Environnement Canada Environment Canada

CONTRACT SPECIFICATIONS

Storage Units and Grading

at

335 River Road
Ottawa, Ontario
K1V 1C7

Property Management, District 1
Environment Canada

Project No: RR-019b

Issued for Tender
8 December 2017

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I. CONSTRUCTION SPECIFICATIONS

1. SUMMARY OF WORK

The work involves the construction of a retaining wall and the installation of three (3) Quatrex EMRS fuel storage units at 335 River Road in the City of Ottawa, Ontario. Civil, Electrical and Structural disciplines will be involved.

It is proposed to install three (3) Quatrex ERMS fuel storage units on slab-on-grade foundations. A retaining wall is to be constructed on the south side of the slabs to accommodate the higher grade in the vicinity of the underground pump station and reservoir.

Around the existing exterior fuel tank on the east side of the slabs, some existing jersey barriers and bollards are to be removed and replace with new concrete filled steel bollards as well as a new 300mm high concrete curb to contain potential fuel spills.

The surrounding parking lot area, which is currently gravel will be paved.

The General Contractor is responsible for the coordination and implementation of the Commissioning of all Sub-Contractor work, equipment and installations. All completed Electrical work is to be functionally and performance tested and verified by the installing Trade Contractor, and written reports indicating sign-offs provided when completed. A complete Commissioning Manual Summary report is to be prepared and submitted along with the other close-out documents at the end of the project.

2. TIME OF COMPLETION

1. Commence work in accordance with notification of acceptance of your tender submission and complete the work including rectification of deficiencies within 3 months.

3. HOURS OF WORK

1. **Hours of operation**

Regular hours - Monday to Friday – 06:00 to 18:00 hours

- Unescorted access to individuals with security clearance, who have taken the required on-site training as required for work within specified work areas.

Evening work - Monday to Friday – 18:00 to 06:00 hours

- All individuals must be escorted during these timelines. This work must be co-ordinated with the site contact and your request will be granted depending on the escort availabilities.
- Commissionaires can be scheduled in advance however it requires a minimum 2-3 weeks' notice to set up a commissionaire contract.

- On short notice there is no guarantee we can accommodate your request, it depends on the availability of our on-site staff.
- Emergency work will require the site security officer acceptance.

Weekend work - Friday night from 18:00 to Monday morning 06:00

- Same requirements as for Evening work.

Holiday work

- Please avoid booking work on these dates, however if it must be, it will be dependent on the availability of an escort.

2. Work requiring power shutdown and/or Lock-Out (LOTO) work shall be completed off-hours Monday through Friday from 18:00hrs to 06:00hrs and/or on weekends from 07:00hrs to 18:00hrs.

3. Shutdown, bypassing or isolating any initiating device or zone on the fire alarm system or the fire sprinkler system shall be undertaken after hours Monday through Friday from 18:00hrs to 06:00hrs or on weekends from 07:00hrs to 18:00hrs.

4. Provide an implementation strategy in writing three (3) weeks prior to the first shutdown which clearly lists which activities require after hours work, the sequence of shutdowns, and the maximum length of each shutdown, to insure the owner can organize the shutdown of lab equipment.

5. The Contractor shall not permit his personnel to work alone on this project when the following activities are undertaken;
    1. Work assessment determines that the potential health & safety risk is high;
    2. Work requiring entry into or work within a Confined Space;
    3. Work requiring Lock-Out and Tag-Out;
    4. Work requiring use of fall arrest equipment;
    5. Work on scaffolding;
    6. Work requiring supplied air respirators or similar equipment;
    7. Hot Work and/or Hot Tap activities;
    8. Work involving cranes or hoisting;
    9. Work or work situations identified by the Departmental Representative.

6. Staff training and demonstrations shall be scheduled during regular business hours Monday to Friday. The Contractor shall obtain approvals from the Departmental Representative on the training schedule prior to the scheduled training date and time.

4. SCHEDULING

1. Within one week of contract award, submit a bar chart construction schedule for the work, indicating anticipated progress stages within time of completion. Minimum stages include mobilization, shop drawing submittal, order and delivery of major components and equipment, major approvals stages, interim and final inspection times, commissioning timeframes, final deficiency corrections and demobilization. When schedule has been reviewed and approved by the Departmental Representative take necessary measures to complete work within scheduled times. Do not change schedule without written approvals from the Departmental Representative. Contractor must confirm the required power shutdowns required and the activities for each shutdown and have these in his schedule

5. CONTRACT DOCUMENTS

1. Drawings and specifications are complementary, items shown or mentioned in one and not in the other are deemed to be included in the contract work.

2. Any questions that arise in relation to the design shall be brought to the attention of the Departmental Representative. Failure to comply with this procedure may necessitate amendments and other layout modifications as required to complete the Work, costs of which shall be solely the responsibility of the Contractor.

3. Study all documents, which describe, or are related to any operation before commencement of that operation. Report discrepancies discovered between existing conditions and documentation. Obtain ruling on required interpretation before commencing work

4. Any changes to the scope of work are to be confirmed in writing by the Departmental Representative and Contract value changes approved, prior to start of said work.

5. The cost of any additional work to the Owner shall be the actual cost of the work plus ten percent (10%) overhead and ten percent (10%) profit on the actual cost of the work.

6. CONTRACTOR'S USE OF SITE

1. Do not unreasonably encumber site, with material or equipment.

2. Execute the work with the least possible interference or disturbance to the normal use of the exiting premises. Make arrangements with the Departmental Representative to facilitate the work as stated.

3. Maintain existing services to the building and provide for personnel and vehicle access.

4. Where security is reduced by the work, provide temporary means to maintain security.

5. Contractor shall utilize assigned washroom facilities and shall maintain them neat and tidy.

7. Contractor shall be responsible to supply their own accommodations. No storage space will be provided within the building. Accommodation will be made for limited on-site storage at the discretion of the Departmental Representative in area designated by the Departmental Representative.

7. CONTRACTOR PROJECT SUPERINTENDENT

1. The Contractor shall, upon award of contract, designate a Project Superintendent. The Contractor shall provide the name, cellular phone number to the Departmental Representative at the pre-construction meeting. The Project Superintendent shall have full responsibility for the project and shall be authorized to accept and act upon any notice or direction provided by the Departmental Representative. Project Superintendent shall be available on site at all times that work is being performed under this contract.

2. Supervise and direct all person engaged in the work, including all tradesmen and suppliers. Become familiar with the requirements of each trade. Coordinate delivery and work operations. Examine the work of all trades during work operations to ensure compliance with the contract requirements. Expedite all work to maintain the contract schedule.

3. Cooperate with all other contractors working on site in parallel or related projects.

4. Attend coordination and project meetings at the direction of the Departmental Representative.

8. CONTRACTOR and SUB CONTRACTORS

1. The Contractor agrees to employ those sub-contractors proposed by him in writing as listed in the Contractor's tender submission.

2. Do not change or substitute approved sub-contractors without prior authorization from the Departmental Representative.

3. Contractor and sub-contractor personnel shall be qualified as per definitions under the Ontario Trades Qualification and Apprenticeship Acts and as required by regulatory agencies in Ontario.

4. Electrical work shall be carried out by qualified and licensed electrical contractors as per Ontario regulations.

5. Fire alarm work shall be carried out by qualified and accredited personnel as per Ontario regulations.

9. WORKMANSHIP

1. Workmanship shall be the best quality, executed by workers experienced and skilled in the respective duties for which they are employed. Immediately notify the Departmental Representative, if required, if work is such as to make it impractical to produce required results.

2. Do not employ any person unfit or unskilled in their required duties. The Departmental Representative reserves the right to require the dismissal from the site, workers deemed incompetent, careless, insubordinate or otherwise objectionable.

3. The Work as covered by the tender documents 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 the tender documents. 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 shall be carried out at the expense of the Contractor.

4. Decisions as to the quality or fitness of workmanship in cases of dispute rest solely with the Departmental Representative, whose decision is final.

10. RECORD DRAWINGS

1. As work progresses, maintain accurate records to show deviations from the contract drawings. Just prior to completion of work, supply to the Departmental Representative one set of white prints with all deviations neatly inked in. Contractor to show actual layouts for underground services including elevations, all mechanical piping and ductwork and all electrical wiring diagrams, locations and sizes of electrical conduits, pull boxes and wiring, circuits etc. The contractor will deliver the "as-built" records to the prime consultants, and will then provide 2 copies on digital CD's of the "Final Record Drawings" in PDF, and AutoCad formats for the owners records.

11. SHOP DRAWINGS

1. Provide four (4) copies of the shop drawings as listed in the specifications and/or drawings to the Departmental Representative prior to ordering materials. Shop drawings to illustrate details of portion of work specific to the project requirements. Information to clearly indicate the items to be reviewed. Generic drawings are not acceptable. Shop drawings shall be forwarded electronically to the Departmental Representative.

2. Allow two (2) working weeks for Departmental Representative's review of each shop drawing submission.

12. CODES AND STANDARDS

1. The following codes and Standards are in place for work under this contract. The latest edition applicable at the time to be utilized.

   .1 The National Building Code of Canada
   .2 The National Fire Code of Canada
   .3 The Ontario Electrical Safety Code
   .4 Ontario Provincial Standard (OPS)
   .5 Ontario Occupational Health and Safety Act and Regulations for Construction
   .6 Projects
   Canada Labor Code Part II and Federal Occupational Health and Safety Policies

13. FEES AND CERTIFICATES

1. Submit a completed Notice of Project Form to the Ontario Ministry of Labour as required by the notification requirements under the Regulations for Construction Projects made pursuant to the Ontario Occupational Health and Safety Act. Provide copy to the Departmental Representative.

2. Submit to the Electrical Inspection Authority the necessary number of working drawings and specifications for examination and approval prior to commencement of work and pay all associated fees.
   .1 Obtain and pay for all electrical inspection fees.
   .2 On completion of the work provide copies of the Electrical Inspection Authority inspection approval certificates.

14. CONSTRUCTION SAFETY MEASURES

1. Observe and enforce construction safety measures required by Ontario Occupational Health and Safety Acts and Regulations for Construction Projects, Canada Labor Code Part II, Occupational Health and Safety, Workers' Compensation Board and municipal statutes and authorities and site specific Health and Safety Policies and Directives

2. In the event of conflict between any provisions of above authorities, the most stringent will apply.

3. Provide and maintain guardrails, fences, barricades, lights, signs and other devices required for protection of workmen and public in accordance with the requirements of the Canada Labour Code Part II, Occupational Health and Safety, Ontario Occupational Health and Safety Act and Regulations for Construction Projects and Local by-laws. All signs shall be bilingual or CSA universal pictograms.

4. Ensure the safety of building personnel at all times when performing work.

5. Refer to Specifications Section 01 35 00 Health and Safety for additional requirements

15. FIRE SAFETY REQUIREMENTS

1. Comply with the National Building Code of Canada for fire safety in construction and the National Fire Code of Canada for fire prevention, fire fighting and life safety in building in use.

2. Comply with Canadian Centre for Occupational Healt and Safety (CCOHS) Standards;

   .1 CSA Group Standards;
   .2 available on the following internet site:
   http://www.ccohs.ca/products/CSAStandards/ and
   http://shop.csa.ca/en/canada/standards+codes/icat/publications
   .2 Retain all fire safety documents on site.

3. Refer to Section 01 35 00 of this document for further information on Health and Safety

16. WORKPLACE SAFETY AND INSURANCE BOARD

1. Prior to commencing the work, throughout the total performance of the work when requesting payments and prior to receiving final payment, the Contractor shall provide evidence of good standing with Workplace Safety and Insurance Board of Ontario.

17. UTILITIES

1. Water supply is available on site and will be provided for construction usage at no cost. Departmental Representative reserves the right to limit volume of water utilized.

2. Existing electrical services to a maximum of 15 KVA required for the work may be used by the Contractor without charge. Ensure capacity is adequate prior to connecting and imposing additional loads. Connect and disconnect at own expense and responsibility.

18. PROTECTION

1. Protect finished work against damage until take-over.

2. Protect the work and all surrounding equipment, landscape, structures, floors, ceilings, walls, etc., from damage.

2. Make good, at no cost to the Owner, any damage caused.

3. Protect any services, which are uncovered during work.

4. Protect all areas adjacent to the construction areas from dust and debris produced during construction. Use hoarding, solid walls, drop cloths, sealed dust screens and tarps and clean up and vacuum up all debris daily.

19. PRODUCT HANDLING AND STORAGE

1. Deliver materials in original and unopened containers or wrappings with Manufacturers' seals and labels intact and legible.

2. Deliver materials in sufficient quantity to allow continuity of the work. Do not encumber site with unnecessary materials.

3. All unused materials at the end of any working day shall be properly protected from damage.

4. All materials, equipment, etc. to be handled and stored as not to interfere with the operation of the building.

5. All material and equipment to be new unless specified otherwise.

6. Contractors who use controlled products must ensure that their workers are properly trained in the safe use and handling of such products in compliance with the Workplace Hazardous Materials Information System (WHMIS).

7. Comply with all requirements with respect to Controlled products labeling and Material Safety Data Sheets (MSDSs) according to the requirements of WHMIS and the Hazardous Products Act.

20. PRODUCT AVAILABILITY

1. Upon award of contract immediately review product delivery requirements and advise the Departmental Representative of any foreseeable delays.

2. In the event of failure to notify the Departmental Representative at commencement of the work, the Departmental Representative reserves the right to require the supply of substitute products of equivalent quality at no increase in contract price to ensure adherence to project schedule.

21. MATERIALS STANDARDS

1. Materials shall be new and work shall conform to the minimum applicable standards of the Canadian General Standards Board, the Canadian Standards Association, the National Building Code of Canada and all applicable Provincial and Municipal codes. In the case of conflict or discrepancy the most stringent requirements shall apply.

2. Products (materials, equipment and articles) incorporated in work shall be new, not damaged or defective and of best quality compatible with specifications for purpose intended. If requested by the Departmental Representative, furnish evidence as type, source, and quality of product.

3. Defective products will be rejected, regardless of previous inspections. Inspection does not relieve responsibility but is a precaution against oversight or error. Remove and replace defective products at own expense and be responsible for delays and expenses caused by rejection.

4. Should any dispute arise as to the quality of fitness of products, the decision shall rest with the Departmental Representative based upon requirements of Contract Documents. Departmental Representative's decisions shall be final.

5. Ensure that materials, equipment, services and labour are brought to site in sufficient quantity and in accordance with requirements of the work schedule.

22. MATERIALS OTHER THAN SPECIFIED

1. Secure in writing, permission from the Departmental Representative to use any materials other than those specified.

23. HAZARDOUS MATERIALS

1. Comply with the requirements of the Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of hazardous materials: and regarding labeling and the provision of Material Safety Data Sheets (MSDS) acceptable to Health Canada.

24. REMOVED MATERIALS

1. Unless otherwise specified, materials for removal become the Contractor's property and shall be taken from the site.

25. PROJECT CLEANLINESS

1. Remove waste materials and debris from the site at the end of each day. Leave the work area unencumbered upon completion of each work shift. Store materials and equipment.

2. Ensure site is clean, orderly and neat at all times during the work shift. Provide additional cleaning as requested by the Departmental Representative.

3. At the end of the project, remove dirt, dust and other disfigurations from all surfaces affected by the project including, but not limited to ceilings, walls, floors, fixtures and lights. Clean by dusting, damp wiping, washing, waxing and polishing to the satisfaction of the Departmental Representative.

4. Upon completion, remove scaffolding, temporary protections and surplus materials. Make good any defects noted at this stage.

5. Clean areas affected under contract, to a condition at least equal to that previously existing and to satisfaction of the Departmental Representative.

6. Use only cleaning materials recommended by manufacturer of surface to be cleaned.

26. WASTE MANAGEMENT

1. Comply with the Environmental Protection Act, Ontario Regulations O.Reg. 102/94 and O. Reg. 103/94 for waste management programs on construction and demolition projects.

27. EXISTING SERVICES

1. Where work involves breaking into or connecting to existing services, Carry out work at times directed by the Departmental Representative. Connection to existing services shall be after hours and/or on weekends.

2. Before commencing Work, establish location and extent of service lines in area of Work and notify the Departmental Representative of findings.

3. Submit schedule to and obtain approval from the Departmental Representative for any shutdown or closure of active service or Facility. Adhere to approved schedule and provide notice to affected parties. Do not alter schedule without prior written consent of the Departmental Representative.

4. Give the Departmental Representative 96 hours' notice related to each necessary interruption of any mechanical or electrical service throughout the course of the work. Obtain written authorization from the Departmental Representative prior to any interruption. Keep duration of those interruptions to a minimum.

5. Where unknown services are encountered, immediately advise Departmental Representative and confirm findings in writing.

6. Fire alarm shutdowns, re-activation shall be the responsibility of the Contractor.

Shutdown, bypassing or isolating any initiating device or zone on the fire alarm system or the sprinkler system shall be undertaken after hours Monday to Friday from 18:00hrs to 06:00hrs or on weekends from 07:00hrs to 18:00hrs. All shutdowns, bypassing or isolation activities on the fire alarm system or the fire sprinkler system must be authorized in writing by the Property Management District 1 Senior Operations Technician prior to initiating work. Approvals for shutdowns, bypassing or isolation activities require a minimum of 96 hours. Contractors shall schedule their request submittals through the Departmental Representative.

28. CUTTING, PATCHING AND MAKING GOOD

1. Cut existing surfaces as required to accommodate new work. Openings shall be neatly cut and dimensioned to fit electrical conduits, mechanical pipes and/or ductwork passing through the surfaces. Obtain the Departmental Representative's approval before cutting into structure. Cutting torches shall not be permitted.

2. Patch and make good cut on both sides of surfaces, damaged or disturbed to match or better existing conditions to the satisfaction of the Departmental Representative.
   Note: The Contractor shall patch and make good existing openings when Contractor utilizes the existing openings for his work.

3. Fill voids left around all electrical conduits, mechanical pipes and/or ductwork with appropriate fire-proofing material to maintain fire stop integrity. Finish patching with finishing compounds to the satisfaction of the Departmental Representative.

29. DEMOLITION

1. Except if expressly stated otherwise, materials indicated for removal, become the Contractor's property and shall be promptly taken from the site.

30. EQUIPMENT

1. Provide and maintain equipment such as temporary stairs, ladders, ramps, scaffolds, swing stages, runways, chutes and the like, as required for execution of work

2. Provide and maintain conveying equipment such as cranes, hoists, derricks and the like, as required for execution of work.

3. Assume complete responsibility for construction strength, placing, anchoring and operation of derricks, cranes, hoists and other mechanical contrivances used for work; and ensure that loads carried thereon can be safely supported and be free from accidents to all persons.

4. Have hoist capacities, with regard to anticipated loads, verified by a Professional Departmental Representative registered in the Province of Ontario.

5. Comply with all governing safety regulations in force at the time of construction.

6. Remove immediately such equipment when not required for work.

7. Provide and maintain, on site, suitable fire extinguishers in sufficient quantities, as required by the Safety Code.

31. LOADING

1. Take precautions to prevent the overloading of any part of the structure during the progress of the work. Make good, at no expense to Owner, any damage resulting from such overloading.

32. HOISTING

1. All crane operations are restricted to the following:

    a) All craning of materials and equipment must be done outside normal building operating hours, ensure interior areas below are kept unoccupied.

33. POWDER ACTUATED GUNS

1. Do not employ powder-actuated guns using explosives, unless expressly permitted by the Consultant. If permitted, comply with requirements of CAN3-Z166.2-M85 (Use and Handling of Powder Actuated Tools).

34. TAXES

1. Pay all taxes properly levied by law (including Federal, Provincial and Municipal)

2. The Harmonized Sales Tax (HST) is NOT to be considered an applicable tax for the purposes of this bid. The bidder shall therefore include separately any amount in his bid price for the said HST. In the event the HST does apply, the successful Contractor will indicate on each application for payment as a separate amount the appropriate HST the Owner is legally obliged to pay. The Contractor's HST registration number must be shown on all invoices. This amount will be paid to the Contractor in addition to the amount certified for payment under the contract and will therefore not affect the contract price.

35. SIGNS – ADVERTISING

1. No advertising and/or posting of company signs shall be permitted.

2. Provide common-use signs as related to traffic control, information, instruction, health and safety, use of equipment, public safety devices, in both official languages or by the use of commonly understood graphic symbols to the Departmental Representative's approval.

36. SECURITY CLEARANCES

1. All personnel employed on this project shall be subject to a security check. Obtain the requisite clearance as instructed for each individual required to enter the premises.

2. **Security access**
   - For access, Contractors must submit the company name, individual names and date of birth along with the individual's security level clearance. Once security has reviewed and accepted these individuals they will be granted access.
   - Enhanced Security level is required for all contractors and individuals on this site.
   - Special escorted access maybe granted but is not guaranteed for those which do not presently meet this requirement.
   - All individuals must sign in and out at the main security desk whenever entering or exiting the site. No matter how long the duration is. The exception to this is deliveries or pickups where the individual is not out of the truck working on site.

37. BUILDING SMOKING ENVIRONMENT

1. Smoking is prohibited in the building and on the roofs. Obey smoking restrictions on building property as directed by the Departmental Representative.

38. GUARANTEE

1. Provide written one (1) year guarantee for all materials and labour provided as part of this Contract. Effective start date shall be date of final completion.

2. The contractor, at own expense, shall correct any defects in the work due to faulty products and/or workmanship appearing within the extended guarantee/warranty periods set out in the individual sections from date of final completion.

39. TRAINING AND DEMONSTRATION

1. Upon completion of the all installations, provide qualified personnel to train and demonstrate all the installations to the site's operations and maintenance personnel. Contractor to review newly installed equipment and demonstrate the start/stop and control functions of the installed equipment. Training and demonstration to be for a

duration of four (4) hours or, as indicated in the equipment specification section. Training date and time to be coordinated with and approved by the Departmental Representative.

40. OPERATIONS AND MAINTENANCE MANUALS

1. Provide two (2) sets of operations and maintenance manuals with data indexed in vinyl hard covered "D" ring binders. Data to include detailed technical information, documents and records describing operation and maintenance of individual components, copies of all final approved shop drawings, inspection and testing reports, warranties, and all other data specifically requested within the specifications.

2. Each binder shall have a cover sheet listing title, location and project number. Names, addresses and telephone numbers of the Contractor, Sub-Contractors and all suppliers.

3. Each binder shall list all maintenance materials, special tools, and spare parts. This will also include a signed transmittal of receipt by the owner's representatives or the Departmental Representative.

4. Provide two copies on digital media in .pdf format and of the entire Operations and Maintenance manual. Vendor literature available from the vendor in native .pdf format shall be included. If vendor literature is not available in .pdf is shall be scanned. All other information shall be scanned into .pdf. An electronic index shall be created which allows for easy navigation through the files.

41. SHIPPING AND RECEIVING

1 Contractor must be on site to receive all shipments.

2. Contractor is responsible to unload all shipments.

3. Deliveries maybe turned away if the contractor is not on site.

4. Contractor materials are not to be left in the shipping and receiving area.

5. Shipper may accept to assist the Contractor to load or unload goods and materials. Any movement of Contractor's materials will be at the request of the contractor, however the site accepts no responsibility for any damage lost or stolen goods or materials. If the contractor does not accept this condition the shipper will not assist the contractor.

END OF SECTION

PART 1 – GENERAL

1.1 PRECEDENCE

.1 For Federal Government projects, Division 1 Sections take precedence over technical specification sections in other Divisions of this Project Manual.

1.2 REFERENCES

.1 Canada Labour Code, Part 2, Canada Occupational Safety and Health Regulations.

.2 Health Canada/Workplace Hazardous Materials Information System (WHMIS).
- .1 Material Safety Data Sheets (MSDS).

.3 Province of Ontario
- .1 Occupational Health and Safety Act and Regulations for Construction Projects, R.S.O. [1990 June 2002].

1.3 SUBMITTALS

.1 Make submittals to Consultant and Owners Representative for review.

.2 Submit site-specific Health and Safety Plan: Within 7 days after date of Notice to Proceed and prior to commencement of Work. Health and Safety Plan must include:
- .1 Results of site specific safety hazard assessment.
- .2 Results of safety and health risk or hazard analysis for site tasks and operation.

.3 Submit 5 copies of Contractor's authorized representative's work site health and safety inspection reports to Departmental Representative weekly.

.4 Submit copies of reports or directions issued by Federal and Provincial health and safety inspectors.

.5 Submit copies of incident and accident report.

.6 Departmental Representative will review Contractor's site-specified Health and Safety Plan and provide comments to Contractor. Revise plan as appropriate and resubmit plan to Departmental Representative within 7 days after receipt of comments from Departmental Representative.

.7 Departmental Representative's review of Contractor's final Health and Safety plan should not be construed as approval and does not reduce the Contractor's overall responsibility for construction Health and Safety.

.8 Medical Surveillance: where prescribed by legislation, regulation or safety program, submit certification of medical surveillance for site personnel prior to commencement of Work, and submit additional certifications for any new site personnel to Departmental Representative.

.9 On-site Contingency and Emergency Response Plan: address standard operating procedures to be implemented during emergency situations.

1.4 FILING OF NOTICE

.1 File Notice of Project with Provincial authorities prior to beginning of Work.

1.5 SAFETY ASSESSMENT

.1 Perform site specified safety hazard assessment related to project.

1.6 MEETINGS

.1 Schedule and administer Health and Safety meeting with Departmental Representative prior to commencement of project and prior to each outage.

