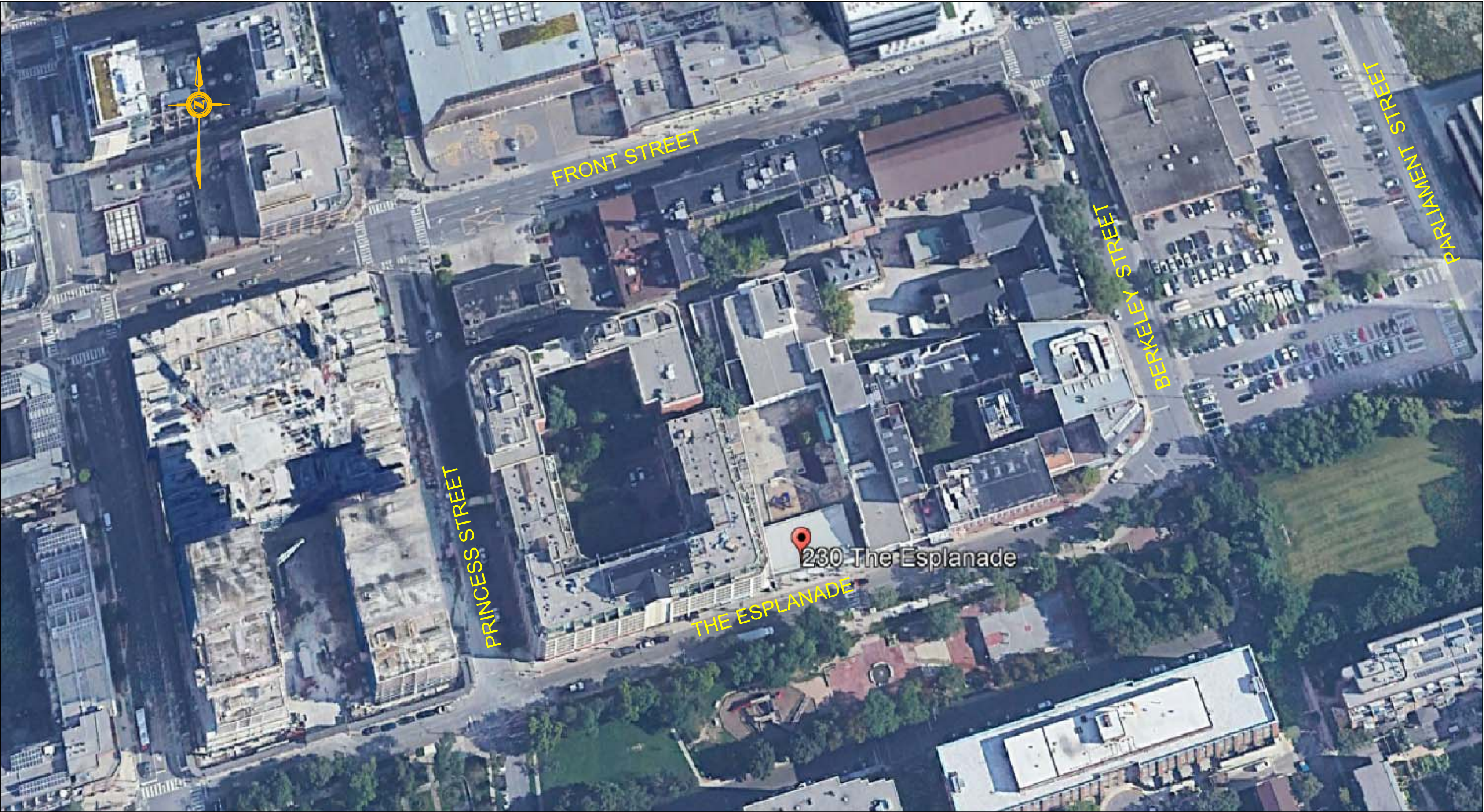


CITY OF TORONTO - PARKS & RECREATION
ST. LAWRENCE COMMUNITY RECREATION CENTER & DAYCARE
ROOFING & CHILLER REPLACEMENT
230 THE ESPLANADE, TORONTO, ON



1
A1 KEY PLAN
N.T.S.

DRAWING INDEX:

ARCHITECTURAL:

- A1 – KEY PLAN, OBC MATRIX & DRAWING INDEX
A2 – SITE PLAN

STRUCTURAL:

- S1 – GROUND FLOOR PLAN
S2 – ROOF PLAN
S3 – DETAILS

ROOFING:

- R1 – ROOFING REPLACEMENT – NOTES
R2 – ROOFING REPLACEMENT – ROOF PLANS
R3 – ROOFING REPLACEMENT – DETAILS

MECHANICAL:

- M1 – MECHANICAL SPECIFICATIONS & SITE PLAN
M2 – MECHANICAL SPECIFICATIONS CONT'D
M3 – ROOF PLAN & MECHANICAL PENTHOUSE DEMO
M4 – ROOF PLAN & MECHANICAL PENTHOUSE RENO
M5 – GYM. MECHANICAL ROOM DEMO
M6 – GYM. MECHANICAL ROOM RENO
M7 – COOLING TOWER & CHILLER SCHEMATIC DEMO
M8 – COOLING TOWER & CHILLER SCHEMATIC RENO
M9 – CONTROL SEQUENCE DIAGRAM
M10 – CONTROL SPECIFICATION
M11 – MECHANICAL DETAILS & SCHEDULE

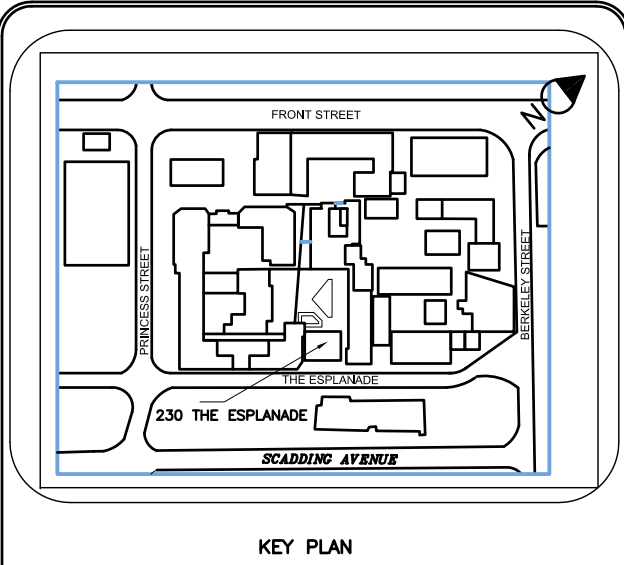
ELECTRICAL:

- E1 – ELECTRICAL SPECIFICATION AND LEGEND
E2 – ELECTRICAL DEMOLITION PLAN
E3 – ELECTRICAL POWER PLAN
E4 – SINGLE LINE DIAGRAM

3
A1 DRAWING INDEX
N.T.S.

	ONTARIO BUILDING CODE DATA MATRIX PARTS 11 – RENOVATION OF EXISTING BUILDING		
	EXISTING BUILDING CLASSIFICATION	DESCRIBE EXISTING USE: <u>COMMUNITY CENTER</u>	11.2.1
		LOW RISE: (<u>COMBUSTIBLE AND NON-COMBUSTIBLE</u>)	T 11.2.1.1A T 11.2.1.1B TO N
		CONSTRUCTION INDEX: <u>EIGHT (8)</u>	
		HAZARD INDEX: <u>FIVE (5)</u>	
11.2	ALTERATION TO EXISTING BUILDING IS	BASIC RENOVATION: <input checked="" type="checkbox"/> EXTENSIVE RENOVATION: <input type="checkbox"/>	11.3.3.1 11.3.3.2
11.3	REDUCTION IN PERFORMANCE LEVEL	STRUCTURAL: <input checked="" type="checkbox"/> NO <input type="checkbox"/> YES BY INCREASE IN OCCUPANT LOAD: <input checked="" type="checkbox"/> NO <input type="checkbox"/> YES BY CHANGE IN MAJOR OCCUPANCY: <input checked="" type="checkbox"/> NO <input type="checkbox"/> YES PLUMBING: <input checked="" type="checkbox"/> NO <input type="checkbox"/> YES SEWAGE SYSTEM: <input checked="" type="checkbox"/> NO <input type="checkbox"/> YES	11.4.2 11.4.2.1 11.4.2.2 11.4.2.3 11.4.2.4 11.4.2.5
11.4	COMPENSATING CONSTRUCTION	STRUCTURAL: <input checked="" type="checkbox"/> NO <input type="checkbox"/> YES INCREASE IN OCCUPANT LOAD: <input checked="" type="checkbox"/> NO <input type="checkbox"/> YES CHANGE IN MAJOR OCCUPANCY: <input checked="" type="checkbox"/> NO <input type="checkbox"/> YES PLUMBING: <input checked="" type="checkbox"/> NO <input type="checkbox"/> YES SEWAGE SYSTEM: <input checked="" type="checkbox"/> NO <input type="checkbox"/> YES	11.4.3 11.4.3.2 11.4.3.3 11.4.3.4 11.4.3.5 11.4.3.6
11.5	COMPLIANCE ALTERNATIVES PROPOSED	<input checked="" type="checkbox"/> NO <input type="checkbox"/> YES	11.5.1

2
A1 OBC MATRIX
N.T.S.



5		
4		
3	FOR TENDER/ PERMIT	FEB.26.25
2	FOR CLIENT REVIEW @100%	JAN.31.25
1	FOR CLIENT REVIEW @ 60%	JAN.15.25
NO.	REVISION	DATE

NOTE:
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Toronto
PARKS & RECREATION
CAPITAL PROJECTS
METRO HALL
55 JOHN STREET, 24th FLOOR
TORONTO, ONTARIO, M5V 3C6

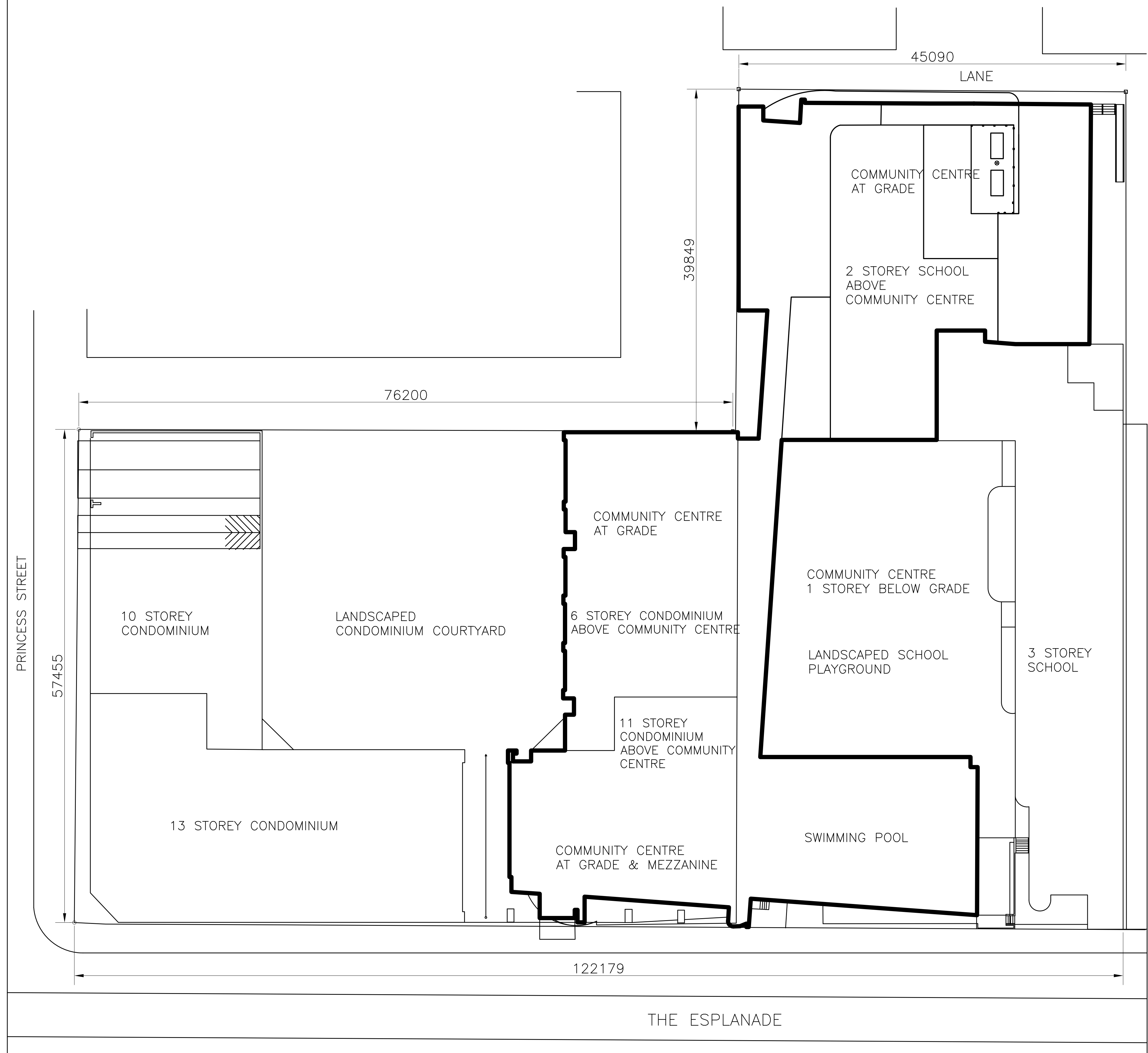
TABCON
CONSULTING INC.
494 McNicoll Avenue, Suite # 201
Toronto, Ontario, M2H 2E1
Tel. : (647) 974-7006
Web Site : www.tabcon.com

Project Name :
ST. LAWRENCE CRC & DAYCARE
Project Address :
230 THE ESPLANADE
TORONTO, ON
Job Descript. :
ROOFING & CHILLER REPLACEMENT
KEY PLAN, OBC MATRIX & DRG. INDEX

Design: R.A.
DRAWN: R.A.
Approv.: A.T.
Scale: As Shown
Date: JANUARY 15, 2025

Project No.
Job No.
Dwg.No.
A1
OF 2





1 SITE PLAN
A2 N.T.S.



KEY PLAN

5		
4		
3	FOR TENDER/ PERMIT	FEB.26,25
2	FOR CLIENT REVIEW @100%	JAN.31,25
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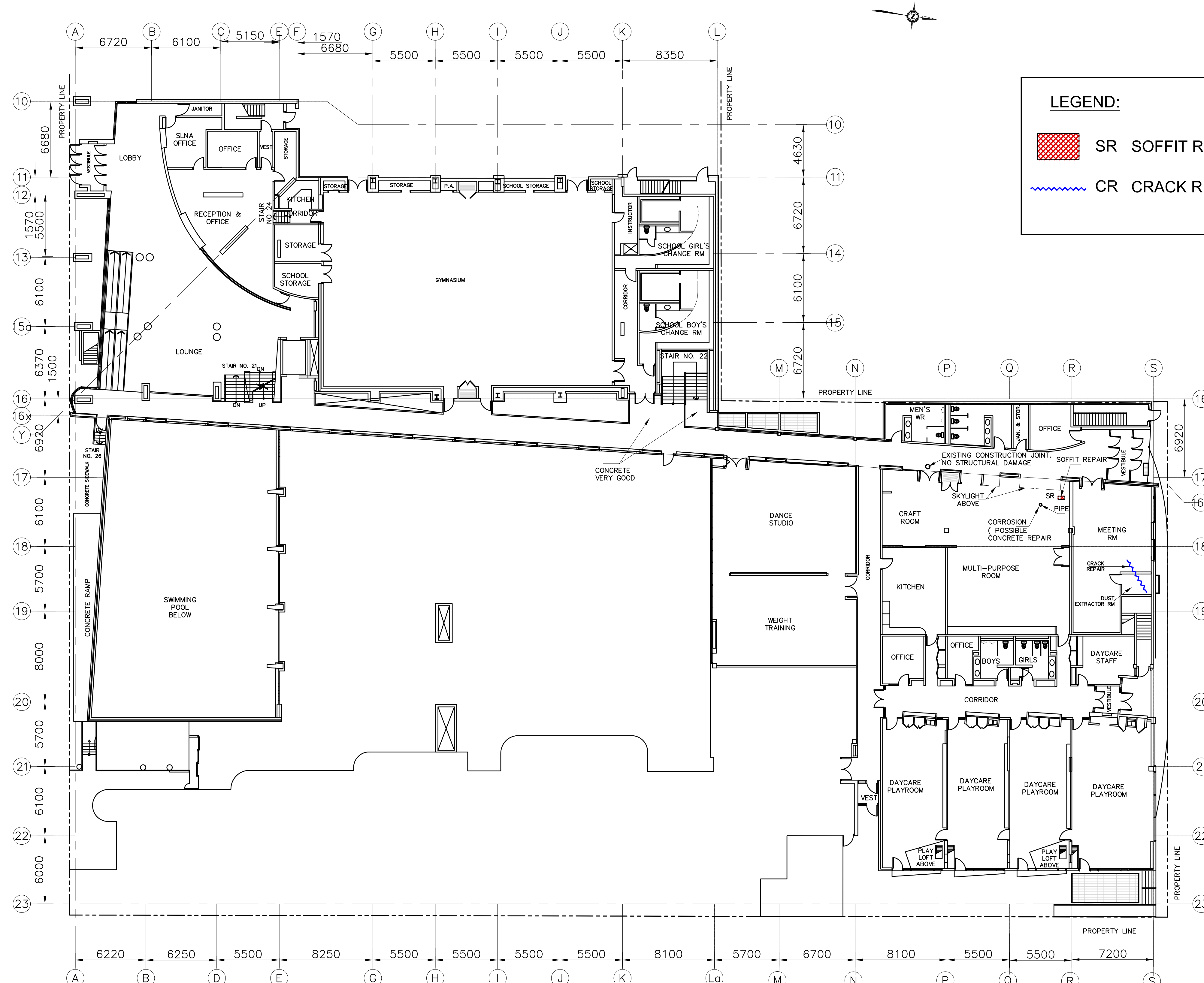
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**230 THE ESPLANADE
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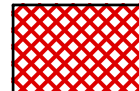
SITE PLAN


Design: R.A.	
DRAWN: R.A.	
Approv.: A.T.	
Scale: As Shown	
Date: JANUARY 15, 2025	

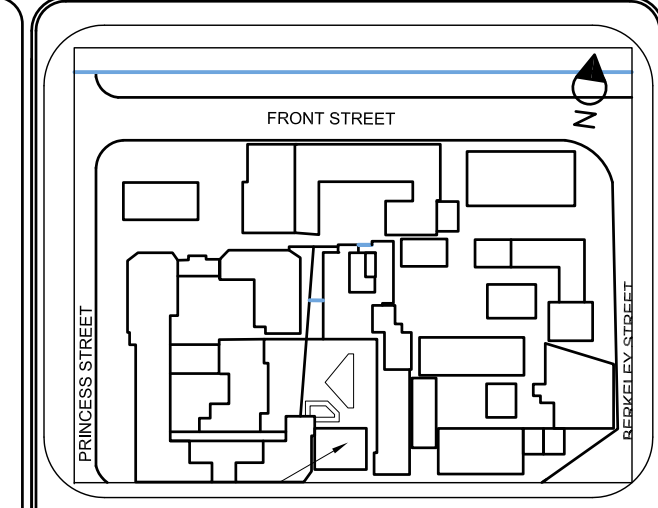
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Job No.	A2 OF 2



LEGEND:

 SR SOFFIT REPAIR

 CR CRACK REPAIR



KEY PLAN

NO.	REVISION	DATE
5		
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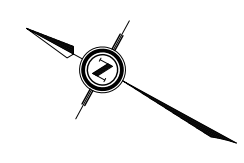
Job Descript. :
ROOFING & CHILLER REPLACEMENT
STRUCTURAL REPAIRS

GROUND FLOOR PLAN

Design:	R.A.
DRAWN:	R.A.
Approv.:	A.T.
Scale:	As Shown
Date:	JANUARY 15, 2025

Project No.	Dwg.No.
Job No.	S1 OF 3





STEEL STRUCTURAL FRAME:
LOCALIZED REPAIR GRINDING,
PRIMING AND PAINTING)

THE ROOF DIRECTLY
ABOVE THE COMMUNITY
RECREATION CENTRE

± 3000 ± 3000

METAL ROOF DECK AND
FRAME IN GOOD
CONDITION

THE ROOF ABOVE THE
MECHANICAL ROOM

REPLACE STEEL BEAMS:
REPLACE STEEL BEAMS

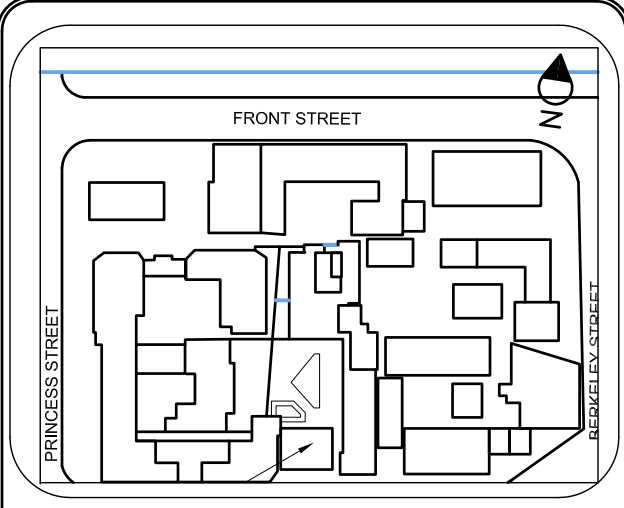
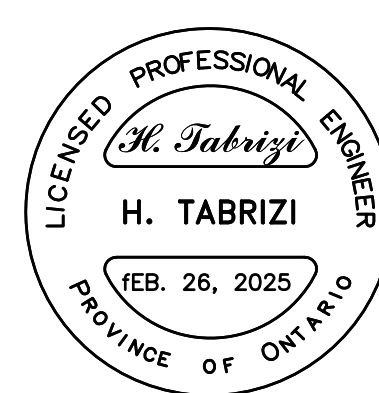
LEGEND:



EXISTING STEEL BEAMS (W200x42 (W8x28).
REPLACE EXISTING BEAMS WITH NEW STEEL BEAMS
TO MATCH NEW COOLING TOWER CAPACITY AND
DIMENSIONS

SKYLIGHT SKYLIGHT

THE ROOF DIRECTLY ABOVE THE COMMUNITY RECREATION CENTRE



NO.	REVISION	DATE
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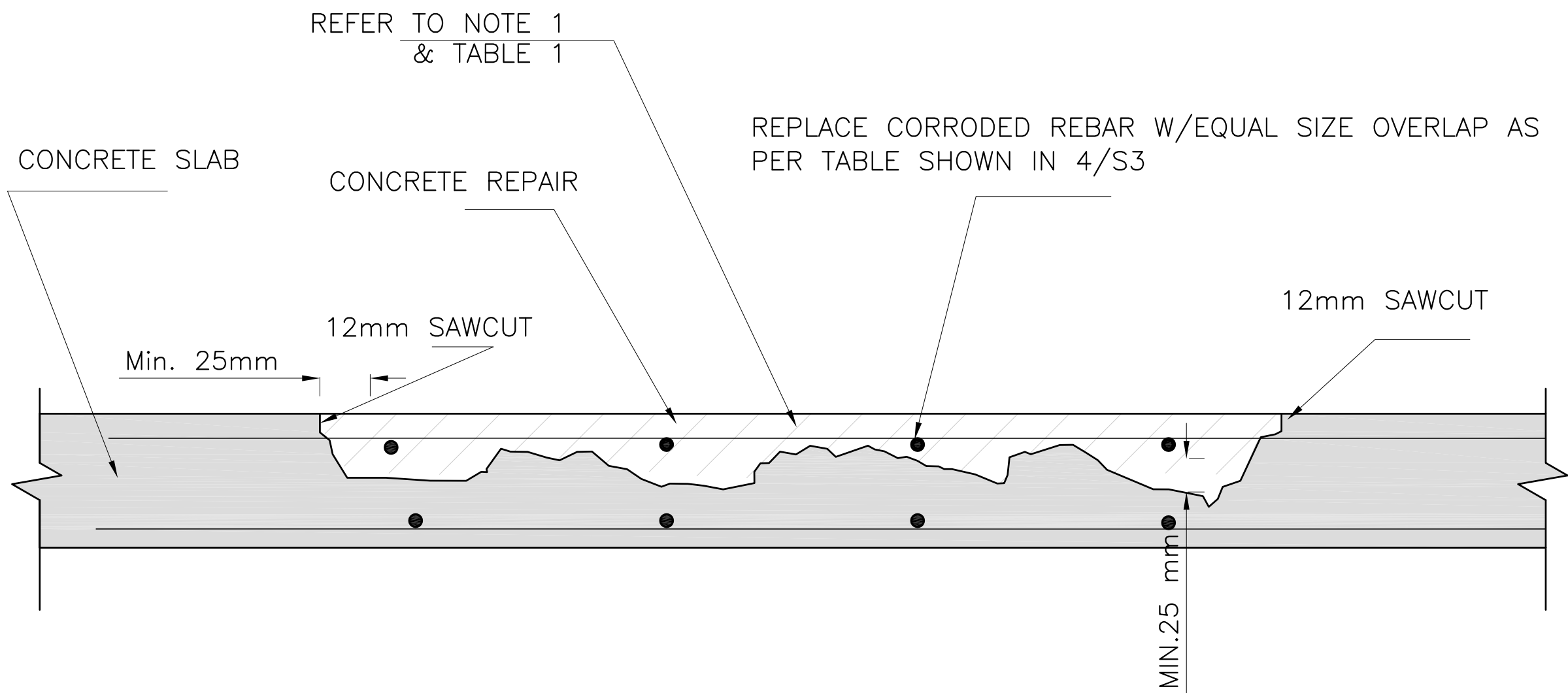
Project Address :
230 THE ESPLANADE
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STRUCTURAL REPAIRS

ROOF PLAN

Design:	R.A.
DRAWN:	R.A.
Approv.:	A.T.
Scale:	As Shown
Date:	JANUARY 15, 2025

Project No.	
Job No.	
Dwg.No.	S2 OF 3

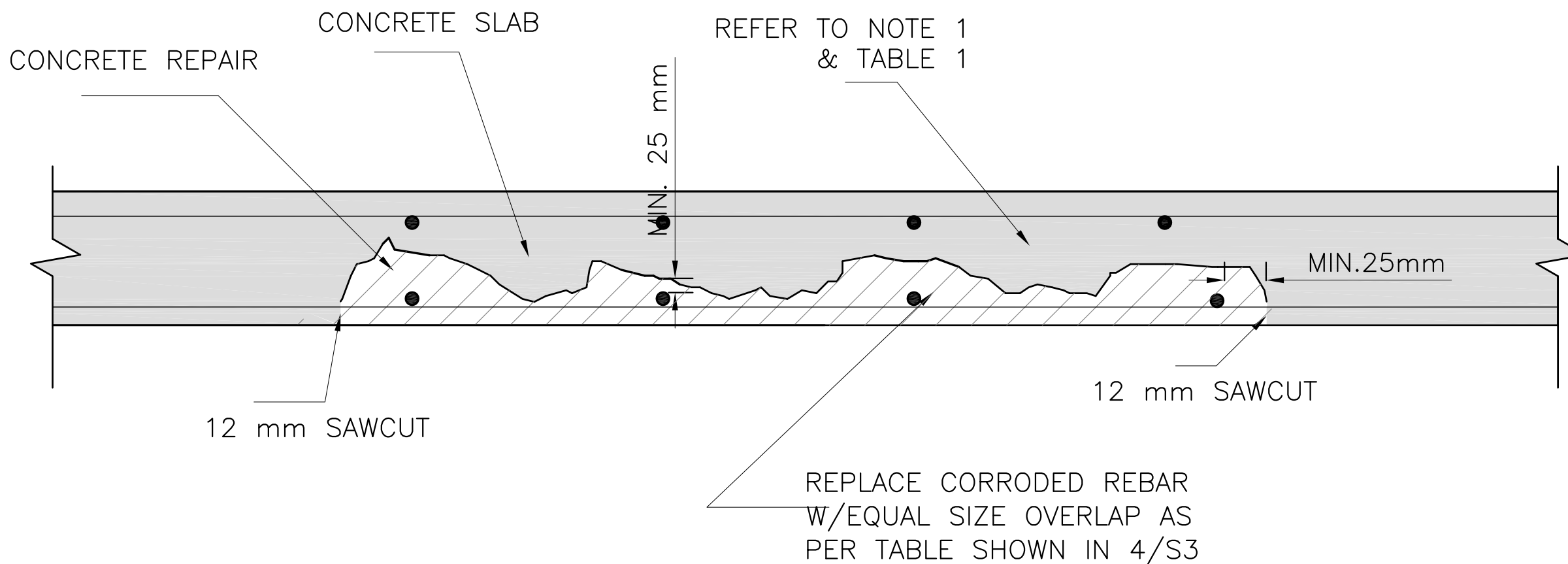


1 TOP SURFACE CONCRETE REPAIR DETAIL
S3 N.T.S.

NOTE:

1. PROVIDE TEMPORARY SHORING/BRACING PRIOR TO CONCRETE REMOVAL.
2. SAW CUT PERIMETER OF THE REPAIR AREA TO A DEPTH OF 12 mm.
3. CHIP AND BREAK DELAMINATED CONCRETE.
4. REMOVE CONCRETE AROUND REBAR UNTIL RUST FREE REBAR ARE ENCOUNTERED.
5. SPLICE NEW REBARS TO ALL EXISTING REBARS W/ 15% OR MORE LOSS OF SECTIONAL AREA.
6. REMOVE CONCRETE MINIMUM 25 mm BEYOND FACE OF REBAR AS SHOWN.
7. SANDBLAST AND CLEAN CONCRETE SURFACE AND REINFORCEMENT.
8. REINFORCEMENT SHALL BE CLEANED TO "NEAR WHITE SURFACE".
9. APPLY BONDING AGENT AND CORROSION INHIBITOR PER SPEC.
10. FORM AND POUR POLYMER MODIFIED MORTAR OR CONCRETE W/ MIN. 35Mpa COMPRESSIVE STRENGTH @ 28 DAYS
11. CONCRETE EXPOSURE CLASS SHALL BE C1

3 NOTE 1
S3 N.T.S.



NOTE:

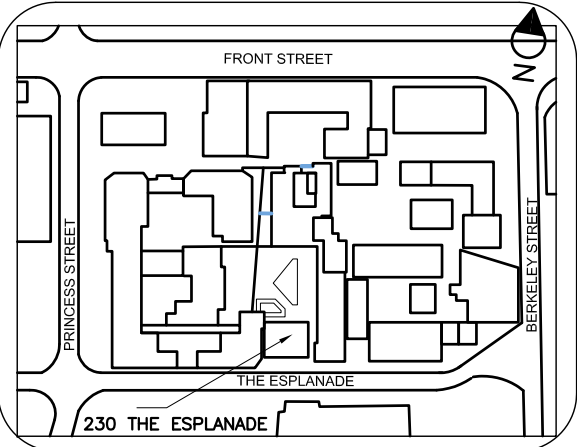
1. CONTRACTOR TO PROVIDE SHORING SHOP DRAWINGS FOR CONSULTANT'S REVIEW. SHOP DRAWINGS SHALL BE PREPARED, STAMPED AND SIGNED BY A PROFESSIONAL ENGINEER LICENSED IN PROVINCE OF ONTARIO.
2. PROTECT FLOOR SLAB WHEN BREAKING DELAMINATED CONCRETE SLAB ABOVE.

