

Request for Tender

Document Number: 2025-331T

Document Title: NEW GENERATOR INSTALLTION AT PEEL YOUTH VILLAGE, 99 ACORN PLACE, MISSISSAUGA, PROJECT 24563

Date Issued: Tuesday, June 10, 2025

Non-mandatory site visit date: Friday, June 20, 2025 @11:00AM

ELECTRONIC BID SUBMISSIONS ONLY shall be received by the Agency through the Bidding System no later than:

**12:00 noon local time
Monday, July 7, 2025**

A Bidder's representative should attend the non-mandatory site visit where applicable.

It is the Bidder's sole responsibility to ensure that:

- **the submission is received electronically by the Agency through the Bidding System by the date and time specified above**
- **the submission is accompanied by all required documentation including but not limited to a digital bid bond in the amount of \$200,000**

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Telephone Number: (437) 996-9641

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Instructions to Bidders

1. DEFINITIONS

- (a) “Agency” means The Regional Municipality of Peel, Peel Regional Police, Peel Housing Corporation and any other government or agency or board on behalf of which The Regional Municipality of Peel is acting and for the purposes of the performance of the Contract shall mean the municipality or entity awarding the Contract. For purposes of the Contract, “Agency” shall include “Owner” as defined in the Contract.
- (b) “Bidder” means any proponent, respondent or other person or entity who has obtained official procurement documents for the purpose of submitting, or who has submitted a Bidder Submission in response to the Document. Furthermore, the definition of “Bidder” shall include any entity affiliated or related to the Bidder (including any entity with the same directing mind as the Bidder) as determined in the discretion of the Director of Procurement, in consultation with the Regional Solicitor.
- (c) “Bidder Submission” means the document as completed by the Bidder for the purpose of offering to sell to the Agency the goods and/or services specified in the Document, and includes but is not limited to quotations, tenders and proposals.
- (d) “Bidding System” means the electronic system used by the Agency for its public tenders, bids and request for proposals at the following website: peelregion.bidsandtenders.ca, which is required to be used for all dissemination of information by or on behalf of the Agency and all submissions from Bidders for this Document.
- (e) “Contract” means the undertaking by the parties to perform their respective duties, responsibilities and obligations as prescribed in this Document and represents the entire agreement between the parties.
- (f) “Document” means the document describing the goods and/or services to be purchased and the terms upon which the goods and/or services are to be purchased and includes, without limitation, those documents referenced on the index of the Document and such addenda as may be issued by the Agency from time to time.
- (g) “Operator” means the Owner’s operations and maintenance employees, and/or contract operator of the site where the Work is being performed.
- (h) “Procurement Representative” means the person named as the Procurement Representative or designate on the Document.
- (i) “Region of Peel” has the same meaning as the Agency.
- (j) “Vendor” means the successful Bidder and includes the term “Contractor” who enters into the Contract with the Agency for the provision of the goods and/or services set out in this Document.
- (k) “Consultant” means C.E.S. Engineering Ltd.

2. INFORMATION AND COMMUNICATIONS

- 2.1 Any questions or information required regarding this Document must be submitted through the Bidding System via peelregion.bidsandtenders.ca by clicking the ‘Submit a Question’ button for the selected bid opportunity at least four working days prior to closing. Do not submit your questions via e-mail. No oral communications will be considered binding.

Instructions to Bidders

- 2.2 Any Bidder who requests and/or receives any information, with regards to this Document, by any person(s) other than the Procurement Representative or designate, may be disqualified from further consideration.
- 2.3 It is recommended that vendors add noreply@bidsandtenders.ca to their "safe senders" lists in their e-mail systems and monitor their spam/ clutter/ junk filters to ensure they do not miss automatically generated messages sent by bidsandtenders.ca that relate to this bid opportunity.

3. **NON-MANDATORY SITE VISIT**

- 3.1 One (1) non-mandatory site visit is scheduled in order to ascertain the Work requirements outlined in the Bid Document. The site visit will be held as indicated in the Online Bidding System and below. Additional site visits will not be permitted.

Non-Mandatory Site Visit - TBA

Date and Time: Friday, June 20, 2025 @11:00AM

Location: 99 Acorn Place, Mississauga

Meeting Details: Security Desk at the Lobby

3.2 **Personal Protective Equipment**

Bidders shall note that the above facility is designated under the Regional Safety Program as a hard hat, safety vest and safety boot zone. All Bidders' representatives will be expected to arrive equipped with hard hat, reflective vest, safety glasses and CSA rated safety boots to participate in the site visit. Failure to wear the proper safety equipment may result in disqualification from completing the site visit.

- 3.3 Bidders are reminded that this site visit is NON-MANDATORY. Attendance will be at the discretion of the Bidder, however, Bidders who choose not to attend will be deemed to have received all of the information made available to attendees. A Bidder's failure to attend the non-mandatory site visit is at the Bidder's sole risk and responsibility.
- 3.4 During the site visit, Bidders may ask questions and seek clarifications pertaining to the Bid Document. Notwithstanding that the Agency may give oral answers at a site visit, such answers shall not be considered final unless issued by way of an Addendum to the Bid Document. Therefore, Bidders are strongly encouraged to submit such questions in writing and in accordance with the instructions contained in the Bid Document.
- 3.5 No statement, consent, waiver, acceptance, approval or anything else said or done in any site visit by the Agency or any of its respective

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advisors, employees or representatives shall amend or waive any provision of the Bid Document, or be binding on the Agency or be relied upon in any way by Bidders, except when and only to the extent expressly confirmed in an Addendum to the Bid Document issued in accordance with the process identified in the Bid Document.

4. DATE AND PLACE FOR RECEIVING BIDDER SUBMISSIONS AND ACCEPTANCE PERIOD

- 4.1 ELECTRONIC BID SUBMISSIONS ONLY shall be received by the Agency through the Bidding System and must be received on or before 12:00 noon local time in Brampton, Ontario on Monday, July 7, 2025.
- 4.2 The closing date and time shall be determined by the Agency's Bidding System.
- 4.3 This procurement is being advertised in accordance with the applicable procurement obligations outlined in the Canada-European Union Comprehensive Economic and Trade Agreement (CETA), Canadian Free Trade Agreement (CFTA), and the Ontario-Quebec Trade and Cooperation Agreement (OQTCA).
- 4.4 Bidder Submissions submitted and/or received by any other method will be disqualified by the Agency unless instructed otherwise by published addenda in respect of the Document.
- 4.5 Only documents found on the Region of Peel's website at peelregion.bidsandtenders.ca are to be considered "official" documents. The Region of Peel accepts no responsibility for the accuracy or completeness of information found on other websites. The onus is on the Bidder to check the Region of Peel's website to verify they have received all relevant information. The Bidder risks submitting a non-compliant bid if addenda or other required information is missing, and disqualification could result.
- 4.6 It is the Bidder's sole responsibility to ensure their Bidder Submission is received by the time and date specified in the Agency's Bidding System. The receipt of Bidder Submissions can be delayed due to a number of factors including, but not limited to, "internet traffic", file transfer size, and transmission speed. The Bidder should allow sufficient time to upload its Bidder Submission, including any attachments. Late Bidder Submissions will not be accepted by the Agency's Bidding System.
- 4.7 A Bidder Submission will only be considered to be submitted once it has been RECEIVED by the Agency in its Bidding System, regardless of when the Bidder Submission was submitted by the Bidder.

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- 4.8 Bidders will be sent a confirmation e-mail by the Agency's Bidding System to the e-mail address provided by the Bidder when it registered as a Plan Taker in the Bidding System for the Document advising that its Bidder Submission was submitted successfully. Bidders should not consider its Bidder Submission to have been submitted until it has received the confirmation e-mail.
- 4.9 The Bidder is solely responsible for the delivery of its Bidder Submission in the manner and by the closing date and time prescribed in the Agency's Bidding System. Each Bidder is responsible for the actual delivery of its Bidder Submission prior to the closing time and closing date.
- 4.10 The Agency is not responsible for any incomplete or misdirected Bidder Submissions due to electronic technical problems arising out of the Bidder's use of the Agency's Bidding System.
- 4.11 Bidder Submissions received by the Agency in accordance with the terms and conditions of the Document shall be irrevocable and open for acceptance for a period of 90 days following the date of the Bidder Submission closing.

5. ADDENDA

Addenda, if required, issued by the Procurement Representative and related to this Contract shall hereby form part of the Contract.

Any addenda related to this Contract will be posted through the Bidding System at peelregion.bidsandtenders.ca. Although the Bidding System will attempt to notify registered Bidders of when addenda are posted on the Bidding System, the Agency does not guarantee any receipt of notifications by Bidders and waives any responsibility. It is the sole responsibility of Bidders to check the Bidding System often to inform themselves of any posted addenda.

Bidders shall acknowledge receipt of any addenda when submitting their Bidder Submission through the Bidding System. Bidders shall check a box for each addendum and any applicable attachments that have been issued before a Bidder can submit their Bidder Submission online all in accordance with the terms and conditions of the Document and the Bidding System.

The Agency encourages Bidders not to submit their Bid Submission prior to forty-eight hours before the Document closing time and date, in the event that an addendum is issued. If a Bidder submits their Bidder Submission prior to this or at any time prior to the Document closing and an addendum is issued by the Agency, the Bidding System shall WITHDRAW their Bidder Submission and change their Bidder Submission to an INCOMPLETE STATUS (NOT accepted by the Agency) and the withdrawn Bidder Submission can be viewed by the

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Bidder in the “MY BIDS” section of the Bidding System. The Bidder is solely responsible to:

- i) make any required adjustments to their Bidder Submission;
- ii) acknowledge the addendum/addenda; and
- iii) ensure the re-submitted Bidder Submission is RECEIVED by the Agency through the Bidding System no later than 12:00 noon local time on the Document closing date.

NOTES TO BIDDERS: Additional company contacts are recommended for the reasons outlined below:

- Do not invite any additional contacts that you do not want to have access to view, edit, submit and/or withdraw or who may be in direct competition, for example a company may have two divisions that could compete for the same bid opportunity.
- You are strongly urged, when creating or updating a Bidding System Bidder account, to add additional company contacts to create their own login to the Bidding System. This will permit your invited contacts that have created their own login to manage (register, submit, edit and withdraw) Bids which your company is a Registered Plan Taker for. In the event you are on vacation, or due to illness, etc., these additional contacts may act on your company's behalf and have the authority to receive addendum notifications from the Bidding System and where permitted by the terms and conditions of the Document, to submit Bidder Submissions electronically through the Bidding System and/or withdraw and/or edit and/or acknowledge addendum/addenda, on your behalf.
- If you are an invited company contact, it is imperative that you create your login from the link contained in the e-mail invitation. Do NOT go directly to peelregion.bidsandtenders.ca website and create a separate Bidder account.

6. CONTRACT AWARD

The Agency reserves the right to award the Contract in its entirety or in part to one or more Vendors in accordance with its requirements. Prior to award, the Agency reserves the right to perform a site visit at the Bidder's facilities for the purpose of evaluating the Bidder Submission.

Without limiting, and in addition to all other rights to which the Agency is entitled pursuant to this Document, the Agency shall be entitled to fully evaluate the Bidder Submission, which evaluation may include, without limitation, a review of references provided by the Bidder and of those that may be obtained by the Agency independently, past performance history of contracts between the Bidder and the Agency and/or between the Bidder and third parties, past completion history (including completion of full contract term, late or extended completion of contract and late delivery of goods or services), litigation and claims history of the Bidder (including previous, existing or potential litigation with the Agency or

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others and construction liens filed by the Bidder or subcontractors), delivery of incorrect services, customer service and responsiveness, or history of bidding unrealistic pricing, any of which may result in higher ultimate costs or other difficulties for the Agency, and to reject a Bidder Submission if the same is, in the Agency's sole opinion, unsatisfactory, or would not provide the best value to the Agency.

7. **PRIORITIZING CANADIAN GOODS AND SERVICES**

Bidders shall note that in response to trade tariffs imposed in 2025 by the United States of America ("U.S.") on Canadian goods and retaliatory tariffs imposed by Canada on U.S. goods, Peel Regional Council has endorsed the prioritization of Canadian and other non- U.S. goods and services over those of the U.S. in the Agency's procurement of goods and services, for such time as such tariffs are in effect.

7.1 **Definitions**

For the purposes of this Document and Contract, the following definitions shall apply:

7.1.1 "Canadian Business Subsidiary" means a corporation operating in Canada, that acts as a Bidder, Vendor, supplier, subcontractor, subconsultant, manufacturer or distributor of goods and services and is controlled by a parent corporation outside of Canada, and where:

- the business subsidiary has permanent offices or production facilities in any province or territory of Canada, and
- a minimum of 70% of the deliverables will be provided by employees based in Canada.

7.1.2 "Canadian Vendor" means a Bidder, Vendor, supplier, subcontractor, subconsultant, manufacturer or distributor of any business structure that conducts its activities on a permanent basis in Canada. The business either:

- has its headquarters or principal place of business in any province or territory of Canada; or
- has at least 70% of its employees in Canada at the time and date of bid closing of the applicable procurement process; or
- is a Canadian Business Subsidiary.

7.1.3 "Non-U.S. Business Subsidiary" means a business subsidiary controlled by a parent corporation operating on a permanent basis in the U.S., that acts as a Bidder, Vendor, supplier, subcontractor, subconsultant, manufacturer or distributor of goods, where:

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- the business subsidiary has permanent offices or production facilities outside of the U.S.; and
- a minimum of 70% of the deliverables will be provided by employees based outside of the U.S.

7.1.4 “Non-U.S. Vendor” means a Bidder, Vendor, supplier, subcontractor, subconsultant, manufacturer or distributor of any business structure that does not meet the definition of “U.S. Based Vendor”.

7.1.5 “Trade Partner Vendor” means a Bidder, Vendor, supplier, subcontractor, subconsultant, manufacturer or distributor of any business structure that conducts its activities on a permanent basis within a country that is a party to an international trade agreement applicable to municipalities in Canada. The Trade Partner Vendor either:

- has its headquarters or main office within a country that is a party to an international trade agreement applicable to municipalities in Canada, or
- has at least 70% of its employees based in a country that is a party to an international trade agreement applicable to municipalities in Canada at the time and date of bid closing of the applicable procurement process.

7.1.6 “U.S. Based Vendor” means a Bidder, Vendor, supplier, subcontractor, subconsultant, manufacturer or distributor of any business structure that conducts its activities on a permanent basis in the U.S. The business either:

- has its headquarters or principal place of business in any state or territory of the U.S.; or
- has at least 70% of its employees in the U.S. at the time and date of bid closing of applicable procurement process.

U.S. Based Vendor does not include a Non-U.S. Business Subsidiary.

7.2 **Bidder Eligibility**

7.2.1 The Agency’s intent is to award the Contract to a compliant Bidder Submission meeting the requirements of the Document and where the Bidder origin meets the definition of a Canadian Vendor or Canadian Business Subsidiary or Non-U.S. Business Subsidiary or Trade Partner Vendor, unless otherwise deemed not feasible in the sole and absolute discretion of the Agency.

7.2.2 In order to be considered for Contract award, Bidders must complete in full the Bidder Origin Attestation table in the Online Bidding System Forms.

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- 7.2.3 A Bidder's failure to provide accurate information in the Bidder Origin Attestation table may result in disqualification of the Bidder Submission and/or termination of any resulting Contract.
- 7.2.4 The Agency reserves the right to award the Contract to a compliant Bidder Submission meeting the requirements of the Document, where the Bidder origin meets the definition of a U.S. Based Vendor, only under circumstances where no Canadian Vendor or Canadian Business Subsidiary or Non-U.S. Business Subsidiary or Trade Partner Vendor are available to satisfy the requirements of the Agency, as determined in the sole and absolute discretion of the Agency.

7.3 **Subcontractors, Subconsultants, and Suppliers**

- 7.3.1 The awarded Vendor shall only be permitted to carry, utilize, and contract with subcontractors, subconsultants, and suppliers to perform the Work and provide deliverables, that meet the defined requirements of a Canadian Vendor or Canadian Business Subsidiary or Non-U.S. Business Subsidiary or Trade Partner Vendor, unless otherwise deemed not feasible in the sole and absolute discretion of the Agency.
- 7.3.2 The awarded Vendor shall ensure that its subcontractors, subconsultants, and suppliers also comply with the requirements of subsection 8.3.1.
- 7.3.3 The Agency reserves the right to permit the awarded Vendor to subcontract with a U.S. Based Vendor to perform the Work and provide deliverables only under circumstances where no viable Canadian Vendor or Canadian Business Subsidiary or Non-U.S. Business Subsidiary or Trade Partner Vendor are available to satisfy the requirements of the Contract and the Agency, as determined by the Agency in its sole and absolute discretion.

8. **QUANTITIES**

Quantities in the Document are approximate only and are based on information available to the Agency at the time of tendering. Final quantities for payment of tender items supplied on a unit price basis shall be based on actual field measurements as determined by the Agency.

9. **BID PRICING CHANGES**

The legislation and regulations governing the workplace in Ontario, including, without limitation, the Canadian *Income Tax Act*, the Canadian *Immigration and Refugee Protection Act*, Ontario *Employment Standards Act, 2000*, *Employer Health Tax Act*, *Labour Relations Act, 1995*, *Occupational Health and Safety Act* and *Workplace Safety and Insurance Act, 1997* may change at any time and may impact upon Bidders' pricing and overhead costs. In submitting its Submission, each Bidder hereby acknowledges that it has considered any proposed changes to legislation and regulations, and any impact such changes, if any, may have on its pricing. Bidders are advised that the Agency will not entertain requests to

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change submitted bid prices for this Document based on changes to the minimum wage or other legislative or regulatory amendments made under any statute. It is each Bidder's obligation to operate according to all applicable law at all times. For clarity, each Bidder takes on all risk and responsibility for cost increases due to legislative and regulatory changes. For further clarity, each Bidder takes on all risks due to health, environmental, social, emergency or other factors which may arise and which may result in unforeseen or otherwise uncalculated costs or legal circumstances to the Bidder in order to complete the Work, to keep its workers or the public safe according to applicable law and government order, or to address other intervening circumstances. The Bidder is required to arrange its own contractual and subcontractor obligations for labour, materials or other matters related to this contract so as to minimize or eliminate extra costs or circumstances which may jeopardize its ability to fulfill its contractual obligations to the Agency under this Document or Contract award.

10. TARIFFS

10.1 Bidder Submissions shall include all costs associated with only those tariffs that are in effect as of the Document closing date and time indicated in the Bidding System. If additional tariffs come into force after the Document closing date and time that increase the Vendor's costs of performing the work the Vendor shall notify the Agency in writing within 15 calendar days of the enactment of the additional tariffs. Such notice shall include a detailed description of the tariffs, including the rates and amounts of the tariffs and the specific products or components thereof that are affected. The Vendor shall take commercially reasonable steps to mitigate the costs and damages it may incur as a result of such tariffs by consulting with the Agency to determine whether:

- the goods can be sourced from countries to which the additional tariffs do not apply; and/or
- the goods can be shipped and imported into Canada prior to the effective date of the additional tariffs.

10.2 If the goods can only be sourced from a country subject to the additional tariffs and cannot be shipped before the additional tariff's effective date, the Agency will reimburse the Vendor, and the Contract price shall be adjusted accordingly, for the reasonable direct costs the Vendor incurs as a direct result of the additional tariffs, provided sufficient documentary evidence is submitted that substantiates such costs. No claims for costs the Vendor incurs as an indirect result of the tariffs (such as, without limitation, due to fluctuations in the cost of materials caused by general market conditions, supply chain disruptions, or geopolitical events—even if such factors are influenced by the tariffs at issue), markups, or administrative charges will be considered. The Agency must approve the submitted documentary evidence before any Contract price adjustment

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may be authorized. Examples of documentary evidence which may be acceptable to the Agency include:

- Official manufacturer notice outlining the price increase and reason (e.g., tariff changes).
- Updated price list from the manufacturer showing the revised rates and effective date.
- Government-issued tariff documentation (for example, Canadian Border Services Agency notice).
- Supplier/Contractor or distributor correspondence with supporting manufacturer documentation.
- Customs documentation showing applicable tariff rates and their impact on costs.

10.3 This entitlement to a potential increase in the Contract price does not apply to price increases for factors that the Vendor could have reasonably anticipated, accounted for or avoided as of the Document closing date and time. Such factors include, but are not limited to, fluctuations in the cost of fuel, delivery costs, or inflation.

10.4 The Agency reserves the right to deny the Vendor's claim for a Contract price adjustment if the documentary evidence provided by the Vendor does not meet the Agency requirements, as determined by the Agency in its sole discretion. The Agency may refuse the Vendor's claim for an adjustment to the Contract price or approve an amount less than what was requested if the Agency, in its sole discretion, determines that the price adjustment request is unreasonable or exceeds the Agency's budgetary limits.

10.5 This price adjustment is the Vendor's sole and exclusive remedy in relation to the imposition of additional tariffs. For clarity, the Vendor shall not be entitled to an extension to the Contract time/Contract term on account of the additional tariffs (including, without limitation, on account of any delays, disruptions, cost increases, economic or market conditions, or supply chain impacts arising directly or indirectly from the additional tariffs). Upon receiving payment for the price adjustment, the Vendor agrees to waive its entitlement to, and release the Agency from, any claims for additional compensation, schedule extensions, or other relief (including, without limitation, an increase in the Contract price and/or extensions of the Contract time/Contract term) arising out of the imposition of the additional tariffs.

10.6 If a tariff that was in effect at the Document closing date and time is subsequently reduced or eliminated, resulting in a decrease of the Vendor's costs of performing the work, the Contract price shall be

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adjusted downward to reflect the reduction or elimination of the tariff and the associated decrease in the Vendor's costs.

- 10.7 In addition to any other audit rights available to the Agency under the Document, the Agency shall have the right to audit, inspect, and examine the Vendor's records necessary to verify any required Contract price adjustment pursuant to these paragraphs, including without limitation invoices, receipts, purchase orders, customs documentation, supplier quotations, supplier payment terms, and any other relevant financial or transactional records. The Vendor shall cooperate fully with any such audit, inspection, or examination and provide access to such records promptly upon request.

11. **TIME OF COMPLETION**

The Contractor shall diligently complete the Work in accordance with the time of completion set out below. **The Substantial Performance Date nor the Ready-for-Takeover date shall extend beyond the dates provided below after the written order for commencement of the Works by the Owner.**

If this time limit is not sufficient to permit completion of the Work by the Contractor within the Working Hours, the Contractor shall add and/or augment the Working Hours throughout the life of the Contract to the extent necessary to ensure that the Work will be completed within the time limit specified. Any additional costs occasioned by compliance with these provisions will be considered to be included in the prices bid for the various items of Work and no additional compensation will be allowed.

Any extension of working hours beyond those specified in this Contract will require written authorization of the Owner.

- 11.1 The Contractor agrees to attain **Substantial Performance of the Work**, by the day of **September 25, in the year 2026**, and **Ready-for-Takeover**, by the day of **October 30, in the year 2026**."

12. **DIGITAL BID BOND**

To be considered, the Bidder's Submission must include a digitally created and electronically delivered bid bond in the form of bond included in Appendix 5.5 herein, naming the Agency as Obligee, in the amount of \$200,000.

The bond must be issued by a surety company licensed to issue surety bonds in the Province of Ontario.

The bond must be delivered by means of a service or application recognized as meeting in whole or in part the Surety Association of Canada's mandatory requirements for e-bonding solutions. Photocopies, images or scanned facsimiles will not be accepted.

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It is to be noted that the digital bid bonds of all Bidders will not necessarily be verified by the Agency. Prior to award of the Contract, the Agency will verify the digital bid bond of the Bidder who is proposed to be awarded the Contract by the Agency. Where the digital bid bond is not verifiable, the bid will be deemed non-compliant and disqualified. In such a case, the Agency will proceed to verify the digital bid bond of the next Bidder proposed to be awarded the Contract, and continue the process as necessary, until a digital bond is verified by a fully compliant Bidder whose bid is proposed to be awarded the Contract by the Agency.

If a digital bid bond and an Agreement to Bond are requested by the Agency and the surety company only provides the Bidder with a merged version, the Bidder is required to upload the merged document in both applicable fields of the online Bidding System forms.

The digital bid bond of the Bidder whose submission is accepted shall be called upon should the Bidder fail to execute a Contract and provide the necessary documents as required within this Document (such as a satisfactory bond, insurance certificate, Workplace Safety and Insurance Board letter of clearance) within seven days after receiving written notice from the Agency of the award of the Contract to the Bidder.

13. **FORM OF AGREEMENT AND ELECTRONIC AGREEMENT TO BOND**

Upon receipt of written notice from the Agency that it has been awarded the Contract, the successful Bidder shall be required to execute an agreement with the Agency on the terms of the CCDC2 Stipulated Price Contract 2020, as amended by the Agency's Supplementary Conditions as contained herein.

In order to be considered for award, the Bidder shall submit through the Bidding System as part of their Bidder Submission, an Agreement to Bond in the form attached in Appendix 5.1 , completed by a Bonding Company permitted to issue performance bonds and labour and material payment bonds in Ontario and with an A.M. Best rating of B+ or better. Any others will not be accepted. Each Bidder must submit the completed Agreement to Bond as part of their Bidder Submission in order to validate their Bidder Submission.

If a digital bid bond and an Agreement to Bond are requested by the Agency and the surety company only provides the Bidder with a merged version, the Bidder is required to upload the merged document in both applicable fields of the online Bidding System forms.

Upon receipt of written notice from the Agency that it has been awarded the Contract, the successful Bidder shall provide, within seven days of such notice, a digitally created and electronically delivered Performance Bond and a Labour and Material Payment Bond, each for the amount of **50 per cent** of the total lump sum price, substantially in the forms required under the *Construction Act*, to guarantee the performance of all obligations of the Contract.

Instructions to Bidders

The Performance Bond and a Labour and Material Payment Bond must be submitted by the successful Bidder in a digital format that meets the following Surety Association of Canada (SAC) criteria:

- 13.1 The version of the bond submitted by the successful Bidder must be verifiable by the Agency with respect to the totality and wholeness of the bond form including: the content, all digital signatures, and all digital seals with the Surety Company, or an approved verification service provider of the Surety Company.
- 13.2 The version of the bond submitted by the successful Bidder must be viewable, printable and storable in pdf format or other standard electronic file format acceptable to the Agency, and in a single file.
- 13.3 Photocopies, images or scanned facsimiles of bonds will not be accepted.
- 13.4 The verification of the successful Bidder's submitted bonds may be conducted by the Agency immediately or at any time during the life of the bond and at the discretion of the Agency, with no requirement for passwords or fees.
- 13.5 The results of the bond verification must provide a clear, immediate and printable indication of pass or fail regarding item 12.1.
- 13.6 Bonds failing the verification process will NOT be considered to be valid and will NOT be accepted by the Agency as satisfying the requirements of the Contract.

14. INSURANCE

Within seven days after receiving written notice from the Agency of the award of the Contract, the successful Bidder shall submit to the Agency the completed Certificate of Insurance form with the required coverages and information as stated within the Contract Documents. No other form shall be accepted by the Agency.

The insurance shall be maintained continuously from the commencement of the Contract until such time as established in the Supplementary Conditions to Contract CCDC2-2020, SC.46, GC 11.1 – INSURANCE, as set out herein and established within the Contract Documents.

A deductible clause is only acceptable if the Contractor submits a signed and sealed letter stating the following:

"We (insert Contractor's name) authorize the Region of Peel to appoint an independent adjuster to settle any claims arising from this Contract which are for amounts less than our insurance deductible figure. Furthermore, the Region can deduct any amounts of justifiable claims from monies owing to the Contractor."

15. VENDOR AS CONSTRUCTOR

The Vendor acknowledges that, unless the Agency advises the Vendor of the Vendor's engagement of a safety consultant who will fulfill the role of

Instructions to Bidders

“constructor” for the project, the Vendor will be the “constructor” and the “employer” within the meaning of the *Occupational Health and Safety Act* (Ontario) and the Vendor undertakes to carry out the duties, obligations and responsibilities of the constructor and the employer with respect to the project.

In this project, the Agency may have cause to enter into more than one contract for the project. Additionally, there may be instances where the Agency’s staff are required to attend the project site for specified intervals to perform work associated with the project. In such cases, the Vendor is required and agrees to fulfill all of the duties, obligations and responsibilities of the “constructor” and “employer” with respect to the project and on behalf of the owner, in accordance with the terms and conditions set out in SC 42 of the Supplementary General Conditions, and any other requirements are set out in the Contract Documents.

16. **GUIDELINES FOR THE CONTRACTOR WHERE OWNER’S STAFF AND OTHER CONTRACTORS ARE REQUIRED TO PERFORM WORK ON THE PROJECT SITE**

Requirements for the contractor where other vendors/contractors or the Owner’s staff/other contractors are required to attend the project site to perform work associated with the project are as follows.

The contractor shall:

- (a) Assume and fulfill the responsibility of constructor for all Owner’s staff/other contractors attending the project site to conduct required Work.
- (b) Provide orientation to Owner’s staff/other contractors prior to Work commencement at the site.
- (c) Identify a site supervisor contact or assistant for all Owner’s staff/other contractors.
- (d) Maintain a sign in/out log of all visitors to the site, including owner’s staff/other contractors.
- (e) Maintain a signed copy of the Owner’s Staff/Other Contractors Project Constructor Coordination Form (Appendix 5.9) for any Owner’s staff/other contractors on site, in which all such persons working on the site shall provide a signed acknowledgement that they will comply with the contractor’s safety program and safety instructions.
- (f) In order to avoid delays, provide sufficient notice and coordinate Owner’s staff/other contractors’ work so it does not impact or conflict with any other work happening at the site.
- (g) Schedule Owner’s staff/other contractors’ work as close as possible to substantial completion to avoid the majority of construction hazards and risk to Owner’s staff/other contractors.
- (h) Maintain a log of all Form 1000 provided by each employer on site.

17. **VENDOR PERFORMANCE EVALUATIONS**

Under this Contract, the requirements of Procedure F35-27, Vendor Performance Management (VPM) (the “Procedure”), as amended, shall be in full force and effect. **The Procedure supersedes the previous versions of F35-27**

Instructions to Bidders

Contractor Performance Evaluations and F35-39 Consultant Performance Evaluations. The Procedure and all related information and documentation may be amended from time to time and the most recent version shall form part of this Contract. If awarded this Contract, the Bidder(s) shall be evaluated in accordance with the Procedure.

The Procedure provides guidance on vendor performance evaluations for Vendors under Contract with the Agency. Evaluations provide a summary of a Vendor's performance on any awarded Contract and will become an official record. Vendor performance evaluations will serve the following purposes:

- Provide feedback to Vendors for performance improvements and / or acknowledgement of Satisfactory performance, and
- Inform Bidders/Vendors eligibility or ineligibility to be awarded future Agency Contracts.

The complete Procedure, guidelines and information regarding Vendor Performance Evaluation criteria can be found on the Agency's website at peelregion.ca/business/procurement, "Vendor Performance Management Program" or <https://peelregion.ca/business/procurement/vendor-performance-management-program/>.

18. **SUBCONTRACTORS**

The Bidder shall provide in the Bidder Submission the name and address of each of its proposed subcontractors to be utilized in this project.

Attention is drawn to Section GC 3.6 of the General Conditions, Section SC.20 Subcontractors and Suppliers of the Supplementary Conditions and to the instructions on the List of Suppliers and Subcontractors in the online Bidding System forms.

It is the responsibility of Bidders to ensure any subcontractors they retain are in good standing with the Agency under the Procedure and meet all requirements of this Document and are thus eligible to perform work on Agency contracts. Prior to bidding on this Document, Bidders shall contact the Agency at 905-791-7800 ext. 7538 to obtain a list of Contractors suspended from performing work on any Agency contracts as a subcontractor. Should a Bidder name any subcontractor in its Bidder Submission that is suspended as a subcontractor under the Procedure, the Bidder shall be required to name a replacement satisfactory to the Agency, acting reasonably, at no additional cost to the Agency, failing which the Bidder shall be deemed non-compliant and not given consideration for Contract award. By submitting a Bidder Submission, the Bidder accepts that the Agency has no liability to the Bidder or any subcontractor or third party related to the rejection of a subcontractor who is ineligible to be considered, or otherwise unsatisfactory to the Agency.

Instructions to Bidders

The Bidder agrees, that if awarded the Contract, it will only carry, utilize, and contract with subcontractors and suppliers to perform the Work and provide deliverables, that meet the defined requirements of a Canadian Vendor or Canadian Business Subsidiary or Non-U.S. Business Subsidiary or Trade Partner Vendor, unless otherwise approved in writing by the Agency in its sole and absolute discretion.

19. BIDDER SUBMISSION

- (a) The Bidder Submission must be submitted electronically using the Bidding System.
- (b) A person or persons with authority to bind the Bidder must electronically declare on the online Bidding System that their Bidder Submission has been made entirely in accordance with the Document.
- (c) All pricing in the Bidder Submission must be expressed in figures, and must be in Canadian Dollars.
- (d) Prices in the Bidder Submission must include all costs necessary to complete the Work in accordance with the Document including customs and duties.
- (e) The Bidder represents, warrants and confirms that no oral or written alterations or variations in the Document and/or Contract have been made by the Bidder and none shall be valid or binding upon the Agency unless authorized by the Agency in writing.
- (f) Bidder Submissions which are qualified or subject to any conditions, limitations or restrictions shall be rejected by the Agency.
- (g) The Bidder acknowledges that it is solely responsible for obtaining and reviewing all Contract documents and all addenda issued by the Agency pertaining to the Document.

Only Bidders that are registered as a Plan Taker for this Document with Bids and Tenders at peelregion.bidsandtenders.ca and have obtained this Document from Bids and Tenders or the Agency, may submit a Bidder Submission.

Should the Agency receive a Bidder Submission that is subsequently found to be from a Bidder that is not a registered Plan Taker with Bids and Tenders at peelregion.bidsandtenders.ca, and the Bidder did not obtain the Document from Bids and Tenders or the Agency, the Agency reserves the right to reject the Bidder Submission as non-compliant and give it no further consideration for contract award.

20. AGENCY RIGHTS

The Agency reserves the right, in its sole and absolute discretion to:

- (a) deem a Bidder Submission to be unbalanced and may reject any and all Bidder Submissions, which it so deems, and for this purpose, "unbalanced" shall include, without limitation, a Bidder Submission which does not reflect a realistic breakdown of the costs of each or any portion of the Work;

Instructions to Bidders

- (b) adjust the totals in a Bidder Submission where there are errors in extensions, additions or computations. In such cases, the unit prices shown shall govern;
- (c) reject any or all Bidder Submissions, accept a Bidder Submission which is not the lowest price, reject a Bidder Submission even if it is the only one received by the Agency; and cancel or suspend or delay this request for Bidder Submissions at any time either before or after the receipt of Bidder Submissions, following which the Agency may proceed as it determines in its sole discretion, including without limitation, negotiating with any one or more of the Bidders or any other person or entity for the performance of the Work under such terms and conditions as the Agency may decide in its sole discretion, or issuing a new request for Bidder Submissions on the same or modified terms, all without liability to itself;
- (d) if making an award of the Contract in its entirety or in part, to one or more Vendors, make changes to the content of the Contract to address unforeseen circumstances which may have arisen during the bidding period, including but not limited to health, environmental, social or emergency events including but not limited to epidemics and pandemics, which require responses to ensure the health and safety of workers, the health of the public and of Agency staff, and the efficacy of the project are maintained at all times, if in doing so the best interests of the Agency will be served, and the Agency will assess the expected costs of such changes and make a contingency allowance for same, which the Vendor may claim costs against on a zero mark-up basis upon proof sufficient to the Agency, unless such changes are expected to be able to be accommodated by the Vendor without change to the Contract Price;
- (e) award the Contract in its entirety or in part, to one or more Vendors, if in doing so the best interests of the Agency will be served;
- (f) inspect and have a demonstration of the goods and/or services offered prior to award of a Contract and request evidence of experience, ability or financial standing;
- (g) waive formalities, technical defects, irregularities and omissions in a Bidder Submission, and may accept a Bidder Submission which does not comply with the formal requirements of the Document, if in doing so the best interests of the Agency will be served;
- (h) remove from the Agency's list of vendors the name of any vendor and/or Bidder for failure to accept a contract or for unsatisfactory performance or non-performance of a contract;
- (i) fully evaluate the Bidder Submission, which evaluation may include, without limitation, a review of references provided by the Bidder and of those that may be obtained by the Agency independently, past performance history of contracts between the Bidder and the Agency and/or between the Bidder and third parties, past completion history (including completion of full contract term, late or extended completion of contract and late delivery of goods or services), litigation and claims history of the Bidder (including previous, existing or potential litigation with the Agency or others and construction liens filed by the Bidder or

Instructions to Bidders

subcontractors), delivery of incorrect services, customer service and responsiveness, or history of bidding unrealistic pricing, any of which may result in higher ultimate costs or other difficulties for the Agency, and to reject a Bidder Submission if the same is, in the Agency's sole opinion, unsatisfactory, or would not provide the best value to the Agency;

- (j) reject and disqualify any or all Bidder Submissions based on a Bidder's Vendor Performance Rating, status and standing as per the Agency's Vendor Performance Evaluations procedures, as amended from time to time;
- (k) seek further information and/or clarification, including without limitation a detailed price breakdown, from any Bidder after the closing time, for the purposes of assisting the Agency in interpreting and evaluating any Bidder Submission and in interpreting any inconsistencies which may appear in any Bidder Submission, and the Agency shall have the right to consider and rely on such further information and clarifications in evaluating the Bidder Submissions and awarding the Contract;
- (l) verify any Bidder statement or claim in a Bidder Submission by whatever means the Agency deems appropriate, and reject any Bidder Submission containing any such statement or claim if, in the judgment of the Agency, the statement or claim is unwarranted, not credible, or false; and
- (l) either before, after or as a change to the terms of the Contract award, to temporarily suspend or to alter the timelines of the Contract delivery schedule or any other terms of the Contract in its sole discretion, in response to circumstances beyond the Agency's control or legislative changes or orders of a government, related to health (such as public health, occupational health and safety or construction safety), environmental, social or other emergent or unforeseen circumstances such as epidemics and pandemics.

21. **CONFIDENTIAL INFORMATION/OWNERSHIP AND DISCLOSURE OF
BIDDER SUBMISSIONS**

- (a) The Vendor agrees to protect and maintain the confidentiality of all personal or other information, including all personal health information, that the Vendor accesses or of which the Vendor acquires knowledge of as a result of the services in this Contract, and agrees to use, collect, disclose, retain, protect and dispose of the personal (health) information only in accordance with all privacy legislation applicable to the Agency where it is acting on behalf of the Agency. Disclosure of any information shall be done only with the Agency's prior written consent. The provisions of the indemnity clause in this Contract apply to any breach of privacy or confidentiality in this clause. The Vendor shall ensure that its directors, officers, employees, agents, subcontractors and anyone else for whom it is responsible in law all adhere to the requirements of this section regarding privacy and confidentiality.
- (b) The Agency, and the Agency's responsibilities under this Contract, are subject to all applicable privacy legislation including the *Municipal Freedom of Information and Protection of Privacy Act*, R.S.O. 1990

Instructions to Bidders

c.M.56, as amended ("MFIPPA") and/or the *Personal Health Information Protection Act*, 2004 ("PHIPA") with respect to the collection, use, disclosure, retention and protection of confidential, sensitive or personal (health) information under the Agency's custody and control. Under an MFIPPA request, all documents provided to the Agency by the Vendor pursuant to the procurement process which led to this Contract, and the Contract itself and associated documents, may be required by law to be made available to a requesting member of the public, with the possible exception that the party submitting certain information requests that it be treated as confidential and that there is an appropriate exemption to disclosure in MFIPPA, or a non-disclosure requirement in either MFIPPA or PHIPA.

- (c) The Bidder Submissions, along with all correspondence, documentation and information provided to the Agency by any Bidder in connection with or arising out of the Bidder Submission, once received by the Agency, shall become the property of the Agency and may be appended to any agreement and/or purchase order with the successful Bidder. Bidders must identify in their Bidder Submissions any scientific, technical, proprietary, commercial or other confidential information, the disclosure of which could cause them injury.
- (d) In public bids, the name of each Bidder and the lump sum price contained in their Bidder Submission shall be published on the Bidding System.
- (e) Where award is to be made by Regional Council, the Peel Police Services Board or the Board of Directors of Peel Housing Corporation, information regarding all Bidder Submissions, including names of each Bidder, lump sum prices and the annual or overall value of the Contract and/or Bidder Submissions shall be included in public reports to Regional Council or the relevant Boards such that the information is released publicly. The Bidder acknowledges that the Agency cannot guarantee it can honour requests to keep Bidder information confidential in light of applicable law requirements, and also in light of the need for transparency and public disclosure where release of Bidder information in public Council reports related to a specific project or procurement process is necessary.

22. **COLLUSION AND CONFLICT OF INTEREST**

- (a) By submitting a Bidder Submission, each Bidder represents and warrants that no member, officer or employee of the Agency or Council has or will have an interest, directly or indirectly, in the performance of the Contract, or in the supplies, work or business in connection with the said Contract, or in any portion of the profits thereof, or in any monies to be derived therefrom; the Bidder Submission is not made in collusion with any other Bidder making a Bidder Submission for the same goods and services and is, in all respects, fair and without fraud; and that neither it nor any of its subcontractors nor any of their respective representatives has any actual, apparent or potential conflict of interest or existing business or other relationship with the Agency or any or any other party or person providing

Instructions to Bidders

advice or services to the Agency with respect to the Document or the Work or any of their respective representatives that gives rise or might give rise to an unfair advantage (a "Conflict of Interest"). Each Bidder acknowledges that it is within the Agency's discretion to determine whether a Conflict of Interest exists.

- (b) Should the Bidder give or offer any gratuity to or attempt to bribe any member of the Agency, or to commit collusion or fraud, the Agency shall be at liberty to reject the Bidder Submission or, if a Contract has been awarded, terminate the Contract forthwith, without liability to itself, and to rely upon the sureties as provided for.
- (c) By submitting a Bidder Submission for this Document, each Bidder thereby releases and forever discharges the Agency from any and all liability related to any determination the Agency may make regarding Conflicts of Interest, including any disqualification, prohibition, rejection or contract termination which may result therefrom.
- (d) In addition to all other rights in this Document or otherwise available at law or in equity, the Agency may, in its discretion, immediately disqualify a Bidder Submission or may terminate any contract entered into in connection with or resulting from the Document, without liability, penalty or cost, upon giving notice to the Bidder if the Bidder or any of their respective representatives fails to disclose or has failed to disclose any Conflict of Interest.

23. HARMONIZED SALES TAX (HST) INFORMATION

The Agency is subject to the payment of provincial and federal taxes imposed by the Provincial and Federal Governments and, if required, the collection of any withholding tax for non-resident Vendors. All prices within this document shall be quoted exclusive of HST.

24. ACCESSIBILITY FOR ONTARIANS WITH DISABILITIES

The Vendor shall comply with the *Accessibility for Ontarians with Disabilities Act* 2005, and its Regulations thereunder with regard to the provision of goods or services to persons with disabilities. The Vendor acknowledges that pursuant to the *Accessibility for Ontarians with Disabilities Act* 2005, the Region of Peel must, in deciding to purchase goods or services through its procurement process, consider accessibility for persons with disabilities to such goods or services. This legislation can be accessed through the following link to the Government of Ontario's website: ontario.ca/laws/statute/05a11. You may also access this link at peelregion.ca/procurement, "Additional Information for Bidders" and view the accessibility standards.

25. INVOICING AND ELECTRONIC PAYMENT INSTRUCTIONS

25.1 All invoices must be sent to the individual ordering the goods/services or as directed at the time of the order placement. Failure to do so will result in a delay of payment.

Instructions to Bidders

- 25.2 The Agency's method of payment is by Electronic Funds Transfer (EFT). The Vendor will be required to provide the Agency with the Application for Vendor Direct Deposit form containing original signatures in ink, by return mail, fax or hand delivered, the following banking information:
- 25.2.1 Names of two Company Officers, their titles, e-mail addresses, fax numbers, and phone numbers. Note: Both Company Officers must sign off on any subsequent changes to the Vendor's banking information.
- 25.2.2 Company mailing and remittance addresses.
- 25.2.3 Banking information including a void cheque.
- 25.2.4 The Vendor is required to notify the Agency of any changes to this information immediately.
26. **EMERGENCY RESPONSE REQUIREMENTS**
- 26.1 In addition to the Contractor's obligations to follow all applicable law pursuant to paragraphs A-1.3 and GC 10.2.3 of the CCDC 2-2020, as may be amended by the Supplementary, including but not limited to that applicable to public health, occupational health and safety and to construction safety, the parties acknowledge that there may arise circumstances, such as epidemics and pandemics, where they intend to cooperate in good faith with each other to resolve concerns which may arise related to health, environmental, social or other emergency circumstances, so as to continue the Work and to avoid any increases in Contract Price or delay in progress of the Work wherever possible.
- 26.2 The parties acknowledge the Delay terms in paragraph 6.5.3 of the CCDC 2-2020, as may be amended by the Supplementary Conditions, related to causes beyond the Contractor's control. There may be circumstances which arise after Contract Award, and relate to any contingency allowance which the Region of Peel may have put in place or which a party believes extend beyond or in addition to such contingency allowance terms, but which do not meet those circumstances in paragraph 6.5.3 of the CCDC 2-2020, as may be amended by the Supplementary Conditions, and which the parties wish to discuss. Such topics may include the following non-exhaustive list:
- .1 stop Work;
 - .2 suspend Work;
 - .3 change Work;
 - .4 change Substantial Performance Date or the date of Ready-for-Takeover;
 - .5 change critical path of Construction Schedule;
 - .6 change subcontractors or suppliers per GC 3.6 of the CCDC 2-2020, as may be amended by the Supplementary Conditions.

Instructions to Bidders

the parties agree to:

- .7 use paragraph 8.3.3 of the CCDC 2-2020, as may be amended by the Supplementary Conditions to conduct amicable discussions or negotiations;
- .8 to work within Part 6 of the CCDC 2-2020, as may be amended by the Supplementary Conditions, wherever possible to agree upon any changes;
- .9 to work together notwithstanding paragraph 6.3.3 of the CCDC 2-2020, as may be amended by the Supplementary Conditions, where needed; and,
- .10 the parties agree that in such circumstances, paragraph. 7.2.2 of the CCDC 2-2020, as may be amended by the Supplementary Conditions, delay prior to termination by the Contractor shall be extended to 120 days or longer.

26.3 This section is to be distinguished from paragraph 10.2.7 of the CCDC 2-2020, as may be amended by the Supplementary Conditions, as it is acknowledged that the circumstances for discussion in this regard relate to situations where health, environmental, social or emergency needs or government regulation related to same may dictate the Contractor's response to, within the terms of the Contract, request changes which will not result in a change to Contract Price if they are discussed early and promptly or where a change to Contract Price may be agreed between the parties on a zero mark-up basis, and where it is the preference of both parties that the Work continue, even though subject to differing or extra health or safety obligations.

26.4 In such discussions or negotiations, the following is applicable:

- 26.4.1 changes in the Work would preferably be made by agreement;
- 26.4.2 if changes are requested by the Contractor, there shall be no extra cost to the Owner or costs on a zero mark-up basis as may be agreed upon with the Owner; and
- 26.4.3 if changes are requested by the Owner, there shall be no extra cost to the Owner unless the Contractor provides records as may be necessary to support a claim on a zero-mark-up basis to which the Owner could agree.

Supplementary Conditions to Contract CCDC2 - 2020

SCHEDULE 1

**Supplementary Conditions for Standard Construction Document CCDC2 2020
Stipulated Price Contract**

SC.1 GENERAL

These Supplementary Conditions presuppose the use of the Standard Construction Document CCDC2 - 2020 Stipulated Price Contract. These "Supplementary Conditions" void, supersede or amend the "Agreement", "Definitions" and "General Conditions" as hereinafter provided, as the case may be.

SC.2 ARTICLE A-1 – THE WORK

1. Amend Article A-1 THE WORK as follows:

- (a) **add** "diligently" to the beginning of paragraph 1.1.
- (b) **delete** everything after "Contract Documents," in paragraph 1.3 and **replace** with the following:

"attain *Substantial Performance of the Work*, by the day of September 25 , in the year 2026, and *Ready-for-Takeover*, by the day of October 30, in the year 2026."

- (c) **add** new paragraph 1.4 as follows:

"1.4 provide all the labour, materials, equipment, machinery, Products and work including, without limitation, all Commissioning services required by the Contract Documents in order to fully complete and construct the Work and in accordance with, and satisfaction of, all applicable federal, provincial, municipal and local laws, regulations, rules, by-laws, guidelines, standards, permits, statutes, ordinances, and codes including, without limitation, those relating to occupational health and safety and any and all obligations, responsibilities and duties required by or set out in any site plan agreement or approval, attributable to the Place of the Work and/or the proposed development therein, and furnish efficient business and construction administration and superintendence consistent with the interests of the Owner."

SC.3 ARTICLE A-3 – CONTRACT DOCUMENTS

1. **Add** the following documents to the existing list of Contract Documents set out in Article A-3 CONTRACT DOCUMENTS:

- Addenda, as issued
- Instruction to Bidders
- Supplementary General Conditions to CCDC2-2020
- Specifications
 - Division 01 – General Requirements
 - 01 11 00 - Summary of Work
 - 01 14 00 - Work Restrictions

Supplementary Conditions to Contract CCDC2 - 2020

- 01 32 16 - Construction Progress Documentation
- 01 33 00 - Submittal Procedures
- 01 35 29 - Health and Safety Requirements
- 01 41 00 - Regulatory Requirements
- 01 45 00 - Quality Control
- 01 51 00 - Temporary Utilities
- 01 74 00 - Cleaning
- 01 74 19 - Waste Management And Disposal
- 01 77 00 - Closeout Procedures
- 01 78 00 - Closeout Submittals
- 01 79 00.13 - Demonstration And Training
- 01 91 13 - General Commissioning Requirements
- 01 91 13.13 - Commissioning Plan
- Division 07 – Thermal and Moisture Protection
 - 07 84 00 - Fire Stopping
 - 07 92 00 - Joint Sealants
- Division 23 – Heating, Ventilating and Air-Conditioning (HVAC)
 - 23 01 05 - Use of HVAC Systems During Construction
 - 23 05 00 - Common Work Results for HVAC
 - 23 05 05 - Installation of Pipework
 - 23 05 17 - Pipe Welding
 - 23 05 29 - Hangers & Supports for HVAC Piping & Equipment
 - 23 05 48 - Vibration Isolation for HVAC Piping and Equipment
 - 23 05 93 - Testing, Adjusting and Balancing
 - 23 07 13 - Mechanical Insulation
 - 23 08 10 - Commissioning of Mechanical Systems
 - 23 11 23 - Natural gas Piping System
 - 23 31 05 - Standard Ductwork
 - 23 33 00 - Duct System Dampers and Accessories
 - 23 34 00 - HVAC Fans
- Division 26 – Electrical
 - 26 05 00 - Common Work Results for Electrical
 - 26 05 05 - Selective Demolition for Electrical
 - 26 05 14 - Power Cable and Overhead Conductors (1001V)
 - 26 05 20 - Wire and Box Connectors 0-1000V
 - 26 05 21 - Wires and Cables Up To 1000V
 - 26 05 22 - Connectors and Terminations
 - 26 05 28 - Grounding - Secondary
 - 26 05 29 - Hangers and Supports for Electrical Systems
 - 26 05 30 - Wiring Methods
 - 26 05 31 - Splitters Junction Pull Box Cabinets
 - 26 05 32 - Outlet Boxes Conduit Boxes and Fittings
 - 26 05 33 - Raceways And Boxes for Electrical Systems
 - 26 05 34 - Conduits, Conduit Fastenings and Conduit Fittings
 - 26 05 73 - Overcurrent Protective Devices Coordination Study
 - 26 08 00 - Commissioning of Electrical Systems

Supplementary Conditions to Contract CCDC2 - 2020

- 26 12 16.01 - Dry Type Transformers Up To 600v Primary
 - 26 24 13 - Switchboard
 - 26 27 26 - Wiring Devices
 - 26 28 13.01 - Fuses Low Voltage
 - 26 28 16.02 - Molded Case Circuit Breakers
 - 26 28 20 - Ground Fault Circuit Interrupters Class A
 - 26 28 23 - Disconnect Switches - Fused and Non-fused
 - 26 29 03 - Control Devices
 - 26 32 13.02 – Power Generation Natural Gas
 - 26 77 19.20 - Closeout Requirements for Electrical Work
- Division 28 – Electronic Safety and Security
 - 28 46 00 - Fire Detection and Alarm
- Site Drawings
 - G-001 Cover Page
 - G-002 Key Plan
 - A0.01 Cover Page
 - A1.01 General Notes, Legends, Key Plan, Site Location
 - A1.02 Overall Ground Floor Plan & Reflected Ceiling Plan
 - A1.03 Overall Typical Floor Plan & Reflected Ceiling Plan (Lvl 2 & 3)
 - A1.04 Enlarged Unit Plans & RCPS
 - A1.05 Enlarged Unit Plans & RCPS
 - A1.06 Enlarged Unit Plans & RCPS
 - A1.07 Sections & Details
 - S1 General Notes and Keyplan
 - S2 Garage Roof Framing Plan
 - S3 General Notes and Keyplan
 - M-001 Site Plan, Drawings List, Legend
 - M-101 Parking Garage HVAC
 - M-401 New Generator Room - HVAC Layout
 - M-501 Mechanical Details
 - M-601 Gas Piping Schematic
 - M-801 Mechanical Equipment Schedules
 - E001 Site Plan Legend and Drawing List
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 - E102 Parking Garage Power Layout Installation (Phase 1)
 - E103 Parking Garage Power Layout Switchover Phase (Phase 2)
 - E104 Parking Garage Power Layout Final
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 - E106 Parking Garage Control Wiring Installation
 - E107 New Generator Room Lighting Layout
 - E401 New Generator Room Power Layout
 - E402 Existing Chiller and Parking Garage Layout
 - E403 Existing Electrical Rooms Power Layout
 - E501 Electrical Details
 - E601 Single Line Diagram Installation (Phase 1)

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- E602 Single Line Diagram Switchover Phase (Phase 2)
 - E603 Single Line Diagram Final
 - E604 Equipment and Panel Schedules
 - CCDC2 Stipulated Price Contract 2008 - This is not attached but forms part of the Contract
 - Digital Bid Bond
 - Form of Release at Substantial Performance of the Work
 - Performance Bond substantially in the form required under the Construction Act - This is not attached but forms part of the Contract
 - Labour and Material Payment Bond substantially in the form required under the Construction Act - This is not attached but forms part of the Contract
 - Owner's Staff/Other Contractors Project Construction Coordination Form
 - Owner's Staff/Other Contractors Anticipated to Attend Site for Contractor Coordination
 - Online Bidding System forms
2. **Add** new paragraphs 3.2 and 3.3 to Article A-3 CONTRACT DOCUMENTS, as follows:
- "3.2 If either the Specifications or the Request for Tender (or other procurement document issued by the Owner) provide for more than one improvement to be made under the Contract, and such improvements are to be made to lands that are not contiguous (each, a "*Non-Contiguous Improvement*"), then each such improvement is deemed to be made and performed under a separate contract for the purposes determining Substantial Performance of the Work, Ready-for-Takeover, completion of the contract, and for any other purpose under section 2 of the Payment Legislation, and the relevant provisions of this Contract will be deemed amended accordingly.
- 3.3 Paragraph 3.2 will apply to all of the Contractor's contracts with its Subcontractors and Suppliers working on each such improvement on a pass through basis. The Contractor shall include in all of its contracts with Subcontractors and Suppliers notice of such deeming of separate contracts for such purposes, and shall ensure that it separates the Work and the supply of Products for each improvement."

SC.4 ARTICLE A-5 PAYMENT

1. **Delete** ARTICLE A-5 PAYMENT in its entirety and **replace** with the following:

"ARTICLE A-5 PAYMENT

- 5.1 Subject to, and in accordance with, the provisions of the Contract Documents and the Payment Legislation the Owner shall:
- .1 make monthly progress payments to the Contractor on account of the Contract Price when due in the amount certified by the Consultant together with such Value Added Taxes as may be applicable to such amount certified by the Consultant;

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- .2 on the 61st day following Substantial Performance of the Work, pay the Contractor the unpaid balance of the basic holdback amount when due together with such Value Added Taxes as may be applicable to such payment; and
 - .3 upon the issuance of the final certificate for payment, pay to the Contractor the unpaid balance of the Contract Price when due together with such Value Added Taxes as may be applicable to such payment.
- 5.2 As such payments become due, the Contractor shall, in accordance with the terms of its agreements with any Subcontractors, Suppliers and workmen, pay all of its Subcontractors, Suppliers and workmen in full on account of work properly performed or Products properly supplied, as applicable, less any holdback monies retained in compliance with the Payment Legislation.
- 5.3 In the event of loss or damage occurring where payment becomes due under the property and boiler and machinery insurance policies, payments shall be made to the Contractor in accordance with the provisions of GC 11.1 - INSURANCE of the General Conditions.
- 5.4 Interest
- .1 Should either party fail to make payments as they become due under the terms of the Contract or in an award by arbitration or court, interest at the greater of one per cent per annum above the bank rate and the minimum rate required under the Payment Legislation on such unpaid amounts shall also become due and payable until payment. Such interest shall be compounded on a monthly basis. The bank rate shall be the rate established by the Bank of Canada as the minimum rate at which the Bank of Canada makes short term advances to the chartered banks.
 - .2 Interest shall apply at the rate and in the manner prescribed by paragraph 5.4.1 of this Agreement on the amount of any claim advanced and for which the Contractor is thereafter entitled to payment, either pursuant to Part 8 - Dispute Resolution of the General Conditions, or otherwise, from the date the amount would have been due and payable under the Contract, had it not been in dispute, until the date it is paid."

SC.5 ARTICLE A-6 RECEIPT OF AND ADDRESSES FOR NOTICES IN WRITING

- 1. In paragraph 6.2, **delete** "or by other form of electronic communication during the transmission of which no indication of failure of receipt is communicated to the sender."
- 2. **Add** new paragraph 6.6 to Article A-6 RECEIPT OF AND ADDRESSES FOR NOTICES IN WRITING, as follows:

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- “6.6 In addition to the addresses, requirements and timelines set out in this paragraph 6.6, the following applies:
- .1 for the purposes of Part I.1 the *Construction Act* (Prompt Payment) and Part 5 - PAYMENT,
 - (i) applications for payment and Proper Invoices will be considered given or delivered by the Contractor to the Owner when they are received by the Owner and such receipt can be verified; and
 - (ii) notices of non-payment will be considered to have been given or delivered by the Owner to the Contractor when they have been sent by the Owner and such delivery can be verified, and
 - .2 for the purposes of Part II.1 of the *Construction Act* (Adjudication), any notices, communications or delivery of documents to be given under the Payment Legislation will:
 - (i) in the case of the Owner, be given by the Contractor, by electronic mail, to adjudication@peelregion.ca and to the individuals and locations indicated in the Owner’s Notice in Writing delivered to the Contractor prior to the commencement of the Work; and
 - (ii) in the case of the Contractor, be given by the Owner to individuals and locations indicated in the Contractor’s Bidder Submission.”

SC.6 ARTICLE A-7 – LANGUAGE OF THE CONTRACT

1. **Delete** paragraph 7.1 and **replace** with the following:
- “7.1 When the Contract Documents are prepared in both English and French languages, it is agreed that in the event of any apparent discrepancy between the English and French versions, the English language shall prevail.”

SC.7 ARTICLE A-9 ASSIGNMENT OF SUBCONTRACTS

1. **Add** new ARTICLE A-9 - ASSIGNMENT OF SUBCONTRACTS, as follows:
- “ARTICLE A-9 ASSIGNMENT OF SUBCONTRACTS**
- 9.1 The Owner shall not be deemed by virtue of the Contract or for any other reason to have any contractual relationship with or obligation to any Subcontractor or Supplier but the Contractor hereby agrees that in the event that:
- .1 the Contract is terminated; or
 - .2 the Contractor’s right to continue the Work is terminated;

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and at the sole and absolute option of the Owner, any or all subcontracts for Work or Products as may be selected by the Owner, in its sole and absolute discretion, shall, upon notice to the Contractor and the affected Subcontractors and Suppliers from the Owner, be assigned to the Owner, without any further action being necessary from the Contractor or the affected Subcontractors and Suppliers and in order to ensure the Owner's rights, the Contractor shall:

.3 contractually obligate each of its Subcontractors and Suppliers to agree that each such subcontract shall be assignable, at the Owner's option, to the Owner, upon delivery of the notice described above, in the event that:

- (i) the Contract is terminated; or
- (ii) the Contractor's right to continue the Work is terminated.

9.2 The Contractor shall provide satisfactory evidence to the Owner that this obligation has been fulfilled."

SC.8 DEFINITIONS

1. In the definition of "Change Directive" **delete** the words "within the general scope of the Contract Documents".
2. In the definition of "Consultant" **add** the following sentence after the last sentence:

"The words 'Engineer', 'Architect' or 'Consultant' wherever used in the Contract Documents shall be regarded as synonymous."
3. In the definition of "Contractor" add the following sentence after the second sentence:

"For the purpose of the Contract, the words 'Contractor', 'Vendor' or 'General Contractor' shall be regarded as synonymous."
4. In the definition of "Drawings" **add** "and approved, in writing, by the Owner" after the word "issued," in the second line.
5. In the definition of "Place of the Work" **add** the following sentence:

"The term 'Place of the Work' and 'Site' wherever used in the Contract Documents shall be regarded as synonymous."
6. In the definition of "Ready-for-Takeover" delete everything after "when" and replace with "the Owner confirms in writing that the Contractor has achieved Ready-for-Takeover in accordance with paragraph 12.1.4".8.
7. In the definition of "Shop Drawings" **delete** "which the Contractor provides" and **replace** with "to be provided by the Contractor".
9. In definition "Specifications" **add** "and approved, in writing, by the Owner" after "issued," in the first line.

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10. In definition “Work” **add** “, Products, installation, Commissioning and Testing, checkout, start-up, testing” after “total construction”.

11. **Delete** definition “Working Day” in its entirety and **replace** with the following:

“Working Day

Working Day means a day when The Regional Municipality of Peel is open, Monday to Friday, and does not include weekends or statutory holidays.”

12. **Add** the following new definitions in the appropriate order alphabetically:

“Authorities Having Jurisdiction

The phrase Authorities Having Jurisdiction or the term Authorities means those authorities having jurisdiction under law over the Work or parts thereof.

Commission and Test

Commission and Test means, and Commissioning and Testing refers to, the procedure which includes testing, reviewing, inspecting, checking, adjusting, and measuring Work performed by the Contractor to demonstrate and verify the installation, operation and performance of all components and the entire system, including certification of any such Commissioning and Testing.

Contractual Milestone

Contractual Milestone means the phases or milestones of the Work as described in the Specifications, which are intended by the Parties to constitute phases for the purposes of a phased release of holdback in accordance with the Payment Legislation.

Construction Schedule

Construction Schedule means the schedule indicating the timing of major activities of the Work submitted by the Contractor and approved in writing by the Owner including attaining Substantial Performance of the Work by the Substantial Performance Date and the date set out for Ready-for-Takeover, as described in GC 3.4 - CONSTRUCTION SCHEDULE.

Excess Soil

Excess Soil includes “excess soil” within the meaning of the Excess Soil Regulation.

Excess Soil Legislation

Excess Soil Legislation means any laws, ordinances, rules, regulations or codes, which are or become in force during the performance of the Work dealing with the excavation, management, handling, storage, removal, disposal and transportation of Excess Soil including, the Excess Soil Regulation.

Excess Soil Regulation

Excess Soil Regulation means the On-Site and Excess Soil Management Regulation (O. Reg. 406/19).

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Hazardous Material

Hazardous Material means, collectively, any contaminant, designated substance, waste, hazardous waste or subject waste (as defined in the Ontario Environmental Protection Act and any associated regulations as amended from time to time (the “EPA”) or the *Ontario Occupational Health & Safety Act* and any associated regulations, as amended from time to time (the “OHSA”)), toxic substance (as defined in the *Canadian Environmental Protection Act* and any associated regulations, as amended from time to time (the “CEPA”)), dangerous goods (as defined in the *Transportation of Dangerous Goods Act* (Canada) and any associated regulations, as amended from time to time (“TDGA”)), or pollutant (as defined in the EPA), or any other substance or material which, when released to the natural environment, is likely to cause harm, injury, loss, damage, impairment or degradation to the natural environment or a risk or harm, injury, loss, damage, or impairment to human health and safety, including asbestos, “PCBs”, arsenic, silica and any other contaminant, substance, or material defined or regulated in, or for purposes of, any applicable law. Whenever the terms “toxic and hazardous substances” is used in the Contract, it shall be deemed amended to read “Hazardous Material”.

Install

Install means the placement of materials, equipment, or components, including receiving, unloading, transporting, storage, uncrating and installing, and performance of such testing and finish work as is compatible with the degree of installation specified.

Project Leader

Project Leader means the “project leader” within the meaning of the Excess Soil Regulation.”

Proper Invoice

Proper Invoice means an application for payment in the form of invoice provided by the Owner to the Contractor, if applicable, containing the information that may be required for the application for payment to constitute a “proper invoice” under the Payment Legislation, including the following:

1. All of the information specified to be included in a proper invoice as set out in section 6.1 of the *Construction Act*, namely:
 - a. the Contractor’s name and address;
 - b. the date of the application for payment and the period during which the Work was performed;
 - c. information identifying the authority, whether in the Contract or otherwise, under which the Work was performed;
 - d. a description, including quantity where appropriate, of the Work performed and Products supplied;

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- e. the amount payable for the Work performed, and the payment terms; and
 - f. the name, title, telephone number and mailing address of the person to whom payment is to be sent;
- 2. an original statutory declaration in the form of CCDC 9A, or other form of statutory declaration that includes the same unqualified declaration, certifying that all accounts of the Contractor, including for the subcontracts, construction machinery and equipment, materials, Products, labour and other indebtedness which may have been incurred by the Contractor and for which the Owner might in any way be held responsible have been paid in full, except for amounts properly retained as holdback or as an identified amount in dispute;
- 3. the total amount of expenditures to date and the total estimated expenditures to be made for the remaining balance of the Work;
- 4. after the first application for payment, evidence of compliance with the applicable worker's compensation legislation at the Place of the Work, including payments due thereunder;
- 5. any certificates, inspection reports, or data resulting from Commissioning and Testing required under the Contract Documents confirming the satisfactory completion of such Commissioning and Testing;
- 6. payment receipts for Products and materials purchased under conditional sales contracts;
- 7. a breakdown of approved Change Orders and percentage completed of each shall be included, in a form satisfactory to the Owner;
- 8. all documents evidencing that the Work complies with the Excess Soil Legislation and such other documents as required by the Excess Soil Legislation; and
- 9. any additional information that the Owner or the Consultant may reasonably require."

Provide

Provide means to supply and install or supply, install and connect as applicable, complete and in place, including accessories, finishes, tests, and services required to render each item so specified complete and ready for use.

Release

Release means a release by the Contractor substantially in the form set out in the Contract Documents or as the Owner may prescribe.

Reports

Reports means the Reports set out in Article A-3 - CONTRACT DOCUMENTS.

Rules of Mediation and Arbitration

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Rules of Mediation and Arbitration mean the rules as provided in CCDC 40 in effect at the time of bid close.”

Substantial Performance Date

Substantial Performance Date means the date by which the Contractor shall attain Substantial Performance of the Work as specified in Article A-1 - THE WORK, or, if there are Non-Contiguous Improvements, the dates by which the Contractor shall attain Substantial Performance of the Work for a given improvement as specified in Article A-1 - THE WORK.

Supply or Furnish

Supply or Furnish means fabrication or procurement of materials, equipment, or components, or performance of services to the extent specified and shown. Where used with respect to materials, equipment, or components, the term includes crating and delivery to the Place of the Work but is not intended to include installation of items, either temporary or final.”

SC.9 GC 1.1 CONTRACT DOCUMENTS

1. **Delete** the first sentence in paragraph 1.1.1 and **replace** it with the following:
“1.1.1 The intent of the Contract Documents is to include the construction, labour, Products, Construction Equipment and other services necessary, complementary or ancillary, for the performance and completion of the Work by the Contractor in accordance with the Contract Documents or properly inferable from them.”
2. **Delete** paragraphs 1.1.3 and 1.1.4 and **replace** them with the following:
“1.1.3 The Contractor shall review the Contract Documents and shall report promptly to the Owner and the Consultant any error, inconsistency, or omission the Contractor may discover. If the Contractor does discover any error, inconsistency, or omission in the Contract Documents, the Contractor shall not proceed with the Work affected until the error, inconsistency or omission has been addressed and in dealing with such error, inconsistency or omission the Contractor shall co-operate with the Owner in good faith to resolve such errors, inconsistency or omission so as to avoid any increase in the Contract Price or delay in the progress of the Work. Notwithstanding the foregoing, inconsistencies and omissions shall not include lack of reference on the Drawings or in the Specifications to labour and/or Products that are required or normally recognized within respective trade practices as being necessary for the complete execution of the Work.
1.1.4 The Contractor declares and represents that in entering into the Contract with the Owner for the performance of the Work, it has reviewed any and all documentation including, without limitation, the Reports provided by the Owner and has either visually investigated for itself the character of the Work to be done and all local conditions including, without limitation, the position of all pole lines, conduits, watermains, sewers and other

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underground and overground utilities and structures, or that, not having so reviewed or visually investigated, the Contractor has assumed and does hereby assume all risk of conditions now existing or arising in the course of the Work which could have been reasonably identified by a visual inspection or which are identified or inferred in any information provided by the Owner including, without limitation, the Reports, which might or could make the Work, or any items thereof more expensive in character, or more onerous to fulfill, than was contemplated or known when the Contract was signed.”

3. **Delete** paragraph 1.1.5.1 in its entirety and **replace** with the following:

“.1 the order of priority of documents, from highest to lowest, shall be:

- The agreement between the Owner and the Contractor
- The Definitions
- Addenda, as issued
- Instruction to Bidders
- Supplementary General Conditions to CCDC2-2020
- Agreement to Bond
- Specifications
 - Division 01 – General Requirements
 - 01 11 00 - Summary of Work
 - 01 14 00 - Work Restrictions
 - 01 32 16 - Construction Progress Documentation
 - 01 33 00 - Submittal Procedures
 - 01 35 29 - Health and Safety Requirements
 - 01 41 00 - Regulatory Requirements
 - 01 45 00 - Quality Control
 - 01 51 00 - Temporary Utilities
 - 01 74 00 - Cleaning
 - 01 74 19 - Waste Management And Disposal
 - 01 77 00 - Closeout Procedures
 - 01 78 00 - Closeout Submittals
 - 01 79 00.13 - Demonstration And Training
 - 01 91 13 - General Commissioning Requirements
 - 01 91 13.13 - Commissioning Plan
 - Division 07 – Thermal and Moisture Protection
 - 07 84 00 - Fire Stopping
 - 07 92 00 - Joint Sealants
 - Division 23 – Heating, Ventilating and Air-Conditioning (HVAC)
 - 23 01 05 - Use of HVAC Systems During Construction
 - 23 05 00 - Common Work Results for HVAC
 - 23 05 05 - Installation of Pipework
 - 23 05 17 - Pipe Welding
 - 23 05 29 - Hangers & Supports for HVAC Piping & Equipment
 - 23 05 48 - Vibration Isolation for HVAC Piping and Equipment
 - 23 05 93 - Testing, Adjusting and Balancing

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- 23 07 13 - Mechanical Insulation
 - 23 08 10 - Commissioning of Mechanical Systems
 - 23 11 23 - Natural gas Piping System
 - 23 31 05 - Standard Ductwork
 - 23 33 00 - Duct System Dampers and Accessories
 - 23 34 00 - HVAC Fans
- Division 26 – Electrical
 - 26 05 00 - Common Work Results for Electrical
 - 26 05 05 - Selective Demolition for Electrical
 - 26 05 14 - Power Cable and Overhead Conductors (1001V)
 - 26 05 20 - Wire and Box Connectors 0-1000V
 - 26 05 21 - Wires and Cables Up To 1000V
 - 26 05 22 - Connectors and Terminations
 - 26 05 28 - Grounding - Secondary
 - 26 05 29 - Hangers and Supports for Electrical Systems
 - 26 05 30 - Wiring Methods
 - 26 05 31 - Splitters Junction Pull Box Cabinets
 - 26 05 32 - Outlet Boxes Conduit Boxes and Fittings
 - 26 05 33 - Raceways And Boxes for Electrical Systems
 - 26 05 34 - Conduits, Conduit Fastenings and Conduit Fittings
 - 26 05 73 - Overcurrent Protective Devices Coordination Study
 - 26 08 00 - Commissioning of Electrical Systems
 - 26 12 16.01 - Dry Type Transformers Up To 600v Primary
 - 26 24 13 - Switchboard
 - 26 27 26 - Wiring Devices
 - 26 28 13.01 - Fuses Low Voltage
 - 26 28 16.02 - Molded Case Circuit Breakers
 - 26 28 20 - Ground Fault Circuit Interrupters Class A
 - 26 28 23 - Disconnect Switches - Fused and Non-fused
 - 26 29 03 - Control Devices
 - 26 32 13.02 – Power Generation Natural Gas
 - 26 77 19.20 - Closeout Requirements for Electrical Work
- Division 28 – Electronic Safety and Security
 - 28 46 00 - Fire Detection and Alarm
- Site Drawings
 - G-001 Cover Page
 - G-002 Key Plan
 - A0.01 Cover Page
 - A1.01 General Notes, Legends, Key Plan, Site Location
 - A1.02 Overall Ground Floor Plan & Reflected Ceiling Plan
 - A1.03 Overall Typical Floor Plan & Reflected Ceiling Plan (Lvl 2 & 3)
 - A1.04 Enlarged Unit Plans & RCPS
 - A1.05 Enlarged Unit Plans & RCPS
 - A1.06 Enlarged Unit Plans & RCPS
 - A1.07 Sections & Details
 - S1 General Notes and Keyplan

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- S2 Garage Roof Framing Plan
 - S3 General Notes and Keyplan
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 - M-401 New Generator Room - HVAC Layout
 - M-501 Mechanical Details
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 - CCDC2 Stipulated Price Contract 2008 - This is not attached but forms part of the Contract
 - Digital Bid Bond
 - Form of Release at Substantial Performance of the Work
 - Performance Bond substantially in the form required under the Construction Act - This is not attached but forms part of the Contract
 - Labour and Material Payment Bond substantially in the form required under the Construction Act - This is not attached but forms part of the Contract
 - Owner's Staff/Other Contractors Project Construction Coordination Form
 - Owner's Staff/Other Contractors Anticipated to Attend Site for Contractor Coordination
 - Online Bidding System forms
4. In paragraph 1.1.9 **add** the following at the end of the paragraph:
"or in establishing the extent of the work to be performed by a trade."
5. In the first sentence of paragraph 1.1.10 **delete** "and shall remain the Consultant's property" and **replace** with "not the Contractor's property,".

SC.10 GC 1.4 ASSIGNMENT

1. **Delete** paragraph 1.4.1 in its entirety and **replace** with the following:

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- “1.4.1 The Contractor may not assign, subcontract, or otherwise transfer the Agreement or any of its rights, benefits, and/or obligations, without the Owner’s prior written consent.
- 1.4.2 The Owner may assign, transfer, convey, or otherwise dispose of the Agreement or any of its rights, benefits, warranties, and/or obligations, in whole or in part, without the prior written consent of, but with written notice to the Contractor in the following circumstances:
 - a) to one or more municipalities;
 - b) to a municipal service board;
 - c) to a municipal business corporation; or
 - d) if an assignment, transfer, conveyance or other disposition is required for any other reason, including as a result of, or pursuant to, a court order or a legislative act, including the “*Hazel McCallion Act (Peel Dissolution), 2023*,” as well as any regulations made thereunder; (collectively the “Assignee”).
- 1.4.3 Upon assignment, transfer, conveyance or other disposition to the *Assignee* of the Owner's obligations under the Agreement, the Owner shall be released from its obligations arising thereunder.
- 1.4.4 In the event of an assignment, transfer, conveyance or other disposition in accordance with section 1.4.2 above, the Contractor shall be responsible to immediately transfer any insurance, warranties, securities, or other similar obligations to the Assignee, or to make alternative arrangements for such obligations to the satisfaction of the *Assignee*.”

SC.11 GC 1.5 TIME IS OF THE ESSENCE OF THE CONTRACT

- 1. **Add** new GC 1.5 TIME as follows:
 - “GC 1.5 TIME
 - 1.5.1 All time limits stated in the Contract Documents are of the essence of the Contract.”

SC.12 GC 1.6 CONFIDENTIAL INFORMATION

- 1. **Add** new GC 1.6 CONFIDENTIAL INFORMATION as follows:
 - “**GC 1.6 CONFIDENTIAL INFORMATION**
 - 1.6.1 The Contractor agrees to protect and maintain the confidentiality of all personal or other information, including all personal health information, that the Contractor accesses or of which the Contractor acquires knowledge of as a result of the performance of its obligations under this Contract, and agrees to use, collect, disclose, retain, protect and dispose of the personal (health) information only in accordance with all privacy legislation applicable to the Owner where it is acting on behalf of the Owner. Disclosure of any information shall be done only with the Owner’s prior written consent. The provisions of the indemnity clause in this Contract apply to any breach of privacy or confidentiality in this clause.

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The Contractor shall ensure that its directors, officers, employees, agents, subcontractors and anyone else for whom it is responsible in law all adhere to the requirements of this section regarding privacy and confidentiality.

- 1.6.2 The Owner, and the Owner's responsibilities under this Contract, are subject to all applicable privacy legislation including the Municipal Freedom of Information and *Protection of Privacy Act*, R.S.O. 1990 c.M.56, as amended ("MFIPPA") and/or the *Personal Health Information Protection Act*, 2004 ("PHIPA") with respect to the collection, use, disclosure, retention and protection of confidential, sensitive or personal (health) information under the Owner's custody and control. Under an MFIPPA request, all correspondence, documentation and information provided to the Owner by the Contractor, including the Contract itself and associated documents, may be required by law to be made available to a requesting member of the public, with the possible exception that the party submitting certain information requests that it be treated as confidential and that there is an appropriate exemption to disclosure in MFIPPA, or a non-disclosure requirement in either MFIPPA or PHIPA.
- 1.6.3 All correspondence, documentation and information provided to the Owner by the Contractor in connection with or arising out of the Contract, once received by the Owner, shall become the property of the Owner. The Contractor must identify to the Owner in writing if the disclosure of any such correspondence, documentation or information, any scientific, technical, proprietary, commercial or other confidential information, could cause the Contractor injury.
- 1.6.4 The Contractor acknowledges that the Owner cannot guarantee it can honour requests to keep Contractor information confidential in light of applicable law requirements, and also in light of the need for transparency and public disclosure where release of the Contractor's information in public Council reports related to a specific project is necessary."

SC.13 GC 1.7 CO-OPERATION, CONSULTATION AND CO-ORDINATION

1. **Add** new GC 1.7 CO-OPERATION, CONSULTATION AND CO-ORDINATION as follows:

"GC 1.7 CO-OPERATION, CONSULTATION AND CO-ORDINATION

- 1.7.1 The Contractor shall, at all times and as part of the Work, fully assist, cooperate, consult and coordinate with the Consultant and any other consultants, Other Contractors, the Owner's own forces and other entities retained or identified by the Owner which are related to the Project (each, an "**Other Entity**" and collectively, the "**Other Entities**"). The objective of such assistance, co-operation, consultation and co-ordination is to make certain the Work is properly coordinated with and integrated with the work and services of the Other Entities.

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- 1.7.2 Without limiting the generality of any other provision in the Contract, the Contractor shall attend all design, construction, general co-ordination and progress meetings relating to the Work between the Consultant, the Owner and Other Entities and any other meeting relating to the Project as requested by the Owner to discuss and resolve all matters and issues relating to the Project. The Contractor shall, on a timely basis, prepare and distribute detailed minutes to the Owner of the construction and progress meetings which it attends, if requested by the Owner.”

SC.14 GC 2.2 ROLE OF THE CONSULTANT

1. **Add** the following sentence to paragraph 2.2.3 “The presence of such project representatives at the Place of the Work will not abrogate any of the Contractor’s responsibility to perform the Work as required by the Contract Documents.”
2. In paragraph 2.2.5 **add** “to the Contractor” after the words “the Consultant will not be responsible” in each of the first two sentences.
3. In paragraph 2.2.6 **delete** “Except with respect to GC 5.1 - FINANCING INFORMATION REQUIRED OF THE OWNER, the” and **replace** with “The”.
4. In paragraph 2.2.16 **add** “to the Contractor” after the words “the Consultant does not guarantee”.
5. In paragraph 2.2.18 **delete** “against whom the Contractor makes no reasonable objection and”.

SC.15 GC 2.3 REVIEW AND INSPECTION OF THE WORK

1. In the second sentence of paragraph 2.3.1 **delete** “the Consultant” and **replace** with “the Consultant and Owner”.
2. **Amend** paragraph 2.3.2 as follows:
 - (a) **delete** “tests” and **replace** with “Commissioning and Testing”;
 - (b) **add** “regulations, rules, by-laws, standards, guidelines, permits, statutes, codes,” before “laws or ordinances”;
 - (c) **add** “, and any applicable Commissioning and Testing” at the end of the first sentence; and
 - (d) **add** “and of any applicable Commissioning and Testing” at the end of the second sentence.
3. In paragraph 2.3.6 **delete** “designated in” and **replace** with “required by” and **add** “or required by the Consultant” after “Contract Documents”.
4. In paragraph 2.3.7 **delete** “designated in” and **replace** with “required by”.

SC.16 GC 2.4 DEFECTIVE WORK

1. In paragraph 2.4.1 **delete** “Consultant” in the first instance and **replace** with “Consultant and/or Owner” and **add** “, at the Contractor’s expense,” after “Contract Documents,”

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SC.17 GC 3.2 CONSTRUCTION BY THE OWNER OR OTHER CONTRACTORS

1. In paragraph 3.2.2.3, **add** the words “as the Owner considers appropriate” after the words “GC 11.1 - INSURANCE” in the second line.
2. **Add** the following sentence to paragraph 3.2.3.4 “Failure by the Contractor to so report shall invalidate any claims against the Owner by reason of deficiencies in the work of the Other Entities except those deficiencies not then reasonably discoverable.”
3. **Add** new paragraph 3.2.3.5 as follows:
 - .5 coordinate and perform the Work with care and diligence so as to ensure that the Owner and the Other Entities will be in a position to proceed according to schedule with the delivery, installation and testing of the equipment and other components to be incorporated into the Project and allow the Owner and the Other Entities reasonable opportunity to receive and store materials and products on site and to perform their work.”

SC.18 GC 3.4 CONSTRUCTION SCHEDULE

1. **Delete** paragraph 3.4.1 and **replace** with the following:
 - “3.4.1 The Contractor shall:
 - .1 prior to commencement of construction, prepare and submit to the Owner and the Consultant for their review and acceptance a construction schedule indicating the critical path for the Project, using Microsoft Project (.mpp format) or, demonstrating that the Work will be performed in conformity with the Contract Time, and shall conform to the phasing and sequencing requirements for the Work as set out in the Contract Documents or as otherwise required by the Consultant or the Owner including, without limitation, a Products delivery schedule with respect to the Products whose delivery is critical to the schedule of the Work. The Contractor shall provide the schedule information required by this paragraph 3.4.1.1 in both electronic format and hard copy. Once approved by the Owner and the Consultant, the construction schedule submitted by the Contractor under this paragraph 3.4.1.1, as updated by the Contractor and approved by the Owner, shall become the “Construction Schedule”;
 - .2 monitor the progress of the Work on a weekly basis relative to the Construction Schedule and update the Construction Schedule on a monthly basis;
 - .3 perform the Work in accordance with the Construction Schedule;
 - .4 advise the Consultant of any revisions required to the Construction Schedule as a result of extension of the Contract Time in accordance with PART 6 - CHANGES IN THE WORK; and

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- .5 identify potential variances between scheduling and scheduled completion dates and implement necessary adjustments in the Construction Schedule in order to attain Substantial Performance of the Work by the Substantial Performance Date and to attain the date set out for Ready-for-Takeover in the Construction Schedule.”
- 2. **Add** new paragraphs 3.4.2 and 3.4.3 as follows:
 - “3.4.2 On request of the Consultant, the Contractor shall provide information regarding the progress of the Work or any part of it, or, copies, schedules and orders covering materials, components and services. The Contractor shall cooperate fully with the Consultant, and shall ensure that all Subcontractors and Suppliers and anyone for whom the Subcontractors and Suppliers may be responsible also cooperate and make available on request the same documents.
 - 3.4.3 Without limiting the other obligations of the Contractor under GC 3.4, the Contractor shall not amend the Construction Schedule (including, without limitation, any changes to the critical path) without the prior written approval of the Owner.”

SC.19 GC 3.5 CONTRACTOR’S PERSONNEL COMMITMENT

- 1. **Delete** GC 3.5 - SUPERVISION in its entirety and **replace** it with the following:

“GC 3.5 CONTRACTOR’S PERSONNEL COMMITMENT

 - 3.5.1 The Contractor shall furnish a competent and adequate staff, who shall be in attendance at the Place of the Work at all times, as necessary, for the proper administration, co-ordination, supervision and superintendence of the Work; organize the procurement of all materials and equipment so that they will be available at the time they are needed for the Work; and keep an adequate force of skilled workmen on the job to complete the Work in accordance with all requirements of the Contract Documents.
 - 3.5.2 Prior to commencement of the Work, the Contractor shall select a competent and experienced full time project manager (the “**Project Manager**”), and a competent and experienced full time site supervisor (the “**Site Supervisor**”) who shall be in attendance at the Place of the Work at all times. The Project Manager shall have full responsibility for the prosecution of the Work, with full authority to act in all matters as may be necessary for the proper co-ordination, supervision, direction and technical administration of the Work, who shall attend site meetings in order to render reports on the progress of the Work and who shall have authority to bind the Contractor in all matters related to this Contract. The Project Manager and the Site Supervisor shall be satisfactory to the Owner and shall not be changed except for good reason and with the prior written approval of the Owner.

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- 3.5.3 The Project Manager and Site Supervisor shall represent the Contractor at the Place of the Work and notices and instructions given to the Project Manager and/or the Site Supervisor shall be held to have been received by the Contractor.
- 3.5.4 The Contractor may not change its Project Manager or its Site Supervisor without the Owner's prior written approval which shall not be unreasonably withheld. Further, the Contractor shall not employ or continue to employ on the Work anyone to whom the Owner may reasonably object.
- 3.5.5. The Contractor shall provide the Owner and the Consultant with the names, addresses and telephone numbers of the Project Manager, the Site Supervisor and other responsible field persons who may be contacted for emergency and other reasons during non-working hours."

SC.20 GC 3.6 SUBCONTRACTORS AND SUPPLIERS

- 1. In paragraph 3.6.4 **add** "or anyone else performing the Work" after "Supplier".
- 2. **Add** new paragraph 3.6.7 as follows:
 - "3.6.7 The Contractor shall not change any of the Subcontractors or Suppliers proposed by it in writing and accepted by the Owner at the signing of the Contract without the Owner's prior written consent or execute any subcontracts for the performance of the Work without the Owner's prior written consent."

SC.21 GC 3.7 LABOUR AND PRODUCTS

- 1. **Delete** paragraph 3.7.1 and **replace** it with the following:
 - "3.7.1 The Contractor shall:
 - .1 maintain good order and discipline among all personnel engaged on the Work;
 - .2 not employ any persons on the Project whose labour affiliation (or lack thereof) is incompatible with other labour employed in connection with this Project or at the Place of the Work; and
 - .3 act promptly on all problems of labour relations including grievances and jurisdictional disputes. The Contractor shall not employ on the Work anyone not skilled in the task assigned to it and the Owner has the right to require the Contractor to remove from the workforce for the Work any employee, representative or other personnel deemed by the Owner, acting reasonably, to be incompetent, careless or otherwise objectionable, or whose actions are contrary to public interest or inconsistent with the best interest of the Owner."
- 2. **Amend** paragraph 3.7.3 as follows:
 - (a) **add** "and free from defects." after "new"; and

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- (b) **delete** the second sentence of paragraph 3.7.3 and **replace** it with the following:
- “All Products and workmanship shall be in every respect of the best quality and the Work shall be performed in accordance with the best modern practice. Whenever the Contract Documents, or directions of the Consultant, admit of a reasonable doubt about what is permissible, and when they fail to state the quality of any Work, the interpretation that requires the quality be consistent with the quality of similar Products specified is to be followed.”
3. **Add** new paragraph 3.7.4 as follows:
- “3.7.4 The cost for overtime required beyond the normal working day to complete individual construction operations of a continuous nature, such as pouring or finishing of concrete or similar work, or work that the Contractor elects to perform at overtime rates without the Owner or the Consultant requesting it shall not be chargeable to the Owner and shall be at the sole cost and expense of the Contractor.”
4. **Add** new paragraph 3.7.5 as follows:
- “3.7.5 The Owner and the Contractor acknowledge and agree that the beneficial ownership of any portion of the Products required by the Contract Documents to be incorporated and form part of the Work shall pass to the Owner immediately upon payment therefore or upon incorporation thereof as part of the Work, whichever first occurs. For greater certainty, title to Products delivered, but not installed, shall pass to the Owner when paid for (subject to any applicable holdback). The Contractor agrees to promptly execute and deliver to the Owner, from time to time as the Owner may require, any further documentation required to identify, evidence, perfect or protect the Owner’s beneficial, or registered, interest in the Products, including, without limitation, any registrations pursuant to the Personal Property Security Act (Ontario). Notwithstanding the foregoing, the Contractor acknowledges and agrees that it shall continue to bear the risk of loss or damage with respect to the Work until the date of acceptance of the Work by the Owner in accordance with the Contract Documents.”

SC.22 GC 3.8 SHOP DRAWINGS

1. In paragraph 3.8.1 **add** “or as the Consultant may reasonably request” at the end of the paragraph.

SC.23 GC 3.9 OPERATIONAL RISKS

1. **Add** new GC 3.9 - OPERATIONAL RISKS as follows:

“GC 3.9 OPERATIONAL RISKS

- 3.9.1 The position of all pole lines, conduits, water mains, sewers and other underground and overground utilities and structures is not necessarily

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shown on the Contract Drawings, and, where shown, the accuracy of the position of such utilities and structures is not guaranteed. Before starting Work, the Contractor shall inform itself of the exact locations of such utilities and structures, and shall be liable for damages, as a result of any act or omission, to any utilities identified or reasonably to have been identified, whether or not the result of negligence, by those for whom he is responsible. Unless otherwise specified, the Contractor shall temporarily support or relocate such utilities and structures, or temporarily remove them, and restore them, to the satisfaction of the owners of the utilities and structures. The Contractor waives any claim and releases the Owner and the agents of the Owner from all liability for damages suffered as a result of such Contract Drawings or any operation required under this paragraph.

- 3.9.2 Permanent relocation of underground or overhead utilities will be performed and paid for by the Owner, if necessitated by coincidence of lines or grades, or both unless such relocation has been specifically included within the Work by the drawings or specifications. The Contractor shall be responsible for scheduling permanent relocations of utilities with the Work.
- 3.9.3 The Consultant will provide the Contractor in writing with bench marks and points of reference to be used by him in setting out the Work. The Owner will be responsible only for the correctness of the information so supplied. From these bench marks and points of reference the Contractor will do his own setting out. The setting out by the Contractor shall include but shall not be limited to the preparation of grade sheets, the installation of centre lines stakes, grade stakes, offsets and site rails.”

SC.24 GC 5.1 FINANCING INFORMATION REQUIRED OF THE OWNER

1. **Delete** GC 5.1 - FINANCING INFORMATION REQUIRED OF THE OWNER in its entirety and **replace** it with the following:

“GC 5.1 ESTIMATES

- 5.1.1 On the 25th day of each month during the Contract Time, the Contractor will deliver to the Consultant a draft of the Contractor’s proposed application for payment for all of the Work performed by the Contractor in that month (a **“Draft Application”**), in order to facilitate and expedite payments under GC 5.2 APPLICATIONS FOR PAYMENT, GC 5.3 PAYMENT and GC 5.5 FINAL PAYMENT, including an estimate of the Work to be performed and Products to be delivered at the date of such application for payment but before the end of that month and including any reports or certificates confirming the satisfactory completion of any Commissioning and Testing of any part of the Work that the Contractor will include in its final and proper application for payment pursuant to paragraph 5.2.1.

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- 5.1.2 The Contractor shall review with the Consultant and the Owner, at a scheduled time, the Draft Application and the percentage of the Work completed for each item indicated in the schedule of values. This procedure shall be complied with for each Draft Application for payment.
- 5.1.3 Nothing in GC 5.1 - ESTIMATES is intended to condition, pre-condition, prevent or delay the Contractor's right to submit its final and proper applications for payment in accordance with paragraph 5.2.1 of this Contract and the Payment Legislation."

SC.25 GC 5.2 APPLICATIONS FOR PAYMENT

- 1. **Delete** paragraphs 5.2.1 and 5.2.2 and **replace** with the following:
 - "5.2.1 Notwithstanding GC 5.1 ESTIMATES and the submission of a Draft Application, the Contractor shall submit two copies its final and proper application for payment to the Consultant and the Owner, in a form satisfactory to the Owner, monthly as the Work progresses on the first Working Day after the end of the month to which the application for payment relates. Deviation or incomplete submissions with respect to the form will require resubmission of the application for payment. Applications for payment not submitted on that day may be deferred by the Owner to the next following month. Applications for payment submitted after the 180th day after the end of the month to which the application for payment relates will not be accepted or paid for by the Owner.
 - 5.2.2 The Contractor shall ensure that each application for payment for Work complies with the requirements set out in this Contract, and will include as part of it application for payment of all the documents and information required in this Part 5 - PAYMENT and required for a Proper Invoice, including any reports or certificates confirming the satisfactory completion of any Commissioning and Testing of any completed part of the Work. The Owner may, in its discretion, reject any application for payment that does not comply with GC 5.2 - APPLICATIONS FOR PAYMENT, or the Owner may withhold up to 100 per cent of the amounts otherwise payable in relation to that application for payment until such application for payment includes all of the documents and information required under this Part 5 - PAYMENT and for a Proper Invoice. Without limiting the foregoing, authorization for payment of products and materials purchased under conditional sales contracts shall not be made by the Owner until evidence of payment is submitted."
- 2. **Delete** paragraph 5.2.7 in its entirety and replace with "INTENTIONALLY DELETED."

SC.26 GC 5.3 PAYMENT

- 1. In paragraph 5.3.1.1 **delete** "10 calendar days" and **replace** with "5 Working Days"
- 2. **Delete** paragraph 5.3.1.2 in its entirety and **replace** with the following:

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“subject to the certifications set out in the Consultant’s certificate for payment and to the Payment Legislation, including the delivery of a notice of non-payment under the Payment Legislation, the Owner shall make payment to the Contractor on account as provided in Article A-5 of the Agreement - PAYMENT on or before 28 days after the date that the Consultant or the Owner receives the Contractor’s application for payment and Proper Invoice in accordance with this Contract.”

3. **Add** new paragraphs 5.3.2 and 5.3.3 as follows:

“5.3.2 If the Contractor fails to comply with paragraph 5.2 APPLICATIONS FOR PAYMENT or paragraph 10.4 WORKERS’ COMPENSATION, the Owner shall not be required to make payments to the Contractor until the obligation has been complied with.

5.3.3 Payment by the Owner pursuant to the Contract shall not preclude the Owner from thereafter disputing any of the items involved and shall not be construed as acceptance of any part of the Work.”

SC.27 GC 5.4 SUBSTANTIAL PERFORMANCE OF THE WORK AND PAYMENT OF HOLDBACK

1. **Add** “Subject to paragraph 3.2 of Article A-3 - CONTRACT DOCUMENTS,” at the beginning of paragraph 5.4.1.

2. **Delete** paragraphs 5.4.2 through 5.4.6, inclusive, in their entirety and **replace** them with the following:

“5.4.2 At the time of issuance by the Consultant of the certificate of Substantial Performance of the Work, the Consultant shall:

- .1 notify the Contractor of the value of the Warranty Holdback required by paragraph 12.4 WARRANTY SECURITY HOLDBACK, hereof.
- .2 prepare a separate certificate (the “Substantial Performance Payment Certificate”) showing:
 - (i) the value of work completed to date,
 - (ii) the value of outstanding or uncompleted work,
 - (iii) the value of the required Warranty Holdback,
 - (iv) the amount of the holdback being held in accordance with the Payment Legislation (allowing for any previous release of holdback to the Contractor in respect of completed Subcontractors, Suppliers and deliveries of pre-selected equipment),
 - (v) the amount due the Contractor, and
- .3 prepare a payment certificate releasing to the Contractor the holdback held in accordance with the Payment Legislation in respect of Work performed up to the Substantial Performance

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Date which will certify, among other matters, that all documents and information have been delivered by the Contractor that are required under GC 5.4 SUBSTANTIAL PERFORMANCE OF THE WORK AND PAYMENT OF HOLDBACK.

- 5.4.3 After the issuance of the certificate of Substantial Performance of the Work, the Contractor shall:
- .1 submit an application for payment of the holdback amount containing all of the information and documents required under this Contract and of a Proper Invoice;
 - .2 an original statutory declaration in the form of CCDC 9A, or other form of statutory declaration that includes the same unqualified declaration, that all liabilities incurred by the Contractor and its Subcontractors and Suppliers in carrying out the Contract have been discharged, and that all liens in respect of the Contract and subcontracts thereunder have expired or have been satisfied, discharged or provided for by payment into court, to state that all accounts for materials, labour, subcontracts, products, construction equipment, and other indebtedness which may have been incurred by the Contractor, or by any Subcontractor or Supplier, up to the date of Substantial Performance of the Work and for which the Owner might in any way be held responsible have been paid in full, except for amounts properly retained as a holdback or as an identified amount in dispute;
 - .3 submit a written undertaking by the Contractor to complete expeditiously any outstanding Work and to discharge all unfulfilled obligations under the Contract;
 - .4 submit the Contractor's final claim for all amounts incurred before and on the date of Substantial Performance of the Work;
 - .5 submit a Release by the Contractor;
 - .6 submit any certificates, inspection reports, or data resulting from Commissioning and Testing required under the Contract Documents confirming the satisfactory completion of such Commissioning and Testing;
 7. all documents evidencing that the Work complies with the Excess Soil Legislation and such other documents as required by the Excess Soil Legislation;
 - .8 submit all manuals, as-built drawings and other turnover documents required under the Contract Documents; and
 - .9 any additional information that the Owner or the Consultant may reasonably require."

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- 5.4.4 Notwithstanding the foregoing, if the Contractor has not provided the documents required by the General Conditions by the 30th day after the publication of the certificate of Substantial Performance of the Work, the Owner, at its discretion, shall be entitled to withhold an amount equal to up to 100 per cent of the amount of statutory holdback as security for the Contractor's delivery of the outstanding document(s). In the event of a withholding under this GC 5.4.4, the Owner shall pay the withheld amount to the Contractor upon the earlier of (a) the Contractor's delivery of such documents, (b) the end of the limitation period related to any claim that could arise from the Contractor's non-delivery, and (c) a determination by the Consultant that such withheld amount should be released to the Contractor.
- 5.4.5 Subject to the requirements of any Payment Legislation and the delivery by the Owner of a notice of non-payment under the Payment Legislation, the statutory holdback amount and any other holdback amount authorized by the certificate for payment of the holdback, shall become due and payable to the Contractor on the day following the expiration of the holdback period stipulated in the lien legislation applicable to the Place of the Work."
- 5.4.5 Subject to paragraphs 5.4.6 and 5.4.7 and subject to the Payment Legislation, when the Contractor considers that it has completed a Contractual Milestone, the Contractor may apply for the payment of holdback that has accrued under the Contract for the performance of the Work for that Contractual Milestone by delivering to the Owner an application for payment that includes all of the following:
- .1 a statutory declaration signed by the Contractor affirming (i) the amount of the Contract Price paid during that Contractual Milestone, (ii) the amount of the Contract Price remaining under the Contract (including amounts of all Change Orders and Change Directives), (iii) the amount of the statutory holdback accrued for that Contractual Milestone, (iv) that there are no adjudications or claims (including lien claims) outstanding between the Contractor and any of its Subcontractors or Suppliers, (v) that there are no liens registered against title or claims to lien to the Place of the Work or given to the Owner, (vi) that the Contractor has not received any notice in writing of a lien claim, (vii) that the Contractor has provided to each applicable Subcontractor and Supplier a notice that the Contractor has submitted an application for early payment of accrued holdback that includes holdback that will be paid to them after receipt of holdback from the Owner;
 - .2 a copy of the notice supplied to each applicable Subcontractor and Supplier as set out in paragraph 5.4.5.1(vii);

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- .3 evidence substantiating the amount of the accrued holdback for that Contractual Milestone claimed in the Contractor's application for payment, if requested by the Owner or the Consultant;
 - .4 the name, title, telephone number and mailing address of the person to whom payment is to be sent;
 - .5 the Contractor's HST number;
 - .6 a statutory declaration in the most current form of CCDC 9A, or other form of statutory declaration that includes the same unqualified declaration, that all liabilities incurred by the Contractor and its Subcontractors and Suppliers in carrying out the Contract have been discharged, and that all liens in respect of the Contract and subcontracts thereunder have expired or have been satisfied, discharged or provided for by payment into court;
 - .7 a statutory declaration in the most current form of CCDC 9B from each applicable Subcontractor or Supplier and a declaration from the Subcontractor or Supplier that it has been paid in full as required by the applicable contract up to and including the latest progress payment as at the signing of the declaration
 - .8 a Certificate of Clearance from the Workplace Safety and Insurance Board (WSIB) confirming that all assessments or compensation to the WSIB have been paid at the time the application for payment is submitted;
 - .9 Certificate of the Consultant certifying the full completion of the applicable Contractual Milestone; and
 - .10 any other information as the Owner or the Consultant may reasonably request.
- 5.4.6 Subject to the requirements of any Payment Legislation, the delivery by the Owner of a notice of non-payment under the Payment Legislation, and, without duplication, the payments of progressive releases of holdback made pursuant to paragraph 5.4.5, this paragraph 5.4.6, and paragraph 5.4.7, the statutory holdback amount and any other holdback amount authorized by the certificate for payment of the holdback, the Owner may pay such holdback to the Contractor on the date that is the day after all liens that may be claimed against the statutory holdback accruing for the applicable Contractual Milestone have expired or have been satisfied, discharged or otherwise provided for under the Payment Legislation (the "**Contractual Milestone Holdback Payment Date**").
- 5.4.7 The Owner shall not be obliged to release any accrued holdback on a phased basis or on the Contractual Milestone Holdback Payment Date unless and until all of the following conditions have been satisfied:
- .1 the Contract Price is greater than \$10,000,000 (or such higher amount as set out in the Regulations under the Payment

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Legislation), and the subcontract price for any Subcontractor or Supplier whose holdback is included in the Contractor's application for payment of accrued holdback is greater than \$5,000,000;

- .2 the Contract provides a description of the applicable Contractual Milestone;
- .3 the Contractor has included similar provisions for the release of accrued holdback upon the completion of a Contractual Milestone in its subcontracts with applicable Subcontractors and Suppliers. The Owner will not be obliged to release holdback in respect of subcontracts with applicable Subcontractors and Suppliers if the applicable subcontract does not include an acknowledgement that holdback will be released on a phased basis in accordance with the Payment Legislation and this Contract, and a requirement for the Contractor to pay the Subcontractor or Supplier the holdback within 7 days of receipt of same from the Owner, and the Contractor will provide evidence of such terms upon request by the Owner;
- .4 the Contractor is not in default at the time of its application for payment or on the Contractual Milestone Holdback Payment Date; and
- .5 as of the Contractual Milestone Holdback Payment Date, (i) there are no liens registered against title or claims to lien to the Place of the Work or any claims for lien given to the Owner, (ii) all liens in respect of the Contract have been satisfied, discharged or otherwise provided for under the Payment Legislation, (iii) the Owner has not issued to the Contractor a notice of non-payment of holdback, (iv) there are no adjudications or claims (including lien claims) outstanding between the Contractor and any of its Subcontractors or Suppliers, and (v) the Contractor has not received any written notice of lien.

5.4.8 the Contractor agrees to defend, indemnify and hold harmless the Owner from and against all actions, claims, demands, losses, costs (including fees and disbursements), damages, suits or proceedings whatsoever which may be brought against or made upon the Owner and against all loss, liability, judgments, claims, suits, demands or expenses which the Indemnified Parties may sustain, suffer or be put to resulting from or arising out of the payment of holdback pursuant to paragraphs 5.4.5, 5.4.6, or 5.4.7."

3. **Add** new paragraph 5.4. as follows:

"5.4. If there are Non-Contiguous Improvements, then, pursuant to the Payment Legislation, the Owner shall release holdback in accordance with this GC 5.4 upon the issuance of a certificate of

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Substantial Performance of the Work for each such improvement. The parties acknowledge and agree that, notwithstanding any release of holdback pursuant to this paragraph 5.4., the Owner shall be entitled to withhold amounts for the purposes of and pursuant to GC 12.4 - WARRANTY HOLDBACK as if the Owner had not made any release of holdback pursuant to this GC 5.4."

SC.28 GC 5.5 FINAL PAYMENT

1. In paragraph 5.5.1.1 **add** "as defined in Section 2(3) of the *Construction Act*" after the words "Work is completed" and **add** "containing all of the information and documents required under this Contract and of a Proper Invoice and including all final reports and certificates confirming satisfactory completion of all required Commissioning and Testing, to the extent applicable" after the words "final payment".
2. **Amend** paragraph 5.5.4 as follows:
 - (a) **add** "and provided that the Contractor has satisfied the requirements of paragraph 5.5.1," after "Place of the Work"; and
 - (b) **delete** "5 calendar days after" and **replace** with "28 calendar days after".
3. **Add** new paragraph 5.5.5 as follows:

"5.5.5 At the time of issuance by the Consultant of the final certificate of payment, the Consultant shall:

 - .1 Prepare a certificate (the "**Completion Payment Certificate**") showing:
 - (i) the final Contract Price,
 - (ii) the amount of the further 10 per cent holdback (based on the value of further work completed over and above the value of work completed shown in the Substantial Performance Payment Certificate),
 - (iii) the value of the required Warranty Holdback, and
 - (iv) the amount due to the Contractor.
 - .2 Prepare a payment certificate releasing to the Contractor the further 10 per cent holdback. Subject to the provisions of the Payment Legislation, including the Owner's issuance of a notice of non-payment of holdback, and the submission by the Contractor of the documents required by the General Conditions, such further 10 per cent holdback shall become payable after 60 days from the date of completion of the Work as established by the final certificate of payment.

If, at the end of the Warranty Period, any monies are still being retained by the Owner as Warranty Holdback or for other reasons, the Consultant

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will issue a certificate (the “**Warranty Holdback Payment Certificate**”) releasing the monies due the Contractor.”

SC.29 GC 5.6 DEFERRED WORK

1. In paragraph 5.6.1 **delete** “If” and **replace** with “Subject to applicable lien legislation, if”.

SC.30 GC 5.8 LIENS

1. **Add** new GC 5.8 LIENS as follows:

“GC 5.8 LIENS

- 5.8.1 Notwithstanding any other term or condition in the Contract Documents, the Owner shall not be obligated to make payment to the Contractor, if at any time such certificate or payment was otherwise due:
 - .1 a claim for lien arising from the performance of the Work has been registered against the Place of Work, or given to the Owner,
 - .2 a written notice of lien has been delivered to the Owner in accordance with the Payment Legislation; or
 - .3 the Owner or mortgagee of the Place of Work has received a written notice of lien.
- 5.8.2 In the event that a construction lien arising from the performance of the Work is registered against the Place of Work, or given to the Owner, the Contractor shall, within 10 calendar days, at its sole expense, vacate or discharge or otherwise remove the lien from title to the premises. If the lien is merely vacated, the Contractor shall, if requested, undertake the Owner’s defence of any subsequent lawsuit commenced in respect of the lien at the Contractor’s sole expense.
- 5.8.3 In the event that the Contractor fails or refuses to vacate or discharge a construction lien within the time prescribed above, if the Owner receives a notice of lien, the Owner shall, at its option, be entitled to take all steps necessary to vacate and/or discharge the lien, and all costs and expenses incurred by the Owner in so doing (including, without limitation, legal fees on a full indemnity basis, disbursements, the cost of any security to vacate the lien and any payment which may ultimately be made out of or pursuant to security posted to vacate the lien) shall be for the account of the Contractor, and the Owner may deduct such amounts from amounts otherwise due or owing to the Contractor. If the Owner vacates the lien, it shall be entitled to retain all amounts it would be required to retain pursuant to the Payment Legislation if the lien had not been vacated.
- 5.8.4 Without limiting any of the foregoing, the Contractor shall indemnify the Owner for all costs (including, without limitation, legal fees on a full indemnity basis) it may occur in connection with the claim for lien or subsequent lawsuit brought in connection with the lien, or in connection

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with any other claim or lawsuit brought against the Owner by any person that provided services or materials to the Place of Work which constituted a part of the Work.

- 5.8.5 This GC 5.8 does not apply to construction liens claimed by the Contractor.”

SC.31 GC 6.1 OWNER'S RIGHT TO MAKE CHANGES

1. In paragraph 6.1.1.2 **add** “or a Change Directive” after “Change Order”.
2. **Add** new paragraphs 6.1.3 to 6.1.8 as follows:
 - “6.1.3 The value of a change shall be determined in one or more of the following methods: (a) by estimate and acceptance in a lump sum; (b) by unit prices set out in the Contract or subsequently agreed upon; (c) by cost and a fixed or percentage fee.
 - 6.1.4 Where changes in the Work are paid for under method (b) of paragraph 6.1.3, the value of changes is based on the net difference in quantities with the appropriate unit rate applied.
 - 6.1.5 Where changes in the Work are to be paid under method (c) of paragraph 6.1.3, the cost to the Owner shall be the actual cost of credits and where additional work is required, the cost to the Owner shall be the actual cost plus a percentage covering overhead and profit, after all credits included in the change have been deducted. Wherein changes in the Work are to be paid under method (c) of paragraph 6.1.3, an allowance covering overhead and profit shall be calculated as follows:
 - .1 on Work performed by the Contractor’s own forces, 10 per cent; and
 - .2 on Work performed by Subcontractors or Suppliers, five per cent.
 - 6.1.6 If any change in the Work is made by which the amount of Work to be done is decreased, or if the whole or any portion of the Work is dispensed with, the Owner shall, subject to paragraph 6.1.3, not be liable to the Contractor for any costs or damages whatsoever including, without limitation, any indirect, consequential or special damages, such as loss of profits, loss of opportunity or loss of productivity.
 - 6.1.7 A Change Order shall be a final determination or adjustment in the Contract Time and Contract Price. There shall be no adjustments to the Contract Time or Contract Price or compensation or payment of any kind whatsoever (including, without limitation, claims for loss of productivity) based on the aggregate number, scope or value of changes in the Work whether resulting from Change Order or Change Directive.
 - 6.1.8 It is the express intention of the parties that any claims by the Contractor for a change in the Contract Price and/or Contract Time shall be barred unless there has been strict compliance with the requirements of all of PART 6 - CHANGES IN THE WORK and the Contractor has notified the

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Owner and Consultant, within the earlier of: (i) ten (10) Working Days of any event or circumstance of which Contractor has knowledge which provides the Contractor with a change in the Contract Price and/or Contract Time pursuant to the terms and conditions of the Contract, or (ii) such other period of time expressly allowed for by the Contract. Such notice from the Contractor shall include without limitation, sufficient and adequate information and documentation to allow the Consultant and the Owner to properly consider the claim of the Contractor (including, without limitation, the cause of the change in the Contract Time, a description of the impact on the change in the Contract Time will have on the critical path of the Construction Schedule and a description of the portions of the Work affected thereby and a breakdown of the change in the Contract Price, together with all pertinent details and all other backup information and documents). The Contractor has an ongoing obligation to augment the information and documents described in this paragraph as it becomes available. No course of conduct or dealing between the parties, no express or implied acceptance of alterations or additions to the Work, and no claims that the Owner has been unjustly enriched by any alteration or addition to the Work, whether in fact there is any such unjust enrichment or not, shall be the basis of a claim for additional payment under this Contract or a claim for any extension of the Contract Time."

SC.32 GC 6.3 CHANGE DIRECTIVE

1. **Delete** paragraph 6.3.2 and **replace** it with "INTENTIONALLY DELETED"
2. **Delete** paragraph 6.3.3 and **replace** it with "INTENTIONALLY DELETED".
3. In paragraphs 6.3.7.3 and 6.3.7.4, **delete** everything after "hand tools".
3. In paragraph 6.3.7.1 (2) **add** "required as a result of the change" after "materials or equipment".
4. **Add** the following to the end of paragraph 6.3.7.6: ", provided however that the costs included in such amounts shall be limited to the actual costs of the items described in this paragraph 6.3.7 changing 'Contractor' to 'Subcontractor' as necessary".
5. In paragraph 6.3.7.7 **add** "reasonable" before "travel".
6. At the end of paragraph 6.3.7, **add** the following:

"All other costs attributable to the change in the Work including the costs of all administrative or supervisory personnel are included in overhead and profit calculated in accordance with the provisions of paragraph 6.1.5 of GC 6.1 OWNER'S RIGHT TO MAKE CHANGES".

SC.33 GC 6.4 CONCEALED OR UNKNOWN CONDITIONS

1. In paragraphs 6.4.1.1 and 6.4.1.2 **add** "or the Reports" after "Contract Documents".

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2. In paragraph 6.4.2 **add** “Having regard to and subject to the liabilities and responsibilities assumed by the Contractor pursuant to GC 3.9 - OPERATIONAL RISK,” at the beginning of the first and second sentences.
3. **Add** the following to the end of paragraph 6.4.4 “or GC 15 EXCESS SOIL, as applicable.”
4. **Add** new paragraph 6.4.5 as follows:
“6.4.5 Without limiting the generality of any other provision in the Contract Documents, during the performance of the Work, the Contractor shall, as a part of the Contract Price and Work, perform any additional geotechnical and subsurface and other investigations, tests and studies beyond those being provided by the Owner, which a reasonable and prudent contractor would conduct to ascertain the nature and extent of subsurface or otherwise concealed physical conditions at the Place of the Work.”

SC.34 GC 6.5 DELAYS

1. In paragraph 6.5.1 **delete** “performance of the Work” in the first line and **replace** with “performance of a critical path activity on the Construction Schedule” and **delete** “them” in the second line and **replace** with “the Consultant”.
2. In paragraph 6.5.1 **add** the following to the end of the paragraph:
“, provided that the Owner shall not be liable for any other costs or damages whatsoever including, without limitation, any indirect, consequential, or special damages, such as loss of profits, loss of opportunity or loss of productivity resulting from such delay.”
3. **Delete** paragraph 6.5.2 in its entirety and **replace** it with “INTENTIONALLY DELETED.”
4. **Delete** paragraph 6.5.3 in its entirety and **replace** it with the following:
“6.5.3 If the Contractor is delayed in the performance of the Work by:
 - .1 labour disputes, strikes, lock-outs affecting the Work or the Project,
 - .2 fire, unusual delay by common carriers or unavoidable casualties,
 - .3 abnormally adverse weather conditions,
 - .4 any cause beyond the Contractor’s control that would make performance of the Work impossible other than one resulting from a default or breach of Contract by the Contractor, or
 - .5 a stop work order issued by a court or other public authority, including but not limited to an order issued as the result of an act or omission of the Contractor or any person or other entity employed or engaged by the Contractor directly or indirectly,

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then the Contract Time shall be extended for such reasonable time as the Consultant may recommend in consultation with the Contractor. The extension of time shall not be less than the time lost as the result of the event causing the delay, unless the Contractor agrees to a shorter extension. The Contractor shall not be entitled to payment for costs incurred by such delays unless such delays result from actions by the Owner, Consultant or anyone employed or engaged by them directly or indirectly provided that the Owner shall, in such instance, only be liable for reasonable costs incurred by the Contractor and shall not be liable for any other costs or damages whatsoever including, without limitation, any indirect, consequential, or special damages, such as loss of profits, loss of opportunity or loss of productivity resulting from such delay. Notwithstanding the foregoing, the Contractor shall use its best efforts to minimize the impact of such event upon the performance of the Work and Contract Time."