1.7 REGULATORY REQUIREMENTS

.1 The Contractor shall comply with the specified standards and regulations to ensure safe operations. The latest editions are applicable.

.1 Canada Labour Code Part II.

.2 Canada Occupational Safety and Health Regulations.

.3 National Building Code Part 8 – Safety Measures at Construction & Demolition Sites.

.4 National Fire Code Part 4 – Flammable and Combustible Liquids.

.5 National Fire Code Part 5 – Hazardous Processes and Operations.

.6 Ontario Occupational Health and Safety Act and Regulations including;

.1 Construction Projects (O.Reg.213/91).
.2 Occupational Health and Safety Act.
.3 Workplace Hazardous Materials Information System (WHMIS).
.4 Ontario Trades Qualification and Apprenticeship Act.
.5 Ontario Electrical Safety Code (Reg.10/91).

1.8 GENERAL REQUIREMENTS

.1 Develop written site-specific Health and Safety Plan based on hazard assessment prior to beginning site Work and continue to implement, maintain, and enforce plan until final demobilization from site. Health and Safety Plan must address project specifications.

.2 Departmental Representative may respond in wr5iting, where deficiencies or concerns are noted and may request re-submission with correction of deficiencies or concerns.

1.9 RESPONSIBILITY

.1 The Contractor shall be responsible for health and safety of persons on site, safety of property on site and for protection of persons adjacent to site and environment to extent that they may be affected by conduct of Work.

.2 Comply with and enforce compliance by employees with safety requirements of Contract Documents, applicable federal, provincial, territorial and local statutes, regulations, and ordinances, and with site-specific Health and Safety Plan.

1.10 COMPLIANCE REQUIREMENTS

.1 Comply with Ontario Health and Safety Act and Regulations for Construction Projects, R.S.O..

1.11 UNFORSEEN HAZARDS

.1 When unforeseen or peculiar safety-related factor, hazard, or condition occur during performance of Work, follow procedures in place for Employee's Right to Refuse Work in accordance with Acts and Regulations of the Province of Ontario and advise Departmental. Representative verbally and in writing.

1.12 POSTING OF DOCUMENTS	.1	Ensure applicable items, articles, notices and orders are posted in conspicuous location on site in accordance with Acts and Regulations of the Province of Ontario, and in consultation with Departmental Representative.
1.13 CORRECTION OF NON-COMPLIANCE	.1	The Contractor shall immediately address health and safety non-compliance issues identified by authority having jurisdiction or by Departmental Representative.
	.2	Provide Departmental Representative with written report of action taken to correct non-compliance of health and safety issues identified.
	.3	Departmental Representative may stop Work if work is deemed to be life threating and non-compliance of health and safety regulations is not corrected.
1.14 DISCIPLINARY ACTION	.1	The Contractor's disregard and/or lack of compliance to health and safety measures, procedures and policies may lead to disciplinary action by the Departmental Representative.
1.15 BLASTING	.1	Blasting or other use of explosives is not permitted without prior receipt of written instruction by Departmental Representative.
1.16 CONTRACTOR ACCIDENT AND INCIDENT REPORT	.1	The Contractor shall advise the Departmental Representative of any accident, injury, near-miss incident, fire, explosion or chemical spill occurring at the Work site and any visit to the site by a governmental enforcement official.
1.17 WORK STOPPAGE	.1	Give precedence to safety and health of public and site personnel and protection of environment over cost and schedule considerations of Work.

1.18 SITE HEALTH AND SAFETY POLICIES AND DIRECTIVES

.1 Where applicable the Contractor shall comply and follow all prescribed site Health and Safety Policies and Directives including but not limited to the following:

.1 Worker Profile Sheet: The Contractor shall submit to the Departmental Representative a completed Worker Profile Sheet c/w all attachments including copies of licenses, certificates and permits for supporting qualifications to perform required work for a given project for each individual worker requiring access to the site. The completed Worker Profile Sheets are required for each individual worker prior to working on site. Live work is not permitted.

.2 Emergency and Fire Evacuation Route: The Contractor shall obtain training on procedures of evacuating the site under emergency and/or fire situations. Contractor training and sign-off is required prior to initiating site work.

.3 Ontario Trades Qualifications and Apprenticeship Act: The Contractor shall sign-off confirming that the Trades Qualifications and Apprenticeship Act shall be observed and followed. Contractor sign-off is required prior to initiating site work.

.4 Lab safety training sessions for all individuals requiring access into the specific lab areas with limited access restrictions.

1.19 WORKPLACE SAFETY AND INSURANCE BOARD

.1 Prior to commencing the work, throughout the total performance of the work when requesting payments and prior to receiving final payment, the Contractor shall provide evidence of good standing with Workplace Safety and Insurance Board of Ontario.

1.20 CONSTRUCTION SAFETY MEASURES

.1 Observe and enforce construction safety measures required by Ontario Occupational Health and Safety Acts and Regulations for Construction Projects,

Canada Labour Code Part II, Occupational Health and Safety, Workers' Compensation Board and municipal statutes and authorities and site specific Health and Safety Policies and Directives.

.2 In the event of conflict between any provisions of above authorities, the most stringent will apply.

.3 Provide and maintain guardrails, fences, barricades, lights, signs and other devices required for protection of workmen and public in accordance with the requirements of the Canada Labour Code Part II, Occupational Health and Safety, Ontario Occupational Health and Safety Act and Regulations for Construction Projects and Local by-laws. All signs shall be bilingual or CSA universal pictograms.

.4 Ensure the safety of building personnel at all times when performing work.

PART 2 – PRODUCTS

2.1 NOT USED .1 Not Used.

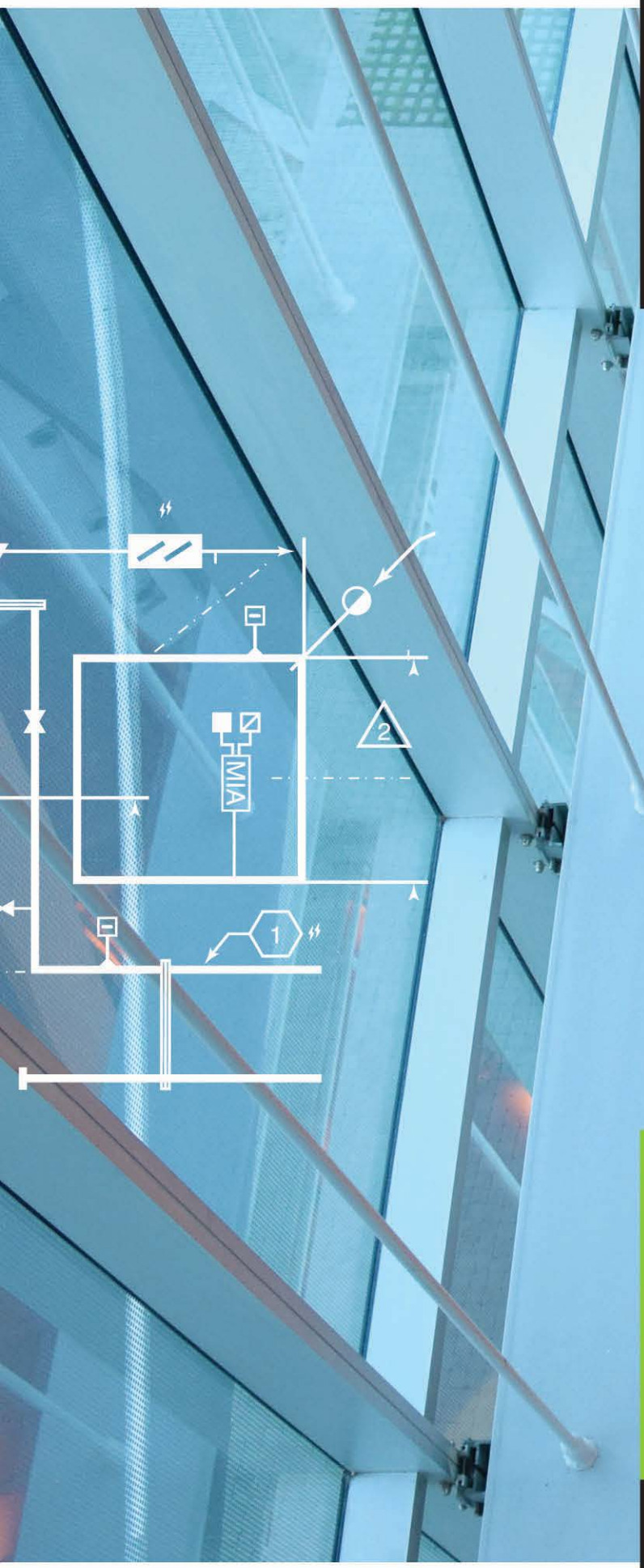
PART 3 – EXECUTION

3.1 NOT USED .1 Not Used.

END OF SECTION

PAGEAU MOREL

UN ENGAGEMENT DURABLE | A SUSTAINABLE COMMITMENT



Environment Canada

Storage Units and Grading

7323-008-00

www.pageaumorel.com

PAGEAU MOREL

365, boul. Gréber, bur. 302
Gatineau (Québec) J8T 5R3

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www.pageaumorel.com

Environment Canada

Storage Units and Grading

Electrical Specifications 7323-008-00

Septembre 8, 2016

For Tender #2

2016-09-08

Electrical

This document should not be used for construction purposes

TABLE OF CONTENTS

ELECTRICAL SPECIFICATIONS

DRAWINGS LIST | LISTE DE DESSINS

ISSUE | EMISSION	
DATE:	2016-09-08
REASON:	FOR TENDER #2 / POUR APPEL D'OFFRES #2

PAGE	NUMBER	DRAWING TITLE	REVISION	DESCRIPTION
1/3	E-001	LEGEND / LÉGENDRE	0	Issued
2/3	E-002	SITE PLAN / PLANS DE SITES	0	Issued
3/3	E-110	ELECTRICAL DETAILS / DÉTAILS ÉLECTRIQUES	0	Issued

TABLE OF CONTENTS

1. General

1.1 The general conditions of the contract as defined in the Owner's specifications apply.

1.2 As built drawings are submitted to show the existing location of equipment to be relocated and/or removed. The "EXISTING" drawings are to be compared with the "MODIFIED" drawings which show the new layout. The works to be performed are shown on these drawings as the difference between the two (2) sets.

1.3 The Contractor must have a copy of drawings and specifications on the site.

2. Definitions

2.1 The following definitions used throughout this Division.

2.1.1 The expression "Owner" corresponds to the expression "Client" and identifies: "Environment Canada ERMS".

2.1.2 The expression "Engineer" corresponds to the expression "Professional" and identifies: "Pageau Morel et associés inc." hereafter Pageau Morel.

2.1.3 The expression "Structural Engineer" identifies: "Cima +".

2.1.4 The expression "Contractor" identifies the company, which will be awarded the contract for the execution of the works and applies to all subcontractors employed by this company.

2.1.5 The expression "Site" identifies the building of Environment Canada ERMS at 335 River Road, Ottawa, Ontario.

2.1.6 The expression "Division" used in the present specifications identifies the company or companies responsible for the execution of the work covered by the named Division.

2.1.7 The expression "Section" used in the present specification identifies the company or companies responsible for the execution of the work covered by the named Section.

3. Shop drawings

3.1 The expression "Shop Drawings" means drawings, schematics, illustrations, tables, execution graphics, brochures or other data that the Contractor must submit to show in detail some part of the work.

3.2 Review all shop drawings before submittal to the Engineer. This review implies that the Contractor has determined or will determine measurements and has verified or will verify on the site, the construction criteria, materials, catalog numbers and similar data, and that he has reviewed and coordinated each shop drawing with the Contractual Documents and Specifications.

3.3 Submit shop drawings to the Engineer within reasonable delays and in a logical sequence in compliance with the construction schedule.

3.4 The Engineer's review consists in reviewing the conformity of shop drawings with the contract documents for recommendation to the Client or Owner. The Engineer is not liable for any responsibility for dimensions, details nor quantities.

3.5 If the Contractor installs equipment or material for which he has not submitted shop drawings for verification, the Engineer may, if the equipment or material is not installed in accordance with plans and specifications, require the equipment or material to be removed and replaced by a compliant product at no additional cost to the Owner.

3.6 Shop drawings relating to products, special design systems or installations, custom equipment or similar to, all of which are not standard or catalogued products, will be considered engineering documents and as such, shall be authenticated by their author engineer. Authentication shall be in conformity with current Province of Ontario Laws and By-Laws. As an example, not limited to, shop drawings of a custom air-handling unit are covered by the present article and as such, constitute engineering documents that will require an authentication by their author engineer.

3.7 When shop drawings are resubmitted, indicate in writing all revisions other than those required by the Engineer.

3.8 Submit for review by the Engineer, within reasonable delays of the contract award, the complete set of shop drawings required under this Division. Faxed shop drawings are not accepted. For shop drawings where the entire document's format does not exceed 11" x 17", submit one (1) copy, paper or PDF (one file). For shop drawings with formats larger than 11" x 17", submit three (3) paper copies.

3.9 When accepted by Owner, shop drawings can be submitted in electronic format. The following rules must be followed entirely:

- The identification form must be included;
- A shop drawing identification sheet hereby mentioned shall be included;
- A single file in PDF format for each shop drawing shall be submitted. In the case where more than one document constitute the drawing, they must all be incorporated into a single file;
- Printing parameters of the drawings must be incorporated in the file to assure a scaled printing on a commercial printer;
- The file must be of an excellent graphical quality;
- Transmission of the shop drawings must follow the path of communication established for the project;
- A transmittal sheet shall be attached to submitted drawings.

3.9.1 Shop drawings not following these directives will be returned to the contractor with a "Rejected" recommendation.

3.10 Each shop drawing of drawings shall be presented with an identification form. The shop drawing identification sheet shall include as a minimum the following information:

- Owner's name;
- Project's name;
- Engineer's name;
- Contractor's name;
- Name of sender;
- Sub contractor's name;
- Supplier's name;
- Specialty;
- Description;
- Specifications section number and article number;
- Revision number;
- Blank space for stamp of Conformity Review.

3.11 An identification form model is included at the end of this Section

3.12 Submit all shop drawings in French or in English, certified for construction by the manufacturer.

3.13 Drawings for non-standard articles or materials shall be produced, especially for the project.

3.14 Shop drawings shall include:

3.14.1 Construction details, dimensions, weights and equipment or material characteristics together with supplementary information such as bulletins, illustrations and exploded views of constituting parts. Marketing folders or publicity brochures will not be accepted.

3.14.2 Graphs, curves, capacities, efficiency and other technical data submitted by the manufacturer or requested by the Engineer concerning the operation of the equipment.

3.14.3 Wiring diagrams, single line diagrams, principle diagrams, control diagrams, operating sequences and all interconnections with other systems when required.

3.14.4 Flow diagrams for air, water, oil, fuel, etc. if applicable.

3.15 Verification of the conformity of the document will be done depending on the nature of the document:

- Engineering document;
- Other document.

3.15.1 The nature of the document identifies if a document is an engineering document or not. An engineering document can be as defined above or can be required via specific requirements in the electrical or mechanical specifications demanding engineering documents.

3.15.2 A document not identified as an engineering document will be identified as an other document. The term other document implies that the document is a shop drawing as defined above or any other document allowing adequate verification with respect to any requirement of the specifications and drawings.

3.16 Shop drawings will be returned with one or two of the following mentions: "Reviewed", "Modify and resubmit", "Modify as noted", "Rejected".

3.16.1 Drawings stamped "Reviewed" will not be further commented. Drawings comply with contractual documents.

3.16.2 Drawings stamped "Rejected" shall be done over again and resubmitted for approval. Drawings do not comply with contractual documents.

3.16.3 Drawings stamped "Modify as noted" shall not be resubmitted. Conditionally to the corrections indicated, drawings comply with contractual documents.

3.16.4 Drawings stamped "Modify and resubmit" shall be resubmitted, in part or in whole, as indicated for further examination. Drawings do not comply with contractual documents.

3.16.5 Drawings stamped "Modify as noted" and "Modify and resubmit" shall be resubmitted in part or in whole, as indicated, for further examination. Conditionally to the corrections indicated, drawings comply with contractual documents.

3.17 The Engineer's examination of the shop drawings does not relieve the Contractor from supplying equipment conforming to current standards and bylaws and to the requirements of this specification.

3.18 Any equipment, which is manufactured without the Engineer's prior examination, may be rejected. Assume all costs inherent to such a rejection.

3.19 The Engineer reserves a period of 10 working days, upon reception of the shop drawings, for their reviewal.

3.20 Shop drawings on electronic support

3.20.1 An electronic copy of Engineer's drawings is available to help the production of Contractor's shop drawings.

3.20.2 To receive a copy, the Contractor must address a written demand to Pageau Morel. The Contractor must specify the trade required and the transmittal mode, with his demand. That demand must include the responsibility disclaim form at the end of this section, duly filled-out.

3.20.3 To prevent any confusion about drawings nature and revisions, Contractor must respect the following instructions:

- Do not modify nor remove elements to Pageau Morel block;
- Identify Contractor's drawing independently, indicating at least:
  - Enterprise name;
  - Drawing title;
  - Drawing number;
  - Revisions and revision dates.

3.20.4 The electronic name of the Contractor's drawing shall differ from the Engineer's drawing.

3.20.5 At printout, the Contractor drawing identification must be shown.

4. Related works

4.1 Coordinate and take necessary measures to execute the works described herein in accordance with the drawings and specifications and as required by the installation.

4.2 Excavation and filling-in for buried works shall be done according to layout and at the indicated depth. Install protection materials around and above services and supervise closely.

4.3 Obtain the structural Engineer's approval for openings, boring and other works on concrete structural elements.

4.4 Obtain the Structural Engineer's approval for openings, boring and other works on metal structural elements before executing the work.

4.5 Surface mounted distribution equipment shall be hanged on fire proof 19 mm (¾") thick plywood installed 604 mm (12") from the finished floor up to 1827 mm (8') in height.

4.6 Boring and patching of exterior membranes and sealing of these membranes.

5. Openings

5.1 Obtain approval of a Structural Engineer before drilling a load-bearing element, slab or other and before inserting a sleeve.

5.2 The contractor is responsible for all damage and breakage due to its openings. Use all technical means available to ensure not to damage existing pipes, cables or structural elements with the opening.

5.3 Make the openings so that the ridge are level and clean and ensure that the sealing gasket is the least visible as possible. Achieve airtight seals between the structures and pipes, conduits and sleeves.

5.4 All filling and sealing work must be done to maintain the performance and integrity of the fire resistance required for the construction of floors, walls and ceilings.

6. Acceptable products

6.1 The tender shall be based on the acceptable specified products and installation methods identified in the tender documents.

6.2 The name of manufacturers, catalog, numbers, trade names, trademarks specified herein are used to clearly indicate the type and quality of the required products and materials.

6.3 When the name of a manufacturer or a trademark is followed by "only", this manufacturer only may be considered without possibility of substitution.

6.4 When two or more manufacturer names or trademarks are specified, the choice between them is up to the Contractor.

6.5 Inform the Engineer immediately should equipment, products or materials be discontinued. The Engineer shall advise as to the acceptable products to be used.

6.6 Substitutions

6.6.1 Substitutions to manufacturer names or trademarks specified may be proposed if the following conditions are met:

6.6.2 The tender price is based on the specified acceptable products and methods of execution in the tender documents.

6.6.3 The proposed substitutes must conform to all specified requirements (characteristics, performances, conformity with standards, etc.)

6.6.4 Assume all costs related to the substitutions including those in other Sections or Divisions and those resulting from adjustments due to the acceptance of the substitution.

6.6.5 Requests for substitution must be made on the appropriate form annexed to this Section and which must be joined to the tender form (do not submit the request for substitution form if no substitution is requested). Write down in the appropriate column of the form the Section and article number of the specification, the manufacturer and model proposed together with the cost variation resulting from the substitution.

6.6.6 Any request for substitution, which is not submitted on the request for substitution form, will be rejected.

6.6.7 Any substitution requested after the bid closure will be rejected.

6.7 Proof of equivalence

6.7.1 Submit proof of equivalence, for each proposed substitute, after the bid closure.

6.7.2 To prove an equivalence supply all the following information:

- Characteristics;
- Performance;
- Performance curves;
- Manufacture and finish;
- Dimensions and weight;
- Conformity with standards;
- Any other pertinent information.

6.7.3 Indicate all differences with the tender documents.

6.7.4 The proof of equivalence shall be approved by the Engineer. The Owner does not commit himself to accept a substitute even if the proof of equivalence is established.

6.8 Use goods or materials manufactured Canada unless the Contractor can demonstrate that such goods or materials are not available in Canada at a reasonable price . The Owner reserves the right that he be provided the names and addresses of manufacturers of materials and products purchased with price support to enable it to verify the quality, quantity and origin.

7. Samples

7.1 Submit two standard units of each sample required under this specification or which may be reasonably demanded by the Engineer for his approval. The samples shall bear a label showing their origin and their function and shall conform to the requirements of the specification.

7.2 Include the cost of the samples in the price of the bid.

7.3 Maintain one of each unit on the site until the end of the works. The other unit shall be kept by the Engineer.

8. Evaluation of change order and modification

8.1 Should change orders or modification be required during the execution of the works, their cost shall be evaluated according to the following rules:

8.2 Labour

8.2.1 The regular time cost of labour is the total hourly cost, plus administration rate and profits.

8.2.2 Only the actual working hours shall be billed.

8.2.3 The cost for the superintendent shall be covered by an addition of 10% increase in the cost of labour.

8.2.4 The rate increase for work done outside the regular working hours of the project shall be covered under a separate agreement.

8.3 Materials

8.3.1 Materials shall be billed under the best available cost, all discounts included, plus applicable taxes and further defined administration and profit rates.

8.4 Administration and profits

8.4.1 The applicable rates on labour and materials for administration and profit shall be 15 %.

8.4.2 The applicable administration and profit rates on labour and materials for work executed by a sub-Contractor shall be 10 % for the subcontractor and 5 % for the Contractor.

8.4.3 For change orders or modifications resulting in a charge and a credit, the above rates apply to the difference between the charge and credit

8.4.4 The rate does not apply to a reduction in the price of the contract.

8.5 Other costs

8.5.1 No other costs or expenses will be accepted.

9. Codes and standards

9.1 The design, materials, equipment, the construction and arrangement of all the equipment, components and accessories shall conform to pertinent codes, standards, ordinances, decrees and bylaws, and to revision bulletins produced by municipal, provincial, federal or other agencies and shall also conform to current practice.

9.2 For each particular case, the ordinance, statute, standard, code or bylaw having the strictest rules shall have precedence over the others.

9.3 When a standard is specified, the most recent edition prior to the starting date of the work shall apply.

9.4 All equipment shall bear the label or seal of the different organizations governing the standards and approval of such equipment.

9.5 Should there be no alternative but to supply non-validated equipment, it shall be possible to use equipment approved by other recognized organization provided that the Contractor assume the cost of special approval by organization responsible for inspection of the installation.

10. Security codes

10.1 Insure that all works and installation methods conform to the latest editions and bulletins of following statutes, codes or bylaws that applies.

11. Materials and equipment

11.1 Unless stated otherwise, use new equipment and materials free from any defects.

11.2 Supply materials and equipment conforming to the specifications for design, quality and performance and for which spare parts are readily available.

11.3 Unless stated otherwise, use equipment from one manufacturer only for equipment or materials of the same type or of the same class.

11.4 Corresponding components of the same equipment or of identical equipment shall be interchangeable and when having been interchanged shall have equal performances.

11.5 Equipment shall be designed to be installed, dismantled and maintained at minimal cost.

11.6 Control panels and constituent elements of the same equipment shall be shop assembled.

12. Materials shipping and storage

12.1 Deliver and store the materials according to the Manufacturer's instructions and insure that all seals and labels are intact.

12.2 Deliver and store in an upright position all floor mounted equipment.

12.3 Close all equipment doors and keep them locked. Protect material from dust and damages.

12.4 If required block all moving parts to prevent their damage during shipping or moving and remove the blocks according to the manufacturer's recommendations.

12.5 Equipment scheduled for indoor installation shall be stored indoor or in a weather proof shelter.

13. Safe keeping of tools and materials

13.1 The Contractor is responsible for the safe keeping of materials and tools which he brings on site. He shall assume all losses resulting from damages or thefts, vandalism or other depravation where his materials and/or his tools are concerned.

14. Cleanliness of the site

14.1 The Contractor shall maintain the site free of debris, empty containers, used materials and pay for their regular removal from the site as the work progresses. At the end of the work, the Contract

15. Equipment installation

15.1 Insure that maintenance and dismantling may be executed without moving of pipe joints or conduits by using flanges, unions or valves and insure that structural elements do not constitute obstacles. Dismantling must be done without draining pipes and/or stop supply of other equipments.

15.2 All seals and labels from manufacturer and approving organization shall be readily seen and readable once the equipment is in its final location.

15.3 Unless indicated otherwise use the most recent manufacturer's written recommendations concerning materials, equipment and installation methods to be used.

15.4 Inform the Engineer in writing concerning any discrepancy between this specification and the manufacturer's instruction. The Engineer shall define which document to use.

15.5 Supply anchoring devices and accessories of same metal and finish as that of the supporting element. Use non-corrosive anchors, supports and shims for outdoors and indoors.