2 SOFFIT CONCRETE REPAIR DETAIL
S3 N.T.S.

TABLE 1

REBAR SIZE	LAP LENGTH mm IN f'c (35 Mpa) CONCRETE & REBAR GRADE 400
10M	370 mm
15M	520 mm
20M	650 mm
25M	1000 mm
30M	1200 mm

4 TABLE 1
S3 N.T.S.



KEY PLAN

5		
4		
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STRUCTURAL REPAIRS

NOTES & DETAILS

Design:	R.A.
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Approv.:	A.T.
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Date:	JANUARY 15, 2025

Project No.	
Job No.	
Dwg.No.	S3 OF 3

NEW CONSTRUCTION

ROOFS A, B, C, E, F, G

REMOVE THE EXISTING ROOF DOWN TO THE DECK AND DISCARD. KEEP FOR REUSE ALL INSULATION AND BALLAST. PRIME THE DECK WITH ASPHALT PRIMER. RAISE THE PERIMETER WITH TWO LAYERS OF WOOD BLOCKING AND A SHIM. TORCH APPLY A MODIFIED BASE SHEET MEMBRANE. INSTALL MODIFIED PEEL AND STICK FLASHING ON ALL PERIMETER WALL DETAILS. TORCH APPLY A MODIFIED CAP SHEET AND CAP SHEET FLASHING. INSTALL A LAYER OF 6 MIL POLYETHYLENE SHEET. INSTALL BACK IN PLACE ORIGINAL INSULATION. ALLOW TO REPLACE UP TO 20% OF INSULATION.ON ROOF A INSTALL A SECONDARY LAYER OF 25.4mm POLYSTYRENE IV INSULATION. ON ALL OTHER ROOFS INSTALL A SECONDARY LAYER OF 51mm POLYSTYRENE IV INSULATION. INSTALL A LAYER OF FILTER FABRIC SHEET. INSTALL BALLAST BACK IN PLACE. INSTALL 24 GAUGE SHEET METAL. INSTALL ALL SEALANTS. ON ROOF A REPLACE ALL CONCRETE PAVERS AS SHOWN. AT LOCATION OF DOOR DO NOT INSTALL SECONDARY INSULATION LAYER. INSTALL NEW DRAIN INSERTS WITH U FLOW SEALS. PROVIDE A VIDEO INSPECTION OF ALL DRAINS PRIOR TO CONSTRUCTION AND UPON COMPLETION OF CONSTRUCTION. SUPPLY AND INSTALL A NEW LADDER COMPLETE WITH SAFETY RAILINGS TO ROOF D. ALLOW TO REMOVE ALL TREES GROWING ON ROOFS. ALLOW TO TRIM EXISTING TREES WHICH OVERHANG THE ROOF. SUPPLY AND INSTALL A SAFETY RAILING AS SHOWN ON ROOF A. SUPPLY AND INSTALL A NEW RAILING AROUND THE ROOF HATCH ON ROOF A

ROOF D

REMOVE THE EXISTING ROOF DOWN TO THE DECK AND DISCARD. RAISE THE PERIMETER WITH THREE ROWS OF WOOD BLOCKING. INSTALL A NEW LAYER OF 12.7mm DENS DECK PRIME MECHANICALLY FASTENED TO THE DECK. TORCH APPLY A MODIFIED BASE SHEET MEMBRANE. INSTALL MODIFIED PEEL AND STICK FLASHING. TORCH APPLY A MODIFIED CAP SHEET AND CAP SHEET FLASHING. INSTALL A LAYER OF 101.6mm POLYSTYRENE IV INSULATION. INSTALL A SECONDARY LAYER OF 51.0mm POLYSTYRENE IV INSULATION. INSTALL A FILTER FABRIC SHEET. INSTALL BALLAST BACK IN PLACE. INSTALL 24 GAUGE SHEET METAL FLASHING. INSTALL NEW DRAIN INSERT WITH U FLOW SEAL. INSTALL CONCRETE PAVERS AT LADDER. PROVIDE VIDEO INSPECTION OF THE DRAIN PRIOR TO CONSTRUCTION AND UPON COMPLETION OF CONSTRUCTION.

SITE SAFETY & COORDINATION

THE CONTRACTOR SHALL WEAR SAFETY HARD HATS, BOOTS AND GLASSES ON SITE AT ALL TIMES. THE CONTRACTOR SHALL USE POWER AND WATER SOURCES AS DESIGNATED BY THE ENGINEER, HE SHALL KEEP THESE SOURCES FREE FROM DEFECTS AND SHALL REPAIR ANY EQUIPMENT WHICH SHALL BECOME DAMAGED DURING CONSTRUCTION. THE CONTRACTOR SHALL ABIDE BY ALL SAFETY RULES AND REGULATIONS OF THE PLANT. THE CONTRACTOR SHALL ALSO ABIDE BY ALL SECURITY REGULATIONS OF THE SITE. THE CONTRACTOR SHALL STORE ALL HIS EQUIPMENT IN A SAFE PLACE AND MANNER. THE OWNER SHALL NOT BE RESPONSIBLE FOR ANY STOLEN OR LOST GOODS. DO NOT STORE MATERIALS ON THE ROOF WITHOUT THE PERMISSION OF THE ENGINEER. DO NOT OVERLOAD THE INSTALLATION OF ANY NEW ROOF. ENSURE THAT THE ROOF IS DRY AND FREE FROM ANY RAIN AND MOISTURE.

PARKING IN AREAS AROUND THE BUILDING IS PROHIBITED EXCEPT FOR LOADING AND UNLOADING OF ALL MATERIALS. PARK ALL VEHICLES IN DESIGNATED AREAS AND AS ARRANGED WITH THE SITE ENGINEER. COORDINATE ALL MECHANICAL AND ELECTRICAL DISCONNECT OF HVAC EQUIPMENT WITH THE ENGINEER. LEAVE ALL PARKING AREAS, GROUNDS AND ROOFS AREAS CLEAR OF DEBRIS. STORE ALL MATERIALS UNDER TARPS EACH NIGHT. USE PROPER WEIGHTS FOR LIFTING DEVICES. INSTALL SAFETY BARRIERS AROUND ROOFS UNDER CONSTRUCTION IN ACCORDANCE WITH OHSA. ALL CONTRACTOR STAFF MEMBERS SHALL BE TIED OFF WHILE WORKING AT THE EDGE OR WHILE USING THE HOIST. ROPE OFF ALL AREAS AROUND THE GARBAGE BOX. ERECT SIGNS ” DANGER MEN WORKING OVERHEAD” AROUND ROOFS UNDER CONSTRUCTION. USE WASHROOM FACILITIES AS DESIGNATED BY THE BUILDING OPERATIONS MANAGER. TEAR OFF ONLY THOSE SECTIONS OF ROOF WHICH CAN BE COMPLETED EACH DAY.

NO WORK SHALL BE CARRIED OUT DURING INCLEMENT WEATHER OR IF INCLEMENT WEATHER IS FORECAST. TAKE ALL PRECAUTIONS TO PREVENT LEAKS INTO THE BUILDING. ENSURE THAT ALL MATERIALS ARE COVERED WITH APPROPRIATE TARPS. ALL ROLLS SHALL BE STORED ON VERTICAL ENDS. ALL INSULATION NOT USED SHALL REMAIN IN PLASTIC COVERING. PROVIDE ONE FIRE EXTINGUISHER FOR EVERY TORCH APPLICATOR. KEEP ALL AREAS OF CONSTRUCTION IN A TIDY MANNER. TAKE ALL MATERIALS TO AN APPROVED DUMP SITE. PROVIDE CONTINUOUS SUPERVISION AND MONITORING OF THE SITE FOR SAFETY AND LOGISTICS

ENTRY INTO THE BUILDING SHALL BE IN STREET SHOES ONLY. PROTECT ALL FLOORS FROM ASPHALT STAINS. PROTECT ALL WALLS FROM ASPHALT STAINS. THE CONTRACTOR SHALL WORK ON SITE FROM 07:00 TO 18:30 HOURS EACH DAY. NO WORK WILL BE ALLOWED ON WEEKENDS UNLESS PRIOR APPROVAL HAS BEEN OBTAINED FROM THE PROJECT MANAGER OF THE CITY AND OPERATIONS MANAGER OF THE SITE. PROTECT ALL PEDESTRIANS FROM THE WORK. CLEAN THE SITE EVERY NIGHT AND SECURE ALL MATERIALS THAT COULD BLOW OFF THE ROOF.

ROOF CONSTRUCTION

ROOFS A, B, F, G

CONCRETE DECK, PROTECTION SHEET, 45 MIL EPDM MEMBRANE, 101.6mm POLYSTYRENE TYPE IV INSULATION, FILTER FABRIC SHEET, RIVER STONE BALLAST

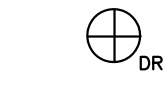


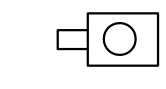


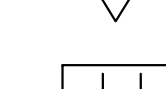
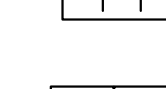
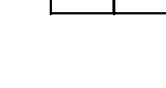

ROOFS C, E

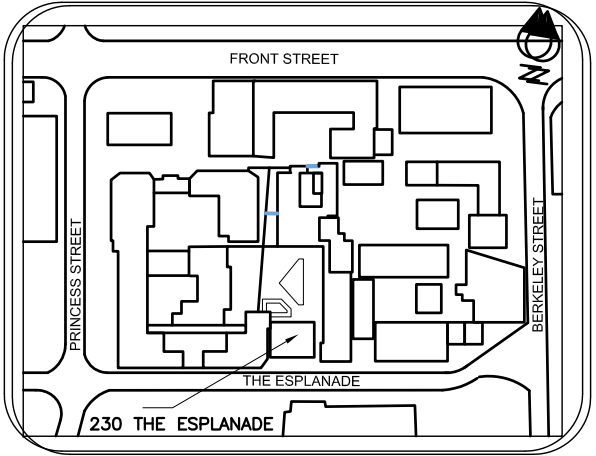
CONCRETE DECK, HOT RUBBERIZED ASPHALT MEMBRANE, POLYETHYLENE SHEET, 101.6mm POLYSTYRENE TYPE IV INSULATION, FILTER FABRIC SHEET, RIVER STONE BALLAST

ROOF D

STEEL DECK, 12.7mm DENS DECK BOARD, PROTECTION SHEET, 45 MIL EPDM MEMBRANE, 101.6mm POLYSTYRENE TYPE IV, INSULATION, FILTER FABRIC SHEET, RIVER STONE BALLAST

LEGEND

- OR
- Drain
- 
- SOIL VENT
- 
- STACK
- 
- SCUPPER
- 
- EXHAUST DUCT
- 
- SQUARE VENT
- 
- ROOF HATCH
- 
- CONCRETE PAVERS
- 
- LADDER
- 
- CONCRETE SLEEPER



KEY PLAN

5		
4		
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METRO HALL
55 JOHN STREET, 24th FLOOR
TORONTO, ONTARIO, M5V 3C6

ROOFING CONSULTANT:

THERMACO ENGINEERING
SERVICES (1986) LTD.

P.O. BOX 202 MALTON CSC
MISSISSAUGA, ONTARIO, L4T 3B6
TEL: (905) 565-0650
FAX: (905) 565-7412



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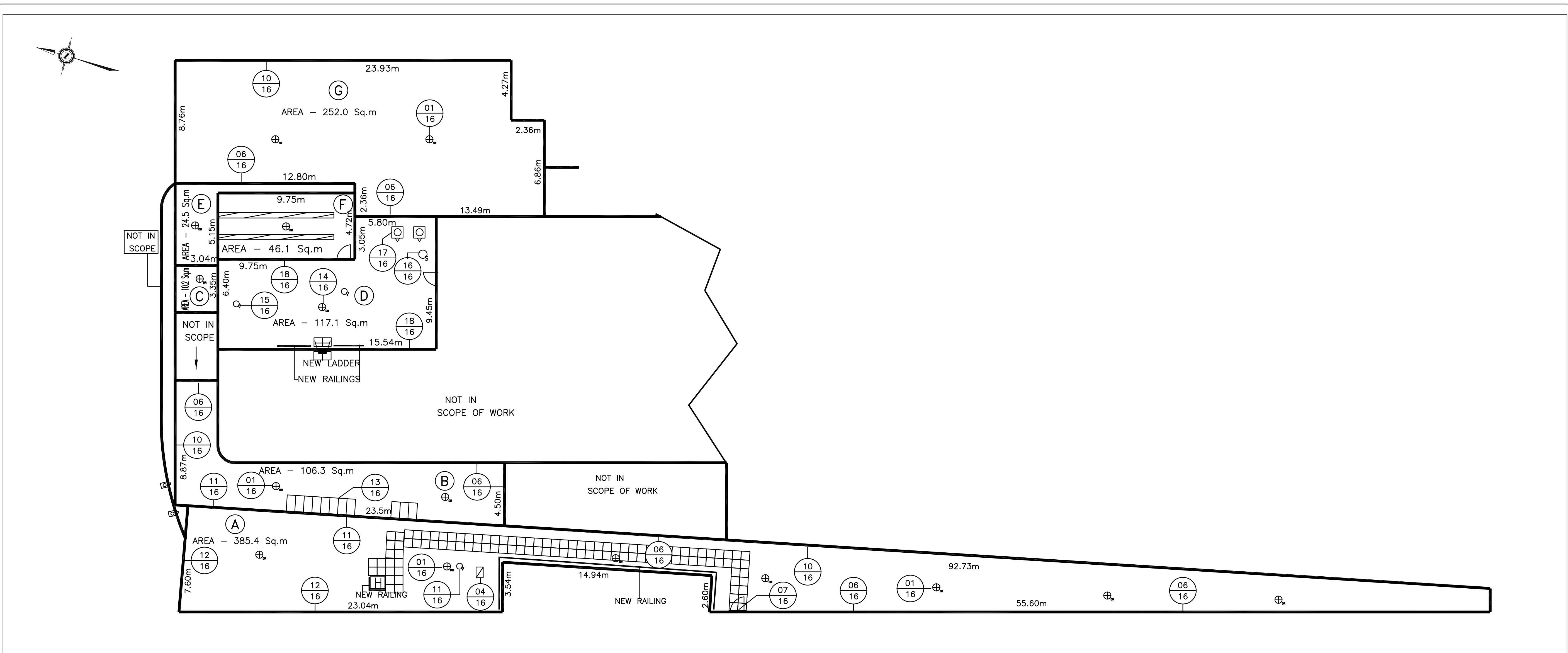
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ROOFING REPLACEMENT

NOTES

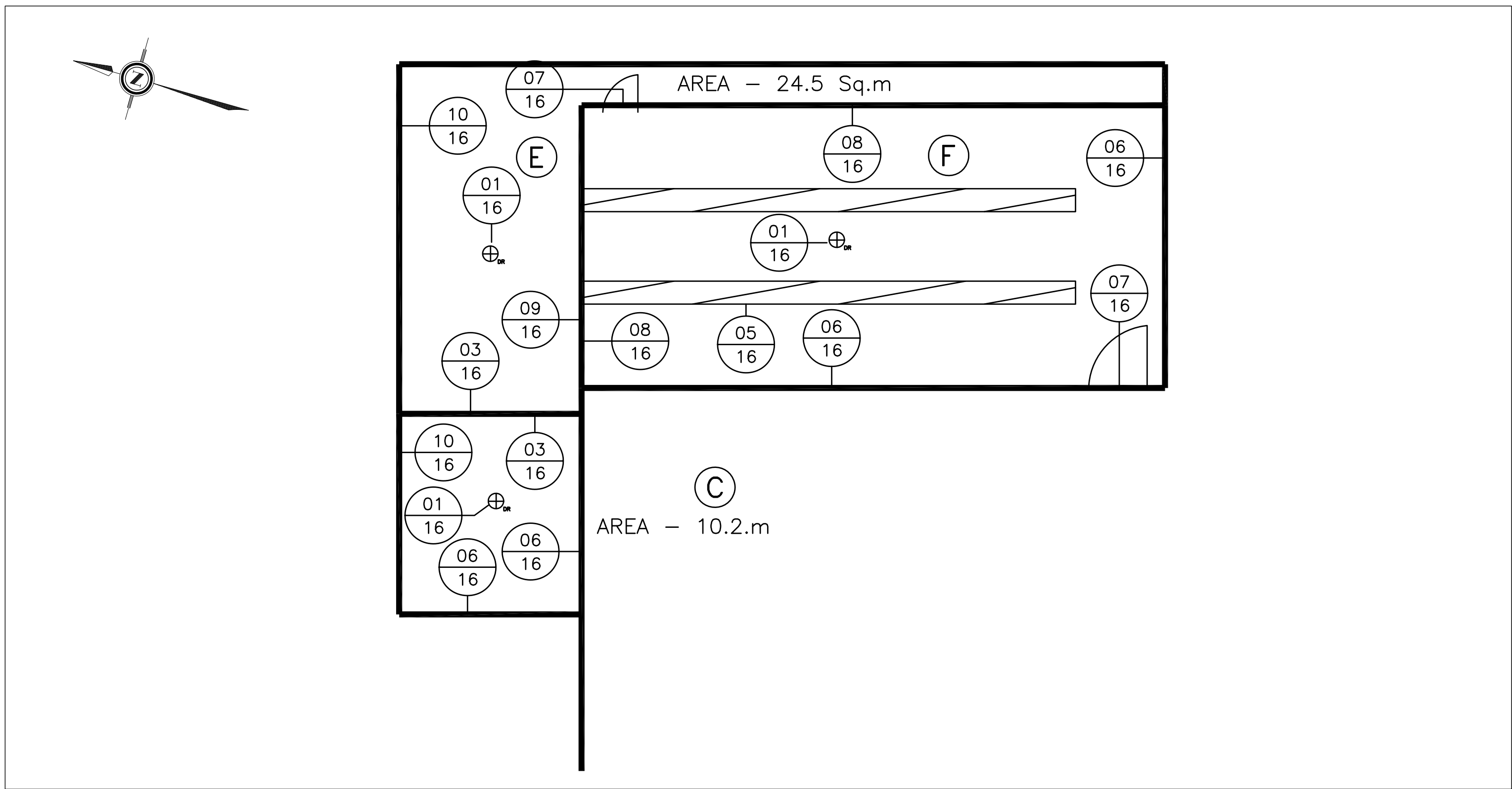
Design:	B.F. TESSLER
DRAWN:	H.S.
Approv.:	B.F. TESSLER
Scale:	AS SHOWN
Date:	January 15, 2025

Project No.	Dwg.No.
Job No.	R1 OF 03

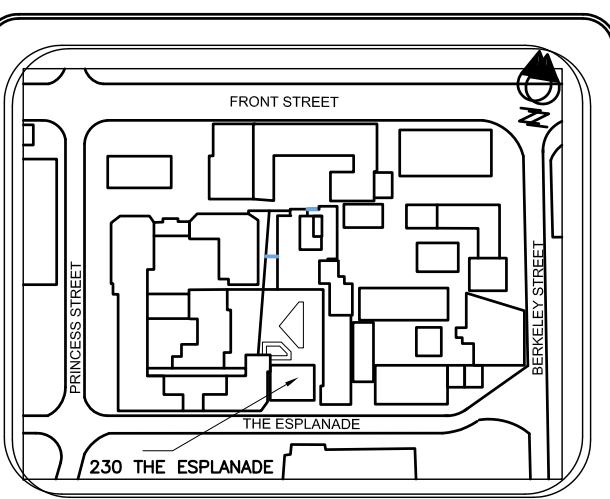
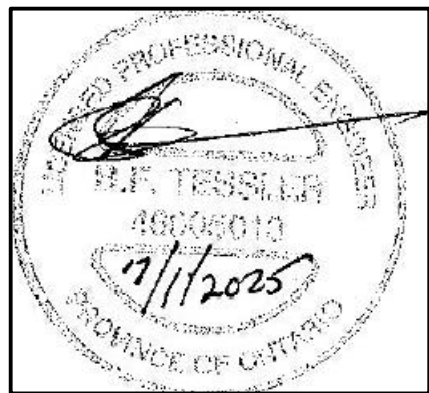




1 ROOFING REPLACMENT – ROOF PLANS
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2 ROOFING REPLACMENT – ROOF PLANS
N.T.S.



KEY PLAN		
5		
4		
3	FOR TENDER/ PERMIT	FEB.26,25
2	FOR CLIENT REVIEW @100%	JAN.31,25
1	FOR CLIENT REVIEW @ 60%	JAN.15,25
NO.	REVISION	DATE

NOTE:
CONTRACTOR MUST CHECK AND VERIFY ALL DIMENSIONS AND BE RESPONSIBLE FOR SAME, REPORTING ANY DISCREPANCIES TO THE OWNER, BEFORE TENDER CLOSING.

LATEST APPROVED DRAWINGS ONLY TO BE USED FOR CONSTRUCTION.

PRINTS ARE NOT TO BE SCALED.

Toronto

PARKS & RECREATION
CAPITAL PROJECTS
METRO HALL
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TORONTO, ONTARIO, M5V 3C6

ROOFING CONSULTANT:

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P.O. BOX 202 MALTON CSC
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Project Name :
ST. LAWRENCE CRC & DAYCARE

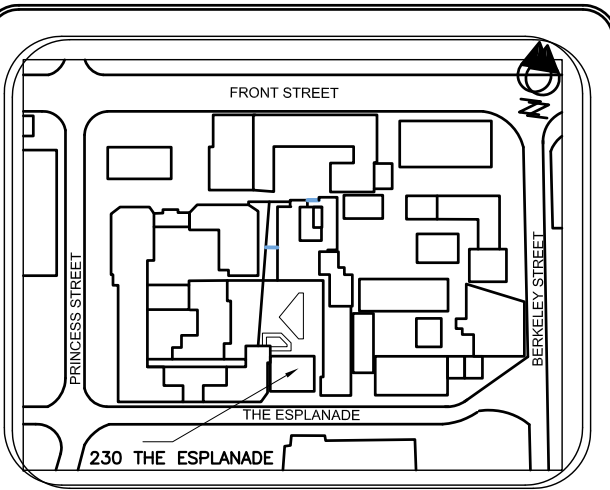
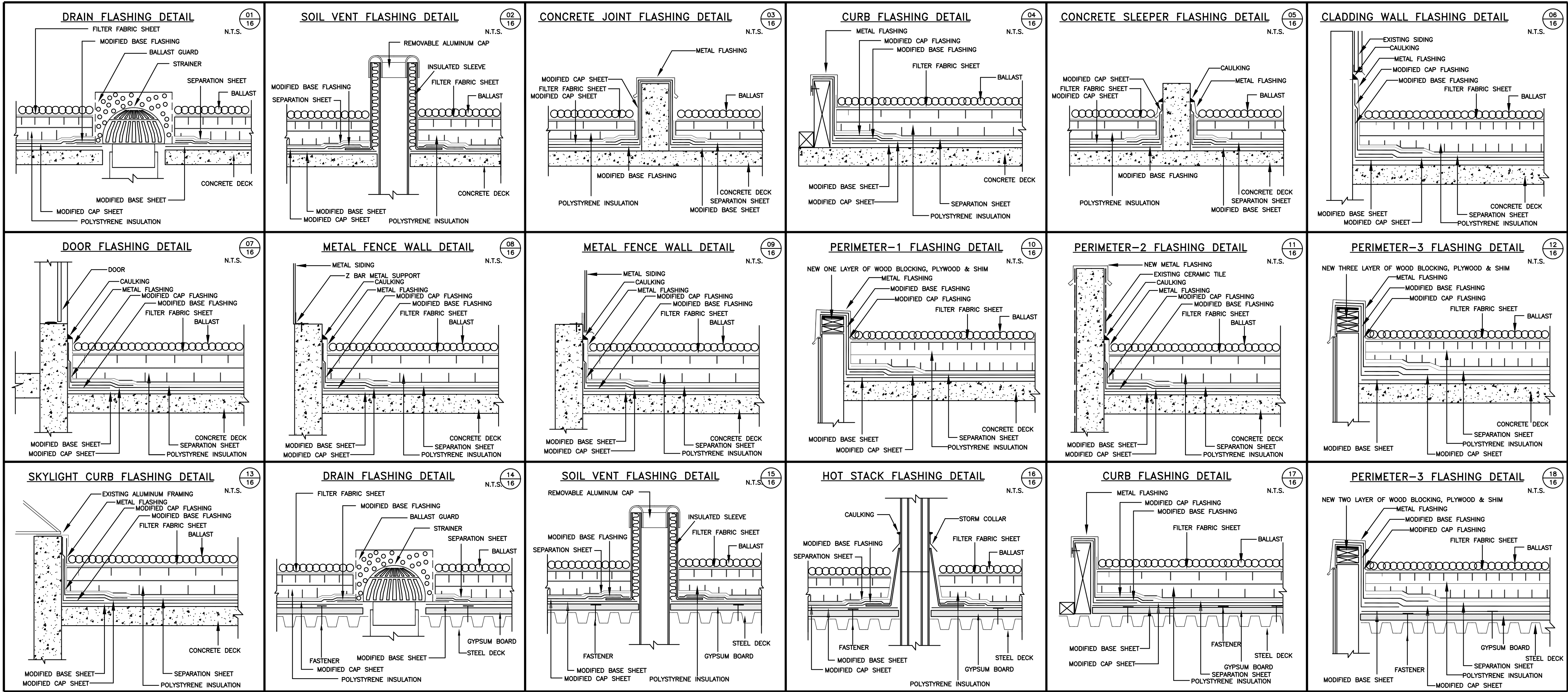
Project Address :
**230 THE ESPLANADE
TORONTO, ON**

Job Descript. :
**ROOFING & CHILLER REPLACEMENT
ROOFING REPLACEMENT**

ROOF PLAN

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**230 THE ESPLANADE
TORONTO, ON**
Job Descript. :
**ROOFING & CHILLER REPLACEMENT
ROOFING REPLACEMENT**
DETAILS

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A) GENERAL CONDITIONS

1. SUPPLY AND INSTALL ALL ITEMS, ARTICLES, MATERIALS, AND OPERATIONS. INCLUDE ALL LABOUR, EQUIPMENT, MATERIALS, TOOLS NECESSARY TO COMPLETE ALL SYSTEMS SHOWN ON THE DRAWINGS REPRESENTING A COMPLETE INSTALLATION.

2. VISIT AND INSPECT THE SITE AND ALL OTHER DRAWINGS. BECOME FAMILIAR WITH THE BUILDING CONSTRUCTION AND DETAILS. NO ALLOWANCE WILL BE MADE FOR FAILURE TO DO SO.

3. BE RESPONSIBLE FOR CARE OF THE BUILDING. DO ALL CUTTING, PATCHING, AND PAINTING REQUIRED FOR THE WORK OF THIS TRADE. WORKS TO BE PERFORMED BY THE GENERAL CONTRACTOR'S FORCES AT THE MECHANICAL CONTRACTOR'S EXPENSE.

4. THIS CONTRACTOR IS TO ALLOW FOR CUTTING AND PATCHING PERTAINING TO THE MECHANICAL SYSTEMS INSTALLATION.

UNLESS NOTED OTHERWISE, THIS SHALL INCLUDE ALL CUTTING AND PATCHING OF ROOFS, PARTITION WALLS, CEILINGS, AND FLOORS AND OUTSIDE WALLS. ALL CUTTING AND PATCHING SHALL BE PERFORMED BY WORKERS SPECIALIZED IN THIS TYPE OF WORK AND CAPABLE OF PERFORMING TO GOOD COMMERCIAL STANDARDS.

ALL PATCHING SHALL BE DONE SO AS TO MAINTAIN ANY FIRE SEPARATIONS, SOUND TRANSMISSION CLASS RATINGS, VAPOR RETARDED PERFORMANCE, INSULATION VALUES, ETC.

5. CLEAN ALL DEBRIS DAILY UPON COMPLETION OF CONTRACT.

6. COOPERATE WITH ALL OTHER TRADES. COORDINATE WORK WITH ALL OTHER TRADES. PATCH AND SEAL ALL FLOOR AND WALL OPENINGS WITH FIRE RESISTANT INSULATION AND MASTIC.

7. SLEEVES:

PROVIDE SLEEVES FOR PIPING AS FOLLOWS:

—FOR ALL PENETRATIONS OF POURED CONCRETE STRUCTURES. SLEEVES ARE NOT REQUIRED PROVIDED THE MECHANICAL CONTRACTOR CUTS ALL REQUIRED OPENINGS AFTER THE CONCRETE INSTALLATION AND PROVIDED ALL OPENINGS COMPLY WITH THE FIRESTOP MANUFACTURERS REQUIREMENTS.

—FOR ALL COPPER PIPE PENETRATIONS OF MASONRY AND POURED CONCRETE STRUCTURES WHERE REQUIRED TO PREVENT DIRECT CONTACT OF THE MASONRY/POURED CONCRETE WITH THE COPPER PIPING. SLEEVES ARE NOT REQUIRED PROVIDED THAT DIRECT CONTACT OF COPPER AND MASONRY /POURED CONCRETE IS PREVENTED AND PROVIDED THE OPENINGS COMPLY WITH THE FIRESTOP MANUFACTURERS REQUIREMENTS.

8. SLEEVES SHALL BE SCHEDULE 40 STEEL. PLASTIC PIPE SLEEVES MAY BE USED IN POURED CONCRETE STRUCTURES PROVIDED OPENINGS CAN BE PROVIDED WHICH COMPLY WITH THE REQUIREMENTS OF THE FIRESTOP MANUFACTURER AND THE LOCAL AUTHORITY.

SLEEVES SHALL BE SIZED LARGE ENOUGH TO ALLOW FOR ANY LATERAL MOVEMENT OF PIPING DUE TO EXPANSION/CONTRACTION, PIPE INSULATION, FIRE STOPPING AND SOUND PACKING.

9. FIRE STOPPING:

FIRESTOPPING SHALL BE PRO SET SYSTEMS OR APPROVED EQUAL FIRE STOP SEALING/DEVICES OF A TYPE TO SUIT PIPING, BUILDING CONSTRUCTION, OPENING SIZE, ETC. INSTALL ACCORDING TO MANUFACTURERS DETAILED INSTALLATION INSTRUCTIONS. NOTE: REFER TO MANUFACTURERS DETAILED INSTALLATION DRAWINGS AND PROVIDE SHOP DRAWINGS OF ALL FIRE STOP SYSTEMS PRIOR TO APPLICATION OF FIRE STOPPING. SHOP DRAWINGS SHALL SHOW APPROVALS OF ALL GOVERNING AGENCIES.

ALL FIRE STOP SYSTEMS SHALL MEET THE F AND I RATINGS OF THE WALL CONSTRUCTION IN WHICH THEY ARE INSTALLED. ALL SYSTEMS SHALL BE IDENTIFIED WITH APPROPRIATE SF NUMBERS

10. ONE SET OF OWNER'S APPROVED DRAWINGS AND PERMIT DRAWINGS SHALL BE KEPT ON SITE AND AVAILABLE FOR CHECKING AT ALL TIMES DURING CONSTRUCTION.

11. ALL MATERIALS TO MEET FLAME SPREAD RATING REQUIREMENTS OF AUTHORITIES HAVING JURISDICTION.

12. OBTAIN ALL PERMITS REQUIRED. ARRANGE FOR INSPECTION OF THE WORK BY INSPECTION AUTHORITY AND PAY ALL FEES. PROVIDE FINAL CERTIFICATE TO THE OWNER.

13. MECHANICAL CONTRACTORS SHALL COMPLY WITH ALL RULES AND REGULATIONS SET FORTH BY THE OWNER.

14. SUBMIT 5 COPIES OF SHOP DRAWINGS FOR APPROVAL OF ALL EQUIPMENT AND FIXTURES.

15. PROVIDE A CERTIFICATE OF GUARANTEE OF WORKMANSHIP AND MATERIAL FOR ONE YEAR FROM DATE OF ACCEPTANCE.

16. IDENTIFY ALL EQUIPMENT WITH LAMICOID PLATES.

17. ANY WORK NOT SHOWN ON THE DRAWINGS OR SPECIFICALLY MENTIONED IN THE SPECIFICATIONS BUT CONSIDERED NECESSARY FOR THE COMPLETION OF THE WORK IN PROPER MANNER SHALL BE PROVIDED BY THIS CONTRACTOR WITHOUT ADDITIONAL CHARGE.

18. BEFORE FABRICATION AND INSTALLATION OF DUCTWORK AND PIPING, MAKE CERTAIN THAT SUCH ITEMS CAN BE INSTALLED AS SHOWN ON THE DRAWINGS WITHOUT INTERFERENCE WITH THE STRUCTURE OR THE WORK OF OTHER TRADES. IF ANY MATERIALS ARE FABRICATED OR INSTALLED PRIOR TO THE INVESTIGATION AND REACHING OF A SOLUTION TO POSSIBLE INTERFERENCE PROBLEMS, NECESSARY CHANGES SHALL BE MADE AT THE CONTRACTOR'S EXPENSE.

19. NOTE: THIS CONTRACTOR SHALL VERIFY EXACT LOCATION AND ARRANGEMENT OF EXISTING MECHANICAL SERVICES AND EQUIPMENT PRIOR TO FABRICATION AND INSTALLATION OF DUCTWORK. THIS CONTRACTOR SHALL PROVIDE ALL REQUIRED ELBOWS, DUCTWORK, PIPING, PIPE FITTINGS, ETC., TO COMPLETE THE INTENT OF THIS DRAWING. NO EXTRA WILL BE ALLOWED FOR THIS WORK.

20. NOTHING CONTAINED HEREIN SHALL BE CONSTRUED TO RELIEVE THIS CONTRACTOR FROM MAKING GOOD AND PERFECT IN ALL USUAL DETAILS OF CONSTRUCTION AND HE WILL BE HELD RESPONSIBLE TO PROVIDE AND FURNISH MATERIAL TO DO ALL WORK AND LABOUR, AND BEAR EXPENSES INCIDENTAL TO THE SATISFACTORY COMPLETION OF THE WORK EMBRACED IN THESE SPECIFICATIONS.

