NATIONAL RESEARCH COUNCIL
1200 MONTREAL ROAD OTTAWA, ONTARIO K1A 0R6
BUILDING M-12 ROOM G31 CONDENSATE TANK REPLACEMENT

MECHANICAL DRAWING LIST	
DRAWING NUMBER	DRAWING NAME
5741-M00	ROOM G31 SPECIFICATIONS - COVER SHEET
5741-M01	ROOM G31 SPECIFICATIONS - GENERAL & MECHANICAL SCOPE
5741-M02	ROOM G31 SPECIFICATIONS - PIPING
5741-M03	ROOM G31 SPECIFICATIONS - SCHEDULES
5741-M04	ROOM G31 DEMOLITION DRAWING - EXISTING CONDENSATE RECEIVER TANK
5741-M05	ROOM G31 SCHEMATIC - NEW CONDENSATE TANK, PUMPS AND PIPING
5741-M06	ROOM G31 LAYOUT - NEW CONDENSATE TANK, PUMPS AND PIPING
5741-M07	ROOM G31 DETAILS - NEW CONDENSATE TANK 12COT1

ISSUED FOR TENDER
NOT FOR CONSTRUCTION
DECEMBER 13/19

National Research Council Canada
Administrative Services and Property Management Branch

Conseil national de recherches Canada
Division des services administratifs et gestion de l'immobilier

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GENERAL NOTES 2

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- Verify all dimensions and site conditions and be responsible for same
- Vérifier toutes les dimensions et l'etat des liéux et en assumer la responsabilité

A Detail no. No. du détail
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project / projet
BUILDING M-12
CONDENSATE TANK REPLACEMENT

MONTREAL ROAD CAMPUS

drawing / dessin
ROOM G31 SPECIFICATIONS
COVER SHEET

designed / conçu	date / date
IS	08/07/2019
drawn / dessiné	scale / échelle
IS	N.T.S.
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dwg.no. / dessin no.
5741-M00

ASPM A1 (841x594)

C
0 10 20mm 40 60 80 100 120 140 160 180 200mm

General Conditions

1. The work of this contract is comprised of the replacement of (1) condensate tank including piping and accessories, and the installation and wiring of pump status, and float levels located at 1200 Montreal Road, building M–12. Existing strap–on temperature sensors on the vent line and the overflow line to be reused in the new installation. The contractor shall supply and install, but not limited to, all equipment, labor, electrical, piping, supports, insulation, instruments, control system wiring and controls, construction bulks and consumables, and testing and balancing per the specifications and information outlined in the contract drawings.

2. The work of this project must include provision for coordinating with all trades on site for all work covered under separate contract.

3. All work to be executed in accordance with the requirements of NRC Section 00 10 00 General Instructions. In the event of any discrepancies between this set of instructions and the NRC specifications, NRC specifications shall govern. △2

4. Contractor to bear all costs for all material, equipment, labor, seismic engineering, sub–trades, permits, inspections, testing and balancing outlined in this contract unless otherwise noted.

5. The contractor's use of the premises is restricted and the contractor shall use the premises under the direction of the NRC Departmental Representative. All work shall be scheduled with the NRC Departmental Representative in order to minimize conflict and the Owner's use of the premises. Adjacent areas to the work space shall be operational during the demolition and construction period for normal day to day operation. The contractor shall make every reasonable effort to execute the work with minimal interferences or disturbances.

6. Normal working hours on the NRC property are from 8:00 a.m. until 4:30 p.m., Monday to Friday inclusive, except statutory holidays. At all other times, special written passes are required for access to the building site. Before scheduling any work outside normal working hours, obtain permission from the Departmental Representative to perform the specific tasks. An escort may be required whenever working outside normal hours. Contractor to bear the associated costs.

7. All contractor and subcontractor employees must be security cleared in accordance with NRC requirements and must wear and keep visible identification badges issued by NRC. Contractor to coordinate with NRC Departmental Representative.

8. All service interruptions, if required, must be arranged in advance with the NRC Departmental Representative with 2 weeks advanced notice. All interruptions are to be of a minimum duration. All coordinated power outages must be scheduled with NRC.

9. Contractor to submit a construction schedule with their fee proposal and update the schedule after contracting. Submittal to include a GANTT chart outlining the entire construction project schedule having at minimum all major milestones (as per good judgment). NRC to approve the construction schedule prior to construction. In the event the contractor is not meeting the approved schedule, the contractor shall contact NRC immediately to determine reasonable solutions to keep the project on schedule.

10. Shop drawings and product data (including wiring diagrams) shall be submitted to the NRC Departmental Representative with reasonable promptness for review and for approval prior to ordering. Work affected by the submittal shall not proceed until the review is complete. Shop drawings to be submitted 10 days prior to tender close and to include installation instructions including electrical wiring diagrams if equipment submitted is for the purpose of seeking an approved equipment equivalent. All shop drawings and product data to be submitted in imperial units for review. The contractor's responsibility for errors, omissions and deviations in a submission is not relieved by the NRC Departmental Representative review of the submittals. △2

11. Contractor is responsible for a safe work environment at all times. Contractor must maintain work area(s) in a tidy condition, free from accumulation of waste products and debris, including that caused by the work of this contract. All construction waste and debris shall be cleaned and removed from the facility daily by the contractor and at their own expense.

12. Products, materials, equipment and articles (referred to as products throughout the specification) incorporated in the work shall be new, not damaged or defective, and of the best quality (compatible with the specifications) for the purpose intended. If requested the contractor shall furnish evidence to the type, source, and quality of the products provided. Defective products whenever identified shall be rejected regardless of previous inspections. Inspections do not relieve the contractor's responsibility, but is a precaution against oversight or error. All defective products shall be removed and replaced at the contractors expense. All delays and expense caused by the rejection shall be the responsibility of the contractor. Should any dispute regarding the quality or fitness for service arise, the decision shall rest solely with the NRC Departmental Representative based on the requirements of the contract documents.

13. The contractor shall coordinate contract drawings with site conditions prior to the commencement of fabrication and installation. All interferences shall be reported to the NRC Departmental Representative. The contractor shall work with the NRC Departmental Representative in determining reasonable solutions at no additional costs to the project.

14. Project close–out shall be complete upon submittal of the following to the NRC Departmental Representative:

    a. Hard copies, 2 bilingual or 2 English and 2 French (printed and placed in binders with an index) and (1) soft (electronic) copy of operating and maintenance manuals for all installed equipment including all shop drawings.

    b. The contractor shall be responsible for all documentation for as–built conditions and shall submit red lined drawings documenting the final site installation.

    c. All deliverables mentioned within the contract drawings.

    d. All Hazardous Materials Assessment(s) or other reports.

    e. All inspections as per the local authorities having jurisdiction.

    f. All mechanical and electrical project close–out submittals as per the mechanical and electrical specifications.

15. The contractor shall be responsible and bear all costs for supplying and receiving all equipment for this project, off loading, storing and moving into final location.

16. All cabling, fire protection systems and other building services to be protected during installation. Any interference or damage to be reported immediately to the NRC Departmental Representative.

17. The contractor shall ensure that the placement of new equipment does not interfere with the operation and maintenance of any existing or other new equipment.

18. All equipment is to be installed per manufacturer's instructions.

19. Contractor shall not stop or disconnect any equipment within the space without the NRC Departmental Representative's approval in advance.

20. The contractor is advised that fire alarm sensors are placed in several locations in the building. The NRC Departmental Representative is to be advised when working near a sensor to determine if the sensor must be disconnected or disabled during the work.

21. Removal and relocation of existing equipment is necessary per contract drawings and specific contract drawings provide arrangements and details to describe the general design intent of the work and do not show the exact details for all installation conditions. A site review is mandatory and the contractor shall make themselves aware of all obstructions, interferences and other site conditions not captured on contract drawings and documents. The contractor shall be advised that some details used in the drawings may change depending on specific site conditions. NRC reserves the right to make reasonable adjustments due to site conditions not captured in the contract documents or specifications up to three feet to the location of equipment, piping, supports and architectural details at no cost to NRC.

22. It is the responsibility of the contractor, prior to proceeding with any scope of work within the contract documents, to contact the engineer and NRC if the contractor requires any clarification in regards to any information shown within the contract drawings.

Basic Mechanical Requirements

1. The contractor shall comply with Municipal, Provincial, or National Codes as applicable, Rules and Regulations and/or Authorities having jurisdiction. Comply with the National Building Code in areas where the Municipal or Provincial Building Codes are not mandatory. The contractor shall comply with the Occupational Health and Safety Act and Regulations for Construction Projects.

2. The contractor shall obtain, at their cost, all building permits and inspections, pressure, refrigeration and natural gas piping registration with provincial authorities and any other requirements per the authorities having jurisdiction. Test all piping systems as required by CSA B51 and B31.9 codes.

3. The work is suitably outlined on the contract drawings with regards to sizes, general locations and arrangements. The location of equipment, associated piping, associated ductwork, and other material describes the general requirements of the work. The routing of piping and ductwork may be altered, upon approval, for ease of installation, cost reduction or relief from a site interference. The contractor shall include as part of the work specific manufacturer's installation details and requirements outlined in the installation instructions for the actual equipment being provided.

4. All materials shall meet or exceed the building code requirements for flame spread and smoke developed rating.

5. In order to achieve the desired routing some wiring and other components may need to be altered or relocated. Once identified the contractor shall notify the NRC Departmental Representative of the alteration for approval. The contractor shall be responsible for all costs associated with the rewiring/relocation as required. Alteration shall be made by qualified personnel only and approved by the NRC Departmental Representative prior to the commencement of work.

6. Trade qualifications: Plumbers, Welders, Pipe Fitters and all other applicable trades. All trade workers to have provincial certification licensed by the Provincial Authorities and/or other authorities having jurisdiction. The ratio of Journeymen to apprentice shall not exceed the ratio as defined by the provincial authority. The contractor shall maintain an up to date record listing Journeymen and apprentices working on the site.

7. Contractor to install equipment in a compact, neat and workman like manner with accessibility to all maintenance points.

8. Equipment to be installed per manufacturer's recommendations. Adequate space is necessary for maintenance and disassembly. If components are installed that do not permit maintenance the contractor shall rework the installation as directed by the NRC Departmental Representative. All costs for the rework shall be to the contractor's account. All components to be installed and commissioned in accordance with industry standards and manufacturer's printed instructions. Contractor to allow for costs to have manufacturer's representative for all new equipment to come to site and supervise their equipment commissioning.

Mechanical Scope

The contractor shall supply, install, and conduct the following work below:

1. All required demolition and relocation of equipment as outlined in the contract drawings and specifications.

2. The contractor shall supply and install, but not limited to, all equipment, labor, electrical, piping, supports, seismic engineering and supports, instruments, control system wiring and controls, construction bulks and consumables and testing and balancing per the specifications and information outlined below.

3. All equipment mentioned within the contract drawings including the mechanical schedule:
    a. Room G31 – condensate tank with 2 pumps and mechanical alternator and all associated piping and wiring.

4. The following control points are to be installed (see electrical drawings for details):
    a. Room G31 – overflow and vent temperature sensors (existing to be reused).
    b. Room G31 – mechanical alternator float position contacts.
    c. Room G31 – pump current.

5. Provide all required inspections per the authorities having jurisdiction.

6. Registering new piping and tanks for valid CRNs is not required.

7. Water balancing report for all new equipment stating flow and discharge pressure.

8. All new electrical power supplies/feeds for new and relocated equipment per the contract drawings.

9. All required cranes and/or other equipment to demolish existing equipment and install all new equipment within the contract drawings.

10. All temporary heating for the work space while construction is being performed.

11. All items mentioned within the contract drawings. This list above does not exclude any items mentioned within any of the contract drawings.

Asbestos and Other Hazardous Substances within the Building:

1. The intent of this section is to inform the contractor and all other applicable parties in regards to the possibility of asbestos and other possible Hazardous Substances present within the building. This section is not to be relied upon. Contractor to take the required steps as outlined below and as per NRC's instructions and specifications as to identifying Hazardous Materials and having the required assessments done and work procedures put in place to provide a safe work environment for everyone.

2. Contractor to coordinate a meeting with the NRC Departmental Representative and NRC Building Coordinator to form a work plan in regards to the possibility of asbestos and other Hazardous Substances present within the building. The following (not limited to) is to be discussed: possible locations of asbestos containing materials and any other Hazardous Materials, plans to remove if required, contracting practices, existing NRC Asbestos protocol(s)/procedure(s), and any existing/past Hazardous Materials Reports including Asbestos Reports.

3. Contractor to refer to NRC Specification Section of hazardous material surveys. NRC to bear all costs for Asbestos and all other Hazardous Material Assessments. Contractor shall bear all costs associated with the removal and containment of any Hazardous material(s), temporary barriers, temporary fan systems, filtration systems, storage, inspections, reports, shipping and handling of Hazardous Materials, disposal of Hazardous Materials, and other requirements deemed necessary for all work within this contract.

