# U66A - HVAC UPGRADE 1920 RESEARCH RD, OTTAWA, ON MECHANICAL

#### **GENERAL NOTES:**

- 1. ALL WORK SHOWN OR IMPLIED ON THESE DRAWINGS SHALL BE CARRIED OUT IN ACCORDANCE WITH: A. ALL CODES AND LAWS APPLICABLE (OBC)
  - INSTRUCTIONS TO BIDDERS
  - IN ACCORDANCE WITH SMACNA-LATEST EDITION (DUCTWORK) IN ACCORDANCE WITH FM & NFPA (FIRE PROTECTION) E. IN ACCORDANCE WITH ULC STANDARDS
- 2. PRIOR TO SUBMITTING TENDERS, EACH TRADE SHALL EXAMINE THE SITE TO DETERMINE THE CONDITIONS WHICH MAY AFFECT THE PROPOSED WORK. NO CLAIM FOR EXTRA PAYMENT WILL BE CONSIDERED BECAUSE OF FAILURE TO FULFILL THIS CONDITION. START OF WORK WILL BE DEEMED EVIDENCE OF ACCEPTANCE OF, AND SATISFACTION WITH, EXISTING CONDITIONS.
- 3. THE DRAWINGS SHALL BE CONSIDERED TO SHOW THE GENERAL CHARACTER AND SCOPE OF THE WORK AND NOT THE EXACT DETAILS OF THE INSTALLATION. THE INSTALLATION SHALL BE COMPLETE WITH ALL ACCESSORIES REQUIRED FOR A COMPLETE AND OPERATIVE INSTALLATION.
- 4. MECHANICAL CONTRACTOR IS RESPONSIBLE TO FIELD MEASURE LOCATION OF NEW OR RELOCATED EQUIPMENT TO VERIFY CLEARANCES WITH THE MANUFACTURER PRIOR TO ORDERING.
- THESE MECHANICAL DRAWINGS MUST BE READ IN CONJUNCTION WITH THE ARCHITECTURAL AND ELECTRICAL DRAWINGS AND SPECIFICATIONS.
- 6. THE WORD "PROVIDE" SHALL DENOTE "SUPPLY AND INSTALL". THE WORD "TAB" SHALL DENOTE "TESTING, ADJUSTING, AND BALANCING".
- 7. CONTRACTOR SHALL FOLLOW THE BIDDING DOCUMENT PROJECT SCHEDULE. UPON AWARD, CONTRACTOR SHALL SUBMIT WORK SCHEDULE TO PROJECT MANAGER & ENGINEER FOR APPROVAL
- 8. THE MECHANICAL CONTRACTOR SHALL COORDINATE THE WORK WITH ALL OTHER TRADES AND THE OWNER. THE CONTRACTOR IS RESPONSIBLE FOR COMMUNICATING SAFETY REQUIREMENTS TO ITS EMPLOYEES AND COMPLYING WITH OCCUPATIONAL HEALTH AND SAFETY ACT.
- CONTRACTOR TO PROVIDE, PRIOR TO COMMENCEMENT OF WORK, ONTARIO 9. MINISTRY OF LABOUR CONTRACTOR REGISTRATION FORM AS WELL AS A CURRENT SIGNED AND DATED CORPORATE HEALTH AND SAFETY POLICY.
- 10. CONTRACTOR TO PROVIDE FOR THE USE OF HIS WORK FORCE A FIRST AID KIT ACCEPTABLE TO WSIB AND MOL.
- 11. PAY ALL REQUIRED FEES AND PERMITS.
- 12. WORKMANSHIP AND MATERIALS SHALL MATCH OR EXCEED THAT OF THE EXISTING AS PRESENTED BY THE PROJECT MANAGER.
- 13. ALL WORK TO BE CONDUCTED DURING HOURS SPECIFIED BY THE PROJECT MANAGER.
- 14. ALL CHANGES AND CONNECTIONS TO EXISTING SERVICES, REQUIRING THE SHUTDOWN OF THAT SERVICE SHALL BE DONE AT THE TIME DESIGNATED BY THE PROJECT MANAGER, UNLESS OTHERWISE STATED.
- 15. THE CONTRACTOR SHALL AT ALL TIMES KEEP PREMISES FREE FROM THE ACCUMULATION OF WASTE MATERIAL TO THE SATISFACTION OF THE PROJECT MANAGER. THE CLEANING OF THE AFFECTED AREA SHALL BE CONTINUOUS. PLACE DUST PROTECTION IN THE FORM OF COVER SHEETS OVER EQUIPMENT AND FURNITURE TO ENSURE NO DUST INFILTRATION.
- 16. EQUIPMENT REQUIRING CONNECTION TO AN ELECTRICAL POWER SOURCE SHALL BE CSA OR ULC APPROVED FOR USE AT LOCATION OF INSTALLATION.
- 17. COORDINATE MATERIAL STORAGE WITH THE SITE SUPERINTENDENT AND OTHER TRADES.
- 18. MANUFACTURER'S INSTRUCTIONS REGARDING THE HANDLING, INSTALLATION AND TESTING OF EQUIPMENT SPECIFIED HEREIN SHALL BE CONSIDERED PART OF THIS SPECIFICATION.
- 19. SUPPLY TOOLS, EQUIPMENT AND PERSONNEL TO DEMONSTRATE AND INSTRUCT OPERATING AND MAINTENANCE PERSONNEL IN OPERATING, CONTROLLING, ADJUSTING, TROUBLESHOOTING AND SERVICING OF ALL SYSTEMS AND EQUIPMENT DURING REGULAR WORK HOURS. PRIOR TO ACCEPTANCE.
- 20. MECHANICAL CONTRACTOR SHALL OBTAIN AND PAY FOR HOISTING AND REMOVAL OF MECHANICAL EQUIPMENT. COORDINATE HOISTING SCHEDULE WITH PROJECT MANAGER. TAKE ALL NECESSARY PRECAUTIONS TO PREVENT DAMAGE TO PUBLIC AND PRIVATE PROPERTY. USE PROPER BARRIERS AND/OR PERSONNEL TO ENSURE HOISTING SAFETY FOR EMPLOYEES AND PUBLIC. CONTRACTOR IS RESPONSIBLE FOR ANY DAMAGE TO EQUIPMENT AND/OR PROPERTY DURING HOISTING. ARRANGE AND PAY FOR ANY REQUIRED PERMITS.
- 21. INSPECT ALL NEW AND/OR RELOCATED EQUIPMENT UPON DELIVERY AND/OR RELOCATION AND NOTIFY PROJECT ENGINEER OF ANY DAMAGE OR DEFICIENCIES.
- 22. ALL EQUIPMENT, PIPING, DUCTWORK AND WIRING SHALL BE SUSPENDED FROM THE BUILDING STRUCTURE.
- 23. PROVIDE BLACK WITH WHITE WRITING LAMACOID PLATE ON ALL NEW EQUIPMENT. LABEL UNIT AS SHOWN ON DRAWINGS. LETTERING SIZE TO BE MINIMUM 25MM HIGH. MOUNT NEAR CONTROL SECTION OF THE UNIT.

- 24. PROVIDE CUTTING, PATCHING AND CORING OF ALL WALLS, CEILING AND OTHER SURFACES AS REQUIRED FOR MECHANICAL WORK. CHECK WITH BUILDING MANAGEMENT PRIOR TO CORE DRILLING AND CUTTING OF FLOOR SLAB REGARDING BUILDING REQUIREMENTS AND POLICIES. PRIOR TO SLAB CUTTING OR CORING, SCAN THE SLAB USING GPR TECHNOLOGY AND COORDINATE DRILLING TO MINIMIZE CUTTING OF THE REINFORCING STEEL AND CONDUIT. FIRE STOP ALL NEW FIRE RATED PENETRATIONS. THE CONTRACTOR IS TO INCLUDE IN TENDER PRICE ALL WORK ASSOCIATED WITH CORE DRILLING AFTER NORMAL WORKING HOURS. OBTAIN WRITTEN VERIFICATION OF LOCATIONS FROM THE STRUCTURAL ENGINEER OF RECORD PRIOR TO DRILLING. CUTTING TORCHES SHALL NOT BE USED FOR MAKING HOLES. PATCH ALL HOLES THROUGH SLAB WITH FIRE-STOP CAULKING (ULC LISTED). PATCHED SURFACES ARE TO BE PRIMED FINISHED, READY FOR FINAL COVERING BY OTHERS (COORDINATE WITH ROOFING CONTRACTOR).
- 25. CONTRACTOR SHALL BE RESPONSIBLE FOR DEACTIVATION, DRAINING, REFILLING AND REACTIVATING OF WET PIPE SPRINKLER SYSTEM OR STANDPIPE ON A DAILY BASIS. COORDINATE WITH OWNER.
- 26. PIPING LAYOUT ILLUSTRATED ON DRAWINGS INDICATES GENERAL ROUTING OF PIPE WORK AND DOES NOT SHOW ALL FITTINGS AND OFFSETS REQUIRED FOR COMPLETE INSTALLATION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL PIPING FITTINGS & OFFSETS REQUIRED FOR COORDINATED INSTALLATION WITH OTHER SYSTEMS (DUCTWORK, PIPING, CONDUITS, LIGHTS, ETC.)
- 27. CONTRACTOR SHALL BE RESPONSIBLE FOR DEACTIVATION, DRAINING AND REFILLING OF DOMESTIC WATER SYSTEMS TO ALLOW PLUMBING FIXTURE REPLACEMENTS.
- 28. PROTECT EXISTING AIR HANDLING SYSTEM FROM CONSTRUCTION DUST. PROVIDE FILTER MEDIA ON RETURN OPENINGS: FASTEN SECURELY TO THE RETURN DUCT INLET; REPLACE DURING CONSTRUCTION AS REQUIRED. APPROVED MATERIAL: AIRGUARD TR200 OR APPROVED EQUAL.
- 29. DUCT SIZES INDICATED ON DRAWINGS WHERE ACOUSTICALLY LINED ARE FREE AREA SIZES AND NOT SHEET METAL SIZES.
- 30. COORDINATE DUCTWORK ROUTING PRIOR TO DUCT FABRICATION; IF MODIFICATIONS ARE REQUIRED, REVISE DUCT SIZE TO MAINTAIN CROSS SECTIONAL AREA.
- 31. ALLOW FOR 1500 MM OF ADJUSTMENT FOR EXACT LOCATION OF AIR HANDLING UNITS, PUMPS, DUCTS, PIPING, ETC. AT NO EXTRA COST OR CREDIT.
- 32. PRIOR TO CLOSING OF CEILINGS, MECHANICAL CONTRACTOR SHALL NOTIFY THE ENGINEER THAT AN INSPECTION IS REQUIRED BEFORE PROCEEDING.
- 33. CONTRACTOR TO NOTIFY PROJECT MANAGER 3 DAYS BEFORE SCHEDULED SUBSTANTIAL COMPLETION TO ARRANGE INTERIM INSPECTION AND EQUIPMENT COMMISSIONING. NOTIFY PROJECT MANAGER IN WRITING OF ANY CHANGES IN SCHEDULE.
- 34. WARRANTY PERIOD SHALL BE FOR TWELVE (12) MONTHS AFTER THE DATE OF SUBSTANTIAL COMPLETION AS DETERMINED BY ENGINEER.
- 35. SUBMITTALS: .1 SUBMIT ONE(1) COPY OF SHOP DRAWINGS AND PRODUCT DATA IN ELECTRONIC PDF FORMAT FOR ENGINEER'S REVIEW PRIOR TO PURCHASING AND ORDERING. HARD COPY SHOP DRAWINGS WILL NOT BE ACCEPTED. REVIEWED ELECTRONIC SHOP DRAWINGS WILL BE RE-DISTRIBUTED AS PER PROJECT MANAGER'S INSTRUCTIONS. SHOP DRAWINGS SHALL INCLUDE ALL SPECIFIED EQUIPMENT & SYSTEMS.
  - .2 PROVIDE SUBMITTALS IN ACCORDANCE WITH APPLICABLE CODES REQUIRED FOR OCCUPANCY INCLUDING BUT NOT LIMITED TO THE FOLLOWING: .1 PLUMBING & UTILITIES: .1 SEISMIC CERTIFICATION LETTER SUBMITTED.
  - .2 HVAC: .1 SEISMIC CERTIFICATION LETTER SUBMITTED.
  - .3 MECHANICAL SCOPE OF WORK CONSIDERED COMPLETE WHEN THE FOLLOWING ITEMS HAVE BEEN RECEIVED AND REVIEWED BY ENGINEER: .1 ALL SHOP DRAWINGS LISTED IN THIS SPECIFICATION. .2 BALANCING REPORT IN ACCORDANCE WITH TAB SECTION IN
  - SPECIFICATIONS. .3 AS-BUILT DRAWINGS SHOWING AS-BUILT CONDITIONS COMPLETE WITH RED LINED MARKUPS TO PROJECT MANAGER WITH
  - CONTRACTOR'S SIGNATURE. .4 START-UP REPORT FROM MANUFACTURER OF EQUIPMENT. .5 THREE (3) COPIES OF OPERATIONS AND MAINTENANCE MANUALS CONTAINING ALL ITEMS PREVIOUSLY REVIEWED BY ENGINEER IN A THREE RING BINDER AND DIVIDERS ORGANIZING ALL SUBMISSIONS BY EACH MECHANICAL TRADE. OPERATIONS MANUAL TO ALSO INCLUDE THE FOLLOWING BUT SHALL NOT BE
  - LIMITED TO: .1 LIST OF TRADES INVOLVED AND CONTACT INFORMATION. .2 CONTRACTOR'S LETTER OF WARRANTY.
  - .3 ALL LETTERS REQUIRED FOR WORKPLACE CONFORMANCE.