21. VERIFY VOLTAGE ON SITE BEFORE ORDERING EQUIPMENT.

22. SUBMIT ONE SET OF MARKED UP SEPAS TO THE OWNER SHOWING AS-BUILT CONDITIONS AT COMPLETION OF THE PROJECT.

23. MECHANICAL CONTRACTOR SHALL PROVIDE TO OWNER 3 BOUND SETS OF MAINTENANCE AND OPERATING INSTRUCTIONS FOR ALL MECHANICAL EQUIPMENT.

24. COMPLETE MECHANICAL INSTALLATION SHALL BE PERFORMED IN ACCORDANCE WITH ALL APPLICABLE CODES, BY-LAWS AND AUTHORITIES HAVING JURISDICTION.

25. PROVIDE ACCESS DOORS (WHERE REQUIRED) FOR NEW AND EXISTING CONCEALED VALVES, DAMPERS, ETC., HAVE THESE INSTALLED BY THE TRADES IN WHOSE WORK THE DOORS ARE REQUIRED. FINISH DOORS TO MATCH WALL AND CEILING FINISHES. CONSULT WITH CONSTRUCTION MANAGER FOR LOCATIONS. CEILING ACCESS DOORS SHALL BE MARKSPOT MODEL NO. DW-5040 WITH A FINISH TO MATCH CEILING.

26. SUPPLY AND INSTALL HANGERS TO INCLUDE ALL MISCELLANEOUS STEEL SUCH AS ANGLE IRON, BANDS, C-CLAMPS WITH RETAINING CLIPS, CHANNELS, HANGER RODS, ETC., NECESSARY FOR THE INSTALLATION OF WORK.

27. HANGERS SHALL BE FASTENED TO BUILDING STEEL, CONCRETE, OR MASONRY, BUT NOT TO PIPING. HANGING FROM METAL DECK IS NOT PERMITTED. HANGERS MUST BE ATTACHED TO UPPER CHORD OF BAR JOIST. WHERE INTERFERENCES OCCUR, AND IN ORDER TO SUPPORT DUCTWORK OR PIPING, THE CONTRACTOR MUST INSTALL TRAPEZOID TYPE HANGERS OR SUPPORTS WHICH SHALL BE LOCATED WHERE THEY DO NOT INTERFERE WITH ACCESS TO FIRE DAMPERS, VALVES, AND OTHER EQUIPMENT. HANGERS FOR AIR INSULATED PIPING SHALL BE SIZED AND INSTALLED FOR THE OUTER DIAMETER OF INSULATION. INSTALL 6" LONG SPLIT CIRCLE GALVANIZED SADDLE BETWEEN THE HANGER AND THE PIPE INSULATION.

28. HANGERS AND PIPING OF DISSIMILAR METALS SHALL BE DI-ELECTRICALLY SEPARATED.

29. UNLESS NOTED OTHERWISE, ALL POWER WIRING TO MECHANICAL EQUIPMENT SHALL BE PERFORMED BY ELECTRICAL CONTRACTOR. A LOW VOLTAGE CONTROL WIRING AND ASSOCIATED CONTROL ITEMS, INCLUDING STARTERS AND DISCONNECT SWITCHES SHALL BE SUPPLIED AND INSTALLED BY MECHANICAL CONTRACTOR.

B) PLUMBING AND DRAINAGE

1. ALL PLUMBING WORK, MATERIALS AND INSTALLATIONS SHALL MEET THE REQUIREMENTS OF THE LATEST EDITION OF LOCAL PLUMBING CODES AND AUTHORITIES HAVING JURISDICTION.

2. WHERE BELOW GRADE SANITARY DRAINAGE SYSTEM IS SHOWN ON DRAWINGS AND/OR REQUIRED, THIS MECHANICAL CONTRACTOR SHALL BE RESPONSIBLE FOR ALL SAW CUTTING OF THE FLOOR SLAB, DO ALL EXCAVATIONS, PROVIDE CRUSHED STONE BED AND INSTALL PIPE COMPACTED BACKFILL TO UNDERSIDE OF CONCRETE FLOOR. POURING OF THE FLOOR SHALL BE THE RESPONSIBILITY OF THE GENERAL CONTRACTOR.

3. FOR UNDERGROUND SANITARY, USE X H CAST IRON CLASS 4000, C.S.A. B-70 OR ABS PLASTIC PIPE.

4. FOR ABOVE GRADE SANITARY DRAINS OF SIZES 2 1/2" (65MM) AND SMALLER, USE GALVANIZED IRON C.S.A. B-63 OR COPPER DWV.

5. FOR SANITARY VENT PIPES, USE COPPER TUBING (DWV).

6. FOR DOMESTIC COLD AND HOT WATER PIPING AND FITTINGS, USE TYPE "L" HARD COPPER PIPE WITH SOLDER FITTINGS.

7. FOR CONDENSATE DRAINS AND PUMPED SANITARY PIPING, USE TYPE "M" COPPER PIPE.

8. FOR GAS PIPING, USE ASTM A-53 SCHEDULE 40 PIPING.

9. PLASTIC PIPES (ABS AND PVC) WILL NOT BE ACCEPTED FOR ABOVE GROUND INSTALLATIONS.

10. ALL STEEL PIPING UNLESS INDICATED OTHERWISE SHALL HAVE THREADED CONNECTIONS AND ALL COPPER PIPING SHALL HAVE SOLDERED JOINTS OF 300 LBS. PRESSURE.

11. ALL CONNECTIONS BETWEEN DISSIMILAR METALS SHALL UTILIZE DIELECTRIC INSULATING FITTINGS, COUPLINGS AND UNIONS.

12. SUPPORT PIPES AS PER CODE REQUIREMENTS.

13. PROVIDE SHUT-OFF VALVES OR SCREWDRIVER STOPS ON WATER SERVICE TO ALL FIXTURE AND EQUIPMENT. USE BACKFLOW PREVENTERS ON EQUIPMENT CONNECTIONS. WATTS MODEL 90M3. USE CGA APPROVED GAS COCKS WITH QUARTER STOPS.

.1 FOR DOMESTIC WATER, CHILLED, CONDENSER AND HEATING WATER:

a) BALL VALVES IN LIEU OF GATE AND GLOBE VALVES OF SIZES 2" AND SMALLER, USE CRANE 9302 OR 9322 (800 PSI).

b) BUTTERFLY VALVES IN LIEU OF GATE AND GLOBE VALVES OF SIZES 2 1/2" AND LARGER, USE CRANE 44 LUG WAFER, CAST IRON BODY, DUCTILE IRON OR LUMINUM BRONZE DISC, STAINLESS STEEL STEM, EPDM SEAT. LEVER ACTUATED UP TO AND INCLUDING SIZE 6", 8" AND ABOVE TO BE GEAR ACTUATOR.

c) GATE VALVES, USE CRANE 431, 437 (300 PSI) FOR 2" VALVES AND SMALLER AND CRANE CLASS 150 CAST STEEL NO. 33XU/C (300 PSI) FOR 2 1/2" VALVES AND LARGER.

d) GLOBE VALVES, USE CRANE 7 (300 PSI) FOR 2" VALVES AND SMALLER AND CRANE 143 CAST STEEL (300 PSI) FOR 2 1/2" VALVES AND LARGER.

e) CHECK VALVES, USE CRANE 137 OR 1342 (300 PSI) FOR 2" VALVES AND SMALLER AND CRANE 147 (300 PSI) FOR 2 1/2" VALVES AND LARGER.

f) CHECK VALVES WITH PUMPS: USE WAFER CHECK, CENTERLINE SERIES 800, DUAL CHECK AND MISSION CHECK.

g) STRAINERS: USE Y STRAINER CAST IRON CLASS 125 WITH S.S. STANDARD MESH.

14. PROVIDE WATER HAMMER ARRESTORS, SMS INC. #SC SERIES WATER HAMMER ARRESTORS WITH BRASS PISTON IN A TYPE 'K' COPPER CASING SIZE ACCORDING TO MANUFACTURER'S RECOMMENDATIONS CHART BELOW TO ELIMINATE WATER HAMMER AND SHOCK FROM PIPING SYSTEM. PROVIDE WATER HAMMER ARRESTORS ON HOT AND COLD WATER SUPPLIES TO ALL QUICK VALVES, SOLENOIDS, AND PLUMBING FIXTURES, AND LOCATE IN AN UPRIGHT POSITION BETWEEN THE LAST TWO FIXTURES ON A LINE, OR HORIZONTALLY AT THE END OF LINE CLOSEST TO SUPPLY SOURCE ON PROJECTS EXCEEDING FIVE STORIES IN HEIGHT. PROVIDE WATER HAMMER ARRESTORS ON DOMESTIC WATER RISERS AS FOLLOWS. LOCATE ARRESTORS AT THE END OF RISER OPPOSITE SUPPLY SOURCE. ARRESTOR SHALL BE TWO PIPE SIZES LARGER THAN THE RISER IS AT THE CONNECTION POINT. NOT EXCEEDING: LARGEST PIPE SIZE DIAMETER IN THE RISER WATER HAMMER ARRESTORS.

15. INSULATE ALL DOMESTIC COLD WATER PIPES AND FITTINGS WITH 1" (25 MM) PRE-FORMED LOW PRESSURE FIBREGLASS INSULATION WITH VAPOUR BARRIER JACKET. SEAL ALL JOINTS OF VAPOUR BARRIER. INSULATION SHALL CONFORM TO ASHRAE 90.1 REQUIREMENTS.

16. INSULATE ALL DOMESTIC HOT WATER PIPES AND FITTINGS (105F-140F) WITH FIBRE GLASS INSULATION (PRE-FORMED), COMPLETE WITH VAPOUR BARRIER. SEAL ALL JOINTS OF VAPOUR BARRIER. INSULATION THICKNESS TO CONFORM TO ASHRAE 90.1 REQUIREMENTS AND SHALL BE AS FOLLOWS:

a) USE 1" (25MM) THICK INSULATION FOR PIPE SIZES UP TO 1 1/4" (32MM).

b) USE 1 1/2" (38MM) THICK INSULATION FOR PIPE SIZES OF 1 1/2" (38MM) AND LARGER.

17. INSTALL A SANITARY VENT SYSTEM TO COMPLY WITH ALL APPLICABLE CODES, AND AUTHORITIES HAVING JURISDICTION. ENSURE THAT PLUMBING VENT PENETRATIONS THROUGH ROOF ARE MINIMUM 10'-0" (3.05 M) FROM ANY AIR INTAKE OPENING.

18. INSTALL CHROME PLATED ESCUTCHEONS PLATES AT ALL EXPOSED PIPE PENETRATIONS THROUGH WALLS AND CEILINGS.

19. INSTALL PVC JACKET ON ALL INSULATED PIPING IN EXPOSED AREAS (NO CEILINGS).

20. ALL GAS PIPING UP TO 2" (50 MM) IN SIZE SHALL HAVE THREADED JOINTS AND PIPING OF 2 1/2" (65 MM) IN SIZE AND LARGER SHALL HAVE WELDED JOINTS. COMPLY WITH AUTHORITIES HAVING JURISDICTION.

21. ALL GAS PIPING SHALL BE PAINTED YELLOW AND BE WELDED WITH SHUT-OFF VALVES AT EACH APPLIANCE.

22. VAPOUR SEAL WITH 1/8" (3 MM) WET COATS OF VAPOUR BARRIER MASTIC, REINFORCED WITH GALSS FABRIC.

23. PRESSURE TEST PIPING SYSTEMS IN ACCORDANCE WITH LOCAL AND PROVINCIAL CODES FOR LEAKS BEFORE INSULATION IS APPLIED. SUBMIT REPORT TO OWNER AND A COPY TO THE ENGINEER.

C) MECHANICAL NOTES:

1. THE REMOVAL OF PART OF MECHANICAL WORK IS NOT SHOWN ON PLANS. CONTRACTOR SHALL VISIT THE SITE AND CONFIRM ALL OF THE EXISTING MECHANICAL ITEMS TO BE REMOVED, AND THE REMOVAL WORK SHALL BE INCLUDED IN THE TENDER PRICE.

2. PROTECT FINISHED OR UNFINISHED WORK AND OPERATING WORK AREAS BY TARP-AULINS, OR OTHER COVERING FROM DAMAGE DUE TO EXECUTION OF WORK. REPAIR DAMAGE TO BUILDING RESULTING FROM THE WORK TO THE SATISFACTION OF CONSULTANTS AT NO EXPENSE TO THE OWNER.

3. UNLESS NOTED OTHERWISE, ALL SANITARY DRAIN PIPES OF SIZE 3" (75 MM) AND SMALLER SHALL BE SLOPED AT 2 % AND DRAIN PIPES OF SIZE 4" (100 MM) AND LARGER SHALL BE SLOPED AT 1 %.

4. ALL EXISTING SERVICES SHOWN ON PLAN ARE APPROXIMATE AND BASED ON BASE BUILDING DRAWINGS / SITE SURVEY. CONTRACTOR SHALL VERIFY ALL CONNECTIONS, DUCT SIZES AND LOCATIONS ON SITE AND REPORT ANY DISCREPANCIES TO THE ENGINEER.

5. ANY SERVICES NOT SHOWN ON THE DRAWINGS THAT ARE EXPOSED DURING CONSTRUCTION SHALL BE VERIFIED BY THE CONTRACTOR AS TO THE SOURCE AND ROUTING. REPORT TO THE ENGINEER WITH PROPOSED RESOLUTIONS FOR THE SERVICES THAT HAVE BEEN EXPOSED AT NO EXTRA COST TO CLIENT.

6. LAYOUT SHOWN FOR CLARITY. COORDINATE INSTALLATION WITH ALL OTHER TRADES AND PROVIDE ADDITIONAL ELBOWS AND FITTINGS FOR OFFSETS AS REQUIRED, NOT ONLY TO FACILITATE THE INSTALLATION OF SERVICES IDENTIFIED HERE, BUT TO PERMIT COMPLETE INSPECTION AND MAINTENANCE OF ALL SERVICES.

7. SHUT-DOWNS OF EXISTING SYSTEMS REQUIRED FOR THIS INSTALLATION SHALL BE FULLY COORDINATED WITH THE BUILDING MANAGEMENT AND THIS WORK PERFORMED AS DIRECTED IN WRITING BY THE BUILDING MANAGEMENT. CONNECTION TO EXISTING SERVICES SHALL BE PERFORMED DURING OFF-WORK HOURS OR ON WEEKENDS IN PREMIUM TIME.

8. ENSURE A MINIMUM HORIZONTAL CLEARANCE OF 10'-0" (3.05 M) IS MAINTAINED BETWEEN AIR INTAKES AND EXHAUST AIR OUTLETS.

INSULATION

1. COVER ALL DOMESTIC HOT AND COLD WATER, AND HEATING AND CHILLED WATER PIPING WITH 1 IN. (25 MM) FINISHED THICKNESS, PRE-MOULDED LOW PRESSURE GLASS FIBRE INSULATION (5.5 LBS. DENSITY). FOR DOMESTIC COLD WATER AND CHILLED WATER PIPING USE A VAPOUR BARRIER JACKET.

2. PROVIDE PIPE SIZE HANGERS AND INSULATE OVER HANGERS AND 4 IN. UP HANGER RODS ON COLD AND CHILLED WATER LINES. PROVIDE OVER-SIZED HANGERS WITH HANGERS POSITIONED OVER THE INSULATION ON PIPES LARGER THAN 2 IN. DIA. WHERE CONDENSER WATER LINES ARE PROVIDED WITH CITY WATER BACK-UP, INSULATE ALL SUPPLY LINES EXPOSED TO CITY WATER.

3. COVER ALL FITTINGS, VALVES, WATER METERS AND APPURTENANCES WITH 1 IN. (25 MM) BLANKET INSULATION OR ARMAFLEX. SEAL INSULATION FOR COLD WATER FITTINGS WITH A VAPOUR BARRIER ADHESIVE AND REINFORCE WITH GLASS OPEN WEAVE FIBRE TAPE AND FINISH SMOOTH WITH A COAT OF MASTIC.

4. ALL HORIZONTAL INDIRECT CONDENSATE DRAINAGE PIPING SHALL BE COVERED WITH 1 IN. (25 MM) FINISHED THICKNESS FIBREGLASS DUAL TEMPERATURE INSULATION, WITH FACTORY APPLIED, FIRE RESISTIVE FIBREGLASS REINFORCED KRAFT PAPER AND ALUMINIUM FOIL VAPOUR BARRIER OR EQUAL. WHERE CONDENSATE LINES ROUTE INTO A DIRECT DRAIN, INSULATE THE TRAP AND FIRST 20 FEET OF DIRECT DRAIN.

5. MAKE GOOD ALL EXISTING INSULATION, WHERE DAMAGED, WHEN CONNECTING TO EXISTING SERVICES. WHERE EXISTING INSULATION HAS BEEN PREVIOUSLY REMOVED, OR IS IN A STATE OF DISREPAIR, BRING THIS ITEM TO THE CONSULTANT'S ATTENTION.

6. WHERE INSULATED PIPING IS EXPOSED, PROVIDE PVC JACKETING CONFORMING WITH THE FLAME AND SMOKE SPREAD RATINGS REQUIRED BY CODE AND AS SUPPLIED BY ACWIL INSULATIONS LTD., AS AN ALTERNATIVE, PROVIDE CANVAS COVERING WITH TWO APPLICATIONS OF SIZING.

7. THERMALLY INSULATE SUPPLY AIR DUCTWORK WITH 1 IN. (25 MM, MIN. R-VALUE OF 5.0) FINISHED THICKNESS FIBREGLASS REINFORCED FOIL-FACED RIGID VAPOUR SEAL DUCT INSULATION. FLEXIBLE DUCT INSULATION WITH VAPOUR BARRIER MAY BE USED IN CONCEALED SPACES. INSULATION SHALL BE INSTALLED USING BOTH PINS AND ADHESIVE. ADHESIVE TO BE APPLIED COMPLETELY OVER ALL SURFACES OF THE DUCTWORK. PINS SHALL BE ON MAXIMUM 18 IN. CENTRES. PINS SHALL BE TACK WELDED, AND CLIPPED AFTER SPEED WASHERS ARE INSTALLED.

8. SEAL ALL JOINTS OF VAPOUR BARRIER, WHERE SUPPLY AIR DUCT IS EXPOSED INSIDE BUILDING, DUCTWORK SHALL BE ACOUSTICALLY LINED, AND EXTERIOR THERMAL INSULATION IS NOT REQUIRED UNLESS SPECIFICALLY NOTED.

9. INSULATE ALL EXHAUST AND OUTSIDE AIR INTAKE PLENUMS AT LOUVERES OR HOODS. INSULATE ALL DUCTWORK FOR A MINIMUM LENGTH OF 10 FEET ON THE BUILDING SIDE OF THE ASSOCIATED MOTORIZED EXHAUST DAMPERS AND THE ENTIRE LENGTH OF THE OUTSIDE AIR INTAKE DUCT. USE 1 IN. (25 MM) FINISHED THICKNESS RIGID INSULATION BOARD WITH VAPOUR BARRIER, AND WHERE EXPOSED TO VIEW COVER WITH CANVAS.

10. DIESEL EXHAUST SHALL HAVE TWO LAYERS OF 2 IN. (50 MM) FINISHED THICKNESS CALCIUM SILICATE INSULATION APPLIED WITH STAGGERED JOINTS, SECURELY WIRE THE ENTIRE LENGTH OF THE INSULATION, COVERED WITH HIGH TEMPERATURE CEMENT AND CANVAS JACKET. INSULATION SHALL BE CONTINUOUS OVER MUFFLER AND EXTEND FOR ENTIRE RUN WITHIN THE BUILDING.

11. ALL PIPING, CARRYING FLUIDS SUBJECT TO FREEZING, ROUTING OUTSIDE THE BUILDING, OR IN SPACES SUBJECT TO FREEZING TEMPERATURES, SHALL BE ELECTRICALLY TRACED BY DIVISION 16 AND INSULATED WITH 2 IN. THICKNESS FIBREGLASS INSULATION AND COVERED WITH A WEATHERPROOF PVC OR ALUMINIUM JACKET.

12. WHERE SUPPLY, RETURN, OR KITCHEN EXHAUST DUCTS ARE LOCATED ON THE ROOF OR EXPOSED TO THE ELEMENTS, INSULATE WITH 2 IN. OF RIGID FIBREGLASS INSULATION. INSULATION IS TO BE CANVAS COVERED AND SEALED WITH TWO APPLICATIONS OF AN ASPHALT BASED INSULATION WEATHER PROTECTION COATING.

13. INSULATION AND VAPOUR BARRIER SHALL BE CONTINUOUS AT ALL FITTINGS, HANGERS AND THROUGH WALLS OR FLOORS.

14. TAPE ALL JOINTS AND SEAMS AND BAND AT 16 IN. (350MM) INTERVALS.

15. STAPLES SHALL NOT BE USED FOR SECURING INSULATION.

16. TEST ALL PIPING AND SEAL ALL DUCT JOINTS WITH DUCT SEALER BEFORE APPLYING INSULATION. (WHERE DUCTS ARE NOT 100% AIR TIGHT, INSULATION WILL PRESSURIZE, AND OPEN AT JOINTS AND SEPARATE FROM THE DUCT.)

17. ALL INSULATION MATERIALS TO BE SUPPLIED BY OWENS-CORNING, CERTANTIED-WASON, KNAUF OR PARKER.

18. INSULATE ALL EXTERIOR CONDENSER WATER PIPES AND FITTINGS WITH 2" (50 MM) PRE-FORMED LOW PRESSURE FIBREGLASS INSULATION WITH VAPOUR BARRIER JACKET. SEAL ALL JOINTS OF VAPOUR BARRIER. INSULATION SHALL CONFORM TO ASHRAE 90.1 REQUIREMENTS. ALL EXPOSED INSULATED PIPE SHALL BE COVERED IN WATERPROOF CANVAS JACKET. PIPES ON ROOFS SHALL BE COVERED IN AN EMBOSSED ALUMINIUM JACKET.

E) CHILLED WATER & CONDENSER WATER PIPES, VALVES AND FITTINGS

1. CHILLED WATER AND CONDENSER WATER PIPES, VALVES AND FITTINGS

1.1. CHILLED WATER AND CONDENSER WATER PIPING SHALL BE STANDARD BLACK STEEL SCHEDULE 40 PIPE TO ASTM-A53 WITH SCREWED JOINTS AND FITTINGS. BRANCH PIPING TWO SIZES SMALLER THAN THE MAIN MAY BE CUT DIRECTLY INTO MAIN AND WELDED IN AN APPROVED MANNER. USE LONG RADIUS ELBOWS AT ALL TURNS.

ONLY USE "O" FLEX VITACULC COUPLINGS WHERE USED IN BASE BUILDING SYSTEMS. DO NOT LOCATE OVER COMPUTER ROOMS, ETC.

1.2. PIPES 2-1/2 IN. (65 MM) AND LARGER SHALL BE VITACULC GROOVED PIPING AND 2 IN. (50 MM) AND SMALLER, 300 PSI CAST IRON SCREWED.

1.3. AUTOMATIC AIR VENTS SHALL BE INSTALLED AT ALL HIGH POINTS IN THE WATER PIPING SYSTEM AND SHALL BE EQUAL TO SARCO OR MAID-O-MIST. PROVIDE DRAINS AT ALL LOW POINTS.

1.4. INSTALL PRESSURE GAUGES EQUAL TO TRERICE OR WINTERS AT THE SUCTION AND DISCHARGE OF ALL PUMPS, HIGH AND LOW SIDE OF ALL PRESSURE REDUCING OR REGULATING STATIONS. SUPPLY LINES OF CHILLED WATER AND CONDENSER WATER SYSTEM IN EACH MECHANICAL EQUIPMENT ROOM AND AT EACH PIECE OF EQUIPMENT SERVED.

1.5. ISOLATING GATE VALVES, BALANCING GLOBE VALVES, AUTOMATIC CONTROL VALVES, CONTROL SENSORS, ETC., SHALL BE INSTALLED AS INDICATED ON PLANS AND/OR REQUIRED FOR OPERATION AND SERVICING OF EQUIPMENT. ALL VALVES SHALL BE SUITABLE FOR THE OPERATING PRESSURE OF THE SYSTEM IN WHICH THEY ARE INSTALLED. MAKE AND MODEL SHALL CONFORM TO THE BASE BUILDING STANDARDS AND SPECIFICATIONS.

1.6. PROVIDE ISOLATION VALVES AND DRAIN VALVES FOR ALL NEW COLDS AND EQUIPMENT.

1.7. HYDRAULICALLY TEST ALL PIPING SYSTEMS AT NOT LESS THAN 12 TIMES THE WORKING PRESSURE OF FINAL SYSTEM PRESSURES (BUT NOT LESS THAN 75 PSI) FOR A PERIOD OF NOT LESS THAN 12 HOURS. FLUSH PIPING AND SUBMIT A TEST REPORT TO THE CONSULTANT AND LANDLORD.

1.8. FLUSHING AND TESTING TO BE DONE PRIOR TO CONNECTION TO BUILDING SYSTEM. PROVIDE A TEMPORARY ISOLATION LOOP. CO-ORDINATE WITH THE LANDLORD, AND THE LANDLORD'S CHEMICAL TREATMENT SUPPLY COMPANY FOR ALL REQUIRED CHEMICALS, FLUSHING ARRANGEMENT, TREATMENT, TESTING AND PROCEDURE IN OPENING THE SYSTEM UP TO THE BASE BUILDING CIRCUIT.

1.9. FLOW BALANCING VALVES FOR EACH SUPPLEMENTARY UNIT TO BE EQUAL TO TOUR AND ANDERSON LIMITED, MODEL STA-D, SEE EQUIPMENT SPECIFICATION FOR FLOW RATES.

GENERAL NOTES

1. ALL EXISTING SERVICES SHOWN ARE APPROXIMATE AND BASED ON EXISTING RECORD DRAWINGS. CONTRACTOR WILL VERIFY ALL CONNECTIONS, DUCT SIZES, AND LOCATIONS ON SITE AND REPORT ANY DISCREPANCY TO THE CONSULTANT.

2. ANY SERVICES NOT SHOWN ON THE DRAWINGS THAT ARE EXPOSED DURING CONSTRUCTION WILL BE VERIFIED BY THE CONTRACTOR AS TO THE SOURCE AND ROUTING. REPORT TO THE CONSULTANT WITH PROPOSED RESOLUTIONS FOR THE SERVICES THAT HAVE BEEN EXPOSED AT NO EXTRA COST TO CLIENT.

PROJECT CLOSEOUT AND COMPLETION

THE FOLLOWING INFORMATION MUST BE PROVIDED TO THE ENGINEER PRIOR TO FINAL SITE INSPECTION AND ISSUANCE OF THE ENGINEERS FINAL SIGN OFF LETTER TO OBTAIN OCCUPANCY.

THE FOLLOWING INFORMATION MUST BE PROVIDED TO THE OWNER UPON PROJECT COMPLETION;

- AIR BALANCING REPORT.
- LETTERS OF WARRANTY FROM THE MECHANICAL AND ELECTRICAL CONTRACTORS.
- AS BUILT DRAWINGS IN HARD COPY (24"x36" D-SIZE)
- AS BUILT DRAWINGS IN SOFT COPY ON CD IN AUTOCAD 2010 (.DWG AND .PDF)
- ONE COPY OF BUSINESS LICENSE
- ONE COPY OF BUILDING PERMIT FINAL (RECORD OF INSPECTION SIGN OFF)
- ONE COPY REVIEW FOR GENERAL COMMITMENT
- ONE COPY STATUTORY DECLARATION
- ONE COPY OF CONTRACTOR'S CURRENT W.S.I.B.
- ONE COPY SPRINKLER VERIFICATION

F) DUCTWORK

1. ALL ROUND DUCTWORK SHALL BE SPIRAL, EXPOSED SPIRAL. DUCTWORK SHALL BE EQUAL TO ALPHA FREE FLOW SPIRAL DUCT. SINGLE WALL ROUND DUCT MADE FROM G60 GALVANIZED STEEL CONFORMING TO ASTM A525-8. PROVIDE MATCHING MANUFACTURED FITTINGS. DUCT GAUGES TO CONFORM TO ASHRAE, SMACNA AND SPIDA STANDARDS. SUBMIT SHOP DRAWINGS FOR DUCTS AND FITTINGS. PROVIDE A SEALANT ON ALL JOINTS.

1. NOTE THE REMOVAL OF MECHANICAL WORK IS NOT SHOWN ON PLANS. CONTRACTOR SHALL VISIT THE SITE AND CONFIRM ALL OF THE EXISTING MECHANICAL ITEMS TO BE REMOVED, AND THE REMOVAL WORK SHALL BE INCLUDED IN THE TENDER PRICE. PROTECT FINISHED OR UNFINISHED WORK AND OPERATING WORK AREAS BY TARP-AULINS, OR OTHER COVERING FROM DAMAGE DUE TO EXECUTION OF WORK. REPAIR DAMAGE TO BUILDING RESULTING FROM THE WORK TO THE SATISFACTION OF CONSULTANTS AT NO EXPENSE TO THE OWNER.

2. UNLESS NOTED OTHERWISE, ALL SUPPLY, RETURN AND EXHAUST AIR DUCTS PERTAINING TO THIS PROJECT SHALL BE NEW.

3. ALL ROUND DUCTWORK SHALL BE SPIRAL.

4. ALL FLEXIBLE ROUND DUCT CONNECTIONS TO RIGID DUCTWORK AND EQUIPMENT SHALL BE SCREWED AND TAPED.

5. MECHANICAL CONTRACTOR SHALL COORDINATE INSTALLATION OF ALL DUCTWORK AND DIFFUSERS WITH CEILING AND ROOF FRAMING MEMBERS.

6. SHUT-DOWNS OF EXISTING SYSTEMS REQUIRED FOR THIS INSTALLATION SHALL BE FULLY COORDINATED WITH THE BUILDING MANAGEMENT AND THIS WORK PERFORMED AS DIRECTED IN WRITING BY THE BUILDING MANAGEMENT. CONNECTION TO EXISTING SERVICES SHALL BE PERFORMED DURING OFF-WORK HOURS OR ON WEEKENDS IN PREMIUM TIME.

7. SPIN-ON DUCT FITTINGS SHALL BE KERR-HUNT MODEL NO. SO-2, COMPLETE WITH BALANCING DAMPER, OF SIZE EQUAL TO BRANCH DUCT DIAMETER.

8. FLEXIBLE DUCTWORK IS PERMISSIBLE IN LAY-IN OR DRYWALL CEILINGS ONLY. MAXIMUM 5'-0" LENGTH ALLOWED.

9. EQUIVALENT DUCT SIZES MAY BE SUBSTITUTED, IN LIEU OF THOSE SHOWN, IN ORDER TO AVOID INTERFERENCE WITH THE STRUCTURAL MEMBERS. OBTAIN ENGINEER'S APPROVAL BEFORE FABRICATION.

10. INSTALL TURNING VANES IN ALL 90 DEGREE DUCT ELBOWS IN SUPPLY AIR SYSTEMS, (AND RETURN AIR SYSTEMS ONLY WHERE SHOWN).

11. RUN ALL DUCTWORK AND PIPING AS HIGH AS POSSIBLE.

12. SUPPLY AND INSTALL FIRE DAMPERS WHERE SHOWN, OR WHERE REQUIRED BY LOCAL CODES AND AUTHORITIES HAVING JURISDICTION. RATE FIRE DAMPERS TO MATCH THE RATING OF THE SEPARATION CROSSED. PROVIDE ONLY ULC RATED DAMPERS. INSTALL AS SPECIFIED IN NFPA CUA 904.

13. IT IS THIS MECHANICAL CONTRACTOR'S RESPONSIBILITY TO ENSURE CLEAR PASSAGE OF RETURN AIR BACK TO ALL RESPECTIVE AIR CONDITIONING SYSTEMS RELATED TO THIS PROJECT.

14. ALL EXPOSED DUCTWORK IN OCCUPIED SPACES SHALL BE PAINTED, CLEAN AND PREPARE DUCT SURFACES FOR PAINTING. COLOR AS SELECTED BY INTERIOR DESIGNER.

15. ALL SUPPLY AIR DUCTWORK SHALL HAVE JOINTS SEALED WITH APPROVED DUCT SEALANT.

16. FABRICATE ALL DUCTWORK AND HANGERS TO ASHRAE AND SMACNA RECOMMENDATIONS.

17. ENSURE A MINIMUM HORIZONTAL CLEARANCE OF 10'-0" (3.05 M) IS MAINTAINED BETWEEN AIR INTAKES AND EXHAUST AIR OUTLETS.

18. FIRE DAMPERS AT CEILING PENETRATION SHALL BE RUSKIN CTD2 C/W STANDARD FRAME STYLE RATED FOR 1-1/2 HOURS. INSTALL TO MEET MANUFACTURER'S REQUIREMENTS.