4. Contractor to coordinate a meeting with the NRC Departmental Representative to formulate the requirements of providing a safe work environment for all building occupants and employees.

6. All personnel are to be trained and fully informed of the Asbestos and other Hazardous Materials Work Plan and Procedure(s) formulated in order to best protect workers and building occupants.

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project / projet
BUILDING M-12
CONDENSATE TANK REPLACEMENT
MONTREAL ROAD CAMPUS

drawing / dessin
ROOM G31 SPECIFICATIONS GENERAL AND MECHANICAL SCOPE

designed / conçu	date / date
IS	09/07/2019
drawn / dessiné	scale / échelle
IS	NTS
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BN	1 of/de 1
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BN	A1-011391-05-01

dwg.no. / dessin no.
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ASPM A1 (841x594)

0 10 20mm 40 60 80 100 120 140 160 180 200mm

Piping Design Data

All components must be suitable for continuous operation at the following design conditions in Table 1.1:

1. Design Code: ASME B31.9, Ontario Building Code.
2. All piping to be in conformance with all local/municipal, provincial, and national codes.
3. All piping to be inspected as per the requirements of the authority having jurisdiction.
4. All pipe, fittings, flanges, manual valves, automated valves, and all other pressure retaining parts shall conform to component standards listed in ASME B31.9 Table 926.1.

TABLE 1.1: Piping Specification: CS1, Nominal Pipe Sizes Up to 2"

Service:	Condensate					
MAWP	[150 psig at 365°F]					
Temp. Limits	[−4°F to 190°F]					
Corrosion Allowance:	0.062" for Threaded Fittings					
ASME Rating	Class 150					
Material	Carbon Steel					
Design Code	ASME B31.9 Normal Fluid					
Item	Size	Rating	Type/Connection	Material	Standard	Notes
Pipe	≤ 3"	Sch. 80	Seamless, PE	ASTM A106 Gr. B	ASME B36.10	
Fittings	≤ 3"	3000 Class	THD	ASTM A105N	ASME B16.11	
Flanges	≤ 2"	Class 150	RF THD or Blind	ASTM A105N	ASME B16.5	
Gaskets	ALL	Class 150		1/8" spiral wound 304SS graphite filled	ASME B16.20	
Bolts	ALL			Bolts: ASTM A193 Gr. B7 Nuts: ASTM A194 Gr. 2H Washers: ASTM F436	Dimensions: ASME B18.2 Threads: ASME B1.1 Class 2	
Valves						
Gate	≤ 2"	Class 800	THD	Forged ASTM A105 Body/Bonnet, Rising Stem, BB−OS&Y, 13% Cr Trim, Graphite Packing, Manual Handwheel, API 602 Manufacturers: VELAN #S−2054B−02TY or equal		
Check	≤ 2"	Class 800	THD	Swing Check, Forged ASTM A105 Body, Bolted Cover, 13% Cr or Full Stellite Trim, Graphite Gasket, API 602 Manufacturers: VELAN #S−2114B−02TS or equal		

2

Installation of Piping

1. Examination and inspection of all work covered under ASME B31.9 (latest), Building Services Piping, shall be per that code. All costs for inspection and testing shall be carried by the contractor.
2. A pressure test shall be performed on new piping per ASME B31.9 along with any requirements by the authority having jurisdiction. If leaks are found piping to be repaired as required.
3. Maintain clearances between pipes and structures for maintenance, both as directed and to manufacturer's recommendations.
4. Provide vents as required at system high points to ensure air is purged from the piping system.
5. Provide drains (whether indicated or not on contract drawings) at all low points of piping systems in order to facilitate proper drainage. Size drains accordingly. Provide isolating valve and capped valve outlet.
6. Seal piping passing through walls/floors. Maintain all wall, floor, and any other fire separation ratings. All fire separations to be in compliance with the National and Provincial Building Code (latest).
7. Connect branch lines into main headers using welding tees or welding outlet fittings. The branch outlet shall be consistent with the lines sizes as described above. All branch outlets shall conform to ASME B31.9.
8. Cap open ends of piping during installation. Remove all foreign material from inside piping.
9. Remove all burrs from piping. Clean scale and dirt.
10. Grade nominally horizontal piping as indicated. Slope piping to drainage points.
11. Revisions to location of piping require written approval of NRC Departmental Representative.
12. Except where indicated otherwise, slope piping in direction of flow for positive drainage and venting.

Pressure Tests

1. Piping to be tested per ASME B31.9 and as per the local authority having jurisdiction.
2. Testing to occur before piping, equipment and fittings are concealed.
3. Contractor to bear all costs required for inspection test fees, apparatus, equipment, testing medium, freeze protection, retesting and making good any damage. NRC Departmental Representative to determine whether repair or replacement is appropriate.
4. Insulate or conceal pipes only after approval and certification of tests by NRC Departmental Representative.
5. Safety precautions in the event of pipe rupture should be in place to eliminate hazards to personnel in the proximity of piping being tested.
6. Acceptance of a test and repair of any defects shall be per ASME B31.9 (latest) and NRC Departmental Representative.

Cleaning and Inspection

1. Leave all joints in piping systems uncovered until all tests are completed and system inspected and approved by authority having jurisdiction.
2. Remove all weld scale, dirt and debris. Thoroughly internally clean and inspect all pipes.

Labeling

1. All piping to be labeled in accordance with CAN/CGSB−24.3−92

Piping Components & Specialties

Flexible Metal Pump Connectors

1. Install flexible connectors on the discharge piping of the pumps as shown in the drawings. To be 12" overall length stainless steel braided flexible hose, 1 1/2" pipe size, working pressure rating of 427psi at 70F and 393psi at 250F. Acceptable material: Senior Flexonics model SA−BSN−024−12 or approved equal.

Temprature Sensors

1. Reuse installed existing temperature sensors. Temprature sensor to be strapped to pipe outer diameter at the location specificied in the piping schematic. Temperature range between −4°F and 221°F (manufacturer: Greystone). Extension of wiring might be required. See electrical drawings for more information.

Pipe Insulation

1. Insulation (including all service jacket) to meet NFPA 90A & 90B. Maximum flame spread rating of 25 and maximum smoke developed rating of 50 in accordance with ASTM E84−15b, NFPA 255 and CAN/ULC−S102−07.
2. Insulation shall not flame, smolder, smoke or glow at in service temperature per ASTM C411−11.
3. All piping to be insulated with fibre glass insulation meeting ASTM C547 Type I, with minimum 3.5 psf density for suitability with firestop assemblies requiring jacketed fiberglass pipe insulation having a product density at or above 3.5 psf, and has a factory applied vapor−barrier jacket meeting ASTM C1136. Acceptable material: Johns Manville Micro−lok HP insulation with factory applied vapor barrier jacket or approved equal. Fittings to be insulated with pre−formed fibre glass fittings or mitered segments. Mitred segments to have all joints sealed with fibre glass embedded vapor seal mastic and a 1/8" thick wet coat of vapour seal mastic.
4. All condensate piping to have a piping insulation thickness of 1" for 1/2" to 3" diameter piping.
5. All piping, fittings, and valves to have white PVC jacketing meeting ASTM D1784, Class 16354−C. PVC jacketing to have maximum flame spread rating of 25 and maximum smoke developed rating of 50 in accordance with ASTM E84. Acceptable material: Johns Manville Zeston 2000 series PVC 20 mil thick, white jacketing or approved equal.
6. All fittings and valves to be insulated and jacketed with Johns Manville Zeston 2000 PVC insulated fitting covers and Hi−Lo Temp insulation inserts or approved equal.
7. All insulation and fittings to be installed per manufacturer's instructions.

Tank Insulation

1. Insulation to meet NFPA 90A & 90B. Maximum flame spread rating of 25 and maximum smoke developed rating of 50 in accordance with ASTM E84−15b, NFPA 255 and CAN/ULC−S102−07.
2. Tank to be insulated with fibre glass insulation meeting ASTM C612 Type IA and 1B. Thickness to be 1". Acceptable material: Johns Manville 800 Series Spin−Glass, Type 814, 3.0 pcf or approved equal.
3. Insulation to be clad with aluminum roll jacketing, c/w Poly−Kraft moisture barrier, embossed finish, 0.016" thick.
4. Fasten jacket with ø1/8" button head rivets and 22 Ga. stainless steel 'S' clips, 3/4" wide, 0.03" thick.

Pipe Supports

1. All piping and piping supports to be installed in order to allow for thermal movement.
2. All piping in ceiling to be supported with clevis type hanger. Hangers to be suspended from angles or strut, bolted to steel structure. Contractor to allow for movement and insulation shields at supports. All supports to have suitable insulation shields designed to prevent crushing of the insulation and provide proper pipe support.
3. Carbon steel piping supports: supports to be spaced maximum 6' apart for 1/2" to 2" piping.
4. Contractor is responsible for proper attachment and adjustment of pipe supports to building structure.
5. Adjust supports after system is in operation.
6. Acceptable products: Grinnel, Piping Tech, Anvil or approved equal.

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ROOM G31 SPECIFICATIONS
PIPING

designed / conçu: IS	date / date: 08/07/2019
drawn / dessiné: IS	scale / échelle: N.T.S.
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CONDENSATE TANK ASSEMBLY IN ROOM G31

TANK DATA

TAG	MANUFACTURER	MODEL	OVERALL DIMENSIONS (IN)			NET WEIGHT (LBS)	NOTES
			L	W	H		
12COT1	TOBIN–EVEREDY	DUPLEX SYSTEM CUSTOM	50	35	16	T.B.D.	316 stainless steel material. Includes mechanical alternator. Contains max 200°F condensate. 100 U.S gallon capacity. Comes with tank frame designed and supplied by tank vendor.

PUMP DATA

TAG	MANUFACTURER	MODEL	MOTOR HP	MOTOR SPEED (RPM)	ELECTRICAL			FLUID	FLOW (GPM)	DUTY HEAD (FT)	NOTES
					V	PH	FLA (A)				
12COP1A	DARLING	1 1/2" UNICON	1.5	3450	600	3	1.25	CONDENSATE	42.5	58	1'–2 7/8" pump depth
12COP1B	DARLING	1 1/2" UNICON	1.5	3450	600	3	1.25	CONDENSATE	42.5	58	1'–2 7/8" pump depth

MECHANICAL ALTERNATOR FLOAT SWITCH DATA

TAG	MANUFACTURER	CLASS	TYPE	FORM	TANK CONNECTION	NEMA	HIGH WATER ALARM CIRCUIT	PACKING	NOTES
–	SQARE D	9038	CG36	T.B.D.	2 1/2" MNPT	NEMA 1	YES, option N25	VITON, option Z20	SS 304 float, SS 316 rod, 2.5 in cast iron bushing, brass sealing connector

Seismic Engineering and Supports

1. NRC building M–12 has an "other" importance category. The contractor shall provide seismic engineering for the systems being installed in accordance with the Provincial and National Building Codes. All piping components and equipment shall have seismic restraints and braces per the building code and SMACNA guidelines. Upon completion the contractor shall provide a letter to the NRC Departmental Representative signed and sealed by the Seismic Engineer of record stating that all systems meet the project seismic requirements. 2

2. The contractor is to contact the seismic engineer during tendering in order to determine the required seismic scope of work (from the seismic engineer) in order for the contractor to account for this work during the tendering process. All work required by the seismic engineer is to be supplied and installed by the contractor per the seismic engineers instructions.

3. Contractor to contact the NRC Departmental Representative with any issues obtaining the required seismic engineering services by others.

ISSUED FOR TENDER
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DECEMBER 13/19

C

0 10 20mm 40 60 80 100 120 140 160 180 200mm

ASPM A1 (841x594)

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Administrative Services and Property Management Branch | Division des services administratifs et gestion de l'immobilier

NRC · CNRC

GENERAL NOTES 2

- CONTRACTOR TO VERIFY ALL DIMENSIONS AND CLEARANCES ON SITE PRIOR TO CONSTRUCTION AND REPORT ANY DISCREPANCIES AND/OR OMISSIONS TO DEPARTMENTAL REPRESENTATIVE.
- CONTRACTOR MUST VISIT THE SITE AND FULLY FAMILIARIZE THEMSELF WITH THE SCOPE OF THE WORK PRIOR TO PROJECT COMMENCEMENT.
- ALL TRADES TO COORDINATE WORK ON SITE, WITH APPROVAL OF DEPARTMENTAL REPRESENTATIVE TO AVOID ANY CONFLICTS AND/OR INTERFERENCE.
- ANY AND ALL REQUIRED SHUTDOWNS SHALL BE COORDINATED WITH DEPARTMENTAL REPRESENTATIVE.
- INSTALLATION OF ALL SYSTEMS SHALL BE IN ACCORDANCE WITH APPLICABLE CODES AND STANDARDS.
- CONTRACTOR TO BE RESPONSIBLE FOR REINSTATEMENT AND REPAIR OF ANY DAMAGE CAUSED BY WORK.
- CONTRACTOR SHALL PREVENT THE SPREAD OF DUST AND DEBRIS BEYOND AREA OF WORK AND CLEAN ALL SURFACES AT COMPLETION.

