROUGH IN ONLY, TYPICAL AT ALL PA SYSTEM ENCLOSURES. POWER OUTLETS TO BE SUPPLIED AND INSTALLED BY CONTRACTOR. REFER TO ICT NOTE "a", DWG E0.2.
2. ROUGH-IN ONLY FOR PA SPEAKER, POWER FOR CLOCK AND DATA IN PA SYSTEM ENCLOSURE.
3. ROUGH-IN ONLY FOR POWER/DATA AS SHOWN.
4. REPLACE EXISTING ELECTRIC HAND DRYER WITH NEW. DYSON AIRBLADE AB14. COLOUR BY ARCHITECT. REUSE EXISTING POWER.
5. VOICE AND DATA CABLING FOR THE NEW ADDITION TO BE TERMINATED IN THIS ROOM. NEW I.T. RACK TO BE PROVIDED. PROVIDE POWER AND DATA AS REQUIRED BY IT PROVIDER.

DATA NOTES:

1. ALL DATA RUN IDENTIFICATIONS SHOWN ON THIS DRAWING ARE TO BE INSTALLED ACCORDING TO THE NOTES, RACK LAYOUTS AND CABLE RUN TABLE LOCATED ON DRAWING E0.2.
2. ALL JACKS AND PATCH PANEL ENDS ARE TO BE LABELLED USING THE DATA IDENTIFICATION NUMBERS. REFER TO DATA CABLE RUN TABLE ON DWG E0.2.
3. CONTRACTOR IS TO ENSURE THAT THE EXISTING FIBER OPTIC CABLE RUNNING BETWEEN EXISTING MECHANICAL ROOM 104 AND CLASSROOM X102 IS NOT DAMAGED DURING CONSTRUCTION. ANY DAMAGES SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR. COORDINATE DETAILS ON SITE.

1.2 NOTES: (READ ICT NOTES h, DWG E0.2)

1. NCDSB TO PROVIDE RACK
2. NCDSB TO PROVIDE PATCH PANEL (BY PANDUIT) QUICK CONNECT STANDARD. TERMINATIONS B-STANDARD BY CONTRACTOR
3. CONTRACTOR TO PROVIDE 1" PLYWOOD BACKBOARD AND POWER

NOTE:
AT THIS LOCATION PROVIDE 2 POWER OUTLETS (30AMP CIRCUIT) LOCATED 6" BELOW NCDSB IT RACK

1.3 NOTES: (READ ICT NOTES j, DWG E0.2)

1. NCDSB TO PROVIDE RACK
2. NCDSB TO PROVIDE PATCH PANEL (BY PANDUIT) QUICK CONNECT STANDARD. TERMINATIONS B-STANDARD BY CONTRACTOR
3. CONTRACTOR TO PROVIDE 1" PLYWOOD BACKBOARD AND POWER

NOTE:
2 POWER OUTLETS (30AMP CIRCUIT)

PROVIDE DOOR CLOSER/HOLDER DEVICE EQUAL TO LCN 4040SE. TO BE RELEASED BY FIRE ALARM.

PROVIDE WALL MOUNTED SEMI-FLUSH MAGNETIC DOOR HOLD OPEN DEVICE EQUAL TO SIMPLEX RSG DH SERIES. TO BE RELEASED BY FIRE ALARM.

EXISTING IT EQUIPMENT TO BE ENCLOSED AND VENTILATED. SEE ARCHITECTURAL, AND CONFIRM DETAILS WITH IT PROVIDER.

PANEL E TO BE REPLACED: 120/240V, 1ø, 200A, 42CCT.

SPEED CONTROL SWITCH IN CEILING SPACE FOR NEW WASHROOM EXHAUST FAN ON ROOF. COORDINATE WITH MECHANICAL. SEE DWG M2.2 FOR FURTHER DETAILS.

EX. PANEL C 120/240V, 1ø, 160A, 30CCT.

1 / E1.2 POWER, DATA & FIRE ALARM LAYOUT - SECOND FLOOR PLAN - RENO
1:75

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LICENSED PROFESSIONAL ENGINEER
J.R.HAMALAINEN
2017-05-17
PROVINCE OF ONTARIO

BORTOLOTTO

PROJECT NUMBER
PF1701
JR/HE 3203

DATE
17.05.17

SCALE
1:75

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CR

SECOND FLOOR PLAN - RENO
POWER, DATA &
FIRE ALARM LAYOUT

4 E1.2