15.6 Insure that floors and slabs onto which the equipment is to be mounted are on a level.

15.7 Verify all connections done at the factory and tighten if necessary to assure installation integrity.

15.8 Supply an easy means to lubricate the material, including "Lifetime" bearings.

15.9 Bring equipment drainage piping to drains.

15.10 Align the edges of equipment elements, as well as those of rectangular lids and of other similar articles, with the building's walls.

16. Coordination with other divisions

16.1 The drawings show the general arrangement of the systems. Plan and coordinate the works with that of other Divisions to prevent any interference and to insure ultimate use of space.

16.2 The material and equipment shown on the drawings shall be installed in conjunction with material shown on drawings of other Divisions in order to prevent conflicts.

16.3 Any conduit or material incorrectly installed because of faulty coordination, shall be removed and properly installed without cost to the Owner.

17. Obstruction and interference drawings

17.1 Arrange equipment and materials for distribution networks in a manner to minimize the occupied space.

17.2 In case of an obstruction, the Engineer must approve the resulting equipment or material location change.

17.3 If required, prepare interference drawings to show that the equipment fits into the specified space and location without hindering the equipment of other Divisions and while still providing sufficient maintenance clearances for all concerned equipment.

17.4 The Engineer may require for a particular location the preparation of interference drawings should he suspect interferences in this particular location.

17.5 The Contractor is responsible for the coordination of the electromechanical elements location in the building, mostly in false ceilings, shafts and equipment rooms. He is also responsible for the preparation of interference drawings.

18. System cleanliness

18.1 At the end of each working day, all pipes, conduits openings shall be capped, and equipment shall be covered to prevent the entry of dust, dirt or other foreign matter.

18.2 It is forbidden to use the Owner's garbage containers, compactor and plumbing fixtures to dispose of solvents, construction debris or other liquids.

19. Mounting heights

19.1 Mounting heights are shown on the legend or on the drawings and are generally measured from the finished floor to the center of the equipment or outlet, unless indicated differently.

19.2 Mounting heights shown on the drawings are approximate and shall be confirmed by the Engineer or Architect.

19.3 If the equipment mounting height is not shown obtain the information from the Engineer before proceeding with the installation.

19.4 Final apparent equipment mounting heights shall be confirmed, on the site, by the Architect or Engineer.

20. Symmetry

20.1 Installation of the equipment, conduits and piping etc., to be symmetrical. They shall be installed in the same plan without unnecessary deviations and parallel to the building lines.

21. As built drawings

21.1 Additional copies of the drawings will be supplied by the Engineer for the production of as built drawings.

21.2 Carefully mark a copy of the drawings, using red color, showing all deviations of the work from the contractual drawings supplied, following the execution as it progresses. Keep this copy on the site for consultation by the Engineer or Owner's representative.

21.3 On this copy of the drawings indicate particularly without this being a limitation:

21.3.1 The location of all supplies and feeders to main and secondary services for each system.

21.3.2 The new final location of all relocated equipment.

21.3.3 Changes to circuit, zone and other arrangements.

21.3.4 Conduit diameters and number of installed conductors.

21.3.5 Exact location of underground or concealed work using coordinates from a reference point.

21.3.6 Submit a complete copy of the as built drawings to the engineer at the time of request for the substantial performance of the work. Such drawings shall reflect, at the termination of the work, the final state of the installation including the exact location of all equipment and all supplies.

22. Receipts

22.1 Hand over to the Owner the followings articles:

22.1.1 Maintenance products and specified portable material.

22.1.2 Specified spare parts.

22.1.3 Keys for all material supplied with a lock.

22.2 Obtain from the Owner receipts for all above articles and hand them over to the Engineer.

23. Certificate of compliance

23.1 The Contractor shall hand over to the Engineer, at the completion of the work, the certificate of compliance joined to this Section, by which he states that all works have been executed in compliance with the plans and specifications and conform to all applicable codes.

23.2 Submit this certificate to the Engineer at the same time as the request for substantial achievement of the work.

23.3 Have this form signed by a company executive and have the seal of the company apposed.

24. Warranty

24.1 All work performed under this Contract shall be contract by warranty for a period of one (1) year for materials and workmanship.

24.2 The Contractor shall, on receipt of notice in writing from the Owner, and at his own expense, make good all defects of whatever nature, which may develop during a period of one year.

24.3 In the event of the Contractor refusing or neglecting to do so within a reasonable time, the Owner may employ some other person or persons to make good any such defects, loss or damage, and the expense of employing such person or persons to make good any such defects, loss or damage, shall be charged to and paid for by the Contractor and/or Insurance Company.

25. Work performed in an existing building

25.1 Any work, which requires the complete or partial shutdown of any system, in order to perform connections or modifications, may be executed only during the shutdown period established by the Owner and under his previously obtained written agreement.

25.2 Supply a work schedule to permit the coordination of work with other Divisions and with the Owner's personnel and to permit the scheduling of the shutdown periods.

25.3 Works shall be executed during normal working hours, panel DP-26 replacement to be done after hours.

25.4 Coordinate with the Owner or his representatives the receiving and handling of all materials.

25.5 Reduce inconveniences related to dust and noise to a minimum.

25.6 Conform always to the Owner's rules and requirements for security or other measures.

25.7 All personnel, including subcontractors, shall wear an identification badge when on the site.

25.8 Smoking in the Owner's building is strictly prohibited as well as outside within a radius of 7.5 m from any entrance.

25.9 Always cooperate with the Owner to insure that the Owner's operations are not affected, under any circumstances, and for the whole duration of the work.

25.10 The Owner is not, by any means, committed to supply parking spaces inside or outside his property.

26.

26. Complementary of drawings and specifications

26.1 The drawings and specifications and additional documents form a whole. They must be analyzed in conjunction and no omission can be used to eliminate the obligation to provide complete and functional systems.

26.2 The Contractor is responsible for verifying all the information, even if that information is in a section or on a drawing concerning mainly another discipline.

26.3 The equipment list and accessories provided in the various sections of the specifications may not list all the equipment. It is up to the Contractor to verified all drawings and specifications for different section and supply and install all materials and accessories shown in the drawings and/or specified in the specifications.

27. Penetrations of assembly with a fire resistance rating

27.1 Any existing penetration and any new penetration in walls and floors with a fire resistance rating (existing or new) must be sealed after the passage of pipes or ducts in order to restore or maintain the integrity of the fire walls and floors.

27.2 Refer to architectural drawings for the location of walls and floors with a fire resistance rating.

27.3 The openings and penetrations, new and existing that are kept, should be sealed with the products according to an authorized sealing systems by ULC or any other organization approved by codes and standards.

27.3.1 Acceptable Products:

- 3M;
- Hilti;
- Self-Seal.

27.4 Retain the services of a specialist in fireproofing or demonstrate that the proposed personnel for installation has been formed and is accredited by the sealant manufacturer for fireproofing all the work.

27.5 Provide to the Engineer for approval shop drawings of all fireproofing systems firewall available. These drawings must include for each system:

27.5.1 System number and ULC and/or FM approval.

27.5.2 Specifications of each product used.

28. Questions and explanations

28.1 The Tenderers shall advise the Engineer, in writing only, of any divergence of opinion, ambiguity or incertitude which may be found during the examination of the tender documents and as soon as possible during the tender period.

28.1.1 Questions shall be addressed to:

Mr. Pierre Catellier

from Pageau Morel & Associates Inc.
email: pcatellier@pageaumorel.com

28.2 If required, the Tenderers will be informed of any changes or explanations concerning the tender documents.

28.3 Explanations and changes brought to the tender documents will be done only through addenda prepared the Engineer. No verbal communication will be considered. Addenda form an integral part of the tender documents and the Tenderers shall take into account, in their bid, all indications contained therein.

28.4 It shall not be possible to give answers to questions received later than 48 hours prior to the closure of the tenders.

CERTIFICATE OF COMPLIANCE

Project : _____

Project address : _____

Trade : _____

Specifications sections : _____

We hereby certify that all materials and equipments used, and all visible or hidden works that we performed or have had performed are, in all points, conform to drawings, specifications, addendum and changes of specification submitted by the Engineer Pageau Morel et associés inc.

Trade name : _____

Address : _____

Telephone number : _____

Signer's name : _____

Signature : _____

Title : _____

SEAL

REQUEST FOR SUBSTITUTION FORM

Project : _____

Tenderer : _____

Date : _____

Section	Article no.	Proposed manufacturer	Model	Tender amount variation	
				minus	plus

NOTES:

1. For each proposed substitution, we are committed to provide the proof of equivalence.
2. Our tender is based on acceptable products specified and execution methods foreseen in Tender call documents and not on substitutes described above.
3. If Owner rejects one or all proposed substitutes, we are committed to use acceptable products that are specified.
4. We attach to tender form, _____ sheet(s) of "Request For Substitution Form", including this sheet.

Signature of the Bid: _____

RESPONSIBILITY DISCLAIM

Object: ELECTRONIC DRAWINGS USE CONVENTION

We, _____ do release Pageau Morel et associés inc hereafter Pageau Morel of any responsibility resulting from the use of the electronic drawings having been used for tenders or issued for construction, for the development of our own installation's drawings and/or details or for any other use.

We recognize and agree:

- That the electronic drawings in question are supply to us for our use only, and we commit ourselves not to distribute them without Pageau Morel authorization;
- That no insurance is given regarding coherent and exactitude of the enclosed information;
- That we will not hold responsible Pageau Morel for any error resulting from their use;
- That we remain fully responsible of our drawings.

Also we will undertake :

- To verify on site and coordinate the accuracy of information, of existing conditions and dimensions that are enclosed as if we realized the electronic drawings ourselfs.

AutoCAD version required : _____

Company : _____

Signatory name : _____

Signature : _____

Date : _____

DESSIN D'ATELIER | FICHE D'IDENTIFICATION

(Cette fiche doit être remplie par l'entrepreneur pour chaque dessin d'atelier soumis)

PROJET _____

N° PROJET _____
PHASE _____

ENTREPRENEUR _____
Adresse _____

Gérant de projet _____
Téléphone _____
Courriel _____

PROPRIÉTAIRE _____
(Client)
ARCHITECTE _____

INGÉNIEUR _____

APPROBATION DE L'ENTREPRENEUR

Émis par _____

SOUS-TRAITANT _____
Adresse _____

Responsable _____
Téléphone _____
Courriel _____

FOURNISSEUR _____
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PRODUIT SOUMIS		**DESSIN ÉMIS POUR**	
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AUTRE			

VÉRIFICATION DE L'INGÉNIEUR (tampon)

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Nombre de pages _____
Délai de livraison _____

DESCRIPTION DU DESSIN D'ATELIER

Référence au plan n° _____

Référence au devis Division _____
Page _____ Article _____

REMARQUES

RÉVISION	**DATE D'ÉMISSION**

END OF SECTION

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1. Ownership

1.1 This Section is an integral part of Section 20 05 00 – "General Requirements Concerning Common Work Results".

2. Electrical code and CSA standards

2.1 Manufactured products to comply with related CSA Standards, although these Standards may not be specifically designated by number in this specification.

2.2 All electrical works shall conform to the Ontario Electrical Safety Code (25th edition-2012), specified standards and revisions in force at the time of the bid.

3. Material identification

3.1 Identify all equipment supplied under the present Division.

3.2 Distribution equipment

3.2.1 All panels, , junction and pull boxes all other supplied equipment under this Division shall bear an identification plate. See plate details on the drawings.

3.2.2 The plate shall bear the three (3) following identifications corresponding to those shown on the drawings:

- Top: Identification of voltage — "120208 VOLT"
- Center: Equipment identification — "Distribution Panel 28"
- Bottom: Identification of source apparatus — "Fed From: Transformer 38 Electrical Room 14"

3.2.3 Use lamicoid plastic screwed on nameplates, with white letters machine engraved on black background. Provide enough space to engrave about 25 characters.

3.2.4 Submit list of identifications for approval.

3.2.5 Inside all main panels and splitter boxes, phases "A", "B", "C", "N" shall be identified by 51 mm (2") high letters.

3.3 120/208 V and 600 V service panels.

3.3.1 Identify each panel circuit in the typewritten schedule inserted in a plastic holder on the inside of the panel door. The circuit numbers shall be those shown on the drawings. Theses schedules shall be included in the operation and maintenance manuals.

3.3.2 For modified electric panels, supply a new updated typewritten list.

3.4 Wiring

3.4.1 Identify all wiring according to the applicable Electrical Code.

3.4.2 Every conductor in panels, relay boxes, motor control center, cabinets, etc., shall be identified with its circuit number with Z markers from Wieland or Thomas & Betts equivalent according to size.

3.4.3 Identify each conductor, inside equipment including junction boxes, with its circuit and panel number or its function (alarm, circuits 1, 2 3 etc.) with Thomas & Betts series WBC vinyl markers or equivalent from Wieland or Brady.

3.4.4 Wiring between relay boxes and lighting control panels.

.1 Identify connection points on incoming terminal strips from lighting control panels.

.2 Identify local controls with switch subscript at relay box terminal strip and lighting control panel terminal strip.

3.4.5 Fire alarm and communication wiring.

.1 Each conductor shall be identified as shown on the drawings, with Thomas and Betts series WBC vinyl markers or equivalent from Wieland or Brady, in each panel, junction or pull box, heat detector, ionization smoke detector, pull station, alarm bell, emergency telephone, end of line resistor or loud speaker.

.2 Since each zone cable is made up of two conductors, each shall be respectively labeled with the letters "A" and "B".

4. Nominal voltages

4.1 Operating voltages shall conform to standard CAN3-C235.

4.2 Each motor, electric heater and control and distribution device shall operate satisfactorily at a frequency of 60 Hz and inside voltage limits established in the above mentioned standard. Equipment to operate under extreme conditions mentioned in the standard without damage.

5. Abbreviations

5.1 CSA means Canadian Standards Association (CSA).

5.2 AMEEC means Association des manufacturiers de produits électriques et électroniques du Canada (see EEMAC).

5.3 ANSI means American National Standard Institute and replaces ASA, American Standard Association.

5.4 SSC means Supply and Services Canada (ASC).

5.5 ASTM means American Society for Testing and Materials.

5.6 BS means British Standard.

5.7 CBM means Certified Ballast Manufacturer.

5.8 CEMA means Canadian Electrical Manufacturer Association (now known as EEMAC).

5.9 CMB means Construction Materials Board (CMC).

5.10 NBC means National Building Code (CNB).

5.11 EEMAC means Electrical and Electronic Manufacturers Association of Canada (see AMEEC).

5.12 FM means Factory Mutual.

5.13 ICEA means Insulated Cable Engineers Association.

5.14 IEEE means Institute of Electrical and Electronic Engineers.

5.15 IES means Illuminating Engineering Society.

5.16 NEMA means National Electrical Manufacturer Association.

5.17 NFPA means National Fire Prevention Association.

5.18 CGSB means Canadian Government Standards Bureau (ONGC).

5.19 ULC means Underwriter's Laboratory of Canada.

5.20 The following abbreviations shall apply:

- A ampere(s)
- am amplitude modulation
- AWG American Wire Gauge
- ac alternating current
- dc direct current
- dB decibel(s)
- fm frequency modulation
- Hz Hertz
- kHz kilohertz
- kV kilovolt(s)
- kVA kilovoltampere(s)
- kW kilowatt(s)
- kWh kilowatthour(s)
- lm lumen
- mA milliampere
- MHz megahertz
- rms root-mean-square
- rpm revolution-per-minute
- vhf very high frequency
- uhf ultra high frequency
- V volt(s)
- W watt(s)

5.21 Refer to CSA Standard Z85 for other abbreviations.

6. Passage through walls and ceilings

6.1 Sleeves shall be installed prior to the pouring of concrete. Sleeves passing through concrete shall be schedule 40 steel pipes, having a sufficiently large diameter to allow free passage of the conduit and exceeding the floor or wall by 51 mm (2").

6.2 When cables or conduits pass through a fire rated wall or ceiling, fill the space between the sleeve and the cables or conduits with ULC or FM approved sealant. The fire rating of the installation shall be equivalent to the fire rating of the wall or ceiling being traversed. Acceptable products: Wieland, Nelson, 3M, Thomas and Betts.

7. Location of outlets

7.1 The location of apparatus and outlets shown on the drawings is approximate. The exact location shall be satisfactory and conform to instructions and requirements of this specification and satisfy the conditions at the moment of installation. Consult with the Engineer as required.

7.2 Do not install outlets back to back in the same wall; leave a 150 mm (6") space between boxes.

7.3 The Engineer may request the relocation of outlets, without cost or credit, providing that the request be made prior to the installation, inside a 3.05 m (10') radius of the original location and that the installation is similar to the original type.

7.4 Make necessary adjustments when interior finish is completed.

7.5 When outlets are shown on exterior walls use flexible polyethylene vapour barriers Iberville model VB.1, 2, 3 and/or 54 to keep the wall integrity. The installation shall be according to the manufacturer's recommendation.

8. Electrical schematics

8.1 Supply Engineer's drawing showing the schematic electrical distribution, framed and Plexiglass covered at the following locations:

8.1.1 In the main electrical room.

8.1.2 In the generator room.

9. Coordination of protection devices

9.1 Insure that circuit protection devices, such as overloads relays and fuses are in agreement with required capacities and adjusted to values as specified.

10. Insulation test

10.1 With a 500 V megger, test the insulation value of circuits, supply cables and equipment rated at 350 V or less.

10.2 With a 1,000 V megger, test the insulation value of supply circuit cables and equipment rated between 350 V and 600 V.

10.3 Test the resistance to ground value before applying voltage.

10.4 Verify that the values are within the acceptable limits set by the applicable Electrical Code otherwise apply corrective measures.

11. Dismantling

11.1 Remove all existing electrical equipment on floors, walls, partitions, columns, or ceilings to be dismantled even if such equipment is not shown on the drawings. Existing electrical equipment to be removed are not all shown on the drawings and when they are shown it is only indicative.

11.2 Remove all electric equipment, which will not be re-used, from the ceiling space.

11.3 For all mechanical and electrical equipment scheduled for removal perform the following:

11.3.1 Disconnect the equipment.

11.3.2 Remove wiring, conduits and existing cables up to the supply or to the last operating outlet. Plug all openings in boxes and cabinets with approved devices.

11.3.3 Remove the electrical equipment.

11.4 Existing cables or wiring may not be reused unless specifically indicated otherwise on the drawings.

12. Areas protected by sprinklers

12.1 Except otherwise noted, the building is protected by an automatic fire extinguishing system (water sprinklers).

12.2 All electrical equipment having openings for ventilation, bus duct connection, etc., shall be designed for installation in sprinkler protected rooms. This applies, among others, on transformers, distribution centers, sub-stations, etc.

12.3 The construction and installation of equipment shall prevent the water from sprinkler system to penetrate into the equipment and touch live parts or components.

12.4 Insure that water coming from sprinkler system which could remain on top equipment cannot enter inside the panel box by openings for penetration of conduits, cables, bus ducts, etc. Use watertight connectors. Seal all penetrations on top of electrical apparatus.

13. Marking against electric shocks and arcs

13.1 Contractor shall supply and install appropriate warning marking on equipment subject to require inspections, adjustments, repairs or maintenance under live conditions, according to the article 2-206 of the applicable Electrical Code. Marking shall be installed on following equipment, among others:

- Medium and low voltage switchgears;
- Low voltage switchboards;
- Motor control centers, starters, disconnect switches, breakers and splitter troughs;
- Distribution and utilization panels;
- Automatic transfer switches;
- Equipment power panels and control panels.

14. Voltage drop in branch circuit

14.1 A voltage drop greater than 2% in branch circuit wiring for receptacle or equipment, shall be considered unacceptable and will have to be corrected by the electrical contractor at is own expense.

END OF SECTION

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PART 1 - GENERAL

1.1 General requirements

1.1.1 Section 20 05 00 – "General Requirements Concerning Common Work Results" applies.

1.2 Summary

1.2.1 Content of this Section

.1 Works of this section include, but are not limited to: the supply, handling, transportation, set up and installation of all systems and their accessories hereafter mentioned or shown on the drawings and which are to be operational. In general, all major parts of the works consist of, but are not limited to:

- Conductors and connectors;
- Cables and connectors.

1.3 Shop drawings and technical data

1.3.1 Submit shop drawings and technical data regarding Section 20 05 00 – "General Requirements Concerning Common Work Results".

1.3.2 Submit shop drawing and technical data of the following items:

- Cable.

PART 2 - PRODUCTS

2.1 Conductors

2.1.1 Reference standards

.1 Thermoplastic insulated conductors conforming to CSA standard C22.2 no. 75

.2 XLPE insulated conductors conforming to CSA standard C22.2 no. 38

2.1.2 Conductors shall be cooper with cross linked polyethylene type RW90 - 40^{o} or TW75 insulation as specified, good for 600 V. Conductors shall be solid for sizes 12 and 10 and stranded for other sizes.

2.1.3 Conductor application

.1 Distribution and branch circuits

- RW90 indoor;
- RWU90 outdoor and indoor portion of circuit going outdoor;
- Size 12 AWG minimum.

.2 Grounding conductor in same conduit with other conductors

- RW90 (green) indoor;
- RWU90 (green) outdoor or buried;
- Size 12 AW minimum.

.3 Surface grounding conductor, single conductor in a conduit or direct buried

- Bare;
- Size 12 AWG minimum.

2.1.4 Fire alarm and communication circuits, according to article "Detection and Fire Alarm".

2.1.5 The following information shall be permanently marked, at regular intervals, on extra-low voltage conductors.

.1 The size followed by a blank for copper conductors

.2 The conductor insulation type.

.3 The name of the manufacturer.

.4 FT-1 or FT-4 category, where applicable.

2.1.6 Acceptable manufacturers:

- General Cable;
- Nexans Canada inc.;
- Prysmian;

2.2 Splices and terminations

2.2.1 Connection to conform to CSA standard C22.2 no. 65

2.2.2 Up to 750 V

.1 For conductor size no. 10 AWG and smaller use Thomas & Betts Marrette connectors or equal.

.2 For larger conductors use Burndy compression connectors, Color Keyed series from Thomas & Betts or equal, insulated with 3M cold shrink insulator, series 8420 or equal.

.3 NEMA lug connector, dimension conforming to conductors and connection plate. Compression connectors, Color Keyed from Thomas & Betts or equal.

.4 Lugs, terminals and screws shall be compatible with copper and aluminium conductors. They shall be marked for this application.

.5 For connection of copper to aluminium use, Alcan's Coppertail Thomas & Betts BI-PIN or Burndy's Hyplug connectors.

2.3 Cables

2.3.1 TECK type armoured cable

.1 TECK type armoured cable conforming to CSA standard C22.2 no. 131.

.2 Stranded, RW90 type insulation, copper conductor sizes as shown, and having the material specified under sub-article "Conductors".

.3 Bare copper grounding conductor, stranded for multi-conductor cables, and bare copper concentric grounding conductor for single conductor cables.

.4 Tape covering.

.5 PVC protective sheathing.

.6 Interlocking aluminium armour.

.7 PVC jacket HL type.

.8 TECK 90 (-40 °C) type, FT-4.

2.3.2 Cable applications

.1 TECK type armoured cable: as shown

2.3.3 Acceptable manufacturers:

- General Cable;
- Nexans Canada inc.;
- Prysmian;
- Alcan.

2.4 Cable connectors

2.4.1 Cable connectors conforming to CSA standard C22.2 no. 188

2.4.2 Cable connectors to suit copper cables.

2.4.3 In the event that the cable shall penetrate in an electrical equipment such as electrical panel, frequency variable drive, starter or other types of equipment that are certified for an installation protected with sprinklers, the connectors shall be sealed type. If no sealed type connectors are available, the cable shall enter underneath the equipment.

2.4.4 Description and catalog number apply to 16 mm (½") cables. For all other cable sizes connectors shall be from the same series.

2.4.5 TECK" type armoured cable: Thomas & Betts "Star Teck" series or Iberville CI-TC series.

PART 3 - EXECUTION

3.1 Wires and cables

3.1.1 General

.1 All wires and cables to be handled with great care at all times. No wire or cable installation below temperature limits set by the manufacturers will be allowed.

.2 Special care shall be taken to prevent wire or cable crushing or scratching.

.3 Use CSA approved lubricants compatible with the wire or cable jacket to reduce pulling tension.

3.1.2 Cable installation

.1 Install cables only when cable tray installation is completely finished and only when risk of construction damage is past.

.2 To maintain colour coding sequence in multi conductor control cables always draw the wires in the same direction.

3.1.3 Installation of conductors

.1 Tie and shape conductor bundles in panels, cabinets and motor control centers, using Thomas & Betts Ty-Rap cable ties.

.2 Install wires in conduits as shown.

.3 Do not pull spliced conductors in conduits.

.4 Simultaneously install all conductors in the same conduit.

.5 When the size of the conductor is larger than the size of the lug receiving it, per example to reduce voltage drop, use the largest size allowed for the lug and install a compression connector, type "H" from Thomas & Betts or equal, between the two conductors. Use tools recommended by manufacturer. Install over the connector an insulating cover designed to suit the connector.

END OF SECTION

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PART 1 - GENERAL

1.1 General requirements

1.1.1 Section 20 05 00 – "General Requirements Concerning Common Work Results" applies.

1.2 Summary

1.2.1 Content of this Section

.1 Works of this section include, but are not limited to: the supply, handling, transportation, set up and installation of all systems and their accessories hereafter mentioned or shown on the drawings and which are to be operational. In general, all major parts of the works consist of, but are not limited to:

- Electrical conduits and accessories;
- Connection boxes.