5. In paragraph 6.5.4, **add** "and Owner" after "Consultant" and **add** the following to the end:

"Without limiting the generality of the foregoing, the following shall also apply to the event of delay dealt with by paragraphs 6.5.1 or 6.5.3:

- .1 the notice provided by the Contractor as set out in this paragraph 6.5.4 shall include, without limitation, the information and documentation required by paragraph 6.1.8.
- .2 the Contractor shall take all reasonable steps to minimize the impact of the delay event upon the performance of the Work, the Contract Time and the Contract Price, resume performance of all its obligations under the Contract affected by the delay as soon as practicable and use all reasonable endeavours to remedy any failure to perform.

Failure to adhere strictly to these notice provisions shall constitute a waiver and release of any obligation of the Owner to extend the Contract Time as a result of such delay and of any claim by the Contractor for costs as a result of such delay."

6. **Add** new paragraph 6.5.6 as follows:

"6.5.6 If the Work should be behind schedule for a reason other than as described in paragraphs 6.5.1 or 6.5.3, or if any of the Subcontractors or Suppliers or anyone for whom they are responsible delay the progress of any portion of the Work necessary to complete the Work on schedule, the Contractor shall not be relieved of its obligations under the Contract Documents and shall use all possible and, if necessary, extraordinary measures to bring the Work back on schedule. The Contractor shall exercise all reasonable means within its discretion, such as directing any Subcontractors or Suppliers creating delays to increase their labour forces and equipment, to improve the organization and expediting of the Work, or to work overtime as may be necessary. The Contractor shall

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provide any additional supervision, co-ordination and expediting, including overtime by its own personnel as may be required to achieve this end. The costs and expenses incurred by the use of such measures and overtime shall be borne by the Contractor, the Suppliers and/or the Subcontractors.”

SC.35 GC 7.1 OWNER’S RIGHT TO PERFORM THE WORK, TERMINATE THE CONTRACTOR’S RIGHT TO CONTINUE WITH THE WORK OR TERMINATE THE CONTRACT

1. In paragraph 7.1.1 **add** “or terminate the Contract” after “Work” in the fourth line.
2. In paragraph 7.1.2 **add** “, fails or neglects to maintain the latest Construction Schedule provided pursuant to paragraph 3.4” immediately following the word “properly” in the first line and **delete** “to a substantial degree and if the Consultant has given a written statement to the Owner and the Contractor which provides the detail of such neglect to perform the Work properly or such failure to comply with the requirements of the Contract to a substantial degree.”
3. In paragraph 7.1.5 **add** “or terminates the Contract” after “Work” in the first line and **add** “without prejudice to any other right or remedy which is available to the Owner” before “the Owner shall be”.
4. In paragraph 7.1.5.2 **delete** “until a final certificate for payment is issued”.
5. In paragraph 7.1.5.3 **delete** “; however, if such costs of finishing the Work is less than the unpaid balance of the Contract Price, the Owner shall pay the Contractor the difference”.
6. **Add** paragraphs 7.1.7 to 7.1.11 as follows:
 - “7.1.7 Notwithstanding any other provision in the Contract Documents, the Contract may be terminated by the Owner without cause. Any such termination shall be effected by delivery to the Contractor of a notice of termination, specifying the date upon which such termination becomes effective. The Owner’s entitlement to so terminate the Contract shall be absolute and unconditional and exercisable by the Owner in its sole and absolute discretion.
 - 7.1.8 In the event of any termination by the Owner pursuant to paragraph 7.1.7, the Contractor shall only be entitled to payment of the following amounts:
 - .1 that portion of the Contract Price relating to Work performed prior to the termination date, as certified by the Consultant; plus
 - .2 Subcontractor and sub-subcontractor cancellation costs (which costs shall not include loss of profit claims) reasonably incurred by the Contractor as the result of such termination; provided the Contractor has substantiated such costs to the Owner’s reasonable satisfaction and after the Owner has reviewed the details thereof; plus

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- .3 subject in all cases to the Owner being informed of all details relating thereto and the prior written approval of the Owner being obtained (which approval may not be unreasonably withheld), reasonable demobilization costs defined to include equipment and office dismantling, transportation to Contractor's storage facility, lease or rental cancellation costs, transportation of the Contractor's employees to their home offices, provided each such demobilization cost shall be reasonable and substantiated (to the Owner's reasonable satisfaction) by the Contractor.
- 7.1.9 Except as described in paragraph 7.1.8, the Contractor shall not be entitled to any additional reimbursement on account of any such termination including, without limitation, indirect, special, consequential or other damages, including, without limitation, loss of profits, loss of opportunity or loss of productivity, notwithstanding any other provision of the Contract Documents.
- 7.1.10 The terms of the Contract, which expressly or by their nature are intended to survive the termination or discharge of the Contract, shall survive such termination or discharge including, without limitation, GC 12.3 WARRANTY.
- 7.1.11 Upon a termination, the Owner may publish a notice of termination in the form and manner prescribed in the Payment Legislation. For greater certainty, a termination in accordance with this GC 7.1 will be effective whether or not a notice of termination is published."

SC.36 GC 7.2 CONTRACTOR'S RIGHT TO SUSPEND THE WORK OR TERMINATE THE CONTRACT

1. In paragraph 7.2.2 **delete** "20" and **replace** with "60".
2. In paragraph 7.2.3 **add** "and instructing the Owner to correct the default in the five (5) Working Days immediately following the receipt of such Notice in Writing" after "contractual obligations".
3. **Delete** paragraph 7.2.3.1 in its entirety and **replace** with "INTENTIONALLY DELETED".
4. In paragraph 7.2.3.2 **add** "subject to the other terms and conditions of the Contract," before "the Owner".
5. In paragraph 7.2.3.4 **delete** "except for GC 5.1 FINANCING INFORMATION REQUIRED OF THE OWNER".
6. **Delete** paragraph 7.2.4. in its entirety, **renumber** paragraph 7.2.5 as paragraph 7.2.6 and **add** the following new paragraphs 7.2.4 and 7.2.5:

"7.2.4 If the default cannot be corrected in the 5 Working Days specified, the Owner shall be in compliance with the Contractor's instructions if the Owner:

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- .1 commences the correction of the default within the specified time;
and
 - .2 provides the Contractor with an acceptable schedule for such
correction, and
 - .3 corrects the default in accordance with such schedule.
- 7.2.5 If the Owner fails to correct the default in the time specified or subsequently agreed upon, without prejudice to any other right or remedy the Contractor may have, the Contractor may suspend the Work for not more than 90 days or terminate the Contract.”

SC.37 GC 8.1 AUTHORITY OF THE CONSULTANT

1. **Delete** paragraph 8.1.1 and **replace** with the following:
 - “8.1.1 All differences between the parties to the Contract as to the interpretation, application or administration of the Contract or any failure to agree where agreement between the parties is called for, herein collectively called disputes, shall be referred to the Consultant in the first instance. A dispute which is not resolved by the findings of the Consultant shall only be settled in accordance with the requirements of Part 8 of the General Conditions – DISPUTE RESOLUTIONS except if the Owner and the Contractor both agree, in a duly executed agreement in writing otherwise pursuant to paragraph 8.3.9.”
2. **Delete** paragraphs 8.1.2 and 8.1.3 in their entirety and **replace** with the following:
 - “8.1.2 If a dispute is not resolved promptly, or the Owner and the Contractor cannot agree where agreement is required, the Consultant shall give such written instructions as in the Consultant’s opinion are necessary for the proper performance of the Work and to prevent delays pending settlement of the dispute. The parties shall act immediately according to such instructions, it being understood that by so doing neither party will jeopardize any claim the party may have. If it is subsequently determined that such instructions were in error or at variance with the Contract Documents, the Owner shall pay the Contractor the costs incurred by the Contractor in carrying out such instructions which the Contractor was required to do beyond what the Contract Documents correctly understood and interpreted would have required, including costs resulting from interruption of the Work.”

SC.38 GC 8.2 ADJUDICATION

1. **Add** new paragraphs 8.2.2 and 8.2.3, as follows:
 - “8.2.2 If the Contractor issues a notice of adjudication to the Owner, it will include with such notice a description of the reasons for its dispute that includes a reference to the applicable application for payment and Proper Invoice, all Notices in Writing demanding payment, authority for the claim

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under the Contract (including copies of any applicable Change Order, Change Directive or written approval of any change).

- 8.2.3 The parties acknowledge and agree that the adjudication of a payment dispute in accordance with the Payment Legislation will not pause, withdraw, discontinue, or prejudice any mediation, arbitration, or court proceeding that relates to the same matter and that was commenced prior to the delivery of a notice of adjudication under the Payment Legislation unless the parties otherwise agree in writing.”

SC.39 GC 8.3 NEGOTIATION, MEDIATION AND ARBITRATION

1. In paragraph 8.3.1 **delete** “‘Rules of Mediation and Arbitration of Construction Industry Disputes’ in effect at the time of bid closing” and **replace** with “Rules of Mediation and Arbitration, as applicable”.
2. In paragraph 8.3.1.2 **delete** “either party by Notice in Writing requests” and **replace** with “both parties agree”.
3. In paragraph 8.3.4 **delete** “Rules of Mediation of Construction Disputes as provided in CCDC 40 in effect at the time of bid closing” and **replace** with “Rules of Mediation and Arbitration, as applicable”.
4. In paragraph 8.3.6 **delete** “rules for mediation as provided in CCDC 40 in effect at the time of bid closing” and **replace** with “Rules of Mediation and Arbitration, as applicable”.
5. **Add** a new paragraph 8.3.9 as follows:
“8.3.9 This GC 8.3 NEGOTIATION, MEDIATION AND ARBITRATION, the parties acknowledge that they may, by mutual agreement in writing, agree to refer a particular dispute directly to court.”

SC.40 GC 9.1 PROTECTION OF WORK AND PROPERTY

1. In paragraph 9.1.1 and paragraph 9.1.3, **delete** “property adjacent to the Place of the Work” and **replace** with “property adjacent to, in the vicinity of or proximate to the Place of the Work”.
2. **Delete** paragraph 9.1.1.1 in its entirety and **replace** with “INTENTIONALLY DELETED.”

SC.41 GC 9.2 TOXIC AND HAZARDOUS SUBSTANCES

1. **Add** new paragraphs 9.2.10 to 9.2.14 as follows:
“9.2.10 Neither the Contractor nor anyone for whom it is responsible shall bring on to the Place of the Work any toxic or hazardous substances and materials except as needed in order to perform the Work. If such toxic or hazardous substances or materials are required, storage in quantities sufficient to allow work to proceed for fourteen (14) calendar days only shall be permitted. All such toxic and hazardous materials and substances shall be handled and disposed of only in accordance with all Laws that are applicable at the Place of the Work. Without limiting the

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generality of any other provision in the Contract, the Contractor shall promptly provide the Owner with Material Safety Data Sheets for such toxic or hazardous substances or materials.

9.2.11 The Contractor shall indemnify and hold harmless the Owner and Consultant and their respective officers, directors, agents and employees, independent contractors from and against any and all liabilities, costs, expenses, and claims resulting from bodily injury, including death, harm or damage to the environment, and damage to property of any person, corporation or other entity, that arises from the use by the Contractor or anyone for whom the Contractor is responsible of any toxic or hazardous substances or materials at the Place of the Work.

9.2.12 The Contractor shall be familiar with, and comply with, the workplace hazardous materials information system. The Contractor shall ensure that all employees and Subcontractors and anyone for whom they are responsible who work with or in proximity to hazardous material fully understand all potential hazards and have been thoroughly trained to deal with any emergencies. Without limiting the generality of the foregoing, all employees and Subcontractors and anyone for whom they are responsible shall be able to:

- a) Recognize and understand the labelling on hazardous materials; and
- b) Understand material safety data sheets and are knowledgeable on how to safely use, store, handle and dispose of hazardous materials.

9.2.13 The Contractor shall ensure all material safety data sheets pertinent to the completion of the Work are at the Place of the Work.

9.2.14 For the purposes of GC 9.2 - Toxic and Hazardous Substances, the definition of Hazardous Material shall exclude Excess Soil.”

SC.42 GC 9.4 CONSTRUCTION SAFETY

1. **Add** new paragraphs 9.4.6 and 9.4.7 as follows:

“9.4.6 Without restricting the generality of the foregoing, the Contractor acknowledges that the Contractor is the “constructor” and the “employer” within the meaning of the *Occupational Health and Safety Act* (Ontario) and the Contractor undertakes to carry out the duties, obligations and responsibilities of the constructor and the employer with respect to the Project. For clarity, the Contractor, in fulfilling the role of “constructor” and “employer”, shall have the right to remove the Other Entities from the Place of the Work should they not comply with the Contractor's safety program and safety instructions. Without restricting the generality of any other term or condition in the Contract, the Contractor shall indemnify and hold harmless the Owner from any liability for claims, damages or penalties, including reasonable legal fees to defend any offences, arising

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from the Contractor's failure to comply with the duties, responsibilities and obligations of the constructor and the employer under the *Occupational Health and Safety Act* (Ontario)."

- 9.4.7 The Contractor acknowledges that the Owner may retain the services of a safety consultant (the "**Safety Consultant**") to serve as the "constructor" for the Project. Notwithstanding any provision to the contrary in this Contract, including paragraphs 9.4.1 and 9.4.4, any Special Provisions and provisions in Division 1 of the Specifications relating to occupational health and safety, in the event that the Owner advises the Contractor that the Owner has retained a Safety Consultant, the Safety Consultant shall be responsible for fulfilling the role of the "constructor", and the Contractor agrees to comply, and to cause all Subcontractors and Suppliers to comply, with all instructions received from the Safety Consultant."

SC.43 GC 10.1 TAXES AND DUTIES

1. **Delete** GC 10.1 TAXES AND DUTIES in its entirety and **replace** with the following:

"GC 10.1 TAXES AND DUTIES

- 10.1.1 The Contract Price shall include all taxes, tariffs and customs duties in effect at the time of the bid closing except for Value Added Taxes payable by the Owner to the Contractor as stipulated in Article A-4 of the Agreement - CONTRACT PRICE.
- 10.1.2 Any increase or decrease in costs to the Contractor due to changes in such included taxes, tariffs and duties after the time of the bid closing shall increase or decrease the Contract Price accordingly.
- 10.1.3 The Contractor shall provide a detailed breakdown of additional taxes, tariffs and duties in a form satisfactory to the Owner. Profit and overhead shall not be included in the increase or decrease in costs incurred by the Contractor due to changes in the aforementioned taxes, tariffs and duties.
- 10.1.4 Where an exemption or recovery of government sales taxes, tariffs, customs duties or excise taxes is applicable to the Contract, the parties agree to cooperate with each other to obtain such exemptions. Refunds that are properly due to the Owner and have been recovered by the Contractor shall be promptly refunded to the Owner. In addition, any reduction or elimination of taxes, tariffs or customs duties that take effect after the date of bid closing resulting in savings to the Contractor shall be due to the Owner in the form of a credit to the Contract Price."

SC.44 GC 10.2 LAWS, NOTICES, PERMITS, AND FEES

1. **Delete** paragraph 10.2.2 in its entirety and **replace** with the following:

"10.2.2. Without limiting the generality of any other provision in the Contract, the Contractor shall obtain and pay for, at its sole expense and cost, all permits, development approvals, licences,

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certificates, charges, refundable deposits, and approvals including, without limitation, building permit, site plan approval, water and sanitary sewer permits, water and sewer connection charges, site alteration permits, curb cut and road cut permits, sign permits, hydro approvals, and occupancy permit necessary for the performance of the Work and the use and occupation of the Work by the Owner in accordance with the Contract Documents, the cost of which shall all be included in the Contract Price.”

2. **Delete** paragraph 10.2.3 in its entirety and **replace** with the following:

“10.2.3. The Contractor shall comply, and shall require its employees, agents, Subcontractors, Suppliers and anyone for whom they are responsible to comply, with all laws, ordinances, guidelines, standards, permits, statutes, by-laws, rules, regulations, or codes, and subject to GC 9.4, all of the Owner’s policies and procedures which are or become in force and are applicable to the performance of the Work including, without limitation, all those relating to the preservation of the public health, occupational health and safety and to construction safety.”

3. In paragraph 10.2.5 **delete** “The Contractor” and **replace** with “Subject to paragraphs 1.1.3 and 1.1.4, the Contractor”.

4. **Delete** paragraph 10.2.6 in its entirety and **replace** with the following:

“10.2.6. If the Contractor fails to notify the Owner and the Consultant in writing, fails to obtain direction as required in paragraph 10.2.5, and/or performs work that it knows or ought to have known that contravenes any laws, ordinances, guidelines, standards, permits, statutes, by-laws, rules, regulations, or codes, the Contractor shall be responsible for and shall correct the violations thereof, and shall bear the costs, expenses, and damages attributable to the failure to comply with the provisions of such laws, ordinances, guidelines, standards, permits, statutes, by-laws, rules, regulations, or codes.”

5. **Add** new paragraph 10.2.8 as follows:

“10.2.8. Without limiting the generality of any other provision in the Contract Documents, the Contractor shall cause all certificates to be furnished that are required or given by the appropriate governmental or quasi-governmental Authorities as evidence that the Work as installed conforms with the laws and regulations of Authorities Having Jurisdiction, including, without limitation, certificates of compliance for the Owner’s occupancy or partial occupancy. The certificates are to be final certificates giving complete clearance of the Work, in the event that such

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governmental or quasi-governmental Authorities furnish such certificates.”

SC.45 GC 10.3 PATENT FEES

1. In paragraph 10.3.1 **add** “indemnify and” before “hold the” in the second line.
2. In paragraph 10.3.2 **add** “by the Owner” after “supplied to the Contractor.”

SC.46 GC 11.1 INSURANCE

1. **Delete** GC 11.1 INSURANCE in its entirety and **replace** with the following:

“GC 11.1 INSURANCE

11.1.1 Without restricting the generality of GC 13.1 - INDEMNIFICATION, the Contractor shall provide, maintain and pay for the following insurance coverage’s:

1. Commercial General Liability insurance shall be with limits of not less than **\$5,000,000** per occurrence with an annual aggregate limit of not less than **\$5,000,000** within any policy year. The policy shall be maintained for at least twenty-four (24) months from the date of Substantial Performance of the Work.

The insurance shall be in the name of the Contractor, include the Owner as an additional insured, and include bodily injury including death, personal injury, property damage including loss of use thereof, contractual liability, non-owned automobile liability, owner’s and contractor’s protective, products and completed operations, employer’s liability, contingent employer’s liability with coverage including the operations and activities of the Contractor and those for whom the Contractor is in law responsible. The policy shall contain cross liability and severability of interest clauses.

The insurance coverage shall not be less than the insurance provided by IBC Form 2100, or its equivalent replacement, provided that IBC form 2100 shall contain the latest edition of the relevant CCDC endorsement form and shall include hook, hoist and crane liability (if applicable) and an endorsement with respect to sudden and accidental pollution acceptable to the Owner (including an extension for a standard provincial or territorial form of non-owned automobile liability policy), and IBC Form 2320.

The policy will include but is not limited to the liability of the insureds arising out of their general supervision, if any, or such operations with respect to safety or otherwise, or arising out of the ownership or control of the premises on which such operations are performed.

All liability coverage shall be maintained for completed operations hazards from the date of Contract Completion on an ongoing basis for a period of six (6) years following the date of Contract Completion.

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To achieve the desired limit, umbrella or excess liability insurance may be used. Subject to satisfactory proof of financial capability by the Contractor, the Owner may agree to increase the deductible amounts.

All policies of insurance shall be primary and shall not act as co-insurance or as excess coverage to any policies obtained by the Owner for its sole protection.

Prior to commencement of the Work and upon the placement, renewal, amendment or extension of all or any part of the insurance, the Contractor shall promptly provide the Owner with a certified true copy of the policy(ies) by an authorized representative of the insurer together with copies of any amending endorsements or a Certificate of Insurance on the Owner's form evidencing compliance with the policy requirements and endorsed to provide the Owner with not less than 30 days' notice in writing in advance of any cancellation, change or amendment restricting coverage.

2. Automobile insurance in respect of vehicles that are required by law to be insured under an Automobile Insurance Policy, shall have limits of not less than **\$2,000,000** inclusive per accident or occurrence for bodily injury, death and damage to property, covering all licensed vehicles owned or leased by the Contractor, and endorsed to provide the Owner with not less than 30 days' notice in writing in advance of any cancellation, change or amendment restricting coverage. The policy shall be maintained for at least twenty-four (24) months from the date of Substantial Performance of the Work. Where the policy has been issued pursuant to a government-operated automobile insurance system, the Contractor shall provide the Owner with confirmation of automobile insurance coverage for all automobiles registered in the name of the Contractor.
3. All Risks Contractors' Equipment Insurance covering construction machinery and equipment used by the Contractor for the performance of the Work, including Boiler Insurance on temporary boilers and pressure vessels, shall be in a form acceptable to the Owner and shall not allow subrogation of claims by the insurer against the Owner or any and all other parties engaged in the Project. The policies shall be endorsed to provide the Owner with not less than 30 days notice in writing in advance of cancellation, change, or amendment restricting coverage.

11.1.2 Prior to commencement of the Work and upon the placement, renewal, amendment, or extension of all or any part of the insurance, the Contractor shall promptly provide the Owner with confirmation of coverage and, if required, a certified true copy of the policies certified by an authorized representative of the insurer together with copies of any amending endorsements applicable to the Work or Certificate of Insurance on the Owner's form evidencing compliance with the policy requirements and endorsed to provide the Owner with not less than 30

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days' notice in writing in advance of any cancellation, change or amendment restricting coverage.

11.1.3 The parties shall pay their share of the deductible amounts in direct proportion to their responsibility in regard to any loss for which the above policies are required to pay, except where such amounts may be excluded by the terms of the Contract.

11.1.4 If the Contractor fails to provide or maintain insurance as required by the Contract Documents, then the Owner shall have the right to provide and maintain such insurance and give evidence to the Contractor and the Consultant. The Contractor shall pay the cost thereof to the Owner on demand or the Owner may deduct the cost from the amount which is due or may become due to the Contractor.

11.1.5 All required insurance policies shall be with insurers licensed to underwrite insurance, in the Province of Ontario and shall be at the approval, not unreasonably withheld, of the Owner."

11.1.6 If the Owner or the Consultant requests that any adjudicators, other consultants, experts or administrators attend the Place of the Work in order to inspect or review any part of the Work, the Owner or the Consultant shall provide the Contractor with a Notice in Writing of such attendance. The Contractor shall ensure that the Place of the Work is safe for such attendance, inspection or review, and shall accompany such persons throughout the attendance to ensure any such attendance, inspection or review is completed in a safe manner."

SC.47 GC 12.1 READY-FOR-TAKEOVER

1. **Add** a new paragraph 12.1.1.9 as follows:

"9 any other information or documents which the Owner may request, acting reasonably."

2. **Delete** paragraph 12.1.2 in its entirety and **replace** it with "INTENTIONALLY DELETED."

3. **Delete** paragraphs 12.1.3 and 12.1.4 in their entirety and **replace** them with the following:

"12.1.3 When the Contractor considers that the Work has met, and the Contractor has performed, all of the requirements of paragraph 12.1.1, the Contractor shall deliver to the Consultant and to the Owner a comprehensive list of items to be completed or corrected, together with a written application for Ready-for-Takeover for the Consultant and the Owner to review. Failure to include an item on the list does not alter the responsibility of the Contractor to complete the Contract or comply with its obligations under the Contract.

12.1.4 The Consultant shall review the Work to verify the validity of the Contractor's application for Ready-for-Takeover and will promptly advise the Owner whether the Work has met, and the Contractor has performed,

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all of the requirements of paragraph 12.1.1. After the Consultant has provided its advice to the Owner, the Owner shall, in its sole discretion, in writing, accept the Contractor's application for Ready-for-Takeover or reject the Contractor's application for Ready-for-Takeover, with reasons. If the Owner rejects the Contractor's application for Ready-for-Takeover, the Contractor shall promptly address the reasons indicated by the Owner for the rejection of the Contractor's application for Ready-for-Takeover and reapply in accordance with paragraph 12.1.3."

SC.48 GC 12.2 EARLY OCCUPANCY BY THE OWNER

1. **Delete** GC 12.2 in its entirety and **replace** it with the following:

"GC 12.2 INSURANCE EARLY OCCUPANCY BY THE OWNER

- 12.2.1 Upon the Owner's request, the Owner shall, at any time or times, have the right of occupying and/or using any part or parts of the Work (including, without limitation, for the purposes of installing and testing fittings and equipment), whether partially performed or entirely complete, or whether completed on schedule or not, before the completion of the Work.
- 12.2.2 In the event the Owner desires to exercise the privilege of occupancy and/or use of the Work as provided above, the Contractor shall co-operate with the Owner throughout in making available for the Owner's use such building services as heating, ventilation, cooling, water, lighting and telephone for the space or spaces to be occupied and/or used, and if the equipment required to furnish such services is not entirely completed at the time the Owner desires to occupy and/or use the aforesaid space or spaces, the Contractor shall make every reasonable effort to complete same as soon as possible to the extent that the necessary equipment can be put into operation and use and any extra cost beyond that originally required to complete the Work arising from such early occupancy and/or use shall be borne by the Owner.
- 12.2.3 In the event that the Owner exercises the privilege of occupancy and/or use of the Work as provided above, it agrees to do so, so as not to materially interfere with the respective work of the Contractor, Subcontractors or Suppliers and under the understanding that the Owner will be occupying premises within a construction site which will require compliance with all normal construction site requirements including, without limitation, health and safety requirements.
- 12.2.4 It shall be understood, however, that the Owner's occupancy and/or use of such space or spaces of the Work shall not constitute the Owner's acceptance of any Work, materials or equipment which are not in accordance with the requirements of the Contract Documents, nor affect the warranty period under the Contract, nor relieve the Contractor from its obligations, duties, responsibilities, and liabilities to complete the Work, nor for responsibility for loss or damage due to or arising out of defects in,

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or malfunctioning of, any Work, material or equipment, nor from any other unfulfilled duties, liabilities, obligations or responsibilities under the Contract nor from any other duty, liability, obligation or responsibility under the Contract including, without limitation, the Contractor's warranty obligations. If, however, damage results from any act by the Owner, the Owner shall assume its share of the responsibility for such damage."

SC.49 GC 12.3 WARRANTY

1. **Delete** paragraph 12.3.1 in its entirety and **replace** it with the following:
"12.3.1 The Contractor agrees to remedy, at its costs, any defects in materials and workmanship which are identified by the Owner within a period of 24 months (except where otherwise noted for a longer period of time in the Contract Documents) from Ready-for-Takeover, or, if there are Non-Contiguous Improvements, from the date of Ready-for-Takeover for the last such improvement to achieve Ready-for-Takeover (the "**Warranty Period**"). This warranty shall cover labour and material, including, without limitation, the costs of removal and replacement of covering materials. This warranty shall not limit extended warranties on any items of equipment or material called for elsewhere in the specifications or otherwise provided by any manufacturer of such equipment or material."
2. In paragraph 12.3.3 **delete** "one year" and **replace** with "24 months".
3. In paragraph 12.3.4 **delete** "one year" and **replace** with "24 months".
4. **Add** the following to paragraph 12.3.5:
"The carrying out of the replacement work and making good of defects shall be executed at such times as convenient with the Owner which may entail overtime work on the part of the Contractor. Additional charges for overtime work in this regard must be borne by the Contractor."
5. **Delete** paragraph 12.3.6 in its entirety and **add** new paragraphs 12.3.6 to 12.3.9:
"12.3.6 Any material or equipment requiring excessive servicing during the Warranty Period (or free maintenance period, if applicable) shall be considered defective and the warranty (or free maintenance period) shall be deemed to take effect from the time that the defect has been corrected so as to cause excessive servicing to terminate.
12.3.7 The final payment certificate shall not relieve the Contractor from its responsibility under this GC 12.3 - WARRANTY.
12.3.8 Following Ready-for-Takeover, and without limiting the Contractor's warranty under this GC 12.3, the Contractor shall assign to the Owner, to the extent assignable, the benefit of all warranties and guarantees relating to the Work. The assignment shall expressly reserve the right of the Contractor to make any claims under such warranties and guarantees and such assignment shall in no way prejudice any rights of or benefits accruing to the Contractor pursuant to such warranties and guarantees."

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12.3.9 The provisions of the GC 12.3 - WARRANTY shall not deprive the Owner of any action, right or remedy otherwise available to the Owner for the Contractor's failure to fulfill its obligations or responsibilities under the Contract and shall not be construed as a waiver of claims in favour of the Contractor or as a limitation on the time in which the Owner may pursue such other action, right or remedy. The warranties set out in the Contract are not supplemental to and do not limit or preclude the application of any other conditions and warranties, express or implied, by law or trade usage."

SC.50 GC 12.4 WARRANTY SECURITY HOLDBACK

1. **Add** new GC 12.4 - WARRANTY SECURITY HOLDBACK as follows:

"GC 12.4 WARRANTY SECURITY HOLDBACK

12.4.1 The Contractor agrees that the Owner may withhold an amount of the payments due by the Owner to the Contractor hereunder as security for the Contractor's performance of its warranty obligations hereunder (the "Warranty Holdback"). The amount of the Warranty Holdback shall be determined based on the contract price in accordance with the following table:

CONTRACT PRICE		VALUE OF WARRANTY HOLDBACK (\$)
FROM (\$)	TO (\$)	
Less than 0.1M		4 per cent of Final Contract Price
0.1 M	0.5 M	4,000 on first 0.1 M + 3.0 per cent on next 0.4M
0.5 M	1.0 M	16,000 on first 0.5 M + 2.4 per cent on next 0.5M
1.0 M	2.0 M	28,000 on first 1.0 M + 2.2 per cent on next 1.0M
2.0 M	4.0 M	50,000 on first 2.0 M + 2.0 per cent on next 2.0M
4.0 M	6.0 M	90,000 on first 4.0 M + 1.8 per cent on next 2.0M
6.0 M	10.0 M	126,000 on first 6.0M + 1.5 per cent on next 4.0M
Over 10.0 M		186,000 on first 10.0M + 1.0 per cent on balance

For the avoidance of doubt, the Warranty Holdback shall be adjusted from time to time to account for changes to the contract price as a result of approved Change Orders and Change Directives.

12.4.2 In order to fund the Warranty Holdback, the Owner may, at its sole discretion, retain the Warranty Holdback progressively as a percentage of some or all progress payment to the Contractor, or retain a lump sum upon the achievement of Ready-for-Takeover or, if insufficient funds have been retained at the time of Ready-for-Takeover, retain a portion of any remaining payment owing to the Contractor, including any remaining progress payment, final or finishing work payment, or the holdback under the Payment Legislation, if any.

12.4.3 The Owner shall release the Warranty Holdback, less any amount due to the Owner by the Contractor hereunder, at the end of the Warranty Period. Notwithstanding the foregoing:

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- .1 after the first 12 months of the Warranty Period, the Contractor may apply for a release of 80 per cent of the Warranty Holdback, provided that balance of the Warranty Holdback shall not be below \$5,000 as a result of the release and provided that there are no outstanding deficiencies at the time of the application; and
- .2 The Contractor may apply in writing to the Owner at the time of Ready-for-Takeover to substitute for the monies retained as the Warranty Holdback an alternative warranty security of equivalent or greater value comprising:
 - (i) one or more irrevocable letters of credit, or
 - (ii) another readily negotiable security.

Acceptance of any such alternative shall be at the sole discretion of the Owner.

Following receipt and acceptance of any such alternative security by the Owner, the Consultant shall release to the Contractor the monies previously retained for warranty security purposes.

The Owner may, at its discretion, allow the total Warranty Holdback to be made up in part of monies retained under the Contract and in part of an alternative warranty security as indicated in (a) and (b) above provided that the total value of such parts, as determined by the Owner, shall be not less than the required value as derived from the table set out above.

Such alternative warranty security or the monies derived therefrom, less any deductions made as provided for in the Contract, shall be released to the Contractor following the issuance by the Consultant of a Warranty Holdback Payment Certificate.”

SC.51 GC 13.1 INDEMNIFICATION

1. **Delete** paragraph 13.1.1 in its entirety and **replace** with the following:

“13.1.1 The Contractor shall indemnify the Owner, the Consultant and their respective officers, council members, chairs, partners, agents, employees, servants, insurers, advisors, consultants, contractors, successors and assigns (collectively the “**Indemnified Parties**”), and save them harmless from and against any and all claims, demands, losses, costs, damages, actions, causes of action, suits or proceedings and all other liabilities, losses and expenses including bodily injury or death to any Person or loss or damage to property, court costs, interest, legal fees, adjusting fees and disbursements (collectively “claims”) made against or suffered or incurred by the Indemnified Parties, directly or indirectly and which arise from or are connected with:

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- .1 any failure or alleged failure by the Contractor (or any Subcontractor, Supplier or anyone for whom the Contractor and/or its Subcontractors and Suppliers may be responsible) to comply with the Contract Documents including any applicable Laws or Regulations, including provincial workers' compensation laws or regulations;
- .2 any infringement or alleged infringement by the Contractor (or any Subcontractor, Supplier or anyone for whom the Contractor and/or its Subcontractors and Suppliers may be responsible) of any intellectual property right including without limitation any misuse, passing off or infringement or alleged infringement of trade-marks;
- .3 any defective or potentially hazardous goods used by the Contractor (or any Subcontractor, Supplier or anyone for whom the Contractor and/or its Subcontractors and Suppliers may be responsible);
- .4 any form of theft, fraud, or illegal activity by the Contractor (or any Subcontractor, Supplier or anyone for whom the Contractor and/or its Subcontractors and Suppliers may be responsible) or any of their respective agents, directors, officers, or employees;
- .5 any wilful act, omission or negligence of the Contractor (or any Subcontractor, Supplier or anyone for whom the Contractor and/or its Subcontractors, and Suppliers may be responsible), or any of their respective agents, directors, officers, servants, contractors or employees;
- .6 any negligence by the Contractor (or any Subcontractor, Supplier or anyone for whom the Contractor and/or its Subcontractors, and Suppliers may be responsible) directly or indirectly arising or contributing to or alleged to arise out of the Contractor's performance of or the failure to perform the Work, or out of the conditions of the work, the job site, adjoining land, driveways, streets or alleys used in connection with the performance of the Work under this Contract;
- .7 any negligence, errors or omissions, or monies owing to the Owner for claims payable under this indemnity due to failure of any insurance required of Subcontractors or Suppliers thereof as retained by Contractor, but shall not include any claims arising solely from the active negligence of the party asking to be defended, indemnified or saved harmless; and
- .8 any failure or alleged failure by the Contractor to comply with the requirements of GC 14 - EXCESS SOIL (including, the Excess Soil Legislation and the duties and responsibilities of the Project Leader) and any orders, fines, penalties, charges, alleged offences, actions, demands, directions, or proceedings imposed or

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commenced by a governmental authority or third party, as applicable, and legal fees and disbursements to defend same, arising out of or attributable to the Excess Soil Legislation including, the Owner's failure or alleged failure to comply with any duties or responsibilities it may be found to have, or alleged to have, as a Project Leader."

2. **Delete** paragraphs 13.1.2 and 13.1.3 in their entirety and **replace** each with "INTENTIONALLY DELETED."

SC.52 GC 13.2 WAIVER OF CLAIMS

1. **Delete** paragraph 13.2 in its entirety and **replace** with the following:

"GC 13.2 WAIVER OF CLAIMS

12.2.1 Subject to any rights or remedies provided by the Payment Legislation, as of the date of the final certificate for payment, the Contractor expressly waives and releases the Owner from all claims against the Owner including, without limitation, those that might arise from the negligence or breach of contract by the Owner except:

- .1 those made in writing in compliance with the Contract Documents prior to the Contractor's application for final payment and still unsettled; and
- .2 those arising from the provisions of GC 9.2 - TOXIC AND HAZARDOUS SUBSTANCES AND MATERIALS or GC 10.3 PATENT FEES."

PART 14 MISCELLANEOUS

1. **Add** new PART 14 MISCELLANEOUS as follows:

"PART 14 MISCELLANEOUS

"PART 14 MISCELLANEOUS

GC 14.1 REVIEW BY OWNER AND REVIEW BY CONSULTANT

14.1.1 Neither the Owner's and/or Consultant's receipt, review or approval of any documents or the Work nor the failure of the Owner and/or Consultant's to provide comment shall limit, waive or diminish the Contractor's obligations, responsibilities, duties or liabilities under the Contract. The review or approval by the Owner and/or Consultant is intended only to ascertain that the document or the performance of the Contractor's duties, liabilities, responsibilities or obligations under the Contract including, without limitation, the Work generally meets the intention of the Contract and is not an assurance or confirmation of the adequacy, quality, fitness, suitability or correctness of the Contractor's obligations, responsibilities, duties and liabilities under the Contract including, without limitation, the Work, for which the Contractor is solely responsible in accordance with the Contract.

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GC 14.2 CARE AND SKILL

- 14.2.1 The Contractor acknowledges, confirms, represents and warrants to the Owner that:
- .1 in performing the Work, it shall at all times exercise the degree of care and skill that ought to be exercised by contractors in performing work of the nature contemplated herein; and
 - .2 it has the necessary experience, skill and expertise required to enable it to fulfill its obligations, duties, liabilities, and responsibilities herein.

GC 14.3 NON-INTERFERENCE

- 14.3.1 The Contractor acknowledges that the Place of the Work is and will continue to be occupied by the Owner and the Owner will continue to carry out its normal operations at the Place of the Work. The Contractor agrees to perform the Work in the least intrusive manner possible. Without limiting the generality of the foregoing, the Contractor acknowledges and agrees that it shall carry out its duties, responsibilities, and obligations under the Contract in such a manner so as not to disrupt or interfere with any of the Owner's or any third party's existing facilities and ongoing operations or activities or other operations located in the area adjacent to, in the vicinity of or proximate to the Place of the Work.

GC 14.4 LIQUIDATED DAMAGES

- 14.4.1 It is expressly agreed by the parties that if the date of Substantial Performance of the Work occurs later than the Substantial Performance Date, the Contractor shall pay to the Owner liquidated damages calculated as \$0 for each calendar day that Substantial Performance of the Work extends beyond the Substantial Performance Date. It is expressly agreed that it is difficult to calculate the damages which would result from the Contractor's failure to attain Substantial Performance of the Work by the Substantial Performance Date, and the parties agree that the liquidated damages are not intended to be penalties but rather represent the parties' best estimate of damages resulting from the delay.
- 14.4.2 In the event that the Consultant reasonably determines that the Contractor is not progressing in accordance with the Construction Schedule with the result that the Contractor will not achieve Substantial Performance of the Work by the Substantial Performance Date, the Owner will commence to hold back amounts from payments due to the Contractor totalling an amount sufficient to cover the Consultant's estimate of liquidated damages that may be payable pursuant to paragraph 14.4.1. In the event that the Owner hold backs more than is owed pursuant to paragraph 14.4.1, it shall forthwith pay such excess to the Contractor.

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- 14.4.3 The Owner may deduct any amount due under this paragraph from any monies that may be due or payable to the Contractor on any account whatsoever. The liquidated damages payable under this paragraph are in addition to and without prejudice to any other remedy, action or other right that may be available to the Owner.

GC 14.5 DAMAGES AND MUTUAL RESPONSIBILITY

- 14.5.1 If either party to the Contract should suffer damage in any manner because of any wrongful act or neglect of the other party or of anyone for whom the other party is responsible in law, then that party shall be reimbursed by the other party for such damage. The reimbursing party shall be subrogated to the rights of the other party in respect of such wrongful act or neglect if it be that of a third party.
- 14.5.2 Claims for damage under paragraph 14.5.1 shall be made in writing to the party liable within reasonable time after the first observance of such damage and if undisputed shall be confirmed by Change Order. Disputed claims shall be resolved as set out in Part 8 of the General Conditions - DISPUTE RESOLUTION.
- 14.5.3 If the Contractor has caused damage to the work of one of the Other Entities, the Contractor agrees upon due notice to settle with such Other Entity by negotiation or arbitration. If the Other Entity makes a claim against the Owner on account of damage alleged to have been so sustained, the Owner shall notify the Contractor and may require the Contractor to defend the action at the Contractor's expense. The Contractor shall satisfy a final order or judgement against the Owner and pay the costs incurred by the Owner arising from such action.
- 14.5.4 If the Contractor becomes liable to pay or satisfy a final order, judgment, or award against the Owner, then the Contractor, upon undertaking to indemnify the Owner against any and all liability for costs, shall have the right to appeal in the name of the Owner such final order or judgment to any and all courts of competent jurisdiction.

GC 14.6 RIGHT OF SET-OFF

- 14.6.1 The Owner has the right to set-off against the balance due or to become due to the Contractor under the Contract, any reasonable and substantiated amounts due or to become due from the Contractor to the Owner under the Contract.

GC 14.7 SOFTWARE

- 14.7.1 Without limiting the generality of any other provision in the Contract, the Contractor, as a part of the Work, shall supply and install all software required by the Contract Documents or included with any systems required by the Contract Documents ("**Software**"). The Contractor shall grant or obtain a perpetual, irrevocable non-exclusive royalty-free license to use the Software sufficient for the Owner's purposes.

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GC 14.8 CONTRACT SECURITY

- 14.8.1 The Contractor shall, prior to commencement of the Work or within the specified time, provide to the owner any contract security specified in the Contract Documents.
- 14.8.2 If the Contract Documents require surety bonds to be provided, such bonds shall be issued by a duly licensed surety company authorized to transact the business of suretyship in the province or territory of the Place of the Work and shall be maintained in good standing until the fulfillment of the Contract. The form of such bonds shall be substantially in the forms required under the Payment Legislation and with a surety company deemed acceptable by the Owner.
- 14.8.3 The Contractor shall, as part of the Contract Price, provide a Performance Bond with a face value of 50 per cent of the Contract Price and a Labour and Material Payment Bond with a face value of 50 per cent of the Contract Price, substantially in the form required under the Payment Legislation.

The Labour and Material Payment Bond shall be in effect for a period of not less than one year (1) after the date on which the Contractor last performed Work on the Contract, including Work performed under any warranty or guarantees provided in the Contract.

The Performance Bond and a Labour and Material Payment Bond must be submitted by the Contractor in a digital format that meets the criteria of the Surety Association of Canada (SAC) and as stated in the Contract Documents.

GC 14.9 CLEAN UP

- 14.9 Without limiting GC 12.2, the Owner shall have the right to back charge cleaning to the Contractor if it is not done within 24 hours of written notice to clean and the Owner shall have the right to back charge cost of damage to the Place of the Work caused by Contractor's, Subcontractor's or Supplier's transportation in and out of the Place of the Work if not repaired within 5 Working Days of written notice to repair or before final payment, whichever is earlier."

SC.53 PART 15 EXCESS SOIL

1. **Add** new PART 15 EXCESS SOIL, as follows:

"PART 15 EXCESS SOIL

GC 15 EXCESS SOIL

- 15.1 The Contractor shall determine if the Excess Soil Legislation applies to the Work or the Project and shall provide the Owner with immediate written notice of such determination. For clarity, the Contractor acknowledges and agrees that this is an ongoing obligation of the Contractor during the performance of the Work.

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- 15.2 If the Excess Soil Legislation applies to the Work or the Project, the Contractor, at the Contractor's cost and expense, shall:
- i) be solely responsible for compliance with the requirements of the Excess Soil Legislation during the performance of the Work; and
 - ii) perform the Work in accordance with, and subject to, the Excess Soil Legislation and the Contract Documents
- 15.3 Without restricting the generality of any other provision in the Contract Documents:
- i) for the duration of the Project, until Contract Completion, in respect of the Work, the Project and the Place of the Work, the Contractor shall carry out, and fulfill, the duties and responsibilities of the Project Leader in accordance with the requirements of the Excess Soil Legislation;
 - ii) the Contractor's responsibilities under paragraph 10.2.2 include procuring, and, as a part of the Contract Price, paying for, all permits, approvals, registrations and disposal fees, costs and expenses required by the Excess Soil Legislation; and
 - iii) the documents at the Place of the Work referred to in paragraph 3.9.1 include, all documents evidencing that the Work complies with the Excess Soil Legislation and such other documents as required by the Excess Soil Legislation.
- 15.4 For clarity, this GC 15 - EXCESS SOIL is applicable to Excess Soil, even when such Excess Soil differs materially from those indicated in the Contract Documents or is of a nature which differs materially from those ordinarily found to exist and generally recognized as inherent in construction activities of the character provided for in the Contract Documents.
- 15.5 This GC 15 EXCESS SOIL does not limit, and is in addition to, any other responsibility or liability of the Contractor in connection with the Contract."

END OF SUPPLEMENTARY CONDITIONS

AGREEMENT TO BOND

We, the undersigned, hereby agree to become bound as Surety for

In a Performance Bond totalling **50 per cent** of the Contract amount and a Labour and Material Payment Bond totalling **50 per cent** of the Contract amount, substantially in the forms required under the *Construction Act* and conforming to the Instruments of Contract attached hereto, for the full and due performance of the Works shown as described herein, if the Tender for

**NEW GENERATOR INSTALLTION AT PEEL YOUTH VILLAGE, 99 ACORN PLACE,
MISSISSAUGA, PROJECT 24563**

is accepted by the Owner.

It is a condition of the Contract that if the above-mentioned Tender is accepted by the Agency, application for a Performance Bond and a Labour and Material Payment Bond, each in the amount of **50 per cent** of the Contract amount, and each substantially in the forms prescribed by the *Construction Act*, must be completed with the undersigned within 10 days of acceptance of Tender related thereto, otherwise this Agreement shall be null and void.

Dated this _____ day of _____, _____.

Name of Bonding Company

Signature of Authorized Person Signing
for Bonding Company (Company Seal)

Position

DIGITAL BID BOND

BOND NUMBER _____

KNOW ALL MEN BY THESE PRESENTS THAT _____
as Principal, hereinafter called the Principal, and

_____ a corporation
created and existing under the laws of Ontario, and duly authorized to transact the business of Suretyship
in Ontario as Surety, hereinafter called the Surety, are held and firmly bound unto The Regional
Municipality of Peel as Oblige, hereinafter called the Oblige, in the amount of

_____ Dollars,

(\$ _____) lawful money of Canada, for the payment of which sum, well and
truly to be made, the Principal and the Surety bind themselves, their heirs, executors, administrators,
successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, the Principal has submitted a written Bid to the Oblige, dated the _____ day of
_____, 20____,

for: _____
DESCRIPTION OF WORK

NOW, THEREFORE, THE CONDITION OF THIS OBLIGATION is such that if the aforesaid Principal
shall have the Bid accepted within ninety (90) days from the Closing Date and the said Principal will,
within the time required, enter into a formal contract and give the specified security to secure the
performance of the terms and conditions of the Contract, then this obligation shall be null and void;
otherwise the Principal and the Surety will pay unto the Oblige the difference in money between the
amount of the Bid of the said Principal and the amount for which the Oblige legally contracts with
another party to perform the work if the latter amount be in excess of the former.

The Principal and the Surety shall not be liable for a greater sum than the specified penalty of this Bond.

Any suit under this Bond must be instituted before the expiration of seven months from the date of this
Bond.

IN WITNESS WHEREOF, The Principal and the Surety have signed and sealed this Bond this _____
day of _____, 20____.

SIGNED, SEALED AND DELIVERED

SIGNATURE OF WITNESS
(if not signed under corporate seal)

By _____ (Seal)
SIGNATURE AND SEAL OF PRINCIPAL
I/We have the authority to bind the Corporation

NAME OF WITNESS (PRINTED)

SURETY (Seal)

By _____
ATTORNEY-IN-FACT

ADDRESS AND PHONE NUMBER OF SURETY

Appendix 5.6

Form of Release at Substantial Performance of the Work

Date: _____
Owner: _____
Contractor: _____
Document Number: _____
Project: _____
Applicable Invoice: _____

Context

- A. The Contractor identified above (the “Contractor”) and the Regional Municipality of Peel entity, government, agency, or board identified above as the Owner (the “Owner”) entered into a contract dated _____ (the “Contract”) pursuant to the procurement document number identified above for the Contractor to provide certain work and services in respect of the project identified above (the “Project”).
- B. Capitalized terms used but not defined in this Release have the meanings given to them in the Agreement.
- C. Pursuant to the Contract, the Contractor is providing this Release to the Owner in support of its application for payment of holdback upon Substantial Performance of the Work.

Release

- 1. Except for the claims set out in section 2, as of the date set out above, the Contractor on its own behalf and on behalf of its successors and assigns hereby irrevocably waives, releases, and forever discharges the Owner and its directors, officers, Region of Peel council members, representatives, employees, contractors, agents, and their respective successors and assigns (the “Released Group”) from any and all claims, changes, disputes, complaints, liabilities, obligations, damages, actions, causes of action, proceedings, debts, demands, losses, and expenses whatsoever, at law and in equity, which it may have had, may now have, or may have arising out of or in connection with the Contract (“Claims”).
- 2. The Contractor does not release the Released Group from the following Claims:
 - a. Claims for any sums retained by the Owner for the Warranty Holdback;
 - b. Claims arising from Work which remains to be completed by the Contractor on the Project as at the date of this Release;
 - c. Claims which cannot be waived under the *Construction Act* (Ontario); and
 - d. the following Claims (including any outstanding Claims about which the Contractor has previously notified the Owner and attach additional page if necessary):

The Contractor acknowledges and agrees that if it leaves Section 2.d. blank or responds “none” in Section 2.d., the Contractor is deemed not to have reserved any Claims other than those in Sections 2.a., 2.b., and 2.c.

- 3. Except for the Claims set out in Section 2.d., Contractor’s managerial or senior supervisory personnel do not know, or have reason to know based on good and prudent industry practices, of any potential or actual claims that are required to be notified to Owner according to the requirements of the Contract as of the date of this Release.
- 4. This Release is freely and voluntarily given and the Contractor acknowledges and represents that it has fully reviewed the terms and conditions of this Release and that it is fully informed with respect to the legal effect of this Release.

General

5. No provision of this Release which may be deemed unenforceable shall in any way invalidate any other provision hereof, all of which shall remain in full force and effect.
6. This Release shall be binding upon, and shall inure to the benefit of, the Contractor, the Owner, and their respective heirs, successors, legal representatives and assigns.
7. This Release and the Contract constitute the entire agreement between the parties with respect to the subject matter hereof and supersedes all prior and contemporaneous agreements. No change or waiver shall be valid unless in writing and signed by an authorized representative of the party against whom such change or waiver is sought to be enforced.
8. This Release may be executed and delivered electronically.
9. This Release is governed by the laws of Ontario and the federal laws of Canada applicable therein. Any dispute arising out of this Release shall be governed by the terms of the Contract.

[INSERT FULL CORPORATE NAME OF CONTRACTOR]

By: _____

Name: _____

Title: _____

I have authority to bind the corporation.

Owner’s Staff/Other Contractors Project Constructor Coordination Form

This coordination document must be completed and signed by the General Contractor (GC) and the Region of Peel (ROP) Project Manager. The Owner’s Staff/Other Contractors Project Constructor Coordination Form is intended to seek the GC’s approval to allow Owner’s Staff/Other Contractors to access a construction site while the GC maintains the overall responsibility of the project site as the Constructor on the project site. By signing below, the GC will maintain Constructor designation and site responsibility including the coordination of Owner’s Staff/Other Contractors as approved to complete work on site.

PART A: To be completed by Region of Peel Project Manager or staff requesting access

Request to attend Construction Site to complete work:			
Location:		Description of work and site interaction:	
From date:	Time:	To Date:	Time:
Owner’s Staff/Other Contractors to attend project site: (by signing below, Owner’s Staff/Other Contractors agree to follow the GC/Constructors’ established health and safety rules and instructions on the project site at all times, including following the identified sign-in process whenever attending the project site)			
Name:	Title:	Signature:	
Name:	Title:	Signature:	
Name:	Title:	Signature:	
Name:	Title:	Signature:	
Name:	Title:	Signature:	
Name:	Title:	Signature:	
Name:	Title:	Signature:	
Name:	Title:	Signature:	
Name:	Title:	Signature:	

Owner’s Staff/Other Contractors Supervisor or Assistant (required whenever more than five staff are expected on site at a time):		
Name:	Title:	Signature:

Owner’s Staff/Other Contractors will follow the GC/Constructors’ established health and safety rules on the project site at all times, including following the identified sign-in process whenever attending the project site.

Owner's Staff/Other Contractors Project Constructor Coordination Form

PART B: To be completed by the General Contractor and Region of Peel Project Manager

Communication and Site Responsibility - This coordination document must be completed and signed by the GC and the ROP Project Manager. It is intended to assist everyone involved to understand who will be working on the project site on behalf of the Region of Peel, when the work will take place, and that the Constructor designation and site responsibility will be maintained by the GC identified within this document while this work is being completed.

By signing you acknowledge commitment to the roles and responsibilities as described in this coordination document.

Peel Region Project Manager:		
Name:	Title:	Signature:
		Date:
GC Representative:		
Representative Name:	Title:	Signature:
		Date:

PART C: To be completed by Site Constructor/General Contractor at the time of orientation

The general contractor/constructor will ensure that prior to entering the project site the following items have been reviewed with the Owner's Staff/Other Contractors:

Activity	Completed	Date	Activity	Completed	Date
Owner's Staff/Other Contractors have received orientation on project site and constructor emergency process has been reviewed.	☐		Hazard assessment of ROP work area on site has been conducted along with review of potential electrical hazards, physical hazards, chemical, etc.	☐	
Protective equipment has been provided to Owner's staff/ Other Contractors.	☐		Additional hazards or risks have been identified in site work area (list below).	☐	
Comments:					
Project Site Supervisor/Contact(s): <i>Identify Contractor Representative to supervise Owner's Staff/Other Contractors while on site to perform work.</i>					
GC Representative:	Title:	Signature:			

Copies of the completed document must be provided to the construction project manager for distribution to the employee's direct supervisor. Original to be maintained by the general contractor at the construction site.

Owner's Staff/Other Contractors Anticipated to Attend Site for Contractor Coordination

Owner's staff/Other contractors' information (i.e. ISTS staff or XYZ Vendor)	Description of work	Anticipated stage of construction and duration of work

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1. GENERAL

1.1 Related Requirements

- 1.1.1 All tender documentation.

1.2 General Conditions

- 1.2.1 The General Conditions of the Contract and Articles of this Division apply to and form part of all Sections of these Specifications.
- 1.2.2 It is essential that Work of this Contract be performed so as not to interfere with Agency's use of the building.
- 1.2.3 Have Subcontractors and suppliers confirm that they have carefully read and understood the General Conditions of the Contract and this section before commencing their respective work. Claims for delay and/or extra expense will not be accepted by reason of non-compliance with this requirement.
- 1.2.4 Specifications, Schedules and Drawings are complementary and items mentioned or indicated on one may not be mentioned or indicated on the others.
- 1.2.5 Drawings are intended to convey scope of Work and indicate general and approximate location, arrangement and size of fixtures, equipment, ducts, piping, conduit and outlets. Obtain more accurate information regarding location, arrangement and sizes from study and coordination of Drawings, and shop drawings; become familiar with conditions and spaces affecting these matters before proceeding with Work. Where conditions require reasonable changes in indicated location and arrangements, make such changes at no additional cost to Agency.

1.3 Discrepancies / Conflicts / Omissions

- 1.3.1 If discrepancies or conflicts in, or omissions from Drawings, Specifications or other Contract Documents are suspected, or if there is doubt as to the meaning or intent thereof notify the Consultant or designate at once.
- 1.3.2 Drawings, Specifications and other Contract Documents are intended to be in compliance with federal, provincial and municipal laws, by-laws, regulations and other requirements of authorities having jurisdiction. Perform work in conformity with such requirements. If discrepancies, conflicts or omissions are suspected, notify the Consultant at once.

1.4 Site Examination

- 1.4.1 Make a careful examination of the site of the Work, and investigate and be satisfied as to all matters relating to the nature of the Work to be undertaken, as to the means of access and egress thereto and therefrom, as to the obstacles to be met with, as to the rights and interests which may be interfered with during the construction of the Work, as to the extent of the Work to be performed and any and all

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mailers which are referred to in the Drawings, Specifications and other Contract Documents, or which are necessary for the full and proper understanding of the Work and the conditions under which it will be performed.

- 1.4.2 Contractor is held to have examined site and ascertained extent and nature of conditions affecting performance of Work before Bidding, including location of concealed services which may have to be protected, removed or relocated.
- 1.4.3 Contractor is held to have examined Specifications, Drawings and other such bidding and contract documents, before bidding, and it shall be assumed that Contractor understands these Specifications, Drawings and other such documents.
- 1.4.4 Contractor is held to have reported to Consultant, before executing the Contract, ambiguities, discrepancies, omissions, errors, departures from building bylaws or from good practice discovered during examination. If ambiguities, discrepancies, omissions are not reported and clarified, the most stringent requirement shall govern, as determined by the Consultant.
- 1.4.5 Before commencing the work of any Section or trade, carefully examine the work of other Sections and trades upon which it may depend, examine substrate surfaces, and report in writing to the Consultant, defects which might affect new Work. Commencement of new Work shall constitute acceptance of conditions and work by other Sections, trades, and Other Contractors upon which the new Work depends. If repair of surfaces is required after commencement of specific work it shall be included in the work of the trade providing the specific system or finish.
- 1.4.6 Give particular attention to finished dimensions and elevations of the Work. Make finished work fit indicated spaces accurately. Make finished work flush, plumb, true to lines and levels and accurate in all respects.
- 1.4.7 No allowances shall be made subsequently by the Agency or Consultant or designate for error or negligence in connection with these requirements and no claim will be considered for circumstances or omissions which could have been prevented or included for, had these procedures been followed.

1.5 Work Covered by Contract Documents

- 1.5.1 This section only provides a summary of the scope of work. The scope of work is not limited to the list provided here. Refer to the drawings and specifications for full scope of work.
- 1.5.2 Structural Changes
 - .1 As per Structural Set of Drawings
- 1.5.3 Fire Suppression, HVAC and BAS:
 - .1 As per Mechanical set of Drawings.
- 1.5.4 Division 26 – Electrical Distribution Upgrade

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- .1 As per Electrical Set of Drawings
 - 1.5.5 Division 22 – Plumbing Upgrade
 - .1 As per Plumbing Set of Drawings
 - 1.5.6 The Contractor shall furnish all labor, materials, equipment and incidental services necessary to perform all Work. All construction work shall be in compliance with the accompanying drawings, specifications and other contract documents.
 - 1.5.7 Division of the Work among Subcontractors, suppliers or vendors is solely the Contractor's responsibility. Neither the Project Manager/Agency nor Consultant assumes any responsibility to act as an arbiter to establish subcontract terms between sectors or disciplines of work.
 - 1.5.8 For complete Scope of Work refer to all drawings, specification and other contract documents.
- 1.6 **Contracts**
 - 1.6.1 Construction Work under single CCDC 2 -2020 Stipulated Price Contract and Supplemental Conditions.
- 1.7 **General Requirements**
 - 1.7.1 The requirements of the Articles of Agreement, Conditions of the Contract, Division 1. Apply to and form all Sections of the Contract Documents and the Work.
 - 1.7.2 Work in this Specification is divided into descriptive sections which are not intended to identify absolute contractual limits between Subcontractors, nor between the Trade Contractor and their Subcontractors. The Trade Contractor is responsible for organizing division of labour and supply of materials essential to complete the Contract.
 - 1.7.3 Specifications, Schedules and Drawings are complementary and items mentioned or indicated on one may not be mentioned or indicated on the others.
 - 1.7.4 Trade Contractor shall be responsible for materials, products, operations, or methods mentioned in the specifications or indicated on the drawings and shall provide to the quality or subject to the qualifications noted. Perform, according to the conditions stated, each operation prescribed and provide labour, materials, products, equipment and services to complete the Work.
 - 1.7.5 Where the singular or masculine is used in the Contract Documents, it shall be read and construed as if the plural, feminine or neuter had been used when the context or the statement so requires and as required to complete the Work, and the rest of the sentence, clause, paragraph, or Article shall be construed as if all changes in grammar, gender or terminology thereby rendered necessary had been made.
 - 1.7.6 The terms "exposed" or "exposed to view" refers to surfaces that are within the line of vision of persons from any accessible viewpoint, both

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within and without the building. Where any part of a surface is exposed to view, all other portions of that surface shall also be considered as exposed to view.

1.8 Work Sequence

- 1.8.1 Construction Work in suitable manner to accommodate Municipality of Peel, continuous use of premises during construction, as described below.
- 1.8.2 Cooperation with Municipality of Peel in scheduling operations to minimize conflict.
- 1.8.3 All of the Work is to proceed to the schedule submitted by the Proponent and accepted by the Agency. The Proponent's schedule will recognize the following restrictions:
- 1.8.4 The Proponent must perform his activities respecting the requirements set forth in the specifications Division 01 - Section 01 11 00 - "Summary of Work" Paragraph 1.10 Occupancy and Use of Premises as will safeguard the operations of building. All services are to be left in good repair and operating while the Work is undertaken.
- 1.8.5 All work to comply to the requirements of the latest National Building Code.
- 1.8.6 Noisy work or work which would cause a safety hazard (including work that generates odours) must be completed on the following hours 9:00am to 7:00PM. All occupied areas impacted by after hours and weekend work must be made safe and cleaned at the end of daily construction/work activities so building staff may continue their regular daily duties the next business day.
- 1.8.7 Exterior work can be completed at any time provided that work is not overly disruptive or would cause a safety hazard to occupants. Work can also take place in the interior of the building as long as the space is not occupied. During this period,
 - .1 Construction work in public areas (offices, corridors, etc.) can only be between 9:00am to 7:00pm.
 - .2 General construction work in service areas (mechanical rooms, roof, electrical room etc.) that are not accessible to the resident occupants can be carried out during normal hours if there are no activities disrupting the normal operation of the building (asbestos abatement, noise, hot work, equipment delivery, etc.).
 - .3 Any hazardous material removals, demolition removals, and any deliveries must be completed or scheduled between hours 9:00am to 7:00pm .
 - .4 No work will be allowed beyond hours 9:00am to 7:00pm.
- 1.8.8 Safe access through the lobby/corridors must be maintained. Throughout the construction period, the Proponent is to include for any hoarding, covered walkway, etc., necessary for this purpose. The

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construction activities are to be scheduled so as to minimize any complete shutdown of the lobby and Corridors accessibility.

- 1.8.9 The contractor is required to provide all PPE, equipment, materials, and labour including ladders/ lifts, etc.
- 1.8.10 Electric welding from building power source is not permitted.
- 1.8.11 The Proponent must abide by the Rules and Regulations of Peel Region.

1.9 Contractor's Use of Premises

- 1.9.1 The Proponent shall maximize use of premises as much as possible to allow for:
 - .1 Building Occupancy.
- 1.9.2 Assume full responsibility for protection from construction hazards of building staff, resident occupants and the public at all times when they are on the site.
- 1.9.3 Assume full responsibility for the protection of the existing buildings and landscaping from damage due to the Work of the Proponent or any Sub-contractors employed on the site. After obtaining the approval of the Peel Region project Team, make good all damage to Peel Region's satisfaction and at no cost to Peel Region.
- 1.9.4 Do not encumber site with materials or equipment.
- 1.9.5 Do not load structure with weight that will endanger the structure.
- 1.9.6 Assume full responsibility for protection and safekeeping of products stored on premises.
- 1.9.7 Move any stored products or equipment which interfere with operations of building at no cost to Peel Region.
- 1.9.8 Temporary access points as may be required at the perimeter of the building shall be as later approved by Peel Region.

1.10 Occupancy and Use of Premises

- 1.10.1 The Proponent and all Sub-contractors are expected to understand that all areas of the building remain occupied during the Work and that the Work is to be executed in such a manner as to provide the minimum interference with the partial use of the premises by the occupants and the public, and the maximum safety of the occupants and the public during the Work. The Proponent and all Sub-contractors will take reasonable measures for the control of noise during Working hours.
- 1.10.2 All noise and vibration generating operations, such as jack hammering, drilling, compacting and the use of other such equipment, that will interfere with the occupied portions of the building shall be confined to hours between 9:00am to 7:00pm.
- 1.10.3 The work shall be confined to the area defined on the drawings except that services connections and certain portions of landscaping, hard paving and curb work shall be executed on Municipal property under regulations of authorities having jurisdiction

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- 1.10.4 Where the Proponent contemplates entering any occupied area of the premises to carry out Work or to obstruct or take out of use any occupied area of the existing occupied premises, he shall request a meeting with the Peel Region Site Staff and Facilities Management in order to reach agreement as to the time, and length of time, he may possess, obstruct or remove from use any such area. No Work to existing occupied facilities shall be proceeded with until so authorized.
- 1.10.5 The Proponent may be requested from time to time to suspend certain objectionable operations causing undue interference with ongoing functions of the building.
- 1.10.6 It is essential that the existing building be maintained weather tight at all times. The Proponent shall therefore furnish all temporary protection, enclosures, tarpaulins, etc., as may be required to weatherproof any openings made by the Work. The Proponent and all Sub-contractors must seal off or temporarily dam all open roof edges, etc. to prevent any water present on existing roof areas, from entering the occupied floor(s).
- 1.10.7 The Proponent is to ensure that throughout the duration of the construction, the Peel Region's power requirements must not be affected by the service of the construction.

1.11 Setting Out

- 1.11.1 Be responsible for setting out the Work. Prior to setting out the Work, verify dimensions and elevations shown on the Contract Documents and report to Peel Region Construction Manager Team any unsatisfactory conditions that may adversely affect the proper completion of the Work.
- 1.11.2 Accurately set out the Work from levels and lines. Where Work of this Contract is dependent upon grades and elevations of existing structures or facilities, such grades or elevations shall take precedence over those determined by reference to established elevations. Advise Municipality of Peel Construction Manager Team of any discrepancies.
- 1.11.3 During any activity of the Work, layout and check all features, including but not limited to the following:
- 1.11.4 Establish and maintain temporary bench marks set required to perform the Work. The Proponent may be requested from time to time to suspend certain objectionable operations causing undue interference with ongoing functions of the building.
- 1.11.5 Provide general dimensions, lines and elevations required to perform the Work.
- 1.11.6 In the event of a discrepancy between Municipality of Peel and the Trade Contractor regarding horizontal and/or vertical alignment conditions, which are beyond allowable specified tolerance, Municipality of Peel may engage the services of an independent Land Surveyor. The surveyor shall investigate the disputed condition and

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the results of the independent investigation shall determine the bearer of costs for this service, being either Municipality of Peel or the Trade Contractor.

.1 If the Trade Contractor is found to be in error, all costs incurred to correct the condition shall be assumed by the Trade Contractor.

1.12 Building Dimensions

1.12.1 Ensure that the necessary job dimensions are taken and Sub-contractors are coordinated for the proper execution of the Work. Assume complete responsibility for the accuracy and completeness of all dimensions, and for coordination of all elements of the Project.

1.12.2 Report any inconsistencies, ambiguities, discrepancies, omissions, and errors between Site conditions and Contract Documents to Municipality of Peel project team prior to the commencement of Work. If inconsistencies, ambiguities, discrepancies, omissions, and errors are not reported and clarified, the most stringent requirement shall govern, as determined by Municipality of Peel Construction representative.

1.12.3 Verify that Work, as it proceeds, is executed in accordance with dimensions and positions indicated which maintain levels and clearance to adjacent Work, as set out by requirements of the Contract Documents, and ensure that Work installed in error is rectified without extra cost to Municipality of Peel before construction continues.

1.12.4 Check and verify dimensions referring to Work and interfacing of services. Dimensions, when pertaining to the Work of other Sections (Sub-contractors), shall be verified with the Section (Sub-contractor) concerned. Ensure that Sub-contractors performing various Sections cooperate for the proper performance of the Work.

1.12.5 Do not scale directly from the Drawings. If there is ambiguity or lack of information, immediately inform Municipality of Peel project team. Any change through the disregarding of this clause shall be the responsibility of the Proponent.

1.12.6 All details and measurements of any Work which is to fit or conform to Work installed shall be taken at the site.

1.13 Existing Site Conditions

1.13.1 Make a careful examination of the site, and investigate and be satisfied as to all matters relating to the nature of the Work to be undertaken, as to the means of access and egress thereto and therefrom, as to the obstacles to be met with, as to The extent of the Work to be performed and any and all matters which are referred to in the Contract Documents.

1.13.2 Report any inconsistencies, ambiguities, discrepancies, omissions, and errors between Site conditions and Contract Documents to

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Municipality of Peel Construction Manager prior to the commencement of Work. If inconsistencies, ambiguities, discrepancies, omissions, and errors are not reported and clarified, the most stringent requirement shall govern, as determined by Municipality of Peel Construction Manager.

1.14 Records

- 1.14.1 Maintain a complete accurate log of control and survey Work as it progresses.
- 1.14.2 On request of the Agency, submit documentation to verify the accuracy of field engineering Work.

1.15 Materials and Products

- 1.15.1 Work to be based on using new materials and products specified or indicated by reference to standards, codes, specifications, to a manufacturer's name, by trade name or by catalogue reference. Where two or more trade names are specified, the choice shall be optional with the Proponent.
- 1.15.2 The Contract Price to be based on materials and products specified.
- 1.15.3 Please refer to the Request for Tender Front End document for proposed alternates or substitutions.
 - .1 Proposed substitutions to show the material and product names and complete specifications and state what difference, if any, will be made to the Contract Price for each substitution, should it be accepted.
 - .2 Should the proposed substitution be accepted either in part or in whole, the Proponent will assume full responsibility when the substitution affects any other Work or Work of other Sections (Sub-contractors). Drawing changes required as a result of the substitution will be executed by the Consultant at the Proponent's expense.
 - .3 Proposed substitutions must satisfy all design conditions and other specified requirements. Properties included but not limited to the following as applicable, will be considered:
 - .1 Physical dimension requirements **must** satisfy the space limitations,
 - .2 Static and dynamic weight limitations,
 - .3 Structural properties,
 - .4 Audible noise levels,
 - .5 Vibration generation,
 - .6 Interchangeability of parts and / or components,
 - .7 Accessibility for maintenance,
 - .8 Possible removal or replacement,
 - .9 Colours,
 - .10 Textures,

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- .11 Compatibility with other materials, products, assemblies and components.

1.15.4 The cost of changes in the Work of a Sub-contract necessitated by the use of proposed material and / or product substitution is to be borne by the Sub-contractor proposing the substitution.

1.16 Code Requirements

1.16.1 Proposed substitutions for materials, products, methods and processes shall meet the requirements of the Provincial Building Code latest version, as amended, and the regulations, by-laws and municipal statutes of authorities having jurisdiction including the latest amendments thereto.

1.16.2 Proposed substitution materials, products, methods and processes must not negate the compliance of adjacent materials, products and constructions with the requirements of the Provincial Building Code latest version, as amended, and the regulations, by-laws and municipal statutes of authorities having jurisdiction including the latest amendments thereto, to which the proposed substitutions may be applied or attached.

1.17 Supplementary Definitions

1.17.1 In the Specifications, references such as "shown on the Drawings", "specified", "scheduled", "called for" and the like shall be deemed to include Work required by any of the Contract Documents.

1.17.2 In the Specifications the expression Section(s) is synonymous with Sub-contractor(s) if the context permits. The expression "all Sections" shall be deemed to include the Proponent.

1.18 Material Handling and Storage

1.18.1 Store packaged material in original, undamaged containers with manufacturer's labels and seals intact.

1.18.2 Store sand, masonry units and manufactured items off ground on approved supports and protect each pile with weatherproof covering. Stack to permit air circulation and to prevent damage to units. Use mechanical equipment for handling to minimize damage.

1.18.3 Prevent damage to materials during handling and storage.

1.18.4 Damaged materials are not acceptable. Remove damaged or rejected material from site immediately at the Proponent's or Sub-contractor's expense.

1.19 Lintels and Bridging

1.19.1 Ensure correct formation and bridging of openings in masonry and structural walls as required to carry the work in its entirety including new openings/reworking the existing openings for the mechanical and electrical work. The lintels and bridges affected by this work are to be

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reviewed and certified with a structural engineer who is a P.Eng in the province of work.

1.20 Temporary Work

1.20.1 The expression “provide” shall be deemed to include the provision, installation and finishing, maintenance, servicing and removal of the Work described. All Work damaged by temporary installations shall be repaired and made good at no expense to Municipality of Peel.

1.21 Examination

1.21.1 Each Section (Sub-contractor) shall examine surfaces prepared by other Sections (Sub-contractors) which affect its Work and shall ensure that defects are corrected. Commencement of Work shall imply acceptance of prepared Work.

1.21.2 All Sections (Sub-contractors) shall check and verify with the Proponent all dimensions, especially those pertaining to Work of more than just their Section (Sub-contractors Work).

1.21.3 All details and measurements of any Work which is to fit to, or conform with, Work already installed by other Sections (Sub-contractors, shall be taken at the job site by the Sections (Sub-contractors) concerned.

1.22 Supply and / or Installation

1.22.1 Unless the word “only” suffixes “supply” or “install” or other variations of those words according to the Section wherein they are used, it is the express intent of this Contract that “supply and install” is implied.

1.22.2 Unless otherwise specified, Work shall be installed in accordance with the manufacturer’s printed directions and recommendations.

1.23 Satisfaction / Approval

1.23.1 The expression “to the satisfaction or approval of the Agency” shall be implied throughout the Specifications in regard to all materials and Workmanship.

1.23.2 “Submit for approval” means that the item in question is to be submitted to the Agency for approval and that a written acceptance of it is authorization for its use in the Work shall be obtained before it is incorporated in the Work. Sections (Sub-contractors) shall submit items for approval to the Agency via the Proponent.

1.23.3 An “approved Method” means that which has the manufacturer’s recommendation or which is generally accepted as good trade practice. The Agency’s approval is also required.

1.24 Fastenings

1.24.1 Use exposed metal fastenings and accessories of a permanent type that are of same texture, colour and finish as the base metal on which they occur.

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- 1.24.2 Use metal fastening of the same material as the metal component they are anchoring or of a metal which will not set up an electrolytic action which would cause damage to the fastening and / or metal component.
- 1.24.3 Use fastenings of a type and size and install them in a manner to provide positive permanent anchorage of the unit to be anchored in position. Install anchors at required spacing to provide required load bearing or shear capacity.
- 1.24.4 Keep exposed fastenings to a minimum, evenly spaced and neatly laid out. Show on shop drawings.
- 1.24.5 Fastenings which cause spalling or cracking of material to which anchorage is being made are not permitted.
- 1.24.6 Limitations for use of Power Actuated Tools:
 - .1 The use of powder activated fasteners is prohibited without the written authorization of the Municipality of Peel.
 - .2 Where such authority is given, it will be for low velocity type powder activated fasteners and for horizontal application only.
 - .3 The manufacturer of the equipment selected, Ramset, shall send a representative to site to demonstrate the equipment prior to its use, and this representative shall make periodic inspections to ensure compliance with instructions issued by him and correct application of material. In all cases a shield shall be used where fasteners are applied to concrete. The use of fasteners in precast concrete is to be avoided if possible as there is an increased tendency to shatter surfaces.
 - .4 Fasteners shall not be nearer than 2.5 inches (65 mm) to the edge of any precast or cast-in-place formed concrete member.
 - .5 Under no circumstances shall fasteners be used on concrete members less than 3 inches (75 mm) in thickness.
 - .6 Such fasteners shall not be used in areas where corrosion can take place, for instance due to high humidity or condensation.
 - .7 Generally use support anchorage of cast-in-place type set into concrete forms prior to pouring concrete, or self-drilling type such as Phillips "Red Head" T-32 tie wire type. When drilling upwards, use jig to hold drill steady and plumb.
 - .8 Provide pull-out tests on anchors, or otherwise test to ensure anchorage is sufficient for particular application including a minimum safety factor of seven. Provide evidence of such tests if requested.
 - .9 Submit samples of proposed anchoring or hanging devices with technical data and test data.

1.25 Existing Services

- 1.25.1 The Proponent is responsible for ensuring all "Existing Services" (including but not limited to structural elements, water pipes, drains, electrical cables and fixtures, communications cables and fixtures,

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security cables and fixtures, HVAC ducting, cables and fixtures, etc.) are not interrupted and / or damaged by the Construction Work. The proponent must take all precautions to ensure that services buried underground or contained in a floor or contained in other elements are identified on the drawings provided by Municipality of Peel and have been clearly identified on the Work Site.

- 1.25.2 Municipality of Peel will not be liable for any loss, damage, delay or claim whatsoever resulting or arising from the absence in whole or part of services not shown on drawings.

1.26 Emergencies

- 1.26.1 Notify Municipality of Peel project Team immediately should an emergency arise on the site, including personal injuries and accidents. Provide complete details on extent of emergency, cause and the action being taken. This notification shall be by telephone or email immediately after the occurrence.

1.27 Field Marking

- 1.27.1 Do not use wick pen to mark face of products to be installed in the Work. Such pen marks will show through applied paint or vinyl coatings and the like in due course. The Proponent will be held responsible and required to remedy such defects, classified as "latent defects" regardless of when they occur.

1.28 Trademarks and Labels

- 1.28.1 Trademarks and labels, including applied labels shall not be visible in the finished Work. Such trademarks or labels shall be removed by grinding if necessary, or painted out where the particular material has been painted.
- 1.28.2 The exception of this requirement shall be those essential to obtain identification of mechanical and electrical equipment and those required to be visible by authorities having jurisdiction and those on plumbing fixtures and trims.

1.29 Safety

- 1.29.1 The Proponent is to be solely responsible for safety on site and for the compliance with all codes, regulations and laws of all authorities having jurisdiction.

1.30 Existing Surfaces

- 1.30.1 All surfaces to receive a new finish are to be properly prepared to receive the new finish supplied. All implementations to be repaired to ensure that blemishes do not telegraph through the new finish.
- 1.30.2 The term "Make Good" shall mean repairing or filling operations performed on existing floors, walls, ceilings or any other exposed

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surfaces. It is intended that finished surfaces match and line with adjoining surfaces.

- 1.30.3 "Make Good" all surfaces and finishes disturbed or damaged due to Work of this contract to match existing or adjoining surfaces. Ensure the materials used to repair the damage are compatible with the existing materials and work.
- 1.30.4 The Site must be restored to a condition equal to the existing conditions or, if specified elsewhere, to a condition better than the existing conditions.
- 1.30.5 Restore lands outside of the limits of the Work, which are disturbed or damaged due to the Work to their original condition in addition to complying with the requirements of the General Conditions of the Form of Agreement.

1.31 Parking

- 1.31.1 Parking spaces are very limited at site and no parking spots can be guaranteed to contractors.

1.32 Sub-Division of Work - Specification Format and Contractor's Responsibility for Coordination of Sub-Contractors:

1.32.1 Cooperation

- .1 Provide forms, templates, anchors, sleeves, inserts and accessories required to be fixed to or inserted into Work and set in place or instruct separate Sections (Sub-contractors) as to their locations.
- .2 Supply items to be "Built-In" as and when required together with templates, measurements, shop drawings and other related information and assistance.
- .3 Pay the cost of extra Work and make up time lost as a result of failure to provide necessary information and items to be "Built-In" in adequate time.

1.32.2 Coordination

- .1 Ensure that Sections (Sub-contractors) cooperate with each other including Other Trade Contractors employed by Municipality of Peel, so that Work will be carried out expeditiously and will be satisfactory in all respects at completion.
- .2 Ensure that Sections (Sub-contractors) examine Contract Documents with particular emphasis to Work of other Sections (Sub-contractors) which may affect the performance of their own Work.
- .3 Ensure Sections (Sub-contractors) cooperate with other Sections (Sub-contractors) whose Work attaches to or is affected by their own Work, and ensure that minor adjustments are made to make adjustable Work fit to fixed Work.
- .4 Ensure that Sections (Sub-contractors) requiring foundations or openings to be left for the installation of their Work furnish

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the necessary information to the Sections (Sub-contractors)

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- concerned in ample time so that proper provisions can be made.
- .5 Pay particular attention to types of ceiling construction and clearances throughout, especially where recessed fixtures are required. Coordinate work with Other Trade Contractors and Sub-trades wherever ventilation ducts or piping installations occur to ensure that conflicts are avoided.
 - .6 Install ceiling mounted components in accordance with final ceiling plans. Inform Municipality of Peel Construction Manager of conflicting installations.
 - .7 Install and arrange ducts, piping, tubing, conduit, equipment, fixtures, materials and products to conserve headroom and space with minimum interference and in neat, orderly and tidy arrangement. Run pipes, ducts, tubing and conduit, vertical, horizontal and square with building grid unless otherwise indicated. Install piping, ducts, and conduit as close to underside of structure as possible unless shown otherwise.
 - .8 Make provision for unrestricted relocation of light fixtures to replace ceiling panels at grid spaces of the same size, without interference or restriction by items located within the ceiling space.
 - .9 Where supports or openings are to be left for the installation of various parts of the Work furnish the necessary information to those concerned in ample time so that proper provision can be made for such items. Have cutting, drilling and other remedial work, and the subsequent patching or other work required for failing to comply with this requirement, performed at a later date at no additional Cost to Municipality of Peel.
 - .10 Ensure that items to be "Built-In" are supplied as and when required by Sections (Sub-contractors) building in the items together with templates, measurements or shop drawings and other related information and assistance.
 - .11 Ensure coordination of products supplied in metric and imperial units into the overall layout.
 - .12 Placing, installation, application and connection of work by Municipality of Peel's own forces or by Other Trade Contractors on and to the Trade Contractor's Work shall not relieve the Trade Contractor of his responsibility to provide and maintain the specified warranties.
 - .13 Ensure that setting drawings, templates, and all other information necessary for the location and installation of materials, fixtures, equipment, holes, sleeves, inserts, anchors, accessories, fastenings, connections, and access panels are provided by each Section whose work requires cooperative location and installation by other Sections, and that such information is communicated to the applicable

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- installer. Have cutting, fixing and making good to the work of Other Trade Contractors, Sub-trades required for, and make up time lost as result of, failure to comply with this requirement, at no additional cost to Agency.
- .14 Coordinate with removals/installations specified in other Divisions and Other Contracts.
- .15 Properly coordinate the work of the various Sections and trades to assure the best arrangement of pipes, conduits, ducts and mechanical, electrical and other equipment, in the available space. Under no circumstances will any extra payment be allowed due to the failure by the Trade Contractor to coordinate the Work. If required, in critical locations, prepare interference and/or installation drawings showing the work of the various Sections as well as the existing installation, and submit these drawings to the Construction Manager for review before the commencement of Work.
- .16 In case of damage to active services or utilities, notify Construction Manager and respective authorities immediately and make all required repairs under direction of Construction Manager and respective authorities. Carry out repairs to such damaged services and utilities continuously to completion, including working beyond regular working hours.
- .17 Under no circumstances will any extra payment be allowed due to the failure by the Trade Contractor to coordinate the Work. If required, in critical locations, prepare interference and/or installation drawings showing the work of the various Sections as well as the existing installation, and submit these drawings to Municipality of Peel project Team and Consultant for review before the commencement of Work.

1.33 Cutting and Patching

- 1.33.1 The expression “make good”, refers to repair and restoration of both new and existing Work.
- 1.33.2 Do not cut, bore or sleeve load bearing members without first obtaining Consultant’s written authority for each condition, unless shown on Drawings.
- 1.33.3 Cut holes after they are located and sized by applicable Sections (Sub-contractors) requiring holes.
- 1.33.4 Have cutting and patching done by the Section (Sub-contractor) involved, e.g. have holes in masonry cut and patched by the mason. However, the Proponent shall be responsible for all cutting and remedial Work that is shown upon, or reasonably implied by the Contract Documents.
- 1.33.5 Make cuts with clean, true, smooth edges. Fit units to tolerances established for best standard practice for applicable Work. Make patches as inconspicuous as possible in final assembly.

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- 1.33.6 Be responsible for correct formation and bridging of openings in masonry and structural walls required by other Sections (Sub-contractors).
- 1.33.7 Ensure compatibility between installed materials and security of installation.

1.34 Other Contractors

- 1.34.1 The Proponent is responsible to correlate and coordinate all Work with that of other Contractors having separate contracts with the Agency or the Municipality of Peel in order to complete the Work as expeditiously as possible.
- 1.34.2 Prior to commencement of Work ensure that all Sections (Sub-contractors) are fully conversant with the extent of the Work, the conditions and materials on the project, the schedule of completion, restrictions to safety, and access.
- 1.34.3 Inform all Sections (Sub-contractors) that each is responsible for checking all Sections of the specification for Work pertaining to their Section (Sub-contractor's Work).

1.35 Extended Warranty

- 1.35.1 All warranties, including the required standard two year warranty, shall start at the date of publication of Substantial Performance of the Total Contract, or when Work of an area is substantially completed, accepted and taken over for use by the Municipality of Peel. Ensure that all warranties comply with this stipulation prior to submission of same.
- 1.35.2 Municipality of Peel shall give prompt notice in writing to the Consultant and the Proponent of any defects noted during the warranty period(s), promptly requesting them to remedy such defects.
- 1.35.3 During the month prior to the end of the standard one year warranty period, Municipality of Peel, the Consultant and the Proponent, shall conduct an inspection of the project, the Proponent shall promptly remedy any defects due to faulty materials or Workmanship.
- 1.35.4 At the expiry of the standard two year warranty period the Proponent shall formally assign to Municipality of Peel all extended warranties given by Sub-contractors for their Work on the project and such Sub-contractors shall formally be advised of the assignment.
- 1.35.5 Extended warranties are specified elsewhere as required in the individual Specifications Sections shall be issued jointly in the joint name of Municipality of Peel, Proponent and Sub-contractor.

1.36 Incentive Processing Support

- 1.36.1 Agency intends to apply for SaveOnEnergy, Enbridge Retrofit, FCM Green Municipal Fund incentives based on the estimated energy savings associated with the scope of work of this project.

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- 1.36.2 All incentives are paid by the utility companies and other third-party funding agencies directly to the Agency.
- 1.36.3 Contractor shall provide the following documents to support the incentive applications:
 - .1 Installed equipment specifications and cut sheets as requested by the incentive programs.
 - .2 Removed equipment recycling/disposal certificates.
 - .3 Invoices showing quantities and model numbers of installed energy efficiency equipment.
 - .4 Site pictures clearly showing equipment to be removed and newly installed equipment under energy efficiency improvement scope of work including nameplate pictures.
 - .5 Support incentive application efforts as required.

2. PRODUCTS

2.1 Not Used

- 2.1.1 Not Used.

3. EXECUTION

3.1 Not Used

- 3.1.1 Not Used.

END OF SECTION

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Division 01, Specifications, Section 01 14 00, Work Restrictions

1. GENERAL

1.1 Related Requirements

1.1.1 All tender documentation.

1.2 Access and Egress

1.2.1 Design, construct and maintain temporary "access to" and "egress from" work areas, including stairs, runways, ramps or ladders and scaffolding, independent of finished surfaces and in accordance with relevant municipal, provincial and other regulations.

1.3 Use of Site and Facilities

1.3.1 Contractors shall provide their own storage for materials and equipment. Use of Agency's onsite areas (Yards and others) for contractor's materials and equipment storage is unacceptable.

1.3.2 Execute work with least possible interference or disturbance to building operations, occupants, public and normal use of premises. Arrange with Project Manager/Agency to facilitate execution of work.

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

1.3.4 Where security is reduced by work provide temporary means to maintain security.

1.3.5 Contractor team is not allowed to use the building washrooms at all. Provide temporary services (portable toilet, etc.) for the duration of the project to be installed in coordination with the Agency.

1.3.6 Use of elevator in building, for moving workers and material could be permitted under coordination with Consultant and full protection of elevator surfaces against scratches and damages.

1.3.7 Stairs shall be utilized as the routes for material delivery and an access to place of Work.

1.3.8 Closures: protect work temporarily until permanent enclosures are completed.

1.4 Alterations, Additions or Repairs to Existing Building

1.4.1 Refer to Specifications, Division 1, Section 01 11 00 - Summary of Work.

1.5 Existing Services

1.5.1 Refer to Specifications, Division 1, Section 01 11 00 - Summary of Work.

1.6 Special Requirements

1.6.1 Contractor shall ensure uninterrupted Agency's and user's access to the following building areas during project construction phase:

1.6.2 Access to First Air Room

1.6.3 Access to existing server room at the second floor administration area.

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- 1.6.4 Access to washroom areas on the first floor during following periods
7:00am to 4:00pm.
- 1.6.5 Ensure Contractor's personnel employed on site become familiar with
and obey regulations including safety, fire, traffic and security
regulations.
- 1.6.6 Keep within limits of work and avenues of ingress and egress.
- 1.6.7 Deliver materials outside specified work zone construction restricted
hours
- 1.6.8 Contractors to set access path for personnel and equipment to each
work zone in coordination with Consultant and Agency. The agreed
access path and work hours restriction shall be respected throughout
all phases of this project.

2. PRODUCTS

2.1 Not Used

- 2.1.1 Not Used.

3. EXECUTION

3.1 Not Used

- 3.1.1 Not Used.

END OF SECTION

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Division 01, Specifications, Section 01 32 16, Construction Progress Documentation

1. GENERAL

1.1 General

- 1.1.1 Schedules required:
 - .1 Construction schedule.
 - .2 *Product* delivery schedule.
 - .3 Inspection and testing schedule.
- 1.1.2 Format:
 - .1 Submit construction schedule in form acceptable to *Consultant* and *Agency*.
 - .2 Include horizontal time scale identifying the first *Working Day* of each week.
 - .3 Format for listings: The chronological order of the start of each item or part of the *Work*.
 - .4 Identification of listings: By systems description.
- 1.1.3 Construction schedule:
 - .1 Include the complete sequence of construction activities, including provision for climate and weather.
 - .2 Include the dates for the commencement and completion of each major element of the *Work* parallel to the sections of the specifications.
 - .3 Show projected percentage of completion for each item as of the first *Working Day* of each week.
 - .4 Submit draft schedule for review, and incorporate responses to comments identified by *Consultant* and/or *Agency*.
 - .5 Show dates for the commencement and completion of inspection and testing.
 - .6 At each date of submission of schedule, indicate progress of each activity.
 - .1 Show changes occurring since previous submission of the construction schedule:
 - .1 Major changes in scope.
 - .2 Change Orders and Change Directives.
 - .3 Activities modified since previous submission.
 - .4 Revised projections of progress and completion.
 - .5 Other identifiable changes.
 - .2 Include a narrative report to define:
 - .1 Problem areas, anticipated delays, and the impact on the schedule.
 - .2 Corrective action recommended and its impact on the schedule.
 - .3 Include cash flow projection with minimum look ahead as directed by the *Consultant*.
 - .7 Submit revised construction schedule with each application for payment.
- 1.1.4 *Product* delivery schedule:

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- .1 Include dates for delivery of *Products*, equipment, finish items, factory-finished manufactured items. Show last dates for order, shipment, and delivery in order to meet construction schedule.
 - 1.1.5 Inspection and testing schedule:
 - .1 Prepare schedule for inspection and testing by advance discussion with the selected independent inspection and testing company to determine the time required for the independent inspection and testing company to perform its tests and to issue each of its findings and allow for required time in the construction schedule.
 - .2 Refer to Section 01 45 00 for additional requirements for inspection and testing scheduling.
- 1.2 **Progress Schedule**
 - 1.2.1 Submit the following schedule within two (2) weeks from date of award of *Contract* unless otherwise specified herein.
 - 1.2.2 Prepare a progress schedule of the *Work* consistent with the preliminary schedule. Allow time for preparing and reviewing shop drawings, delivery of major items and equipment and the completion of construction for each *Subcontractor* or special operation required to construct the building and finish exterior areas of the *Work*.
 - 1.2.3 Keep progress schedule up to date and advise parties concerned of changes.
 - 1.2.4 Issue digital copies to all parties concerned. Issue revised copies at suitable intervals.
- 1.3 **Cost Breakdown Schedule**
 - 1.3.1 Submit the following schedule within two (2) weeks from date of award of *Contract* unless otherwise specified herein.
 - 1.3.2 Prepare a cost breakdown for each section of the *Work* coordinated with the progress schedule.
 - 1.3.3 Submit a draft format for acceptance by the *Consultant*.
 - 1.3.4 Keep the cost breakdown schedule up to date with the progress schedule and advise the *Consultant* of changes.
 - 1.3.5 Issue revised copies to the *Consultant* at time of each change.
- 1.4 **Progress and Weekly Reports**
 - 1.4.1 Progress reports:
 - .1 Submit to the *Consultant* and *Agency*, progress reports coincident with Project site meetings and with each progress payment claim consisting of a concise description and a marked-up schedule showing physical percentage complete by item and in total.
 - 1.4.2 Weekly reports:

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- .1 Maintain in the field office at the *Place of the Work* a written weekly record of the progress of parts of the *Work* available. Show dates of commencement and completion of parts of the *Work*, daily high and low temperatures and other weather particulars, number of people engaged on the *Work* (including sub-trades) broken down in groups for each part of the *Work*.

2. PRODUCTS

2.1 Not Used

- 2.1.1 Not used.

3. EXECUTION

3.1 Not Used

- 3.1.1 Not used.

END OF SECTION

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Division 01, Specifications, Section 01 33 00, Submittal Procedures

1. GENERAL

1.1 Related Requirements

1.1.1 All tender documentation.

1.2 Administrative

1.2.1 Submit to Consultant and Project Manager/Agency submittals listed for review. Submit promptly and in orderly sequence to not cause delay in Work. Submittals for all the equipment with long lead items (over 4 weeks delivery) shall be within the two weeks of contract award. Failure to submit within this time frame is not considered sufficient reason for extension of Contract Time and no claim for extension by reason of such default will be allowed.

1.2.2 Do not proceed with Work affected by submittal until review is complete.

1.2.3 Present shop drawings, product data, samples and mock-ups in SI Metric units.

1.2.4 Where items or information is not produced in SI Metric units converted values are acceptable.

1.2.5 Review submittals prior to submission to Consultant. This review represents that necessary requirements have been determined and verified, or will be, and that each submittal has been checked and co-ordinated with requirements of Work and Contract Documents. Submittals not stamped, signed, dated and identified as to specific project will be returned without being examined and considered rejected.

1.2.6 Notify Consultant and Project Manager/Agency, in writing at time of submission, identifying deviations from requirements of Contract Documents stating reasons for deviations.

1.2.7 Verify field measurements and affected adjacent Work are co-ordinated.

1.2.8 Contractor's responsibility for errors and omissions in submission is not relieved by Consultant's review of submittals.

1.2.9 Contractor's responsibility for deviations in submission from requirements of Contract Documents is not relieved by Consultant review.

1.2.10 Keep one reviewed copy of each submission on site.

1.3 Shop Drawings and Product Data

1.3.1 Refer to Specifications 23 05 00 Common Work Results for HVAC and 26 05 00 Common Work Results for Electrical.

1.3.2 The term "shop drawings" means drawings, diagrams, illustrations, schedules, performance charts, brochures and other data which are to be provided by Contractor to illustrate details of a portion of Work.

1.3.3 Submit drawings stamped and signed by professional engineer registered or licensed in province or territory of the Work.

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- 1.3.4 Indicate materials, methods of construction and attachment or anchorage, erection diagrams, connections, explanatory notes and other information necessary for completion of Work. Where articles or equipment attach or connect to other articles or equipment, indicate that such items have been coordinated, regardless of Section under which adjacent items will be supplied and installed. Indicate cross references to design drawings and specifications.
- 1.3.5 Allow 5 days for Consultant's review of each submission. Allow 10 days for BAS submittal.
- 1.3.6 Adjustments made on shop drawings by Consultant are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to Project Manager/Agency and Consultant prior to proceeding with Work.
- 1.3.7 Make changes in shop drawings as Consultant may require, consistent with Contract Documents. When resubmitting, notify Consultant in writing of revisions other than those requested.
- 1.3.8 Accompany submissions with transmittal letter, containing:
 - .1 Date.
 - .2 Project title and number.
 - .3 Contractor's name and address.
 - .4 Identification and quantity of each shop drawing, product data and sample.
 - .5 Other pertinent data.
- 1.3.9 Submissions include:
 - .1 Date and revision dates.
 - .2 Project title and number.
 - .3 Name and address of:
 - .1 Subcontractor.
 - .2 Supplier.
 - .3 Manufacturer.
 - .4 Contractor's stamp, signed by Contractor's authorized representative certifying approval of submissions, verification of field measurements and compliance with Contract Documents.
 - .5 Details of appropriate portions of Work as applicable:
 - .1 Fabrication.
 - .2 Layout, showing dimensions, including identified field dimensions, and clearances.
 - .3 Setting or erection details.
 - .4 Capacities.
 - .5 Performance characteristics.
 - .6 Standards.
 - .7 Operating weight.
 - .8 Wiring diagrams.
 - .9 Single line and schematic diagrams.
 - .10 Relationship to adjacent work.

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- 1.3.10 After Consultant's review, distribute copies.
- 1.3.11 Submit electronic copy of shop drawings for each requirement requested in specification Sections and as Consultant may reasonably request.
- 1.3.12 Submit electronic copies of product data sheets or brochures for requirements requested in specification Sections and as requested by Consultant where shop drawings will not be prepared due to standardized manufacture of product.
- 1.3.13 Submit electronic copies of test reports for requirements requested in specification Sections and as requested by Consultant.
 - .1 Report signed by authorized official of testing laboratory that material, product or system identical to material, product or system to be provided has been tested in accord with specified requirements.
 - .2 Testing must have been within 3 years of date of contract award for project.
- 1.3.14 Submit electronic copies of certificates for requirements requested in specification Sections and as requested by Consultant.
 - .1 Statements printed on manufacturer's letterhead and signed by responsible officials of manufacturer of product, system or material attesting that product, system or material meets specification requirements.
 - .2 Certificates must be dated after award of project contract complete with project name.
- 1.3.15 Submit electronic copies of manufacturers instructions for requirements requested in specification Sections and as requested by Consultant.
 - .1 Pre-printed material describing installation of product, system or material, including special notices and Material Safety Data Sheets concerning impedances, hazards and safety precautions.
- 1.3.16 Submit electronic copies of Manufacturer's Field Reports for requirements requested in specification Sections and as requested by Consultant.
- 1.3.17 Documentation of the testing and verification actions taken by manufacturer's representative to confirm compliance with manufacturer's standards or instructions.
- 1.3.18 Submit electronic copies of Operation and Maintenance Data for requirements requested in specification Sections and as requested by Consultant.
- 1.3.19 Delete information not applicable to project.
- 1.3.20 Supplement standard information to provide details applicable to project.
- 1.3.21 If upon review by Consultant, no errors or omissions are discovered or if only minor corrections are made, copies will be returned and fabrication and installation of Work may proceed. If shop drawings are

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rejected, noted copy will be returned and resubmission of corrected shop drawings, through same procedure indicated above, must be performed before fabrication and installation of Work may proceed.

1.4 Samples

- 1.4.1 Submit for review samples in as requested in respective specification Sections. Label samples with origin and intended use.
- 1.4.2 Deliver samples prepaid to site office.
- 1.4.3 Notify Project Manager/Agency and Consultant in writing, at time of submission of deviations in samples from requirements of Contract Documents.
- 1.4.4 Where colour, pattern or texture is criterion, submit full range of samples.
- 1.4.5 Adjustments made on samples by Project Manager/Agency and/or Consultant are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to Project Manager/Agency and Consultant prior to proceeding with Work.
- 1.4.6 Make changes in samples which Project Manager/Agency and/or Consultant may require, consistent with Contract Documents.
- 1.4.7 Reviewed and accepted samples will become standard of workmanship and material against which installed Work will be verified.

1.5 Mock-Ups

- 1.5.1 Erect mock-ups in accordance with 01 45 00 - Quality Control.

1.6 Photographic Documentation

- 1.6.1 Submit electronic copy of colour digital photography in jpg/bin/tif format with standard resolution monthly with progress statement, or as directed by Project Manager/Agency and/or Consultant.
- 1.6.2 Project identification: name and number of project and date of exposure indicated.
- 1.6.3 Number of viewpoints: 2 locations.
 - .1 Viewpoints and their location as determined by Project Manager/Agency and/or Consultant.
 - .2 Frequency of photographic documentation: monthly. or as directed by Project Manager/Agency and/or Consultant.
 - .3 Upon completion of: services before concealment of Work, or as directed by Project Manager/Agency and/or Consultant.

1.7 Certificates and Transcripts

- 1.7.1 Immediately after award of Contract, submit.
- 1.7.2 Submit transcription of insurance immediately after award of Contract.

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2. PRODUCTS

2.1 Not Used

2.1.1 Not Used.

3. EXECUTION

3.1 Not Used

3.1.1 Not Used.

END OF SECTION

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Division 01, Specifications, Section 01 35 29, Health and Safety Requirements

1. GENERAL

1.1 Reference Standards

- 1.1.1 Canadian Construction Association (CCA).
 - .1 COVID-19 Standardized Protocols for All Canadian Construction Sites.
- 1.1.2 Canada Labour Code, Part 2, Canada Occupational Safety and Health Regulations.
- 1.1.3 Canadian Standards Association (CSA): Canada.
 - .1 CSA S350-M1980(R2003), Code of Practice for Safety in Demolition of Structures.
- 1.1.4 National Building Code 2015 (NBC).
 - .1 NBC 2015, Division B, Part 8 Safety Measures at Construction and Demolition Sites.
- 1.1.5 National Fire Code 2015 (NFC).
 - .1 NFC 2015, Division B, Part 5 Hazardous Processes and Operations, subsection 5.6.1.3 Fire Safety Plan.
- 1.1.6 Province of Ontario.
 - .1 Occupational Health and Safety Act Revised Statutes of Ontario 1990, Chapter 0.1 as amended, and Regulations for Construction Projects, O. Reg. 213/91 as amended.
 - .2 O. Reg. 490/09, Designated Substances.
 - .3 Workplace Safety and Insurance Act, 1997.
 - .4 Municipal statutes and authorities.
 - .5 Public Health Ontario, COVID-19 Restrictions and Public Health Measures.

1.2 Submittals

- 1.2.1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- 1.2.2 Submit site-specific Health and Safety Plan within 7 days after date of Notice to Proceed and before commencement of Work. Health and Safety Plan to include:
 - .1 Results of site-specific safety hazard assessment.
 - .2 Results of safety and health risk or hazard analysis for site tasks and operation found in work plan.
 - .3 Measures and controls to be implemented to address to identify safety hazards and risks.
- 1.2.3 Submit to Departmental Representative within 24 hours of receipt:
 - .1 Copies of reports or directions issued by Federal, Provincial and Territorial health and safety inspectors.
 - .2 Copies of incident and accident reports and immediately notify Region of Peel Project Manager verbally.
- 1.2.4 Submit weekly copies of Contractor's authorized representative's work site health and safety inspection reports to Region of Peel Project Manager.
- 1.2.5 Submit WHMIS Safety Data Sheets (SDS).

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- 1.2.6 Provide a Fire Safety Plan, specific to the work location, in accordance with NBC, Division B, Article 8.1.1.1.3 prior to commencement of work. The plan shall be coordinated with, and integrated into, the existing Building Emergency Procedures and Evacuation Plan in place at the site. Region of Peel Project Manager will provide Building Emergency Procedures and Evacuation Plan. Deliver two copies of the Fire Safety Plan to the Region of Peel Project Manager not later than 14 days before commencing work.
 - 1.2.7 Contractor's and Sub-contractors' Safety Communication Plan.
 - 1.2.8 Contingency and Emergency Response Plan addressing standard operating procedures specific to the project site to be implemented during emergency situations. Coordinate plan with existing Building, Facility, Tenant's Emergency Response Requirements and procedures provided by Region of Peel Project Manager.
 - 1.2.9 Submit names of personnel and alternates responsible for site safety and health.
 - 1.2.10 Submit records of Contractor's Health and Safety meetings when requested.
 - 1.2.11 Region of Peel Project Manager will review Contractor's site-specific Health and Safety Plan and provide comments to Contractor within 5 days from date of submission.
 - .1 Revise plan when required and resubmit to Region of Peel Project Manager within 5 days after receipt of comments from Region of Peel Project Manager.
 - 1.2.12 Region of Peel Project Manager'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.
 - 1.2.13 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 Region of Peel Project Manager.
 - .1 Provide on-site COVID safety and action plan for review and acceptance as part of CSSSP. Plan to meet the latest Ministry of Health guidelines.
 - 1.2.14 Submit Workplace Safety and Insurance Board (WSIB) – Experience Rating Report.
- 1.3 Filing of Notice**
- 1.3.1 File Notice of Project with Provincial authorities prior to beginning of Work.
 - 1.3.2 Contractor's shall be responsible and assume the main Contractor role for each work zone location and not the entire complex. Contractor shall provide a written acknowledgement of this

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responsibility within 3 weeks of Contract award. Contractor to submit written acknowledgement to Region of Peel Project Manager.

1.3.3 Work zone locations include all areas as shown on the Drawings.

1.3.4 Contractor to agree to install proper site separation and identification in order to maintain time and space always throughout life of project.

1.4 Safety Assessment

1.4.1 Perform site specific safety hazard assessment related to project.

1.5 Meetings

1.5.1 Schedule and administer Health and Safety meeting with Region of Peel Project Manager prior to commencement of Work.

1.6 Regulatory Requirements

1.6.1 Do Work in accordance with Section 01 41 00 - Regulatory Requirements.

1.6.2 Comply with the Acts and regulations of the Province of Ontario.

1.6.3 Comply with specified standards and regulations to ensure safe operations at site.

1.7 Project / Site Conditions

1.7.1 Work at site may involve contact with:

.1 Designated Substances: Refer to Agency's Designated Substance Report and Division 02.

1.7.2 Adhere to all regulatory standards relating to hazardous material including:

- .1 PSPC Asbestos Management Directive and Standard, 2017.
- .2 MOL – Lead on Construction Projects.
- .3 MOL – Silica on Construction Projects.
- .4 Canada Labour Code.
- .5 Canadian Environmental Assessment Act.

1.8 General Requirements

1.8.1 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.

1.8.2 Region of Peel Project Manager may respond in writing, where deficiencies or concerns are noted and may request re-submission with correction of deficiencies or concerns.

1.8.3 Relief from or substitution for any portion or provision of minimum Health and Safety standards specified herein or reviewed site- specific Health and Safety Plan shall be submitted to Region of Peel Project Manager in writing.

1.8.4 Use power actuated devices only after receipt of written approval from Region of Peel Project Manager.

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- 1.8.5 Locates are required before doing any core drilling, cutting of concrete. Located to be posted on project site in a conspicuous location for the duration of the Work.

1.9 Responsibility

- 1.9.1 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.
- 1.9.2 Contractor will be responsible and assume the role Constructor as described in the Ontario Occupational Health and Safety Act and Regulations for Construction Projects.
- 1.9.3 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

- 1.10.1 Comply with Ontario Occupational Health and Safety Act, R.S.O. 1990, c. 0.1 and Ontario Regulations for Construction Projects, O. Reg. 213/91.
- 1.10.2 Comply with Occupational Health and Safety Regulations, 1996.
- 1.10.3 Comply with Occupational Health and Safety Act, General Safety Regulations, O.I.C.
- 1.10.4 Comply with Canada Labour Code, Canada Occupational Safety and Health Regulations.

1.11 Unforeseen Hazards

- 1.11.1 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 Ontario having jurisdiction and advise Region of Peel Project Manager verbally and in writing.
- 1.11.2 When unforeseen or peculiar safety-related factor, hazard, or condition occur during performance of Work, follow procedures in accordance with Acts and Regulations of Province having jurisdiction and advise Region of Peel Project Manager verbally and in writing.

1.12 Health and Safety Co-Ordinator

- 1.12.1 Employ and assign to Work, competent and authorized representative as Health and Safety Co-ordinator. Health and Safety Co-ordinator must:
 - .1 Have site-related working experience specific to activities associated with.
 - .2 Have working knowledge of occupational safety and health regulations.

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Division 01, Specifications, Section 01 35 29, Health and Safety Requirements

- .3 Be responsible for completing Contractor's Health and Safety Training Sessions and ensuring that personnel not successfully completing required training are not permitted to enter site to perform Work.
- .4 Be responsible for implementing, enforcing daily and monitoring site-specific Contractor's Health and Safety Plan.
- .5 Be on site during execution of Work and report directly to and be under direction of Certified Industrial Hygienist Registered Occupational Hygienist site supervisor.

1.13 Posting of Documents

- 1.13.1 Ensure applicable items, articles, notices and orders are posted in conspicuous location on site in accordance with Acts and Regulations of Province having jurisdiction, and in consultation with Region of Peel Project Manager.

1.14 Correction of Non-Compliance

- 1.14.1 Immediately address health and safety non-compliance issues identified by authority having jurisdiction or by Region of Peel Project Manager.
- 1.14.2 Provide Region of Peel Project Manager with written report of action taken to correct non-compliance of health and safety issues identified.
- 1.14.3 Region of Peel Project Manager may stop Work if non-compliance of health and safety regulations is not corrected.

1.15 Blasting

- 1.15.1 Blasting or other use of explosives is not permitted.

1.16 Powder Actuated Devices

- 1.16.1 Use powder actuated devices only after receipt of written permission from Region of Peel Project Manager.

1.17 Work Stoppage

- 1.17.1 Give precedence to safety and health of public and site personnel and protection of environment over cost and schedule considerations for Work.

2. PRODUCTS

2.1 Not Used

- 2.1.1 Not used.

3. EXECUTION

3.1 Not Used

- 3.1.1 Not used.

END OF SECTION

**NEW GENERATOR INSTALLATION AT PEEL YOUTH VILLAGE
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Division 01, Specifications, Section 01 41 00, Regulatory Requirements

1. GENERAL

1.1 References to Regulatory Requirements

- 1.1.1 Perform Work in accordance with but not limited to National Building Code latest version (NBC) and Province Building Code latest version including all amendments up to tender closing date and other codes of provincial and local application provided that in case of conflict or discrepancy, more stringent requirements apply.
- 1.1.2 Where specified standards are not dated, conform to latest issue of specified standard, amended and revised of the bid closing date.
- 1.1.3 Meet or exceed requirements of:
 - .1 Contract documents.
 - .2 Specified standards, codes and referenced documents.
- 1.1.4 Electrical components and equipment which are not CSA approved shall be approved by the Authority Having Jurisdiction prior to connection to the electrical service. Pay for costs associated with obtaining necessary approval.
- 1.1.5 Canadian Construction association (CCA)
 - .1 COVID-19 Standardized Protocols for All Canadian Construction Sites
- 1.1.6 Adhere to HWDSB COVID 19 Vendor Access Requirements

1.2 Designated Substances

- 1.2.1 Hazardous materials may be encountered during the work. Refer to Agency's Designated Substances Report.
 - .1 Asbestos: demolition of spray or trowel-applied asbestos is hazardous to health.
- 1.2.2 PCB: Polychlorinated Biphenyl: Polychlorinated Biphenyl is hazardous waste.
- 1.2.3 Lead: Lead may be considered hazardous waste.
- 1.2.4 Mercury: mercury is considered hazardous waste.
- 1.2.5 Fuel Oil: Fuel oil may be considered a liquid or ignitable waste.
- 1.2.6 Ozone Depleting Substances: Ozone Depleting Substances are considered hazardous waste.

END OF SECTION

**NEW GENERATOR INSTALLATION AT PEEL YOUTH VILLAGE
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Division 01, Specifications, Section 01 45 00, Quality Control

1. GENERAL

1.1 Related Requirements

1.1.1 All tender documentation.

1.2 References

1.2.1 Section 25 01 10 – Item 1.22 – Quality Assurance.

1.3 Inspection

1.3.1 Allow Project Manager/Agency and Consultant access to Work. If part of Work is in preparation at locations other than Place of Work, allow access to such Work whenever it is in progress.

1.3.2 Give timely notice requesting inspection if Work is designated for special tests, inspections or approvals by the Project Manager/Agency and/or Consultant instructions, or law of Place of Work.

1.3.3 If Contractor covers or permits to be covered Work that has been designated for special tests, inspections or approvals before such is made, uncover such Work, have inspections or tests satisfactorily completed and make good such Work.

1.3.4 Project Manager/Agency or Consultant might order part of Work to be examined if Work is suspected to be not in accordance with Contract Documents. If, upon examination such work is found not in accordance with Contract Documents, correct such Work and pay cost of examination and correction.

1.4 Independent Inspection Agencies

1.4.1 Independent Inspection/Testing Agencies might be engaged by the Project Manager/Agency and/or Consultant for purpose of inspecting and/or testing portions of Work.

1.4.2 Provide equipment required for executing inspection and testing by appointed agencies.

1.4.3 Employment of inspection/testing agencies does not relax responsibility to perform Work in accordance with Contract Documents.

1.4.4 If defects are revealed during inspection and/or testing, appointed agency will request additional inspection and/or testing to ascertain full degree of defect. Correct defect and irregularities as advised by the Project Manager/Agency and/or Consultant at no cost. Pay costs for retesting and reinspection.

1.5 Access to Work

1.5.1 Allow inspection/testing agencies access to Work, off site manufacturing and fabrication plants.

1.5.2 Co-operate to provide reasonable facilities for such access.

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Division 01, Specifications, Section 01 45 00, Quality Control

1.6 Procedures

- 1.6.1 Notify appropriate agency and Project Manager/Agency and/or Consultant in advance of requirement for tests, in order that attendance arrangements can be made.
- 1.6.2 Submit samples and/or materials required for testing, as specifically requested in specifications. Submit with reasonable promptness and in orderly sequence to not cause delays in Work.
- 1.6.3 Provide labour and facilities to obtain and handle samples and materials on site. Provide sufficient space to store and cure test samples.

1.7 Rejected Work

- 1.7.1 Remove defective Work, whether result of poor workmanship, use of defective products or damage and whether incorporated in Work or not, which has been rejected by the Project Manager/Agency and/or Consultant as failing to conform to Contract Documents. Replace or re-execute in accordance with Contract Documents.
- 1.7.2 Make good other Contractor's work damaged by such removals or replacements promptly.
- 1.7.3 If in opinion of Project Manager/Agency and/or Consultant, it is not expedient to correct defective Work or Work not performed in accordance with Contract Documents, Agency will deduct from Contract Price difference in value between Work performed and that called for by Contract Documents.

1.8 Reports

- 1.8.1 Submit electronic copies of inspection and test reports to Project Manager/Agency and/or Consultant.
- 1.8.2 Provide copies to subcontractor of work being inspected or tested and manufacturer or fabricator of material being inspected or tested.

1.9 Tests and Mix Designs

- 1.9.1 Not Used.

1.10 Mock-Ups

- 1.10.1 Prepare mock-ups for Work specifically requested in specifications. Include for Work of Sections required to provide mock-ups.
- 1.10.2 Construct in locations acceptable to Project Manager/Agency and/or Consultant.
- 1.10.3 Prepare mock-ups for Project Manager/Agency's and/or Consultant's review with reasonable promptness and in orderly sequence, to not cause delays in Work.
- 1.10.4 Failure to prepare mock-ups in ample time is not considered sufficient reason for extension of Contract Time and no claim for extension by reason of such default will be allowed.

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- 1.10.5 If requested, Project Manager/Agency and/or Consultant will assist in preparing schedule fixing dates for preparation.
- 1.10.6 Remove mock-up at conclusion of Work or when acceptable to Project Manager/Agency and/or Consultant.
- 1.10.7 Mock-ups may remain as part of Work.

1.11 Mill Tests

- 1.11.1 Not Used.

1.12 Equipment and Systems

- 1.12.1 Submit adjustment and balancing reports for mechanical, electrical and building equipment systems.

2. PRODUCTS

2.1 Not Used

- 2.1.1 Not Used.

3. EXECUTION

3.1 Not Used

- 3.1.1 Not Used.