SYMBOL	
M1	ME
М2	ME
М3	ME

SYMBOL
(E)
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(N)

(X)

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	FA	N COIL (INDOOR U	UNIT)						FLUID	COOLER		
LOCATION	CAPACITY (kW)	INDOOR DESIGN CONDITIONS	ELECTRIC	CAL DATA	BASIS OF DESIGN MAKE/MODEL	TAG	LOCATION	CAPACITY (kW)	AMBIENT TEMP	ELECTRIC	CAL DATA	BASIS OF DESIGN
LOCATION	CAFACITT (KW)	(*FDB/%RH)	MCA/MOP	V/PH/Hz	- DASIS OF DESIGN MARE/MODEL	TAG	LUCATION	CAFACITI (KW)	(°C)	MCA/MOP	V/PH/Hz	DASIS OF DESIGN
AS INDICATED	1.8	22/50	14/20	575/3/60	DECTRON DS-035-NM-I-GONT4302N0G2AE0	66DRY01	AS INDICATED	0.56	35	6/15	575/3/60	DECTRON NG-V-02
TAILS REFER TO SPECIFICA		T ACCEPTABLE OU	ALITY STANDARD	ONLY								

#### DRAWING LIST

#### DESCRIPTION

- ECHANICAL GENERAL NOTES, LEGENDS & SCHEDULES
- CHANICAL SPECIFICATIONS
- CHANICAL HVAC NEW WORK

#### GENERAL LEGEND

DESCRIPTION
EXISTING PIPING/DUCTWORK/EQUIPMENT
EXISTING PIPING/DUCTWORK/EQUIPMENT TO BE REMOVED/RELOCATED
NEW/RELOCATED PIPING/DUCTWORK/EQUIPMENT
EXISTING PIPING/DUCTWORK/EQUIPMENT BELOW SLAB
NEW PIPING/DUCTWORK/EQUIPMENT BELOW SLAB
DENOTES EXISTING EQUIPMENT
DENOTES RELOCATED EQUIPMENT
DENOTES NEW EQUIPMENT
DENOTES EQUIPMENT TO BE REMOVED

PLUMBING LEGEND					
SYMBOL	DESCRIPTION				
	PIPING OFFSET				
	BRANCH PIPING DOWN				
	PIPING DOWN				
_0	PIPING UP				
>	REDUCER				
\$	PIPE BREAK				
	P-TRAP				
$\bowtie$	ISOLATION VALVES				
2	CHECK VALVE				
Γ.J.	STRAINER				
$\sim$	FLEXIBLE PIPE				
H424	CIRCUIT BALANCING VALVE				
虚	SAFETY RELIEF VALVE (SRV)				
ψ	UNION				
O PG X	PRESSURE GAUGE				
<b>Γ</b>	THERMOMETER				
	PUMP				
🗏 🖨 FD1	FLOOR DRAIN (TYPE)				
Н	HUMIDITY SENSOR				

	National Research Council Canada Administrative Services and Property Manageme Branch	
		CNAC
REMARKS	GENERAL 1 • CONTRACTORS TO CHECK DIMENSIONS ON SITE PR CONSTRUCTION AND REP OMISSIONS TO DEPARTME • CONTRACTORS MUST VIS FAMILIARIZE THEMSELVES THE WORK. • PREVENT THE SPREAD CO BEYOND THE WORK AREA SURFACES AT COMPLETION • MAKE GOOD ALL SURFACE WORK. • COORDINATE ALL SHUTDON DEPARTMENTAL REPRESE • PROVIDE ALL LABOUR AND TO FORM A COMPLETE, DESCRIBED ON DRAWING	K AND VERIFY ALL IOR TO DEMOLITION OR PORT ANY ERRORS OR ENTAL REPRESENTATIVE. IT THE SITE & FULLY S WITH THE SCOPE OF OF DUST & DEBRIS A AND CLEAN ALL ON. CES AFFECTED BY THIS OWNS WITH THE ENTATIVE. ND MATERIAL REQUIRED FUNCTIONAL SYSTEM AS
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	2018-10-10 ISSUED FOR REVIEW - N	MECHANICAL 3
	2018-07-31 ISSUED FOR TENDER -	ELECTRICAL 2
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	GOODKEY WEEDMARK &	ASSOCIATES LIMITED
	<b>Consulting</b>	Engineers ASSOCIATES LIMITED 613 727–5111 Voice 613 727–5115 Fax www.gwal.com Web
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#### **MECHANICAL SPECIFICATIONS:**

- 1. SEISMIC RESTRAINT:
  - .1 PROVIDE COMPLETE SEISMIC RESTRAINT SYSTEM FOR ALL MECHANICAL SYSTEMS AS PER ONTARIO BUILDING CODE LATEST EDITION & NFPA13.
  - .2 SEISMIC RESTRAINT DESIGN AND SUPERVISION SHALL BE CONDUCTED AND STAMPED BY A PROFESSIONAL SEISMIC ENGINEER. SUBMIT LETTER AND CALCULATION FOR ENGINEER'S REVIEW PRIOR TO SUBSTANTIAL COMPLETION.
  - .3 THE FINAL CERTIFICATION LETTER SHALL BE FORMATTED TO IDENTIFY THE FOLLOWING WITHIN THE BODY OF THE LETTER:
  - .1 THE DATE OF THE FINAL INSPECTION .2 A STATEMENT THAT LISTS ALL CONTRACT DOCUMENTS WHICH WERE REVIEWED
  - INCLUDING BUT NOT LIMITED TO THE MECHANICAL DRAWINGS, PROJECT CHANGE ORDERS, SITE INSTRUCTIONS, ETC.
  - .3 A STATEMENT WHICH CLEARLY IDENTIFIES ANY EXCLUSIONS OF SCOPE OF SERVICE, AND
  - .4 A STATEMENT THAT CERTIFIES THE COMPLETE MECHANICAL SEISMIC INSTALLATION MEETS THE LATEST VERSION OF OBC & APPLICABLE COES & STANDARDS.

#### 2. INSTALLATION OF PIPEWORK: .1 CLEARANCES:

- .1 PROVIDE CLEARANCES AROUND SYSTEMS, EQUIPMENT AND COMPONENTS FOR OBSERVATION OF OPERATION, INSPECTION, SERVICING, MAINTENANCE AND AS RECOMMENDED BY MANUFACTURER.
- .2 DRAINAGE: .1 INSTALL DRAIN VALVE AT LOW POINTS IN PIPING SYSTEMS AND AT THE BASE OF ALL RISERS.
- .2 DRAIN VALVE: NPS 3/4 FULL PORT BALL VALVES UNLESS INDICATED OTHERWISE, WITH HOSE MALE THREAD, CAP AND DRAIN. .3 PIPE WORK INSTALLATION:
- .1 SCREWED FITTINGS TO BE JOINTED WITH TEFLON TAPE.
- .2 PROTECT OPENINGS AGAINST ENTRY OF FOREIGN MATERIAL. .3 ASSEMBLE PIPING USING FITTINGS MANUFACTURED TO ANSI STANDARDS.
- .4 EXCEPT WHERE INDICATED OTHERWISE, SLOPE PIPING IN DIRECTION OF FLOW FOR POSITIVE DRAINAGE AND VENTING.
- .5 EXCEPT WHERE INDICATED, INSTALL SO AS TO PERMIT SEPARATE THERMAL INSULATION OF EACH PIPE.
- .6 GROUP PIPING WHEREVER POSSIBLE AND AS INDICATED. .7 USE ECCENTRIC REDUCERS AT PIPE SIZE CHANGES TO ENSURE POSITIVE
- DRAINAGE AND VENTING. .4 SLEEVES: .1 INSTALL WHERE PIPES PASS THROUGH CONCRETE STRUCTURES AND FIRE RATED ASSEMBLIES.
  - .2 MATERIAL: SCHEDULE 40 BLACK STEEL PIPE .3 PROVIDE SPACE FOR FIRE STOPPING. MAINTAIN FIRE RATING INTEGRITY. ENSURE NO CONTACT BETWEEN COPPER PIPE OR TUBE AND SLEEVE.
- 3. DRAINAGE, WASTE & VENT PIPING: .1 COPPER TYPE DWV ABOVE GRADE; SOLDER: 95:5, 50:50 TO ASTM B32-00EL,
- TYPE 50A. .2 FIRE & SMOKE RESISTANT COATED DWV PVC PIPING & FITTINGS, IPEX SYSTEM XFR
- 15/50 PVC-DWV, ABOVE GRADE. .3 CAST IRON ABOVE GRADE; MECHANICAL JOINTS: PROVIDE HUBLESS SOIL PIPE COUPLINGS CONSTRUCTED OF EXTRA WIDE 4 TO 6 BAND CORRUGATED TYPE 304
- STAINLESS STEEL BANDS. WITH HEAVY DUTY WORM DRIVE CLAMPS.
- .4 BELOW GRADE PVC DR28 OR SYSTEM 15 .5 SLOPE SANITARY DRAIN ACCORDING TO CODE.
- .6 INSTALL IN ACCORDANCE WITH CANADIAN PLUMBING CODE, PROVINCIAL PLUMBING CODE AND LOCAL AUTHORITY HAVING JURISDICTION.
- .7 LAB WASTE PIPING FROM SINK TO NEUTRALIZER TANK TO BE PVDF TYPE. BLUE LINF.

#### HYDRONIC PIPING: 4.

ASPM A1 (841x594)

- .1 STEEL PIPE: TO ASTM A53/A53M, GRADE B, AS FOLLOWS:
- .1 NPS 21/2 TO 8, SCHEDULE 40. .2 COPPER PIPING:
- .1 TYPE L HARD DRAWN COPPER TUBING: TO ASTM B 88M. .3 PIPE JOINTS:
- .1 NPS 2 AND UNDER: .1 CAST BRONZE THREADED FITTINGS: TO ANSI/ASME B16.15.
- .2 WROUGHT COPPER AND COPPER ALLOY SOLDER JOINTS PRESSURE FITTINGS: TO ANSI/ASME B16.22 .3 CAST COPPER ALLOY SOLDER JOINT PRESSURE FITTINGS: TO ANSI
- B16.18. .4 DI-ELECTRIC COUPLINGS:
- .1 PROVIDE WHEREVER PIPES OF DISSIMILAR METALS ARE JOINTED. .2 FOR PIPE SIZES 2 NPS AND UNDER, PROVIDE DI-ELECTRIC UNIONS OR COUPLINGS. .5 JOINTS
- .1 SOLDER, TIN-ANTIMONY, 95:5: TO ASTM B32. .2 SILVER SOLDER BCUP: TO AWS A5.8.
- .3 BRAZING: AS INDICATED.
- .2 NPS 2-1/2 AND OVER: .1 COOLING SYSTEMS NPS 21/2 AND OVER: WELDED, FLANGED OR GROOVED MECHANICAL COUPLINGS C/W STAINLESS STEEL HARDWARE. NO GROOVED COUPLINGS ON GLYCOL SYSTEMS.
- .2 HEATING AND GLYCOL SYSTEMS NPS 21% AND OVER: WELDED OR
- FLANGED, GROOVED JOINTS ARE NOT ACCEPTED. .3 WELDING FITTINGS AND FLANGES TO CSA W47.1 AND CSA W47.1. 7. HYDRONIC SPECIALTIES:
- .5 FLANGES: RAISED FACE, WELD NECK.
- .6 FLANGE GASKETS: TO ANSI/AWWA C111/A21.11. .7 PIPE THREAD: TAPER.
- .8 BOLTS AND NUTS: TO ANSI B18.2.1 AND ANSI/ASME B18.2.2.
- .9 GROOVED MECHANICAL COUPLINGS C/W STAINLESS STEEL HARDWARE AS MANUFACTURED BY VICTAULIC ARE ACCEPTABLE AS LISTED. STYLE 07; ZEROFLEX FOR RIGID CONNECTIONS. STYLE 77 FOR FLEXIBLE CONNECTIONS. .10 FITTINGS:
- .1 SCREWED FITTINGS: MALLEABLE IRON, TO ASME B16.3, CLASS .2 PIPE FLANGES AND FLANGED FITTINGS:
- .1 CAST IRON: TO ANSI/ASME B16.1, CLASS 125.
- .2 STEEL: TO ANSI/ASME B16.5. .3 BUTT-WELDING FITTINGS: STEEL, TO ANSI/ASME B16.9.
- .4 UNIONS: MALLEABLE IRON, TO ASTM A47/A47M AND ANSI/ASME B16.3. .5 FITTINGS FOR ROLL GROOVED PIPING: MALLEABLE IRON
- TO ASTM A47/A47M, DUCTILE IRON TO ASTM A536, MANUFACTURED BY VICTAULIC ARE ACCEPTABLE AS LISTED.