PART 2 - PRODUCTS

2.1 Conduits

2.1.1 Reference standards

.1 Electric metallic tubing (EMT) conforming to CSA C22.2 no. 83 standard.

.2 PVC conduits conforming to CSA C22.2 no. 211.2 standard.

2.1.2 Application

.1 Electric metallic tubing (EMT):

- Inside

.2 PVC conduits:

- For outdoor installation;
- For underground installation.

2.1.3 Acceptable manufacturers:

- Columbia or equivalent (EMT, Rigid);
- IPEX or equivalent (PVC).

2.2 Conduit supports

2.2.1 One hole malleable iron clamp for apparent conduits up to 53 mm (2"). Two (2) hole clamps for conduits larger than 53 mm (2").

2.2.2 Saddler to hang conduits from apparent metallic structures.

2.2.3 U type channels to support several conduits or TECK cable with spacing conforming to applicable Electrical Code.

2.2.4 Threaded steel rods to support suspended conduits and having a bearing capacity adequate for the load. Minimum 6 mm (¼") diameter.

2.2.5 The following catalog numbers apply to 16 mm (½") conduits. For any other size conduit use supports from the same series.

.1 Galvanized steel clamps, Unistrut series U814.

.2 Angle iron support, Thomas & Betts series #1276 for rigid conduits and series #4159, 16 mm (½") for EMT

.3 Concrete wedge anchor, Star Co Series 3435-0000

.4 Brick and masonry expansion shield, Star Co Series 1835-0300.

.5 Cable and conduit clamp, Unistrut series M5026.

.6 PVC covered steel clamps for PVC conduits, Scepter CS series.

2.2.6 TECK Cable Fasteners

.1 Nylon tie, Ty-Rap, MX series, for cables installed in horizontal raceways.

.2 Cable clamps, Thomas & Betts series CH118, for cables installed in vertical raceways or on U type channels.

2.3 Conduit connectors

2.3.1 Reference standards

.1 Connectors conforming to CSA C22.2 no. 18 standard.

.2 PVC connectors conforming to CSA C22.2 no. 85 standard

2.3.2 Connectors shall be specifically designed for conduits used.

2.3.3 Prefabricated "L" type connectors where 90^{o} elbows are required on 27 mm (1") and larger conduits.

2.3.4 In the event that the conduct shall penetrate in an electrical equipment such as electrical panel, frequency variable drive, starter or other types of equipment that are certified for an installation protected with sprinklers, the connectors shall be sealed type. If no sealed type connectors are available, the conduct shall enter underneath the equipment.

2.3.5 The following catalog numbers apply to 16 mm (½") conduits. For other sizes use connectors from the same series.

.1 Electric Metallic Tubing

- Connectors: Iberville no. 5004;
- Set screw couplings: Iberville no. 5104.

.2 PVC conduits

- Couplings: Scepter EC series;
- Terminal adapters: Scepter TA or FA series.

2.4 Splitter troughs, cabinets, junction and pull boxes

2.4.1 Reference standards

.1 Pull and junction boxes and with hinged covers conforming to CSA C22.2 no. 40 standard.

.2 Splitter troughs conforming to CSA C22.2 no. 76 standard.

2.4.2 Junction and pull boxes

.1 Welded steel boxes with screw fastened flat cover for surface mounting.

.2 Cover with a 25 mm (1") minimum trim compatible with recessed pull and junction boxes.

2.4.3 Acceptable manufacturers:

- Bel;
- Roger Girard;
- Iberville.

2.5 Boxes

2.5.1 Reference standards

.1 Outlet and branch circuit boxes conforming to CSA C22.2 no. 18 standard.

.2 PVC boxes conforming to CSA C22.2 no. 85 standard.

2.5.2 General

.1 Box dimensions to conform to applicable Electrical Code.

.2 Outlet boxes shall be gauged where several wiring devices are to be installed at the same location.

.3 Covers for boxes which are not used for wiring devices shall be plain.

.4 Knock down boxes are not acceptable except when used on outlets with non metallic sheathed cable.

2.5.3 PVC conduit boxes.

.1 PVC boxes shall be used on PVC conduit networks.

2.5.4 Outdoor boxes

.1 Weatherproof designed for covers with four screws and for surface mounting.

2.5.5 Acceptable manufacturers:

- Iberville;
- Thomas & Betts;
- Roger Girard;
- Bel;
- Crouse Hinds;
- Appleton.

PART 3 - EXECUTION

3.1 Conduits

3.1.1 General

.1 All conduits are not shown on the drawings. Those that are shown are only represented schematically. When the specified conduit size is indicated, do not install smaller diameter conduits.

.2 Apparent conduits shall be installed in such a manner as not to decrease the headroom and to use the less possible space.

3.1.2 Bending and cutting of conduits

.1 Bend conduits cold and insure that the resulting flattening does not reduce the original conduit diameter by more than 1/10. Conduits having a flattening greater than 1/10 diam. or which have twisted bends shall be considered defective and shall be replaced.

.2 All conduits greater than 21 mm (¾") diam. shall be mechanically bent.

.3 Bending radii shall not be smaller than manufactured bends.

.4 Rigid conduits threaded on site shall have long enough threaded sections to allow good conduit tightening.

.5 Conduit ends to be reamed to remove bars which could damage conductors.

3.1.3 Installation of conduits

.1 All electrical conduits to be fastened with appropriate clamps. Electrical conduits shall not be attached to suspended ceilings, plumbing, ventilation or air conditioning ducts or any other apparatus. Steel cables or holed straps shall not be accepted.

.2 Unless otherwise shown, conduits shall not pass through structural elements.

.3 All surface mounted metallic conduits shall be fastened with malleable iron clamps, bolts and anchors. Follow applicable Electrical Code for spacing.

.4 When conduits are grouped, they shall be mounted on suspended or surface mounted galvanized U shaped steel channels.

.5 Attach single suspended conduits with steel clamps.

.6 Rod diameters and support spacing shall be determined from the configuration of the grouped conduits. Support channels shall be as manufactured by Unistrut, Wieland or Burndy.

.7 Install conduits parallel to steam or hot water pipes spacing them at least 150 mm (6") horizontally and 75 mm (3") vertically.

.8 Conduit runs to include a maximum of three 90° elbows or a length of 30 m (100'). Provide cable supports in vertical runs according to the spacing shown in table 21 of the applicable Electrical Code. The supports shall be mounted in a box and be manufactured by O-Z/Gedney. Each run extremity to end into a box.

.9 Expansion sleeves to be installed at building expansion joints and on long and straight conduit runs. Electrical continuity to be insured by flexible links compatible with the materials and according to the applicable Electrical Code.

.10 All conduits to be capped to prevent foreign objects from entering during the construction.

.11 Corrosive cleaning agents shall not be used. Remove and replace the obstructed section.

.12 Insure that conduit interior is dry before proceeding with cable pulling.

.13 Supply and install a polypropylene pulling rope in empty conduits to ease the eventual pulling of wire or cables.

.14 Conduit installation to be such as to insure electric continuity of grounding.

3.1.4 Apparent conduits

.1 Conduits to be installed parallel to or perpendicular to building site lines.

.2 Leave a 1,500 mm (60") clearance for conduits installed in the back of gas operated infrared heaters.

.3 When required conduits shall be installed on girder ribs.

3.1.5 Underground conduits, direct burial

.1 Conduits shall be buried to the specified depth.

.2 Install grouped conduits on undisturbed soil or on 150 mm (6") thick granular fill compacted to 95% dry Proctor Index.

.3 Before proceeding with conduit installation excavate the whole path to insure that no obstacles will interfere with the conduit.

.4 Install conduits to specified levels and grades with minimum slope of 1:400 for water drainage.

.5 Install conduits according to the specified layout using preformed rigid plaster interlocking spacers to achieve a 50 mm (2") minimum vertical and horizontal spacing. Spacing slips to be not more than 1,500 mm (60") from one another and bottom rows to be installed at specified grade. Joints on successive layers to be staggered by 750 mm (30").

.6 Apply a thick coat of bituminous paint on all joints to render them waterproof (except for joints on PVC conduits).

.7 Use galvanized steel conduits for that part of the conduit run which emerges beyond the definitive ground level.

.8 Perform transposition and direction changes with 5° elbows.

.9 Use bell ends at access to conduits in manholes and buildings.

.10 Use conduit adapter sleeves to mate metallic to non-metallic conduits.

.11 Cut, trim and ream conduit ends, to manufacturer's recommendations, to obtain finished conduit ends similar to the manufactured ones.

.12 Protect the conduit array with a 150 mm (6") thick sand layer over conduit row.

.13 Install a Brady Identaline tape marker with the "Underground power line" warning, above the conduit run, before backfilling.

3.2 Boxes, splitter troughs and cabinets

3.2.1 Boxes

.1 Boxes to be independently supported from the conduit to which they are connected.

.2 Install recessed elements flush with the finished wall when possible, use plaster rings and insure that edges of the wall covering are at 6 mm (¼") from the opening.

.3 Fill boxes with foam or paper to prevent construction materials from entering.

.4 Provide sufficiently large openings on boxes for the conduits and armored cable installation. Reducing washers are not allowed.

.5 Pull and junction boxes shall all be accessible once all works from other trades is finished.

3.2.2 Pull and junction boxes

.1 Supply and install the number of pull and junction boxes required to complete the installation.

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PART 1 - GENERAL

1.1 General requirements

1.1.1 Section 20 05 00 – "General Requirements Concerning Common Work Results" applies.

1.2 Summary

1.2.1 Content of this Section

.1 Works of this section include, but are not limited to: the supply, handling, transportation, set up and installation of all systems and their accessories hereafter mentioned and/or shown on the drawings and which are to be operational. In general, all major parts of the works consist of, but are not limited to:

- Distribution and utilization panels;
- Circuit-breaker.

1.3 Shop drawings and technical data

1.3.1 Submit shop drawings and technical data regarding Section 20 05 00 – "General Requirements Concerning Common Work Results".

1.3.2 Submit shop drawing and technical data of the following items:

- Distribution and utilization panels.

PART 2 - PRODUCTS

2.1 Circuit breaker type distribution panels

2.1.1 Distribution panels conforming to CSA C22.2 no. 29 standard.

2.1.2 Supplied by the same and only manufacturer.

2.1.3 Voltage 120/208 V

2.1.4 Arrange bus bars per phase order. All circuits shall be identified by a letter, as shown on drawings.

2.1.5 Panels shall have bus bars, and number of branch circuits and circuit breakers as shown.

2.1.6 Panels to be complete with door, lock and two keys, locks and keys to be interchangeable for all panels of the same type.

2.1.7 Bus bars shall be copper, as the supports and circuit breakers material have the same expansion coefficients, with full capacity neutral.

2.1.8 For surface or flush mounting as shown on drawings.

2.1.9 Panel bus bars to be compatible with plug-on circuit breakers.

2.1.10 Standard finish: ASA 61 grey baked enamel.

2.1.11 Circuit breakers: conforming to article "Molded case circuit breakers".

2.1.12 The grounding bus bar shall be conform to article « Grounding and Bonding ».

2.1.13 Acceptable manufacturers:

- Plug-on circuit breaker panels:
  - Schneider (Square D), model I-Line; **ONLY THIS PRODUCT IS ALLOWED**.

2.2 Molded case circuit breakers

2.2.1 Molded case circuit breakers conforming to CSA C22.2 no. 5 standard.

2.2.2 Circuit protection devices contained in plastic insulated enclosures.

2.2.3 Bolted or plug-on to the panel bus bars.

2.2.4 Quick make quick break mechanism.

2.2.5 Manually operated.

2.2.6 Complete with thermal and magnetic trip unit compensated for an ambient temperature of 40 °C (104 °F).

2.2.7 Multipole breakers to have a common trip device and operating lever.

2.2.8 In 120 or 208 Volts circuits use, unless otherwise noted on the distribution diagram or on the panel description sheets, single, two or three pole circuit breakers having the ratings as shown and with a 10 kA minimum RMS, symmetrical rupturing capacity.

2.2.9 Authentication of new breakers (not counterfeited)

.1 Except otherwise noted, all breakers installed in panels (new or existing) shall be new and obtained exclusively from a distributor authorized by manufacturer.

.2 Submit with breaker shop drawings, a copy of the purchase order to the distributor. Quantities, models and sizes shown on the purchase order shall correspond to those indicated on the shop drawings.

.3 Retain all packing slips of material delivered to the job site and provide one copy to the Engineer. All packing slips shall bear one signature attesting receiving by the Contractor.

.4 In case of default to the requirement of this article, the Engineer may request a verification by the manufacturer of breakers. Costs related to this verification will be at Contractor's expense.

PART 3 - EXECUTION

3.1 Panels

3.1.1 Install panels where shown and fasten them solidly, plumb and square with adjacent surfaces.

3.1.2 Install surface mounted panels on plywood. Panels to be grouped on common plywood as much as possible.

3.1.3 Connect all circuits to respective loads as shown.

3.1.4 Connect each neutral conductor to the neutral bus bar, each neutral conductor being appropriately identified.

3.1.5 When distribution panels are installed side by side, the enclosures shall be of the same size and welded together. Doors shall have the same size, be perfectly aligned and mounted on separate covers.

3.2 Molded case circuit breaker

3.2.1 Install circuit breakers and connect as shown.

3.2.2 When a panel is replaced with a new one, the contractor shall verify the compatibility of the existing breakers with the new panel type. New breakers shall be supplied if the existing breakers are not compatible with the new panel and cannot be relocated.

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PART 1 - GENERAL

1.1 General requirements

1.1.1 Section 20 05 00 – "General Requirements Concerning Common Work Results" applies.

1.2 Summary

1.2.1 Content of this Section

.1 Works of this section include, but are not limited to: the supply, handling, transportation, set up and installation of all systems and their accessories hereafter mentioned and/or shown on the drawings and which are to be operational. In general, all major parts of the works consist of, but are not limited to:

- Lighting fixtures.

1.3 Shop drawings and technical data

1.3.1 Submit shop drawings and technical data regarding Section 20 05 00 – "General Requirements Concerning Common Work Results".

1.3.2 Submit shop drawing and technical data of the following items:

- Lighting fixtures (one (1) per fixture type);

PART 2 - PRODUCTS

2.1 Light emitting diode devices (LED)

2.1.1 Reference Standards - Devices

.1 Photometric tests in accordance with IES LM-79 *Approved Method: Electrical and Photometric Measurements of Solid-State Lighting Products*.

.2 Light depreciation determined according to IES LM-80 *Approved Method: Measuring Lumen Maintenance of LED Light Sources.*

.3 Long-term light depreciation determined according to IES TM-21 *Projecting Long Term Lumen Maintenance of LED Light Sources*.

.4 UL 8750 *Light Emitting Diode Equipment for Use in Lighting Products*.

2.1.2 Reference Standards – Drivers

.1 UL 1310 Class 2 Power Units or equivalent CSA.

.2 ANSI C62.41 Category A IEEE Recommended Practice for Surge Voltages in Low-Voltage AC Power Circuits.

.3 FCC Title 47 CFR Part 18 *Electronic Code of Federal Regulations – Telecommunication – Industrial, Scientific, and Medical Equipment.*

2.1.3 All LED devices and their components must, at minimal meet all reference standards listed above.

2.1.4 Each fixture must be equipped with a compatible factory installed driver. Everything must be approved for exterior installation.

2.1.5 Supply units shall be equipped with colour connectors determined in accordance with the standard requirements ANSI C82.11.

2.1.6 Driver technical data:

.1 120 V ±5 %, 60 Hz.

.2 Power factor: 90 % minimum.

.3 Total harmonic distortion: 20 % maximum.

.4 Class A nominal sound volume.

.5 Operation ambient temperature: 10 to 40 °C, 90 % R.H.

.6 The housing temperature: 0 at 62 ºC, 90 % H.R.

.7 Must tolerate without damage a condition of open circuit or short circuit without of fuses or other external protection devices.

.8 Must not contain any PCB.

2.1.7 Minimum 10 year warranty, parts and labor, for the device. This includes, without limitation, diodes, connectors, driver and all other components necessary for the proper functioning of the device.

2.2 Lighting fixtures

2.2.1 Reference standards

.1 Lighting fixtures conforming to applicable standards.

2.2.2 Shop drawings

.1 Submit for approval all lighting fixtures photometric data, physical and electrical characteristics. Data to be established by an independent testing laboratory.

.2 Submit one separate shop drawing including all required information of each lighting fixture type.

2.2.3 Manufacturing standards is given through the manufacturers catalog numbers in the list of lighting fixtures given on the drawings.

2.2.4 Approved manufacturers: As defined in the list of lighting fixtures.

PART 3 - EXECUTION

3.1 Lighting fixtures

3.1.1 Fixture installation

.1 Locate fixtures as shown.

.2 Connect fixtures to lighting circuits as shown.

.3 Install lighting fixtures after all other works, which may damage or soil them have been finished.

.4 Electrical, mechanical and architectural drawings shall be examined when installing lighting fixtures.

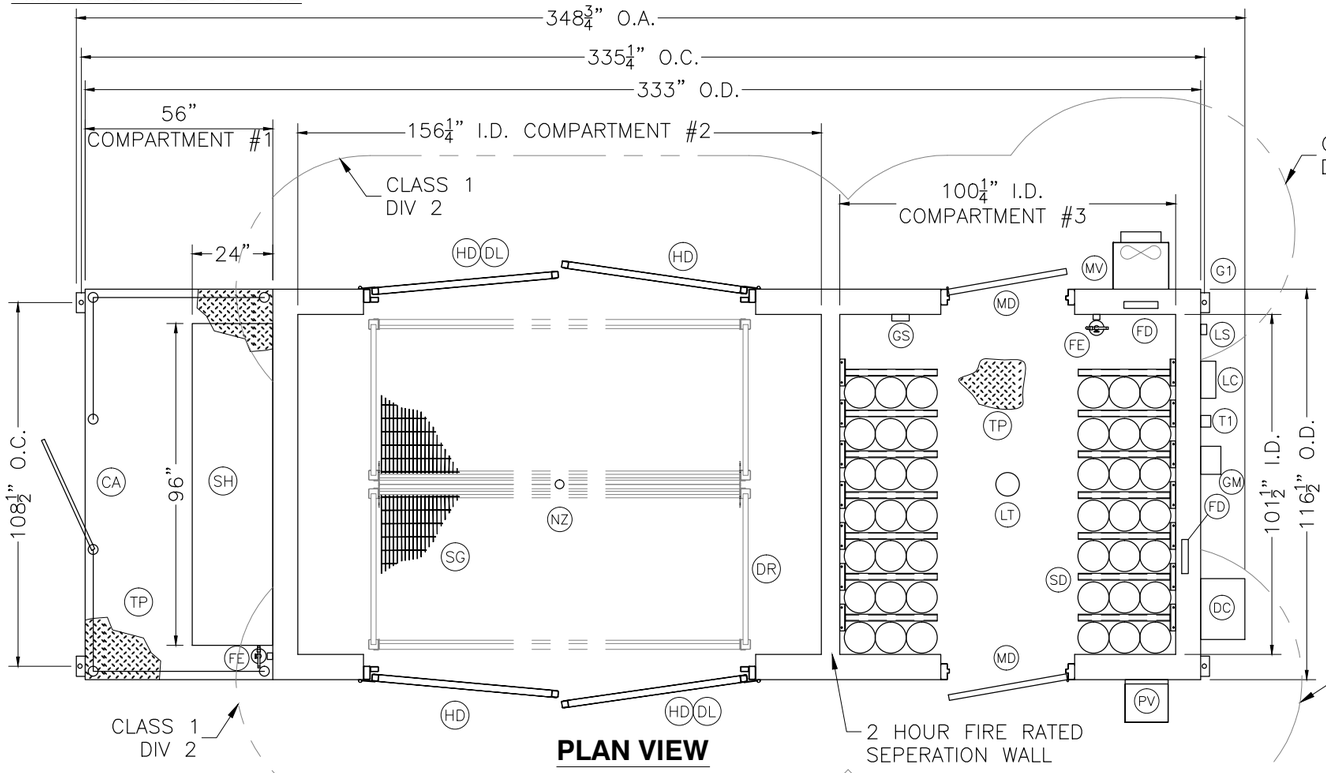
.5 When a fixture is surface mounted, the outlet box shall be of a type, which will be completely covered by the fixture after its installation.

.6 Refer to plans for lighting fixture installation detail on fence post.

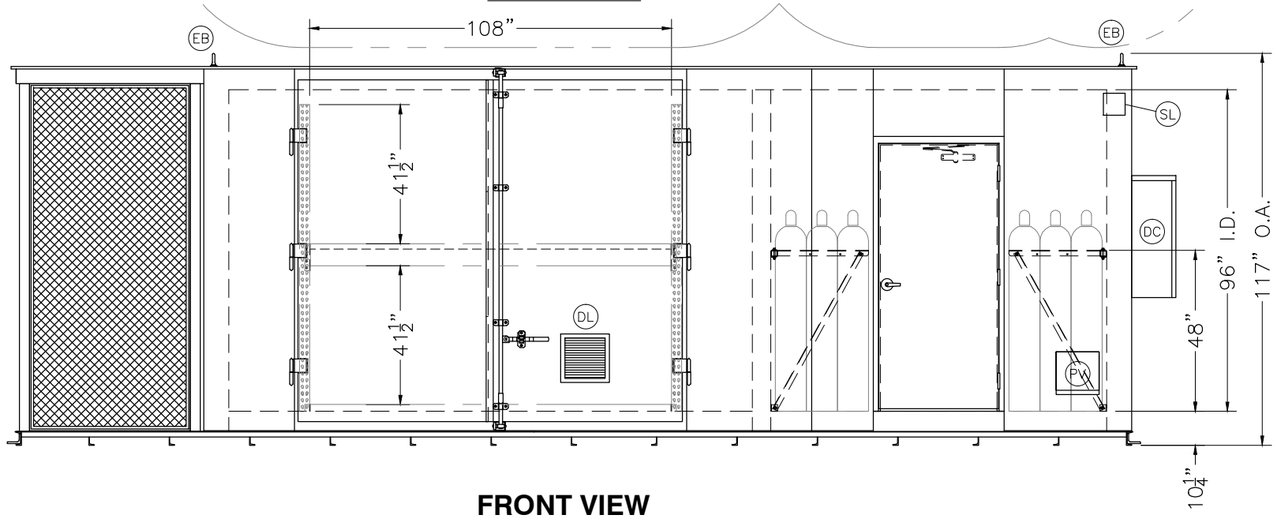
END OF SECTION

II. STORAGE UNITS INFO

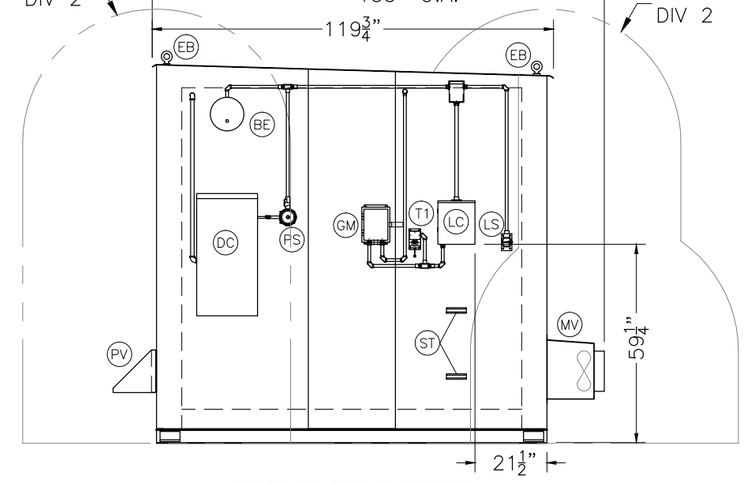
PMT1 - GAS & FUEL STORAGE



PLAN VIEW



FRONT VIEW



RIGHT SIDE VIEW

GENERAL SPECIFICATIONS:

NOMINAL SIZE:	28' x 10' x 10'
APPROX. AREA:	224 SQ. FT.
STORAGE CAPACITY:	(52) 55 GAL. DRUMS
SUMP VOLUME:	411 GALS. COMPARTMENT #2
UNIT EST. WEIGHT:	18,600 LBS.
CONSTRUCTION:	2–HR FIRE RATED WALLS WITH FIRE RESISTIVE CEILING\ROOF
ELECTRIC:	INTERIOR – CLASS1, DIV 1 GR. C&D EXTERIOR – NEMA 3R
POWER:	120/240, SINGLE PHASE, 60HZ
DOORS:	(2) SINGLE DOOR – 36" x 80" (2) DOUBLE HINGED DOOR (1) FENCED DOOR – 36" x 80"
STORAGE:	250 PSF LOAD
ROOF:	65 PSF LOAD
WIND:	19 PSF (90mph)
UP–LIFT:	ANCHORING REQUIRED – REFER TO DRAWING #H90–0007–000
SEISMIC:	ZONE 4
COLOR:	BLUE