LCI ENGINEERING
36 Antares Drive, Suite 200
Ottawa, Ont., Canada K2E 7W5
Tel.: (613) 737-7746 Fax.: (613) 737-1114

No.	Date	Revision	By: Par.
2	13/12/2019	UPDATES PER NRC COMMENTS	MAL
1	31/07/2019	ISSUED FOR TENDER	IS
0	12/07/2019	PRELIMINARY FOR REVIEW	IS

Date Printed | Date imprimée

- Verify all dimensions and site conditions and be responsible for same
- Vérifier toutes les dimensions et l'etat des liéux et en assumer la responsabilité

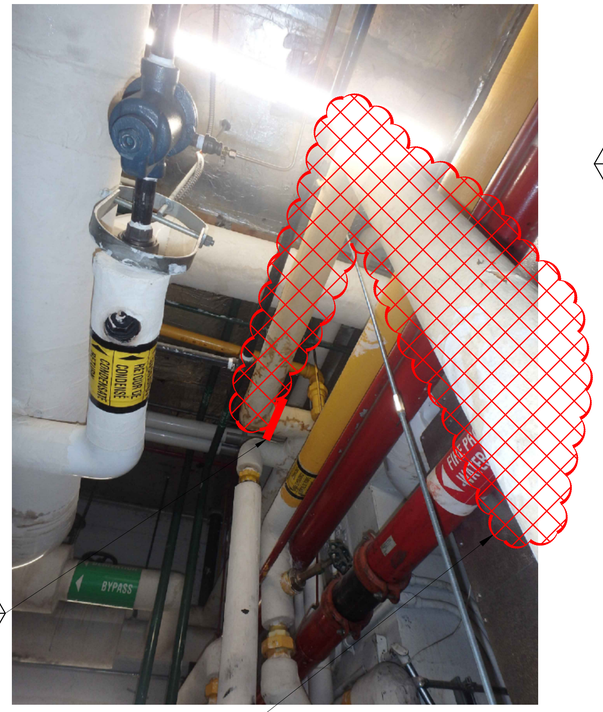
A Detail no. No. du détail
B Location drawing no. sur dessin no.
C Drawing no. dessin no.

project / projet
BUILDING M-12
CONDENSATE TANK REPLACEMENT
MONTREAL ROAD CAMPUS

drawing / dessin
ROOM G31 SPECIFICATIONS SCHEDULES

designed / conçu	date / date
IS	08/07/2019
drawn / dessiné	scale / échelle
IS	N.T.S.
checked / vérifié	sheet / feuille
BN	1 of/de 1
approved / approuvé	W.O.no. / D.T.no.
BN	A1-011391-05-01

dwg.no. / dessin no.
5741-M03



PICTURE VIEW 1B
SCALE: N.T.S.

PICTURE VIEW 1C
SCALE: N.T.S.

PICTURE VIEW 1D
SCALE: N.T.S.

PICTURE VIEW 1A
SCALE: N.T.S.

PICTURE VIEW 1E
SCALE: N.T.S.

ISSUED FOR TENDER
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DECEMBER 13/19

GENERAL NOTES:

1. CONTRACTOR TO FIELD SURVEY SITE CONDITIONS TO VERIFY ALL DIMENSIONS AND FINAL EQUIPMENT LOCATIONS. ALL DIMENSIONS IN INCHES UNLESS OTHERWISE NOTED. ALL DIMENSIONS ARE APPROXIMATE AND NOT TO BE SCALED. FIELD SURVEY AS REQUIRED.
2. CONTRACTOR TO PROVIDE NRC DEPARTMENTAL REPRESENTATIVE WITH A MINIMUM 2 WEEKS NOTICE PRIOR TO ANY DEMOLITION TO OBTAIN THE REQUIRED INSTRUCTIONS FROM NRC DEPARTMENTAL REPRESENTATIVE.
3. CONTRACTOR IS RESPONSIBLE FOR OBTAINING AND SUBMITTING ALL PERMITS TO NRC DEPARTMENTAL REPRESENTATIVE PRIOR TO DEMOLITION AND CONSTRUCTION.
4. NOT ALL EXISTING EQUIPMENT, PIPING, AND OR ELECTRICAL EQUIPMENT AND ASSOCIATED WIRING AND CONDUITS SHOWN WITHIN CONTRACT DRAWINGS. FIELD SURVEY AS REQUIRED.
5. REFER TO ELECTRICAL DRAWINGS FOR DETAILS REGARDING REQUIRED ELECTRICAL DEMOLITION AND NEW WORK.
6. RETURN ALL MANUAL FLANGED VALVES, CONTROL VALVES AND INSTRUMENTATION TO NRC DEPARTMENTAL REPRESENTATIVE.
7. CONSULT NRC DEPARTMENTAL REPRESENTATIVE IN REGARDS TO HAZARDOUS MATERIALS WITHIN MECHANICAL ROOMS ALONG WITH ALL OTHER AREAS WITHIN THE SCOPE OF WORK FOR THIS CONTRACT. SEE SPECIFICATIONS. 2
8. FOR REASONS OF CONTROL CONTINUITY IN BUILDING, ALL CONTROLS WORK SHALL BE BY AINSWORTH WHICH SHALL BE RETAINED BY THE ELECTRICAL CONTRACTOR. SEE DRAWING E–03 FOR ADDITIONAL INFORMATION. 2

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Administrative Services and Property Management Branch
Division des services administratifs et gestion de l'immobilier

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A Detail no. / No. du détail
B Location drawing no. / sur dessin no.
C Drawing no. / dessin no.

project / projet
BUILDING M-12
CONDENSATE TANK REPLACEMENT
MONTREAL ROAD CAMPUS

drawing / dessin
ROOM G31 DEMOLITION DRAWING
EXISTING CONDENSATE
RECEIVER TANK

designed / conçu	date / date
IS	08/07/2019
drawn / dessiné	scale / échelle
IS	N.T.S.
checked / vérifié	sheet / feuille
BN	1 of/de 1
approved / approuvé	W.O.no. / D.T.no.
BN	A1-011391-05-01

dwg.no. / dessin no.
5741-M04

ASPM A1 (841x594)

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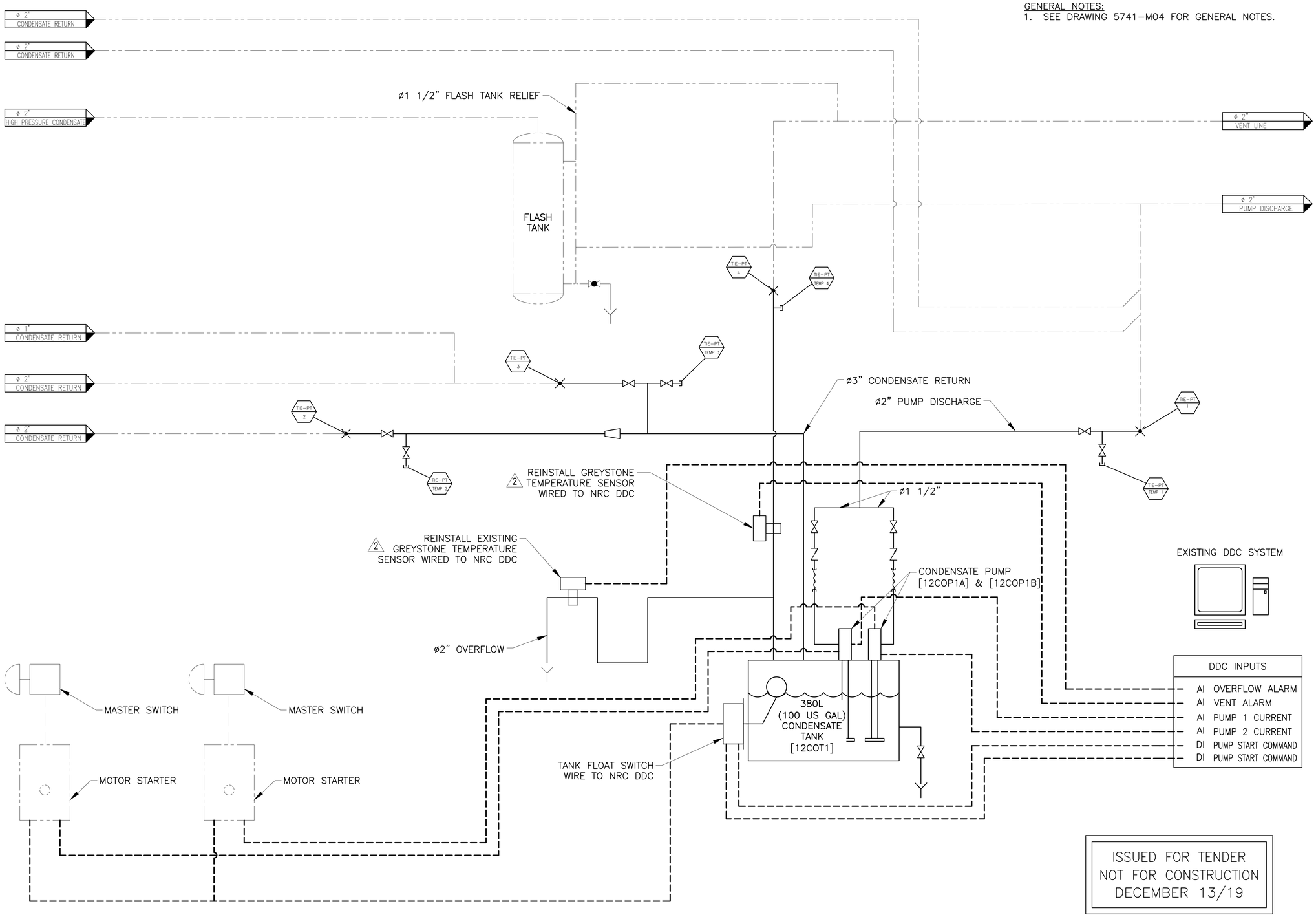
GENERAL NOTES:
1. SEE DRAWING 5741–M04 FOR GENERAL NOTES.



ISSUED FOR TENDER
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DECEMBER 13/19

ASPM A1 (841x594)

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0 10 20mm 40 60 80 100 120 140 160 180 200mm

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GENERAL NOTES 2

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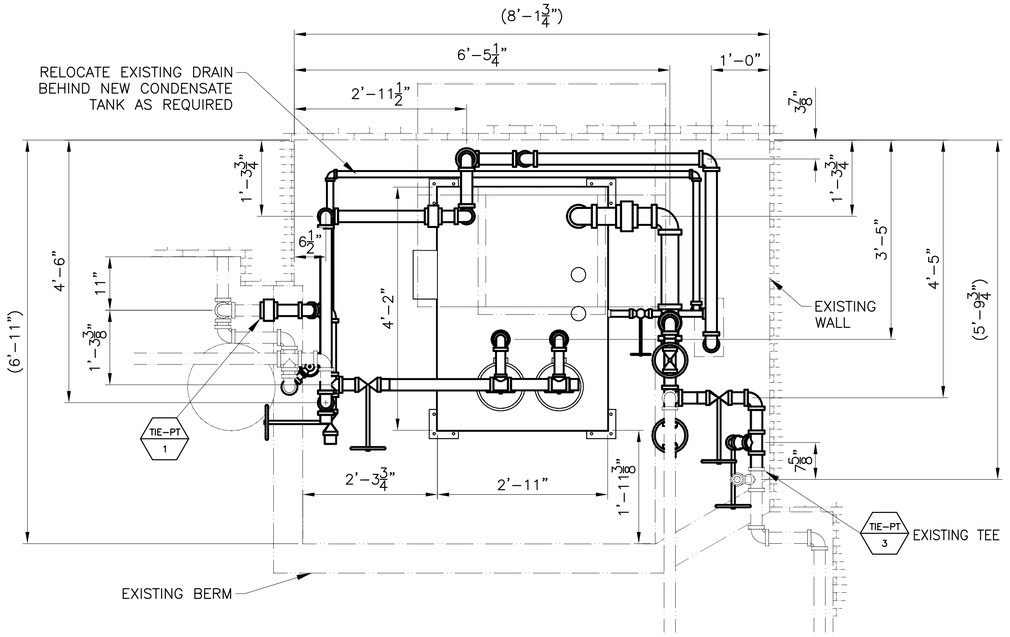
C Drawing no. dessin no.