19. VERTICAL FIRE DAMPERS AT WALL PENETRATIONS SHALL BE RUSKIN DIBD2 STYLE 'B' RATED FOR 1-1/2 HOURS.

20. HORIZONTAL FIRE DAMPERS AT FLOOR PENETRATIONS SHALL BE RUSKIN DIBD2 STYLE 'B' RATED FOR 1-1/2 HOURS. RUSKIN DIBD23 STYLE 'A' RATED FOR 3 HOURS.

21. DUCT DIMENSIONS ARE CLEAR INSIDE DIMENSIONS.

DRAWING LIST	
M1	MECHANICAL SPECIFICATION AND SITE PLAN
M2	MECHANICAL SPECIFICATION CONT'D
M3	ROOF PLAN AND MECHANICAL PENTHOUSE DEMO
M4	ROOF PLAN AND MECHANICAL PENTHOUSE RENO
M5	GYM MECHANICAL ROOM DEMO
M6	GYM MECHANICAL ROOM R

COOLING TOWER SPECIFICATION

SECTION 23 65 00
COOLING TOWERS

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. DRAWINGS AND GENERAL PROVISIONS OF THE CONTRACT, INCLUDING GENERAL AND SUPPLEMENTARY CONDITIONS AND DIVISION 01 SPECIFICATION SECTIONS, APPLY TO THIS SECTION.

1.2 SUMMARY

- A. THIS SECTION INCLUDES FACTORY ASSEMBLED AND TESTED, OPEN CIRCUIT MECHANICAL FORCED-DRAFT VERTICAL DISCHARGE COOLING TOWER.

1.3 SUBMITTALS

- A. PRODUCT DATA: FOR EACH TYPE OF PRODUCT INDICATED, INCLUDE RATED CAPACITIES, PRESSURE DROP, PERFORMANCE CURVES WITH SELECTED POINTS INDICATED, FURNISHED SPECIALTIES, AND ACCESSORIES.

- B. SHOP DRAWINGS: COMPLETE SET OF MANUFACTURER'S PRINTS OF EQUIPMENT ASSEMBLIES, CONTROL PANELS, SECTIONS AND ELEVATIONS, AND UNIT ISOLATION. INCLUDE THE FOLLOWING:

1. ASSEMBLED UNIT DIMENSIONS.
2. WEIGHT AND LOAD DISTRIBUTION.
3. REQUIRED CLEARANCES FOR MAINTENANCE AND OPERATION.
4. SIZES AND LOCATIONS OF PIPING AND WIRING CONNECTIONS.
5. WIRING DIAGRAMS: FOR POWER, SIGNAL, AND CONTROL WIRING. DIFFERENTIATE BETWEEN MANUFACTURER INSTALLED AND FIELD INSTALLED WIRING.

- C. OPERATION AND MAINTENANCE DATA: EACH UNIT TO INCLUDE OPERATION AND MAINTENANCE MANUAL.

1.4 QUALITY ASSURANCE

A. VERIFICATION OF PERFORMANCE:

1. THE THERMAL PERFORMANCE SHALL BE CERTIFIED BY THE COOLING TECHNOLOGY INSTITUTE IN ACCORDANCE WITH CTI CERTIFICATION STANDARD STD-201. LACKING SUCH CERTIFICATION, A FIELD ACCEPTANCE TEST SHALL BE CONDUCTED WITHIN THE WARRANTY PERIOD IN ACCORDANCE WITH CTI ACCEPTANCE TEST CODE ATC-105, BY A LICENSED CTI THERMAL TESTING AGENCY.
2. UNIT SOUND PERFORMANCE RATINGS SHALL BE TESTED ACCORDING TO CTI ATC-128 STANDARD. SOUND RATINGS SHALL NOT EXCEED SPECIFIED RATINGS.

1.5 WARRANTY

- A. SUBMIT A WRITTEN WARRANTY EXECUTED BY THE MANUFACTURER, AGREEING TO REPAIR OR REPLACE COMPONENTS OF THE UNIT THAT FAIL IN MATERIALS AND WORKMANSHIP WITHIN THE SPECIFIED WARRANTY PERIOD.
1. THE ENTIRE UNIT SHALL HAVE A COMPREHENSIVE FIVE (1) YEAR WARRANTY AGAINST DEFECTS IN MATERIALS AND WORKMANSHIP FROM START UP, NOT TO EXCEED EIGHTEEN(18) MONTH FROM SHIPMENT OF THE UNIT.
 2. FAN MOTOR/DRIVE SYSTEM: WARRANTY PERIOD SHALL BE FIVE (5) YEARS FROM DATE OF UNIT SHIPMENT FROM FACTORY (FAN MOTOR(S), FAN(S), FAN SHAFT(S), BEARINGS, MECHANICAL SUPPORT, SHEAVES, BUSHINGS AND BELT(S)).

PART 2 – PRODUCTS

2.1 MANUFACTURERS

- A. MANUFACTURERS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE COOLING TOWERS MANUFACTURED BY ONE OF THE FOLLOWING:

1. EVAPCO MODEL LSTC-5212

2.2 THERMAL PERFORMANCE

- A. EACH UNIT SHALL BE CAPABLE TO COOL 483.0 GPM OF WATER ENTERING AT 96.1° F LEAVING AT 86.1° F AT A DESIGN ENTERING WET BULB OF 77.0° F.

2.3 IBC COMPLIANCE

- A. THE STRUCTURE OF THIS PRODUCT SHALL BE DESIGNED, ANALYZED, AND CONSTRUCTED IN ACCORDANCE WITH THE WIND AND SEISMIC LOAD REQUIREMENTS OF THE FOLLOWING: 2009 IBC, 2012 IBC, 2015 IBC, 2018 IBC, ASCE/SEI 7-05, ASCE/SEI 7-10, ASCE/SEI 7-16, NFPA 5000. FOR IMPORTANCE FACTOR (IP) = 1.0, SDS = 0.67 (Ø Z/H = 0) AND P = 288 PSF.

2.4 COMPONENTS

- A. DESCRIPTION: FACTORY ASSEMBLED AND TESTED, FORCED DRAFT COUNTERFLOW COOLING TOWER.

B. MATERIALS OF CONSTRUCTION

1. ALL PANELS INCLUDING THE FAN SNOOTS, HOUSINGS AND SUPPORTS SHALL BE CONSTRUCTED OF HEAVY GAUGE MILL HOT-DIP GALVANIZED STEEL. ALL GALVANIZED STEEL SHALL BE COATED WITH A MINIMUM OF 2.35 OUNCES OF ZINC PER SQUARE FOOT OF ZINC PER SQUARE FOOT OF AREA (G-235 HOT-DIP GALVANIZED STEEL DESIGNATION). DURING FABRICATION, ALL GALVANIZED STEEL PANEL EDGES SHALL BE COATED WITH A 95% PURE ZINC-RICH COMPOUND.

ALL EVAPORATIVE COOLING EQUIPMENT UTILIZING GALVANIZED CONSTRUCTION REQUIRE INITIAL PASSIVATION TO MAXIMIZE THE SERVICE LIFE OF THE EQUIPMENT. THE SITE'S WATER TREATMENT VENDOR SHOULD BE CONTACTED SEVERAL WEEKS PRIOR TO ADDING ANY WATER TO THE SYSTEM TO PROVIDE A PASSIVATION PLAN ALONG WITH ASSOCIATED PASSIVATION PLAN COSTS.

C. FAN(S):

1. FANS SHALL BE FORWARD CURVED CENTRIFUGAL OF EPOXY COATED STEEL CONSTRUCTION. THE FANS SHALL BE FACTORY INSTALLED, AND STATICALLY AND DYNAMICALLY BALANCED FOR VIBRATION FREE OPERATION.

D. FAN HOUSING

1. THE COMPLETE DRIVE SYSTEM, INCLUDING THE ELECTRIC MOTOR, BELTS, BEARINGS, FAN, AND DRIVES SHALL BE COMPLETELY ENCLOSED IN A PROTECTIVE HOUSING WHICH COVERS THE DRIVE SYSTEM AND PROVIDES SOUND REDUCTION.

E. DRIFT ELIMINATORS

1. DRIFT ELIMINATORS SHALL BE CONSTRUCTED ENTIRELY OF POLYVINYL CHLORIDE (PVC) IN EASILY HANDLED SECTIONS. DESIGN SHALL INCORPORATE THREE CHANGES IN AIR DIRECTION AND LIMIT THE WATER CARRYOVER TO A MAXIMUM OF 0.001% OF THE RECIRCULATING WATER RATE. DRIFT ELIMINATORS SHALL BE SELF-EXTINGUISHING, HAVE A FLAME SPREAD OF LESS THAN 25 UNDER ASTM E84, AND SHALL BE RESISTANT TO ROT, DECAY AND BIOLOGICAL ATTACK.

F. WATER DISTRIBUTION SYSTEM

1. SPRAY NOZZLES SHALL BE PRECISION MOLDED ABS WITH LARGE ORIFICE THREADED INTO BRANCH

- G. PIPING WITH INTERNAL SLUDGE RING TO ELIMINATE CLOGGING. SPRAY HEADER AND BRANCHES SHALL BE SCHEDULE 40 POLYVINYL CHLORIDE (PVC) FOR CORROSION RESISTANCE.

H. AIR INLET SCREENS

1. PROTECTIVE SCREENS SHALL BE PROVIDED OVER AIR INLET
1. ELECTRONIC WATER LEVEL CONTROL
1. ELECTRONIC WATER LEVEL CONTROL PACKAGE SHALL HAVE THREE (3) STAINLESS STEEL WATER LEVEL SENSORS (ONE (1) HIGH LEVEL, ONE (1) LOW LEVEL AND ONE (1) GROUND) WITH A NEMA 4X ENCLOSURE MOUNTED IN A CLEANABLE SCHEDULE 40 PVC EXTERNAL STANDPIPE WITH SLOW CLOSING SOLENOID VALVE(S) AND STRAINER(S). WIRING IS NOT INCLUDED AND COMPONENTS MUST BE FIELD MOUNTED. VALVES SHALL BE SIZED FOR 25 PSI MINIMUM TO 125 PSI MAXIMUM PRESSURE. STANDPIPE MAY REQUIRE HEAT TRACING BY OTHERS IN COLD WEATHER APPLICATIONS.

J. PAN STRAINER

1. PAN STRAINER(S) SHALL BE ALL TYPE 304 STAINLESS STEEL CONSTRUCTION WITH LARGE AREA REMOVABLE PERFORATED SCREENS.

K. PIPE CONNECTION TYPE

1. ANY CONNECTIONS PROVIDED WITH A GROOVE (GVD) OR BEVELED FOR WELDING/GROOVED (BW/GVD) SHALL CONFORM TO STANDARD GROOVE (SPECIALIZATION) DRIVES.

2.5 MOTORS AND DRIVES

- A. GENERAL REQUIREMENTS FOR MOTORS ARE SPECIFIED IN DIVISION 23 SECTION 'MOTORS'

B. FAN MOTOR

- FAN MOTOR(S) SHALL BE TOTALLY ENCLOSED, BALL BEARING TYPE ELECTRIC MOTOR(S) SUITABLE FOR MOIST AIR SERVICE. MOTOR(S) ARE PREMIUM EFFICIENT, CLASS F INSULATED, 1.15 SERVICE FACTOR DESIGN, INVERTER RATED PER NEMA MG1 PART 31.4.4.2 AND SUITABLE FOR VARIABLE TORQUE APPLICATIONS AND CONSTANT TORQUE SPEED RANGE WITH PROPERLY SIZED AND ADJUSTED VARIABLE FREQUENCY DRIVES.

- FAN MOTOR(S) SHALL INCLUDE STRIP-TYPE SPACE HEATERS WITH SEPARATE LEADS BROUGHT TO THE MOTOR CONDUIT BOX.

C. FAN DRIVE

1. THE FAN DRIVE SHALL BE V-BELT TYPE WITH OD TAPERED BUSHINGS DESIGNED FOR 150% OF THE MOTOR NAMEPLATE POWER. THE BELT MATERIAL SHALL BE NEOPRENE REINFORCED WITH POLYESTER CORD AND SPECIFICALLY DESIGNED FOR EVAPORATIVE EQUIPMENT SERVICE. BELT ADJUSTMENT SHALL BE ACCOMPLISHED FROM THE EXTERIOR OF THE UNIT.

D. FAN SHAFT

1. FAN SHAFT SHALL BE TUBULAR, GROUND AND POLISHED STEEL WITH FORGED BEARING JOURNALS. EXPOSED SURFACE SHALL BE COATED WITH RUST PREVENTATIVE.

E. FAN SHAFT BEARINGS

1. FAN SHAFT BEARINGS SHALL BE HEAVY-DUTY, SELF-ALIGNING BALL TYPE BEARINGS WITH EXTENDED LUBRICATION LINES TO GREASE FITTINGS LOCATED ON EXTERIOR OF UNIT.

2.6 MAINTENANCE ACCESS

- A. FAN SECTION
1. FAN SCREENS SHALL BE REMOVABLE FOR FAN MOTOR AND DRIVE ACCESS AT GRADE.

B. BASIN SECTION

1. CIRCULAR ACCESS DOOR SHALL BE LOCATED ABOVE THE BASIN TO ALLOW FOR EASY ACCESS TO PAN INTERIOR

C. LADDER

1. A VERTICAL ALUMINIUM LADDER SHALL BE PROVIDED FOR ACCESS TO THE WATER DISTRIBUTION AND HEAT TRANSFER MEDIA.

- SAFETY CAGE(S) SHALL BE PROVIDED ON ALL VERTICAL LADDER(S) AND SHIP MOUNTED. SAFETY CAGE(S) SHALL BEGIN BETWEEN 7 FEET (MINIMUM) AND 8 FEET (MAXIMUM) ABOVE GRADE.

CHILLER SPECIFICATION

PART 2 PRODUCTS

2.01 OPERATING CONDITIONS

- A. PROVIDE WATER-COOLED LIQUID CHILLER WITH THE CAPACITY AS SCHEDULED ON DRAWINGS.

- B. CHILLER SHALL BE DESIGNED TO OPERATE USING R-454B REFRIGERANT.

- C. CHILLER SHALL BE DESIGNED FOR PARALLEL EVAPORATOR WATER FLOW.

- D. THE LIQUID TO BE CHILLED WILL BE WATER CONTAINING CORROSION INHIBITORS.

- E. CHILLER SHALL BE DESIGNED TO OPERATE USING 575 VOLT, 3 PHASE, 60 HZ ELECTRICAL POWER SUPPLY.

2.01 WATER-COOLED PACKAGED CHILLER

- A. APPROVED MANUFACTURER IS MULTISTACK.

- B. SYSTEM DESCRIPTION: CHILLER SHALL INCORPORATE SCROLL-TYPE COMPRESSORS AND CAN CONSIST OF MULTIPLE 85 TON MODULES. EACH REFRIGERANT CIRCUIT SHALL CONSIST OF AN INDIVIDUAL COMPRESSOR, COMMON DUAL CIRCUITED CONDENSER, DUAL CIRCUITED EVAPORATOR, THERMAL EXPANSION VALVES, AND CONTROL SYSTEM. EACH CIRCUIT SHALL BE CONSTRUCTED TO BE INDEPENDENT OF OTHER CIRCUITS FROM A REFRIGERATION AND ELECTRICAL STAND-POINT. THE MULTI-CIRCUIT CHILLER MUST BE ABLE TO PRODUCE CHILLED WATER EVEN IN THE EVENT OF A FAILURE OF ONE OR MORE REFRIGERANT CIRCUITS. CIRCUITS SHALL NOT CONTAIN MORE THAN 28 LB. OF R-454B REFRIGERANT.

C. GENERAL

1. CHILLER MODULES SHALL BE ETL LISTED IN ACCORDANCE WITH UL STANDARD 1995, CSA CERTIFIED PER STANDARD C22.2#236

2. CHILLER MODULES SHALL BE AHRI CERTIFIED.

3. MODULES SHALL SHIP WIRED AND CHARGED WITH REFRIGERANT. ALL MODULES SHALL BE FACTORY RUN TESTED PRIOR TO SHIPMENT ON AN AHRI CERTIFIED OR 3RD PARTY VERIFIED TEST STAND.

4. COMPRESSORS, HEAT EXCHANGERS, PIPING AND CONTROLS SHALL BE MOUNTED ON A HEAVY GAUGE, POWDER COATED STEEL FRAME. ELECTRICAL CONTROLS, CONTACTORS, AND RELAYS FOR EACH MODULE SHALL BE MOUNTED WITHIN THAT MODULE.

- D. SOUND REDUCTION PANEL PACKAGE EACH MODULE SHALL BE SUPPLIED WITH A LIGHT WEIGHT ALUMINIUM FRAME WITH SOUND REDUCTION PANELS. PANELS ARE POWDER COATED 20 GAUGE STEEL WITH 1" OF FIBERGLASS INSULATION TO REDUCE SOUND LEVELS. OPTIONAL SOUND PACKAGE WILL REDUCE SOUND PRESSURE LEVELS MEASURED AT 1 METER AT A MINIMUM OF 12 DBA.

- E. CHILLED AND CONDENSER WATER MAINS: EACH MODULE SHALL INCLUDE SUPPLY AND RETURN MAINS FOR BOTH CHILLED AND CONDENSER WATER. CUT GROOVED END CONNECTIONS ARE PROVIDED FOR INTERCONNECTION TO SIX (EIGHT) INCH STANDARD (6.625") (8.625") OUTSIDE DIAMETER) PIPING WITH GROOVED TYPE COUPLINGS. ROLLED GROOVED SHALL BE UNACCEPTABLE. CHILLED WATER MAINS SHALL BE INSULATED WITH 1" CLOSED CELL INSULATION. WATER MAINS SHALL BE INSTALLED SUCH THAT THEY ARE BENEATH ANY POWER OR CONTROL WIRING SO AS TO PROVIDE FOR SAFE OPERATION IN THE EVENT OF CONDENSATION OR MINOR PIPING LEAKS.

- F. EVAPORATORS AND CONDENSERS: EACH EVAPORATOR AND CONDENSER SHALL BE BRAZED PLATE HEAT EXCHANGERS CONSTRUCTED OF 316 STAINLESS STEEL; DESIGNED, TESTED, AND STAMPED IN ACCORDANCE WITH UL 1995 CODE FOR 650 PSIG REFRIGERANT SIDE WORKING PRESSURE AND 150 PSIG WATER SIDE WORKING PRESSURE. BOTH THE CONDENSER AND EVAPORATOR HEAT EXCHANGERS SHALL BE MOUNTED BELOW THE COMPRESSOR. THIS ANNUNCIATION WILL BE IN PLAIN ENGLISH. ALPHANUMERIC CODES SHALL BE UNACCEPTABLE

- G. FAILURE OF CHILLER TO START OR CHILLER SHUTDOWN DUE TO ANY OF THE ABOVE SAFETY CONTROLS SHALL BE ANNUNCIATED BY DISPLAY OF THE APPROPRIATE DIAGNOSTIC DESCRIPTION AT THE UNIT CONTROL PANEL. THIS ANNUNCIATION WILL BE IN PLAIN ENGLISH. ALPHANUMERIC CODES SHALL BE UNACCEPTABLE

- H. THE CHILLER SHALL BE FURNISHED WITH A MASTER CONTROLLER AS AN INTEGRAL PORTION OF THE CHILLER CONTROL CIRCUITRY TO PROVIDE THE FOLLOWING FUNCTIONS:

1. PROVIDE AUTOMATIC CHILLER SHUTDOWN DURING EXCESSIVE WHEN THE LOAD LEVEL DECREASES BELOW THE NORMAL OPERATING REQUIREMENTS OF THE CHILLER. UPON AN INCREASE IN LOAD, THE CHILLER SHALL AUTOMATICALLY RESTART.
2. PROVISIONS FOR CONNECTION TO AUTOMATICALLY ENABLE THE CHILLER FROM A REMOTE ENERGY MANAGEMENT SYSTEM.
3. THE CONTROL PANEL SHALL PROVIDE ALPHANUMERIC DISPLAY SHOWING ALL SYSTEM PARAMETERS IN THE ENGLISH LANGUAGE WITH NUMERIC DATA IN ENGLISH UNITS.
4. EACH MODULE SHALL CONTAIN A SLAVE CONTROLLER THAT WILL ALLOW ANY MODULE TO RUN IN THE EVENT OF A MASTER CONTROLLER FAILURE OR LOSS OF COMMUNICATION WITH THE MASTER CONTROLLER VIA AN ON/OFF/MANUAL TOGGLE SWITCH.

- D. NORMAL CHILLER OPERATION
1. WHEN CHILLER IS ENABLED, THE FACTORY SUPPLIED MASTER CONTROLLER STAGES THE CHILLER CAPACITY FROM MINIMUM TO MAXIMUM AS REQUIRED BY BUILDING LOAD.
 2. THE CHILLER CONTROL SYSTEM SHALL RESPOND TO ENTERING WATER TEMPERATURE AND WILL HAVE AN INTEGRAL RESET BASED ON ENTERING WATER TEMPERATURE TO PROVIDE FOR EFFICIENT OPERATION AT PART-LOAD CONDITIONS

E. POWER PHASE MONITOR

1. PROVIDE A POWER PHASE MONITOR ON THE INCOMING POWER SUPPLY TO THE CHILLER. THIS DEVICE SHALL PREVENT THE CHILLER FROM OPERATING DURING PERIODS WHEN THE INCOMING POWER IS UNSUITABLE FOR PROPER OPERATION.
2. THE POWER PHASE MONITOR SHALL PROVIDE PROTECTION AGAINST THE FOLLOWING CONDITIONS:

- a. LOW VOLTAGE (BROWN-OUT)
- b. PHASE ROTATION
- c. LOSS OF PHASE
- d. PHASE IMBALANCE

PART 3 INSTALLATION

3.01 PIPING SYSTEM FLUSHING PROCEDURE

- A. PRIOR TO CONNECTING THE CHILLER TO THE CONDENSER AND CHILLED WATER LOOP, THE PIPING LOOPS SHALL BE FLUSHED WITH A DETERGENT AND

- CONTROLS OR SENSORS SHALL CAUSE A 'FAULT' INDICATION AT THE MASTER CONTROLLER AND SHUTDOWN OF THAT COMPRESSOR WITH THE TRANSFER OF LOAD REQUIREMENTS TO THE NEXT AVAILABLE COMPRESSOR. IN THE CASE OF A SYSTEM FAULT THE ENTIRE CHILLER WILL BE SHUT DOWN. WHEN A FAULT OCCURS, THE MASTER CONTROLLER SHALL RECORD CONDITIONS AT THE TIME OF THE FAULT AND STORE THE DATA FOR RECALL. THIS INFORMATION SHALL BE CAPABLE OF BEING RECALLED THROUGH THE KEYPAD OF THE MASTER CONTROLLER AND DISPLAYED ON THE MASTER CONTROLLER'S 2 LINE BY 40 CHARACTER BACK-LIT LCD. A HISTORY OF FAULTS SHALL BE MAINTAINED INCLUDING DATE AND TIME OF DAY OF EACH FAULT (UP TO THE LAST 20 OCCURRENCES).

5. INDIVIDUAL MONITORING OF LEAVING CHILLED WATER TEMPERATURES FROM EACH REFRIGERATION SYSTEM SHALL BE PROGRAMMED TO PROTECT AGAINST FREEZE-UP.

6. THE CONTROL SYSTEM SHALL MONITOR ENTERING AND LEAVING CHILLED WATER TEMPERATURES TO DETERMINE SYSTEM LOAD AND SELECT THE NUMBER OF COMPRESSOR CIRCUITS REQUIRED TO OPERATE. RESPONSE TIMES AND SET POINTS SHALL BE ADJUSTABLE. THE SYSTEM SHALL PROVIDE FOR VARIABLE TIME DELAY BETWEEN COMPRESSOR SEQUENCING AND TEMPERATURE SENSING, SO AS TO FINE TUNE THE CHILLER TO DIFFERENT EXISTING BUILDING CONDITIONS.

7. THE CHILLER SHALL BE CAPABLE OF INTERFACING TO A BUILDING AUTOMATION SYSTEM. INTERFACE SHALL BE ACCOMPLISHED USING AN INTEROPERABILITY WEB PORTAL AND SHALL BE CAPABLE OF COMMUNICATION OVER BACNET, MODBUS OR LON.

- K. CHILLER SHALL HAVE A SINGLE POINT POWER CONNECTION AND EXTERNAL INPUTS AND OUTPUTS TO BE COMPATIBLE WITH THE BUILDING MANAGEMENT SYSTEM. INPUTS/OUTPUTS INCLUDE:

1. REMOTE START/STOP
2. CUSTOMER ALARM RELAY
3. CUSTOMER CHILLED/LOAD LIMIT RESET SIGNAL
4. ECW TO MECHANICAL COOLING MODULE
5. ECW TO MECHANICAL COOLING MODULE
6. ECW TO MECHANICAL COOLING MODULE
7. LOWH FROM MECHANICAL COOLING MODULE
8. POWER PHASE MONITOR
9. CHILLED WATER FLOW SWITCH INPUT
10. CONDENSER WATER FLOW SWITCH INPUT
11. FULL LOAD LIMIT RELAY
12. CONDENSER PUMP RELAY
13. DDOS CONDENSER MULTIFLUSH RELAY
14. CHILLED WATER PUMP RELAY

- L. EACH INLET WATER HEADER SHALL INCORPORATE A BUILT IN 30-MESH (MAXIMUM) IN-LINE STRAINER SYSTEM TO PREVENT HEAT EXCHANGER FOULING AND ACCOMMODATE 100% FLOW FILTRATION WITH A MINIMUM SURFACE AREA OF 475 SQ INCHES PER MODULE. CONDENSER-SIDE STRAINER SYSTEM SHALL INCORPORATE AN AUTOMATIC DEBRIS BLOW-DOWN SYSTEM FOR SELF-CLEANING OF THE STRAINER SYSTEM THAT IS CONTROLLED AND POWERED BY THE CHILLER.

- M. SINGLE POINT POWER: CHILLER WITH HOFFMAN STYLE ELECTRICAL SYSTEM FOR SINGLE POINT POWER AT A 5,000 AMP SCGR.

2.03 SAFETIES, CONTROLS AND OPERATION

- A. CHILLER SAFETY CONTROLS SYSTEM SHALL BE PROVIDED WITH THE UNIT (MINIMUM) AS FOLLOWS:
1. LOW EVAPORATOR REFRIGERANT PRESSURE
 2. LOSS OF FLOW THROUGH THE EVAPORATOR
 3. LOSS OF FLOW THROUGH THE CONDENSER
 4. HIGH CONDENSER REFRIGERANT PRESSURE
 5. HIGH COMPRESSOR MOTOR TEMPERATURE
 6. LOW SUCTION GAS TEMPERATURE
 7. LOW LEAVING EVAPORATOR WATER TEMPERATURE

- B. FAILURE OF CHILLER TO START OR CHILLER SHUTDOWN DUE TO ANY OF THE ABOVE SAFETY CONTROLS SHALL BE ANNUNCIATED BY DISPLAY OF THE APPROPRIATE DIAGNOSTIC DESCRIPTION AT THE UNIT CONTROL PANEL. THIS ANNUNCIATION WILL BE IN PLAIN ENGLISH. ALPHANUMERIC CODES SHALL BE UNACCEPTABLE

- C. THE CHILLER SHALL BE FURNISHED WITH A MASTER CONTROLLER AS AN INTEGRAL PORTION OF THE CHILLER CONTROL CIRCUITRY TO PROVIDE THE FOLLOWING FUNCTIONS:

1. PROVIDE AUTOMATIC CHILLER SHUTDOWN DURING EXCESSIVE WHEN THE LOAD LEVEL DECREASES BELOW THE NORMAL OPERATING REQUIREMENTS OF THE CHILLER. UPON AN INCREASE IN LOAD, THE CHILLER SHALL AUTOMATICALLY RESTART.
2. PROVISIONS FOR CONNECTION TO AUTOMATICALLY ENABLE THE CHILLER FROM A REMOTE ENERGY MANAGEMENT SYSTEM.
3. THE CONTROL PANEL SHALL PROVIDE ALPHANUMERIC DISPLAY SHOWING ALL SYSTEM PARAMETERS IN THE ENGLISH LANGUAGE WITH NUMERIC DATA IN ENGLISH UNITS.
4. EACH MODULE SHALL CONTAIN A SLAVE CONTROLLER THAT WILL ALLOW ANY MODULE TO RUN IN THE EVENT OF A MASTER CONTROLLER FAILURE OR LOSS OF COMMUNICATION WITH THE MASTER CONTROLLER VIA AN ON/OFF/MANUAL TOGGLE SWITCH.

- D. NORMAL CHILLER OPERATION
1. WHEN CHILLER IS ENABLED, THE FACTORY SUPPLIED MASTER CONTROLLER STAGES THE CHILLER CAPACITY FROM MINIMUM TO MAXIMUM AS REQUIRED BY BUILDING LOAD.
 2. THE CHILLER CONTROL SYSTEM SHALL RESPOND TO ENTERING WATER TEMPERATURE AND WILL HAVE AN INTEGRAL RESET BASED ON ENTERING WATER TEMPERATURE TO PROVIDE FOR EFFICIENT OPERATION AT PART-LOAD CONDITIONS

E. POWER PHASE MONITOR

1. PROVIDE A POWER PHASE MONITOR ON THE INCOMING POWER SUPPLY TO THE CHILLER. THIS DEVICE SHALL PREVENT THE CHILLER FROM OPERATING DURING PERIODS WHEN THE INCOMING POWER IS UNSUITABLE FOR PROPER OPERATION.
2. THE POWER PHASE MONITOR SHALL PROVIDE PROTECTION AGAINST THE FOLLOWING CONDITIONS:

- a. LOW VOLTAGE (BROWN-OUT)
- b. PHASE ROTATION
- c. LOSS OF PHASE
- d. PHASE IMBALANCE

PART 3 INSTALLATION

3.01 PIPING SYSTEM FLUSHING PROCEDURE

- A. PRIOR TO CONNECTING THE CHILLER TO THE CONDENSER AND CHILLED WATER LOOP, THE PIPING LOOPS SHALL BE FLUSHED WITH A DETERGENT AND

- HOT WATER (110-130° F) MIXTURE TO REMOVE PREVIOUSLY ACCUMULATED DIRT AND OTHER ORGANICS. IN OLD PIPING SYSTEMS WITH HEAVY ENCRUSTATION OF INORGANIC MATERIALS CONSULT A WATER TREATMENT SPECIALIST FOR PROPER PASSIVATION AND/OR REMOVAL OF THESE CONTAMINANTS.

- B. DURING THE FLUSHING, A 30 MESH (MAX.) Y-STRAINERS (OR ACCEPTABLE EQUIVALENT) SHALL BE IN PLACE IN THE SYSTEM PIPING AND EXAMINED PERIODICALLY AS NECESSARY TO REMOVE COLLECTED RESIDUE. THE USE OF ON BOARD CHILLER STRAINERS SHALL NOT BE ACCEPTABLE. THE FLUSHING PROCESS SHALL TAKE NO LESS THAN 6 HOURS OR UNTIL THE STRAINERS WHEN EXAMINED AFTER EACH FLUSHING ARE CLEAN. OLD SYSTEMS WITH HEAVY ENCRUSTATION SHALL BE FLUSHED FOR A MINIMUM OF 24 HOURS AND MAY TAKE AS LONG AS 48 HOURS BEFORE THE FILTERS RUN CLEAN. DETERGENT AND ACID CONCENTRATIONS SHALL BE USED IN STRICT ACCORDANCE WITH THE RESPECTIVE CHEMICAL MANUFACTURER'S INSTRUCTIONS. AFTER FLUSHING WITH THE DETERGENT AND/OR DILUTE ACID CONCENTRATIONS THE SYSTEM LOOP SHALL BE PURGED WITH CLEAN WATER FOR AT LEAST ONE HOUR TO ENSURE THAT ALL RESIDUAL CLEANING CHEMICALS HAVE BEEN FLUSHED OUT.