LEGEND

BE–BELL FOR DRY CHEM
CA–CAGED AREA
DC–DRY CHEM FIRE SUPPRESSION
DL–DOOR LOUVRE, 1½ HOUR RATED
DR–DRUM RACKING
EB–EYE–BOLT
FD–FIRE DAMPER, 1½ HOUR RATED
FE–FIRE EXTINGUISHER
G1–EXTERIOR GROUNDING
GM–GAS MONITOR
GS–GAS SENSOR
HD–HINGED DOOR
LC–LOAD CENTER
LT–LIGHT, 300W, XP
LS–LIGHT SWITCH
MD–MANWAY DOOR, 1½ HOUR LISTED
MV–MECHANICAL VENTILATION
NZ–NOZZLE FOR DRY CHEM
PV–PASSIVE VENT W/ HOOD & HARDWARE SHIPPED DISASSEMBLED, INSTALLED BY CUSTOMER
PS–PRESSURE SWITCH FOR DRY CHEM SYSTEM
SD–STEEL DIVIDERS
SG–STEEL GRATING
SH–SHELF, 8'–0" LG. x 24" DEEP
ST–STRUT 6" LG.
T1–THERMOSTAT
TP–TREAD PLATE

MARKINGS

SL–SUPPLIER LABEL

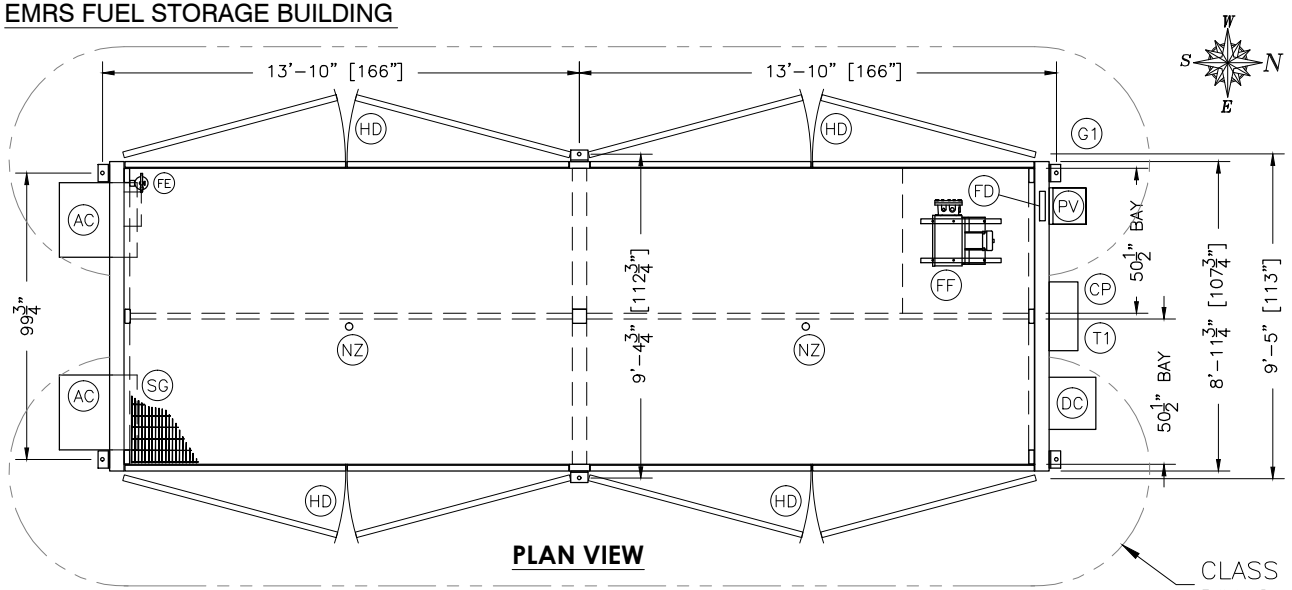
CUSTOMER OBSERVATIONS			
☐ APPROVED ☐ CHANGES REQUIRED			
☐ ADITIONAL NOTES ATTACHED			
SIGNATURE:			
CUSTOMER COMMENTS	KM	7/31/15	3
ADDED THERMOSTAT	KM	07/13/15	2
CUSTOMER COMMENTS	KM	5/28/15	1
REVISION	BY	DATE	REV

QUATREX ENVIRONMENTAL INC.
2105, MONTEREY
LAVAL (QUEBEC)
H7L 3T6

Title:
1014341
SAFETY STORAGE BUILDING
28 x 10 X 10

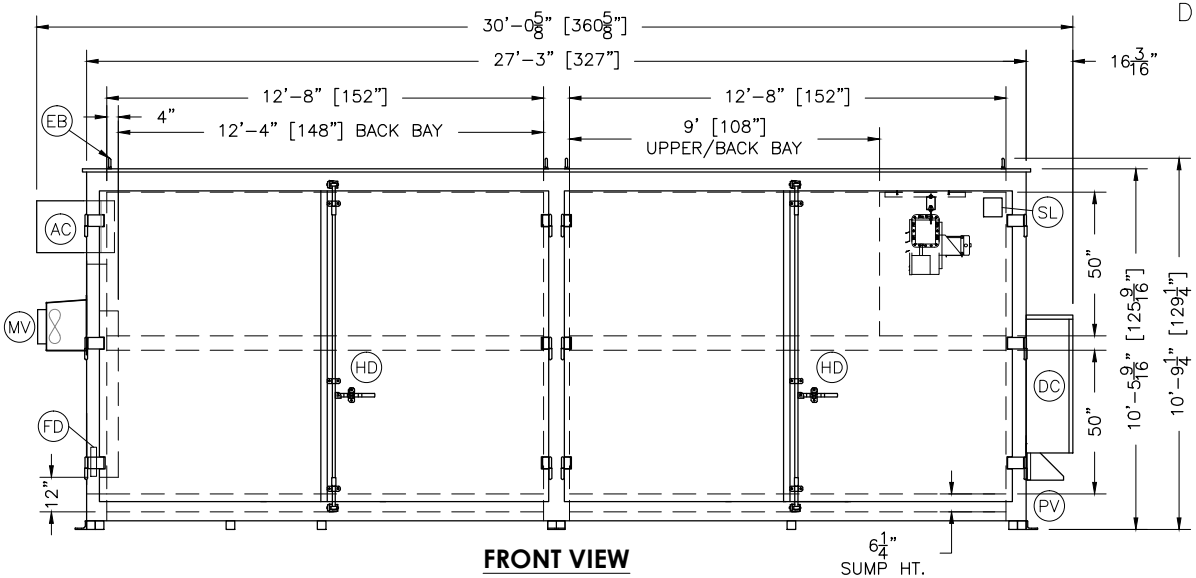
Drawn by:	Checked by:	Date:
KLM		05/21/15
Scale: SEE DIMENS.	Drawing No.: 148011QX-1R-1	△

EMRS FUEL STORAGE BUILDING



PLAN VIEW

CLASS 1
DIV 2



FRONT VIEW

GENERAL SPECIFICATIONS:

NOMINAL SIZE:	28' x 10' x 11'
STORAGE CAPACITY:	(92) 55 GAL. DRUMS
SUMP VOLUME:	767 GALS.
UNIT EST. WEIGHT:	22,300 LBS.
CONSTRUCTION:	2–HR FIRE RATED WALLS WITH FIRE RESISTIVE CEILING\ROOF
ELECTRIC:	INTERIOR – CLASS1, DIV 2 GR. C&D EXTERIOR – NEMA 3R (UNLESS OTHERWISE NOTED)
POWER:	120/240, SINGLE PHASE, 60HZ
DOORS:	(4) DOUBLE HINGED DOORS
STORAGE:	152" BAY – 9600 LBS PER BAY
ROOF:	65 PSF LOAD
WIND:	19 PSF (90mph)
UP–LIFT:	ANCHORING REQUIRED – REFER TO DRAWING #H90–0007–000
SEISMIC:	ZONE 4
COLOR:	BLUE

LEGEND

AC–AIR CONDITIONER, HAZ LOCATION, 19K BTU
BE–BELL FOR DRY CHEM
CP–24x36 CONTROL PANEL
DC–DRY CHEM FIRE SUPPRESSION
EB–EYE–BOLT
FD–FIRE DAMPER, 1½ HOUR RATED
FE–FIRE EXTINGUISHER
FF–HEATER, FAN FORCED, HAZ LOCATION, 10KW
FS–FAN SWITCH
G1–EXTERIOR GROUNDING
HD–HINGED DOOR
MV–MECHANICAL VENTILATION
NZ–NOZZLE FOR DRY CHEM
PS–PRESSURE SWITCH FOR DRY CHEM SYSTEM
PV–PASSIVE VENT W/ HOOD & HARDWARE SHIPPED DISASSEMBLED, INSTALLED BY CUSTOMER
SG–STEEL GRATING
ST–STRUT 6" LG.
T1–TEMPERATURE CONTROLLER

NOTES:

1. *HEATER TO PROVIDE AN INTERNAL TEMPERATURE OF 5°C WITH OUTSIDE AMBIENT OF –25°C.*
2. *A/C TO PROVIDE AN INTERNAL TEMPERATURE OF 24°C WITH OUTSIDE AMBIENT OF 38°C.*
3. *HEATER AND A/C ARE NOT SIZED FOR CONTINUOUS MECHANICAL VENTILATION.*

MARKINGS

SL–SUPPLIER LABEL

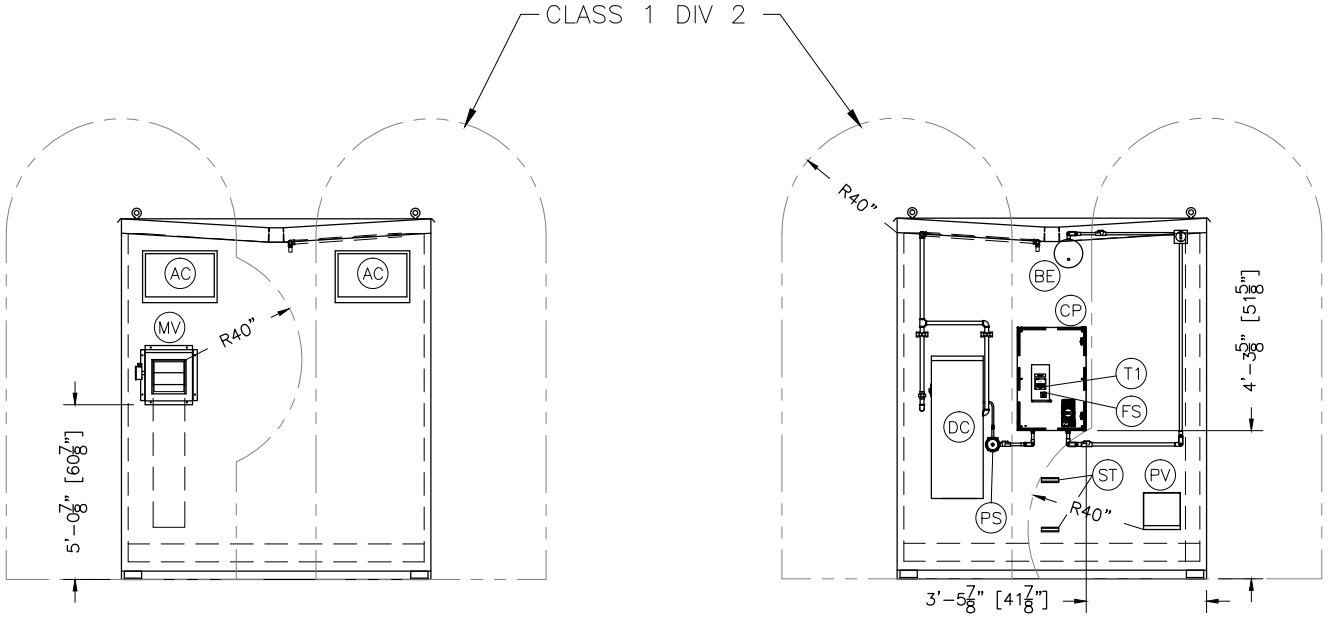
CUSTOMER OBSERVATIONS			
☐ APPROVED ☐ CHANGES REQUIRED			
☐ ADITIONAL NOTES ATTACHED			
SIGNATURE:			
CUSTOMER COMMENTS	KM	7/31/15	2
CUSTOMER COMMENTS	KM	5/28/15	1
REVISION	BY	DATE	REV

QUATREX ENVIRONMENTAL INC.
2105, MONTEREY
LAVAL (QUEBEC)
H7L 3T6

Title:
1014342
L82–9601–MOD
SAFETY STORAGE BUILDING
28 x 10 X 11

Drawn by:	Checked by:	Date:
KLM		05/27/15
Scale: SEE DIMENS.	Drawing No.: 1408011QX–1R–2	△

EMRS FUEL STORAGE BUILDING



LEFT SIDE VIEW

RIGHT SIDE VIEW

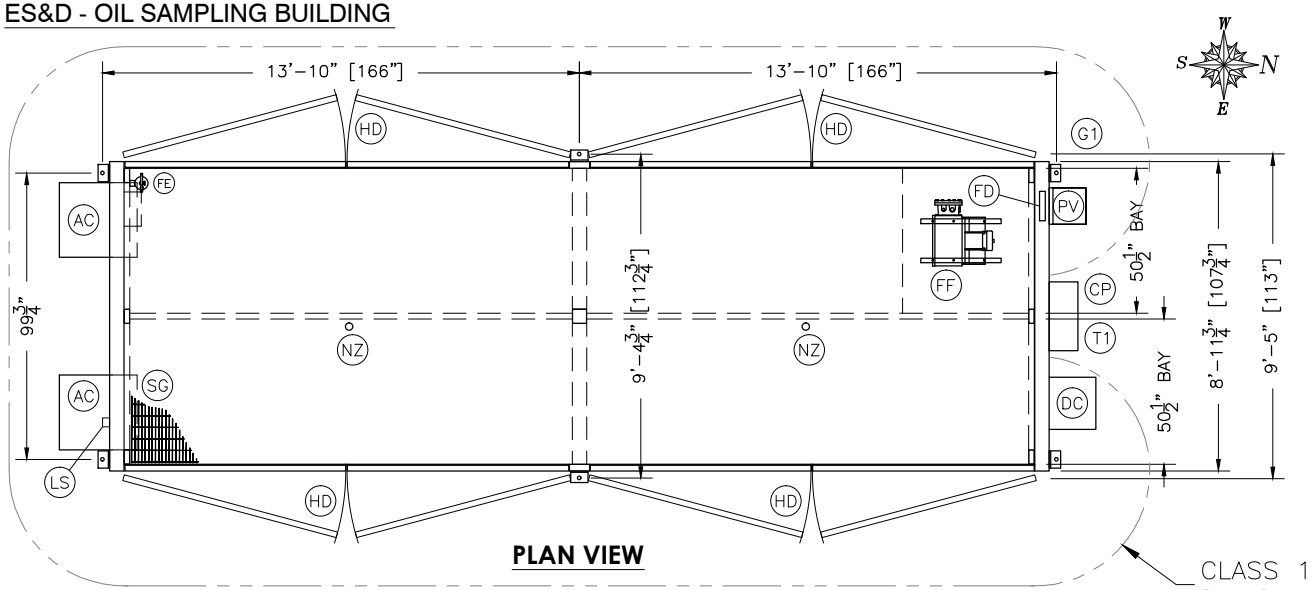
CUSTOMER OBSERVATIONS			
☐ APPROVED ☐ CHANGES REQUIRED			
☐ ADITIONAL NOTES ATTACHED			
SIGNATURE:			
REVISION	BY	DATE	REV

QUATREX ENVIRONMENTAL INC.
2105, MONTEREY
LAVAL (QUEBEC)
H7L 3T6

Title:
1014342
L82-9601-MOD
SAFETY STORAGE BUILDING
28 x 10 X 11

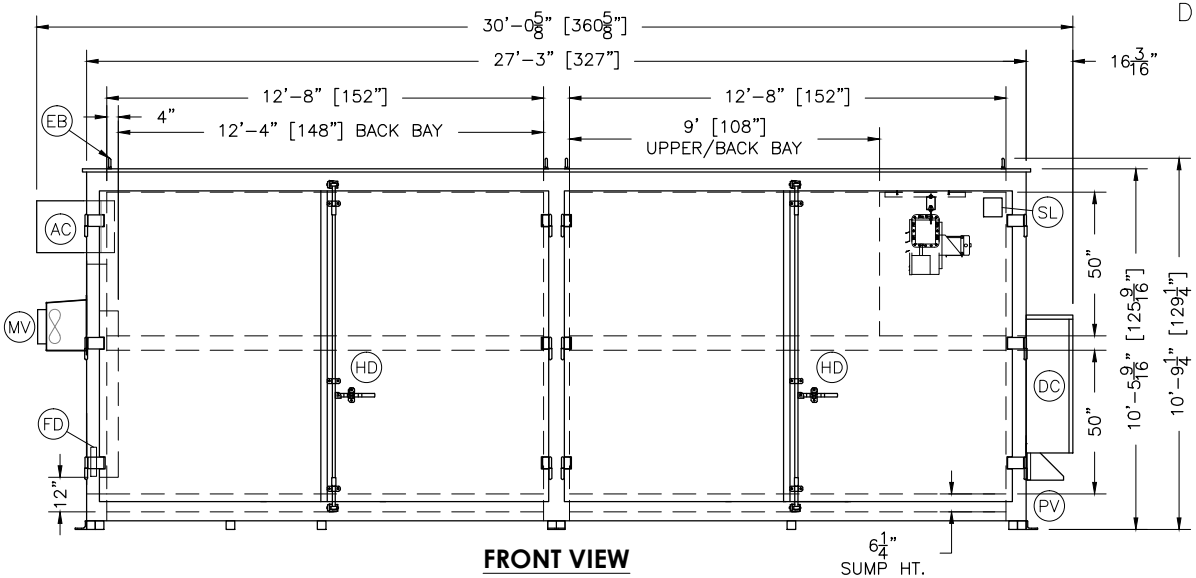
Drawn by:	Checked by:	Date:
KLM		05/27/15
Scale: SEE DIMENS.	Drawing No.: 1408011QX-1R-2	△

ES&D - OIL SAMPLING BUILDING



PLAN VIEW

CLASS 1
DIV 2



FRONT VIEW

GENERAL SPECIFICATIONS:

NOMINAL SIZE:	28' x 10' x 11'
STORAGE CAPACITY:	(76) 55 GAL. DRUMS
SUMP VOLUME:	767 GALS.
UNIT EST. WEIGHT:	22,300 LBS.
CONSTRUCTION:	2–HR FIRE RATED WALLS WITH FIRE RESISTIVE CEILING\ROOF
ELECTRIC:	INTERIOR – CLASS1, DIV 2 GR. C&D EXTERIOR – NEMA 3R (UNLESS OTHERWISE NOTED)
POWER:	120/240, SINGLE PHASE, 60HZ
DOORS:	(1) SINGLE DOOR – 36" x 80" (4) DOUBLE HINGED DOORS
STORAGE:	108" BAY – 6400 LBS PER BAY 152" BAY – 9600 LBS PER BAY SHELVING AREA – 250 PSF
ROOF:	65 PSF LOAD
WIND:	19 PSF (90mph)
UP–LIFT:	ANCHORING REQUIRED – REFER TO DRAWING #H90–0007–000
SEISMIC:	ZONE 4
COLOR:	BLUE

LEGEND

AC–AIR CONDITIONER, HAZ LOCATION, 19K BTU
BE–BELL FOR DRY CHEM
CP–24x36 CONTROL PANEL
DC–DRY CHEM FIRE SUPPRESSION
EB–EYE–BOLT
FD–FIRE DAMPER, 1½ HOUR RATED
FE–FIRE EXTINGUISHER
FF–HEATER, FAN FORCED, HAZ LOCATION, 7.5KW
FS–FAN SWITCH
G1–EXTERIOR GROUNDING
HD–HINGED DOOR
MV–MECHANICAL VENTILATION
NZ–NOZZLE FOR DRY CHEM
PS–PRESSURE SWITCH FOR DRY CHEM SYSTEM
PV–PASSIVE VENT W/ HOOD & HARDWARE SHIPPED DISASSEMBLED, INSTALLED BY CUSTOMER
SG–STEEL GRATING
ST–STRUT 6" LG.
T1–TEMPERATURE CONTROLLER

NOTES:

1. *HEATER TO PROVIDE AN INTERNAL TEMPERATURE OF 5°C WITH OUTSIDE AMBIENT OF –25°C.*
2. *A/C TO PROVIDE AN INTERNAL TEMPERATURE OF 24°C WITH OUTSIDE AMBIENT OF 38°C.*
3. *HEATER AND A/C ARE NOT SIZED FOR CONTINUOUS MECHANICAL VENTILATION.*

MARKINGS

SL–SUPPLIER LABEL

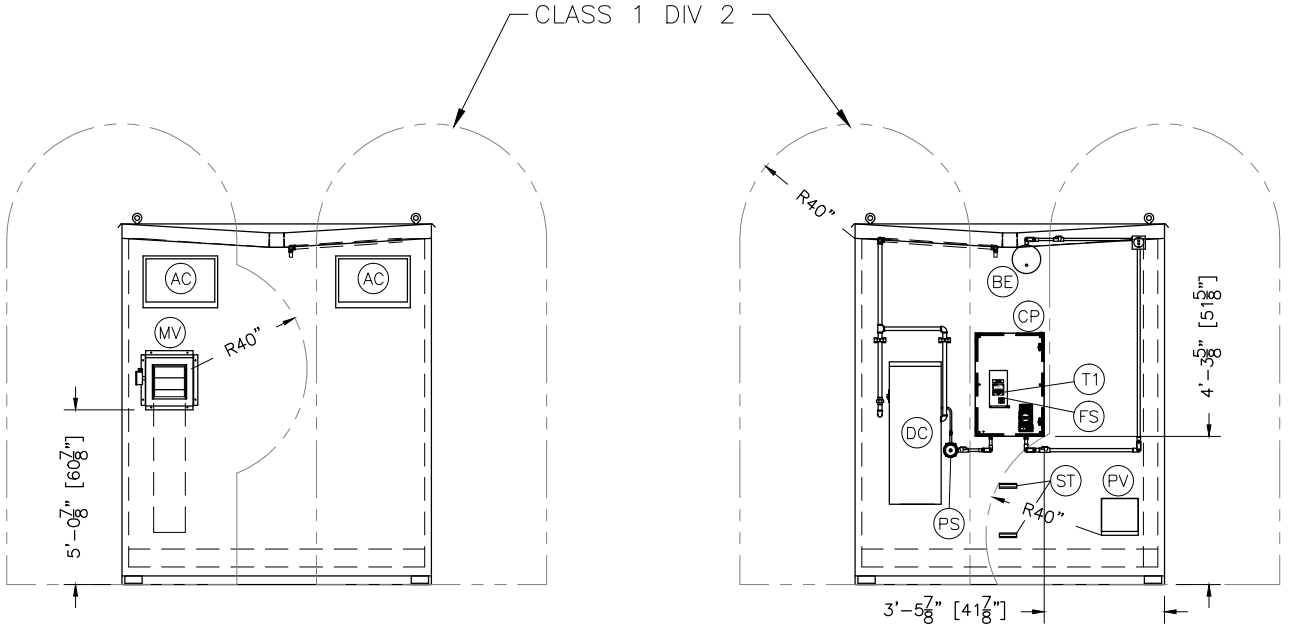
CUSTOMER OBSERVATIONS			
☐ APPROVED ☐ CHANGES REQUIRED			
☐ ADITIONAL NOTES ATTACHED			
SIGNATURE:			
CUSTOMER COMMENTS	KM	7/31/15	2
CUSTOMER COMMENTS	KM	5/28/15	1
REVISION	BY	DATE	REV

QUATREX ENVIRONMENTAL INC.
2105, MONTEREY
LAVAL (QUEBEC)
H7L 3T6

Title:
1014343
L82–9601–MOD
SAFETY STORAGE BUILDING
28 x 10 X 11

Drawn by:	Checked by:	Date:
DEN		5/26/15
Scale: SEE DIMENS.	Drawing No.: 1408011QX–1R–3	

ES&D - OIL SAMPLING BUILDING



LEFT SIDE VIEW

RIGHT SIDE VIEW

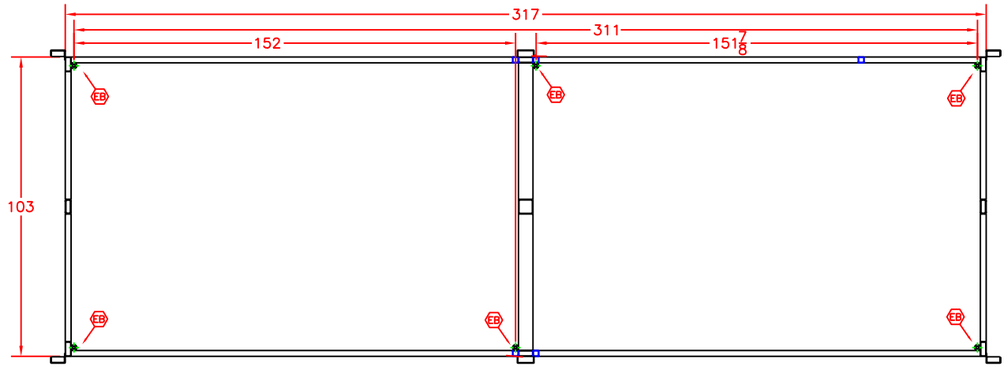
CUSTOMER OBSERVATIONS			
☐ APPROVED ☐ CHANGES REQUIRED			
☐ ADITIONAL NOTES ATTACHED			
SIGNATURE:			
REVISION	BY	DATE	REV

QUATREX ENVIRONMENTAL INC.
2105, MONTEREY
LAVAL (QUEBEC)
H7L 3T6

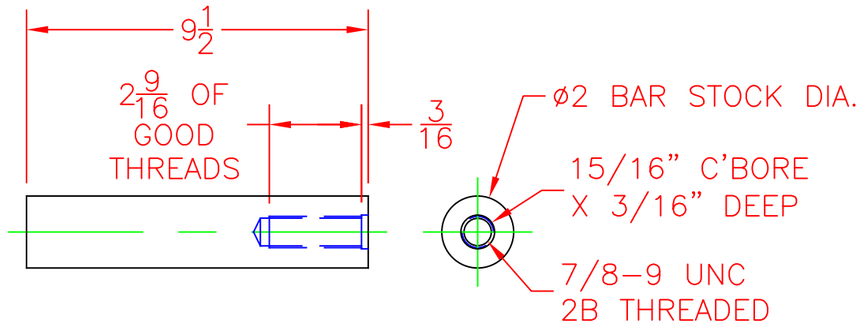
Title:
1014343
L82-9601-MOD
SAFETY STORAGE BUILDING
28 x 10 X 11

Drawn by:	Checked by:	Date:
DEN		5/26/15
Scale: SEE DIMENS.	Drawing No.: 1408011QX-1R-3	△

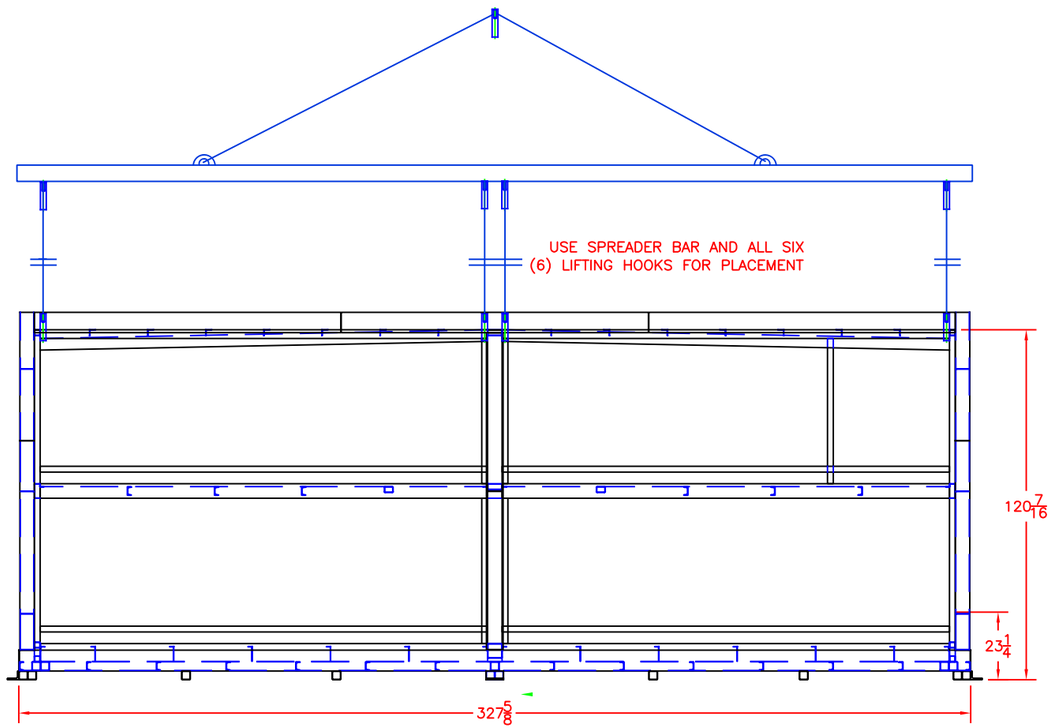
Notes:
1) Each units have six (6) lifting hooks, four (4) at the corners and two (2) on the outside of the centre.
2) Each units weighs approximately 22,500 Lbs.