END OF SECTION

**NEW GENERATOR INSTALLATION AT PEEL YOUTH VILLAGE
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Division 01, Specifications, Section 01 51 00, Temporary Utilities

1. GENERAL

1.1 Related Requirements

1.1.1 All tender documentation

1.2 References

1.2.1 Not Used.

1.3 Action and Informational Submittals

1.3.1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.

1.4 Installation and Removal

1.4.1 Contractor team is not allowed to use the building washrooms at all. Provide temporary services (portable toilet, etc.) for the duration of the project in coordination with the Agency.

1.4.2 Provide temporary utilities controls in order to execute work expeditiously.

1.4.3 Remove from site all such work after use.

1.5 Dewatering

1.5.1 Not Used.

1.6 Water Supply

1.6.1 Agency will provide continuous supply of potable water for construction use.

1.6.2 Pay all costs for installation, maintenance and removal.

1.6.3 Agency will pay for water utility charges.

1.7 Temporary Heating and Ventilation

1.7.1 If necessary, provide temporary heating required during construction period, including attendance, maintenance, fuel, and associated costs.

1.7.2 Construction heaters used inside building must be vented to outside or be non-flameless type. Solid fuel salamanders are not permitted.

1.7.3 Provide temporary heat and ventilation in enclosed areas as required to:

.1 Facilitate progress of Work.

.2 Protect Work and products against dampness and cold.

.3 Prevent moisture condensation on surfaces.

.4 Provide ambient temperatures and humidity levels for storage, installation and curing of materials.

.5 Provide adequate ventilation to meet health regulations for safe working environment.

1.7.4 Maintain temperatures of minimum 15 degrees C in areas where construction is in progress.

1.7.5 Ventilating:

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- .1 Prevent accumulations of dust, fumes, mists, vapours or gases in areas occupied during construction.
- .2 Provide local exhaust ventilation to prevent harmful accumulation of hazardous substances into atmosphere of occupied areas.
- .3 Dispose of exhaust materials in manner that will not result in harmful exposure to persons.
- .4 Ventilate storage spaces containing hazardous or volatile materials.
- .5 Ventilate temporary sanitary facilities.
- .6 Continue operation of ventilation and exhaust system for time after cessation of work process to assure removal of harmful contaminants.
- 1.7.6 Permanent heating system of building to be used when available. Be responsible for damage to heating system if use is permitted.
- 1.7.7 On completion of Work for which permanent heating system is used, replace filters and clean the system as necessary.
- 1.7.8 Maintain strict supervision of operation of temporary heating and ventilating equipment to:
 - .1 Conform with applicable codes and standards.
 - .2 Enforce safe practices.
 - .3 Prevent abuse of services.
 - .4 Prevent damage to finishes.
 - .5 Vent direct-fired combustion units to outside.
- 1.7.9 Be responsible for damage to Work due to failure in providing adequate heat and protection during construction.

1.8 Temporary Power and Light

- 1.8.1 Connect to existing power supply in accordance with Canadian Electrical Code and provide meters and switching.
- 1.8.2 If necessary, provide and pay for temporary power during construction for temporary lighting and operating of power tools, to a maximum supply of 230 volts 30 amps.
- 1.8.3 Arrange for connection with appropriate utility company. Pay costs for installation, maintenance and removal.
- 1.8.4 Temporary power for electric cranes and other equipment requiring in excess of above is responsibility of Contractor.
- 1.8.5 If necessary, provide and maintain temporary lighting throughout project. Ensure level of illumination on all floors and stairs is not less than 162 lx.
- 1.8.6 Existing electrical power and lighting systems may be used for construction requirements only with prior approval of Project Manager/Agency provided that guarantees are not affected. Make good damage to electrical system caused by use under this Contract.

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Division 01, Specifications, Section 01 51 00, Temporary Utilities

- 1.8.7 Provide a 600kW 208 Volt generator (for period approximately five weeks) to power the complex soon as Alectra have removed their equipment.

1.9 Temporary Communication Facilities

- 1.9.1 Not Used.

1.10 Fire Protection

- 1.10.1 Provide and maintain temporary fire protection equipment during performance of Work required by insurance companies having jurisdiction, governing codes, regulations and bylaws.
- 1.10.2 Burning rubbish and construction waste materials is not permitted on site.

2. PRODUCTS

2.1 Not Used

- 2.1.1 Not Used.

3. EXECUTION

3.1 Not Used

- 3.1.1 Not Used.

END OF SECTION

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Division 01, Specifications, Section 01 74 00, Cleaning

1. GENERAL

1.1 Related Requirements

- 1.1.1 All tender documentation.

1.2 Project Cleanliness

- 1.2.1 Maintain Work in tidy condition, free from accumulation of waste products and debris other than that caused by Agency or other Contractors.
- 1.2.2 Vacuum and dust each area of work as soon as work is completed.
- 1.2.3 Remove waste materials from site afterhours daily or dispose of as directed by Agency. Do not burn waste materials.
- 1.2.4 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.
- 1.2.5 Clean interior areas prior to start of finishing work and maintain areas free of dust and other contaminants during finishing operations.
- 1.2.6 Store volatile waste in covered metal containers and remove from premises at end of each working day.
- 1.2.7 Provide adequate ventilation during use of volatile or noxious substances. Use of building ventilation systems is not permitted for this purpose.
- 1.2.8 Use only cleaning materials recommended by manufacturer of surface to be cleaned, and as recommended by cleaning material manufacturer.
- 1.2.9 Schedule cleaning operations so that resulting dust, debris and other contaminants will not fall on wet, newly painted surfaces nor contaminate building systems.

1.3 Final Cleaning

- 1.3.1 After each classroom or area of construction is complete, it must be left in the exact state of cleanliness it was prior to construction commencing.
- 1.3.2 When Work is Substantially Performed remove surplus products, tools, construction machinery and equipment not required for performance of remaining Work.
- 1.3.3 Remove waste products and debris other than that caused by others, and leave Work clean and suitable for occupancy.
- 1.3.4 Prior to final review remove surplus products, tools, construction machinery and equipment.
- 1.3.5 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.
- 1.3.6 Clean and polish project related mechanical and electrical fixtures.
- 1.3.7 Remove stains, spots, marks and dirt from electrical and mechanical fixtures.
- 1.3.8 Vacuum clean and dust mechanical rooms, behind grilles, louvres and screens.

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Division 01, Specifications, Section 01 74 00, Cleaning

- 1.3.9 Inspect finishes, fitments and equipment and ensure specified workmanship and operation.

- 1.4 **Waste Management and Disposal**

- 1.4.1 Separate waste materials for reuse and recycling.

- 2. **PRODUCTS**

- 2.1 **Not Used.**

- 2.1.1 Not Used.

- 3. **EXECUTION**

- 3.1 **Not Used.**

- 3.1.1 Not Used.

END OF SECTION

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Division 01, Specifications, Section 01 74 19, Waste Management and Disposal

1. GENERAL

1.1 Summary

1.1.1 This Section includes requirements for management of construction waste and disposal, which forms the Designer's commitment to reduce and divert waste materials from landfill.

1.2 Related Requirements

1.2.1 Section 01 51 00– Temporary Utilities

1.3 Reference Standards

1.3.1 American Society for Testing and Materials (ASTM):
.1 ASTM E1609 01, Standard Guide for Development and Implementation of a Pollution Prevention Program

1.4 Definitions

1.4.1 Clean Waste: Untreated and unpainted; not contaminated with oils, solvents, sealants or similar materials.

1.4.2 Construction and Demolition Waste: Solid wastes typically including building materials, packaging, trash, debris, and rubble resulting from construction, re modeling operations repair and demolition.

1.4.3 Hazardous: Exhibiting the characteristics of hazardous substances including properties such as ignitability, corrosiveness, toxicity or reactivity.

1.4.4 Non hazardous: Exhibiting none of the characteristics of hazardous substances, including properties such as ignitability, corrosiveness, toxicity, or reactivity.

1.4.5 Non toxic: Not poisonous to humans either immediately or after a long period of exposure.

1.4.6 Return: To give back reusable items or unused products to vendors for credit.

1.4.7 Reuse: To reuse a construction waste material in some manner on the project site.

1.4.8 Salvage: To remove a waste material from the project site to another site for resale or reuse by others.

1.4.9 Sediment: Soil and other debris that has been eroded and transported by storm or well production run off water.

1.4.10 Source Separation: The act of keeping different types of waste materials separate beginning from the first time they become waste.

1.4.11 Toxic: Poisonous to humans either immediately or after a long period of exposure.

1.4.12 Trash: Any product or material unable to be reused, returned, recycled, or salvaged.

1.4.13 Volatile Organic Compounds (VOC's): Chemical compounds common in and emitted by many building products over time through outgassing:

.1 Solvents in paints and other coatings;

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Division 01, Specifications, Section 01 74 19, Waste Management and Disposal

- .2 Wood preservatives; strippers and household cleaners;
- .3 Adhesives in particleboard, fiberboard, and some plywood; and foam insulation.
- .4 When released, VOC's can contribute to the formation of smog and can cause respiratory tract problems, headaches, eye irritations, nausea, damage to the liver, kidneys, and central nervous system, and possibly cancer.

1.4.14 Waste: Extra material or material that has reached the end of its useful life in its intended use. Waste includes salvageable, returnable, recyclable, and reusable material.

1.4.15 Construction Waste Management Plan: A project related plan for the collection, transportation, and disposal of the waste generated at the construction site; the purpose of the plan is to ultimately reduce the amount of material being landfilled.

1.5 Administrative Requirements

1.5.1 Coordination: Coordinate waste management requirements with all Divisions of the Work for the project, and ensure that requirements of the Construction Waste Management Plan are followed.

1.6 Delivery, Storage and Handling

1.6.1 Handling Requirements: Clean materials that are contaminated before placing in collection containers and ensure that waste destined for landfill

1.6.2 Hazardous Waste and Hazardous Materials: Handle in accordance with applicable regulations.

2. PRODUCTS

2.1 Not Used

2.1.1 Not Used.

3. EXECUTION

3.1 Not Used

3.1.1 Not Used.

END OF SECTION

**NEW GENERATOR INSTALLATION AT PEEL YOUTH VILLAGE
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Division 01, Specifications, Section 01 77 00, Closeout Procedures

1. GENERAL

1.1 Related Requirements

1.1.1 All tender documentation.

1.2 References (Latest Revision)

1.2.1 Canadian Construction Documents Committee (CCDC)

.1 CCDC 2, Stipulated Price Contract.

1.3 Administrative Requirements

1.3.1 Acceptance of Work Procedures:

.1 Contractor: conduct inspection of Work, identify deficiencies and defects, and repair as required to conform to Contract Documents.

.1 Notify Project Manager/Agency and Consultant in writing of satisfactory completion of Contractor's inspection and submit verification that corrections have been made.

.2 Request Consultant's inspection.

.2 Consultant's Inspection:

.1 Project Manager/Agency, Consultant and Contractor to inspect Work and identify defects and deficiencies.

.2 Contractor to correct Work as directed.

.3 Completion Tasks: submit written certificates in English that tasks have been performed as follows:

.1 Work: completed and inspected for compliance with Contract Documents.

.2 Defects: corrected and deficiencies completed.

.3 Equipment and systems: tested, adjusted, balanced and fully operational.

.4 Certificates required: submitted.

.5 Operation of systems: demonstrated to Agency's personnel.

.6 Commissioning of mechanical systems: completed in accordance with 01 91 13 - General Commissioning (Cx) Requirements and 23 08 10 - Commissioning of Mechanical Systems, and copies of final Commissioning Report submitted to Project manager/Agency and Consultant.

.7 Work: complete and ready for final inspection.

.4 Final Inspection:

.1 When completion tasks are done, request final inspection of Work by Project manager/Agency and Consultant, and Contractor.

.2 When Work incomplete according to Project manager/Agency and/or Consultant, complete outstanding items and request re-inspection.

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Division 01, Specifications, Section 01 77 00, Closeout Procedures

- .5 Declaration of Substantial Performance: when Project manager/Agency and Consultant consider deficiencies and defects corrected and requirements of Contract substantially performed, make application for Certificate of Substantial Performance.
- .6 Commencement of Lien and Warranty Periods: date of Agency's acceptance of submitted declaration of Substantial Performance to be date for commencement for warranty period and commencement of lien period unless required otherwise by lien statute of Place of Work.
- .7 Final Payment:
 - .1 When Project manager/Agency and Consultant considers final deficiencies and defects corrected and requirements of Contract met, make application for final payment.
 - .2 Refer to CCDC 2-2020: when Work deemed incomplete by Project manager/Agency and/or Consultant, complete outstanding items and request re-inspection.
- .8 Payment of Holdback: after issuance of Certificate of Substantial Performance of Work, submit application for payment of holdback amount in accordance with contractual agreement.

1.4 Final Cleaning

- 1.4.1 Clean in accordance with Section 01 74 00 - Cleaning.

2. PRODUCTS

2.1 Not Used

- 2.1.1 Not Used.

3. EXECUTION

3.1 Not Used

- 3.1.1 Not Used.

END OF SECTION

**NEW GENERATOR INSTALLATION AT PEEL YOUTH VILLAGE
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Division 01, Specifications, Section 01 78 00, Closeout Submittals

1. GENERAL

1.1 Related Requirements

1.1.1 All tender documents.

1.2 References (Latest Revisions)

1.2.1 Section 25 01 12 – Submittals and Review Process.

1.2.2 Canadian Construction Documents Committee (CCDC).

.1 CCDC 2, Stipulated Price Contract.

1.3 Administrative Requirements

1.3.1 Pre-warranty Meeting:

.1 Convene meeting 2 weeks prior to contract completion with Project Manager/Agency and Consultant, in accordance with Section 01 31 19 - Project Meetings to:

.1 Verify Project requirements.

.2 Review warranty requirements.

.2 Project Manager/Agency to establish communication procedures for:

.1 Notifying construction warranty defects.

.2 Determine priorities for type of defects.

.3 Determine reasonable response time.

.3 Contact information for bonded and licensed company for warranty work action: provide name, telephone number and address of company authorized for construction warranty work action.

.4 Ensure contact is located within local service area of warranted construction, is continuously available, and is responsive to inquiries for warranty work action.

1.4 Action and Informational Submittals

1.4.1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.

1.4.2 Two weeks prior to Substantial Performance of the Work, submit to Project Manager/Agency and Consultant, electronic final copy of operating and maintenance manuals in English.

1.4.3 Provide spare parts, maintenance materials and special tools of same quality and manufacture as products provided in Work.

1.4.4 Provide evidence, if requested, for type, source and quality of products supplied.

1.5 Format

1.5.1 Provide an electronic copy of the final version of the close out document.

1.5.2 Organize data as instructional manual.

1.5.3 Cover: Title 'Project Record Documents'; list title of project and identify subject matter of contents.

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Division 01, Specifications, Section 01 78 00, Closeout Submittals

- 1.5.4 Arrange content by systems, under Section numbers and sequence of Table of Contents.
- 1.5.5 Provide index for each separate product and system, with typed description of product and major component parts of equipment.
- 1.5.6 Text: manufacturer's printed data, or typewritten data.
- 1.5.7 Drawings: provide electronic copy of as built drawings
 - .1 Consultant will provide electronic copy of the CAD files upon receipt of as-built mark ups from the contractor. Contractor to include the CAD files in dwg format on CD/USB to the final close out document.

1.6 Contents - Project Record Documents

- 1.6.1 Table of Contents for Each Volume: provide title of project;
 - .1 Date of submission; names.
 - .2 Addresses, and telephone numbers of Consultant and Contractor with name of responsible parties.
 - .3 Schedule of products and systems, indexed to content of volume.
- 1.6.2 For each product or system:
 - .1 List names, addresses and telephone numbers of subcontractors and suppliers, including local source of supplies and replacement parts.
- 1.6.3 Product Data: mark each sheet to identify specific products and component parts, and data applicable to installation; delete inapplicable information.
- 1.6.4 Drawings: supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams.
- 1.6.5 Typewritten Text: as required to supplement product data.
 - .1 Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions specified in Section 01 45 00 - Quality Control.
- 1.6.6 Training: refer to Section 01 79.00.13

1.7 As-Built Documents and Samples

- 1.7.1 Maintain, at site for Project Manager/Agency and Consultant one record copy of:
 - .1 Contract Drawings.
 - .2 Specifications.
 - .3 Addenda.
 - .4 Change Orders and other modifications to Contract.
 - .5 Reviewed shop drawings, product data, and samples.
 - .6 Field test records.
 - .7 Inspection certificates.
 - .8 Manufacturer's certificates.

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- 1.7.2 Store record documents and samples in field office apart from documents used for construction.
 - .1 Provide files, racks, and secure storage.
- 1.7.3 Label record documents and file in accordance with Section number listings in List of Contents of this Project Manual.
 - .1 Label each document "PROJECT RECORD" in neat, large, printed letters.
- 1.7.4 Maintain record documents in clean, dry and legible condition.
 - .1 Do not use record documents for construction purposes.
- 1.7.5 Keep record documents and samples available for inspection by Project Manager/Agency and Consultant.

1.8 Recording Information on Project Record Documents

- 1.8.1 Record information on set of drawings, provided by Project Manager/Agency and/or Consultant.
- 1.8.2 Use felt tip marking pens, maintaining separate colours for each major system, for recording information.
- 1.8.3 Record information concurrently with construction progress.
 - .1 Do not conceal Work until required information is recorded.
- 1.8.4 Contract Drawings and shop drawings: mark each item to record actual construction, including:
 - .1 Measured depths of elements of foundation in relation to finish first floor datum.
 - .2 Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
 - .3 Measured locations of internal utilities and appurtenances, referenced to visible and accessible features of construction.
 - .4 Field changes of dimension and detail.
 - .5 Changes made by change orders.
 - .6 Details not on original Contract Drawings.
 - .7 References to related shop drawings and modifications.
- 1.8.5 Specifications: mark each item to record actual construction, including:
 - .1 Manufacturer, trade name, and catalogue number of each product actually installed, particularly optional items and substitute items.
 - .2 Changes made by Addenda and change orders.
- 1.8.6 Other Documents: maintain manufacturer's certifications, inspection certifications, field test records, required by individual specifications sections.
- 1.8.7 Provide digital photos, if requested, for site records.

1.9 Final Survey

- 1.9.1 Submit final site survey certificate in accordance with Section 01 71 00 - Examination and Preparation, certifying that elevations and

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locations of completed Work are in conformance, or non-conformance with Contract Documents.

1.10 Equipment and Systems

- 1.10.1 For each item of equipment and each system include description of unit or system, and component parts.
 - .1 Give function, normal operation characteristics and limiting conditions.
 - .2 Include performance curves, with engineering data and tests, and complete nomenclature and commercial number of replaceable parts.
- 1.10.2 Panel board circuit directories: provide electrical service characteristics, controls, and communications.
- 1.10.3 Include installed colour coded wiring diagrams.
- 1.10.4 Operating Procedures: include start-up, break-in, and routine normal operating instructions and sequences.
 - .1 Include regulation, control, stopping, shut-down, and emergency instructions.
 - .2 Include summer, winter, and any special operating instructions.
- 1.10.5 Maintenance Requirements: include routine procedures and guide for trouble-shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.
- 1.10.6 Provide servicing and lubrication schedule, and list of lubricants required.
- 1.10.7 Include manufacturer's printed operation and maintenance instructions.
- 1.10.8 Include sequence of operation by controls manufacturer.
- 1.10.9 Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.
- 1.10.10 Provide installed control diagrams by controls manufacturer.
- 1.10.11 Provide Contractor's co-ordination drawings, with installed colour coded piping diagrams.
- 1.10.12 Provide charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.
- 1.10.13 Provide list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.
- 1.10.14 Include test and balancing reports as specified in Section 01 45 00 - Quality Control and 25 01 13 - General Commissioning (Cx) Requirements.
- 1.10.15 Additional requirements: as specified in individual specification sections.

1.11 Materials and Finishes

- 1.11.1 Building products, applied materials, and finishes: include product data, with catalogue number, size, composition, and colour and texture designations.

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- .1 Provide information for re-ordering custom manufactured products.
- 1.11.2 Instructions for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.
- 1.11.3 Moisture-protection and weather-exposed products: include manufacturer's recommendations for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.
- 1.11.4 Additional requirements: as specified in individual specifications sections.

1.12 Maintenance Materials

1.12.1 Spare Parts:

- .1 Provide spare parts, in quantities specified in individual specification sections.
- .2 Provide items of same manufacture and quality as items in Work.
- .3 Deliver to site, location as directed; place and store.
- .4 Receive and catalogue items.
 - .1 Submit inventory listing to Project Manager/Agency and Consultant.
 - .2 Include approved listings in Maintenance Manual.
- .5 Obtain receipt for delivered products and submit prior to final payment.

1.12.2 Extra Stock Materials:

- .1 Provide maintenance and extra materials, in quantities specified in individual specification sections.
- .2 Provide items of same manufacture and quality as items in Work.
- .3 Deliver to site, location as directed; place and store.
- .4 Receive and catalogue items.
 - .1 Submit inventory listing to Project Manager/Agency and Consultant.
 - .2 Include approved listings in Maintenance Manual.
- .5 Obtain receipt for delivered products and submit prior to final payment.

1.12.3 Special Tools:

- .1 Provide special tools, in quantities specified in individual specification section.
- .2 Provide items with tags identifying their associated function and equipment.
- .3 Deliver to site, location as directed; place and store.
- .4 Receive and catalogue items.
 - .1 Submit inventory listing to Project Manager/Agency and Consultant.

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- .2 Include approved listings in Maintenance Manual.

1.13 Delivery, Storage and Handling

- 1.13.1 Store spare parts, maintenance materials, and special tools in manner to prevent damage or deterioration.
- 1.13.2 Store in original and undamaged condition with manufacturer's seal and labels intact.
- 1.13.3 Store components subject to damage from weather in weatherproof enclosures.
- 1.13.4 Store paints and freezable materials in a heated and ventilated room.
- 1.13.5 Remove and replace damaged products at own expense and for review by Project Manager/Agency and Consultant.

1.14 Warranties and Bonds

- 1.14.1 Develop warranty management plan to contain information relevant to Warranties.
- 1.14.2 Submit warranty management plan, 30 days before planned pre-warranty conference, to Project Manager/Agency's and/or Consultant's approval.
- 1.14.3 Warranty management plan to include required actions and documents to assure that Project Manager/Agency receives warranties to which it is entitled.
- 1.14.4 Provide plan in narrative form and contain sufficient detail to make it suitable for use by future maintenance and repair personnel.
- 1.14.5 Submit, warranty information made available during construction phase, to Project Manager/Agency and Consultant for approval prior to each monthly pay estimate.
- 1.14.6 Assemble approved information in binder, submit upon acceptance of work and organize binder as follows:
 - .1 Separate each warranty or bond with index tab sheets keyed to Table of Contents listing.
 - .2 List subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible principal.
 - .3 Obtain warranties and bonds, executed in duplicate by subcontractors, suppliers, and manufacturers, within [ten] days after completion of applicable item of work.
 - .4 Verify that documents are in proper form, contain full information, and are notarized.
 - .5 Co-execute submittals when required.
 - .6 Retain warranties and bonds until time specified for submittal.
- 1.14.7 Except for items put into use with Agency's permission, leave date of beginning of time of warranty until Date of Substantial Performance is determined.
- 1.14.8 Conduct joint 4 month and 9 month warranty inspection, measured from time of acceptance, by Project Manager/Agency.
- 1.14.9 Include information contained in warranty management plan as follows:

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- .1 Roles and responsibilities of personnel associated with warranty process, including points of contact and telephone numbers within the organizations of Contractors, subcontractors, manufacturers or suppliers involved.
- .2 Listing and status of delivery of Certificates of Warranty for extended warranty items.
- .3 Provide list for each warranted equipment, item, feature of construction or system indicating:
 - .1 Name of item.
 - .2 Model and serial numbers.
 - .3 Location where installed.
 - .4 Name and phone numbers of manufacturers or suppliers.
 - .5 Names, addresses and telephone numbers of sources of spare parts.
 - .6 Warranties and terms of warranty: include one-year overall warranty of construction. Indicate items that have extended warranties and show separate warranty expiration dates.
 - .7 Cross-reference to warranty certificates as applicable.
 - .8 Starting point and duration of warranty period.
 - .9 Summary of maintenance procedures required to continue warranty in force.
 - .10 Cross-Reference to specific pertinent Operation and Maintenance manuals.
 - .11 Organization, names and phone numbers of persons to call for warranty service.
 - .12 Typical response time and repair time expected for various warranted equipment.
- .4 Contractor's plans for attendance at 4 and 9 month post-construction warranty inspections.
- .5 Procedure and status of tagging of equipment covered by extended warranties.
- .6 Post copies of instructions near selected pieces of equipment where operation is critical for warranty and/or safety reasons.
- 1.14.10 Respond in timely manner to oral or written notification of required construction warranty repair work.
- 1.14.11 Written verification to follow oral instructions.
 - .1 Failure to respond will be cause for the Project Manager/Agency to proceed with action against Contractor.

1.15 Warranty Tags

- 1.15.1 Tag, at time of installation, each warranted item. Provide durable, oil and water resistant tag approved by Project Manager/Agency.
- 1.15.2 Attach tags with copper wire and spray with waterproof silicone coating.
- 1.15.3 Leave date of acceptance until project is accepted for occupancy.

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1.15.4 Indicate following information on tag:

- .1 Type of product/material.
- .2 Model number.
- .3 Serial number.
- .4 Contract number.
- .5 Warranty period.
- .6 Inspector's signature.
- .7 Construction Contractor.

2. PRODUCTS

2.1 Not Used

2.1.1 Not Used.

3. EXECUTION

3.1 Not Used

3.1.1 Not Used.

END OF SECTION

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Division 01, Specifications, Section 01 79 00.13, Demonstration and Training

1. GENERAL

1.1 Summary

1.1.1 Section Includes:

- .1 This Section specifies roles and responsibilities of Commissioning Training.

1.1.2 Related Requirements

- .1 Sections 01 91 13 – General Commissioning Requirements and
01 91 13.13 – Commissioning Plan.

1.2 Trainees

- 1.2.1 Trainees: personnel selected for operating and maintaining this facility. Includes Department Representatives, building operators, maintenance staff, security staff, and technical specialists as required.

- 1.2.2 Trainees will be available for training during later stages of construction for purposes of familiarization with systems.

1.3 Instructors

1.3.1 Consultant will provide:

- .1 Descriptions of systems.
- .2 Instruction on design philosophy, design criteria, and design intent.

1.3.2 Contractor and certified factory-trained manufacturers' personnel: to provide instruction on the following:

- .1 Start-Up, operation, shutdown of equipment, components and systems.
- .2 Control features, reasons for, results of, implications on associated systems of, adjustment of set points of control and safety devices.
- .3 Instructions on servicing, maintenance and adjustment of systems, equipment and components.

1.3.3 Contractor and equipment manufacturer to provide instruction on:

- .1 Start-up, operation, maintenance and shutdown of equipment they have certified installation, started up and carried out PV tests.

1.4 Training Objectives

1.4.1 Training to be detailed and duration to ensure:

- .1 Safe, reliable, cost-effective, energy-efficient operation of systems in normal and emergency modes under all conditions.
- .2 Effective on-going inspection, measurements of system performance.
- .3 Proper preventive maintenance, diagnosis and troubleshooting.
- .4 Ability to update documentation.

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- .5 Ability to operate equipment and systems under emergency conditions until appropriate qualified assistance arrives.

1.5 Training Materials

- 1.5.1 Instructors to be responsible for content and quality.
- 1.5.2 Training materials to include:
 - .1 "As-Built" Contract Documents.
 - .2 Operating Manual.
 - .3 Maintenance Manual.
 - .4 Management Manual.
 - .5 TAB and PV Reports.
- 1.5.3 Project Manager, Commissioning Manager and Department Representatives will review training manuals.
- 1.5.4 Training materials to be in a format that permits future training procedures to same degree of detail.
- 1.5.5 Supplement training materials:
 - .1 Transparencies for overhead projectors.
 - .2 Multimedia presentations.
 - .3 Manufacturer's training videos.
 - .4 Equipment models.

1.6 Scheduling

- 1.6.1 Include in Commissioning Schedule time for training.
- 1.6.2 Deliver training during regular working hours, training sessions to be 8 hours in length.
- 1.6.3 Training to be completed prior to acceptance of facility.

1.7 Responsibilities

- 1.7.1 Be responsible for:
 - .1 Implementation of training activities,
 - .2 Coordination among instructors,
 - .3 Quality of training, training materials,
- 1.7.2 Consultant will evaluate training and materials.
- 1.7.3 Upon completion of training, provide written report, signed by Instructors, witnessed by Consultant.

1.8 Training Content

- 1.8.1 Training to include demonstrations by Instructors using the installed equipment and systems.
- 1.8.2 Content includes:
 - .1 Review of facility and occupancy profile.
 - .2 Functional requirements.
 - .3 System philosophy, limitations of systems and emergency procedures.
 - .4 Review of system layout, equipment, components and controls.

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- .5 Equipment and system start-up, operation, monitoring, servicing, maintenance and shut-down procedures.
- .6 System operating sequences, including step-by-step directions for starting up, shut-down, operation of valves, dampers, switches, adjustment of control settings and emergency procedures.
- .7 Maintenance and servicing.
- .8 Trouble-shooting diagnosis.
- .9 Inter-Action among systems during integrated operation.
- .10 Review of O&M documentation.
- 1.8.3 Provide specialized training as specified in relevant Technical Sections of the construction specifications.

2. PRODUCTS

2.1 Not Used

- 2.1.1 Not Used.

3. EXECUTION

3.1 Not Used

- 3.1.1 Not Used.

END OF SECTION

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Division 01, Specifications, Section 01 91 13, General Commissioning Requirements

1. GENERAL

1.1 Summary

1.1.1 Section Includes:

- .1 General requirements relating to commissioning of project's components and systems, specifying general requirements to PV of components, equipment, sub-systems, systems, and integrated systems.

1.1.2 Related Requirements

- .1 Section 01 79 00.13 – Demonstration and Training for Building Commissioning
- .2 Section 01 91 13.13 – Commissioning (CX) Plan

1.1.3 Acronyms:

- .1 Cx - Commissioning.
- .2 EMCS - Energy Monitoring and Control Systems.
- .3 O&M - Operation and Maintenance.
- .4 PI - Product Information.
- .5 PV - Performance Verification.
- .6 TAB - Testing, Adjusting and Balancing.

1.2 General

1.2.1 Cx is a planned program of tests, procedures and checks carried out systematically on systems and integrated systems of the finished Project. Cx is performed after systems and integrated systems are completely installed, functional and Contractor's Performance Verification responsibilities have been completed and approved. Objectives:

- .1 Verify installed equipment, systems and integrated systems operate in accordance with Contract Documents and design criteria and intent.
- .2 Ensure appropriate documentation is compiled into the Operation and Maintenance Manuals
- .3 Effectively train O&M staff.

1.2.2 Contractor assists in Cx process, operating equipment and systems, troubleshooting and making adjustments as required.

- .1 Systems to be operated at full capacity under various modes to determine if they function correctly and consistently at peak efficiency. Systems to be interactively with each other as intended in accordance with Contract Documents and design criteria.
- .2 During these checks, adjustments to be made to enhance performance to meet environmental or user requirements.

1.2.3 Design Criteria: as per client's requirements or determined by designer. To meet Project functional and operational requirements.

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1.3 Commissioning Overview

- 1.3.1 For Cx responsibilities refer to Section 01 91 13- Commissioning (Cx) Plan.
- 1.3.2 Cx to be a line item of Contractor's cost breakdown.
- 1.3.3 Cx activities supplement field quality and testing procedures described in relevant technical sections.
- 1.3.4 Cx is conducted in concert with activities performed during stage of project delivery. Cx identifies issues in Planning and Design stages which are addressed during Construction and Cx stages to ensure the built facility is constructed and proven to operate satisfactorily under weather, environmental and occupancy conditions to meet functional and operational requirements. Cx activities includes transfer of critical knowledge to facility operational personnel.
- 1.3.5 Consultant will issue Interim Acceptance Certificate when:
 - .1 Completed Cx documentation has been received, reviewed for suitability and approved by Consultant.
 - .2 Equipment, components and systems have been commissioned.
 - .3 O&M training has been completed.

1.4 Non-Conformance to Performance Verification Requirements

- 1.4.1 Should equipment, system components, and associated controls be incorrectly installed or malfunction during Cx, correct deficiencies, re-verify equipment and components within the unfunctional system, including related systems as deemed required by Consultant, to ensure effective performance.
- 1.4.2 Costs for corrective work, additional tests, inspections, to determine acceptability and proper performance of such items to be borne by Contractor. Above costs to be in form of progress payment reductions or hold-back assessments.

1.5 Pre-Cx Review

- 1.5.1 Before Construction:
 - .1 Review Contract Documents, confirm by writing to Consultant.
 - .1 Adequacy of provisions for Cx.
 - .2 Aspects of design and installation pertinent to success of Cx.
- 1.5.2 During Construction:
 - .1 Co-ordinate provision, location and installation of provisions for Cx.
- 1.5.3 Before start of Cx:
 - .1 Have completed Cx Plan up-to-date.
 - .2 Ensure installation of related components, equipment, sub-systems, systems is complete.
 - .3 Fully understand Cx requirements and procedures.

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- .4 Have Cx documentation shelf-ready.
- .5 Understand completely design criteria and intent and special features.
- .6 Submit complete start-up documentation to Consultant.
- .7 Have Cx schedules up-to-date.
- .8 Ensure systems have been cleaned thoroughly.
- .9 Complete TAB procedures on systems, submit TAB reports to Consultant for review and approval.
- .10 Ensure "As-Built" system schematics are available.
- 1.5.4 Inform Consultant in writing of discrepancies and deficiencies on finished works.

1.6 Conflicts

- 1.6.1 Report conflicts between requirements of this section and other sections to Consultant before start-up and obtain clarification.
- 1.6.2 Failure to report conflict and obtain clarification will result in application of most stringent requirement.

1.7 Action and Informational Submittals

- 1.7.1 Submittals: in accordance with Section 01 78 00 – Closeout Submittals.
 - .1 Submit no later than 4 weeks after award of Contract:
 - .1 Draft Cx documentation.
 - .2 Preliminary Cx schedule.
 - .2 Request in writing to Consultant for changes to submittals and obtain written approval at least 4 weeks prior to start of Cx.
 - .3 Submit proposed Cx procedures to Consultant where not specified and obtain written approval at least 4 weeks prior to start of Cx.
 - .4 Provide additional documentation relating to Cx process required by Consultant.

1.8 Commissioning Documentation

- 1.8.1 Third party commissioning agent hired by the Agency to review and approve Cx documentation.
- 1.8.2 Provide completed and approved Cx documentation to Third party commissioning agent

1.9 Commissioning Schedule

- 1.9.1 Provide detailed Cx schedule as part of construction schedule.
- 1.9.2 Provide adequate time for Cx activities prescribed in technical sections and commissioning sections including:
 - .1 Approval of Cx reports.
 - .2 Verification of reported results.
 - .3 Repairs, retesting, re-commissioning, re-verification.

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.4 Training.

1.10 Commissioning Meetings

- 1.10.1 Convene Cx meetings following project meetings as specified herein.
- 1.10.2 Purpose: to resolve issues, monitor progress, identify deficiencies, relating to Cx.
- 1.10.3 Continue Cx meetings on regular basis until commissioning deliverables have been addressed.
- 1.10.4 At 60 % construction completion stage to call a separate Cx scope meeting to review progress, discuss schedule of equipment start-up activities and prepare for Cx. Issues at meeting to include:
 - .1 Review duties and responsibilities of Contractor and subcontractors, addressing delays and potential problems.
 - .2 Determine the degree of involvement of trades and manufacturer's representatives in the commissioning process.
- 1.10.5 Thereafter Cx meetings to be held until project completion and as required during equipment start-up and functional testing period.
- 1.10.6 Meeting will be chaired by Cx Agent, who will record and distribute minutes.
- 1.10.7 Ensure subcontractors and relevant manufacturer representatives are present at 60 % and subsequent Cx meetings and as required.

1.11 Starting and Testing

- 1.11.1 Contractor assumes liabilities and costs for inspections. Including disassembly and re-assembly after approval, starting, testing and adjusting, including supply of testing equipment.

1.12 Witnessing of Starting and Testing

- 1.12.1 Provide 14 days notice prior to commencement.
- 1.12.2 Third party commissioning agent to witness of start-up and testing.
- 1.12.3 Contractor's Cx Agent to be present at tests performed and documented by sub-trades, suppliers and equipment manufacturers.

1.13 Manufacturer's Involvement

- 1.13.1 Factory testing: manufacturer to:
 - .1 Coordinate time and location of testing.
 - .2 Provide testing documentation for approval by Third party commissioning agent.
 - .3 Arrange for Consultant to witness tests.
 - .4 Obtain written approval of test results and documentation from Third party commissioning agent before delivery to site.
- 1.13.2 Obtain manufacturers installation, start-up and operations instructions prior to start-up of components, equipment and systems and review with Third party commissioning agent.

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- .1 Compare completed installation with manufacturer's published data, record discrepancies, and review with manufacturer.
- .2 Modify procedures detrimental to equipment performance and review same with manufacturer before start-up.
- 1.13.3 Integrity of warranties:
 - .1 Use manufacturer's trained start-up personnel where specified elsewhere in other divisions or required to maintain integrity of warranty.
 - .2 Verify with manufacturer that testing as specified will not void warranties.
- 1.13.4 Qualifications of manufacturer's personnel:
 - .1 Experienced in design, installation and operation of equipment and systems.
 - .2 Ability to interpret test results accurately.
 - .3 To report results in clear, concise, logical manner.

1.14 Procedures

- 1.14.1 Verify that equipment and systems are complete, clean, and operating in normal and safe manner prior to conducting start-up, testing and Cx.
- 1.14.2 Conduct start-up and testing in following distinct phases:
 - .1 Included in delivery and installation:
 - .1 Verification of conformity to specification, approved shop drawings and completion of PI report forms.
 - .2 Visual inspection of quality of installation.
 - .2 Start-up: follow accepted start-up procedures.
 - .3 Operational testing: document equipment performance.
 - .4 System PV: include repetition of tests after correcting deficiencies.
 - .5 Post-substantial performance verification: to include fine-tuning.
- 1.14.3 Correct deficiencies and obtain approval from Consultant after distinct phases have been completed and before commencing next phase.
- 1.14.4 Document require tests on approved PV forms.
- 1.14.5 Failure to follow accepted start-up procedures will result in re-evaluation of equipment by an independent testing agency selected by Consultant. If results reveal that equipment start-up was not in accordance with requirements, and resulted in damage to equipment, implement following:
 - .1 Minor equipment/systems: implement corrective measures approved by Consultant.
 - .2 Major equipment/systems: if evaluation report concludes that damage is minor, implement corrective measures approved by Consultant.

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- .3 If evaluation report concludes that major damage has occurred, Consultant shall reject equipment.
 - .1 Rejected equipment to be remove from site and replace with new.
 - .2 Subject new equipment/systems to specified start-up procedures.

1.15 Start-Up Documentation

- 1.15.1 Assemble start-up documentation and submit to Third party commissioning agent for approval before commencement of commissioning.
- 1.15.2 Start-up documentation to include:
 - .1 Factory and on-site test certificates for specified equipment.
 - .2 Pre-start-up inspection reports.
 - .3 Signed installation/start-up check lists.
 - .4 Start-up reports,
 - .5 Step-by-step description of complete start-up procedures, to permit Consultant to repeat start-up at any time.

1.16 Operation and Maintenance of Equipment and Systems

- 1.16.1 After start-up, operate and maintain equipment and systems as directed by equipment/system manufacturer.
- 1.16.2 With assistance of manufacturer develop written maintenance program and submit Third party commissioning agent for approval before implementation.
- 1.16.3 Operate and maintain systems for length of time required for commissioning to be completed.
- 1.16.4 After completion of commissioning, operate and maintain systems until issuance of certificate of interim acceptance.

1.17 Test Results

- 1.17.1 If start-up, testing and/or PV produce unacceptable results, repair, replace or repeat specified starting and/or PV procedures until acceptable results are achieved.
- 1.17.2 Provide manpower and materials, assume costs for re-commissioning.

1.18 Start of Commissioning

- 1.18.1 Notify Consultant at least 21 days prior to start of Cx.
- 1.18.2 Start Cx after elements of building affecting start-up and performance verification of systems have been completed.

1.19 Instruments / Equipment

- 1.19.1 Submit to Third party commissioning agent for review and approval:
 - .1 Complete list of instruments proposed to be used.

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- .2 Listed data including, serial number, current calibration certificate, calibration date, calibration expiry date and calibration accuracy.

1.19.2 Provide the following equipment as required:

- .1 2-way radios.
- .2 Ladders.
- .3 Equipment as required to complete work.

1.20 Commissioning Performance Verification

1.20.1 Carry out Cx:

- .1 Under accepted simulated operating conditions, over entire operating range, in all modes.
- .2 On independent systems and interacting systems.

1.20.2 Cx procedures to be repeatable and reported results are to be verifiable.

1.20.3 Follow equipment manufacturer's operating instructions.

1.20.4 EMCS trending to be available as supporting documentation for performance verification.

1.21 Witnessing Commissioning

1.21.1 Third party commissioning agent to witness activities and verify results.

1.22 Authorities having Jurisdiction

1.22.1 Where specified start-up, testing or commissioning procedures duplicate verification requirements of authority having jurisdiction, arrange for authority to witness procedures so as to avoid duplication of tests and to facilitate expedient acceptance of facility.

1.22.2 Obtain certificates of approval, acceptance and compliance with rules and regulation of authority having jurisdiction.

1.22.3 Provide copies to Consultant within 5 days of test and with Cx report.

1.23 Commissioning Constraints

1.23.1 Since access into secure or sensitive areas will be very difficult after occupancy it is necessary to complete Cx of occupancy, weather, and seasonal sensitive equipment and systems in these areas before issuance of the Interim Certificate, using, if necessary, simulated thermal loads.

1.24 Extrapolation of Results

1.24.1 Where Cx of weather, occupancy, or seasonal-sensitive equipment or systems cannot be conducted under near-rated or near-design conditions, extrapolate part-load results to design conditions when approved by Consultant in accordance with equipment manufacturer's instructions, using manufacturer's data, with manufacturer's assistance and using approved formulae.

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Division 01, Specifications, Section 01 91 13, General Commissioning Requirements

1.25 Extent of Verification

- 1.25.1 Provide manpower and instrumentation to verify performance of 100% of the installed equipment.
- 1.25.2 Conduct tests repeated during verification under same conditions as original tests, using same test equipment, instrumentation.
- 1.25.3 Review and repeat commissioning of systems if inconsistencies found in more than 20% of reported results.
- 1.25.4 Perform additional commissioning until results are acceptable to Third party commissioning agent.

1.26 Repeat Verifications

- 1.26.1 Assume costs incurred by Third party commissioning agent for third and subsequent verifications where:
 - .1 Verification of reported results fail to receive Third party commissioning agent approval.
 - .2 Repetition of second verification again fails to receive approval.
 - .3 Third party commissioning agent deems Contractor's request for second verification was premature.

1.27 Sundry Checks and Adjustments

- 1.27.1 Make adjustments and changes which become apparent as Cx proceeds.
- 1.27.2 Perform static and operational checks as applicable and as required.

1.28 Deficiencies, Faults, Defects

- 1.28.1 Correct deficiencies found during start-up and Cx to satisfaction of Third party commissioning agent.
- 1.28.2 Report problems, faults or defects affecting Cx to Third party commissioning agent in writing. Stop Cx until problems are rectified. Proceed with written approval from Third party commissioning agent.

1.29 Completion of Commissioning

- 1.29.1 Upon completion of Cx leave systems in normal operating mode.
- 1.29.2 Except for warranty and seasonal verification activities specified in Cx specifications, complete Cx prior to issuance of Interim Certificate of Completion.
- 1.29.3 Cx to be considered complete when contract Cx deliverables have been submitted and accepted by Third party commissioning agent.

1.30 Activities upon Completion of Commissioning

- 1.30.1 When changes are made to baseline components or system settings established during Cx process, provide updated Cx form for affected item.

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1.31 Training

1.31.1 In accordance with Section 01 79 00.13 - Demonstration and Training for Building Commissioning.

1.32 Maintenance Materials, Spare Parts, Special Tools

1.32.1 Supply, deliver, and document maintenance materials, spare parts, and special tools as specified in contract.

1.33 Occupancy

1.33.1 Cooperate fully with Consultant during stages of acceptance and occupancy of facility.

1.34 Installed Instrumentation

1.34.1 Use instruments installed under Contract for TAB and PV if:

- .1 Accuracy complies with these specifications.
- .2 Calibration certificates have been deposited with Consultant.

1.34.2 Calibrated EMCS sensors may be used to obtain performance data provided that sensor calibration has been completed and accepted.

1.35 Performance Verification Tolerances

1.35.1 Application tolerances:

- .1 Specified range of acceptable deviations of measured values from specified values or specified design criteria. Except for special areas, to be within +/-10% of specified values.

1.35.2 Instrument accuracy tolerances:

- .1 To be of higher order of magnitude than equipment or system being tested.

1.35.3 Measurement tolerances during verification:

- .1 Unless otherwise specified actual values to be within +/-2% of recorded values.

1.36 Agency's Performance Testing

1.36.1 Performance testing of equipment or system by Third party commissioning agent will not relieve Contractor from compliance with specified start-up and testing procedures.

2. PRODUCTS

2.1 Not Used

2.1.1 Not Used.

3. EXECUTION

3.1 Not Used

3.1.1 Not Used.

END OF SECTION

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Division 01, Specifications, Section 01 91 13.13, Commissioning Plan

1. GENERAL

1.1 Summary

1.1.1 Section Includes:

- .1 Description of overall structure of Plan and roles and responsibilities of commissioning team.

1.1.2 Related Requirements

- .1 Section 01 79 00.13 - Demonstration and Training for Building Commissioning
- .2 Section 01 91 13 - General Commissioning Requirements

1.2 Reference Standards

1.2.1 CSA Z320 - Building Commissioning Standard

1.2.2 ASHRAE Guideline 0: The Commissioning Process

1.2.3 ASHRAE Standard 202: Commissioning Process for Buildings and Systems

1.2.4 National Institute of Building Sciences (NIBS) Guideline 3 Exterior Enclosure Technical Requirements for the Commissioning Process

1.2.5 Building Commissioning Association: New Construction Cx Best Practices

1.3 General

1.3.1 Provide a fully functional facility:

- .1 Systems, equipment and components meet user's functional requirements before date of acceptance and operate consistently at peak efficiencies and within specified energy budgets under normal loads.
- .2 Facility user and O& M personnel have been fully trained in aspects of installed systems.
- .3 Complete documentation relating to installed equipment and systems.

1.3.2 Term "Cx" in this section means "Commissioning".

1.3.3 Use this Cx Plan as master planning document for Cx:

- .1 Outlines organization, scheduling, allocation of resources, documentation, pertaining to implementation of Cx.
- .2 Communicates responsibilities of team members involved in Cx Scheduling, documentation requirements, and verification procedures.
- .3 Sets out deliverables relating to O&M, process and administration of Cx.
- .4 Describes process of verification of how built works meet Agency/Investor's design requirements.
- .5 Produces a complete functional system prior to issuance of Certificate of Occupancy.
- .6 Management tool that sets out scope, standards, roles and responsibilities, expectations, deliverables, and provides:
 - .1 Overview of Cx.

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- .2 General description of elements that make up Cx Plan.
 - .3 Process and methodology for successful Cx.
 - 1.3.4 Acronyms:
 - .1 Cx - Commissioning.
 - .2 EMCS - Energy Monitoring and Control Systems.
 - .3 MSDS - Material Safety Data Sheets.
 - .4 PI - Product Information.
 - .5 PV - Performance Verification.
 - .6 TAB - Testing, Adjusting and Balancing.
 - .7 WHMIS - Workplace Hazardous Materials Information System.
 - 1.3.5 Commissioning terms used in this Section:
 - .1 Bumping: short term start-up to prove ability to start and prove correct rotation.
 - .2 Deferred Cx - Cx activities delayed for reasons beyond Contractor's control due to lack of occupancy, weather conditions, need for heating/cooling loads.
- 1.4 **Development of 100% Cx Plan**
 - 1.4.1 The Third-Party Commissioning Agent is responsible for Development of 100% Cx Plan.
- 1.5 **Refinement of Cx Plan**
 - 1.5.1 The Third-Party Commissioning Agent is responsible for Refinement of Cx Plan
- 1.6 **Composition, Roles and Responsibilities of Cx Team**
 - 1.6.1 Third party commissioning agent to maintain overall responsibility for project and is sole point of contact between members of commissioning team.
 - .1 Third party commissioning agent is responsible for:
 - .1 Organizing Cx.
 - .2 Monitoring operations Cx activities.
 - .3 Witnessing, certifying accuracy of reported results.
 - .4 Witnessing and certifying TAB and other tests.
 - .5 Ensuring implementation of final Cx Plan.
 - .6 Performing verification of performance of installed systems and equipment.
 - .2 Construction Team: contractor, subcontractors, suppliers and support disciplines, is responsible for construction/installation in accordance with Contract Documents, including:
 - .1 Testing.
 - .2 TAB.
 - .3 Performance of Cx activities.
 - .4 Delivery of training and Cx documentation.

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- .5 Assigning one person as point of contact with Consultant and Region of Peel Cx Manager for administrative and coordination purposes.
- .3 Contractor's Cx agent implements specified Cx activities including:
 - .1 Demonstrations.
 - .2 Training.
 - .3 Testing.
 - .4 Preparation, submission of test reports.
- .4 Department Representative: represents lead role in Operation Phase and onwards and is responsible for:
 - .1 Receiving facility.
 - .2 Day-To-Day operation and maintenance of facility.

1.7 Cx Participants

- 1.7.1 Employ the following Cx participants to verify performance of equipment and systems:
 - .1 Installation contractor/subcontractor:
 - .1 Equipment and systems except as noted.
- 1.7.2 Ensure that Cx participant:
 - .1 Could complete work within scheduled time frame.
 - .2 Available for emergency and troubleshooting service during first year of occupancy by user for adjustments and modifications outside responsibility of O&M personnel.
- 1.7.3 Provide names of participants to Consultant and details of instruments and procedures to be followed for Cx 3 months prior to starting date of Cx for review and approval.

1.8 Deliverables Relating to O&M Perspectives

- 1.8.1 General requirements:
 - .1 Compile English documentation.
 - .2 Documentation to be computer-compatible format ready for inputting for data management.
- 1.8.2 Provide deliverables:
 - .1 Warranties.
 - .2 Project record documentation.
 - .3 Inventory of spare parts, special tools and maintenance materials.
 - .4 Maintenance Management System (MMS) identification system used.
 - .5 WHMIS information.
 - .6 MSDS data sheets.
 - .7 Electrical Panel inventory containing detailed inventory of electrical circuitry for each panel board. Duplicate of inventory inside each panel.

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1.9 Deliverables Relating to the Cx Process

- 1.9.1 General:
 - .1 Start-up, testing and Cx requirements, conditions for acceptance and specifications form part of relevant technical sections of these specifications.
- 1.9.2 Definitions:
 - .1 Cx as used in this section includes:
 - .1 Cx of components, equipment, systems, subsystems, and integrated systems.
 - .2 Performance verification tests.
- 1.9.3 Deliverables: provide:
 - .1 Cx Specifications.
 - .2 Startup, pre-Cx activities and documentation for systems, and equipment.
 - .3 Completed installation checklists (ICL).
 - .4 Completed product information (PI) report forms.
 - .5 Completed performance verification (PV) report forms.
 - .6 Results of Performance Verification Tests and Inspections.
 - .7 Description of Cx activities and documentation.
 - .8 Description of Cx of integrated systems and documentation.
 - .9 Training Plans.
 - .10 Cx Reports.
 - .11 Prescribed activities during warranty period.
- 1.9.4 Third party commissioning agent to witness and certify tests and reports.

1.10 Pre-cx Activities and Related Documentation

- 1.10.1 Items listed in this Cx Plan include the following:
 - .1 Conduct pre-start-up tests: conduct pressure, static, flushing, cleaning, and "bumping" during construction as specified in technical sections. To be witnessed and certified by Consultant and does not form part of Cx specifications.
 - .2 Third party commissioning agent will monitor some of these inspections and tests.
- 1.10.2 Pre-Cx activities - MECHANICAL:
 - .1 HVAC equipment and systems:
 - .1 "Bump" each item of equipment in its "stand-alone" mode.
 - .2 At this time, complete pre-start-up checks and complete relevant documentation.
 - .3 After equipment has been started, test related systems in conjunction with control systems on a system-by-system basis.
 - .4 Perform TAB on systems. TAB reports to be approved by Consultant.
 - .2 EMCS:

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- .1 EMCS trending to be available as supporting documentation for performance verification.
- .2 Perform point-by-point testing in parallel with start-up.
- .3 Carry out point-by-point verification.
- .4 Demonstrate performance of systems, to be witnessed by Consultant prior to start of 30 day Final Acceptance Test period.
- .5 Perform final Cx and operational tests during demonstration period and 30 day test period.
- .6 Only additional testing after foregoing have been successfully completed to be "Off-Season Tests".

1.11 Performance Verification (PV)

1.11.1 Performance Verification (PV):

- .1 Use procedures modified generic procedures to suit project requirements.
- .2 Third party commissioning agent to witness and certify reported results using approved PI and PV forms.
- .3 Third party commissioning agent to approve completed PV reports and provide to Department Representative.
- .4 Failure of randomly selected item shall result in rejection of PV report or report of system startup and testing.

1.12 Cx Activities and Related Documentation

- 1.12.1 Perform Cx by specified Cx agency using procedures developed by Third party commissioning agent and approved by Department Representative.
- 1.12.2 Department Representative to monitor Cx activities.
- 1.12.3 Upon satisfactory completion, Cx agency performing tests to prepare Cx Report using approved PV forms.
- 1.12.4 Third party commissioning agent to witness, certify reported results of, Cx activities and forward to Department Representative.
- 1.12.5 Department Representative reserves right to verify a percentage of reported results at no cost to contract.

1.13 Installation/Start-Up Check Lists

- 1.13.1 Installation/start-up check sheets shall be prepared by Commissioning Agent hired by the Agency.

1.14 Functional Performance Verification (FPC) Forms

- 1.14.1 Functional verification forms shall be prepared by Commissioning Agent hired by the Agency.

1.15 Cx Schedules

- 1.15.1 Prepare detailed Cx Schedule and submit to Consultant for review and approval same time as project Construction Schedule. Include:

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- .1 Milestones, testing, documentation, training and Cx activities of components, equipment, subsystems, systems and integrated systems, including:
 - .1 Design criteria, design intents.
 - .2 Pre-TAB review: 28 days after contract award, and before construction starts.
 - .3 Cx agents' credentials: 60 days before start of Cx.
 - .4 Cx procedures: 30 days after award of contract.
 - .5 Cx Report format: 30 days after contract award.
 - .6 Submission of list of instrumentation with relevant certificates: 21 days before start of Cx.
 - .7 Notification of intention to start TAB: 21 days before start of TAB.
 - .8 Notification of intention to start Cx: 14 days before start of Cx.
 - .9 Identification of deferred Cx.
 - .10 Implementation of training plans.
 - .11 Cx reports: immediately upon successful completion of Cx.
 - .2 Detailed training schedule to demonstrate no conflicts with testing, completion of project and hand-over to Department Representative.
 - .3 6 months in Cx schedule for verification of performance in all seasons and wear conditions.
- 1.15.2 After approval, incorporate Cx Schedule into Construction Schedule.
- 1.15.3 Third party commissioning agent, Consultant, Contractor, Contractor's Cx agent, and Department Representative will monitor progress of Cx against this schedule.

1.16 Cx Reports

- 1.16.1 Submit reports of tests, witnessed and certified by third party commissioning agent to Department Representative who will verify reported results.
- 1.16.2 Include completed and certified PV reports in properly formatted Cx Reports.
- 1.16.3 Before reports are accepted, reported results to be subject to verification by Departmental Representative.

1.17 Activities During Warranty Period

- 1.17.1 Cx activities must be completed before issuance of Interim Certificate, it is anticipated that certain Cx activities may be necessary during Warranty Period, including:
 - .1 Fine tuning of HVAC systems.
 - .2 Adjustment of ventilation rates to promote good indoor air quality and reduce deleterious effects of VOCs generated by off-gassing from construction materials and furnishings.

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1.18 Training Plans

1.18.1 Refer to Section 01 79 00.13- Demonstration and Training for Building Commissioning].

1.19 Final Settings

1.19.1 Upon completion of Cx to satisfaction of third-party Commissioning Agent and Department Representative lock control devices in their final positions, indelibly mark settings marked and include in Cx Reports.

2. PRODUCTS

2.1 Not Used

2.1.1 Not Used.

3. EXECUTION

3.1 Not Used

3.1.1 Not Used.

END OF SECTION

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Division 07, Specifications, Section 07 84 00, Fire Stopping

1. GENERAL

1.1 Related Work

- 1.1.1 Fire stopping and smoke seals within mechanical assemblies (i.e. inside ducts, dampers) and electrical assemblies (i.e. inside cable trays) are specified in Division 23 and 26 respectively.
- 1.1.2 Coordinate work of this section with other sections as required to properly execute the work and as necessary maintain satisfactory progress of the work of other sections.

1.2 Related Sections

- 1.2.1 Section 01 33 00 – Submittal Procedures.
- 1.2.2 Section 01 45 00 – Quality Control.

1.3 References (Latest Revisions)

- 1.3.1 Underwriter's Laboratories of Canada (ULC)
 - .1 CAN-S115, Fire Tests of Firestop Systems.

1.4 Definitions

- 1.4.1 Fire Stop Material: device intended to close off opening or penetration during fire or materials that fill openings in wall or floor assembly where penetration is by cables, cable trays, conduits, ducts and pipes and poke-through termination devices, including electrical outlet boxes along with their means of support through wall or floor openings.
- 1.4.2 Single Component Fire Stop System: fire stop material that has Listed Systems Design and is used individually without use of high temperature insulation or other materials to create fire stop system.
- 1.4.3 Multiple Component Fire Stop System: exact group of fire stop materials that are identified within Listed Systems Design to create on site fire stop system.
- 1.4.4 Tightly Fitted; (ref: NBC Part 3.1.9.1.1 and 9.10.9.6.1): penetrating items that are cast in place in buildings of non-combustible construction or have "0" annular space in buildings of combustible construction.
 - .1 Words "tightly fitted" should ensure that integrity of fire separation is such that it prevents passage of smoke and hot gases to unexposed side of fire separation.

1.5 Submittals

- 1.5.1 Prior to start of work submit the following:
 - .1 Duplicate 300 x 300 mm samples showing actual firestop material proposed for project.
- 1.5.2 Shop drawings to show proposed material, reinforcement, anchorage, fastenings and method of installation. Construction details should accurately reflect actual job conditions.
- 1.5.3 Manufacturer's engineering judgement identification number and drawing details when no ULC or cUL system is available. Engineering

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judgement must include both project name and contractor's name who will install firestop system as described in drawing.

- 1.5.4 Manufacturer's product data for materials and prefabricated devices, providing descriptions are sufficient for identification at job site.
- 1.5.5 Include manufacturer's printed instructions for installation. Include manufacturer's specifications, training letter, and technical data for each material including the composition and limitations, documentation of ULC or CUL firestop systems to be used.
- 1.5.6 Material safety data sheets provided with product delivered to job site.

1.6 Mock-Up

- 1.6.1 Construct mock-up in accordance with Section 01 45 00 – Quality Control.
- 1.6.2 Construct mock-up showing service penetrations, fire separation and floor assemblies. Mock-up may be part of finished work.
- 1.6.3 Allow two (2) working days for inspection of mock-up by Agency's Representative before proceeding with membrane work.

1.7 Manufacturer's Representative

- 1.7.1 A manufacturer's representative is to be on site during initial installation of firestop systems to train appropriate contractor personnel in proper selection and installation procedures and at commissioning stage to certify acceptance completed installation. Training will be done as per manufacturer's written recommendations published in their literature and drawing details.

1.8 Quality Assurance

- 1.8.1 Qualifications:
 - .1 Installer: person specializing in fire stopping installations with minimum five (5) years documented experience approved by the fire stopping manufacturer.
 - .2 Manufacturer: company with minimum five (5) years experience in producing of material used for work required for this project, with sufficient production capacity to produce and deliver required units without causing delay in work.
- 1.8.2 All fire stopping materials for this project to be supplied by a single manufacturer.

2. PRODUCTS

2.1 Materials

- 2.1.1 Use only firestop products that have been ULC or cUL tested for specific fire-rated construction conditions conforming to construction assembly type, penetrating item type, annular space requirements and fire-rating involved for each separate instance.
- 2.1.2 Fire stopping and smoke seal systems: in accordance with CAN-S115.

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- .1 Asbestos-free materials and systems capable of maintaining an effective barrier against flame, smoke and gases in compliance with requirements of CAN-S115 and not to exceed opening sizes for which they are intended.
- .2 Firestop system rating: as indicated on drawings.
- 2.1.3 Service penetration assemblies: certified and tested by ULC or cUL in accordance with CAN-S115.
- 2.1.4 Service penetration firestop components: certified and tested by ULC or cUL in accordance with CAN-S115.
- 2.1.5 Fire-resistance rating of installed fire stopping assembly in accordance with NBC.
- 2.1.6 Non-curing, re-penetrable intumescent sealants, caulking or putty material for use with flexible cables or cable bundles.
- 2.1.7 Fire stopping and smoke seals at openings around penetrations for pipes, ductwork and other mechanical items requiring sound and vibration control: elastomeric seal. Consult with Agency's Representative and damper manufacturer prior to installation ULC or cUL firestop systems that might hamper the performance of fire dampers as it pertains to duct work.
- 2.1.8 Intumescent sealants or caulking materials for use with combustible items (penetrants consumed by high heat and flame) including insulated metal pipe, PVC jacketed, flexible cable or cable bundles and plastic pipe. No silicone based firestop are allowed to be applied on plastic pipes.
- 2.1.9 Primers: to manufacturer's recommendation for specific material, substrate, and end use.
- 2.1.10 Water (if applicable): potable, clean and free from injurious amounts of deleterious substances.
- 2.1.11 Damming and backup materials, supports and anchoring devices: to manufacturer's recommendations, and in accordance with tested assembly being installed as acceptable to authorities having jurisdiction.
- 2.1.12 Sealants for vertical joints: non-sagging.

3. EXECUTION

3.1 Preparation

- .1 Examine sizes and conditions of voids to be filled to establish correct thicknesses and installation of materials. Ensure that substrates and surfaces are clean, dry and frost free.
- .2 Prepare surfaces in contact with fire stopping materials and smoke seals to manufacturer's instructions.
- .3 Maintain insulation around pipes and ducts penetrating fire separation without interruption to vapour barrier.
- .4 Mask where necessary to avoid spillage and over coating onto adjoining surfaces; remove stains on adjacent surfaces.

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3.2 Installation

- 3.2.1 Install fire stopping and smoke seal material and components in accordance with ULC certification or UL Products Certified for Canada (CUL) and manufacturer's instructions.
- 3.2.2 Seal holes or voids made by through penetrations, poke-through termination devices, and unpenetrated openings or joints to ensure continuity and integrity of fire separation are maintained.
- 3.2.3 Provide temporary forming as required and remove forming only after materials have gained sufficient strength and after initial curing.
- 3.2.4 Tool or trowel exposed surfaces to a neat finish.
- 3.2.5 Remove excess compound promptly as work progresses and upon completion.

3.3 Inspection

- 3.3.1 Notify Agency's Representative when ready for inspection and prior to concealing or enclosing firestopping materials and service penetration assemblies.

3.4 Schedule

- 3.4.1 Firestop and smoke seal at:
 - .1 Penetrations through fire-resistance rated masonry, concrete, and gypsum board partitions and walls.
 - .2 Edge of floor slabs at curtain wall and precast concrete panels.
 - .3 Perimeter of fire-resistance rated masonry and gypsum board partitions.
 - .4 Intersection of fire-resistance rated masonry and gypsum board partitions.
 - .1 Control and sway joints in fire-resistance rated masonry and gypsum board partitions and walls.
 - .2 Penetrations through fire-resistance rated floor slabs, ceilings and roofs.
 - .3 Openings and sleeves installed for future use through fire separations.
 - .4 Around mechanical and electrical assemblies penetrating fire separations.
 - .5 Rigid ducts: greater than 129 cm²: fire stopping to consist of bead of fire stopping material between retaining angle and fire separation and between retaining angle and duct, on each side of fire separation.

3.5 Clean Up

- 3.5.1 Remove excess materials and debris and clean adjacent surfaces immediately after application.
- 3.5.2 Remove temporary dams after initial set of fire stopping and smoke seal materials.

END OF SECTION

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Division 07, Specifications, Section 07 92 00, Joint Sealants

1. GENERAL

1.1 Summary

- 1.1.1 Section includes:
.1 Interior building sealants.

1.2 Submittals

- 1.2.1 Submit required submittals in accordance with Section 01 33 00.
- 1.2.2 Product data sheets:
.1 Submit manufacturer's Product data sheets for Products proposed for use in the work of this section.
.2 Submit manufacturer's and Product name for each sealant which will be used in the Work prior to commencing the Work.
- 1.2.3 Samples:
.1 Submit "wet sample" sealant colour samples for each sealant Product and colour.
- 1.2.4 Test and evaluation reports:
.1 Test sealant in contact with samples of materials to be sealed to verify adhesion will be achieved and no staining of the material will result. Prepare sample joints at the Place of the Work of each type of sealant for each joint condition.
.1 Submit test results to Consultant prior to application of sealants.
.2 Test sealant in contact with samples of porous materials to be sealed to ensure that no staining of the material will result in accordance with ASTM C1248-08(2012).
.1 Submit test results to Consultant prior to application of sealants.

1.3 Quality Assurance

- 1.3.1 Qualifications:
.1 Installers / applicators: Execute the work of this section only by a Subcontractor with minimum 5 years experience in application of Products, systems and assemblies specified and with approval and training of Product manufacturers. Installer to comply with quality assurance articles referenced in ASTM C1193-16 for installation of joint sealants.
- 1.3.2 Mock-up:
.1 Submit 2440 mm (96") long sealant joint mock-up.

1.4 Field Conditions

- 1.4.1 Conform to sealant manufacturer's specifications and recommendations.
- 1.4.2 Verify substrates and ambient air temperature at the Place of the Work before, during and after application.

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Division 07, Specifications, Section 07 92 00, Joint Sealants

1.5 Extended Warranty

- 1.5.1 Warrant work of this section in accordance with Section 01 78 36 for a period of 2 years.
- 1.5.2 Repair or replace joint sealants which fail to perform as air tight and water-tight joints; or fail in joint adhesion, cohesion, abrasion resistance, weather resistance, or general durability; or appear to deteriorate or become unserviceable or causing an objectionable appearance resulting from either defective or non-conforming materials and workmanship or in any other manner not clearly specified by submitted manufacturer's data as an inherent quality of the material for the exposure indicated.
 - .1 Defects shall include, but are not limited to:
 - .1 Staining from abutting materials or filler.
 - .2 Migrating, bleeding into, or staining abutting materials.
 - .3 Unsightly surface deformation.
 - .4 Excessive colour change, chalking, or dust pick-up.
 - .5 Failing adhesively or cohesively where maximum elongation is less than 25% of designed width of exposed joints.
 - .6 Hardening to more than 25% over specified hardness.

2. PRODUCTS

2.1 Sealants

- 2.1.1 General:
 - .1 Colours: Sealant colours shall match colours of adjacent materials, as selected and approved by Consultant.
 - .1 Colours shall be selected from manufacturer's full range of colours.
 - .2 Colours shall be custom colour.
 - .2 Comply with ASTM C920-11 and other requirements indicated for each liquid-applied chemically curing sealant, including those referencing ASTM C920-11 classifications for type, grade, class, and uses.
 - .3 For sealants to be applied to porous substrates: Provide products that have undergone testing according to ASTM D1248-16 and have not stained porous joint substrates indicated for Work.
 - .4 Sealant supplied shall not exude any material(s) which travels into adjacent materials, or travels onto surfaces of adjacent materials; causing damage, or attracting soiling, which becomes apparent during the service life of the building.
- 2.1.2 Interior general sealants:
 - .1 Interior sealant; at joints with painted gypsum board: one-component paintable acrylic or polyurethane sealant in accordance with the following:
 - .1 Comply with (Latest revisions):

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- .1 ASTM C834.
 - .2 CGSB 19-GP-5M.
 - .2 Interior sealant; at movement paintable joints in vertical surfaces, no detectible odour: one-component sealant in accordance with the following:
 - .1 Comply with (Latest revisions):
 - .1 ASTM C920, Type M or S, Grade NS, Class 25
 - .2 CAN/CGSB 19.13-M87.
 - .3 Interior sealant, mildew resistant one part silicone sealant in accordance with the following:
 - .1 Comply with (Latest revisions):
 - .1 ASTM C920, Type S, Grade NT, Class 25
 - .2 CAN/CGSB 19.22-M89.

2.2 Accessories

- 2.2.1 General: Provide joint sealants, primers, backings, and fillers that are compatible with one another and with joint substrates and other sealants or joint fillers specified and approved for applications indicated under joint sealant scheduled and under conditions of service and application as demonstrated by joint sealant manufacturer based on proven test results and field experience. When incompatible, inform Consultant and change to compatible type acceptable to Consultant.
- 2.2.2 Cylindrical sealant backings: Provide joint backings that meet ASTM C1330-02, Type O (open-cell polyurethane), or Type B (non-absorbent bi-cellular backing materials with surface skin), sized 25 percent or greater than joint opening with proper density to control sealant depth and profile. Follow joint sealant manufacturer's recommendations with backing selections for optimum joint sealant performance, in accordance with the following schedule:
 - .1 Use open cell foam with non-absorbing closed cell skin (Sof-Rod) for vertical joints; round shape for open joints and triangular shape for angular joints.
 - .2 Use closed cell foam for horizontal joints.
- 2.2.3 Bond-breaker tape: Polyethylene tape or other approved plastic tape as recommended by joint sealant manufacturer to prevent 3-sided joint adhesion to rigid, inflexible joint fillers or joint surfaces at back of joint where such adhesion would restrict proper sealant movement or result in sealant failure.
- 2.2.4 Masking tape: Non-staining, non-absorbent and compatible with joint sealants and adjacent surfaces.
- 2.2.5 Sealant primers: Use primers only as recommended by sealant manufacturer where required to enhance adhesion of sealant to specific joint substrates indicated and as determined for use from pre-construction mock-up testing. Select primers in consultation with

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sealant manufacturer and manufacturer of substrate material which do not have a detrimental effect on sealant adhesion or in-service performance.

2.2.6 Cleaners for nonporous surfaces:

- .1 Provide non-staining, chemical cleaners of type which are acceptable to manufacturer of sealant and sealant backing material, which are not harmful to substrates and adjacent nonporous materials, and which do not leave oily residues or otherwise have a detrimental effect on sealant adhesion or in-service performance.
- .2 Provide cleaner conditioner required for glass and glazed surfaces as recommended by sealant manufacturer.

3. EXECUTION

3.1 Manufacturer's Recommendations

- 3.1.1 Unless specified otherwise herein, comply with the recommendations and directions of the manufacturer whose materials are being used in the work of this section.

3.2 Preparation

- 3.2.1 Protect adjacent work areas and finished surfaces from damage during joint sealant installation.
- 3.2.2 Clean and prepare joint surfaces and substrates of substance that could impair the bond of joint sealants immediately before installing joint sealants.
- 3.2.3 Provide a dry, dust-free and cleaned substrate for optimum results.
- 3.2.4 Clean porous joint surfaces by using heavy-duty brushing, light abrasive, mechanical abrading or combination of these methods to produce a clean, sound surface for optimum bond with joint sealants per manufacturer's recommendations.
- 3.2.5 Non-porous surfaces shall be cleaned using the two-cloth wipe method as referenced in ASTM C1193-16 and outlined by joint sealant manufacturer's instruction.
- 3.2.6 Rusting or scaling surfaces shall be prepared using abrasive cleaning methods as recommended by joint sealant manufacturer prior to joint sealant installation. Efflorescence, mould, mildew and algae must be removed and neutralized prior to joint sealant installation.
- 3.2.7 Coordinate cleaning, priming and installation to avoid contamination of wet, freshly coated or adjacent finished surfaces. Prepare finish-coated surfaces per joint sealant manufacturer's specific recommendations.
- 3.2.8 Test materials for indications of staining or poor adhesion before any sealing is commenced. Submit reports in writing to Consultant of results.

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3.3 Masking

- 3.3.1 Where necessary to prevent contamination or marring surfaces of adjacent materials, mask areas adjacent to joints with masking tape prior to priming or sealing application. Remove tape immediately after joint has been completed and an initial set achieved.

3.4 Installation

- 3.4.1 Apply joint sealants for continuous waterproof sealant joint protection. Vertical joints shall be lapped over horizontal joints as recommended by sealant manufacturer. Comply with installation recommendations in ASTM C1193-16 for use of joint sealants as applicable to each specific sealant installation.
- 3.4.2 Install sealant primers only when recommended by sealant manufacturer and demonstrated at pre-construction tests after joint surface preparation has been completed and when surfaces are verified as clean and dry. Allow any primer installation to completely dry or cure prior to installation of backing or joint sealants. Primer is mandatory for gun applied sealants.
- 3.4.3 Install joint sealants using proven techniques that comply with the following and in proper sequence with installation of primers and backings.
- .1 Using proper joint sealant dispensing equipment, place sealants by pushing sealant beads into opening to fully wet-out joint sealant substrates. Fill sealant joint opening to full and proper configuration.
 - .2 Install, providing uniform cross-sectional shapes and depths in relation to joint width for optimum sealant movement capability per joint sealant manufacturer's instructions.
- 3.4.4 Joint sealant tooling is required for non-sag joint sealant installations. Immediately after placing fresh sealants and before skinning or curing begins, tool sealants using metal spatulas designed for this purpose in accordance with manufacturer's recommendations. Provide a smooth, uniform sealant finish, eliminating air pockets and ensuring good contact for optimum sealant adhesion within each side of the joint opening.
- .1 Provide concave joint configuration as indicated per figure 5- A in ASTM C1193 (latest revision) unless otherwise indicated.
 - .2 Use tooling agents that are approved in writing by sealant manufacturer and that do not discolour sealants or adjacent surfaces.
 - .3 Remove excess sealant from surfaces adjacent to joint openings using metal spatula, promptly cleaning any sealant residue from adjacent finished surfaces. Remove masking after joint sealant is installed.

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- 3.4.5 Allow single-component sealants to fully cure before adhesion testing is performed as recommended by joint sealant manufacturer.
- 3.4.6 Match approved sealant mock-up for colour, finish and overall aesthetics. Remove, refinish or re-install work not in compliance with the Contract Documents.
- 3.4.7 When surfaces of adjacent materials are to be painted, perform sealant work before these surfaces are painted.
- 3.4.8 Check form release agent used on concrete for compatibility with primer and sealant. If they are incompatible inform Consultant and change primer and sealant to compatible type, or clean concrete to sealant manufacturer's acceptance.
- 3.4.9 Install joint backing material, filler strips, gaskets, bond breakers and similar type material of comparable performance characteristics. Install bond breaker tape or packing over asphalt impregnated fibre board as recommended by sealant manufacturer.
- 3.4.10 Where joints are 12.7 mm (1/2") or deeper, insert backing material in continuous uniform compression with setback from finished face of adjoining materials equal to required depth of sealant (width/depth ratio) as specified herein.
- 3.4.11 On horizontal traffic surfaces, support joint filler against vertical movement which might result from traffic loads, including foot traffic.
- 3.4.12 Install bond breaker tape in bottom of joints in lieu of sealant backing where proper depth cannot be obtained when backing is installed.
- 3.4.13 Maintain correct sealant depth. Sealant depth shall be 1/2 the width of the joint, maximum depth shall be 12.7 mm (1/2"), minimum depth shall be 6 mm (1/4"). Comply with manufacturer's written recommendations.
- 3.4.14 Fillet bead sealant joints to be sized to provide proper contact area with substrates, in accordance with manufacturer's written recommendations.
- 3.4.15 Apply sealants using pressure-operated guns fitted with suitable nozzles in accordance with manufacturer's directions. Apply sealants in such manner as to ensure good adhesion to sides of joints and to completely fill voids in joints.
- 3.4.16 Apply sealants so that surfaces of joints are smooth, full bead, free from ridges, wrinkles, sags, air pockets and embedded impurities. Tool sealant surfaces to produce a smooth surface.
- 3.4.17 Install sealant with exterior face of sealant set back 10 mm (3/8") from face of adjacent materials at building movement joints, unless otherwise indicated.
- 3.4.18 Do not apply sealants to areas where installation of paints, coatings or flooring is in progress. Apply sealants after such work is complete and fully cured.

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3.5 Interior Sealant Schedule

- 3.5.1 Include in work of this section sealants to seal open joints in surfaces exposed to view, and to make building weather-tight and air-tight, as applicable, as indicated, and as otherwise specified, except where specified under the work of other sections.
- 3.5.2 Install sealant to:
 - .1 Movement and control joints on exposed in situ concrete walls.
 - .2 Interior control and expansion joints in floor and wall surfaces.
 - .3 Raked out joints at junctions of masonry with concrete walls and columns, and at intersection of masonry walls and partitions where joint reinforcement is installed.
 - .4 Perimeters of exterior and interior door and window frames.
 - .5 Joints at tops of non-load bearing masonry walls at the underside of in situ concrete.
 - .6 Exposed interior control joints in gypsum board.
 - .7 Millwork junctions with walls.
- 3.5.3 Mildew resistant sealant at wet areas:
 - .1 Counter/wall junctions at countertops.

3.6 Field Quality Control

- 3.6.1 Conduct quality control in accordance with Section 01 45 00.

3.7 Adjusting and Cleaning

- 3.7.1 Remove droppings and clean off excess sealant or sealant residue adjacent to sealant joint installations as the work progresses by methods approved by joint sealant manufacturer before material achieves initial set.
- 3.7.2 Do not damage adjacent surfaces with harmful removal techniques and protect finished surfaces beyond those that have been masked.
- 3.7.3 Remove and replace damaged joint sealants.
- 3.7.4 Remove temporary coverings and masking protection from adjacent work areas upon completion.

3.8 Protection

- 3.8.1 Protect installed sealants during and after final curing from damage resulting during construction.

END OF SECTION

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Division 23, Specifications, Section 23 01 05, Use of HVAC Systems During Construction

1. GENERAL

1.1 Summary

1.1.1 Section Includes:

- .1 Use of mechanical systems during construction.

1.2 Use of Systems

1.2.1 Use of new and existing permanent heating and ventilating systems for supplying temporary heat or ventilation is permitted only under following conditions:

- .1 Entire system is complete, pressure tested, cleaned, flushed out.
- .2 Specified water treatment system has been commissioned, water treatment is being continuously monitored.
- .3 Building has been closed in, areas to be heated/ventilated are clean and will not thereafter be subjected to dust-producing processes.
- .4 There is no possibility of damage
- .5 Supply ventilation systems are protected by 60 % filters, inspected daily, changed every 2 weeks or more frequently as required.
- .6 Return systems have approved filters over openings, inlets, outlets.
- .7 Systems will be:
 - .1 Operated as per manufacturer's recommendations and instructions.
 - .2 Operated by Contractor.
 - .3 Monitored continuously by Contractor.
- .8 Warranties and guarantees are not relaxed.
- .9 Regular preventive and other manufacturers recommended maintenance routines are performed by Contractor at own expense and under supervision of Agency & Consultant.
- .10 Refurbish entire system before static completion; clean internally and externally, restore to "as- new" condition, replace filters in air systems.

1.2.2 Filters specified in this Section are over and above those specified in other Sections of this project.

1.2.3 Exhaust systems are not included in approvals for temporary heating ventilation. All miscellaneous equipment.

2. PRODUCTS

2.1 Not Used

2.1.1 Not used

3. EXECUTION

3.1 Not Used

3.1.1 Not used

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END OF SECTION

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Division 23, Specifications, Section 23 05 00, Common Work Results for HVAC

1. GENERAL

1.1 Conformance

- 1.1.1 General Conditions, Supplements and Amendments shall govern this Division (read in conjunction with Instruction to Tenderers / Bidders). This section covers items common to section of Mechanical and is intended to supplement requirements of Division 01.

1.2 Work Included

- 1.2.1 Provide complete, fully tested and operational mechanical systems to meet requirements described herein, in complete accordance with applicable codes and ordinances.
- 1.2.2 "Provide" shall mean "Supply and Install" products and services specified.
- 1.2.3 Provide materials, equipment and plant, of specified performance and quality, with current models with published, certified ratings for which replacement parts are readily available.
- 1.2.4 Provide project management and on-site supervision to undertake administration, meet schedules, ensure performances, and coordination, establish orderly completion and delivery of fully commissioned installation.
- 1.2.5 Follow Manufacturer's recommendations for installation, safety, access for inspection, maintenance and repairs. Provide access to motors, belts, filters and lubricating points. Install equipment to permit maintenance and disassembly with minimum disturbance to connecting piping or duct systems.
- 1.2.6 Most stringent requirements of this and other mechanical sections shall govern.
- 1.2.7 Work shall be in accordance with the Drawings and Specifications and their intent, complete with necessary components, including those not normally shown or specified, but required for complete installation.
- 1.2.8 Provide seismic restraints for required equipment, piping and ductwork.
- 1.2.9 Connect mechanical services to equipment furnished by Agency or other Sections, including start-up and test.

1.3 Standard of Acceptance

- 1.3.1 Means that item named and specified by Manufacturer and/or catalogue number forms part of specification and sets standard regarding performance, quality of material and workmanship and when used in conjunction with referenced standard, shall be deemed to supplement standard.
- 1.3.2 Acceptable products
- .1 Manufacturers are listed within section where they are specified or in equipment schedules.
- 1.3.3 Where two or more items of equipment and/or material, of the same type, are required, provide products of single Manufacturer.

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- 1.3.4 Visible Manufacturer's nameplate shall indicate Manufacturer's name, model number, serial number, capacity data, electrical characteristics and approval stamps.
- 1.3.5 Provide new materials and equipment not less than quality specified and of current models with published ratings and available replacement parts. Equipment shall have ULC, CSA or ASME nameplates as required by Authorities having jurisdiction.
- 1.3.6 Use same brand of Manufacturer throughout, unless otherwise specified, for each specification application of equipment or material.
- 1.3.7 Replace materials less than specified quality and relocate work incorrectly installed as determined by Consultant.
- 1.4 Addition of Acceptable Manufacturers**
 - 1.4.1 Equipment/material considered to satisfy specification, but of Manufacturer other than those named in section specifying equipment/material may be submitted in writing to Bids and Tenders for consideration prior to the Closing for Questions date as per the tender document.
 - 1.4.2 Addition of Manufacturer's names to specifications shall be by addendum only.
 - 1.4.3 Provide complete technical and performance equivalency comparison to specified equipment to show that proposed equipment is equal to, or better than the specified equipment.
- 1.5 Tender Inquiries**
 - 1.5.1 Contractor queries during tender period shall be made in writing to Consultant. Contractor queries will be collected and suitable addenda issued for clarification. No verbal information will be issued by Consultant's office during tender. Tender queries may be emailed, faxed, mailed, or couriered to Consultant's office. No telephone questions will be answered.
- 1.6 Equipment List/Sub-Trades**
 - 1.6.1 Unless requested otherwise, submit within seven days of contract award a list naming Subcontractors and Manufacturers of equipment to be used.
 - 1.6.2 Equipment list shall be full list of materials intended for installation.
- 1.7 Detailed Price Breakdown**
 - 1.7.1 Provide to Consultant within 30 days of award of Contract, separate materials and labour breakdown. Progress payments shall not be processed until breakdown is received as follows:
 - .1 Project start-up costs (shop drawings, permits, etc.)
 - .2 Equipment Installation
 - .3 Insulation and firestopping
 - .4 Vibration isolation

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- .5 Commissioning
- .6 Sheet metal
- .7 BAS Controls
- .8 Verification of control systems
- .9 Balancing of air and water systems
- .10 Equipment and systems testing
- .11 Maintenance Manuals and Record Drawings
- 1.7.2 Contractor to provide materials and labour breakdown for each point listed on Consultant's change notice. Contractor also to receive same from affected Sub-Trades and submit their breakdown. Additional information to be provided as per Consultant's request.

1.8 Responsibilities

- 1.8.1 Responsibility as to Division providing equipment or materials rests solely with General Contractor. Extras shall not be considered based on difference in interpretation of specifications as to which trade provides certain equipment or materials.
- 1.8.2 Visit site before tendering. Examine local and existing conditions on which work is dependent. No consideration will be granted for any misunderstanding of work to be done resulting from failure to visit site.
- 1.8.3 Ensure equipment does not transmit noise and/or vibration to other parts of building, as a result of poor installation practice.
- 1.8.4 Where Contract Documents do not contain sufficient information for proper selection of equipment for bidding, notify Consultant during tendering period.
- 1.8.5 Examine Consultants' (architectural, code, landscape, structural, civil, electrical, food services) drawings plus Code Consultant's report and work of other trades to ensure work can be carried out. Conflicts or additional work not covered by drawings and specifications shall be brought to attention of Consultant before start of work.
- 1.8.6 During freezing weather, protect materials such that no harm can be done to installations already in place and/or to materials and equipment on project.
- 1.8.7 On completion of work, tools and surplus waste materials shall be removed and work left clean and operating correctly.
- 1.8.8 Advise Consultant of specified equipment, material or installation which violates laws, ordinances or regulations.

1.9 Coordination and Supervision

- 1.9.1 Check drawings of trades to verify space and headroom limitations for work to be installed. Coordinate work with trades and make changes to facilitate satisfactory installation.
- 1.9.2 Drawings are diagrammatic and approximately to scale unless detailed otherwise. They are not intended to show structural details or architectural features. Contract Documents establish scope, material and installation quality and are not detailed installation instructions.

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- 1.9.3 Install distribution systems and equipment generally in locations and routes shown, close to building structure avoiding interference with other services or free space.
- 1.9.4 Work out interference problems on site with other trades and coordinate work before fabricating, or installing any material or equipment. Where necessary, produce interference drawings. Ensure materials and equipment fit into allotted spaces and equipment can be properly serviced and replaced. Extras for improper coordination and removal of equipment to permit remedial work shall not be considered.
- 1.9.5 When open web structural joists are used, obtain structural shop drawings to ensure adequate space is available for installation of pipes and ductwork.
- 1.9.6 Coordinate with other divisions including, but not limited to the following:
 - .1 Electrical requirements for mechanical equipment and devices requiring electrical power or connection to fire alarm/annunciator panels.
- 1.9.7 Mechanical Contractor shall provide following services:
 - .1 Coordinate mechanical work
 - .2 Follow up on material and equipment deliveries, review shop drawings and produce interference drawings
 - .3 Ensure Sub-Trades are installing work properly
 - .4 Ensure interconnecting phases with Mechanical are covered
 - .5 Review cost breakdown, progress claims and cost submissions for mechanical work
 - .6 Resolve and direct responsibility for warranty
 - .7 Provide digital photographs of progress as specified
- 1.10 Inspection of Work**
 - 1.10.1 Consultant Representative shall review work prior to being concealed. Piping below ground must be reviewed prior to covering.
 - 1.10.2 Work shall be approved by authorities having jurisdiction.
 - 1.10.3 Openings shall be sealed, in particular in fire rated walls and floors. Sealing shall be inspected prior to covering.
- 1.11 Permits**
 - 1.11.1 Obtain required permits and pay fees and comply with Provincial, Municipal and other legal regulations and bylaws applicable to work.
 - 1.11.2 Arrange for inspection of work by authorities having jurisdiction. On completion of work, furnish final unconditional certificates of approval by inspecting authorities.
 - 1.11.3 Contractors and Sub-Contractors responsible for installation of smoke control and sprinkler systems shall be made available to demonstrate sequence of operation and interconnection with other life safety/fire

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protection systems at coordinated site inspection with Authority
Having Jurisdiction for occupancy permit.

1.12 Codes, Regulations and Standards

1.12.1 Mechanical work shall conform to the following codes, regulations and standards, and other codes in effect at time of award of Contract, and any others having jurisdiction. The applicable version of each code and standard shall apply unless otherwise specified in the contract documents:

- .1 Bylaws
 - .1 Region of Peel
 - .2 Local Building Bylaws
- .2 Canadian Gas Association
 - .1 National Standard of Canada CAN/CGA-B149.1-00. -
Natural Gas Installation Code
- .3 National Research Council of Canada
 - .1 National Building Code of Canada
 - .2 National Fire Code of Canada
- .4 Province of Ontario
 - .1 Comply with requirements of all Municipal, Provincial and Federal Bylaws and Ordinances as well as requirements of Utilities such as Ontario Gas Utilization Code, The Ontario Electrical Safety Code
 - .2 In general, and as applicable, perform all Work of Division 23 to comply with physical and chemical properties, characteristics and performance requirements of recognized associations and agencies as listed herein and in the following:
 - .1 ACCGH- American Conference of Governmental Industrial Hygienists
 - .2 AMCA- Air Moving & Conditioning Association
 - .3 ADC-Air Diffusion Council
 - .4 ANSI- American National Standards Institute
 - .5 ARI- Air Conditioning & Refrigeration Institute
 - .6 ASCII - American Standard Communication Information Interchange
 - .7 ASHRAE- American Society of Heating, Refrigeration and Air Conditioning Engineers
 - .8 ASME- American Society of Mechanical Engineers
 - .9 ASTM- American Society for Testing and Materials
 - .10 AWWA- American Water Works Association
 - .11 CGA- Canadian Gas Association
 - .12 CGSB- Canadian General Standards Board
 - .13 CIRI- Canadian Industrial Risk Insurers

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- .14 CSA- Canadian Standards Association
 - .15 CTI- Cooling Tower Institute
 - .16 EAI- Electronic Industry Association
 - .17 FCC-Fire Commissioner of Canada
 - .18 FM- Factory Mutual
 - .19 ISA- Instrument Society of America
 - .20 IAO- Insurers Advisory Organization
 - .21 MMC-Marsh McLennan Insurance Protection Consultants
 - .22 MTC- Ministry of Transportation and Communication
 - .23 NBCC- National Building Code of Canada
 - .24 NFPA- National Fire Protection Association
 - .25 OBC-Provincial Ontario Building Code
 - .26 OFM-Local Fire Codes or Standards Ontario Fire Marshall
 - .27 MOEE- Ontario Ministry of Environment and Energy
 - .28 OML- Ministry of Labour and Workmen's Compensation Requirements
 - .29 OWRA- Ontario Plumbing Code
 - .30 TSSA- Technical Standards & Safety Authority
 - .31 UL- Underwriter's Laboratories Inc.
 - .5 SMACNA Publications
 - .1 HVAC Duct Construction Standards
 - .2 Fire, Smoke and Radiation Damper Installation Guide
 - .3 Guidelines for Seismic Restraints of Mechanical Systems
- 1.12.2 Where specifications specifically indicate requirements more onerous than aforementioned codes, these requirements shall be incorporated.

1.13 Warranty

- 1.13.1 Equipment and systems shall be warrantied for one year. Provide written certifications to Agency. Provide extended warranty certificates on equipment as applicable and specified.
- 1.13.2 Use of equipment or systems during construction shall not alter warranty period or represent acceptance of work or equipment.
- 1.13.3 Warranty coverage shall include labour and material to correct defective equipment, workmanship, material and building damage caused by failure of same.
- 1.13.4 Warranties shall be effective from date of Substantial Completion

1.14 Workmanship

- 1.14.1 Workmanship shall be in accordance with established practice and standards accepted and recognized by Consultant and Contractor.

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- 1.14.2 Tradesmen engaged in installation of work covered within Mechanical shall be qualified in accordance with requirement of Tradesmen Qualification Act and pertinent licensing requirement required by Ministry of Municipal Affairs.

1.15 Performance Verification of Installed Equipment

- 1.15.1 Installed mechanical equipment may be subject to performance verification as specified herein if required by Consultant.
- 1.15.2 When performance verification requested, equipment shall be tested to determine compliance with specified performance requirements.
- 1.15.3 Consultant will determine by who shall carry out testing. When requested, Contractor shall arrange for services of independent testing agency.
- 1.15.4 Testing procedures shall be reviewed by Consultant.
- 1.15.5 Maintain building comfort condition when equipment removed from service or testing purposes.
- 1.15.6 Promptly provide Consultant with test reports.
- 1.15.7 Should test results reveal that originally installed equipment meets specified performance requirements, Agency will pay costs resulting from performance verification procedure.
- 1.15.8 Should test results reveal equipment does not meet specified performance, equipment will be rejected and the following shall apply
 - .1 Remove rejected equipment. Replace with equipment which meets requirements of Contract Documents, including specified performance requirements.
 - .2 Replacement equipment may be subject to performance verification as well, using same testing procedures on originally installed equipment.
 - .3 Contractor shall pay costs resulting from performance verification procedure.

1.16 Drawings and Measurements

- 1.16.1 Drawings are diagrammatic and are intended to indicate scope and general arrangement of work and are not detailed installation drawings. Do not scale drawings. Obtain accurate dimensions from Architectural and Structural drawings.
- 1.16.2 Consult Architectural drawings and details for exact locations of fixtures and equipment. Obtain this information from Consultant where definite locations are not indicated.
- 1.16.3 Take field measurements where equipment and material dimensions are dependent upon building dimensions.

1.17 Phased Construction

- 1.17.1 Make allowances to phase work in accordance with project phasing.
- 1.17.2 Existing services and existing building must be maintained in operation. Provide and install temporary services as required.

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- 1.17.3 Trades in this Division shall make allowance for implications of having to complete work in new addition before proceeding with work in existing building.

1.18 Sequence of Work

- 1.18.1 Before interrupting major services, notify Agency and arrange acceptable schedule for interruptions.
- 1.18.2 Before interrupting services, complete preparatory work as far as possible and have materials on site and prefabricated (where practical) and work continuously to keep length of interruption to minimum.
- 1.18.3 Include for cost of work that may be required out of regular hours to minimize period of service interruption when connecting into existing systems.

1.19 Building Operation during Construction

- 1.19.1 In order to minimize operation difficulties for building staff, trades must cooperate with Agency throughout construction period and particularly ensure that noise is minimized.
- 1.19.2 Convenient access for staff and public to building must be maintained. Minor inconveniences and interruption of services will be tolerated, provided advance notice is given, but Contractor shall to coordinate his work, in consultation with Agency, so operation of facility can be maintained as nearly normal as possible.

1.20 Shop Drawing

- 1.20.1 Submit shop drawings in accordance with Province MCA format including the following information:
 - .1 Cover sheet
 - .2 Physical and dimensional data
 - .3 Service space requirements
 - .4 Electrical requirement data
 - .5 Performance data
 - .6 Manufacturers' specifications
 - .7 Installation instructions
 - .8 Starting instructions
 - .9 Maintenance instructions
 - .10 Operating instructions
- 1.20.2 Fan and pump submissions shall include performance curves (charts are not acceptable).
- 1.20.3 Include radiated, discharge and inlet sound power levels for major pieces of mechanical equipment.
- 1.20.4 Do not include non-applicable information. Non-applicable information shall be removed entirely or crossed out from shop drawing.
- 1.20.5 Cover sheet shall include the following information

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- .1 Title, number of pages, Contractor, Supplier, Manufacturer, date of submission
 - .2 Place for Consultant's review stamp 4" x 3"
 - .3 Related parties involved in Contractor's pre-submission review (Mechanical and General Contractors)
 - .4 Related parties involved in Consultant's review
 - .5 Area allocated for comments
- 1.20.6 Maintain one complete copy of reviewed shop drawings on site in indexed 3-ring binder.
- 1.20.7 Shop drawings not prepared as described above shall not be reviewed by Consultant.
- 1.20.8 Do not order equipment or materials until shop drawings have been accepted by Consultant.
- 1.20.9 Related mechanical equipment and materials shall be submitted together (e.g. coils, heat exchangers, glycol pump, furnaces complete with cooling coil and condensing unit). Shop drawings not properly submitted with related equipment shall be held until related shop drawings submitted.
- 1.20.10 Submit in imperial/SI units to match those specified.
- 1.20.11 Consultant's review of shop drawings shall not relieve Contractor from compliance with specified requirements. Installed materials and equipment shall meet specified requirements whether or not shop drawings are reviewed by Consultant.
- 1.20.12 Shop drawing review by Consultant shall provide the following certification: "Reviewed for general design and compliance with the contract documents. Dimensions and suitability for site condition are the responsibility of the Contractor. Coordinate electrical requirements with the Electrical Contractor. This review of drawing shall not relieve the Contractor from complying with the conditions of the contract documents."
- 1.21 Temporary Heating**
- 1.21.1 Do not use permanent systems for temporary heat without written permission from Consultant.
- 1.21.2 Clean and overhaul equipment used during construction. Restore to original working condition. Replace equipment or components not operating properly. Replace mechanical seals in pumps used for temporary heating regardless of condition.
- 1.21.3 Use of permanent systems for temporary heat shall not modify terms of warranty.
- 1.21.4 Operate systems under conditions which ensure no permanent damage with safety devices and controls installed and fully operational. [Operate water systems with specified water treatment].
- 1.21.5 Operate fans at design resistance with temporary 60% dust spot efficiency filters installed and filter media on return and exhaust air

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outlets. Clean dirty ducts with industrial power vacuum equipment as directed by Consultant.

- 1.21.6 Provide alarm indicating system failure on systems used for temporary heat. Connect alarm to independent alarm company system.

1.22 Temporary or Trial Usage

- 1.22.1 Temporary or trial usage by Agency of mechanical equipment supplied under this contract shall not represent acceptance.
1.22.2 Repair or replace permanent equipment used temporarily.
1.22.3 Repair or otherwise rectify damage caused by defective materials or workmanship during temporary or trial usage.

1.23 Spare Parts

- 1.23.1 Provide spare parts as follows
- .1 One set of packing for each pump
 - .2 One casing joint gasket for each size pump
 - .3 One glass for each gauge glass installed
 - .4 One set of V-belts for each piece of machinery
 - .5 One filter cartridge for each filter installed (pre- and final filters)

1.24 Project Close-Out Requirements

- 1.24.1 The project closeout requirements are specifically listed in each section of this specification. Refer to detailed specifications in each section for further, detailed requirements.

1.25 Semi Final Inspection

- 1.25.1 Perform the following before semi-final field review
- .1 HVAC systems capable of operation with automatic controls in operation with alarms functional
 - .2 Tests on systems and equipment completed and certificates of approval obtained from Authorities
 - .3 Rough balance of air and water systems completed
 - .4 Firestopping completed
 - .5 Valve tagging completed and equipment, ductwork and piping identified. Escutcheons installed
 - .6 Equipment lubricated in accordance with Manufacturer's data
 - .7 Extended warranty form mailed to Manufacturer and copy provided to Agency
 - .8 Submit sample of Operating and Maintenance Manuals. Ensure access doors suitable located and equipment accessible
 - .9 Written report submitted by Manufacturer's Representative on noise and vibration control devices including flexible connections
 - .10 Fan plenums cleaned and permanent filters installed

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- .11 Ensure electrical connections to mechanical equipment are complete and motor rotation correct
- .12 For packaged, self-contained HVAC equipment, Manufacturer's checkout list completed. Copies forwarded to Consultant and included in Maintenance Manuals
- .13 Turn all digital photography files over to Consultant with dates of photos and locations taken from

1.26 Substantial Performance Requirements

- 1.26.1 Consultant shall issue checklist for completion by Contractor before Substantial Completion Field Review. Provide written declaration that work is complete. The following items shall be complete before Substantial Completion Field Review
 - .1 Ductwork has been cleaned, provide letter of verification to Commissioning Agent and this Consultant
 - .2 Draft balancing reports have been submitted to this consultant
 - .3 Commissioning Checklists for operational readiness and safety checks have been submitted to this Consultant
 - .4 Controls pre-operational readiness checklists (end to end checks and sequences of operation) have been verified and submitted to this Consultant
 - .5 All control devices have been calibrated and checked for proper operation. Submit report through Commissioning Agent
 - .6 Final draft Mechanical Maintenance Manuals have been submitted for review to this Consultant
 - .7 Draft Record drawings (marked up whiteprints or ACAD files) have been submitted to this Consultant for review
 - .8 The most recent Site Review (inspection) Report has been re-submitted to this Consultant with all outstanding items either crossed off and initialed as "Done", and outstanding items noted with "Time to Complete" or "by others" with a clear statement of who the "others" are and that they have been alerted to perform the rectification of the deficient work
 - .9 Confirmation that training sessions have been arranged and set up for the Agency's operating personnel for Controls and Systems Operation

1.27 Deficiency Holdbacks and Deficiency Inspections

- 1.27.1 Work under this Division, which is still outstanding when substantial performance is certified, will be considered deficient and a sum equal to minimum twice the estimated cost of completing that work will be held back.

2. PRODUCTS

2.1 Operating and Maintenance Manuals

- 2.1.1 The following indexing system shall be used:

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- .1 Tab 1.0 - Mechanical Systems: title page with clear plastic protection cover.
- .2 Tab 1.1 - List of Mechanical Drawings: provide list of mechanical drawings.
- .3 Tab 1.2 - Description of Systems: provide description of each system with summer or winter operating variances and controller operating setpoints.
- .4 Tab 1.3 - Operating Division: provide operating description of each major component and how components interface with other components, operation of controls including operational sequences for summer or winter, troubleshooting sequences and safeguards to check if equipment goes offline.
- .5 Tab 1.4 - Maintenance and Lubrication Division: provide preventative maintenance and lubrication schedule for each major component including weekly, monthly, semi annual and maintenance schedule requirements for pneumatic, electronic and DDC systems.
- .6 Tab 1.5 - List of Equipment Suppliers and Contractors: provide list of equipment suppliers and Contractors, including addresses and telephone numbers. Furnish list of spare parts for each piece of equipment such as bearings, seals v-belts, filters, etc.
- .7 Tab 2.0, 2.1, etc. - Certification: provide copies of WHMIS safety data sheets. Include copy of test data, cleaning and chemical treatment program, analysis of system water taken at time system was put into operation, hydrostatic or air tests performed, equipment alignment certificates, copy of valve tag and pipe colour identification schedules and inspection approval certificates for plumbing and natural gas systems.
- .8 Tab 3.0, 3.1, etc. - Shop Drawings and Maintenance Bulletins: provide materials received in compliance with Shop Drawings.
- .9 Tab 4.0 - Balance Reports: provide copies of balance reports.
- 2.1.2 Submit documents to Consultant for review before turning over to Agency.
- 2.1.3 Obtain shop drawing information for Mechanical equipment and include in appropriate section.

2.2 Record Drawings and Digital Photographs

- 2.2.1 Digital photographs of project shall be taken before covering or concealing underground piping and/or service in walls, concealed ceilings, furring or shafts. Photographs shall be emailed to the Consultant at info@cesgroup.ca with the Consultant's job number and project name clearly indicated on the email. Identify each photo with the date and location the photograph was taken from within the same email.

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- 2.2.2 Prior to each Field Review, the Contractor shall ensure one set of white prints clearly marked (for Consultant inspection) indicating any changes and deviations from Contract Documents, including any work by change orders and job instructions plus:
 - .1 Alterations to ductwork, piping, mechanical equipment and associated work.
 - .2 Inverts of services at key points within building, entering and leaving building and at property line. Dimension to services in relation structure and building, entering and leaving building grid lines for buried services, manholes, catch basins and outside shutoff valves.
 - .3 Locations of concealed piping, conduit and equipment such as fire dampers, cleanouts, service valves and access doors.
- 2.2.3 If the marked up white prints are not available for inspection, 5% of the Progress Payment is automatically deducted.
- 2.2.4 Before substantial Performance, turn marked up white prints over to Consultant. Allow \$3,500.00 for Consultant to transfer site changes to AutoCAD files and provide two sets of white prints marked "Record Drawings" and electronic AutoCAD files on a CD ROM disk to the Agency.

2.3 Access Doors

- 2.3.1 Acceptance Products
 - .1 Zurn
 - .2 Wade
 - .3 Acudor
 - .4 Can-Aqua
 - .5 Milcor
 - .6 Maxam
 - .7 Van-Met
 - .8 Titus
- 2.3.2 Supply flush mounted access doors, for installation in ceilings and walls, to permit servicing of mechanical equipment and accessories, inspection of life safety or operating devices, and where specifically indicated. Also see Drawings and Schedules for Titus Access grilles.
- 2.3.3 Unless otherwise noted, access doors shall be minimum: 18" x 18" for body entry, 12" x 12" for hand entry, 8" x 8" for cleanout access. Access doors in building surfaces shall be at least as large as duct access panels accessed through them and shall be oversized when necessary. Size to suit masonry modules when located in masonry wall.
- 2.3.4 Locate access doors so concealed items are readily accessible for adjustment, operation and maintenance. Locate in service and storage areas wherever possible. Do not locate in paneled, feature or special finish walls, without prior approval of Consultant.

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- 2.3.5 Access doors in fire separations of 3/4 hour rating and higher, and firewalls shall have compatible fire rating and ULC label with tamper-proof latch and be self closing.
- 2.3.6 Minimum Requirements:
 - .1 180° door swing, mitered rounded safety corners flush welded, concealed hinges, screwdriver latches, and anchor straps or lugs to suit construction, steel prime coated.
 - .2 Plaster or wet wall construction: 14 gauge bonderized steel flush with wall or ceiling type with concealed flange.
 - .1 Acceptable Product
 - .1 Acudor PS-5030
 - .3 Masonry or drywall construction
 - .1 16 gauge for 16" x 16" and smaller
 - .2 14 gauge for 18" x 18" and larger bonderized steel face of wall type with exposed flange.
 - .3 Acceptable Product
 - 1. Acudor UF-5000.
 - .4 Tile, ceramic tile, marble, terrazzo, plaster or wet wall construction in washrooms and other special areas
 - .1 14 gauge stainless steel flush with wall or ceiling with concealed flange.
 - .2 Acceptable Product
 - .1 Acudor PS-5030 stainless.
 - .5 Acoustical tile ceiling and similar block materials
 - .1 14 gauge bonderized steel recessed ceiling type.
 - .1 Acceptable Product
 - 1. Acudor AP-5010 or AT-5020.
 - .6 Feature wall construction
 - .1 Recessed wall type selected to complement and conform with architectural module, treatment, or paneling, size shall conform to adjacent finished areas.

3. EXECUTION

3.1 Concealment

- 3.1.1 Conceal piping, ductwork and conduit in partitions, walls, crawlspaces and ceiling spaces, unless otherwise noted.
- 3.1.2 Do not install piping and conduit in outside walls or roof slabs unless specifically indicated. When required, install them inside the building insulation.

3.2 Access

- 3.2.1 Install work to be readily accessible for adjustment, operation and maintenance. Furnish access doors where required in building surfaces for installation by building trades.

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- 3.2.2 Provide 3/4" diameter brass/aluminum/stainless steel number tags or "Allflex" plastic tags with type or service and valve number stamped in black, secured to valve wheel with key chain for all valves. Provide typewritten valve directory giving number, service and location. For valves hidden in suspended ceilings, provide flexible plastic film with permanent pressure-sensitive adhesive type label on the ceiling grid indicating location of valves. Include in Maintenance Manuals and under glass, wall mounted, location determined by Consultant.

3.3 Protection of Work

- 3.3.1 Protect equipment and materials, stored or in place, from weather, moisture, dust and physical damage.
- 3.3.2 Mask machine surfaced finishes and edges. Secure covers over equipment openings and open ends of piping, ductwork and conduits, as installation progresses.
- 3.3.3 Equipment having operating parts bearing on machined surfaces, showing signs of rusting, pitting or physical damage will be rejected.
- 3.3.4 Refinish damaged or marred factory finish.
- 3.3.5 Air systems shall have temporary air filters installed before fans are operated. Install new air filters before system acceptance.

3.4 Cutting, Patching, Digging, Canning and Coring

- 3.4.1 Lay out cutting, patching, digging, canning and coring required to accommodate mechanical services. Coordinate with other Divisions.
- 3.4.2 Refer to Structural drawings for permissible locations of openings and permissible opening sizes in concrete floors and walls. Openings through Structural members shall not be made without approval of Consultant.
- 3.4.3 Be responsible for correct location and sizing of openings required under Mechanical, including pipe sleeves and duct openings. Allow oversized openings for fire dampers and pipe penetrations where insulation is specified.
- 3.4.4 Verify location of existing service runs and steel reinforcing within existing concrete floor and walls prior to core drilling and/or cutting. Cost of repairs to existing services and structural components damaged as a result of core drilling and cutting will not be considered.

3.5 Fastening to Building Structure

- 3.5.1 General
 - .1 Do not use inserts in base material with compressive strength less than 2,000 psi Inserts shall have factor of safety of 4.
- 3.5.2 Types
 - .1 Cast-in-place type
 - .1 Channel type - Burndy, Canadian Strut, Unistrut, Cantruss or Hilti Channel

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- .2 Wedge type galvanized steel concrete insert, Grinnell Fig. 281 for up to 8" pipe size
 - .3 Universal type malleable iron body insert, Grinnell Fig. 282 for up to 8" pipe size
 - .4 Screw concrete insert, Grinnell Fig. 152 for up to 12" pipe size
 - .2 Drilled, mechanical expansion type
 - .1 Hilti HSL or UCAN LHL heavy duty anchor for using in concrete with compressive strength not less than 2840 psi.
 - .2 Hilti Kwik-Bolt or UCAN WED stud anchor for concrete (do not use in seismic restraint applications).
 - .3 Hilti HDI or UCAN IPA drop-in anchor for concrete.
 - .4 Hilti or UCAN Sleeve Anchor (medium and light duty) for concrete and masonry.
 - .5 Hilti ZBP or UCAN Zamac pin bolt (light duty) for concrete and masonry
 - .3 Drilled, adhesive type:
 - .1 Hilti HVA or UCAN Adhesive Anchor consisting of anchor rod assembly with a capsule containing a two-component adhesive, resin and hardener.
 - .2 Hilti HY150 consisting of anchor rod with a two part adhesive system.
 - .3 For use in concrete housekeeping bases (in vertical downward position) where distance to edge of concrete base could cause weakness if mechanical expansion type anchor were used.
 - .4 Rod assemblies shall extend minimum 2" into concrete slab below housekeeping bases.
- 3.5.3 Installation:
- .1 Drilling for inserts shall be performed using appropriate tool specifically designed for insert. Diameter and depth of each drilled hole shall be exact dimensions as specified by insert Manufacturer.
 - .2 Refer to Manufacturer's recommendations for tightening torques to be applied to inserts.
 - .3 Where specifically called for, drills shall include a dust vacuum system, Hilti SAV Dust Vacuum System.

3.6 Service Penetrations in Rated Fire Separations

- 3.6.1 Piping, tubing, ducts, wiring, conduits, etc. passing through rated fire separations shall be smoke and fire proofed with ULC approved materials in accordance with CAN4-S115-M85 and ASTM E814 standards and which meet requirements of Building Code in effect. This includes new services, which pass through existing rated

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separations, and also existing services, which pass through new rated separation or existing separations whose rating, have been upgraded.

- 3.6.2 Fire resistance rating of installed firestopping assembly shall not be less than fire resistance rating of surrounded assembly indicated on Architectural drawings.
- 3.6.3 Smoke and fire stopping shall be installed by qualified Contractor who shall submit letter certifying that work is complete and in accordance with this specification.
- 3.6.4 Install fire stopping and smoke seal material and components in accordance with ULC certification and Manufacturer's instructions in formed sleeved or cored penetrations.

3.7 Service Penetrations in Non-Rated Separations

- 3.7.1 Piping, tubing, ducts, wiring, conduits, etc. passing through non-rated fire separations and non-rated walls and floors shall be tightly fitted and sealed on both sides of separation with silicon sealant to prevent passage of smoke and/or transmission of sound.

3.8 Pipe Sleeves

- 3.8.1 Provide pipe sleeves for piping passing through rated walls and floors. Sleeves shall be concentric with pipe.
- 3.8.2 Pipes and ducts passing through fire rated separations that have no fire resistance (non-rated separations) do not require sleeve, but insulation at separation shall be wrapped with 24 gauge thick galvanized sheet steel band for application of flexible caulking compound.
- 3.8.3 Pipe sleeves for floors and interior walls shall be minimum 24 gauge thick galvanized sheet steel with lock seam joints.
- 3.8.4 Pipe sleeves for perimeter walls and foundation walls shall be cast-iron sleeve or Schedule 40 steel pipe with annular fin continuously welded at midpoint and protruding 6" beyond sleeve diameter. Annular fin shall be embedded into centre of wall.
- 3.8.5 Pipe sleeves for wet or wash down floor areas such as washrooms, janitors' rooms, laboratories and mechanical equipment rooms shall be Schedule 40 steel pipe.
- 3.8.6 Except as otherwise noted, pipe sleeves are not required for holes formed or cored in interior concrete walls or floors.
- 3.8.7 Pipe sleeves shall extend 2" above floors in unfinished areas and wet areas and 1/4" above floors in finished areas.
- 3.8.8 Pipe sleeves shall extend 1" on each side of walls in unfinished areas and 1/4" in finished areas.
- 3.8.9 Pipe sleeves shall extend 1" beyond exterior face of building. Caulk with flexible caulking compound.
- 3.8.10 Sleeve Size
 - .1 1/2" clearance all around, between sleeve and pipe or between sleeve and pipe insulation.

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- 3.8.11 Paint exterior surfaces of ferrous sleeves with heavy application of rust inhibiting primer.
- 3.8.12 Packing of Sleeves
 - .1 Where sleeves pass through foundation walls and perimeter walls, space between sleeve and pipe or between sleeve and pipe insulation shall be caulked with waterproof fire retardant nonhardening mastic.
 - .2 Pack future-use sleeves with mineral wool insulation and then seal with ULC approved fire stop sealant for rated fire separations.

3.9 Escutcheons and Plates

- 3.9.1 Provide on pipes passing through finished walls, partitions, floors and ceilings.
- 3.9.2 Plates shall be stamped steel, split type, chrome-plated or stainless steel concealed hinge, complete with springs, suitable for external dimensions of piping insulation. Secure to pipe or finished surface. For pipes passing through suspended ceilings and annulated piping passing through walls, outside diameter shall cover opening or sleeve.
- 3.9.3 Where pipe sleeve extends above finished floor, escutcheons or plates shall clear sleeve extension.

3.10 Equipment Supports

- 3.10.1 Provide stands and supports for equipment and materials supplied.
- 3.10.2 Lay out concrete bases and curbs required under Mechanical.
- 3.10.3 Concrete bases shall be minimum 4" thick, or as noted and shall project at least 6" outside bedplate, unless otherwise directed. Bases and curbs shall be keyed to floor and incorporate reinforcing bars and/or steel mesh. Chamfer edges of bases.
- 3.10.4 Equipment with bedplates shall have metal wedges places under edges of bedplates to raise them 1" above base after levelling. Wedges shall be left permanently in place. Fill space between bedplate and base with non-shrink grout - Embeco or In-Pakt.
- 3.10.5 Construct equipment supports of structural steel or steel pipe. Securely brace. Employ only welded construction. Bolt mounting plates to structure.
- 3.10.6 Support ceiling hung equipment with rod hangers and/or structural steel.

3.11 Equipment Installation

- 3.11.1 Provide unions and flanges to permit equipment maintenance and disassembly and to minimize disturbance to piping and duct systems and without interfering with building structure or other equipment.
- 3.11.2 Provide means of access for servicing equipment including permanently lubricated bearing.
- 3.11.3 Pipe equipment drains to floor drains

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- 3.11.4 Line up equipment, rectangular cleanouts and similar items with building walls wherever possible.