#### 5. THERMAL INSULATION FOR PIPING:

- .1 GENERAL: .1 ALL COMPONENTS OF INSULATION SYSTEM TO HAVE MAXIMUM FLAME SPREAD RATING OF 25 AND MAXIMUM SMOKE DEVELOPED RATING OF 50 IN ACCORDANCE WITH CAN4-S102 .2 TIAC CODE A-1 FORMED MINERAL FIBRE WITHOUT VAPOUR BARRIER: .1 APPLICATION: FOR PIPING, VALVES AND FITTINGS ON:
- .1 GLYCOL COOLING WATER. .2 MATERIAL:
- .1 MINERAL FIBRE: TO CAN/CGSB-51.9-92. .2 MAXIMUM "K" FACTOR: TO CAN/CGSB-51.9-92. .3 THICKNESS: 25MM

#### .5 FASTENINGS: .1 FOR INSULATION SYSTEMS TIAC CODE A-1:

- .1 TAPE: SELF-ADHESIVE, ALUMINUM, REINFORCED, 50MM WIDE MINIMUM. .2 CONTACT ADHESIVE: QUICK SETTING. .3 CANVAS ADHESIVE: WASHABLE.
- .4 TIE WIRE: 1.5MM DIAMETER STAINLESS STEEL. .5 BANDS: STAINLESS STEEL, 19MM WIDE, 0.5MM THICK.
- .6 THERMAL INSULATING AND FINISHING CEMENT: TO
- CAN/CGSB-51.12-95. .7 VAPOUR RETARDER LAP ADHESIVE: WATER BASED, FIRE RETARDANT
- TYPE, COMPATIBLE WITH INSULATION. .8 INDOOR VAPOUR RETARDER FINISH: VINYL EMULSION TYPE ACRYLIC, COMPATIBLE WITH INSULATION.

#### .2 FOR INSULATION SYSTEMS TIAC CODE: A-3. 1 SECUREMENTS: TAPE AT 300 MM OC.

- 2 SEALS: VR LAP SEAL ADHESIVE, VR LAGGING ADHESIVE. 3 INSTALLATION: TIAC CODE: 1501-C.
- .6 JACKETS:
- .1 CANVAS
  - .1 220 G/SQ.M. COTTON, PLAIN WEAVE, TREATED WITH DILUTE FIRE RETARDANT LAGGING ADHESIVE TO ASTM C921. 2 LAGGING ADHESIVE: COMPATIBLE WITH INSULATION .3 RANDOM SAMPLES TO BE TAKEN DURING INSTALLATINO C/W DATE &
  - TIME ON SAMPLE.
- .2 ALUMINUM: .1 TO ASTM B209.
  - .2 THICKNESS: 0.50 MM SHEET. .3 FINISH: EMBOSSED.
  - .4 JOINING: LONGITUDINAL AND CIRCUMFERENTIAL SLIP JOINTS WITH 50
  - MM LAPS. .5 FITTINGS: 0.5 MM THICK DIE-SHAPED FITTING COVERS WITH
- FACTORY-ATTACHED PROTECTIVE LINER. .6 METAL JACKET BANDING AND MECHANCIAL SEALS: STAINLESS STEEL,
- 19 MM WIDE, 0.5 MM THICK AT 300 MM SPACING. .3 APPLICATION:
- .1 EXPOSED INDOORS: CANVAS, EXCEPT GENERATOR EXHAUST SHALL BE ALUMINUM. 2 EXPOSED EXTERIOR: ALUMINUM.
- .3 CONCEALED, INDOORS: PVC ON VALVES AND FITTINGS ONLY. NO FURTHER FINISH.
- .4 USE VAPOUR RETARDER JACKET ON TIAC CODE A-3 INSULATION COMPATIBLE WITH INSULATION.
- .5 FINISH ATTACHMENTS: STAINLESS STEEL BANDS AT 150 MM O.C.
- SEALS: WING OR CLOSED. .6 INSTALLATION: TO APPROCIATE TIAC CODE CRF/1 THROUGH CRF/5.
- VALVES:
- .1 BALL VALVES: .1 BODY AND CAP: CAST HIGH TENSILE BRONZE TO ASTM B62 OR BRASS TO 10. DDC CONTROLS: ASTM B16/B16M C36000.
- .2 STEM: TAMPERPROOF BALL DRIVE. .3 STEM PACKING NUT: EXTERNAL TO BODY .4 BALL AND SEAT: REPLACEABLE CHROME PLATED BRASS SOLID FULL PORT
- BALL AND TEFLON SEATS. .5 STEM SEAL: TFE WITH EXTERNAL PACKING NUT.
- .6 OPERATOR: REMOVABLE LEVER HANDLE. .7 ACCEPTABLE MATERIAL: CRANE, JENKINS, TOYO, VICTAULIC, KITZ. .3 CHECK VALVES:
- .1 NPS 2 AND UNDER, BRONZE SWING TYPE, BRONZE DISC: .1 STANDARD SPECIFICATION: MSS SP-80.
- .2 CONNECTIONS: WITH HEX. SHOULDERS.
- .3 BODY: Y-PATTERN WITH INTEGRAL SEAT AT 45°, SCREW-IN CAP WITH HEX HEAD. .4 DISC AND SEAT: RENEWABLE ROTATING DISC, TWO-PIECE HINGE DISC
- CONSTRUCTION; SEAT: REGRINDABLE. .2 NPS 21/2 AND OVER, CAST IRON: 1 BODY AND BOLTED COVER: WITH TAPPED AND PLUGGED OPENING ON
- EACH SIDE FOR HINGE PIN. UP TO NPS 16: CAST IRON TO ASTM A126 CLASS B. .2 NPS 18 AND OVER: CAST IRON TO ASTM A126 CLASS C. .2 DISC: ROTATING FOR EXTENDED LIFE.
- 1 UP TO NPS 6: BRONZE TO ASTM B62. .2 NPS 8 AND OVER: BRONZE-FACED CAST IRON.
- .3 SEAT RINGS: RENEWABLE BRONZE TO ASTM B62 SCREWED INTO RODY
- .4 HINGE PIN, BUSHINGS: RENEWABLE BRONZE TO ASTM B62. .3 ACCEPTABLE MATERIAL: CRANE, JENKINS, TOYO, VICTAULIC, KITZ.

.1 PROPYLENE GLYCOL: .1 PROVIDE PRE-MIXED PROPYLENE GLYCOL IN 50% CONCENTRATION BY WEIGHT FOR GLYCOL COOLING SYSTEM. ACCEPTABLE MATERIAL: DOWFROST OR EQUAL. .2 GLYCOL MAKE-UP PACKAGE

- .1 THE CONTRACTOR SHALL SUPPLY AND INSTALL, AS PACKAGE (GMU) [FOR INDICATED ON THE PLANS AND IN THE SMALL SYSTEMS] SPECIFICATIONS, A PREFABRICATED, AUTOMATIC AND AUTONOMOUS MAKE-UP PACKAGE FOR THE GLYCOL SYSTEM.
- .2 THE PACKAGE SHALL BE WALL MOUNTED TO OPERATE ON A STANDARD 120 V, 15 AMP, 60 HZ ELECTRICAL CIRCUIT, AND TO MAINTAIN A FILL PRESSURE IN THE GLYCOL SYSTEMS AS INDICATED. .3 IT SHALL FEATURE A CUT-OFF AND ALARM ARRANGEMENT WHICH WILL STOP
- THE PUMP IN CASE OF EXCESSIVE PRESSURE, OR A LOW SOLUTION LEVEL, AND ACTIVATE DRY CONTACT ALARM .4 A TRANSLUCENT 25L (6 USGAL) POLYETHYLENE SOLUTION CONTAINER,
- COMPLETE WITH LID, SHALL BE MOUNTED ON THE PUMPING ASSEMBLY AND SHALL INCLUDE A STRAINER AND A SHUT OFF VALVE. BUILT-IN GLYCOL SOLUTION RECOVERY LINE SHALL BE PIPED IN FROM THE SYSTEM RELIEF VALVE OUTLET TO THE SOLUTION CONTAINER, THROUGH ITS LID IN SUCH A WAY THAT THE LID CAN BE REMOVED FOR FILLING AND MIXING. .5 THE ASSEMBLY SHALL BE MOUNTED IN A STURDY STEEL WALL BRACKET. IT
- SHALL INCLUDE A 0.04 L/S (0.7 USGPM) AT FREE FLOW PUMP. 120 V TO 24 VDC 50W AC MOTOR, A MAGNETIC STARTER, A PRESSURE TANK WITH A PRESSURE CONTROL, A PRIMING VALVE, A PRV, A SHUT-OFF VALVE AND A PRESSURE GAUGE. IT SHALL BE CONNECTED TO THE SYSTEM WITH A 6 MM (14") NPT CONNECTION. NOTE: THE ABOVE EQUIPMENT DOES NOT REPLACE THE EXPANSION TANK,
- NOR THE RELIEF VALVE OF A CLOSED SYSTEM. .6 ACCEPTABLE MATERIAL: AXIOM DMF 150 WITH SMW003 WALL BRACKET & RIA10-1 LOW LEVEL ALARM PANEL & REMOTE CONTACTS.

- AND COMPARE TO MANUFACTURERS DATA. .2 MAKE ADJUSTMENTS TO ENSURE SYSTEMS OPERATING IN CONFORMANCE WITH MANUFACTURERS REQUIREMENTS. 5 VERIFICATION:

ENGINEER.

RECEIVED AND APPROVED BY ENGINEER.

| 120

200mm

.1 ALL REPORTED RESULTS SUBJECT TO VERIFICATION BY ENGINEER. .2 PROVIDE MANPOWER AND INSTRUMENTATION TO VERIFY UP TO 30% OF ALL REPORTED RESULTS. .3 NUMBER AND LOCATION OF VERIFIED RESULTS TO BE AT DISCRETION OF .4 BEAR COSTS TO REPEAT TAB AS REQUIRED TO SATISFACTION OF ENGINEER. .5 PRODUCE "AS-BUILT" FULL SYSTEM SCHEMATICS. USE AS-BUILT DRAWINGS FOR REFERENCE. .6 TAB TO BE CONSIDERED COMPLETE ONLY WHEN FINAL TAB REPORT

.1 FORMAT TO BE IN ACCORDANCE WITH ASSOCIATED AIR BALANCING COUNCIL

.3 DO TAB OF COMPLETE MECHANICAL SYSTEMS OVER ENTIRE OPERATING RANGE IN ACCORDANCE WITH MOST STRINGENT CONDITIONS OF AABC (ASSOCIATED AIR BALANCE COUNCIL) & NABC (NATIONAL AIR BALANCE

.2 HYDRONIC SYSTEMS: PLUS OR MINUS 10%. .2 ADJUST OR REPLACE SHEAVES AS REQUIRED TO MEET DESIGN

12. TESTING, ADJUSTING AND BALANCING (TAB): .1 TAB MEANS TO TEST. ADJUST AND BALANCE TO PERFORM IN ACCORDANCE WITH REQUIREMENTS OF CONTRACT DOCUMENTS AND TO DO ALL OTHER WORK AS SPECIFIED IN THIS SECTION.

.9 DESIGNATED CONTRACTOR: AINSWORTH DEHUMIDIFICATION UNIT: .1 PROVIDE NEW STANDALONE DEHUMIDIFIER WITH ASSOCIATED GLYCOL FLUID COOLER WITH INTEGRAL PUMP AS SCHEDULED. .2 BASIS OF DESIGN UNIT IS THE ONLY APPROVED MANUFACTURER AND MODEL. ALTERNATIVE MANUFACTURERS MAY BE ACCEPTED FOLLOWING SUBMISSION OF

.5 THE DDC & HVAC MECHANICAL EQUIPMENT CONTROLLERS SHALL RESIDE ON THE BUILDING LEVEL NETWORK. .6 DDC & HVAC MECHANICAL EQUIPMENT CONTROLLERS SHALL USE THE SAME PROGRAMMING LANGUAGE AND TOOLS. DDC & HVAC MECHANICAL EQUIPMENT CONTROLLERS WHICH REQUIRE DIFFERENT PROGRAMMING LANGUAGE OR TOOLS ON A NETWORK ARE NOT ACCEPTABLE. .7 ALL CONTROLS SHALL MATCH BASE BUILDING STANDARDS.