project / projet
BUILDING M-12
ROOM G31 CONDENSATE TANK
MONTREAL ROAD CAMPUS

drawing / dessin
ROOM G31 SCHEMATIC - NEW CONDENSATE TANK, PUMPS AND PIPING

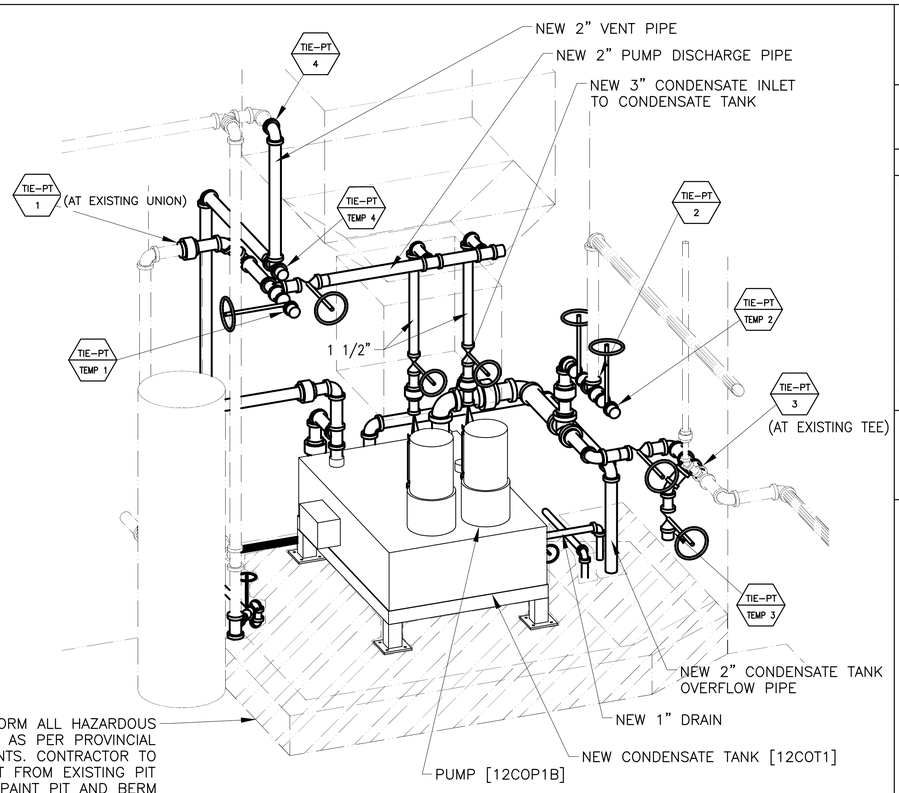
designed / conçu: IS	date / date: 05/07/2019
drawn / dessiné: IS	scale / échelle: NTS
checked / vérifié: BN	sheet / feuille: 1 of/de 1
approved / approuvé: BN	W.O.no.: A1-011391-05-01 / D.T.no.

dwg.no. / dessin no.: 5741-M05



PLAN VIEW

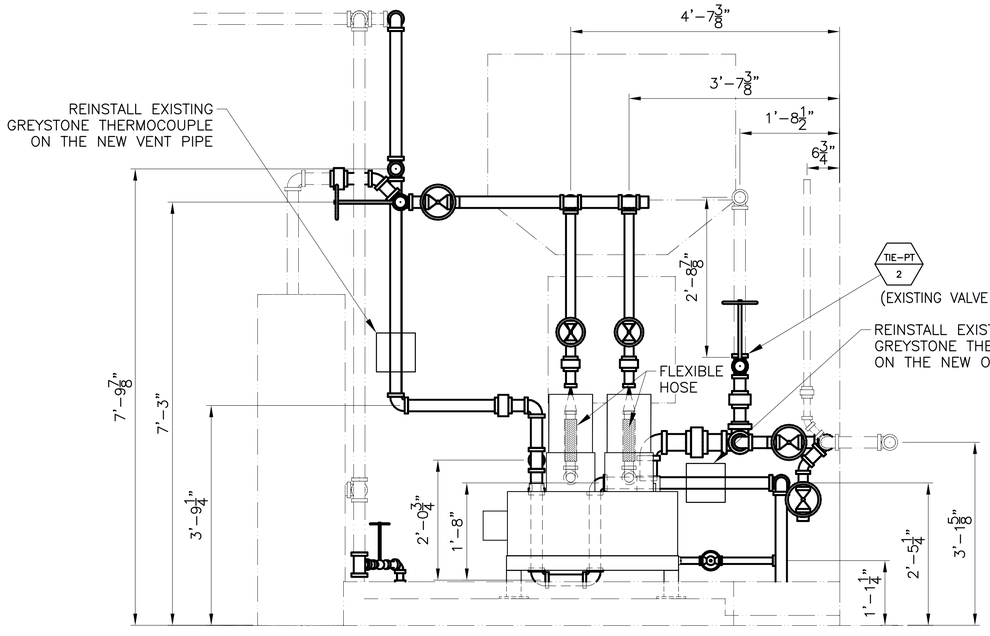
SCALE: 3/4" = 1'–0"



ISOMETRIC VIEW

FINAL INSTALLATION
SCALE: N.T.S.

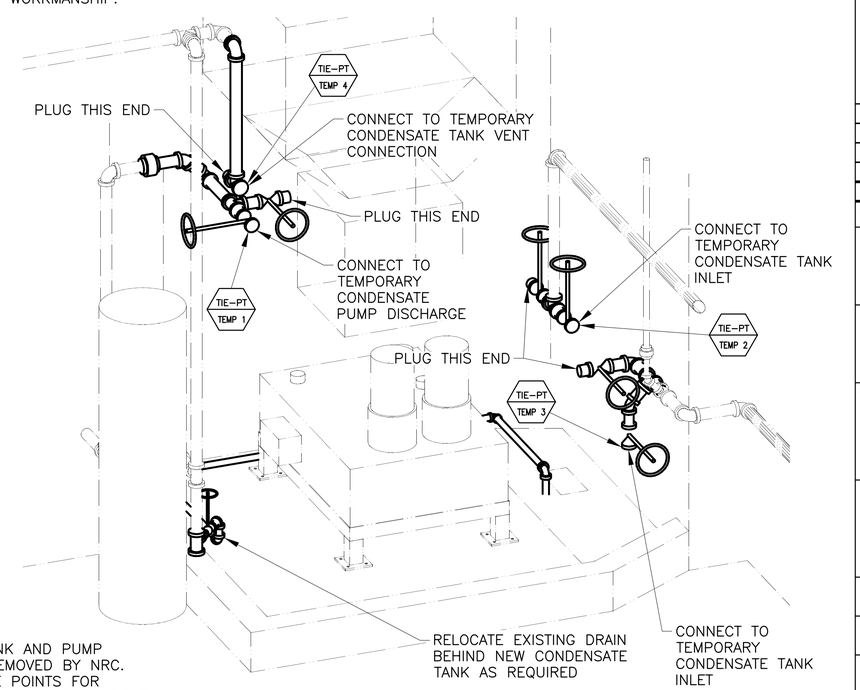
3 CONTRACTOR TO PERFORM ALL HAZARDOUS MATERIAL ABATEMENT AS PER PROVINCIAL LEGISLATION REQUIREMENTS. CONTRACTOR TO CLEAN AND REMOVE PAINT FROM EXISTING PIT AND BERM. CONTRACTOR TO PAINT PIT AND BERM AS PER NRC SPECIFICATION 099199 AND 011000. NRC SHALL RETAIN DST AS A THIRD PARTY EXPERT TO OVERSEE/MONITOR THE ABATEMENT WORK. DST WILL HAVE THE FINAL WORD ON BOTH METHODOLOGY AND WORKMANSHIP.



ELEVATION VIEW VIEW

LOOKING WEST
SCALE: 3/4" = 1'–0"

NOTE:
TEMPORARY CONDENSATE TANK AND PUMP SUPPLIED, INSTALLED AND REMOVED BY NRC. CONTRACTOR TO PROVIDE TIE POINTS FOR TEMPORARY CONNECTION AS SOON AS POSSIBLE. CONNECTION TO AND FROM TEMPORARY TANK AND PUMP BY NRC.



ISOMETRIC VIEW

TEMPORARY INSTALLATION
SCALE: N.T.S.

ISSUED FOR TENDER
NOT FOR CONSTRUCTION
DECEMBER 13/19

C

0 10 20mm 40 60 80 100 120 140 160 180 200mm

ASPM A1 (841x594)

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Administrative Services and Property Management Branch / Division des services administratifs et gestion de l'immobilier

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GENERAL NOTES 3

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Tel.: (613) 737-7745 Fax.: (613) 737-1114

GENERAL NOTES:

1. FOR GENERAL NOTES SEE DWG. 5741–M04.
2. ALL NEW PIPING TO BE SCH80, ASTM A106 Gr.B.
3. ALL PIPE FITTINGS THREADED 3000#, ASTM A105.
4. CONTRACTOR TO INSTALL A UNION WITHIN 6" OF ALL TANK CONNECTIONS.
5. CONTRACTOR TO INSULATE NEW CONDENSATE TANK, INCLUDING TANK BOTTOM. SEE MECHANICAL SPECIFICATIONS FOR INSULATION REQUIREMENTS.

No.	Date	Revision	By: Par:
3	13/12/2019	UPDATES PER NRC COMMENTS	MAL
2	23/08/2019	UPDATES PER NRC COMMENTS	IS
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Date Printed / Date imprimée

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A Detail no. No. du détail
B Location drawing no. sur dessin no.
C Drawing no. dessin no.

project / projet
BUILDING M-12
CONDENSATE TANK REPLACEMENT
MONTREAL ROAD CAMPUS

drawing / dessin
ROOM G31 LAYOUT
NEW CONDENSATE TANK, PUMPS AND PIPING

designed / conçu	date / date
IS	03/07/2019
drawn / dessiné	scale / échelle
IS	N.T.S.
checked / vérifié	sheet / feuille
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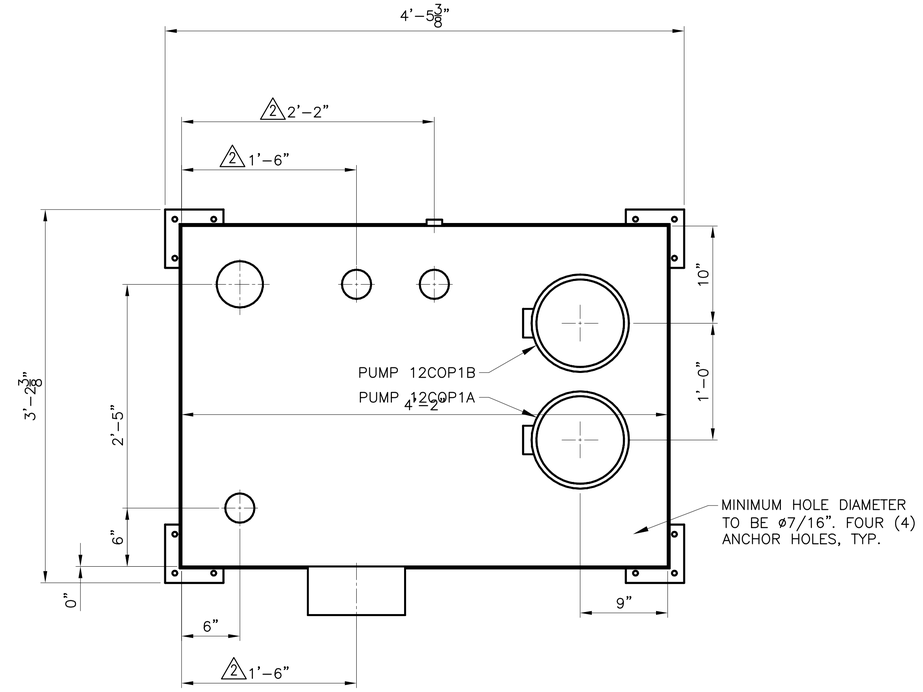
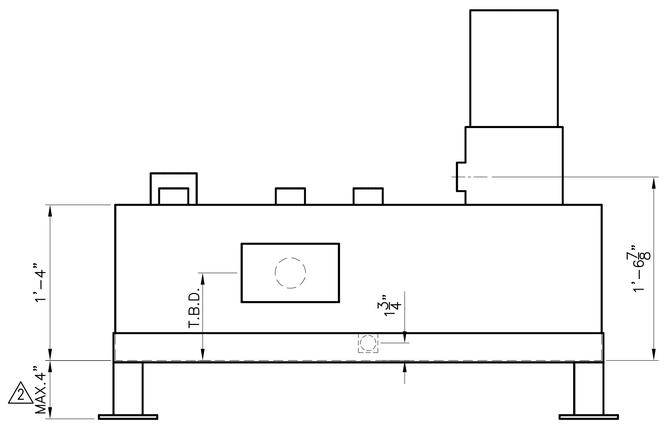
approved / approuvé	W.O.no. / D.T.no.
BN	A1-011391-05-01

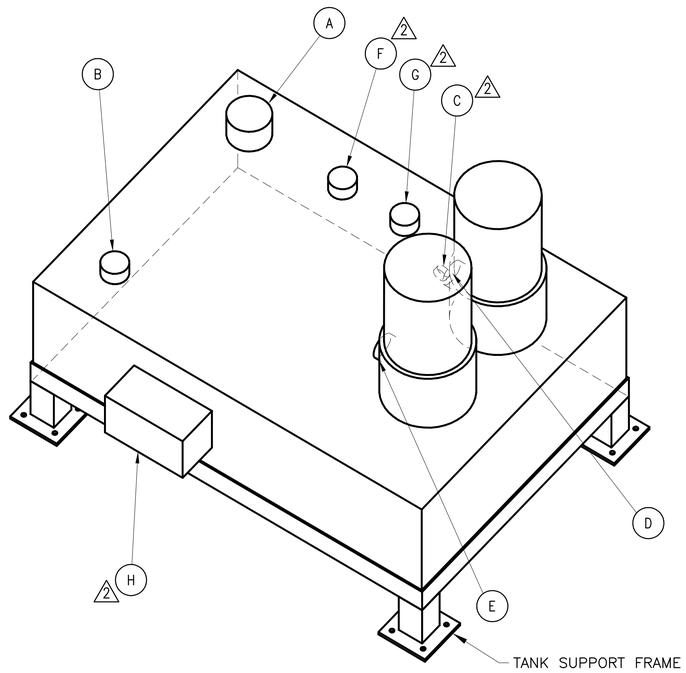
dwg.no. / dessin no.
5741-M06



PLAN VIEW
SCALE: 1 1/2" = 1'-0"



ELEVATION VIEW
SCALE: 1 1/2" = 1'-0"



ISOMETRIC VIEW
SCALE: N.T.S.