3.12 Mechanical and Electrical Coordination of Responsibilities

- 3.12.1 All starters motor control centres, etc., along with input and output power wiring shall be by the Electrical Contractor. This is with the exception of packaged equipment.
- 3.12.2 Packaged equipment shall have integral starters and only power feeders will be provided. The packaged equipment starters shall be provided by the Mechanical Contractor.
- 3.12.3 Electrical Contractor shall provide all remote disconnect switches.
- 3.12.4 All control wiring (including BAS), except fire alarm, shall be provided by the Mechanical Contractor. This also includes Mechanical 120 volt control wiring.
- 3.12.5 Voltage for motors ½ HP and larger shall be 600 V 3-phase. Anything small than ½ shall be 120 V single phase or 208 V 1 or 3 phase, unless specifically noted otherwise.
- 3.12.6 All multi-speed motors to be consequent pole, permanent split capacitor type.
- 3.12.7 All motors for mechanical equipment shall be by the Mechanical Contractor.
- 3.12.8 No 2-speed double winding motors shall be used.
- 3.12.9 Thermistor protection to be provided on motors 25 HP and larger using approved thermistors as part of the Mechanical Scope of Work.
- 3.12.10 Thermistors will be provided by Mechanical Contractor.
- 3.12.11 Electrical Contractor shall provide manual reset devices for motor starters for thermistor interface (only for starters that are provided by Electrical Contractor).
- 3.12.12 All fire alarm work shall be done by the Electrical Contractor. Electrical Contractor shall provide all relays for interface to control wiring for fan shutdown and fan start-up for air handling units used as part of the smoke control system(s) and any other hard-wired mechanical components connected for fire alarm interlocks.
- 3.12.13 Mechanical Contractor shall provide Transient Voltage Surge Suppressor for all of their microprocessor based equipment, i.e. BAS, etc.
- 3.12.14 Mechanical Contractor shall provide the Electrical Contractor with locations where power circuits are required for mechanical control systems, i.e. BAS panels, etc.
- 3.12.15 Should the Mechanical Contractor change or modify motor sizes from what is reflected on the Bid Documents during any stage of this project, they shall be responsible to cover all associated electrical costs for the changes, such as revised motor starter and feeds etc.

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3.13 Miscellaneous Metal

- 3.13.1 Be responsible for miscellaneous steel work relative to Mechanical, including, but not limited to:
- .1 Support of equipment
 - .2 Hanging, support, anchoring, guiding and relative work as it applies to piping, ductwork, heat exchangers, hot water storage tanks, expansion tanks, fans and mechanical equipment.
 - .3 Access platforms, ladders and catwalks.
 - .4 Pipe anchor and/or support posts.
 - .5 Ceiling ring bolts - secure to structure or steel supports.
- 3.13.2 All steel work shall be primed and undercoat painted ready for finish under Division 9. Refer to drawings for details.

3.14 Flashing

- 3.14.1 Flash and counter flash where mechanical equipment passes through weather or water proofed walls, floors and roofs.
- 3.14.2 Flash, vent and soil pipes projecting 3" minimum above finished roof surface with lead worked 1" minimum into hub, 8" minimum clear on side with minimum 24" x 24" sheet size. For pipes through outside walls turn flange back into wall and caulk.
- 3.14.3 Flash floor drains over finished areas with lead 10" clear on sides with minimum 36" x 36" sheet size. Fasten flashing to drain clamp device.
- 3.14.4 Provide curbs for mechanical roof installations 8" minimum high above roof insulation. Flash and counter flash with galvanized steel, soldered and made waterproof.
- 3.14.5 Provide continuous lead or neoprene safes for built-up mop sinks, and shower stalls located above finished rooms. Solder at joints, flash into floor drains and turn up 6" into walls or to top of curbs and caulk into joints.

3.15 Di-Electric Couplings

- 3.15.1 Provide wherever pipes of dissimilar metals are joined.
- 3.15.2 Provide insulating unions for pipe sizes NPS 2 and under and flanges for pipe sizes over NPS 2.
- 3.15.3 Provide felt or rubber gaskets to prevent dissimilar metals contact.
- 3.15.4 Acceptable Products
- .1 Capital
 - .2 Walter Vallet
 - .3 EPCO

3.16 Lubrication of Equipment

- 3.16.1 Lubricate new equipment prior to operating, except sealed bearings, which shall be checked.
- 3.16.2 Use lubricant recommended by Manufacturer for service.

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- 3.16.3 Extend lubricating connections and sight glasses to outside of housings, where lubricating positions are not readily accessible.
- 3.16.4 Submit check list, showing that operated equipment has been lubricated prior to and during any temporary heating period and demonstration and instruction period.

3.17 Painting

- 3.17.1 Finish painting of piping and ductwork shall be carried out by other trades.
- 3.17.2 Provide factory finish on manufactured items. At completion, touch up damaged surfaces to match original. Do not paint over nameplates.

3.18 Equipment Protection and Clean-Up

- 3.18.1 Protect equipment and material in storage, on site and after installation until final acceptance. Leave factory covers in place. Take special precautions to prevent entry of foreign material into working parts of piping and duct systems.
- 3.18.2 Mechanical equipment stored on site shall be kept in dry, heated and ventilated storage area.
- 3.18.3 Thoroughly clean piping, ducts and equipment of dirt, cuttings and other foreign material.
- 3.18.4 Protect bearings and shafts during installation. Grease shafts and sheaves to prevent corrosion. Supply and install necessary extended nipples for lubrication purposes.
- 3.18.5 Provide, install and maintain 30% efficient temporary filters to return and exhaust air openings from ceiling spaces to prevent air born dust from entering ducts, plenums and coils. Install filters to return air grilles when fans are operated and building is not clean.

3.19 Start-Up

- 3.19.1 Before starting equipment or systems, provide certificate stating plant is ready for start-up and the following conditions have been met.
 - .1 Safety controls installed and fully operational.
 - .2 Qualified personnel available to operate plant.
 - .3 Permanent electrical connections made to equipment.
 - .4 Boiler(s) started up and adjusted by Manufacturer's Representatives.
 - .5 Air filters installed.
 - .6 Pump and fan drives properly aligned by journeyman millwright.
 - .7 Mechanical equipment rooms, including plenums, vacuum cleaned.

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3.20 Turnover Seminar for Operating Staff

- 3.20.1 At completion of project, Mechanical Contractor shall organize and conduct seminars to instruct Agency and Representatives in operation and preventative maintenance of equipment and systems.
- 3.20.2 Detailed information regarding contents, duration and instructors for any particular system is included in Section 01 79 00.13: Commissioning – Demonstration and Training and Section 23 08 10 Commissioning of Mechanical Systems.

END OF SECTION

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1. GENERAL

1.1 Related Requirements

1.2 References

- 1.2.1 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-1.181-99, Ready-Mixed Organic Zinc-Rich Coating.
- 1.2.2 Canadian Standards Association (CSA International)
 - .1 CSA B139-04, Installation Code for Oil Burning Equipment. Operated by Contractor.
- 1.2.3 National Fire Code of Canada (NFCC 2005)

1.3 Action and Informational Submittals

- 1.3.1 Provide submittals in accordance with Section [01 33 00 - Submittal Procedures] and Section [23 05 00 - Common Work Results for HVAC].
- 1.3.2 Product Data:
 - .1 Provide manufacturer's printed product literature, specifications and datasheets for piping and equipment and include product characteristics, performance criteria, physical size, finish and limitations.

1.4 Quality Insurance

- 1.4.1 Welding
 - .1 Welding qualifications in accordance with CSA B51.
 - .2 Use qualified and licensed welders possessing certificate for each procedure performed from Authority Having jurisdiction.
 - .3 Submit welder qualifications to Consultant
 - .4 Each welder to possess identification symbol issued by authority having jurisdiction.
 - .5 Certification of companies for fusion welding of aluminum in accordance with CSA W47.2.
- 1.4.2 Inspectors
 - .1 Inspectors qualified to CSA W178.2
- 1.4.3 Certifications
 - .1 Registration of welding procedures in accordance with CSA B51.
 - .2 Copy of welding procedures available for inspection
 - .3 Safety in welding, cutting and allied processes in accordance with CSA-W117.2.

1.5 Delivery, Storage and Handling

- 1.5.1 Deliver, store and handle materials in accordance with manufacturer's written instructions.
- 1.5.2 Delivery and Acceptance Requirements:

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- .1 Deliver materials to site in original factory packaging, labelled with manufacturer's name, address.
- 1.5.3 Packaging Waste Management: remove for reuse and return by manufacturer of pallets crates padding and packaging materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

2. PRODUCTS

2.1 Material

- 2.1.1 Paint: zinc-rich to CAN/CGSB-1.181.
 - .1 Primers, Paints and in accordance with manufacturer's recommendations for surface conditions.
 - .2 Primer: maximum VOC limit 250 g/L to Standard GS-11 to SCAQMD Rule 1113.
 - .3 Paints: maximum VOC limit 150 g/L to Standard GS-11 to SCAQMD Rule 1113.
- 2.1.2 Sealants: in accordance with Section 07 92 00 - Joint Sealants.
 - .1 Sealants: maximum VOC limit to SCAQMD Rule 1168 to GSES GS-36.
- 2.1.3 Sealants: maximum VOC limit to SCAQMD Rule 1168 to GSES GS-36
- 2.1.4 Adhesives: maximum VOC limit to SCAQMD Rule 1168 to GSES GS-36.
- 2.1.5 Fire Stopping: in accordance with Section 07 84 00 - Fire Stopping.
- 2.1.6 Piping shall comply with the Boiler and Pressure Vessels Act and CSA Standard B51
- 2.1.7 Heating water, chilled water, condenser water, and glycol piping shall be Schedule 40 black steel pipe; stretch reduced continuous weld, ASTM A53

3. EXECUTION

3.1 Application

- 3.1.1 Manufacturer's Instructions: comply with manufacturer's written recommendations, including product technical bulletins, handling, storage and installation instructions, and datasheets.

3.2 Connections to Equipment

- 3.2.1 In accordance with manufacturer's instructions unless otherwise indicated.
- 3.2.2 Use valves and either unions or flanges for isolation and ease of maintenance and assembly.
- 3.2.3 Use double swing joints when equipment mounted on vibration isolation and when piping subject to movement.

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3.3 Clearances

- 3.3.1 Provide clearance around systems, equipment and components for observation of operation, inspection, servicing, maintenance and as recommended by manufacturer and National Fire Code of Canada CSA B139.
- 3.3.2 Provide space for disassembly, removal of equipment and components as recommended by manufacturer CSA B139 as indicated without interrupting operation of other system, equipment, components.

3.4 Drains

- 3.4.1 Install piping with grade in direction of flow except as indicated.
- 3.4.2 Install drain valve at low points in piping systems, at equipment and at section isolating valves.
- 3.4.3 Pipe each drain valve discharge separately to above floor drain.
 - .1 Discharge to be visible.
- 3.4.4 Drain valves: NPS 3/4 gate or globe valves unless indicated otherwise, with hose end male thread, cap and chain.

3.5 Air Vents

- 3.5.1 Install manual air vents to CSA B139 at high points in piping systems.
- 3.5.2 Install isolating valve at each automatic air valve.
- 3.5.3 Install drain piping to approved location and terminate where discharge is visible.
- 3.5.4 On all up-feed coils, radiation, etc. provide a screwdriver operated manual air vent at the high point
- 3.5.5 At all high points of the piping system and at the top of each pipe riser, provide an automatic float air vent complete with isolation valve. Pipe discharge to floor drain or to janitor sink with DN15 (1/2") dia. Tubing

3.6 Dielectric Coupling

- 3.6.1 General: compatible with system, to suit pressure rating of system.
- 3.6.2 Locations: where dissimilar metals are joined.
- 3.6.3 NPS 2 and under: isolating unions or bronze valves.
- 3.6.4 Over NPS 2: isolating flanges.

3.7 Pipework Installation

- 3.7.1 Install pipework to CSA B139.
- 3.7.2 Screwed fittings jointed with Teflon tape.
- 3.7.3 Protect openings against entry of foreign material.
- 3.7.4 Install to isolate equipment and allow removal without interrupting operation of other equipment or systems.
- 3.7.5 Assemble piping using fittings manufactured to ANSI standards.
- 3.7.6 Saddle type branch fittings may be used on mains if branch line is no larger than half size of main.

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- .1 Hole saw (or drill) and ream main to maintain full inside diameter of branch line prior to welding saddle.
- 3.7.7 Install exposed piping, equipment, rectangular cleanouts and similar items parallel or perpendicular to building lines.
- 3.7.8 Install concealed pipework to minimize furring space, maximize headroom, conserve space.
- 3.7.9 Slope piping, except where indicated, in direction of flow for positive drainage and venting.
- 3.7.10 Install, except where indicated, to permit separate thermal insulation of each pipe.
- 3.7.11 Group piping wherever possible and as indicated.
- 3.7.12 Ream pipes, remove scale and other foreign material before assembly.
- 3.7.13 Use eccentric reducers at pipe size changes to ensure positive drainage and venting.
- 3.7.14 Provide for thermal expansion as indicated.
- 3.7.15 Valves:
 - .1 Install in accessible locations.
 - .2 Remove interior parts before soldering.
 - .3 Install with stems above horizontal position unless indicated.
 - .4 Valves accessible for maintenance without removing adjacent piping.
 - .5 Use chain operators on valves NPS 2 1/2 and larger where installed more than 2400 mm above floor in Mechanical Rooms.
 - .6 Provide chain wheel operators and operating chain for all valves located more than 2.1m (7 ft.) above floor or walkway
 - .7 All valves to be of one manufacture and shall have the manufacturer's name and pressure rating clearly marked on the body. Valves to conform to the current requirements of ANSI, ASTM, ASME, and applicable Manufacturer's Standardization Society Specification (MSS).
 - .8 All valves shall have a CRN registration number.
 - .9 Valves shall be the same size as the line in which installed.
 - .10 Valves shall be located in such a manner that the top works, operators, and bonnets may be easily removed.
 - .11 Stems of valves shall be positioned for maximum ease in use, but in no event in a manner causing a hazard, or with stem down.
 - .12 Provide drain valves at all low points of system. Drain valves shall be ball or gate valve with cap and chain.
- 3.7.16 Gate and Butterfly valves
 - .1 Use gate ball or butterfly valves at branch take-offs for isolating purposes except where specified
 - .2 Install butterfly valves on chilled water and related condenser water systems only.

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- .3 Install butterfly valves between weld neck flanges to ensure full compression of liner
- .4 Provide gate and/or butterfly valves:
 - .1 Entering and leaving all equipment and terminal units
 - .2 On all branches
 - .3 As isolation of each floor
 - .4 At the base of all risers
- 3.7.17 Globe Valves
 - .1 Install globe valves in bypass around control valves
 - .2 Provide globe valves:
 - .1 On all bypass systems.
 - .2 Where required for throttling control.
- 3.7.18 Ball Valves
 - .1 Install plug cocks or ball valves for glycol service
 - .2 For pipe sizes DN50 (2") and smaller, ball valves may be substituted for gate and globe valves
- 3.7.19 Check Valves:
 - .1 Install silent check valves on discharge of pumps and in vertical pipes with downward flow and as indicated.
 - .2 Install swing check valves in horizontal lines on discharge of pumps and as indicated.
 - .3 Install check valves on the discharge of multiple equipment
- 3.7.20 Drain Valves
 - .1 Install 20mm ($\frac{3}{4}$ ") dia. drain valves at all down-fed terminal heating and/or cooling units
 - .2 Install 40mm (1- $\frac{1}{2}$ ") dia. or line size valves at low points and other drain points on system
 - .3 Install 40mm (1- $\frac{1}{2}$ ") dia. valves for flushing purposes
 - .4 Provide drain valves at inlet and outlet of all major pieces of equipment including boilers, chillers, heat exchangers and coils for draining and flushing of equipment
- 3.7.21 Circuit Balancing Valves
 - .1 Provide circuit balancing valves as follows:
 - .1 In return branch mains and branch connections to return mains
 - .2 In each return riser
 - .3 In return piping connections to air handling unit heating and cooling coils, fan coil units, heat pump units, reheat coils in air terminal control units, and any other similar equipment
 - .4 Locate balancing valves a minimum of five pipe diameters downstream of any pipping fitting, and a minimum of ten pipe diameters from any pump. Maintain two pipe diameters downstream of any balancing valves free of any fitting.

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- 3.7.22 Provide all necessary expansion joints or loops to control all piping movement without imposing undue stress onto structure, apparatus, or piping systems.
- 3.7.23 Where possible, use loops or swing joints. Where loops or swing joints cannot be used due to space limitations and where shown, provide a manufactured expansion joint in accordance with the manufacturer's instructions, complete with all the necessary anchors and guides.

3.8 Sleeves

- 3.8.1 General: install where pipes pass through masonry, concrete structures, fire rated assemblies, and as indicated.
- 3.8.2 Material: schedule 40 black steel pipe.
- 3.8.3 Construction: use annular fins continuously welded at mid-point at foundation walls and where sleeves extend above finished floors.
- 3.8.4 Sizes: 6 mm minimum clearance between sleeve and uninsulated pipe or between sleeve and insulation.
- 3.8.5 Installation:
 - .1 Concrete, masonry walls, concrete floors on grade: terminate flush with finished surface.
 - .2 Other floors: terminate 25 mm above finished floor.
 - .3 Before installation, paint exposed exterior surfaces with heavy application of zinc-rich paint to CAN/CGSB-1.181.
- 3.8.6 Sealing:
 - .1 Foundation walls and below grade floors: fire retardant, waterproof non-hardening mastic.
 - .2 Elsewhere:
 - .1 Provide space for firestopping.
 - .3 Provide space for firestopping. Sleeves installed for future use: fill with lime plaster or other easily removable filler.
 - .4 Ensure no contact between copper pipe or tube and sleeve.

3.9 Executions

- 3.9.1 Install on pipes passing through walls, partitions, floors, and ceilings in finished areas.
- 3.9.2 Construction: one piece type with set screws.
 - .1 Chrome or nickel plated brass or type 302 stainless steel.
- 3.9.3 Sizes: outside diameter to cover opening or sleeve.
 - .1 Inside diameter to fit around pipe or outside of insulation if so provided
- 3.9.4 Preparation for fire stopping
- 3.9.5 Install firestopping within annular space between pipes, ducts, insulation and adjacent fire separation in accordance with Section 07 84 00 - Fire Stopping.
- 3.9.6 Uninsulated unheated pipes not subject to movement: no special preparation.

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- 3.9.7 Uninsulated heated pipes subject to movement: wrap with non-combustible smooth material to permit pipe movement without damaging fires topping material or installation.
- 3.9.8 Insulated pipes and ducts: ensure integrity of insulation and vapour barriers.

3.10 Flushing Out of Piping Systems

- 3.10.1 Flush system in accordance with Section 23 08 02 - Cleaning and Start-up of Mechanical Piping Systems.
- 3.10.2 Before start-up, clean interior of piping systems in accordance with requirements of Section 01 74 00 - Cleaning supplemented as specified in relevant mechanical sections.
- 3.10.3 Preparatory to acceptance, clean and refurbish equipment and leave in operating condition, including replacement of filters in piping systems.

3.11 Pressure Testing of Equipment and Pipework

- 3.11.1 Advise Agency & Consultant 48 hours minimum prior to performance of pressure tests.
- 3.11.2 Pipework: test as specified in relevant sections of heating, ventilating and air conditioning work.
- 3.11.3 Maintain specified test pressure without loss for 4 hours minimum unless specified for longer period of time in relevant mechanical sections.
- 3.11.4 Prior to tests, isolate equipment and other parts which are not designed to withstand test pressure or media.
- 3.11.5 Conduct tests in presence of Agency & Engineer.
- 3.11.6 Pay costs for repairs or replacement, retesting, and making good. Agency & Engineer to determine whether repair or replacement is appropriate.
- 3.11.7 Insulate or conceal work only after approval and certification of tests by Agency & Engineer.

3.12 Existing Systems

- 3.12.1 Connect into existing piping systems at times approved by Agency & Engineer.
- 3.12.2 Request written approval by Agency & Engineer 10days minimum, prior to commencement of work
- 3.12.3 Be responsible for damage to existing plant by this work.

3.13 Cleaning

- 3.13.1 Clean in accordance with Section 01 74 00 - Cleaning.
 - .1 Remove surplus materials, excess materials, rubbish, tools and equipment.

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- 3.13.2 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 7419 - Construction/Demolition Waste Management and Disposal

END OF SECTION

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Division 23, Specifications, Section 23 05 17, Pipe Welding

1. GENERAL

1.1 Related Requirements

- 1.1.1 Section 23 05 00 Common Work Results
- 1.1.2 Section 23 05 05 Installation of Pipework

1.2 References (Latest Revisions)

- 1.1.3 American National Standards Institute/American Society of Mechanical Engineers (ANSI/ASME)
 - .1 ANSI/ASME B31.1, Power Piping.
 - .2 ANSI/ASME B31.3, Process Piping.
 - .3 ANSI/ASME Boiler and Pressure Vessel Code:
 - .1 BPVC Section I: Power Boilers.
 - .2 BPVC Section V: Nondestructive Examination.
 - .3 BPVC Section IX: Welding and Brazing Qualifications.
- 1.1.4 American National Standards Institute/American Water Works Association (ANSI/AWWA)
 - .1 ANSI/AWWA C206, Field Welding of Steel Water Pipe.
- 1.1.5 American Welding Society (AWS)
 - .1 AWS C1.1M/C1.1, Recommended Practices for Resistance Welding.
 - .2 AWS Z49.1, Safety in Welding, Cutting and Allied Process.
 - .3 AWS W1, Welding Inspection Handbook.
- 1.1.6 Canadian Standards Association (CSA International)
 - .1 CSA W47.2, Certification of Companies for Fusion Welding of Aluminum.
 - .2 CSA W48, Filler Metals and Allied Materials for Metal Arc Welding.
 - .3 CSA B51, Boiler, Pressure Vessel and Pressure Piping Code.
 - .4 CSA-W117.2, Safety in Welding, Cutting and Allied Processes.
 - .5 CSA W178.1, Certification of Welding Inspection Organizations.
 - .6 CSA W178.2, Certification of Welding Inspectors.

1.3 Action and Informational Submittals

- 1.1.7 Provide submittals in accordance with Section [01 33 00 - Submittal Procedures] and Section [23 05 00 - Common Work Results for HVAC].

1.4 Quality Assurance

- 1.1.8 Qualifications:
 - .1 Welders:
 - .1 Welding qualifications in accordance with CSA B51.
 - .2 Use qualified and licensed welders possessing certificate for each procedure performed from authority having jurisdiction.

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- .3 Submit welder's qualifications to Consultant.
- .4 Each welder to possess identification symbol issued by authority having jurisdiction.
- .5 Certification of companies for fusion welding of aluminum in accordance with CSA W47.2.
- .2 Inspectors:
 - .1 Inspectors qualified to CSA W178.2.
- .3 Certifications:
 - .1 Registration of welding procedures in accordance with CSA B51.
 - .2 Copy of welding procedures available for inspection.
 - .3 Safety in welding, cutting and allied processes in accordance with CSA-W117.2.

1.5 Delivery, Storage and Handling Units

- 1.1.9 Deliver, store and handle in accordance with Section 23 05 00 Common Work Results.
- 1.1.10 Deliver materials to site in original factory packaging, labelled with manufacturer's name, address.

2. PRODUCTS

2.1 Electrodes

- 1.1.11 Electrodes: in accordance with CSA W48 Series.

3. EXECUTION

3.1 Application

- 1.1.12 Manufacturer's Instructions: comply with manufacturer's written recommendations, including product technical bulletins, handling, storage and installation instructions, and datasheets.

3.2 Quality of Work

- 1.1.13 Welding: in accordance with ANSI/ASME B31.1 and B31.3, ANSI/ASME Boiler and Pressure Vessel Code, Sections I and IX and ANSI/AWWA C206, using procedures conforming to AWS B3.0, AWS C1.1.

3.3 Installation Requirements

- 1.1.14 Identify each weld with welder's identification symbol.
- 1.1.15 Backing rings:
 - .1 Where used, fit to minimize gaps between ring and pipe bore.
 - .2 Do not install at orifice flanges.
- 1.1.16 Fittings:
 - .1 NPS 2 and smaller: install welding type sockets.
 - .2 Branch connections: install welding tees or forged branch outlet fittings.

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- 1.1.17 Ensure that pipe welding is done by a welder holding a certificate from the Department of Labour for the class of piping to be welded
- 1.1.18 When welding or cutting with a torch, take every precaution to prevent fire. Ensure that welding or torch cutting operators have a fully charged 4.5kg (10 lb.) carbon dioxide fire extinguisher with them, when welding or cutting in building, or tunnels. Protect wooden structures with asbestos blanket

3.4 Inspection and Tests-General Requirements

- 1.1.19 Review weld quality requirements and defect limits of applicable codes and standards with Consultant before work is started.
- 1.1.20 Formulate "Inspection and Test Plan" in co-operation with Consultant.
- 1.1.21 Do not conceal welds until they have been inspected, tested and approved by inspector.
- 1.1.22 Provide for inspector to visually inspect welds during early stages of welding procedures in accordance with Welding Inspection Handbook. Repair or replace defects as required by codes and as specified.

3.5 Specialist Examinations and Tests

- 1.1.23 General:
 - .1 Perform examinations and tests by specialist qualified to CSA W178.1 and CSA W178.2 and approved by Consultant.
 - .2 To ANSI/ASME Boiler and Pressure Vessels Code, Section V, CSA B51 and requirements of authority having jurisdiction.
 - .3 Inspect and test 10 % of welds in accordance with "Inspection and Test Plan" by non-destructive visual examination.
- 1.1.24 Hydrostatically test welds to ANSI/ASME B31.1.
- 1.1.25 Visual examinations: include entire circumference of weld externally and wherever possible internally.
- 1.1.26 Failure of visual examinations:
 - .1 Upon failure of welds by visual examination, perform additional testing as directed by Consultant of total of up to 10% of welds, selected at random by Consultant by radiographic tests.

3.6 Defects Causing Rejection

- 1.1.27 As described in ANSI/ASME B31.1 and ANSI/ASME Boiler and Pressure Vessels Code.
- 1.1.28 In addition, chilled water systems below 1,000 kPa:
 - .1 Undercutting greater than 0.8 mm adjacent to cover bead on outside of pipe.
 - .2 Undercutting greater than 0.8 mm adjacent to root bead on inside of pipe.

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- .3 Undercutting greater than 0.8 mm at combination of internal surface and external surface.
- .4 Incomplete penetration and incomplete fusion greater than total length of 38 mm in 1500 mm length of weld depth of such defects being greater than [0.8] mm.
- .5 Repair cracks and defects in excess of 0.8 mm in depth.
- .6 Repair defects whose depth cannot be determined accurately on basis of visual examination tests.

3.7 Repair of Welds which failed Tests

- 1.1.29 Re-inspect and re-test repaired or re-worked welds at Contractor's expense

3.8 Cleaning

- 1.1.30 Clean in accordance with Section 01 74 00 - Cleaning.

END OF SECTION

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Division 23, Specifications, Section 23 05 29, Hangers & Supports for HVAC Piping & Equipment

1. GENERAL

1.1 Related Work

- 1.1.1 This Specification Section forms part of the Contract Documents and is to be read, interpreted and coordinated with other parts.
- 1.1.2 Refer to Section 23 05 49 for seismic restraint of piping.

1.2 General

- 1.2.1 Provide hangers and supports to secure equipment in place, prevent vibration, protect against damage from earthquake, maintain grade, provide for expansion and contraction and accommodate insulation.
- 1.2.2 Provide insulation protection saddles on insulated piping.
- 1.2.3 Fabricate hangers, supports and sway braces in accordance with ANSI B31.1 and MSS-SP58.
- 1.2.4 Set inserts in position in advance of concrete work. Use grid system in equipment rooms.
- 1.2.5 Support from top of structural members. Where structural bearings do not exist or inserts are not in suitable locations, suspend hangers from steel channels or angles. Provide supplementary structural members, as necessary.
- 1.2.6 Do not suspend from metal deck.
- 1.2.7 Hangers for copper pipe shall be copper plated or plastic dipped unless pipe hangers bear on piping insulation (cold services).
- 1.2.8 All exterior roof mounted wire braces and supports/anchors/fittings shall be of aircraft grade stainless steel, with minimum cable size of 0.15" diameter.

2. PRODUCTS

2.1 Upper Attachments

- 2.1.1 Concrete
 - .1 Inserts for cast-in-place concrete: galvanized steel wedge. ULC listed for pipe NPS 3/4 through NPS 8 - Grinnell/Anvil Fig. 281.
 - .2 Carbon steel plate with clevis for surface mount: malleable iron socket with expansion case and bolt. Minimum two expansion cases and bolts for each hanger - Grinnell/Anvil, plate fig. 49, socket fig. 290, expansion case fig. 117.
 - .3 Drilled concrete insert shall be Hilti Model HSL or HVA.
 - .1 Acceptable Products
 - .1 Hubbard Enterprises Holdrite #121LD, #125, #205
 - .4 Inserts shall be ICBO approved.
- 2.1.2 Steel Beam (Bottom Flange)
 - .1 Cold piping NPS 2 and under: malleable iron C clamp - Grinnell/Anvil fig. 61
- 2.1.3 ***Cold piping NPS 2-1/2 and larger and hot piping: malleable iron beam clamp - Grinnell/Anvil fig. 292, Holdrite #280, Holdrite #261***

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- 2.1.4 Steel Beam (Top)
 - .1 Cold piping NPS 2 and under: malleable iron "top of beam" C clamp - Grinnell/Anvil fig. 61
 - .2 Cold piping NPS 2-1/2 and larger and hot piping: steel jaw, hook rod with nut, spring washer and plain washer - Grinnell/Anvil fig. 227, Holdrite #261
- 2.1.5 Steel Joist (Top Chord)
 - .1 Cold piping NPS 2 and under: steel washer plate with double locking nuts - Grinnell/Anvil fig. 60
 - .2 Cold piping NPS 2-1/2 and larger and hot piping: steel washer plates with double locking nut, carbon steel clevis and malleable iron socker - Grinnell/Anvil: washer plate fig. 60, clevis fig 66., socket fig. 290, Holdrite #261 or #115 with #271 Silencer
- 2.1.6 Steel Channel or Angle (Bottom)
 - .1 Cold piping NPS 2 and under: malleable iron C clamp - Grinnell/Anvil fig. 86
 - .2 Cold piping NPS 2-1/2 and larger and hot piping: universal channel clamp - Grinnell/Anvil fig. 226
- 2.1.7 Steel Channel or Angle (Top)
 - .1 Cold piping NPS 2 and under: malleable iron "top of beam" C clamp - Grinnell/Anvil fig. 61.
 - .2 Cold piping NPS 2-1/2 and larger and hot piping: steel jaw, hook rod with nut, spring washer and plain washer - Grinnell/Anvil fig. 227.
- 2.2 **Middle Attachments (Rod)**
 - 2.2.1 Carbon steel black (electro-galvanized/cadmium plated for mechanical rooms) continuous threaded rod - Grinnell/Anvil fig 146 or Myatt fig. 434.
- 2.3 **Pipe Attachments**
 - 2.3.1 Cold piping, steel or cast-iron: hot piping steel, with less than 1" horizontal movement; hot piping, steel, with more than 12" middle attachment (rod) length: adjustable clevis - Grinnell/Anvil fig. 260.
 - 2.3.2 Cold copper piping: hot copper piping with less than 1" horizontal movement; hot copper piping with more than 12" middle attachment (rod) length: adjustable clevis copper plated - Grinnell/Anvil fig. CT65.
 - 2.3.3 Suspended hot piping, steel and copper, with horizontal movement in excess of 1"; hot steel piping with middle attachment (rod) 12" or less pipe roller - Grinnell/Anvil fig. 174 or Grinnell/Anvil fig. 181 up to NPS 6 and Grinnell/Anvil fig. 171 NPS 8 and larger.
 - 2.3.4 Bottom supported hot piping, steel and copper: pipe roller stand - Grinnell/Anvil fig. 271.

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- 2.3.5 Spring hangers: where required to offset expansion on horizontal runs which follow long vertical risers - Grinnell/Anvil fig. 171 single pipe roll hanger with Grinnell/Anvil fig 178.

2.4 Riser Clamps

- 2.4.1 Steel or cast-iron pipe: galvanized carbon steel - Grinnell Anvil fig. 261 or Myatt fig. 182.
- 2.4.2 Copper pipe: carbon steel copper finished - Grinnell/Anvil fig. CT-121.
- 2.4.3 Isolated Clamp – Holdrite #273 with 10 gauge bearing plates and pads.

2.5 Saddles and Shields

- 2.5.1 Cold piping NPS 2 and under: protection shield with pipe insulation under shield with uninterrupted vapour barrier - Kingspan “K Block” - high density insulation.
- 2.5.2 Cold piping NPS 2-1/2 and over: protection shield with high density insulation under shield with uninterrupted vapour barrier - Kingspan “K Block” high density insulation.
- 2.5.3 Hot piping NPS 3 and under: insulation over pipe hanger, Holdrite #270 Isolation Hanger.
- 2.5.4 Hot piping NPS 4 and over: protective saddle with insulation under saddle - Grinnell/Anvil fig. 160 to 166, Holdrite #71 Isolation Hanger.

2.6 Wall Supports

- 2.6.1 Horizontal pipe adjacent to wall
 - .1 Angle iron wall brackets with specific hangers
 - .1 Acceptable Products
 - .1 Holdrite #261, #280, #255 and #285
- 2.6.2 Vertical pipe adjacent to wall
 - .1 Exposed pipe wall support for lateral movement restraint - Grinnell/Anvil fig. 262 or 263
 - .2 Channel type support - Burndy, Canadian Strut, Cantruss or Unistrut (arrangement to be acceptable to BC Boiler Inspection Department).

2.7 Floor Supports

- 2.7.1 Horizontal Pipe
 - .1 Do not support piping from the floor unless specifically indicated
- 2.7.2 Vertical Pipe
- 2.7.3 Mid-point of risers between floor slabs - adjustable fabricated steel supports. Refer to Section 23 05 49 Seismic Restraints.

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3. EXECUTION

3.1 Hanger Spacing

- 3.1.1 Spacing and middle attachment (rod) diameter as specified in paragraphs below or as in table below, whichever is more stringent.
- .1 Plumbing piping
 - .1 Most stringent requirements of the Plumbing Code or Authority Having Jurisdiction
 - .2 Fire protection
 - .1 To applicable fire code; toggle hangers are unacceptable
 - .3 Gas Piping
 - .1 Refer to Gas Code CAN/CGA-B149.1
 - .4 Flexible joint roll groove pipe
 - .1 In accordance with table below, but not less than one hanger at joints
 - .5 Within 12" of each horizontal elbow, tee, joints, etc.
- 3.1.2 **Maximum hanger spacing table:**

Pipe Size: NPS	Rod Diameter (inches)	Maximum Spacing (ft²)	
		Steel Pipe	Copper Pipe
1/2	3/8	6'-0"	5'-0"
3/4, 1	3/8	8'-0"	6'-0"
1 1/4, 1 1/2	3/8	10'-0"	6'-0"
2	3/8	10'-0"	10'-0"
2 1/2, 3, 4	1/2	10'-0"	10'-0"
5, 6, 8	5/8	10'-0"	
10, 12	7/8	10'-0"	

3.2 Hanger Installation

- 3.2.1 Offset hanger so that rod is vertical in operating position.
- 3.2.2 Adjust hangers to equalize load.
- 3.2.3 Install hanger to provide minimum 1/2" clear space between finished covering and adjacent work.
- 3.2.4 Support vertical piping at every other floor.
- 3.2.5 Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.
- 3.2.6 Where practical, support risers piping independently of connected horizontal piping.
- 3.2.7 Install plastic inserts between steel studs and piping.
- 3.2.8 For beam clamps, extend hanger rod tight to underside of beam with top bolt and washer.

3.3 Inserts

- 3.3.1 User inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams wherever practical.
- 3.3.2 Set inserts in position in advance of concrete work. Provide reinforcement rod in concrete for inserts carrying piping over 4" or ducts over 60" wide.

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- 3.3.3 Where concrete slabs form finished ceiling, finish inserts, flush with slab surface.
- 3.3.4 Where inserts are omitted, drill through concrete slab from below and provide rod with recessed square plate and nut above slab, in concealed locations.
- 3.3.5 Provide test mock up for review.
- 3.3.6 Provide inserts above chillers, pumps and sump pumps to permit equipment servicing. Provide an eyebolt.
- 3.3.7 Inserts shall be installed in accordance with Manufacturer's recommendations and in no case closer than 7'-0" apart.

END OF SECTION

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Division 23, Specifications, Section 23 05 93, Testing, Adjusting and Balancing

1. GENERAL

1.1 Related Work

- 1.1.1 This Specification Section forms part of the Contract Documents and is to be read, interpreted and coordinated with other parts.

1.2 Work Included

- 1.2.1 Adjust and balance air systems.
- 1.2.2 Perform acoustic measurements.

1.3 Intent

- 1.3.1 Perform work as an integral part of contract.

1.4 Subtrade

- 1.4.1 An NEBB or AABC certified balancing contractor/firm shall be retained to perform all balancing work as outlined in the contract

1.5 Procedures

1.5.1 General

- .1 Before TAB, review with Consultant methods and instruments to be used. Include descriptive data, procedure data and sample forms.
 - .1 Descriptive Data
 - .1 Review design concepts and general function of each system including associated equipment and operation cycles including BAS Systems sequence of operations
 - .2 Confirm listing of flow and terminal measurements to be performed and selection points for proposed sound measurements
 - .2 Procedure Data
 - .1 Outline procedures for taking test measurements to establish compliance with requirements. Specify type of instrument to be used, method of instrument application (by sketch) and correction factors
 - .3 Data sheets required as a minimum are as follows
 - .1 Exhaust Fan Test Sheet
 - .2 Louvre and motorized damper Test Sheet
 - .3 Generator inlet/outlet Test Sheet
 - .4 Covering comments sheet detailing systems balanced setpoints
 - .5 Note: All test sheets shall include a Column detailing achieved results as a % of design.

1.6 Cooperation

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- 1.6.1 TAB firm shall check and report defects or deficiencies that may affect balancing.
- 1.6.2 Mechanical Contractor shall cooperate with balancing firm to
 - .1 Provide sufficient time before final completion date so that TAB can be accomplished
 - .2 Provide labour and tools to make corrections without delay
 - .3 Place heating ventilating and air conditioning systems and equipment into full operation and continue operation
 - .4 Advise TAB firm of changes made to system during construction
 - .5 Install required test holes complete with removable and replaceable plugs
 - .6 Make necessary revisions to controls, dampers, and fan drives and consult with equipment Manufacturers as required to achieve specified systems performance
 - .7 Supply and install dampers as shown and where required to obtain final system balance
 - .8 Provide ladders scaffolds, tools and labour to assist work of balancing firm, including removing ceiling tiles and guards and adjusting pulleys and belts, replace when finished
 - .9 Control and/or equipment Manufacturer shall work with balancing firm when setting damper linkages and minimum outside air dampers. They shall be available for readjusting of dampers of controls improperly calibrated
 - .10 Set pressure regulating valves to operating and code conditions
 - .11 Check and set relief and safety valves to code requirements
 - .12 Clean strainers. Provide clean air filter immediately before air balancing
 - .13 Change variable pitch pulley supplied on 15 hp motors and larger to fixed pulleys after air balance. Provide pulleys
 - .14 Provide drive changes required to suit final balance

1.7 Tests

- 1.7.1 Do not externally insulate or conceal work until tested and approved. Follow construction schedule and arrange for tests.
- 1.7.2 Arrange for Agency's Representative to be present.
- 1.7.3 Bear costs including retesting and making good.
- 1.7.4 Prior to tests, isolate equipment or other parts which are not designed to withstand test pressures.

2. PRODUCTS

2.1 Instruments

- 2.1.1 Instruments for TAB of air and hydronic systems shall have been calibrated within six months and verified for accuracy before start of work.

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- 2.1.2 Submit list of equipment to be used for balancing and calibration certificates for each instrument listed.

3. EXECUTION

3.1 General Procedures

- 3.1.1 TAB to maximum flow deviation from specified values of 10% at terminal devices and -0% +5% at equipment or mean sound level deviation of 20 dB. Provide air balancing volumes and settings for all air supply, exhaust and return air ducts and terminals regardless of whether a special air volume tag has been noted on the drawing.
- 3.1.2 Permanently mark setting on valves, splitters, dampers and other adjustment devices.
- 3.1.3 Take measurements to verify system TAB has not been disrupted or such disruption has been rectified.
- 3.1.4 At final field review, recheck random selections of data recorded in report. Recheck points or areas as selected and witnessed by Agency.
- 3.1.5 At completion, allow minimum two days for Consultant to witness test procedures and conduct tests for each system.
- 3.1.6 When building is occupied before completion, continue execution of work outside occupied hours.

3.2 Site Visits

- 3.2.1 Schedule total of 2 site visits to complete TAB work.
- 3.2.2 Review of installation shall be made at scheduled visit and any additional dampers or valves required for proper balance shall be reviewed with Consultant and Contractors.
- 3.2.3 Allow for four visits to site to adjust systems for seasonal changes during warranty.

3.3 Acceptance

- 3.3.1 Mechanical systems shall not be considered ready for final field review until TAB results are acceptable to Consultant.
- 3.3.2 If found that specified flows cannot be achieved on portions of system, actual conditions shall be reported to Consultant for consideration of correctable action before continuing TAB procedure.
- 3.3.3 If measured flow at final field review shows deviation of 10% at terminal devices, 5 per cent at equipment or more or mean sound level deviation of 10 dB or more from certified report listing, by more than 10% of selected areas, report shall be rejected.
- 3.3.4 If report rejected, systems shall be re-balanced and certified report submitted at no extra cost.

3.4 TAB Report

- 3.4.1 Submit draft copies of reports before final acceptance of project. Provide three copies of final report for inclusion in Operating and Maintenance Manuals. Submit one digital copy in PDF to Consultant.

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- 3.4.2 Submit with report, fan curves with operating conditions plotted.
- 3.4.3 Report shall be indexed as follows:
 - .1 Section One
 - .1 Instrumentation and Measurement Procedures
 - .2 Section Two
 - .1 System Data (Designed, Installed and Recorded), test sheet to be systems sequential. Each system should include the following test sheets
 - .1 System Schematic
 - .2 Maintain equipment test sheets
 - .3 System distribution (inlet / outlets / valves) test sheets
 - .4 Profile pressure test sheets
 - .5 Comments sheet noting system setpoints

3.5 Air System Procedures

- 3.5.1 Adjust duct and terminal balance dampers and adjust or change drive sheaves to balance supply, return and exhaust air systems to provide design air qualities (within $\pm 10\%$) at each outlet and inlet and maintain design relationship between outdoor and exhaust air system quantities.
- 3.5.2 Submit report to the Consultant indicating final fan rpm, motor operating amperages, system static pressure and final air quantities obtained.
- 3.5.3 Air systems shall be balanced at total 105 % to 110% of specified total airflow rates.
- 3.5.4 Execute air systems balancing for each air system in accordance with AABC and NEBB specifications and as describer herein.
- 3.5.5 Make tests with supply, return and exhaust systems operating and doors and windows closed or in normal operation condition.
- 3.5.6 Test and adjust blower rpm to design requirements.
- 3.5.7 Test and record motor full load amps.
- 3.5.8 Test and record required and measured system static pressures, and fan total static pressure.
- 3.5.9 Control and/or equipment Manufacturer shall set adjustments of automatically operated dampers to operate as indicated in cooperation with balancing firm.
- 3.5.10 Use volume control devices to regulate air quantities only to extent that adjustments do not create objectionable air motion or sound levels. Effect volume control by duct internal devices such as dampers and splitters.
- 3.5.11 Vary total system airflow rates by adjustments of fan speeds. Vary branch air quantities by damper regulation.
- 3.5.12 Record installed fan drive assemblies, fan sheaves, motor sheaves and belts.
- 3.5.13 Record each installed motor Manufacturer.

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3.6 TAB Data

- 3.6.1 TAB and equipment data shall be listed in Metric Units.
- 3.6.2 Duct Air Quantities – Generator Ductwork, Outside Air and Exhausts (Minimum and Maximum)
 - .1 Number of pressure readings
 - .2 Sum of velocity measurement
 - .3 Average velocity (m/s)
 - .4 Duct recorded airflow rate (l/s)
 - .5 Duct design airflow rate (l/s)
- 3.6.3 Air Inlets and Outlets:
 - .1 Outlet identification, location and designation
 - .2 Application factors
 - .3 Design and recorded airflow rates (l/s)

END OF SECTION

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Division 23, Specifications, Section 23 07 13, Mechanical Insulation

1. GENERAL

1.1 Application

- 1.1.1 This Section specifies insulation requirements that are common to mechanical work Sections of the Specification and it is a supplement to each Section and is to be read accordingly.

1.2 Submittals

- 1.2.1 Product Data Sheets: Submit a product data sheet for each insulation system product.
- 1.2.2 Removable/Reusable Insulation Covers: Submit a fabrication drawing for each custom made cover to indicate material and fabrication details, and a 300 mm (12") square sample of the proposed cover material.
- 1.2.3 Lagging Adhesive Colour Samples: Submit a colour chart for coloured lagging adhesive for canvas jacketed insulation.

1.3 Quality Assurance

- 1.3.1 Mechanical insulation is to be applied by a licensed journeyman insulation mechanic, or by an apprentice under direct, daily, on-site supervision of a journeyman mechanic.
- 1.3.2 Do not apply insulation unless leakage tests have been satisfactorily completed.
- 1.3.3 Ensure that all surfaces to be insulated are clean and dry.
- 1.3.4 Ensure that the ambient temperature is minimum 13°C (55°F) for at least one day prior to the application of insulation, and for the duration of insulation work, and that relative humidity is and will be at a level such that mildew will not form on insulation materials.
- 1.3.5 The company with the sub-contract for mechanical insulation work is to be a member in good standing of the Thermal Insulation Association of Canada.
- 1.3.6 All insulation materials must be stored on site in a proper and dry storage area. Any wet insulation material is to be removed from the site.

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Division 23, Specifications, Section 23 07 13, Mechanical Insulation

1.4 Definitions

1.4.1 For the work of this Section:

- .1 "concealed" means mechanical services and equipment above suspended ceilings, in non-accessible chases, in accessible pipe spaces, and furred-in spaces;
- .2 "exposed" means exposed to normal view during normal conditions and operations;
- .3 "mineral fibre" includes glass fibre, rock wool, and slag wool;
- .4 "domestic water" or "potable water" means all piping extended from the building Municipal supply main.

2. PRODUCTS

2.1 Fire Hazard Ratings

2.1.1 Unless otherwise specified, all insulation system materials inside the building must have a fire hazard rating of not more than 25 for flame spread and 50 for smoke developed when tested in accordance with CAN/ULC-S102, Surface Burning Characteristics of Building Materials and Assemblies.

2.2 Thermal Performance

2.2.1 Unless otherwise specified, thermal performance of insulation is to meet or exceed the values given in Tables 6.8.2.A, 6.8.2.B, 6.8.3.A and 6.8.3.B of ASHRAE/IES Standard 90.1-2013.

2.3 Equipment Insulation Materials

2.3.1 **Blanket Mineral Fibre:** Blanket type roll form insulation to ASTM Standard C553-00, 24 kg/m³ (1½ lb./ft.³) density, with a factory applied vapour barrier facing. Acceptable products are:

- .1 Johns Manville Inc. Microlite FSK Duct Wrap Type 150;
- .2 Knauf Fiber Glass Blanket Insulation FSK Duct Wrap Type III;
- .3 Manson Insulation Inc. ALLEY WRAP FSK Duct Wrap Type III;
- .4 Certainteed Corporation Softtouch FSK Duct Wrap Type 150.

2.3.2 **Semi-Rigid Mineral Fibre Board:** Roll form, moulded insulation to ASTM Standard C1393-00a, with a factory applied vapour barrier facing consisting of laminated aluminum foil and kraft paper. Acceptable products are:

- .1 Knauf Fiber Glass Pipe and Tank Insulation;
- .2 Manson Insulation Inc. "AK FLEX";
- .3 Johns Manville Inc. Pipe and Tank Insulation "Micro-Flex";
- .4 Multi-Glass Insulation Ltd. "MULTI-FLEX MF";
- .5 Owens Corning Pipe and Tank Insulation;
- .6 Glass-Cell Fabricators Ltd. "R-Flex".

2.4 Ductwork System Insulation Materials

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- 2.4.1 **Rigid Mineral Fibre Board:** Preformed board type insulation to ASTM C612-00a, 48 kg/m³ (3.0 lb./ft.³) density, with a factory applied reinforced aluminum foil and kraft paper facing. Acceptable products are:
- .1 Knauf Fiber Glass Insulation Board with FSK facing;
 - .2 Manson Insulation Inc. "AK BOARD FSK";
 - .3 Johns Manville Inc. Type 814 "Spin-Glas";
 - .4 Owens Corning 703.
- 2.4.2 **Semi-Rigid Mineral Fibre Board:** Roll form insulation to ASTM Standard C1393 00a, consisting of cut strips of rigid mineral board insulation glued to an aluminium foil and kraft paper facing. Acceptable products are:
- .1 Multi-Glass Insulation Ltd. "Multi-Flex MKF";
 - .2 Glass-Cell Fabricators Ltd. "R-FLEX";
 - .3 Owens Corning Pipe and Tank Insulation;
 - .4 Johns Manville Inc. Pipe and Tank Insulation.
- 2.4.3 **Blanket Mineral Fibre:** Blanket type roll form insulation to ASTM Standard C553-00, 24 kg/m³ (1½ lb./ft.³) density, 40 mm (1½") thick, with a factory applied vapour barrier facing. Acceptable products are:
- .1 Johns Manville Inc. Microlite FSK Duct Wrap Type 150;
 - .2 Knauf Fiber Glass Blanket Insulation FSK Duct Wrap Type III;
 - .3 Manson Insulation Inc. ALLEY WRAP FSK Duct Wrap Type III;
 - .4 Certainteed Corporation Softtouch FSK Duct Wrap Type 150.
- 2.4.4 **Flexible Foam Elastomeric Sheet - Indoor:** Sheet form, CFC free, closed cell, self-adhering elastomeric nitrile rubber insulation with a water vapour permeability rating of 0.08 in accordance with ASTM E96 Procedure A. Acceptable products are:
- .1 Armacell "AP/Armaflex SA";
 - .2 IK Insulation Group "K-Flex Duct Wrap", S2S.
- 2.4.5 **Flexible Foam Elastomeric Sheet - Outdoor.** Sheet form, CFC free, closed cell, self-adhering elastomeric nitrile rubber insulation with a water vapour permeability rating of zero in accordance with ASTM C 534, Type II. with 17.5 mils laminated covering, UV resistance. Acceptable products are:
- .1 Armacell "ArmaTuff SA" or equivalent.

2.5 Insulating Coatings

- 2.5.1 Equal to Robson Thermal Manufacturing Ltd. insulating coatings as follows:
- .1 anti-condensation coating, "No Sweat-FX";
 - .2 thermal insulating coating, "ThermaLite".

2.6 Insulation Fastenings

- 2.6.1 Wire: Minimum #15 gauge galvanized annealed wire.

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- 2.6.2 Wire Mesh: Minimum #15 gauge galvanized annealed wire factory woven into 25 mm (1") hexagonal mesh.
- 2.6.3 Aluminium Banding: Equal to ITW Insulation Systems Canada "FABSTRAPS" minimum 12 mm (½") wide, 0.6 mm (1/16") thick aluminium strapping.
- 2.6.4 Stainless Steel Banding: Equal to ITW Insulation Systems Canada "FABSTAPS" 0.6 mm (1/16") thick, minimum 12 mm (½") wide type 304 stainless steel strapping.
- 2.6.5 Duct Insulation Fasteners: Weld-on 2 mm (3/32") diameter zinc coated steel spindles of suitable length, complete with minimum 40 mm (1½") square plastic or zinc plated steel self-locking washers.
- 2.6.6 Tape Sealant: Equal to MACtac Canada Ltd. self-adhesive insulation tapes, types PAF, FSK, ASJ, or SWV as required to match the surface being sealed.
- 2.6.7 Adhesive - Mineral Fibre Insulation: Clear, pressure sensitive, brush consistency adhesive, suitable for a temperature range of -20°C to 82°C (-4°F to 180°F), compatible with the type of material to be secured, and WHMIS classified as non-hazardous.
- 2.6.8 Adhesive – Flexible Elastomeric Insulation: Armacell "Armaflex" #520 air-drying contact adhesive.
- 2.6.9 Lagging Adhesive: White, brush consistency, ULC listed and labeled, 25/50 fire/smoke rated lagging adhesive for canvas jacket fabric, suitable for color tinting, complete with fungicide and washable when dry.
- 2.6.10 Sheet Metal Screws: No. 10 stainless steel sheet metal screws.

2.7 Insulation Jackets and Finishes

- 2.7.1 White PVC: Roll form sheet and fitting covers, minimum 15 mil thick white PVC, 25/50 rated, complete with installation and sealing accessories. Acceptable products are:
 - .1 Proto Corp. "LoSMOKE";
 - .2 The Sure-Fit System "SMOKE-LESS 25/50";
 - .3 Johns Manville Inc. "Zeston" 300.
- 2.7.2 Rigid Aluminium: Where the ductwork/pipework are exposed to outside, the insulation shall have rigid aluminum jackets. Equal to ITW Insulation Systems Canada "Lock-on" 0.406 mm (0.016") thick embossed aluminum jacket material to ASTM B209 and ASTM C1729, factory cut to size and complete with polysurlyn moisture barrier and continuous modified Pittsburgh Z-Lock, and "Fabstraps" and butt straps with weatherproof the end to end joints. Fittings are to be two-piece epoxy coated pressed aluminum with weather locking edges.
- 2.7.3 Stainless Steel: Equal to ITW Insulation Systems Canada "Lock-on" 0.254 mm (0.010") thick type 304 embossed stainless steel to ASTM A240, factory cut to size and complete with moisture barrier and continuous modified Pittsburgh Z-Lock, and butt straps with

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"Fabstraps" to cover end to end joints. Fittings are to be two pieces pressed stainless steel with weather locking edges.

- 2.7.4 Adhesive Backed Flexible Aluminium: MFM Building Products Corp. "Flex-Clad 400" roll form sheet material with an aggressive rubberized asphalt adhesive backing, high- density polyethylene reinforcement, and an embossed aluminum facing.

- 2.7.5 Protective Coating - Flexible Foam Elastomeric Insulation: Equal to Armacell "WB Armaflex" weatherproof, water-based latex enamel finish.

3. EXECUTION

3.1 General Insulation Application Requirements

- 3.1.1 Unless otherwise specified, do not insulate the following:

- .1 factory insulated equipment and piping;
- .2 manufactured expansion joints and flexible connections;
- .3 acoustically lined ductwork and/or equipment;
- .4 flexible branch ductwork from sheet metal ducts to grilles or diffusers;
- .5 piping unions, except for unions in "cold" category piping.

- 3.1.2 Install insulation directly over pipes and ducts and not over hangers and supports.

- 3.1.3 Install duct insulation continuous through walls, partitions, and similar surfaces except at fire dampers.

- 3.1.4 Where existing insulation work is damaged as a result of a new mechanical work, repair the damaged insulation work to new work standards.

- 3.1.5 Carefully and neatly gouge out insulation for proper fit where there is interference between weld bead, mechanical joints, etc., and insulation. Bevel away from studs and nuts to permit their removal without damage to insulation, and closely and neatly trim around extending parts of pipe saddles.

- 3.1.6 Where thermometers, gauges, and similar instruments occur in insulated piping, and where access to heat transfer piping balancing valve ports and similar items are required, create a neat, properly sized hole in the insulation and provide a suitable grommet in the opening.

3.2 Equipment Insulation Requirements - Blanket Type Mineral Fibre

- 3.2.1 Insulate the following equipment with mineral fibre blanket type insulation of the thickness indicated:

- .1 domestic cold water pump casings – 40 mm (1½") thick;

- 3.2.2 Unless otherwise noted, wrap the equipment to a thickness and insulating value equal to an equivalent thickness of rigid sectional

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pipe insulation. Laminate the insulation in place with a full coverage of adhesive and secure with wire. Apply a jacket of the insulation vapour barrier material secured in place with adhesive or sealant tape.

- 3.2.3 Lay the fibreglass blanket on radiant ceiling panels after testing is complete.

3.3 Equipment Insulation Requirements - Semi-Rigid Mineral Fibre

- 3.3.1 Insulate the following equipment with semi-rigid mineral fibre board insulation of thickness indicated:

- .1 uninsulated domestic hot water storage tank(s) – 40 mm (1½") thick;
- .2 flash tanks – 40 mm (1½") thick;
- .3 heating main air separator – 40 mm (1½") thick;

- 3.3.2 Install the insulation as required to fit the shape and contour of the equipment. Secure the insulation in place with adhesive, and with aluminum straps on 450 mm (18") centres. Apply a 6 mm (¼") thick skim coat of insulating cement, then, when the insulating cement has dried, apply a 6 mm (¼") thick coat of cement trowelled smooth.

- 3.3.3 For "cold" equipment, prime the insulation with suitable sealer and apply a jacket of glass thread reinforced foil and kraft paper vapour barrier jacket material laminated in place with a full coverage of adhesive.

- 3.3.4 Provide removable and replaceable insulated metal covers for all equipment with removable heads to permit the heads to be removed and replaced without damaging the adjacent insulation work.

3.4 Ductwork Insulation Requirements - Mineral Fibre

- 3.4.1 Insulate the following ductwork systems inside the building and above ground with mineral fibre insulation of the thickness indicated:

- .1 all outside air intake ductwork, casings and plenums from fresh air intakes to and including mixing plenums or sections, or, if mixing plenums or sections are not provided, to the first heating coil, or if both mixing plenums or sections and heating coil sections are not provided, and the fresh air is not tempered, then the fresh air ductwork system complete – minimum 40 mm (1½") thick as required;
- .2 mixed supply air or preheated supply air casings, plenums and sections to and including the fan section where not factory insulated – minimum 25 mm (1") thick rigid board or minimum 40 mm (1½") thick flexible blanket as required;
- .3 supply air ductwork outward from fans, except for supply ductwork exposed in the area it serves – minimum 25 mm

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- (1") thick rigid board or minimum 40 mm (1½") thick flexible blanket as required;
- .4 exhaust discharge ductwork for a distance of 3 m (10') downstream (back) from exhaust openings to atmosphere, including any exhaust plenums within the 3 m (10') distance – minimum 25 mm (1") thick rigid board or minimum 40 mm (1½") thick flexible blanket as required;
- .5 any other ductwork, casings, plenums or sections specified or detailed on the drawings to be insulated – thickness as specified.
- 3.4.2 Insulation for casings, plenums, and exposed rectangular ductwork is to be rigid board type. Insulation for round ductwork and concealed rectangular ductwork is to be blanket type.
- 3.4.3 **Exposed Rectangular Ducts and/or Casings:** Liberally apply adhesive to all surfaces of the duct and/or casing. Accurately and neatly press the insulation into the adhesive with tightly fitted butt joints. Provide pin and washer insulation fasteners at 300 mm (12") centres on bottom and side surfaces. Secure and seal all joints with 75 mm (3") wide tape sealant. Additional installation requirements are as follows:
- .1 at trapeze hanger locations install insulation between the duct and the hanger;
- .2 provide drywall type metal corner beads on edges of ductwork, casings and plenums in equipment rooms, service corridors, and any other area where the insulation is subject to accidental damage, and secure in place with tapesalant.
- 3.4.4 **Concealed Rectangular or Oval Ductwork:** Liberally apply adhesive to all surfaces of the duct, and wrap the insulation around the duct with a top butt joint and tight section to section butt joints. Provide pin and washer insulation fasteners at 300 mm (12") centres on bottom surfaces. Secure and seal all joints with 75 mm (3") tape sealant. Additional installation requirements are as follows:
- .1 at each trapeze type duct hanger provide a 100 mm (4") wide full length piece of rigid mineral fibre board insulation between the duct and the hanger.
- 3.4.5 **Exposed & Concealed Round or Oval Ductwork:** Accurately cut sections of insulation to fit tightly and completely around the duct. Liberally apply adhesive to all surfaces of the duct, and wrap the insulation around the duct with a top butt joint and tight section to section butt joints. Seal all joints with tape sealant. At duct hanger locations install the insulation between the duct and hanger. At each hanger location for concealed ductwork where flexible blanket insulation is used, provide a 100 mm (4") wide full circumference strip of semi-rigid board type duct insulation between the duct and the hanger.

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3.4.6 **Common Duct Insulation Requirements:** Insulation application requirements common to all types of rigid ductwork are as follows:

- .1 at duct connection flanges insulate the flanges with neatly cut strips of the rigid insulation material secured with adhesive to side surfaces of the flange with a top strip to cover the exposed edges of the side strips, then butt the flat surface duct insulation up tight to the flange insulation, or, alternatively, increase the insulation thickness to the depth of the flange and cover the top of the flanges with tape sealant;
- .2 the installation of fastener pins and washers is to be concurrent with the duct insulation application;
- .3 cut insulation fastener pins almost flush to the washer and cover with neatly cut pieces of tape sealant;
- .4 accurately and neatly cut and fit insulation at duct accessories such as damper operators (with standoff mounting) and pitot tube access covers;
- .5 prior to concealment of insulation by either construction finishes or canvas jacket material, patch all vapour barrier damage by means of tape sealant.

3.5 Ductwork Insulation Requirements - Flexible Elastomeric

- 3.5.1 Insulate all exposed exterior ductwork (except fresh air intake ductwork) and associated plenums and/or casings outside the building with minimum 40 mm (1½") thick flexible elastomeric sheet insulation as required, applied in two minimum 20 mm (¾") thick layers with staggered tightly butted joints.
- 3.5.2 Install with adhesive in strict accordance with the manufacturer's published instructions to produce a weather-proof installation. Ensure that sheet metal work joints are sealed watertight prior to applying insulation.

3.6 Application of Insulating Coatings

- 3.6.1 Apply, in accordance with the manufacturer's instruction, insulating coatings to the following bare metal surfaces:
- .1 paint all bare metal surfaces clear of "cold" piping and/or equipment insulation for a distance of from 300 mm (12") to 600 mm (24") clear of the pipe or equipment insulation, with "No Sweat-FX" anti-condensation coating;
 - .2 paint all bare metal surfaces associated with mechanical systems with an operating temperature 60°C (140°F) with "ThermaLite" insulating coating.
- 3.6.2 Apply coatings with a brush. Remove any splatter or excess coating from adjacent surfaces.

3.7 Insulation Finish Requirements

- 3.7.1 **Canvas:** Unless otherwise shown and/or specified, jacket all exposed mineral fibre insulation, and calcium silicate duct insulation

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work inside the building with canvas secured in place with a full 100% covering coat of lagging adhesive. Accurately cut canvas with scissors or a knife. Do not rip or tear canvas to size. Remove lagging adhesive splatter from adjacent uninsulated surfaces.

- 3.7.2 **Rigid Aluminium.** Jacket exposed duct/pipe insulation work outside the building with rigid aluminum jacket, secured in place with a full 100% covering coat of lagging adhesive. Cover tightly in place with overlapped circumferential and longitudinal joints arranged to shed water. Seal all joints to produce a neat water-tight installation. Provide slip-type expansion joints where required by manufacturer's instructions.

END OF SECTION

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1. GENERAL

1.1 Summary

- 1.1.1 The purpose of this section is to specify the Divisions 23 contractor's responsibilities in the commissioning process.
- 1.1.2 CES Engineering Ltd. – Commissioning Authority: CES Engineering Ltd. inhouse commissioning department, distinct from the design team will be responsible to manage and administrate the commissioning process on this project.
- 1.1.3 The list of commissioned equipment and systems is found in Section 01 91 13 General Commissioning Requirements. Commissioning requires the participation of contractor to ensure that all systems are operating in a manner consistent with the Contract Documents. The general commissioning requirements and coordination are detailed in the same section.
- 1.1.4 Contractors shall be familiar with all parts of Section 01 91 13 General Commissioning Requirements and the Commissioning Plan issued by the CA and shall execute all commissioning responsibilities assigned to them in the Contract Documents.

1.2 Responsibilities

- 1.2.1 The responsibilities of the Project Manager, Construction manager, Architect, Mechanical and Electrical Consultants/Engineers (A/E), and Commissioning Authority in the commissioning process are provided in Section 01 91 13 Commissioning General Requirements.
- 1.2.2 This section defines the generally expected division of responsibilities between the trades responsible for delivering Divisions 22, and 23 work in its entirety, together with related work in the overall project. These responsibilities may be adjusted as required by the Contractor.
- 1.2.3 Mechanical Controls and TAB Contractors:
 - .1 Construction and Acceptance Phase:
 - .1 Include the cost of participating in the commissioning process as outlined in the specifications in the total contract price.
 - .2 In each purchase order or subcontract written, include requirements for submittal data, commissioning documentation, O&M data and training.
 - .3 Attend a commissioning scoping meeting and other meetings necessary to facilitate the Cx process.
 - .4 Contractors shall provide the CA with normal cut sheets and shop drawing submittals of commissioned equipment.
 - .5 Provide additional requested documentation, prior to normal O&M manual submittals, to the CA for development of start-up and functional testing procedures.

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- .1 Typically this will include detailed manufacturer installation and start-up, operating, troubleshooting and maintenance procedures, full details of any Agency-contracted tests, fan and pump curves, full factory testing reports, if any, and full warranty information, including all responsibilities of the Agency to keep the warranty in force clearly identified.
- .2 In addition, the installation, start-up and checkout materials that are actually shipped inside the equipment and the actual field checkout sheet forms to be used by the factory or field technicians shall be submitted to the CA.
- .3 The CA may request further documentation necessary for the commissioning process.
- .4 This data request may be made prior to normal submittals.
- .6 Provide a copy of the O&M manuals and submittals of commissioned equipment, through normal channels, to the CA for review and approval.
- .7 During construction, maintain as-built red-line drawings for all drawings and final CAD as-builts for contractor-generated coordination drawings. Update after completion of commissioning (excluding deferred testing). Prepare red-line as-built drawings for all drawings and final as-builts for contractor-generated coordination drawings.
- .8 Contractors shall assist (along with the design engineers) in clarifying the operation and control of commissioned equipment in areas where the specifications, control drawings or equipment documentation is not sufficient for writing detailed testing procedures.
- .9 Provide assistance to the CA in preparing the specific functional performance test procedures as specified in Section 01 91 13 and in this section. Subs shall review test procedures to ensure feasibility, safety and equipment protection and provide necessary written alarm limits to be used during the tests.
- .10 Develop a full start-up and initial checkout plan using manufacturer's start-up procedures and the pre-functional checklists from the CA for all commissioned equipment.
- .11 Submit manufacturer's detailed start-up procedures and the full start-up plan to CA for review and approval prior to startup. Refer to the Commissioning Plan and this section for further details on start-up plan preparation.

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- .12 Be proactive in seeing that commissioning processes are executed and that the CA have the scheduling information needed to efficiently execute the commissioning process.
- .13 During the startup and initial checkout process, execute the mechanically related portions of the pre-functional checklists for all commissioned equipment.
- .14 Perform and clearly document all completed startup and system operational checkout procedures, providing a copy to the CA.
- .15 Address current A/E punch list items before scheduling functional testing. Air and water TAB shall be completed with discrepancies and problems remedied before functional testing of the respective air- or water- related systems.
- .16 Provide skilled technicians to execute starting of equipment and to execute the functional performance tests. Ensure that they are available and present during the agreed upon schedules and for sufficient duration to complete the necessary tests, adjustments and problem-solving.
- .17 Perform functional performance testing under the direction of the CA for specified equipment in Section 01 91 13.
- .18 Assist the CA in interpreting system monitoring data, as necessary.
- .19 Correct deficiencies (differences between specified and observed performance) as interpreted by the CA, CM and A/E and retest the equipment.
- .20 Prepare O&M manuals according to the Contract Documents, including clarifying and updating the original sequences of operation to as-built conditions.
- .21 Provide training of the Agency's operating staff using expert qualified personnel, as specified.
- .22 Coordinate with equipment manufacturers to determine specific requirements to maintain the validity of the warranty.
- .2 Warranty Phase
 - .1 Execute seasonal, deferred or post occupancy functional performance testing, witnessed by the CA, according to the specifications.
 - .2 Correct deficiencies and make necessary adjustments to O&M manuals and as-built drawings for applicable issues identified in any seasonal testing.

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- 1.2.4 Mechanical Contractor: The responsibilities of the mechanical contractor, during construction and acceptance phases in addition to those listed in 1.2.3 are:
- .1 Provide startup for all HVAC equipment, except for the building automation control system.
 - .2 Assist and cooperate with the TAB contractor:
 - .1 Putting all HVAC equipment and systems into operation and continuing the operation during each working day of TAB and commissioning, as required.
 - .2 Providing temperature and pressure taps according to the Construction Documents for TAB and commissioning testing.
 - .3 List and clearly identify on the as-built drawings the locations of all air-flow stations.
 - .3 Prepare a preliminary schedule for Division 22, and 23 piping system(s) testing, flushing and cleaning, equipment start-up and TAB start and completion for use by the CA. Update the schedule as appropriate.
 - .4 Notify the CM or CA depending on protocol, when pipe and duct system testing, flushing, cleaning, startup of each piece of equipment and TAB will occur.
 - .5 Be responsible to notify the CM or CA ahead of time, when commissioning activities not yet performed or not yet scheduled will delay construction.
- 1.2.5 Controls Contractor (Division 25): The responsibilities of the controls contractor, during construction and acceptance phases in addition to those listed in 1.2.3 are:
- .1 Sequences of Operation Submittals
 - .1 The Controls Contractor's submittals of control drawings shall include complete detailed sequences of operation for each piece of equipment, regardless of the completeness and clarity of the sequences in the specifications. They shall include:
 - .1 An overview narrative of the system (1 or 2 paragraphs) generally describing its purpose, components and function.
 - .2 All interactions and interlocks with other systems.
 - .3 Detailed delineation of control between any packaged controls and the building automation system, listing what points the EMCS monitors only and what EMCS points are control points and are adjustable.
 - .4 Written sequences of control for packaged controlled equipment. (Equipment manufacturers' stock sequences may be

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- included, but will generally require additional narrative).
- .5 Start-up sequences.
- .6 Warm-up mode sequences.
- .7 Normal operating mode sequences.
- .8 Unoccupied mode sequences.
- .9 Shutdown sequences.
- .10 Capacity control sequences and equipment staging.
- .11 Temperature and pressure control: setbacks, setups, resets, etc.
- .12 Detailed sequences for all control strategies, e.g., economizer control, optimum start/stop, staging, optimization, demand limiting, etc.
- .13 Effects of power or equipment failure with all standby component functions.
- .14 Sequences for all alarms and emergency shut downs.
- .15 Seasonal operational differences and recommendations.
- .16 Initial and recommended values for all adjustable settings, set-points and parameters that are typically set or adjusted by operating staff; and any other control settings or fixed values, delays, etc. that will be useful during testing and operating the equipment.
- .17 Schedules, if known.
- .18 To facilitate referencing in testing procedures, all sequences shall be written in small statements, each with a number for reference. For a given system, numbers will not repeat for different sequence sections, unless the sections are numbered.
- .2 Control Drawings Submittal
 - .1 The control drawings shall have a key to all abbreviations.
 - .2 The control drawings shall contain graphic schematic depictions of the systems and each component.
 - .3 The schematics will include the system and component layout of any equipment that the control system monitors, enables or controls, even if the equipment is primarily controlled by packaged or integral controls.
 - .4 Provide a full points list.
 - .5 The Controls Contractor shall keep the CA informed of all changes to this list during programming and setup.
- .3 As-Built Documentation

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- .1 An updated as-built version of the control drawings and sequences of operation shall be included in the final controls O&M manual submittal and shall include any system tuning and/or sequence of operation modifications established during functional testing.
- .4 Required Assistance to TAB: Assist and cooperate with the TAB contractor in the following:
 - .1 Meet with the TAB contractor prior to beginning TAB and review the TAB plan to determine the capabilities of the control system toward completing TAB.
 - .2 Provide the TAB any needed unique instruments for setting terminal unit boxes and instruct TAB in their use (handheld control system interface for use around the building during TAB, etc.).
 - .3 For a given area, have all required pre-functional checklists, calibrations, startup and selected functional tests of the system completed and approved by the CA prior to TAB.
 - .4 Provide a qualified technician to operate the controls to assist the TAB contractor in performing TAB, or provide sufficient training for TAB to operate the system without assistance.
- .5 Required Assistance to CA: Assist and cooperate with the CA in the following manner:
 - .1 Using a skilled technician who is familiar with this building, execute the functional testing of the controls system as specified for the controls contractor in this section and in Section 25 08 00.
 - .2 Assist in the functional testing of all equipment specified in Section 01 91 13 and this section.
 - .3 Provide two-way radios during the functional testing.
 - .4 Execute all control system trend logs specified in Division 25.
- .6 Written Agenda
 - .1 The controls contractor shall prepare a written plan indicating in a step-by-step manner, the procedures that will be followed to test, checkout and adjust the control system prior to functional performance testing, according to the process in Section 01 91 13 and this section.
 - .2 At minimum, the plan shall include each type of equipment controlled by the automatic controls.
- .7 Checkout Certification
 - .1 Provide a signed and dated certification to the CA, and CM upon completion of the checkout of each controlled device, equipment and system prior to functional

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- testing for each piece of equipment or system, that all system programming is complete as to all respects of the Contract Documents, except functional testing requirements.
- .8 Additional Control Points
- .1 Beyond the control points necessary to execute all documented control sequences, provide monitoring, control and virtual points as specified in Division 25.
- .2 List and clearly identify on the as-built duct and piping drawings the locations of all static and differential pressure sensors (air, water and building pressure).
- 1.2.6 TAB Contractor: The duties of the TAB contractor, in addition to those listed in 1.2.3 are:
- .1 Submit the outline of the TAB plan and approach for each system and component to the CA, CM and the controls contractor four weeks prior to starting the TAB. This plan will be developed after the TAB has some familiarity with the control system. The submitted plan will include:
- .1 Certification that the TAB contractor has reviewed the construction documents and the systems with the design engineers and contractors to sufficiently understand the design intent for each system.
- .2 An explanation of the intended use of the building control system. The controls contractor will comment on feasibility of the plan.
- .3 All field checkout sheets and logs to be used that list each piece of equipment to be tested, adjusted and balanced with the data cells to be gathered for each.
- .4 Discussion of what notations and markings will be made on the piping drawings during the process.
- .5 Copies of the final test report forms to be used.
- .6 Detailed step-by-step procedures for TAB work for each system and issue: terminal flow calibration (for each terminal type), diffuser proportioning, branch / submain proportioning, total flow calculations, rechecking, diversity issues, expected problems and solutions, etc. Criteria for using air flow straighteners or relocating flow stations and sensors will be discussed. Provide the analogous explanations for the hydronic side.
- .7 List of all water flow, system capacity and efficiency measurements to be performed and a description of specific test procedures, parameters, formulas to be used.
- .8 Details of how total flow will be determined (pump curves, circuit setter, flow station, ultrasonic, etc.).

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- .9 The identification and types of measurement instruments to be used and their most recent calibration date.
- .10 Specific procedures that will ensure that water side is operating at the lowest possible pressures and provide methods to verify this.
- .11 Details of methods for making any specified coil or other system plant capacity measurements.
- .12 Details of any TAB work to be done in phases (by floor, etc.), or of areas to be built out later.
- .13 Details regarding specified deferred or seasonal TAB work.
- .14 Details of any specified false loading of systems to complete TAB work.
- .15 Plan for hand-written field technician logs of discrepancies, deficient or uncompleted work by others, contract interpretation requests and lists of completed tests (scope and frequency).
- .16 Plan for formal progress reports (scope and frequency).
- .17 Plan for formal deficiency reports (scope, frequency and distribution).
- .2 A running log of events and issues shall be kept by the TAB field technicians.
- .1 Submit hand-written reports of discrepancies, deficient or uncompleted work by others, contract interpretation requests and lists of completed tests to the CA and CM at least twice a week.
- .3 Communicate in writing to the controls contractor all setpoint and parameter changes made or problems and discrepancies identified during TAB which affect the control system setup and operation.
- .4 Provide a draft TAB report to the CA within two weeks of completion including a full explanation of the methodology, assumptions and the results in a clear format with designations of all abbreviations.
- .5 Provide the CA with any requested data, gathered, but not shown on the draft reports.
- .6 Provide a final TAB report for the CA with details, as in the draft.
- .7 Conduct functional performance tests and audit checks on the original TAB as specified for TAB in Section 23 05 93.

2. PRODUCTS

2.1 Test Equipment

- 2.1.1 Contractor shall provide all test equipment necessary to fulfill the testing requirements of this section.

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2.1.2 Contractors shall submit a list of equipment to be used and copies of latest equipment calibration certificates to the Commissioning Authority and Consultant for approval.

- .1 The equipment to be provided shall include, but is not limited to:
 - .1 pressure measurements: manometers, pressure gauges, digital pressure readers, pressure trending devices;
 - .2 temperature measurements: thermometers, digital thermometers, thermocouples, temperature trending devices;
 - .3 rotative speed: tachometer;
 - .4 sound measurement: electronic sound level meter for acoustic measurement with octave band analysis;
 - .5 vibration measurement: accelerometer;
 - .6 electrical measurements: voltmeter, ammeter and wattmeter
 - .7 Any other equipment specified by the manufacturer to perform required testing and verification.

2.1.3 Refer to Section 01 91 13 for additional requirements

2.2 Test Equipment Calibration

2.2.1 All equipment shall be calibrated and carry current certification in accordance with the manufacturer's instructions.

2.2.2 A copy of test equipment specifications and calibration certificates must be included in a dedicated submittal for each division.

3. EXECUTION

3.1 Submittals

3.1.1 Contractor shall provide submittal documentation relative to commissioning as required in Part 1 of this section, 01 91 13 Commissioning - General Requirements, and the Commissioning Plan.

3.1.2 The following are required submissions as outlined in this specification. Additional technical submittals shall be provided as requested at the initial commissioning meetings and dependent on the technical scope of the project.

3.2 Pre-Startup

3.2.1 Carry out any Factory Acceptance Tests and off-site pre-commissioning as otherwise directed by the technical specifications of Divisions 21, 22, and 23.

3.3 Start-up, Pre-functional Checklists and Initial Checkout

3.3.1 General

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- .1 The sub-contract trades shall follow the start-up and initial checkout procedures listed in this section, in 01 91 13 and in Divisions 22 and 23.
 - .2 The Contractor has start-up responsibility and is required to complete systems and sub-systems so they are fully functional, meeting the design objectives of the Contract Documents.
 - .3 The following system start-up procedures are presented as a minimum standard of acceptance to validate the commissioning of the identified systems. Requirements listed in the mechanical consultant's specification sections may differ from the requirements listed below. The most onerous requirements shall be carried by the contractor in all cases.
- 3.3.2 Phase 1 - System and Equipment Readiness
- .1 Before starting up any systems or equipment, provide written verification stating that the specific system or item of equipment is ready for starting and the following conditions have been met:
 - .1 Copies of all tests and certificates have been submitted to the Consultant and/or CA.
 - .2 All safety controls have been installed, wired, dry tested, and are fully operational.
 - .3 The permanent electrical wiring connections have been made to all equipment and that power is available.
 - .4 Qualified operating personnel are available and ready to operate the equipment.
 - .5 All systems have been checked and are physically complete and ready to operate, including all wiring and controls.
 - .6 Correct operation of all equipment and machinery, correct fan rotation, pump rotation, etc. has been confirmed.
 - .7 All equipment lubrication and pre-start checks have been carried out.
 - .8 Proper overload protection has been provided for all motors, controls, and control circuits.
 - .9 All systems have been checked for pressure and leakage
 - .10 All vibration isolators and seismic restraints have been checked, adjusted, and shimmed as necessary
 - .11 All control and alarm functions have been checked and are operational.
 - .12 Any self-diagnostic packaged control systems have been checked and are operational.
 - .13 Strainers, traps, filters, etc. have been cleaned out. All strainers and traps shall be tagged with the date of inspection and cleaning noted.

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- .2 All deficiencies shall be recorded and reviewed by the commissioning team, and shall be corrected and verified prior to proceeding to the next Commissioning Phase.
- .3 When all the above has been completed in a satisfactory manner the contractors may proceed to Phase 2 – System Activation, Testing and Balancing.
- 3.3.3 Phase 2 - System Activation, Testing and Balancing: This phase shall include, but not necessarily be limited to the following:
 - .1 Mechanical Systems - General
 - .1 Activation of all systems, sub-systems, and equipment.
 - .2 Check out operation of all equipment and machinery. Check rotational direction of all moving equipment.
 - .3 Check for any abnormal equipment vibration and noise. Determine cause and rectify.
 - .4 Complete all system identification, labels, nameplates, pipe identification, colour coding, flow arrows, sprinkler signs, hydraulic data plates, etc.
 - .5 Adjust vibration isolators and seismic restraints as required.
 - .6 Clean out all strainers, traps, filters, etc. All strainers and traps shall be tagged with the date of inspection and cleaning noted.
 - .7 All deficiencies shall be recorded and reviewed by the commissioning team, and shall be corrected and verified prior to proceeding further.
 - .8 If, in the opinion of the Consultant and/or CA, field operations and testing indicates that any item of equipment or machinery does not meet the specifications, the Agency may request that testing of the equipment in question be carried out by an independent testing laboratory or testing agency. In the event that the tested equipment or machinery proves to meet the specification, the Agency shall pay for the independent lab testing. If the equipment or machinery does not meet the specification the Contractor will be responsible to pay the costs of all testing and the costs of all alterations to the equipment or machinery to bring it up to specifications, any subsequent testing, or the complete cost of replacing the equipment or machinery with new equipment or machinery that meets the specifications.
 - .2 HVAC Systems:
 - .1 Provide the services of a factory authorized representative for the start-up of all major and/or specialty equipment, including but not limited to the

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following. Provide a written report on forms provided by manufacturer.

- .1 Gas Detection System
- .2 Testing and adjusting of all systems and equipment.
 - .1 Balancing of all air systems and locking all balance dampers.
 - .2 Set and adjust all air grilles, registers, and diffusers for proper throw and distribution and optimum comfort.
 - .3 Set up all constant volume and variable volume fans. Adjust drives or change drive or driven sheaves as required.
 - .4 Plug all air pressure and flow measurement holes in ducts and plenums.
 - .5 Verify and certify that all fire dampers are operational and accessible for maintenance. Ensure that fusible links are correct rating for the location and duty and that they are readily accessible for replacement.
 - .6 Verification of water tightness of all roof and exterior wall penetrations.
 - .7 Verification and certification of fire-stopping and sealing of all HVAC, Plumbing, and Sprinkler penetrations through all rated and non-rated fire separations and sound separations.
 - .8 Verification that all coil drain pans are clear and functional.
 - .9 Fit all air filters with new filter media and provide spare filter media as specified.
 - .10 All problems revealed by the Balancing Agency shall be rectified, fan speeds shall be altered as required, and drive and driven sheaves shall be replaced as necessary. The Contractor shall be prepared to provide labour and material to replace drives and driven sheaves if required to properly balance fan systems at no additional cost to the contract.
 - .11 System operations in the fire mode shall be tested in the presence of the authorities having jurisdiction. Obtain a written statement/certificate of approval of all operations.
 - .12 System operations in the emergency power mode shall be tested in coordination with Division 26. Obtain a written statement/certificate of approval of all operations.

3.3.4 Control Systems

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- .1 The Building Controls Systems shall be fully tested and commissioned by manufacturer's technician to operate in the manner defined by the specifications.
- .2 A point-to-point testing shall be done by EMCS Contractor. This test shall include, but is not limited to:
 - .1 Ensuring that wiring is accurately connected to appropriate terminals;
 - .2 Check and verify that each input point is reporting to the Building Automation and Controls Systems panels and workstations in the normal state and change or state
 - .3 Checking the function of each control and controlled device (such as the beginning, end and extent of actuator travel);
 - .4 Connection integrity between actuator and device;
 - .5 Calibration of sensors;
 - .6 Output from sensors;
 - .7 Operation of relays;
 - .8 Data/information integrity at console;
 - .9 Remote reset integrity from console to field device;
 - .10 Interfacing with other systems such as life safety monitoring system.
 - .11 EMCS contractor in conjunction with the mechanical contractor shall create simulated design load conditions for control verification tests.
- .3 Provide the calibration procedure for each analog sensor. Physically check the calibration of each analog sensor type using a calibrated instrument prior to testing. All procedures used shall be fully documented on the prefunctional checklists or other suitable forms, clearly referencing the procedures followed and written documentation of initial, intermediate and final results.
- .4 Verify that all safeties are operating (i.e.. freeze-stats).
- .5 Check out sequence of operation step by step.
- .6 EMCS Contractor shall provide a print-out of general and critical alarm lists and all points connected to the Building Automation and Controls Systems. The all point log shall be sub-divided into points per system. One report shall be taken prior to the acceptance test.
- .7 Create false alarms at each point and provide a print-out of the test;
- .8 Verify that each time of day and optimum start program is operational in software and at the device
- .9 When all the above has been completed in a satisfactory manner the system shall go through a process of fine tuning of controls and systems operations.

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- .10 Recheck operation and calibration of all controls, instruments, and operators. Recalibrate as required. All controls shall be fine tuned for accurate response, precise sequencing, and smooth operation.
- .11 All set points and schedules shall be reviewed and adjusted as required.

3.4 Functional Performance Testing

3.4.1 General

- .1 Refer to Section 01 91 13 for a list of systems to be commissioned and to technical specifications from Divisions 21, 22 and 23 for a description of the process and for specific details on the required functional performance tests.
- .2 The commissioning procedures and functional testing do not relieve the contractor of the responsibility to provide all products and labour required to furnish the Agency with complete, functional building systems, or partially shift that responsibility to the CA, or Agency.
- .3 Functional testing is intended to begin upon completion of the Start-Up, Prefunctional Checklists and Initial Checkout - Phase 2 – System Activation, Testing and Balancing
- .4 Functional testing may proceed prior to the completion of systems or sub-systems at the discretion of the CA, CM, and Agency.
- .5 The functional performance testing phase shall not commence until the Start-Up activities have been completed to the satisfaction of the CA. Beginning system testing before full completion, does not relieve the Contractor from fully completing the system, including all pre-functional checklists as soon as possible.

3.4.2 Phase 3 – Verification of System Performance

- .1 Mechanical Equipment functional performance testing process shall include, but not be limited to, the following:
 - .1 Confirming the ease of access to all equipment requiring servicing, including motors, filters, coils, drives, control dampers, automatic dampers, backdraft dampers, fire dampers, fusible links, damper operators, etc.
 - .2 Confirming the operation and sequencing of all automatic control dampers, linkages, control valves, and control devices, etc.
 - .3 Confirming the proper response and operation of all variable volume pump controls.
 - .4 Confirming the operation of all systems and equipment under all modes of operation, including emergency power and fire alarm mode.

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- .5 Inspecting and verifying that all piping systems, drain pans, etc., are clean and that the recommended water treatment is up to specification.
- .6 Any failure will result in termination of inspection and future 100% inspections will be at the contractor's cost.
- .2 EMCS Functional Performance Testing procedure:
 - .1 EMCS System Demonstration to CA
 - .1 Prior to acceptance, the control system shall undergo a series of performance tests to verify operation and compliance with this specification. These tests shall occur after the Contractor has completed the installation, started up the system, and performed its own tests.
 - .2 The tests described in this section are to be performed in addition to the tests that the contractor performs as a necessary part of the installation, start-up, and debugging process and as specified in the 3.3.9 of this specification. The CA will be present to observe and review these tests. The CA shall be notified at least 10 days in advance of the start of the testing procedures.
 - .3 The demonstration process shall follow that approved in "Submittals". The approved checklists and forms shall be completed for all systems throughout the demonstration.
 - .4 The contractor shall provide at least two persons equipped with two-way communication, and shall demonstrate actual field operation of each control and sensing point for all modes of operation including day, night, occupied, unoccupied, fire/smoke alarm, seasonal changeover, and power failure modes.
 - .5 The purpose is to demonstrate the calibration, response, and action of every point/object and system. Any test equipment required to prove the proper operation shall be provided by and operated by the contractor.
 - .6 As each control input and output is checked, a log shall be completed showing the date, technician's initials, and any corrective action taken or needed. This will form part of the "Point Verification Report".
 - .7 Verification of all input/output points with regards to proper operation. CA will inspect 100% of all points for physical installation, including conduit, wire, labels, connections, etc.

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- .8 CA may choose to randomly inspect 50% of each point type for input/output response.
- .2 Final Acceptance:
 - .1 This phase shall consist of verifying to CA that the deficiencies as identified during "Demonstration" have been rectified. If deficiencies are still found, the Contractor will have one week to correct them and costs for additional inspection shall be billed to the contractor.
 - .2 Demonstrate compliance with "System Performance".
 - .3 Demonstrate and simulate compliance with Sequences of Operation through all modes of operation.
 - .4 Demonstrate complete operation of Operator Interface.
 - .5 Additionally, the following items shall be demonstrated:
 - 1. BAS Loop Response. The contractor shall supply trend data output in a graphical form showing the step response of each BAS loop. The test shall show the loop's response to a change in setpoint, which represents a change of actuator position of at least 25% of its full range. The sampling rate of the trend shall be from 10 seconds to 3 minutes, depending on the speed of the loop. The trend data shall show for each sample the setpoint, actuator position, and controlled variable values. Any loop that yields unreasonably under-damped or over-damped control shall require further tuning by the contractor.
 - 2. Optimum Start/Stop. The contractor shall supply a trend data output showing the capability of the algorithm. The hour-by-hour trends shall include the output status of all optimally started and stopped equipment, as well as temperature sensor inputs of affected areas.
 - 3. Operational logs for each system that indicate all setpoints, operating points, valve positions, mode, and equipment status shall be submitted to the CA. These logs shall cover three 48-hour periods and have a sample frequency of not more than 10 minutes.

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4. A power failure for the building will be simulated and proper system operation and recovery observed.
- .3 Integration Testing:
 - .1 Upon completion of individual system tests, tests of the integrated systems shall be performed to verify that all components work together.

3.5 Testing Documentation, Non-Conformance, and Approvals

- 3.5.1 Refer to Section 01 91 13 for specific details on non-conformance issues relating to pre-functional checklists and tests.
- 3.5.2 Refer to Section 01 91 13 for issues relating to functional performance tests.

3.6 Operation and Maintenance (O&M) Manuals

- 3.6.1 Contractor shall compile and prepare documentation for all equipment and systems covered in the Divisions 22 and 23 sections of the Performance Specification documents.
- 3.6.2 Contractor shall deliver O&M documents according to Section 01 91 13 Commissioning General Requirements and other applicable sections of the Performance Specification documents.
- 3.6.3 The CA shall receive a copy of the O&M manuals for review.
- 3.6.4 Systems Manual Requirements: The contractor shall provide the following information to the CA to assist in compilation of the Systems Manual. The CA is responsible for production of the Systems Manual.
- 3.6.5 Information to be provided by the contractor includes:
 - .1 Approved equipment submittals including Sequence of Operation
 - .2 Contractor & Supplier listing with contact information
 - .3 All data generated during the commissioning process, including start-up reports, evaluation checklists and completed test certificates and reports
 - .4 Equipment Operating schedules including set points
 - .5 Manufacturer's recommended calibration and preventive maintenance instructions.
- 3.6.6 Special Control System O&M Manual Requirements:
- 3.6.7 In addition to documentation that may be specified elsewhere, the controls contractor shall compile and organize at minimum the following data on the control system in labeled 3-ring binders with indexed tabs.
 - .1 Three copies of the controls training manuals in a separate manual from the O&M manuals.
 - .2 Operation and Maintenance Manuals containing:
 - .1 Specific instructions on how to perform and apply all functions, features, modes, etc. mentioned in the controls training sections of this specification and other

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- features of this system. These instructions shall be step- by-step. Indexes and clear tables of contents shall be included. The detailed technical manual for programming and customizing control loops and algorithms shall be included.
 - .2 Full as-built set of control drawings (refer to Submittal section above for details).
 - .3 Full as-built sequence of operations for each piece of equipment.
 - .4 Full points list.
 - .5 Full print out of all schedules and set points after testing and acceptance of the system.
 - .6 Full as-built print out of software program.
 - .7 Electronic copy on disk of the entire program for this facility.
 - .8 Marking of all system sensors and thermostats on the as-built floor plan and mechanical drawings with their control system designations.
 - .9 Maintenance instructions, including sensor calibration requirements and methods by sensor type, etc.
 - .10 Control equipment component submittals, parts lists, etc.
 - .11 Warranty requirements.
 - .12 Copies of all checkout tests and calibrations performed by the Contractor (not commissioning tests).
 - .3 The manual shall be organized and subdivided with permanently labeled tabs for each of the following data:
 - .1 Sequences of operation
 - .2 Control drawings
 - .3 Points lists
 - .4 Controller / module data
 - .5 Thermostats and timers
 - .6 Sensors and DP switches
 - .7 Valves and valve actuators
 - .8 Dampers and damper actuators
 - .9 Program setups (software program printouts)
 - .4 Field checkout sheets and trend logs should be provided to the CA for inclusion in the Commissioning Report.
- 3.6.8 Special TAB Documentation Requirements:
- .1 The TAB will compile and submit the following with other documentation that may be specified elsewhere in the Specifications.
 - .1 Final report containing an explanation of the methodology assumptions, test conditions and the results in a clear format with designations of all uncommon abbreviations and column headings.

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- .2 The TAB shall mark on the drawings where all traverse and other critical measurements were taken and cross reference the location in the TAB report.
- 3.6.9 Review and Approvals
 - .1 Review of the commissioning related sections of the O&M manuals shall be made by the A/E and by the CA. Refer to Section 01 78 00 for details.
- 3.6.10 Review of the commissioning related sections of the O&M manuals shall be made by the A/E and by the CA. Refer to Section 01 91 13 for details.

3.7 Training of Agency Personnel

- 3.7.1 Demonstration and training shall not proceed until the following tasks and deliverables have been completed and reviewed/approved by the CA:
 - .1 Functional Performance Testing Completed, including Issues Log summarizing status/remaining issues. Systems verified to be operating to design intent.
 - .2 O&M Manuals have been reviewed, approved, and final version submitted to the Agency
 - .3 Record Drawings completed and submitted to the Agency. In the absence of final Record Drawings, a full colour, full size scanned copy of the as-builts may be provided by the contractor in both hard and digital copy.
- 3.7.2 Detail information regarding contents, duration and instructors for any particular system is included in Section 01 79 00.13: Commissioning – Demonstration and Training.
- 3.7.3 Mechanical Contractor: The mechanical contractor shall have the following training responsibilities:
 - .1 Provide the CA with a training plan two weeks before the planned training according to the outline described in Section 01 79 00.13.
 - .2 Provide designated Agency personnel with comprehensive orientation and training in the understanding of the systems and the operation and maintenance of each piece of HVAC equipment including, but not limited to, p, heat, air handling units, fans, terminal units, controls and water treatment systems, etc.
 - .3 Training shall normally start with classroom sessions followed by hands-on training on each piece of equipment, which shall illustrate the various modes of operation, including startup, shutdown, fire/smoke alarm, power failure, etc.
 - .4 During any demonstration, should the system fail to perform in accordance with the requirements of the O&M manual or sequence of operations, the system will be repaired or adjusted as necessary and the demonstration repeated.

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- .5 The appropriate trade or manufacturer's representative shall provide the instructions on each major piece of equipment. This person may be the start-up technician for the piece of equipment, the installing contractor or manufacturer's representative. Practical building operating expertise as well as in-depth knowledge of all modes of operation of the specific piece of equipment are required. More than one party may be required to execute the training
 - .6 The controls contractor shall attend sessions other than the controls training, as requested, to discuss the interaction of the controls system as it relates to the equipment being discussed.
 - .7 The training sessions shall follow the outline in the Table of Contents of the operation and maintenance manual and illustrate whenever possible the use of the O&M manuals for reference.
- 3.7.4 The TAB contractor shall have the following training responsibilities: TAB shall meet with facility staff after completion of TAB and instruct them on the following:
- .1 Go over the final TAB report, explaining the layout and meanings of each data type.
 - .2 Discuss any outstanding deficient items in control, ducting or design that may affect the proper delivery of air or water.
 - .3 Identify and discuss any terminal units, duct runs, diffusers, coils, fans and pumps that are close to or are not meeting their design capacity.
 - .4 Discuss any temporary settings and steps to finalize them for any areas that are not finished.
 - .5 Other salient information that may be useful for facility operations, relative to TAB.

3.8 Written Work Products

- 3.8.1 Contractor's written work products will consist of the startup and initial checkout plan and functional testing described in this section and Section 01 91 13 General Commissioning Requirements and the completed startup, initial checkout and pre-functional, and functional checklists.

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Division 23, Specifications, Section 23 11 23, Natural Gas Piping System

1. GENERAL

1.1 Submittals

- 1.1.1 Product Data: Submit product data for all products specified in Part 2 of this Section except for pipe, fittings, and unions. Indicate performance criteria, conformance to appropriate reference standards, and limitations.
- 1.1.2 For each gas pressure regulating station, submit:
 - .1 a selection sheet for each PRV, indicating connected equipment, heating loads, design allowance, meter model, body size, spring range, and orifice size
 - .2 a selection sheet for each relief valve(s) serving a PRV

1.2 Quality Assurance

- 1.2.1 Codes and Standards: All gas system work is to be in accordance with requirements of CAN/ CSA-B149.1, Natural Gas and Propane Installation Code, as amended by local Gas Codes.
- 1.2.2 Tradesmen: All gas system work is to be performed only by licensed Gas Technicians under direct on-site supervision of a Gas Technician holding a Gas Technician 1 Certificate authorized under the TSSA Act.
- 1.2.3 System Design Approval: Apply for, on TSSA forms, approval of the gas system design by the TSSA prior to work beginning at the site and prior to ordering any equipment. Submit the completed TSSA Form and copies of shop drawings/ product data sheets as required to the TSSA and obtain an approval certificate. Pay all costs for the TSSA review and approval process. If the TSSA requires revisions to the system and the revisions result in an extra cost, a Notice of Change will be issued by the Consultant for the revision.

2. PRODUCTS

2.1 Pipe, Fittings, and Joints

- 2.1.1 Polyethylene: For underground piping use safety yellow coloured polyethylene pipe, fittings, and joints to CSA-B137.4. Equal to Polyubes PE-2708 SDR8.8 with fusion welded fittings.
- 2.1.2 Uncoated Black Steel - Welded Joints: All above ground piping shall be schedule 40 mild black carbon steel, ASTM A53, Grade B, mill or site bevelled, complete with factory made forged steel butt welding fittings and welded joints for pipes 2- 1/ 2" (65mm) and above, and socket welding fittings and welded joints for pipe 2" (50mm) and below.
- 2.1.3 Flexible Stainless Steel: Equipment connections shall be made with flexible, CSA certified, 860 kPa (125 psi) rated, gas-tight, convoluted stainless steel tubing factory jacketed with a bright yellow PVC coating which is continuously identified. The tubing is to be supplied in coils and is to be complete with factory attached stainless steel end fittings,

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and adapter unions, protective plates, and steel clamps. Acceptable products are:

- .1 Tru-Flex Metal Hose LLC. "Pro-Flex"
- .2 Titeflex Corp. "Gastite"
- .3 Omega Flex Canada "TracPipe"
- .4 Or approved Equal

2.2 Piping Unions

- 2.2.1 Screwed Piping: Malleable iron, ground joint, bronze, or brass to iron or bronze to bronze seat screwed unions and union elbows with a minimum pressure rating of 1725 kPa (250 psi) steam at 260° C(500° F).
- 2.2.2 Flanged Piping: Forged carbon steel slip-on type raised faced welding flange unions to ASTM A105, 150 lb. Class for steel pipe, and slip-on type 150 lb. Class bronze flanges for copper pipe.
- 2.2.3 Copper to Steel: Equal to Kamco Products "Copper Stopper".

2.3 Shut-Off Valves

- 2.3.1 Ball Type: CSA certified, minimum 3100 kPa (450 psi) WOG rated, 1/4 turn, full port non-lubricated brass ball valves, each complete with a Teflon PTFEseat, chrome plated solid ball, removable lever handle, and screwed ends for sizes 2" (50mm) and smaller, and flanged ends for sizes 2-1/2" (65 mm) and larger. CGA 3.16 certified for natural gas or liquid petroleum up to 125 PSIG. Acceptable products are:
 - .1 Threaded: Kitz Corp. Code 68ALL
 - .2 Flanged: Kit z Corp. 150SCTDZM
- 2.3.2 Emergency Generator: All gas valves serving the emergency generator shall be monitored and supervised. Provide flanged, 2-piece, full port, Class 150 Stainless Steel Ball and Stem gas valve, wrench operated, stainless steel body, and suitable for installation outdoors. Valve shall be complete with a limit switch and dome indicator, complete with open and close switches, weatherproof, stainless steel mounting bracket, and 2 cable entries. Valve shall be equal to Jomar FL-SS-100- 150 complete with Jomar ASM limit switch.

2.4 Earthquake Activated Automatic Shut-off Valve

- 2.4.1 Equal to KAS International or Nihon Koso Model 315 HPF earthquake activated, flanged, high-pressure automatic shut-off valve suitable for both natural gas and propane, ULC listed and in accordance with ANSI Z21.70, Earthquake Actuated Automatic Gas Shutoff Valves.

2.5 Pressure Regulators

- 2.5.1 CSA certified pressure regulators as follows:
 - .1 vented type: spring-loaded self-operated design, tight closing, selected for the facility gas pressure and piping pressure loss,

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and connected equipment load at full firing rate plus 20% spare, and complete with:

- .1 1035 kPa (150 psi) rated cast iron body finished with corrosive resistant epoxy enamel
- .2 aluminum diaphragm and spring case with Nitrile diaphragm, disc, and body o-ring
- .3 throttling type, high flow rate, tight shut-off relief valve selected to protect equipment downstream of the regulator in coordination with regulator capacity
- .2 Acceptable manufacturers are:
 - .1 Maxitrol Co.
 - .2 Jordan Valve
 - .3 Fisher Controls
 - .4 Leslie Controls Inc.
 - .5 Lakeside Process Controls
 - .6 Bryan Donkin USA
 - .7 American Meter
 - .8 Or approved equal

3. EXECUTION

3.1 Natural Gas Service

- 3.1.1 Make all required arrangement with the natural gas supply utility on behalf of the Agency for installation of natural gas service piping with gas pressure regulator and meter assembly where shown.
- 3.1.2 Provide 2 m (7') high minimum 200 mm (8") diameter Schedule 80 galvanized steel concrete filled bollards at the meter-regulator location in a pattern to protect the meter-regulator. Install the pipe straight and plumb a 1.2 m (4') below grade in a continuous 600 mm (2') diameter reinforced concrete footing. Smoothly crown the top of the concrete above the top of the pipe.
- 3.1.3 Ensure that new gas service is 10 PSI as noted on the drawings.

3.2 Natural Gas Piping Installation Requirements

- 3.2.1 Provide all required natural gas distribution piping and connect gas-fired or operated equipment, and provide all required vent piping to the atmosphere, including vent piping from pressure regulators. Do all piping work in accordance with requirements of CAN/ CSA-B149, Natural Gas and Propane Installation Code, as amended by local Gas Codes.
- 3.2.2 Install all gas piping within joist space from meter incoming vertical leg to penetrations through curbs.
- 3.2.3 Coordinate installation of gas piping with the installation of sprinkler heads. Gas piping shall be installed such that is a minimum of 600 mm (24") away from any sprinkler head in plan view. Install pipes and expansion joints accordingly.

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- 3.2.4 Provide waterproof sleeves through all roof curb penetrations.
- 3.2.5 Support all rooftop gas piping with manufactured roof supports equal to Dura- Blok db10.
- 3.2.6 Piping is to be as follows:
 - .1 for underground piping polyethylene yellow jacket pipe with solvent welded fittings.
 - .2 for above-ground piping, uncoated Schedule 40 black steel with all welded joints within the building, with threaded piping for sizes 2" and smaller outside of the building serving a single piece of mechanical equipment.
- 3.2.7 Install flexible stainless steel pipe connections to equipment in strict accordance with the pipe manufacturer's printed instructions.
- 3.2.8 Slope gas piping in the direction of flow to low points.
- 3.2.9 Ensure that supports for roof-mounted piping are sized (height) to accommodate the roof slope and the required piping slope, and to permit the installation of low point dirt pockets.
- 3.2.10 Provide full pipe diameter 150 mm (6") long drip pockets in accordance with CSA B439 requirements and:
 - .1 at the bottom of all vertical risers, at all piping low points
 - .2 at all equipment connections
 - .3 at piping penetration from indoors to outdoors (or vice versa) including pipe penetrations through the roof
 - .4 at piping penetration between different temperature interior spaces
 - .5 wherever else shown and/ or required.
- 3.2.11 Identify all-natural gas piping above ground with 2 coats of safety yellow enamel applied over primer, and SMS Ltd. or equal coil type vinyl identification makers with arrows.
- 3.2.12 For all underground gas piping, provide continuous 75 mm (3") wide yellow PVC warning tape with "CAUTION – GAS LINE BURIED BELOW" wording at 750 mm (30") intervals located above the pipe at approximately 250 mm (10") below grade.
- 3.2.13 Provide expansion loops/ joints at every building expansion joint and at a minimum of every 120m (400 feet). Provide two pipe guides on either side of the expansion loop. Provide a pipe anchor between each set of expansion loops.

3.3 Installation of Shut-Off Valves

- 3.3.1 All shut-off valves shall be wrench-operated plug valves or acceptable ball valves. Ball valves shall be threaded ends for 2" (50mm) and smaller and flanged for 2- 1/ 2" (65mm) and larger.
 - .1 Provide a union on the downstream connection of each threaded valve.
 - .2 Ensure that valves are located for easy accessibility and maintenance.

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- .3 Provide a shut-off valve for each piece of equipment to allow for ease of isolation.
- .4 Provide a shutoff valve upstream of each pocket to allow the drip pocket to be drained without shutting off any equipment upstream.
- .5 Provide auxiliary supervisory contact on shut-off valves serving the natural gas generator. All shutoff valves shall be supervised by the electrical contractor. Mechanical contract shall provide the supervisory switch and install it on the valve.

3.4 Installation of Pressure Regulators

- 3.4.1 Provide pressure regulators in gas distribution piping where indicated and/ or required.
- 3.4.2 Use vented type pressure regulators for all other applications. All regulator vents shall be piped a minimum of 900mm (3 feet) above the roof.
- 3.4.3 Install regulating stations in accordance with requirements of CAN/ CSA-B149.1.
- 3.4.4 Provide 6 mm (¼") diameter test ports upstream and downstream of each regulator assembly.
- 3.4.5 Locate outdoor regulating stations a minimum of 300 mm (12") away from walkways, and 3 m (10') away from equipment air intakes and building openings. Provide all required vent piping and terminate vents in a turn-down elbow fit ting with a bronze bug screen secured in place.
- 3.4.6 When the installation is complete, check each regulator for proper operation and adjust and set each regulator to the correct discharge pressure.
- 3.4.7 Indicate operating set-points, relief settings, and vent arrangements for each regulating station on as-built record drawings.
- 3.4.8 Provide an over-pressure device with the pressure regulator at each piece of equipment.
- 3.4.9 Regulators serving emergency generators shall be installed not less than 3m (10 feet) of piping length from the generator gas inlet.

END OF SECTION

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Division 23, Specifications, Section 23 31 05, Standard Ductwork

1. GENERAL

1.1 Submittals

- 1.1.1 **Shop Drawings/Product Data:** Submit shop drawings/product data sheets for all products specified in this Section except shop fabricated ductwork and fittings.
- 1.1.2 **Test Data:** Submit duct leakage test data prior to ductwork being covered from view.

2. PRODUCTS

2.1 Galvanized Steel Ductwork

- 2.1.1 **General:** Galvanized steel sheet is to be hot dipped in accordance with requirements of ASTM A653. Galvanizing for bare uncovered duct to be finish painted is to be G60. All other galvanizing is to be G90.
- 2.1.2 **Rectangular:** Lock forming grade hot dip galvanized steel, ASTM A653, shop fabricated, minimum #26 gauge.
- 2.1.3 **Round:** Factory machine fabricated, spiral, mechanically locked flat seam, single wall duct, fittings and couplings.
- 2.1.4 **Flat Oval:** Factory machine fabricated, single wall, 4-ply spiral lock seam duct, fittings and couplings.

2.2 Flexible Metallic Ductwork

- 2.2.1 **Bare:** Spirally wound, semi-rigid, self-supporting corrugated aluminum duct with continuous triple lock seams, SMACNA Form "M-UN", ULC-S110 listed and labelled as a Class 1 Air Duct, constructed of dead soft aluminum strip, and supplied in 3 m (10') lengths.
- 2.2.2 **Insulated:** Spirally wound, semi-rigid, self-supporting corrugated aluminum duct with continuous triple lock seams, SMACNA Form "M-I", ULC-S110 listed and labelled as a Class 1 Air Duct, constructed of dead soft aluminum strip, supplied in 3 m (10') lengths and factory covered with 40 mm (1½") thick, 12 kg/m³ (0.75 lb/ft³) density fibreglass insulation with a vinyl jacket meeting flame spread and smoke developed requirements of CAN/ULC-S102.

2.3 Metal Duct System Joint Sealant

- 2.3.1 ULC listed and labelled, premium grade, grey colour, water base, non-flammable duct sealer, brush, or gun applied, with a CAN/ULC S102 maximum flame spread rating of 5 and smoke developed rating of 0.

2.4 Acoustic Lining

- 2.4.1 Minimum 25 mm (1") thick acoustic lining material meeting NFPA 90A requirements and flame spread and smoke developed fire hazard ratings of CAN/ULC-S102, flexible for round ducts, board

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type for rectangular ducts, consisting of a bonded fiberglass mat coated on the inside (airside) face with a black fire-resistant coating.

3. EXECUTION

3.1 Fabrication and Installation of Galvanized Steel Ductwork

- 3.1.1 Provide all required standard galvanized steel ductwork, rectangular and/or round and/or flat oval as shown. Note that where rectangular ductwork is shown, round or flat oval ductwork of equivalent cross-sectional area is acceptable.
- 3.1.2 Unless otherwise specified, construct and install ductwork in accordance with ANSI/SMACNA HVAC Duct Construction Standards Metal and Flexible to suit the duct pressure class designation of minimum 625 Pa (2.5" w.c.) positive or negative as applicable, a minimum velocity of 10 m/s (2000 fpm), and so that the ductwork does not "drum". All flat surfaces of rectangular ductwork are to be cross-broken. Duct system sealing is to meet ANSI/SMACNA Seal Class A requirements.
- 3.1.3 Variable air volume ductwork from supply fans to boxes is to be as above but rectangular duct take-offs are to be double side straight taper type with a take-off length equal to 0.5 times the branch duct width but minimum 150 mm (6") length, and the double taper side is to have an included angle of minimum 60°.
- 3.1.4 Duct Routing and Dimensions: Confirm the routing of all ductwork at the site and site measure ductwork prior to fabrication. Note that duct dimensions may be revised to suit site routing and building element requirements, if dimension revisions are reviewed with and approved by the Consultant. Duct routing and/or dimension revisions to suit conditions at the site are not grounds for a claim for an extra cost.
- 3.1.5 Ducts Run Within or Through OWSJ: Refer to structural drawings. Where ductwork is to be run within or through open web steel joists, note that ductwork shown on the mechanical drawings is schematic only and is to be altered as required to suit the steel joist configuration, spacing, panel points, and cross-bridging at no additional cost.
- 3.1.6 Ductwork Located at Sprayed Fireproofing: Wherever ductwork is required at locations where sprayed fireproofing is applied to building construction, install the ductwork only after the fireproofing work is complete and do not compromise the fire rating of the sprayed fireproofing.
- 3.1.7 Automatic Control Components: Install (but do not connect) all duct system mounted automatic control components supplied as part of the automatic control work.
- 3.1.8 Heat Transfer Equipment Connections: Where indicated, provide duct connections to fan powered heat transfer equipment with integral coils.

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- 3.1.9 Rectangular Duct Support Inside Building: Support horizontal rectangular ducts inside the building in accordance with ANSI/SMACNA HVAC Duct Construction Standards Metal and Flexible, but use trapeze hangers with, unless otherwise specified, galvanized steel channels, and galvanized steel hanger rods for all ducts that are exposed, and all concealed ducts wider than 500 mm (20").
- 3.1.10 Round and Flat Oval Duct Support Inside Building: Support round and flat oval ducts inside the building in accordance with ANSI/SMACNA HVAC Duct Construction Standards Metal and Flexible, but, unless otherwise specified, for both uninsulated and insulated ducts exposed in finished areas, use bands and secure at the top of the duct to a hanger rod, all similar to Ductmate Canada Ltd. type "BA". If the duct is insulated, size the strap to suit the diameter of the insulated duct.
- 3.1.11 Flanged Duct Joints: Where flanged duct joints are used, do not locate the joints in wall or slab openings, or immediately at wall or slab openings. Do not use flanged joints for exposed uninsulated ducts in finished areas.
- 3.1.12 Support of Roof Mounted Ducts: As specified in the mechanical work Section entitled Duct System Dampers and Accessories.
- 3.1.13 Watertight Ductwork: Where watertight horizontal ductwork is required, construct the ducts without bottom longitudinal seams. Solder or weld the joints of bottom and side sheets. Seal all other joints with duct sealer. Slope horizontal duct to hoods, risers, or drain points. Provide the drain points. Provide watertight ductwork for:
- 3.1.14 all galvanized steel ductwork outside the building or otherwise exposed to the elements;

3.2 Leakage Testing:

- 3.2.1 Leakage testing is to be performed by the Testing, Adjusting and Balancing Agency in accordance with the SMACNA HVAC Air Duct Leakage Test Manual and is to be witnessed by the Consultant.
- 3.2.2 Ductwork leakage is not to exceed one percent of the total air quantity handled by the respective fans.
- 3.2.3 Leakage test the following ductwork:
- 3.2.4 All supply, exhaust and return air duct systems 25' (7.5 m) and longer;
- 3.2.5 Other ductwork as required.
- 3.2.6 Be responsible for the following:
- 3.2.7 Preparing duct systems for leakage testing prior to installation of external insulation including capping duct runouts and provision of final tap-in for test equipment;

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- 3.2.8 Schedule testing with TAB agency in advance and ensure notice is given to Consultant so that they may witness testing. Be present for all testing;
- 3.2.9 Resealing and/or replacement of defective ductwork;
- 3.2.10 Bearing all costs associated with retesting ductwork which has failed to pass leakage testing.
- 3.2.11 Application of Sealants: Apply sealants by brush or gun to cleaned metal surfaces. Where bare ductwork is exposed apply neat uniform lines of sealant. Randomly brushed, sloppy looking sealant applications will be rejected and must be repaired or replaced with a neat application of the sealant.
- 3.2.12 Protective Coating for Exposed Exterior Ducts: Clean exterior exposed (uninsulated) ducts with a heavy full coverage of Bakor #410-02 black metal paint.

3.3 Installation of Flexible Ductwork

- 3.3.1 Provide maximum 3 m (10') long lengths of flexible ductwork for connections unless approved by the consultant between galvanized steel duct mains and branches, and necks of ceiling grilles and diffusers. Flexible connections for wall mounted diffusers are permitted inside existing shafts only if it is specifically noted the drawings, ductwork up to the shaft connection is rigid.
- 3.3.2 At rectangular galvanized steel duct, accurately cut holes and provide flanged or "Spin-in" round flexible duct connection collars. Seal joints with duct sealer.
- 3.3.3 Install flexible ducts as straight as possible and support in accordance with requirements of ANSI/SMACNA HVAC Duct Construction Standards Metal and Flexible, and secure at each end with nylon or stainless steel gear type clamps, and seal joints. Provide long radius duct bends where they are required.
- 3.3.4 Do not penetrate fire barriers with flexible duct.

3.4 Installation of Acoustic Lining

- 3.4.1 Provide acoustic lining in ductwork in locations as follows:
- 3.4.2 wherever shown and/or specified on the drawings;
- 3.4.3 supply ductwork downstream of air terminal boxes for a distance of 2.4 m (8') measured along the duct and outward from the box in all directions;
- 3.4.4 for all transfer air ducts.
- 3.4.5 Install lining in accordance with requirements of ANSI/SMACNA HVAC Duct Construction Standards Metal and Flexible, however, for all installations regardless of velocity, at leading and trailing edges of duct liner sections, provide galvanized steel nosing channel as per the detail entitled Flexible Duct Liner Installation found in the ANSI/SMACNA manual referred to above.