.8 CONTROLS CONTRACTOR SHALL ASSIST BALANCING CONTRACTOR DURING BALANCING

TECHNICAL INFORMATION AND DETAILS WHICH DEMONSTRATE COMPLIANCE WITH

INFORMATION BY ENGINEER, ALTERNATIVE MANUFACTURERS WILL BE INCLUDED AS

PROJECT REQUIREMENTS. FOLLOWING REVIEW OF SUBMITTED TECHNICAL

.1 DO TAB TO FOLLOWING TOLERANCES OF DESIGN VALUES:

.1 HVAC SYSTEMS: PLUS OR MINUS 5%.

ACCEPTABLE MATERIAL VIA ADDENDUM ONLY.

.1 ALL 24VDC ( LOW VOLTAGE ) CONTROLS BY CONTROLS CONTRACTOR. .2 PROVIDE EMT CONDUIT C/W STEEL COUPLINGS AND FITTINGS FOR CONTROL WIRING IN EXPOSED OR EXTERIOR LOCATIONS. REFER TO ELECTRICAL SPECIFICATIONS FOR INSTALLATION DETAILS. .3 PROVIDE FT-6 FIRE RATED CABLE FOR CONTROL WIRING IN CONCEALED AREAS. .4 PROVIDE DDC CONTROLLER FOR 2 WAY MODULATING CONTROL VALVES.

LETTERING FOR PIPING 3" OR LARGER, 3/4" HIGH LETTERING FOR 2 1/2" OR SMALLER. MATCH EXISTING BASE BUILDING STANDARD OR AS FOLLOWS: BACKGROUND: <u>LABEL</u> GI YR

3.0M 3.0M 3.0M 3.0M

PLUMBING CODE, OBC, AURHORITY HAVING JURISDICTION, AND AS FOLLOWS: MAXIMUM PIPE MAXIMUM STEEL MAXIMUM COPPER PIPE SPACING: 2.5M 3.0M

.1 PVC MARKERS, CONTINUOUS OPERATING TEMPERATURE OF 212F, 2" HIGH

CONCENTRATION OF LOADS DUE TO WEIGHT OF VALVES, STRAINERS, ETC. .6 PIPE HANGERS AND SUPPORTS SHALL BE PAINTED WITH ZINC RICH PAINT AFTER MANUFACTURE 7 PROVIDE INSULATION PROTECTION SHIELDS AS REQUIRED. .2 BASE MOUNTED EQUIPMENT: .1 PROVIDE A POURED CONCRETE STEEL REINFORCED HOUSE KEEPING PAD C/W CHAMFERED EDGES AND GRANULAR BASE (MIN 150MM DEEP) AS PER STRUCTURAL DESIGN. .2 ALL EQUIPMENT TO BE SUPPORTED BY STRUCTURAL GRADE STEEL C/W NEOPRENE PAD VIBRATION ISOLATION AND ANCHORED TO THE BUILDING

.3 SUBMIT ENGINEERED STAMPED SHOP DRAWINGS FOR APPROVAL, PLUS FINAL

.3 HANGERS SHALL BE SPACED IN ACCORDANCE WITH THE MOST STRINGENT

REQUIREMENTS OF MANUFACTURER'S RECOMMENDATIONS, CANADIAN

STRUCTURAL SIGNOFF FOLLOWING COMPLETION OF WORK.

.1 COPPER PIPING UP TO NPS 13 MM EVERY 1500 MM.

.2 HANGERS SHALL BE WITHIN 300 MM OF EACH ELBOW.

<u>PIPE\_SPACING</u>

2.5M

2.5M

2.5M

2.5M

2.5M

2.5M

INSTALLATION. DESIGN SHALL BE IN ACCORDANCE WITH ANSI B31.1 AND .2 SUPPORT FROM TOP OR BOTTOM OF STRUCTURAL MEMBERS. WHERE STRUCTURAL BEARING DOES NOT EXIST OR INSERTS ARE NOT IN SUITABLE LOCATIONS, PROVIDE SUPPLEMENTARY STRUCTURAL STEEL MEMBERS. .3 SUPPORTS MADE FROM WIRE, WOOD, ROPE OR ANY OTHER VULNERABLE MAKE-SHIFT MATERIAL ARE NOT PERMITTED. .4 FOR UNINSULATED COPPER PIPE OR TUBING THE CLAMPS AND SUPPORTS SHALL HAVE AN ELECTROPLATED COPPER FINISH. .5 PROVIDE ADDITIONAL SUPPORTS AT CHANGES IN PIPE DIRECTION AND FOR

8. BASES, PIPE HANGERS AND SUPPORTS: .1 BASES, HANGERS, SUPPORTS AND SWAY BRACES SHALL BE OF MANUFACTURED TYPE AND ASSEMBLED AS PER MANUFACTURER'S INSTRUCTIONS. ENSURE THAT SUPPORTS, GUIDES AND ANCHORS DO NOT TRANSMIT EXCESSIVE QUANTITIES OF HEAT TO BUILDING STRUCTURE. DESIGN HANGERS AND SUPPORTS TO OPERATE UNDER ALL OPERATING CONDITIONS. ALLOW FOR FREE EXPANSION AND CONTRACTION AND PREVENT THE TRANSMISSION OF EXCESSIVE STRESSES INTO PIPE WORK OR CONNECTED EQUIPMENT. PROVIDE FOR VERTICAL ADJUSTMENT AFTER

.1 GENERAL:

MSS-SP58.

STRUCTURE

.4 HANGER SPACING

<u>SIZE (NPS):</u>

UP TO 1-1/4

PIPE IDENTIFICATION:

1-1/2

2–1/2

<u>CONTENTS:</u>

GLYCOL SUPPLY

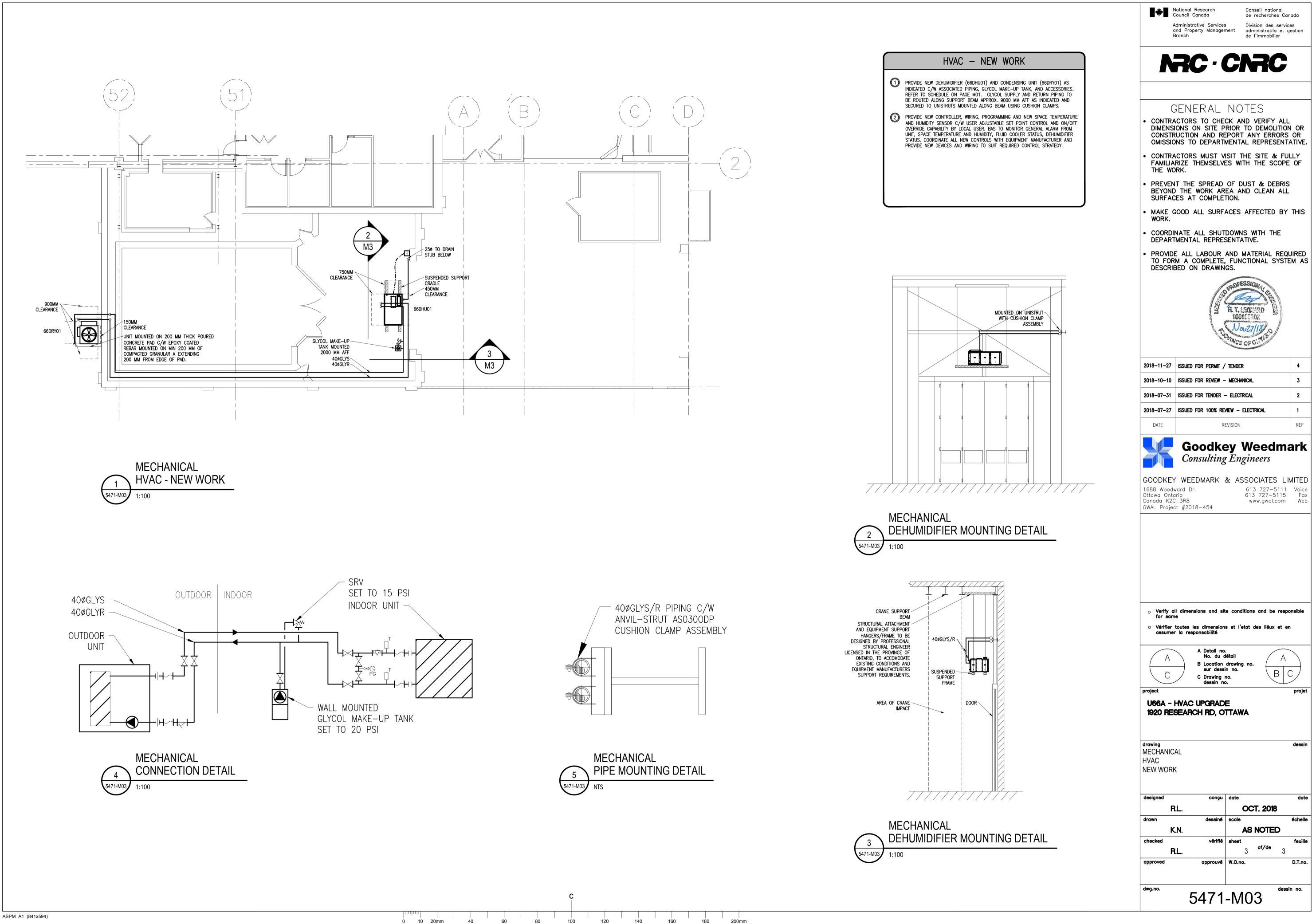
GLYCOL RETURN

ACTIVITIES

.1 GENERAL:

.2 TOLERANCES:

National Research	Conseil national					
Administrative Services	de recherches Canada Division des services					
and Property Management Branch						
GENERAL N • CONTRACTORS TO CHECK						
DIMENSIONS ON SITE PRIO CONSTRUCTION AND REPOR	RT ANY ERRORS OR					
• CONTRACTORS MUST VISIT						
FAMILIARIZE THEMSELVES V THE WORK.						
• PREVENT THE SPREAD OF						
BEYOND THE WORK AREA SURFACES AT COMPLETION						
MAKE GOOD ALL SURFACE WORK.	S AFFECTED BY THIS					
COORDINATE ALL SHUTDOW DEPARTMENTAL REPRESENT						
PROVIDE ALL LABOUR AND						
TO FORM A COMPLETE, FU DESCRIBED ON DRAWINGS.						
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2018-10-10 ISSUED FOR REVIEW - MEC						
2018–07–31 Issued for tender – Ele	CTRICAL 2					
2018-07-27 ISSUED FOR 100% REVIEW	- ELECTRICAL 1					
DATE REVISIC	N REF					
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Consulting E	<b>Weedmark</b> <i>ngineers</i>					
	0					
GOODKEY WEEDMARK & A	613 727-5111 Voice					
Ottawa Ontario Canada K2C 3R8 GWAL Project #2018-454	613 727–5115 Fax www.gwal.com Web					
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60 | 80 | 120 | 140 | 160 | 180 | 100 

| 200mm

# GENERAL NOTES / TYPICAL DETAILS

#### GENERAL

THE GENERAL NOTES AND TYPICAL DETAILS ARE APPLICABLE TO ALL STRUCTURAL CONDITIONS NOT SPECIFICALLY DETAILED OR REFERENCED ON STRUCTURAL DRAWINGS.

THESE DRAWINGS ARE FOR THE USE OF THE CONSULTANT'S CLIENT ONLY. ALL INFORMATION SHOWN APPLIES TO THIS PROJECT ONLY AND REFLECTS THE BEST JUDGEMENT OF THE CONSULTANT IN LIGHT OF THE AVAILABLE INFORMATION AT THE TIME OF PREPARATION. DECISIONS OR ACTIONS MADE BY THIRD PARTIES BASED ON THE DRAWINGS ARE THE SOLE RESPONSIBILITY OF SUCH PARTIES. THESE DRAWINGS ARE THE PROPERTY OF ADJELEIAN ALLEN RUBELI LTD. AND MAY NOT BE REPRODUCED IN

#### CODES AND STANDARDS

ANY FORM WITHOUT WRITTEN PERMISSION.

DESIGN AND CONSTRUCTION TO BE IN ACCORDANCE WITH THE NATIONAL BUILDING CODE OF CANADA 2015, AND THE TERM "BUILDING CODE" THROUGHOUT THESE DRAWINGS MEANS THAT CODE. THE FOLLOWING STANDARDS MAY BE REFERRED TO BY SHORT FORM ON THESE DRAWINGS:

STANDARD TITLE/DESCRIPTION		SHORT FORM
ASTM A1085-13	COLD-FORMED WELDED CARBON STEEL HOLLOW STRUCTURAL SECTIONS (HSS)	ASTM A1085
CSA S16-09	DESIGN OF STEEL STRUCTURES	CSA S16

REFERENCES ARE TO METRIC VERSIONS OF STANDARDS, UNLESS CONTEXT DICTATES OTHERWISE. SHORT FORM REFERENCES TO CSA STANDARDS MAY SOMETIMES OMIT "CSA".