NOZZLE SCHEDULE

ITEM	QTY	SIZE	SERVICE / DESCRIPTION	RATING	CONN TYPE
A	1	3"	CONDENSATE INLET	3000#	THREADED
B	1	2"	VENT / OVERFLOW	3000#	THREADED
C	1	1"	DRAIN	3000#	THREADED
D	1	1 1/2"	PUMP DISCHARGE #1	3000#	THREADED
E	1	1 1/2"	PUMP DISCHARGE #2	3000#	THREADED
2 F	1	2"	SPARE (SUPPLIED WITH THREADED PLUG)	3000#	THREADED
2 G	1	2"	SPARE (SUPPLIED WITH THREADED PLUG)	3000#	THREADED
H	1	2 1/2"	MECHANICAL ALTERNATOR	3000#	THREADED

GENERAL NOTES:
1. SEE DRAWING 5741-M04 FOR GENERAL NOTES.
2. EXTERNAL SURFACES TO BE CLEAN & BURR FREE.
3. TANK INSTALLED INDOORS AT 1200 MONTREAL ROAD.
4. PUMP AND MECHANICAL ALTERNATOR MOUNTING TO BE DETERMINED AND INSTALLED BY TANK VENDOR.
5. SEE DRAWING 5741-M03 FOR TANK, PUMP AND MECHANICAL ALTERNATOR SPECS.
6. TANK TO BE SUPPLIED BY VENDOR WITH SUPPORT FRAME WHICH PROVIDES SUFFICIENT SUPPORT FOR GRAVITY LOADS AND SEISMIC LOADS SPECIFIC TO OTTAWA, ONTARIO REGION. CONTRACTOR TO ANCHOR TANK FRAME TO THE CONCRETE FLOOR. ANCHORING DETERMINED BY SEISMIC ENGINEER UNDER SEPARATE CONTRACT WITH CONTRACTOR.

ISSUED FOR TENDER
NOT FOR CONSTRUCTION
AUGUST 23/19

National Research Council Canada / Conseil national de recherches Canada
Administrative Services and Property Management Branch / Division des services administratifs et gestion de l'immobilier

NRC · CNRC

MATERIAL SPECIFICATIONS:

DESCRIPTION:	MATERIAL:	THK'NS:
SHELL:	316/316L	TBD
FITTINGS:	316/316L	TBD
FLANGES:	–	TBD
BOLTING:	–	–
GASKETS:	–	TBD

LCI ENGINEERING
36 Antares Drive, Suite 200
Ottawa, Ont., Canada K2E 7W5
Tel.: (613) 737-7745 Fax: (613) 737-1114

DESIGN DATA:

DESIGN CODE:	ASME VIII-1 2017
ASME U-STAMP:	NO
CRN No.:	NOT REQUIRED
DESIGN PRESSURE:	15 PSIG
DESIGN TEMPERATURE:	100°C(212°F)
OPERATING PRESSURE:	5 PSIG
OPERATING TEMPERATURE:	93°C(200°F)
MAX. ALLOW. OPER. PRES.:	–
MIN. DSG. METAL TEMP.:	0°C(32°F)
HYDRO. TEST PRES.:	TBD
CORROSION ALLOWANCE:	ZERO
RADIOGRAPHY:	TBD
LIQUID PENETRANT:	TBD
SEISMIC LOAD:	PER O.B.C.
WIND LOAD:	NONE
CONTENTS:	WATER & SATURATED STEAM
CONTENTS S.G.:	1.0
CONTENTS DESIGN pH:	6.5 TO 8.5
CONTENTS OPERATING pH:	7
MAX. LIQUID LEVEL:	–
FLOODED CAPACITY:	380L
WORKING CAPACITY:	TBD
WEIGHT, EMPTY:	TBD
WEIGHT, FULL, OPERATING:	TBD

No.	Date	Revision	By: Par
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C Drawing no. / dessin no.

project / projet
BUILDING M-12
CONDENSATE TANK REPLACEMENT
MONTREAL ROAD CAMPUS

drawing / dessin
ROOM G31 DETAILS
NEW CONDENSATE TANK 12COT1

designed / conçu: IS	date / date: 09/07/2019
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checked / vérifié: BN	sheet / feuille: 1 of/de 1
approved / approuvé: BN	W.O.no.: A1-011391-05-01 / D.T.no.

dwg.no. / dessin no.: 5741-M07

ASPM A1 (841x594)

0 10 20mm 40 60 80 100 120 140 160 180 200mm

NATIONAL RESEARCH COUNCIL
1200 MONTREAL ROAD OTTAWA, ONTARIO K1A 0R6
M12 - CONDENSATE TANK REPLACEMENT

ELECTRICAL DRAWING LIST	
DRAWING NUMBER	DRAWING NAME
5741-E00	TITLE AND DRAWING LIST
5741-E01-1	SPECIFICATIONS (PAGE 1 of 2)
5741-E01-2	SPECIFICATIONS (PAGE 2 of 2)
5741-E02	FLOOR PLAN FOR DEMOLITION
5741-E03	FLOOR PLAN FOR CONSTRUCTION
5741-E04	WIRING DIAGRAM

ISSUED FOR TENDER
NOT FOR CONSTRUCTION
JULY 31/19

C

0 10 20mm 40 60 80 100 120 140 160 180 200mm

ASPM A1 (841x594)

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Administrative Services and Property Management Branch / Division des services administratifs et gestion de l'immobilier

NRC · CNRC

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A Detail no. / No. du détail
B Location drawing no. / sur dessin no.
C Drawing no. / dessin no.

project / projet
BUILDING M-12
ROOM G-31 CONDENSATE TANK
MONTREAL ROAD CAMPUS

drawing / dessin
ELECTRICAL.
TITLE AND
DRAWING LIST.

designed / conçu	date / date
MP	08/07/2019
drawn / dessiné	scale / échelle
MP	N.T.S.
checked / vérifié	sheet / feuille
MAL	1 of/de 1
approved / approuvé	W.O.no. / D.T.no.
MAL	A1-011391-05-01

dwg.no. / dessin no.
5741-E00

General Conditions

1. The work of this contract is comprised of the replacement of a condensate tank, the two pumps and the control system located at 1200 Montreal Road, building M12. The contractor shall supply and install all equipment, components, supports and wiring required for a complete electrical system per the specifications and information outlined in the contract drawings.
2. The work of this project must include provision for coordinating with all trades on site for all work covered under separate contract.
3. All work to be executed in accordance with the requirement of NRC Section 00 10 00 General Instructions. If discrepancies exist between the contract drawings and NRC General Instructions, the NRC General Instructions shall prevail.
4. Contractor to bear all costs for all material, equipment, labor, seismic engineering, sub-trades, permits, inspections and testing outlined in this contract unless otherwise noted.
5. The contractor's use of the premises is restricted and the contractor shall use the premises under the direction of the NRC Departmental Representative. All work shall be scheduled with the NRC Departmental Representative in order to minimize conflict and the Owner's use of the premises. Adjacent areas to the work space shall be operational during the demolition and construction period for normal day to day operation. The contractor shall make every reasonable effort to execute the work with minimal interferences or disturbances.
6. Normal working hours on the NRC property are from 8:00 a.m. until 4:30 p.m., Monday to Friday inclusive, except statutory holidays. At all other times, special written passes are required for access to the building site. Before scheduling any work outside normal working hours, obtain permission from the Departmental Representative to perform the specific tasks. An escort may be required whenever working outside normal hours. Contractor to bear the associated costs.
7. All contractor and subcontractor employees must be security cleared in accordance with NRC requirements and must wear and keep visible identification badges issued by NRC. Contractor to coordinate with NRC Departmental Representative.
8. All service interruptions, if required, must be arranged in advance with the NRC Departmental Representative with 2 weeks advanced notice. All interruptions are to be of a minimum duration. All coordinated power outages must be scheduled with NRC.
9. Contractor to submit a construction schedule with their fee proposal and update the schedule after contracting. Submittal to include a GANTT chart outlining the entire construction project schedule having at minimum all major milestones (as per good judgement). NRC to approve the construction schedule prior to construction. In the event the contractor is not meeting the approved schedule, the contractor shall contact NRC immediately to determine reasonable solutions to keep the project on schedule.
10. Shop drawings and product data (including wiring diagrams) shall be submitted to the NRC Departmental Representative with reasonable promptness for review and for approval prior to ordering. Work affected by the submittal shall not proceed until the review is complete. Shop drawings to be submitted 10 days prior to tender close and to include installation instructions including electrical wiring diagrams if equipment submitted is for the purpose of seeking an approved equipment equivalent. All shop drawings and product data to be submitted in imperial units for review. The contractor's responsibility for errors, omissions and deviations in a submission is not relieved by the NRC Departmental Representative review of the submittals.

△2

11. Contractor is responsible for a safe work environment at all times. Contractor must maintain work area(s) in a tidy condition, free from accumulation of waste products and debris, including that caused by the work of this contract. All construction waste and debris shall be cleaned and removed from the facility daily by the contractor and at their own expense.
12. Products, materials, equipment and articles (referred to as products throughout the specification) incorporated in the work shall be new, bearing Canadian Standard Association or Authorized Electrical Inspection Department labels, of the best quality (compatible with the specifications) for the purpose intended and subject to the approval of the NRC Department Representative. If requested the contractor shall furnish evidence to the type, source, and quality of the products provided. Defective products whenever identified shall be rejected regardless of previous inspections. Inspections do not relieve the contractor's responsibility, but is a precaution against oversight or error. All defective products shall be removed and replaced at the contractors expense. All delays and expense caused by the rejection shall be the responsibility of the contractor. Should any dispute regarding the quality or fitness for service arise, the decision shall rest solely with the NRC Departmental Representative based on the requirements of the contract documents. After a contract is awarded, utilize alternative methods and/or materials only after receiving the NRC Departmental Representative's approval.
13. The contractor shall coordinate contract drawings with site conditions prior to the commencement of fabrication and installation. All interferences shall be reported to the NRC Departmental Representative. The contractor shall work with the NRC Departmental Representative in determining reasonable solutions at no additional costs to the project.
14. Project close-out shall be complete upon submittal of the following to the NRC Departmental Representative:
    a. Hard copies, (2) bilingual or (2) English and (2) French (printed and placed in binders with an index) and (1) soft (electronic) copy of operating and maintenance manuals for all installed equipment including all shop drawings.
    b. The contractor shall be responsible for all documentation for as-built conditions and shall submit red lined drawings documenting the final site installation.
    c. All deliverables mentioned within the contract drawings.
    d. All Hazardous Materials Assessment(s) or other reports.
    e. All inspections as per the local authorities having jurisdiction.
    f. All mechanical and electrical project close-out submittals as per the mechanical and electrical specifications.
15. The contractor shall be responsible and bear all costs for supplying and receiving all equipment for this project, including off loading, storing and moving into final location.
16. All cabling, fire protection systems and other building services to be protected during installation. Any interference or damage to be reported immediately to the NRC Departmental Representative.
17. The contractor shall ensure that the placement of new equipment does not interfere with the operation and maintenance of any existing or other new equipment.
18. All equipment is to be installed per manufacturer's instructions.
19. Contractor shall not stop or disconnect any equipment within the space without the NRC Departmental Representative's approval in advance.
20. The contractor is advised that fire alarm sensors are placed in several locations in the building. The NRC Departmental Representative is to be advised when working near a sensor to determine if the sensor must be disconnected or disabled during the work.
21. Removal and relocation of existing equipment is necessary per contract drawings and specific contract drawings provide arrangements and details to describe the general design intent of the work and do not show the exact details for all installation conditions. A site review is mandatory and the contractor shall make themselves aware of all obstructions, interferences and other site conditions not captured on contract drawings and documents. The contractor shall be advised that some details used in the drawings may change depending on specific site conditions. NRC reserves the right to make reasonable adjustments due to site conditions not captured in the contract documents or specifications up to three feet to the location of equipment, supports and architectural details at no cost to NRC.
22. It is the responsibility of the contractor, prior to proceeding with any scope of work within the contract documents, to contact the engineer and NRC if the contractor requires any clarification in regards to any information shown within the contract drawings.