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3.5 Duct System Protection, Cleaning and Start-Up

- 3.5.1 Clean all new ductwork to meet the requirements of the NADCA ACR Standard.
- 3.5.2 Temporarily cover all open ends of ducts during construction.
- 3.5.3 Vacuum all dirt and foreign matter from the entire duct systems and clean duct system terminals and the interior of air handling units prior to operating fans.
- 3.5.4 Prior to starting any supply air handling system provide 50 mm (2") thick glass fibre construction filters at fan equipment in place of permanent filters.
- 3.5.5 Provide cheesecloth over all duct system inlets and outlets and run the system for twenty- four hours, after which remove the cheesecloth, the construction filters, and install new permanent filters.
- 3.5.6 Include all labour for a complete site walk-through with testing and balancing personnel following the route of all duct systems to be tested, adjusted and balanced for the purpose of confirming the proper position and attitude of dampers, the location of pitot tube openings, and any other work affecting the testing and balancing procedures. Perform all corrective work required as a result of this walk-through.

END OF SECTION

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Division 23, Specifications, Section 23 33 00, Duct System Dampers and Accessories

1. GENERAL

1.1 Submittals

- 1.1.1 **Shop Drawings/Product Data:** Submit shop drawings/product data sheets for all products specified in this Section. Shop drawings and product data sheets must confirm that the products proposed meet all requirements of the Contract Documents.

2. PRODUCTS

2.1 Air Turning Vanes

- 2.1.1 For square elbows - multiple-radius turning vanes, interconnected with bars, adequately reinforced to suit the pressure and velocity of the system, constructed of the same materials the duct they are associated with, and in accordance with ANSI/SMACNA HVAC Duct Construction Standards Metal and Flexible.
- 2.1.2 For short branch ducts at grille and diffuser connections - air extractor type, each equipped with a matching bottom operated 90 degree opposed blade volume control damper, constructed of the same material as the duct it is associated with and in accordance with requirements and details in ANSI/SMACNA HVAC Duct Construction Standards Metal and Flexible.

2.2 Manual Balancing (Volume) Dampers

- 2.2.1 Flanged and drilled, single or parallel blade (depending on damper size) manual balancing dampers, each constructed of the same material as the connecting ductwork unless otherwise specified, each designed to maintain the internal free area of the connecting duct, and each complete with:
- .1 a hexagonal or square shaft extension through the frame;
 - .2 non-stick, non-corrosive synthetic bearings for rectangular dampers, flange stainless steel bearings for round dampers;
 - .3 blade stops for single blade dampers, designed to prevent the blade from moving more than 90°;
 - .4 linkage for multiple blade dampers;
 - .5 a locking hand quadrant damper operator with, for insulated ducts 50 mm standoff mounting.
- 2.2.2 **Rectangular Dampers:** Nailor Industries Inc. #SP1010 FF 16G LC BS NS, maximum size
- 2.2.3 1.2 m x 1.2 m (4' x 4') for a single damper.
- 2.2.4 **Multiple Rectangular Damper Section Assembly:** Rectangular assembly supplied with the dampers or site constructed, of the same material as the damper and designed for tight and secure mounting of the individual dampers.
- 2.2.5 Acceptable manufacturers are:
- .1 Nailor Industries Inc.;
 - .2 T.A. Morrison & Co. Inc. "TAMCO";
 - .3 NCA Manufacturing Ltd.;
 - .4 Greenheck Fan Corp.;

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- .5 Ruskin Co.
- .6 Or approved equal

2.3 Flexible Connection Material

2.3.1 Waterproof, indoor-outdoor type flexible connection material meeting requirements of NFPA 90A, consisting of woven glass fibre fabric coated on both sides with synthetic rubber. Acceptable products are:

- .1 Duro Dyne Canada Inc. "DUROLON";
- .2 Dyn Air Inc. "HYPALON".

2.4 Roof Duct Supports

2.4.1 Equal to Portable Pipe Hangers (Canada) Inc. Model PHP-D adjustable duct support assemblies sized to suit the duct size, each assembly complete with injection moulded recycled plastic and carbon black bases and tubular hot dip galvanized steel framing.

2.5 Fan and Duct System Explosion/Implosion Prevention Access Doors

2.5.1 McGill AirFlow Pressure-Relief (positive or negative) access doors constructed of the same material as the duct or plenum they are associated with, each complete with a sealing gasket, special latches, and cover with safety chain.

2.5.2 Size access doors to match requirements of the system so that the pressure drop through the open blow-out door at the required flow rate will not exceed the rated pressure of the duct system.

2.5.3 Acceptable manufacturers are:

- .1 McGill Air Flow;
- .2 United Enertech;
- .3 Greenheck Fan Corp.
- .4 Or approved equal

2.6 Duct Access Doors

2.6.1 In accordance with ANSI/SMACNA HVAC Duct Construction Standards Metal and Flexible, with sizes suitable in all respects for the purpose for which they are provided, and, unless otherwise specified, constructed of the same material as the duct they are associated with.

2.7 Ductwork Drain Points

2.7.1 Equal to Ductmate Canada Ltd. "DUCTMATE MOISTURE DRAIN", 20 mm ($\frac{3}{4}$ ") diameter moisture drains with galvanized sheet metal funnel, and chrome plated brass threaded drain, nut and cap.

2.8 Motorized Control Dampers

2.8.1 T.A. Morrison & Co. Inc. "TAMCO", 100 mm (4") deep, flanged aluminum control dampers with AMCA certified maximum leakage through a 1.2 m x 1.2 m (4' x 4') damper of 52 L/s/m² (110 ft³/min) against 1 kPa (0.145 psi) differential static pressure. Control

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dampers for mixing applications are to be parallel blade type. Control dampers for open-shut service are to be opposed blade type.

2.8.2 Standard Damper: Series 1000 dampers complete with:

- .1 extruded 6063T5 aluminum frame and blades, each with an integral slot to receive a gasket;
- .2 extruded silicone frame gaskets and extruded EPDM blade gaskets;
- .3 slip-proof aluminum and corrosion resistant plated steel linkage concealed in the frame, equipped with self-sealing and self-lubricating bearings consisting of a Ticona "Celcon" inner bearing fixed on the hexagonal blade pin and rotating in a polycarbonate outer bearing inserted in the frame.

2.8.3 Insulated Damper: As specified for standard dampers but with all four sides of the frames insulated with injected polyurethane foam, and with the blades thermally broken and insulated with expanded polyurethane foam.

2.8.4 Damper Motor: Equal to Belimo CSA certified, spring return, direct coupled electric motor damper actuator, 120 volt or 24 volt as required, electronic overload protected, complete with position indicator, a housing to suit the mounting location, and additional features as required to suit the application and control sequence.

3. EXECUTION

3.1 Installation of Turning Vanes

- 3.1.1 Provide turning vanes in ductwork elbows wherever required, due to site installation routing and duct elbow radius, turning vanes are recommended in accordance with ANSI/SMACNA HVAC Duct Construction Standards Metal and Flexible.
- 3.1.2 Provide volume extractor type turning vanes in short branch supply duct connections off mains to grilles and diffusers where shown and/or specified.

3.2 Installation of Manual Balancing (Volume) Dampers

- 3.2.1 Provide manual balancing dampers in all open end ductwork, in all duct mains, and wherever else shown and/or specified.
- 3.2.2 Install the dampers so that the operating mechanism is accessible and positioned for easy operation, and so that the dampers cannot move or rattle. Ensure that operating mechanisms for dampers in insulated ducts are complete with stand-off mounting brackets.
- 3.2.3 Where a duct for which a balancing damper is required has dimensions larger than the dimensions of the maximum size volume damper available, provide multiple dampers bolted together in a properly sized assembly, or bolted to a heavy-gauge black structural steel angle or channel framework which is properly sized. Seal to prevent air by-pass, and provide connecting linkage.

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- 3.2.4 Confirm exact damper locations with personnel doing air quantity balancing testing work and install dampers to suit. Include for providing five additional dampers at no additional cost.

3.3 Installation of Flexible Connection Material

- 3.3.1 Provide a minimum of 100 mm (4") of flexible connection material where ducts, plenums, and/or easings connect to fans, and wherever else shown or specified.
- 3.3.2 Rigidly secure a minimum of 75 mm (3") of duct material (minimum #24 gauge) to each edge of the flexible fabric and to the fan, duct, plenum, etc., in accordance with ANSI/SMACNA HVAC Duct Construction Standards Metal and Flexible. Ensure that connections to the flexible fabric material are arranged and supported so as to not impose any external forces on the fabric.

3.4 Installation of Roof Mounted Duct Supports

- 3.4.1 Supply supports for roof mounted ductwork as indicated.
- 3.4.2 Accurately mark the location and spacing of roof support assemblies. At each plastic base location, carefully scrape away loose roof ballast (gravel) and all other debris and dirt. Prime the existing membrane with a primer which is compatible with existing roofing components. Set bases in adhesive in accordance with the manufacturer's installation instructions. Scrape loose ballast back around and on the bases. Install framing, and install ductwork on the cross-members. Secure ductwork to cross-members with galvanized steel banding.

3.5 Installation of Pressure Release Doors

- 3.5.1 Provide pressure release access doors where shown to prevent duct system explosion or implosion as a result of a duct obstruction, i.e. closed fire damper, which prevents normal air flow through the system. Size access doors in accordance with requirements of Part 2 of this Section.
- 3.5.2 Where pressure release doors are shown in suction ducts or plenums, mount the access door assembly so that the door swings in and the latch mechanism is on the inside of the duct or plenum. If the latch mechanism is not accessible, provide a standard access door at the latch side of the pressure release access door for maintenance purposes.
- 3.5.3 Adjust each latch mechanism by means of the adjusting pin to suit the static pressure of the particular system in accordance with the latch mechanism manufacturer's instructions.

3.6 Installation of Duct Access Doors

- 3.6.1 Provide access doors in ductwork for access to all components which will or may need maintenance and/or repair, including reheat coils. Install in accordance with requirements of ANSI/SMACNA HVAC Duct Construction Standards Metal and Flexible.

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- 3.6.2 Identify access doors provided for fusible link damper maintenance with "FLD" stencil painted or marker type red lettering and ensure that the doors are properly located for damper maintenance.
- 3.6.3 When requested, submit a sample of proposed duct access doors for review.
- 3.6.4 Where sectionalized fusible link dampers and/or balancing dampers are provided in large ducts, provide a plenum type access door to suit, and adequately reinforce the ductwork to suit the access door installed.

3.7 Installation of Motorized Control Dampers

- 3.7.1 Provide motorized control dampers where shown. Secure in place to prevent movement or rattle, and to prevent air bypass around the damper.
- 3.7.2 Provide insulated dampers in fresh air intake ductwork or openings, and for exhaust air service at exterior walls.
- 3.7.3 Equip each damper with an electric motor actuator, 120 volt or 24 volt as required. Ensure that each actuator is equipped with all required features to suit the application.

3.8 Control Wiring

- 3.8.1 Provide all required power wiring for controls from 15A-1P circuits terminated in junction boxes adjacent to the control work, and do all control wiring to connect control components.
- 3.8.2 Install wiring in conduit in accordance with electrical work wiring material and installation requirements.

END OF SECTION

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1. GENERAL

1.1 General

- 1.1.1 This section of the specification shall be read in conjunction with and shall be governed by the requirements outlined in Section 23 05 00.

1.2 Summary

- 1.2.1 Section Includes:
- .1 Fans, motors, accessories and hardware for commercial use.
 - .2 Sustainable requirements for construction and verification.

1.3 References (Latest Revisions)

- 1.3.1 Air Movement and Control Association Inc. (AMCA):
- .1 99 - Standards Handbook
 - .2 200 - Publication, Air Systems
 - .3 201-90 - Publication, Fans and Systems
 - .4 202-88 - Publication, Troubleshooting
 - .5 203-90 - Publication, Field Performance Measurement of Fan Systems
 - .6 211-05 - Publication, Certified Ratings Program – Product Rating Manual for Fan Air Performance
 - .7 300-96 - Standard Reverberant Room Method for Sound Testing of Fans
 - .8 311-05 - Publication Certified Ratings Program – Product Rating Manual for Fan Sound Performance
 - .9 99-0401-86 - Classification for Spark Resistant Construction
 - .10 99-2408-69 - Operating Limits for Centrifugal Fans
- 1.3.2 Air Movement and Control Association Inc. (AMCA), American National Standards Institute (ANSI):
- .1 204-05 - Standard Balance Quality and Vibration Levels for Fans
 - .2 210-99 - Standard Laboratory Methods of Testing Fans for Aerodynamic Performance Rating
- 1.3.3 American National Standards Institute (ANSI):
- .1 11-r1999 - Method of Evaluating Load Ratings of Bearings
- 1.3.4 American Society of Civil Engineers (ASCE):
- .1 7-02 - Minimum Design Loads for Building and Other Structures
- 1.3.5 American Society of Heating, Refrigerating and Air Conditioning Engineers, Inc. (ASHRAE):
- .1 Chapter 45 - 2003 Handbook, HVAC Applications
 - .2 Chapter 7 - 2001 Fundamentals handbook, Sound-Vibration
 - .3 Chapter 32 - 2001 Fundamentals handbook, Duct Design
 - .4 Chapter 18 - 1992 HVAC System and Equipment handbook, Fans
- 1.3.6 American Society for Testing and Materials (ASTM):
- .1 E330-02 - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylight and Curtain Walls by Uniform Static Air Pressure Difference
- 1.3.7 National Fire Protection Association (NFPA)

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- .1 70 - National Electrical Code
- .2 90A-02 - Standard for the Installation of Air-Conditioning and Ventilating Systems
- .3 92A-06 - Recommend Practice for Smoke-Control System
- .4 92B-05 - Standard for Smoke Management System in Malls, Atria, and Large Areas
- .5 96-04 - Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations
- 1.3.8 Occupational Safety and Health Administration (OSHA):
 - .1 1910.212 - General requirements for Machine Guarding
 - .2 1910.219 - General requirements for guarding safe use of mechanical power transmission apparatus
 - .3 1926.300 - General requirements for safe operation and maintenance of hand and power tools
- 1.3.9 Underwriters Laboratories (UL):
 - .1 507 - Electric Fans
 - .2 555 - Fire Dampers
 - .3 555S - Smoke Dampers
 - .4 705 - Standard Power Ventilators
 - .5 762 - Standard Power Roof Ventilators for Restaurant Exhaust Appliances
 - .6 793 - Snow Load

1.4 System Description

- 1.4.1 Performance Requirements:
 - .1 Catalogued or published ratings for manufactured items: obtained from tests carried out by manufacturer or those ordered by manufacturer from independent testing agency signifying adherence to codes and standards in force.
 - .2 Capacity: flow rate, static pressure, bhp W, efficiency, revolutions per minute, power, model, size, sound power data and as indicated on schedule.
 - .3 Fans: statically and dynamically balanced, constructed in conformity with AMCA 99.
 - .4 Sound ratings: comply with AMCA 301, tested to AMCA 300. Supply unit with AMCA certified sound rating seal.
 - .5 Performance ratings: based on tests performed in accordance with ANSI/AMCA 210. Supply unit with AMCA certified rating seal, except for propeller fans smaller than 300 mm diameter.

1.5 Submittals

- 1.5.1 Product Data:
 - .1 Submit manufacturer's printed product literature, specifications and datasheet in accordance with Section 01 33 00 Submittal Procedures. Include product characteristics, performance criteria, and limitations.
- 1.5.2 Shop Drawings:

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- .1 Submit shop drawings and product data in accordance with Section 01 33 00 Submittal Procedures.
- .2 Provide:
 - .1 Fan performance curves showing point of operation, BHP and efficiency.
 - .2 Sound rating data at point of operation.
 - .3 Indicate:
 - .4 Motors, sheaves, bearings, shaft details.
 - .5 Minimum performance achievable with variable speed controllers and variable inlet vanes as appropriate.
 - .6 Quality assurance submittals: submit following in accordance with Section 01 33 00 Submittal Procedures.
 - .7 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
 - .8 Instructions: submit manufacturer's installation instruction

1.6 Closeout Submittals:

- 1.6.1 Provide operation and maintenance data for incorporation into manual specified in Section 01 78 00 Closeout Submittals.

1.7 Acoustical Performance

- 1.7.1 Acoustical performance shall be established by AMCA standard 330, ASHRAE Standard 68 or ARI 260P procedures. Sound data shall be supplied that meets or exceeds requirements indicated on schedules. (Data that is presented in sones or Bels is not acceptable.

1.8 Quality Assurance

- 1.8.1 Performance ratings: Conform to AMCA standard 211 and 311. Fans must be tested in accordance with ANSI/AMCA Standard 210-99 and AMCA Standard 300-96 in an AMCA accredited laboratory. Fans shall be certified to bear the AMCA label for air and sound performance seal.
- 1.8.2 Classification for Spark Resistant Construction Conform to AMCA 99
- 1.8.3 Each fan shall be given a balancing analysis which is applied to wheels at the outside radius. The maximum allowable static and dynamic imbalance is 0.05 ounces (Balance grade of G6.3)
- 1.8.4 Comply with the National Electrical Manufacturers Association (NEMA), standards for motors and electrical accessories.
- 1.8.5 The High Wind models shall be analyzed and stamped by a state license P.E. to the ASCE 7-02 Standard which meets the IBC, Florida and Miami- Dade codes.
- 1.8.6 Each High Wind model is subject to be certified by a third party to the ASTM E330 Static Pressure Difference Standard.
- 1.8.7 All High Wind models shall be analyzed using Computational Fluid Dynamics (CFD). The CFD simulates the flow of high speed (150MPH) winds over the surface of objects.

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- 1.8.8 The Finite Element Analysis (FEA) is the results from the CFD and it can accurately predict the stress, strain, and deflection resulting from high wind loads

1.9 Maintenance

- 1.9.1 Provide maintenance materials in accordance with Section 01 78 00 Close Out submittals. and section 23 05 00. '
- 1.9.2 Furnish list of individual manufacturer's recommended spare parts for equipment, include:
- .1 Bearings and seals.
 - .2 Addresses of suppliers.
 - .3 List of specialized tools necessary for adjusting, repairing or replacing.
 - .4 Spare Parts
 - .5 Provide one spare set of V belts for each fan provided.

1.10 Delivery, Storage, and Handling

- 1.10.1 Packing, shipping, handling and unloading:
- 1.10.2 Deliver, store and handle in accordance with manufacturer's written requirements.
- 1.10.3 Deliver, store and handle materials in accordance with manufacturer's written instructions.

1.11 Warranty

- 1.11.1 Manufacturer's Warranty: Submit, for Agency's acceptance, manufacturer's standard warranty document executed by authorized company official. Manufacturer's warranty is in addition to, and not a limitation of, other rights Agency may have under Contract Documents
- .1 The warranty of this equipment is to be free from defects in material and workmanship for a period of one year from the purchase date. Any units or parts which prove defective during the warranty period will be replaced at the Manufacturers option when returned to Manufacturer, transportation prepaid.
 - .2 Motor Warranty is warranted by the motor manufacturer for a period of one year. Should motors furnished by us prove defective during this period, they should be returned to the nearest authorized motor service station.

2. PRODUCTS

2.1 Warranty

- 2.1.1 Manufacturer's Warranty: Submit, for Agency's acceptance, manufacturer's standard warranty document executed by authorized company official. Manufacturer's warranty is in addition to, and not a limitation of, other rights Agency may have under Contract Documents
- .1 The warranty of this equipment is to be free from defects in material and workmanship for a period of one year from the

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purchase date. Any units or parts which prove defective during the warranty period will be replaced at the Manufacturers option when returned to Manufacturer, transportation prepaid.

- .2 Motor Warranty is warranted by the motor manufacturer for a period of one year. Should motors furnished by us prove defective during this period, they should be returned to the nearest authorized motor service station.

2.2 Belt Drive Sidewall Exhaust Fans

2.2.1 General Description:

- .1 Fan arrangement shall be either supply or exhaust, see Fan Schedule
- .2 Sidewall mounted applications
- .3 Performance capabilities up to 53,200 cubic feet per minute (cfm) and static pressure to 1 inches of water gauge
- .4 Fans are available in eight sizes with nominal wheel diameters ranging from 20 inches through 60 inches (20 - 60 unit sizes)
- .5 Maximum continuous operating temperature 130 Fahrenheit (54.4 Celsius)
- .6 Each fan shall bear a permanently affixed manufacture's engraved metal nameplate containing the model number and individual serial number.

2.2.2 Propeller

- .1 Material type: steel blades and hubs
- .2 Securely attached to fan shaft by welding or with standard square key and set screw or tapered bushing.
- .3 Statically and dynamically balanced in accordance with AMCA Standard 204-05
- .4 The propeller and fan inlet will be matched and shall have precise running tolerances for maximum performance and operating efficiency.

2.2.3 Motors:

- .1 AC Induction Motor
 - .1 Motor Enclosure: Open drip proof (ODP) - opening in the frame body and or end brackets.
 - .2 Motors are permanently lubricated, heavy duty ball bearing type to match with the fan load and pre-wired to the specific voltage and phase.
 - .3 Accessible for maintenance

2.2.4 Shafts and Bearings:

- .1 Fan shaft shall be ground and polished solid steel with an anti-corrosive coating.
- .2 Permanently sealed bearings or pillow block ball bearings
- .3 Bearing shall be selected for a minimum L10 life in excess of 100,000 hours (equivalent to L50 average life of 500,000 hours), at maximum cataloged operating speed.
- .4 Bearings are 100 percent factory tested.
- .5 Fan Shaft first critical speed is at least 25 percent over

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- maximum operating speed.
- 2.2.5 Drive Frame:
 - .1 Drive frame assemblies shall be galvanized steel, and bolted construction.
 - .2 Drive frame shall have formed channels and fan panels shall have pre-punched mounting holes, formed flanges and a deep formed one piece inlet venturi.
- 2.2.6 Vibration Isolation:
 - .1 Double studded or pedestal mount true isolators.
 - .2 No metal-to-metal contact.
 - .3 Sized to match the weight of each fan.
- 2.2.7 Disconnect Switches:
 - .1 NEMA rated: NEMA 1: indoor application no water. Factory standard.
 - .2 Positive electrical shut-off
 - .3 Wired from fan motor to junction box installed within motor compartment.
- 2.2.8 Drive Assembly
 - .1 Belts, pulleys, and keys oversized for a minimum of 150 percent of driven horsepower.
 - .2 Belts: Static free and oil resistant
 - .3 Fully machined cast iron type, keyed and securely attached to the wheel and motor shafts.
 - .4 The motor pulley shall be adjustable for final system balancing.
 - .5 Readily accessible for maintenance
- 2.2.9 Options/Accessories:
 - .1 Birdscreen:
 - .1 Material Type: Galvanized
 - .2 Protects fan discharge.
 - .2 Dampers
 - .1 Gravity Type
 - .2 Prevents outside air from entering back into the building when fan is off.
 - .3 Galvanized frames with pre-punched mounting holes

3. EXECUTION

3.1 Manufacturer's Instructions

- 3.1.1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheet.

3.2 Fan Installation

- 3.2.1 Install fans system as indicated on the Installation, Operation and Maintenance Manual (IOM) and contract drawings.
- 3.2.2 Install fans in accordance with manufacturer's instructions.
- 3.2.3 Provide sheaves and belts required for final air balance.
- 3.2.4 Bearings and extension tubes to be easily accessible.
- 3.2.5 Install fan restraining snubbers as indicated. Flexible connections

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shall not be in tension during running. Provide all sheaves and belts required for final air balance.

3.3 Anchor Bolts and Templates

- 3.3.1 Size anchor bolts to withstand seismic acceleration and velocity forces as specified.

3.4 Adjusting

- 3.4.1 Adjust exhaust fans to function properly.
- 3.4.2 Adjust Belt Tension
- 3.4.3 Lubricate bearings.
- 3.4.4 Adjust drive for final system balancing.
- 3.4.5 Check wheel overlap

3.5 Cleaning

- 3.5.1 Proceed in accordance with Section 01 74 00 - Cleaning.
- 3.5.2 Upon completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

3.6 Protection

- 3.6.1 Protect installed product and finished surfaces from damage during construction.
- 3.6.2 Protect installed exhaust fans to ensure that, except for normal weathering, fans will be without damage or deterioration at time of substantial completion.

END OF SECTION

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Division 23, Specifications, Section 23 51 00, Generator Exhaust Systems

1. GENERAL

1.1 SUMMARY

1.1.1 Related Requirements

- .1 Section 23 05 00 Common Work Requirements.

1.2 REFERENCES

1.2.1 Sheet Metal and Air Conditioning Contractors National Association (SMACNA)

1.2.2 Underwriters' Laboratories of Canada (ULC)

1.2.3 Health Canada/Workplace Hazardous Materials Information System (WHMIS)

- .1 Material Safety Data Sheets (MSDS).

1.3 ACTION AND INFORMATIONAL SUBMITTALS

1.3.1 Product Data:

- .1 Submit manufacturer's printed product literature, specifications and datasheet in accordance with Section 01 33 00 - Submittal Procedures and Section 23 05 00 - Common Work Results for HVAC. Include product characteristics, performance criteria, and limitations.

1.3.2 Shop Drawings:

- .1 Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures and Section 23 05 00 - Common Work Results for HVAC.
 - .1 Submit drawings stamped and signed by professional engineer registered or licensed in Province of Ontario.

1.3.3 Indicate following:

- .1 Methods of sealing sections.
- .2 Methods of expansion.
- .3 Details of thimbles.
- .4 Bases/Foundations.
- .5 Supports.
- .6 Guy details.
- .7 Rain caps.

1.3.4 Closeout Submittals

- .1 Submit operation and maintenance data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

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1.4 QUALITY ASSURANCE

1.4.1 Regulatory Requirements: work to be performed in compliance with CEPA, CEEA, TDGA, and applicable Provincial /Territorial regulations.

1.4.2 Certificates:

.1 Catalogued or published ratings: obtained from tests carried out by independent testing agency or manufacturer signifying adherence to codes and standards.

1.5 DELIVERY, STORAGE AND HANDLING

1.5.1 Packing, shipping, handling and unloading:

1.5.2 Waste Management and Disposal:

1.5.3 Construction/Demolition Waste Management and Disposal: separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

1.6 WARRANTY

1.6.1 The manufacturer shall warranty the chimney for fifteen (15) years from date of delivery for functional failure and failure due to condensate in the vent system. See manufacturer's warranty for details.

1.6.2 The sizing of the complete vent system shall be guaranteed by the manufacturer and a copy of the sizing calculations submitted to the engineer for review and approval prior to the contractor placing an order and release.

1.6.3 4The manufacturer shall submit a venting drawing for approval showing all vent system components. The contractor must position all venting components, equipment, water and gas piping to accommodate the vent system design.

2. PRODUCTS

2.1 GENERATOR EXHAUST

2.1.1 Scope

.1 The pre-fabricated chimney, breeching and components shall be listed as an Industrial Chimney by Intertek in the United States and Canada according to UL/ULC standard for use with medium heat equipment firing gas, liquid or solid fuels, as described in NFPA 37 and NFPA 211, which

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produce exhausted flue gases at a maximum temperature of 1400°F under continuous firing.

- .2 The chimney shall be listed for temperatures of 1400°F under continuous firing and 1400°F in brief forced firing according to UL-103, ULC-S604, and ULC/ORD-C959.
- .3 The factory built breeching system shall be made in accordance with NFPA 211. This stack system shall be designed and installed to be gas tight. It shall be listed by Intertek in accordance with UL103 to withstand up to 60-inch internal water column pressure.

2.2 CONSTRUCTION

- 2.2.1 Each CIX section shall be made of two steel cylinders separated by 2 inch of high temperature fiber insulation. The published clearance of 1 inch to combustible shall be the result of UL/ULC standard.
- 2.2.2 The inner wall (flue) shall be constructed from 304 or 316 stainless steel, 0.035 inch thick. The outer wall (casing) shall be constructed from galvalume, 304 stainless or 316 stainless steel, 0.018- inch-thick for diameter 5 inch to 24 inch and 0.024 inch for diameter 26 inch to 36 inch.
- 2.2.3 Non-stainless steel surfaces exposed outside shall be protected by a minimum of one base coat of primer and one finish coat of corrosion resistant paint suitable for high temperature. All primer and paint must be supplied by the contractor and shall be equivalent to series 4100 or 9400 as manufactured by Rust-Oleum. An outer wall made of 304 or 316 stainless steel doesn't need to be painted.
- 2.2.4 The inner wall (flue) shall be laser or plasma welded.
- 2.2.5 All section joints shall be self-centering to ensure proper spacing between the inner wall (flue) and the outer wall (casing).
- 2.2.6 All section joints are connected and sealed with factory supplied locking bands at the outer wall (casing) only. Use appropriate sealant as specified in the manufacturer's installation manual.
- 2.2.7 The chimney shall be designed to compensate for thermal expansion.

2.3 MANUFACTURERS

- 2.3.1 Specification requirements shall be met by using Security Chimneys Secure Stack Models CIX exhaust flue or approved equal. Equivalent

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submittals shall demonstrate that the alternate material is in compliance with all specification requirements.

3. EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

- 3.1.1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheet.

3.2 INSTALLATION

- 3.2.1 All section joins are held in place by one mechanical locking band and sealed with appropriate sealant.
- 3.2.2 For Positive Pressure applications, apply the sealant as recommended by the manufacturer's installation instructions and recommendations.
- 3.2.3 When installed according to the manufacturer's installation instructions, the chimney and its supporting system shall resist side loads at least 1.5 times the weight per foot of piping.
- 3.2.4 All 90° turns shall be made by using two 45° elbows. Entrance of each riser from the boilers to the horizontal breeching and the breeching to the entrance of the chimney shall be made using a 45° elbow and tee 45°. The 45° tee at the base of the chimney shall have a drain type tee cap.
- 3.2.5 The entire stack system from the appliance to the termination, including all accessories, except as noted, shall be from one manufacturer.
- 3.2.6 Roof/Wall penetrations shall be suitable for the specified roof construction and shall comply with the manufacturer's installation instructions.

3.3 CLEANING

- 3.3.1 Proceed in accordance with Section 01 74 00 - Cleaning.
- 3.3.2 Upon completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

END OF SECTION

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Division 26, Specifications, Section 26 05 00, Common Work Results for Electrical

1. GENERAL

1.1 Related Requirements

1.1.1 This Section covers items common to Sections of Division 26. This section supplements the requirements of Division 1, Division 22, Division 23, Division 28.

1.2 References (Latest Revisions)

1.2.1 Canadian Standards Association (CSA International)

.1 CSA C22.2 No. 61010-1.

.2 CAN/CSA-C22.3 No. 1, Overhead Systems.

.3 CAN3-C235-83, Preferred Voltage Levels for AC Systems, 0 to 50,000 V.

1.2.2 Institute of Electrical and Electronics (IEEE)/National Electrical Safety Code Product Line (NESC)

.1 IEEE SP1122-2000, The Authoritative Dictionary of IEEE Standards Terms, 7th Edition.

1.2.3 Provincial Electrical Safety Code latest version

1.2.4 Provincial Building Code latest version

1.3 Definitions

1.3.1 Electrical and electronic terms: unless otherwise specified or indicated, terms used in these specifications, and on drawings, are those defined by IEEE SP1122-2000.

1.4 Design Requirements

1.4.1 Operating voltages: to CAN3-C235.

1.4.2 Motors, electric heating, control and distribution devices and equipment to operate satisfactorily at 60 Hz within normal operating limits established by above standard.

1.4.3 Equipment to operate in extreme operating conditions established in above standard without damage to equipment.

1.4.4 Language operating requirements: provide identification labels for control items in English.

1.5 Submittals

1.5.1 Submittals: in accordance with Division 01 – General Requirements.

1.5.2 The Contractor is required to make submissions as follows:

.1 Prepare a schedule of shop drawings, not later than four weeks after the award of the Contract, indicating drawing submission and equipment delivery dates.

.2 Allow 7 working days for review by our office.

.3 Submit data on originals or good clear photocopies applicable only to equipment or systems being supplied. Do not submit general data covering a range of products. Clearly mark or highlight items being supplied, normal and optional accessories.

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- .4 Faxed copies of shop drawings will NOT be acceptable.
- .5 Shop Drawings shall clearly indicate the identification number used on the drawings or schedules. In addition, the materials and/or equipment being supplied require accurate dimensions, capacity, operating characteristics and performance data as described in the specifications and listed in equipment schedules.
- .6 Submit complete packages by system (i.e. all panel boards, starters, conduits) and including all necessary information to allow for complete review of submitted shop drawings and associated system.
- .7 Shop Drawings being submitted where the size, capacity or voltage are different from the specified piece of equipment, the specified data and alternate data must be highlighted on the front cover sheet.
- .8 "Resubmit" Shop Drawings or Shop Drawings requiring additional information will have to be forwarded or returned to our office in a timely fashion to allow time for review again, along with revised scheduling or delivery date changes as a result of having to provide additional information or resubmission.
- .9 Shop Drawings shall be accompanied by a completed copy of the attached "Shop Drawing Submittal Sheet". The submittal sheet shall be used for stamping by the Contractors and Consultants.
- .10 Shop Drawings must bear the stamp and signature of the submitting Sub-Contractor as well as the General Contractor to indicate that the Shop Drawings or Catalogue Cuts are in conformance with all requirements of the drawings, that they have coordinated this equipment with other equipment which is related and/or connected and that they have verified all dimensions to ensure the proper installation of equipment including recommended service space and without interference with the work of other trades. Ensure that mechanical and electrical co-ordination is complete before submitting drawings for review. Incomplete or improperly submitted shop drawings will be rejected.
- .11 In addition to project identification, date, etc., the form of stamp used in drawings review will contain the following format:
 - .1 Drawing: Review
 - .2 Reviewed As Modified
 - .3 Revise and Re Submit
 - .4 Not Reviewed
- .12 This stamp to be applied by the Consultant to each and every shop drawing.

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- .13 This review by the Consultant is for the sole purpose of ascertaining conformance with the design concept. This review shall not mean that the Consultant approved the detail design inherent in the shop drawings, responsibility for which to remain with the Contractor, and such review shall not relieve the Contractor of responsibility for errors or omissions in the shop drawings or responsibility for meeting all requirements of the contract documents. The Contractor is responsible for dimensions to be confirmed and correlated at the job site, for information that pertains solely to fabrication processes or to techniques of construction and installation and for co-ordination of the work of other interfacing Trades as well as compliance with codes and requirements of Authorities.
- .14 Samples:
 - .1 Submit samples representative of material to be delivered to site if requested by Engineer including but not limited to:
 - .1 Lighting Fixtures
 - .2 Exit Lights
 - .3 Wires and Cables
 - .4 Connectors and Terminations
 - .5 Outlet Boxes
 - .6 Cable Trays
 - .7 Modular Wiring System
 - .8 Identification and equipment tag samples
 - .9 Other items as requested by the Consultant
- .15 Co-ordination/Installation Drawings:
 - .1 The Contractor is required to prepare drawings in conjunction with all other trades concerned, showing sleeves and openings for passage through structure and all inserts, equipment bases and supports, and relate these to suitable grid lines and elevation datum.
 - .2 Prepare co-ordination drawings for all areas where the work of other Divisions 22, 23, 26 and/or 28 could conflict with and/or obstruct the work of other trades and/or other Sections of this Division. Submit drawings for review by the Consultant.
- .16 Shop drawings and product data accompanied by:
 - .1 Detailed drawings of bases, supports and anchor bolts.
 - .2 Acoustical sound power data, where applicable.
 - .3 Points of operation on performance curves.
 - .4 Manufacturer to certify current model production.
 - .5 Certification of compliance to applicable codes.
- .17 In addition to transmittal letter referred to in Division 01 – General Requirements:
 - .1 Identify section and paragraph number.

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- .2 Closeout Submittals:
 - .1 Provide operation and maintenance data for incorporation into manual specified in Division 01 – General Requirements.
- .3 Operation and maintenance manual approved by, and final copies deposited with, Engineer before final inspection.
- .4 Operation data to include:
 - .1 Control schematics for systems including environmental controls.
 - .2 Description of systems and their controls.
 - .3 Description of operation of systems at various loads together with reset schedules and seasonal variances.
 - .4 Operation instruction for systems and component.
 - .5 Description of actions to be taken in event of equipment failure.
 - .6 Component schedule and single line diagram.
 - .7 Colour coding chart.
- .5 Maintenance data to include:
 - .1 Servicing, maintenance, operation and trouble-shooting instructions for each item of equipment.
 - .2 Data to include schedules of tasks, frequency, tools required and task time.
- .6 Performance data to include:
 - .1 Equipment manufacturer's performance datasheets with point of operation as left after commissioning is complete.
 - .2 Equipment performance verification test results.
 - .3 Special performance data as specified.
 - .4 Testing and Commissioning Reports
- .7 Approvals:
 - .1 Submit required copies of draft Operation and Maintenance Manual to Departmental Representative and Engineer for approval.
 - .2 Submit required copies of draft Operation and Maintenance Manual to Agency Representative and Engineer for approval. Submission of individual data will not be accepted.
 - .3 Make changes as required and re-submit as directed by Agency Representative and Engineer.
- .8 Additional data:
 - .1 Prepare and insert into operation and maintenance manual additional data when need

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- for it becomes apparent during specified demonstrations and instructions.
- .9 Site records:
 - .1 Consultant will provide 1 set of reproducible electrical drawings. Provide sets of white prints as required or each phase of work. Mark changes as work progresses and as changes occur. Include changes to existing electrical systems, control systems and low voltage control wiring.
 - .2 Transfer information weekly to reproducible, revising reproducible to show work as actually installed.
 - .3 Use different colour waterproof ink for each service.
 - .4 Make available for reference purposes and inspection.
 - .10 As-built drawings:
 - .1 Prior to start of Testing and Commissioning finalize production of as-built drawings.
 - .2 Identify each drawing in lower right hand corner in letters at least 12 mm high as follows: - "AS BUILT DRAWINGS: THIS DRAWING HAS BEEN REVISED TO SHOW ELECTRICAL SYSTEMS AS INSTALLED" (Signature of Contractor) (Date).
 - .3 Submit to Engineer for approval and make corrections as directed.
 - .4 Perform testing and commissioning using asbuilt drawings.
 - .5 Submit completed reproducible as-built drawings with Operating and Maintenance Manuals.
 - .11 Submit copies of as-built drawings for inclusion in final Commissioning report in accordance with Division 01 – General Requirements.

1.6 Quality Assurance

- 1.6.1 Quality Assurance: in accordance with Section 01 45 00 - Quality Control.
- 1.6.2 Qualifications: electrical Work to be carried out by qualified, licensed electricians or apprentices in accordance with authorities having jurisdiction as per the conditions of Province Act respecting manpower vocational training and qualification.

1.7 Delivery, Storage and Handling

- 1.7.1 Material Delivery Schedule: provide Contractor with schedule within 2 weeks after award of Contract.

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1.8 System Start-Up

- 1.8.1 Instruct Consultant and operating personnel in operation, care and maintenance of systems, system equipment and components.
- 1.8.2 Arrange and pay for services of manufacturer's factory service engineer to supervise start-up of installation, check, adjust, balance and calibrate components and instruct operating personnel.
- 1.8.3 Provide these services for such period, and for as many visits as necessary to put equipment in operation and ensure that operating personnel are conversant with aspects of its care and operation.

1.9 Operating Instructions

- 1.9.1 Provide for each system and principal item of equipment as specified in technical sections for use by operation and maintenance personnel.
- 1.9.2 Operating instructions to include following:
 - .1 Wiring diagrams, control diagrams, and control sequence for each principal system and item of equipment.
 - .2 Start up, proper adjustment, operating, lubrication, and shutdown procedures.
 - .3 Safety precautions.
 - .4 Procedures to be followed in event of equipment failure.
 - .5 Other items of instruction as recommended by manufacturer of each system or item of equipment.
- 1.9.3 Print or engrave operating instructions and frame under glass or in approved laminated plastic.
- 1.9.4 Post instructions where directed.
- 1.9.5 For operating instructions exposed to weather, provide weather-resistant materials or weatherproof enclosures.
- 1.9.6 Ensure operating instructions will not fade when exposed to sunlight and are secured to prevent easy removal or peeling.

2. PRODUCTS

2.1 Access Panels and Doors

- 2.1.1 All access panels and/or doors to facilitate the maintenance and/or servicing of all electrical equipment installed in concealed spaces shall be provided.
- 2.1.2 Record drawings to indicate the location of these panels and doors.
- 2.1.3 Doors and panels in fire-rated enclosures shall be ULC listed sandwich doors and shall have the same rating as the enclosure.
- 2.1.4 Doors shall have concealed hinges and screwdriver operated lock.

2.2 Materials and Equipment

- 2.2.1 Material and equipment to be CSA certified. Where CSA certified material and equipment are not available, obtain special approval from authority having jurisdiction before delivery to site and submit such approval as described in 1.5 – SUBMITTALS.
- 2.2.2 Factory assemble control panels and component assemblies.

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2.3 Electric Motors, Equipment and Controls

- 2.3.1 Verify installation and co-ordination responsibilities related to motors, equipment and controls, as indicated (if applicable).
- 2.3.2 Control wiring and conduit: in accordance with Section 26 29 03 - Control Devices except for conduit, wiring and connections below 50 V which are related to control systems specified in mechanical sections (if applicable).

2.4 Warning Signs

- 2.4.1 Warning Signs: in accordance with requirements of Consultant.
- 2.4.2 Porcelain enamel signs, minimum size 175 x 250 mm]

2.5 Wiring Terminations

- 2.5.1 Ensure lugs, terminals, screws used for termination of wiring are suitable for either copper or aluminum conductors.

2.6 Equipment Identification

- 2.6.1 Identify electrical equipment with nameplates as follows:
 - .1 Nameplates: plastic laminate 3 mm, matt white finish face, black core, mechanically attached with self tapping screws.
 - .2 Sizes as follows:

NAMEPLATE SIZES			
Size 1	10x50 mm	1 line	3 mm high letters
Size 2	12x70mm	1 line	5 mm high letters
Size 3	12x70mm	2 lines	3 mm high letters
Size 4	20x90mm	1 line	8 mm high letters
Size 5	20x90mm	2 lines	5 mm high letters
Size 6	25x100mm	1 line	12 mm high letters
Size 7	25x100mm	2 lines	6 mm high letters

- 2.6.2 Labels: embossed plastic labels with 6 mm high letters unless specified otherwise.
- 2.6.3 Wording on nameplates to be approved by Consultant prior to manufacture.
- 2.6.4 Allow for minimum of twenty-five (25) letters per nameplate.
- 2.6.5 Co-ordinate names of equipment and systems with mechanical sections when they are used in project, to ensure that identical names are used.
- 2.6.6 Nameplates for terminal cabinets and junction boxes to indicate system and/or voltage characteristics.
- 2.6.7 Identify equipment with Size 3 labels engraved as directed by Consultant.
- 2.6.8 Disconnects, starters and contactors: indicate equipment being controlled and voltage.
- 2.6.9 Terminal cabinets and pull boxes: indicate system and voltage.
- 2.6.10 Transformers: indicate capacity, primary and secondary voltages.

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2.7 Wiring Identification

- 2.7.1 Identify wiring with permanent indelible identifying markings, numbered, on both ends of phase conductors of feeders and branch circuit wiring.
- 2.7.2 Maintain phase sequence and colour coding throughout.
- 2.7.3 Colour coding: to CSA C22.1.
- 2.7.4 Use colour coded wires in communication cables, matched throughout system

2.8 Conduit and Cable Identification

- 2.8.1 Colour code conduits, boxes and metallic sheathed cables.
- 2.8.2 Code with plastic tape or paint at points where conduit or cable enters wall, ceiling, or floor, and at 15 m intervals.
- 2.8.3 Colours: 25 mm wide prime colour and 20 mm wide auxiliary colour.

	Prime	Auxiliary
Up to 250 V	Yellow	
Up to 600 V	Yellow	Green
Up to 5 kV	Yellow	Blue
Up to 15 kV	Yellow	Red
Telephone	Green	
Other Communication Systems	Green	Blue
Fire Alarm	Red	
Emergency Voice	Red	Blue
Other Security System	Red	Yellow

2.9 Finishes

- 2.9.1 Shop finish metal enclosure surfaces by application of rust resistant primer inside and outside, and at least two coats of finish enamel.

3. EXECUTION

3.1 Installation

- 3.1.1 Do complete installation in accordance with CSA C22.1 except where specified otherwise.
- 3.1.2 Do overhead and underground systems in accordance with CSA C22.3 No.1

3.2 Nameplates and Labels

- 3.2.1 Ensure manufacturer's nameplates, CSA labels and identification nameplates are visible and legible after equipment is installed.

3.3 Manufacturer's and CSA Labels

- 3.3.1 Equipment and material to be CSA-certified. Where there is no alternative to supplying equipment, which is not CSA-certified, special approval to be obtained from Electrical Inspection Department.

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3.4 Operation and Maintenance Manuals

- 3.4.1 Include the following information in the Operation and Maintenance manuals:
- .1 Names and address of local suppliers for the items included.
 - .2 Details of design elements, construction features, component function and maintenance requirements, to permit effective start-up, operation, maintenance, repair, modification, extension and expansion of any portion or feature of the installation.
 - .3 Technical data, product data, supplemented by bulletins, component illustrations, exploded views, technical descriptions of items and parts lists. Advertising or sales literature is not acceptable.
- 3.4.2 Review information provided in the maintenance instructions and manual with the Agency's operating personnel to ensure a complete understanding of the electrical equipment and systems and their operation.

3.5 Conduit and Cable Installation

- 3.5.1 Conduits and sleeves to be installed prior to pouring of concrete.
- .1 Sleeves through concrete: plastic, sized for free passage of conduit, and protruding 50mm.
- 3.5.2 Plastic sleeves to be removed before conduit installation if used in fire rated walls or floors.
- 3.5.3 Installation of cables, conduits and fittings to be embedded or plastered over, neatly and close to building structure so furring can be kept to minimum.

3.6 Construction Drawings

- 3.6.1 Fully dimensioned drawings to be prepared showing sleeves and openings through structure. Locations and weights on all load points to be indicated.
- 3.6.2 Prepare drawings of pits, curbs, sills, equipment bases, anchors, inertia slabs, etc.
- 3.6.3 Fully-dimensioned construction drawings of products and services in electrical rooms, service and ceiling spaces, and all other critical locations, to be prepared. Co-ordinate the Work with all other Divisions. Base drawings on reviewed shop drawings and indicate all details pertaining to access, clearances, cleanouts, sleeves, electrical connections, drain locations and elevations of pipes, ducts and conduits.
- 3.6.4 Construction/interference drawings to be submitted prior to commencement of work.
- 3.6.5 Construction drawings are prepared for construction and record purposes only and are not part of the contract documents or shop drawings.

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3.7 Cutting and Patching

- 3.7.1 All cutting and patching required for the installation of new equipment and surface restoration to be done after the removal of existing equipment. Materials equal to those comprising the surrounding area to be used for patching.
- 3.7.2 Be aware of fire-rated partitions, minimize the area affected by the work, and return all surfaces to condition encountered before the work.
- 3.7.3 Finished surfaces shall be painted to match adjacent surfaces.

3.8 Protection

- 3.8.1 Building and structure to be protected from damage due to carrying out this work.
- 3.8.2 All electrical work to be protected from damage. All equipment to be kept dry and clean at all times.
- 3.8.3 All openings in equipment and materials to be covered.

3.9 Demolition

- 3.9.1 All power and systems to be made safe and disconnected, as and when, and to the extent required, to facilitate with the demolition.
- 3.9.2 Ensure that all electrical, life safety services, and services for existing equipment, in areas outside the areas of this work, that are required to remain in service, shall do so.
- 3.9.3 Any electrical feeders or equipment that are required to remain in service, that are secured to existing walls, floors or ceilings to be demolished or that are buried and required to be excavated for new work are to be relocated.
- 3.9.4 Any electrical equipment on walls or ceilings that will be demolished and rebuilt to be removed and replaced.
- 3.9.5 When deleting and/or making safe existing electrical work, ensure that it includes all wiring back to the associated panel board or control panel.
- 3.9.6 Existing light fixtures, devices, outlets, etc. which are not to be reused are to be disconnected and removed. Such items shall be cartoned and turned over to the Agency at a place designated by the Agency. Unused raceway and outlets to be cut back and capped and remove unused wiring back to panel board in an approved manner.
- 3.9.7 All existing equipment, which is to be reused and/or relocated, to be thoroughly inspected and refurbished to ensure correct operation when put back into service and to meet OESC approval.
- 3.9.8 All existing electrical equipment which is no longer required shall be removed and disposed of off-site.
- 3.9.9 Work shall be carried out with a minimum of noise, dust and disturbance.

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- 3.9.10 Tools and clean up equipment shall be provided. Agency's permission shall be obtained for the use of electrical, plumbing or drainage outlets.
- 3.9.11 Daily clean-up and proper disposal of debris generated by daily operations shall be provided. On completion of the work, all tools, surplus materials and waste materials shall be removed, and the premises left in a clean, perfect condition.

3.10 Equipment Supports, Anchors and Hangers

- 3.10.1 All supports required for the erection and support of the electrical work shall be provided.
- 3.10.2 All suspended equipment shall be supported from the bottom.
- 3.10.3 All lintels shall be provided where required.
- 3.10.4 All hangers shall be suspended directly from the structure using approved inserts or beam clamps.
- 3.10.5 Pipe hooks, or perforated straps shall not be used.
- 3.10.6 Hangers shall be spaced such that there is a hanger within 610mm (24") of every bend and that the maximum spacing does not exceed the limits indicated in Provincial Hydro Electric Power Commission (HEPC) code.
- 3.10.7 Vertical pipes shall be supported at each floor slab and at the top and bottom of each riser.
- 3.10.8 All conduit or cable shall be supported at equipment mounted on spring isolators, with spring hangers for at least 4572mm.
- 3.10.9 Any conduits supported from ductwork, pipes, etc. shall not be allowed.

3.11 Expansion Joints and Loops

- 3.11.1 Expansion joints or loops in conduits crossing expansion joints in the structure shall be provided without imposing undue stress on structure, apparatus or conduit.

3.12 Finishes

- 3.12.1 Metal enclosure surfaces to be shop finished by application of rust resistant primer inside and outside, and at least two coats of finish enamel.
- 3.12.2 Surfaces of shop-painted equipment scratched or marred during shipment or installation, to be cleaned and touched up to match original paint.
- 3.12.3 Exposed non-galvanized hangers, racks and fastenings to be cleaned and primed to prevent rusting.

3.13 Firestopping

- 3.13.1 Firestopping and smoke seal to be provided where cable, bus ducts, cable tray or conduits pass through floors and fire-rated walls.

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3.14 Load Balance

- 3.14.1 Measure phase current to panelboards with normal loads operating at time of acceptance. Branch circuit connections to be adjusted as required to obtain best balance of current between phases and record changes.
- 3.14.2 Phase voltages to be measured at loads and adjust transformer taps to within 2% of rated voltage of equipment.
- 3.14.3 A report listing phase and neutral currents on panelboards, dry-core transformers and motor control centres, operating under normal load to be submitted at completion of work. Hour and date on which each load was measured, and voltage at time of test to be indicated

3.15 Location of Outlets

- 3.15.1 Locate outlets in accordance with Section 26 05 32 - Outlet Boxes, Conduit Boxes and Fittings.
- 3.15.2 Do not install outlets back-to-back in wall; allow minimum 150 mm horizontal clearance between boxes.
- 3.15.3 Change location of outlets at no extra cost or credit, providing distance does not exceed 3000 mm, and information is given before installation.
- 3.15.4 Locate light switches on latch side of doors.
- 3.15.5 Locate disconnect devices in mechanical and elevator machine rooms on latch side of floor.

3.16 Mounting Heights

- 3.16.1 Mounting height of equipment is from finished floor to centre line of equipment unless specified or indicated otherwise.
- 3.16.2 If mounting height of equipment is not specified or indicated, verify before proceeding with installation.
- 3.16.3 Install electrical equipment at following heights unless indicated otherwise:
 - .1 Local switches: 1100 mm.
 - .2 Wall receptacles:
 - .1 General: 500 mm.
 - .2 Above top of continuous baseboard heater: 200 mm.
 - .3 Above top of counters or counter splash backs: 175mm.
 - .4 In mechanical rooms: 1400 mm.
 - .3 Panelboards: as required by Code or as indicated.
 - .4 Telephone and interphone outlets: 500 mm.
 - .5 Wall mounted telephone and interphone outlets: 1100 mm.
 - .6 Fire alarm stations: 1100 mm.
 - .7 Fire alarm bells: 2100 mm.
 - .8 Television outlets: 500 mm.
 - .9 Wall mounted speakers: 2100 mm.
 - .10 Clocks: 2100 mm.
 - .11 Doorbell pushbuttons: 1100 mm.

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3.17 Co-Ordination of Protective Devices

- 3.17.1 Ensure circuit protective devices such as overcurrent trips, relays and fuses are installed to required values and settings.

3.18 Field Quality Control

3.18.1 Load Balance:

- .1 Measure phase current to panelboards with normal loads (lighting) operating at time of acceptance; adjust branch circuit connections as required to obtain best balance of current between phases and record changes.
- .2 Measure phase voltages at loads and adjust transformer taps to within 2% of rated voltage of equipment.
- .3 Provide upon completion of work, load balance report as directed in Section 1.5 SUBMITTALS: phase and neutral currents on panelboards, dry-core transformers and motor control centers, operating under normal load, as well as hour and date on which each load was measured, and voltage at time of test.

3.18.2 Conduct following tests in accordance with Section 26 08 00 – Commissioning.

- .1 Power generation and distribution system including phasing, voltage, grounding and load balancing.
- .2 Circuits originating from branch distribution panels.
- .3 Lighting and its control.
- .4 Motors, heaters and associated control equipment including sequenced operation of systems where applicable.
- .5 Systems: fire alarm system and communications.
- .6 Insulation resistance testing:
 - .1 Megger circuits, feeders and equipment up to 350 V with a 500 V instrument.
 - .2 Megger 350-600 V circuits, feeders and equipment with a 1000 V instrument.
 - .3 Check resistance to ground before energizing.

3.18.3 Carry out tests in presence of Consultant.

3.18.4 Provide instruments, meters, equipment and personnel required to conduct tests during and at conclusion of project.

3.18.5 Manufacturer's Field Services:

- .1 Obtain written report from manufacturer verifying compliance of Work, in handling, installing, applying, protecting and cleaning of product and submit Manufacturer's Field Reports as described in Section 1.5 - SUBMITTALS.
- .2 Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.

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- .3 Schedule site visits, to review Work, as directed in Section 1.6
- QUALITY ASSURANCE.

3.19 Record of Drawings

3.19.1 The Consultant shall provide the Contractor with two extra sets of white prints on which the contractor shall clearly mark, as the job progresses, all changes and deviations from that shown on contract drawings. Drawings shall be kept up-to-date during construction and in addition to field measurements shall include variation orders, field instructions and all other changes. After inspection and approval of service lines in trenches, the contractor shall take as-built measurements, including all depths, prior to backfilling operations. It will not be sufficient to check off line locations. Definite measurements shall be taken for each service line. The location of buried duct banks, etc. shall be shown on the drawings from fixed points. On completion of the building, the contractor shall forward to the Consultant the two sets of drawings indicating all such changes and deviations for review. Include in the tender price, the cost for the production of CAD CD record drawings by the Consultant's staff.

3.20 Single Line Electrical Diagrams

- 3.20.1 Single line electrical diagrams to be provided under Plexiglas.
- 3.20.2 Fire alarm riser diagram, plan and zoning of building shall be provided under Plexiglas at fire alarm control panel and annunciator.
- 3.20.3 Drawings: 610mm x 610mm minimum size.
- 3.20.4 Single line diagram show adheres to IEEE 315 graphics and IOs CAD standard

3.21 Tags and Directory

- 3.21.1 After finished painting is completed, each main feeder cable and conduit service to be identified. Locate identification:
 - .1 Behind each access door.
 - .2 At each change of direction and at junction boxes.
 - .3 At not more than 12 meters apart in straight runs of exposed conduit, but on both sides of sleeves.
 - .4 At not more than 12 meters apart in straight runs of conduit behind removable enclosures such as lay in type ceiling, cut on both sides of sleeves.
- 3.21.2 Stencils and stencil paint, or lemuroid plates, to be used on all conduit and ductwork.
- 3.21.3 Use letters a minimum of 25mm high.
- 3.21.4 The identification shall describe system voltage and services; e.g. "120/208 Volt lighting fed from panel 2A".
- 3.21.5 Conduits and outlet boxes for the various systems shall be identified by the use of distinctive colour paints. Colour for each system shall match the existing colour code on site. In the event that there is no

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existing colour code for a particular system on site, the following colours shall be used subject to approval from the Agency:

- .1 120/208 Volt System – Yellow
- .2 Telephone Conduit System – Green
- .3 Intercom and Low Voltage Signal Systems – Black
- .4 Emergency System – Orange

- 3.21.6 All equipment to be identified with lamacoid plastic plates, white background with black engraved letters 6mm (¼") high. An itemized list of all name tag wording to be submitted to Agency for approval.
- 3.21.7 Lighting and Power Panels: Plates to be mounted on door. Typical identification: "Lighting Panel 3A, 347/600 Volt, 3 Phase, 4-Wire". Identify source of power: "Supplied from Main Switchboard".
- 3.21.8 Disconnect Switches and Starters: Plates to be mounted externally on switch box cover. Typical Identification: "Fan S4, 208 Volt, 3 Phase".
- 3.21.9 Plates shall be installed after all painting has been completed and shall be secured with mechanical fastening devices, except on the inside of panel doors where gluing will be accepted.
- 3.21.10 Manufacturer's nameplate to be affixed to each item of all equipment showing the size, name of equipment, serial number and all information usually provided, including voltage, frequency, # of phases, horsepower, etc., and the name of the manufacturer and his address. Ensure that all stamped, etched and engraved lettering on plates is perfectly legible. Ensure that nameplates are not painted over. Where apparatus is to be concealed, attach the nameplate in an approved location on the equipment support or frame.
- 3.21.11 All equipment to be identified with the corresponding remote controls.
- 3.21.12 Panels and other apparatus which have exposed faces in finished areas are to be ensured to not have any visible trademarks or other identifying symbols. Nameplates to be mounted behind doors.
- 3.21.13 All outlet boxes provided in the ceiling space for future lighting and/or power connections shall be identified on the box cover with Brady selfsticking markers indicating circuits contained in the box.

3.22 Vibration Isolation

- 3.22.1 Vibration isolation control shall be provided as necessary so as to prevent transmission of objectionable vibration to the building structure, and from one area to another.
- 3.22.2 All steel bases and concrete inertia pads shall be provided. All bases to be installed to clear the sub base (housekeeping pads) by minimum 25mm for steel bases, and 50mm for concrete bases.
- 3.22.3 All floor mounted equipment shall be erected on 102mm high reinforced concrete pads. Concrete pads shall be of similar dimensions to that of the foot print of the equipment. Wherever vibrations eliminating devices and/or concrete inertia blocks are specified, these items shall, in all cases, be mounted upon the 102mm high reinforced concrete pads; unless specified to the contrary.

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3.22.4 All concrete foundations and supports shall be provided by this division. The contractor shall provide dimensioned drawings and details of all such work required and shall submit same to the Consultant for approval.

3.23 Wiring Terminations

3.23.1 Lugs, terminals, screws used for termination of wiring to be suitable for either copper or aluminum conductors.

3.24 Guarantee

3.24.1 The Contractor shall furnish a written guarantee, countersigned, stating that all work executed under this division will be free from defects of materials and workmanship for a period of one year from the date of final acceptance of this work. The above Contractor further agrees that he will, at his own expense, repair, and replace all such defective work, and all other work damaged during the process of repair during the term of the warranty period, except where damage is due to negligence on the part of the Agency.

3.24.2 All extended guarantees to be furnished for equipment requiring same in the specifications.

3.25 Completion

3.25.1 All fixtures and equipment shall be cleaned. All plated surfaces shall be polished.

3.25.2 All relays to be set to operating condition.

3.25.3 All temporary protection and covers to be removed.

3.25.4 Inside of switchgear, panelboards, motor control center, and fire alarm control panel and annunciators to be vacuum cleaned and ensured to be free from debris and dust.

3.25.5 All lamps to be changed, and to be new at time of system acceptance.

3.25.6 Leave electrical work in as new working order.

3.26 Cleaning

3.26.1 Clean and touch up surfaces of shop-painted equipment scratched or marred during shipment or installation, to match original paint.

3.26.2 Clean and prime exposed non-galvanized hangers, racks and fastenings to prevent rusting.

END OF SECTION

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Division 26, Specifications, Section 26 05 05, Selective Demolition for Electrical

1. GENERAL

1.1 Summary

1.1.1 This Section includes requirements for selective demolition and removal of electrical and communications components including removal of conduit, junction boxes, and panels to source home run removal and incidentals required to complete work described in this Section ready for new construction.

1.2 Definitions

1.2.1 Demolish: Detach items from existing construction and legally dispose of items off site, unless indicated as removed and salvaged, or removed and reinstalled.

1.2.2 Remove: Planned deconstruction and disassembly of electrical items from existing construction including removal of conduit, junction boxes, cabling and wiring from electrical component to panel taking care not to damage adjacent assemblies designated to remain; legally dispose of items off site, unless indicated as removed and salvaged, or removed and reinstalled.

1.2.3 Remove and Salvage: Detach items from existing construction and deliver them to Agency ready for reuse.

1.2.4 Remove and Reinstall: Detach items from existing construction, prepare them for reuse, and reinstall them where indicated.

1.2.5 Existing to Remain: Existing items of construction that are not removed and that are not otherwise indicated as being removed and salvaged, or removed and reinstalled.

1.2.6 Hazardous Substances: Dangerous substances, dangerous goods, hazardous commodities and hazardous products may include asbestos, mercury and lead, PCB's, poisons, corrosive agents, flammable substances, radioactive substances, or other material that can endanger human health or wellbeing or environment if handled improperly as defined by Federal Hazardous Products Act (RSC 1985) including latest amendments.

1.3 Action and Informational Submittals

1.3.1 Action Submittals: Provide in accordance with Section 01 33 00– Submittal Procedures before starting work of this Section.

1.4 Administrative Requirements

1.4.1 Coordination: Coordinate work of this Section to avoid interference with work by other Sections.

1.5 Site Conditions

1.5.1 Existing Conditions: Condition of materials identified as being salvaged or demolished are based on their observed condition at time of site examination before construction.

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- 1.5.2 Existing Hazardous Substances: Agency performed a hazardous substances assessment, and it is not expected that hazardous substances will be encountered in Work.
- 1.5.3 Discovery of Hazardous Substances: It is not expected that Hazardous Substances will be encountered in Work; immediately notify Consultant if materials suspected of containing hazardous substances are encountered and perform following activities:
 - .1 Hazardous substances will be as defined in Hazardous Products Act.
 - .2 Stop work in area of suspected hazardous substances.
 - .3 Take preventative measures to limit users' and workers' exposure, provide barriers and other safety devices and do not disturb.
 - .4 Hazardous substances will be removed by Agency under a separate contract or as a change to Work.
 - .5 Proceed only after written instructions have been received from Consultant.

2. PRODUCTS

2.1 Not Used Repair Materials

- 2.1.1 General Patching and Repair Materials:
- 2.1.2 Electrical Repair Materials: Use only new materials, CSA or ULC labelled as appropriate and matching components remaining after work associated with components identified for removal or demolition are completed.
- 2.1.3 Firestopping Repair Materials: Use firestopping materials compatible with existing firestopping systems where removal or demolition work affects rated assemblies, restore to match existing fire rated performance.

2.2 Salvage and Debris Materials

- 2.2.1 Material: Demolished materials become Contractor's property and will be removed from Project site; except for items indicated as being reused, salvaged, reinstalled, or otherwise indicated to remain Agency's property.
- 2.2.2 Salvaged Materials: Carefully remove materials designated for salvage and store in a manner to prevent damage or devaluation of materials and as follows:
 - .1 Leave main electrical distribution panel in place; panel can be used for temporary construction power for this and subsequent contracts in accordance with Section 01 51 00– Temporary Utilities; coordinate temporary power connections with.
 - .2 Leave main telephone terminal backboard in place; panel can be used for temporary construction telephone system for this and subsequent contracts in accordance with Section 01 51

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00– Temporary Utilities; coordinate temporary telephone connections with.

3. EXECUTION

3.1 Examination

- 3.1.1 Verification of Existing Conditions: Visit site, thoroughly examine and become familiar with conditions that may affect work of this Section before Construction Bid; Agency will not consider claims for extras for work or materials necessary for proper execution and completion of contract that could have been determined by a site visit.

3.2 Preparation

- 3.2.1 Protection of Existing Systems to Remain: Protect systems and components indicated to remain in place during selective demolition operations and as follows:
- .1 Prevent movement and install bracing to prevent settlement or damage of adjacent services and parts of existing buildings scheduled to remain.
 - .2 Notify Consultant and cease operations where safety of buildings being demolished, adjacent structures or services appears to be endangered and await additional instructions before resuming demolition work specified in this Section.
 - .3 Prevent debris from blocking drainage inlets.
 - .4 Protect mechanical systems that will remain in operation.
- 3.2.2 Protection of Building Occupants: Sequence demolition work so that interference with use of the building by Agency and users is minimized and as follows:
- .1 Prevent debris from endangering safe access to and egress from occupied buildings.
 - .2 Notify Consultant and cease operations where safety of occupants appears to be endangered and await additional instructions before resuming demolition work specified in this Section.

3.3 Execution

- 3.3.1 Removal and Demolition:
- .1 Disconnect electrical circuits and panel feeders; maintain electrical service and main distribution panel as is, ready for subsequent Work.
 - .2 Remove and reuse existing luminaires, electrical devices and equipment including associated conduits, boxes, wiring, and similar items unless specifically noted otherwise.
 - .3 Disconnect and remove communication systems including associated conduits, boxes, cabling, and similar items unless specifically noted otherwise.

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- .4 Disconnect and remove telephone outlets, associated conduit, cabling and sub terminal backboards and related accessories; maintain telephone service and main terminal backboard as is.
- .5 Perform demolition work in a neat and workmanlike manner:
 - .1 Remove tools or equipment after completion of work and leave site clean and ready for subsequent renovation work.
 - .2 Repair and restore damages caused as a result of work of this Section to match existing materials and finishes.
- .6 Disconnect panel feeders back to main distribution panel and re label respective circuit breaker as "SPARE".
- .7 Place weatherproof blank cover plates on exterior outlet boxes remaining after demolition and removal activities.
- .8 Remove existing conduits, boxes, cabling and wiring associated with removed luminaires, electrical devices and equipment.
- .9 Grind off conduits and make flush with surface of concrete where conduits are cast into concrete; seal open ends of conduit with silicone sealant and leave in place.
- .10 Seal open ends of conduit with silicone sealant and leave in place where they are inaccessible or cannot be removed without damaging adjacent construction.

3.4 Closeout Activities

- 3.4.1 Demolition Waste Disposal: Arrange for legal disposal and remove demolished materials to accredited provincial landfill site or alternative disposal site (recycle centre).

END OF SECTION

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Division 26, Specifications, Section 26 05 14, Power Cable and Overhead Conductors (1001V)

1. GENERAL

1.1 Related Requirements

1.1.1 Section 26 05 00.

1.2 References (Latest Revisions)

1.2.1 Canadian Standards Association (CSA International)

.1 CSA-C22.2 No. 131, Type TECK 90 Cable.

.2 CAN/CSA-C61089, Round Wire Concentric Lay Overhead Electrical Stranded Conductors.

1.2.2 National Electrical Manufacturers' Association (NEMA)/Insulated Cable Engineers Association (ICEA)

.1 ICEA S-93-639/NEMA WC74, 5-46 KV Shielded Power Cable for Use in the Transmission and Distribution of Electrical Energy.

1.3 Action and Informational Submittals

1.3.1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures and Section 23 05 00 - Common Work Results for HVAC.

1.3.2 Provide product data in accordance with Section 01 33 00 - Submittal Procedures] and Section 23 05 00 - Common Work Results for HVAC.

.1 Provide manufacturer's printed product literature, specifications, data sheet and include product characteristics, performance criteria, physical size, finish and limitations.

1.3.3 Quality assurance submittals: submit following in accordance with Section 01 45 00 - Quality Control.

.1 Manufacturer's Instructions: submit manufacturer's installation instructions and special handling criteria, installation sequence, cleaning procedures and maintenance.

1.4 Delivery, Storage and Handling

1.4.1 Deliver, store and handle materials in accordance with manufacturer's written instructions.

2. PRODUCTS

2.1 PVC Insulated Power Cables (1001- 5000 V)

2.1.1 Conductors: stranded copper, size and configuration as indicated on drawings.

2.1.2 Insulation: cross-linked polyethylene compound rated RW90 or RWU90 as required depending on location.

2.1.3 Cable jacket: thermosetting with separator tape between shield and jacket.

2.1.4 Class 2 compact round.

2.1.5 Insulation: PVC 1 kV voltage level.

2.1.6 Extruded PVC jacket rated minus 40 degrees C.

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3. EXECUTION

3.1 Installation

- 3.1.1 Install grounding in accordance with local inspection authority having jurisdiction.
- 3.1.2 Provide cable identification tags and identify each phase conductor of power cable.

3.2 Field Quality Control

- 3.2.1 Perform tests in accordance with Section 26 05 00 - Common Work Results for Electrical.
- 3.2.2 Use of qualified tradespersons for installation, splicing, termination and testing of high voltage power cables.
- 3.2.3 Engage an independent testing agent to test high voltage power cable. Submit test result and inspection certificate.

END OF SECTION

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Division 26, Specifications, Section 26 05 20, Wire and Box Connectors 0-1000V

1. GENERAL

1.1 Related Requirements

1.1.1 Section 26 05 00.

1.2 References (Latest Revisions)

1.2.1 Canadian Standards Association (CSA International)

.1 CAN/CSA-C22.2 No.18, Outlet Boxes, Conduit Boxes, Fittings and Associated Hardware.

.2 CSA C22.2 No.65, Wire Connectors.

1.2.2 National Electrical Manufacturers Association (NEMA)

1.2.3 Provincial Building Code

1.2.4 Provincial Electrical Code (Adopted CSA C22.1-18)

2. PRODUCTS

2.1 Materials

2.1.1 Pressure type wire connectors to: CSA C22.2 No.65, with current carrying parts of copper sized to fit copper conductors as required.

2.1.2 Fixture type splicing connectors to: CSA C22.2 No.65, with current carrying parts of copper conductors 10 AWG or less.

2.1.3 Bushing stud connectors to consist of:

.1 Connector body and stud clamp for round copper conductors tube.

.2 Clamp for round copper conductors.

.3 Stud clamp bolts.

.4 Sized for conductors' tubes as indicated.

3. EXECUTION

3.1 Remove Insulation Carefully from Ends of Conductors and:

3.1.1 Apply coat of zinc joint compound on aluminum conductors prior to installation of connectors.

3.1.2 Install mechanical pressure type connectors and tighten screws with appropriate compression tool recommended by manufacturer. Installation shall meet secureness tests in accordance with CSA C22.2 No.65.

3.1.3 Install fixture type connectors and tighten. Replace insulating cap.

3.1.4 Install bushing stud connectors.

END OF SECTION

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Division 26, Specifications, Section 26 05 21, Wires and Cables Up To 1000V

1. GENERAL

1.1 Product Data

1.1.1 Submit product data in accordance with Section 26 05 00.

1.2 Standards

- 1.2.1 CAN/CSA-C22.2 No.0.3, Test Methods for Electrical Wires and Cables
- 1.2.2 CAN/CSA-C22.2 No.18, Outlet Boxes, Conduit Boxes, Fittings and Associated Hardware.
- 1.2.3 CAN/CSA-C22.2 No.38, Thermoset-Insulated Wires and Cables
- 1.2.4 CAN/CSA-C22.2 No.51, Armoured Cables
- 1.2.5 CSA C22.2 No.65, Wire Connectors.
- 1.2.6 CSA C22.2 No.75, Thermoplastic-Insulated Wires and Cables
- 1.2.7 CSA C22.2 No.65, Wire Connectors.
- 1.2.8 CSA C22.2 No. 131 Type TECK 90 Cable All cables installed in areas requiring fire rating shall conform to test FT-4.
- 1.2.9 OESC (Electrical Safety Code) - latest version.

1.3 Submittals

- 1.3.1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures and Section 23 05 00 - Common Work Results for HVAC and Section 26 05 00 – Common Work Results for Electrical.
- 1.3.2 Product Data:
 - .1 Provide manufacturer's printed product literature, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.
 - .2 Provide shop drawings: in accordance with Section 01 33 00 - Submittal Procedures and Section 23 05 00 - Common Work Results for HVAC and Section 26 05 00 – Common Work Results for Electrical.

2. PRODUCTS

2.1 Armored Cables TECK90

- 2.1.1 Cable: to CAN/CSA-C22.2 No.131.
- 2.1.2 Type to be TECK90, multiple conductors with annealed, Class B stranded copper conductors, 600V/1000V rating for minimum #12 AWG and larger, of the size as indicated on drawings.
- 2.1.3 Grounding: An uninsulated Class B stranded copper conductors included in cable assembly.
- 2.1.4 Insulation: Cross-Linked Polyethylene rated for 90°C.
- 2.1.5 Armour: Aluminum or galvanized steel interlocking armor for mechanical protection.
- 2.1.6 Inner Jacket: Polyvinyl Chloride (PVC)

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- 2.1.7 Outer Jacket: Polyvinyl Chloride (PVC) heat-, flame- and moisture-resistant jacket rated -40°C, the standard color is black but colored jackets will be provided on request.
- 2.1.8 Temperature rating: Operational from -40°C to +90°C, for wet or dry conditions.
- 2.1.9 Environmental & Installation Characteristics:
 - .1 Direct burial.
 - .2 Indoor & outdoor use: UV-resistance jacket.
 - .3 Chemical resistance: resists oil, acids and corrosive substances
 - .4 Flexible & Easy to install: Interlocked armor provides strength with flexibility.

2.2 Armored Cables AC90

- 2.2.1 Cable: to CSA C22.2 No 51
- 2.2.2 Conductors: RW90 insulated copper, multi-conductor, with solid, annealed commercial grade 98 percent conductivity tinned copper conductors or stranded copper conductors. 600V/1000V rating for minimum size #12 and larger, complete with green insulated ground wire. Size of conductors, as indicated on drawings.
- 2.2.3 Insulation: Cross-Linked Polyethylene.
- 2.2.4 Armour: interlocking metal armor for mechanical protection and flexibility.
- 2.2.5 Temperature rating: Operational from -40°C cold bend to +90°C dry locations.
- 2.2.6 Environmental & Installation Characteristics:
 - .1 Dry locations where mechanical protection is required.
 - .2 Suitable for concealed or exposed installations.
 - .3 Can be installed on cable trays, open runs, or secured to surfaces.

2.3 Building Wires

- 2.3.1 Conductors:
 - .1 Copper conductors, of the size as indicated on drawings, having a minimum conductivity of 98 percent.
 - .2 Copper conductors: Stranded for 12 AWG and larger, with 1000 V insulation for 347/600 Volt systems, and 600 V insulation for 120/208 V systems, of chemically cross-linked thermosetting polyethylene material rated RW90.

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- .3 Use RWU90 to CSA C22.2 No. 38 for wiring installed underground, outdoors and in humid areas.
- .4 Conductors shall be minimum No. 12 AWG, size conductor for maximum 2% voltage drop to the furthest outlet on a fully loaded branch circuit.
- .5 Minimum wire size shall be No. 12 AWG. Home runs to lighting and receptacle panels which exceed 24 m (80') in length shall be minimum No. 10 AWG. Home runs which exceed 40 m (120') in length shall be minimum No. 8 AWG. Home runs which exceed 60 m (180') in length shall be minimum 6 AWG.
- .6 Conductors shall be colour coded. Conductors No. 10 AWG and smaller shall have colour impregnated into insulation at time of manufacture. Conductors No. 8 AWG and larger may be colour coded with adhesive colour coding tape, but only black insulated conductors shall be employed in this case, except for neutrals which shall be white wherever possible.
- .7 Colour coding shall be as follows: Red - Phase A, Black - Phase B, Blue - Phase C, White - Neutral, Green - Ground, Orange - Control.
- .8 Insulation: RW90 unless RWU90 is specified.
- 2.3.2 Manufacturers: Acceptable manufacturers are:
 - .1 General Cable
 - .2 South Wire
 - .3 Nexans

2.4 Control Cables

- 2.4.1 300 V control cable: Stranded annealed copper conductors sized as indicated, with XPLE insulation with a shielding of 100% coverage of aluminum polyester tape and drain wire over each group and over all conductors.
- 2.4.2 Jacket: FT4 Flame Retardant PVC or FT6 Plenum rated in open style cable trays in floor void spaces
- 2.4.3 Armour: Steel (No armour required if installed in conduit or approved wireway)
- 2.4.4 300 V cables shall conform to CSA standards CAN 3-C21.2 M86.
- 2.4.5 Custom control cables shall be designed and assembled in the configurations as indicated.
- 2.4.6 Each conductor shall be black and number coded, pairs shall be black and white and number coded.
- 2.4.7 Manufacturers: Acceptable manufacturers are:
 - .1 Canada Wire and Cable Limited.
 - .2 Pirelli.
 - .3 Belden.
 - .4 Shaw flex Inc.

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Division 26, Specifications, Section 26 05 21, Wires and Cables Up To 1000V

3. EXECUTION

3.1 General

- 3.1.1 Install grounding, grounded and neutral conductors without any fuses, switches or breakers of any kind unless otherwise indicated.
- 3.1.2 Ground the grounded or neutral conductor at the source of supply as indicated and isolate the grounded or neutral conductor at all other locations.
- 3.1.3 Do not use any grounded or neutral conductors as a grounding conductor.
- 3.1.4 Do not use any grounding conductor as a grounded or neutral conductor.
- 3.1.5 Do not splice any wiring in any raceway. Make splices only at junction boxes.
- 3.1.6 Provide sufficient slack at the connection points of conductors to permit proper connections to be made.
- 3.1.7 Do not install any conductors in any raceway until the raceway is complete and cleared of all obstructions.
- 3.1.8 Install all conductors in conduit at the same time taking care not to twist the conductors.
- 3.1.9 Use wire pulling lubricants that will not shorten the life of the insulation.
- 3.1.10 Do not install any wires or cables at temperatures above or below those which will cause damage to the wires or cables.

3.2 Installation of Building Wires

- 3.2.1 Install wiring as follows:
 - .1 In conduit systems in accordance with Section 26 05 32.

3.3 Installation of Armoured cables

- 3.3.1 Install cables as indicated.
- 3.3.2 Terminate cables in accordance with Section 26 05 20.

3.4 Installation of Control Cables

- 3.4.1 Install control cables, as indicated in conduit and in cable-troughs.
- 3.4.2 Ground individual pair control cable shields at the supply and only unless otherwise indicated.
- 3.4.3 Ground the overall control cable shields at both ends.

END OF SECTION

**NEW GENERATOR INSTALLATION AT PEEL YOUTH VILLAGE
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Division 26, Specifications, Section 26 05 22, Connectors and Terminations

1. GENERAL

1.1 Related Requirements

- 1.1.1 Section 01 33 00 – Submittal Procedures.
- 1.1.2 Section 26 05 33 – Raceway and Boxes for Electrical Systems.

1.2 References (Latest Revisions)

- 1.2.1 Canadian Standards Association (CSA International)
 - .1 CSA C22.2 No.41, Grounding and Bonding Equipment.

1.3 Product Data

- 1.3.1 Submit product data in accordance with Section 01 33 00 - Submittal Procedures and Section 23 05 00 - Common Work Results for HVAC.

1.4 Certificates

- 1.4.1 Obtain inspection certificate of compliance covering high voltage stress coning from inspection authority and include it with maintenance manuals.

2. PRODUCTS

2.1 Connectors and Terminators

- 2.1.1 Copper compression connectors to CSA C22.2 No. as required sized for conductors.
- 2.1.2 Contact aid for aluminum cables where applicable.
- 2.1.3 4-way joint boxes dry location type in accordance with Section 26 05 32 - Outlet Boxes Conduit Boxes and Fittings.

3. EXECUTIONS

3.1 Installation

- 3.1.1 Install stress cones, terminations, and splices in accordance with manufacturer's instructions.
- 3.1.2 Bond and ground as required to CSA C22.2 No.41.

END OF SECTION

**NEW GENERATOR INSTALLATION AT PEEL YOUTH VILLAGE
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Division 26, Specifications, Section 26 05 28, Grounding - Secondary

1. GENERAL

1.1 Related Requirements

1.1.1 Section 26 05 00.

1.2 References (Latest Revisions)

1.2.1 American National Standards Institute (ANSI)/Institute of Electrical and Electronics Engineers (IEEE)

.1 ANSI/IEEE 837, Qualifying Permanent Connections Used in Substation Grounding.

1.2.2 Canadian Standards Association, (CSA International)

1.2.3 Ontario Electrical Safety Code

1.2.4 Ontario Building Code

1.3 Additional References for Health Care Facilities (Latest Revisions)

1.3.1 CAN/CSA Z32, Electrical Safety and Essential Electrical Systems in Health Care Facilities.

2. PRODUCTS

2.1 Equipment

2.1.1 Clamps for grounding of conductor: size as required to electrically conductive underground water pipe.

2.1.2 Copper conductor: minimum 6 m long for each concrete encased electrode, bare, stranded, tinned, soft annealed, size.

2.1.3 Grounding conductors: bare stranded copper, tinned, soft annealed, size

2.1.4 Insulated grounding conductors: green, type 6 mm².

2.1.5 Ground bus: copper, size, complete with insulated supports, fastenings, connectors.

2.1.6 Non-corroding accessories necessary for grounding system, type, size, material as indicated, including but not necessarily limited to:

.1 Grounding and bonding bushings.

.2 Protective type clamps.

.3 Bolted type conductor connectors.

.4 Thermit welded type conductor connectors.

.5 Bonding jumpers, straps.

.6 Pressure wire connectors.

3. EXECUTION

3.1 Installation General

3.1.1 Install complete permanent, continuous grounding system including, conductors, connectors, accessories, as indicated, to conform to requirements of local authority having jurisdiction over installation.

3.1.2 Install connectors in accordance with manufacturer's instructions.

3.1.3 Protect exposed grounding conductors from mechanical injury.

3.1.4 Use mechanical connectors for grounding connections to equipment provided with lugs.

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- 3.1.5 Soldered joints not permitted.
- 3.1.6 Install bonding wire for flexible conduit, connected at both ends to grounding bushing, solderless lug, clamp or cup washer and screw. Neatly cleat bonding wire to exterior of flexible conduit.
- 3.1.7 Install flexible ground straps for bus duct enclosure joints, where such bonding is not inherently provided with equipment.
- 3.1.8 Install grounding resistance bank.
- 3.1.9 Connect building structural steel and metal siding to ground by welding copper to steel.
- 3.1.10 Make grounding connections in radial configuration only, with connections terminating at single grounding point. Avoid loop connections.
- 3.1.11 Ground secondary service pedestals.

3.2 Equipment Grounding

- 3.2.1 Install grounding connections to typical equipment included in, but not necessarily limited to following list. Service equipment, transformers, switchgear, duct systems, frames of motors, motor control centers, starters, control panels, building steel work, generators, elevators and escalators, distribution panels, outdoor lighting.

3.3 Grounding Bus

- 3.3.1 Ground bus: copper, [50 mm][2"] x [6 mm][¼"] thick complete with insulated supports, fastenings, connectors, length as indicated.
- 3.3.2 Ground items of electrical equipment in electrical room to ground bus with individual bare stranded copper connections size 2/0AWG.

3.4 Communication Systems

- 3.4.1 Install grounding connections for telephone, sound, fire alarm, intercommunication systems as follows:
- 3.4.2 Telephones: make telephone grounding system in accordance with telephone company's requirements.
- 3.4.3 Sound, fire alarm, intercommunication systems as indicated.

3.5 Field Quality Control

- 3.5.1 Perform tests in accordance with Section 26 05 00 - Common Work Results - Electrical.
- 3.5.2 Perform ground continuity and resistance tests using method appropriate to site conditions and to approval of Consultant and local authority having jurisdiction over installation.
- 3.5.3 Perform tests before energizing electrical system.
- 3.5.4 Disconnect ground fault indicator during tests.

END OF SECTION

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Division 26, Specifications, Section 26 05 29, Hangers and Supports for Electrical Systems

1. GENERAL

1.1 Related Requirements

- 1.1.1 Section 26 05 00 – Common Work Results for Electrical.
- 1.1.2 Section 23 05 29 - Hangers & Supports for HVAC Piping & Equipment
- 1.1.3 Section 23 05 48 - Vibration Isolation for HVAC Piping and Equipment

1.2 Related Work

- 1.2.1 This Specification Section forms part of the Contract Documents and is to be read, interpreted and coordinated with other parts.

1.3 Regulatory Requirements

- 1.3.1 Restraints shall meet the requirements of the District Standards, Provincial Building Code, National Building Code, Provincial Fire Code and National Fire Code.

1.4 Submittals

- 1.4.1 Submit shop drawings of restraining devices including details of attachment to structure, either tested in independent testing laboratory or approved by Ontario Registered Professional Engineer.
- 1.4.2 Proposed inserts or connections to structure to follow directions of project Structural Consultant.

1.5 Scope of Work

- 1.5.1 Provide restraint on hangers and supports for lighting fixtures, panelboards, fuse boxes, generator switchboard, pad-mounted and wall-mounted transformers, which is part of building electrical systems.
- 1.5.2 When equipment is mounted on concrete housekeeping pads and/or concrete curbs, the anchor bolts shall extend through the pad into structure.
- 1.5.3 It is responsibility of equipment Manufacturers to design equipment so that strength and anchorage of internal components of equipment exceeds force level used to restrain and anchor unit itself to supporting structure.

2. PRODUCTS

2.1 Support Channels

- 2.1.1 U shape, size 41 x 41 mm, 2.5 mm thick, surface mounted.

3. EXECUTION

3.1 Installation

- 3.1.1 Secure equipment to solid masonry, tile and plaster surfaces with lead anchors.
- 3.1.2 Secure equipment to poured concrete with expandable inserts.

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- 3.1.3 Secure equipment to hollow masonry walls or suspended ceilings with toggle bolts.
- 3.1.4 Secure surface mounted equipment with twist clip fasteners to inverted T bar ceilings. Ensure that T bars are adequately supported to carry weight of equipment specified before installation.
- 3.1.5 Support equipment, conduit or cables using clips, spring loaded bolts, cable clamps designed as accessories to basic channel members.
- 3.1.6 Fasten exposed conduit or cables to building construction or support system using straps.
 - .1 One-hole malleable iron straps to secure surface conduits and cables 50 mm and smaller.
 - .2 Two-hole steel straps for conduits and cables larger than 50 mm.
 - .3 Beam clamps to secure conduit to exposed steel work.
- 3.1.7 Suspended support systems.
 - .1 Support individual cable or conduit runs with 6 mm dia threaded rods and spring clips.
 - .2 Support 2 or more cables or conduits on channels supported by 6 mm dia threaded rod hangers where direct fastening to building construction is impractical.
- 3.1.8 For surface mounting of two or more conduits use channels at 0,2 m on centre spacing.
- 3.1.9 Provide metal brackets, frames, hangers, clamps and related types of support structures where indicated or as required to support conduit and cable runs.
- 3.1.10 Ensure adequate support for raceways and cables dropped vertically to equipment where there is no wall support.
- 3.1.11 Do not use wire lashing or perforated strap to support or secure raceways or cables.
- 3.1.12 Do not use supports or equipment installed for other trades for conduit or cable support except with permission of other trade and approval of Consultant.
- 3.1.13 Install fastenings and supports as required for each type of equipment cables and conduits, and in accordance with manufacturer's installation recommendations.

END OF SECTION

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Division 26, Specifications, Section 26 05 30, Wiring Methods

1. GENERAL

1.1 Reference

1.1.1 Common work results – Electrical: Section 26 05 01.

1.2 Related Work

1.2.1 Section 26 05 34 - Conduits, Conduit Fastenings and Fittings.

1.2.2 Section 26 05 43.01 - Concrete Encased Duct banks.

1.2.3 Section 26 05 21 - Wires and Cables up to 1000V.

1.2.4 Section 26 05 32 - Outlet Boxes, Conduit Boxes and Fittings.

1.2.5 Section 26 05 20 - Wire and Box Connectors up to 1000V.

1.2.6 Section 28 46 00 - Fire Detection and Alarm.

2. PRODUCTS

2.1 N/A

3. EXECUTION

3.1 General

3.1.1 General: All wiring shall be recessed when located in finished areas. Surface mounted conduit may be used in mechanical rooms, service spaces. Provide protection to conduits which may be subject to mechanical damage.

3.1.2 Main 600/347V and 120/208 V, 3-Phase 3 or 4-Wire Distribution:

.1 Type RW90 in conduit horizontally to main vertical busways;

.2 main mechanical systems feed – wire in conduit.

.3 Type TECK90 cable (including ground) run horizontally and vertically to equipment.

.4 All other feeders as detailed on drawings; wire in conduit.

3.1.3 Lighting branch circuits:

.1 The wiring method, final connection, and mounting shall be proposed by the contractor and submitted in wiring for each fixture type and mounting scenario. The contractor shall allow for the following:

.1 Branch circuit wiring to ceiling junction boxes – wire in conduit (EMT);

.2 AC90 cables shall only be used between ceiling junction boxes to light fixtures within 10 ft. (3 m).

3.1.4 Power branch circuits:

.1 The wiring method, final connection, and mounting shall be proposed by the contractor and submitted in wiring for wiring device type. The contractor shall allow for the following:

.1 Branch circuit wiring to ceiling junction boxes – wire in conduit (EMT);

.2 Junction box to general purpose receptacles where installed in interior partitions – AC90 (maximum 3.5 m down partition to receptacle).

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Division 26, Specifications, Section 26 05 30, Wiring Methods

- .3 Special purpose receptacles and connections (kitchen equipment, mechanical equipment, telecom equipment, etc.) – wire in conduit directly to the point of use. The contractor shall provide conduit one size larger than required by code.
 - .4 In block wall – wire in conduit (EMT). ENT will not be permitted for this use.
 - .5 In concrete floor slab – wire in conduit ENT may be used up to 1" (27mm). Rigid PVC shall be used for greater than 1-1/4" (35mm) and greater conduit sizes.
 - .6 Surface mounted in service spaces – wire in conduit (EMT).
 - .7 Surface mounted in regularly occupied areas – Wire in conduit EMT with rain-tight connectors.
 - .8 Surface mounted in finished areas – By approval only, wiremold.
- 3.1.5 Fire Alarm System:
- .1 Mineral insulated cable for all loops between data gathering panels and the fire alarm control panel as shown on drawings
 - .2 wire in conduit for all other loops and runs;
 - .3 flexible connections to supervised valves, pressure switches, flow switches, smoke dampers, etc.
- 3.1.6 Outside Plant Communication Systems:
- .1 Cable in conduit.
- 3.1.7 Vibrating Equipment:
- .1 Vibrating equipment includes: motors, transformers, pumps, solenoid valves, generators, or any equipment that is prone to vibration.
 - .2 Provide flexible connection by means of a minimum 300 mm of liquid tight flexible conduit.
- 3.1.8 Low Voltage Switching: Wire in conduit.
- 3.1.9 Site Lighting: Wire in conduit. For this purpose, use PVC conduit.

END OF SECTION

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Division 26, Specifications, Section 26 05 31, Splitters Junction Pull Box Cabinets

1. GENERAL

1.1 Related Requirements

1.1.1 Section 26 05 00.

1.2 References (Latest Revision)

1.2.1 Provincial Electrical Safety Code latest version

1.2.2 Provincial Building Code latest version

1.3 Action and Informational Submittals

1.3.1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures and Section 23 05 00 - Common Work Results for HVAC and Section 26 05 00 – Common Work Results for Electrical.

1.3.2 Product Data:

.1 Provide manufacturer's printed product literature, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.

.2 Provide shop drawings: in accordance with Section 01 33 00 - Submittal Procedures and Section 23 05 00 - Common Work Results for HVAC and Section 26 05 00 – Common Work Results for Electrical.

2. PRODUCTS

2.1 Splitters

2.1.1 Construction: sheet metal enclosure, welded corners and formed hinged cover suitable for locking in closed position.

2.1.2 Terminations: main and branch lugs to match required size and number of incoming and outgoing conductors as indicated.

2.1.3 Spare Terminals: minimum three spare terminals or lugs on each connection or lug block sized less than 25 A.

2.2 Cabinets

2.2.1 Existing

3. EXECUTION

3.1 Splitter Installation

3.1.1 Mount plumb, true and square to building lines.

3.1.2 Extend splitters full length of equipment arrangement except where indicated otherwise.

3.2 Junction, Pull Boxes and Cabinets Installation

3.2.1 Install pull boxes in inconspicuous but accessible locations.

3.2.2 Mount cabinets with top not higher than 2 m above finished floor except where indicated otherwise.

3.2.3 Install terminal block as indicated in Type T cabinets.

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- 3.2.4 Only main junction and pull boxes are indicated. Install additional pull boxes as required by CSA C22.1.

3.3 Identification

- 3.3.1 Equipment Identification: to Section 26 05 00 - Common Work Results for Electrical.
- 3.3.2 Identification Labels: size 2 indicating system name voltage and phase or as indicated.

END OF SECTION

**NEW GENERATOR INSTALLATION AT PEEL YOUTH VILLAGE
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Division 26, Specifications, Section 26 05 32, Outlet Boxes, Conduit Boxes and Fittings

1. GENERAL

1.1 Related Requirements

1.1.1 Section 26 05 00.

1.2 References (Latest Revisions)

1.2.1 Provincial Electrical Safety Code latest version

1.2.2 CSA-C22.2 No.18.1, Metallic Outlet Boxes

1.2.3 UL 514C, Non-Metallic Outlet Boxes, Flush Device Boxes and Covers

1.3 Action and Informational Submittals

1.3.1 Provide submittals in accordance with

.1 Section 01 33 00 - Submittal Procedures

.2 Section 23 05 00 - Common Work Results for HVAC

.3 Section 26 05 00 – Common Work Results for Electrical.

1.3.2 Submit samples for floor box in accordance with

.1 Section 01 33 00 - Submittal Procedures

.2 Section 23 05 00 - Common Work Results for HVAC

.3 Section 26 05 00 – Common Work Results for Electrical.

2. PRODUCTS

2.1 Outlet and Conduit Boxes General

2.1.1 Size boxes in accordance with CSA C22.1.

2.1.2 102 mm square or larger outlet boxes as required.

2.1.3 Gang boxes where wiring devices are grouped.

2.1.4 Blank cover plates for boxes without wiring devices.

2.1.5 120 V outlet boxes for 120 V switching devices.

2.1.6 Combination boxes with barriers where outlets for more than one system are grouped.

2.2 Coordination Of Outlet Box Locations

2.2.1 Locate as shown on the Drawings and as required to facilitate pulling.

2.2.2 Electrical box locations shown on the Drawings are approximate unless dimensioned. Verify location of floor boxes and outlets before roughing in.

2.2.3 Locate outlet boxes to allow access. If inaccessible, furnish, arrange, and pay for installation of access doors.

2.2.4 Coordinate Work of this section with the Work of other sections and trades to avoid conflicts. Check and verify door swings and

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Division 26, Specifications, Section 26 05 32, Outlet Boxes, Conduit Boxes and Fittings

locations of built-in cabinets, plumbing, heating, and ventilating equipment.

- 2.2.5 Install outlet boxes of sizes and at locations necessary to serve equipment furnished under this or other divisions of the specifications. Make final connections thereto. Outlet boxes required if equipment is furnished with pigtail for external connection, does not have space to accommodate branch circuit wiring, or requires wire with insulation rating different from branch circuit wiring. Review equipment Shop Drawings for required outlet locations.
- 2.2.6 Where more than one outlet box is shown on the Drawings, and indicated to be at same elevation or one above the other, align them exactly on center lines horizontally or vertically. Relocate outlet boxes which are not so installed (including lighting, receptacle, power, signal, and temperature control outlets) at no additional cost to the Agency.
- 2.2.7 Centered on Built-In Work: In the case of doors, cabinets, recessed or similar features, or where outlet boxes are centered between such features, such as between door jamb and cabinet, make these outlet box locations exact. Relocate outlet boxes which are not centered.
- 2.2.8 Flush mount boxes with front edge of box or plaster ring even with finished surface of wall and ceiling, except those mounted above accessible ceilings and where surface mounting is permitted.
- 2.2.9 Locate to maintain headroom and to present a neat appearance.
- 2.2.10 Route conduit from switch and receptacle boxes in walls vertically to space above ceiling. Install junction box before horizontal run.
- 2.2.11 Offset outlet boxes minimum of one stud horizontal separation between flush boxes mounted on opposite sides of acoustic rated common wall.
- 2.2.12 Install outlet boxes with minimum 6-inch horizontal separation between closest edges of flush boxes mounted on opposite sides of common wall.
- 2.2.13 Ceiling Locations: Locate outlet either at corner joint or in center of a panel, whichever is closer to normal spacing. Locate outlet boxes in same room in same panel locations.

2.3 Conduit Boxes

- 2.3.1 Cast FD aluminum boxes with factory-threaded hubs and mounting feet for surface wiring of devices.

2.4 Fittings General

- 2.4.1 Bushing and connectors with nylon insulated throats.
- 2.4.2 Knock-out fillers to prevent entry of debris.
- 2.4.3 Conduit outlet bodies for conduit up to 35mm and pull boxes for larger conduits.
- 2.4.4 Double locknuts and insulated bushings on sheet metal boxes.

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Division 26, Specifications, Section 26 05 32, Outlet Boxes, Conduit Boxes and Fittings

3. EXECUTION

3.1 Installation

- 3.1.1 Support boxes independently of connecting conduits.
- 3.1.2 Install all outlets flush.
- 3.1.3 Fill boxes with paper, sponges or foam or similar approved material to prevent entry of debris during construction. Remove upon completion of work.
- 3.1.4 For flush installations mount outlets flush with finished wall using plaster rings to permit wall finish to come within 6 mm of opening.
- 3.1.5 Provide correct size of openings in boxes for conduit, mineral insulated and armoured cable connections. Do not install reducing washers.
- 3.1.6 Vacuum clean interior of outlet boxes before installation of wiring devices.
- 3.1.7 Identify systems for outlet boxes as required.

END OF SECTION

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Division 26, Specifications, Section 26 05 33, Raceways and Boxes for Electrical Systems

1. GENERAL

1.1 Related Requirements

1.1.1 Section 26 05 00.

1.2 References

1.2.1 Canadian Standards Association (CSA International)

.1 CSA C22.2 No.40-M1989(R1999), Cutout, Junction and Pull Boxes.

1.3 Product Data

1.3.1 Submit product data in accordance with Section 01 33 00 - Submittal Procedures.

2. PRODUCTS

2.1 Junction Boxes Distribution Level

2.1.1 Welded steel rectangular boxes 6 mm thick painted with chromate primer and gray enamel with removable plate on front side, designed for through run of main cable and porcelain enclosed disconnecting branches of three single conductor cables, using pothead plug and socket disconnectors enclosed in porcelain tubes and caps, standard designed for no voltage disconnecting, and for wall mounting in manhole.

3. EXECUTION

3.1 Installation

3.1.1 Install splice boxes at cable joint, on floor of trench. Tighten armour clamps and fill with compound.

3.1.2 Install junction boxes on trench floor around cable splice to CSA C22.2 No.40. Connect cable terminals to box contacts. Fasten lid securely and check for air leaks before trench is backfilled.

3.1.3 Install distribution level steel boxes on walls of manholes. Splice main cable in box and connect branch feeder. Fasten cover and fill with compound.

3.1.4 Install power level boxes as follows:

.1 Cast iron type: on trench floor, connect cable terminals to box contacts, fasten lid and fill with compound before trench is backfilled.

.2 Steel type: mount on wall of manhole; connect cables to box terminals; install disconnect links, fasten lid securely.

END SECTION

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Division 26, Specifications, Section 26 05 34, Conduits, Conduit Fastenings and Conduit Fittings

1. GENERAL

1.1 Related Requirements

1.1.1 Section 26 05 00.

1.2 References (Latest Revisions)

1.2.1 Canadian Standards Association (CSA International)

- .1 CAN/CSA C22.2 No. 18, Outlet Boxes, Conduit Boxes, Fittings and Associated Hardware, A National Standard of Canada.
- .2 CSA C22.2 No. 45, Rigid Metal Conduit.
- .3 CSA C22.2 No. 56, Flexible Metal Conduit and Liquid-Tight Flexible Metal Conduit.
- .4 CSA C22.2 No. 83, Electrical Metallic Tubing.
- .5 CSA C22.2 No. 211.2, Rigid PVC (Unplasticized) Conduit.
- .6 CAN/CSA C22.2 No. 227.3, Nonmetallic Mechanical Protection Tubing (NMPT), A National Standard of Canada (February 2006).

1.3 Action and Informational Submittals

1.3.1 Provide submittals in accordance with

- .1 Section 01 33 00 - Submittal Procedures
- .2 Section 23 05 00 - Common Work Results for HVAC
- .3 Section 26 05 00 – Common Work Results for Electrical.

1.3.2 Product data: submit manufacturer's printed product literature, specifications and datasheets.

1.3.3 Quality assurance submittals:

- .1 Test reports: submit certified test reports.
- .2 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
- .3 Instructions: submit manufacturer's installation instructions.

1.4 Waste Management and Disposal

1.4.1 Deliver, store and handle materials in accordance with manufacturer's written instructions.

1.4.2 Place materials defined as hazardous or toxic waste in designated containers.

1.4.3 Ensure emptied containers are sealed and stored safely for disposal away from children.

1.5 Location Of Conduits

1.5.1 Drawings do not indicate all conduit runs. Those indicated are in diagrammatic form only.

1.5.2 Electrical Subcontractor shall produce layout sketches of conduit runs through mechanical and electrical service areas to avoid any conflict

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with other construction elements and to determine the most efficient route to run conduit.

2. PRODUCTS

2.1 Conduits

- 2.1.1 Rigid metal conduit: to CSA C22.2 No. 45, galvanized steel threaded.
- 2.1.2 Epoxy coated conduit: to CSA C22.2 No. 45, with zinc coating and corrosion resistant epoxy finish inside and outside.
- 2.1.3 Electrical metallic tubing (EMT): to CSA C22.2 No. 83, with couplings.
- 2.1.4 Rigid Polyvinyl Chloride (PVC) conduit: to CSA C22.2 No. 211.2.
- 2.1.5 Flexible metal conduit: to CSA C22.2 No. 56, liquid-tight flexible metal
- 2.1.6 FRE conduit: to CSA C22.2.
- 2.1.7 Flexible PVC conduit: to CAN/CSA-C22.2 No. 227.3.

2.2 Conduit Fastenings

- 2.2.1 One-hole steel straps to secure surface conduits 50 mm and smaller.
- 2.2.2 Two-hole steel straps for conduits larger than 50 mm.
- 2.2.3 Beam clamps to secure conduits to exposed steel work.
- 2.2.4 Channel type supports for two or more conduits at 1.5 m on center.
- 2.2.5 Threaded rods, 6 mm diameter, to support suspended channels.

2.3 Conduit Fittings

- 2.3.1 Fittings: manufactured for use with conduit specified. Coating: same as conduit.
- 2.3.2 Ensure factory "ells" where 90 degrees bends for 25 mm and larger conduits.
- 2.3.3 Watertight connectors and couplings for EMT.
- 2.3.4 Setscrews are not acceptable.

2.4 Expansion Fittings For Rigid Conduit

- 2.4.1 Weatherproof expansion fittings with internal bonding assembly suitable for 100 mm linear expansion.
- 2.4.2 Watertight expansion fittings with integral bonding jumper suitable for linear expansion and 19 mm deflection in all directions.
- 2.4.3 Weatherproof expansion fittings for linear expansion at entry to panel.

2.5 Fish Cord

- 2.5.1 Polypropylene.

3. EXECUTION

3.1 Manufacturer's Instructions

- 3.1.1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheets.

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3.2 Installation

- 3.2.1 Install conduits to conserve headroom in exposed locations and cause minimum interference in spaces through which they pass.
- 3.2.2 Conceal conduits except in mechanical and electrical service rooms and in unfinished areas.
- 3.2.3 Surface mount conduits except in finished areas or as indicated.
- 3.2.4 Use rigid hot dipped galvanized steel threaded conduit except where specified otherwise.
- 3.2.5 Use epoxy coated conduit underground and in corrosive areas.
- 3.2.6 Use electrical metallic tubing (EMT) where subject to mechanical injury.
- 3.2.7 Use rigid PVC conduit underground
- 3.2.8 Use flexible metal conduit for connection to motors in dry areas, to recessed lighting fixtures.
- 3.2.9 Use liquid tight flexible metal conduit for connection to motors or vibrating equipment in damp, wet or corrosive locations.
- 3.2.10 Fill with compound.
- 3.2.11 Minimum conduit size for lighting and power circuits: 21 mm.
- 3.2.12 Bend conduit cold. Replace conduit if kinked or flattened more than 1/10th of its original diameter.
- 3.2.13 Mechanically bend steel conduit over 19 mm diameter.
- 3.2.14 Field threads on rigid conduit must be of sufficient length to draw conduits up tight.
- 3.2.15 Install fish cord in empty conduits.
- 3.2.16 Remove and replace blocked conduit sections. Do not use liquids to clean out conduits.
- 3.2.17 Dry conduits out before installing wire.

3.3 Surface Conduits

- 3.3.1 Run parallel or perpendicular to building lines.
- 3.3.2 Group conduits wherever possible on suspended channels.
- 3.3.3 Do not locate conduits less than 75 mm parallel to steam or hot water lines with minimum of 25 mm at crossovers.

3.4 Concealed Conduits

- 3.4.1 Run parallel or perpendicular to building lines.
- 3.4.2 Do not install horizontal runs in masonry walls.

3.5 Cleaning

- 3.5.1 Proceed in accordance with Section 01 74 00 - Cleaning.
- 3.5.2 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

END OF SECTION

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Division 26, Specifications, Section 26 05 73, Overcurrent Protective Devices Coordination Study

1. GENERAL

1.1 Description

- 1.1.1 This section specifies the overcurrent protective device coordination study, related calculations and analysis, indicated as the study in this section.
- 1.1.2 A short-circuit and selective coordination study, and arc flash calculations and analysis shall be prepared for the electrical overcurrent devices to be installed under this project.
- 1.1.3 The study shall present a well-coordinated time current analysis of each overcurrent protective device from the individual device up to the utility source and the on-site generator sources.

1.2 References (Latest Revisions)

- 1.2.1 Institute of Electrical and Electronics Engineers (IEEE):
 - .1 IEEE 141 – Recommended Practice for Electric Power Distribution and Coordination of Industrial and Commercial Power Systems.
 - .2 IEEE 242 – Recommended Practice for Protection and Coordination of Industrial and Commercial Power Systems.
 - .3 IEEE 399 – Recommended Practice for Industrial and Commercial Power System Analysis.
 - .4 IEEE 241 – Recommended Practice for Electric Power Systems in Commercial Buildings.
 - .5 IEEE 1015 – Recommended Practice for Applying Low Voltage Circuit Breakers Used in Industrial and Commercial Power Systems.
 - .6 IEEE 1584 – IEEE Guide for Performing Arc Flash Hazard Calculations.
 - .7 IEEE 241 - Recommended Practice Electrical Systems in Commercial Buildings
 - .8 IEEE 242 - Recommended Practice for Protection and Coordination of Industrial and Commercial Power Systems
- 1.2.2 American National Standards Institute (ANSI):
 - .1 ANSI C57.12.00 – Standard General Requirements for Liquid-Immersed Distribution, Power, and Regulating Transformers.
 - .2 ANSI C37.13 – Standard for Low Voltage ac Power Circuit Breakers Used in Enclosures.
 - .3 ANSI C37.010 – Standard Application Guide for ac High Voltage Circuit Breakers Rated on a Symmetrical Current Basis.
 - .4 ANSI C37.41 – Standard Design Tests for High Voltage Fuses, Distribution Enclosed Single-Pole Air Switches, Fuse Disconnecting Switches and Accessories.
 - .5 ANSI C37.5 – Methods for Determining the rms Value of a Sinusoidal Current Wave and Normal-Frequency Recovery Voltage, and for Simplified Calculation of Fault Currents.

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- 1.2.3 Canadian Standards Association:
 - .1 CSA Z462-18, Workplace Electrical Safety
- 1.2.4 Provincial Electrical Safety Code, latest edition.

1.3 Quality Assurance

- 1.3.1 The study shall be prepared and performed by a registered professional electrical engineer licensed to practice in the province.

1.4 Submittals

- 1.4.1 Submit six copies of the following:
 - .1 Product data on the software program to be used for the study. Software shall be in mainstream use in the industry, shall provide device settings and ratings, and shall show selective coordination by time-current drawings.
 - .2 Complete study as described in paragraph 1.6. Submittal of the study shall be well-coordinated with submittals of the shop drawings for equipment in related specification sections.
 - .3 Certifications: Two weeks prior to final inspection, submit the following.
 - .1 Certification by the Contractor that the overcurrent protective devices have been set in accordance with the approved study.

1.5 Study Requirements

- 1.5.1 The study shall be in accordance with the latest IEEE and NFPA standards.
- 1.5.2 The study shall include one line diagram, short-circuit and ground fault analysis, protective coordination plots for all overcurrent protective devices, and arc flash calculations and analysis.
- 1.5.3 One Line Diagram:
 - .1 Show all electrical equipment and wiring to be protected by the overcurrent devices.
 - .2 Show the following specific information:
 - .1 Calculated fault impedance, X/R ratios, and short-circuit values at each feeder and branch circuit bus.
 - .2 Relay, circuit breaker, and fuse ratings.
 - .3 Generator kW/kVA and transformer kVA and voltage ratings, percent impedance, X/R ratios, and wiring connections.
 - .4 Voltage at each bus.
 - .5 Identification of each bus, matching the identification on the drawings.
 - .6 Conduit, conductor, and busway material, size, length, and X/R ratios.
- 1.5.4 Short-Circuit Study:

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- .1 The study shall be performed using computer software designed for this purpose. Pertinent data and the rationale employed in developing the calculations shall be described in the introductory remarks of the study.
 - .2 Calculate the fault impedance to determine the available short-circuit and ground fault currents at each bus. Incorporate applicable motor and/or generator contribution in determining the momentary and interrupting ratings of the overcurrent protective devices.
 - .3 Present the results of the short-circuit study in a table. Include the following:
 - .1 Device identification.
 - .2 Operating voltage.
 - .3 Overcurrent protective device type and rating.
 - .4 Calculated short-circuit current.
- 1.5.5 Selective Coordination Study:
- .1 Prepare the coordination curves to determine the required settings of overcurrent protective devices to demonstrate selective coordination. Graphically illustrate on log-log paper that adequate time separation exists between devices, including the utility company upstream device if applicable. Plot the specific time current characteristics of each overcurrent protective device in such a manner that all devices are clearly depicted.
 - .2 The following specific information shall also be shown on the coordination curves:
 - .1 Device identification.
 - .2 Potential transformer and current transformer ratios.
 - .3 Three phase and single phase ANSI damage points or curves for each cable, transformer, or generator.
 - .4 Applicable circuit breaker or protective relay characteristic curves.
 - .5 No damage, melting, and clearing curves for fuses.
 - .6 Transformer in-rush points.
 - .3 Develop a table to summarize the settings selected for the overcurrent protective devices. Include the following in the table:
 - .1 Device identification.
 - .2 Protective relay or circuit breaker potential and current transformer ratios, sensor rating, and available and suggested pickup and delay settings for each available trip characteristic.
 - .4 Fuse rating and type.
- 1.5.6 Arc Flash Calculations and Analysis:

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- .1 An incident energy study shall be done in accordance with the IEEE 1584-2004A, "IEEE Guide for Performing Arc Flash Hazard Calculations" as referenced in NFPA 70, "Standard for Electrical Safety in the Workplace", 2008 Revision, in order to quantify the hazard for selection of Personal Protective Equipment (PPE). Simply using the table values from NFPA 70E and assuming fault current levels and clearing times for proper PPE selection is not acceptable. The study author shall assist in selecting appropriate combinations of PPE prior to the final analysis and preparation of equipment
- .2 Arc flash warning labels shall comply with the requirements outlined in CSA Z462-18 and CSA C22.1.
- .3 Arc flash calculations shall be based on actual over-current protective device clearing time. Maximum clearing time shall be in accordance with IEEE 1584.
- .4 Arc flash analysis shall be based on the lowest clearing time setting of the over-current protective device to minimize the incident energy level without compromising selective coordination.
- .5 Arc flash boundary and available arc flash incident energy at the corresponding working distance shall be calculated for all electrical power distribution equipment specified in the project, and as shown on the drawings.
- .6 Required arc-rated clothing and other PPE shall be selected and specified in accordance with the latest CSA Z462-18.

1.6 Analysis

- 1.6.1 Analyze the short-circuit calculations, and highlight any equipment determined to be underrated as specified. Propose solutions to effectively protect the underrated equipment.

1.7 Adjustments, Settings, and Modifications

- 1.7.1 Final field settings and minor modifications of the overcurrent protective devices shall be made to conform with the study, without additional cost to the Government.

1.8 Report Sections

- 1.8.1 Input Data:
 - .1 Utility three-phase and line-to-ground available contribution with associated X/R ratios.
 - .2 Short-circuit reactance of rotating machines with associated X/R ratios.
 - .3 Cable type, construction, size, # per phase, length, impedance and conduit type.
 - .4 Bus duct type, size, length and impedance.

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- .5 Transformer primary & secondary voltages, winding configurations, kVA rating, impedance and X/R ratio.
- .6 Reactor inductance and continuous ampere rating.
- .7 Aerial line type, construction, conductor spacing, size, # per phase, and length.
- 1.8.2 Short-Circuit Data:
 - .1 Source fault impedance and generator contributions.
 - .2 X to R ratios.
 - .3 Asymmetry factors.
 - .4 Motor contributions.
 - .5 Short circuit kVA.
 - .6 Symmetrical and asymmetrical fault currents.
- 1.8.3 Recommended Protective Device Settings:
 - .1 Phase and Ground Relays:
 - .1 Current transformer ratio.
 - .2 Current setting.
 - .3 Time setting.
 - .4 Instantaneous setting.
 - .5 Specialty non-overcurrent device settings.
 - .6 Recommendations on improved relaying systems, if applicable.
 - .2 Circuit Breakers:
 - .1 Adjustable pickups and time delays (long time, short time, ground).
 - .2 Adjustable time-current characteristic.
 - .3 Adjustable instantaneous pickup.
 - .4 Recommendations on improved trip systems, if applicable.
 - .3 Incident energy level (calories/cm²) for each equipment location and recommended PPE.