REFERENCES INCLUDE ALL PUBLISHED ERRATA AND SUPPLEMENTS, UNLESS NOTED OTHERWISE.

#### ABBREVIATIONS AND SYMBOLS

IN ADDITION TO NORMAL ABBREVIATIONS AND SYMBOLS FOR UNITS OF MEASUREMENT (SI UNITS AND US CUSTOMARY UNITS) OR DEFINED IN THE BUILDING CODE AND VARIABLES DESCRIBED ON THE DRAWINGS, THE FOLLOWING ABBREVIATIONS MAY HAVE BEEN USED ON THESE DRAWINGS, WITH OR WITHOUT PERIODS AND SOMETIMES IN COMBINATION:

AFF	ABOVE FINISHED FLOOR					
В	ВОТТОМ					
BOT.	ВОТТОМ					
BPL	BASE PLATE					
BRG	BEARING					
С	CHANNEL OR COMPRESSION					
c/c	CENTRE TO CENTRE					
CJ	CONTROL JOINT					
CONC.	CONCRETE					
CONT.	CONTINUOUS					
c/w	COMPLETE WITH (INCLUDING)					
D.L.	DEAD LOAD					
DIM.	DIMENSION					
EA.	EACH					
E.E	EACH END					
E.F.	EACH FACE					
E.J.	EXPANSION JOINT					
E.S.	EACH SIDE					
EXP. JT	EXPANSION JOINT					
EX.	EXISTING					
EXIST.	EXISTING					
E.W.	EACH WAY					
EL.	ELEVATION					
EXT.	EXTERIOR					
F	FORCE, AXIAL FORCE					
F.F	FAR FACE					
F.D.	FLOOR DRAIN					
FDN	FOUNDATION					
FTG	FOOTING					
FL.	FLOOR					
GALV.	GALVANIZED					
Н	HORIZONTAL					
HOR.	HORIZONTAL					
I.F.	INSIDE FACE					
INT.	INTERIOR					
INCL.	INCLUDING					
L	LENGTH OR STEEL ANGLE					
Ld	REINFORCEMENT DEVELOPMENT LENGTH (TENSION UNLESS NOTED OTHERWISE)					

L.L.	LIVE LOAD OR LOWER LAYER			
LLH	LONG LEG HORIZONTAL			
LLV	LONG LEG VERTICAL			
 M	MOMENT			
MIRR.	MIRRORED			
N.F.	NEAR FACE			
N.I.C.	NOT IN CONTRACT			
N.T.S.	NOT TO SCALE			
0.F.	OUTSIDE FACE			
OPP.	OPPOSITE			
P.C.	PRECAST CONCRETE OR PILECAP			
PCO	PILE CUT-OFF			
PL	PLATE			
REINF.	REINFORCING			
REQ'D	REQUIRED			
R.O.	ROUGH OPENING			
SEC	SECTION			
S.O.G.	SLAB ON GRADE			
STD	STANDARD			
Т	TOP OR TENSION FORCE			
T/	TOP OF			
T.O.	TOP OF			
TJ	TIE JOIST			
T.O.S.	TOP OF STEEL OR TOP OF SLAB			
T.O.W.	TOP OF WALL			
TYP.	TYPICAL			
U.L.	UPPER LAYER			
U/N	UNLESS NOTED			
U/S	UNDERSIDE			
V	VERTICAL OR SHEAR FORCE			
VERT.	VERTICAL			
V.O.S.	VERIFY ON SITE			
WWM	WELDED WIRE MESH			
0	AT (SPACING CENTRE TO CENTRE)			
Ø	DIAMETER			

OTHER ABBREVIATIONS MAY BE USED IN CONTEXT - REQUEST CLARIFICATION IF UNSURE

STRUCTURAL STEE

ENGINEER.

STRUCTURAL STEEL & CONNECTIONS:

STRUCTURES.

STRUCTURAL STEEL.

## SHOP DRAWINGS, SUBMITTALS AND DESIGN DETAILING **CRITERIA FOR SUPPLIERS:**

REPRODUCTIONS OF THE STRUCTURAL DRAWINGS SHALL NOT BE ACCEPTED AS SHOP DRAWINGS.

"PROFESSIONAL ENGINEER" IN THE FOLLOWING PARAGRAPHS AND THROUGHOUT THESE DRAWINGS MEANS A PROFESSIONAL ENGINEER REGISTERED IN AND LICENSED TO PRACTICE IN THE PROVINCE OF ONTARIO AND THE ENGINEER'S "SEAL" SHALL INCLUDE THEIR STAMP, THEIR SIGNATURE AND THE DATE OF SEALING.

REVIEW OF DRAWINGS APPLIES TO GENERAL ARRANGEMENT ONLY FOR THE PURPOSE OF ASCERTAINING CONFORMANCE WITH THE GENERAL DESIGN CONCEPT. THIS REVIEW DOES NOT IMPLY APPROVAL OF DETAIL DESIGN OR QUANTITIES IN SUBMITTED DRAWINGS, NOR DOES IT RELIEVE THE CONTRACTOR OF THEIR RESPONSIBILITY FOR MAKING THE WORK COMPLETE, ACCURATE AND IN ACCORDANCE WITH THE STRUCTURAL DRAWINGS. ALLOW 15 WORKING DAYS FOR SHOP DRAWING REVIEW.

DO NOT FABRICATE MATERIALS BASED ON REJECTED OR DISAPPROVED SHOP DRAWINGS. DOCUMENT SUBMISSIONS SHALL INCLUDE FOR EACH DOCUMENT ELECTRONIC FILES IN PDF FORMAT DELIVERED BY EMAIL TO SUBMITTALS@AAR.CA, UNLESS OTHER FORMATS AND/OR METHODS OF DELIVERY ARE AGREED IN WRITING IN ADVANCE OF SUBMISSION.

PAPER DOCUMENTS SUBMITTED IN LIEU OF ELECTRONIC DOCUMENTS SHALL INCLUDE 2 COPIES AND 1 REPRODUCIBLE FOR EACH DOCUMENT.

SUBMIT WITH SHOP DRAWINGS: DECKING PLAN, PROFILE, DIMENSIONS, CORE THICKNESS, CONNECTIONS TO SUPPORTS, REQUIRED BEARINGS, CLOSURES AND ACCESSORIES.

SUBMIT FOR REVIEW ERECTION DRAWINGS WITH ALL FIELD WORK DETAILS FOR ALL STRUCTURAL STEEL ELEMENTS. ALL STEEL-TO-STEEL CONNECTIONS SHALL BE DESIGNED BY AND THE DRAWINGS SEALED BY A PROFESSIONAL ENGINEER.

SHOP DRAWING SUBMITTALS SHALL INCLUDE STEEL BEAM AND COLUMN CONNECTIONS AND STEEL JOIST DETAILS ALONG WITH DESIGN CALCULATIONS. JOIST CALCULATIONS SHALL BE SEALED BY A PROFESSIONAL

JOIST FABRICATOR TO SUBMIT LAYOUT DRAWINGS FOR JOISTS TO ALLOW CO-ORDINATION OF RELATED INSERTS BY GENERAL CONTRACTOR.

STRUCTURAL STEEL CONNECTIONS SHALL BE DESIGNED TO RESIST THE INDICATED FACTORED MEMBER REACTIONS BY A PROFESSIONAL ENGINEER WHO WILL ALSO SEAL AND SIGN THE SHOP DRAWINGS.

WELDING SHALL BE DESIGNED AND CONSTRUCTED IN ACCORDANCE WITH CSA S16 AND CSA W59. WORK SHALL BE PERFORMED BY CONTRACTORS CERTIFIED AS PER CSA W47.1 AND MEMBERS OF THE CANADIAN WELDING BUREAU.

WHERE DESIGN REACTIONS ARE NOT INDICATED USE THE MAXIMUM REACTION FOR SPAN FROM CISC BEAM LOAD TABLES. FOR COMPOSITE BEAMS INCREASE MAXIMUM REACTION BY 30% (1.3 TIMES). STEEL STRUCTURES DESIGNED TO RESIST SEISMIC FORCES; STEEL CONNECTIONS SHALL BE DESIGNED TO CSA S16, CLAUSE 27.

#### SOURCE OF STRUCTURAL STEEL (INCLUDING FASTENERS AND CFS): ALL STEEL TO MEET SPECIFIED STANDARDS AND THE FOLLOWING:

PROVIDE MILL CERTIFICATES FOR ALL STEEL. PROVIDE TRACING REPORT SHOWING CHAIN OF CUSTODY FROM POINT OF ORIGIN TO SITE. ALL STEEL SHALL HAVE A BORON CONTENT OF NOT MORE THAN 0.0008% BY MASS (8 PARTS IN ONE MILLION BY MASS). STEEL ORIGINATING FROM OUTSIDE OF CANADA, THE UNITED STATES AND THE EUROPEAN UNION SHALL ADDITIONALLY MEET THE FOLLOWING: PROVIDE MATERIAL TESTING TO CONFIRM THE CONFORMANCE TO THE

RELEVANT STANDARDS AND THE MAXIMUM BORON CONTENT NOTED ABOVE. THIS TESTING SHALL BE PERFORMED IN CANADA BY AN ISO 17025 ACCREDITED TESTING LABORATORY.

### DIMENSIONS

CHECK DIMENSIONS ON THESE DRAWINGS AGAINST DIMENSIONS ON SITE BEFORE USING THEM FOR FABRICATION OR CONSTRUCTION. REPORT DISCREPANCIES IMMEDIATELY UPON DISCOVERY.

DRAWINGS HAVE BEEN MADE REASONABLY TO SCALE BUT CONTRACTOR MUST NOT SCALE THE DRAWINGS.

#### **RECORD DRAWINGS**

CONTRACTOR SHALL MAINTAIN TWO SETS OF RECORD DRAWINGS, SHOWING AS-BUILT CONDITIONS OF ALL ASPECTS OF THE STRUCTURE, AVAILABLE FOR REVIEW DURING CONSTRUCTION, AND FOR SUBMISSION TO THE CONSULTANT AND THE OWNER UPON PROJECT COMPLETION.

## INSPECTIONS AND TESTING

THE FOLLOWING ITEMS SHALL BE INSPECTED OR TESTED BY INDEPENDENT INSPECTION/ TESTING AGENCIES DESIGNATED BY THE CLIENT. MATERIALS AND WORKMANSHIP NOT CONFORMING TO THE SPECIFICATIONS SHALL BE REJECTED BY THE CONTRACTOR. REPORTS AND TEST RESULTS SHALL BE PROMPTLY SUBMITTED TO THE ENGINEER FOR REVIEW. TESTING SHALL INCLUDE BUT NOT BE LIMITED TO:

VERIFY THAT MATERIALS AND FABRICATION, INCLUDING ALIGNMENT, PLUMBNESS, BEARING, TOLERANCES, CONNECTIONS, BOLTS, TORQUE, WELDS, AND PAINTING CONFORM TO THE CONTRACT DOCUMENTS, TO CSA S16, TO CSA W59, AND TO OTHER APPLICABLE STANDARDS.

TIGHTNESS OF BOLTED CONNECTIONS AND CHECK ON BEARING, PLUMBNESS AND ALIGNMENT OF STEEL

WELDING INSPECTIONS TO BE VISUAL, EXCEPT WHERE NON-DESTRUCTIVE TESTING IS DEEMED NECESSARY BY THE TESTING AGENCY OR ENGINEER. NON-DESTRUCTIVE TESTING TO VERIFY THE QUALITY OF WELDING, WHERE DEEMED QUESTIONABLE BY VISIBLE DEFECTS OR WHERE REQUIRED BY THE ENGINEER. SURFACE PREPARATION AND PAINT APPLICATION IN BOTH SHOP AND FIELD FOR EXPOSED PAINTED

SUBMIT INSPECTION REPORTS, OUTLINING PROGRESS OF WORK, AND STATING WHETHER OR NOT IT CONFORMS TO THE CONTRACT DOCUMENTS.

## STRUCTURAL STEEL

STRUCTURAL STEEL DESIGN AND CONSTRUCTION SHALL COMPLY WITH CSA S16, UNLESS OTHERWISE NOTED.

ITEM	APPLICABLE SPECIFICATION
W-SHAPES	CSA G40.20/G40.21 - 350W
C, MC AND L-SHAPES	CSA G40.20/G40.21 - 300W
HSS (TUBE)	CSA G40.20/G40.21 - 350W CLASS C OR ASTM A1085
PLATE AND BARS	CSA G40.20/G40.21 - 300W
BOLTS, NUTS AND WASHERS	ASTM A325M c/w A563M AND F436M

ALL STRUCTURAL STEEL TO BE PRIME PAINTED EXCEPT STEEL RECEIVING GALVANIZING, OR STEEL TO BE CAST IN CONCRETE.

ALL BEAM CONNECTIONS TO BE TWO-SIDED UNLESS NOTED. PROVIDE A MINIMUM BEARING OF 200 MM FOR ALL STEEL BEARING ON CONCRETE AND 100 MM FOR STEEL

BEARING ON STEEL UNLESS NOTED. CENTRE ALL BEARING PLATES UNDER BEAMS UNLESS NOTED.