- C. PRIOR TO SUPPLYING WATER TO THE CHILLER THE WATER TREATMENT SPECIFICATION SHALL BE CONSULTED FOR REQUIREMENTS REGARDING THE WATER QUALITY DURING CHILLER OPERATION. THE APPROPRIATE CHILLER MANUFACTURER'S SERVICE LITERATURE SHALL BE AVAILABLE TO THE OPERATOR AND/OR SERVICE CONTRACTOR AND CONSULTED FOR GUIDELINES CONCERNING PREVENTATIVE MAINTENANCE AND OFF-SEASON SHUTDOWN PROCEDURES

3.02 WATER TREATMENT REQUIREMENTS

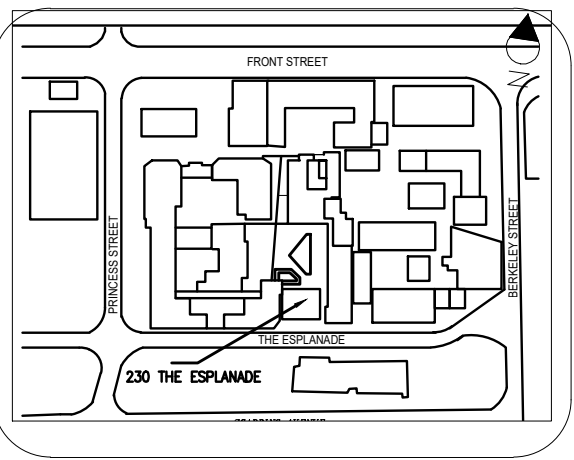
- A. SUPPLY WATER FOR BOTH THE CHILLED WATER AND CONDENSER WATER CIRCUITS SHALL BE ANALYZED AND TREATED BY A PROFESSIONAL WATER TREATMENT SPECIALIST WHO IS FAMILIAR WITH THE OPERATING CONDITIONS AND MATERIALS OF CONSTRUCTION SPECIFIED FOR THE CHILLER'S HEAT EXCHANGERS, HEADERS AND ASSOCIATED PIPING. CYCLES OF CONCENTRATION SHALL BE CONTROLLED SUCH THAT RECIRCULATED WATER QUALITY FOR MODULAR CHILLERS USING 316 STAINLESS STEEL BRAZED PLATE HEAT EXCHANGERS AND CARBON STEEL HEADERS IS MAINTAINED WITHIN THE FOLLOWING PARAMETERS:

1. PH GREATER THAN 7 AND LESS THAN 9
2. TOTAL DISSOLVED SOLIDS (TDS) LESS THAN 1000 PPM
3. HARDNESS AS CaCO3 30 TO 500 PPM
4. ALKALINITY AS Ca CO3 30 TO 500 PPM
5. CHLORIDES LESS THAN 200 PPM
6. SULFATES LESS THAN 200 PPM

3.03 WARRANTY AND START-UP

- A. MANUFACTURER'S WARRANTY: MANUFACTURER SHALL PROVIDE FULL PARTS-ONLY WARRANTY COVERAGE FOR ENTIRE CHILLER FOR A PERIOD OF ONE YEAR. ALL PARTS SHALL BE WARRANTED AGAINST DEFECTS IN MATERIAL AND WORKMANSHIP. SIMILAR PARTS-ONLY COVERAGE SHALL BE PROVIDED FOR THE CHILLERS COMPRESSORS FOR A PERIOD OF FIVE YEARS. THE WARRANTY PERIOD SHALL COMMENCE EITHER ON THE EQUIPMENT START-UP DATE OR SIX MONTHS AFTER SHIPMENT, WHICHEVER IS EARLIER.

- B. MANUFACTURER SHALL PROVIDE THE SERVICES OF A FACTORY AUTHORIZED SERVICE ENGINEER TO PROVIDE COMPLETE START-UP SUPERVISION. FACTORY AUTHORIZED SERVICE ENGINEER SHALL ALSO BE RESPONSIBLE FOR ASSEMBLY OF THE CHILLERS CABINETRY PACKAGE AND ELECTRICAL. HOFFMAN CONNECTION. AFTER START-UP A MANUFACTURER'S REPRESENTATIVE SHALL PROVIDE A MINIMUM OF 8-HOURS OF OPERATOR TRAINING TO THE OWNER'S DESIGNATED REPRESENTATIVE(S).



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**230 THE ESPRANADE
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Job Descripti. :
ROOFING & CHILLER REPLACEMENT

**MECHANICAL SPECIFICATIONS
CONT'D**

Design:	AN
DRAWN:	AN
Approved:	BZ
Scale:	AS SHOWN
Date:	February 26, 25

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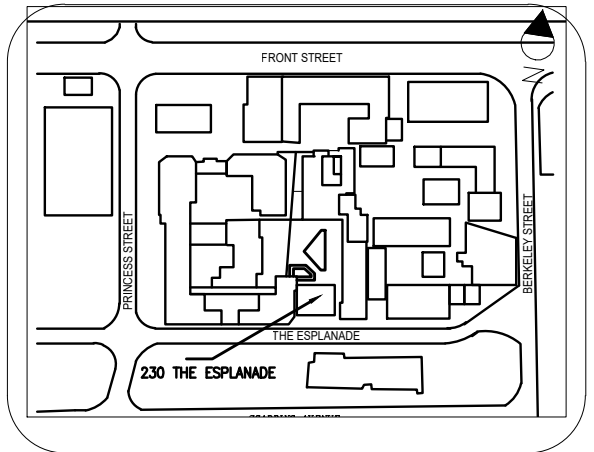
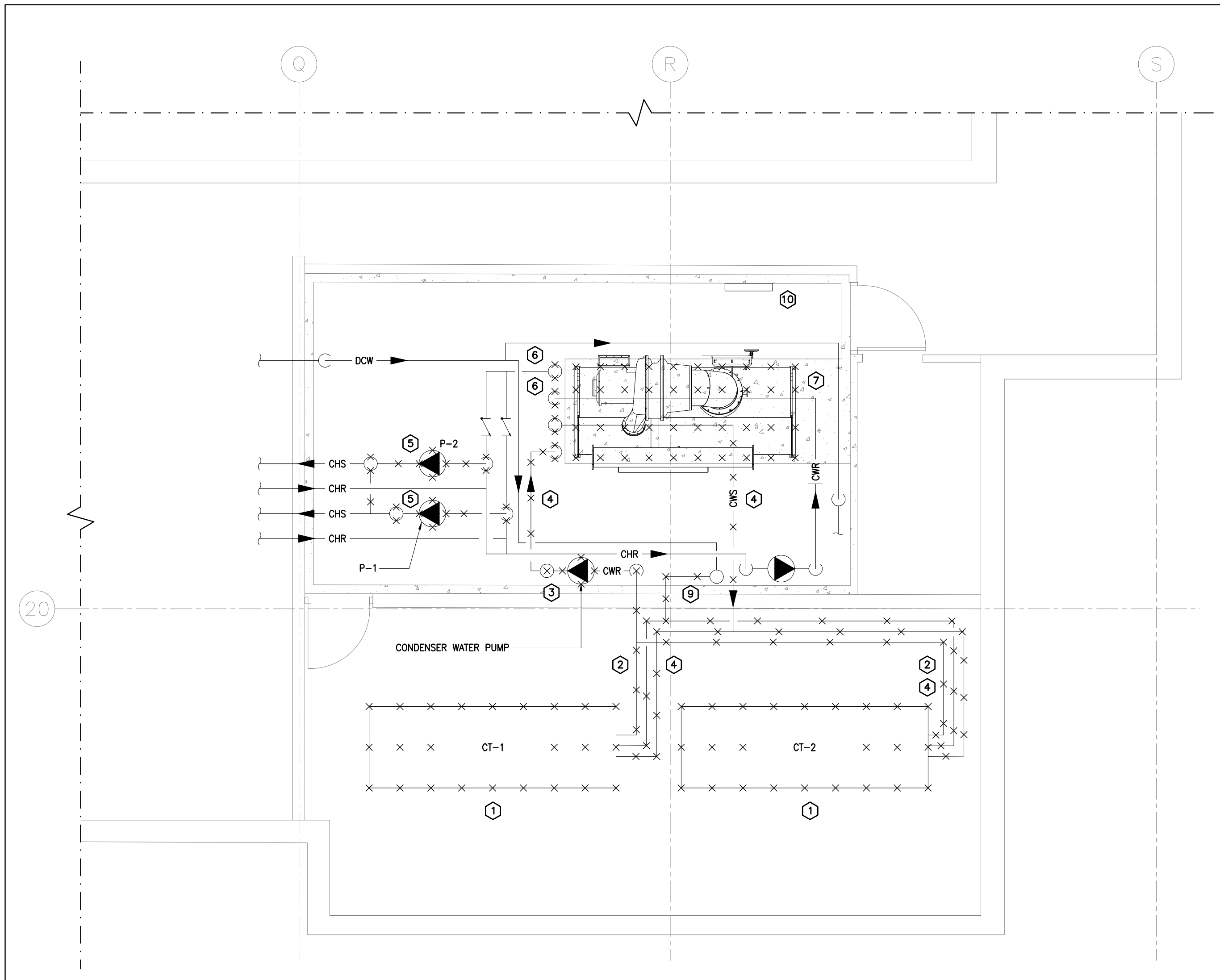
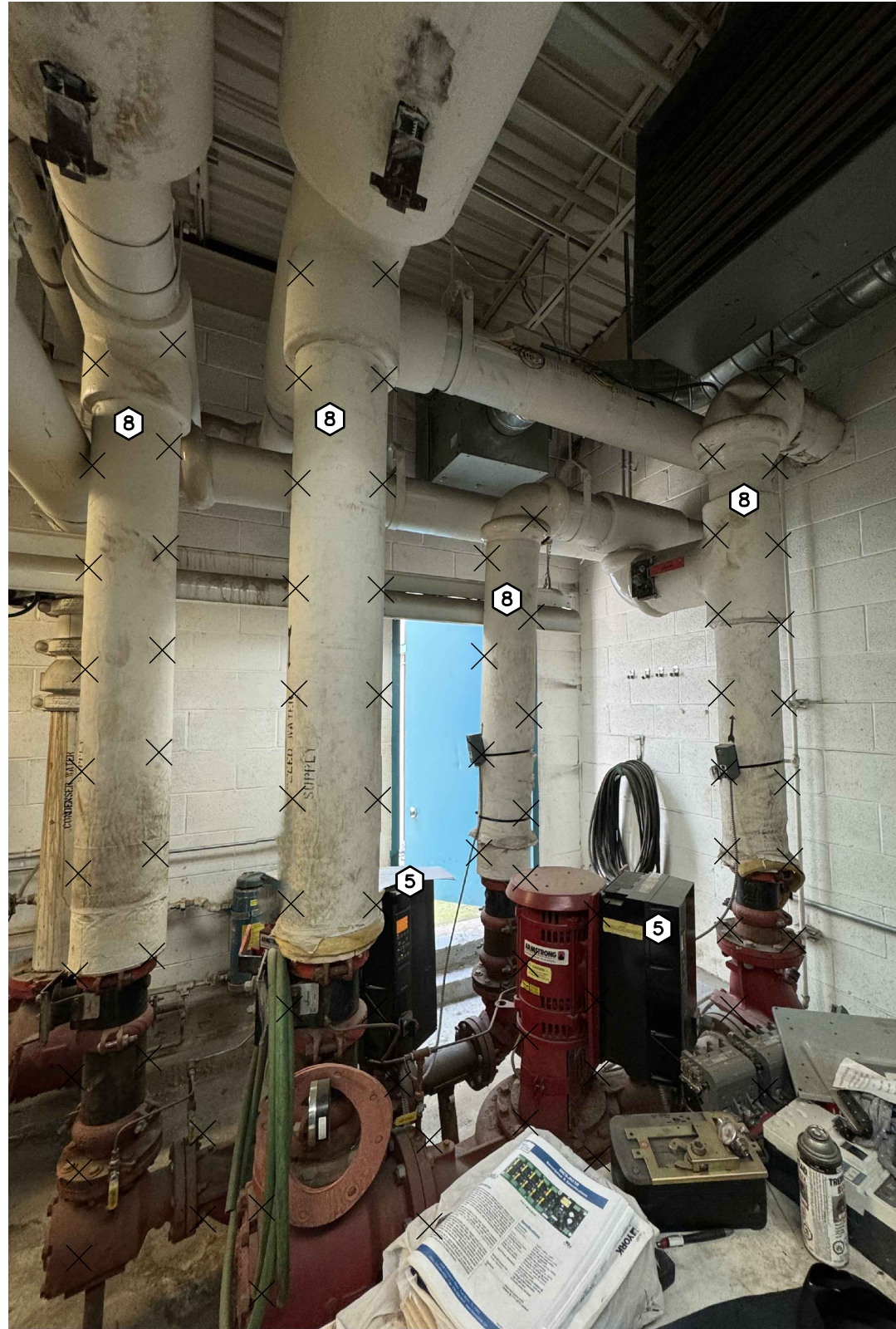


CODED MECHANICAL DEMO NOTES

1. EXISTING COOLING TOWER 1 CT-1 AND COOLING TOWER 2 CT-2 TO BE DISASSEMBLED TO PIECES AND REMOVED.
2. DISCONNECT AND REMOVE ALL ASSOCIATED OUTDOOR PIPING.
3. EXISTING CONDENSER WATER PUMP TO BE REMOVED AND REPLACED.
4. EXISTING CONDENSER WATER SUPPLY AND RETURN TO BE REMOVED.
5. EXISTING COMMUNITY CENTRE CHILLED WATER PUMPS P-1 AND SCHOOL CHILLED WATER PUMP P-2 C/W VFD TO BE REMOVED AND REINSTALLED AFTER CHILLER INSTALLATION.
6. EXISTING CHILLED WATER SUPPLY AND RETURN PIPE TO BE REMOVED TO CEILING LEVEL.
7. EXISTING CHILLER TO BE DISASSEMBLED TO PIECES AND REMOVED. DISCONNECT EXISTING CONTROLS AND RECONNECT TO NEW UNIT.
8. EXISTING CHILLER WATER SUPPLY PIPE TO BE REMOVED TO CEILING LEVEL.
9. EXISTING MAKE UP WATER PIPE TO COOLING TOWER TO BE REMOVED.
10. EXISTING REFRIGERANT MONITOR SYSTEM TO REMAIN.

DEMOLITION NOTES

1. CONTRACTOR SHALL VISIT THE SITE PRIOR TO BID AND SHALL BE FAMILIAR WITH THE LIMITS OF DEMOLITION REQUIRED FOR ALL TRADES. COORDINATE DEMOLITION WITH REQUIREMENTS OF NEW CONSTRUCTION PRIOR TO INITIATING WORK.
2. CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING COMPLETE REMOVAL AND DISCARDING OF ALL DEMOLITION WASTE INCLUDING ANY UNFORESEEN ITEMS WITHIN THE SCOPE OF THE PROJECT.
3. CONTRACTOR SHALL COORDINATE DEMOLITION OPERATIONS WITH CONTINUING OWNER OCCUPATION OF ADJACENT SPACES. ALL DEMOLITION WORK TO BE COORDINATED WITH OWNER AND CONDUCTED UNDER CONTROLLED CONDITIONS.
4. REPAIR/PATCH AS REQUIRED FOR DEMOLITION OF VARIOUS CONSTRUCTION ITEMS. VERIFY AND COORDINATE ANY REQUIRED OPENING WITH RESPECTIVE TRADES. FOR ANY WORK THAT SHALL OCCUR OUTSIDE OF DEMOLITION AREA, CONTRACTOR SHALL RETURN SPACE TO ORIGINAL CONDITION.
5. PROPERLY CAP, PLUG AND CONCEAL ANY PIPING LEFT IN PLACE. CAP ABANDONED SEWER PIPING A MINIMUM OF 8" BELOW FINISH FLOOR PATCH AND REPAIR SLAB.
6. CONTRACTOR SHALL BE RESPONSIBLE TO REMOVE ALL NOT USED WATER PIPING, WASTE AND VENT, DUCTWORK EQUIPMENT IN THE REMODEL AREA.
7. DEMOLISH EXISTING AS REQUIRED PER NEW CONSTRUCTION AS DIRECTED BY ARCHITECT AND/OR AS NOTED ON DRAWINGS. AVOID DISRUPTION OF SERVICES DURING BUSINESS HOURS (IF APPLICABLE). ALL SYSTEM SHUT-DOWNS AND DISRUPTION OF SCHEDULED AFTER NORMAL BUILDING HOURS OR AS OTHERWISE APPROVED BY OWNER.
8. PRIOR TO DEMOLITION FIELD VERIFY AND IDENTIFY ANY EXISTING EQUIPMENT TO REMAIN IN SERVICE THAT IS SERVED BY SYSTEMS TO BE DEMOLISHED. NOTIFY ENGINEER OF ANY SUCH CONDITIONS AND REMOVE AND/OR RELOCATE THE SERVICES AS DIRECTED.
9. MEET WITH OWNER REPRESENTATIVE AND LANDLORD PRIOR TO DEMOLITION TO IDENTIFY WHETHER EXISTING MATERIALS SYSTEMS, EQUIPMENT, ETC. ARE CONSIDERED SALVAGE OR DEBRIS. REMOVE DEBRIS FROM SITE AND DISPOSE OF IN AN APPROVED MANNER AS DIRECTED BY OWNER.
10. TERMINATE DEMOLISHED SYSTEM SERVICES IN A CONCEALED LOCATION IN AN APPROVED MANNER. COORDINATE WITH NEW AND EXISTING CONSTRUCTION.
11. FIELD VERIFY EXISTING PIPING LOCATIONS PRIOR TO WORK.
12. WHERE REQUIRED, COORDINATE EQUIPMENT ELECTRICAL TERMINATION REQUIREMENTS WITH ELECTRICAL CONTRACTOR.



KEY PLAN		
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Toronto

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Project Name :
ST. LAWRENCE CRC & DAYCARE

Project Address :
**230 THE ESPLANADE
TORONTO, ON**


Job Descript. :
**ROOFING & CHILLER REPLACEMENT
ROOF PLAN AND MECHANICAL
PENTHOUSE DEMO**

Design: AN
DRAWN: AN
Approv.: BZ
Scale: AS SHOWN
Date: February 26, 25

Project No.
Job No.

Dwg.No.
M3



- 
- CODED MECHANICAL NOTES

1.

SUPPLY AND INSTALL NEW COOLING TOWER CT-1 AND CT-2 C/W NEW SPRING MOUNTED ISOLATORS. CONNECT TO EXISTING BAS SYSTEM, EXACT LOCATION TO BE VERIFIED ON SITE.

2.

SUPPLY AND INSTALL NEW 25# HEAT TRACED MAKE-UP DCW PIPE TO COOLING TOWER.

3.

SUPPLY AND INSTALL NEW CONDENSER WATER SUPPLY AND RETURN AS SHOWN ON PLAN.

4.

SUPPLY AND INSTALL NEW CONDENSER WATER PUMP.

5.

SUPPLY AND INSTALL NEW CHILLER AND RECONNECT TO EXISTING CONTROL AS SHOWN ON PLAN AND DRAWING.

6.

REINSTALL EXISTING PUMPS P-1 AND P-2 AND RECONNECT TO EXISTING CONTROL.

7.

SUPPLY AND INSTALL NEW CHILLED WATER SUPPLY AND RETURN PIPE AND CONNECT TO EXISTING AS SHOWN ON PLAN.

8.

EXTEND EXISTING WATER PIPE, SUPPLY AND INSTALL NEW WATTS-LF007M20T BACKFLOW PREVENTER AS SHOWN ON PLAN.

9.

EXISTING REFRIGERANT MONITOR SYSTEM TO REMAIN.

10.

NEW 32# DRAIN PIPE TO EXISTING FLOOR DRAIN.

11.

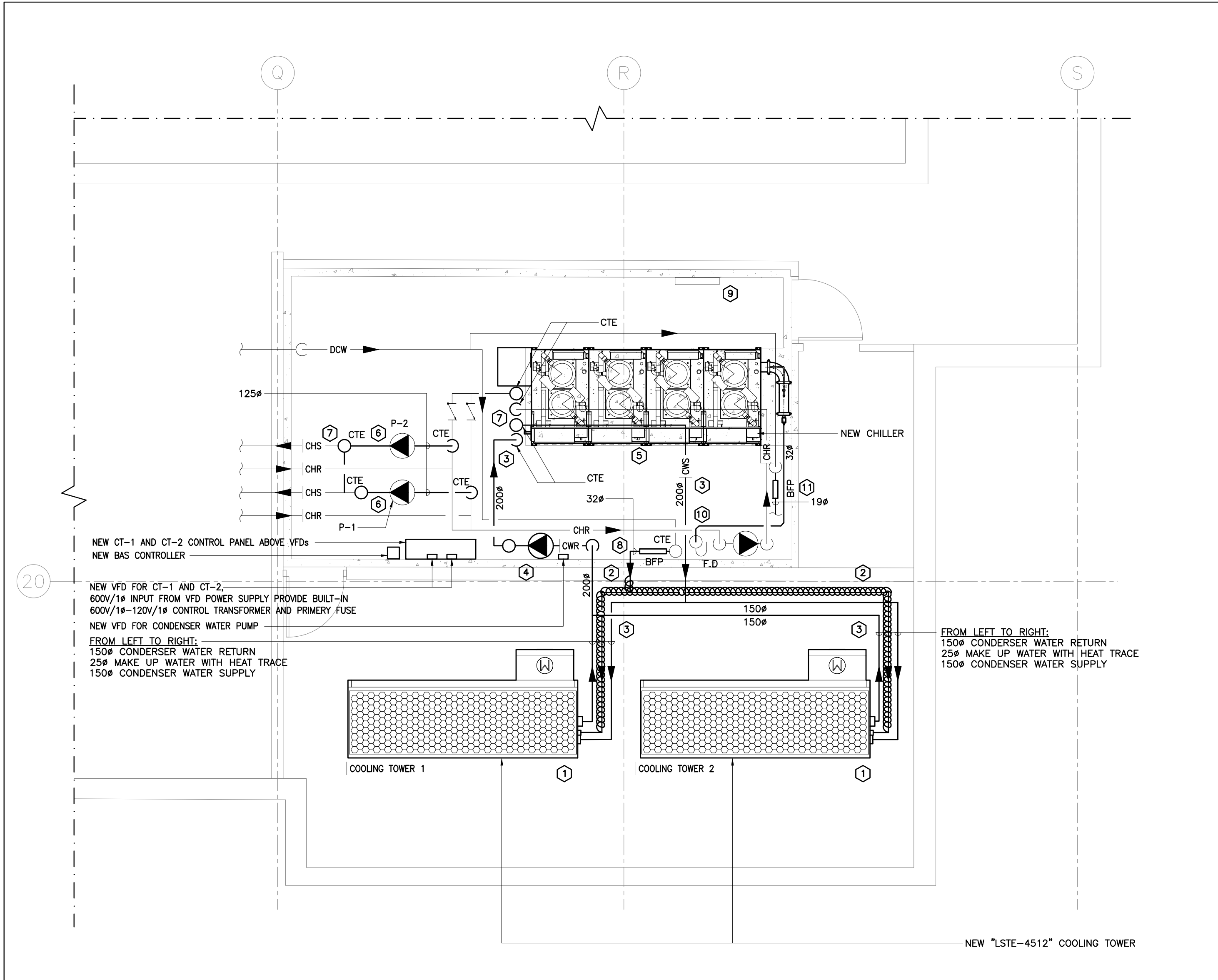
SUPPLY AND INSTALL NEW WATTS-LF007M10T BACKFLOW PREVENTER AS SHOWN ON PLAN

- GENERAL NOTES-MECHANICAL PLAN
1.

CONFIRM DUCT SIZE ON SITE. ENSURE SYSTEM IS OPERATIONAL UPON COMPLETION.
2.

ANY DISCREPANCIES OCCURRING BETWEEN ARCHITECT & ENGINEER'S DRAWINGS SHOULD BE BROUGHT TO THE IMMEDIATE ATTENTION OF THE DESIGNER.
3.

MECHANICAL CONTRACTOR TO INSPECT CONDITION OF ALL EXISTING EQUIPMENT AND PERFORM ALL NECESSARY REPAIRS TO PROVIDE A COMPLETE WORKING SYSTEM.





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PENTHOUSE RENO

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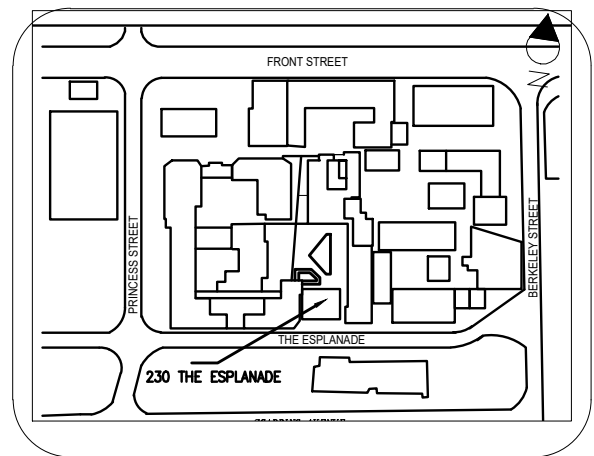
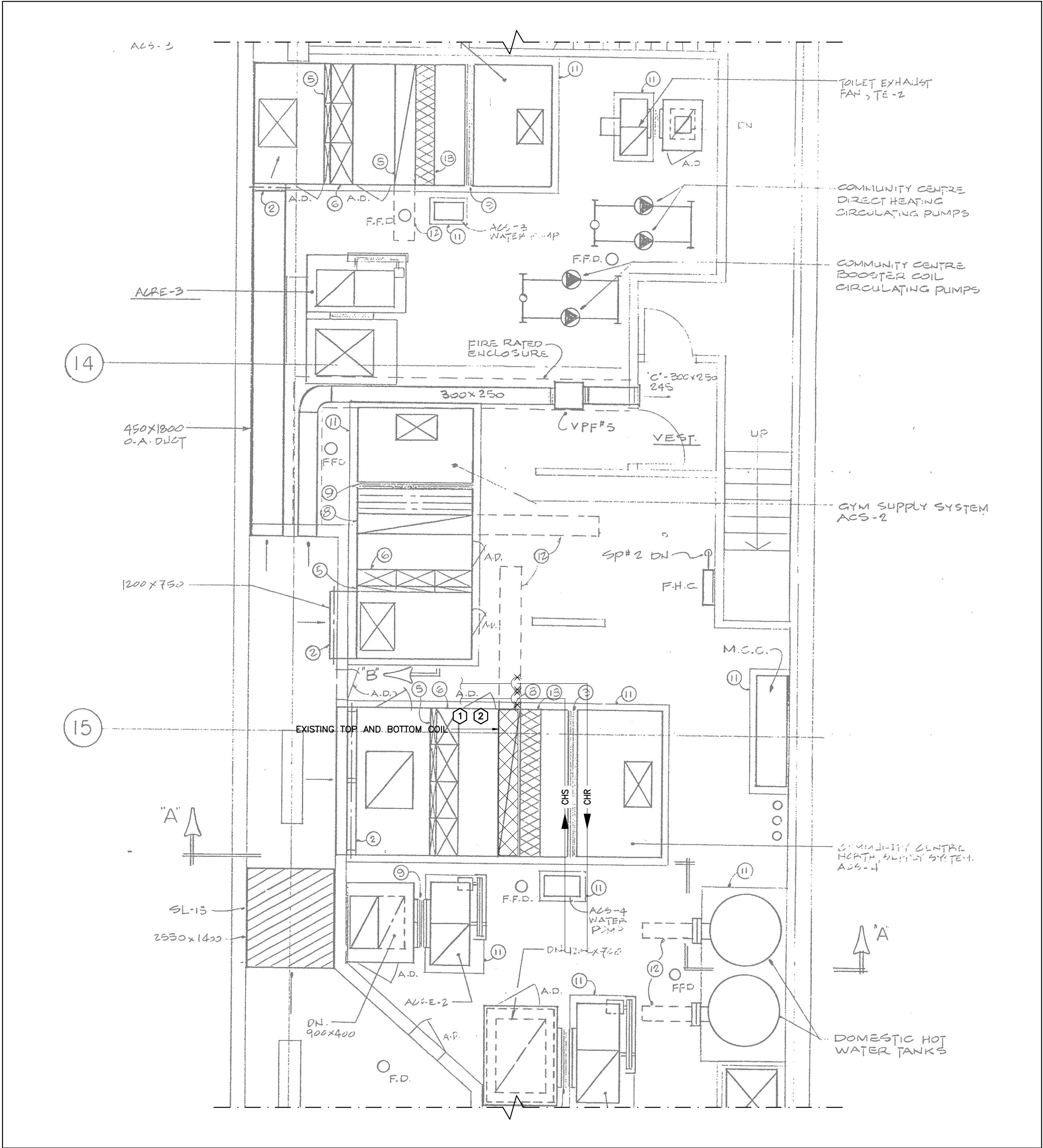
Project No.	Dwg.No. M4
Job No.	