END OF SECTION

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Division 26, Specifications, Section 26 08 00, Commissioning of Electrical Systems

1. GENERAL

1.1 Summary

- 1.1.1 The purpose of this section is to specify the electrical contractor's responsibilities in the commissioning process.
- 1.1.2 CES Engineering Ltd. – Commissioning Authority: CES Engineering Ltd. inhouse commissioning department, distinct from the design team will be responsible to manage and administrate the commissioning process on this project.
- 1.1.3 The list of commissioned equipment and systems is found in Section 01 91 13 Commissioning – General Requirements. Commissioning requires the participation of contractor to ensure that all systems are operating in a manner consistent with the Contract Documents. The general commissioning requirements and coordination are detailed in the same section.
- 1.1.4 Contractors shall be familiar with all parts of Section 01 91 13 Commissioning – General Requirements, 01 91 13.13 Commissioning Plan and 01 79 00.13 Commissioning – Demonstration and Training issued by the CA and shall execute all commissioning responsibilities assigned to them in the Contract Documents.
- 1.1.5 All inspections and field tests shall be in accordance with the latest edition of the following codes, standards, and specifications except as provided otherwise herein.
 - .1 ASHRAE Guideline 0, The Commissioning Process
 - .2 ASHRAE Guideline 1.1, HVAC&R Technical Requirements for the Commissioning Process
 - .3 ASHRAE 202-2013 Commissioning Process for Buildings and Systems
 - .4 InterNational Electrical Testing Association – NETA
 - .1 ANSI/NETA ETT Standard for Certification of Electrical Testing Technicians
 - .2 ANSI/NETA ATS Standard for Acceptance Testing Specifications for Electrical Power Equipment and Systems
 - .5 NECA 090-2004, Commissioning Building Electrical Systems
 - .6 NFPA 70E, Standard for Electrical Safety in the Workplace
 - .7 Occupational Safety and Health Act 29 CFR Part 1910
 - .8 Occupational Safety and Health Act 29 CFR Part 1926

1.2 Responsibilities

- 1.2.1 General
- 1.2.2 The responsibilities of the Project Manager, Construction manager, Architect, Mechanical and Electrical Consultants/Engineers (A/E), and Commissioning Authority in the commissioning process are provided in Section 01 91 13 General Commissioning Requirements.
 - .1 Include and itemize the cost of commissioning in the contract price as identified in section 01 91 13.

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- 1.2.3 Electrical Sub-Contract Trade(s): The commissioning responsibilities applicable to the electrical contractor are as follows (all references apply to commissioned equipment only):
- .1 Construction and Acceptance Phases:
 - .1 Test and commission the system listed in 01 91 13 and Part 3 of this specification.
 - .2 Include the cost of participating in the commissioning process as outlined in the specifications in the total contract price.
 - .3 All parties involved must be cognizant of industry-standard safety procedures. This document does not contain any procedures including specific safety procedures. It is recognized that an overwhelming majority of the tests and inspections recommended in these specifications are potentially hazardous. Individuals performing these tests shall be qualified and capable of conducting the tests in a safe manner and with complete knowledge of the hazards involved.
 - .4 In each purchase order or subcontract written, include requirements for submittal data, O&M data and training.
 - .5 Attend a commissioning scoping meeting and other necessary meetings scheduled by the CA to facilitate the Cx process.
 - .6 Contractors shall provide normal cut sheets and shop drawing submittals to the CA of commissioned equipment.
 - .7 Provide additional requested documentation, prior to normal O&M manual submittals, to the CA for development of start-up and functional testing procedures:
 - .1 Typically this will include detailed manufacturer installation and start-up, operating, troubleshooting and maintenance procedures, full details of any Agency-contracted tests, full factory testing reports, if any, and full warranty information, including all responsibilities of the Agency to keep the warranty in force clearly identified. In addition, the installation and checkout materials that are actually shipped inside the equipment and the actual field checkout sheet forms to be used by the factory or field technicians shall be submitted to the Commissioning Authority.
 - .2 The Commissioning Authority may request further documentation necessary for the commissioning process.

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- .3 This data request may be made prior to normal submittals.
- .8 Provide a copy of the O&M manuals submittals of commissioned equipment, through normal channels, to the CA for review and approval.
- .9 Contractors shall assist (along with the design consultants) in clarifying the operation and control of commissioned equipment in areas where the specifications, control drawings or equipment documentation is not sufficient for writing detailed testing procedures.
- .10 Develop and submit a test plan using manufacturer's start-up procedures and the prefunctional checklists from the CA (or similar) for all commissioned equipment. Submit to CA for review and approval prior to start of inspection and testing. Refer to Section 01 91 13 and this section for further details on start-up plan preparation.
- .11 Provide assistance to the CA in preparing the specific functional performance test procedures as specified in Section 01 91 13 and in this section. Subs shall review test procedures to ensure feasibility, safety and equipment protection and provide necessary written alarm limits to be used during the tests.
- .12 Provide notification to the CA prior to the commencement of any electrical commissioning activity.
- .13 Perform and document inspection and testing for electrical equipment and systems according to the agreed upon test plan, and using the using manufacturer's start-up procedures and the prefunctional checklists from the CA for all commissioned equipment.
- .14 During the pre-energized and initial checkout process coordinate work with the other divisions as required to execute and document the electrical-related portions of the pre-functional checklists for mechanical equipment.
- .15 Perform and clearly document all completed inspections and testing activities, including notification of any deficiencies, providing a copy to the CA prior to the start of functional testing phase.
- .16 Address current A/E punch list items before the start of functional testing.
- .17 Provide skilled technicians to execute starting of equipment and to execute the functional performance tests. Ensure that they are available and present during the agreed upon schedules and for sufficient duration

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- to complete the necessary tests, adjustments and problem-solving.
 - .18 Perform functional performance testing, witnessed by the CA, for specified equipment in Section 01 91 13 and in this section. Assist the CA in interpreting the inspection and testing data, as necessary.
 - .19 Correct deficiencies (differences between specified and observed performance) as interpreted by the CA, CM and A/E and retest the equipment.
 - .20 Prepare O&M manuals according to the Contract Documents, including clarifying and updating the original sequences of operation to as-built conditions.
 - .21 During construction, maintain as-built red-line drawings for all drawings and final CAD as-builts for contractor-generated coordination drawings. Update after completion of commissioning (excluding deferred testing).
 - .22 Provide training of the Agency's operating personnel as specified.
 - .23 Coordinate with equipment manufacturers to determine specific requirements to maintain the validity of the warranty.
- 1.2.4 Warranty Phase:
- .1 Execute seasonal or deferred functional performance testing, witnessed by the design engineers, according to the specifications. This includes deferred voltage/ load balance and power factor testing specified in this section.
 - .2 Correct deficiencies and make necessary adjustments to O&M manuals and as-built drawings for applicable issues identified in any seasonal testing.

2. PRODUCTS

2.1 Test Equipment

- 2.1.1 Contractor shall provide all test equipment necessary to fulfill the testing requirements of this section.
- 2.1.2 The equipment to be provided shall include, but is not limited to:
 - .1 Electrical measurements: ohmmeter, voltmeter, ammeter and wattmeter;
 - .2 Any other equipment specified by the manufacturer to perform required testing and verification.
- 2.1.3 Suitability of Test Equipment
 - .1 All test equipment shall meet the calibration requirements below and be in good mechanical and electrical condition.
 - .2 Field test metering used to check power system meter calibration must be more accurate than the instrument being tested.

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- .3 Accuracy of metering in test equipment shall be appropriate for the test being performed.
- 2.1.4 Test Instrument Calibration
 - .1 The electrical contractor / designated commissioning agent shall have a calibration program which assures that all applicable test instruments are maintained within rated accuracy for each test instrument calibrated.
 - .2 The firm providing calibration service shall maintain up-to-date instrument calibration instructions and procedures for each test instrument calibrated.
 - .3 The accuracy shall be directly traceable to the National Institute of Standards and Technology (NIST).
 - .4 Instruments shall be calibrated in accordance with the following frequency schedule:
 - .1 Field instruments: Analog and digital, 12 months maximum.
 - .2 Laboratory instruments: 12 months maximum.
 - .3 Leased specialty equipment: 12 months maximum.
 - .5 Dated calibration labels shall be visible on all test equipment.
 - .6 Records, which show date and results of instruments calibrated or tested, must be kept up-to-date.
- 2.1.5 Refer to 01 91 13, Part 2 – Products for additional requirements.

3. EXECUTION

3.1 Submittals

- 3.1.1 Contractor shall provide submittal documentation relative to commissioning as required in Part 1 of this section, 01 91 13 Commissioning - General Requirements, and the Commissioning Plan.
- 3.1.2 Generally, the following shop drawing submittals (for new equipment) are required as related to the commissioning process:
 - .1 LV Distribution Equipment
 - .2 Distribution Panels / Branch Panels
 - .3 Circuit breakers
 - .4 Cables
 - .5 Wiring Devices
- 3.1.3 Additional technical submittals shall be provided as requested at the initial commissioning meetings and dependent on the technical scope of the project.
- 3.1.4 The shop drawings are reviewed by the CA for commissioning purposes only and this process is separate to the Engineer's review.

3.2 Inspection and Commissioning Procedures

- 3.2.1 LOW VOLTAGE SYSTEMS (≤ 1 kV)
 - .1 PRE - ENERGIZATION

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- .2 Prior to complete system energization, verify the following pre-energization task are complete:
 - .1 Carry out all Factory Acceptance Tests and off-site pre-commissioning as directed by the technical specifications of Division 26.
 - .2 The sub-contract trades shall follow the pre-energization and initial checkout procedures listed in this section, in 01 91 13 and in Division 26.
 - .3 The following system pre-energization procedures are presented as a minimum standard of acceptance to validate the commissioning of the identified systems. Requirements listed in the electrical consultant's specification sections may differ from the requirements listed below. The most onerous requirements shall be carried by the contractor in all cases.
 - .4 Review Agency's project requirements (OPR), basis of design (BOD), project specifications, and regulatory requirements for information specifically related to the commissioning of the electrical system.
 - .5 Applicable equipment manuals and operational instructions shall be readily available for the commissioning team and Agency.
 - .6 Review factory and field acceptance test data, documentation, results, and deficiencies to verify acceptable condition and suitability for initial energization and final acceptance. Verify all equipment has been tested according to the most recent edition of the ANSI/NETA Standard for Acceptance Testing Specifications for Electrical Power Equipment and Systems (ANSI/NETA ATS) and the project OPR.
 - .7 Verify nameplate and equipment ratings are documented and correct in accordance with the most current drawings.
 - .8 Review drawings, logic diagrams, protective device settings, engineering studies, and other pertinent information to verify accuracy and completeness.
 - .9 Visually inspect equipment.
 - .10 Verify equipment is clearly labeled with unique designations and match designations on all drawings, documentation, programming, and communication protocols.
 - .11 Verify equipment, doors, and fences are labeled with appropriate safety labeling and have the correct information in accordance with applicable regulations.
 - .12 Verify equipment and circuits are correctly bonded and grounded in accordance with applicable regulations.

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- .13 Confirm isolation points have provisions for a lock and/or tag.
- .14 Confirm that correct electrical equipment clearances have been met.
- .15 Confirm clear working space around electrical equipment in accordance with applicable regulations.
- .16 Verify correct operation of mechanical, electrical, key, and safety interlocks on electrical power equipment. Verify duplicate interlock keys are destroyed or retained by authorized personnel in accordance with manufacturer's recommendations.
- .17 Verify correct operation of applicable limit switches.
- .18 Verify wiring interconnection points such as shipping splits, field-connected devices, and SCADA interface.
- .19 Verify current transformer circuits are complete and do not have an open-circuit. Shorting devices should be in the intended position.
- .20 Verify instrument transformer tap connections are correct and match documentation, drawings, and protective device settings.
- .21 Verify protective device settings are correct and match documentation, drawings, and engineering studies.
- .22 Verify arc-flash hazard warning labels in accordance with applicable regulations.
- .23 Verify correct field marking of maximum available fault current at service equipment in accordance with applicable regulations.
- .24 Verify applicable devices, protection and control schemes, SCADA, and communication protocol.
- .25 Verify all intelligent electronic devices and SCADA systems correctly trigger events and disturbance records.
- .26 Verify intelligent electronic devices, communication protocol, and SCADA systems display the correct date and time.
- .27 Verify applicable communication points to end device(s).
- .28 Verify correct neutral grounding system(s).
- .29 Verify correct operation of zone selective interlocking systems.
- .30 Verify panel boards have accurate panel schedules.
- .31 Verify prime, emergency, and standby power systems are operational and ready for energization.
- .32 Verify correct operation of GFCI receptacles.
- .33 Verify correct settings of lighting controls for electrical rooms and substations.

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- .34 Verify correct operation of emergency shutdown systems.
 - .35 Verify current and voltage sensors were tested in accordance with manufacturer's published data.
 - .36 Verify applicable transformer insulating fluid analysis was completed and results are acceptable.
 - .37 Verify correct liquid levels and/or gas pressures in transformers.
 - .38 Verify gas and liquid alarm levels.
 - .39 Verify valves on equipment are in the correct position for energization.
 - .40 Verify transformers are in the correct tap position(s) for energization.
 - .41 Verify pre-start-up procedures on all UPS and battery system components have been performed and documented.
 - .42 Confirm the initializing charge has been completed for battery systems in accordance with manufacturer's requirements.
 - .43 Verify that indications and records are cleared for faults, alarms, and meters.
 - .44 Create as-left setting files.
 - .45 Create a written energization plan.
- .3 **ENERGIZATION**
- .1 Refer to Section 01 91 13 for a list of systems to be commissioned and to Division 26 technical specifications for a description of the process and for specific details on the required functional performance tests.
 - .2 Division 26 is responsible for all installation, inspections and testing required to complete systems and sub-systems to ensure that they are fully functional, meeting the design objectives of the Contract Documents. The commissioning procedures and Functional Testing requirements listed under f this section do not relieve or lessen this responsibility or shift that responsibility partially to the Commissioning Authority or Agency.
 - .3 Functional testing is intended to begin upon completion of the start-up stage. Functional testing may proceed prior to the completion of systems, or sub-systems at the discretion of the CA and Contractor.
 - .4 The functional performance testing phase shall not commence until the Start-Up activities have been completed to the satisfaction of the CA. Beginning functional testing prior to completion of start-up does not relieve the Contractor from fully completing the

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- system, including all pre-functional checklists as soon as possible.
- .5 Restrict access to electrical equipment during energization and commissioning activities. Verify emergency exits are correctly secured to prevent the entrance of an unauthorized person from outside, while allowing free escape from inside.
- .6 Verify removal of temporary protective grounding equipment.
- .7 Verify correct position of switches, circuit breakers, and transfer switches for control circuits, instrument transformer circuits, and power circuits. Verify test switches and terminal block disconnects/switches are in the correct position in accordance with energization plan.
- .8 Follow and document the steps of the energization plan.
- .9 Verify correct current and voltage values to protective devices and metering.
- .10 Verify correct system phase angle and sequence.
- .11 Verify equipment phasing.
- .12 Verify correct motor rotation.
- .13 Verify battery and UPS systems are free of alarms and are in the specified operating mode.
- .14 Verify no alarms or fault indications are present.
- .4 POST - ENERGIZATION
 - .1 Obtain post-energization oil and gas analysis on applicable devices.
 - .2 Verify temperature monitoring and protective devices have established baseline parameters and criteria.
 - .3 Perform thermographic survey of equipment in accordance with the Section 3.2.1.6.3.
 - .4 The manufacturers of installed equipment should be notified of the actual energization date for warranty purposes.
 - .5 Monitor equipment loading and compare to design criteria.
 - .6 Monitor loading on all panelboards to verify balanced loading and voltage levels.
 - .7 Complete commissioning report and supply documentation in accordance with following:
 - .1 Test Report
 - 1. Summary of project.
 - 2. Description of electrical system.
 - 3. The final commissioning plan and the results of the implementation of that plan.

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4. A copy of the commissioning design review records and logs and submittal review logs.
 5. A complete copy of the testing and performance test forms.
 6. Identification of systems or assemblies that do not meet the Agency's project requirements.
 7. Analysis and recommendations.
 8. Resolution plan for incomplete tasks.
 9. As-left relay logic diagrams and setting files.
- .2 Drawing packages
 1. All applicable drawing packages shall be as-built.
 2. A complete as-built drawing package shall be left on site and a duplicate as-built package shall be submitted to the Agency/operator.
 3. O&M Manuals Applicable equipment manuals and operational instructions shall be readily available for the Agency
- .5 REFERENT SECTION – NETA ATS STANDARDS
- .6 Below are relevant excerpts from the NETA ATS Standards to help define inspection and test procedures, guidelines, and values.
 - .1 MOLDED CASE CIRCUIT BREAKER
 - .1 Visual and Mechanical Inspection
 1. Compare equipment nameplate data with drawings and specifications.
 2. Inspect physical and mechanical condition.
 3. Inspect anchorage and alignment.
 4. Verify the unit is clean.
 5. Operate the circuit breaker to insure smooth operation.
 6. Inspect bolted electrical connections for high resistance using one or more of the following methods:
 1. Use of a low-resistance ohmmeter.
 2. Verify tightness of accessible bolted electrical connections by calibrated torque-wrench method in accordance with manufacturer's published data or Table 100.12 (ANSI/NETA ATS).
 3. Perform thermographic survey in accordance with section 3.2.1.6.3.
 7. Inspect operating mechanism, contacts, and arc chutes in unsealed units.

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8. Perform adjustments for final protective device settings in accordance with the coordination study.
- .2 Electrical Tests
 1. Perform resistance measurements through bolted connections with a low-resistance ohmmeter, if applicable.
 2. Perform insulation-resistance tests for one minute on each pole, phase-to-phase and phase-to-ground with the circuit breaker closed, and across each open pole. Apply voltage in accordance with manufacturer's published data. In the absence of manufacturer's published data, use Table 100.1 (ANSI/NETA ATS).
 3. Perform a contact/pole-resistance test.
 4. Perform insulation-resistance tests on all control wiring with respect to ground. Applied potential shall be 500 volts dc for 300-volt rated cable and 1000 volts dc for 600-volt rated cable. Test duration shall be one minute. For units with solid-state components, follow manufacturer's recommendation. (Optional)
 5. Determine long-time pickup and delay by primary current injection.
 6. Determine short-time pickup and delay by primary current injection.
 7. Determine ground-fault pickup and time delay by primary current injection.
 8. Determine instantaneous pickup by primary current injection.
 9. Test functions of the trip unit by means of secondary injection. (Optional)
 10. Perform minimum pickup voltage tests on shunt trip and close coils in accordance with manufacturer's published data.
 11. Verify correct operation of auxiliary features such as trip and pickup indicators, zone interlocking, electrical close and trip operation, trip-free, anti-pump function, and trip unit battery condition. Reset all trip logs and indicators.
 12. Verify operation of charging mechanism.
- .3 Test Values
 1. Test Values – Visual and Mechanical
 1. Compare bolted connection resistance values to values of similar connections. Investigate values which deviate from

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- those of similar bolted connections by more than 50 percent of the lowest value.
2. Bolt-torque levels shall be in accordance with manufacturer's published data. In the absence of manufacturer's published data, use Table 100.12 (ANSI/NETA ATS).
3. Results of the thermographic survey shall be in accordance with section 3.2.1.6.3.
4. Settings shall comply with coordination study recommendations.
2. Test Values – Electrical
 1. Compare bolted connection resistance values to values of similar connections. Investigate values which deviate from those of similar bolted connections by more than 50 percent of the lowest value.
 2. Insulation-resistance values shall be in accordance with manufacturer's published data. In the absence of manufacturer's published data, use Table 100.1 (ANSI/NETA ATS). Values of insulation resistance less than this table or manufacturer's recommendations should be investigated.
 3. Microhm or dc millivolt drop values shall not exceed the high levels of the normal range as indicated in the manufacturer's published data. If manufacturer's published data is not available, investigate values that deviate from adjacent poles or similar breakers by more than 50 percent of the lowest value.
 4. Insulation-resistance values of control wiring shall not be less than two megohms.
 5. Long-time pickup values shall be as specified, and the trip characteristic shall not exceed manufacturer's published time-current characteristic tolerance band, including adjustment factors. If manufacturer's curves are not available, trip times shall not exceed the value shown in Table 100.7 (ANSI/NETA ATS).
 6. Short-time pickup values shall be as specified, and the trip characteristic shall not exceed manufacturer's published time-current tolerance band.

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7. Ground fault pickup values shall be as specified, and the trip characteristic shall not exceed manufacturer's published time-current tolerance band.
 8. Instantaneous pickup values shall be as specified and within manufacturer's published tolerances. In the absence of manufacturer's published data, refer to Table 100.8 (ANSI/NETA ATS).
 9. Pickup values and trip characteristics shall be within manufacturer's published tolerances.
 10. Minimum pickup voltage of the shunt trip and close coils shall conform to the manufacturer's published data. In the absence of the manufacturer's published data, refer to Table 100.20 (ANSI/NETA ATS).
 11. Breaker open, close, trip, trip-free, anti-pump, and auxiliary features shall function as designed.
 12. The charging mechanism shall operate in accordance with manufacturer's published data.
- .2 LOW VOLTAGE CABLES
 - .1 Visual and Mechanical Inspection
 1. Compare cable data with drawings and specifications.
 2. Inspect exposed sections of cable for physical damage and correct connection in accordance with the single-line diagram.
 3. Inspect bolted electrical connections for high resistance using one or more of the following methods:
 1. Use of a low-resistance ohmmeter.
 2. Verify tightness of accessible bolted electrical connections by calibrated torque-wrench method in accordance with manufacturer's published data or Table 100.12 (ANSI/NETA ATS).
 3. Perform thermographic survey in accordance with section 3.2.1.6.3.
 4. Inspect compression-applied connectors for correct cable match and indentation.
 5. Inspect for correct identification and arrangements.

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6. Inspect cable jacket insulation and condition.
- .2 Electrical Tests
 1. Perform resistance measurements through bolted connections with low-resistance ohmmeter, if applicable.
 2. Perform insulation-resistance test on each conductor with respect to ground and adjacent conductors. Applied potential shall be 500 volts dc for 300-volt rated cable and 1000 volts dc for 600-volt rated cable. Test duration shall be one minute.
 3. Perform continuity tests to insure correct cable connection.
 4. Verify uniform resistance of parallel conductors. (Optional)
- .3 Test Values
 1. Test Values – Visual and Mechanical
 1. Compare bolted connection resistance values to values of similar connections. Investigate values which deviate from those of similar bolted connections by more than 50 percent of the lowest value.
 2. Bolt-torque levels shall be in accordance with manufacturer's published data. In the absence of manufacturer's published data, use Table 100.12 (ANSI/NETA ATS). Results of the thermographic survey shall be in accordance with section 3.2.1.6.3.
 2. Test Values – Electrical
 1. Compare bolted connection resistance values to values of similar connections. Investigate values which deviate from those of similar bolted connections by more than 50 percent of the lowest value.
 2. Insulation-resistance values shall be in accordance with manufacturer's published data. In the absence of manufacturer's published data, use Table 100.1 (ANSI/NETA ATS). Values of insulation resistance less than this table or manufacturer's recommendations shall be investigated.
 3. Cable shall exhibit continuity.
 4. Deviations in resistance between parallel conductors shall be investigated.
- .3 THERMOGRAPHIC SURVEY

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- .1 Visual and Mechanical Inspection
 - 1. Perform thermographic survey when load is applied to the system.
 - 2. Remove all necessary covers prior to thermographic inspection. Use appropriate caution, safety devices, and personal protective equipment.
 - 3. Perform a follow-up thermographic survey within 12 months of final acceptance by the Agency. (Optional)
- .2 Report
- 3.2.2 Provide a report which includes the following:
 - 1. Description of equipment to be tested.
 - 2. Discrepancies.
 - 3. Temperature difference between the area of concern and the reference area.
 - 4. Probable cause of temperature difference.
 - 5. Areas inspected. Identify inaccessible and unobservable areas and equipment.
 - 6. Identify load conditions at time of inspection.
 - 7. Provide photographs and/or thermograms of the deficient area.
 - 8. Recommended action.
 - 9. Test Parameters
 - .1 Inspect distribution systems with imaging equipment capable of detecting a minimum temperature difference of 1° C at 30° C.
 - .2 Equipment shall detect emitted radiation and convert detected radiation to visual signal.
 - .3 Thermographic surveys should be performed during periods of maximum possible loading. Refer to ANSI/NFPA 70B, 2010 Edition, Section 11.17.
- 10. Test Results
 - 1. Suggested actions based on temperature rise can be found in Table 100.18 (ANSI/NETA ATS).

3.3 Testing Documentation, Non-Conformance, and Approvals

- 3.3.1 Refer to Section 01 91 13 for specific details on non-conformance issues relating to pre-functional checklists and tests.
- 3.3.2 Refer to Section 01 91 13 for issues relating to functional performance tests.

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3.4 Operation and Maintenance (O&M) Manuals and Systems Manuals

- 3.4.1 Contractor shall compile and prepare documentation for all equipment and systems covered in the Division 26 sections of the Performance Specification documents.
- 3.4.2 Contractor shall deliver O&M documents according to Section 01 91 13 Commissioning General Requirements and other applicable sections of the Performance Specification documents.
- 3.4.3 The CA shall receive a copy of the O&M manuals for review
- 3.4.4 Where required the contractor shall provide the following information to the CA to assist in compilation of the Systems Manual. The CA is responsible for production of the Systems Manual. Information to be provided by the contractor includes:
 - .1 Approved equipment submittals including Sequence of Operation.
 - .2 Contractor & Supplier listing with contact information.
 - .3 Copy of all permits and certificates.
 - .4 All data generated during the commissioning process, including start-up reports, evaluation checklists and completed test certificates and reports.
 - .5 Equipment Operating schedules including set points.
 - .6 List of all incomplete/ deferred testing.
 - .7 Manufacturer's recommended calibration and preventive maintenance instructions.
- 3.4.5 Review of the commissioning related sections of the O&M manuals shall be made by the A/E and by the CA. Refer to Section 01 91 13 for details.

3.5 Training of Agency Personnel

- 3.5.1 Demonstration and training shall not proceed until the following tasks and deliverables have been completed and reviewed/approved by the CA:
 - .1 Functional Performance Testing Completed, including Issues Log summarizing status/remaining issues. Systems verified to be operating to design intent.
 - .2 O&M Manuals have been reviewed, approved, and final version submitted to the Agency
 - .3 Record Drawings completed and submitted to the Agency. In the absence of final Record Drawings, a full colour, full size scanned copy of the as-builts may be provided by the contractor in both hard and digital copy.
- 3.5.2 Detail information regarding contents, duration and instructors for any particular system is included in Section 01 79 00.13 Commissioning – Demonstration and Training.

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3.6 Deferred and Seasonal Testing

- 3.6.1 Refer to Section 01 91 13, Part 3.14 for general requirements of deferred testing.
- 3.6.2 Voltage Checks
- 3.6.3 Make voltage checks throughout the project after the project has been in operation for 30 days, and at this time, if directed by the Consultant, adjust transformers tap settings. Readings taken shall be logged, tabulated and any adjustments made to building system shall be suitably incorporated in the Operating & Maintenance Manuals.
- 3.6.4 Power Factor Readings
 - .1 Division 26 to allow for certified power factor readings in base tender amount. Readings to be taken after the complex is fully occupied and operational for 60 days
 - .2 Power factor shall be recorded at the following locations:
 - .1 Main Distribution Centres
 - .2 Motor Control Centres
- 3.6.5 The Contractor shall allow for at least 2 separate 4 hour visits to the site for general trouble shooting and overseeing the operation and maintenance of all systems and equipment during the first full year warranty period following the final Commissioning and Substantial Performance Certificate being issued.
 - .1 These site meetings are over and above normal trouble and warranty call backs.
 - .2 These site visits shall be coordinated with post-occupancy review performed by the design professionals and Commissioning Authority.
 - .3 The purpose of these site visits is to investigate and troubleshoot the system operations and any problems and to ensure that all systems and equipment are being properly operated and maintained.

3.7 Written Work Products

- 3.7.1 Contractor's written work products will consist of the startup and initial checkout plan and functional testing described in this section and Section 01 91 13 Commissioning – General Requirements and the completed startup, initial checkout and pre-functional, and functional checklists.

END OF SECTION

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Division 26, Specifications, Section 26 12 16.01, Dry Type Transformers up to 600V Primary

1. GENERAL

1.1 Related Requirements

1.1.1 Section 26 05 00.

1.2 References (Latest Revisions)

- 1.2.1 CSA Std C22.2 No 0.12 Equipment Rated 750V or less.
- 1.2.2 CAN/CSA-C22.2 No 47.
- 1.2.3 UL 1561 (Latest edition).
- 1.2.4 CSA C802.2 Minimum Efficiency Values for Dry-Type Transformers.
- 1.2.5 NEMA ST-20 for sound level.
- 1.2.6 National Electrical Manufacturers Association (NEMA)
- 1.2.7 Ontario Electrical Safety Code
- 1.2.8 Ontario Building Code latest version

1.3 Product Data

- 1.3.1 Submit product data in accordance with Section 26 05 00 – Common Work Results for Electrical.

2. PRODUCTS

2.1 Transformer Type

- 2.1.1 Transformers shall be standard general purpose dry type unless otherwise indicated on drawings.
- 2.1.2 Manufacturer: Hammond or approved equal.

2.2 General Purpose Transformers

- 2.2.1 Transformers shall have the following characteristics.
- 2.2.2 Type: AN/AA Ventilated self-cooled.
- 2.2.3 kVA, primary voltage and secondary voltage and as indicated.
- 2.2.4 Single or three phase as indicated.
- 2.2.5 Delta connected primary for three phase transformers.
- 2.2.6 Secondary winding shall be wye connected for three phase transformers unless Harmonic Mitigation type, or unless otherwise noted.
- 2.2.7 Four full capacity 5% adjustment taps, 2 at 2.5% FCBN and 2 at 2.5% FCAN.
- 2.2.8 Scot T connected three phase windings are not acceptable.
- 2.2.9 Copper Windings.
- 2.2.10 220°C Insulation Class.
- 2.2.11 150°C Temperature rise.
- 2.2.12 Standard Impedance.
- 2.2.13 10kV BIL.
- 2.2.14 Sound level per NEMA ST-20.
- 2.2.15 Ventilated Type 1 enclosure with Grey finish.
- 2.2.16 Anti-vibration pads shall be used between the core and the enclosure.

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- 2.2.17 The impregnation process for the core-and-coil assembly shall include a period under vacuum, followed by pressure impregnation (VPI).
- 2.2.18 Transformer shall have embossed aluminum or stainless steel nameplate indicating, but not restricted to the following.
- 2.2.19 KVA rating
- 2.2.20 Voltage rating
- 2.2.21 Impedance
- 2.2.22 Type
- 2.2.23 Insulation class
- 2.2.24 Temperature rise
- 2.2.25 Connection diagram
- 2.2.26 Serial number

3. EXECUTION

3.1 Installation

- 3.1.1 Mount dry type transformers as indicated by codes and manufacturer's instructions.
- 3.1.2 Ensure adequate clearance around transformer for ventilation.
- 3.1.3 Install transformers in level upright position.
- 3.1.4 Remove shipping supports only after transformer is installed and just before putting into service.
- 3.1.5 Loosen isolation pad bolts until no compression is visible.
- 3.1.6 Make primary and secondary connections in accordance with wiring diagram.
- 3.1.7 Energize transformers after installation is complete.

END OF SECTION

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Division 26, Specifications, Section 26 24 13, Switchboards

1. GENERAL

1.1 Related Requirements

- 1.1.1 Section 26 05 28 – Grounding - Secondary
- 1.1.2 Section 26 28 16.02 – Molded Circuit Breakers
- 1.1.3 Section 26 28 23 Disconnect Switches – Fused and Non-fused

1.2 Reference Standards

- 1.2.1 The switchboard and overcurrent protection device(s) referenced herein are designed and manufactured according to the latest revision of the following specifications.
 - .1 Switchgear assemblies: CSA C22.2 No.31
 - .2 Panel boards: CSA C22.2 No.29
 - .3 Molded Case Circuit Breakers: CSA C22.2 No.5
 - .4 Enclosures: CSA 22.2 No.94
 - .5 Ontario Electrical Safety Code, latest edition
 - .6 Ontario Building Code, latest edition

1.3 Action and Informational Submittals

- 1.3.1 Low Voltage Switchboard – Furnish and install switchboard as specified herein and where shown on the associated drawings.
- 1.3.2 Approval documents shall include drawings. Drawings shall indicate front and side enclosure elevations with overall dimensions shown; conduit entrance location and requirements, single-line diagrams, equipment schedule and switchboard instrument details.

1.4 Qualifications

- 1.4.1 Switchboards shall be manufactured in accordance with standards listed Article
- 1.4.2 1.2 – REFERENCE STANDARDS.
 - .1 The manufacturer of the assembly shall be the manufacturer of the major components within the assembly.
 - .2 For the equipment specified herein, the manufacturer shall be ISO 9001 or 9002 certified.
 - .3 The manufacturer of this equipment shall have produced similar electrical equipment for a minimum period of Ten (10) years. When requested by the Engineer, an acceptable list of installations with similar equipment shall be provided demonstrating compliance with this requirement.

1.5 Delivery, Storage, and Handling

- 1.5.1 Inspect and report concealed damage to carrier within their required time.
- 1.5.2 Handle carefully to avoid damage to switchboard internal components, enclosure, and finish.
- 1.5.3 Store in a clean, dry environment. Maintain factory packaging and, if required, provide an additional heavy canvas or heavy plastic cover to protect enclosure(s) from dirt, water, construction debris, and traffic.

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1.6 Operations and Maintenance Materials

1.6.1 Manufacturer shall provide installation instructions:

- .1 Instructions for Safe Installation, Operation and Maintenance of Switchboards Rated 600 Volts or less.

1.7 Warranty

1.7.1 Manufacturer shall warrant specified equipment free from defects in materials and workmanship for the lesser of one (1) year from the date of installation or eighteen. (18) months from the date of purchase.

2. PRODUCTS

2.1 Manufacturers

2.1.1 Eaton, or approved equal.

2.1.2 The listing of specific manufacturers above does not imply acceptance of their products that do not meet the specified ratings, features and functions. Manufacturers listed above are not relieved from meeting these specifications in their entirety. Products in compliance with the specification and manufactured by others not named will be considered only if pre-approved by the Engineer ten (10) days prior to bid date.

2.2 Ratings

2.2.1 The assembly shall be rated to withstand mechanical forces exerted during short-circuit conditions when connected directly to a power source having an available fault current as shown on the drawings.

2.2.2 Voltage and amperage rating to be as indicated on the drawings.

2.3 Enclosure

2.3.1 Switchboard to be free standing construction, totally enclosed (dead front access only) complete with lockable doors, vermin proof, with gaskets and filters on louvers of the Type 2, sprinkler proof rating (complete with rain hood)

2.3.2 The framework shall be formed steel and secured together to support all cover plates, bussing and component devices during shipment and installation. All closure plates are to be single tool, screw removable. Ventilation shall be provided when required. Each section shall include a single-piece removable top plate.

2.3.3 The switchboard enclosure shall be painted on all exterior surfaces. The paint finish shall be ASA61 grey.

2.3.4 Optional steel base channels shall be bolted to the frame to rigidly support the entire shipping section for moving on rollers and for floor mounting.

2.4 Main Disconnect Device

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1.4.1 Main Circuit Breaker as indicated on the drawings.

2.5 Meter

.1 Switchboard meter as indicated on the drawings

2.6 Bussing

2.6.1 All bus bars shall be tin-plated copper bus.

2.6.2 The through bus shall have a maximum ampacity shall be as indicated on the drawing. The switchboard bussing shall be of sufficient cross-sectional area to meet the CSA C22.2 No. 31 standard for temperature rise.

2.6.3 The bus assemblies shall be rated, type tested, and CSA listed to withstand a short circuit of 42 kA symmetrical as indicated on the drawing. Switchboard to be provided with a main breaker (trips set as indicated per the single line drawings).

2.6.4 Voltage rating shall be as indicated on the drawings.

2.6.5 Provisions shall be made for future expansion of additional sections on the left hand side when facing the switchboard from the front.

2.6.6 Ground bus shall be Copper with the size 1.25" x 1.0".

2.6.7 All bolts used on bus bar joints shall be a minimum of grade 5.

2.7 Distribution section

2.7.1 The breakers and all components shall be designed, manufactured and tested in accordance with applicable UL and CSA standards.

2.7.2 Circuit breaker(s) shall be of the thermal magnetic type rated for 80% continuous current as shown on the single line drawings.

2.7.3 Circuit breakers(s) shall have interrupting capacity as indicated on the drawings.

2.7.4 Feeder breakers shall be chassis mounted

2.7.5 Chassis mounts to be provided for future breakers of 100-3p capacity (two off)

2.8 Surge Protection Device

Individually mounted Surge Protective Device (SPD)

200 kA (MIN) switchboard mount SPD with surge counter, complete with disconnect switch in the feeder area of main switchboard section to CSA C22.2 No 8-13 or CUL 1283 certified unit

2.8 Terminations

2.8.1 Termination lugs shall be CSA/UL Listed to accept solid or stranded copper and aluminum conductors. Termination lugs shall be suitable for cables sized per the 75C column of the Electrical Safety Code table. It is permissible for primary cables terminating in a bussed auxiliary section to be sized to the 90C column of the Electrical Safety Code.

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3. EXECUTION

3.1 Examination

- 3.1.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for switchboard installation in accordance with manufacturer's written instructions.
- 3.1.2 Visually inspect substrate in presence of the project manager.

3.2 Manufacturer's Instructions

- 3.2.1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheets.

3.3 Installation

- 3.3.1 Install switchboards in accordance with the manufacturer's written instructions, and applicable standards and safety codes.

3.4 Field Quality Control

- 3.4.1 Inspect complete installation for physical damage, proper alignment, anchorage, and grounding.
- 3.4.2 Measure steady state load currents at each switchboard feeder; rearrange circuits in the switchboard to balance the phase loads within 20% of each other. Maintain proper phasing for multi-wire branch circuits.
- 3.4.3 Check tightness of bolted connections and circuit breaker connections using calibrated torque wrench or torque screwdriver per manufacturer's written specifications.

3.5 Cleaning

- 3.5.1 Progress Cleaning: clean in accordance with Section 01 74 00- Cleaning.
 - .1 Leave Work area clean at end of each day.
- 3.5.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 00- Cleaning.
- 3.5.3 Waste Management: separate waste materials for recycling
 - .1 Remove recycling containers and bins from site and dispose of materials to an appropriate facility.

END OF SECTION

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Division 26, Specifications, Section 26 27 26, Wiring Devices

1. GENERAL

1.1 Related Requirements

1.1.1 Section 26 05 00 – Common Work Results for Electrical.

1.2 References (Latest Revisions)

1.2.1 Canadian Standards Association (CSA International)

.1 CSA-C22.2 No.42, General Use Receptacles, Attachment
Plugs and Similar Devices.

.2 CSA-C22.2 No.42.1, Cover Plates for Flush-Mounted Wiring
Devices (Bi-national standard, with UL 514D).

.3 CSA-C22.2 No.55, Special Use Switches.

.4 CSA-C22.2 No.111, General-Use Snap Switches (Bi-national
standard, with UL 20, latest edition).

1.2.2 Provincial Electrical Safety Code, latest edition

1.2.3 Provincial Building Code, latest edition

1.3 Shop Drawings and Product Data

1.3.1 Submit shop drawings and product data in accordance with

.1 Section 01 33 00 - Submittal Procedures

.2 Section 23 05 00 - Common Work Results for HVAC

.3 Section 26 05 00 – Common Work Results for Electrical.

2. PRODUCTS

2.1 Switches

2.1.1 15 A, 120 V, single pole switches to: CSA-C22.2 No.55.

2.1.2 20 A, 208 V, double pole switches to: CSA-C22.2 No.111.

2.1.3 Manually operated general purpose ac switches with following
features:

.1 Terminal holes approved for No. 12 AWG wire.

.2 Silver alloy contacts.

.3 Urea or melamine moulding for parts subject to carbon
tracking.

.4 Suitable for back and side wiring.

.5 Ivory toggle.

.6 Ground terminal with ground wire size 12 AWG.

2.1.4 Switches of one manufacturer throughout project.

2.1.5 Acceptable materials: Plastic.

2.2 Receptacles

2.2.1 Duplex receptacles, CSA type 5-15 R, 125 V, 15 A, U ground, to:
CSA-C22.2 No.42 with following features:

.1 Ivory urea moulded housing.

.2 Suitable for No. 12 AWG for back and side wiring.

.3 Break-off links for use as split receptacles.

.4 Eight back wired entrances, four side wiring screws.

.5 Triple wipe contacts and rivetted grounding contacts.

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- 2.2.2 Duplex receptacles, CSA type 5-20 R, 125 V, 20 A, U ground, to: CSA-C22.2 No.42 with following features:
- .1 Ivory urea moulded housing. (Colour to be confirmed on site)
 - .2 Suitable for No. 12 AWG for back and side wiring.
 - .3 Break-off links for use as split receptacles.
 - .4 Eight back wired entrances, four side wiring screws.
 - .5 Triple wipe contacts and rivetted grounding contacts.

2.3 Cover Plates

- 2.3.1 Cover plates for wiring devices to: CSA-C22.2 No.42.1.
- 2.3.2 Cover plates from one manufacturer throughout project.
- 2.3.3 Sheet steel utility box cover for wiring devices installed in surface-mounted utility boxes
- 2.3.4 Stainless steel, vertically brushed 1 mm thick cover plates ivory cover plates, thickness 2.5 mm for wiring devices mounted in flush- mounted outlet box.
- 2.3.5 Sheet metal cast cover plates for wiring devices mounted in surface-mounted FS or FD type conduit boxes.
- 2.3.6 Weatherproof double lift spring-loaded cast aluminum cover plates, complete with gaskets for duplex receptacles as indicated.
- 2.3.7 Weatherproof spring-loaded cast aluminum cover plates complete with gaskets for single receptacles or switches outdoors.

3. EXECUTION

3.1 Installation

- 3.1.1 Switches:
- .1 Install single throw switches with handle in "UP" position when switch closed.
 - .2 Install switches in gang type outlet box when more than one switch is required in one location.
 - .3 Mount toggle switches at height in accordance with Section 26 05 00 - Common Work Results - Electrical or as indicated.
- 3.1.2 Receptacles:
- .1 Install receptacles in gang type outlet box when more than one receptacle is required in one location.
 - .2 Mount receptacles at height in accordance with Section 26 05 00 - Common Work Results – Electrical or as indicated.
 - .3 Where split receptacle has one portion switched, mount vertically and switch upper portion.
- 3.1.3 Cover plates:
- .1 Protect stainless steel cover plate finish with paper or plastic film until painting and other work is finished.
 - .2 Install suitable common cover plates where wiring devices are grouped.
 - .3 Do not use cover plates meant for flush outlet boxes on surface-mounted boxes.

END OF SECTION

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Division 26, Specifications, Section 26 28 13.01, Fuses Low Voltage

1. GENERAL

1.1 Related Requirements

- 1.1.1 Section 26 05 00 Common Work Results for Electrical.

1.2 Reference Standards (Latest Revisions)

- 1.2.1 CSA Group
- .1 CAN/CSA-C22.2 No.4, Enclosed and Dead-Front Switches (Tri-National Standard, with ANCE NMX-J-162-2004 and UL 98).
 - .2 CSA C22.2 No.39, Fuseholder Assemblies.

1.3 Action and Informational Submittals

- 1.3.1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- 1.3.2 Product Data:
- .1 Submit manufacturer's instructions, printed product literature and data sheets for fuse and include product characteristics, performance criteria, physical size, finish and limitations.
- 1.3.3 Shop Drawings:
- .1 Provide shop drawings in accordance with Section 01 33 00- Submittal Procedures.
 - .2 Submit drawings stamped and signed by professional engineer registered or licensed in Ontario, Canada.

1.4 Extra Materials

- 1.4.1 Provide maintenance materials in accordance with Section 01 78 00- Closeout Submittals.
- 1.4.2 Two spare fuses of each type and size installed up to and including 600 A.

2. PRODUCTS

2.1 Fuses - General

- 2.1.1 Fuses: product of one manufacturer.
- 2.1.2 Rating: as indicated on the drawings.

2.2 Fuse Types

- 2.2.1 Class L fuses.
- .1 Type L1, time delay, capable of carrying 500% of its rated current for 10 s minimum.
 - .2 Type L2, fast acting.
- 2.2.2 Class J fuses.
- .1 Type J1, time delay, capable of carrying 500% of its rated current for 10 s minimum.
 - .2 Type J2, fast acting.
- 2.2.3 Class R -R fuses.

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- .1 Type R1, (UL Class RK1), time delay, capable of carrying 500% of its rated current for 10 s minimum, to meet UL Class RK1 maximum let-through limits.
 - .2 Type R2, time delay, capable of carrying 500% of its rated current for 10 s minimum.
 - .3 Type R3, (UL Class RK1), fast acting Class R, to meet UL Class RK1 maximum let-through limits.
- 2.2.4 Class C fuses.

2.3 Fuse Storage Cabinet

- 2.3.1 Fuse storage cabinet, manufactured from [2.0] mm thick [750] mm high, [600] mm wide, [300] mm deep, aluminum, hinged, lockable front access door finished in accordance with Section 26 05 00- Common Work Results for Electrical.

3. EXECUTION

3.1 Installation

- 3.1.1 Install fuses in mounting devices immediately before energizing circuit.
- 3.1.2 Ensure correct fuses fitted to physically matched mounting devices.
 - .1 Install rejection clips for Class R fuses.
- 3.1.3 Ensure correct fuses fitted to assigned electrical circuit.
- 3.1.4 Where UL Class RK1 fuses are specified, install warning label "Use only UL Class RK1 fuses for replacement" on equipment.
- 3.1.5 Install spare fuses in fuse storage cabinet.

END OF SECTION

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Division 26, Specifications, Section 26 28 16.02, Molded Case Circuit Breakers

1. GENERAL

1.1 Related Requirements

1.1.1 Section 26 05 00.

1.2 References (Latest Revisions)

1.2.1 CSA International

.1 CSA C22.2 No. 5, Molded-Case Circuit Breakers, Molded- Case Switches and Circuit-Breaker Enclosures (Tri-national standard with UL 489, and NMX-J-266-ANCE-2010).

1.2.2 Provincial Electrical Safety Code.

1.2.3 Provincial Building Code.

1.3 Action and Informational Submittals

1.3.1 Submit in accordance with

.1 Section 01 33 00 - Submittal Procedures

.2 Section 23 05 00 - Common Work Results for HVAC

.3 Section 26 05 00 – Common Work Results for Electrical.

1.3.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for circuit breakers and include product characteristics, performance criteria, physical size, finish and limitations.

1.3.3 Include time-current characteristic curves for all breakers.

1.3.4 Certificates:

.1 Prior to installation of circuit breakers in either new or existing installation, Contractor must submit 3 copies of a production certificate of origin from the manufacturer. Production certificate of origin must be duly signed by factory and local manufacturer's representative certifying that circuit breakers come from this manufacturer and are new and meet standards and regulations.

.2 Production certificate of origin must be submitted to consultant for approval.

.3 Delay in submitting production of certificate of origin will not justify any extension of contract and additional compensation.

.4 Any work of manufacturing, assembly or installation to begin only after acceptance of production certificate of origin by consultant. Unless complying with this requirement, Consultant reserves the right to mandate manufacturer listed on circuit breakers to authenticate new circuit breakers under the contract, and to Contractor's expense.

.5 Production certificate of origin must contain:

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- .6 Manufacturer's name and address and person responsible for authentication. Person responsible must sign and date certificate.
- .7 Licensed dealer's name and address and person of distributor responsible for Contractor's account.
- .8 Contractor's name and address and person responsible for project.
- .9 Local manufacturer's representative name and address. Local manufacturer's representative must sign and date certificate.

1.4 Delivery, Storage and Handling

- 1.4.1 Deliver, store and handle materials in accordance with manufacturer's written instructions.
- 1.4.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- 1.4.3 Storage and Handling Requirements:
 - .1 Store circuit breakers in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Store and protect circuit breakers from nicks, scratches, and blemishes.
 - .3 Replace defective or damaged materials with new.

2. PRODUCTS

2.1 Breakers General

- 2.1.1 Molded-case circuit breakers: to CSA C22.2 No. 5
- 2.1.2 Bolt-on molded case circuit breakers.
- 2.1.3 Molded case circuit breaker to operate automatically by means of thermal and magnetic tripping devices to provide inverse time current tripping and instantaneous tripping for short circuit protection.
- 2.1.4 Common-trip breakers: with single handle for multi-pole applications.
- 2.1.5 Circuit breakers to have minimum symmetrical rms interrupting capacity rating as per panel rating practice.
- 2.1.6 Manufacturers: Eaton or approved equal.

2.2 Optional Features

- 2.2.1 Include:
 - .1 Shunt trip.

3. EXECUTION

3.1 Installation

- 3.1.1 Install circuit breakers as indicated on drawings.

3.2 Cleaning

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- 3.2.1 Progress Cleaning: clean in accordance with Section 01 74 00 - Cleaning.
 - .1 Leave Work area clean at end of each day.
- 3.2.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 00 - Cleaning.
 - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

END OF SECTION

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Division 26, Specifications, Section 26 28 20, Ground Fault Circuit Interrupters Class A

1. GENERAL

1.1 Related Requirements

- 1.1.1 Section 26 05 00 – Common Work Results for Electrical.

1.2 References (Latest Revisions)

- 1.2.1 Canadian Standards Association (CSA International)
 - .1 CAN/CSA-C22.2 No.144, Ground Fault Circuit Interrupters.
- 1.2.2 National Electrical Manufacturers Association (NEMA)
 - .1 NEMA PG 2.2, Application Guide for Ground Fault Protection Devices for Equipment.
- 1.2.3 OESC (Ontario Electrical Safety Code) – Latest Edition
- 1.2.4 Provincial Building Code

1.3 Action and Informational Submittals

- 1.3.1 Submit product data in accordance with:
 - .1 Section 01 33 00 - Submittal Procedures
 - .2 Section 23 05 00 - Common Work Results for HVAC
 - .3 Section 26 05 00 – Common Work Results for Electrical.
- 1.3.2 Submit product data and shop drawings.
- 1.3.3 Submit test report for field testing of ground fault equipment to consultant and a certificate that system as installed meets criteria specified herein.

2. PRODUCTS

2.1 Materials

- 2.1.1 Equipment and components for ground fault circuit interrupters (GFCI): to CAN/CSA-C22.2 No.144, NEMA PG 2.2.
- 2.1.2 Components comprising ground fault protective system to be of same manufacturer.

2.2 Breaker Type Ground Fault Interrupter

- 2.2.1 Single or two pole ground fault circuit interrupter for 15-30 A/500 mA, 120/208 V c/w test and reset facilities.

2.3 Dual Function AFCI/GFCI Fault Interrupter

- 2.3.1 15- 20 A/500 mA, 120/208 V, 1 phase, 10kA rated breaker with LED indicator and self test feature. UL 943 compliant.

2.3.2

2.4 Receptacle type Ground Fault Circuit Interrupter

- 2.4.1 Receptacle Type: NEMA 5-20R (T-slot for compatibility with 15A & 20A plugs), per Section 26 27 26 - Wiring Devices.
- 2.4.2 Ground Fault Protection: Class A GFCI (5mA +/- 1mA threshold per UL 943).
- 2.4.3 Interrupting Capacity: 10kA.
- 2.4.4 Weatherproof cover: in use cover required for wet locations per Section 26 27 26 - Wiring Devices.

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- 2.4.5 UV-resistant and corrosion-resistant materials.
- 2.4.6 Tamper-Resistant (TR): Built-in safety shutters (required by NEC).
- 2.4.7 Self-Testing: Automatic internal self-test function to ensure proper operation.
- 2.4.8 LED Indicator: Power & fault indicator light.
- 2.4.9 Reset & Test Buttons: Clearly marked and easily accessible.

3. EXECUTION

3.1 Installation

- 3.1.1 Do not ground neutral on load side of ground fault relay.
- 3.1.2 Connect supply and load wiring to equipment in accordance with manufacturer's recommendations.

3.2 Field Quality Control

- 3.2.1 Perform tests in accordance with Section 26 05 01 - Common Work Results - Electrical and co-ordinate with Section 26 08 00 Electrical Systems Commissioning.
- 3.2.2 Field test ground fault equipment before commissioning service.
- 3.2.3 Demonstrate simulated ground fault tests.

END OF SECTION

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Division 26, Specifications, Section 26 28 23, Disconnect Switches

1. GENERAL

1.1 Related Requirements

- 1.1.1 Section 26 05 00 Common Work Results for Electrical

1.2 Reference Standards (Latest Revisions)

- 1.2.1 CSA Group
 - .1 CAN/CSA-C22.2 No.4, Enclosed and Dead-Front Switches (Tri-National Standard, with ANCE NMX-J-162-2004 and UL 98).
 - .2 CSA C22.2 No.39, Fuseholder Assemblies.

1.3 Action and Informational Submittals

- 1.3.1 Submit in accordance with:
 - .1 Section 01 33 00- Submittal Procedures
 - .2 Section 26 05 00 – Common Work Results for Electrical.
- 1.3.2 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for [disconnect switches - fused and non- fused] and include product characteristics, performance criteria, physical size, finish and limitations.

2. PRODUCTS

2.1 Disconnect Switches

- 2.1.1 Fusible / Non-fusible disconnect switch in CSA enclosure.
- 2.1.2 Provision for padlocking in off position.
- 2.1.3 Mechanically interlocked door to prevent opening when handle in ON position.
- 2.1.4 Fuses: size as indicated on the drawings, in accordance with Section 26 28 13.01- Fuses - Low Voltage.
- 2.1.5 Quick-make, quick-break action.
- 2.1.6 ON-OFF switch position indication on switch enclosure cover.

2.2 Equipment Identification

- 2.2.1 Provide equipment identification in accordance with Section 26 05 00- Common Work Results for Electrical.
- 2.2.2 Indicate name of load controlled on size 4 nameplate.

3. EXECUTION

3.1 Examination

- 3.1.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for disconnect switches - fused and non-fused installation in accordance with manufacturer's written instructions.
 - .1 Visually inspect substrate in presence of Consultant.
 - .2 Inform Consultant of unacceptable conditions immediately upon discovery.

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- .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Consultant.

3.2 Installation

- 3.2.1 Install disconnect switches complete with fuses if applicable.

3.3 Cleaning

- 3.3.1 Progress Cleaning: clean in accordance with Section 01 74 00-Cleaning.
 - .1 Leave Work area clean at end of each day.

END OF SECTION

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Division 26, Specifications, Section 26 29 03, Control Devices

1. GENERAL

1.1 Related Requirements

1.1.1 Section 26 05 00 Common Work Results for Electrical

1.2 Reference Standards (Latest Revisions)

1.2.1 CSA Group (CSA)

.1 CSA C22.2 No.14, Industrial Control Equipment.

1.2.2 National Electrical Manufacturers Association (NEMA)

.1 NEMA ICS 1, Industrial Control and Systems: General Requirements.

1.3 Action and Informational Submittals

1.3.1 Submit in accordance with

.1 Section 01 33 00- Submittal Procedures.

.2 26 05 00 Common Work Results for Electrical.

1.3.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for [control devices] and include product characteristics, performance criteria, physical size, finish and limitations.

1.3.3 Shop Drawings:

.1 Submit drawings stamped and signed by professional engineer registered or licensed in province or territory of the Work.

.2 Include schematic, wiring, interconnection diagrams.

1.4 Closeout Submittals

1.4.1 Submit in accordance with Section 01 78 00- Closeout Submittals.

1.4.2 Operation and Maintenance Data: submit operation and maintenance data for control devices for incorporation into manual.

2. PRODUCTS

2.1 AC Control Relay

2.1.1 Control Relays: to CSA C22.2 No.14

2.1.2 Contact type: Minimum of one pair of NO and NC, 15 amp rated contacts; electrically held coil voltage 24 V.

2.1.3 Contact rating: NEMA ICS 1

2.2 Control Circuit Transformers

2.2.1 Single phase, dry type.

2.2.2 Primary: 208 V, 60 Hz ac.

2.2.3 Secondary: 24 V, AC.

2.2.4 Rating: 250 VA.

2.2.5 Secondary fuse: 3A.

2.2.6 Close voltage regulation as required by magnet coils.

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3. EXECUTION

3.1 Examination

3.1.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for control devices installation in accordance with manufacturer's written instructions.

- .1 Visually inspect substrate in presence of Consultant.
- .2 Inform Consultant of unacceptable conditions immediately upon discovery.
- .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Consultant.

3.2 Installation

3.2.1 Install control and relay panels, control devices and interconnect.

3.3 Field Quality Control

3.3.1 Perform tests in accordance with Section 26 05 00- Common Work Results for Electrical.

3.3.2 Depending upon magnitude and complexity, divide control system into convenient sections, energize one section at time and check out operation of section.

3.3.3 Upon completion of sectional test, undertake group testing.

3.3.4 Check out complete system for operational sequencing.

3.4 Cleaning

3.4.1 Progress Cleaning: clean in accordance with Section 01 74 00- Cleaning.

END OF SECTION

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Division 26, Specifications, Section 26 32 13.02, Power Generation Natural Gas

1. GENERAL

1.1 Related Requirements

1.1.1 Section 26 05 00 Common Work Results for Electrical

1.2 References (Latest Revisions)

- 1.2.1 Natural Gas Generation System shall comply with the Ministry of Environment regulations
- 1.2.2 The unit shall be Canadian Standards Association certified.
- 1.2.3 CSA B149.1-15 Natural Gas and Propane Installation Code
- 1.2.4 CSA C282-15 Emergency Electrical Power Supply for Buildings
- 1.2.5 CSA C22.2 No. 100-14 Motors and Generators
- 1.2.6 NFPA 211 – 2013 Standard for Chimneys, Fireplaces, Vents, and Solid Fuel–Burning Appliances
- 1.2.7 Ontario Electrical Safety Regulations, latest edition
- 1.2.8 Ontario Environmental Regulations
- 1.2.9 TSSA – Technical Standards and Safety Authority

1.3 Factory Testing

- 1.3.1 Before shipment of the equipment, the engine-generator set shall be tested under rated load for performance and proper functioning of control and interfacing circuits. Tests shall include:
 - .1 Verifying all safety shutdowns are functioning properly.
 - .2 Verify single step load pick-up per CSA C282-15, Clause 6.4.2.
 - .3 Verify transient and voltage dip responses and steady state voltage and speed (frequency) checks.

1.4 Agency's Manuals

- 1.4.1 Three (3) sets of Agency's manuals specific to the product supplied must accompany delivery of the equipment. General operating instruction, preventive maintenance, wiring diagrams, schematics and parts exploded views specific to this model must be included.

1.5 Action and Informational Submittals

- 1.5.1 Submit submittals in accordance with Section 01 33 00 - Submittal Procedures and Section 23 05 00 - Common Work Results for HVAC 26 05 00 Common Work Results for Electrical.

1.6 Warranty

- 1.6.1 The standby electric generating system components, complete engine-generator and instrumentation panel shall be warranted by the manufacturer against defective materials and factory workmanship for a period of 24 months. Such defective parts shall be repaired or replaced at the manufacturer's option, free of charge. Travel and labor shall be included for the first 12 months. Optional additional warranties shall be made available to the Agency at the time of commissioning, for up to 10 years.

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- 1.6.2 The warranty period shall commence when the standby power system is first placed into service. Multiple warranties for individual components (engine, alternator, controls, etc.) will not be acceptable. Satisfactory warranty documents must be provided. Also, in the judgment of the specifying authority, the manufacturer supplying the warranty for the complete system must have the necessary financial strength and technical expertise with all components supplied to provide adequate warranty support.

1.7 Submittals

- 1.7.1 Provide a complete set of Engineering Submittals for approval in electronic format, prior to production release, showing all components, in addition to the engine and generator. Submittals shall include compliance with these specifications.

2. PRODUCTS

2.1 Engine-Generator Set

2.1.1 Engine

- .1 The prime mover shall be a liquid cooled, natural gas fueled. It will have 12 cylinders with a minimum displacement of 33.9 liters (2068 cubic inches), with a minimum rating of 941 HP. The generator set shall provide a minimum rated output of 625 kW at an operating speed of 1800 RPM.
- .2 The engine is to be cooled with a unit mounted radiator, fan, water pump, and closed coolant recovery system providing visual diagnostic means to determine if the system is operating with a normal engine coolant level. The radiator shall be designed for operation in 122 degrees F, 50 degrees C ambient temperature.
- .3 The intake air filter(s) with replaceable element must be mounted on the unit. Full pressure lubrication shall be supplied by a positive displacement lube oil pump. The engine shall have a replaceable oil filter(s) with internal bypass and replaceable element(s). Engine coolant and oil drain extensions, equipped with pipe plugs, must be provided to outside of the mounting base for cleaner and more convenient engine servicing. A fan guard must be installed for personnel safety.
- .4 The engine shall have a battery charging DC alternator with a transistorized voltage regulator. Remote 2-wire starting shall be by a solenoid shift, electric starter.
- .5 The engine fuel system shall be designed for primary operation on natural gas having a nominal BTU content of 1000 BTU per cubic foot delivered to the unit in a vapor state. Gas pressure to the equipment inlet will be supplied by the mechanical contractor between 14-20 inches water column at all load

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- levels. A carburetor, secondary regulator, fuel lock-off solenoid and all piping must be installed at the point of manufacturing, terminating at a single pipe opening external to the mounting base. The dedicated fuel supply line shall be connected directly to the site gas meter station in accordance with the requirements of CSA C282-15, Clauses 7.3.7 and Clause B.13. This division shall provide the wiring connection between the monitored valve at the meter station, and the generator set controller, wired for alarm on valve "closed" condition. Any additional valves installed between the generator and this valve shall also be wired and monitored in the same way.
- .6 The engine shall have (a) unit mounted, thermostatically controlled water jacket heater(s) to aid in quick starting. The wattage shall be as recommended by the manufacturer. The contractor shall provide proper branch circuit from normal utility power source.
- .7 Sensing elements to be located on the engine for low oil pressure shutdown, high coolant temperature shutdown, low coolant level shutdown, overspeed shutdown and overcrank shutdown. These sensors are to be connected to the control panel using a wiring harness with the following features: wire number labeling on each end of the wire run for easy identification, each sensor connection shall be sealed to prevent corrosion and all wiring to be run in flexible conduit for protection from the environment and any moving objects.
- .8 Provide the following items installed at the factory:
- .1 The manufacturer shall supply its recommended stainless steel, flexible connector to couple the engine exhaust manifold to the exhaust system. The connector must be approved for use in Canada.
- .9 Engine speed shall be controlled by electronic governor with no change in alternator frequency from no load to full load. Steady state regulation is to be 0.25%.
- .10 One step load acceptance shall be 100% of engine-generator set nameplate rating and meet the requirements of CSA C282-15 Clause 6.4.2.
- .11 The generator system shall support generator start-up and load transfer within 10 seconds.

2.2 Alternator

- 2.2.1 The alternator shall be a 4-pole revolving field type, 6 or 12 lead, rated at 625 kW with a permanent magnet driven exciter. Photosensitive components will not be permitted in the rotating exciter. The stator shall be direct connected to the engine to ensure permanent alignment. The generator shall meet temperature rise standards for

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Class "H" insulation, operate within Class "F" standards for extended life. All leads must be extended into a separate AC connection box. The alternator shall be protected by internal thermal overload protection and an automatic reset field circuit breaker.

- 2.2.2 One step load acceptance shall be 100% of engine-generator set nameplate rating and meet the requirements of CSA C282-15 Clause 6.4.2. The generator set and regulator must sustain 300% short circuit current for 10 seconds during a 3-phase fault.
- 2.2.3 A NEMA 1 panel that is an integral part of the generator set must be provided to allow the installer a convenient location in which to make electrical output connections. A fully rated, isolated neutral must be included by the generator set manufacturer to insure proper sizing.
- 2.2.4 The electric plant (engine and alternator) shall be mounted with internal vibration isolation onto a welded steel base. External vibration isolation shall not be required for normal pad mounted application on a suspended slab.
- 2.2.5 Provide the following items installed at the factory:
 - .1 A main line circuit breaker carrying the UL/CSA mark shall be factory installed. The breaker shall be rated per the manufacturer's recommendations unless specified on the drawings and mounted in the AC connection box. The line side connections are to be made at the factory. Output lugs shall be provided for load side connections to the emergency bus. A system utilizing manual reset field circuit breakers and current transformers is unacceptable. The main line circuit breaker shall incorporate a set of auxiliary contacts to annunciate a breaker "open" condition, as per CSA C282-15 Table 1. The contact configuration shall be form C (SPDT). The function of these contacts shall be for local and remote annunciation of breaker position. Wire to controller and program for auxiliary fault.
 - .2 A second main line circuit breaker carrying the UL/CSA mark shall be factory installed, for temporary connection to a test load bank during annual testing. The breaker shall be rated per the manufacturer's recommendations unless specified on the drawings and mounted in the AC connection box. The line side connections are to be made at the factory. The breaker shall be equipped with a DC shunt trip, wired for activation of the trip unit when there is a power outage and a call to run in emergency mode from the transfer switch in the building, at time during a load bank test. Auxiliary contacts shall be wired from the transfer switch(es) to the generator set for this purpose. Output lugs shall be provided for load side connections to a test load bank.
 - .3 An alternator strip heater shall be installed to prevent moisture condensation from forming on the alternator windings.

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2.3 Controls

- 2.3.1 The generator control system shall be a fully integrated microprocessor-based control system for standby emergency engine generators meeting all requirements of CSA C282-15.
- 2.3.2 The generator control system shall be a fully integrated control system enabling remote diagnostics and easy building management integration of all generator functions. The generator controller shall provide integrated and digital control over all generator functions including engine protection, alternator protection, speed governing, voltage regulation and all related generator operations. The generator controller must also provide seamless digital integration with the engine's electronic management system if so equipped. Generator controller's that utilize separate voltage regulators and speed governors or do not provide seamless integration with the engine management system are considered less desirable.
- 2.3.3 Communications shall be supported with building automation via the Modbus protocol with BACnet gateway card for seamless integration with BAS.
- 2.3.4 The control system shall provide an environmentally sealed design including encapsulated circuit boards and sealed automotive style plugs for all sensors and circuit board connections. The use of non-encapsulated boards, edge cards, and pc ribbon cable connections are considered unacceptable.
- 2.3.5 Circuit boards shall utilize surface mount technology to provide vibration durability. Circuit boards that utilize large capacitors or heat sinks must utilize encapsulation methods to securely support these components.
- 2.3.6 A predictive maintenance algorithm that alarms when maintenance is required. The controller shall have the capability to call out to the local servicing dealer when maintenance is required.
- 2.3.7 Diagnostic capabilities should include time-stamped event and alarm logs, ability to capture operational parameters during events, simultaneous monitoring of all input or output parameters, callout capabilities, support for multi-channel digital strip chart functionality and .1msec data logging capabilities.
- 2.3.8 The control system shall provide pre-wired customer use I/O: 4 contact inputs, 2 analog inputs, 4 relay outputs, and communications support via RS232, RS485, and an optional modem. Customer I/O shall be software configurable providing full access to all alarm, event, data logging, and shutdown functionality. In addition, custom ladder logic functionality shall be supported to provide application support flexibility. The ladder logic function shall have access to all the controller inputs and customer assignable outputs.
- 2.3.9 The control panel will display all user pertinent unit parameters according to Table 1 of CSA C282-15 including:

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- .1 Engine and alternator operating conditions
- .2 Oil pressure and oil temperature
- .3 Coolant temperature and level alarm
- .4 Natural gas monitored valve closed
- .5 Engine speed
- .6 DC battery voltage
- .7 Run time hours
- .8 Generator voltages, amps, frequency, kilowatts, and power factor
- .9 Alarm Status
- .10 Current alarm(s) condition per CSA C282-15 Table 1
- .11 Alarm Log of last twenty alarm events (date and time stamped)

2.3.10 For system reliability and security concerns, access to and manipulation of the internal operating parameters and alarm limits shall be conducted via password protected PC based software by trained personnel. System configuration support shall be provided locally or remotely by the manufacturers servicing representatives.

2.3.11 The following equipment is to be installed at the engine-generator set manufacturer's facility:

- .1 A DPDT relay (run relay) shall be socket mounted in the generator control panel and operate on engine start and run for customer connection.

2.3.12 The following equipment is to be provided by the engine-generator set manufacturer and shipped loose with the unit:

- .1 Provide a CSA C282-15 compliant alarm annunciator panel for remote indication per local and national code requirements. The annunciator shall be controlled using RS485 communications from the generator controller. Annunciators requiring individual contacts and wires per indication point are not preferred. The panel shall have an ALARM switch that when moved to the OFF position silences the audible alarm. A TEST/RESET switch must be included to verify the lights are functional and reset any condition after it has cleared.
- .2 A surface mount Remote Relay Panel must be provided. The panel will monitor 8 selectable channels via an RS485 data link with the generator control panel. A status change in a form A contact will occur when a monitored channel changes state.

2.4 Unit Accessories

2.4.1 The following equipment is to be installed at the engine-generator set manufacturer's facility:

- .1 The exhaust silencer(s) shall be provided of the size as recommended by the manufacturer and shall be of minimum critical grade. It shall be connected to the engine with a flexible, seamless, stainless steel exhaust connection. A rain cap will terminate the exhaust pipe. All components must be

**NEW GENERATOR INSTALLATION AT PEEL YOUTH VILLAGE
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Division 26, Specifications, Section 26 32 13.02, Power Generation Natural Gas

- properly sized to assure operation without excessive back pressure when installed.
- .2 A heavy duty, lead acid 12VDC battery set rated at 925 CCA, BCI group 31 as minimum, shall be installed by the generator set manufacturer. Provide all inter-cell and connecting battery cables as required for a complete operating system.
 - .3 Provide an automatic dual rate battery charger. The automatic equalizer system shall monitor and limit the charge current to 10 amps. The output voltage is to be determined by the charge current rate. The charger must be protected against a reverse polarity connection. The battery charger is to be factory installed on the generator set. Due to line voltage drop concerns, a battery charger mounted in the transfer switch will be unacceptable.
 - .4 The generator shall be provided with a minimum 125A 120/208VAC single (three) phase load centre with sufficient circuits to power all the accessories. It shall be powered with power from the load side of the transfer switch in the main building. All AC accessories supplied are to be factory wired to the load centre.
 - .5 The motorized dampers shall be powered by AC power from the load centre through a N/C contact on the run relay.

2.5 Manufacturers

- 2.5.1 Acceptable natural gas generator set supplier shall be Generac Industrial Power by Total Power, Cummins, Caterpillar or approved equal.
- 2.5.2 Where alternatives are proposed, the supplier must include a statement of compliance, detailing any variations from base bid specifications.

3. EXECUTION

3.1 Installation

- 3.1.1 Contractor shall install the complete electrical generating system including all fuel connections in accordance with local codes and the manufacturer's recommendations as reviewed by the Engineer.

3.2 Service

- 3.2.1 Supplier of the electric plant and associated items shall have permanent service facilities in this trade area. These facilities shall comprise a permanent force of factory trained and EGSA-certified service personnel on 24-hour call, experienced in servicing this type of equipment, providing warranty and routine maintenance service to afford the Agency maximum protection. Delegation of this service responsibility for any of the equipment listed herein will not be

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considered fulfillment of these specifications. Service contracts shall also be available.

3.3 Startup and Checkout

- 3.3.1 The supplier of the electric generating plant and associated items covered herein shall provide factory trained technicians to check out the completed installation and to perform an initial startup inspection and commissioning to include:
- .1 Ensuring the engine starts (both hot and cold) within the specified time.
 - .2 Verification of all engine parameters within specification.
 - .3 Verify no load frequency and voltage, adjusting if required.
 - .4 Test all automatic shutdowns of the engine-generator.
 - .5 Perform a 4-hour full load test of the electric plant, ensuring full load frequency and voltage are within specification, by using portable load banks. Note any deficiencies.
 - .6 Complete all testing as per all CSA C282-15 Section 10 requirements, document all results, and submit a complete report and letter of acceptance when complete, to the engineer for review.

3.4 Cleaning

- 3.4.1 Clean in accordance with Section 01 74 00 - Cleaning.
- .1 Remove surplus materials, excess materials, rubbish, tools and equipment.
- 3.4.2 Divert unused antifreeze from landfill to antifreeze recycling facility approved by consultant.

END OF SECTION

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Division 26, Specifications, Section 26 77 19.20, Closeout Requirements for Electrical Work

1. GENERAL

1.1 Scope

- 1.1.1 Provide documentation deliverables at completion of the Work for the following milestone events:
- .1 Occupancy permit (where applicable) (Form OP1E),
 - .2 Substantial Performance of the Work (Form SP1E),
 - .3 Ready for take-over by Agency (Form RFT1E),
 - .4 Total Performance of the Work (Form TP1E).

1.2 Definitions

- 1.2.1 The following definitions apply to this section.
- .1 **Occupancy permit** – means either: (i) a permit issued by a regulatory authority to allow the Agency to occupy the building subject to the building permit, or (ii) a building permit close-out procedure where documentation must be submitted to the building authority for that purpose.

1.3 General

- 1.3.1 The prerequisites and submittal of supporting documentation for the aforementioned milestone events may be combined as a single submission at one point in time for the following combination of events:
- .1 Occupancy Permit, and Substantial Performance.
- 1.3.2 Where a prerequisite is listed in more than one milestone event, it shall be included in the earliest- occurring milestone event unless expressly specified otherwise.

1.4 Occupancy Permit

- 1.4.1 Submit the reviewed final record of the Testing of Integrated Life Safety and Fire Protection Commissioning report two weeks prior to application for occupancy permit, where such a report is required.
- 1.4.2 Complete the Occupancy Permit Checklist and submit with required documentation to support the Agency's application for occupancy.

1.5 Substantial Performance

- 1.5.1 Complete the Substantial Performance Checklist and submit with required documentation when applying for Substantial Performance of the Work.
- 1.5.2 Where the work is sub-divided into separate scopes of Work, each requiring a separate Substantial Performance application, provide a separate checklist for each application.
- 1.5.3 Within five working days of the Consultant's review report which indicates that Substantial Performance of the Work has been achieved, provide a detailed schedule for completion and/or correction of the Work of all items described in the Contractors' and the Consultants' deficiency list.

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1.6 Ready-for-Takeover by Agency

- 1.6.1 The basic prerequisites to attaining Ready-for-Takeover of the Work are described in the General Conditions and Supplementary General Conditions of the Contract.
- 1.6.2 Complete the Ready-for-Takeover Checklist and submit with required documentation when applying for Ready-For Takeover of the Work.

1.7 Total Performance

- 1.7.1 Complete the Total Performance Checklist and submit with required documentation when applying for Total Performance of the Work.

Form OP1E: OCCUPANCY PERMIT CHECKLIST	
Project Name:	
Contract:	
Contract Scope:	
Application Date:	
Signed:	

The following requirements are completed and documentation included in this application. Where documentation has been issued directly to the Agency, a copy of the transmittal is enclosed.

- ☐ Building department inspection reports.
- ☐ AHJ electrical systems inspection reports.
- ☐ Fire Alarm Installation and Verification certificate to CAN/ULC-S524.
- ☐ Independent testing company, coordination study and testing reports submitted
- ☐ Integrated Fire Protection and Life Safety test report to ULC-S1001.
- ☐ Equipment start-up reports (Interim).
- ☐ Electrical system testing reports.

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Consultant Review	
Status:	☐ Reviewed ☐ Incomplete or deficient - resubmit
Signed:	
Date:	

Form SP1E: SUBSTANTIAL PERFORMANCE APPLICATION CHECKLIST	
Project Name:	
Contract:	
Contract Scope:	
Application Date:	
Signed:	

The following requirements are completed and documentation included in this application. Where documentation has been issued directly to the Agency, a copy of the transmittal is enclosed.

- ☐ Occupancy permit has been issued by the AHJ (where applicable).
- ☐ Systems have been started-up, tested, and
- ☐ demonstrated to Agency or Consultant (final)
- Equipment and wiring identification completed
- ☐ Spare parts and replacement parts turned over to
- Agency, transmittal attached.

Consultant Review	
Status:	☐ Reviewed ☐ Incomplete or deficient - resubmit
Signed:	
Date:	

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Form RFT1E: READY-FOR-TAKEOVER APPLICATION CHECKLIST	
Project Name:	
Contract:	
Contract Scope:	
Application Date:	
Signed:	

The following requirements are completed and documentation included in this application. Where documentation has been issued directly to the Agency, a copy of the transmittal is enclosed.

- ☐ Substantial Performance has been certified or verified.
- ☐ Occupancy permit has been issued by the AHJ (where applicable). Final cleaning and waste removal completed.
- ☐ Delivery to Agency of Operating and Maintenance documents for systems being taken-over by Agency. Submit copies of up-to-date as-built drawings.
- ☐ Final start-up, testing and balancing reports completed and submitted to Agency, including any items requiring corrections identified by Consultant.
- ☐ The portions of the building being turned over to the Agency can be secured by Agency.
- ☐ Demonstration and training are completed, or Contractor and Agency has agreed to a schedule to provide such training to be completed within one month after the date of Ready-for-Takeover.
- ☐ All commissioning activities except for those activities that are identified or otherwise agreed by the Agency

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to be deferred commission activities which may be
completed after Ready-for-Takeover of the Work.

- ☐ Integrated systems testing of fire protection and life safety systems. All warranties have been submitted to the Agency.
- ☐ A comprehensive list of items to be completed or corrected is provided to Agency and Consultant and included in the application for Ready-for-Takeover, and includes a schedule of when such work will be completed.

Consultant Review	
Status:	☐ Reviewed ☐ Incomplete or deficient - resubmit
Signed:	
Date:	

Form TP1M: TOTAL PERFORMANCE APPLICATION CHECKLIST	
Project Name:	
Contract:	
Contract Scope:	
Application Date:	
Signed:	

The following requirements are completed and included in this application. Where documentation has been issued directly to the Agency, a copy of the transmittal is enclosed.

- ☐ All final Operating and Maintenance documents have been delivered to Agency. All final up-to-date as-built drawings have been delivered to Agency.
- ☐ All demonstration and training are completed.

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- ☐ All commissioning activities are completed, including deferred alternate season commissioning activities.
All known deficiencies have been corrected, including latent deficiencies reported by the Agency.
- ☐ All inspections and tests required to be performed by Contractor or manufacturer's prior to expiry of the warranty period have been completed, and documentation for those inspections and tests are included in this application.

Consultant Review	
Status:	☐ Reviewed ☐ Incomplete or deficient - resubmit
Signed:	
Date:	

END OF SECTION

**NEW GENERATOR INSTALLATION AT PEEL YOUTH VILLAGE
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Division 28, Specifications, Section 28 46 00, Fire Detection and Alarm

1. GENERAL

1.1 Related Sections

1.1.1 Section 26 05 01 – Common Works Results – Electrical

.1 Materials and installation for fire alarm systems.

1.2 Reference Standards (LATEST REVISIONS)

1.2.1 CSA C22.1, Canadian Electrical Code, Part 1 (22nd Edition), Safety Standard for Electrical Installations.

1.2.2 NFPA 72, National Fire Alarm Code.

1.2.3 National Research Council Canada (NRC)

.1 National Building Code of Canada (NBC)

1.2.4 Underwriter's Laboratories of Canada (ULC)

.1 CAN/ULC-S524, Standard for the Installation of Fire Alarm Systems.

.2 CAN/ULC-S525, Audible Signal Device for Fire Alarm Systems.

.3 CAN/ULC-S526, Visual Signal Devices for Fire Alarm Systems.

.4 CAN/ULC-S528, Manual Pull Stations for Fire Alarm Systems.

.5 CAN/ULC-S529, Smoke Detectors for Fire Alarm Systems.

.6 CAN/ULC-S536, Inspection and Testing of Fire Alarm Systems.

.7 CAN/ULC-S537, Verification of Fire Alarm Systems.

.8 CAN/ULC-S541, Speakers for Fire Alarm Systems.

1.2.5 NFPA 70 - National Electrical Code (NEC)

1.2.6 UL 864 - Control Units and Accessories for Fire Alarm Systems

1.2.7 UL 268 - Smoke Detectors for Fire Alarm Systems

1.2.8 UL 1971 - Visual Signaling Appliances

1.3 Shop Drawings

1.3.1 Product Data: Provide data sheets for all fire alarm system components including detectors, notification appliances, and power supplies.

1.3.2 Shop Drawings: Submit detailed layout drawings showing the placement of detectors, notification devices, and conduit/wiring paths.

1.3.3 Installation and Testing Procedures: Submit a detailed plan for installation, commissioning, and testing procedures.

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1.3.4 Operation and Maintenance Manuals: Provide comprehensive manuals for system operation and maintenance procedures.

1.3.5 Certificates: Provide certificates of compliance with relevant codes and standards.

1.4 Quality Assurance

1.4.1 Installer Qualifications: Installations must be performed by qualified fire alarm system installers with 3 years experience in similar projects.

1.4.2 Manufacturer Qualifications: All fire alarm system components shall be from a manufacturer compatible with the existing system and third-party testing certification.

1.4.3 Codes and Standards Compliance: The system shall meet or exceed all requirements set forth in NFPA 72, NEC, and applicable local codes.

2. PRODUCTS

2.1 Materials

2.1.1 Relocate and reconnect existing devices.

2.1.2 New devices to match existing.

2.2 Wiring

2.2.1 Wire for 120 V circuits: No. 12 AWG minimum solid copper conductor.

2.2.2 Wire for low voltage DC circuits: No. 14 AWG minimum solid copper conductor

2.2.3 Wire to remote annunciators: No. 18 AWG minimum solid copper conductor.

2.2.4 Wire for connection to base telegraphic alarm loop: No. 12 AWG minimum solid copper conductor.

2.2.5 Insulation 75 degrees C minimum with nylon jacket.

2.2.6 Colour code wiring.

2.3 Weatherproof Smoke Detector

2.3.1 180° visibility for all visual indicators with cover in place

2.3.2 NEMA 4X watertight enclosure for non-hazardous indoor and outdoor Applications, to include corrosive environments.

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2.3.3 Photoelectric.

2.3.4 Standard interchangeable "twist-in" UL268 photoelectric heads for easy cleaning and replacement

2.3.5 Advanced detector head design yields internal dust filtering.

2.3.6 Front no-tools sampling tube removal and replacement provides for simple inspection of debris accumulation.

2.4 Smoke Detector

.1 180° visibility for all visual indicators with cover in place

.2 NEMA 4X watertight enclosure for non-hazardous indoor and outdoor Applications, to include corrosive environments.

.3 Photoelectric.

.4 Standard interchangeable "twist-in" UL268 photoelectric heads for easy cleaning and replacement

.5 Advanced detector head design yields internal dust filtering.

.6 Front no-tools sampling tube removal and replacement provides for simple inspection of debris accumulation.

2.5 Heat Detectors

2.5.1 Provide fixed temperature heat detectors where smoke detection is not suitable.

2.5.2 Must meet UL 521 or UL 2685 standards and be compatible with the FACP.

2.6 Manual Pull Stations

2.6.1 Provide manual pull stations located at strategic locations as indicated on drawings for initiating alarms manually.

2.6.2 Must comply with UL 38 and be weatherproof where required by code.

2.7 Audible Notification Appliances:

2.7.1 Provide horns/bells with a minimum sound pressure level of eighty dBA at 10 feet in accordance with NFPA 72.

2.7.2 Devices must include adjustable volume settings for different environments.

2.8 Visible Notification Appliances:

2.8.1 Provide flashing strobe lights with a light output of at least thirty candelas.

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3. EXECUTION

3.1 Manufacturer's Instructions

- 3.1.1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheet.

3.2 Installation

- 3.2.1 Install fire alarm system components per manufacturer instructions and in compliance with NFPA 72 and all applicable local codes.
- 3.2.2 Install main control panel and connect to ac power supply.
- 3.2.3 Locate and install manual alarm stations and connect to alarm circuit wiring.
- 3.2.4 Locate and install detectors and connect to alarm circuit wiring. Do not mount detectors within 1 m of air outlets. Maintain at least 600 mm radius clear space on ceiling, below and around detectors. Locate duct type detectors in straight portions of ducts.
- 3.2.5 Locate and install door releasing devices.
- 3.2.6 During the testing and verification of the fire alarm system, all existing and new fire alarm field devices including manual pull stations, detectors, fire modules, shall be externally labelled showing the address allocated to the device in the programming of the fire alarm system. Apply self-adhesive identification labels that shall be 12mm WHITE laminated marker tape with black typed lettering. The same address identification shall be noted on the Record Drawings. Both address labelling at the device and Record Drawings information shall match the addressing from the Test Reports provided by the manufacturer of the fire alarm system.

3.3 Testing

- 3.3.1 Conduct system commissioning and testing as outlined in NFPA 72.
- 3.3.2 Verify all devices are correctly installed and function as intended.
- 3.3.3 Perform sensitivity testing for smoke detectors.
- 3.3.4 Test audible and visual notification devices to ensure proper operation.
- 3.3.5 Test all control panels for functionality including power failure, alarm activation, and notification. Document all test results and provide them to the Agency upon successful completion.

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3.4 Training

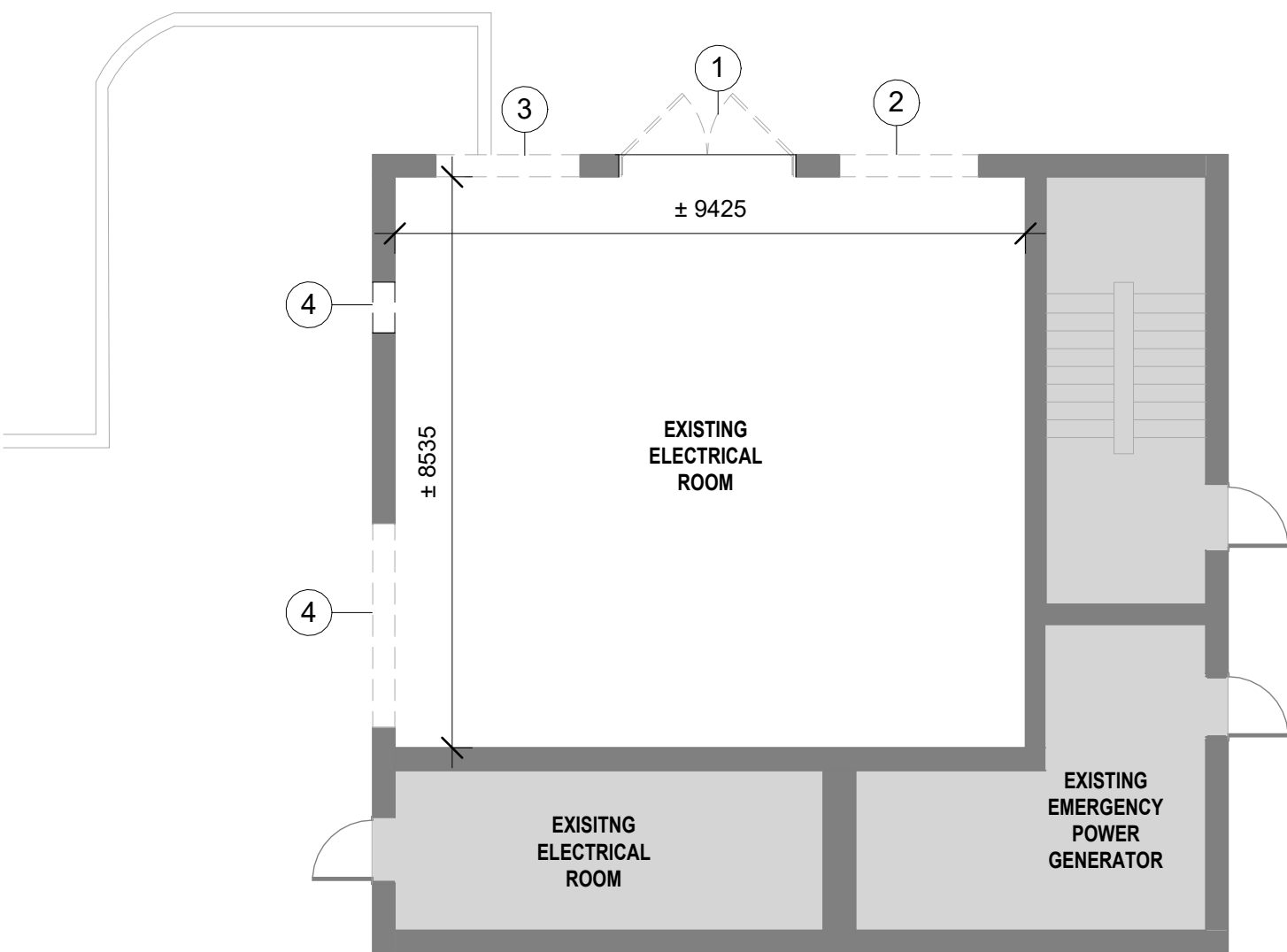
- 3.4.1 A. Provide training for the building Agency and facility management staff on the operation, maintenance, and troubleshooting of the fire alarm system.

3.5 Maintenance

- 3.5.1 Provide maintenance instructions for the continued operation and periodic testing of the fire alarm system, including recommendations for service intervals.

END OF SECTION

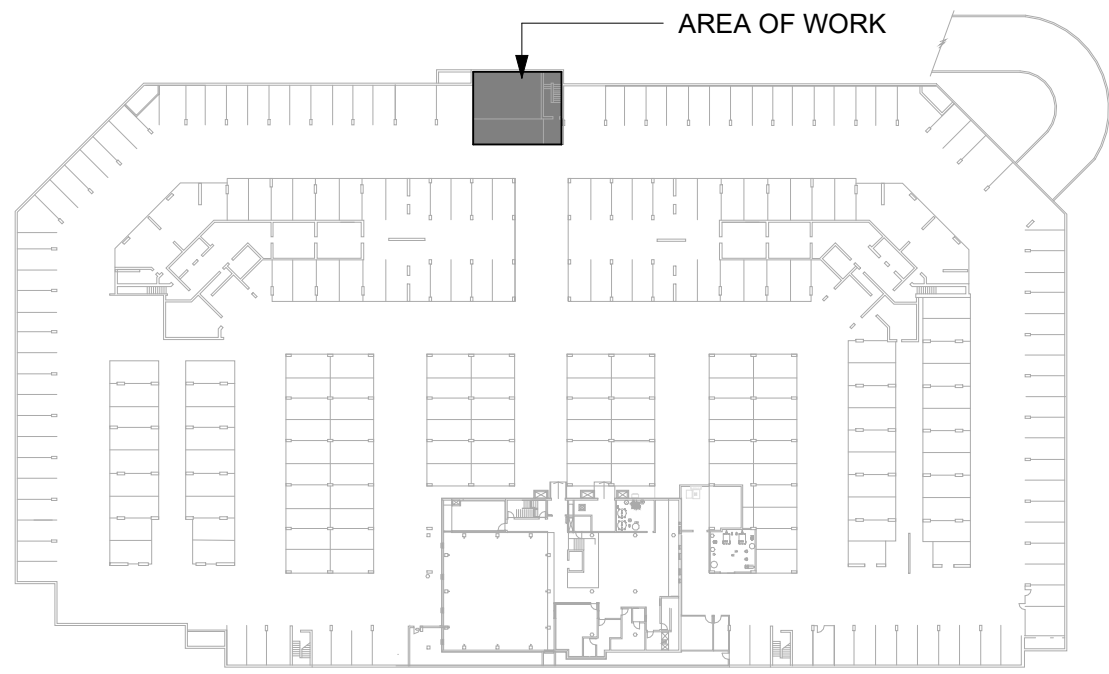
Note Block	
Number	Demolition Note
1	REMOVE EXISTING DOOR, FRAME AND PREPARE OPENING FOR NEW DOORS AND FRAME
2	REMOVE EXISTING LOUVER
3	REMOVE EXISTING LOUVER AND ENLARGE OPENING FOR NEW LOUVER (COORDINATE WITH MECHANICAL AND STRUCTURAL DESIGN)
4	IN EXISTING MASONRY/BRICK WALL CREAT OPENING FOR NEW LOUVER. COORDINATE WITH MECHANICAL AND STRUCTURAL DESIGN. RE-USE BRICK FOR INFILLING OTHER OPENINGS



PARTIAL DEMOLITION PLAN

SCALE: 1:100

2
A1.00



KEY PLAN
SCALE: N.T.S.

DOOR SCHEDULE

DOOR: 2 - 1000mm x 2300mm HOLLOW METAL DOOR (16 GA.)
C/W 300mm HIGH STL KICKPLATE (SITE CONFIRM EXISTING MASONRY OPENING AFTER REMOVAL OF EXISTING DOOR/FRAME)

DOOR FRAME: HOLLOW METAL FRAME (16 GA.)

DOOR & FRAME TO HAVE A FIRE RESISTANCE RATING OF 1 1/2 HRS.

ABBREVIATION LEGEND

STANDARDS

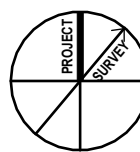
A.F.F. ABOVE FINISHED FLOOR
A/VB AIR / VAPOUR BARRIER
C/W COMPLETE WITH
DN DOWN
EL ELEVATION
EX EXISTING
EXP. EXPOSED
FIN. FINISHED
FTG FOOTING
G.C. GENERAL CONTRACTOR

CL GRID LINE
H.D.G. HOT DIPPED GALVANIZED
N.I.C. NOT IN CONTRACT
N.T.S. NOT TO SCALE
SIM. SIMILAR
STRU. STRUCTURE
T/ TOP OF
TYP. TYPICAL
US UNDERSIDE
U.N.O. UNLESS NOTED OTHERWISE

MATERIAL

CMU CONCRETE MASONRY UNIT
CONC CONCRETE
GWB GYPSUM WALL BOARD
HM HOLLOW METAL
INT INTEGRAL
PT PAINT
RB RUBBER BASE
SHT SHEET
S.S. STAINLESS STEEL
ST STAIN
TG TEMPERED GLASS

DO NOT SCALE DRAWING. DIMENSIONS ARE TO BE CHECKED AND VERIFIED BY THE CONTRACTOR ON SITE.
ALL DRAWINGS, SPECIFICATIONS, AND RELATED DOCUMENTS ARE THE COPYRIGHT PROPERTY OF THE ARCHITECT AND MUST BE RETURNED UPON REQUEST. REPRODUCTION OF DRAWINGS, SPECIFICATIONS, AND RELATED DOCUMENTS IN WHOLE OR IN PART IS STRICTLY FORBIDDEN WITHOUT THE ARCHITECT'S WRITTEN PERMISSION.



SYMBOL LEGEND

0	STRUCTURAL GRID	EL	SPOT ELEVATION
ELEVATION NAME	ELEVATION REFERENCE	?	DEMOLITION / CONSTRUCTION TAG
1 A01	SECTION REFERENCE	ROOM NAME 101	ROOM TAG
1 A100	DETAIL REFERENCE	D100	DOOR TAG
2 A100 3 4	EXTERIOR ELEVATION REFERENCE	W1	WALL TAG
1-B A100 1-C 1-D	INTERIOR ELEVATION REFERENCE	P1	WINDOW / SCREEN TAG
		F1	FLOOR TAG
		R1	ROOF TAG
		#	REVISION TAG

SPECIFICATIONS

GENERAL: THE PROJECT SCOPE INCLUDES RENOVATION OF THE EXISTING ELECTRICAL ROOM AS REQUIRED TO CONVERT IT INTO NEW TRANSFORMER ROOM. THERE IS NO CHANGE OF USE OR OCCUPANCY OF THE EXISTING BUILDING. FOR FULL SCOPE OF WORK, REVIEW THE ENTIRE SET OF DRAWINGS, INCLUDING STRUCTURAL, MECHANICAL AND ELECTRICAL PLANS AND INCLUDE FOR ALL REPAIRS OF MATERIALS DISTURBED BY MECHANICAL/ELECTRICAL WORK. EXISTING CONSTRUCTION IS MASONRY CONCRETE BLOCK ON INTERIOR AND BRICK ON EXTERIOR. AS PER THE CSA 282 STANDARDS, TRANSFORMER ROOM REQUIRES WALLS FIRE RATING TO BE 2 HR. IT IS PRESUMED THAT EXISTING WALLS ARE MASONRY AND PROVIDE REQUIRE FIRERATING. INSPECT SITE CONDITIONS PRIOR TO COMMENCE OF THE WORK AND REPORT ANY DISCREPANCIES. SITE VERIFY ALL DIMENSIONS AND MAKE MODIFICATIONS TO SUIT EXISTING SITE CONDITIONS. REPORT ALL CONTEMPLATED DEVIATIONS FROM THE DRAWINGS PRIOR TO MAKING CHANGES. MAKE GOOD ALL AREAS DISTURBED OR DAMAGED DURING CONSTRUCTION WHETHER SHOWN ON DRAWINGS OR NOT. CONTRACTOR TO PROVIDE AS BUILT DRAWINGS IN PDF AND CAD FORMAT.

DEMOLITION: REFER TO DEMOLITION PLAN AND NOTES ON DRAWING A1.00 AND ALSO STRUCTURAL, MECHANICAL AND ELECTRICAL DEMOLITION DRAWINGS AND NOTES. IN THE AREA OF RENOVATION, REMOVE ALL EXISTING EQUIPMENT AND ITEMS NOTED TO BE DEMOLISHED. PREPARE EXISTING SURFACES, INCLUDING WALLS, FLOORS AND EXPOSED CEILING STRUCTURE FOR NEW FINISHES. FILL IN ALL EXISTING HOLES AND REPAIR AND MAKE GOOD EXISTING STRUCTURE AND FINISHES AS REQUIRED FOR NEW FINISHES.

DOOR & FRAME: AT REMOVED DOOR AND FRAME, PROVIDE NEW HOLLOW METAL, 1.5 HR RATED, INSULATED DOORS, C/W STIFFENERS, 16 ga. 1-3/4" THICK WITH CONTINUOUS WELD EDGE. HOLLOW METAL FRAME TO BE 16 ga. COORDINATE THE SIZE OF FRAME/DOOR WITH THE EXISTING MASONRY OPENING. NEW HARDWARE TO MEET PEEL REGION STANDARDS. CONTRACTOR TO CARRY \$4,000 CASH ALLOWANCE FOR HARDWARE SUPPLY AND INSTALLATION.

EXTERIOR WALLS: AT REMOVED LOUVERS, INFILL OPENING WITH MATERIALS TO MATCH: 190 MM MASONRY BLOCK AND BRICK TO MATCH EXISTING. IF POSSIBLE, REUSE EXISTING BRICK.

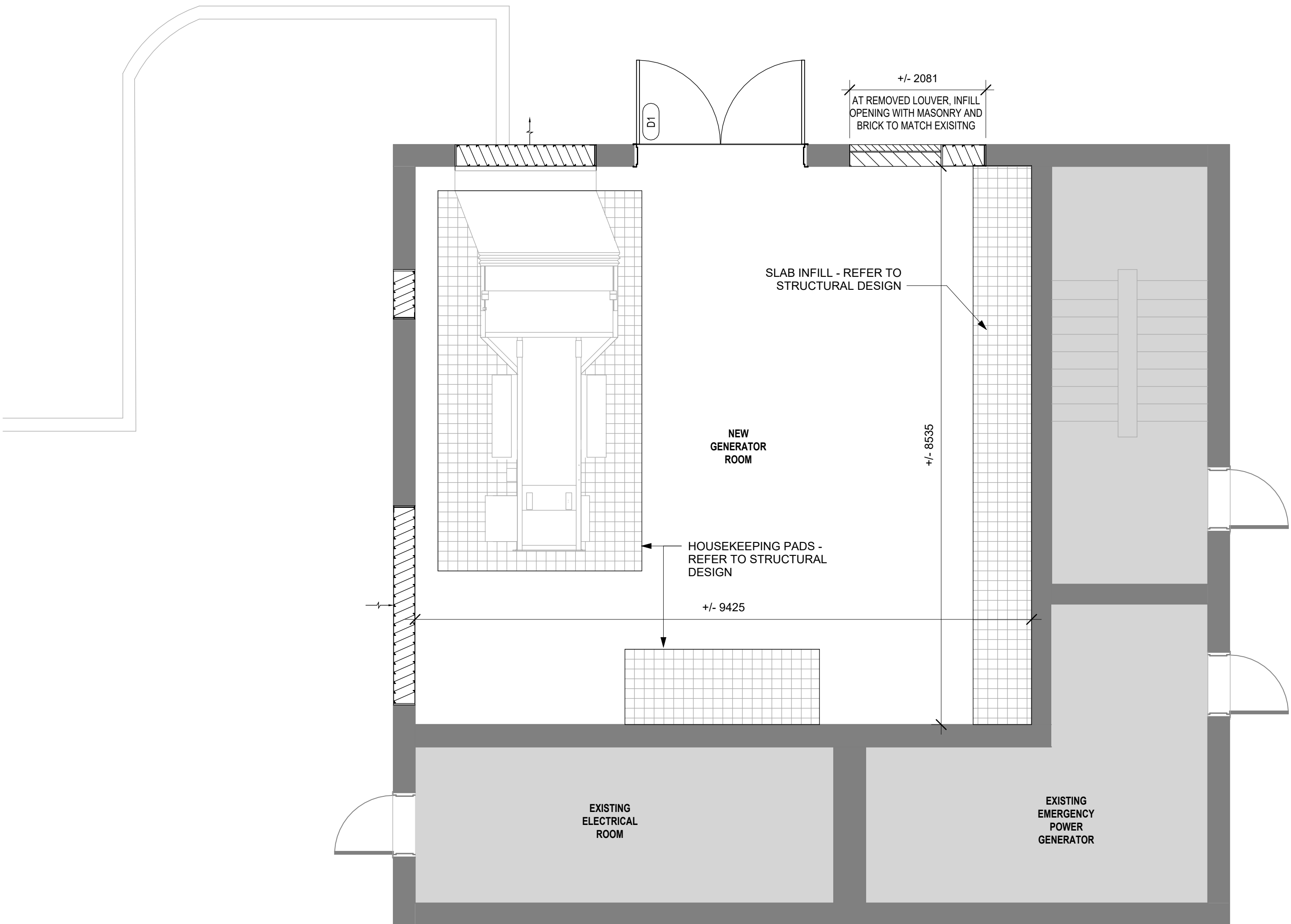
FIRE STOPPING & SMOKE SEALS:
FIRESTOP SEALANT: TO CANULC-S115; ULC LABELLED, NON-SAGGING TYPE FOR VERTICAL APPLICATIONS; TYPES AS LISTED IN TESTED ASSEMBLIES.
FIRESTOP INSULATION: TO CANULC-S702.1, TYPE 2; MANUFACTURED FROM ONLY ROCK OR SLAG FIBERS, AS LISTED IN TESTED ASSEMBLIES.
FIRESTOP ACCESSORIES: FIRESTOP FOAMS, BOARDS, BLOCKS, COLLARS, WRAPS, PUTTYS AND PLUGS; TO CANULC-S115; ULC LABELLED; TYPES AS LISTED IN TESTED ASSEMBLIES.
MANUFACTURERS: 3M CANADA INC. OR HILTI CANADA CORPORATION.
INSPECT PENETRATION FIRESTOP SYSTEMS TO ASTM E2174 AND FIRE- RESISTANT JOINT SYSTEMS TO ASTM E2393.

SEALANTS: GENERAL PURPOSE & ACOUSTICAL SEALANT: TO CAN/CSB-19.17-M. ONE-PART, SILICONIZED ACRYLIC LATEX, MILDEW-RESISTANT ACCOMMODATING JOINT MOVEMENT OF PLUS OR MINUS 12-1/2 PERCENT; COLOURS AS SELECTED BY CONSULTANT; TREMFLEX 834 BY TREMCO OR SIMILAR BY DOW, GENERAL ELECTRIC OR MASTER BUILDERS SOLUTIONS CANADA, INC. INSTALL JOINT SEALANTS TO ASTM C1193.

PAINTING: FINISH PAINT ALL INTERIOR OF NEW TRANSFORMER ROOM, INCLUDING WALLS, CEILINGS, DOORS AND FRAME. CONFORM TO MPI ARCHITECTURAL PAINTING SPECIFICATION MANUAL, USING ONLY PRODUCTS FROM THE FOLLOWING MANUFACTURERS AS LISTED IN MPI APPROVED PRODUCTS LIST FOR EACH SCHEDULED PAINT SYSTEM. PROVIDE PRIMERS AND UNDERCOATS PRODUCED BY SAME MANUFACTURER AS FINISH COATS.

MANUFACTURERS: BENJAMIN MOORE & CO. LTD., ICI (DULUX) PAINTS, MF PAINTS INC. (INNOVATION PLUS), PARA PAINTS CANADA INC., PPG CANADA INC. (PITTSBURGH PAINTS), PRATT & LAMBERT CO., SHERWIN-WILLIAMS CANADA, AND SICO COATINGS, INC. CONFORM TO MPI MAINTENANCE REPAINTING MANUAL FOR REFINISHING EXISTING PREVIOUSLY FINISHED SURFACES.

PAINT SYSTEM SCHEDULE:
a. CONCRETE - OPAQUE PAINTED FINISH: INT. 3.1M - INSTITUTIONAL LOW ODOR/VOC, PREMIUM GRADE; GLOSS LEVEL G5 - SEMI-GLOSS.
b. CONCRETE MASONRY UNITS - OPAQUE PAINTED FINISH: INT. 4.2E - INSTITUTIONAL LOW ODOR/VOC (OVER LATEX BLOCK FILLER); PREMIUM GRADE; GLOSS LEVEL G5 - SEMI-GLOSS. PROVIDE LOCK FILLER PRIMER ON ALL NEW CONCRETE BLOCK MASONRY BEFORE APPLYING PAINT FINISH.
c. BRICK - OPAQUE PAINTED FINISH: INT. 4.1M - INSTITUTIONAL LOW ODOR/VOC (OVER W.B. PRIMER), PREMIUM GRADE; GLOSS LEVEL G5 - SEMI-GLOSS.
d. GALVANIZED AND GALVANEAL METAL - INT. 5.3N - INSTITUTIONAL LOW ODOR/VOC (OVER W.B. GALVANIZED PRIMER), PREMIUM GRADE; GLOSS LEVEL G5.
COLOURS: UP TO 2 COLOURS AS SELECTED BY CONSULTANT.

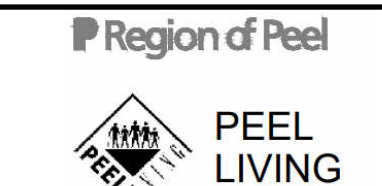


PROPOSED NEW GENERATOR ROOM PLAN

SCALE: 1:50

1
A1.00

SEAL:



project title:

NEW GENERATOR INSTALLATION
AT PEEL YOUTH VILLAGE

PEEL YOUTH VILLAGE, 99 ACORN PLACE MISSISSAUGA, ON

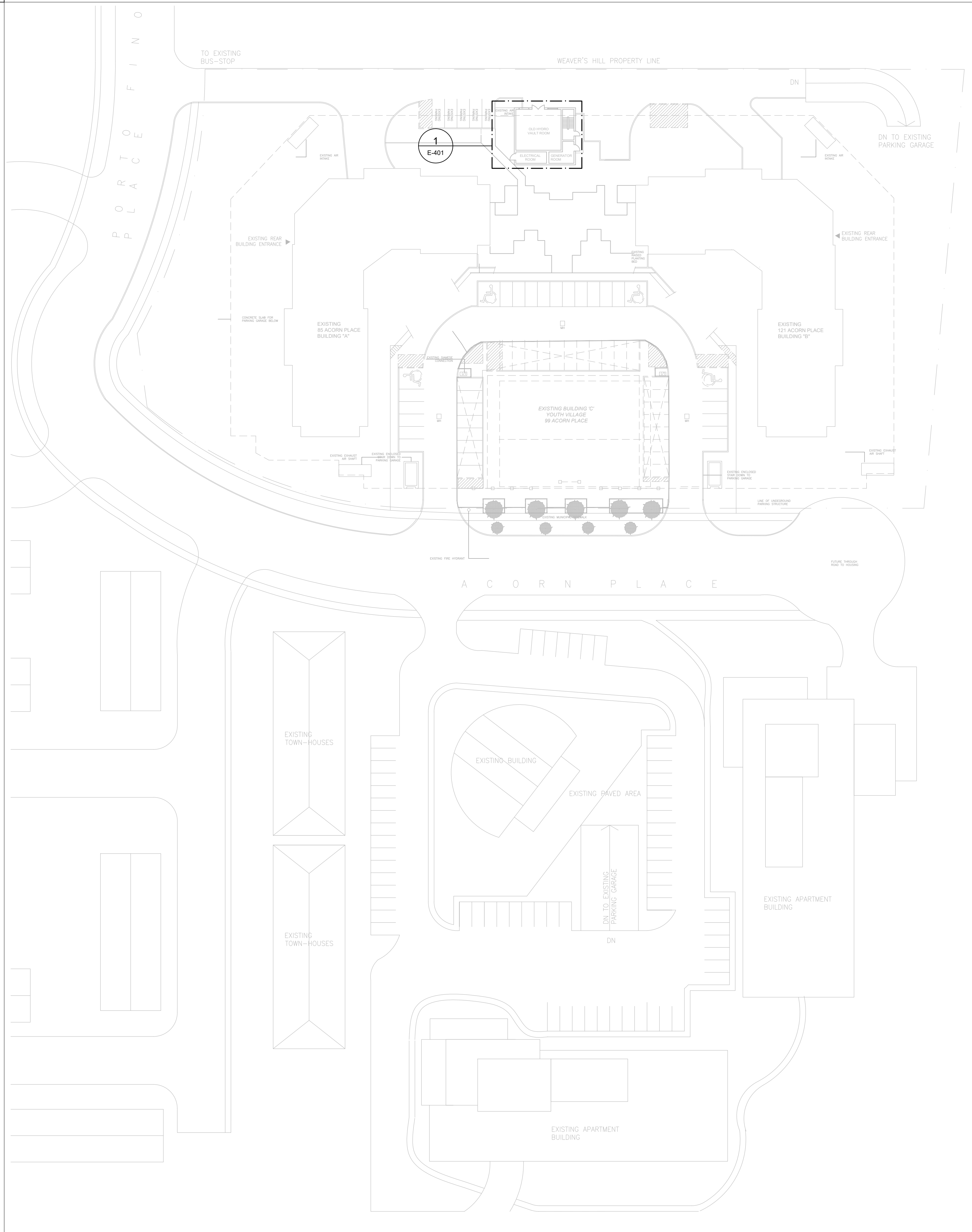
drawing title:
NEW GENERATOR ROOM
DEMOLITION PLAN, PROPOSED
FLOOR PLAN, NOTES AND
SPECIFICATION

drawn:
SG
date:
09/05/24

scale:
As indicated
project number:
24-14-D

checked:
SG / AJ
date:
25/04/02

DRAWING NO:
A1.00
2



1 SITE PLAN
E001 1:500

DRAWING LIST TABLE	
DRAWING NO.	DRAWING TITLE
E001	SITE PLAN LEGEND AND DRAWING LIST
E101	PARKING GARAGE EXISTING POWER LAYOUT
E102	PARKING GARAGE POWER LAYOUT INSTALLATION (PHASE 1)
E103	PARKING GARAGE POWER LAYOUT SWITCHOVER PHASE (PHASE 2)
E104	PARKING GARAGE POWER LAYOUT FINAL
E105	PARKING GARAGE DIST. CONDUIT INSTALLATION COORDINATION
E106	PARKING GARAGE CONTROL WIRING INSTALLATION
E107	NEW GENERATOR ROOM LIGHTING LAYOUT
E401	NEW GENERATOR ROOM POWER LAYOUT
E402	EXISTING CHILLER AND PARKING GARAGE LAYOUT
E403	EXISTING ELECTRICAL ROOMS POWER LAYOUT
E501	ELECTRICAL DETAILS
E601	SINGLE LINE DIAGRAM INSTALLATION (PHASE 1)
E602	SINGLE LINE DIAGRAM SWITCHOVER PHASE (PHASE 2)
E603	SINGLE LINE DIAGRAM FINAL
E604	EQUIPMENT AND PANEL SCHEDULES

ABBREVIATIONS	
CTE	CONNECT TO EXISTING
EX	EXISTING DEVICE TO REMAIN
RE	REMOVE EXISTING DEVICE
RP	REPLACE EXISTING DEVICE WITH NEW DEVICE
R/R	REUSE AND RELOCATE
ER	EXISTING DEVICE TO REMOVE
AFF	ABOVE FINISHED FLOOR
AFG	ABOVE FINISHED GRADE
CM	CEILING MOUNTED
WM	WALL MOUNTED
FM	FLOOR MOUNTED
EM	EMERGENCY
SLD	SINGLE LINE DIAGRAM

GENERAL NOTES

- CONSTRUCTION PLANNING AND EXECUTION TEAM SHALL ENSURE THAT ANY POWER INTERRUPTION TO THE EXISTING BUILDING SERVICES SHALL BE WELL COORDINATED AND APPROVED BY THE CLIENT PRIOR TO SHUTDOWN.
- THESE DRAWINGS ARE DIAGRAMMATIC ONLY. PRIOR TO ANY ELECTRICAL ROUGH IN, VERIFY THE EXACT LOCATIONS OF NEW EQUIPMENT AND DEVICES AS INDICATED ON DRAWINGS. ELEVATIONS AND/OR DETAILS ON THE ELECTRICAL DRAWINGS, WHERE DETAILED INFORMATION IS NOT INDICATED ON THE DRAWINGS, VERIFY THE EXACT LOCATION ON THE SITE WITH THE DIRECTION FROM THE RESPECTIVE CONSULTANT OR THE OWNER'S REPRESENTATIVE.
- ANY DISCREPANCIES BETWEEN DRAWINGS AND SPECIFICATIONS AND/OR EXISTING CONDITIONS ARE TO BE REFERRED TO THE DESIGNER FOR INSTRUCTIONS BEFORE ANY WORK IS BEGUN, AND CONTRACTOR TO ALLOW COST FOR THE ONEROUS OPTION.
- DETAILS ON ELECTRICAL DRAWINGS ARE INTENDED TO BE FOR GENERAL ARRANGEMENT ONLY. DETAILS MAY DO NOT SHOW ALL COMPONENTS BUT ARE MERELY A GUIDE AS TO THE ORIENTATION OF EQUIPMENT THAT IS REQUIRED TO ASSIST THE INSTALLATION.
- THE CONTRACTOR SHALL ASSUME FULL RESPONSIBILITY FOR ANY DISRUPTION TO THE EXISTING SERVICES, THE EXISTING BUILDING MUST BE KEPT IN OPERATION AT ALL THE TIMES. ARRANGE WORK IN SUCH A MANNER THAT INTERRUPTIONS TO THE SERVICES OCCUR ONLY AT SCHEDULED TIMES. UNAVOIDABLE INTERRUPTIONS SHALL BE SCHEDULED WITH THE BOARD AT LEAST 48 HOURS IN ADVANCE. OVERTIME WORK THAT MAY BE REQUIRED TO TIE-IN SERVICES AT NIGHT OR ON WEEKENDS SHALL BE INCLUDED IN THE TENDER AMOUNT.
- CONTRACTOR SHALL ENSURE THAT ALL REQUIRED PERMITS ARE OBTAINED. NO WORK WHICH IS CONDITIONAL ON SUCH PERMITS SHALL BE UNDERTAKEN UNTIL NECESSARY CONDITIONS ARE MET. BUILDING PERMIT IS PROVIDED BY CONSULTANT.
- CARRY OUT CHANGES AS INDICATED TO THE DISTRIBUTION SYSTEM AS INDICATED ON THE DRAWINGS.
- PENETRATION THROUGH FLOORS, CEILINGS AND WALLS SHALL BE PACKED WITH GLASS FIBER FIRE RETARDANT INSULATION AND OR FIRE STOP CAULKING TO MAINTAIN FIRE RATING.
- GENERAL CONTRACTOR WILL BE RESPONSIBLE FOR ALL COORDINATION TO ACCESS THE SITE FOR DELIVERY AND REMOVAL OF GOODS WITH OWNER.
- CONTRACTOR TO PERFORM SITE INSPECTION, INCLUDING CEILING SPACES DURING THE TENDER PERIOD AND ENSURE THAT ALL WORK IS INCLUDED IN THE CONTRACT.
- THE CONTRACTOR SHALL BE RESPONSIBLE FOR DISCONNECTING AND REMOVING ALL ELECTRICAL EQUIPMENT FROM AREAS BEING ALTERED OR DEMOLISHED. WIRING, CONDUIT AND EQUIPMENT REQUIRED TO MAINTAIN SERVICE IN OTHER PARTS OF THE BUILDING SHALL BE TEMPORARILY SUPPORTED, REROUTED, SERVICED OR RELOCATED AS REQUIRED. OBSOLETE CONDUITS AND CABLES SHALL BE REMOVED. ALL EXISTING WIRING WHICH ARE NOT REMOVED SHALL BE DISCONNECTED, BLANKED-OFF AND MADE SAFE.
- THE CONTRACTOR SHALL REPLACE OR REPAIR ANY ITEMS WHICH ARE DAMAGED DUE TO THIS WORK AT NO EXTRA COST TO THE BUILDING OWNER.
- WORK PERFORMED SHALL BE IN CONFORMITY WITH ALL LAWS, BYLAWS, OR REGULATIONS OF THE MUNICIPAL, PROVINCIAL OR OTHER AUTHORITIES HAVING JURISDICTION. NOTHING CONTAINED IN THESE DRAWINGS SHALL BE CONSTRUCTED AS TO BE IN CONFLICT WITH ANY SUCH LAWS.
- CONTRACTOR SHALL PROVIDE POWER TO THE NEW MECHANICAL EQUIPMENT AND BAS CONTROL EQUIPMENT INDICATED ON THE DRAWINGS. REFER TO MECHANICAL SCHEDULE FOR MORE DETAILS.
- ELECTRICAL CONTRACTOR SHALL COMPLY WITH ALL REQUIREMENTS OF THE ONTARIO ELECTRICAL SAFETY REGULATION AND PROVIDE THE FINAL APPROVAL OF THE WORK INSPECTION.
- DOCUMENT ALL FUSE SIZES, TYPES, WIRE AND CONDUIT SIZES.
- UPDATE ALL PANELS SCHEDULES WITH NEATLY TYPE WRITTEN PANEL DIRECTORY. REMOVE ALL MARKINGS ON PANELS THAT DO NOT APPLY TO THE CIRCUITS INDICATED.
- ALL JUNCTION BOXES ARE TO BE IDENTIFIED PER THE SPECIFICATION SECTION. ELECTRICAL CONTRACTOR SHALL ENSURE ACCESS TO ALL JUNCTION BOXES ARE NOT IMPEDED.
- ELECTRICAL CONTRACTOR SHALL TAKE NOTE OF THE

ELECTRICAL SCOPE OF THE WORK

THE FOLLOWING PROVIDES A SUMMARY OF SCOPE OF WORK. REFER TO THE DRAWINGS AND SPECIFICATIONS FOR FULL SCOPE OF WORK.