DO NOT CUT OR CORE ANY OPENINGS IN ANY STRUCTURAL STEEL MEMBERS WITHOUT PRIOR WRITTEN APPROVAL FROM THE STRUCTURAL ENGINEER.

WHERE A STRUCTURAL STEEL SHAPE SHOWN ON THE DRAWINGS IS UNAVAILABLE, A SHAPE OF EQUAL OR GREATER SECTION PROPERTIES AND STRUCTURAL CAPACITY SHALL BE SUBSTITUTED, UPON APPROVAL BY OWNER AND CONSULTANT, AT NO EXTRA COST.

WHERE AN ALTERNATIVE MATERIAL IS REQUESTED, THE CONTRACTOR SHALL FORWARD ALL PRODUCT TECHNICAL INFORMATION FOR REVIEW BY THE ENGINEER.

BOLTS AND RODS SHALL BE SUPPLIED TO SITE AS AN ASSEMBLY WITH THEIR ASSOCIATED NUTS AND WASHERS.

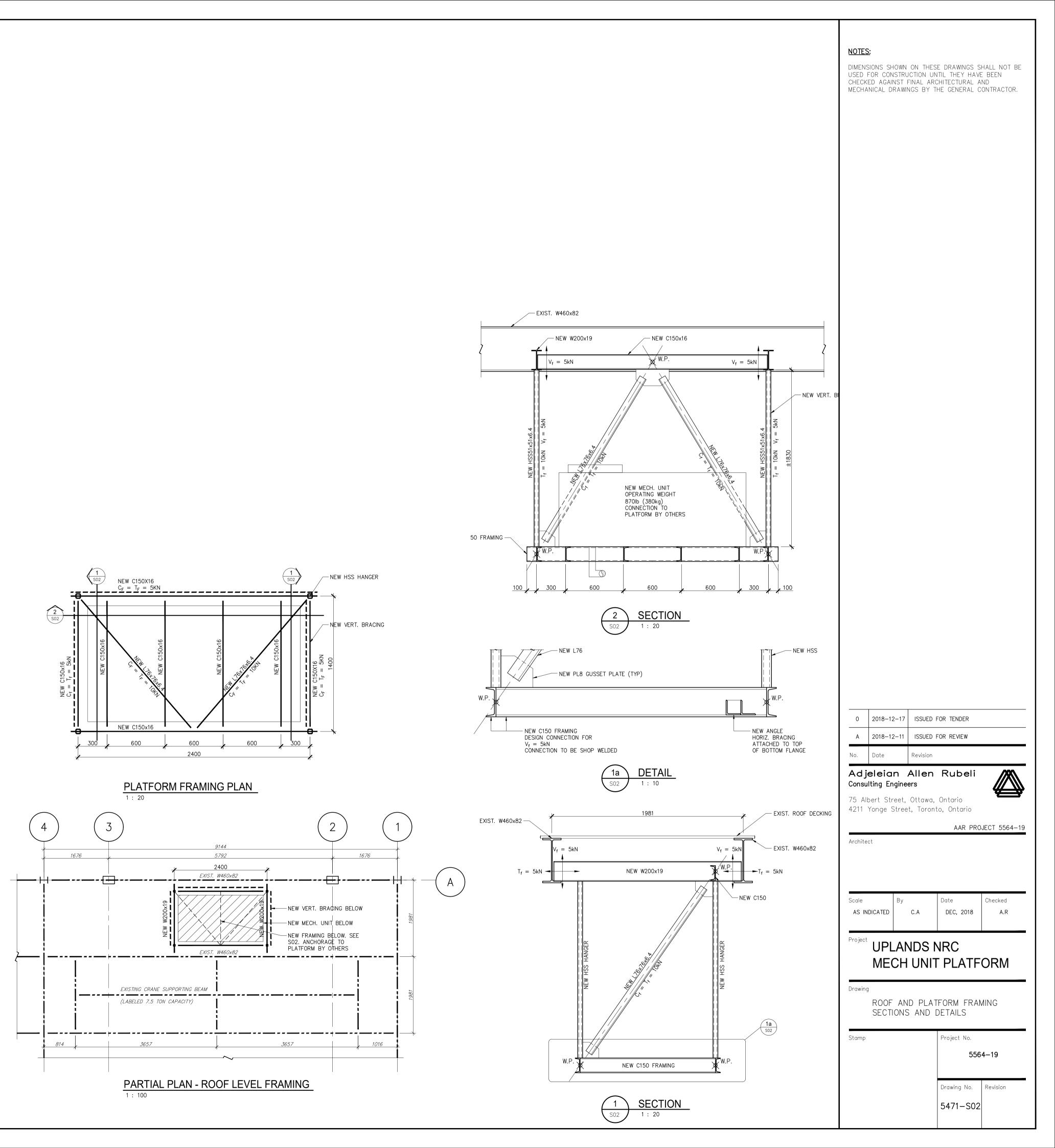
THREADED COMPONENTS SHALL MEET ANSI/ASME B18.2.6M HEAVY HEX CLASS 2A.

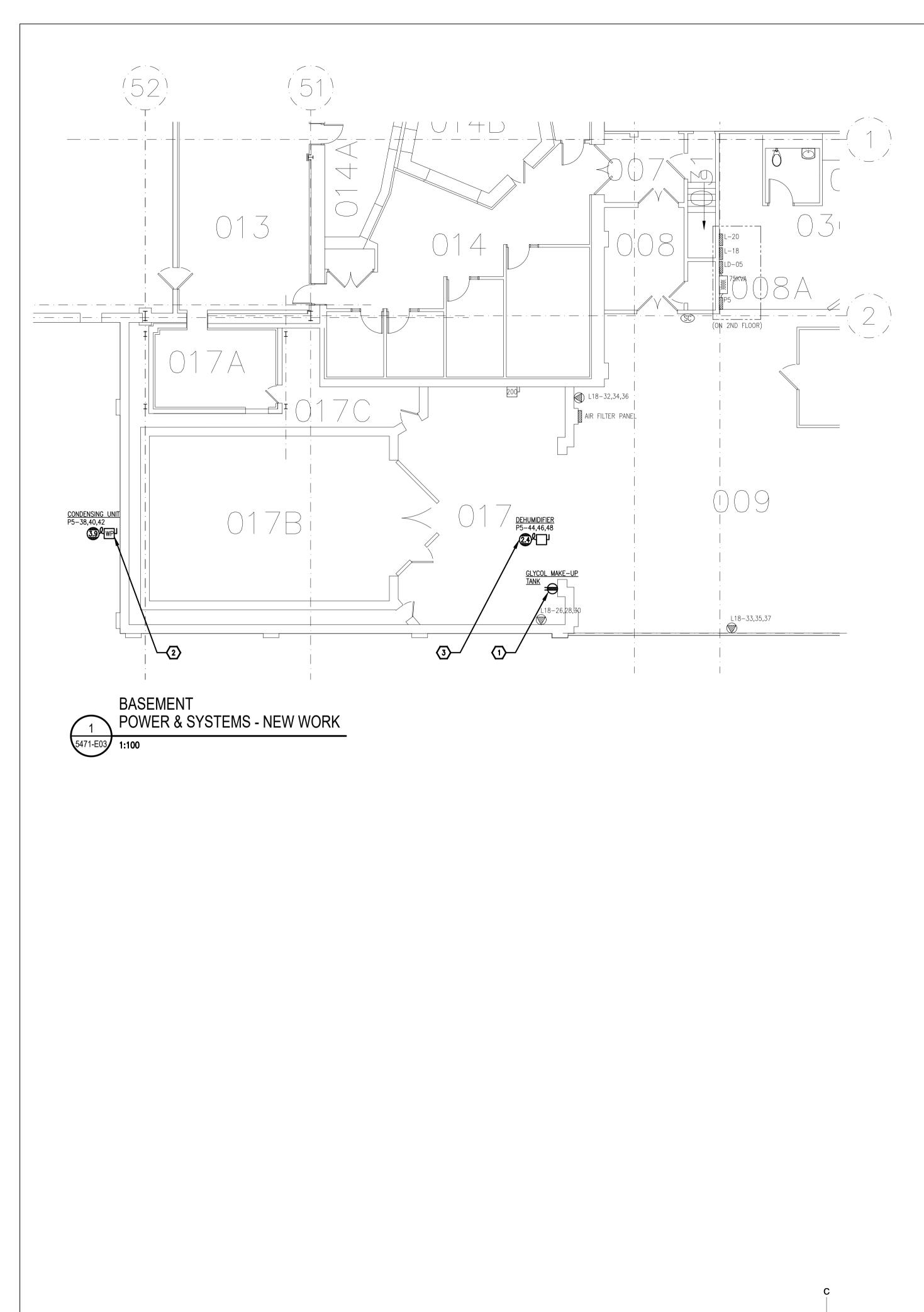
THE APPLICABLE EDITIONS OF ALL ABOVE STANDARDS SHALL BE THOSE REFERENCED BY CSA S16 UNLESS NOTED OTHERWISE.

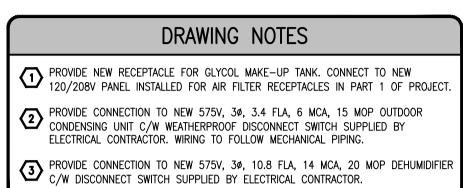
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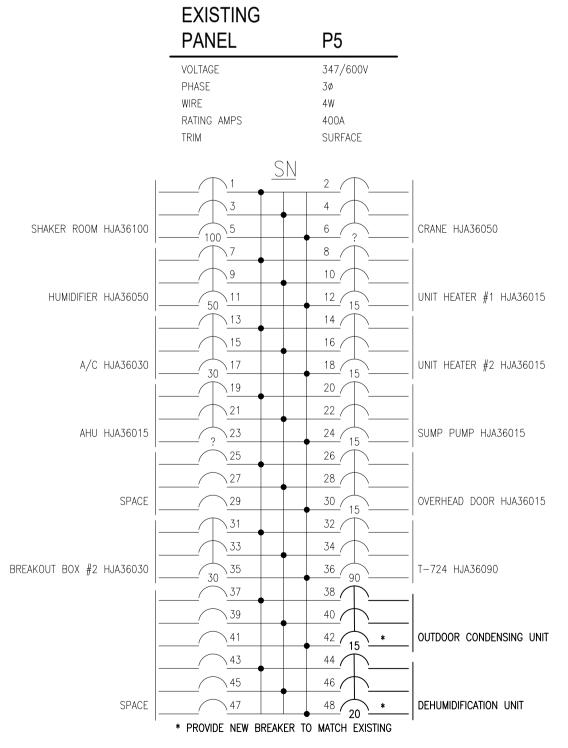
DIMENSIONS SHOWN ON THESE DRAWINGS SHALL NOT BE USED FOR CONSTRUCTION UNTIL THEY HAVE BEEN CHECKED AGAINST FINAL ARCHITECTURAL AND MECHANICAL DRAWINGS BY THE GENERAL CONTRACTOR.

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ELECTRICAL SPECIFICATIONS: COMPLY WITH THE REQUIREMENTS OF THE INSTRUCTIONS TO BIDDERS, THE GENERAL CONDITIONS OF THE CONTRACT AND THE SUPPLEMENTARY GENERAL CONDITIONS INCLUDED IN THE TENDER DOCUMENTS.