Seismic Engineering and Supports

1. NRC building M-12 has an "other" importance category. The contractor shall provide seismic engineering for the systems being installed in accordance with the Provincial and National Building Codes. All piping components and equipment shall have seismic restraints and braces per the building code and SMACNA guidelines. Upon completion the contractor shall provide a letter to the NRC Departmental Representative signed and sealed by the Seismic Engineer of record stating that all systems meet the project seismic requirements.

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2. The contractor is to contact the seismic engineer during tendering in order to determine the required seismic scope of work (from the seismic engineer) in order for the contractor to account for this work during the tendering process. All work required by the seismic engineer is to be supplied and installed by the contractor per the seismic engineers instructions.
3. Contractor to contact the NRC Departmental Representative with any issues obtaining the required seismic engineering services by others.

Basic Electrical Requirements

1. The contractor shall perform all work to meet or exceed the requirements of the various applicable federal, provincial and municipal codes such as the Canadian Electrical Code, the Provincial Building Code, Provincial Fire Code, Provincial Electrical Code and CSA, as well the contractor shall consider CSA Bulletins in force at time of tender submission to be forming part of CSA standard. Work is to be conform to standards and codes as reaffirmed or revised to date of the contractor's proposal. The contractor shall comply with the Occupational Health and Safety Act and Regulations for Construction Projects.
2. All electrical work to be executed in accordance with these requirements. If the contract drawings show discrepancies, the requirements hereby listed shall prevail.
3. The contractor shall apply for all required permits, services and inspections and pay all associated fees to the authorities having jurisdiction. Furnish Certificate of Acceptance from the Hydro inspection Department on completion of work.
4. All equipment supplied by the contractor shall be CSA or ULc approved.
5. Unless noted otherwise, electrical equipment such as enclosures, junction boxes, etc., shall be selected with a NEMA rating suitable for the environment intended.
6. All shipping, crating and handling costs relating to the shipment of contractor-supplied equipment to site shall be paid by the contractor.
7. The contractor shall be responsible for coordinating his work with the work of others during the construction period, so as to maintain a safe and efficient work process and meet schedule.
8. The contractor is responsible to coordinate with all trades for the exact location of all equipment and devices. Locations shown or mentioned in this specification and drawings are approximate only.
9. At the project kick-off meeting, the contractor is to supply delivery dates for all material along with a construction schedule. The contractor is responsible to have all required material on site to prevent delays in the schedule. All required service interruption must be clearly identified on the construction schedule along with the required duration.
10. Electrical contractor to allow 4 hours to participate in a Hazard identification Risk Assessment prior to commencement of work.
11. The contractor is responsible to protect stored material, work in progress and finished work until taken over by NRC. This includes all equipment that might be free-issued by NRC to the contractor.
12. The contractor shall provide all cutting and patching of existing surfaces as required to accommodate the work. The contractor shall patch and make good surface cuts, damaged or disturbed to NRC's approval. Match existing material, color, finish and texture.
13. Whenever conduits, trays, etc., penetrate through floors or fire rated walls, the contractor shall provide and install a ULc listed fire stopped assembly. Rating shall suit wall or floor penetration. Minimum rating shall be 2hrs, if unknown; confirm with Engineer. Acceptable materials: 3M, Hilti or equal.
14. The work is suitably outlined on the contract drawings with regards to sizes, general locations and arrangements. The location of equipment, associated cabling and other material describes the general requirements of the work. The cable routing may be altered, upon approval, for ease of installation, cost reduction or relief from a site interference but all cabling shall follow horizontal and vertical building lines. The contractor shall include as part of the work specific manufacturer's installation details and requirements outlined in the installation instructions for the actual equipment being provided.
15. In order to achieve the desired routing some wiring and other components may need to be altered or relocated. Once identified the contractor shall notify the NRC Departmental Representative and Engineer of the alteration for approval. The contractor shall be responsible for all costs associated with the rewiring/relocation as required. Alteration shall be made by qualified personnel only and approved by the NRC Departmental Representative prior to the commencement of work.
16. Trade Qualifications: Plumbers, Welders, and Electricians. All trade workers to have a Certificate of Qualification as Journeyman or Apprentice Registration as required for the province in which the work is being performed. The ratio of journeyman to apprentice shall not exceed the defined ratio in the Provincial Apprenticeship Act. The contractor shall maintain an up-to-date record listing journeyman and apprentices working on the site.
17. The contractor to install equipment in a compact, neat and workman like manner. All components to be installed and commissioned in accordance with industry standards and manufacturer's printed instructions. No exposed conduits and/or cabling is acceptable in finished spaces.
18. Equipment to be installed per manufacturer's recommendations. Adequate space is necessary for maintenance and disassembly.
19. During the course of the installation and upon completion of the work, remove all rubbish and waste resulting from the work. Check, clean and repaint where necessary all electrical equipment and leave it in first class condition.
20. Disconnect switches 30Amp and above are to be of the "heavy duty" type.
21. All wiring in return air plenums shall be FT-6 rated.
22. Unless specifically noted, all indoor cable runs to be in EMT conduits, and outdoor cable runs to be in rigid conduits.
23. Bonding conductors might not be specifically identified on the drawings. Each electrical feed to have an appropriate bonding conductor sized and installed as per the latest edition of the Electrical Code.

25. All junction boxes, pull boxes and end devices such as receptacles shall be identified with the source circuit number.
26. Ensure that all new and/or modified distribution panel legends have been completed and are accurate. Only typed-up panel legends will be accepted.
27. At the end of the project, measure all amperage at each new and/or modified distribution panels and transformers and hand over to the NRC Departmental Representative. Re-balance all phases as required.
28. As alternative the electrical contractor can provide different wiring method as long as it meets all code requirements. Please note that although alternatives will be considered, the electrical contractor must provide a base price as per the wiring methods shown on the drawings in addition to any alternatives.

Wiring: Conductor material for branch circuit wiring and grounding:

1. Stranded copper.
2. Neutral wire: continuous throughout its length without breaks.
3. Separate insulated green grounding conductors in all electrical conduits.
4. All wire and cable insulation shall meet the C.S.A. Standards for the types and services hereinafter specified. Colours as per section 4-030 of Electrical Code.
5. Unless otherwise specified, use wire and cable types as follows:
    a. Type R90 XLPE cross-link polyethylene stranded for applications using wires sized No. 8 and larger.
    b. Type T90 stranded for applications using wires sized No. 10 and smaller.
    c. For fire alarm wiring refer to Section 283100 (not applicable in this project)
    d. Approved heat resistant wire for wiring through and at lighting and heating fixtures. Where insulation types are shown on the drawings other types shall not be used unless the specification is more restrictive.
6. Use AC90 (BX) cable **only** under the following conditions:
    a. Wiring from a junction box to a recessed lighting fixture in suspended ceilings. Cable length not to exceed 1.5 m (5'), or
    b. Wiring switches or receptacles in existing or new hollow gypsum partitions, vertical runs only with cable length not to exceed 3.5m (12'), or
    c. When specifically called for on drawings or approved in writing by departmental representative.
    d. AC90 shall not be used in insulated walls or masonry walls.
    e. Only AC90 cable of No. 12 AWG will be accepted.
7. Use stranded wire no smaller than No. 12 AWG for lighting and power and no smaller than No. 16 AWG for control wiring.
8. Conductors shall be soft copper properly refined and tinned having a minimum conductivity of 98%.

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Administrative Services and Property Management Branch | Division des services administratifs et gestion de l'immobilier

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- ANY AND ALL REQUIRED SHUTDOWNS SHALL BE COORDINATED WITH DEPARTMENTAL REPRESENTATIVE.
- INSTALLATION OF ALL SYSTEMS SHALL BE IN ACCORDANCE WITH APPLICABLE CODES AND STANDARDS.
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No.	Date	Revision	By: Par:
2	16/12/2019	UPDATES PER NRC COMMENTS	MP/LCI
1	31/07/2019	ISSUED FOR TENDER	MP/LCI
0	12/07/2019	PRELIMINARY FOR REVIEW	MP/LCI

Date Printed / Date imprimée

- Verify all dimensions and site conditions and be responsible for same
- Vérifier toutes les dimensions et l'etat des lieux et en assumer la responsabilité

A Detail no. / No. du détail
B Location drawing no. / sur dessin no.
C Drawing no. / dessin no.

project / projet
BUILDING M-12
ROOM G-31 CONDENSATE TANK
MONTREAL ROAD CAMPUS

drawing / dessin
ELECTRICAL SPECIFICATIONS

designed / conçu	date / date
MP	08/07/2019
drawn / dessiné	scale / échelle
MP	N.T.S.
checked / vérifié	sheet / feuille
MAL	1 of/de 2
approved / approuvé	W.O.no. / D.T.no.
MAL	A1-011391-05-01

dwg.no. / dessin no.
5741-E01

ASPM A1 (841x594)

C
0 10 20mm 40 60 80 100 120 140 160 180 200mm

Wiring: Installation

1. Make joints, taps and splices in approved boxes with solderless connectors. Joints and/or splices are not acceptable inside a panelboard.
2. Ensure the lugs accommodate all the strands of the conductor.
3. Replace any wire or cable showing evidence of mechanical injury.
4. Use No. 10 AWG for branch circuit wiring extending more than 30 m (100 ft.) to farthest outlet from panel.
5. Circuit numbers indicated on the drawing are intended as a guide for the proper connection of multi-wire circuits at the panel.
6. Take care to keep the conductors free from twisting.
7. Use an approved lubricant for pulling in conduit.
8. Leave sufficient slack on all runs to permit proper splicing and connection of electrical devices.
9. Branch circuit wiring of 120 volt applications to be multi-wire utilizing common neutrals. Under no condition shall any switch break a neutral conductor.
10. Provide and install an approved fire- retardant wrap or coating for PVC jacketed cables installed in a grouped configuration of two or more.

Identification: Equipment

1. Identify with 3mm (1/8") Brother, P-Touch non-smearing tape, or an alternate approved by the NRC Departmental Representative, all electrical outlets shown on drawings and/or mentioned in the specifications. These are the lighting switches, recessed and surface mounted receptacles such as those in offices and service rooms and used to plug in office equipment, telecommunication equipment or small portable tools. Indicate only the source of power (Ex. for a receptacle fed from panel L32 circuit #1: "L32-1").
2. Light fixtures are the only exceptions for electrical equipment identification (except as noted in 7.13 below). They are not to be identified.
3. Identify with lamicoid nameplates all electrical equipment shown on the drawings and/or mentioned in the specification such as motor control centers, switchgear, splitters, fused switches, isolation switches, motor starting switches, starters, panelboards, transformers, high voltage cables, industrial type receptacles, junction boxes, control panels, etc., regardless of whether or not the electrical equipment was furnished under this section of the specification.
4. Coordinate names of equipment and systems with other Divisions to ensure that names and numbers match.
5. Wording on lamicoid nameplates to be approved by the NRC Departmental Representative prior to fabrication.
6. Provide two sets of lamicoid nameplates for each piece of equipment; one in English and one in French.
7. Lamicoid nameplates shall identify the equipment, the voltage characteristics and the power source for the equipment. Example: A new 120/240 volt single phase circuit breaker panelboard, L16, is fed from panelboard LD1 circuit 10.

"PANEL L16
120/240 V
FED FROM LD1-10

PANNEAU L16
120/240 V
ALIMENTE PAR LD1-10"

8. Provide warning labels for equipment fed from two or more sources - "DANGER MULTIPLE POWER FEED" black letters on a yellow background. These labels are available from NRC's Facilities Maintenance group in building M-19.
9. All electrical transformers, distribution panels and disconnect switches shall be clearly identified with permanent nameplates. Unless otherwise noted, nameplates shall be rigid lamicoid, minimum 1.5mm (1/16") thick, color coded as stated below. Transformers shall be identified showing its tag designation, capacity, primary voltage and secondary voltage. Distribution panels shall be identified with panel designation, voltage, phase and amperage. Disconnect switches shall be identified with voltage, number of poles, amperage rating, fuse rating if applicable and the words "Disconnect Switch for Equipment XXX", where XXX represents the tag number of the equipment it services. The source of supply (panel, transformer, MCC, SWBD) shall also be shown on the nameplates for all equipment. All equipment to have two sets of lamicoid nameplates for each piece of equipment; one in English and one in French.
    a. Normal Power: Black engraving on white background.
    b. Emergency Power: Black engraving on yellow background.
    c. Fire Alarm Power: White engraving on red background.
10. For all interior lamicoid nameplates, mount nameplates using two-sided tape.
11. For all exterior lamicoid nameplates, mount nameplates using self-tapping 2.3 mm (3/32") dia. slot head screws - two per nameplate for nameplates under 75 mm (3") in height and a minimum of 4 for larger nameplates. Holes in lamicoid nameplates to be 3.7 mm (3/16") diameter to allow for expansion of lamicoid due to exterior conditions.
    x. No drilling is to be done on live equipment.
    y. Metal filings from drilling are to be vacuumed from the enclosure interiors.
12. All lamicoid nameplates shall have a minimum border of 3 mm (1/8"). Characters shall be 9 mm (3/8") in size unless otherwise specified.
13. Identify lighting fixtures which are connected to emergency power with a label "EMERGENCY LIGHTING/ÉCLAIRAGE D'URGENCE", black letters on a yellow background. These labels are available from NRC's Facilities Maintenance group in building M-19.
14. Provide neatly typed updated circuit directories in a plastic holder on the inside door of new panelboards.
15. Carefully update panelboard circuit directories whenever adding, deleting, or modifying existing circuitry.
16. Identify molded case breaker with lamicoid nameplate.