THE SCOPE OF WORK FOR THIS PROJECT INCLUDES CONSTRUCT NEW ELECTRICAL SUPPLY AND NEW ELECTRICAL EQUIPMENT (GENERATOR, SWITCHBOARD, TRANSFORMER, PANEL, ETC.).

DEMOLITION:

- DISCONNECT, DEMOLISH AND DISPOSE EXISTING POWER SUPPLY CONDUCTOR FOR EXISTING SWITCHBOARD "PP-OD" C/W CONDUIT, DRAW BOX, ETC. UPSTREAM TO THE EXISTING SWITCHBOARD "B" (BUILDING "B").

NEW CONSTRUCTION:

- SUPPLY AND INSTALL NEW ELECTRICAL EQUIPMENT AS PER DRAWINGS.
- SUPPLY AND INSTALL NEW TRANSFORMER, SWITCHBOARD, ATS, PANEL, LOAD BANK, BREAKERS, WIRING, CONDUITS,

FITTINGS TO CONNECT NEW EQUIPMENT AS INDICATED ON DRAWINGS.

- RETAIN EXISTING CT's IN THE SWITCHBOARD "B" (BUILDING "B") AND RECONNECT TO NEW SUPPLY FEEDER FOR SWITCHBOARD "C" AS PER SINGLE LINE DIAGRAM.
- IMMEDIATELY PLACE ORDERS FOR ALL EQUIPMENT ON AWARD OF CONTRACT IN ORDER TO EXPEDITE DELIVERY OF SWITCHBOARDS, ETC. AS SOON AS POSSIBLE.
- SUPPLY AND INSTALL A NEW 625KW, 781kVA, 600V, 3 PHASE, 4 WIRE, 60 Hz NATURAL GAS GENERATOR AND GENERATOR ANNUNCIATOR PANEL IN THE NEW GENERATOR ROOM ON THE GROUND FLOOR. ALLOW FOR INSTALLATION OF VIBRATION ISOLATION CONCRETE BASE UNDER NEW 625KW GAS GENERATOR IN ACCORDANCE WITH STRUCTURAL ENGINEERS REQUIREMENTS.
- SUPPLY AND INSTALL CONDUIT FOR CONTROL AND FIRE ALARM WIRING AS PER DRAWINGS.
- SEPARATE PRICE: PROVIDE A SEPARATE PRICE FOR LOAD BANK PROVISION AND INSTALLATION.**

ELECTRICAL SEQUENCE OF THE WORK

PART A - ELECTRICAL INSTALLATION RENEWAL:

- SCOPE OF WORK:** PROVISION OF A NEW SUPPLY TO BUILDING "C" COMPLETE WITH A NEW NATURAL GAS GENERATOR, AUTOMATIC TRANSFER SWITCH AND NEW SWITCHBOARD "C". THIS WILL ALSO INCLUDE ALL CONTROL CIRCUITS, WIRING FOR GENERATOR REMOTE ANNUNCIATOR AND FIRE ALARM SIGNALS TO THE MAIN FIRE ALARM PANEL.

2. WORK SEQUENCE:

PHASE 1 - INSTALLATION PHASE:

- PROVIDE AND INSTALL A NEW 600 VOLTS, THREE PHASE, FOUR WIRE FEEDER (SUPPLY) FROM SWITCHBOARD "B" (IN BUILDING "B") TO NEW ATS IN GENERATOR ROOM AND NEW 600V THREE PHASE, FOUR WIRE, FEED TO SWITCHBOARD "C" NEAR THE EXISTING CHILLER ROOM IN THE LOWER LEVEL OF BUILDING "C".
 - PRE-REQUISITES: COORDINATE WITH BUILDING MANAGER FOR CLOSURE OF PORTIONS OF PARKING LOWER LEVEL FOR ELECTRICAL CONDUIT AND WIRING INSTALLATION WORK TO PROCEED.
 - COORDINATE WITH BUILDING MANAGER FOR ACCESS TO THE BUILDING "B" ELECTRICAL ROOM.
- PROVIDE A NEW 625KW/781KVA NATURAL GAS DRIVEN ELECTRICAL GENERATOR AND AUTOMATIC TRANSFER SWITCH IN THE OLD HYDRO VAULT ON THE GROUND FLOOR (NEW GENERATOR ROOM) OF THE COMPLEX TO INTERFACE THE NORMAL HYDRO SUPPLY WITH THE OF THE POWER PROVIDED BY THE GENERATOR. INCLUDED IN THIS PHASE IS ALL POWER WIRING, CONTROL WIRING, GENERATOR REMOTE ANNUNCIATOR AND ASSOCIATED WIRING.
 - PRE-REQUISITES: ENSURE THAT ALECTRA HAVE VACATED THE ELECTRICAL VAULT AND REMOVED ALL THEIR EQUIPMENT
 - XRAY CONCRETE FLOOR SLAB AND OBTAIN STRUCTURAL ENGINEERS' APPROVAL BEFORE CORE DRILLING FLOOR SLAB FOR CONDUIT ENTERING THE GENERATOR ROOM
- PROVIDE AND INSTALL THE NEW 1200A, 600 VOLTS, THREE PHASE, FOUR WIRE, SWITCHBOARD ("C") NEAR THE EXISTING CHILLER ROOM IN THE LOWER LEVEL OF BUILDING "C". TERMINATE THE FEED FROM THE ATS INTO THE NEW SWITCHBOARD AND INSTALL THE FEED FOR THE SWITCHBOARD PP-OD OUT OF THE 1200 AMP SWITCHBOARD READY FOR EXTENSION INTO THE EXISTING SWITCHBOARD PP-OD DURING THE POWER SHUT DOWN.
- INSTALL AND CONNECT FEEDER BETWEEN TO THE NEW GENERATOR AND THE NEW ATS IN THE GENERATOR ROOM.
- PROVIDE AND INSTALL THE NEW PORTABLE 200kW LOAD BANK ON THE GROUND FLOOR NEAR NEW GENERATOR ROOM AND CAM LOCK CABINET FOR CONNECTION FROM TEMPORARY LOAD BANK.

PHASE 2 SWITCHOVER PHASE:

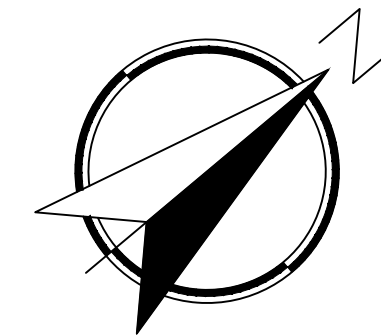
- SHUT DOWN THE POWER TO SWITCHBOARD "B" (IN THE ELECTRICAL ROOM "B" ON THE LOWER LEVEL) AND REMOVE THE EXISTING FEED TO BUILDING "C" FROM SWITCHBOARD "B". AT THE SAME TIME REMOVE THE EXISTING FEED INTO THE SWITCHBOARD PP-OD (IN THE CHILLER ROOM). EXTEND THE FEED OUT OF NEW SWITCHBOARD "C" AS PROVIDED UNDER PHASE 1 OF THE WORK TO SWITCHBOARD PP-OD AND TERMINATE IN LINE SIDE OF EXISTING 1200 AMP FUSE DISCONNECT SWITCH IN SWITCHBOARD PP-OD. INSTALL THREE NEW 1000A FUSES IN THE EXISTING FUSE DISCONNECT SWITCH.
- EXTEND THE FEED INSTALLED FROM THE ATS (IN SWITCH ROOM "B" - BUILDING "B") DOWN INTO THE SWITCHBOARD "B" AND CONNECT INTO THE LOAD SIDE OF THE EXISTING 1200A-3P BREAKER. RECONNECT EXISTING CT-1 IN THE SWITCHBOARD "B" (BUILDING "B") TO NEW SUPPLY FEEDER FOR SWITCHBOARD "C" AS PER SINGLE LINE DIAGRAM. ON COMPLETION OF THE INSTALLATION ENERGIZE THE NEW SUPPLY TO SWITCHBOARD "C" VIA THE NEW ATS IN THE GENERATOR ROOM.
- PRE-REQUISITES: ENSURE COMPLETE ELECTRICAL INSTALLATION IS FULLY INSTALLED AND ALL FEEDS ARE TERMINATED AND HAVE BEEN CHECKED FOR PHASE ROTATION AND THAT INSULATION VALUES AS TESTED COMPLY WITH CODE BEFORE ENERGIZING THE SUPPLY TO SWITCHBOARD "C".

DEMOLITION NOTES

- CONTRACTOR SHALL ENSURE THAT ALL REFUSE IS REMOVED ON A DAILY BASIS AND JOB SITE MAINTAINED IN AN ORDERLY AND SAGE CONDITION.
- PROVIDE DUST PROTECTION FOR ALL EQUIPMENT IN SURROUNDINGS WHEN DEMOLISHING BLOCK WALLS AND/OR ANY ACTIVITY WHICH WILL CREATE DUST. CLEAN ALL EQUIPMENT FROM CONSTRUCTION DUST.
- GENERAL CONTRACTOR WILL BE RESPONSIBLE FOR MAKING ANY SURFACES DAMAGED IN THE RESULT OF ALTERNATIONS.
- REMAINING REMOVED EQUIPMENT AND MATERIALS, UNLESS OTHERWISE NOTED, SHALL BECOME THE PROPERTY OF THE CONTRACTOR AND SHALL BE REMOVED FROM THE SITE UPON COMPLETION OF THE WORK.
- ELECTRICAL CONTRACTOR SHALL ASSIST THE GENERAL CONTRACTOR IN THE DEMOLITION WORK, BY CUTTING BACK ELECTRICAL SERVICES AS NEEDED FOR DEMOLITION WORK.
- ALL REMOVED CIRCUITS TO BE MADE SAFE INCLUDING EXTRA WIRES/CONDUITS TO BE REMOVED.



KEY PLAN



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Contractor to verify all dimensions & conditions on site and immediately notify the departmental representative of all discrepancies.

6	ISSUED FOR PERMIT	07/05/25
5	ISSUED FOR TENDER	04/04/25
4	ISSUED FOR ESA	28/02/25
3	ISSUED FOR TENDER REVIEW	21/02/25
2	ISSUED FOR 90%	20/06/24
1	ISSUED FOR 33%	29/01/24

revisions	description	date
A	A detail no. no. du detail	A
C	B location drawing no. sur dessin no.	B C
	C drawing no. dessin no.	

project
NEW GENERATOR INSTALLATION
AT PEEL YOUTH VILLAGE
PEEL YOUTH VILLAGE, 99 ACORN PLACE
MISSISSAUGA, ON

drawing
dessein

SITE PLAN LEGEND AND DRAWING LIST

Designed By JS Conçu par
Date (yyyy/mm/dd)

Drawn By SM Dessiné par
Date (yyyy/mm/dd)

Reviewed By JS Examiné par
Date (yyyy/mm/dd)

Approved By BR Approuvé par
Date (yyyy/mm/dd)

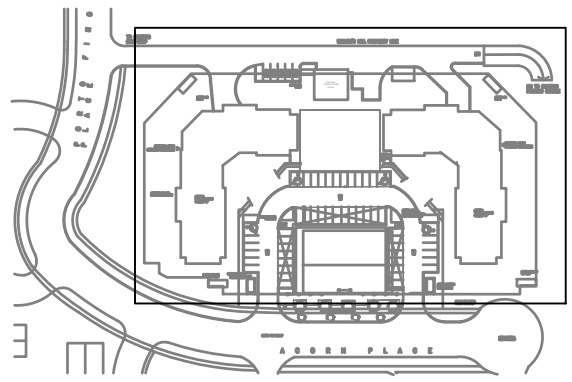
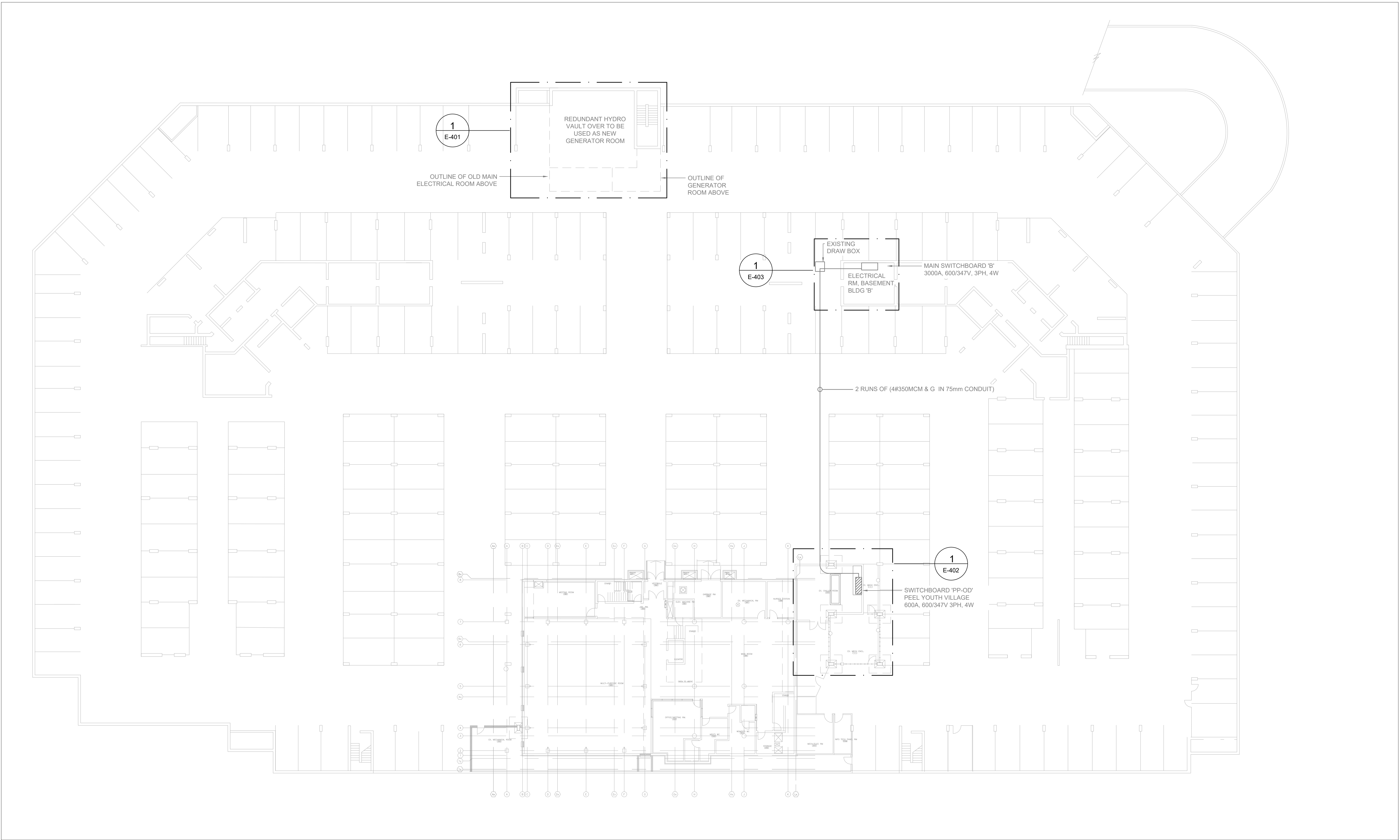
Tender Soumission

Project Manager Administrateur de projets

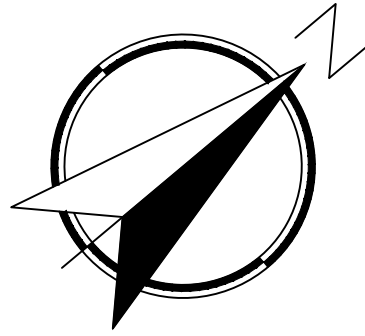
Project no. No. du projet
2022-677P (ON10121.3)

Scale Échelle
AS NOTED

Drawing no. No. du dessin
E001



KEY PLAN



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revisions	description	date
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4	ISSUED FOR ESA	28/02/25
3	ISSUED FOR TENDER REVIEW	21/02/25
2	ISSUED FOR 90%	20/06/24
1	ISSUED FOR 33%	29/01/24

A C	A detail no. no. du detail B location drawing no. sur dessin no. C drawing no. dessin no.	A B C

project
NEW GENERATOR INSTALLATION
AT PEEL YOUTH VILLAGE
PEEL YOUTH VILLAGE, 99 ACORN PLACE
MISSISSAUGA, ON

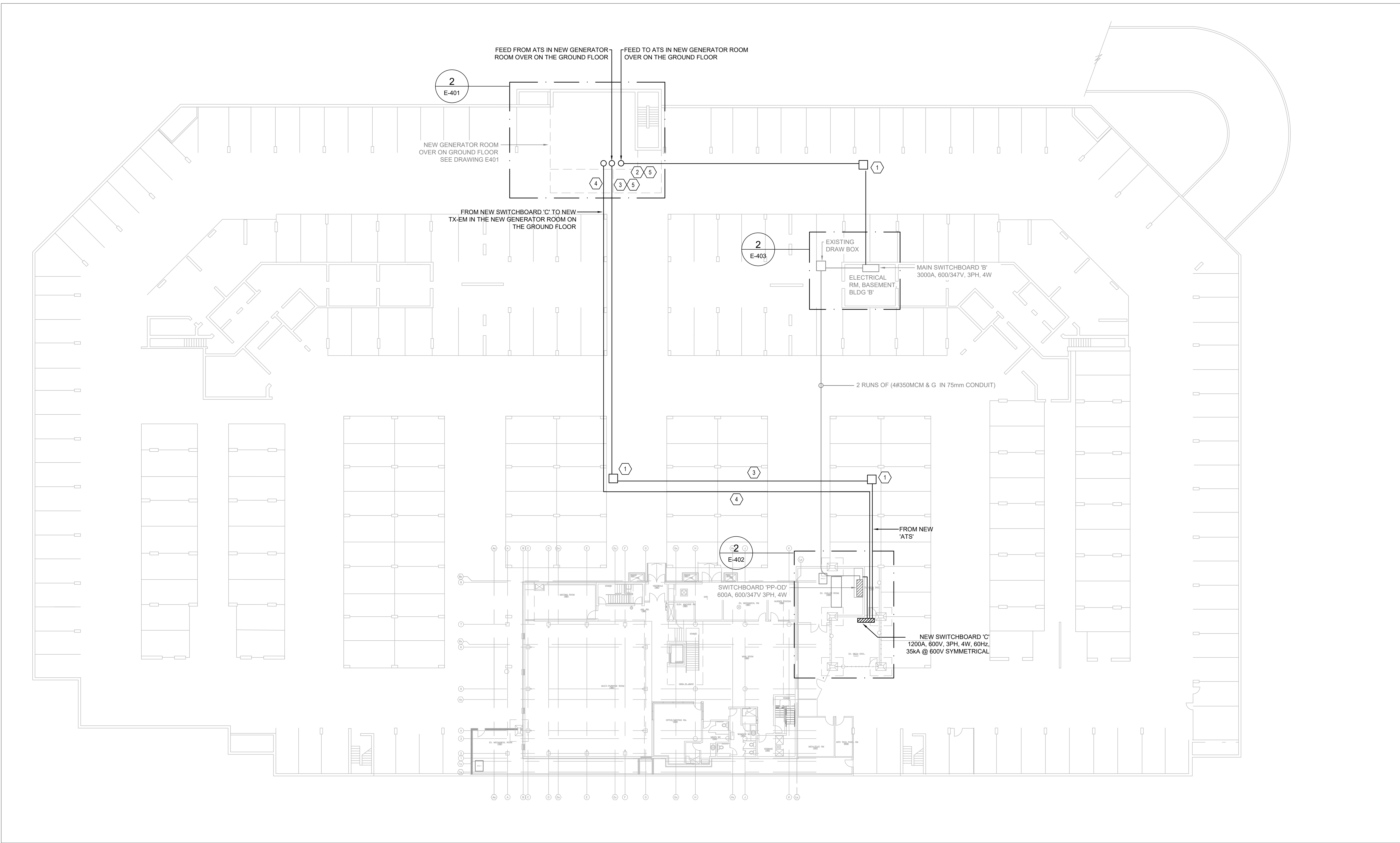
drawing
PARKING GARAGE
EXISTING POWER LAYOUT

Designed By	JS	Conçu par
Date		(yyyy/mm/dd)
Drawn By	SM	Dessiné par
Date		(yyyy/mm/dd)
Reviewed By	JS	Examiné par
Date		(yyyy/mm/dd)
Approved By	BR	Approuvé par
Date		(yyyy/mm/dd)
Tender		Soumission

Project Manager
2022-677P (ON10121.3)

Scale
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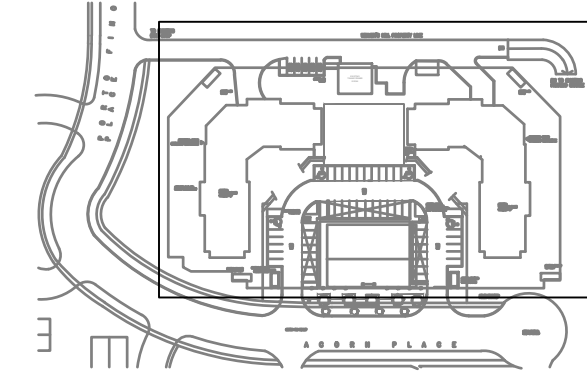
Drawing no.
E101



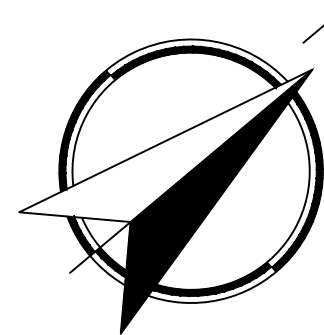
DRAWING NOTES:

PHASE 1:

- 1 PROVIDE AND INSTALL A NEW 1000mm x 1000mm x 304mm (min) HIGH METAL PULL BOX FIXED TO SLAB OVER COMPLETE WITH SCREW DOWN REMOVABLE COVER TYPICAL.
- 2 PROVIDE AND INSTALL 3 RUNS OF (4x750MCM RW90 COPPER CONDUCTORS + G IN 129mm EMT CONDUIT) IN PARALLEL FROM NEW 'ATS' LOCATED IN THE NEW GENERATOR ROOM ON THE GROUND FLOOR (DRAWING E-401, DETAIL #2) TO THE EXISTING SWITCHBOARD 'B' LOCATED IN THE BUILDING 'B' LOWER LEVEL (DRAWING E-403, DETAIL #2). CONDUIT TO BE FIXED TO 762mm UNISTRUT CHANNELS SUPPORTED BY HANGER RODS FROM SLAB OVER. UNISTRUT CHANNELS TO BE LOCATED AT 2m INTERVAL. CONDUIT TO BE STUBBED THROUGH THE WALL INTO THE ELECTRICAL ROOM, IN BUILDING 'B' READY TO BE EXTENDED DOWN INTO SWITCHBOARD 'B' DURING PHASE 2. LEAVE ENOUGH LENGHT OF CONDUCTOR TO CONNECT TO THE 1200/600A-3P BREAKER IN THE EXISTING SWITCHBOARD 'B' DURING THE INCOMING POWER SWITCHOVER PHASE. (APPROXIMATE LOCATION OF PENETRATION TO THE NEW GENERATOR ROOM OVER IS SHOWN. ACTUAL LOCATION TO BE DETERMINED ON THE SITE).
- 3 PROVIDE AND INSTALL 3 RUNS OF (4x750MCM RW90 COPPER CONDUCTORS + G IN 129mm EMT CONDUIT) IN PARALLEL FROM NEW 'ATS' LOCATED IN THE NEW GENERATOR ROOM ON THE GROUND FLOOR (DRAWING E-401, DETAIL #2) TO THE NEW SWITCHBOARD 'C' LOCATED NEAR EXISTING CHILLER ROOM, BUILDING 'C', LOWER LEVEL. (DRAWING E-402, DETAIL #2). CONDUIT TO BE FIXED TO 762mm UNISTRUT CHANNELS SUPPORTED BY HANGER RODS FROM SLAB OVER. UNISTRUT CHANNELS TO BE LOCATED AT 2m INTERVAL. CONDUITS AND WIRING TO BE TERMINATED INTO SWITCHBOARD 'C' READY FOR ENERGIZATION ON COMPLETION PHASE 2. (APPROXIMATE LOCATION OF PENETRATION TO THE NEW GENERATOR ROOM OVER IS SHOWN. ACTUAL LOCATION TO BE DETERMINED ON THE SITE).
- 4 PROVIDE AND INSTALL 3#3 RW90 COPPER CONDUCTORES + G IN 35mm EMT CONDUIT FROM NEW SWITCHBOARD 'C' LOCATED ON THE LOWER LEVEL (DRAWING E-402, DETAIL #2) TO THE NEW TRANSFORMER TX-EM LOCATED IN THE NEW GENERATOR ROOM ON THE GROUND FLOOR (DRAWING E-401, DETAIL #2). CONDUIT TO BE FIXED TO 762mm UNISTRUT CHANNELS PROVIDED FOR MAIN RUN OF FEEDER CONDUITS UNDER NOTES #2 & #3 ABOVE. CONDUITS AND WIRING TO BE TERMINATED INTO SWITCHBOARD 'C' READY FOR ENERGIZATION ON COMPLETION PHASE 2. (APPROXIMATE LOCATION OF PENETRATION TO THE NEW GENERATOR ROOM OVER IS SHOWN. ACTUAL LOCATION TO BE DETERMINED ON THE SITE).
- 5 CONDUITS AND WIRING INSTALLED IN NOTE #2 AND #3 TO TURN UP THROUGH EXISTING SLAB OVER TO ENTER DIRECTLY INTO 'ATS' IN GENERATOR ROOM ABOVE. ALLOW FOR XRAY OF FLOOR SLAB AND CORE DRILLING IN ACCORDANCE WITH STRUCTURAL ENGINEERS INSTRUCTIONS.
- 6 INSTALL CONDUIT AND CONTROL WIRING BETWEEN GENERATOR AND NEW ATS UNIT, PLUS WIRING BETWEEN GENERATOR AND REMOTE ANNUNCIATOR AND WIRING TO FIRE ALARM PANEL.



KEY PLAN



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PEEL
LIVING

Contractor to verify all dimensions & conditions on site and immediately notify the departmental representative of all discrepancies.

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revisions	description	date

A	A detail no.	A
C	no. du detail	B
	B location drawing no.	C
	sur dessin no.	
	C drawing no.	
	dessin no.	

project
NEW GENERATOR INSTALLATION
AT PEEL YOUTH VILLAGE
PEEL YOUTH VILLAGE, 99 ACORN PLACE
MISSISSAUGA, ON

drawing
dessin

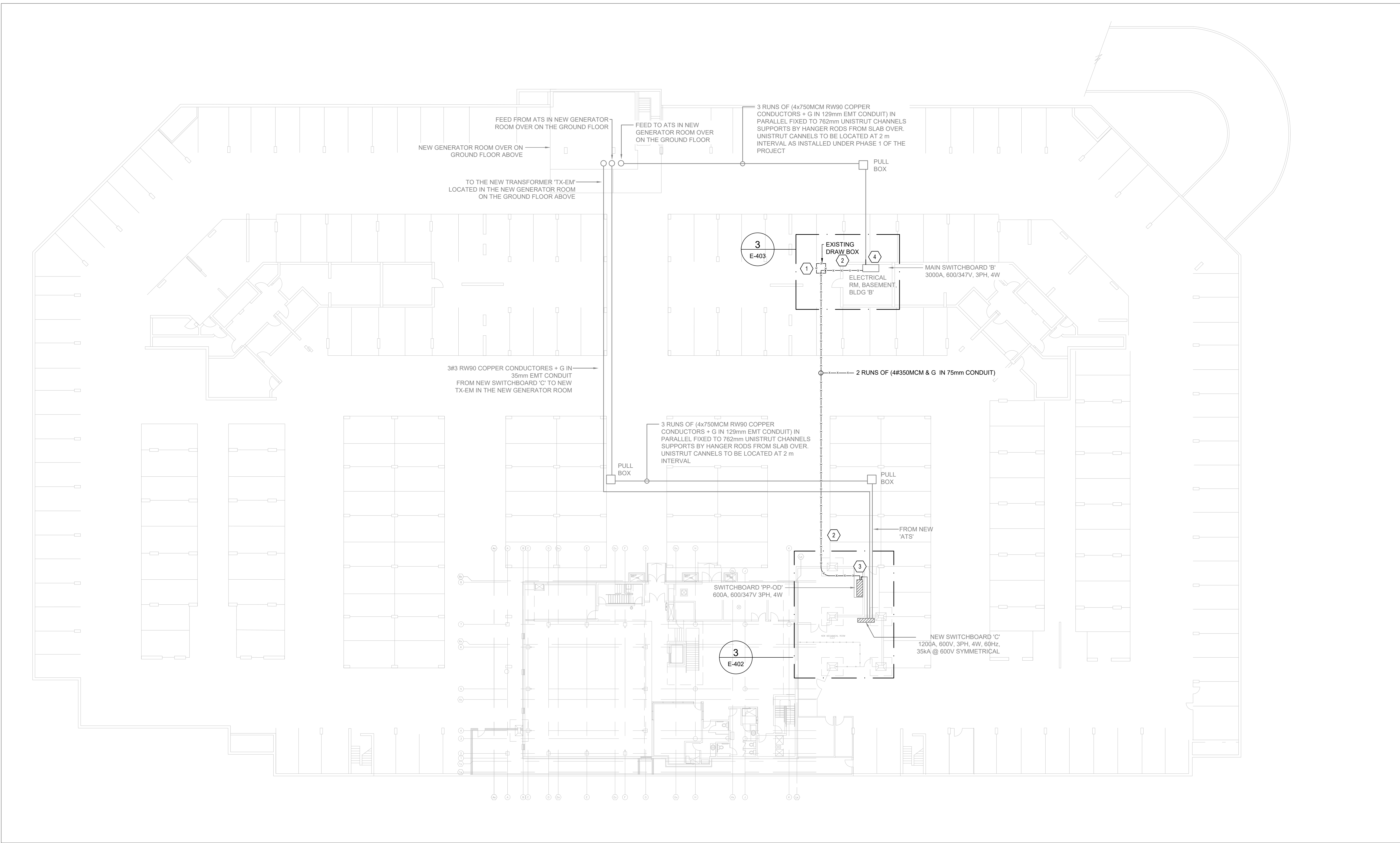
PARKING GARAGE
POWER LAYOUT
INSTALLATION (PHASE 1)

Designed By	JS	Conçu par
Date		(yyyy/mm/dd)
Drawn By	SM	Dessiné par
Date		(yyyy/mm/dd)
Reviewed By	JS	Examiné par
Date		(yyyy/mm/dd)
Approved By	BR	Approuvé par
Date		(yyyy/mm/dd)
Tender		Soumission

Project Manager
Administrateur de projets
Project no.
2022-677P (ON10121.3)
No. du projet

Scale
1:200
Échelle

Drawing no.
E102
No. du dessin



GENERAL NOTES:

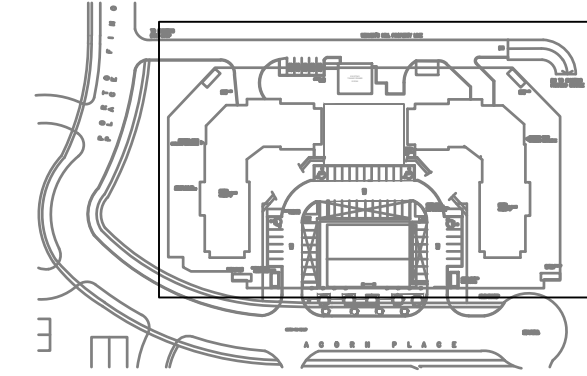
- COORDINATE ALL PHASES OF WORK WITH MECHANICAL CONTRACTOR.

DRAWING NOTES:

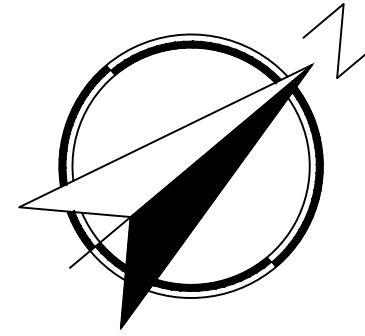
- DISCONNECT, DEMOLISH AND DISPOSE DRAWBOX.
- DISCONNECT, DEMOLISH AND DISPOSE EXISTING POWER SUPPLY FEEDER FROM EXISTING SWITCHBOARDS 'B' AND 'PP-OD'.
- NEW FEED INSTALLED IN PHASE 1 (DRAWING E-402, DETAIL #2, NOTE #8) TERMINATE WITHIN EXISTING SWITCHBOARD 'PP-OD'.
- NEW FEED INSTALLED IN THE PHASE 1 (DRAWING E-403, DETAIL #2) TERMINATE WITHIN EXISTING SWITCHBOARD 'B'.

PHASE 2 - SEQUENCE OF THE WORK

- SHUT DOWN OF POWER TO SWITCHBOARD "B".
- REMOVAL OF EXISTING FEED OUT OF SWITCHBOARD "B" TO SWITCHBOARD "PP-OD".
- TERMINATION OF THE FEEDER FROM SWITCHBOARD "C" INTO THE EXISTING SWITCHBOARD PP-OD.
- TERMINATION OF NEW FEED (TO THE ATS IN THE GENERATOR ROOM) INTO THE 1200A BREAKER IN SWITCHBOARD "B".
- RECONNECT EXISTING CT-1 IN THE SWITCHBOARD "B" (BUILDING "B") TO NEW SUPPLY FEEDER FOR SWITCHBOARD "C".
- REENERGIZATION OF THE SUPPLY TO SWITCHBOARD "B".
- ENERGIZATION OF THE PERMANENT SUPPLY FROM SWITCHBOARD "B" TO NEW 1200A SWITCHBOARD "C" (PEEL YOUTH VILLAGE) VIA THE NEW 1200A ATS IN THE GENERATOR ROOM.
- REMOVAL OF THE REDUNDANT FEED FROM SWITCHBOARD "B" TO SWITCHBOARD "PP-OD".
- COMMISSIONING AND TESTING OF GENERATOR AND ATS.
- NOTE THAT ADEQUATE RESOURCES ARE TO BE PROVIDED TO ENSURE THAT THE MAXIMUM DOWN TIME FOR THIS SHUT DOWN OF POWER IS TO BE LIMITED TO FIVE HOURS.



KEY PLAN



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project
**NEW GENERATOR INSTALLATION
AT PEEL YOUTH VILLAGE**
PEEL YOUTH VILLAGE, 99 ACORN PLACE
MISSISSAUGA, ON

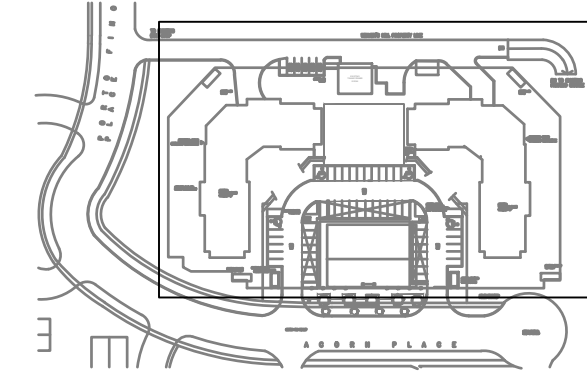
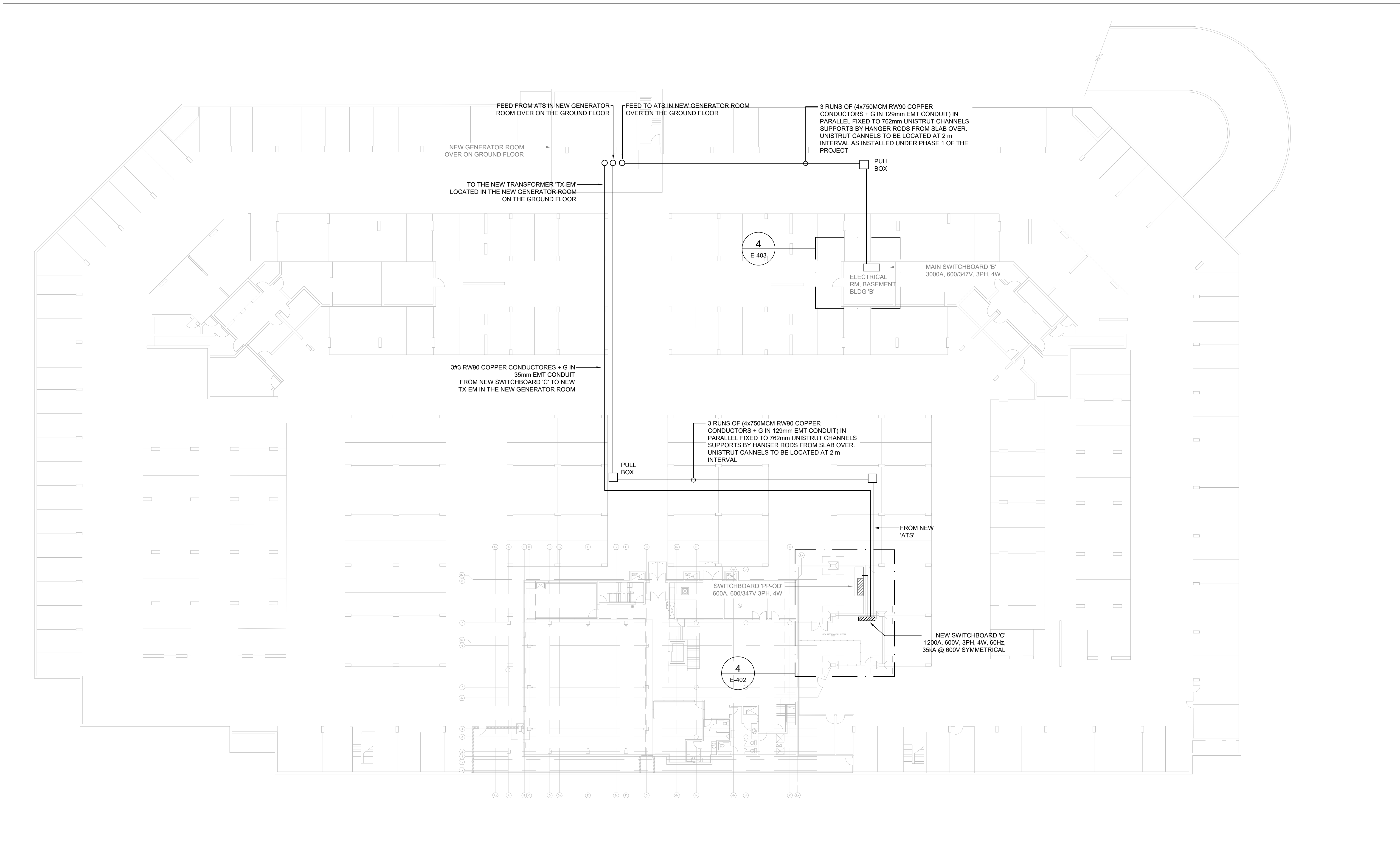
drawing
**PARKING GARAGE POWER
LAYOUT SWITCHOVER
PHASE (PHASE 2)**

Designed By	JS	Conçu par
Date		(yyyy/mm/dd)
Drawn By	SM	Dessiné par
Date		(yyyy/mm/dd)
Reviewed By	JS	Examiné par
Date		(yyyy/mm/dd)
Approved By	BR	Approuvé par
Date		(yyyy/mm/dd)
Tender		Soumission

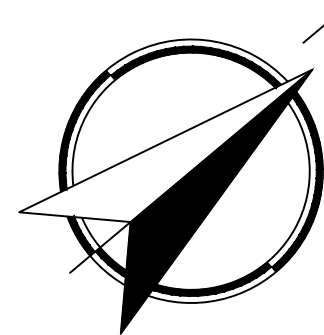
Project Manager
Project no.
2022-677P (ON10121.3)

Scale
1:200

Drawing no.
E103



KEY PLAN



Contractor to verify all dimensions & conditions on site and immediately notify the departmental representative of all discrepancies.

6	ISSUED FOR PERMIT	07/05/25
5	ISSUED FOR TENDER	04/04/25
4	ISSUED FOR ESA	28/02/25
3	ISSUED FOR TENDER REVIEW	21/02/25
2	ISSUED FOR 90%	20/06/24
1	ISSUED FOR 33%	29/01/24

revisions	description	date

A	A detail no.	A
C	no. du detail	B
	B location drawing no.	C
	sur dessin no.	
	C drawing no.	
	dessin no.	

project projet
NEW GENERATOR INSTALLATION
AT PEEL YOUTH VILLAGE
PEEL YOUTH VILLAGE, 99 ACORN PLACE
MISSISSAUGA, ON

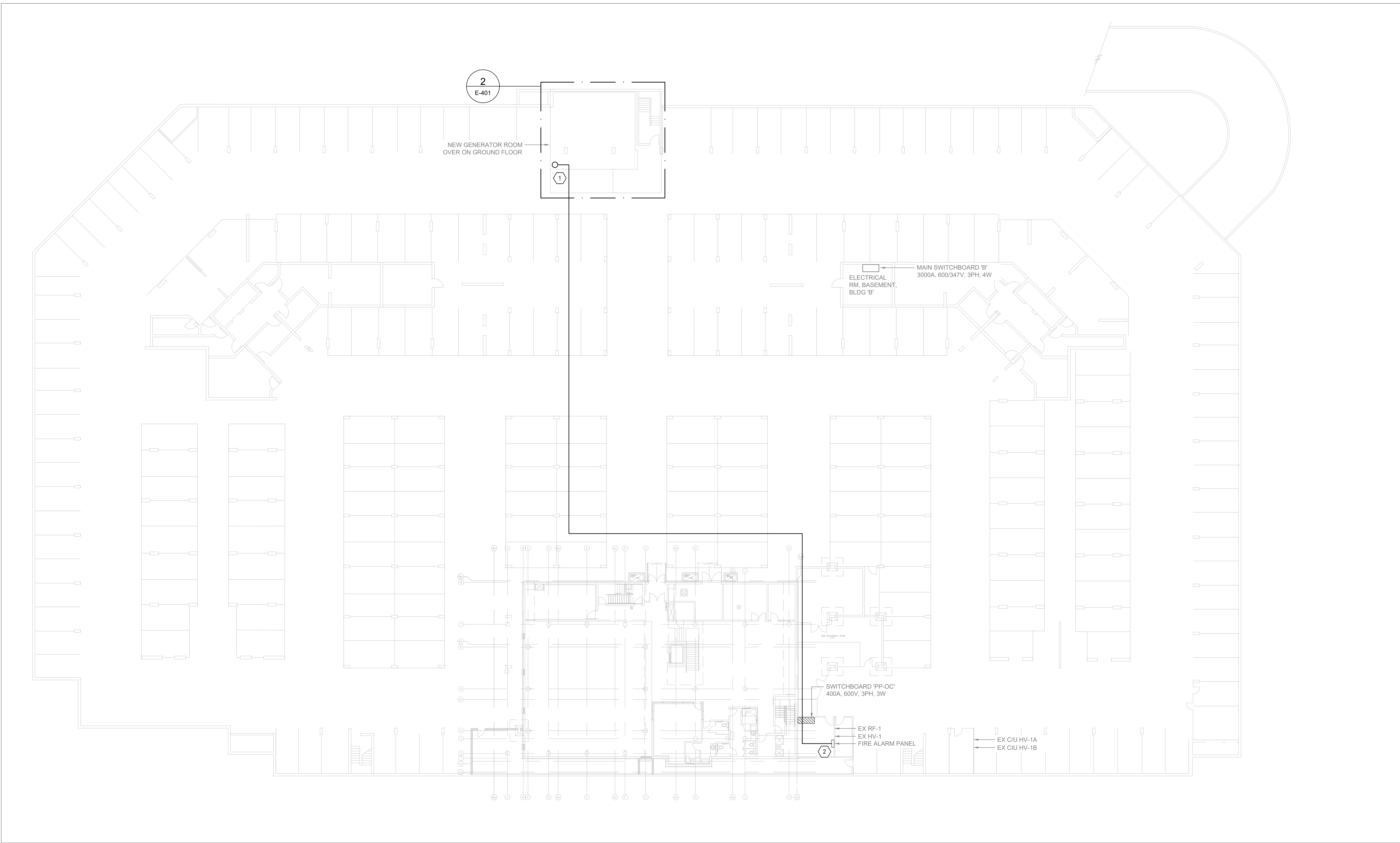
drawing dessin
PARKING GARAGE POWER
LAYOUT FINAL

Designed By	JS	Conçu par
Date		(yyyy/mm/dd)
Drawn By	SM	Dessiné par
Date		(yyyy/mm/dd)
Reviewed By	JS	Examiné par
Date		(yyyy/mm/dd)
Approved By	BR	Approuvé par
Date		(yyyy/mm/dd)
Tender		Soumission

Project Manager Administrateur de projets
Project no. No. du projet
2022-677P (ON10121.3)

Scale Échelle
1:200

Drawing no. No. du dessin
E104

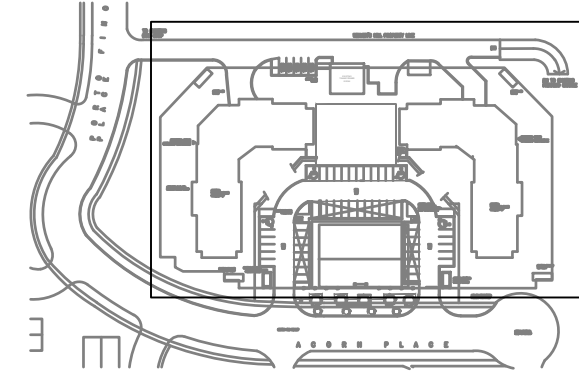


DRAWING NOTES:

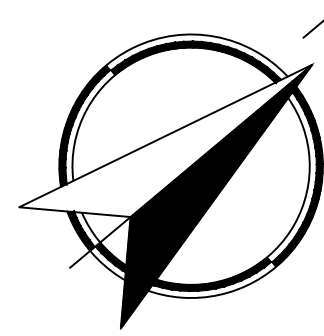
- 1

PROVIDE AND INSTALL CONTROL WIRING 6#12 RW90 CONDUCTORS + G IN 21mm EMT CONDUIT FROM GENERATOR TO EXISTING FIRE ALARM PANEL IN THE MECHANICAL ROOM #014.
- 2

CONTRACTOR TO CARRY COST OF CONTROL WIRING AND CONNECTION TO EXISTING FIRE ALARM PANEL (SEE NOTE #10 ON DRAWING E-107).



KEY PLAN



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6	ISSUED FOR PERMIT	07/05/25
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1	ISSUED FOR 33%	29/01/24

revisions	description	date

A C	A detail no. no. du detail	A B C
	B location drawing no. sur dessin no.	
	C drawing no. dessin no.	

project

NEW GENERATOR INSTALLATION
AT PEEL YOUTH VILLAGE
PEEL YOUTH VILLAGE, 99 ACORN PLACE
MISSISSAUGA, ON

projet

drawing

PARKING GARAGE
CONTROL WIRING
INSTALLATION

dessin

Designed By	JS	Conçu par
Date		(yyyy/mm/dd)
Drawn By	SM	Dessiné par
Date		(yyyy/mm/dd)
Reviewed By	JS	Examiné par
Date		(yyyy/mm/dd)
Approved By	BR	Approuvé par
Date		(yyyy/mm/dd)
Tender		Soumission

Project Manager

Administrateur de projets

Project no.

No. du projet

2022-677P (ON10121.3)

Scale

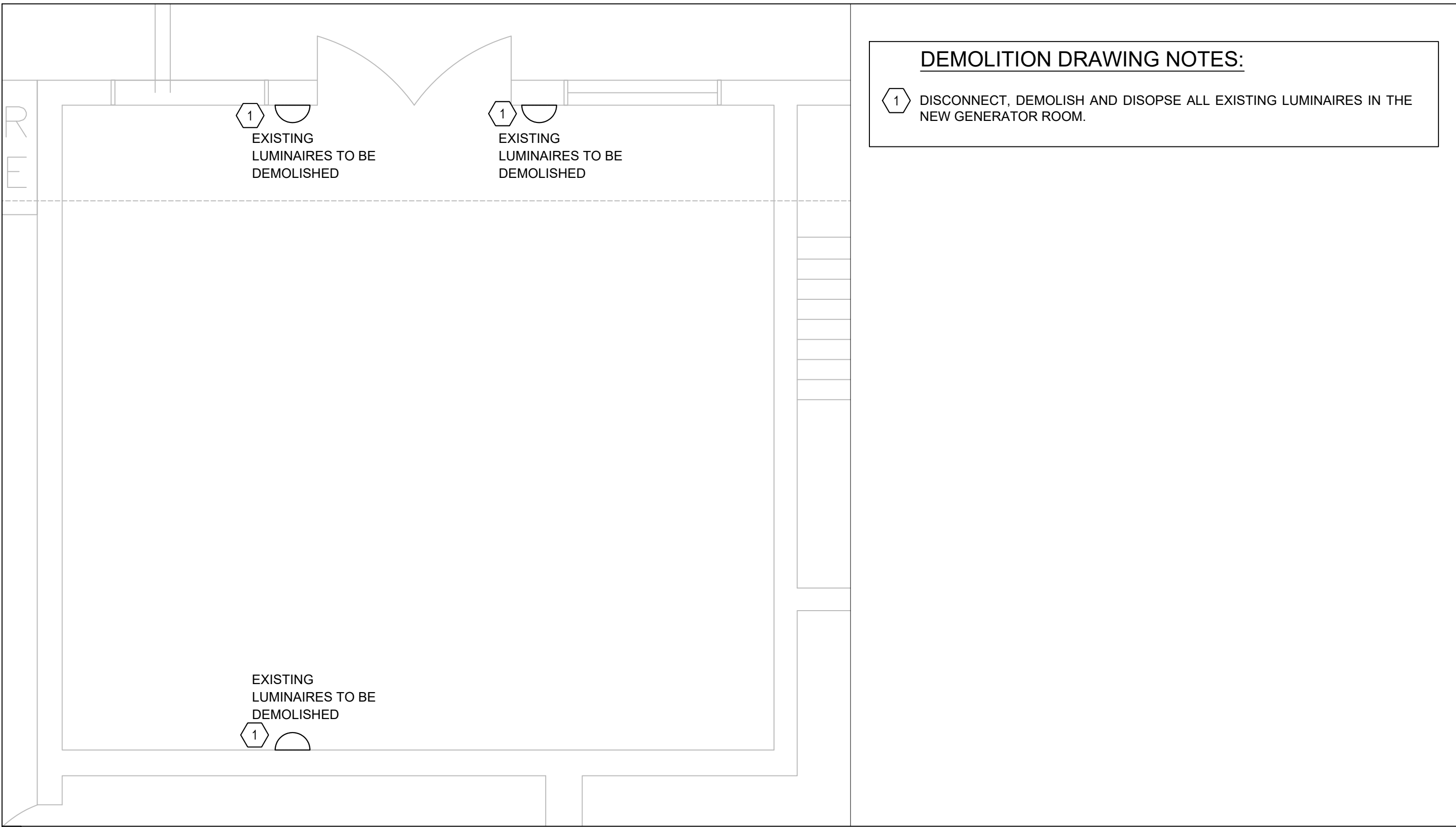
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Échelle

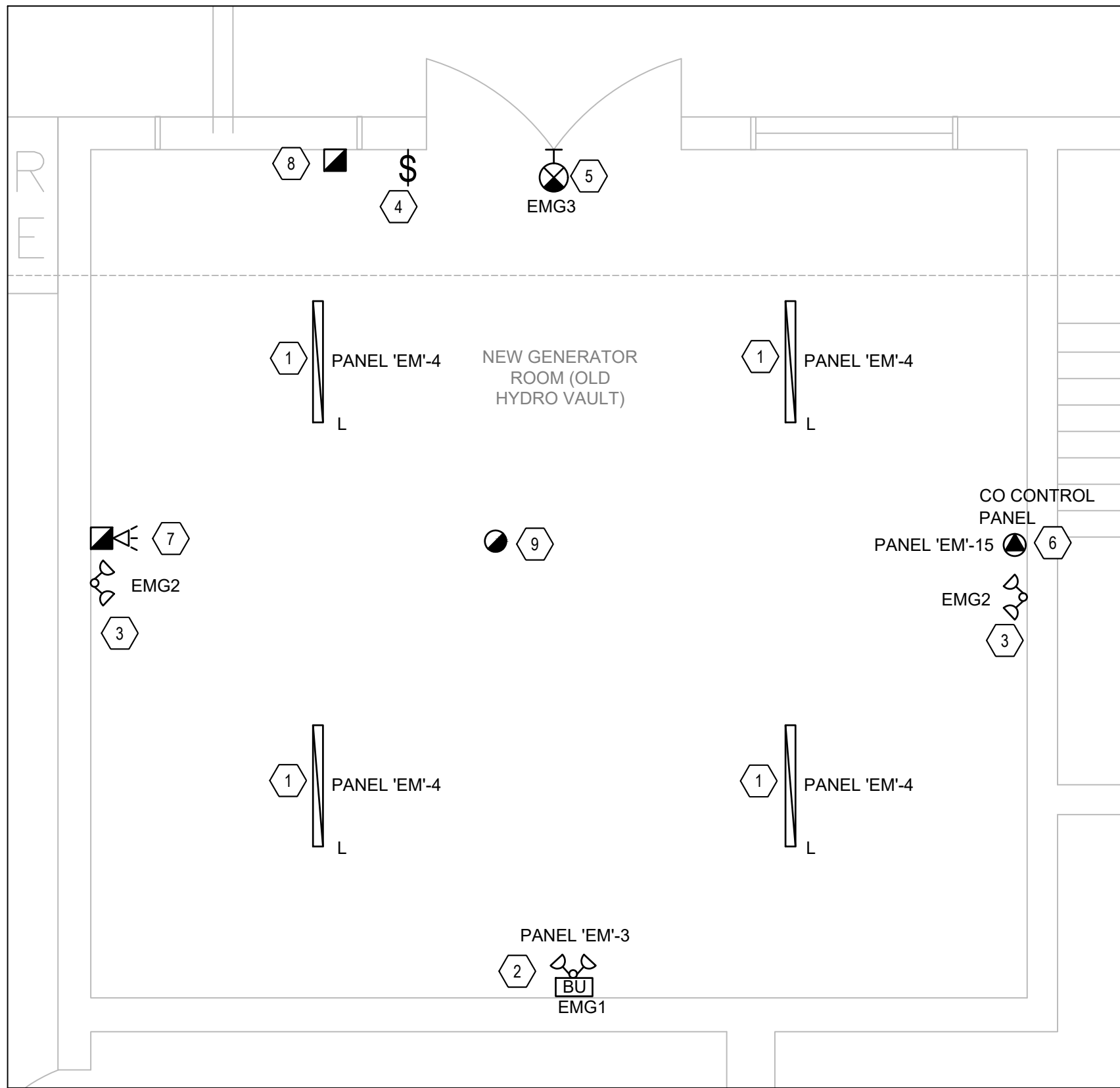
Drawing no.

E106

No. du dessin

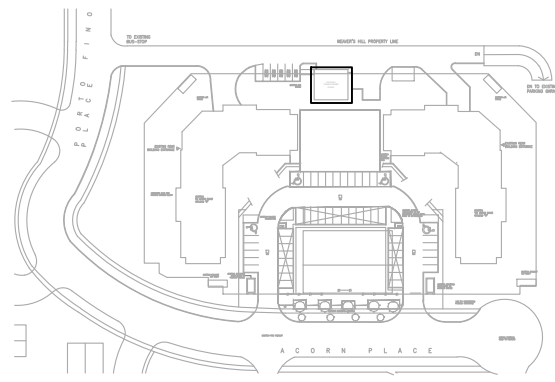


1 NEW GENERATOR ROOM - LIGHTING DEMOLITION LAYOUT
E107 1:50

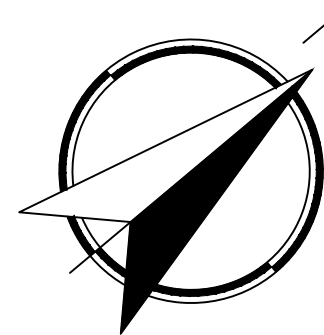


2 NEW GENERATOR ROOM - LIGHTING NEW CONSTRUCTION LAYOUT
E107 1:50

LUMINAIRE SCHEDULE - NEW CONSTRUCTION																
TAG	SYMBOL	DESCRIPTION	MOUNTING	SHAPE	SIZE	LUMENS	CRI	CCT	L70	DRIVER	VOLTAGE	WATTAGE	LAMP TYPE	NOTE	MANUFACTURER	MODEL
L		WATERPROOF LUMINAIRE	SURFACE	RECTANGLE	4 ft.	5586	>80	4000K	100000	ON / OFF	120V / 1P	38	LED	NEW	CURRENT	ALBEO PLR14X08LQVSTKQW
EMG1		BATTERY UNIT EMERGENCY LIGHTING DUAL REMOTE HEADS, RECHARGEABLE, RUNNING TIME: 120min	WALL	RECTANGLE	5'x4-13'16"	170/HEAD	-	5000K	-	-	120V / 1P	250	LED	NEW	ABB	12ESL250/2LG
EMG2		EMERGENCY DUAL REMOTE HEAD, RUNNING TIME: 120min	CEILING / WALL	RECTANGLE	13-1/4'x9"	-	-	5000K	-	-	12V	8	LED	NEW	ABB	EF9DM-LG
EMG3		EMERGENCY EXIT SIGN (FACE ON SHADED SIDE)	WALL	RECTANGLE	12-1/8"x7-3/8"	-	-	-	-	-	6 TO 24V	1	LED	NEW	ABB	ES1WUD9



KEY PLAN



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revisions	description	date

A	A detail no. no. du detail	A
C	B location drawing no. sur dessin no.	B
	C drawing no. dessin no.	C

project
NEW GENERATOR INSTALLATION
AT PEEL YOUTH VILLAGE
PEEL YOUTH VILLAGE, 99 ACORN PLACE
MISSISSAUGA, ON

drawing
NEW GENERATOR ROOM
LIGHTING LAYOUT

Designed By JS Conçu par
Date (yyyy/mm/dd)

Drawn By SM Dessiné par
Date (yyyy/mm/dd)

Reviewed By JS Examiné par
Date (yyyy/mm/dd)

Approved By BR Approuvé par
Date (yyyy/mm/dd)

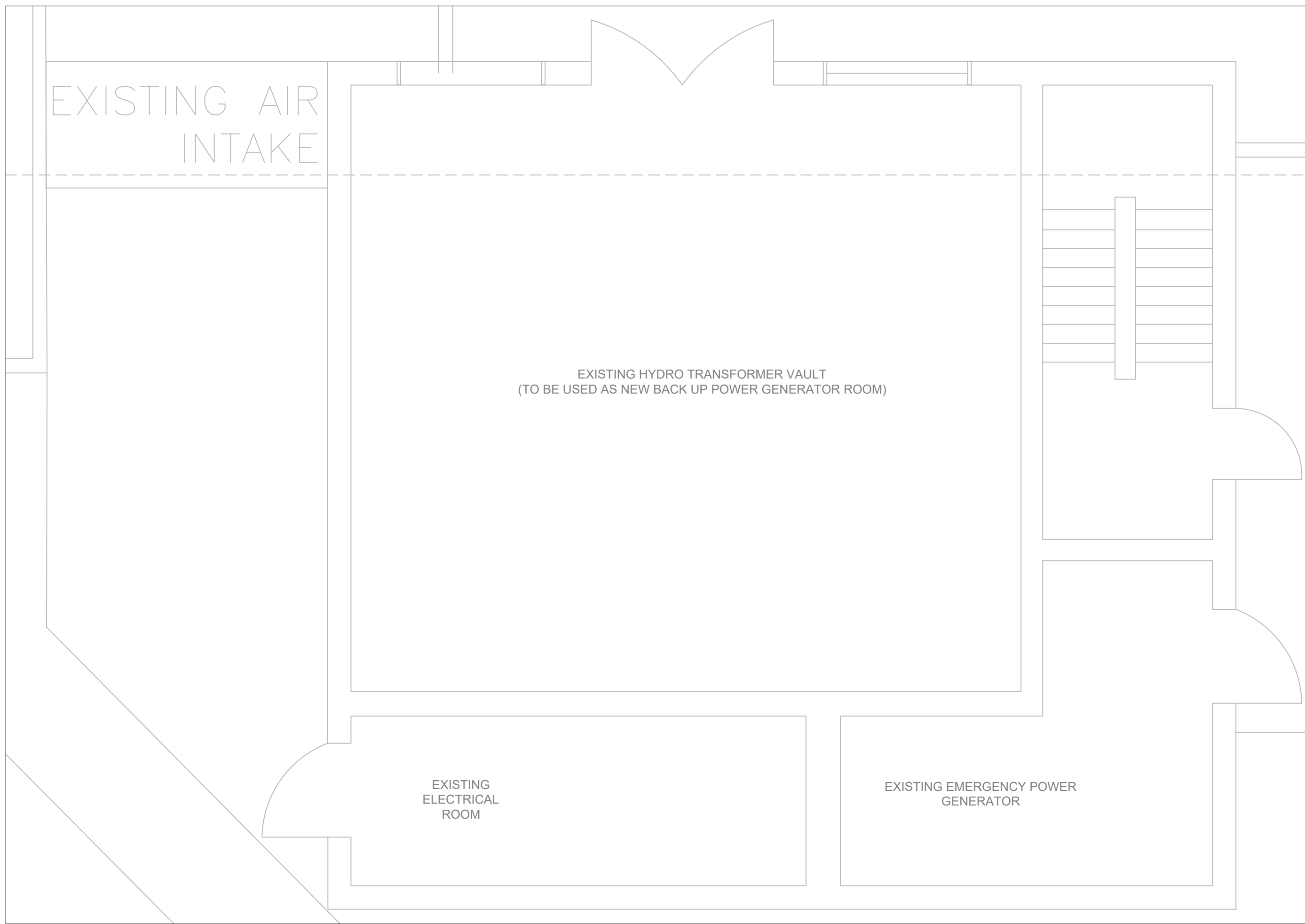
Tender Soumission

Project Manager Administrateur de projets

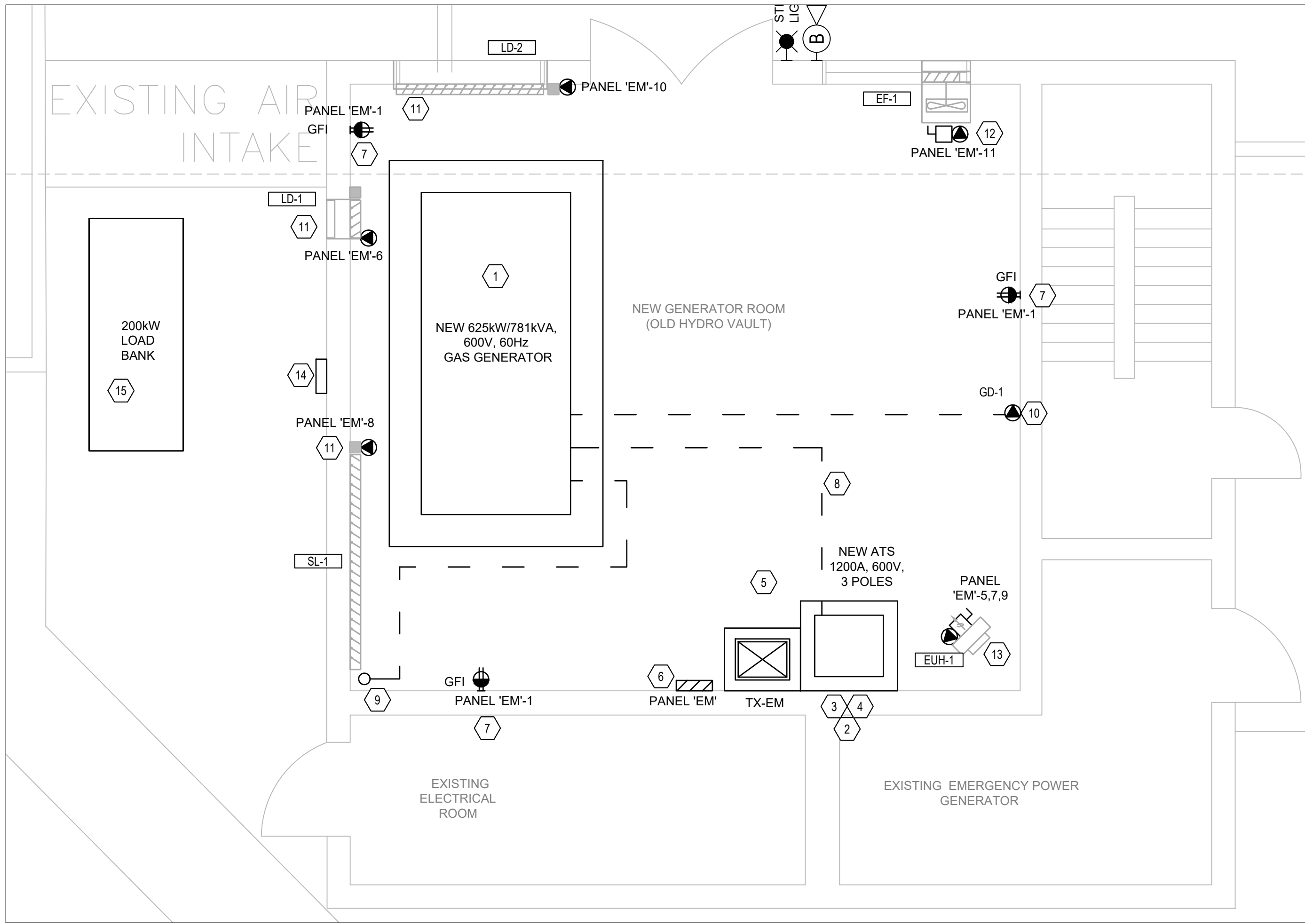
Project no. No. du projet
2022-677P (ON10121.3)

Scale Échelle
AS SHOWN

Drawing no. No. du dessin
E107



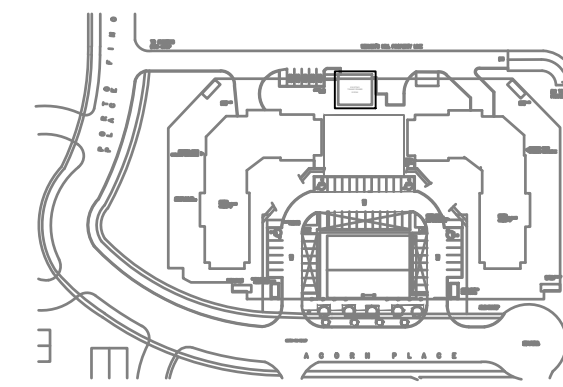
1
E401 1:50
EXISTING TRANSFORMER AND ELECTRICAL ROOM - POWER LAYOUT EXISTING



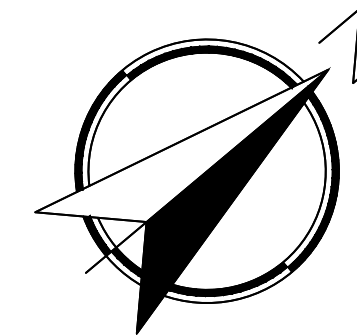
2
E401 1:50
NEW GENERATOR ROOM - NEW CONSTRUCTION POWER LAYOUT

DRAWING NOTES:

- 1 PROVIDE AND INSTALL A NEW 625kW, 781kVA, 600V, 3 PHASE, 4 WIRE, 60 HZ NATURAL GAS GENERATOR C/W WIRING. ALLOW FOR INSTALLATION OF VIBRATION ISOLATION CONCRETE BASE UNDER GENERATOR IN ACCORDANCE WITH STRUCTURAL ENGINEERS REQUIREMENTS. TO CARRY THE COST FOR GEOTECHNICAL ENGINEER TO INVESTIGATE THE SOIL WHERE THE SLAB ON GRADE NEEDS TO BE BUILT AND TO PROVIDE STAMPED ENGINEER RECOMMENDATION REPORT AND DIRECTION ON SOIL PREPARATION FOR THE SLAB ON GRADE IN ADDITION TO RIGID INSULATION REQUIREMENTS.
- 2 PROVIDE AND INSTALL FLOOR MOUNTED 1200A, 600V, 3 PHASE, 3 POLES ATS WITH DOUBLE BY-PASS AND SOLID NEUTRAL BLOCK LOCATED IN THE NEW GENERATOR ROOM.
- 3 PROVIDE AND INSTALL NEW CONDUITS AND WIRE FROM NEW ATS (NOTE #1) TO NEW SWITCHBOARD 'C' NEAR THE CHILLER ROOM IN THE PARKING GARAGE. CONDUITS TO BE RUN UNDERSIDE OF THE GARAGE SLAB BELOW THE ELECTRICAL ROOM. (SEE DRAWING E-102 FOR DETAILS).
- 4 PROVIDE AND INSTALL NEW CONDUITS AND WIRE FROM NEW ATS (NOTE #2) TO EXISTING SWITCHBOARD 'B' IN THE BUILDING 'B'. CONDUITS TO BE RUN UNDERSIDE OF THE GARAGE SLAB BELOW THE ELECTRICAL ROOM. (SEE DRAWING E-102 FOR DETAILS).
- 5 PROVIDE AND INSTALL NEW 75kVA, 600/208/120V, 60Hz TRANSFORMER 'TX-EM' C/W HOUSEKEEPING PAD, WIRING, FITTINGS, CONDUITS ETC.
- 6 PROVIDE AND INSTALL NEW 225A, 120/208V, 3P, 4W, NEMA 1, 42 CCT. GENERATOR HOUSE PANEL 'EM' IN THE NEW GENERATOR ROOM.
- 7 PROVIDE AND INSTALL A NEW WEATHER PROOF NEMA 5-20R GFI CLASS A RECEPTACLE C/W WIRING TO NEW 20A-1P DEDICATED CIRCUIT BREAKER WITHIN NEW PANEL '4P' AS SHOWN ON DRAWING. WIRING TO BE 2x #12 AWG + GND IN 21mm EMT CONDUIT (CONDUIT OUTDOOR NEEDS TO BE PROVIDED WITH WEATHERPROOF FITTINGS). RECEPTACLE TO BE FITTED WITH HEAVY DUTY, WEATHERPROOF WHILE-IN-USE COVER (THOMAS & BETTS RED DOT CAT# CCMUC) OR APPROVED EQUIVALENT.
- 8 PROVIDE GENERATOR/ATS CONTROL CONDUCTORS (4X#12 PVC RW90 CONDUCTORS AND GROUND IN 21mm EMT CONDUIT RUN) BETWEEN ATS AND THE GENERATOR CONTROL PANEL.
- 9 PROVIDE CONTROL CONDUCTORS (2X#12 PVC RW90 CONDUCTORS AND GROUND IN 21mm EMT CONDUIT RUN) BETWEEN THE GENERATOR CONTROL PANEL AND FIRE ALARM PANEL. FOR DETAILS, SEE DRAWING E-106.
- 10 PROVIDE AND INSTALL GENERATOR ANNUNCIATOR PANEL C/W CONTROL CONDUCTORS (RS-485, 4 PAIR 22AWG (7X30) TINNED COPPER, PE INSULATION, OVERALL BELDFOIL/6-TINNED COPPER BRAID(65%) SHIELD, PVC OUTER JACKET, CM, PLTC, AND OIL-RESISTANT IN 21mm EMT CONDUIT).
- 11 PROVIDE AND INSTALL NEW LOCAL TOGGLE SWITCHES 20A-1P C/W WIRING, CONDUIT, FITTINGS, ETC. UPSTREAM TO THE NEW PANEL 'EM' FOR MOTORIZED DAMPERS. PROVIDE FINAL CONNECTION BETWEEN TOGGLE SWITCHES AND DAMPERS WITH WIRING IN FLEXIBLE WATERTIGHT CONDUIT WITH WATERTIGHT CONNECTORS.
- 12 PROVIDE AND INSTALL NEW LOCAL DICONNECT SWITCH 30A-1P C/W WIRING, CONDUIT, FITTINGS, ETC. UPSTREAM TO THE NEW PANEL 'EM' FOR EXHAUST FAN EF-1. PROVIDE FINAL CONNECTION BETWEEN SWITCH AND FAN WITH WIRING IN FLEXIBLE WATERTIGHT CONDUIT WITH WATERTIGHT CONNECTORS.
- 13 PROVIDE AND INSTALL NEW LOCAL DICONNECT SWITCH 30A-3P C/W WIRING, CONDUIT, FITTINGS, ETC. UPSTREAM TO THE NEW PANEL 'EM' FOR ELECTRIC HEATING UNIT EUH-1. PROVIDE FINAL CONNECTION BETWEEN SWITCH AND HEATER WITH WIRING IN FLEXIBLE WATERTIGHT CONDUIT WITH WATERTIGHT CONNECTORS.
- 14 PROVIDE AND INSTALL NEW FFCC-C1 DOCKING STATION CONNECTION BOX NEMA-3R C/W WIRINGS, CONDUIT, FITTINGS ETC. FOR LOAD BANK.
- 15 PROVIDE A SEPARATE PRICE FOR LOAD BANK PROVISION AND INSTALLATION. CONTRACTOR TO CARRY COST FOR PROVIDING LOAD BANK c/w POWER AND CONTROL WIRING.



KEY PLAN



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6	ISSUED FOR PERMIT	07/05/25
5	ISSUED FOR TENDER	04/04/25
4	ISSUED FOR ESA	28/02/25
3	ISSUED FOR TENDER REVIEW	21/02/25
2	ISSUED FOR 90%	20/06/24
1	ISSUED FOR 33%	29/01/24

revisions	description	date
A	A detail no.	A
C	C drawing no.	B C

project
NEW GENERATOR INSTALLATION
AT PEEL YOUTH VILLAGE
PEEL YOUTH VILLAGE, 99 ACORN PLACE
MISSISSAUGA, ON

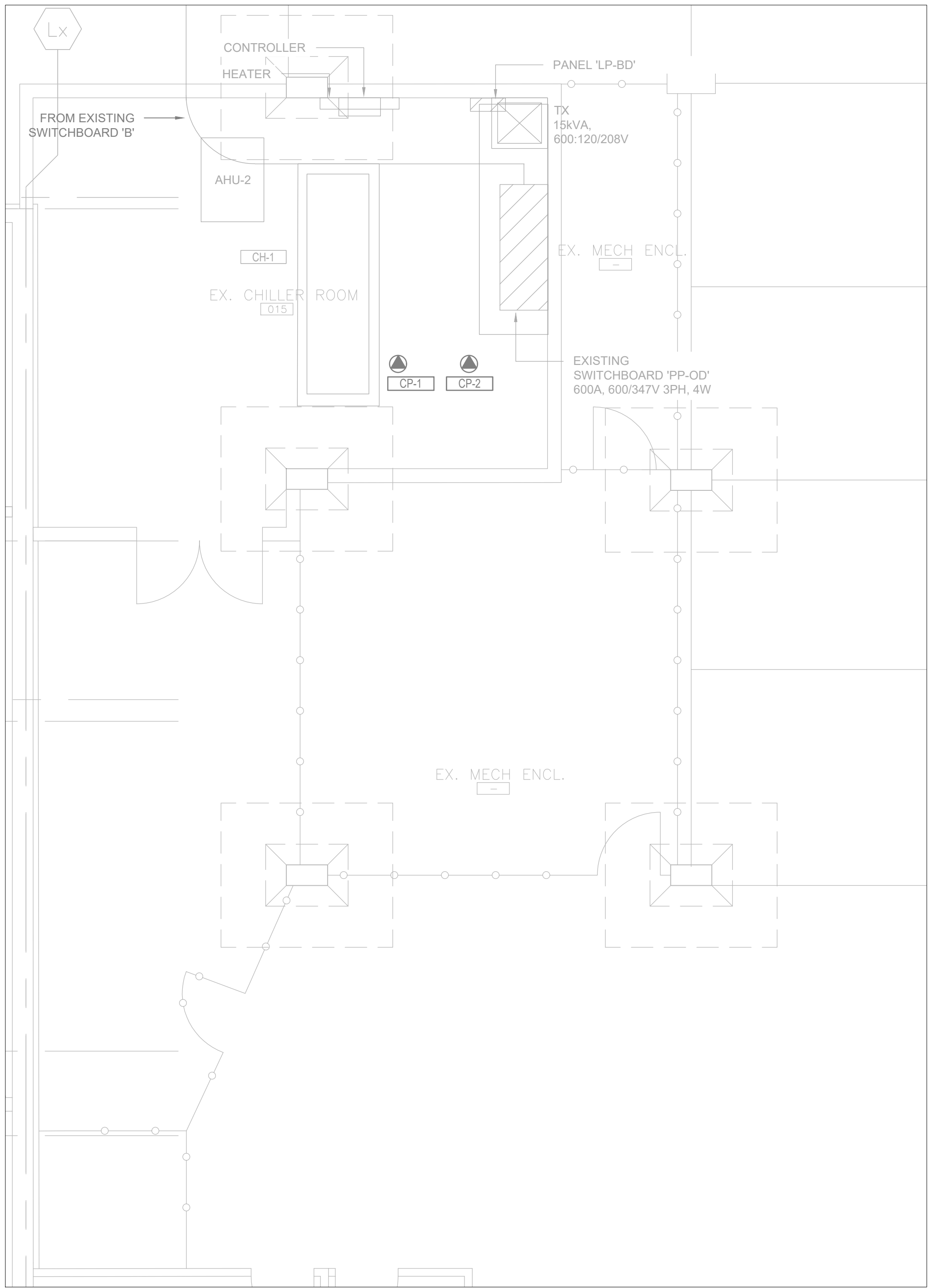
drawing
NEW GENERATOR ROOM
POWER LAYOUT

Designed By	JS	Conçu par
Date		(yyyy/mm/dd)
Drawn By	SM	Dessiné par
Date		(yyyy/mm/dd)
Reviewed By	FZ	Examiné par
Date		(yyyy/mm/dd)
Approved By	BR	Approuvé par
Date		(yyyy/mm/dd)
Tender		Soumission

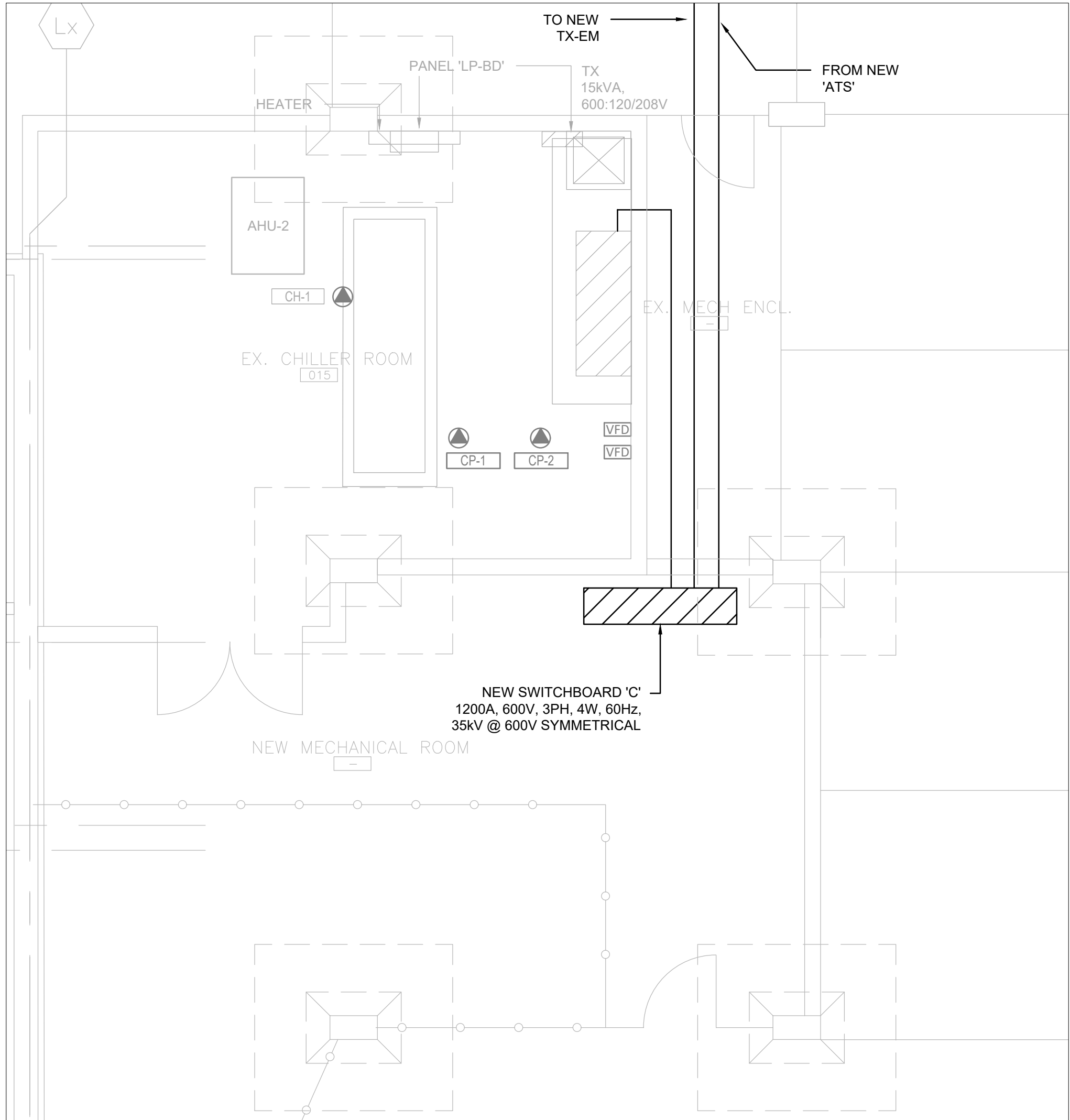
Project Manager
Project no.
2022-677P (ON10121.3)

Scale
1:200

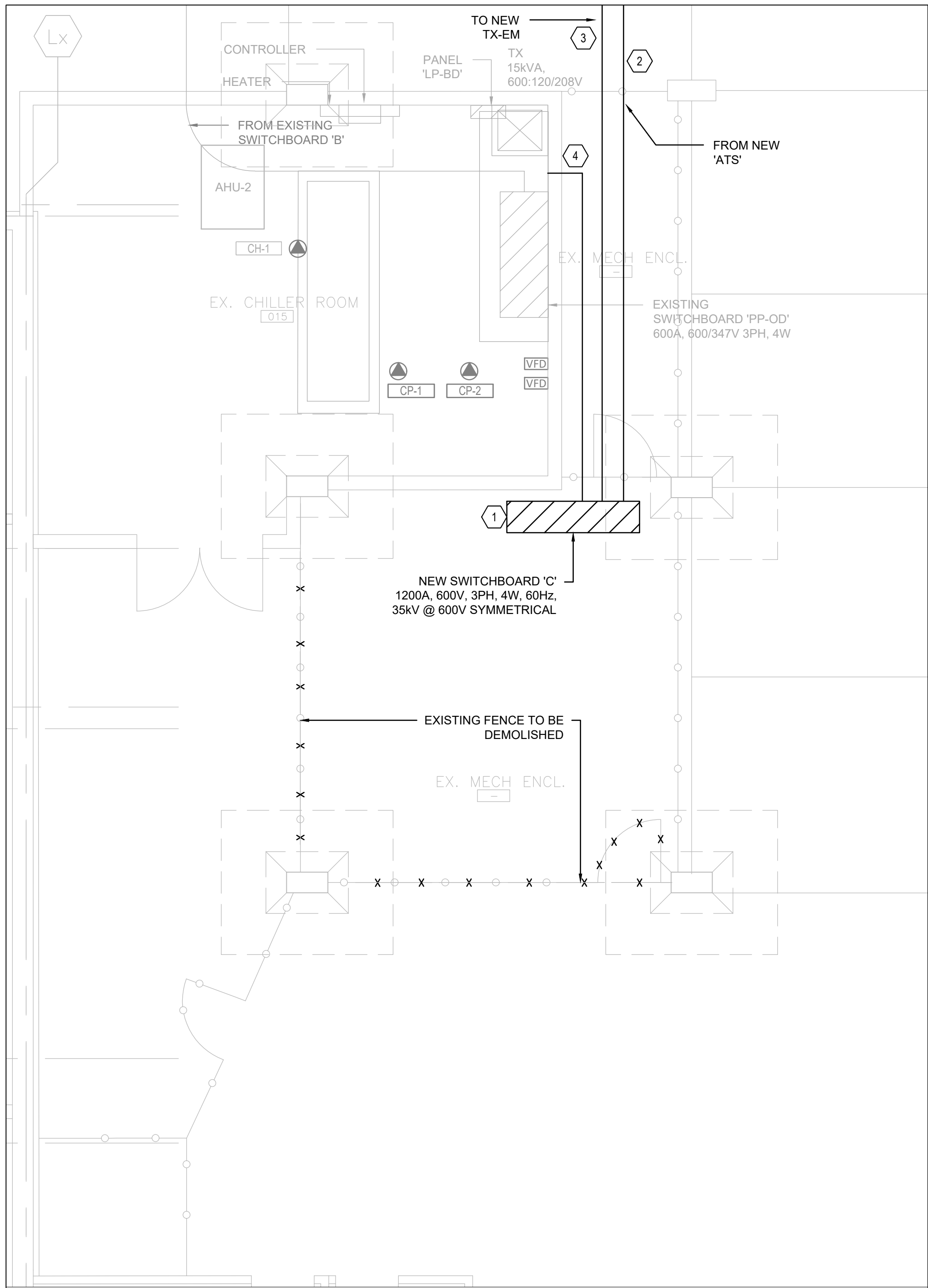
Drawing no.
E401



1 POWER LAYOUT EXISTING
E402 1:50



4 POWER LAYOUT FINAL
E402 1:50



2 POWER LAYOUT INSTALLATION (PHASE 1)
E402 1:50

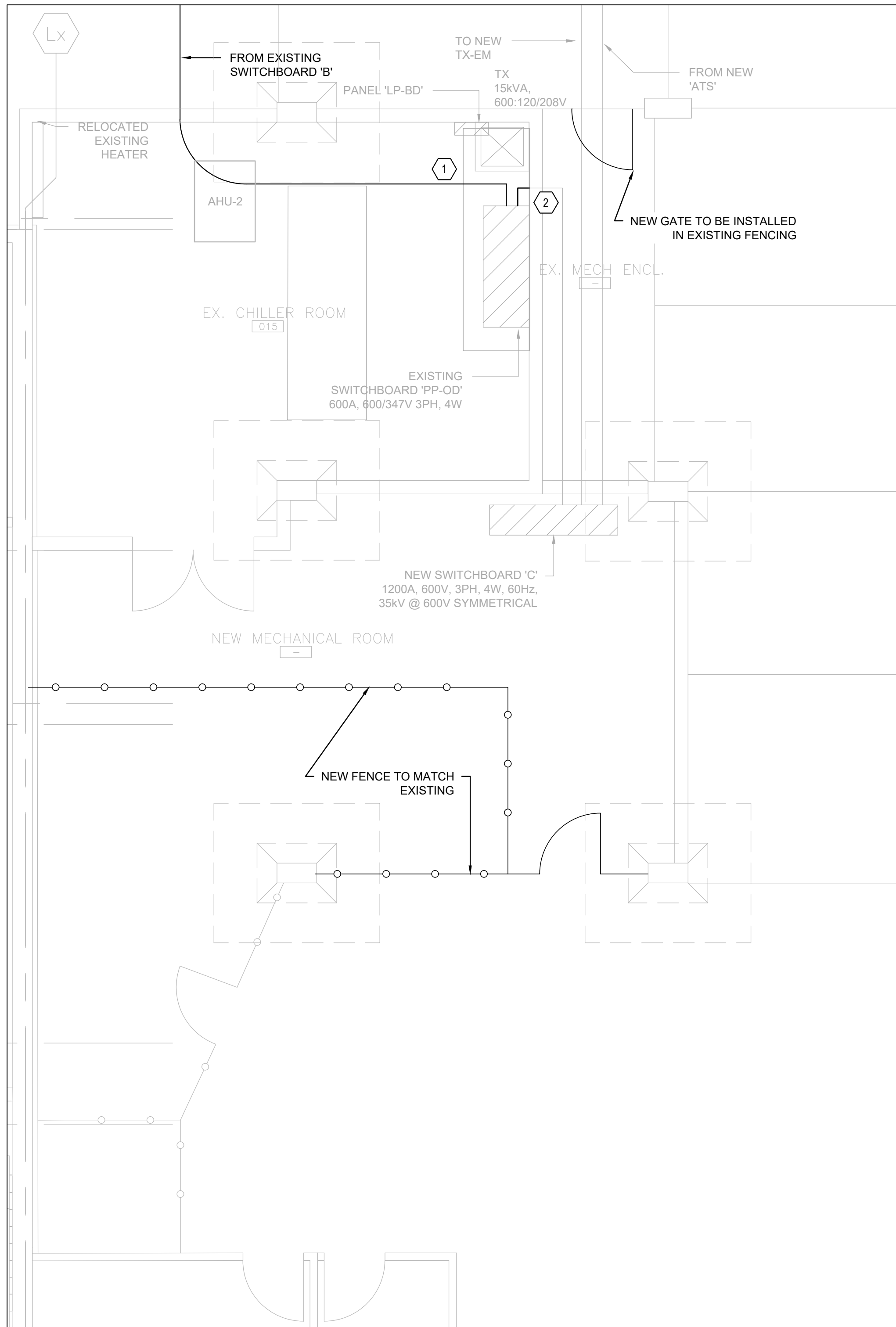
GENERAL NOTES:

- FOR WIRE SIZE AND OTHER INFORMATION SEE ELECTRICAL DRAWING E-606.
- EXACT SWITCHBOARD LOCATIONS TO BE DETERMINED ON THE SITE.

DRAWING NOTES:

PHASE 1:

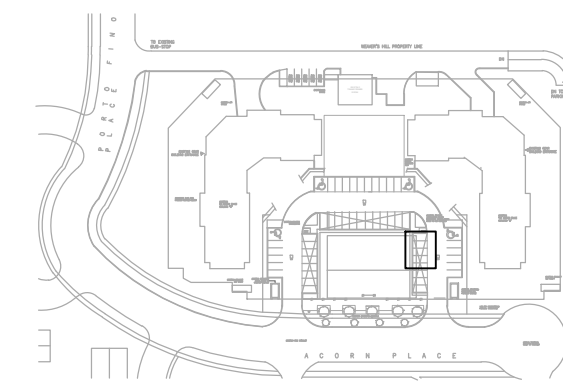
- SUPPLY AND INSTALL THE NEW SWITCHBOARD 'C' 1200A, 600V, 3PH, 4W C/W HOUSEKEEPING PAD NEAR CHILLER ROOM IN LOCATION INDICATED. LOCATE THE SWITCHBOARD AS CLOSE TO THE COLUMN AS POSSIBLE TO LEAVE SPACE FOR FUTURE EXPANSIONS ON THE LEFT SIDE.
- PROVIDE AND INSTALL NEW CONDUIT AND WIRE C/W PULL BOX FROM NEW ATS (DRAWING E-401, DETAIL #2) TO THE NEW SWITCHBOARD 'C' (NOTE #1). LEAVE ENOUGH LENGTH OF CONDUCTOR TO CONNECT INTO SWITCHBOARD 'B' DURING PHASE 2 (DETAIL #3).
- PROVIDE AND INSTALL NEW WIRING IN EMT CONDUITS WITH WATERTIGHT CONNECTORS FROM SWITCHBOARD 'C' LOCATION (NOTE #2) TO NEW TRANSFORMERS TX-EM.
- PROVIDE AND INSTALL TWO RUNS OF (4 X 500 MCM RW90 COPPER CONDUCTORS & 6 IN 91MM EMT CONDUIT) IN PARALLEL FROM THE NEW SWITCHBOARD 'C' LOCATION (NOTE#1) TO THE EXISTING SWITCHBOARD 'PP-OD' (READY TO CONNECT INTO PP-OD INCOMING TERMINALS ON THE 600A-3P FDS IN PHASE 2. LEAVE ENOUGH LENGTH OF CONDUCTOR TO CONNECT INTO SWITCHBOARD 'C' DURING PHASE 2 (DETAIL #3).



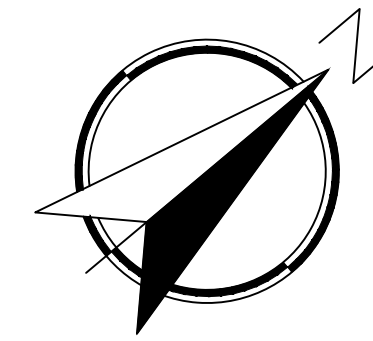
3 POWER LAYOUT SWITCHOVER PHASE (PHASE 2)
E402 1:50

DRAWING NOTES:
PHASE 2:

- DISCONNECT, DEMOLISH AND DISPOSE EXISTING FEED FROM SWITCHBOARD 'B' TO THE EXISTING SWITCHBOARD 'PP-OD'.
- FINALIZE THE TERMINATION OF THE FEED FROM THE NEW SWITCHBOARD 'C' INTO THE EXISTING SWITCHBOARD 'PP-OD' AND READY FOR ENERGIZATION.



KEY PLAN



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revisions	description	date
A	A detail no.	A
C	C drawing no.	B C

project
NEW GENERATOR INSTALLATION
AT PEEL YOUTH VILLAGE
PEEL YOUTH VILLAGE, 99 ACORN PLACE
MISSISSAUGA, ON

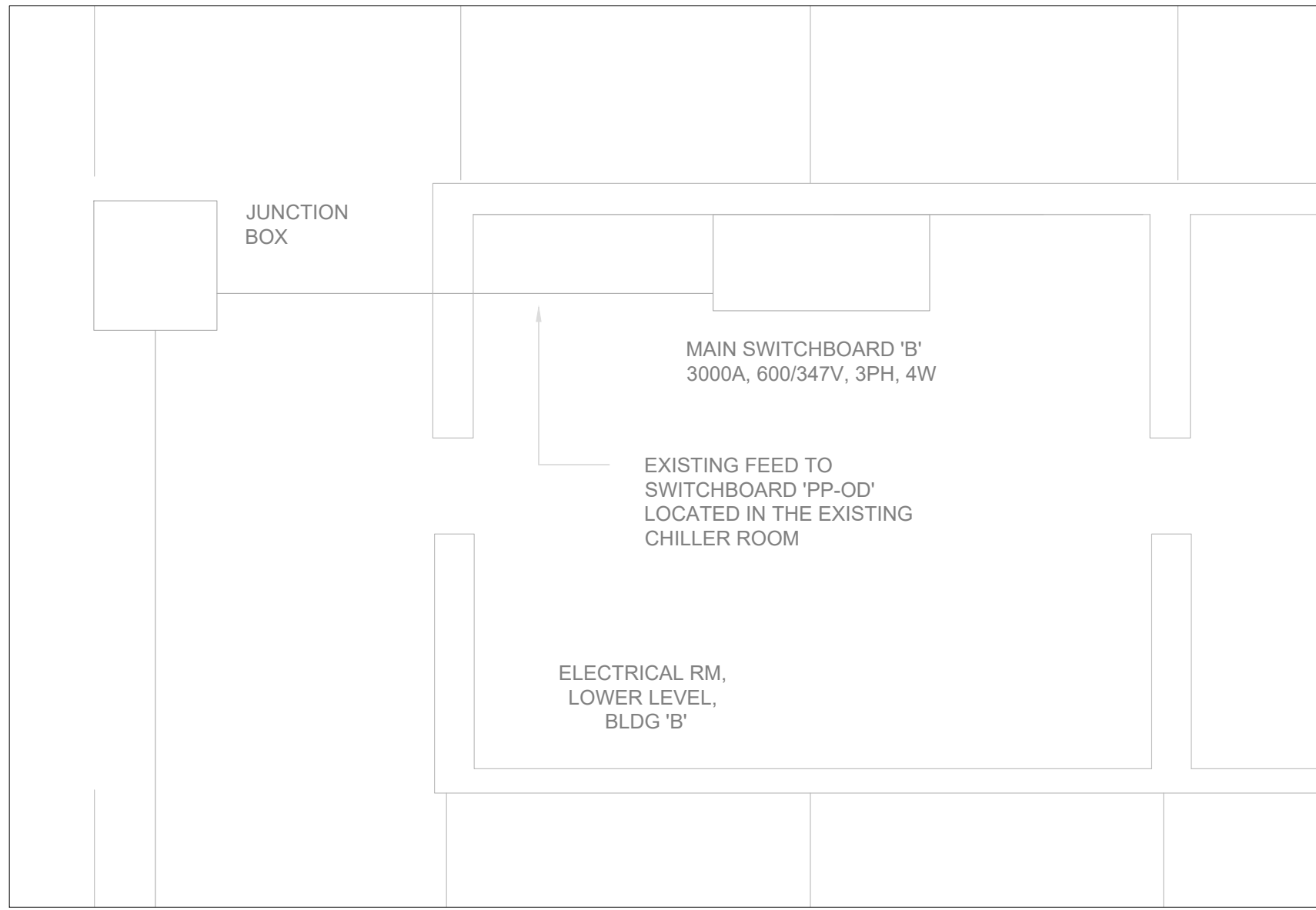
drawing
EXISTING CHILLER AND
PARKING GARAGE LAYOUT

Designed By	JS	Conçu par
Date		(yyyy/mm/dd)
Drawn By	SM	Dessiné par
Date		(yyyy/mm/dd)
Reviewed By	JS	Examiné par
Date		(yyyy/mm/dd)
Approved By	BR	Approuvé par
Date		(yyyy/mm/dd)
Tender		Soumission

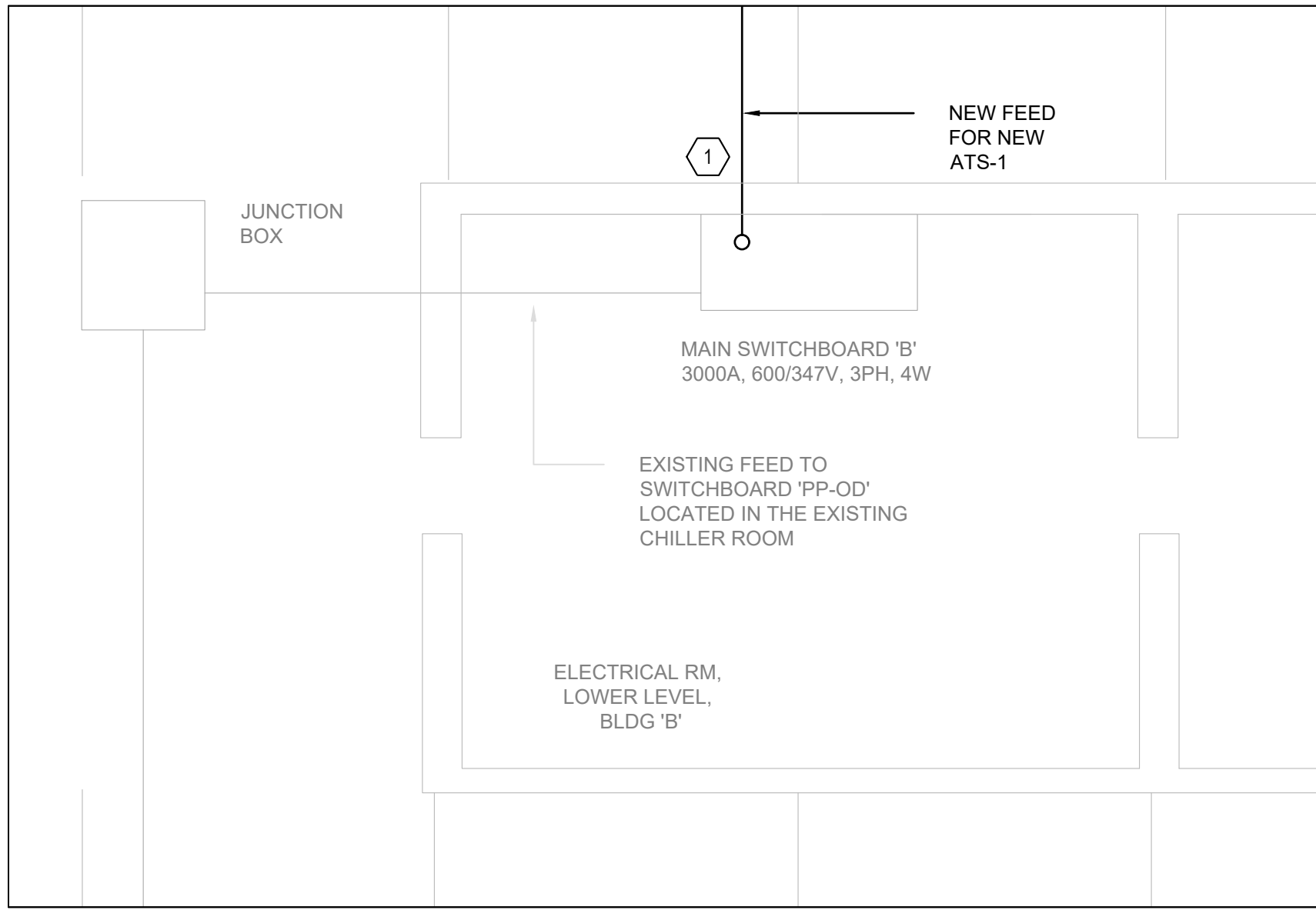
Project Manager
Project no.
2022-677P (ON10121.3)

Scale
AS SHOWN

Drawing no.
E402



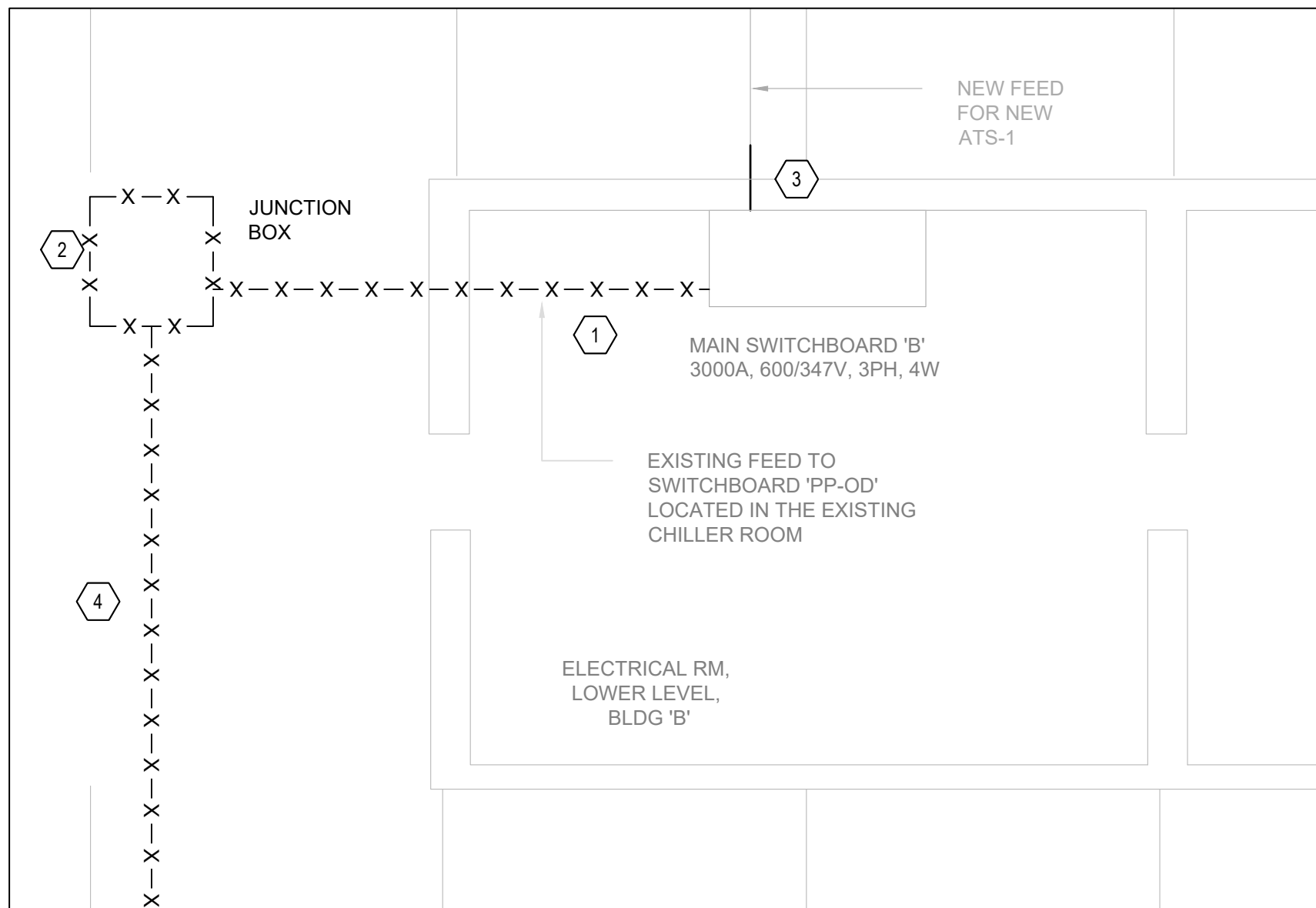
1 EXISTING ELECTRICAL ROOM, BUILDING 'B' LOWER LEVEL - POWER LAYOUT EXISTING
E403 1:50



2 EXISTING ELECTRICAL ROOM, BUILDING 'B' LOWER LEVEL - POWER LAYOUT INSTALLATION (PHASE 1)
E403 1:50

DRAWING NOTES:

1 NEW CONDUIT AND WIRING INSTALLED IN THE PHASE 1 TO BE EXTENDED INTO ELECTRICAL ROOM B (BUILDING 'B') - READY FOR EXTENSION DOWN INTO 1200A BREAKER ON THE SWITCHBOARD 'B' CURRENTLY FEEDING SWITCHBOARD 'PP-OD' IN THE SWITCHOVER PHASE 2.



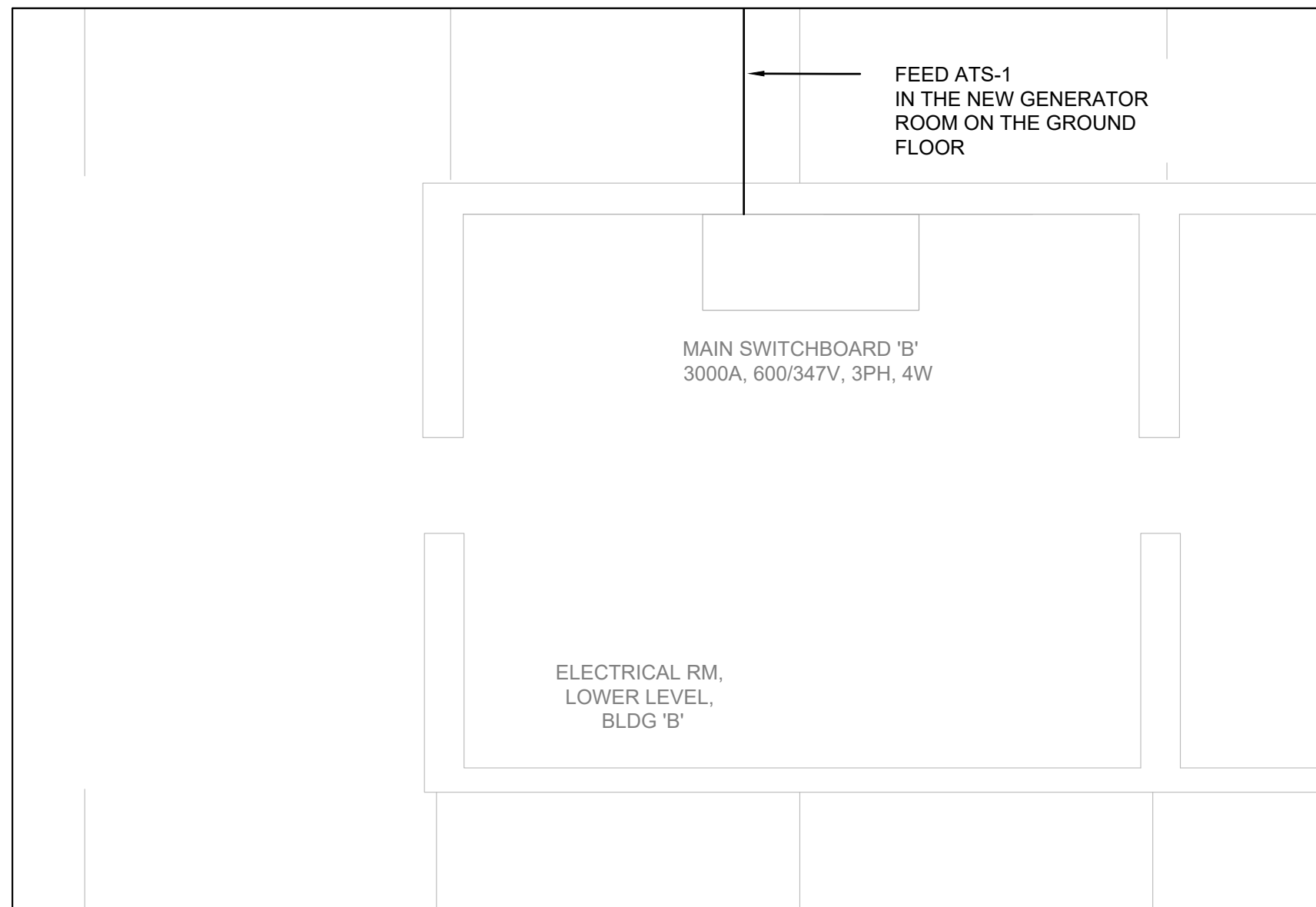
3 EXISTING ELECTRICAL ROOM, BUILDING 'B' LOWER LEVEL - POWER LAYOUT SWITCHOVER PHASE (PHASE 2)
E403 1:50

GENERAL NOTES:

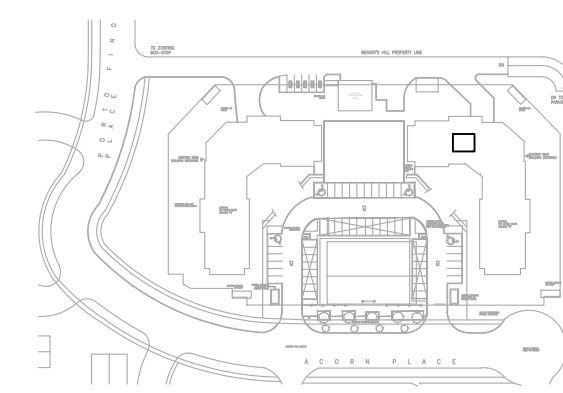
1. COORDINATE WITH ENGINEER, REGION OF PEEL AND MECHANICAL CONTRACTOR ON TIMING OF POWER SHUT DOWN, LENGTH OF POWER OUTAGE, AND TESTING AND COMMISSIONING OPERATIONS.

DRAWING NOTES:

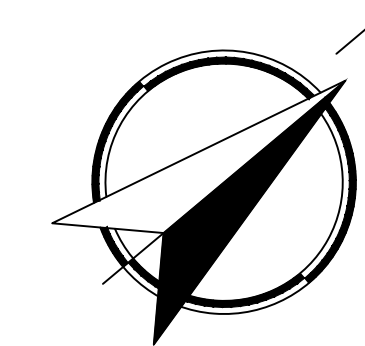
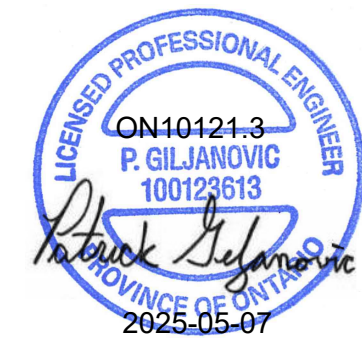
1 DISCONNECT EXISTING FEED FROM SWITCHBOARD 'B' FEEDING SWITCHBOARD 'PP-OD'.
2 DISCONNECT, DEMOLISH AND DISPOSE DRAWBOX.
3 NEW CONDUIT AND WIRING INSTALLED IN THE PHASE 1 (DRAWING E-403, DETAIL #2) TERMINATE INTO THE EXISTING BREAKER 1200A WITHIN EXISTING SWITCHBOARD 'B'.
4 DISCONNECT, DEMOLISH AND DISPOSE EXISTING POWER SUPPLY FEEDER FOR SWITCHBOARD 'B' FROM EXISTING SWITCHBOARD 'PP-OD'.