- CONTRACTOR SHALL FOLLOW THE BIDDING DOCUMENT PROJECT SCHEDULE. UPON AWARD, CONTRACTOR SHALL SUBMIT WORK SCHEDULE AND EQUIPMENT DELIVERY SCHEDULE TO PROJECT MANAGER & ENGINEER FOR REVIEW AND APPROVAL.
- . ALL WORK TO BE CONDUCTED DURING HOURS SPECIFIED BY THE PROJECT MANAGER
- ALL INSTALLATIONS SHALL BE IN ACCORDANCE WITH ALL APPLICABLE CODES AND BY-LAWS AND BE INSTALLED BY LICENSED WORKMEN SKILLED IN THAT PARTICULAR PORTION OF THE CONTRACT.
- ANY CONFLICT OR QUESTIONS THAT ARISE IN RELATION TO THE DESIGN DOCUMENTS DURING THE TENDER PERIOD SHALL BE BROUGHT TO THE ATTENTION OF THE ENGINEER. IF THIS PROCEDURE IS NOT FOLLOWED, REROUTING AND MODIFICATION AS REQUIRED TO COMPLETE THE WORK SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR.
- GIVE ALL NOTICES, OBTAIN ALL NECESSARY PERMITS AND PAY ALL APPLICABLE FEES AND INSPECTION COSTS AND DELIVER TO ENGINEER ALL NECESSARY FINAL CERTIFICATES OF INSPECTION AND APPROVAL WHICH MAY BE REQUIRED BY AUTHORITIES HAVING JURISDICTION OVER WORK, AS EVIDENCE THAT WORK INSTALLED CONFORMS WITH LAWS AND REGULATIONS OF ALL GOVERNING AUTHORITIES. BEFORE FINAL CERTIFICATE OF PAYMENT MAY BE CONSIDERED DUE. FURNISH COPIES OF ALL DRAWINGS AS MAY BE REQUIRED TO COMPLY WITH ABOVE. NOTIFY INSPECTION AUTHORITIES IN SUFFICIENT TIME FOR THEM TO INSPECT WORK.
- EXAMINE SITE AND LOCAL CONDITIONS AFFECTING WORK UNDER THIS DIVISION TO ENSURE THAT WORK UNDER THIS DIVISION CAN BE SATISFACTORILY CARRIED OUT WITHOUT CHANGES TO DRAWINGS. NO ALLOWANCE WILL BE MADE LATER FOR ANY EXPENSE INCURRED THROUGH FAILURE TO MAKE THIS EXAMINATION. START OF WORK WILL BE DEEMED EVIDENCE OF ACCEPTANCE OF, AND SATISFACTION WITH, EXISTING CONDITIONS.
- . GUARANTEE ALL WORK FOR 12 MONTHS FROM THE DATE OF ACCEPTANCE.
- ENSURE THAT ALL PRECAUTIONS ARE TAKEN TO PROTECT ALL PERSONNEL FROM HAZARDS DURING THE WORK. PROTECT ALL EQUIPMENT FROM DAMAGE FROM ANY CAUSE INCLUDING WEATHER.
- 10. USE ONLY NEW, FULLY CSA AND ULC APPROVED FOR USE AS INSTALLED MATERIALS, AND TO MEET THIS SPECIFICATION IN ALL RESPECTS.
- . INSPECT ALL EQUIPMENT UPON DELIVERY AND NOTIFY PROJECT ENGINEER OF ANY DAMAGE OR DEFICIENCIES.
- 12. COORDINATE MATERIAL STORAGE WITH THE SITE SUPERINTENDENT AND OTHER
- 13. CONTRACTOR TO NOTIFY PROJECT MANAGER IN WRITING MINIMUM OF THREE (3) WORKING DAYS BEFORE SCHEDULED SUBSTANTIAL COMPLETION TO ARRANGE INTERIM INSPECTION AND EQUIPMENT COMMISSIONING. NOTIFY PROJECT MANAGER IN WRITING OF ANY CHANGES IN SCHEDULE.
- 14. DURING THE COURSE OF CONSTRUCTION AND UPON COMPLETION. REMOVE ALL RUBBISH AND WASTE RESULTING FROM THIS WORK, TO THE SATISFACTION OF THE ENGINEER. CHECK, CLEAN AND REPAINT WHERE NECESSARY, ALL ELECTRICAL EQUIPMENT AND LEAVE IN A FIRST CLASS CONDITION.
- 5. THE WORK AS COVERED BY THESE SPECIFICATIONS AND PLANS IS INTENDED TO COMPLY EXACTLY WITH THE LATEST RULES AND REGULATIONS OF THE INSPECTION AUTHORITIES. AND THESE RULES ARE TO BE CONSIDERED AN INTEGRAL PART OF THESE SPECIFICATIONS. IN CASE OF CONFLICT, ANY RULING BY THE INSPECTION AUTHORITY SHALL BE FINAL. ALL CHANGES AND ALTERATIONS TO THE CONTRACTOR'S WORK REQUIRED BY AN AUTHORIZED INSPECTOR OR ANY AUTHORITY HAVING JURISDICTION DUE TO THE CONTRACTORS WORK SHALL BE CARRIED OUT AT NO EXPENSE TO THE OWNER.
- 6. MANUFACTURER'S INSTRUCTIONS REGARDING THE HANDLING, INSTALLATION AND TESTING OF EQUIPMENT SPECIFIED HEREIN SHALL BE CONSIDERED PART OF THIS SPECIFICATION
- 7. PROVIDE ELECTRONIC COPY (PDF FORMAT) OF SHOP DRAWINGS FOR ALL SYSTEMS AND EQUIPMENT FOR REVIEW. SHOP DRAWINGS SHALL INCLUDE BUT NOT BE LIMITED TO, THE FOLLOWING INFORMATION:
- FLOOR ANCHORING METHOD AND FOUNDATION TEMPLATE. DIMENSIONED CABLE ENTRY AND EXIT LOCATIONS.
- DIMENSIONED POSITION AND SIZE OF BUS. OVERALL WEIGHT, LENGTH, HEIGHT AND DEPTH, GAUGE AND TYPE OF MATERIALS.
- DIMENSIONED LAYOUT OF INTERNAL AND FRONT PANEL.
- MOUNTED COMPONENTS. ELECTRICAL CHARACTERISTICS AND PERFORMANCE DATA.
- WIRING DIAGRAMS.
- NAME OF CONTRACTOR C/W SIGNED REVIEW STAMP. NAME OF COMPONENT, SERVICE OR SYSTEM.
- NUMBER OF PAGES FOR EACH TYPED PAGE (IE. PG 1 OF 5).
- 18. SUBMIT ELECTRONIC (PDF FORMAT) COPY OF OPERATION & MAINTENANCE (0&M) MANUALS FOR APPROVAL. PROVIDE A COPY OF THE FOLLOWING IN THE MANUALS: LETTER OF WARRANTY
- ELECTRICAL SAFETY AUTHORITY (ESA) INSPECTION CERTIFICATE.
- CITY INSPECTION REPORT UPDATED PANEL SCHEDULES, C/W ELECTRICAL COMPANY'S NAME AND DATED SHOP DRAWINGS
- AS BUILTS
- LOAD BALANCING REPORT. MECHANICAL EQUIPMENT START UP REPORTS.
- LIST OF SUPPLIERS C/W ADDRESS AND PHONE NUMBERS.
- 19. SUPPLY ALL NECESSARY TOOLS. EQUIPMENT AND PERSONNEL AND PROVIDE DEMONSTRATION AND TRAINING TO OPERATING AND MAINTENANCE PERSONNEL IN OPERATING, CONTROLLING, ADJUSTING, TROUBLESHOOTING AND SERVICING OF ALL SYSTEMS AND EQUIPMENT DURING REGULAR WORK HOURS, PRIOR TO ACCEPTANCE.
- 20. AFTER AWARD OF CONTRACT, SUBMIT A DETAILED COST BREAKDOWN INDICATING MATERIAL AND LABOUR COSTS FOR EACH PORTION OF THE WORK, INCLUDING DEMOLITION. LIGHTING. POWER DISTRIBUTION, COMMUNICATIONS, FIRE ALARM, ETC. TO BE APPROVED BY THE ENGINEER.
- 21. EXISTING ELECTRICAL SYSTEMS HAVE BEEN ONLY PARTIALLY INDICATED. REGARD INFORMATION RELATED TO EXISTING INSTALLATION AS A GUIDE ONLY. DETERMINE STATUS, QUANTITIES AND LOCATION OF EQUIPMENT AND SYSTEMS, ON SITE, PRIOR TO COMMENCEMENT OF REMOVAL AND/OR EXTENSION OF SAME.
- 22. THE DRAWINGS SHALL BE CONSIDERED TO SHOW THE GENERAL CHARACTER AND SCOPE OF THE WORK AND NOT THE EXACT DETAILS OF THE INSTALLATION. THE INSTALLATION SHALL BE COMPLETE WITH ALL ACCESSORIES REQUIRED FOR A COMPLETE AND OPERATIVE INSTALLATION.
- 23. THESE ELECTRICAL DRAWINGS AND SPECIFICATIONS MUST BE READ IN CONJUNCTION WITH THE ARCHITECTURAL AND MECHANICAL DRAWINGS AND SPECIFICATIONS.
- 24. THE WORD "PROVIDE" SHALL DENOTE "SUPPLY, INSTALL, CONNECT AND TEST".
- LABELING: 25. FOR ALL NEW, RELOCATED AND EXISTING-TO-REMAIN ELECTRICAL DEVICES WITHIN THE CONTRACT AREA. PROVIDE CLEAR "BROTHER P-TOUCH" LABELS INDICATING CIRCUIT AND PANEL AT ALL EQUIPMENT, DEVICES, RECEPTACLES AND JUNCTION BOXES. FOR DEDICATED RECEPTACLE, INCLUDE THE WORD "DED" C/W CIRCUIT
- NUMBER. FOR EXIT LIGHTS. PROVIDE BLACK LETTERING ON RED BACKGROUND. PROVIDE LAMACOID LABELS ON DISCONNECT SWITCHES, MOTOR STARTERS, TRANSFORMERS AND PANELS. CLEARLY INDICATE EQUIPMENT CONTROLLED OR AREA
- SERVICED AS WELL AS FEEDER SOURCE. INDICATE FUSE SIZE AND TYPE ON FUSED DISCONNECTS SWITCHES. LETTERING TO BE BLACK ON WHITE BACKGROUND. MINIMUM 25mm HIGH. TRACE EXISTING CIRCUITS AND UPDATE PANEL SCHEDULES.

- 26. PROVIDE CUTTING, PATCHING AND CORING OF ALL WALLS, CEILINGS AND OTHER SURFACES REQUIRED TO FIT THE ELECTRICAL EQUIPMENT. CHECK WITH BUILDING MANAGEMENT PRIOR TO CORE DRILLING AND CUTTING OF FLOOR SLAB, REGARDING BUILDING REQUIREMENTS AND POLICIES. PRIOR TO SLAB CUTTING OR CORING. FIRST SCAN THE SLAB AND COORDINATE DRILLING TO MINIMIZE CUTTING OF THE REINFORCING STEEL, FIRE STOP ALL NEW FIRE RATED PENETRATIONS. THE CONTRACTOR IS TO INCLUDE IN TENDER PRICE ALL WORK ASSOCIATED WITH CORE DRILLING AFTER NORMAL WORKING HOURS. OBTAIN WRITTEN VERIFICATION OF THE LOCATIONS FROM THE ARCHITECT AND/OR INTERIOR DESIGNER PRIOR TO DRILLING. CUTTING TORCHES SHALL NOT BE USED FOR MAKING HOLES. PATCH ALL HOLES THROUGH SLAB WITH FIRE-STOP CAULKING (ULC LISTED). PATCHED SURFACES ARE TO BE PRIME FINISHED, READY FOR FINAL COVERING BY OTHERS.
- ANCHORING METHODS: ELECTRICAL EQUIPMENT, FIXTURES, CABLE TRAY, CONDUIT AND CABLING IS TO BE SECURELY ANCHORED OR FASTENED TO THE BUILDING STRUCTURE USING DRILLED HOLE WEDGE ANCHORS FOR CONCRETE STRUCTURES OR STEEL CLAMPS FOR STEEL STRUCTURES.
- a.a. AIR, FUEL OR POWDER ACTUATED DEVICES OR ANY OTHER EQUIVALENT TYPE OF FASTENING DEVICES ARE NOT TO BE USED. WHERE ANCHORING METHOD FORMS PART OF SEISMIC RESTRAINT a.b. REQUIREMENTS, ANCHORING METHODS TO COMPLY WITH SEISMIC RESTRAINT SYSTEMS (SRS).
- 28. GROUNDING AND BONDING: PROVIDE GROUNDING AND BONDING OF ALL EQUIPMENT WITH APPROVED FITTINGS AND CONDUCTORS OF AMPLE CAPACITY IN ACCORDANCE WITH ONTARIO ELECTRICAL SAFETY CODE. ALL CONDUCTORS SHALL HAVE GREEN INSULATION OR BE COLOUR CODED WITH PERMANENTLY ATTACHED GREEN TAPE 21MM WIDE AT EACH END.
- PROVIDE INSULATED GROUND/BONDING CONDUCTOR IN EACH CONDUIT. 29. WIRING AND RACEWAYS:
- a. ALL INTERIOR WIRING SHALL BE STRANDED COPPER RW90 #12 CONDUCTOR MINIMUM.
- ALL EXTERIOR UNDERGROUND WIRING TO BE COPPER RWU-90, MINUS 40 C b.
- c. ALL NEW RACEWAYS SHALL BE THIN WALL ELECTRICAL METALLIC TUBING (EMT). AC-90 (BX) SHALL NOT BE USED, ALL WIRING TO BE IN EMT. CONDUITS TO BE COMPLETE WITH STEEL SET-SCREW COUPLINGS AND CONNECTORS AND NYLON
- BUSHING d. USE LIQUID TIGHT FLEXIBLE METAL CONDUIT FOR CONNECTION TO MOTORS. USE LIQUID TIGHT FLEXIBLE METAL CONDUIT FOR CONNECTION TO EQUIPMENT IN
- DAMP. WET OR CORROSIVE LOCATIONS. SURFACE CONDUIT TO RUN PARALLEL OR PERPENDICULAR TO BUILDING LINES. ALL CONDUITS AND JUNCTION BOXES TO BE ANCHORED TO THE BUILDING
- STRUCTURF. PROVIDE A POLYPROPYLENE PULL STRING IN ALL EMPTY CONDUITS.
- EXISTING FEEDERS RELOCATED UNDER THIS CONTRACT TO BE REWIRED: SPLICE NEW WIRE TO EXISTING WIRE FROM JUNCTION BOX TO JUNCTION BOX, OR FROM JUNCTION BOX TO EXISTING EQUIPMENT. CONTRACTOR MAY RE-USE EXISTING CONDUIT AND/OR GRID PULL BOXES WHERE
- SUITABLE FOR RE-USE WITH NEW OR RELOCATED RUNS. REMOVE AND DISPOSE OF ANY REDUNDANT EXISTING WIRING. 120V CIRCUITS OF LENGTH GREATER THAN 25m TO BE #10 AWG MINIMUM OR AS
- REQUIRED TO LIMIT VOLTAGE DROP WITHIN CODE SPECIFIED VALUE. MINIMUM SIZE CONDUIT TO BE 21mm UNLESS SPECIFIED OTHERWISE.
- 30. ALL NEW SURFACE MOUNTED EQUIPMENT IS TO BE SPRINKLERPROOF, EEMAC TYPE 2, IN SPRINKLERED AREAS.
- DEVICES: SWITCHES AND RECEPTACLES TO BE SPECIFICATION GRADE WITH COVER PLATES AND COLOUR AS SPECIFIED. INSTALL & MOUNT TO CODES AND STANDARDS. COORDINATE EXACT LOCATIONS WITH ARCHITECTURAL AND/OR INTERIOR DESIGNER'S DRAWINGS.