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CODED MECHANICAL NOTES

1. EXISTING CHILLED WATER SUPPLY AND RETURN TO BE REMOVED TO CEILING LEVEL.

2. EXISTING TOP COIL AND BOTTOM COIL FOR ACS-4 TO BE REPLACED AS SHOWN ON PLAN AND SCHEDULE.



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GYM MECHANICAL ROOM DEMO

Design:	AN
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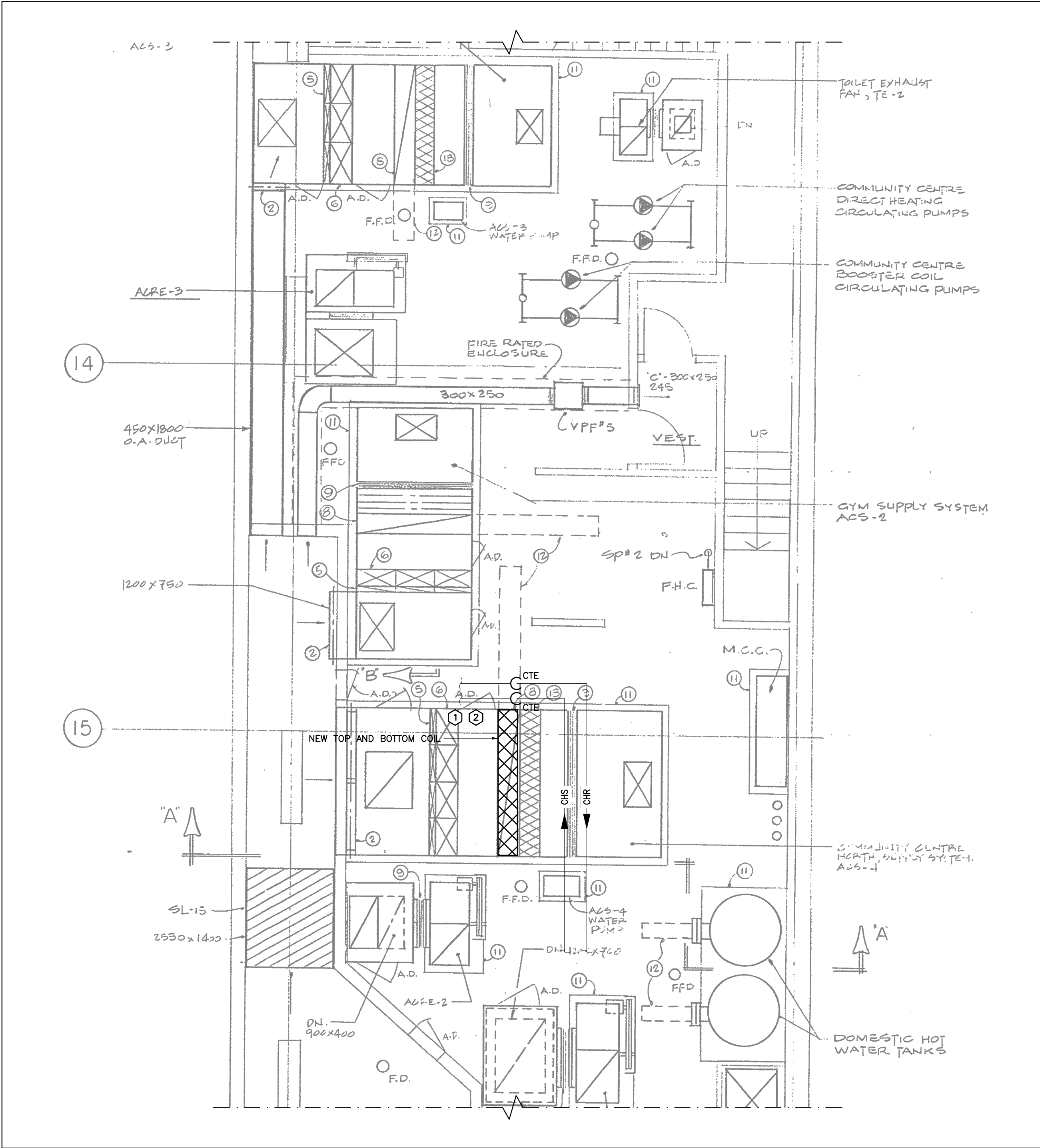
Project No.	Dwg.No.
Job No.	M5



CODED MECHANICAL NOTES

1. SUPPLY AND INSTALL NEW CHILLED WATER SUPPLY AND RETURN WITH VALVE AND PRESSURE GAUGE.

2. SUPPLY AND INSTALL NEW TOP AND BOTTOM COIL FOR ACS-4 AS SHOWN ON PLAN AND SCHEDULE.



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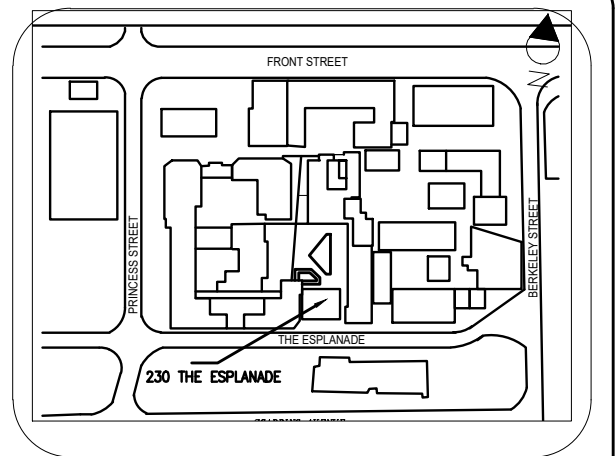
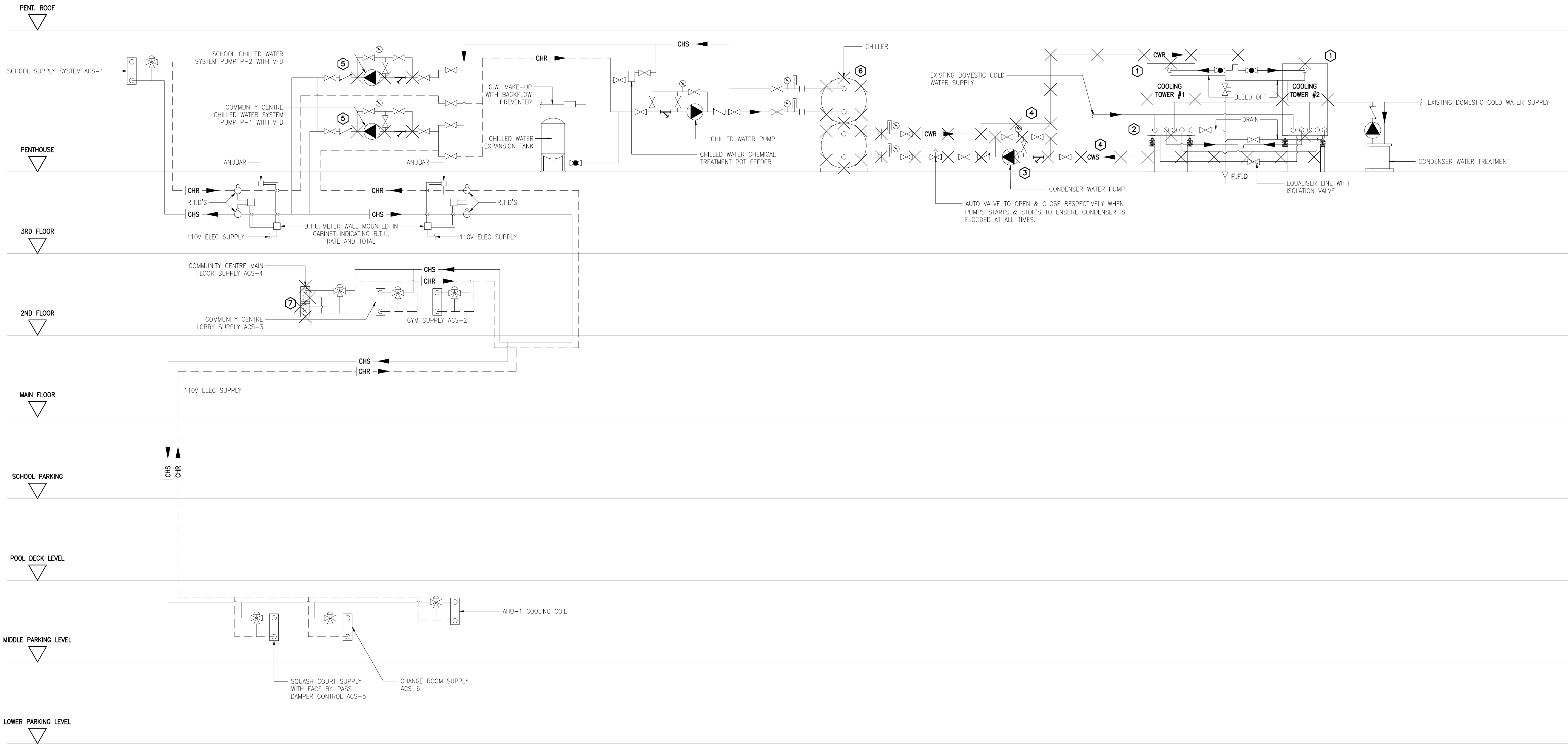
GYM MECHANICAL ROOM RENO

Design: AN
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Approv.: BZ
Scale: AS SHOWN
Date: February 26, 25

Project No.	Dwg.No.
Job No.	M6

CODED MECHANICAL DEMO NOTES

- EXISTING COOLING TOWER 1 CT-1 AND COOLING TOWER 2 CT-2 TO BE DISASSEMBLED TO PIECES AND REMOVED.
- DISCONNECT AND REMOVE ALL ASSOCIATED OUTDOOR PIPING.
- EXISTING CONDENSER WATER PUMP TO BE REMOVED AND REPLACED.
- EXISTING CONDENSER WATER SUPPLY AND RETURN TO BE REMOVED.
- EXISTING COMMUNITY CENTRE CHILLED WATER PUMPS P-1 AND SCHOOL CHILLED WATER PUMP P-2 C/W VFD TO BE REMOVED AND REINSTALLED AFTER CHILLER INSTALLATION.
- EXISTING CHILLER TO BE DISASSEMBLED TO PIECES AND REMOVED AND REPLACED. DISCONNECT EXISTING CONTROLS AND RECONNECT TO NEW UNIT.
- EXISTING TOP COIL AND BOTTOM COIL FOR ACS-4 TO BE REMOVED AND REPLACED WITH NEW.



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JOB NO. 24111

TABCON
CONSULTING INC.

494 McNicoll Avenue, Suite # 201
Toronto, Ontario, M2H 2E1
Tel. : (647) 974-7006
Web Site : www.tabcon.com

Project Name :
ST. LAWRENCE CRC & DAYCARE

Project Address :
**230 THE ESPLANADE
TORONTO, ON**

Job Descript. :
**ROOFING & CHILLER REPLACEMENT
COOLING TOWER AND CHILLER
SCHEMATIC DEMO**

Design:	AN
DRAWN:	AN
Approv.:	BZ
Scale:	AS SHOWN
Date:	February 26, 25

Project No.	Dwg.No.
Job No.	M7

- CODED MECHANICAL NOTES
1.

SUPPLY AND INSTALL NEW COOLING TOWER CT-1 AND CT-2 C/W NEW SPRING MOUNTED ISOLATORS. CONNECT TO EXISTING BAS SYSTEM, EXACT LOCATION VERIFY ON SITE.
2.

SUPPLY AND INSTALL NEW 25# HEAT TRACED MAKE-UP DCW PIPE TO COOLING TOWER.
3.

SUPPLY AND INSTALL NEW CONDENSER WATER SUPPLY AND RETURN AS SHOWN ON PLAN.
4.

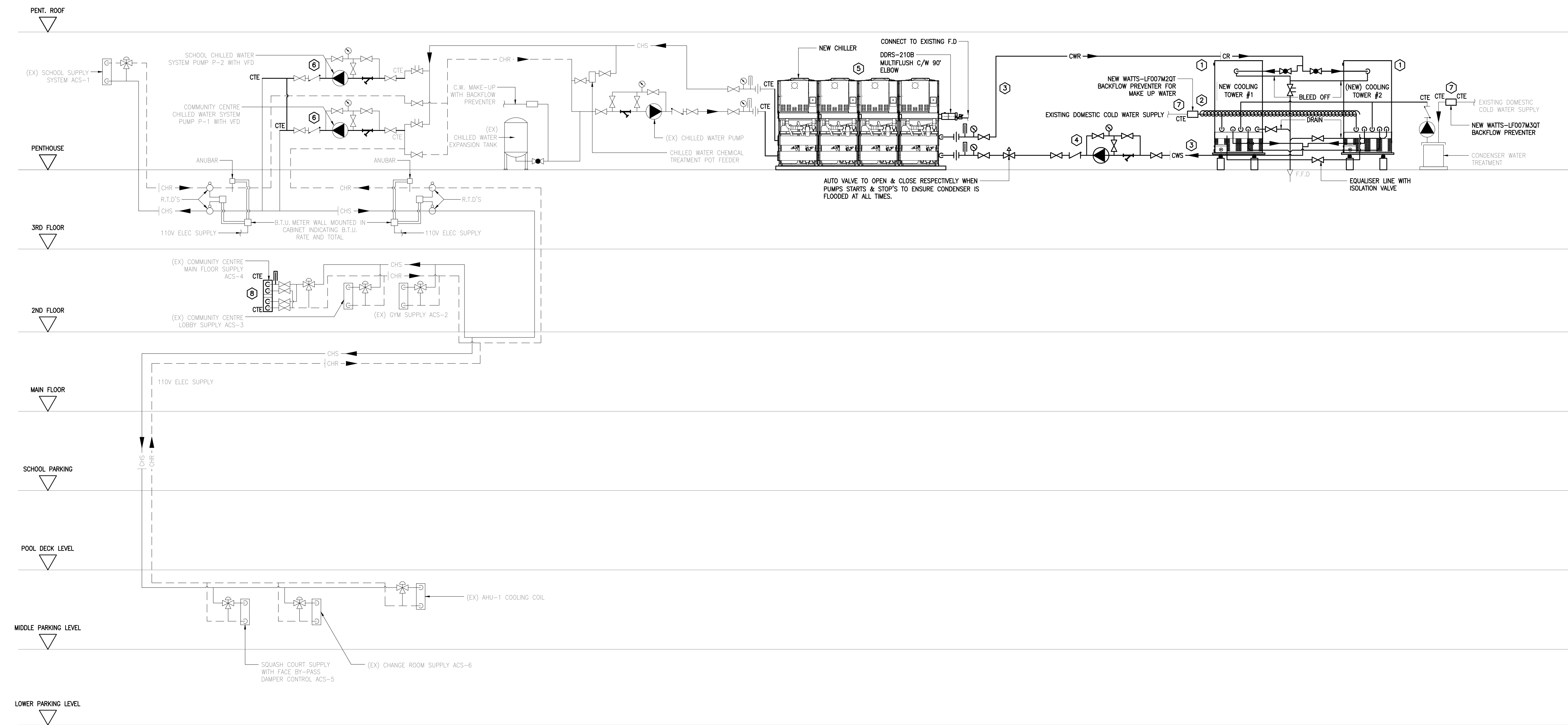
SUPPLY AND INSTALL NEW CONDENSER WATER PUMP.
5.

SUPPLY AND INSTALL NEW CHILLER AND RECONNECT TO EXISTING CONTROL AS SHOWN ON PLAN AND DRAWING.
6.

REINSTALL EXISTING PUMPS P-1 AND P-2 AND RECONNECT TO EXISTING CONTROL.
7.

SUPPLY AND INSTALL NEW BACKFLOW PREVENTER AS SHOWN ON PLAN.
8.

SUPPLY AND INSTALL NEW TOP AND BOTTOM COIL FOR ACS-4.



KEY PLAN

5

4

3

ISSUED FOR TENDER/PERMIT

26 FEB 25

2

ISSUED FOR 100%

04 FEB 25

1

ISSUED FOR REVIEW

14 JAN 25

NO.

REVISION

DATE

NOTE:

CONTRACTOR MUST CHECK AND VERIFY ALL DIMENSIONS AND BE RESPONSIBLE FOR SAME, REPORTING ANY DISCREPANCIES TO THE OWNER, BEFORE TENDER CLOSING.

LATEST APPROVED DRAWINGS ONLY TO BE USED FOR CONSTRUCTION.

PRINTS ARE NOT TO BE SCALED.

Toronto

PARKS & RECREATION

CAPITAL PROJECTS

METRO HALL

55 JOHN STREET, 24th FLOOR

TORONTO, ONTARIO, M5V 3C6

THOMAS A. FEKETE LIMITED

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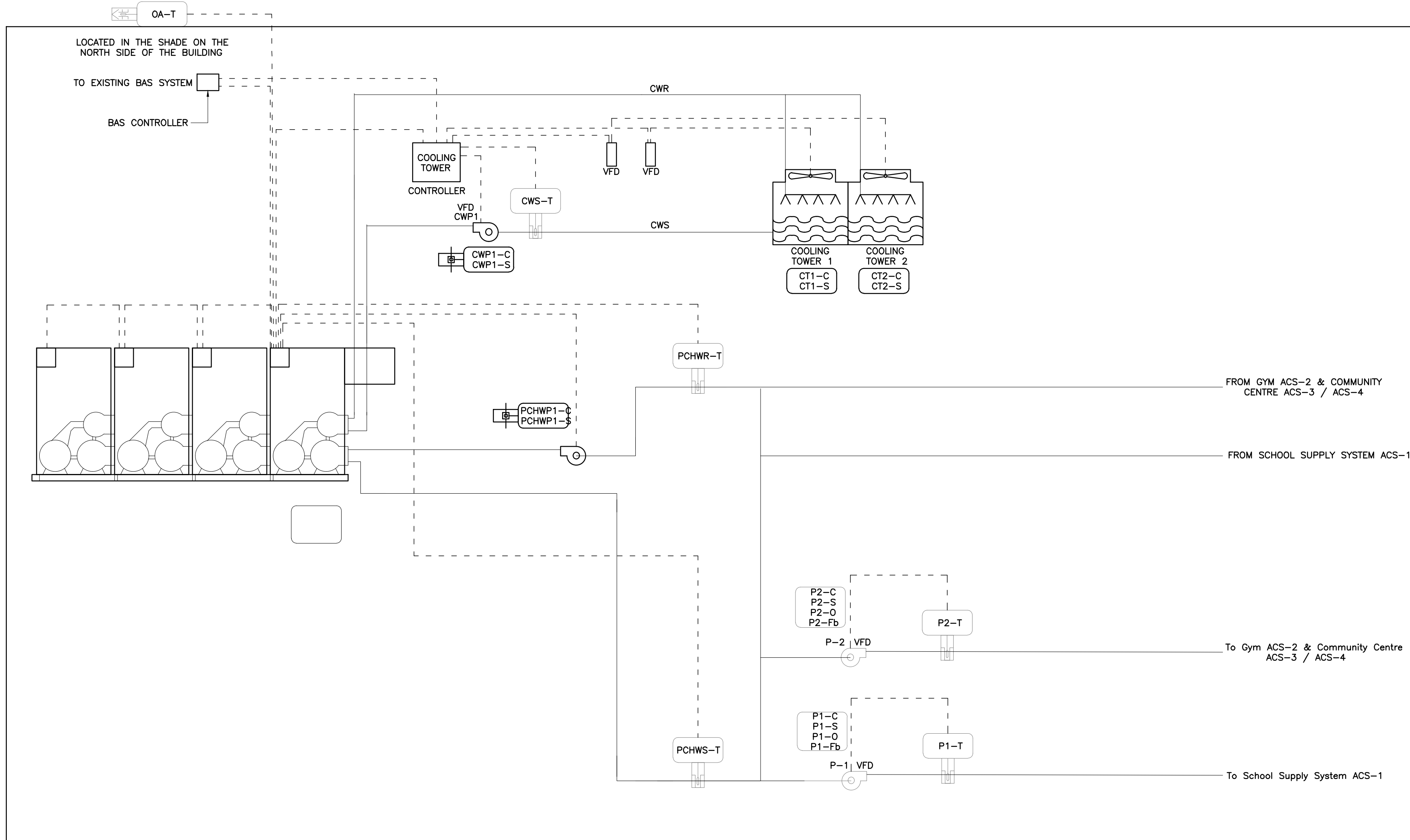
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Dwg.No.

M8



CONTROL SEQUENCE

SYSTEM ENABLE:

THE COOLING SYSTEM WILL AUTOMATICALLY START WHEN THE OUTSIDE AIR TEMPERATURE (OA-T) RISES ABOVE THE SYSTEM ENABLE SETPOINT (CLGOATLOCKOUT-SP) WHILE THE SYSTEM ENABLE (SYSTEM-EN) IS "ON". WHEN THE OUTSIDE AIR TEMPERATURE (OA-T) FALLS BELOW THIS SETPOINT (CLGOATLOCKOUT-SP) OR THE SYSTEM ENABLE (SYSTEM-EN) IS "OFF", THE COOLING SYSTEM WILL BE DISABLED.

CHILLER CONTROL:

THIS SYSTEM CONSISTS OF FOUR MODULAR CHILLERS. ONE MASTER CHILLER SHALL CONTROL OTHER THREE MODULAR CHILLERS WHEN LOW WATER TEMPERATURE IS REQUIRED. EACH CHILLER SHALL BE CONTROLLED VIA ITS OWN INTERNAL CONTROLS TO MAINTAIN A CHILLED WATER SUPPLY TEMPERATURE SETPOINT. BAS SHALL RESET THE SETPOINT BASED ON OUTSIDE AIR TEMPERATURE.

CHILLED WATER PUMP CONTROL:

WHEN ENABLED, THE PRIMARY PUMP (PCHWP1-C) WILL BE STARTED. IF THE PUMP STATUS (PCHWP1-S) DOES NOT MATCH THE COMMAND (PCHWP1-C), AN ALARM WILL BE GENERATED AND THE CHILLER WILL BE STOPPED. THE PUMP (PCHWP1-C) WILL AUTOMATICALLY RESTART ON LOSS OF STATUS (PCHWP1-S), AFTER THE RETRY ATTEMPTS HAVE BEEN EXCEEDED THE PUMP WILL BE LOCKED OUT UNTIL THE SYSTEM RESET (SYS-RESET) IS ACTIVATED. AFTER THE CHILLER IS COMMANDED OFF, THE PUMP (PCHWP1-C) WILL CONTINUE TO RUN FOR A SHORT TIME TO ALLOW THE EQUIPMENT TO COAST DOWN.

CONDENSER WATER PUMP CONTROL:

WHEN ENABLED, THE PUMP (CWP1-C) ASSOCIATED WITH THE CHILLER WILL BE STARTED. IF THE PUMP STATUS (CWP1-S) DOES NOT MATCH THE COMMAND (CWP1-C), AN ALARM WILL BE GENERATED AND THE CHILLER WILL BE STOPPED. THE PUMP (CWP1-C) WILL AUTOMATICALLY RESTART ON LOSS OF STATUS (CWP1-S), AFTER THE RETRY ATTEMPTS HAVE BEEN EXCEEDED THE PUMP WILL BE LOCKED OUT UNTIL THE SYSTEM RESET (SYS-RESET) IS ACTIVATED. AFTER THE CHILLER IS COMMANDED OFF, THE PUMP (CWP1-C) WILL CONTINUE TO RUN FOR A SHORT TIME TO DISSIPATE THE HEAT.

CONDENSER WATER SYSTEM:

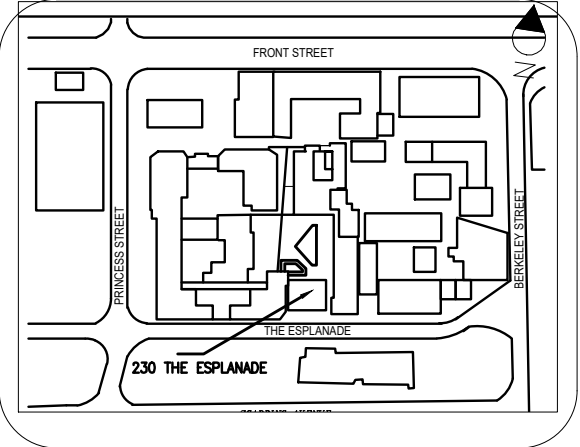
THIS SYSTEM CONSISTS OF TWO SINGLE SPEED (CTX-C) COOLING TOWERS. THE COOLING TOWERS WILL BE STAGED ON AND OFF TO MAINTAIN A CONDENSER SUPPLY WATER TEMPERATURE SETPOINT (CW-SP). WHEN AN ADDITIONAL COOLING TOWER (CTX-C) IS REQUIRED, THE TOWER (CTX-C) WITH THE LOWEST RUNTIME TOTAL SHALL BE ENABLED TO RUN. IF THE TOWER FAN STATUS (CTX-S) DOES NOT MATCH THE COMMAND (CTX-C), AN ALARM WILL BE GENERATED AND THE TOWER FAN WILL BE STOPPED. THE TOWER FAN (CTX-C) WILL AUTOMATICALLY RESTART ON LOSS OF STATUS (CTX-S), AFTER THE RETRY ATTEMPTS HAVE BEEN EXCEEDED THE TOWER FAN WILL BE LOCKED OUT UNTIL THE SYSTEM RESET (SYS-RESET) IS ACTIVATED.

ZONE LOOP CONTROL:

EACH OF THE ZONE CONTROL LOOPS WILL START A PUMP (PX-C) AS THE ZONE BECOMES OCCUPIED. IF THE PUMP STATUS (PX-S) DOES NOT MATCH THE COMMAND (PX-C), AN ALARM WILL BE GENERATED AND THE PUMP WILL BE STOPPED. UPON LOSS OF STATUS (PX-S), THE PUMP (PX-C) WILL RESTART AFTER THE SYSTEM RESET (SYS-RESET) IS ACTIVATED.

ADDITIONAL POINTS MONITORED BY THE FMS:

- CHILLER N STATUS (CHN-S)
- ZONE SUPPLY WATER TEMPERATURE (PX-T)



KEY PLAN

5		
4		
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2	ISSUED FOR 100%	04 FEB 25
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NO.	REVISION	DATE
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ROOFING & CHILLER REPLACEMENT

CONTROL SEQUENCE DIAGRAM

Design:	AN
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COOLING TOWER SCHEDULE(NEW)

TAG	LOCATION	MAKE	MODEL	FLUID TEMP (°F)			COOLING CAPACITY MBH	FLOW (GPM)	FAN AIR FLOW (CFM)	FAN MOTOR (HP)	ELECTRICAL	FLA	OPERATING WEIGHT (LBS)	DIMENSIONS	REMARK
				ENTERING	LEAVING	(WET)									
CT1, CT2	ROOF	EVAPCO	LSTE-4512	96.1	505.1	76	4830	483	26,000	15	575/3/60	14.4	4740	4'- 8⁄8" x 11'-11 1⁄2" x 10'-10 1⁄8"	1. C/W NEW STEEL SUPPORTS, SPRING MOUNTED ISOLATORS, LADDER/SAFETY CAGE, 304 STAINLESS STEEL BASIN. 2. CONNECT TO EXISTING BAS SYSTEM

NOTES:
1) HEATING CONTROLS BY MECHANICAL CONTRACTOR, HEATING STEP-DOWN TRANSFORMER BY ELECTRICAL.
2) INTERLOCK IMMERSION HEATER WITH SPRAY PUMP. HEATER ARE ONLY TO BE ON WHEN THE UNIT IS OFF.
3) OR APPROVED EQUIVALENT.

CHILLER SCHEDULE(NEW)

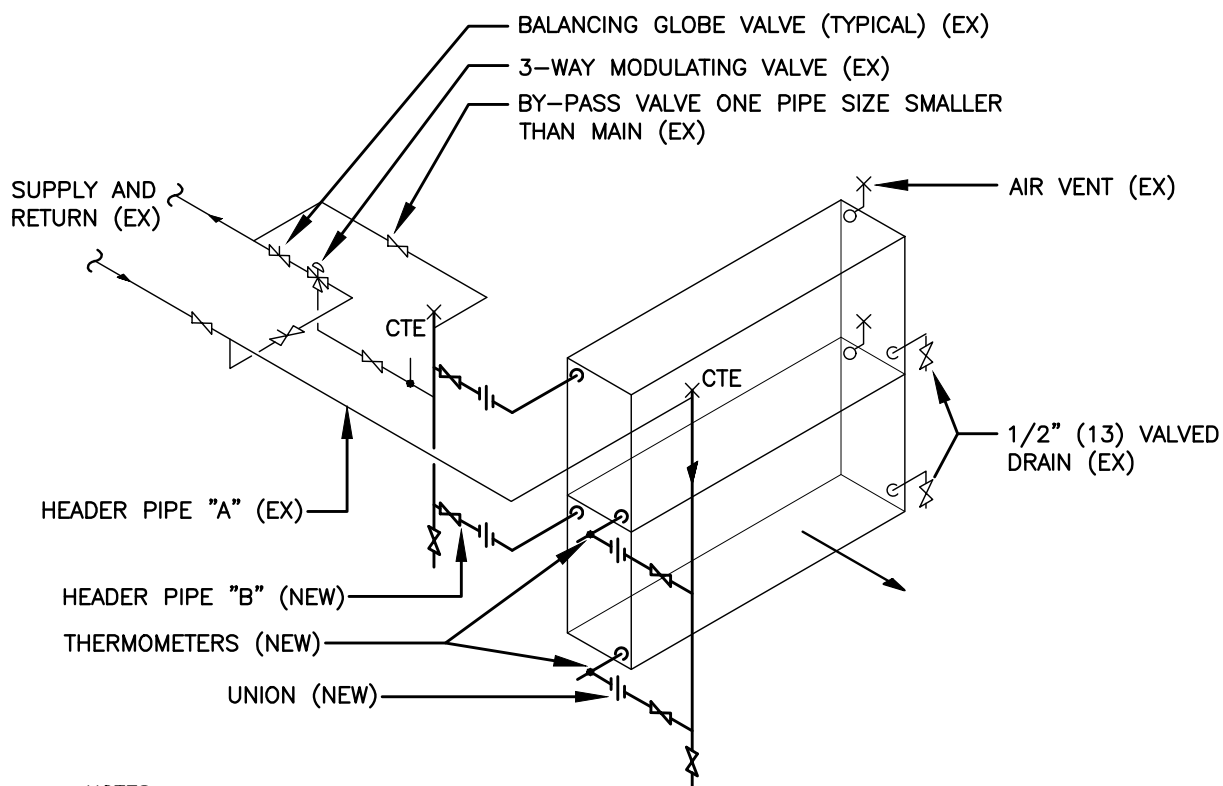
UNIT REF.	MANUFACTURER MODEL No.	CAPACITY	EVAPORATOR				CONDENSER				POWER	MCA	MOP	WEIGHT (LBS)	DIMENSIONS (WxDxH)	REFRIGERANT	REMARK
		TONS	FLOW RATE(GPM)	ENTERING (TEMP.:°F)	ENERING (WET)	ΔP(FT H2O)	FLOW RATE(GPM)	ENTERING (TEMP.:°F)	LEAVING (TEMP.:°F)	ΔP(FT H2O)							
CH-1 (NEW)	MULTISTACK (4) MSS08SKCCA	332.9	798.5	54	44	15.55	964.3	86	96	17.76	575/3/60	314	400	10,500	144"x61"x80"	R454B	1. CONNECT TO EXISTING BAS SYSTEM 2. OR APPROVED EQUIVALENT.

COOLING COIL SCHEDULE

UNIT REF.	MANUFACTURER MODEL No.	L/S	COIL SIZE (M²)	N.T.L. (MM)	TUBE FACE	SERIES	TUBE FACE	ROWS	TYPE	AIR P.D. KPA	ENT AIR °C		LEAV AIR °C		REMARK
											D.B	W.B	D.B	W.B	
ACS-4	AEROFIN	5899	2.23	2134	30	80	30	6	C	0.25	25.9	18.6	11.7	10.6	1. CONNECT TO EXISTING BAS SYSTEM 2. OR APPROVED EQUIVALENT.

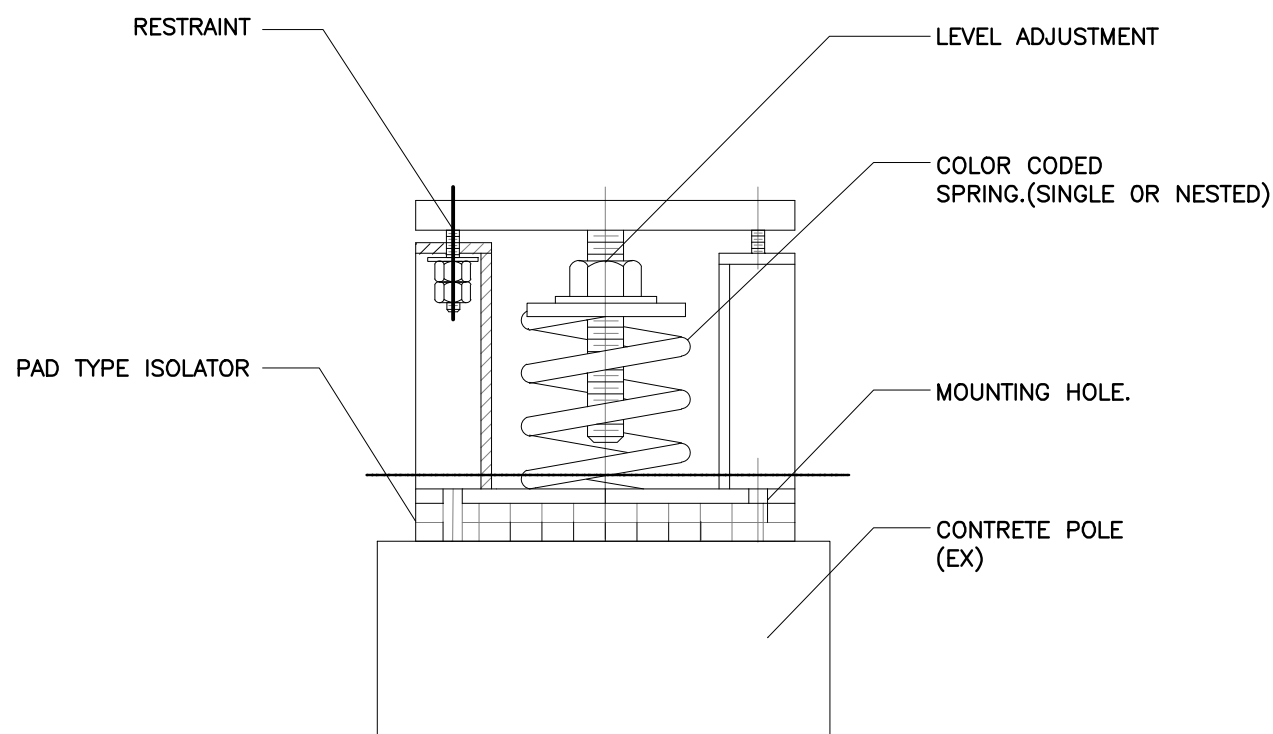
PUMP SCHEDULE

UNIT REF.	MANUFACTURER MODEL No.	USGPM	HD.KPA	RPM	BHP	ELECTRICAL	REMARK
COND. WATER PUMP	ARMSTRONG 4300 0813-020.0	960	164.5	1133	-	575/3/60	1. C/W VFD 2. WIRED TO NEW CHILLER 3. OR APPROVED EQUIVALENT.

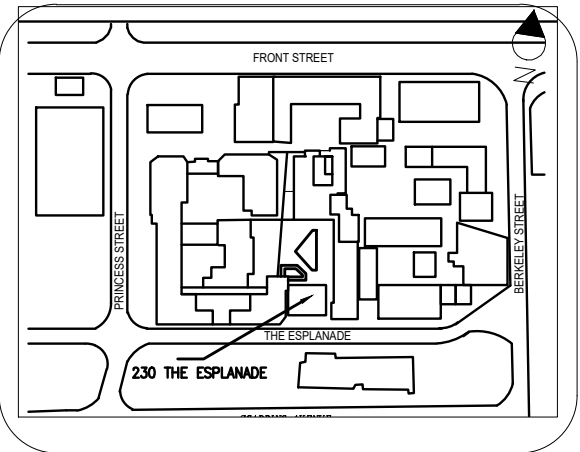
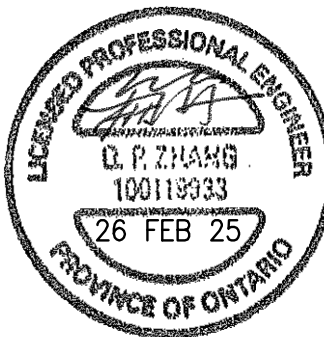


- NOTES:
- PIPE "A" & "B" SIZES TO MATCH EXISTING.
 - LOCATE PIPING UNIONS TO ENSURE THAT COIL CAN BE REMOVED WITHOUT DISTURBING BRANCH PIPING.
 - FOR NUMBER OF COILS IN EACH BANK SEE EQUIPMENT SCHEDULE.