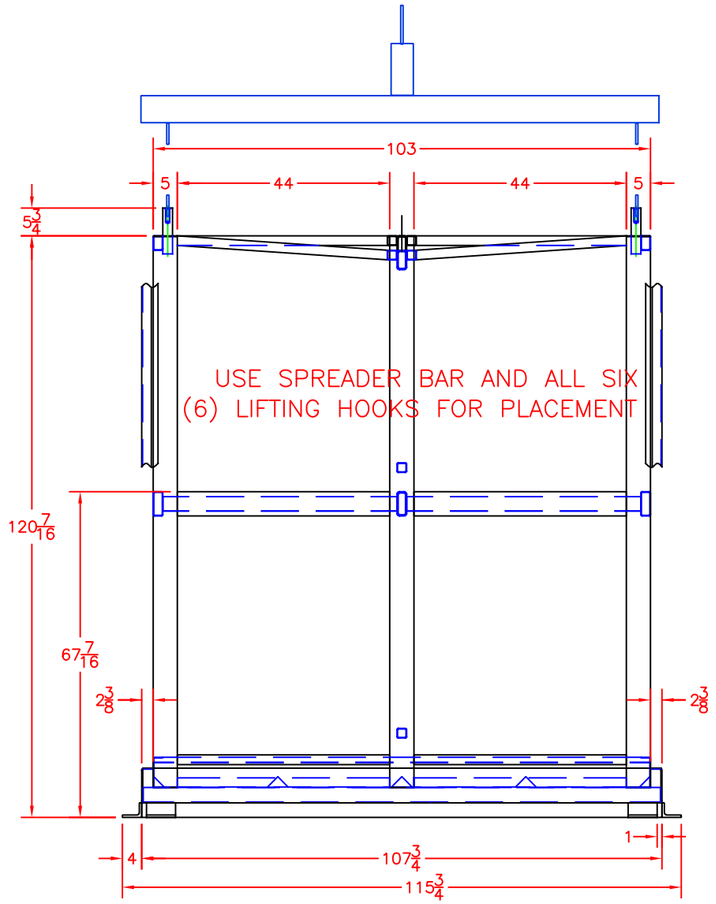
1 / S1 CABINET PLAN VIEW
SCALE: 1:36



EYE BOLT BLOCK DETAIL



2 / S1 CABINET FRONT VIEW
SCALE: 1:36



1 CABINET SIDE VIEW

1014342/43

PROJECT TITLE

QUATREX ENVIRONMENT INC.
L82–9601 P.O.#1014342
LAVAL, QUEBEC, CANADA
PE STAMPED DRAWINGS AND CALCULATIONS

QUATREX ENVIRONMENTAL INC.
2105, MONTEREY
LAVAL (QUEBEC)
H7L 3T6

QUATREX ENVIRONMENTAL INC.

DRAWN BY
KLM

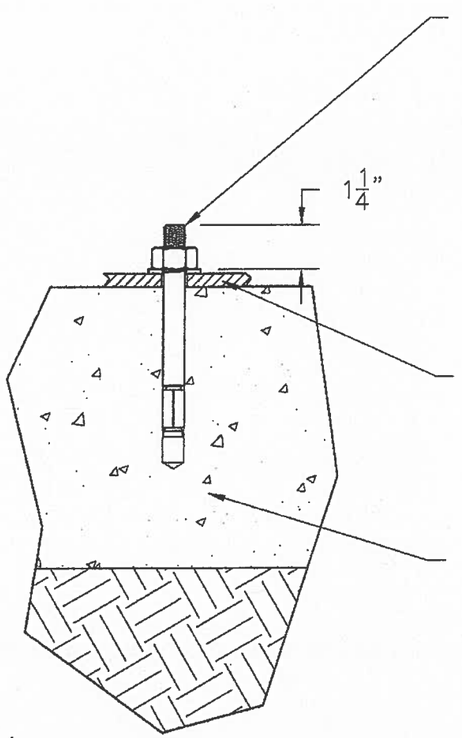
DATE
08/21/15

REVISION LEVEL
–

SHEET TITLE
DOOR DETAILS

SHEET NUMBER
A2


TOPOGRAPHICAL PLAN OF
PART OF LOT 22
REGISTRAR'S COMPILED PLAN 904
CITY OF OTTAWA
Prepared by Annis, O'Sullivan, Vollebekk Ltd.
Scale 1 : 500
Metric
DISTANCES SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048
Notes & Legend
RIVER ROAD
REGIONAL ROAD No. 19
(Also known as LOT 10 CONCESSION I (RIDEAU FRONT)
LOT 18 REGISTRAR'S COMPILED
LOT 19 PLAN 904
LOT 34 REGISTRAR'S COMPILED PLAN 903
LOT 21
LOT 22
3 STOREY PORTION BRICK AND METAL CLAD BUILDING
2 STOREY PORTION
PART 5 PLAN 4R-9815
REGISTRAR'S COMPILED PLAN 904
LOT 39
LOT 42
LOT 41
NOT PART OF THIS SURVEY
LIMEBANK ROAD
ROAD ALLOWANCE BETWEEN CONCESSIONS I AND 2 (RIDEAU FRONT)
BALMORAL ROAD
ROAD ALLOWANCE BETWEEN LOTS 10 AND 11
Final location of the three (3) new storage units
Current location of the three (3) storage units
STORAGE UNITS LOCATION SKETCH
DATE: 19 AUGUST 2016
SITE AREA = 11.1660 Hectares
BOUNDARY INFORMATION COMPILED FROM PLANS AND SURVEY RECORDS.
ELEVATION NOTES
UTILITY NOTES
ANNIS, O'SULLIVAN, VOLLEBEKK LTD.



ANCHOR

TYPE: WEDGE
SIZE: 3/4" DIA.
TENSION: 19,299 LBS.
SHEAR: 21,000 LBS.
3" MIN. EMBEDMENT

FOOTPLATE/HOLD-DOWN BRACKET

CONCRETE

UNREINFORCED STONE
AGGREGATE CONCRETE

COMPRESSION STRENGTH: 5000 PSI

RECOMMENDED SLAB THICKNESS: 4" MIN.

NOTE:
- ULTIMATE LOADS SHOWN FOR ANCHOR. SUPPLIER MAY SHOW LOADS WITH A 4:1 SAFETY FACTOR. DIVIDE ABOVE LOADS BY 4 TO COMPARE WITH ALLOWABLE LOAD.
- TENSION AND SHEAR LOADS ARE DETERMINED BY COMPRESSION STRENGTH OF CONCRETE.

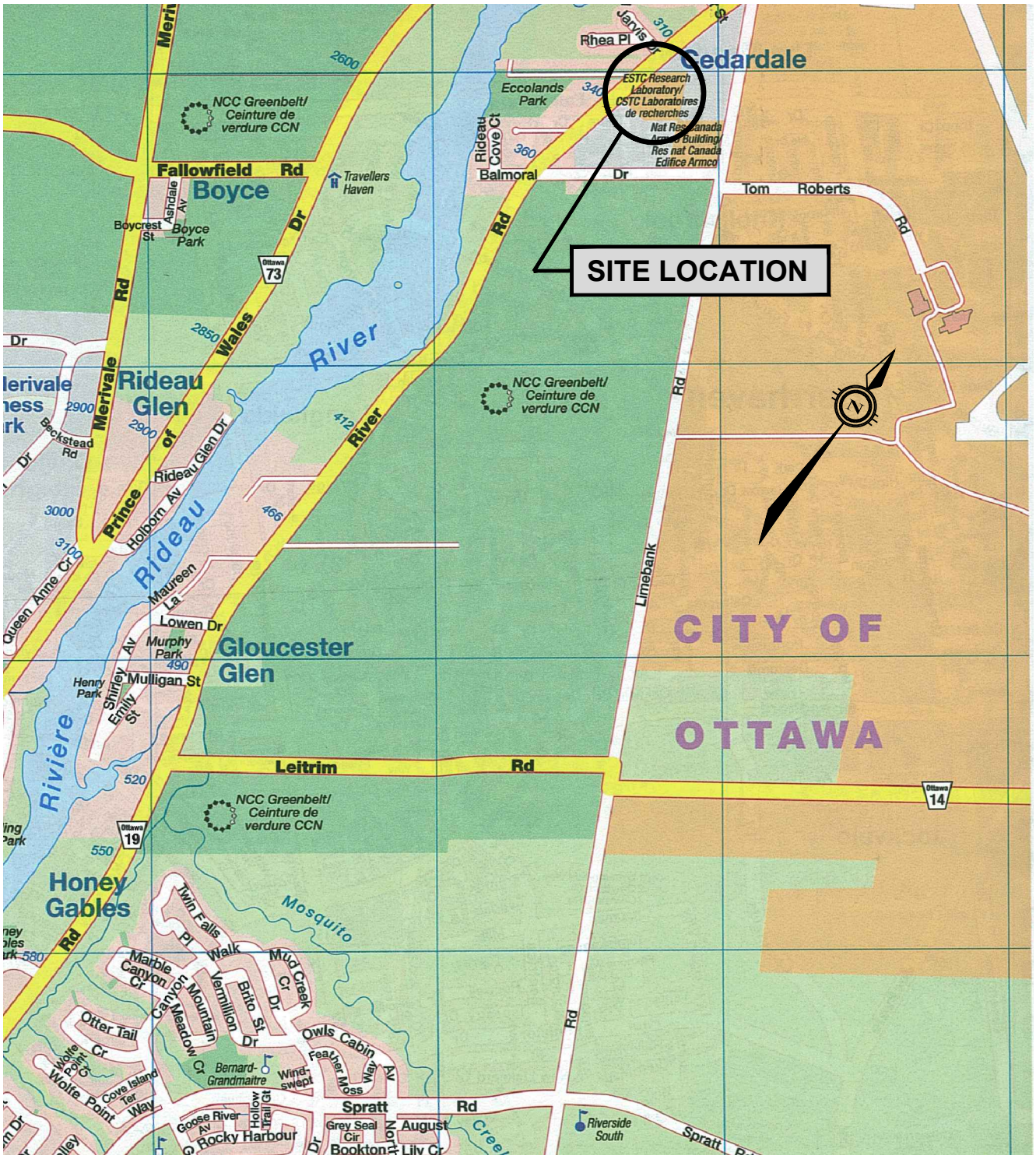
CUSTOMER OBSERVATIONS			
☐ APPROVED ☐ CHANGES REQUIRED			
☐ ADITIONAL NOTES ATTACHED			
SIGNATURE:			
REVISION	BY	DATE	REV

QUATREX ENVIRONMENTAL INC.
1345, MONTEREY
LAVAL (QUEBEC)
H7L 3T6

Title:
RECOMMENDED
ANCHORING DETAIL

Drawn by:	Checked by:	Date:
CWP		05-10-10
Scale:	Drawing No.:	
	H90-0007-000	△

III. GEOTECHNICAL BOREHOLE LOGS



exp Services Inc.
t: +1.613.688.1899 | f: +1.613.225.7337
2650 Queensview Drive, Suite 100
Ottawa, ON K2B 8H6
Canada
www.exp.com

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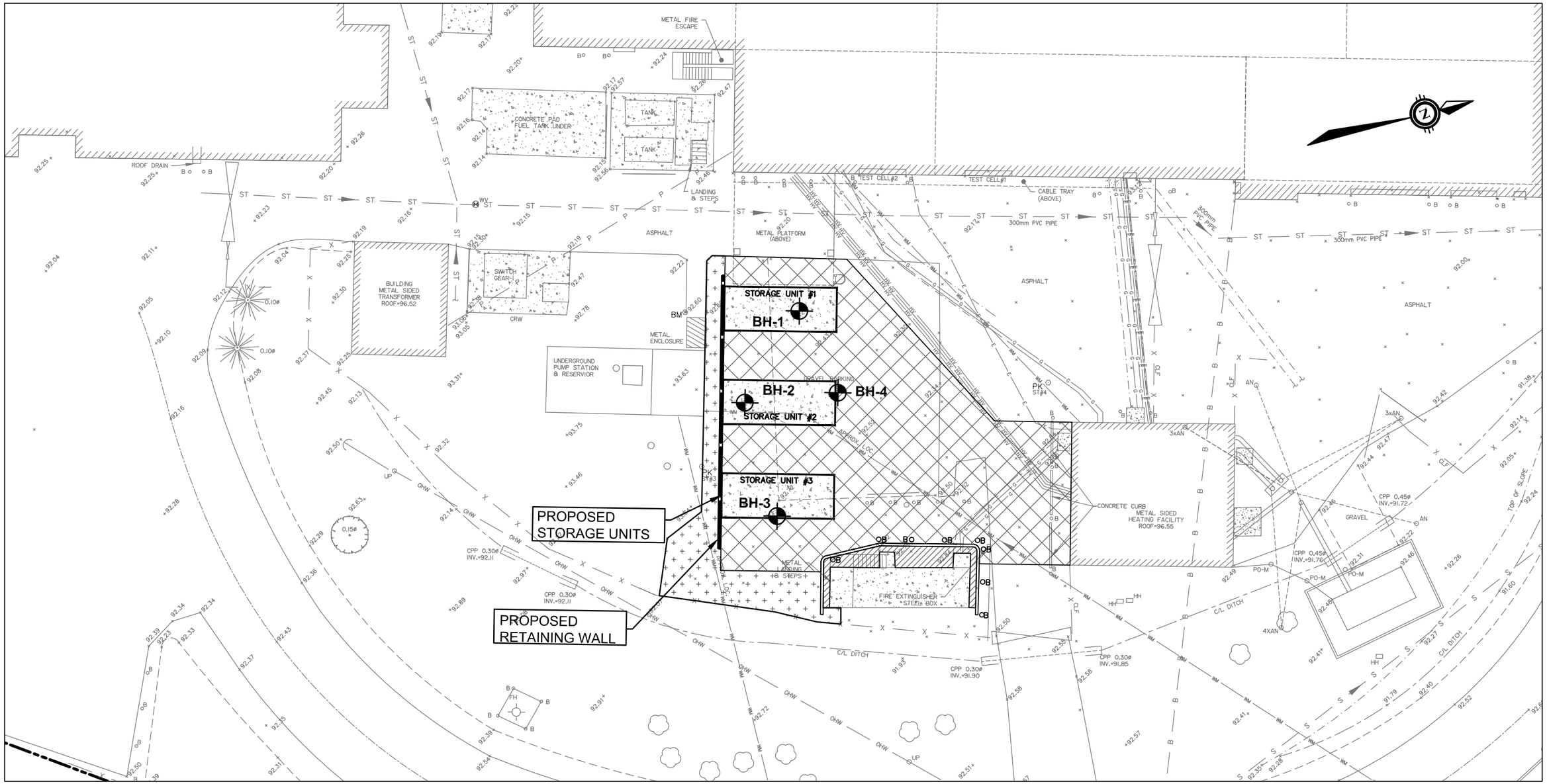
• INDUSTRIAL • INFRASTRUCTURE • SUSTAINABILITY •

scale 1:20,000	CLIENT: CIMA CANADA INC.	project no. OTT-00227292-A0
date JULY 24, 2015	TITLE: SITE LOCATION PLAN PROPOSED FUEL STORAGE UNITS, EMRS FACILTY, ENVIRONMENT CANADA, 335 RIVER ROAD, OTTAWA, ON	FIG 1
drawn by M.N.		

Filename: r:\220000\227000\227292-a0 - geo srvcs_etc erms pad for fuel storage tanks\227292-a0 fig 1 loc. plan.dwg
Last Saved: 7/23/2015 11:04:15 AM
Last Plotted: 7/23/2015 11:04:49 AM Plotted by: nugentm Pen Table:: trow standard, july 01, 2004.ctb



NOTES :

1. THE BOUNDARIES AND SOIL TYPES HAVE BEEN ESTABLISHED ONLY AT BOREHOLE LOCATIONS. BETWEEN BOREHOLES THEY ARE ASSUMED AND MAY BE SUBJECT TO CONSIDERABLE ERROR.
2. SOIL SAMPLES AND ROCK WILL BE RETAINED IN STORAGE FOR THREE MONTHS AND THEN DESTROYED UNLESS THE CLIENT ADVISES THAT AN EXTENDED TIME PERIOD IS REQUIRED.
3. TOPSOIL QUANTITIES SHOULD NOT BE ESTABLISHED FROM THE INFORMATION PROVIDED AT THE BOREHOLE LOCATIONS.
4. BOREHOLE ELEVATIONS SHOULD NOT BE USED TO DESIGN BUILDING(S) OR FLOOR SLABS OR PARKING LOT(S) GRADES.
5. THIS DRAWING FORMS PART OF THE REPORT PROJECT NUMBER AS REFERENCED AND SHOULD BE USED ONLY IN CONJUNCTION WITH THIS REPORT.
6. BASE DRAWING FROM CIMA CANADA INC., DRAWING NO. C5, REV. A, DATED JUNE 19, 2015

LEGEND

BH-2 BOREHOLE NUMBER AND LOCATION

0 3m 6m 12m

HORIZONTAL 1:300

exp Services Inc.
t: +1.613.688.1899 | f: +1.613.225.7337
2650 Queensview Drive, Suite 100
Ottawa, ON K2B 8H6
Canada
www.exp.com

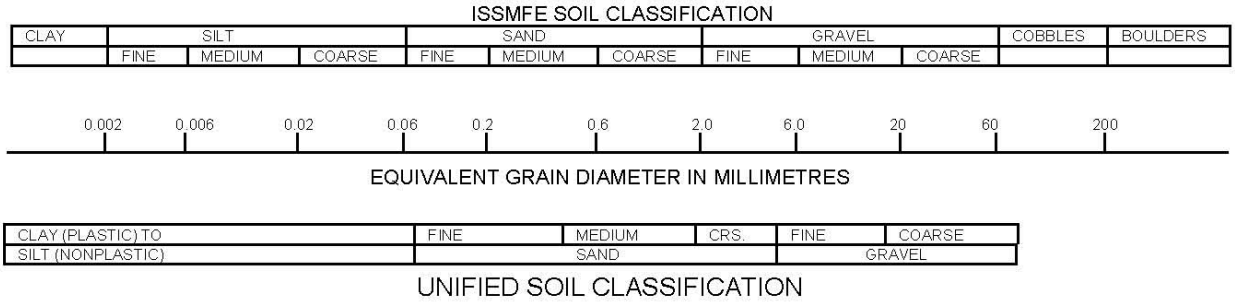
• BUILDINGS • EARTH & ENVIRONMENT • ENERGY •
• INDUSTRIAL • INFRASTRUCTURE • SUSTAINABILITY •

scale 1:300	CLIENT: CIMA CANADA INC.	project no. OTT-00227292-A0
date JULY 24, 2015	TITLE: BOREHOLE LOCATION PLAN PROPOSED FUEL STORAGE UNITS, EMRS FACILTY, ENVIRONMENT CANADA, 335 RIVER ROAD, OTTAWA, ON	FIG 2
drawn by M.N.		

Filename: r:\2000\227000\227292-a0 - geo srvcs_etc erms pad for fuel storage tanks\227292-a0 fig 2 bh plan.dwg
Last Saved: 7/23/2015 11:13:18 AM Plotted by: nugentm Pen Table:: pwgsc_nca_ops.ctb
Last Plotted: 7/23/2015 11:14:03 AM

Notes On Sample Descriptions

1. All sample descriptions included in this report follow the Canadian Foundations Engineering Manual soil classification system. This system follows the standard proposed by the International Societv for Soil Mechanics and Foundation Engineering. Laboratory grain size analyses provided by **exp** Services Inc. also follow the same system. Different classification systems may be used by others; one such system is the Unified Soil Classification. Please note that, with the exception of those samples where a grain size analysis has been made, all samples are classified visually. Visual classification is not sufficiently accurate to provide exact grain sizing or precise differentiation between size classification systems.



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

3. Till: The term till on the borehole logs indicates that the material originates from a geological process associated with glaciation. Because of this geological process the till must be considered heterogeneous in composition and as such may contain pockets and/or seams of material such as sand, gravel, silt or clay. Till often contains cobbles (60 to 200 mm) or boulders (over 200 mm). Contractors may therefore encounter cobbles and boulders during excavation, even if they are not indicated by the borings. It should be appreciated that normal sampling equipment cannot differentiate the size or type of any obstruction. Because of the horizontal and vertical variability of till, the sample description may be applicable to a very limited zone; caution is therefore essential when dealing with sensitive excavations or dewatering programs in till materials.