Identification: Wiring, Cable and Conduit

1. Unless otherwise specified, identify wiring with permanent indelible identifying markings, using either numbered or coloured plastic tapes on both ends of phase conductors of feeders and branch circuit wiring. Maintain phase sequence and colour coding throughout.
2. All conduits and cables shall be identified at both ends with a "Source/Destination" marking. Marking shall be neatly done and shall be waterproof.
3. All new conduits to be factory painted, colour-coded EMT, type as follows:
    a. Fire alarm - red conduit
    b. Emergency power circuits - yellow conduit
    c. Voice/data - blue conduit
    d. Gas detection system - purple conduit
    e. Building Automation system - orange conduit
    f. Security system - green conduit
    g. Control system - black conduit
3. Apply paint to the covers of junction boxes and condulets of existing conduits as follows:
    a. Fire alarm - red
    b. Emergency power circuits - yellow
    c. Voice/data - blue
    d. Gas detection system - purple
    e. Building Automation system - orange
    f. Security system - green
    g. Control system - black
4. 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 a wall.
5. All other systems need not be coloured.

Manufacturer's & approvals labels

1. Ensure that manufacturer's registration plates are properly affixed to all apparatus showing the size, name of equipment, serial number, and all information usually provided, including voltage, cycle, phase and the name and address of the manufacturer.
2. Do not paint over registration plates or approval labels. Leave openings through insulation for viewing the plates. Contractor's or sub-contractor's nameplate not acceptable.

Warning signs and protection

1. Provide warning signs, as specified or to meet requirements of Authorized Electrical Inspection Department and NRC Departmental Representative.
2. Accept the responsibility to protect those working on the project from any physical danger due to exposed live equipment such as panel mains, outlet wiring, etc. Shield and mark all live parts with the appropriate voltage. Caution notices shall be worded in both English and French.

Load balance

1. Measure phase current to new panelboards with normal loads operating at time of acceptance. Adjust branch circuit connections as required to obtain best balance of current between phases and record changes, and revise panelboard schedules.
2. Measure phase voltages at loads and adjust transformer taps to within 2% of rated voltage of equipment.

Motor rotation

1. For new motors, ensure that motor rotation matches the requirements of the driven equipment.
2. For existing motors, check rotation before making wiring changes in order to ensure correct rotation upon completion of the job.

Grounding

1. Thoroughly ground all electrical equipment, cabinets, metal supporting frames, ventilating ducts and other apparatus where grounding is required in accordance with the requirements of the latest edition of the Canadian Electrical Code Part 1, C.S.A. C22.1 and corresponding Provincial and Municipal regulations. Do not depend upon conduits to provide the ground circuits.
2. Run separate green insulated stranded copper grounding conductors in all electrical conduits including those feeding toggle switches and receptacles.

Tests

1. Provide any materials, equipment and labour required and make such tests deemed necessary to show proper execution of this work, in the presence of the NRC Departmental Representative.
2. Correct any defects or deficiencies discovered in the work in an approved manner at no additional expense to the Owner.
3. Megger all branch circuits and feeders using a 600V tester for 240V circuits and a 1000V tester for 600V circuits. If the resistance to ground is less than permitted by Table 24 of the Code, consider such circuits defective and do not energize.
4. The final approval of insulation between conductors and ground, and the efficiency of the grounding system is left to the discretion of the local Electrical Inspection Department.

Coordination of protective devices

1. Ensure circuit protective devices such as overcurrent trips, fuses, are installed to values and settings as indicated on the Drawings.

Demolition Notes

1. Electrical contractor to remove all redundant electrical wiring, conduits and electrical equipment associated with equipment being removed.
2. Verify exact routing of conduits and location of boxes on site prior to removal.
3. Unless otherwise noted, materials for removal become the contractor's property and shall be taken from the site and disposed of.
4. Maintain existing remaining circuits and all systems which pass through all areas of demolition. Provide necessary materials to maintain systems that are remaining. Ensure all materials are concealed when demolition is complete.
5. Electrical contractor to coordinate electrical demolition (disconnect and removal) requirements for equipment being removed by other trades.
6. Before removing power to any equipment, the electrical contractor shall ascertain that power source as shown on drawings is accurate. If it is found that power source is different than shown on drawings, the Electrical Contractor shall notify the Engineer before disconnecting.

ISSUED FOR TENDER
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JULY 31/19

ASPM A1 (841x594)

0 10 20mm 40 60 80 100 120 140 160 180 200mm

National Research Council Canada / Conseil national de recherches Canada
Administrative Services and Property Management Branch / Division des services administratifs et gestion de l'immobilier

NRC · CNRC

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0	12/07/2019	PRELIMINARY FOR REVIEW	MP/LCI

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- Verify all dimensions and site conditions and be responsible for same
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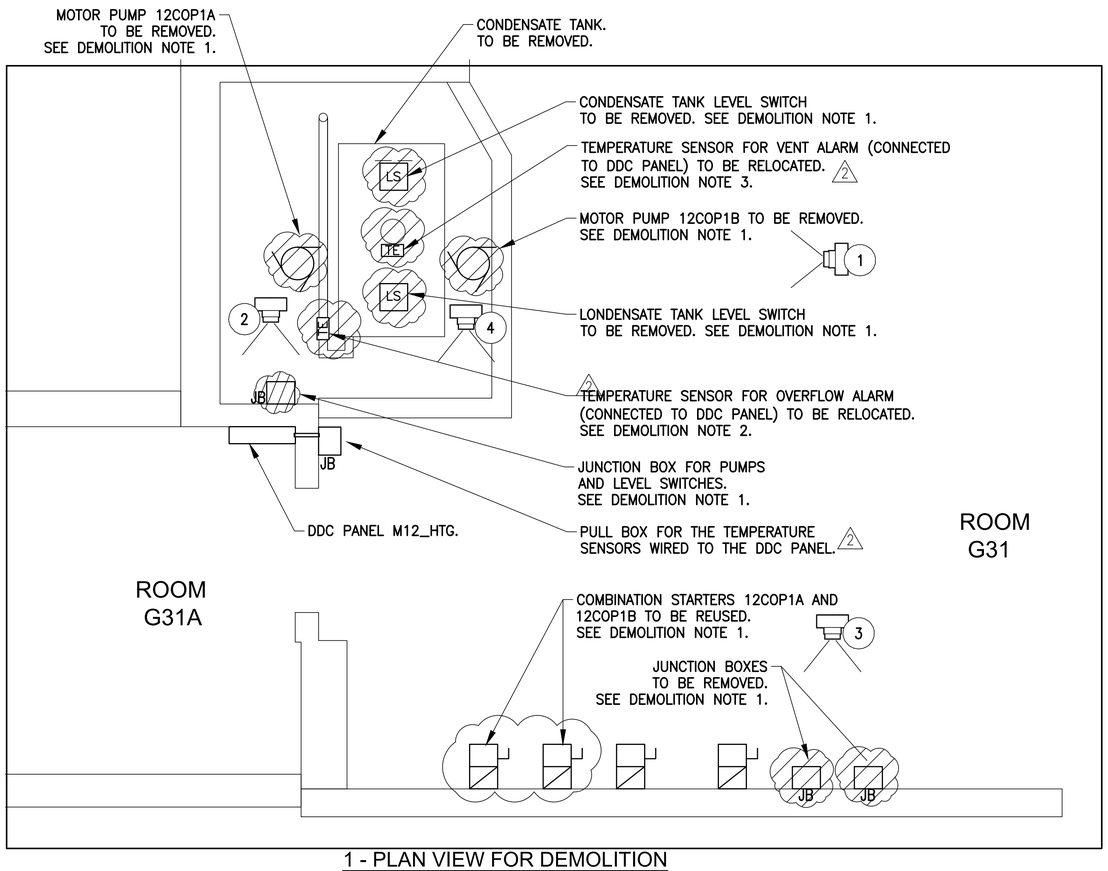
A Detail no. / No. du détail
B Location drawing no. / sur dessin no.
C Drawing no. / dessin no.

project / projet
BUILDING M-12
ROOM G-31 CONDENSATE TANK
MONTREAL ROAD CAMPUS

drawing / dessin
ELECTRICAL SPECIFICATIONS

designed / conçu: MP	date / date: 08/07/2019
drawn / dessiné: MP	scale / échelle: N.T.S.
checked / vérifié: MAL	sheet / feuille: 2 of/de 2
approved / approuvé: MAL	W.O.no.: A1-011391-05-01
	D.T.no.

dwg.no. / dessin no.: 5741-E01



1 - PLAN VIEW FOR DEMOLITION

SCALE: 1/2":1'

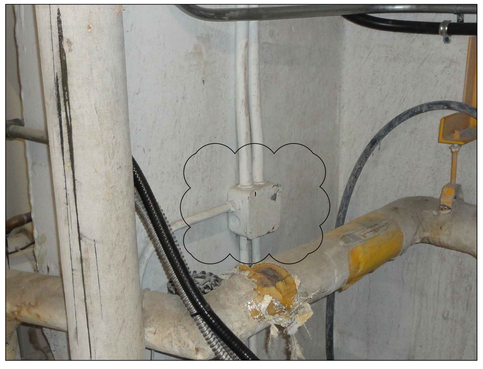
DEMOLITION NOTES:

1. EXISTING CONDENSATE PUMPS 12COP1A AND 12COP1B, AND THE TWO CONDENSATE TANK LEVEL SWITCHES ARE TO BE REMOVED. CONTRACTOR TO REMOVE ALL WIRING ASSOCIATED WITH THE PUMPS AND THE LEVEL SWITCHES UP TO THE STARTERS, ALONG WITH ALL CONDUITS AND JUNCTION BOXES SHOWN ON PICTURES 2 AND 3. CONDUITS GOING INTO THE SLAB (SIMILAR TO THE ONE SHOWN ON PICTURE 4) TO BE CUT AS SHORT AS POSSIBLE AND TO BE CAPPED TO PROVIDE A WATER-SEAL BARRIER.

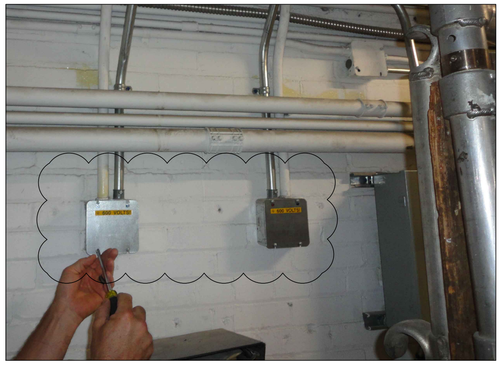
2. TEMPERATURE SENSOR FOR VENT ALARM, WIRED TO DDC PANEL M12_HTG (TAG ID. COP1A_1BVALM) WILL BE RELOCATED AND REWIRED TO THE SAME INPUT IN THE DDC PANEL AFTER INSTALLATION OF THE NEW CONDENSATE TANK. AINSWORTH TO DISCONNECT THE TEMPERATURE SENSOR FROM THE DDC PANEL PRIOR THE ELECTRICAL CONTRACTOR REMOVES THE WIRING.

3. TEMPERATURE SENSOR FOR OVERFLOW ALARM, WIRED TO DDC PANEL M12_HTG (TAG ID. COP1A_1BOFALM) WILL BE RELOCATED AND REWIRED TO THE SAME INPUT IN THE DDC PANEL AFTER INSTALLATION OF THE NEW CONDENSATE TANK. AINSWORTH TO DISCONNECT THE TEMPERATURE SENSOR FROM THE DDC PANEL PRIOR THE ELECTRICAL CONTRACTOR REMOVES THE WIRING.