1 DETAIL OF COOLING COIL PIPING CONNECTIONS
SCALE : N.T.S.



2 SPRING MOUNTED ISOLATION DETAIL
SCALE : N.T.S.



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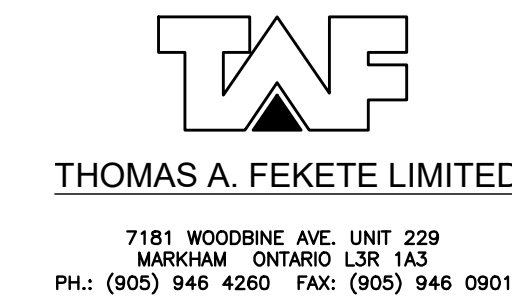
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Project Name :
ST. LAWRENCE CRC & DAYCARE

Project Address :
**230 THE ESPLANADE
TORONTO, ON**

Job Descript. :
**ROOFING & CHILLER REPLACEMENT
MECHANICAL DETAILS AND
SCHEDULE**

Design:	AN
DRAWN:	AN
Approv.:	BZ
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Project No.	Dwg.No.
Job No.	M11

ELECTRICAL LEGEND	
POWER	
	SINGLE PHASE DIRECT CONNECTION OUTLET. (HARDWIRE DIRECT CONNECTION TO EQUIPMENT TERMINALS).
	THREE PHASE DIRECT CONNECTION OUTLET. (HARDWIRE DIRECT CONNECTION TO EQUIPMENT TERMINALS).
	DISCONNECT SWITCH
	MAGNETIC STARTER
	MANUAL SWITCH, 120V SINGLE POLE.
	DUPLEX RECEPTACLE. (20A,1P, 120V UNLESS OTHERWISE NOTED).
	'GFI' DENOTES GROUND FAULT CIRCUIT INTERRUPTER TYPE
	'WP' DENOTES WEATHER PROOF
FIRE ALARM SYSTEM	
	AIR DUCT TYPE SMOKE DETECTOR

16.1 GENERAL CONDITIONS			
a) PROVIDE ALL LABOR, MATERIAL, EQUIPMENT, ETC. REQUIRED TO COMPLETE ALL WORK SHOWN ON THE DRAWINGS OR HEREIN SPECIFIED. THE WORK SHALL BE IN ACCORDANCE WITH LATEST RULES AND REGULATIONS OF ALL AUTHORITIES HAVING LEGAL JURISDICTION OVER THE WORK. INCLUDE ANY SMALL ITEMS OF WORK NOT SPECIFICALLY CALLED FOR BUT REQUIRED TO COMPLETE THE INTENDED INSTALLATION.			
b) THE ENGINEER RESERVES THE RIGHT TO APPROVE THE QUALITY OF MATERIAL AND WORKMANSHIP, ALSO TO CALL FOR ANY TESTS WHICH ARE DEEMED NECESSARY DURING THE PROGRESS OF THE WORK AND A COMPLETE TEST OF EACH SYSTEM AT THE COMPLETION OF THE WORK. THE COST OF SUCH TESTS ARE NOT TO BE CONSIDERED AS EXTRAS.			
ALL ITEMS OR SPECIFICATIONS RELATED TO THE SERVICES INDICATED ON THE DRAWINGS SHALL APPLY TO THE PROJECT. THE BIDDING REQUIREMENTS AND GENERAL REQUIREMENTS (APPLICABLE SECTIONS) OF ARCHITECTURAL SPECIFICATIONS SHALL ALSO GOVERN THE WORK OF THIS DIVISION.			
16.2 SCOPE OF WORK			
WORK TO BE DONE SHALL INCLUDE FURNISHING OF LABOUR, MATERIALS AND EQUIPMENT REQUIRED FOR INSTALLATION, TESTING AND PUTTING INTO PROPER OPERATION FOR COMPLETE ELECTRICAL SYSTEMS AS SHOWN, AS SPECIFIED AND AS OTHERWISE REQUIRED.			
16.3 CODES, STANDARDS, PERMITS AND INSPECTION			
a) WORK TO MEET OR EXCEED THE MINIMUM STANDARDS OF THE FOLLOWING: <ul style="list-style-type: none">- CANADIAN ELECTRICAL CODE, CURRENT EDITION, PART 1, CSA STANDARDS AS ADOPTED AND AMENDED BY PROVINCIAL REGULATIONS AND ONTARIO BUILDING CODE.- ONTARIO ELECTRICAL SAFETY CODE, CURRENT EDITION AND ALL BULLETINS.- LOCAL ELECTRICAL SUPPLY UTILITY CODES AND REGULATIONS.- LOCAL ELECTRICAL SUPPLY UTILITY CODES AND REGULATIONS.- ALL ELECTRICAL WORK SHALL COMPLY WITH LANDLORD'S REQUIREMENTS AND BASE BUILDING STANDARD.			
b) THE ABOVE CODES AND ANY ADDITIONAL REQUIREMENTS OF THE LOCAL OR PROVINCIAL AUTHORITY SHALL FORM AN INTEGRAL PART OF THIS SPECIFICATION AS IF WRITTEN IN FULL.			
c) BE RESPONSIBLE TO APPLY FOR AND OBTAIN ALL PERMITS, INSPECTIONS, EQUIPMENT APPROVALS ETC. AS REQUIRED BY ALL AUTHORITIES HAVING JURISDICTION OVER THIS WORK AND PAY FOR SAME. THESE COSTS SHALL BE INCLUDED IN THE TENDER PRICE.			
d) DELIVER ALL PERMITS TO THE OWNER'S REPRESENTATIVE AS SOON AS THEY BECOME AVAILABLE.			
e) ARRANGE FOR INSPECTION OF ALL ELECTRICAL WORK BY THE ELECTRICAL SAFETY AUTHORITY INSPECTION DEPARTMENT. ON COMPLETION OF THE WORK, PRESENT, TO THE OWNER, THE FINAL UNCONDITIONAL CERTIFICATE OF APPROVAL.			
16.4 INSURANCE			
CONTRACTOR SHALL MAINTAIN SUCH INSURANCE TO FULLY PROTECT BOTH THE OWNER AND HIMSELF FROM ANY AND ALL CLAIMS UNDER THE WORKMANS COMPENSATION ACT AS WELL AS ALL INSURANCE AS NOTED WITHIN ARCHITECTURAL GENERAL CONDITIONS.			
16.5 CONTRACT DOCUMENT			
SPECIFICATIONS AND DRAWINGS ARE INTENDED TO COVER THE EQUIPMENT SPECIFIED. IT IS NOT THE INTENT TO DESCRIBE OR SHOW EVERY DETAIL, AND IT SHALL BE AGREED THAT THE CONTRACTOR PROVIDE ALL WORK AND MATERIAL REQUIRED FOR A COMPLETE AND WORKING SYSTEM ACCORDING TO THE REQUIREMENTS AND INTENT OF THE SPECIFICATIONS AND DRAWINGS.			
ANY DISCREPANCIES SHALL BE SUBMITTED TO THE CONSULTANT FOR HIS INSTRUCTIONS.			
DO NOT SCALE OR MEASURE DRAWINGS, BUT OBTAIN INFORMATION REGARDING ACCURATE DIMENSIONS BY SITE REQUIREMENTS.			
16.6 EXAMINATION OF SITE			
VISIT THE SITE OF THE PROJECT AND FAMILIARIZE YOURSELF WITH ALL CONDITIONS PERTAINING TO THE WORK PRIOR TO SUBMITTING TENDER. NO ALLOWANCE WILL BE MADE FOR OBVIOUS CONSIDERATIONS WHICH MAY BE OVERLOOKED. THIS INCLUDES THE EXISTING SERVICES ABOVE CEILING.			
REPORT ANY DEVATION OR DISCREPANCY AND/OR CONFLICTS TO THE CONSULTANT.			
SCHEDULE AND PERFORM ALL WORK TO MEET THE COMPLETION DATES AS SET OUT BY THE OWNER'S REPRESENTATIVE. COSTS OF ANY OVERTIME TO MEET THE SCHEDULE SHALL BE DEEMED TO BE INCLUDED IN THE TENDER PRICE.			
16.7 SHOP DRAWINGS			
SUBMIT PDF FILES OF MANUFACTURER'S SHOP DRAWINGS TO THE CONSULTANT FOR REVIEW. SUBMITTED SHOP DRAWINGS MUST INDICATE DETAILS OF CONSTRUCTION, DIMENSIONS, SCALE, CAPACITIES, WEIGHTS AND ELECTRICAL PERFORMANCE CHARACTERISTICS OF EQUIPMENT OR MATERIALS, AS WELL AS PROJECT NAME.			
REVIEW SUBMITTALS PRIOR TO SUBMISSION TO CONSULTANT. THIS REVIEW REPRESENTS THAT NECESSARY REQUIREMENTS HAVE BEEN DETERMINED AND VERIFIED, OR WILL BE, AND THAT EACH SUBMITTAL HAS BEEN CHECKED AND CO-ORDINATED WITH REQUIREMENTS OF THE WORK AND CONTRACT DOCUMENTS.			
NO EQUIPMENT SHALL BE DELIVERED TO THE JOB SITE UNLESS THE MANUFACTURER HAS RECEIVED A "REVIEWED" OR "REVIEWED AS NOTED" COPY OF THE PERTINENT SHOP DRAWING.			
REVIEW OF SHOP DRAWINGS BY THE CONSULTANT SHALL NOT ALLEVIATE THE ELECTRICAL CONTRACTOR FROM HIS CONTRACTUAL RESPONSIBILITY FOR ITS CORRECTNESS AND COMPLIANCE WITH THE CONTRACT DOCUMENTS, DIMENSIONS AND DESIGN DETAILS.			
16.8 AS BUILT DRAWINGS			
a. AT THE COMPLETION OF THE WORK, ONE ELECTRONIC COPY OF LATEST DRAWINGS IN AUTOCAD 2006 FORMAT WILL BE BY PROVIDED BY THE CONSULTANT TO THE ELECTRICAL CONTRACTOR, FOR THE PURPOSE OF PREPARING RECORD DRAWINGS.			
b. RECORD, AS THE JOB PROGRESSES, ALL APPROVED CHANGES AND DEVIATIONS MADE TO ANY WORK SHOWN ON THE ORIGINAL CONTRACT DRAWINGS WHETHER BY ADDENDA, REQUESTED CHANGES, JOB INSTRUCTIONS, AND CHANGES DUE TO JOB CONDITIONS.			
c. ALL MAIN BRANCH CONDUIT RUNS, JUNCTIONS BOX LOCATIONS, ETC., MUST BE REFLECTED ON THE AS-BUILT DRAWINGS.			
d. CLEARLY INDICATE 'AS-BUILT' IN THE TITLE BLOCK COLUMN OF THE DRAWINGS AS WELL AS THE ELECTRICAL CONTRACTOR'S NAME AND ADDRESS.			
e. SUBMIT A PRINT TO CONSULTANT FOR REVIEW. WHEN FOUND ACCEPTABLE BY THE CONSULTANT, SUBMIT FIVE (5) SETS OF PRINTS TOGETHER WITH THE CAD-DISK FOR PRESENTATION TO THE LANDLORD AND THE CLIENT.			

ABBREVIATIONS			
E	EXISTING TO REMAIN	WP	WEATHER PROOF
R	EXISTING TO BE REMOVED AND/OR RELOCATED	C	CONDUIT.
ER	EXISTING IN RELOCATED POSITION	EC	EMPTY CONDUIT.
R/R	REMOVE AND REINSTALL	C/W	COMPLETE WITH.
JB	JUNCTION BOX	CLG	CEILING.
AFf	ABOVE FINISHED FLOOR	SS	STAINLESS STEEL

DRAWING LIST	
E1	ELECTRICAL LEGEND AND SPECIFICATIONS
E2	MECHANICAL PENTHOUSE PLAN – ELECTRICAL DEMOLITION PLAN
E3	MECHANICAL PENTHOUSE PLAN – ELECTRICAL NEW POWER PLAN
E4	ELECTRICAL SINGLE LINE DIAGRAM

ELECTRICAL SPECIFICATIONS

16.9 OPERATION AND MAINTENANCE MANUAL

PROVIDE THREE (3) SETS OF OPERATION AND MAINTENANCE MANUALS SUBMITTED IN HARD COVER 3-RING BINDERS, INCLUDE THE FOLLOWING INFORMATION IN THE OPERATIONS AND MAINTENANCE MANUALS:

- NAME AND ADDRESS OF LOCAL SUPPLIERS FOR THE ITEMS INCLUDED
- TECHNICAL DATA AND DESCRIPTION OF ITEMS AND PARTS LISTED
- THE CONSULTANT'S REVIEWED SHOP DRAWINGS.
- CERTIFICATE(S) OF ACCEPTANCE FROM THE AUTHORITIES INSPECTION DEPARTMENT.
- WRITTEN GUARANTEE

16.10 TESTING

- a) PERFORM TEST ON EACH SYSTEM TO THE SATISFACTION OF THE CONSULTANT AND SUBMIT TEST RESULTS FOR APPROVAL PRIOR TO THE FINAL ACCEPTANCE OF THE WORK.
- PANELS SHALL BE BALANCED WITHIN 5% ACROSS PHASES
- GROUNDING SHALL BE AS REQUIRED BY ELECTRICAL SAFETY AUTHORITY CODE AND LOCAL UTILITY REQUIREMENTS.
- TEST ALL SYSTEM GROUNDING CONDUCTORS FOR "PHASE TO GROUND" LOADS, AMMETER SHALL READ LESS THAN ONE AMPERE.

16.11 PRECAUTIONS DURING CONSTRUCTION

- a) THIS PROJECT INCLUDES WORKS IN AREAS WITH SECURITY CONTROL MEASURES. PROVIDE SCHEDULE AND OBTAIN APPROVAL PRIOR TO COMMENCEMENT OF WORK IN THE EXISTING FACILITY. , ALSO OBTAIN INSTRUCTION FROM OWNER REGARDING WHAT TYPE OF WORK CAN BE DONE WITHIN NORMAL HOURS AND WHAT TYPE OF WORK HAVE TO BE DONE AFTER HOURS. TAKE ALL ABOVE MENTIONED RESTRICTIONS INTO CONSIDERATION WHEN SUBMITTING BID. NO ADDITIONAL COST SHALL BE ALLOWED TO COMPENSATE COST ASSOCIATED WITH THESE FACTORS.
- b) CARRY OUT WORK WITH A MINIMUM OF NOISE, DUST AND DISTURBANCE. PROVIDE DAILY CLEAN UP AND PROPER DISPOSAL OF DEBRIS GENERATED BY DAILY OPERATIONS. ON COMPLETION OF THE WORK, ALL TOOLS, SURPLUS MATERIALS AND WASTE MATERIAL SHALL BE REMOVED AND THE PREMISES LEFT IN A CLEAN AND PERFECT CONDITION.
- c) BE RESPONSIBLE AND PAY FOR ANY DAMAGE TO THE BASE BUILDING INCURRED BY WORK OF THIS DIVISION, OR REPAIR TO THE SATISFACTION OF CONSULTANT.

16.11 PRECAUTIONS FOR WORK IN EXISTING BUILDING.

- a) WHEN DELETING AND/OR MAKING SAFE EXISTING ELECTRICAL WORK, ENSURE THAT IT INCLUDES REMOVAL OF ALL DISCONNECTED WIRING BACK TO SOURCE.
- b) DISCONNECT AND REMOVE EXISTING LUMINAIRES, DEVICES WHICH ARE NOT TO BE REUSED. THESE ITEMS SHALL BE CATONED AND RETURN TO LANDLORD AT A PLACE DESIGNATED BY THE LANDLORD. REMOVE ALL REDUNDANT COMMUNICATIONS CABLE IN THE CONSTRUCTION AREA.
- c) ALL ELECTRICAL EQUIPMENT AND DEVICES WHICH ARE NO LONGER REQUIRED SHALL BE REMOVED AND DISPOSED OF, OFF SITE.
- d) WHERE EXISTING OUTLET BOXES ARE REMOVED FROM EXISTING UNDER FLOOR DUCTS, PLUG AND CAP EXISTING HOLES FLUSH WITH FLOOR USING APPROVED FITTING. REMOVE ALL REDUNDANT WIRE AND CABLE BACK TO SOURCE.

- e) ENSURE ALL EXISTING EQUIPMENT WHICH ARE TO BE REUSED IS THOROUGHLY INSPECTED AND REFURBISHED TO ENSURE PROPER OPERATION AND MEETS THE LOCAL ELECTRICAL SAFETY AUTHORITY'S REQUIREMENTS. CONDUIT OR OUTLET BOXES WHICH ARE CORRODED OR DAMAGED SHALL BE REPLACED.
- f) CARRY OUT WORK WITH A MINIMUM OF NOISE, DUST AND DISTURBANCE. PROVIDE DAILY CLEAN UP AND PROPER DISPOSAL OF DEBRIS GENERATED BY DAILY OPERATIONS. ON COMPLETION OF THE WORK, ALL TOOLS, SURPLUS MATERIALS AND WASTE MATERIAL SHALL BE REMOVED AND THE PREMISES LEFT IN A CLEAN AND PERFECT CONDITION.
- g) BE RESPONSIBLE AND PAY FOR ANY DAMAGE TO THE BASE BUILDING INCURRED BY WORK OF THIS DIVISION, OR REPAIR TO THE SATISFACTION OF CONSULTANT.

16.12 IDENTIFICATION

- a) PROVIDE LAMACOD IDENTIFICATION NAMEPLATES. THESE SHALL BE WHITE WITH BLACK ENGRAVED LETTERS AND SHALL BE INSTALLED WITH SCREWS ON ALL EQUIPMENT, NAMEPLATES SHALL BE 3MM (1/8") THICK WITH BEVELLED EDGES.
- b) INFORMATION REQUIRED TO BE SHOWN ON THE NAMEPLATE FOR VARIOUS EQUIPMENT ARE DESCRIBED BELOW:
 - DISCONNECTS, STARTERS AND CONTACTORS: INDICATE EQUIPMENT BEING CONTROLLED AND VOLTAGE, LOCATION, VOLTAGE AND RATING OF UPSTREAM BREAKER OR DISCONNECT SWITCH.
 - TERMINAL, CABINETS AND PULL BOXES: INDICATE SYSTEM AND VOLTAGE.
 - TRANSFORMERS: INDICATE CAPACITY, PRIMARY AND SECONDARY VOLTAGES.
 - UPSTREAM AND DOWNSTREAM DEVICE OR EQUIPMENT LOCATIONS & DESIGNATION.
 - UPS CABINET: INDICATE CAPACITY, INPUT AND OUTPUT VOLTAGE, UPSTREAM - AND DOWNSTREAM DEVICE/EQUIPMENT LOCATIONS & DESIGNATION.
 - PANELBOARDS: INDICATE MAIN LUG (MAIN BREAKER) SIZE; LOCATION, VOLTAGE AND RATING OF UPSTREAM BREAKER OR DISCONNECT SWITCH.

- c) EACH NEW PANEL SHALL HAVE TYPEWRITTEN DIRECTORY SHOWING LOADS CONNECTED TO EACH CIRCUIT. DIRECTORIES SHALL BE MOUNTED ON THE INSIDE OF THE PANEL DOOR IN A TRANSPARENT PLASTIC COVER.
- FOR EXISTING PANELS BEING MODIFIED, UPDATE THE EXISTING DIRECTORIES TO SUIT NEW WORK.

16.13 RESPONSIBILITY

- BE RESPONSIBLE FOR ELECTRICAL WORK UNTIL COMPLETION AND FINAL ACCEPTANCE, BY OWNER, FOR REPLACING ANY ITEM THAT MAY BE DEFECTIVE, DAMAGED, LOST OR STOLEN, WITHOUT ADDITIONAL COST TO THE OWNER OR DELAY TO THE COMPLETION OF THE PROJECT.

16.14 WARRANTY

- a) WARRANT ALL WORK AND APPARATUS INSTALLED, UNDER THIS CONTRACT, AGAINST ALL DEFECTS IN MATERIAL OR WORKMANSHIP FOR A PERIOD OF ONE YEAR AFTER FINAL ACCEPTANCE OF SAME BY THE OWNER.

- b) THESE GUARANTEE SHALL IN NO WAY SUPPLANT ANY OTHER GUARANTEES OF A LONGER PERIOD, BUT SHALL BE BINDING ON ALL OTHER WORK.

16.15 EQUIPMENT AND MATERIAL

- a) ALL EQUIPMENT AND MATERIAL, UNLESS SPECIFICALLY NOTED OTHERWISE, SHALL BE NEW AND FREE OF BLEMISH OR DEFECT. ALL MATERIAL AND EQUIPMENT SHALL BE OF THE TYPE SUBJECT TO FACTORY MUTUAL, UNDERWRITERS' LABORATORIES OF CANADA AND/OR CANADIAN STANDARDS ASSOCIATION INSPECTION AND APPROVAL AND SHALL BEAR UL/C OR CSA LABELS.

16.16 CUTTING AND PATCHING

- a) THE CONTRACTOR SHALL EMPLOY THE PARTICULAR TRADES TO DO ALL REQUIRED CUTTING AND PATCHING AND REPAIRING OF SURFACES FOR HIS WORK.
- b) SUPPORTING MEMBERS OF ANY FLOOR, WALL OR THE BUILDING STRUCTURE SHALL BE CUT ONLY IN SUCH A LOCATION AND MANNER AS DIRECTED BY THE CONSULTANT/OWNER.
- c) ALL HOLES AND SURFACES SHALL BE REPAIRED WITH THE TYPE OF MATERIAL REMOVED BY THE TRADESMEN EXPERT IN THE TYPE OF REPAIR REQUIRED.
- d) PROVIDE FIRE BARRIERS AROUND ALL COMPONENTS IN HOLES THAT PENETRATE FIRE SEPARATIONS. THE FIRE BARRIER MEDIUM PROVIDED SHALL MAKE THE FIRE SEPARATION EQUAL TO OR BETTER THAN THE ONE WHICH WAS CUT AWAY. ALL MATERIALS SHALL BE CSA APPROVED AND UL LISTED.

16.17 FLOOR CUTTING AND CORE DRILLING

- a) WHERE CORE DRILLING OR FLOOR CUTTING IS REQUIRED, THIS CONTRACTOR SHALL NOTIFY LAND LORD OF THE LOCATION AND OBTAIN ITS APPROVAL PRIOR TO COMMENCING. X-RAY FLOOR OR WALL AS REQUIRED BY LANDLORD.
- b) INCLUDE ALLOWANCE IN THE BID PRICE SHOULD CORE DRILLS ARE REQUIRED TO BE CARRIED OUT AFTER NORMAL HOURS.
- c) ANY DAMAGES AS A RESULT OF CORE DRILLING SHALL BE REPAIRED IMMEDIATELY AT NO COST TO LANDLORD OR CLIENT.

16.18 INTERRUPTION OF SERVICE

- a) CO-ORDINATE ALL REQUIRED POWER SHUTDOWNS TO ESSENTIAL SERVICES WITH THE FACILITIES STAFF. PROVIDE TWO-WEEK NOTICE TO LANDLORD AND TENANTS AFFECTED, AND OBTAIN THEIR APPROVAL BEFORE PROCEEDING WITH THE WORK THAT REQUIRES SHUTDOWN.
- b) SUPPLY ALL NECESSARY LABOUR AND MATERIALS REQUIRED TO INTEGRATE THE NEW SYSTEMS INTO THE EXISTING ONE AND TO FACILITATE THE VARIOUS TRANSITION STAGES. PROVIDE A SCHEDULE TO IMPLEMENT THE TRANSITION STRATEGY.
- c) THE BID SUBMITTED SHALL INCLUDE ALL ALLOWANCES FOR TIME SPENDED ON COORDINATION OF INTERRUPTION.

16.19 PRICING FOR CHANGES

- a) PROVIDE DETAILED BREAKDOWN FOR MATERIAL, LABOUR REQUIRED. ALL CHANGES SHOULD BE CALCULATED BASED ON THE LATEST ISSUE OF NATIONAL ELECTRICAL CONTRACTORS ASSOCIATION (NECA) MANUAL, COLUMN ONE FOR THE DURATIONS OF THIS CONTRACT.
 - b) THE HOURLY LABOUR RATE SHALL INCLUDE ALL CHARGES FOR SUPERVISION, VARIABLE LABOUR FACTORS, HAND TOOLS, STORAGE, RENTALS, ADDITIONAL BONDING, PARKING, CLEAN-UP, AS-BUILT DRAWINGS, FREIGHT AND DELIVERY, BUT EXCLUSIVE OF OVERHEAD AND PROFIT.
- 16.20 SYSTEM START-UP
- a) INSTRUCT OWNER AND OPERATING PERSONNEL IN THE OPERATION, CARE AND MAINTENANCE OF SYSTEMS, SYSTEM EQUIPMENT AND COMPONENTS.
 - b) ARRANGE AND PAY FOR SERVICES OF MANUFACTURER'S FACTORY SERVICE ENGINEER TO SUPERVISE START-UP OF INSTALLATION, CHECK, ADJUST, BALANCE AND CALIBRATE COMPONENTS AND INSTRUCT OPERATING PERSONNEL.
 - c) PROVIDE THESE SERVICES FOR SUCH PERIOD, AND FOR AS MANY VISITS AS NECESSARY TO PUT EQUIPMENT IN OPERATION, AND TO ENSURE THAT OPERATING PERSONNEL ARE CONVERSANT WITH ALL ASPECTS OF ITS CARE AND OPERATION.

16.21 GROUNDING

- PROVIDE GROUNDING FOR EQUIPMENT TO THE LATST VERSION OF ELECTRICAL SAFETY CODE AND INSPECTION AUTHORITIES. PROVIDE SEPARATE GREEN INSULATED GROUND CONDUCTOR IN EVERY CONDUIT TO ALL EQUIPMENT/DEVICES

16.22 TEMPORARY SERVICES

- a) IN ALL CASES, ALL TEMPORARY ELECTRICAL SERVICES, AS REQUIRED, SHALL BE PART OF THIS WORK.
- b) PROVIDE TEMPORARY GENERAL LIGHTING THROUGHOUT CONSTRUCTION SITE. REUSE EXISTING LUMINAIRES AT SUITABLE CENTRES TO CONFORM TO CONSTRUCTION STANDARDS AND ALL AUTHORITIES HAVING JURISDICTION.
- c) PROVIDE TEMPORARY GENERAL POWER SUPPLIES WITH RECEPTACLES FOR ALL TRADES AS DIRECTED BY THE GENERAL CONTRACTOR.
- d) MAINTAIN THE TEMPORARY FACILITIES IN GOOD REPAIR AND SAFE WORKING ORDER THROUGHOUT THE DURATION OF THE PROJECT.
- e) AT THE END OF THE PROJECT, REMOVE THE ABOVE NOTED TEMPORARY SYSTEM.

16.23 SUPPORTS AND RASIS AND HANGERS

- a) HANGERS FOR ELECTRICAL CONDUITS SHALL BE GALVANIZED AFTER FABRICATION. DO NOT USE FORGATED STRAPPINGS (GRABBER BARS) TO HANG CONDUITS.

- b) PROVIDE INDEPENDENT SUPPORTS FOR NEW EQUIPMENT, DEVICES AND CONDUITS. DO NOT USE SUPPORTS OR EQUIPMENT INSTALLED FOR OTHER TRADES FOR CONDUIT OR CABLE SUPPORT EXCEPT WITH PERMISSION OF OTHER TRADE AND APPROVAL OF CONSULTANT

16.24 CONDUIT AND FITTINGS

- a) CONDUIT SIZES SHALL AS INDICATED ON DRAWINGS AND SHALL NOT BE REDUCED WITHOUT AUTHORIZATION, CONDUITS IN FINISHED AREAS SHALL BE CONCEALED. ALL SURFACE CONDUITS.

- b) EMT TO BE USED FOR GENERAL APPLICATION UNLESS NOTED OTHERWISE, PROVIDED THAT IT IS NOT SUSCEPTIBLE TO MECHANICAL INJURY. PROVIDE RIGID GALVANIZED CONDUIT IN UNFINISHED AREAS WHERE CONDUIT IS SUSCEPTIBLE TO MECHANICAL INJURY. PROVIDE RIGID PVC CONDUIT IN UNDERGROUND (TRENCH) APPLICATIONS AND WHERE EMBEDDED IN CONCRETE.

- c) CONDUITS SHALL BE INSTALLED AT A MINIMUM OF 6" (152mm) FROM UNINSULATED HEATING PIPES AND CONDUITS CARRYING DATA CABLES.

- d) CLEAN INTERIOR OF ALL CONDUITS TO REMOVE ALL DEBRIS AND WATER AND REMOVE ANY BURRS PRIOR TO PULLING WIRES.
- e) PROVIDE SEPARATE INSULATED GROUND CONDUCTOR IN ALL CONDUITS, REGARDLESS OF TYPE.
- f) FIRESTOPPING IS REQUIRED WHERE HOLES ARE DRILLED THROUGH FLOORS OR WALLS. HOLES SHALL BE PACKED AROUND CONDUIT (OR RACEWAY) WITH AN APPROVED CAULKING COMPOUND. ("CIRAFIBRE 2300" OR "FLAMESEAL" PUTTY) OR EQUIVALENT.
- g) PROVIDE FLEXIBLE METAL CONDUIT FOR CONNECTIONS TO MOTORS, UPS UNITS AND TRANSFORMERS.
- h) MINIMUM CONDUIT SIZE SHALL BE 1/2" (13mm) UNLESS NOTED OTHERWISE.
- i) CONDUITS, ARMoured CABLES AND OTHER RACEWAYS SHALL BE SUPPORTED INDEPENDENTLY OF ANY SUSPENDED CEILING.
- j) DO NOT USE ALUMINUM CONDUIT.
- k) PROVIDE LIQUID-TIGHT FLEXIBLE METAL CONDUIT UNDER RAISED FLOOR AREA IN LAN ROOM.

16.25 PULL & JUNCTION BOXES

- a) BOXES SHALL BE CODE GAUGE AND SIZED TO MEET ELECTRICAL CODE REQUIREMENTS. SHEET STEEL BOXES FOR CONCEALED WORK AND CAST BOXES FOR EXPOSED WORK. "THROUGHWALL" AND "UTILITY" TYPE BOXES SHALL NOT BE USED.
- b) PROVIDE BARRIERS IN BOXES WHERE DIFFERENT VOLTAGES ARE USED.
- c) PROVIDE PULL BOXES ON CONDUIT RUNS AT 50ft (15.25m) INTERVALS.
- d) BOXES SHALL BE SUPPORTED INDEPENDANTLY OF CONDUIT.
- e) IDENTIFY ALL ELECTRICAL BOXES OF DIFFERENT SYSTEMS WITH A DIFFERENT COLOUR, THIS SHALL BE ACHIEVED WITH SPRAY PAINT CANS. COLOURS SHALL MATCH BASE BUILDING STANDARD.

16.26 INSTALLATION OF OUTLETS

THE DRAWINGS SHOW APPROXIMATE LOCATION OF OUTLETS ONLY. THE EXACT LOCATION SHALL BE COORDINATED ON SITE WITH OTHER TRADES. OUTLETS LOCATED INACCUATELY SHALL BE READJUSTED OR RELOCATED AT THE CONTRACTORS EXPENSE PROVIDED THAT THE DISTANCE DOES NOT EXCEED 3m (10'-0"). UNLESS OTHERWISE NOTED, RECEPTACLES SHALL BE MOUNTED AT 15.75" (400mm) AFF TO CENTER LINE.

16.27 INSTALLATION OF PLYWOOD BACKBOARDS

PROVIDE 19mm (3/4") THICK, FIRE RETARDANT PLYWOOD BACKBOARDS AS REQUIRED FOR ALL WALL MOUNTED ELECTRICAL EQUIPMENT/DEVICE OF THIS DIVISION.

16.28 WIRE AND CABLE

- a) UNLESS OTHERWISE NOTED, ALL WIRES SHALL BE COPPER RW90 RATING AS REQUIRED ON SITE AND AS DICTATED BY ELECTRICAL SAFETY AUTHORITY CODE. ALUMINUM WIRE SHALL NOT BE USED.
- b) THE MINIMUM PERMISSIBLE SIZE FOR BRANCH CIRCUIT WIRING SHALL BE #12 AWG.
- c) WIRE #10 AWG AND SMALLER SHALL BE SOLID COPPER, #8 AWG AND LARGER SHALL BE COPPER STRANDED.
- d) ALL WIRING SHALL BE COLOUR CODED AND SHALL BE IDENTIFIED SHOWING SIZE, VOLTAGE RATING AND INSULATION TYPE.
- e) COMMON NEUTRALS SHALL NOT BE USED FOR ALL SINGLE PHASE BRANCH CIRCUITS.
- f) ALL WIRING SHALL BE RUN IN EMT CONDUIT UNLESS NOTED OTHERWISE.
- g) LIQUID-TIGHT METAL FLEXIBLE CONDUIT SHALL BE USED UNDER RAISED FLOOR AREA IN LAN ROOMS. RUN CONDUITS AGAINST FLOOR SLAB AND PARALLEL TO RAISED FLOOR GRID.
- h) PROVIDE METAL FLEXIBLE CONDUIT FOR CONNECTIONS TO MOTORS AND TRANSFORMERS
- i) BRANCH WIRING SHALL BE NO. 12 AWG UP TO 70 FT. AND NO.10 AWG FROM 70 FT. TO 120 FT. FOR A LONGER DISTANCE , THE VOLTAGE DROP SHALL BE CALCULATED AT 3%.