Log of Borehole 1

Project No: OTT-00020228-CO

Project: Geotechnical Investigation - Proposed EMRS Fuel Storage Facility

Location: Environment Canada, 335 River Road, Ottawa, ON

Date Drilled: November 22, 2013

Drill Type: CME-75 (Truck Mount)

Datum: Assumed Geodetic

Logged by: MAD Checked by: SKA

Figure No. 3

Page. 1 of 3

Split Spoon Sample ☒ | Auger Sample ◧ | SPT (N) Value ○ | Dynamic Cone Test ——— | Shelby Tube ■ | Shear Strength by Vane Test +S

Combustible Vapour Reading □ | Natural Moisture Content × | Atterberg Limits |—○ | Undrained Triaxial at % Strain at Failure ⊕ | Shear Strength by Penetrometer Test ▲

GWL	SYMBOL	SOIL DESCRIPTION	Assumed Geodetic m	Depth
		FILL – Crushed limestone to sand and gravel fill, grey, moist (dense to compact)	92.4	0
			91.07	1
				2
		SILTY SAND FILL Fine, some clay seams or pockets, grey, wet (compact)	89.9	3
		CONCRETE SLAB	89.1	
		SILTY SAND Trace to some clay, grey, wet (very loose)	88.5	4
				5
				6
		INFERRED OVERBURDEN Washbore from 6.6 m to Refusal at 24.8 m	85.8	7
				8
				9
				10

Standard Penetration Test N Value: 20 40 60 80

Shear Strength kPa: 50 100 150 200

Combustible Vapour Reading (ppm): 250 500 750

Natural Moisture Content % Atterberg Limits (% Dry Weight): 20 40 60

SAMPLES | Natural Unit Wt. kN/m³

38 | 10
39 | 10
28 | 20
11 | 15
57/125mm | 20
/HW | 10
2 | 5
/HW

Continued Next Page

NOTES:
1. Borehole data requires interpretation by exp. before use by others
2. A monitoring well with a 51 mm diameter pipe was installed upon completion.
3. Field work was supervised by an exp representative.
4. See Notes on Sample Descriptions
5. This Figure is to read with exp. Services Inc. report OTT-00020228-CO

WATER LEVEL RECORDS

Elapsed Time	Water Level (m)	Hole Open To (m)
25 days	1.3	-
70 days	1.3	

CORE DRILLING RECORD

Run No.	Depth (m)	% Rec.	RQD %
1	2.39 - 4.58	19	15
2	24.69 - 26.09	63	13
3	25.58 - 27.08	71	14
4	26.69 - 28.22	98	81

LOG OF BOREHOLE 2013_LOGS OF BOREHOLES.GPJ TROW OTTAWA.GDT 2/18/14

Log of Borehole 1

Project No: OTT-00020228-CO

Project: Geotechnical Investigation - Proposed EMRS Fuel Storage Facility

Figure No. 3

GWL	SYMBOL	SOIL DESCRIPTION	Assumed Geodetic Elevation m	Depth	Standard Penetration Test N Value / Shear Strength kPa	Combustible Vapour Reading (ppm) / Natural Moisture Content % / Atterberg Limits (% Dry Weight)	SAMPLES	Natural Unit Wt. kN/m³
		INFERRED OVERBURDEN Washbore from 6.6 m to Refusal at 24.8 m *(continued)*	82.4	10 11 12 13 14 15 16 17 18 19 20 21 22	20 40 60 80 Shear Strength kPa 50 100 150 200	250 500 750 Natural Moisture Content % Atterberg Limits (% Dry Weight) 20 40 60		

Continued Next Page

NOTES.
1. Borehole data requires interpretation by exp. before use by others
2. A monitoring well with a 51 mm diameter pipe was installed upon completion.
3. Field work was supervised by an exp representative.
4. See Notes on Sample Descriptions
5. This Figure is to read with exp. Services Inc. report OTT-00020228-CO

WATER LEVEL RECORDS

Elapsed Time	Water Level (m)	Hole Open To (m)
25 days	1.3	-
70 days	1.3	

CORE DRILLING RECORD

Run No.	Depth (m)	% Rec.	RQD %
1	2.39 - 4.58	19	15
2	24.69 - 26.09	63	13
3	25.58 - 27.08	71	14
4	26.69 - 28.22	98	81

LOG OF BOREHOLE 2013_LOGS OF BOREHOLES.GPJ TROW OTTAWA.GDT 2/18/14

Log of Borehole 1

Project No: OTT-00020228-CO

Project: Geotechnical Investigation - Proposed EMRS Fuel Storage Facility

Figure No. 3

Page. 3 of 3

GWL	SYMBOL	SOIL DESCRIPTION	Assumed Geodetic m	Depth	Standard Penetration Test N Value 20 40 60 80 / Shear Strength kPa 50 100 150 200	Combustible Vapour Reading (ppm) 250 500 750 / Natural Moisture Content % Atterberg Limits (% Dry Weight) 20 40 60	SAMPLES	Natural Unit Wt. kN/m³
		INFERRED OVERBURDEN Washbore from 6.6 m to Refusal at 24.8 m *(continued)*	70.4	22				
				23				
				24				
		BEDROCK Weathered grey limestone, some vertical fractures, shaley partings from 26.5 - 27 m and 27.6 - 28.23 m	67.6	25				
				26				
				27				
				28				
		Terminated @ 28.23 m Depth	64.2					

NOTES:
1. Borehole data requires interpretation by exp. before use by others
2. A monitoring well with a 51 mm diameter pipe was installed upon completion.
3. Field work was supervised by an exp representative.
4. See Notes on Sample Descriptions
5. This Figure is to read with exp. Services Inc. report OTT-00020228-CO

WATER LEVEL RECORDS

Elapsed Time	Water Level (m)	Hole Open To (m)
25 days	1.3	-
70 days	1.3	

CORE DRILLING RECORD

Run No.	Depth (m)	% Rec.	RQD %
1	2.39 - 4.58	19	15
2	24.69 - 26.09	63	13
3	25.58 - 27.08	71	14
4	26.69 - 28.22	98	81

LOG OF BOREHOLE 2013_LOGS OF BOREHOLES.GPJ TROW OTTAWA.GDT 2/18/14

Log of Borehole 2

Project No: OTT-00020228-CO

Project: Geotechnical Investigation - Proposed EMRS Fuel Storage Facility

Location: Environment Canada, 335 River Road, Ottawa, ON

Date Drilled: November 22, 2013

Drill Type: CME-75 (Truck Mount)

Datum: Assumed Geodetic

Logged by: MAD Checked by: SKA

Figure No. 4

Page. 1 of 1

Split Spoon Sample | Auger Sample | SPT (N) Value | Dynamic Cone Test | Shelby Tube | Shear Strength by Vane Test (S)

Combustible Vapour Reading | Natural Moisture Content | Atterberg Limits | Undrained Triaxial at % Strain at Failure | Shear Strength by Penetrometer Test

GWL	SYMBOL	SOIL DESCRIPTION	Assumed Geodetic m	Depth
		FILL – Crushed limestone to sand and gravel fill, grey, moist	92.6	0
		SILTY CLAY Dessicated, fissured, some sand pockets or seams, brown, moist (firm)	92.4	
		SANDY SILT Slightly cohesive, trace shells, grey, wet (very loose)	89.6	3
		SILTY SAND Fine, trace clay, grey, wet (very loose)	88.0	5
		Terminated @ 8.2 m Depth	84.4	8

Standard Penetration Test N Value: 20 40 60 80

Shear Strength: 50 100 150 200 kPa

Combustible Vapour Reading (ppm): 250 500 750

Natural Moisture Content % / Atterberg Limits (% Dry Weight): 20 40 60

SAMPLES

Natural Unit Wt. kN/m³

NOTES:
1. Borehole data requires interpretation by exp. before use by others
2. Borehole was backfilled upon completion of drilling
3. Field work was supervised by an exp representative.
4. See Notes on Sample Descriptions
5. This Figure is to read with exp. Services Inc. report OTT-00020228-CO

WATER LEVEL RECORDS		
Elapsed Time	Water Level (m)	Hole Open To (m)

CORE DRILLING RECORD			
Run No.	Depth (m)	% Rec.	RQD %

LOG OF BOREHOLE 2013 LOGS OF BOREHOLES.GPJ TROW OTTAWA.GDT 2/18/14

Log of Borehole 3

Project No: OTT-00020228-CO

Project: Geotechnical Investigation - Proposed EMRS Fuel Storage Facility

Location: Environment Canada, 335 River Road, Ottawa, ON

Figure No. 5

Page. 1 of 3

Date Drilled: November 22, 2013

Drill Type: CME-75 (Truck Mount)

Datum: Assumed Geodetic

Logged by: MAD Checked by: SKA

Split Spoon Sample ☒ | Auger Sample ◧ | SPT (N) Value ○ | Dynamic Cone Test —— | Shelby Tube ■ | Shear Strength by Vane Test + S

Combustible Vapour Reading □ | Natural Moisture Content × | Atterberg Limits |—○ | Undrained Triaxial at % Strain at Failure ⊕ | Shear Strength by Penetrometer Test ▲

GWL	SYMBOL	SOIL DESCRIPTION	Assumed Geodetic m	Depth
		SILTY CLAY FILL – Dessicated, oxidized silt veins or pockets, some roots, brown, moist (loose)	92.7	0
		TOPSOIL –	91.2	
		SANDY SILT Some clay, brown, moist (loose to very loose)	91.1	
		LAYERED SILTY CLAY AND SILTY SAND Grey brown, moist (firm to very loose)	90.0	3
		SILTY FINE SAND Slightly coehsive, grey, wet (very loose)	87.7	
		INFERRED OVERBURDEN Drove Dynamic Cone from 8.8 m to Refusal at 24.7 m	84.5	8
				10

Standard Penetration Test N Value: 20 40 60 80

Shear Strength: 50 100 150 200 kPa

Combustible Vapour Reading (ppm): 250 500 750

Natural Moisture Content % Atterberg Limits (% Dry Weight): 20 40 60

SAMPLES

Natural Unit Wt. kN/m³

Continued Next Page

NOTES:
1. Borehole data requires interpretation by exp before use by others
2. Borehole was backfilled upon completion of drilling.
3. Field work was supervised by an exp representative.
4. See Notes on Sample Descriptions
5. This Figure is to read with exp. Services Inc. report OTT-00020228-CO

WATER LEVEL RECORDS

Elapsed Time	Water Level (m)	Hole Open To (m)

CORE DRILLING RECORD

Run No.	Depth (m)	% Rec.	RQD %
1	3 - 3.78	80	
2	3.78 - 4.55	13	0
3	24.69 - 25.7	100	66
4	25.7 - 26.92	82	57

LOG OF BOREHOLE 2013_LOGS OF BOREHOLES.GPJ TROW OTTAWA.GDT 2/18/14

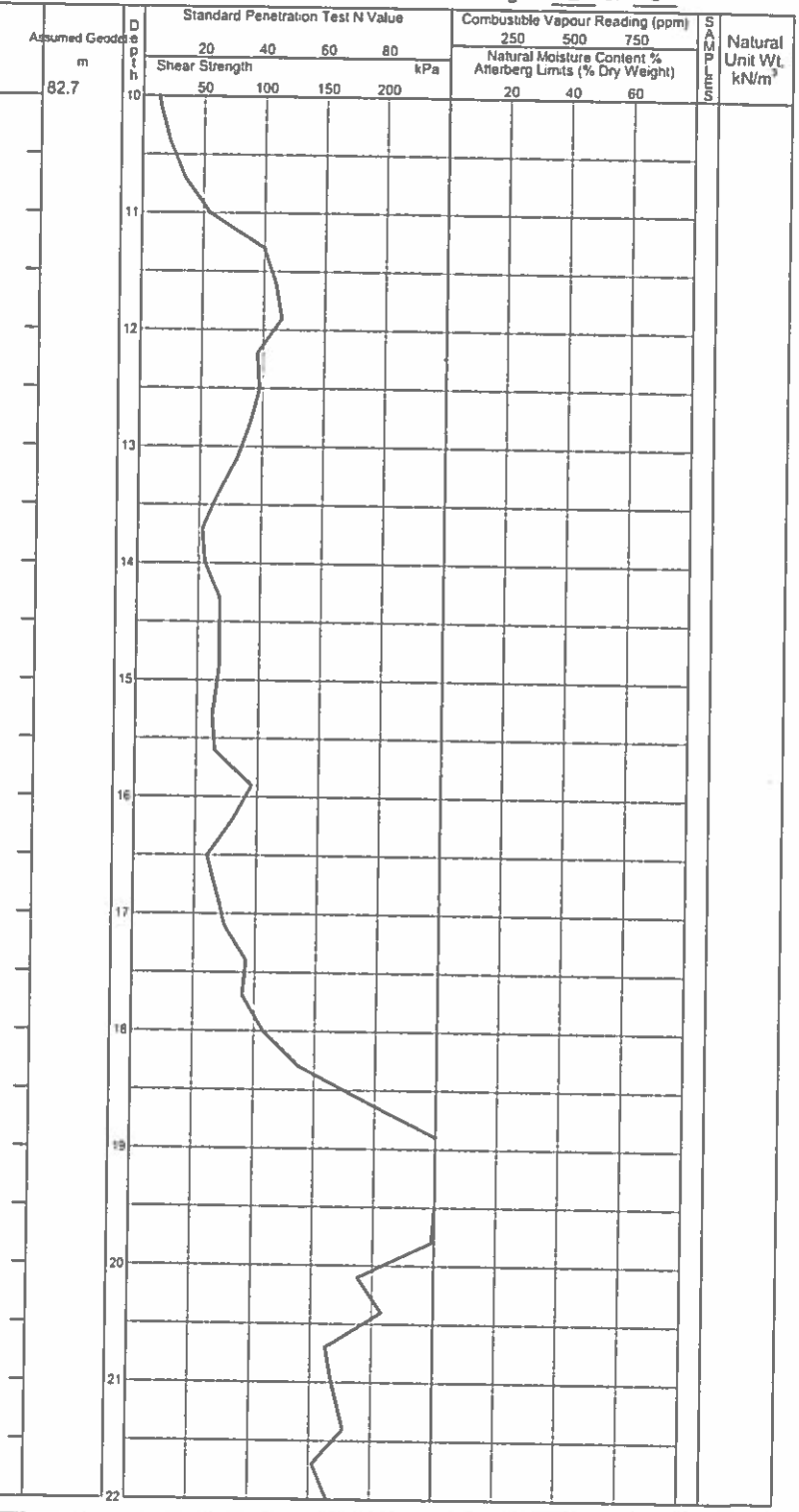
Log of Borehole 3

Project No: OTT-00020228-CO

Project: Geotechnical Investigation - Proposed EMRS Fuel Storage Facility

Figure No. 5

GWL	SYMBOL	SOIL DESCRIPTION	Assumed Geodetic m	Depth	Standard Penetration Test N Value / Shear Strength kPa	Combustible Vapour Reading (ppm) / Natural Moisture Content % / Atterberg Limits (% Dry Weight)	SAMPLES	Natural Unit Wt. kN/m³
		INFERRED OVERBURDEN Drove Dynamic Cone from 8.8 m to Refusal at 24.7 m *(continued)*	82.7	10 11 12 13 14 15 16 17 18 19 20 21 22	20 40 60 80 50 100 150 200	250 500 750 20 40 60		



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NOTES:
1. Borehole data requires interpretation by exp before use by others
2. Borehole was backfilled upon completion of drilling.
3. Field work was supervised by an exp representative.
4. See Notes on Sample Descriptions
5. This Figure is to read with exp. Services Inc. report OTT-00020228-CO

WATER LEVEL RECORDS

Elapsed Time	Water Level (m)	Hole Open To (m)

CORE DRILLING RECORD

Run No.	Depth (m)	% Rec.	RQD %
1	3 - 3.78	80	
2	3.78 - 4.55	13	0
3	24.69 - 25.7	100	66
4	25.7 - 26.92	82	57

LOG OF BOREHOLE 2013_LOGS OF BOREHOLES.GPJ TROW OTTAWA.GDT 2/18/14

Log of Borehole 3

Project No: OTT-00020228-CO

Project: Geotechnical Investigation - Proposed EMRS Fuel Storage Facility

Figure No. 5

Page. 3 of 3

GWL	SYMBOL	SOIL DESCRIPTION	Assumed Geodetic m	Depth	Standard Penetration Test N Value / Shear Strength kPa	Combustible Vapour Reading (ppm) / Natural Moisture Content % / Atterberg Limits (% Dry Weight)	SAMPLES	Natural Unit Wt. kN/m³
		INFERRED OVERBURDEN Drove Dynamic Cone from 8.8 m to Refusal at 24.7 m *(continued)*	70.7	22	20 40 60 80 / 50 100 150 200	250 500 750 / 20 40 60		
				23				
				24				
		BEDROCK Weathered grey limestone, shaley partings at 26.84 m	68.0	25				
				26				
		Terminated @ 26.92 m Depth	65.8					

NOTES
1. Borehole data requires interpretation by exp. before use by others
2. Borehole was backfilled upon completion of drilling.
3. Field work was supervised by an exp representative.
4. See Notes on Sample Descriptions
5. This Figure is to read with exp. Services Inc. report OTT-00020228-CO

WATER LEVEL RECORDS

Elapsed Time	Water Level (m)	Hole Open To (m)

CORE DRILLING RECORD

Run No.	Depth (m)	% Rec.	RQD %
1	3 - 3.78	80	
2	3.78 - 4.55	13	0
3	24.69 - 25.7	100	66
4	25.7 - 26.92	82	57

LOG OF BOREHOLE 2013 LOGS OF BOREHOLES.GPJ TROW OTTAWA.GDT 2/18/14

Log of Borehole 4

Project No: OTT-00020228-CO

Project: Geotechnical Investigation - Proposed EMRS Fuel Storage Facility

Location: Environment Canada, 335 River Road, Ottawa, ON

Date Drilled: December 21, 2013

Drill Type: CME-75 (Truck Mount)

Datum: Assumed Geodetic

Logged by: MAD Checked by: SKA

Figure No. 6

Page. 1 of 3

Split Spoon Sample ☒ | Auger Sample ▯ | SPT (N) Value ○ | Dynamic Cone Test ——— | Shelby Tube ■ | Shear Strength by Vane Test + S

Combustible Vapour Reading □ | Natural Moisture Content × | Atterberg Limits I—○ | Undrained Triaxial at % Strain at Failure ⊕ | Shear Strength by Penetrometer Test ▲

GWL	SYMBOL	SOIL DESCRIPTION	Assumed Geodetic m	Depth m	Standard Penetration Test N Value (20 40 60 80) / Shear Strength kPa (50 100 150 200)	Combustible Vapour Reading (ppm) (250 500 750) / Natural Moisture Content % Atterberg Limits (% Dry Weight) (20 40 60)	SAMPLES	Natural Unit Wt. kN/m³
		FILL – Crushed limestone sand and gravel, grey, moist to wet (compact to very loose)	92.5	0	23	×		
				1	19	×		
			91.12					
				2	16	×		
				3	8	×		
					1	×		
				4	7	×		
		SILTY FINE SAND TO SANDY SILT Clay seams, gre, wet (very loose to loose)	87.9	5	4	×		
				6	8	×		
				7				
		CLAYEY SILT TO SILTY CLAY Sandy, grey, moist (firm to soft)	85.0	8	1	×		
					67.2 + s = 5.6			
				9				
					/HW	×		
				10				

Continued Next Page

NOTES:
1. Borehole data requires interpretation by exp. before use by others
2. A monitoring well with a 51 mm diameter pipe was installed upon completion.
3. Field work was supervised by an exp representative.
4. See Notes on Sample Descriptions
5. This Figure is to read with exp. Services Inc. report OTT-00020228-CO

WATER LEVEL RECORDS

Elapsed Time	Water Level (m)	Hole Open To (m)
25 days	1.4	-
70 days	1.4	

CORE DRILLING RECORD

Run No.	Depth (m)	% Rec.	RQD %

LOG OF BOREHOLE 2013_LOGS OF BOREHOLES.GPJ TROW OTTAWA.GDT 2/18/14

Log of Borehole 4

Project No: OTT-00020228-CO

Project: Geotechnical Investigation - Proposed EMRS Fuel Storage Facility

Figure No. 6

GWL	SYMBOL	SOIL DESCRIPTION	Assumed Geodetic m	Depth
		CLAYEY SILT TO SILTY CLAY Sandy, grey, moist (firm to soft) *(continued)*	82.5	10
		SILTY FINE SAND Occasional clay seams, grey, wet (compact)	82.0	11
				12
				13
				14
				15
				16
				17
				18
				19
				20
		SILTY SAND TILL Coarse sand to fine gravel, grey, wet (compact)	71.5	21
			70.6	22

Standard Penetration Test N Value: 20 40 60 80

Shear Strength kPa: 50 100 150 200

Combustible Vapour Reading (ppm): 250 500 750

Natural Moisture Content % Atterberg Limits (% Dry Weight): 20 40 60

SAMPLES

Natural Unit Wt. kN/m³

29 19 12 15 25 19 8 12

Continued Next Page

NOTES:
1. Borehole data requires interpretation by exp. before use by others
2. A monitoring well with a 51 mm diameter pipe was installed upon completion.
3. Field work was supervised by an exp representative.
4. See Notes on Sample Descriptions
5. This Figure is to read with exp. Services Inc. report OTT-00020228-CO

WATER LEVEL RECORDS

Elapsed Time	Water Level (m)	Hole Open To (m)
25 days	1.4	-
70 days	1.4	

CORE DRILLING RECORD

Run No.	Depth (m)	% Rec.	RQD %

LOG OF BOREHOLE 2013_LOGS OF BOREHOLES.GPJ TROW OTTAWA.GDT 2/18/14

Log of Borehole 4

Project No: OTT-00020228-CO

Project: Geotechnical Investigation - Proposed EMRS Fuel Storage Facility

Figure No. 6

GWL	SYMBOL	SOIL DESCRIPTION	Assumed Geodetic m	Depth	Standard Penetration Test N Value (20 40 60 80) / Shear Strength kPa (50 100 150 200)	Combustible Vapour Reading (ppm) (250 500 750) / Natural Moisture Content % Atterberg Limits (% Dry Weight) (20 40 60)	SAMPLES	Natural Unit Wt. kN/m³
		INFERRED OVERBURDEN Drove Dynamic Cone from 22.5 to Refusal at 25.7 m *(continued)*	70.5	22				
				23				
				24				
				25				
		Refusal to Cone Penetration at 25.7 m Depth	66.8					

NOTES:
1. Borehole data requires interpretation by exp. before use by others
2. A monitoring well with a 51 mm diameter pipe was installed upon completion.
3. Field work was supervised by an exp representative.
4. See Notes on Sample Descriptions
5. This Figure is to read with exp. Services Inc. report OTT-00020228-CO

WATER LEVEL RECORDS

Elapsed Time	Water Level (m)	Hole Open To (m)
25 days	1.4	-
70 days	1.4	

CORE DRILLING RECORD

Run No.	Depth (m)	% Rec.	ROD %

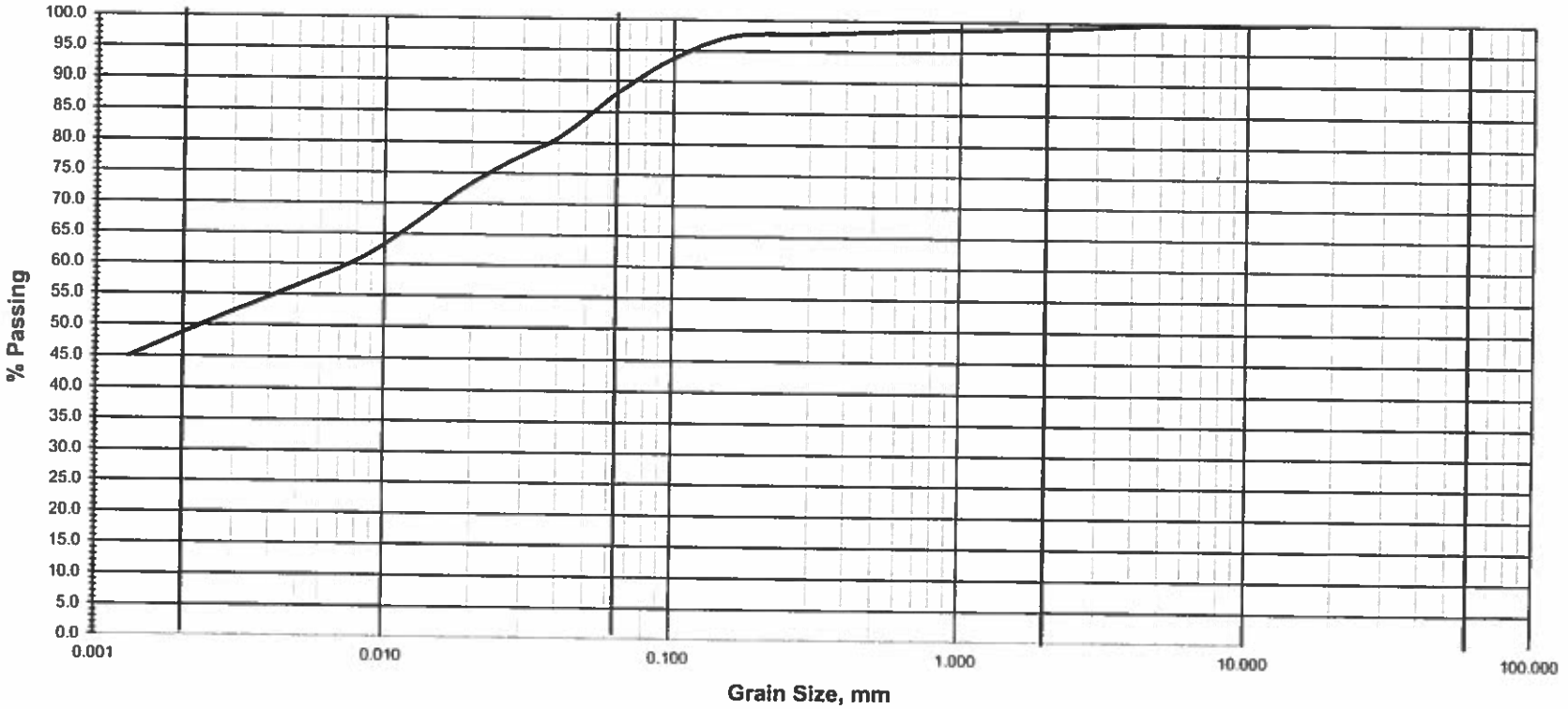
LOG OF BOREHOLE 2013_LOGS OF BOREHOLES.GPJ TROW OTTAWA.GDT 2/18/14

exp Services Inc.
100-2650 Queensview Drive
Ottawa, ON K2B 8H6

Method of Test for Particle Size Analysis of Soil

ASTM D-422

Grain Size Distribution Curve



CLAY	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	
	SILT			SAND			GRAVEL			
Modified M.I.T. Classification										