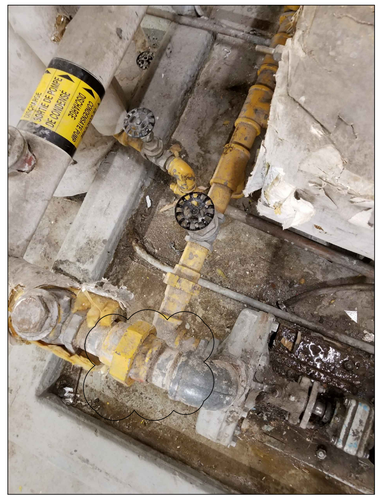
E02 / 1 EXISTING CONDENSATE TANK
N.T.S



E02 / 2 JUNCTION BOX BEHIND CONDENSATE TANK
N.T.S



E02 / 3 JUNCTION BOXES ON STARTERS WALL
N.T.S



E02 / 4 CONDUIT TO CUT AND CAP
N.T.S

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C Drawing no. / dessin no.

project / projet
BUILDING M-12
ROOM G-31 CONDENSATE TANK
MONTREAL ROAD CAMPUS

drawing / dessin
ELECTRICAL.
FLOOR PLAN FOR
DEMOLITION.

designed / conçu: MP	date / date: 08/07/2019
drawn / dessiné: MP	scale / échelle: AS NOTED
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approved / approuvé: MAL	W.O.no.: A1-011391-05-01 / D.T.no.

dwg.no. / dessin no.: 5741-E02

ASPM A1 (841x594)

C

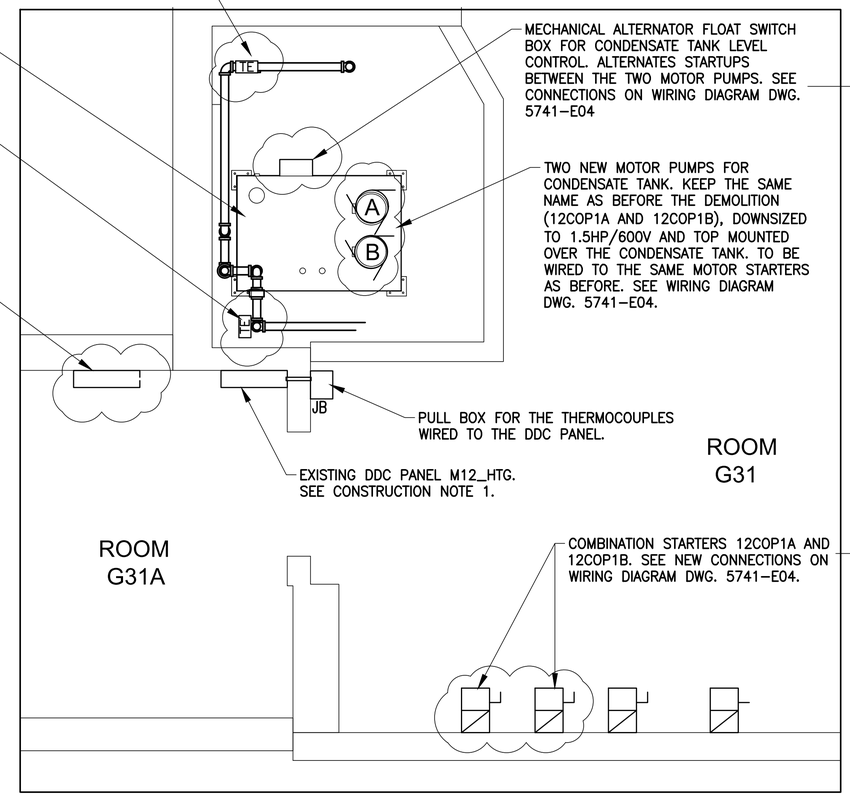
0 10 20mm 40 60 80 100 120 140 160 180 200mm

RELOCATED TEMPERATURE SENSOR FOR OVERFLOW ALARM (HORIZONTALY MOUNTED), TO BE RECONNECTED TO THE DDC PANEL. SEE CONSTRUCTION NOTES 1 AND 2.

RELOCATED TEMPERATURE SENSOR FOR VENT ALARM (VERTICALY MOUNTED) SEE CONSTRUCTION NOTE 1 AND 3.

NEW CONDENSATE TANK

NEW DDC PANEL M12_XXX. EXACT LOCATION INSIDE ROOM G31A TO BE DETERMINED. SEE CONSTRUCTION NOTE 1.



MECHANICAL ALTERNATOR FLOAT SWITCH BOX FOR CONDENSATE TANK LEVEL CONTROL. ALTERNATES STARTUPS BETWEEN THE TWO MOTOR PUMPS. SEE CONNECTIONS ON WIRING DIAGRAM DWG. 5741–E04

TWO NEW MOTOR PUMPS FOR CONDENSATE TANK. KEEP THE SAME NAME AS BEFORE THE DEMOLITION (12COP1A AND 12COP1B), DOWNSIZED TO 1.5HP/600V AND TOP MOUNTED OVER THE CONDENSATE TANK. TO BE WIRED TO THE SAME MOTOR STARTERS AS BEFORE. SEE WIRING DIAGRAM DWG. 5741–E04.

PULL BOX FOR THE THERMOCOUPLES WIRED TO THE DDC PANEL.

EXISTING DDC PANEL M12_HTG. SEE CONSTRUCTION NOTE 1.

COMBINATION STARTERS 12COP1A AND 12COP1B. SEE NEW CONNECTIONS ON WIRING DIAGRAM DWG. 5741–E04.

1 - PLAN VIEW FOR CONSTRUCTION 1/2":1'

CONSTRUCTION NOTES:

1. EXISTING DDC PANEL M12_HTG IN ROOM G31A HAS NO SPARE INPUTS TO MEET THE REQUIREMENTS OF THIS PROJECT. CONTRACTOR WILL BE RESPONSIBLE TO SUB-CONTRACT AINSWORTH (CONTACT AARON DOBSON OR VICTOR DEVEAU @ 613-247-7938) TO SUPPLY THE NECESSARY MATERIAL FOR A PROVISION OF ADDITIONAL INPUTS, TO DO THE INSTALLATION AND THE INTEGRATION TO THE EXISTING DDC SYSTEM. (2)

   ALSO, THE CONTRACTOR SHALL SUB-CONTRACT AINSWORTH TO PROVIDE ASSISTANCE ON ALL TASKS RELATING TO DDC SYSTEM AND TO INSURE THE DELIVERY OF A FULLY FUNCTIONAL SYSTEM. THIS INCLUDES BUT IS NOT LIMITED TO:

   - SUPPLY, INSTALL IN A SUITABLE CABINET AND CONNECT TO THE EXISTING BAS SYSTEM A NEW BAS CONTROL EXPANSION MODULE.
   - DISCONNECT AT THE DDC PANEL ALL WIRES RELATED TO THE INSTRUMENTS PART OF THE DEMOLITION OR THE RELOCATION SCOPE.
   - FOR EACH INPUT, DO THE FINAL CONNECTIONS TO THE TERMINALS INSIDE THE DDC PANELS.
   - VERIFY AND VALIDATE THE FIELD CONNECTIONS MADE BY THE CONTRACTOR IN THE FIELD.
   - FOR EVERY NEW INPUTS, PROVIDE A TAG ID AND NEW CABLE IDENTIFICATION.
   - PROGRAM AND TEST THE NEW INPUTS.
   - PROGRAM TWO ALARMS, ONE PER PUMP, FOR MOTOR FAILURE DETECTION.
   - VERIFY THE INTEGRITY OF THE TWO TEMPERATURE SENSOR THAT ARE BEING RELOCATED.

2. REUSE THE EXISTING TEMPERATURE SENSOR FOR OVERFLOW ALARM AND REWIRE AT THE SAME ADDRESS IN DDC PANEL M12_HTG AS IT WAS BEFORE THE DEMOLITION (TAG ID. COP1A_1BOFALM). USE A SHIELDED TWISTED PAIR 20AWG FT-4 RATED IN A 16MM EMT CONDUIT.

3. REWIRE THE TEMPERATURE SENSOR FOR VENT ALARM AT THE SAME ADDRESS IN DDC PANEL M12_HTG AS IT WAS BEFORE THE DEMOLITION (TAG ID. COP1A_1BVALM). USE A SHIELDED TWISTED PAIR 20AWG FT-4 RATED IN A 16MM EMT CONDUIT.

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drawing / dessin
ELECTRICAL.
FLOOR PLAN FOR CONSTRUCTION.

designed / conçu	date / date
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MAL	1 of/de 1
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MAL	A1-011391-05-01

dwg.no. / dessin no.
5741-E03

ASPM A1 (841x594)

0 10 20mm 40 60 80 100 120 140 160 180 200mm

1 SHIELDED TWISTED PAIR 20AWG
FT-4 RATED IN 21mm EMT CONDUIT

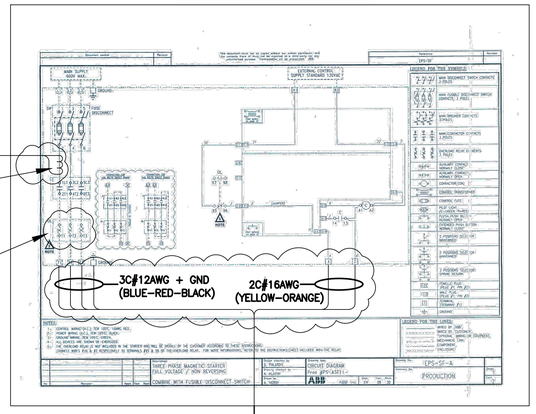
1 SHIELDED TWISTED PAIR 20AWG
FT-4 RATED IN 21mm EMT CONDUIT

2 SHIELDED TWISTED PAIRS 20AWG
FT-4 RATED IN 21mm EMT CONDUIT

12COP1A STARTER

CONTRACTOR TO SUPLLY,
INSTALL AND WIRE NEW
CURRENT SENSOR GREYSTONE
MODEL NO. CS-650-R1

CONTRACTOR TO MODIFY THE
OVERLOAD SETTINGS TO MATCH
THE NEW MOTOR FULL LOAD
AMPERAGE (FLA X 1.25).

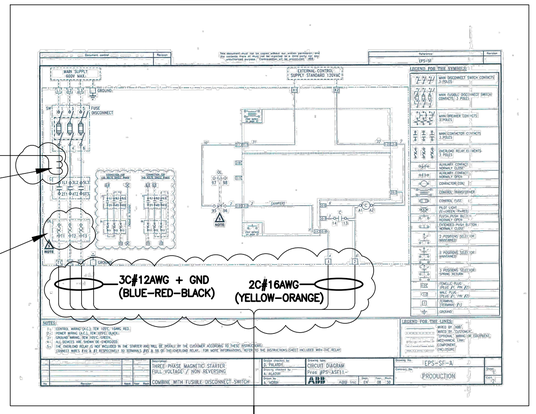


3C#12 + GND AND 2C#16
IN 21mm EMT CONDUIT

12COP1B STARTER

CONTRACTOR TO SUPLLY,
INSTALL AND WIRE NEW
CURRENT SENSOR GREYSTONE
MODEL NO. CS-650-R1

CONTRACTOR TO MODIFY THE
OVERLOAD SETTINGS TO MATCH
THE NEW MOTOR FULL LOAD
AMPERAGE (FLA X 1.25).



3C#12 + GND AND 2C#16
IN 21mm EMT CONDUIT

NEW DDC EXPENSION PANEL IN ROOM G-31A

2 INPUTS TYPE "IG" FOR MOTOR PUMPS 12COP1A
AND 12COP1B CURRENT FEEDBACK.
AINSWORTH TO TERMINATE, TO DETERMINE TAGNAME
AND TO SUPPLY A STANDARD ETIQUETTE.

12COP1A CURRENT

12COP1B CURRENT

JUNCTION BOX
6"x6"

8C#16 IN 21mm EMT CONDUIT

4C#16 IN 21mm EMT CONDUIT

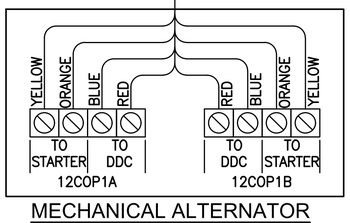
BLUE — 12COP1A START COMMAND
RED

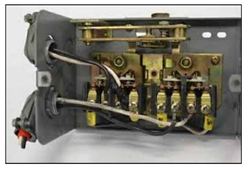
BLUE — 12COP1B START COMMAND
RED

2 INPUTS TYPE "IE" FOR MECHANICAL ALTERNATOR
START COMMAND FEEDBACKS TO MOTOR PUMPS
12COP1A AND 12COP1B.
AINSWORTH TO TERMINATE, TO DETERMINE TAGNAME
AND TO SUPPLY A STANDARD ETIQUETTE.

INSTALL BILINGUAL WARNING LABEL
"DANGER MULTIPLE POWER FEED"
AVAILABLE IN BUILDING M-19.

ALL WIRES TO BE KEPT AS WHOLE INSIDE
THE JUNCTION BOX. DO NOT SPLICE.





MECHANICAL ALTERNATOR
9038 TYPE CG31 SERIE
SQUARE D

3 C#12 + GND
IN 16mm EMT CONDUIT
TO 12COP1A STARTER

12COP1A — BLUE, RED, BLACK

3 C#12 + GND
IN 16mm EMT CONDUIT
TO 12COP1B STARTER

12COP1B — BLUE, RED, BLACK

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1 - WIRING DIAGRAM

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