16.29 WIRING DEVICES

- a) RECEPTACLES TYPES ARE SHOWN ON FLOOR PLAN OR SINGLE LINE DIAGRAM BESIDE RECEPTACLE.
- b) ACCEPTABLE MANUFACTURER OF RECEPTACLES ARE HUBBELL, BRYANT OR ARROW HART.

16.32 CLOSE OUT DOCUMENTATION

THE FOLLOWING INFORMATION MUST BE PROVIDED TO THE ENGINEER PRIOR TO FINAL SITE INSPECTION AND ISSUANCE OF THE ENGINEERS FINAL SIGN OFF LETTER TO OBTAIN OCCUPANCY.

1. FIRE-ALARM-VERIFICATION-REPORT.
2. LETTER OF ACCEPTANCE FROM THE ELECTRICAL SAFETY AUTHORITY.

THE FOLLOWING INFORMATION MUST BE PROVIDED TO THE OWNER UPON PROJECT COMPLETION;

1. LETTERS OF WARRANTY FROM THE ELECTRICAL CONTRACTORS.
2. AS BUILT DRAWINGS AND MANUALS.



KEY PLAN

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PARKS & RECREATION
CAPITAL PROJECTS
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JOB NUMBER: 24111



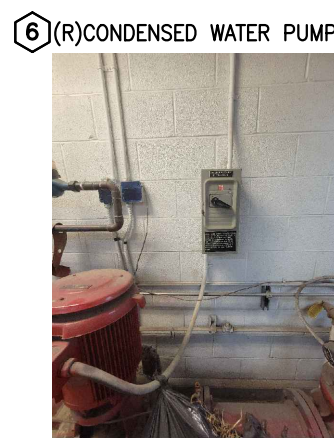
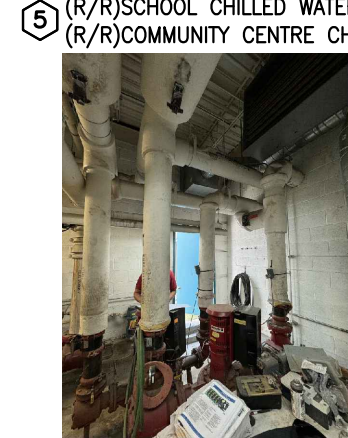
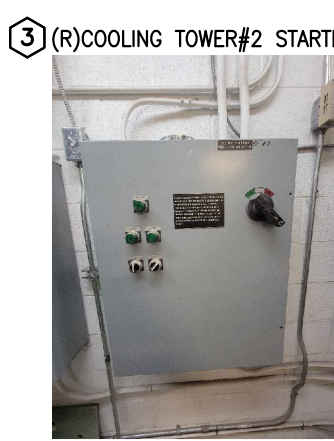
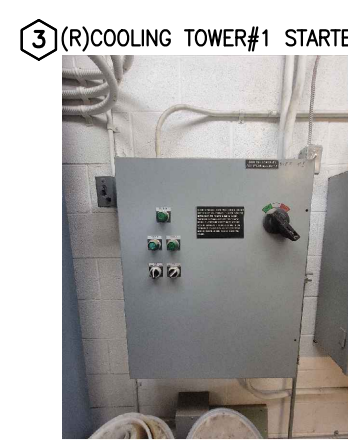
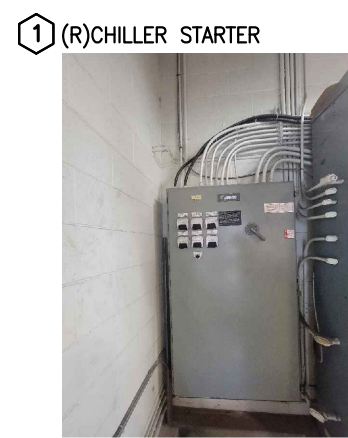
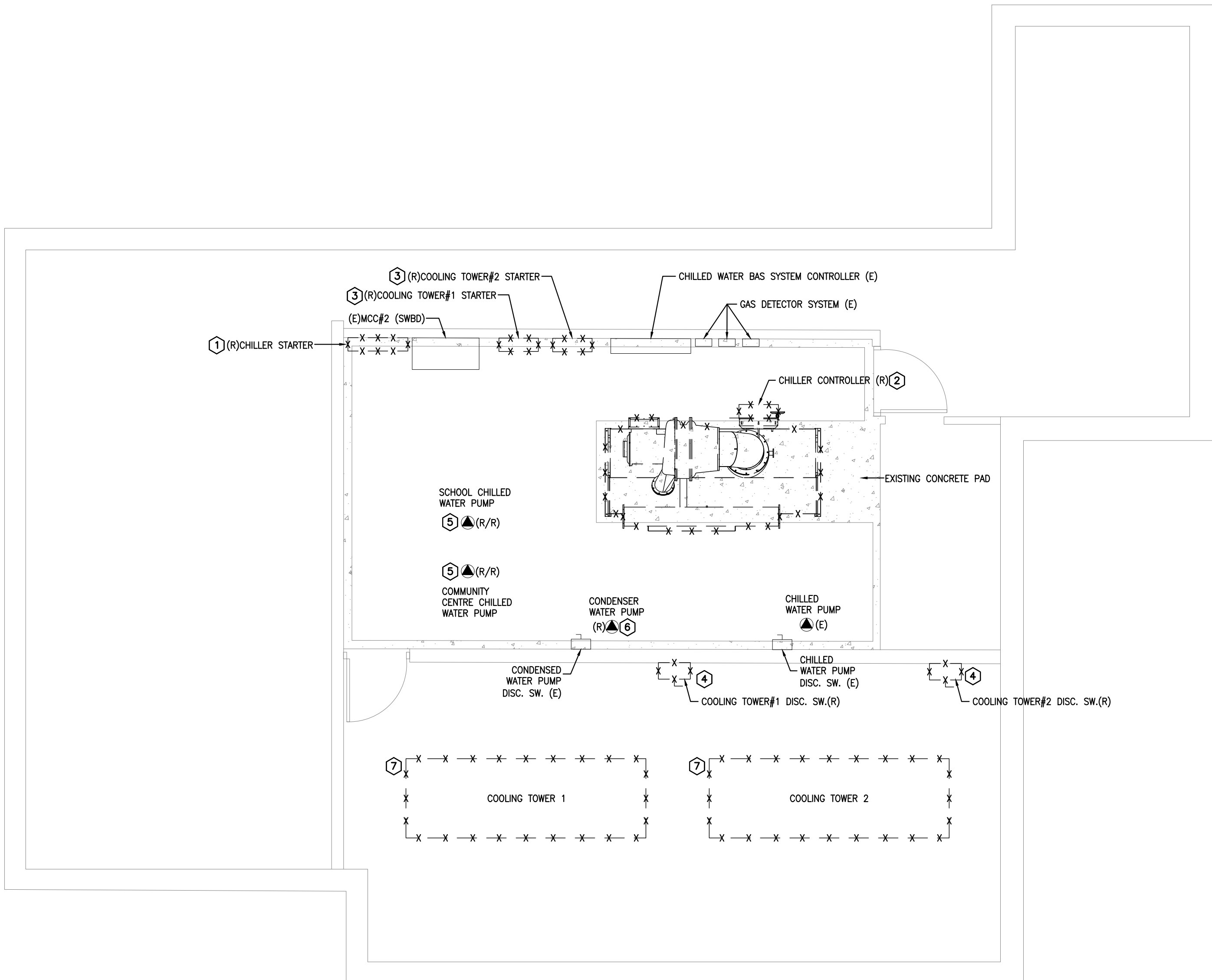
Project Name :
ST. LAWRENCE CRC & DAYCARE
Project Address :
**230 THE ESPLANADE
TORONTO, ON**
Job Descript. :
ROOFING & CHILLER REPLACEMENT

ELECTRICAL SPECIFICATION AND LEGEND

Design:	YJ
DRAWN:	YJ
Approved:	JG
Scale:	1:50
Date:	February 26, 25

Project No.	Dwg.No.
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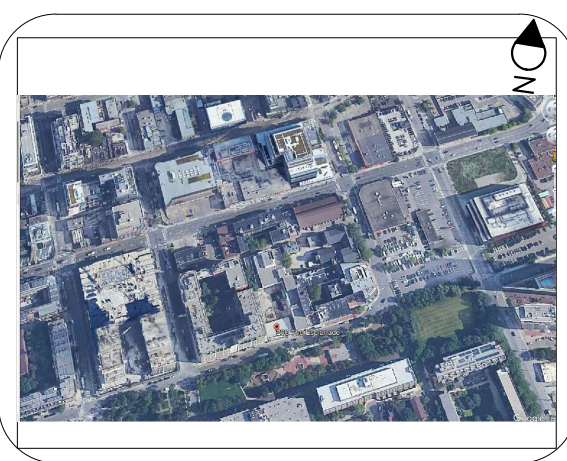


DEMOLITION GENERAL NOTES

1. IN EVERY INSTANCE OF DEMOLITION AND/OR REMODELING, THE E.C. SHALL FIGURE A COMPLETE JOB AS NONE OTHER SHALL BE ACCEPTED.
2. THE DRAWINGS ARE TO BE USED ONLY AS A GUIDELINE FOR DEMOLITION. THE E.C. MUST VISIT THE SITE PRIOR TO BIDDING TO VERIFY ALL WORK REQUIRED FOR A COMPLETE JOB & INCLUDE THE COST OF SUCH WORK IN HIS BID.
3. THE E.C. SHALL MAINTAIN EXISTING SERVICES TO & IN THE EXISTING AREA AS REQUIRED.
4. IF NECESSARY, THE E.C. SHALL PROVIDE TEMPORARY SERVICES IN THE EXISTING AREAS.
5. THE E.C. SHALL DISCONNECT & REMOVE ELECTRIC SERVICE TO ALL MECHANICAL EQUIPMENT BEING REMOVED AS A RESULT OF THE REMODELING.
6. ELECTRICAL EQUIPMENT & DEVICES SHALL BE REMOVED COMPLETE INCLUDING CONDUIT & WIRE.
7. ANY EXISTING CONDUIT, WIRING AND/OR ELECTRICAL & MECHANICAL DEVICES BEING DISTURBED BY THE WORK SHALL BE REWORKED BY THIS CONTRACTOR AS REQUIRED TO RETURN TO ITS FORMER EXISTING OPERATING CONDITION.
8. ANY CIRCUITS FEEDING THROUGH DEVICES OR EQUIPMENT BEING RELOCATED, REWORKED, OR ABANDONED & SERVING OTHER ELECTRICAL DEVICES, AND/OR EQUIPMENT SHALL BE MAINTAINED BY PROVIDING J-BOXES OR OTHER ACCEPTABLE METHOD AS REQUIRED.
9. ALL WALLS, CEILINGS, FLOORS, ETC., BEING DISTURBED BY THE WORK SHALL BE RETURNED TO FINISHED CONDITIONS TO MATCH EXISTING BY THE E.C. & HE SHALL DO HIS OWN CUTTING & PATCHING AS NECESSARY UNDER HIS CONTRACT.
10. EXISTING MATERIALS SHALL BE TURNED OVER TO THE OWNER. IF NOT REQUIRED BY OWNER, THE E.C. SHALL REMOVE THESE MATERIALS FROM THE PREMISES.
11. NO CONDUIT, BOXES, WIRING, OR CABLES SHALL BE INSTALLED WITHIN 1 1/2" OF THE LOWEST POINT OF THE UNDERSIDE OF THE ROOF DECKING, NOR SHALL THEY BE INSTALLED CONCEALED WITHIN METAL-CORRUGATED ROOF DECKING. THE E.C. SHALL BE RESPONSIBLE TO REPLACE AND/OR REWORK EXISTING CONDUIT, BOXES, WIRING, AND CABLEING THAT IS NOT IN COMPLIANCE WITH THIS REQUIREMENT.
12. ALL CONDUIT AND CABLEING SHALL BE PROPERLY SUPPORTED AS REQUIRED BY THE CANADIAN ELECTRICAL CODE. THE E.C. SHALL BE RESPONSIBLE TO REPLACE AND/OR REWORK EXISTING CONDUIT AND/OR CABLEING THAT IS NOT IN COMPLIANCE WITH THIS REQUIREMENT.
13. E.C. SHALL FIELD VERIFY SLAB ON GRADE FLOOR CONSTRUCTION TYPE PRIOR TO CUTTING. UNDER NO CIRCUMSTANCES SHALL THE CONTRACTOR CUT A STRUCTURAL FLOOR SLAB THICKER THAN FOUR (4") INCHES WITHOUT PRIOR WRITTEN APPROVAL FROM ENGINEER OF RECORD. NOTIFY ENGINEER OF RECORD OF ANY SLAB THICKNESS GREATER THAN FOUR (4") INCHES PRIOR TO PROCEEDING WITH ANY SAW CUTTING.

CODED NOTES

1. EXISTING CHILLER STARTER TO BE REMOVED BACK TO SOURCE AND MAKE SAFE.
2. EXISTING CHILLER CONTROLLER TO BE REMOVED BACK TO SOURCE AND MAKE SAFE.
3. EXISTING COOLING TOWER STARTER TO BE REMOVED. KEEP EXISTING FEEDER FOR NEW COOLING TOWER STARTER.
4. EXISTING COOLING TOWER DISCONNECT TO BE REMOVED. KEEP EXISTING FEEDER FOR NEW DISCONNECT SWITCH.
5. DISCONNECT EXISTING POWER SUPPLY TO SCHOOL CHILLED WATER PUMP & COMMUNITY CENTRE CHILLED WATER PUMP. TO ALLOW REMOVE AND INSTALL EXISTING PUMPS BY MECHANICAL TRADE. REMOVE EXISTING FEEDER BACK TO THE ADJACENT WALL. PROVIDE JUNCTION BOX ON WALL AND EXTEND EXISTING FEEDER TO NEW PUMP VFD USING LIQUID TIGHT FLEXIBLE CONDUIT.
6. EXISTING CONDENSER WATER PUMP TO BE REMOVED. KEEP EXISTING FEEDER FOR NEW CONDENSER WATER PUMP.
7. EXISTING COOLING TOWER 1 & 2 TO BE REMOVED. REMOVE EXISTING POWER BACK TO DISC. SW. AND MAKE SAFE.



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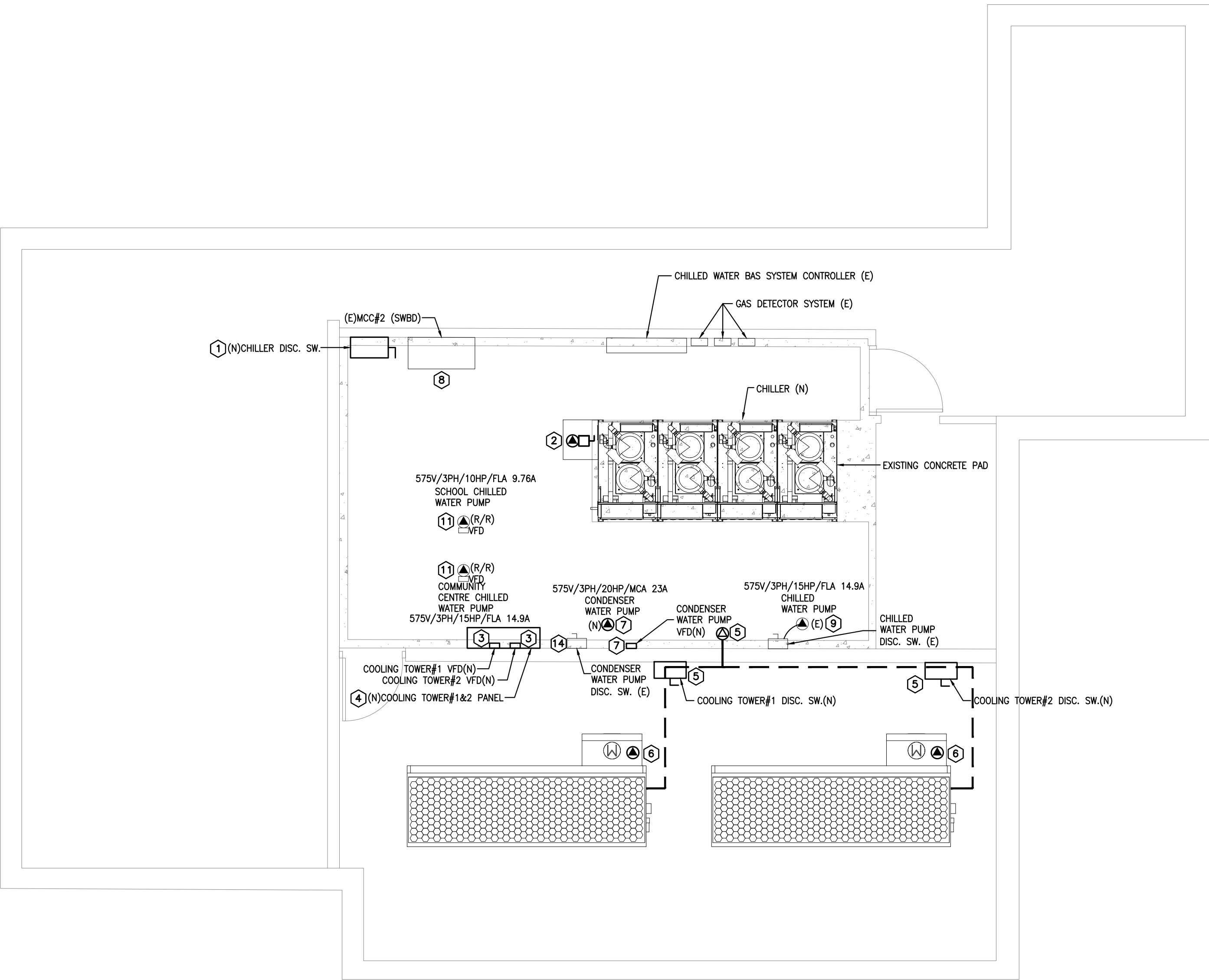
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ROOFING & CHILLER REPLACEMENT

ELECTRICAL DEMOLITION PLAN

Design:	YJ
DRAWN:	YJ
Approv.:	JG
Scale:	1:50
Date:	February 26, 25

Project No.	Dwg.No.
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POWER GENERAL NOTES

1. EXACT ROUTING OF NEW FEEDER SHALL BE CONFIRMED ON SITE PRIOR TO BID.
2. PROVIDE FIRE STOP FOR ANY NEW FEEDER PENETRATIONS THROUGH FIRE RATED FLOOR OR WALLS. SCAN FLOOR PRIOR TO CORE DRILLING.
3. PROVIDE LIQUID TIGHT FLEXIBLE CONDUIT FOR FINAL CONNECTIONS TO ALL PUMPS AND EXTERIOR HVAC EQUIPMENT.
4. ALL NEW POWER FEEDER SHALL BE SUPPORTED BY INDEPENDENT UNISTRUT AT SYSTEM SUPPORTED BY BUILDING STRUCTURE.
5. REUSE EXISTING CIRCUIT AND WIRING IF POSSIBLE, PROVIDE NEW AS REQUIRED TO ACHIEVE A COMPLETE OPERATIONAL SYSTEM.

CODED NOTES

1. PROVIDE NEW 600V, 400A CHILLER DISCONNECT SWITCH FUSED AT 400A TIME DELAY FUSE. PROVIDE 2 RUNS OF (3#3/0 + G IN 2" C) BACK TO SWITCHBOARD MCC#2 AND TAP DIRECTLY TO THE MAIN BUS.
2. PROVIDE 2 RUNS OF (3#3/0 + G IN 2" C) FROM CHILLER DISC. SW. TO CHILLER CONTROL PANEL. PROVIDE POWER FEEDER TO EACH 4 CHILLER MODULES. EC TO CONFIRM EXACT CONDUCTOR SIZE TO CHILLER MODULES PRIOR TO INSTALLATION.
3. RECONNECT TWO EXISTING COOLING TOWER POWER FEEDERS FROM MCC#2 TO NEW COOLING TOWER 1&2 VFDs. VFD IS SUPPLIED BY MECHANICAL TRADE AND INSTALLED BY ELECTRICAL TRADE. EXTEND EXISTING FEEDER AS REQUIRED.
4. PROVIDE NEW 2#12 + G IN 3/4" C FROM NEW COOLING TOWER 1 VFD TO NEW COOLING TOWER PANEL. 600V/1PH INPUT FROM VFD POWER SUPPLY C/W BUILT IN 600V/1PH-120V/1PH CONTROL TRANSFORMER AND PRIMARY FUSE. COOLING TOWER PANEL IS SUPPLIED AND INSTALLED BY MECHANICAL TRADE.
5. PROVIDE NEW 3#12 + G IN 3/4" C FROM NEW COOLING TOWER 1&2 VFDs TO NEW COOLING TOWER 1&2 DISC. SW. RUN CONDUIT INSIDE THE ROOM AND PENETRATE THE WALL TO THE OUTDOOR DISCONNECT. KEEP ALL CONDUIT INSIDE CHILLER ROOM AS MUCH AS POSSIBLE.
6. PROVIDE NEW 3#12 + G IN 3/4" C FROM NEW COOLING TOWER 1&2 DISC. SW. TO NEW COOLING TOWER 1&2. WIRING EXPOSED TO WEATHER SHALL BE RUN IN UV PROOF LIQUID TIGHT FLEXIBLE CONDUIT. ALL CONDUIT SHALL BE SUPPORTED ON WALL OR THROUGH UNISTRUT CHANNELS WITH MINIMUM 6" CLEARANCE FROM THE FLOOR.
7. PROVIDE OF 3#10 + G IN 3/4" C FROM CONDENSER WATER PUMP DISC. SW. TO CONDENSER WATER PUMP VIA NEW VFD.
8. REPLACE SWBD MCC#2 DISC. SW. EXISTING FUSES AS REQUESTED BELOW.
 - EXISTING CONDENSER WATER PUMP FUSE WITH NEW 60A FUSE.
 - EXISTING COOLING TOWER#1 FUSE WITH NEW 40A FUSE.
 - EXISTING COOLING TOWER#2 FUSE WITH NEW 40A FUSE.
9. EXISTING CHILLED WATER PUMP TO REMAIN.
10. REUSE EXISTING POWER SUPPLY FOR HEAT TRACING CABLE FOR 25mm MAKE UP COW PIPE. PROVIDE NEW HEAT TRACING CABLE (CHECK WITH TRM SPEC REQUIRED) PROVIDE EXTERIOR THERMOSTAT FOR SHUTTING DOWN HEAT TRAC CABLE WHEN EXTERIOR TEMPERATURE IS ABOVE 5 DEGREE CELSIUS. TRACE EXISTING POWER SOURCE, ENSURE EXISTING BREAKER IS GFI PROTECTED. IF NOT, PROVIDE NEW GFI BREAKER.
11. DISCONNECT EXISTING POWER SUPPLY TO SCHOOL CHILLED WATER PUMP & COMMUNITY CENTRE CHILLED WATER PUMP. TO ALLOW REMOVE AND INSTALL EXISTING PUMPS BY MECHANICAL TRADE. REMOVE EXISTING FEEDER BACK TO THE ADJACENT WALL. PROVIDE JUNCTION BOX ON WALL AND EXTEND EXISTING FEEDER TO NEW PUMP VFD USING LIQUID TIGHT FLEXIBLE CONDUIT.



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ROOFING & CHILLER REPLACEMENT

ELECTRICAL POWER PLAN

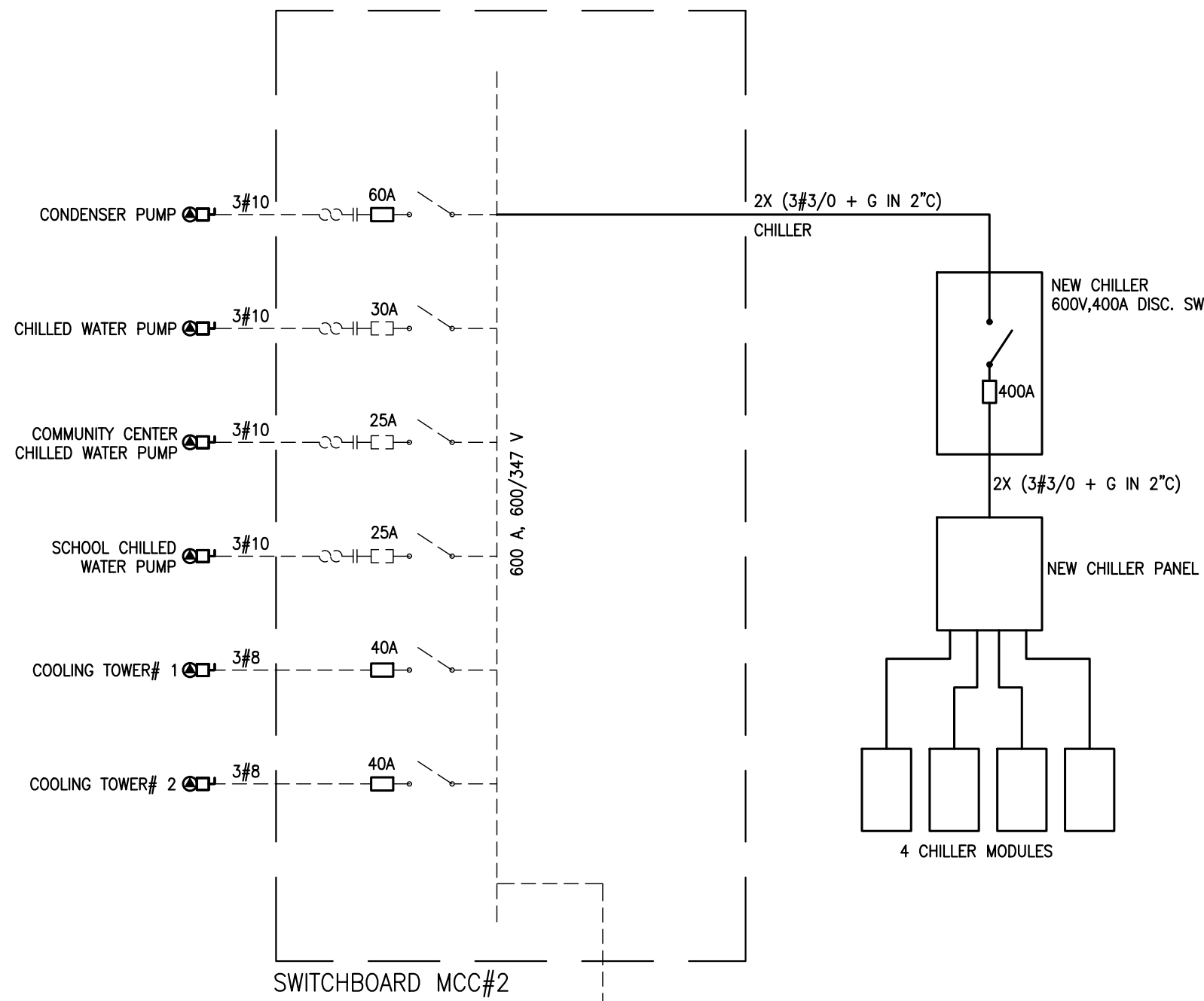
Design:	YJ
DRAWN:	YJ
Approv.:	JG
Scale:	1:50
Date:	February 26, 25

Project No.	Dwg.No.
Job No.	E3 OF 4



----- EXISTING
----- NEW PROVISION

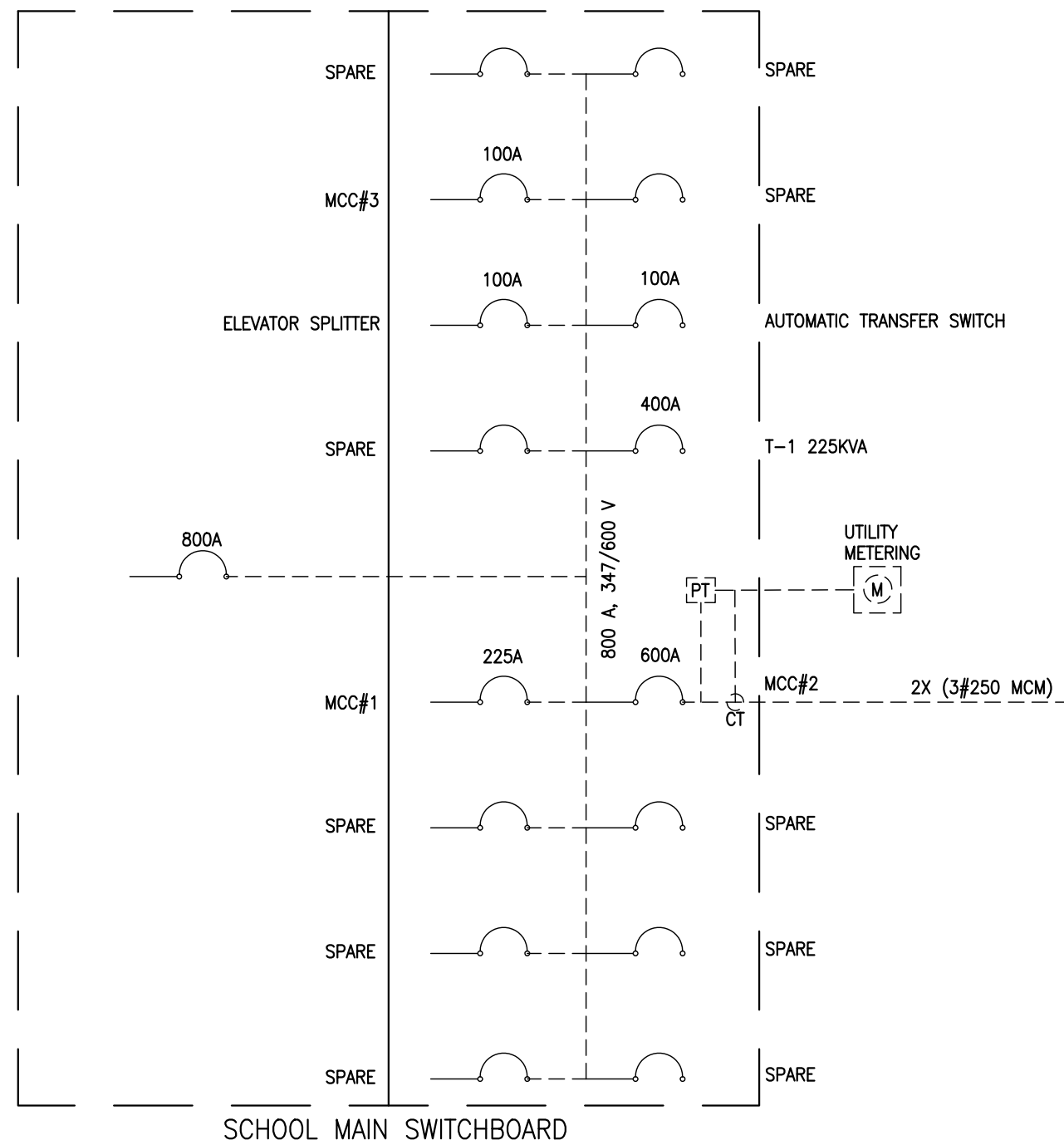
PENTHOUSE MECHANICAL ROOM (CHILLER ROOM)



SWITCHBOARD MCC#2



MCC-2 SCHEDULE (EXISTING)			
CCT	LOAD	LOAD	CCT
1	CONDENSER PUMP	MAIN LUG	
2	CHILLED WATER PUMP		
3	COMMUNITY CENTRE CHILLED WATER PUMP		
4	SCHOOL CHILLED WATER PUMP		
5	COOLING TOWER#1		
6	COOLING TOWER#2		



MAIN ELEC ROOM



KEY PLAN

5		
4		
3		
2	ISSUED FOR TENDER/PERMIT	FEB/26/25
1	ISSUED FOR 100% REVIEW	APR/31/25
NO.	REVISION	DATE

NOTE:
CONTRACTOR MUST CHECK AND VERIFY ALL DIMENSIONS AND BE RESPONSIBLE FOR SAME, REPORTING ANY DISCREPANCIES TO THE OWNER, BEFORE TENDER CLOSING.
LATEST APPROVED DRAWINGS ONLY TO BE USED FOR CONSTRUCTION.
PRINTS ARE NOT TO BE SCALED.



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Project Address :
230 THE ESPLANADE
TORONTO, ON
Job Descript. :
ROOFING & CHILLER REPLACEMENT

SINGLE LINE DIAGRAM

Design:	YJ
DRAWN:	YJ
Approv.:	JG
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Project No.	Dwg.No.
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