Exp Project No.:	OTT-0002228-CO	Project Name :	ERMS Fuel Storage Facility		
Client :	Genivar	Project Location :	Environment Canada - 335 River Road, Ottawa, ON		
Date Sampled :	November 22, 2013	Borehole No. 2	Sample No.: SS3	Depth (m) :	1.5 - 2.1
Sample Description :	Silt-Clay, Some Sand			Figure :	7

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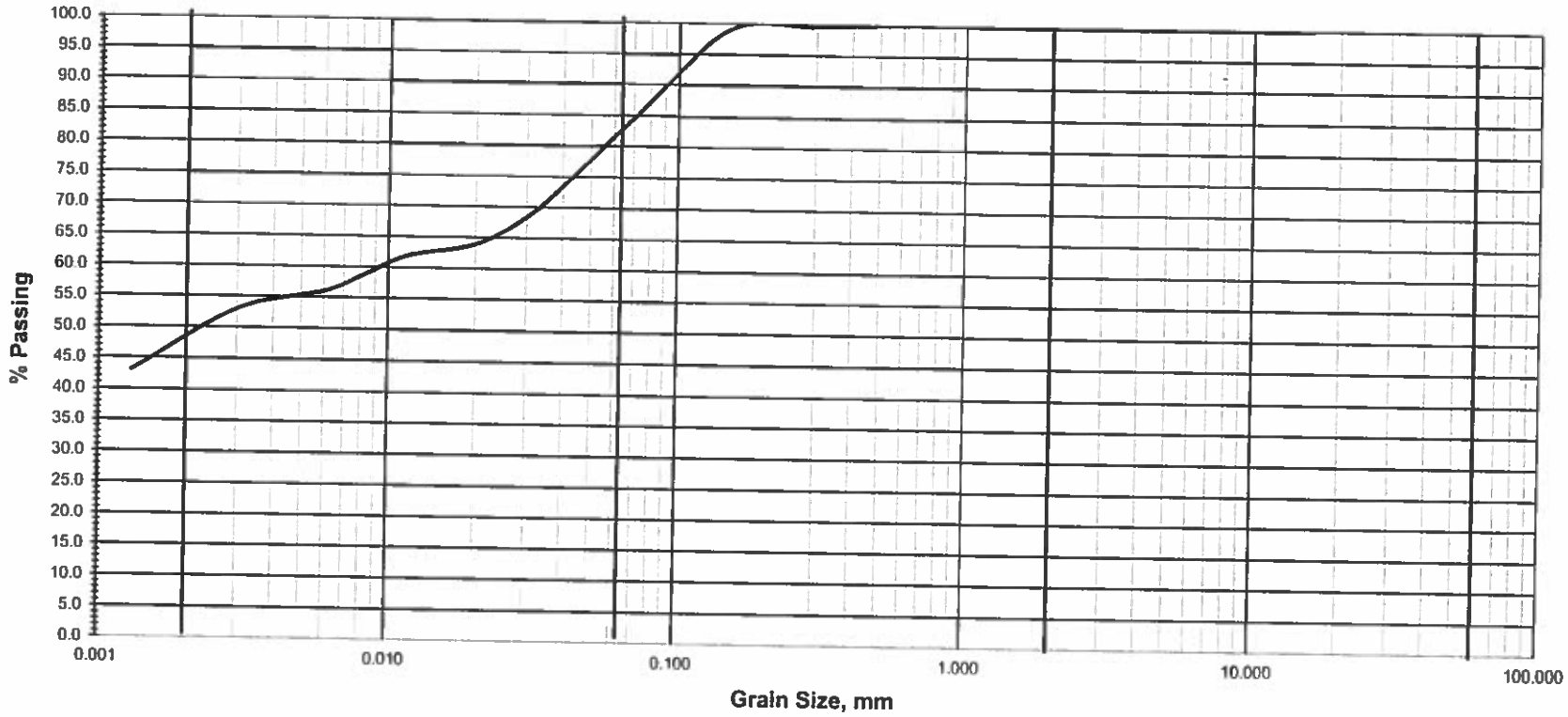
Method of Test for Particle Size Analysis of Soil

ASTM D-422

Grain Size Distribution Curve



CLAY	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	
	SILT			SAND			GRAVEL			
Modified M.I.T. Classification										

Exp Project No.:	OTT-0002228-CO	Project Name :	ERMS Fuel Storage Facility		
Client :	Genivar	Project Location :	Environment Canada - 335 River Road, Ottawa, ON		
Date Sampled :	November 22, 2013	Borehole No. 3	Sample No.: SS4	Depth (m) :	2.3 - 2.9
Sample Description :	Clay-Silt, Some Sand			Figure :	8

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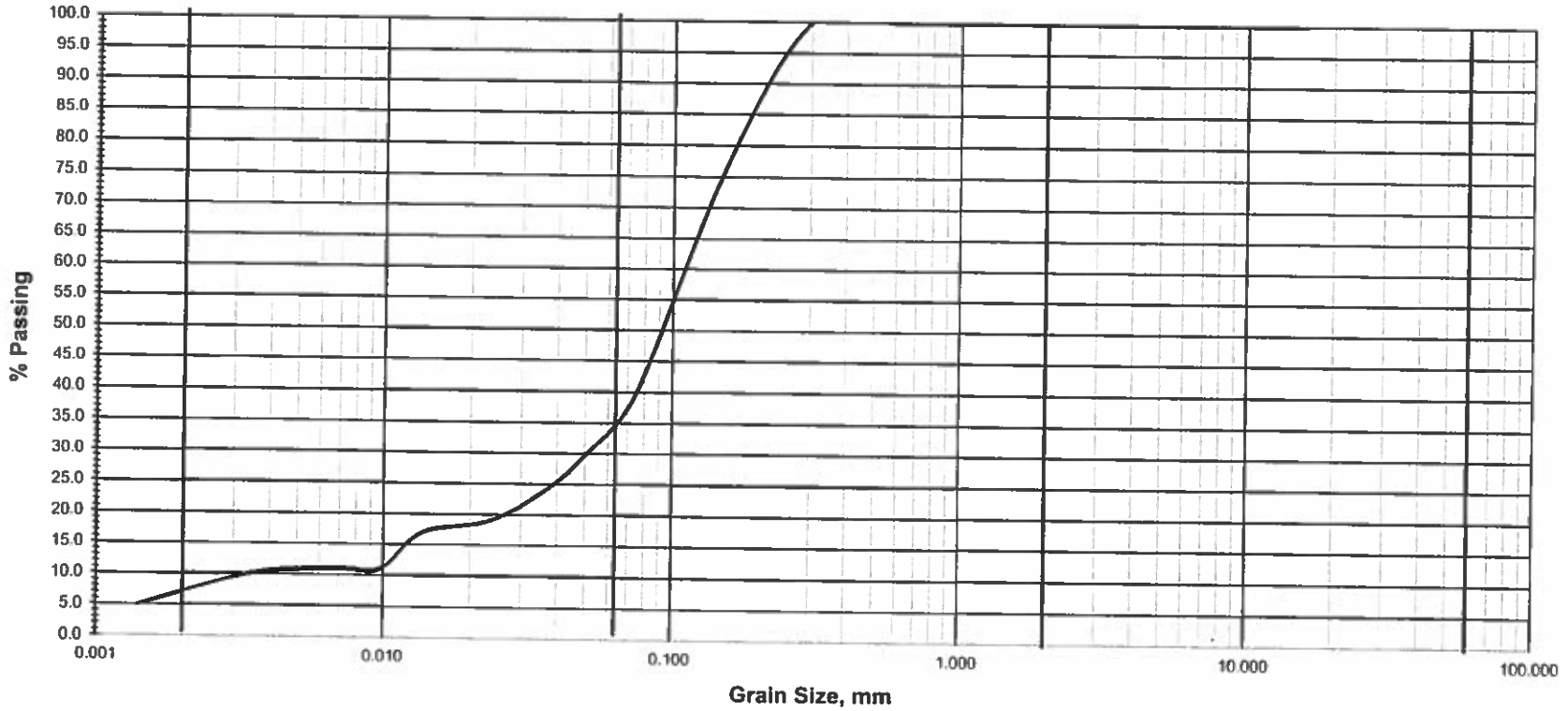
Method of Test for Particle Size Analysis of Soil

ASTM D-422

Grain Size Distribution Curve



CLAY	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	
	SILT			SAND			GRAVEL			
Modified M.I.T. Classification										

Exp Project No.:	OTT-0002228-CO	Project Name :	ERMS Fuel Storage Facility		
Client :	Genivar	Project Location :	Environment Canada - 335 River Road, Ottawa, ON		
Date Sampled :	November 22, 2013	Borehole No. 1	Sample No.: SS7	Depth (m) :	4.6-5.1
Sample Description :	Sand, Some Silt, Trace Clay			Figure :	9

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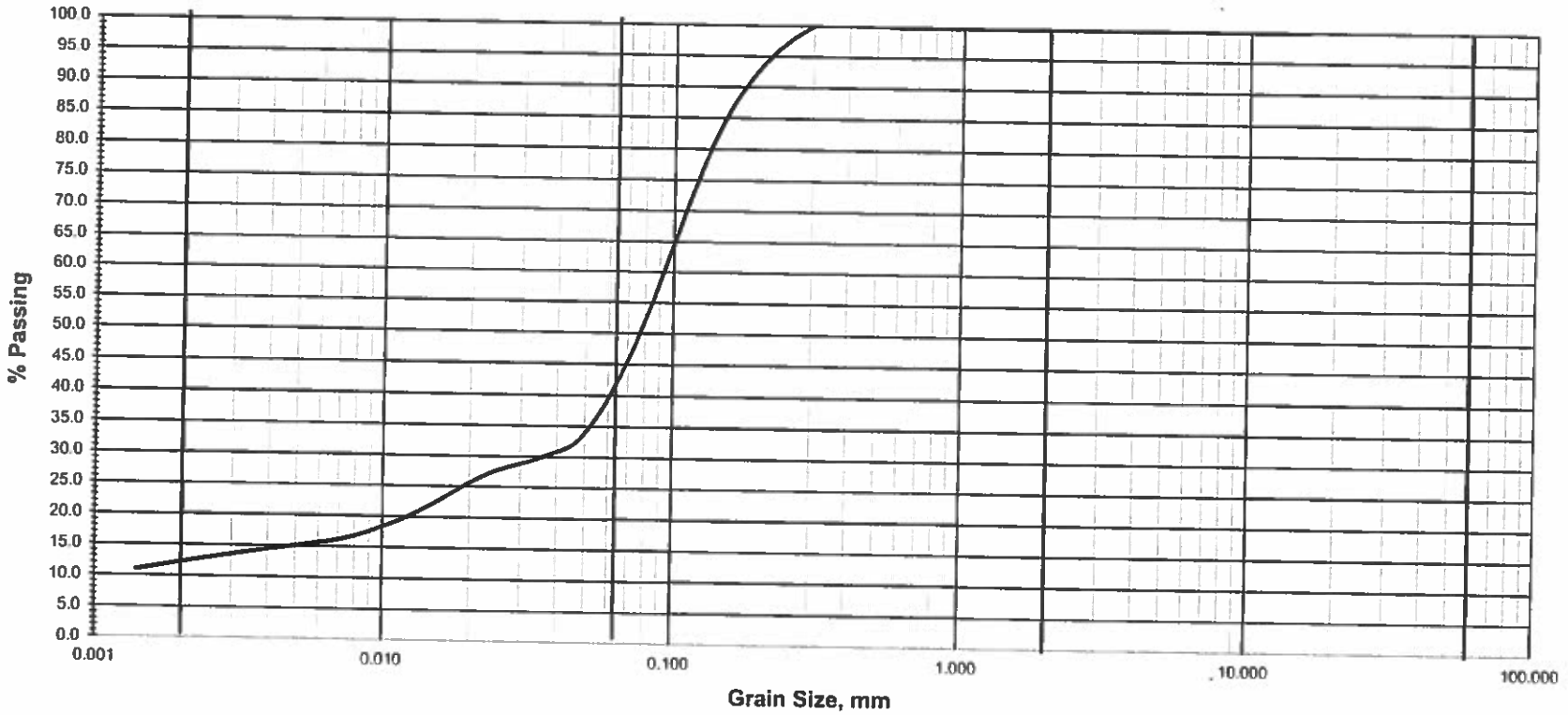
Method of Test for Particle Size Analysis of Soil

ASTM D-422

Grain Size Distribution Curve



CLAY	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	
	SILT			SAND			GRAVEL			
Modified M.I.T. Classification										

Exp Project No.:	OTT-0002228-CO	Project Name :	ERMS Fuel Storage Facility		
Client :	Genivar	Project Location :	Environment Canada - 335 River Road, Ottawa, ON		
Date Sampled :	November 22, 2013	Borehole No. 2	Sample No.: SS6	Depth (m) :	3.8 - 4.4
Sample Description :	Silty Sand, Trace Clay			Figure :	10

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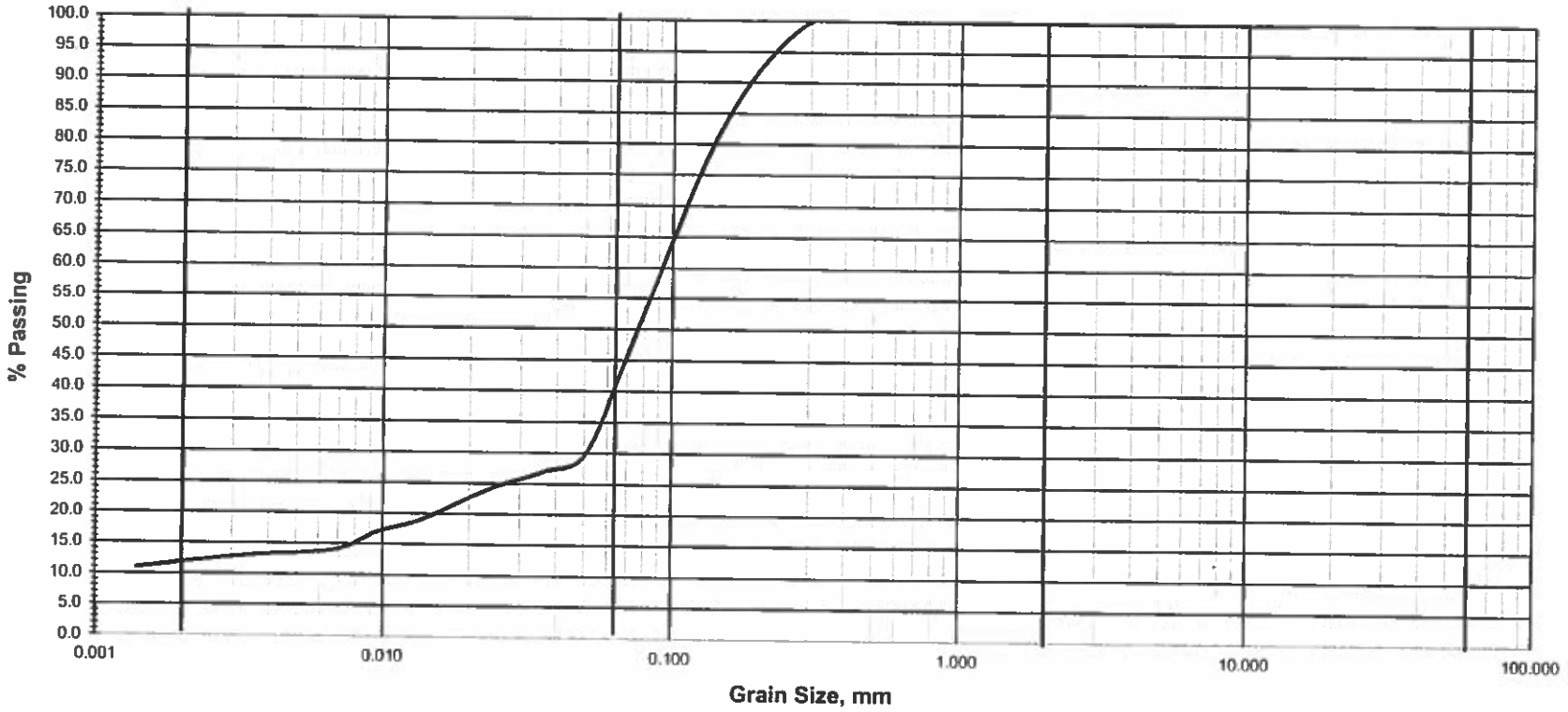
Method of Test for Particle Size Analysis of Soil

ASTM D-422

Grain Size Distribution Curve



CLAY	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	
	SILT			SAND			GRAVEL			
Modified M.I.T. Classification										

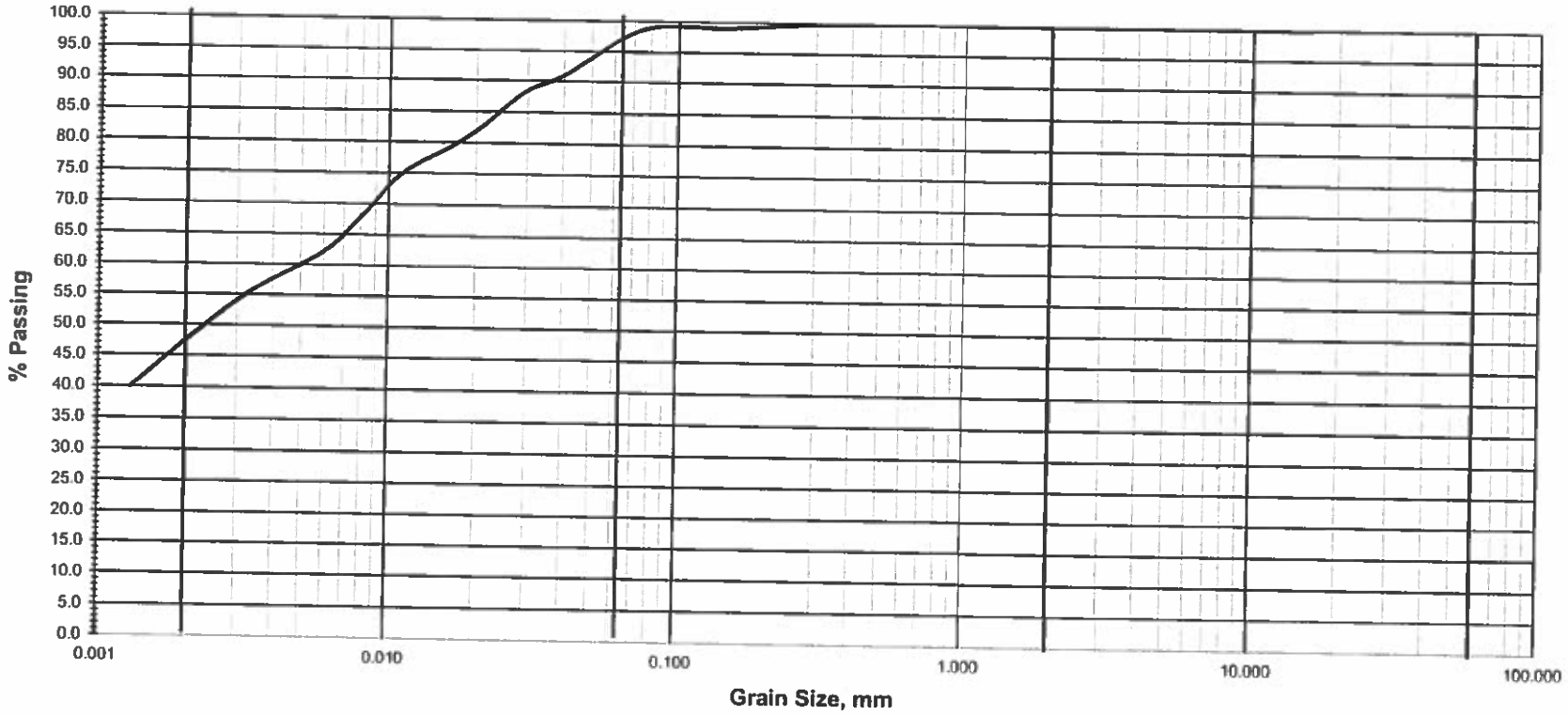
Exp Project No.:	OTT-0002228-CO	Project Name :	ERMS Fuel Storage Facility		
Client :	Genivar	Project Location :	Environment Canada - 335 River Road, Ottawa, ON		
Date Sampled :	November 22, 2013	Borehole No. 3	Sample No.: SS8	Depth (m) :	6.1 - 6.9
Sample Description :	Silty Sand- Some Clay			Figure :	11

exp Services Inc.
100-2650 Queensview Drive
Ottawa, ON K2B 8H6

Method of Test for Particle Size Analysis of Soil

ASTM D-422

Grain Size Distribution Curve



CLAY	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	
	SILT			SAND			GRAVEL			
Modified M.I.T. Classification										

Exp Project No.:	OTT-0002228-CO	Project Name :	ERMS Fuel Storage Facility		
Client :	Genivar	Project Location :	Environment Canada - 335 River Road, Ottawa, ON		
Date Sampled :	November 22, 2013	Borehole No. 4	Sample No.: SS4	Depth (m) :	9.1 - 9.8
Sample Description :	Silt-Clay, Trace Sand			Figure :	12

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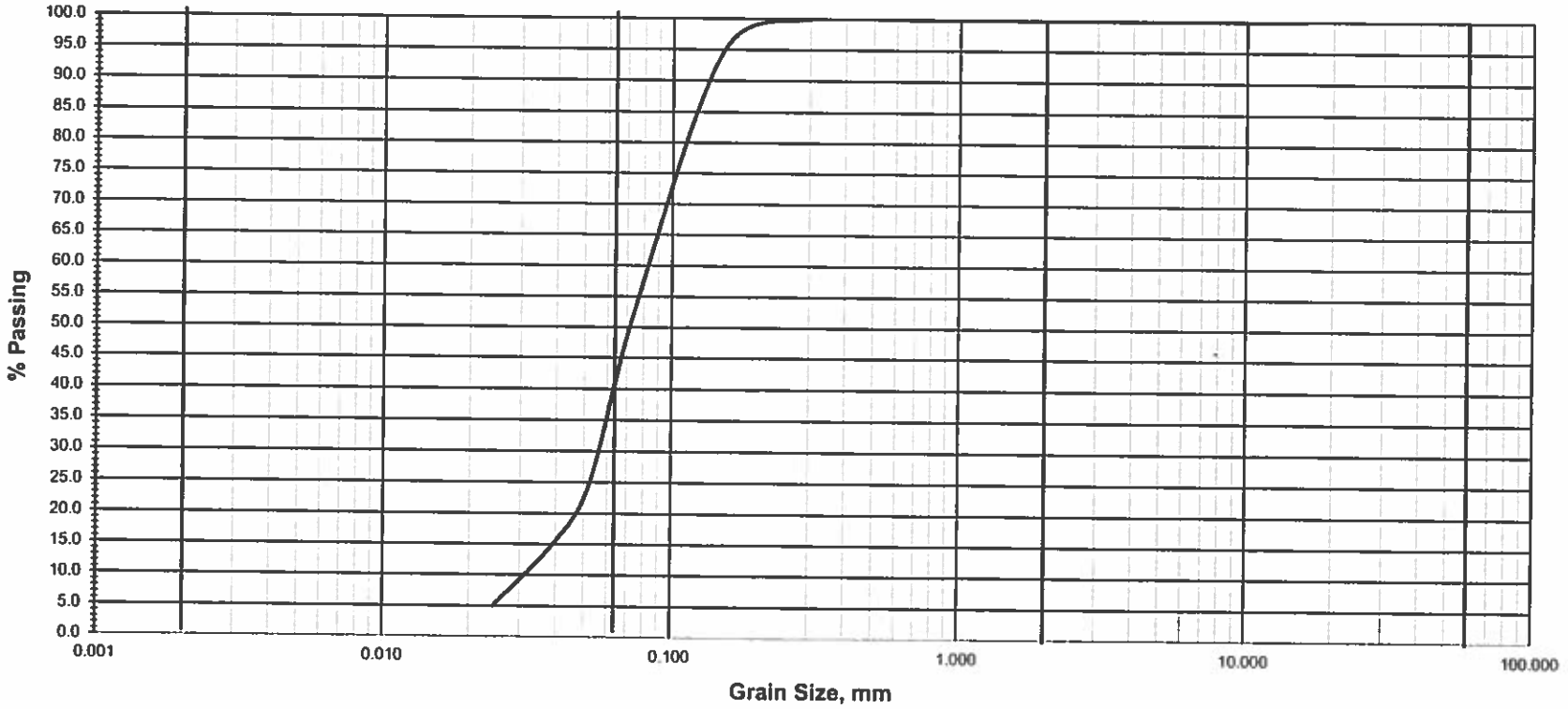
Method of Test for Particle Size Analysis of Soil

ASTM D-422

Grain Size Distribution Curve



CLAY	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	
	SILT			SAND			GRAVEL			
Modified M.I.T. Classification										

Exp Project No.:	OTT-0002228-CO	Project Name :	ERMS Fuel Storage Facility		
Client :	Genivar	Project Location :	Environment Canada - 335 River Road, Ottawa, ON		
Date Sampled :	November 22, 2013	Borehole No. 4	Sample No.: SS7	Depth (m) :	13.7 - 14.3
Sample Description :	Silty Sand			Figure :	13