WIRING DEVICES COLOUR CODING:

STANDARD RECEPTACLE BLACK STAINLESS STEE

32. MOUNTING HEIGHTS:

UNLESS NOTED OTHERWISE, MOUNTING HEIGHT FOR ALL ELECTRICAL DEVICES SHALL MEET 'BARRIER-FREE' CODE REQUIREMENTS:

- a. 400mm A.F.F. FOR RECEPTACLES, VOICE/DATA OUTLETS, ETC. b. 1100mm A.F.F. FOR LIGHT SWITCHES, ETC.
- 33. <u>DISCONNECT SWITCHES:</u> a. HEAVY DUTY FUSIBLE AND NON-FUSIBLE DISCONNECT SWITCH IN CSA ENCLOSURE
- 2 (SPRINKLER PROOF), SIZED AS INDICATED. CSA 3 ENCLOSURE IN OUTDOOR OR DAMP LOCATIONS. ARC QUENCHER AND VISIBLE BLADE, QUICK MAKE, QUICK BREAK
- PROVISION FOR PADLOCKING IN OFF SWITCH POSITION. MECHANICALLY INTERLOCKED DOOR TO PREVENT OPENING WHEN HANDLE IN ON POSITION.
- d. FUSES: SIZE AS INDICATED, HRCJ (TIME DELAY TYPE).
- 34. MOTOR STARTERS:
- a. MANUAL MOTOR STARTERS: HEAVY DUTY C/W ONE OVERLOAD PER PHASE, PILOT LIGHT, QUICK MAKE, QUICK BREAK TOGGLE SWITCH, LOCKING TABS IN "OFF" POSITION. CSA CERTIFIED AS A DISCONNECTING MEANS.
- 35. MECHANICAL EQUIPMENT WIRING: PROVIDE ALL WIRING TO MECHANICAL EQUIPMENT. OBTAIN MECHANICAL SHOP DRAWINGS AND RECONFIRM FEEDER AND BREAKER REQUIREMENTS PRIOR TO INSTALLATION.
- 36. <u>MOLDED CASE CIRCUIT BREAKERS:</u> a. BOLT-ON MOLDED CASE CIRCUIT BREAKER: QUICK-MAKE, QUICK-BREAK TYPE, FOR MANUAL AND AUTOMATIC OPERATION WITH TEMPERATURE COMPENSATION FOR 40 C AMBIENT.
- COMMON-TRIP BREAKERS: WITH SINGLE HANDLE FOR MULTI-POLE APPLICATIONS. CIRCUIT BREAKERS WITH INTERCHANGEABLE TRIPS AS INDICATED. MOLDED CASE CIRCUIT BREAKER TO OPERATE AUTOMATICALLY BY MEANS OF
- THERMAL AND MAGNETIC TRIPPING DEVICES TO PROVIDE INVERSE TIME CURRENT TRIPPING AND INSTANTANEOUS TRIPPING FOR SHORT CIRCUIT PROTECTION.

37. FIELD QUALITY CONTROL

- a. CONDUCT AND PAY FOR THE FOLLOWING TESTS: a.a. 600V AND 120V POWER DISTRIBUTION INCLUDING PHASING, VOLTAGE,
- GROUNDING AND LOAD BALANCING. a.b. MOTORS, HEATERS AND ASSOCIATED CONTROL EQUIPMENT
- INSULATION INTEGRITY TESTING a.c. a.d. HOT SPOT TESTING BY INFRARED SCANNER
- SUBMIT TEST PROCEDURES AND INFORM ENGINEER AT LEAST 7 DAYS BEFORE SCHEDULED TESTS. ENGINEER TO WITNESS TESTS AT HIS DISCRETION.

NOTED, AND MAKE SAFE.

DEMOLITION NOTES:

OTHER DIVISIONS.

IS COMPLETE.

# <u>GENERAL NOTES:</u> 2 COORDINATE WORK WITH ALL OTHER TRADES TO AVOID INTERFERENCE

- CONDUIT. OR ANY OTHER SYSTEMS.
- AND CIRCUIT NUMBER) AS REQUIRED. FOR CEILING INSPECTION.

## POWER NOTES:

## COLOR CODING: 2. COLOUR CODE CONDUITS AND BOXES.

#### FOLLOWS: a. EMERGENCY POWER CIRCUITS - YELLOW CONDUIT b. VOICE/DATA – BLUE CONDUIT

- d. CONTROL SYSTEM BLACK CONDUIT
- CONDUITS AS FOLLOWS:
- b. VOICE/DATA BLUE c. BUILDING AUTOMATION SYSTEM - ORANGE
- A WALL.

# OUTLETS LOCATION:

- EXPENSE, IF REQUIRED.
- a. EMERGENCY POWER CIRCUITS YELLOW d. CONTROL SYSTEM – BLACK

6. ALL OTHER SYSTEMS NEED NOT BE COLOURED.

- ANY CONFLICTS OR REQUIRED CLARIFICATION.

1. UNLESS OTHERWISE NOTED, MATERIALS FOR REMOVAL BECOME THE CONTRACTOR'S PROPERTY AND SHALL BE TAKEN FROM SITE AND DISPOSED OF IN ACCORDANCE WITH ALL APPLICABLE CODES, STANDARDS AND REGULATIONS. 2. DISCONNECT AND MAKE SAFE ALL SYSTEMS TO BE DEMOLISHED INCLUDING PANELS, FEEDERS, BRANCH CIRCUITS AND EQUIPMENT BY OTHER DIVISIONS. COORDINATE WITH

3. MAINTAIN EXISTING REMAINING CIRCUITS, SYSTEMS, ETC., WHICH PASS THROUGH AREA OF CONSTRUCTION AND IN CLOSE PROXIMITY. PROVIDE NECESSARY COMPONENTS TO MAINTAIN SYSTEMS. ENSURE COMPONENTS WILL BE CONCEALED WHEN CONSTRUCTION

4. REINSTATE IMMEDIATELY ANY REMAINING EXISTING SYSTEMS IN-ADVERTENTLY INTERRUPTED DURING CONSTRUCTION.

5. THE DRAWINGS INDICATE KNOWN CONDITIONS AND MAY NOT INDICATE ALL DEMOLITION REQUIREMENTS, ELECTRICAL CONTRACTOR SHALL VISIT THE SITE PRIOR TO TENDER SUBMISSION AND VERIFY REQUIREMENTS AND INCLUDE ALL COSTS IN TENDER. 6. REMOVE REDUNDANT CONDUIT AND WIRING BACK TO SOURCE UNLESS OTHERWISE

7. DEVICES FROM DEMOLITION ARE NOT TO BE REUSED UNLESS NOTED OTHERWISE. NEW DEVICES SHALL BE SUPPLIED WHERE NECESSARY. 8. ALL FIRE ALARM DEVICES TO REMAIN IN OPERATION. PROTECT SMOKE DETECTORS FROM DUST EXPOSURE DURING CONSTRUCTION.

9. ENSURE FIRE ALARM SYSTEM IS OPERATIONAL AT THE END OF EACH SHIFT. 10. AFTER DEMOLITION WORK IS COMPLETE AND MINIMUM THREE (3) WORKING DAYS PRIOR TO PROCEEDING WITH NEW WORK, NOTIFY ENGINEER FOR INSPECTION.

1. ELECTRICAL WORK TO BE DONE IN ACCORDANCE WITH THE ELECTRICAL SAFETY CODE OF ONTARIO, AND WITH NEW ARCHITECTURAL/INTERIOR DESIGNER'S LAYOUT (LOCATION/MOUNTING HEIGHTS). CONTRACTOR TO OBTAIN ALL NECESSARY PERMITS, PAY ALL APPLICABLE FEES AND INSPECTION COSTS.

3. ENSURE ELECTRICAL COMPONENTS (IE. WIRING, CONDUIT, ETC.) RELATING TO THE AREA OF WORK ARE INDEPENDENTLY SECURED TO COMPLY WITH CODE REQUIREMENTS. IT IS NOT ACCEPTABLE TO SECURE THE COMPONENTS TO DUCTWORK, DUCT WORK TO

4. ENSURE ALL EXISTING CEILING MOUNTED BOXES ARE CLOSED PRIOR TO COMPLETION OF PROJECT. PROVIDE LABELLED AND COLOUR CODED COVER PLATES (IE. PANEL NAME 5. MINIMUM THREE (3) WORKING DAYS PRIOR TO CLOSING CEILING, NOTIFY THE ENGINEER

ENSURE EXISTING REMAINING OUTLETS IN AFFECTED AREA ARE FUNCTIONAL. 2. DO NOT MOUNT WALL OUTLETS BACK TO BACK. LEAVE MINIMUM 300mm SPACE BETWEEN OUTLETS. STAGGER OUTLETS WITHIN ALTERNATE STUD CAVITIES. DO NOT ANCHOR BACK TO BACK OUTLETS TO THE SAME STUD.

APPLICABLE TO NEW OR RELOCATED WORK UNLESS OTHERWISE NOTED. 1. TO CONFORM TO CLIENT'S BUILDING CODING SYSTEM.

3. ALL NEW CONDUITS TO BE FACTORY PAINTED, COLOUR-CODED EMT, TYPE AS

c. BUILDING AUTOMATION SYSTEM - ORANGE CONDUIT

4. APPLY PAINT TO THE COVERS OF JUNCTION BOXES AND CONDULETS OF EXISTING

5. FOR SYSTEM RUNNING WITH CABLE, HALF-LAP WRAP WITH DEDICATED COLOURED PVC TAPE TO 100 MM WIDTH, TAPE EVERY 5 M AND BOTH SIDES WHERE CABLE PENETRATES

1. EXACT LOCATION AND MOUNTING HEIGHTS OF OUTLETS TO BE COORDINATED WITH INTERIOR DESIGNER/ARCHITECTURAL DRAWINGS PRIOR TO ROUGH IN. REFER TO ARCHITECTURAL/DESIGNER DRAWINGS FOR MILLWORK, FURNITURE, SCREENS,

COMPONENTS (I.E. TV, DRINKING FOUNTAIN, ETC.) FOR REQUIREMENTS. 2. BRING TO THE ATTENTION OF THE ARCHITECT / INTERIOR DESIGNER AND ENGINEER

3. FAILING TO COORDINATE. THE CONTRACTOR WILL MODIFY THE INSTALLATION AT HIS

LINETYPE LEGEND			
SYMBOL	DESCRIPTION		
۵	120V, 15A RECEPTACLE CONNECTED TO DEDICATED CIRCUIT		
	SPECIAL RECEPTACLE, TYPE AND SIZE AS INDICATED		
l	FLEXIBLE CONDUIT		
0	THREE PHASE ELECTRIC MOTOR		
Ľ	DISCONNECT SWITCH LOCKABLE IN OFF POSITION		
	SURFACE MOUNTED ELECTRICAL PANEL		
	TRANSFORMER		
S	SPEED CONTROLLER		

	ABBREVIATION LEGEND
SYMBOL	DESCRIPTION
В	BLANK WALL PLATE
С	CEILING MOUNTED
E	EXISTING, TO REMAIN
F	FLOOR MOUNTED
N	NEW
OC	INSTALLED OVER COUNTER TOP
R	EXISTING, TO BE DISCONNECTED AND REMOVED
WP	WEATHERPROOF

LINETYPE LEGEND			
SYMBOL	DESCRIPTION		
	NEW WORK		
	EXISTING		
	DEMOLITION		

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