4 EXISTING ELECTRICAL ROOM, BUILDING 'B' LOWER LEVEL - POWER LAYOUT FINAL
E403 1:50



KEY PLAN



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A	A detail no. no. du detail	A
C	B location drawing no. sur dessin no.	B C
	C drawing no. dessin no.	

project NEW GENERATOR INSTALLATION AT PEEL YOUTH VILLAGE
PEEL YOUTH VILLAGE, 99 ACORN PLACE
MISSISSAUGA, ON

drawing EXISTING ELECTRICAL ROOMS POWER LAYOUT

Designed By JS Conçu par
Date (yyyy/mm/dd)

Drawn By SM Dessiné par
Date (yyyy/mm/dd)

Reviewed By JS Examiné par
Date (yyyy/mm/dd)

Approved By BR Approuvé par
Date (yyyy/mm/dd)

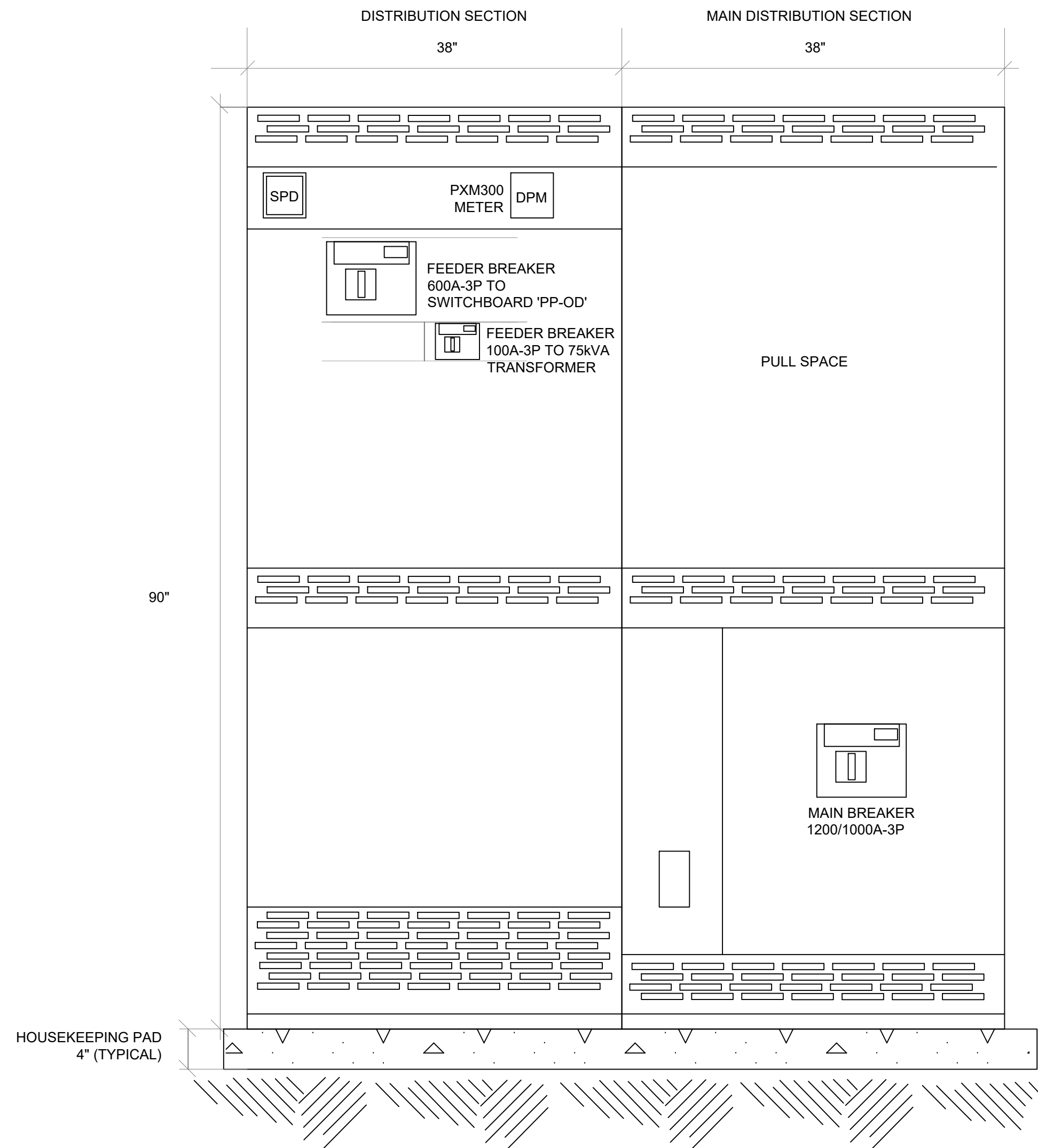
Tender Soumission

Project Manager Administrateur de projets

Project no. No. du projet
2022-677P (ON10121.3)

Scale AS SHOWN Échelle

Drawing no. E403 No. du dessin



NEW CONSTRUCTION NOTES:

- MAIN SWITCHBOARD SHALL BE OF FREE STANDING FLOOR MOUNTED, DEAD FRONT ACCESS, NEMA 3 CONSTRUCTION COMPLETE WITH LOCKABLE CT METERING COMPARTMENT TO AECTRA REQUIREMENTS, AND LOCKABLE HINGED DOORS ON THE FRONT OF EACH CELL.
- CABLES TO ENTER SWITCHBOARD AT HIGH LEVEL THROUGH THE BACK OF THE SWITCHBOARD.
- SEE SINGLE LINE DRAWING E603 FOR DETAILS OF EQUIPMENT ON THE MAIN SWITCHBOARD.

1 SECTION A-A - NEW 1200A, 600V SWITCHBOARD ELEVATION
E501 N.T.S.



Contractor to verify all dimensions & conditions on site and immediately notify the departmental representative of all discrepancies.

6	ISSUED FOR PERMIT	07/05/25
5	ISSUED FOR TENDER	04/04/25
4	ISSUED FOR ESA	28/02/25
3	ISSUED FOR TENDER REVIEW	21/02/25
2	ISSUED FOR 90%	20/06/24
1	ISSUED FOR 33%	29/01/24
revisions	description	date

A	A detail no. no. du detail	A
C	B location drawing no. sur dessin no.	B C
	C drawing no. dessin no.	

project projet
NEW GENERATOR INSTALLATION
AT PEEL YOUTH VILLAGE
PEEL YOUTH VILLAGE, 99 ACORN PLACE
MISSISSAUGA, ON

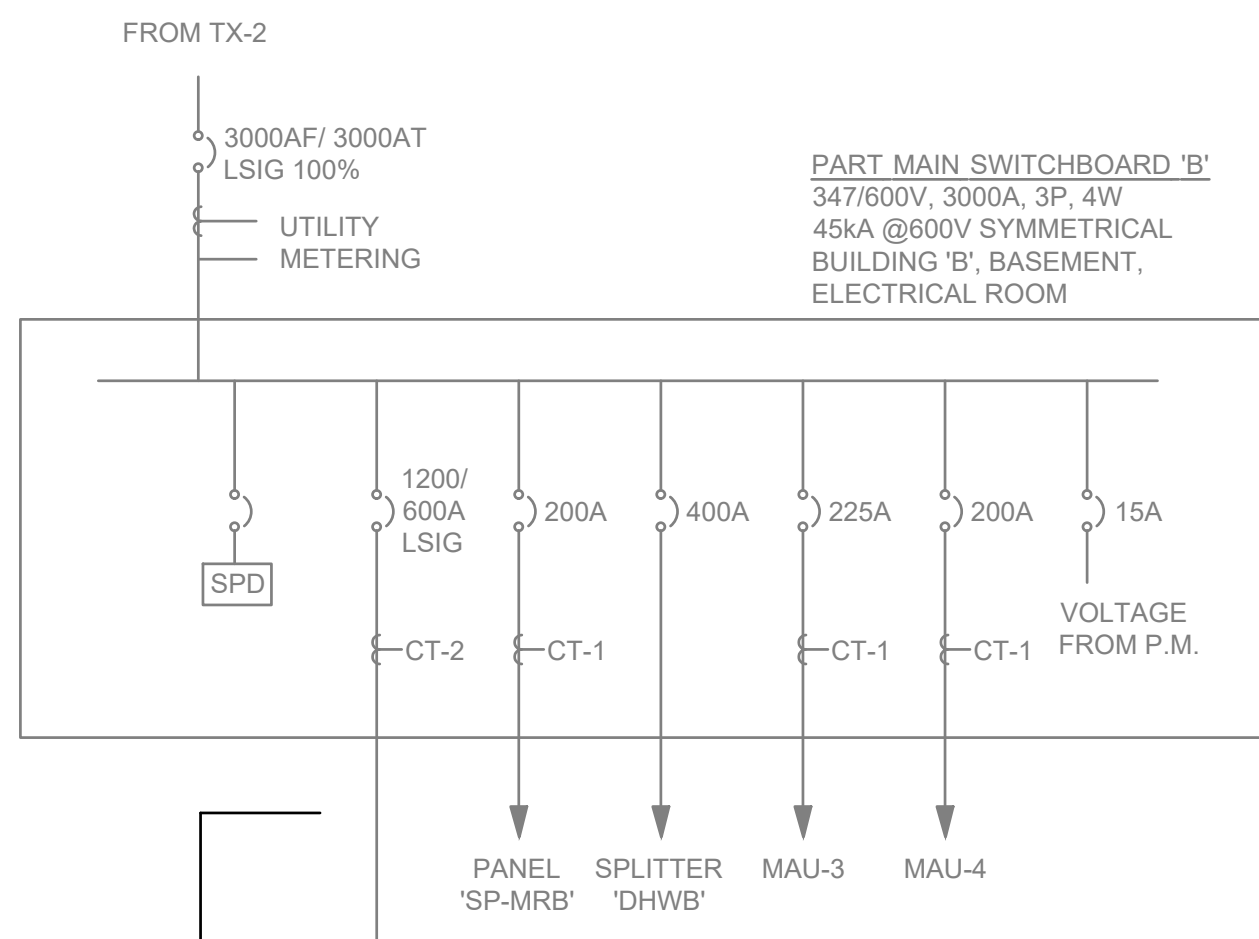
drawing dessin
ELECTRICAL DETAILS

Designed By	JS	Conçu par
Date		(yyyy/mm/dd)
Drawn By	TM	Dessiné par
Date		(yyyy/mm/dd)
Reviewed By	JS	Examiné par
Date		(yyyy/mm/dd)
Approved By	BR	Approuvé par
Date		(yyyy/mm/dd)
Tender		Soumission

Project Manager Administrateur de projets
Project no. No. du projet
2022-677P (ON10121.3)

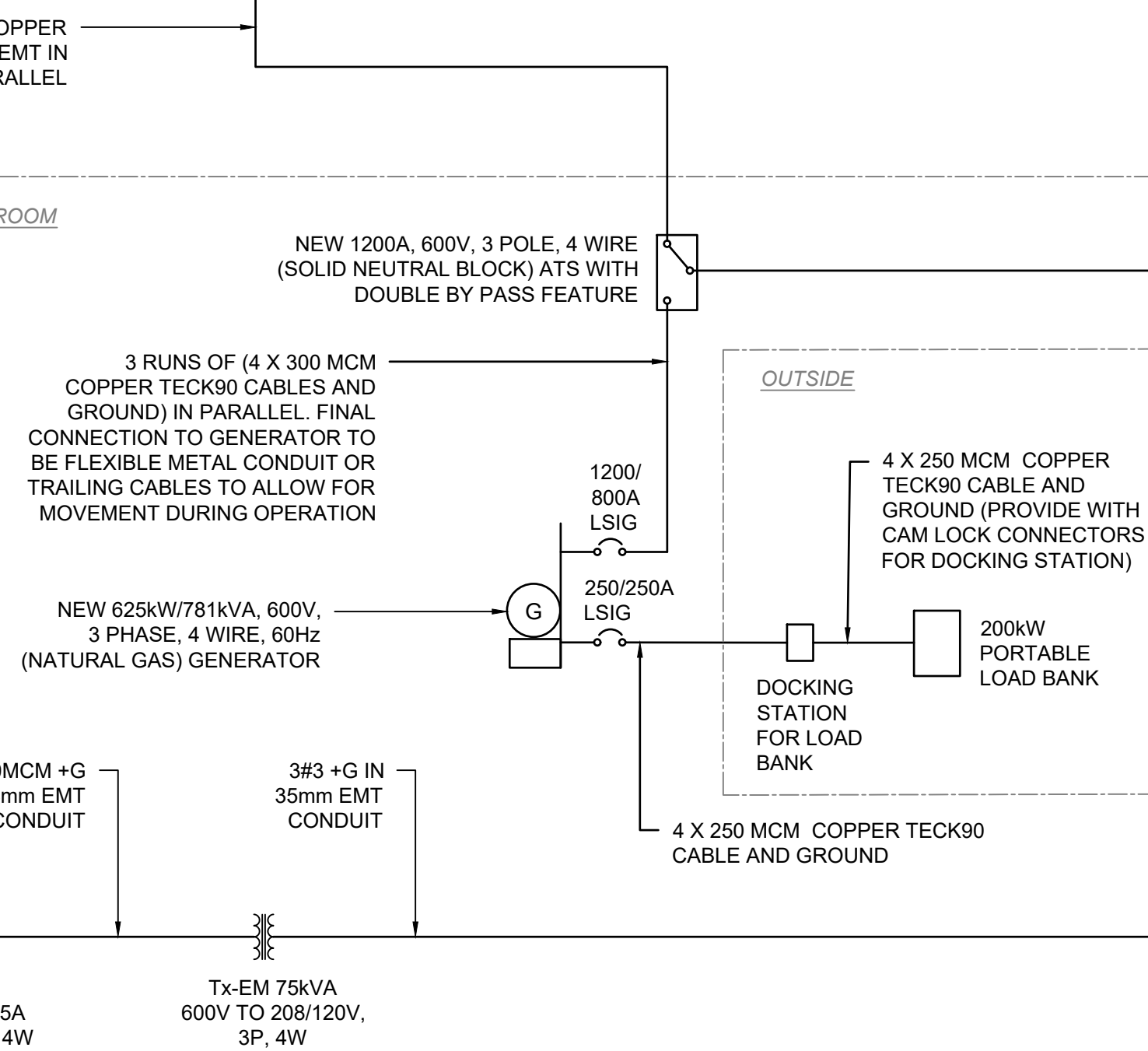
Scale Échelle
AS NOTED

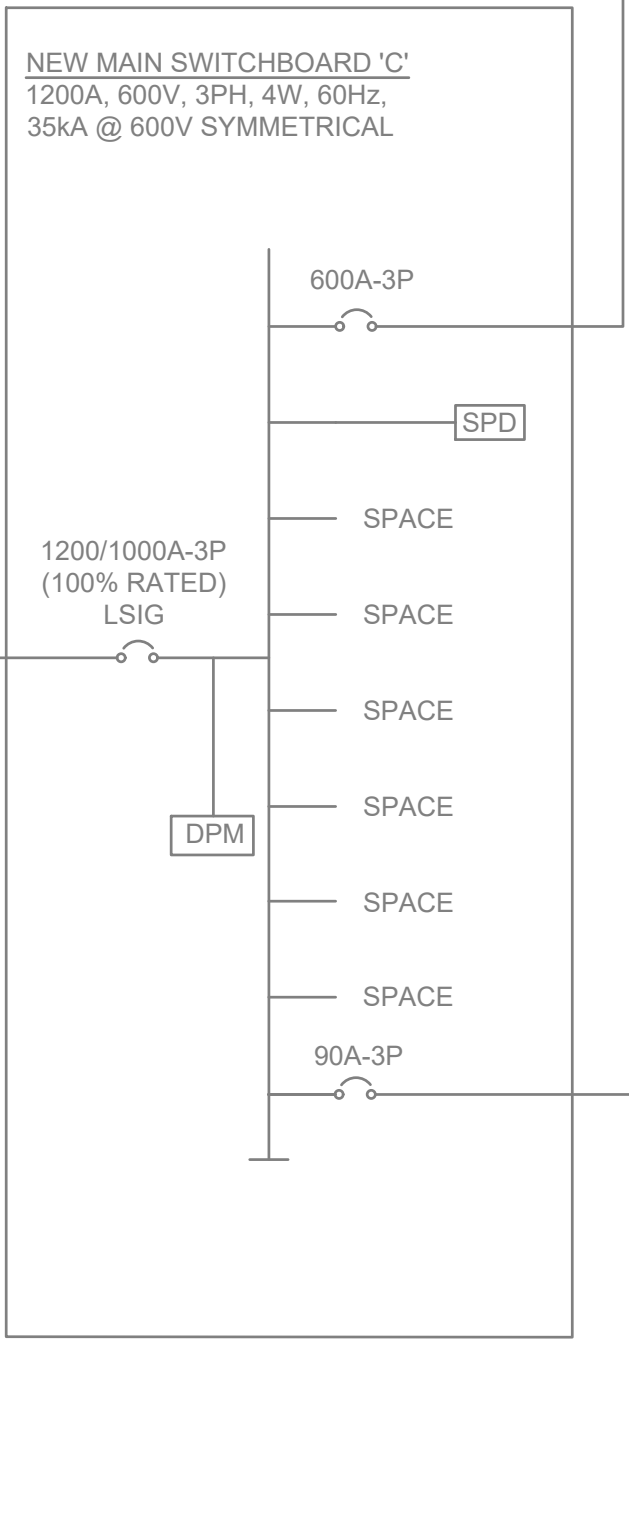
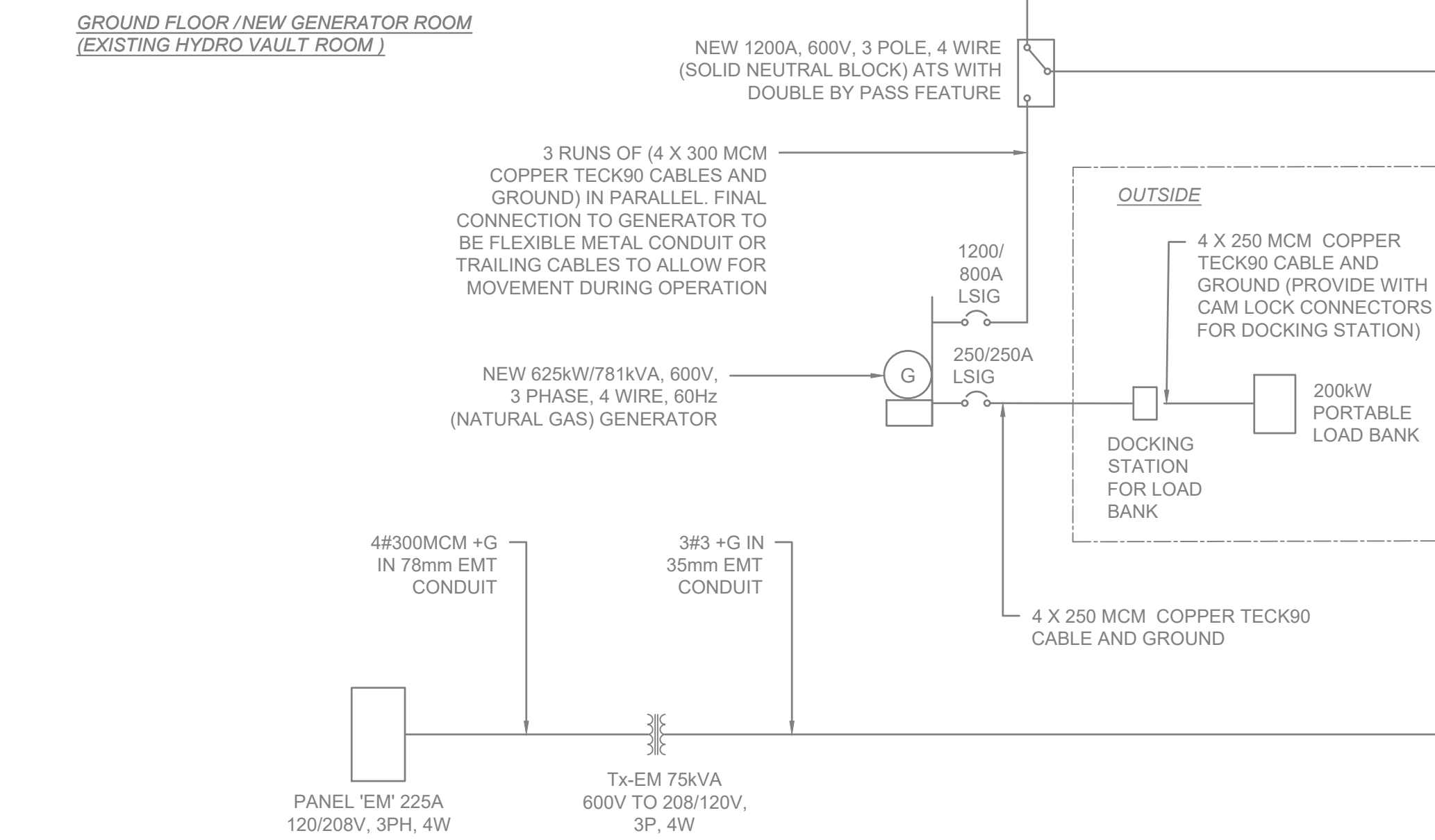
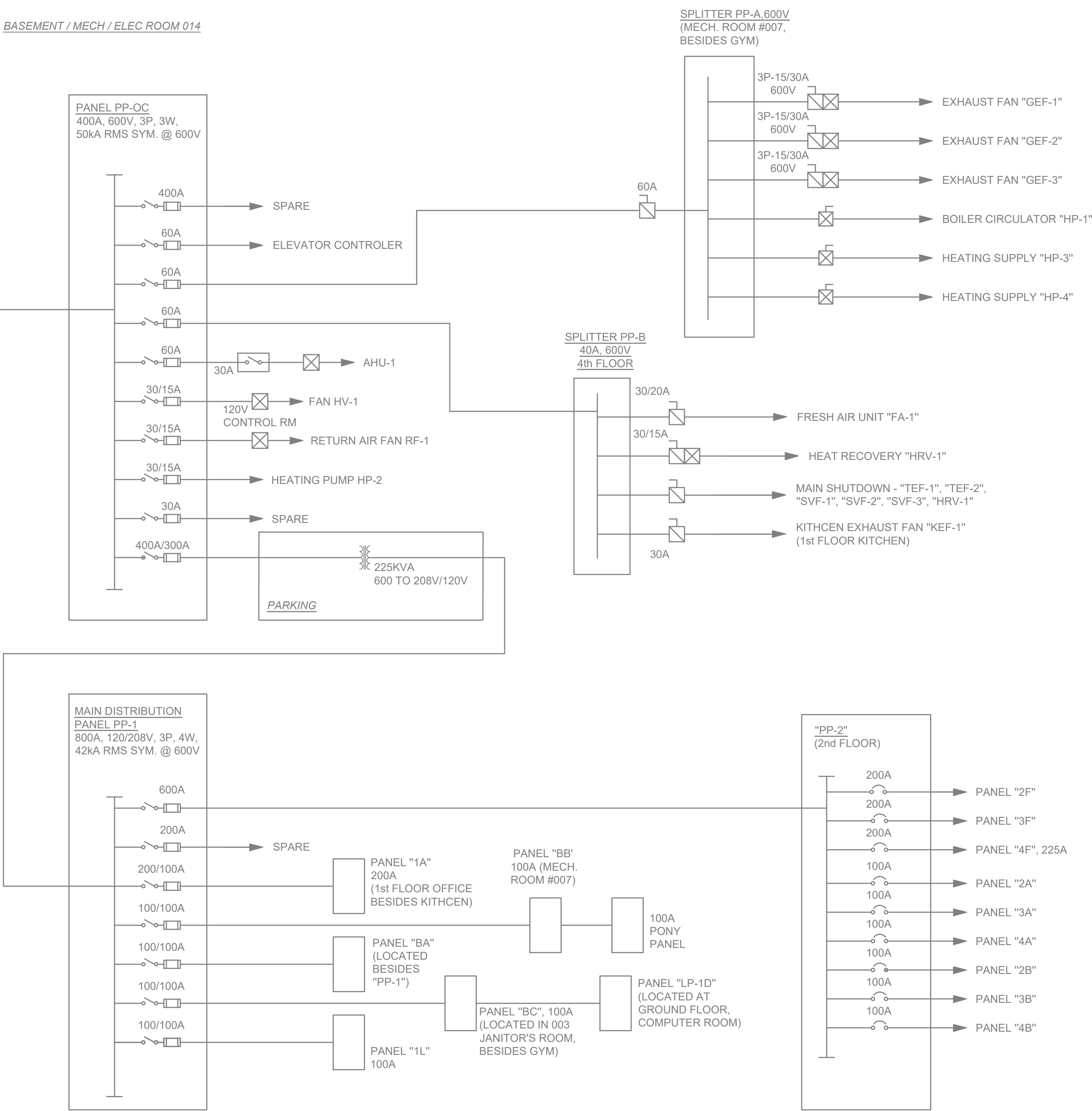
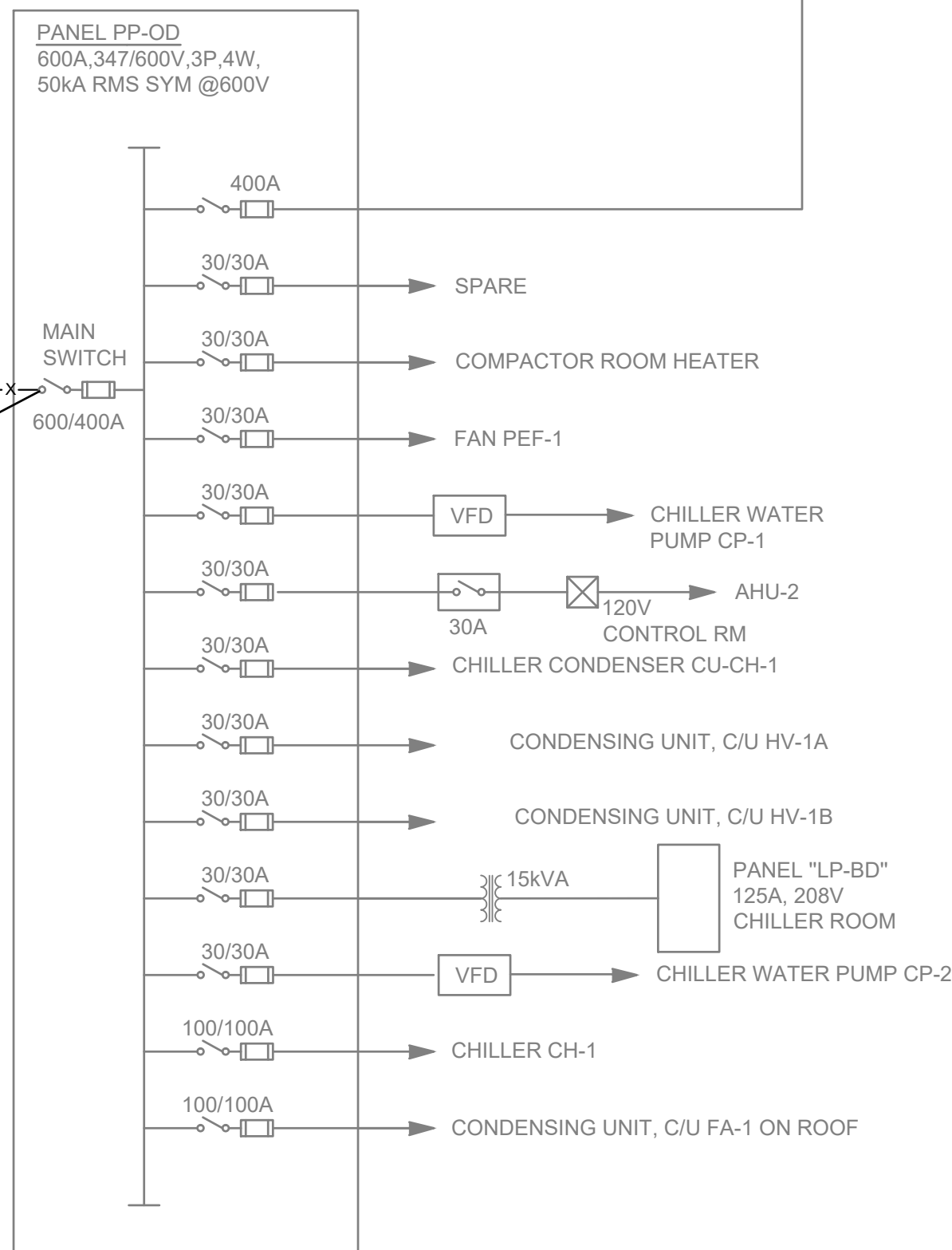
Drawing no. No. du dessin
E501



BASEMENT /
PARKING GARAGE
AREA

ROUND FLOOR / NEW GENERATOR ROOM
(EXISTING HYDRO VAULT ROOM)

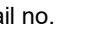




1. DISCONNECT, DEMOLISH AND DISPOSE EXISTING JUNCTION BOX AND CONDUCTOR FROM EXISTING SWITCHBOARD 'B' TO 'PP-OD'
2. TERMINATE FEEDS FROM SWITCHBOARD 'C' (INSTALLED IN THE PHASE 1) TO SWITCHBOARD 'PP-OD' AND FEED TO SWITCHBOARD 'C' INTO 1200A BREAKER ON SWITCHBOARD 'B'. RECONNECT EXISTING CT-1 IN THE SWITCHBOARD 'B' (BUILDING 'B') TO NEW SUPPLY FEEDER FOR SWITCHBOARD 'C'
3. TERMINATE ALL WIRING INSTALLED IN THE PHASE 1.



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revisions	description	date

A detail no.
no. du detail
 B location drawing no.
sur dessin no.
 C drawing no.
dessin no.

project project

**NEW GENERATOR INSTALLATION
AT PEEL YOUTH VILLAGE**

PEEL YOUTH VILLAGE, 99 ACORN PLACE
MISSISSAUGA, ON

drawing dessin

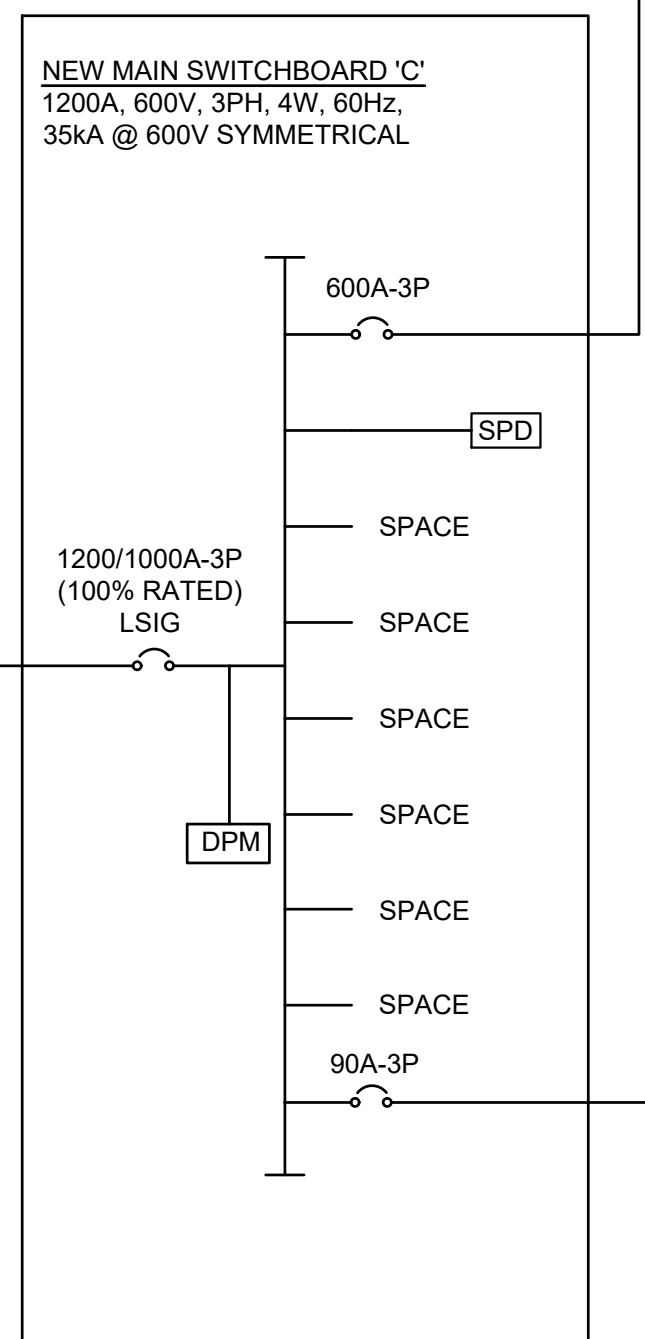
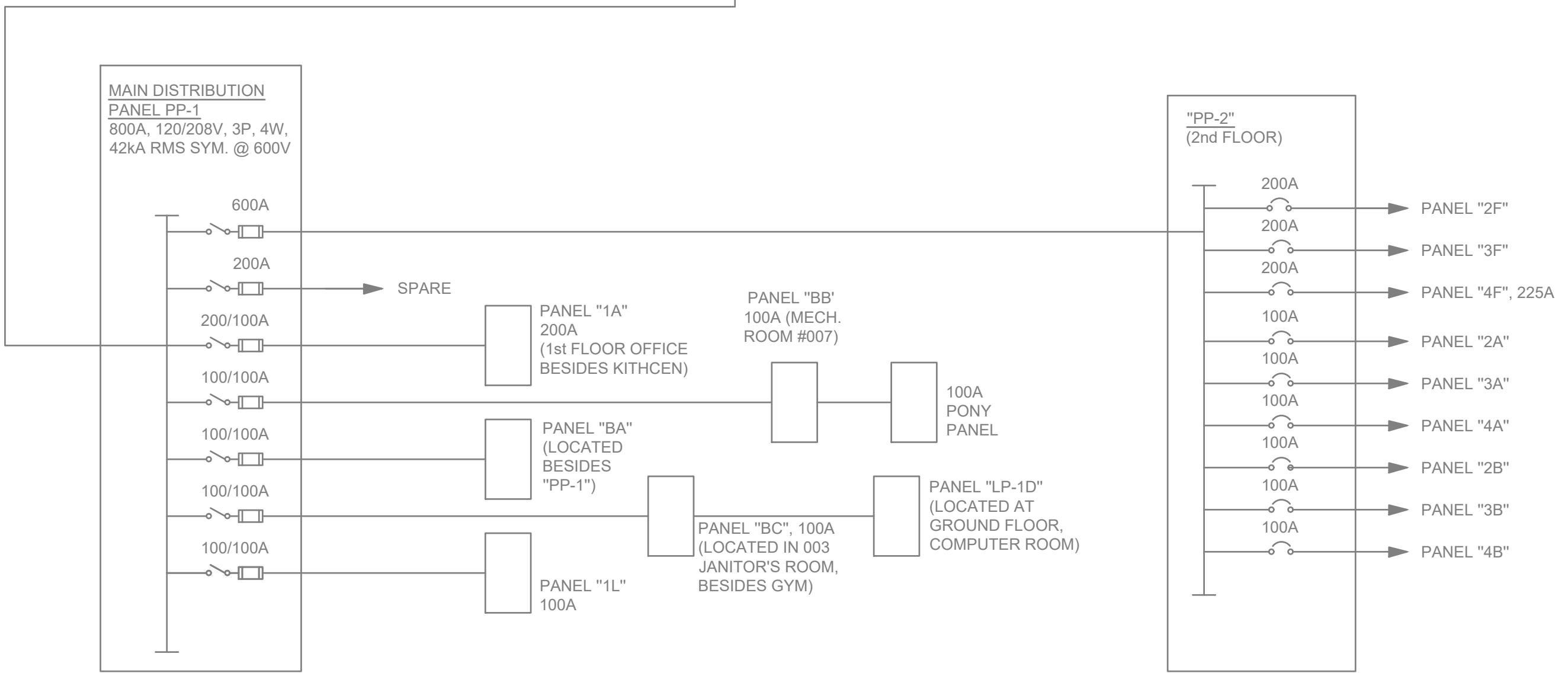
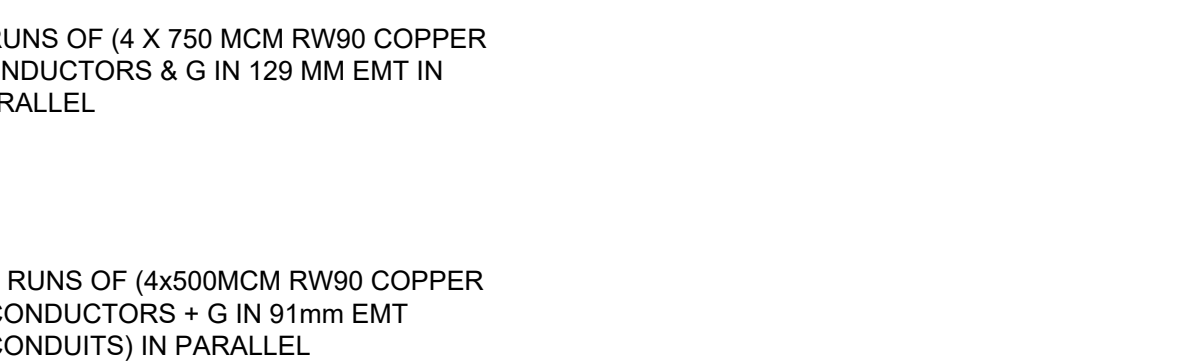
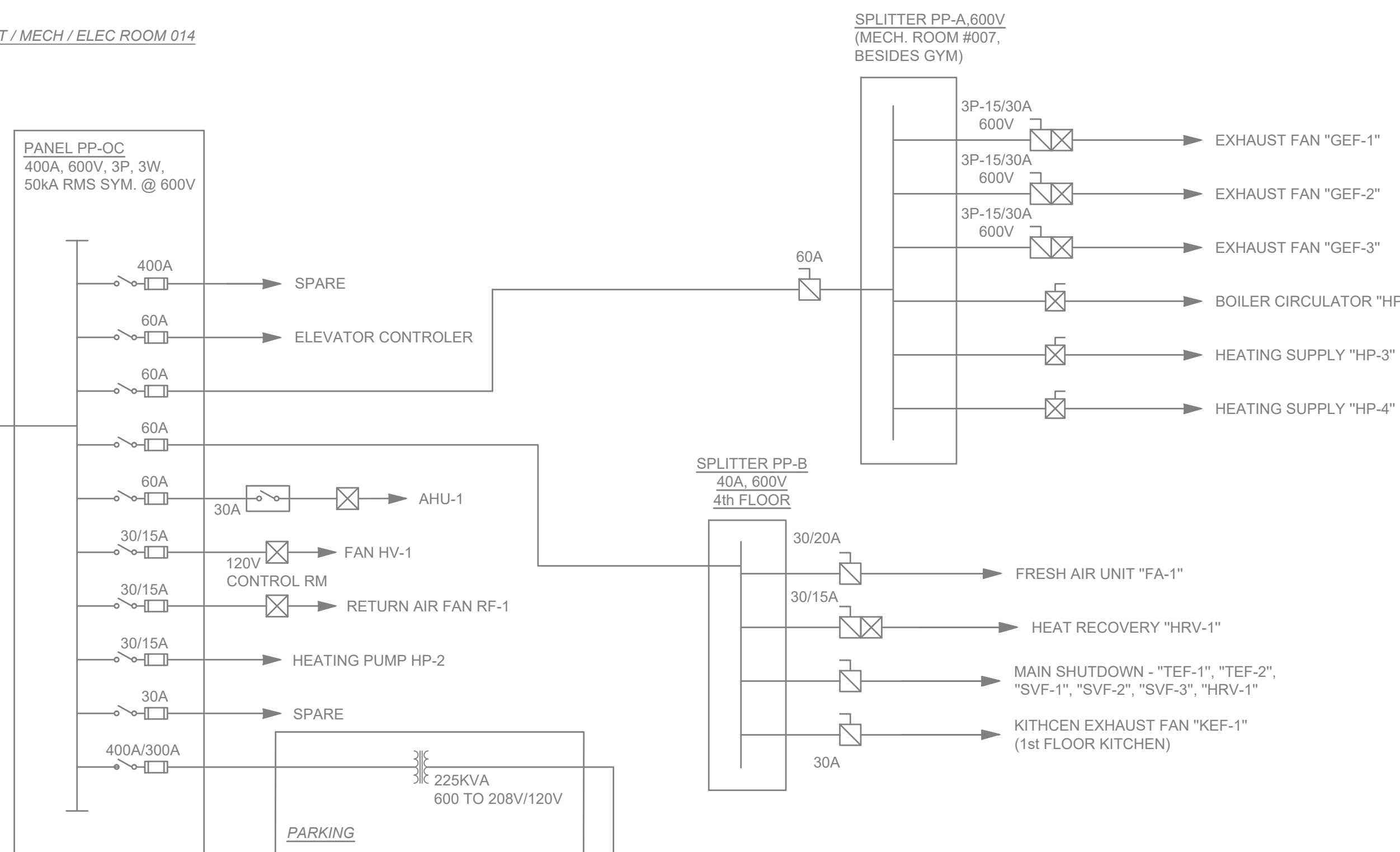
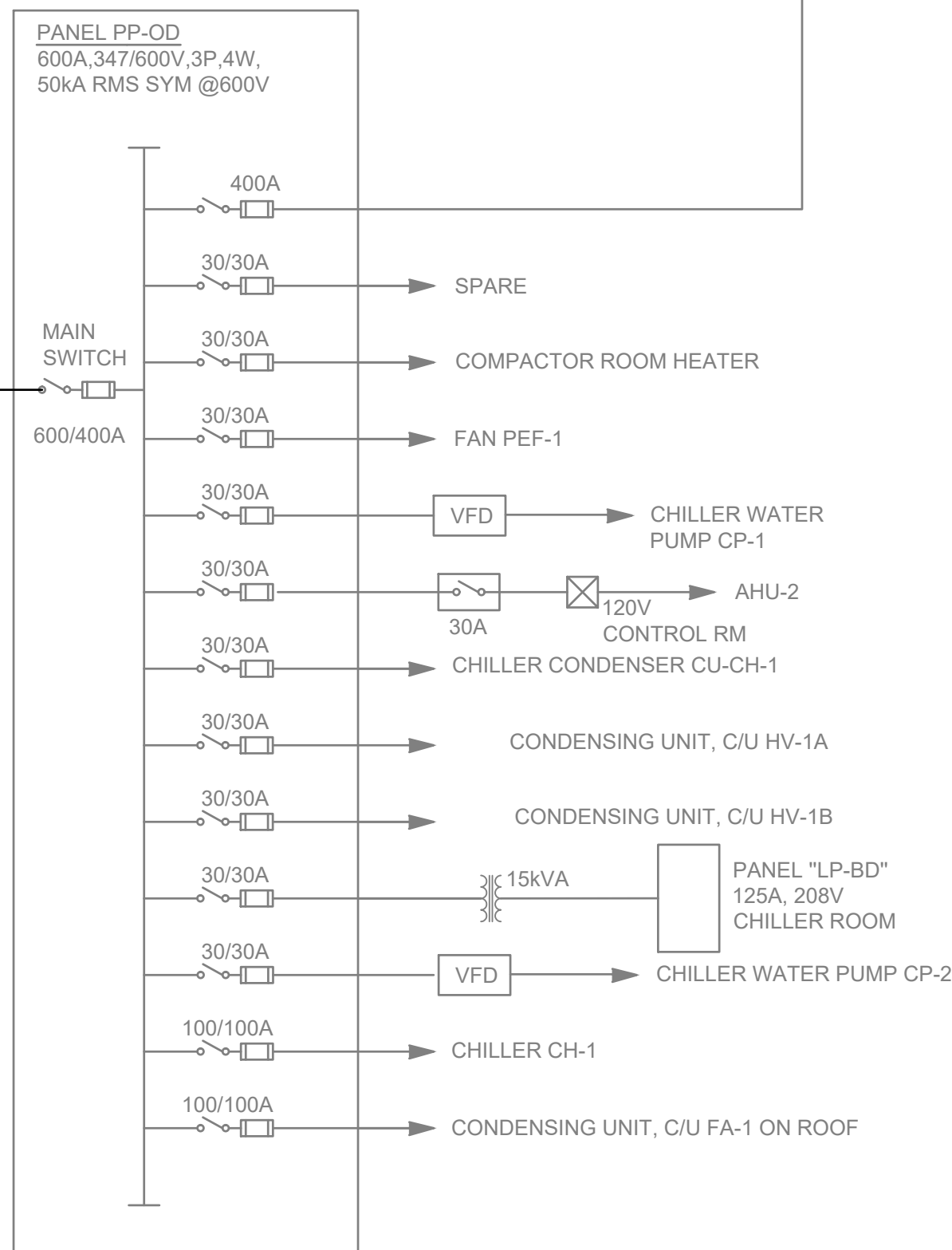
SINGLE LINE DIAGRAM SWITCHOVER PHASE (PHASE 2)

Designed By	JS	Conçu par
Date		(yyyy/mm/dd)
Drawn By	SM	Dessiné par
Date		(yyyy/mm/dd)
Reviewed By	JS	Examiné par
Date		(yyyy/mm/dd)
Approved By	BR	Approuvé par
Date		(yyyy/mm/dd)
Tender		Soumission

Project Manager	Administrateur de projets
Project no.	No. du projet
2022-677P (ON10121.3)	

Scale	Échelle
NTS	

Drawing no.	E602	No. du dessin



1. PROVIDE AND INSTALL NEW EQUIPMENT AS INDICATED ON THE DRAWINGS.
2. FOR PANEL SCHEDULE MECHANICAL EQUIPMENT WIRING AND LOCAL DISCONNECT SWITCH REQUIREMENTS SEE DRAWING # E-604.
3. ALL CABLES SPECIFIED TO BE COPPER RW90 AS INDICATED UNLESS OTHERWISE STATED.

INCOMING COMPARTMENT

1. MAIN SWITCHBOARD SHALL BE A NON-SERVICE ENTRANCE TYPE 2 - 1200A, 600V/347V - 3 PHASE (100% RATED) FREE STANDING TYPE COMPLETE WITH LOCKABLE HINGED DOORS ON FRONT OF EACH CELL, SPRINKLER PROOF TYPE, WITH SLID BOTTOM TO ENSURE 100% DUST PROOF.
2. SWITCHBOARD TO BE PROVIDED WITH GASKETS AND EASILY REPLACEABLE FILTERS PER STRUCTURE AND BE VERMIN PROOF.
3. INTERRUPTING RATING 35 KA (MIN) AT 600 V SYMMETRICAL.
4. BUS BRACING TO B 42KA (MIN).
5. MAIN BREAKER TO BE FIXED TYPE 600V 1200A-THREE POLE (1200A FRAME) 100% RATED COMPLETE WITH XPRL20 LSG TRIP UNIT SET TO 1 000 A UNLESS OTHERWISE STATED ON THE COORDINATION STUDY.
6. PROVISION OF ONE PHX3000 METER WITH DISPLAY AND 1200V CTS.
7. SURGE PROTECTIVE DEVICE 200KA "SPD SERIES" WITH SURGE COUNTER AND DISCONNECT SWITCH.
8. THE COLOR OF FINISH TO BE GREY ASA 61.

DISTRIBUTION COMPARTMENT

1. DISTRIBUTION BREAKERS TO BE AS INDICATED ON THE SINGLE LINE DRAWING AND OF THE POWER DEFENSE THERMAL MAGNETIC TYPE WITH ADJUSTABLE TRIPS.
2. ONE OFF SPARE CHASSIS (100A BREAKER FRAME) TO BE PROVIDED FOR FUTURE USE.

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revisions	description	date

A detail no.
no. du detail

B location drawing no.
sur dessin no.

C drawing no.
dessin no.

project project

**NEW GENERATOR INSTALLATION
AT PEEL YOUTH VILLAGE**

PEEL YOUTH VILLAGE, 99 ACORN PLACE
MISSISSAUGA, ON

drawing	dessin

SINGLE LINE DIAGRAM
FINAL

Designed By	JS	Conçu par
Date		(yyyy/mm/dd)
Drawn By	SM	Dessiné par
Date		(yyyy/mm/dd)
Reviewed By	JS	Examiné par
Date		(yyyy/mm/dd)
Approved By	BR	Approuvé par
Date		(yyyy/mm/dd)
Tender		Soumission

Project Manager	Administrateur de projets
Project no.	No. du projet
2022-677P (ON10121.3)	

Scale	Échelle
NTS	

Drawing no.	E603	No. du dessin



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NEW MECHANICAL EQUIPMENT											
ITEM	EQUIP. No.	DESCRIPTION	LOCATION	LOAD DATA				FEED FROM	WIRING	LOCAL DISCONNECT SWITCH (A)	CONTROL DEVICE
				VOLTAGE (V)	PHASE	POWER (kW)	CIRCUIT BREAKER (A)				
1	EF-1	EXHAUST FAN	GEN. ROOM, ROOF	120	1	0.37	15A-1P	PANEL 'EM'-11	2#12+G in 21mm EMT CONDUIT	30A-1P	BAS SYSTEM
2	MID-3 (LD-1)	MOTORIZED DAMPER	GEN. ROOM, GROUND FLOOR	120	1	0.1	15A-1P	PANEL 'EM'-6	2#12+G in 21mm EMT CONDUIT	TOGGLE SW 20A-1P	BAS SYSTEM
3	MID-1 (LS-2)	MOTORIZED DAMPER	GEN. ROOM, GROUND FLOOR	120	1	0.1	15A-1P	PANEL 'EM'-8	2#12+G in 21mm EMT CONDUIT	TOGGLE SW 20A-1P	BAS SYSTEM
4	MID-2 (LD-2)	MOTORIZED DAMPER	GEN. ROOM, GROUND FLOOR	120	1	0.1	15A-1P	PANEL 'EM'-10	2#12+G in 21mm EMT CONDUIT	TOGGLE SW 20A-1P	BAS SYSTEM
5	EUH-1	ELECTRIC UNIT HEATER	GEN. ROOM, GROUND FLOOR	208	3	5	20A-3P	PANEL 'EM'-5,7,9	3#12+G in 21mm EMT CONDUIT	30A-3P	/

LOCATION: NEW GENERATOR ROOM FED FROM: NEW SWITCHBOARD 'C' MOUNTING TYPE: SURFACE ENCLOSURE RATING: NEMA 1 MAIN BRK: 175A							NEW PANEL 'EM'							PHASE VOLTAGE (V): 120 LINE VOLTAGE (V): 208 PHASE: 3 WIRE: 4 CURRENT RATING (A): 225A INTERR. CURRENT (KA): 10kA		
DESCRIPTION		INSTALL ED LOAD (kW)	BRK (A)	CCT#	PH	CCT#	BRK (A)	INSTALL ED LOAD (kW)	DESCRIPTION							
MAINTENANCE REC. - GEN. RM		1.80	1P20	1	A	2	1P20		SPARE FOR BAS SYSTEM							
BATTERY UNIT EMG1 - GEN.RM		0.25	1P15	3	B	4	1P15	0.16	LTG - GENERATOR ROOM							
UNIT HEATER EUH-1 - GEN ROOM		1.67	3P20	5	C	6	1P15	0.1	MD-3 (LD-1) GEN ROOM							
		1.67		7	A	8	1P20	0.1	MD-1 (LS-2) GEN ROOM							
		1.67		9	B	10	1P15	0.1	MD-2 (LD-2) GEN ROOM							
EF-1		0.37	1P15	11	C	12	3P60	5	GENERATOR CONTROL PANEL							
LOAD BANK CONTROL		1.00	1P15	13	A	14		5								
CO/NO CONTROL PANEL		1.00	1P15	15	B	16		5								
SPACE				17	C	18	1P20		SPARE							
SPACE				19	A	20	1P20		SPARE							
SPACE				21	B	22	1P20		SPARE							
SPACE				23	C	24			SPACE							
SPACE				25	A	26			SPACE							
SPACE				27	B	28			SPACE							
SPACE				29	C	30			SPACE							
SPACE				31	A	32			SPACE							
SPACE				33	B	34			SPACE							
SPACE				35	C	36			SPACE							
SPACE				37	A	38			SPACE							
SPACE				39	B	40			SPACE							
SPACE				41	C	42			SPACE							
NOTE:		LOAD A (A)						9.57								
1. ALL SPARE BREAKERS SHALL BE IN THE OFF POSITION.		LOAD B (A)						8.18								
		LOAD C (A)						7.14								
		INSTALLED LOAD (kW)						25								
		DEMAND FACTOR						1.00								
		DEMAND LOAD (kW)						24.89								



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revisions	description	date

A

C

A detail no.
no. du detail

A

B

C

B location drawing no.
sur dessin no.
C drawing no.
dessin no.

project projet
NEW GENERATOR INSTALLATION
AT PEEL YOUTH VILLAGE
PEEL YOUTH VILLAGE, 99 ACORN PLACE
MISSISSAUGA, ON

drawing dessin

EQUIPMENT AND PANEL SCHEDULES

Designed By JS Conçu par
Date (yyyy/mm/dd)

Drawn By SM Dessiné par
Date (yyyy/mm/dd)

Reviewed By JS Examiné par
Date (yyyy/mm/dd)

Approved By BR Approuvé par
Date (yyyy/mm/dd)

Tender Soumission

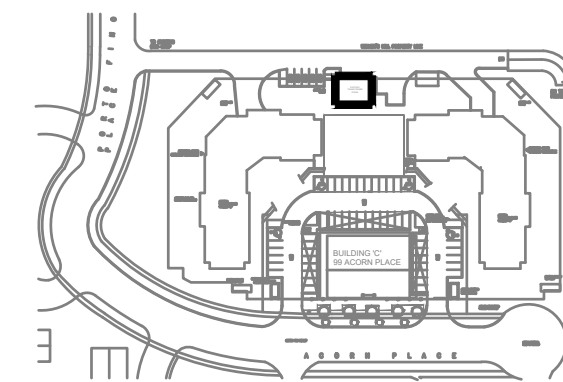
Project Manager Administrateur de projets

Project no. No. du projet
2022-677P (ON10121.3)

Scale Échelle
NTS

Drawing no. No. du dessin
E604

REGION OF PEEL, PEEL YOUTH VILLAGE
NEW GENERATOR INSTALLATION AT PEEL YOUTH VILLAGE PROJECT 22451
99 ACORN PLACE, MISSISSAUGA, ON L4Z 3N2



KEY PLAN



ARCHITECTURAL DRAWING LIST TABLE	
DRAWING NO.	DRAWING TITLE
A0.01	COVER PAGE
A1.01	GENERAL NOTES, LEGENDS, KEY PLAN, SITE LOCATION
A1.02	OVERALL GROUND FLOOR PLAN & REFLECTED CEILING PLAN
A1.03	OVERALL TYPICAL FLOOR PLAN & REFLECTED CEILING PLAN (LVL 2 & 3)
A1.04	ENLARGED UNIT PLANS & RCPS
A1.05	ENLARGED UNIT PLANS & RCPS
A1.06	ENLARGED UNIT PLANS & RCPS
A1.07	SECTIONS & DETAILS

REFER TO ARCHITECTURAL DRAWINGS ISSUED BY AMRA ARCHITECTS.

STRUCTURAL DRAWING LIST TABLE	
DRAWING NO.	DRAWING TITLE
S1	GENERAL NOTES AND KEYPLAN
S2	GARAGE ROOF FRAMING PLAN
S3	GENERAL NOTES AND KEYPLAN

REFER TO STRUCTURAL DRAWINGS ISSUED BY SALAS O'BRIEN

MECHANICAL DRAWING LIST	
NO.	TITLE
G-001	COVER PAGE
G-002	KEY PLAN
M-001	SITE PLAN, DRAWINGS LIST, LEGEND
M-101	PARKING GARAGE HVAC
M-401	NEW GENERATOR ROOM - HVAC LAYOUT
M-501	MECHANICAL DETAILS
M-601	GAS PIPING SCHEMATIC
M-801	MECHANICAL EQUIPMENT SCHEDULES

ELECTRICAL DRAWING LIST	
DRAWING NO.	DRAWING TITLE
E001	SITE PLAN LEGEND AND DRWING LIST
E101	PARKING GARAGE EXISTING POWER LAYOUT
E102	PARKING GARAGE POWER LAYOUT INSTALLATION (PHASE 1)
E103	PARKING GARAGE POWER LAYOUT SWITCHOVER PHASE (PHASE 2)
E104	PARKING GARAGE POWER LAYOUT FINAL
E105	PARKING GARAGE DIST. CONDUIT INSTALLATION COORDINATION
E106	PARKING GARAGE CONTROL WIRING INSTALLATION
E107	NEW GENERATOR ROOM LIGHTING LAYOUT
E401	NEW GENERATOR ROOM POWER LAYOUT
E402	EXISTING CHILLER AND PARKING GARAGE LAYOUT
E403	EXISTING ELECTRICAL ROOMS POWER LAYOUT
E501	ELECTRICAL DETAILS
E601	SINGLE LINE DIAGRAM INSTALLATION (PHASE 1)
E602	SINGLE LINE DIAGRAM SWITCHOVER PHASE (PHASE 2)
E603	SINGLE LINE DIAGRAM FINAL
E604	EQUIPMENT AND PANEL SCHEDULES

PRIME CONSULTANT:



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ARCHITECTURAL CONSULTANT:



AMRA J ARCHITECTS INC.
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MECHANICAL CONSULTANT:



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info@awhooker.com

Contractor to verify all dimensions & conditions on site and immediately notify the departmental representative of all discrepancies.

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A C	A detail no. no. du detail B location drawing no. sur dessin no. C drawing no. dessin no.	A B C

project
NEW GENERATOR INSTALLATION
AT PEEL YOUTH VILLAGE
PEEL YOUTH VILLAGE, 99 ACORN PLACE
MISSISSAUGA, ON

drawing
dessin

COVER PAGE

Designed By
Date
DR
(yyyy/mm/dd)

Drawn By
Date
DR
(yyyy/mm/dd)

Reviewed By
Date
CM
(yyyy/mm/dd)

Approved By
Date
BR
(yyyy/mm/dd)

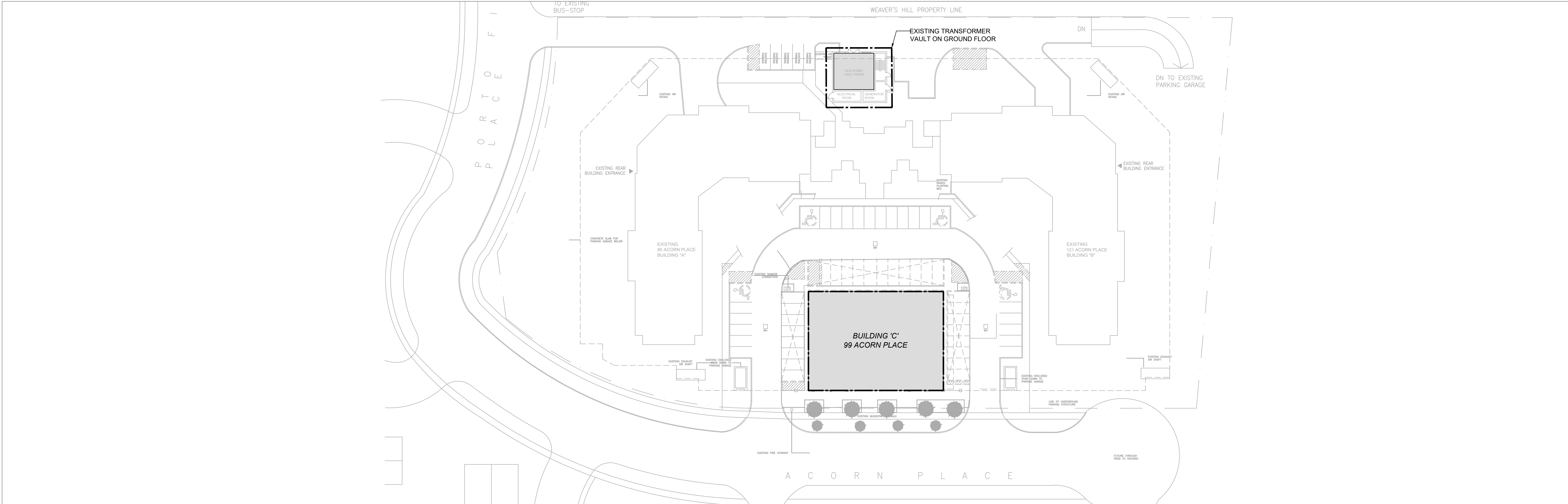
Tender
Soumission

Project Manager
Administrateur de projets

Project no.
2022-677P (ON10121.3)

Scale
NTS
Échelle

Drawing no.
G-001
No. du dessin



1 SITE PLAN
G-002 1 : 250

WORK SEQUENCE - GENERAL NOTES:

- PROJECT LOCATION AND DESCRIPTION:** THE PEEL YOUTH VILLAGE RECREATION AND HOUSING COMPLEX FOR YOUTHS IS LOCATED AT 99 ACORN PLACE, MISSISSAUGA, ONTARIO, AT THE NORTH OF THE HURONTARIO STREET JUNCTION ON HIGHWAY 403. IT CONSISTS OF FOUR LEVELS WITH 48 HOUSING UNITS AND COMMON SPACES. THE PROPERTY IS PART OF APARTMENT COMPLEX THAT INCLUDES TWO OTHER LARGE APARTMENT BUILDINGS "A" AND "B" AND SHARED UNDERGROUND PARKING GARAGE.
- SCOPE OF WORK:** THE PRIMARY SCOPE OF WORK INVOLVES AN ELECTRICAL UPGRADE AND GENERATOR INSTALLATION, SUPPORTED BY MECHANICAL, ARCHITECTURAL, CIVIL, AND STRUCTURAL WORK TO FACILITATE NEW GENERATOR INSTALLATION IN THE EXISTING HYDRO ROOM AND ELECTRICAL IMPROVEMENTS.
- CONSTRUCTION PHASING:** THE FOLLOWING OUTLINES A HIGH-LEVEL WORK SEQUENCE AND OVERALL CONSTRUCTION PHASING, WHICH IS SUBJECT TO CHANGE. CONTRACTOR TEAMS ARE REQUIRED TO PROVIDE A DETAILED PHASING PLAN THAT ACCOUNTS FOR EQUIPMENT DELIVERY, SITE CONDITIONS, AND SPECIFIC PROJECT REQUIREMENTS.
- AREA OF WORK:** THE SCOPE OF THE PROJECT INCLUDES THE BUILDING EXTERIOR, PARKING GARAGE AND MECHANICAL AND ELECTRICAL SERVICE ROOMS.
- REFERENCE DOCUMENTATION:** FOR FURTHER INFORMATION ON CONSTRUCTION PHASING AND DETAILS, REFER TO THE PROJECT DRAWINGS AND SPECIFICATIONS DOCUMENTS.

MECHANICAL:

GENERATOR ROOM:

- SCOPE OF WORK:**
 - COORDINATE WITH ELECTRICAL FOR PROVISION OF NEW GAS GENERATOR IN THE EXISTING HYDRO ROOM, PROVIDE AND INSTALL ALL MECHANICAL RELATED ITEMS SUCH AS DUCTWORK, GAS PIPING.
 - GENERATOR ROOM VENTILATION SYSTEM, TO REMOVE RADIANT HEAT FROM THE GENERATOR C/W TOXIC GAS DETECTION SYSTEM, INSTALLATION OF THE NEW MOTORIZED DAMPERS AND INTAKE/EXHAUST LOUVERS, ELECTRIC HEATERS
 - MODIFICATION OF EXISTING GAS METERING AND RELATED COORDINATION WITH GAS UTILITY.
 - INSTALLATION OF A NEW DEDICATED GAS LINE FOR THE GENERATOR SET, AND RECONNECTION TO EXISTING GAS PIPING.
- WORK SEQUENCE:**
 - WORK CAN COMMENCE INDEPENDENTLY FROM OTHER PHASES/PARTS OF THE SCOPE OF WORK
- PREREQUISITES:**
 - NONE. COORDINATE WITH ELECTRICAL CONTRACTOR.

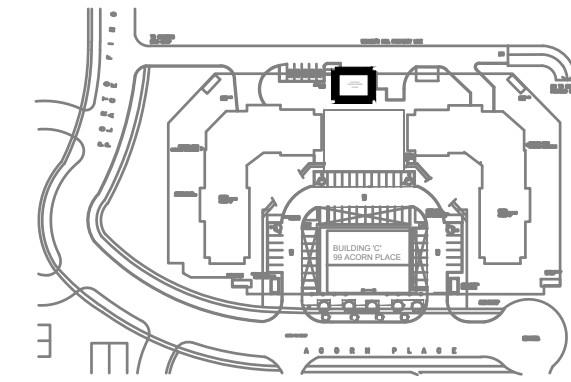
ELECTRICAL

PART A – ELECTRICAL INSTALLATION RENEWAL:

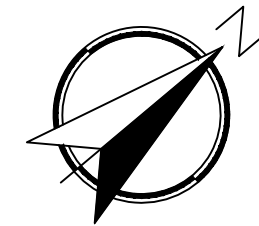
- SCOPE OF WORK:** PROVISION OF A NEW SUPPLY TO BUILDING 'C' COMPLETE WITH A NEW NATURAL GAS GENERATOR, AUTOMATIC TRANSFER SWITCH AND NEW SWITCHBOARD 'C'. THIS WILL ALSO INCLUDE ALL CONTROL CIRCUITS, WIRING FOR GENERATOR REMOTE ANNUNCIATOR AND FIRE ALARM SIGNALS TO THE MAIN FIRE ALARM PANEL.
- WORK SEQUENCE:**
 - PHASE 1 - INSTALLATION PHASE:**
 - PROVIDE AND INSTALL A NEW 600 VOLTS, THREE PHASE, FOUR WIRE FEEDER (SUPPLY) FROM SWITCHBOARD 'B' (IN BUILDING 'B') TO NEW ATS IN GENERATOR ROOM AND NEW 600V THREE PHASE, FOUR WIRE, FEED TO SWITCHBOARD 'C' NEAR THE EXISTING CHILLER ROOM IN THE LOWER LEVEL OF BUILDING 'C'.
 - PRE-REQUISITES: COORDINATE WITH BUILDING MANAGER (THROUGH GENERAL CONTRACTOR) FOR CLOSURE OF PORTIONS OF PARKING LOWER LEVEL FOR ELECTRICAL CONDUIT AND WIRING INSTALLATION WORK TO PROCEED.
 - COORDINATE WITH BUILDING MANAGER (THROUGH GENERAL CONTRACTOR) FOR ACCESS TO THE BUILDING 'B' ELECTRICAL ROOM.
 - PROVIDE A NEW 625kW/781kVA NATURAL GAS DRIVEN ELECTRICAL GENERATOR AND AUTOMATIC TRANSFER SWITCH IN THE OLD HYDRO VAULT ON THE GROUND FLOOR (NEW GENERATOR ROOM) OF THE COMPLEX TO INTERFACE THE NORMAL HYDRO SUPPLY WITH THAT OF THE POWER PROVIDED BY THE GENERATOR. INCLUDED IN THIS PHASE IS ALL POWER WIRING, CONTROL WIRING, GENERATOR REMOTE ANNUNCIATOR AND ASSOCIATED WIRING.
 - PRE-REQUISITES: ENSURE THAT ALECTRA HAVE VACATED THE ELECTRICAL VAULT AND REMOVED ALL THEIR EQUIPMENT
 - XRAY CONCRETE FLOOR SLAB AND OBTAIN STRUCTURAL ENGINEERS' APPROVAL BEFORE CORE DRILLING FLOOR SLAB FOR CONDUIT ENTERING THE GENERATOR ROOM
 - PROVIDE AND INSTALL THE NEW 1200A, 600 VOLTS, THREE PHASE, FOUR WIRE, SWITCHBOARD (C) NEAR THE EXISTING CHILLER ROOM IN THE LOWER LEVEL OF BUILDING 'C'. TERMINATE THE FEED FROM THE ATS INTO THE NEW SWITCHBOARD AND INSTALL THE FEED FOR THE SWITCHBOARD PP-OD OUT OF THE 1200 AMP SWITCHBOARD READY FOR EXTENSION INTO THE EXISTING SWITCHBOARD PP-OD DURING THE POWER SHUT DOWN.
 - INSTALL AND CONNECT FEEDER BETWEEN TO THE NEW GENERATOR AND THE NEW ATS IN THE GENERATOR ROOM.
 - PROVIDE AND INSTALL THE NEW 200kW LOAD BANK ON THE GROUND FLOOR NEAR NEW GENERATOR ROOM.
 - PHASE 2 SWITCHOVER PHASE:**
 - SHUT DOWN THE POWER TO SWITCHBOARD 'B' (IN THE ELECTRICAL ROOM 'B') ON THE LOWER LEVEL) AND REMOVE THE EXISTING FEED TO BUILDING 'C' FROM SWITCHBOARD 'B'. AT THE SAME TIME REMOVE THE EXISTING FEED INTO THE SWITCHBOARD PP-OD (IN THE CHILLER ROOM), EXTEND THE FEED OUT OF NEW SWITCHBOARD 'C' AS PROVIDED UNDER PHASE 1 OF THE WORK TO SWITCHBOARD PP-OD AND TERMINATE IN LINE SIDE OF EXISTING 1200 AMP FUSE DISCONNECT SWITCH IN SWITCHBOARD PP-OD. INSTALL THREE NEW 1000A FUSES IN THE EXISTING FUSE DISCONNECT SWITCH.
 - EXTEND THE FEED INSTALLED FROM THE ATS (IN SWITCH ROOM 'B' - BUILDING 'B') DOWN INTO THE SWITCHBOARD 'B' AND CONNECT INTO THE LOAD SIDE OF THE EXISTING 1200A-3P BREAKER. REST THE TRIP ON THE 1200A BREAKER TO 1200A (OR AS PER THE COORDINATION STUDY), RECONNECT EXISTING CT-1 IN THE SWITCHBOARD 'B' (BUILDING 'B') TO NEW SUPPLY FEEDER FOR SWITCHBOARD 'C' AS PER SINGLE LINE DIAGRAM. ON COMPLETION OF THE INSTALLATION ENERGIZE THE NEW SUPPLY TO SWITCHBOARD 'C' VIA THE NEW ATS IN THE GENERATOR ROOM.
 - PRE-REQUISITES: ENSURE COMPLETE ELECTRICAL INSTALLATION IS FULLY INSTALLED AND ALL FEEDS ARE TERMINATED AND HAVE BEEN CHECKED FOR PHASE ROTATION AND THAT INSULATION VALUES AS TESTED COMPLY WITH CODE BEFORE ENERGIZING THE SUPPLY TO SWITCHBOARD 'C'.

OTHER DIVISIONS BY GENERAL CONTRACTOR

- SCOPE OF WORK:** THE GENERAL CONTRACTOR SHALL OVERSEE THE OVERALL PHASING PLAN AND COORDINATE BETWEEN OTHER CONTRACTORS. THE FOLLOWING IS A HIGH-LEVEL SUMMARY OF THE SCOPE OF WORK FOR THE GENERAL CONTRACTOR ALIGNED WITH THE PHASING PLANS DESCRIBED IN THE MECHANICAL AND ELECTRICAL SECTIONS ABOVE.
- EXCAVATION AND BACKFILLING: MANAGING GROUNDWORKS FOR GAS METER AND GAS PIPING AND INSTALLATION OF EXTERIOR LOADBANK.
- GENERAL DIVISION WORK FOR UPGRADED GAS METER AND SERVICE INCLUDING GROUNDWORKS AND CONCRETE PAD AS REQUIRED.
- SCANNING, CORE DRILLING, AND FIRE STOPPING FOR ALL THE PENETRATIONS ON FLOOR SLABS, ROOF SLABS, AND WALLS FOR MECHANICAL AND ELECTRICAL SERVICES. COORDINATE WITH THE MECHANICAL AND ELECTRICAL FOR THE WORK DETAILS.
- INFILL OF EXISTING PENETRATIONS WITH BLOCK TO MATCH THE EXISTING SURROUNDING FINISH.
- ARCHITECTURAL AND STRUCTURAL WORK RELATED TO NEW WALL LOUVRE PENETRATIONS.
- CONCRETE PAD FOR THE GENERATOR.
- MISCELLANEOUS TASKS: HANDLING ADDITIONAL TASKS SUCH AS PAINTING, FLASHING/SEALING, AND MINOR STRUCTURAL ADJUSTMENTS TO SUPPORT OVERALL PROJECT GOALS.



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project
NEW GENERATOR INSTALLATION
AT PEEL YOUTH VILLAGE
PEEL YOUTH VILLAGE, 99 ACORN PLACE
MISSISSAUGA, ON

drawing
dessin

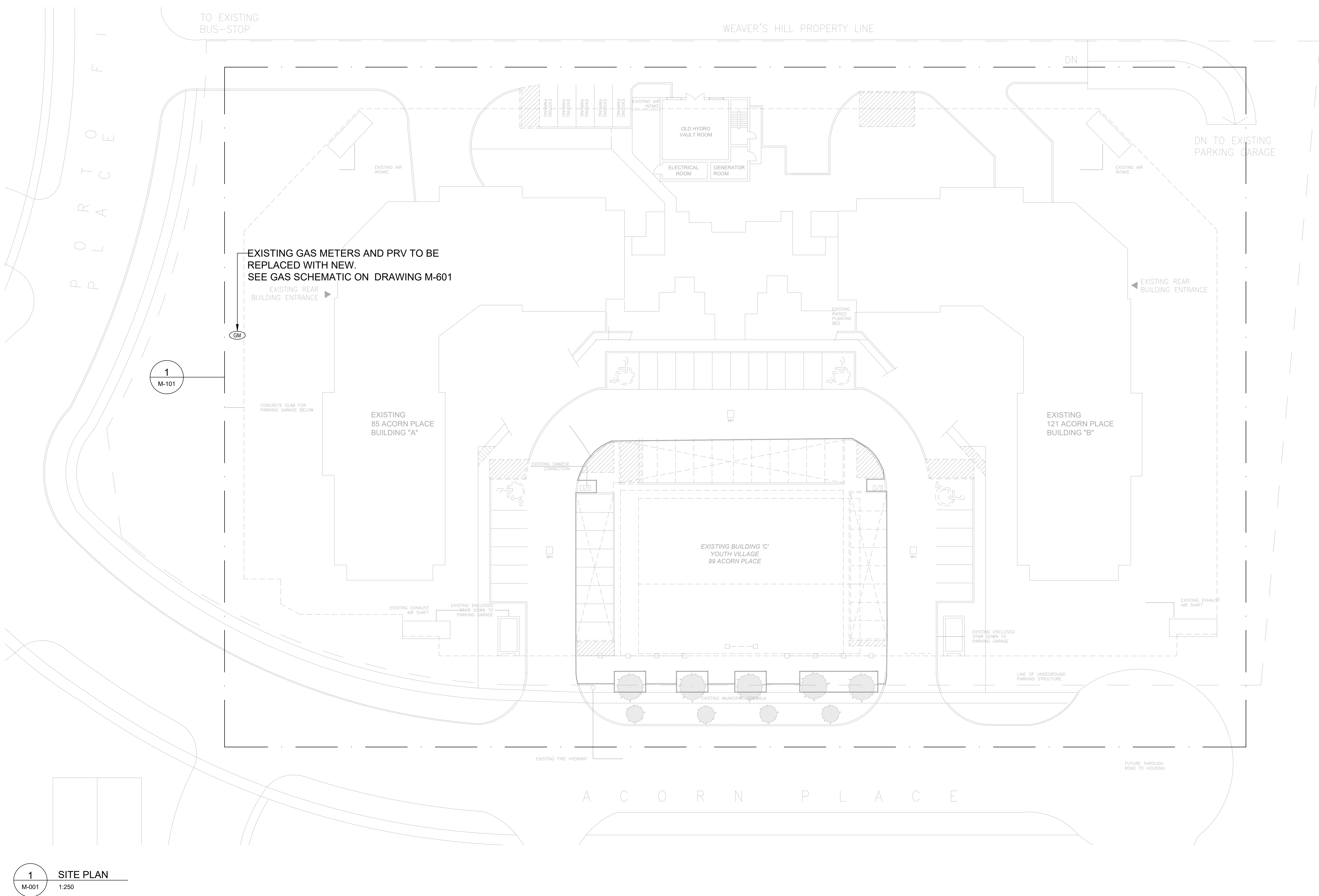
WORK SEQUENCE & PHASING PLAN

Designed By	DR	Conçu par
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Drawn By	DR	Dessiné par
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Tender		Soumission

Project Manager
Administrateur de projets
Project no.
2022-677P (ON10121.3)
No. du projet

Scale
1 : 250
Échelle

Drawing no.
G-002
No. du dessin



1 SITE PLAN
M-001 1:250

GENERAL NOTES:

- ALL DRAWINGS ARE DIAGRAMMATIC ONLY. THE ARRANGEMENTS OF EQUIPMENT SHOWN ARE APPROXIMATIONS ONLY AND MAY BE ALTERED BY THE ENGINEERS TO MEET THE REQUIREMENTS OF THE PROJECT. ALL ROUTING OF SERVICES ARE APPROXIMATE, AND CONTRACTOR IS RESPONSIBLE FOR COORDINATION WITH OTHER DISCIPLINES AND PERFORMING SITE SURVEY FOR EXACT ROUTING OF SERVICES PRIOR TO SUBMITTING BID.
- PRIOR TO SUBMITTING THE BID, CONTRACTOR SHALL CAREFULLY REVIEW THE EXISTING SITE CONDITIONS AND THE SCOPE OF WORK. THE CONTRACTOR MUST PERFORM A SITE INSPECTION DURING THE TENDER PERIOD AND ENSURE THAT ALL WORK THAT IS VISIBLE IS INCLUDED AND CONSIDERED UNDER SCOPE OF WORK OF THIS PROJECT. ALL EXISTING DEVICES AND SERVICES THAT PASS THROUGH THE AREAS OF WORK ARE TO BE MAINTAINED WITHOUT INTERRUPTION. CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATION OF ALL WORK WITH OTHER TRADES. CONSULTANT, AND THE OWNER, CONTRACTOR SHALL PROVIDE TEMPORARY COOLING OR HEATING TO THE AFFECTED AREA DURING THE CONSTRUCTION.
- WHERE WORK INVOLVES INTERRUPTION TO EXISTING SERVICES, INCLUDE FOR ALL COST TO TEMPORARILY OR PERMANENTLY, RELOCATE/RE-ROUTE (AS REQUIRED) EXISTING SERVICES ON WALL/CEILING. RE-INSTALLATION SHALL BE IN ACCORDANCE WITH THE EXISTING STANDARDS. COORDINATE WORK WITH OTHER TRADES. PRIOR TO START OF ANY RELOCATION WORK, IDENTIFY TO OWNER/CONSULTANT AND OBTAIN APPROVAL.
- AS A RESULT OF NEW WORK IN EXISTING AREA, REMOVE ALL ABANDONED SERVICES, DEVICES, AND EQUIPMENT, CUT BACK SERVICES TO SOURCE & MAKE SAFE. INCLUDE FOR REMOVAL AND RE-INSTALLATION OF EXISTING DEVICES & EQUIPMENT AS REQUIRED. INCLUDE FOR ANY CUTTING & PATCHING OF EXISTING SERVICES AS REQUIRED TO REMOVE ABANDONED SERVICES.
- FOR ALL DELETED EXISTING EQUIPMENT AND MATERIALS, COORDINATE WITH OWNER IF THEY WISH TO KEEP SOME FOR SPARE PARTS, AND DISPOSE ANY UNWANTED ITEMS.
- DEMOLITION DRAWINGS INDICATE VISIBLE/KNOWN DEVICES AND/OR SERVICES ONLY. CONTRACTOR SHALL BE RESPONSIBLE FOR DETAILED SITE SURVEY PRIOR TO SUBMITTING THE BID, AND SHALL INCLUDE FOR ALL COSTS ASSOCIATED WITH DEMOLITION SCOPE OF WORK IN THE BID PRICE. MANDATORY SITE WALKTHROUGHS SHALL BE ARRANGED BY THE CONSULTANT TO ALLOW CONTRACTORS TO INVESTIGATE AND RECORD EXISTING CONDITIONS PRIOR TO SUBMITTING THE BID. CONTRACTOR SHALL BE RESPONSIBLE FOR:
 - REVIEW OF EXISTING MECHANICAL SERVICES PRESENTLY SERVING EXISTING AREAS AS AFFECTED BY THE PROPOSED SCOPE OF WORK. IT SHALL BE MECHANICAL CONTRACTOR'S RESPONSIBILITY TO IDENTIFY ALL EXISTING EQUIPMENT, DEVICES, AND SERVICES WHICH ARE TO REMAIN AND WHICH ARE PRESENTLY FED FROM THE AREAS WHICH ARE DESIGNATED TO BE DELETED. MECHANICAL CONTRACTOR SHALL BE RESPONSIBLE FOR REINSTALLATION AND RECONNECTION OF ALL SUCH SERVICES TO MATCH EXISTING STANDARDS. CONTRACTOR SHALL INCLUDE ALL COSTS FOR SITE INVESTIGATION TO SOURCE DELETE SERVICES REQUIRED FOR RE-CONNECTION OF EXISTING SERVICES THAT MUST REMAIN. INCLUDE IN YOUR BID ALL COSTS ASSOCIATED WITH SITE INVESTIGATION, ETC. AND ALL REQUIRED COSTS FOR THIS WORK. REVIEW AND NOTE EXISTING CONDITIONS AND CONFIRM EXACT SITE CONDITIONS.
 - RECORDING OF ANY EXISTING SERVICES, DEVICES, ETC. WHICH MAY BE REQUIRED TO BE RETAINED AND/OR RELOCATED TO SUIT NEW WORK.
 - ENSURING THAT ALL TRADES BEARING UPON THE SCOPE OF WORK OF THIS PROJECT PERFORM DETAILED SITE INVESTIGATIONS REGARDING DEMOLITION AND NEW SCOPE OF WORK PRIOR TO SUBMISSION OF THE BID.
- ALL 90° MITERED DUCT ELBOW SHOWING IN PLAN DWGS SHALL BE C/W TURNING VANE.

HVAC SCOPE OF WORK

THE FOLLOWING PROVIDES A SUMMARY OF SCOPE OF WORK. REFER TO THE DRAWINGS AND SPECIFICATIONS FOR FULL SCOPE OF WORK.

DEMOLITION:
DEMOLISH AND REMOVE:

- DEMOLISH AND REMOVE THE TWO EXISTING LOUVERS. UTILIZE THE EXISTING OPENINGS WHERE INDICATED AND PREPARE THEM FOR THE NEW VENTILATION REQUIREMENTS AS PER THE NEW CONSTRUCTION LAYOUT, AS INDICATED ON THE DRAWINGS.

NEW CONSTRUCTION:

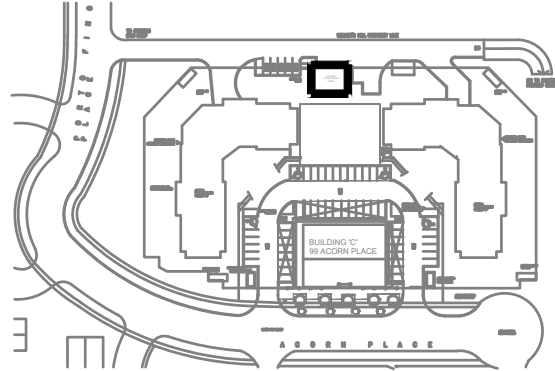
- SUPPLY AND INSTALL A NEW VENTILATION SYSTEM FOR THE GENERATOR ROOM, INCLUDING FRESH AIR INTAKE, EXHAUST SYSTEM, GAS DETECTION, AND TEMPERATURE CONTROL INCLUDING ALL REQUIRED LOUVERS, DAMPERS, AND EXHAUST DUCTWORK.
- MECHANICAL DUCTWORK AND PIPING FOR NEW GAS GENERATOR. INSTALLATION OF GENERATOR EXHAUST SYSTEM C/W MUFFLER.
- COORDINATE WITH THE LOCAL GAS UTILITY COMPANY AND SUBMIT & PAY FOR ALL REQUIRED APPLICATIONS AND INSTALLATION COSTS TO REMOVE THE EXISTING TWO GAS METERS/PRVS (ONE SET SERVES BUILDINGS A AND B , OTHER SET SERVES BUILDING C) REPLACE WITH A SINGLE METER AND PRV STATION TO SERVE THE WHOLE SITE (ALL THREE BUILDINGS + GENERATOR). EXISTING GAS SERVICE CAPACITY IS ADEQUATE FOR THE NEW GENERATOR INSTALLATION DUE TO REMOVAL OF GAS EQUIPMENT IN BUILDINGS A AND B AS PART OF A SEPERATE PROJECT. PROVIDE NEW METER AND PRV STATION SUITABLE FOR GAS REQUIREMENTS INDICATED ON DRAWING M-601
- INSTALLATION OF NEW GAS PIPING TO GENERATOR WITH ACCESSORIES, AND RECONNECTION OF EXISTING GAS PIPING.

TESTING AND BALANCING:

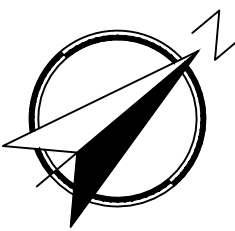
- TESTING AND BALANCING OF GENERATOR ROOM VENTILATION SYSTEM.

MECHANICAL SYMBOLS	
	PIPE UP
	PIPE DOWN
	ISOLATING/GATE VALVE
	CHECK VALVE
	STRAINER
	PRESSURE REDUCING VALVE
	ELECTRONICALLY SUPERVISED VALVE
	VALVE, GAS COCK
	GAS METER/BTU METER
	PUMP
	THERMOMETER
	PRESSURE RELIEF VALVE
	PRESSURE GAUGE
	RECTANGULAR DUCT UP
	RECTANGULAR DUCT DOWN
	ROUND DUCT UP
	ROUND DUCT DOWN
	EXHAUST AIR GRILLE
	SUPPLY AIR DIFFUSER
	AIRFLOW ARROW
	VERTICAL FIRE DAMPER
	HORIZONTAL FIRE DAMPER
	HEATING WATER SUPPLY
	HEATING WATER RETURN
	DOMESTIC COLD WATER
	DOMESTIC HOT WATER
	DOMESTIC HOT WATER RECIRCULATION
	CONDENSATE DRAIN
	NATURAL GAS
	STORM DRAIN
	SANITARY
	GAS VENT PIPING DRAIN
	FIRE LINE
	SPRINKLER LINE

ABBREVIATIONS	
S/A	SUPPLY AIR
E/A	EXHAUST AIR
O/A	OUTDOOR AIR
R/A	RETURN AIR
F/A	FROM ABOVE
T/A	TO ABOVE
F/B	FROM BELOW
T/B	TO BELOW
C/W	COMPLETE WITH
FD (HVAC)	FIRE DAMPER
FD (PLUMBING)	FLOOR DRAIN
AD	AREA DRAIN
PD	PARKING DRAIN
WC	WATER CLOSET
LV	LAVATORY
KS	KITCHEN SINK
BT	BATH TUB
SH	SHOWER
INV	INVERT HEIGHT



KEY PLAN



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project
**NEW GENERATOR INSTALLATION
AT PEEL YOUTH VILLAGE**
PEEL YOUTH VILLAGE, 99 ACORN PLACE
MISSISSAUGA, ON

drawing
**SITE PLAN, DRAWINGS LIST,
LEGEND**

Designed By	DR	Conçu par
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Tender		Soumission
Project Manager	Administrateur de projets	
Project no.	No. du projet	
2022-677P (ON10121.3)		
Scale	Échelle	
1:250		
Drawing no.	No. du dessin	
M-001		

1 PARKING GARAGE PLAN - NEW CONSTRUCTION

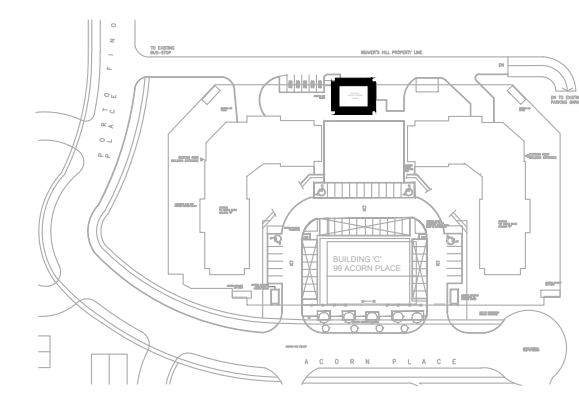
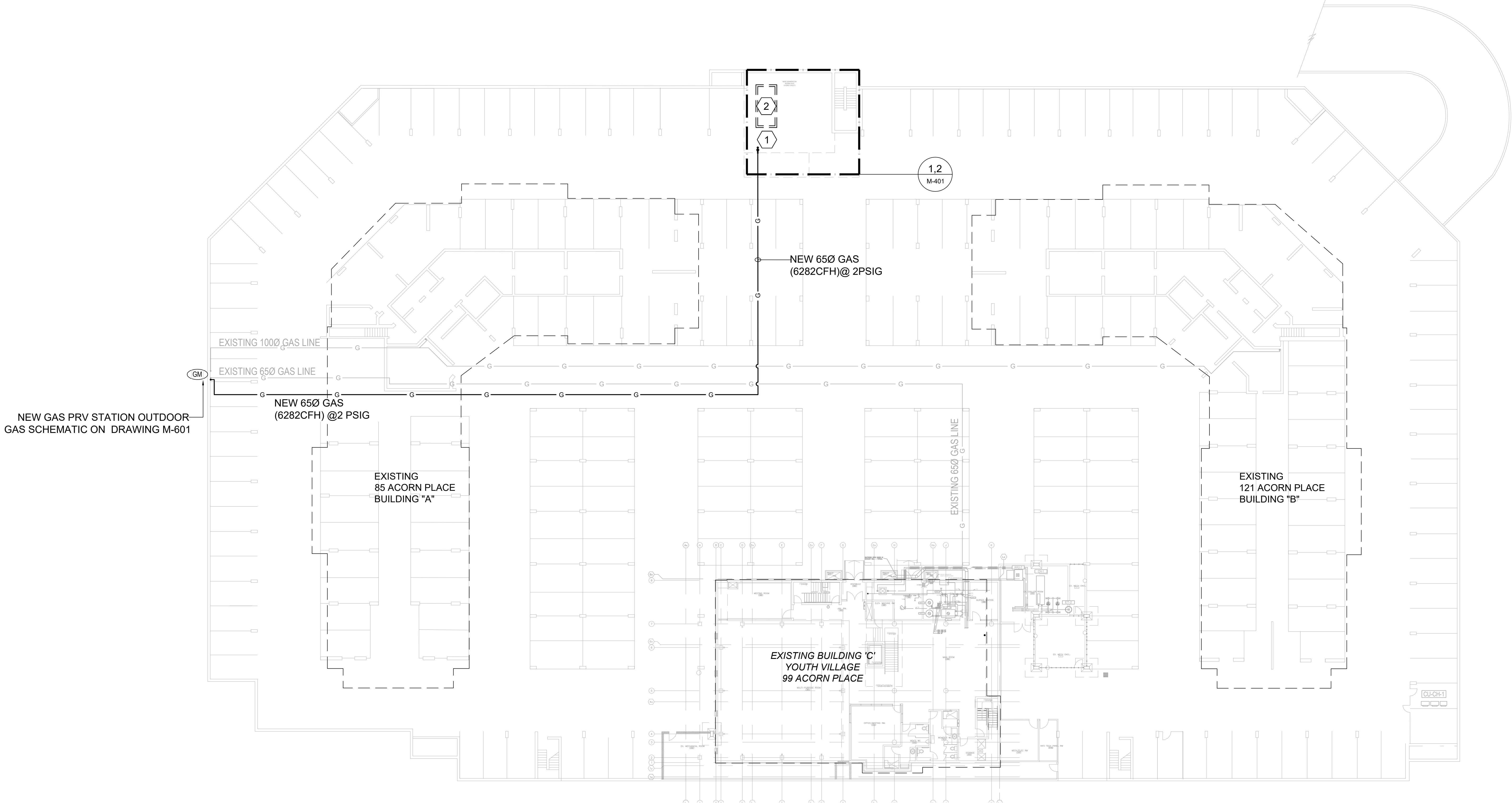
M-101 1:200

GENERAL NOTES:

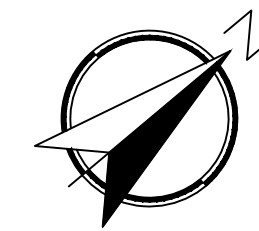
- CONTRACTOR SHALL FAMILIARIZE THEMSELVES WITH EXISTING SITE CONDITIONS. THIS SHALL INCLUDE INVESTIGATION OF ALL PIPING, CONTROL DEVICES, AND ALL OTHER EQUIPMENT AND DEVICES RELATED TO EXISTING SYSTEMS IN THE BUILDING AFFECTED WITH THIS RETROFIT.
- PATCH AND MAKE REPAIR TO THE BUILDING ROOF AND WALLS FOR THE EXISTING OPENINGS UPON DEMOLITION AND MATCH THE EXISTING. MAKE GOOD FINISHES AND PAINT THE INTERIOR WALLS. REFER TO STRUCTURAL AND ARCHITECTURAL DRAWING SET FOR ADDITIONAL DETAILS.

MECHANICAL DRAWING - NEW CONSTRUCTION NOTES:

- SUPPLY AND INSTALL NEW GAS PIPING C/W NEW PRVS, SHUT OFF VALVES AND OTHER ACCESSORIES AS SHOWN AND PER SCHEMATICS DRAWINGS DWG M-601 AND MANUFACTURER INSTRUCTIONS.
- NEW 625kW GAS GENERATOR LOCATED IN THE EXISTING TRANSFORMER ROOM ON GROUND LEVEL. REFER TO DRAWING DWG M-401.
- PENETRATE GAS PIPING FROM METER THROUGH PARKING GARAGE FOUNDATION WALL C/W WATERPROOF SLEEVE. XRAY SCAN FOUNDATION WALL TO DETERMINE APPROPRIATE CORING LOCATION. REPORT TO ENGINEER OF ANY CONCERNS. EXISTING GAS PIPE PENETRATIONS SHALL BE RE-SEALED TO WATERTIGHT.



KEY PLAN



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	C drawing no. dessin no.	C

project projet
**NEW GENERATOR INSTALLATION
AT PEEL YOUTH VILLAGE**
PEEL YOUTH VILLAGE, 99 ACORN PLACE
MISSISSAUGA, ON

drawing dessin

PARKING GARAGE HVAC

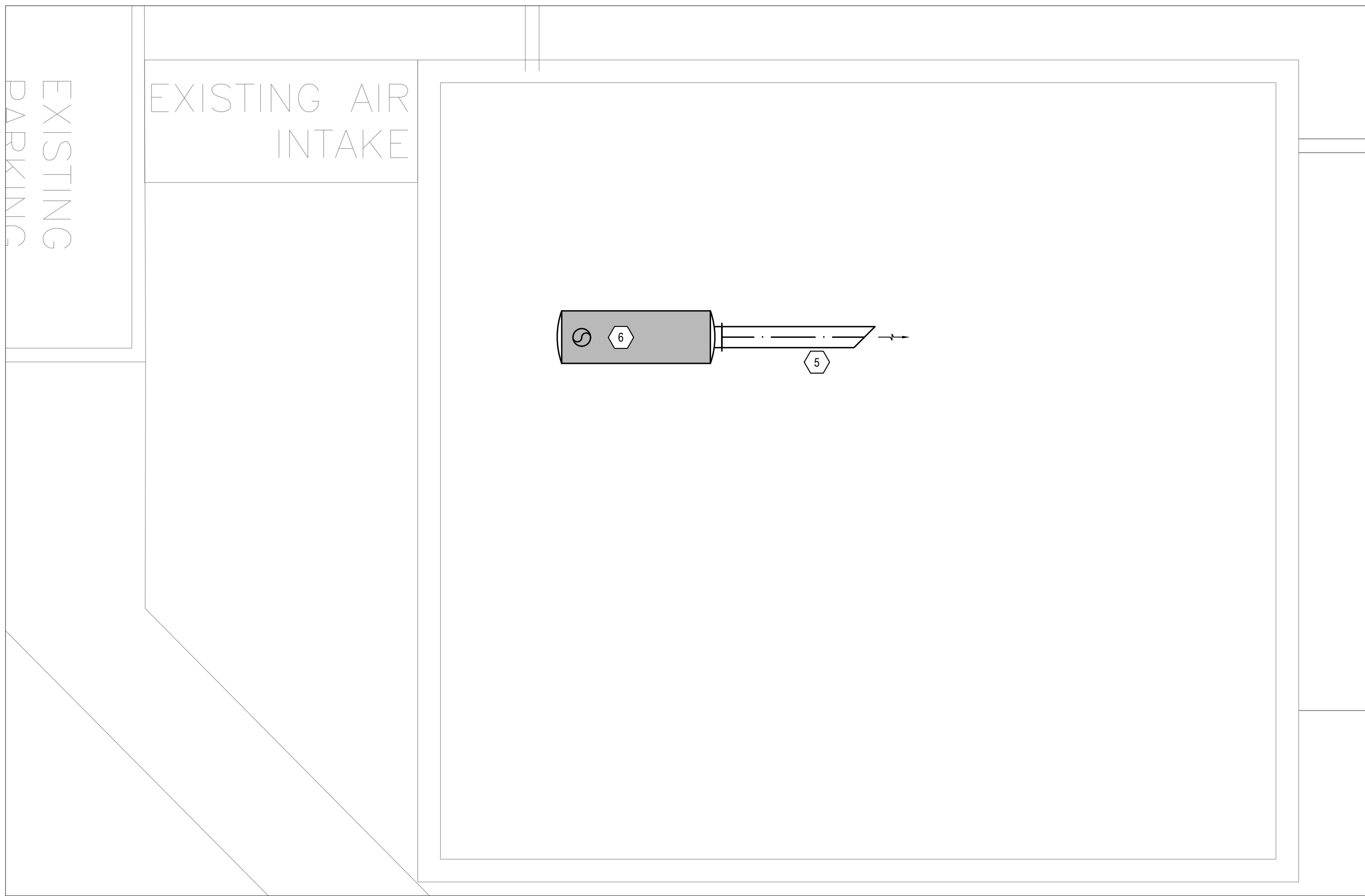
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Project Manager Administrateur de projets

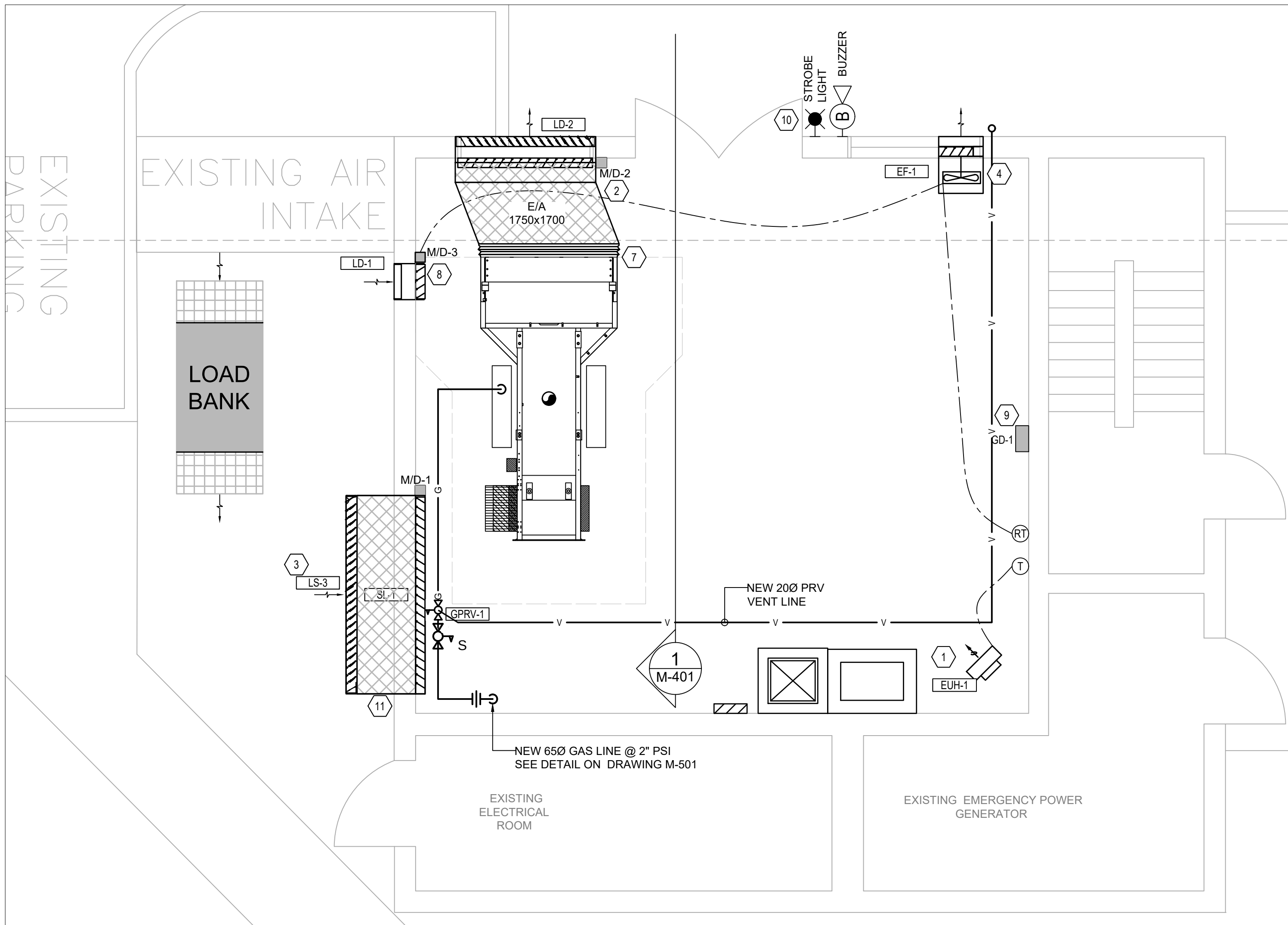
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Scale Échelle
AS SHOWN

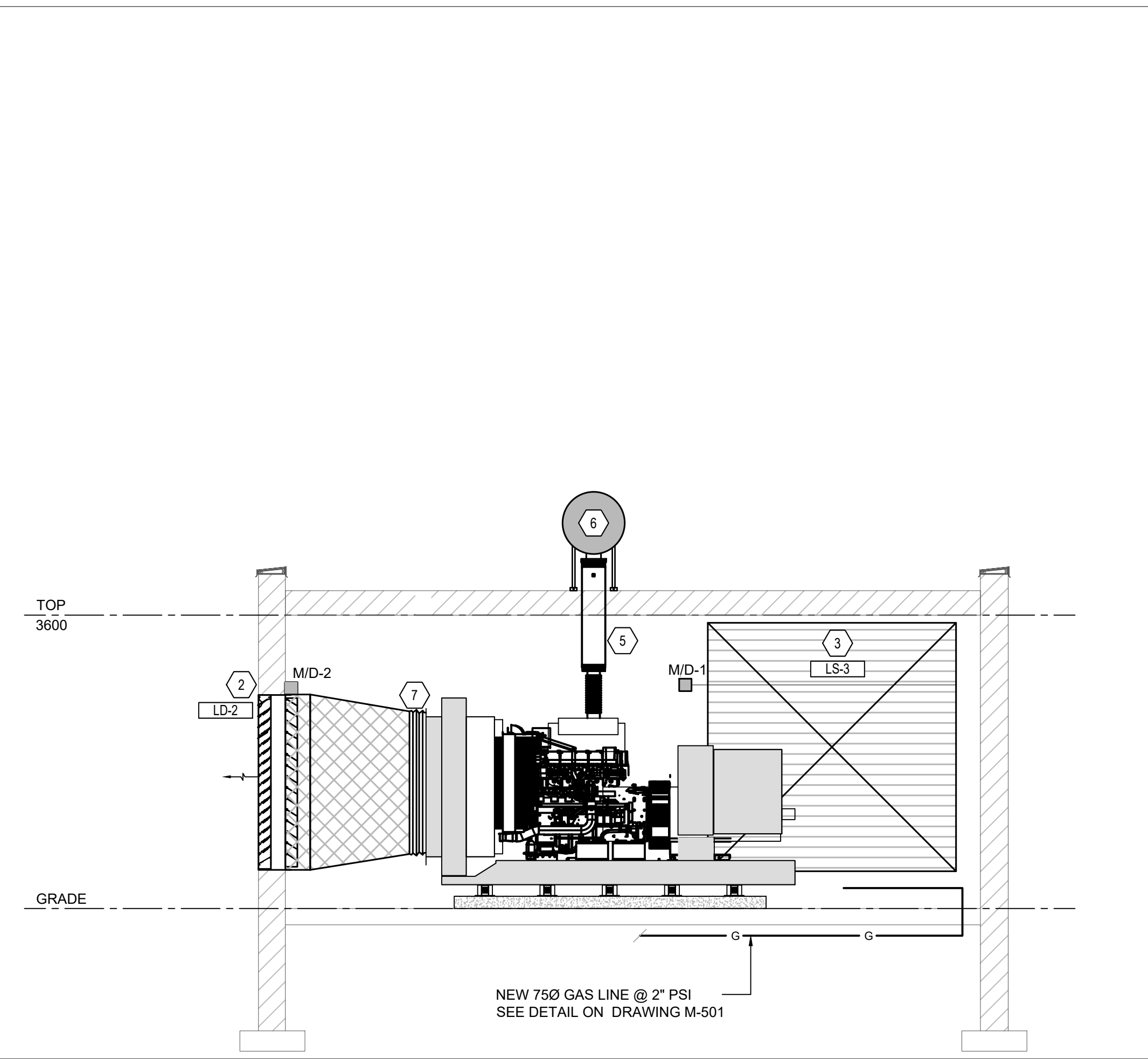
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M-101



2 NEW GENERATOR ROOF - HVAC LAYOUT
M-401 1:50



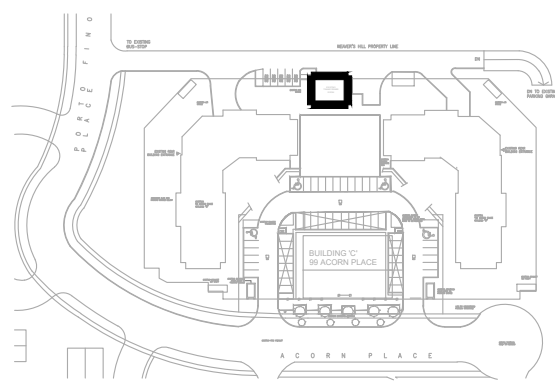
1 NEW GENERATOR ROOM - HVAC LAYOUT
M-401 1:50



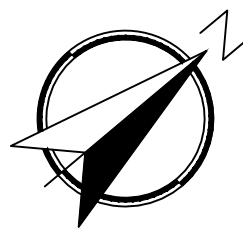
3 NEW GENERATOR ROOM - CROSS SECTION 1
M-401 1:50

DRAWING NOTES:

- 1 PROVIDE AND INSTALL A NEW ELECTRIC UNIT HEATER MOUNTED AT HIGH LEVEL C/W THERMOSTAT.
- 2 E/A LOUVER C/W BIRD SCREEN AND MOTORIZED DAMPER MD-2. INTERLOCK DAMPER WITH GENERATOR AS PER GENERATOR MANUFACTURER'S INSTALLATION INSTRUCTIONS.
- 3 O/A LOUVER C/W BIRD SCREEN AND MOTORIZED DAMPER MD-1. INTERLOCK DAMPER WITH GENERATOR AS PER GENERATOR MANUFACTURER'S INSTALLATION INSTRUCTIONS.
- 4 PROVIDE AND INSTALL SIDEWALL MOUNTED EXHAUST FAN EF-1 C/W BACKDRAFT DAMPER. FAN SHALL BE WIRED TO GAS DETECTION PANEL GD-1, AND REVERSE ACTING THERMOSTAT. PROVIDE ADDITIONAL RELAYS/CONTROL WIRING AS REQUIRED.
- 5 PROVIDE AND INSTALL ULC-LISTED DOUBLE-WALL INSULATED GENERATOR FLUE EXHAUST SYSTEM AS PER SPECIFICATIONS. INSTALL INSULATED THIMBLE FOR ROOF PENETRATION AS SPECIFIED BY THE EXHAUST STACK MANUFACTURER.
- 6 GENERATOR CATALYST SILENCER INSTALLED OUTDOOR ON ROOF. GENERATOR C/W CONDENSATE DRAIN VALVE. CATALYST SILENCER SUPPLIED BY GENERATOR MANUFACTURER AND INSTALLED BY MECHANICAL CONTRACTOR. COORDINATE WITH FINAL GENERATOR AND SILENCER/MUFFLER SHOP DRAWINGS.
- 7 CONTRACTOR TO INSTALL FLEX CONNECTION TO RADIATOR FLANGE AS PER MANUFACTURER INSTALLATION RECOMMENDATIONS.
- 8 O/A LOUVER C/W BIRD SCREEN AND MOTORIZED DAMPER MD-3. INTERLOCKED WITH SIDEWALL MOUNTED EXHAUST FAN EF-1.
- 9 NEW GAS DETECTION PANEL GD-1. INSTALL AT 1200mm A.F.F. REFER TO CONTROLS DRAWING M-501.
- 10 LOCATION OF GAS DETECTION SYSTEM BUZZER & STROBE LIGHT. INSTALL DEVICES AT 1500mm ABOVE FINISHED GRADE, C/W 2" TEXT LAMINACOID LABEL "CARBON MONOXIDE/GAS LEAK ALARM".
- 11 NEW DUCT SLEEVE TO CONTAIN LOUVER, SILENCER, AND MOTORIZED DAMPER. REFER TO DETAIL ON SHEET M-501.



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project projet
NEW GENERATOR INSTALLATION
AT PEEL YOUTH VILLAGE
PEEL YOUTH VILLAGE, 99 ACORN PLACE
MISSISSAUGA, ON

drawing dessin

NEW GENERATOR ROOM - HVAC LAYOUT

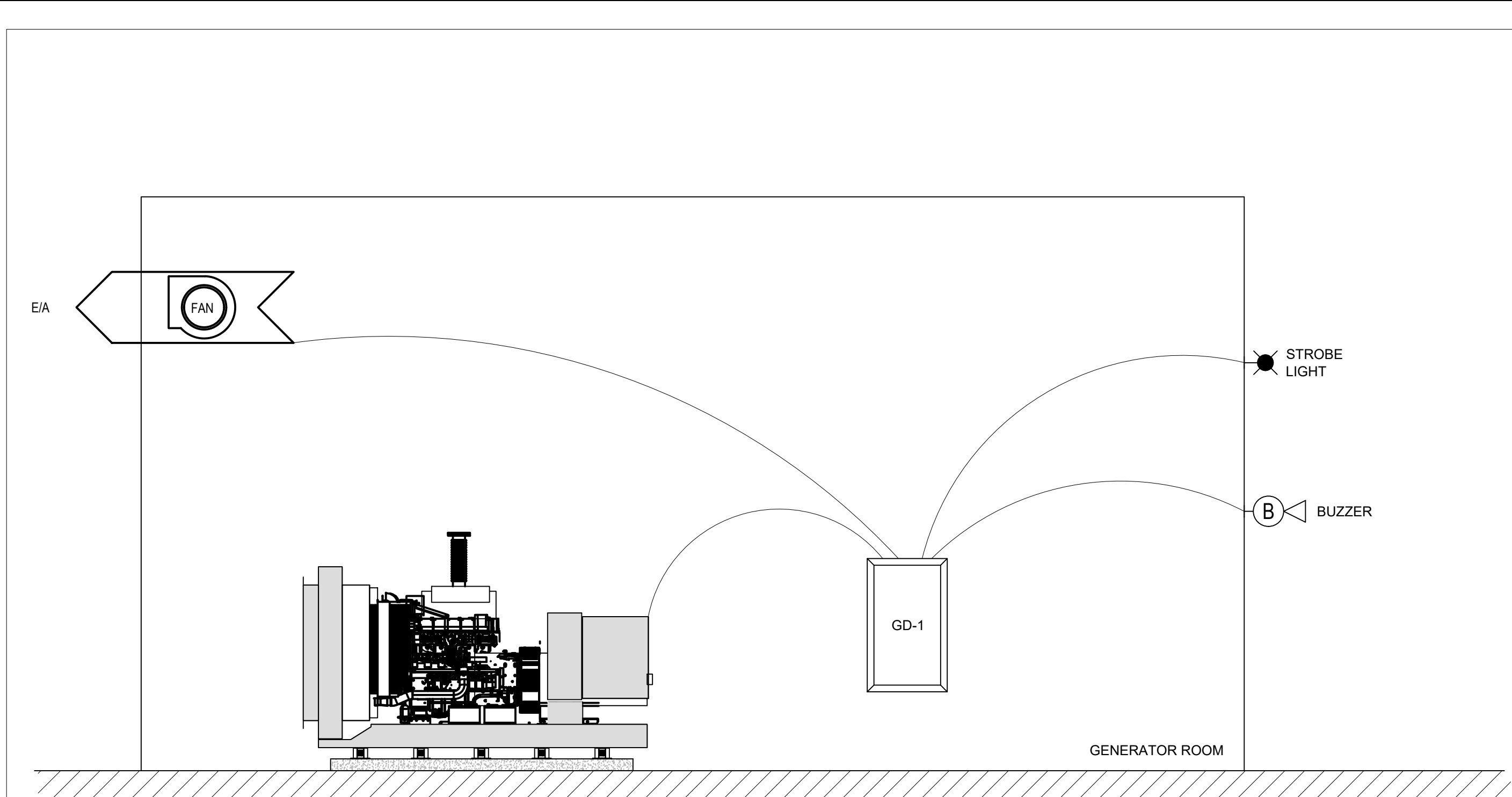
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Tender		Soumission

Project Manager Administrateur de projets

Project no. No. du projet
2022-677P (ON10121.3)

Scale AS SHOWN Échelle

Drawing no. M-401 No. du dessin



GAS DETECTION SYSTEM

STANDALONE GAS DETECTION PANEL GD-1 SHALL CONTINUOUSLY MONITOR ROOM GAS LEVELS.

CONTRACTOR SHALL SUPPLY AND INSTALL NEW PANEL COMPLETE WITH ALL INDICATED ACCESSORIES, AND ADDITIONAL RELAYS/WIRING/TRANSFORMERS AS REQUIRED FOR A FULLY FUNCTIONING SYSTEM. ALL WIRING SHALL BE WITHIN EMT CONDUIT. REFER TO GAS DETECTION PANEL'S PUBLISHED MANUFACTURER'S INSTALLATION AND OPERATING INSTRUCTIONS.

OPERATION

THE GAS DETECTION PANEL SHALL BE SET TO MONITOR BOTH CH₄ (NATURAL GAS), AND CO (CARBON MONOXIDE).

THE GAS DETECTION PANEL SHALL BE FIELD-SET TO ALARM UPON A READING OF:

CH₄: GREATER THAN OR EQUAL TO 20% OF LOWER LIMIT OF FLAMMABILITY

CO: GREATER THAN OR EQUAL TO 25 PPM

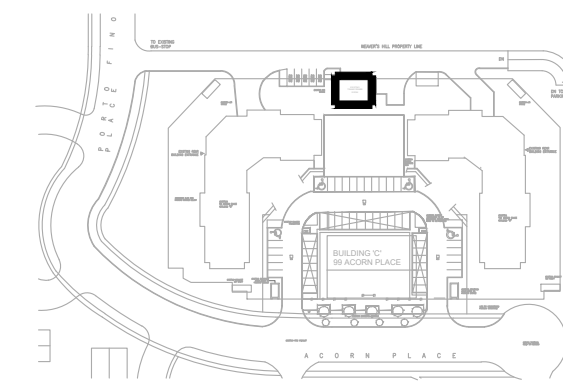
UPON CO ALARM, THE PANEL SHALL OUTPUT A RELAY SIGNAL (RELAY #1) TO EF-1, EF-1 SHALL RUN UNTIL THE ALARM IS DEACTIVATED, PLUS AN ADDITIONAL 30 MINUTES (FIELD SET AT PANEL).

UPON CH₄ ALARM, THE PANEL SHALL OUTPUT RELAY SIGNALS(RELAY #2) TO EF-1, EF-1 SHALL RUN UNTIL THE ALARM IS DEACTIVATED, PLUS AN ADDITIONAL 30 MINUTES (FIELD SET AT PANEL); ADDITIONALLY, A RELAY SIGNAL SHALL BE OUTPUT/DUPPLICATED TO THE GENERATOR CONTROL PANEL TO SHUT IT DOWN COORDINATE WITH ELECTRICAL CONTRACTOR, AND REFER TO GENERATOR INSTALLATION INSTRUCTIONS.

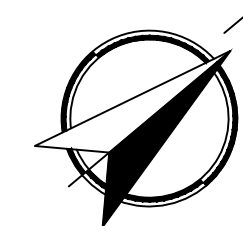
UPON ANY ALARM, THE PANEL SHALL ACTIVATE THE BUZZER AND STROBE UNTIL THE ALARM IS DEACTIVATED.

GENERAL NOTES

- CONTROL CONTRACTOR SHALL PROVIDE ALL THE NECESSARY EQUIPMENT, CONTROLLERS, AND FIELD DEVICES TO ACHIEVE THE CONTROL DIAGRAM AND SEQUENCE OF OPERATION, AS SPECIFIED HERE.
- CONTROL CONTRACTOR TO COORDINATE WITH MECHANICAL CONTRACTOR FOR THE ASSOCIATED MECHANICAL WORK, AND WITH ELECTRICAL CONTRACTOR FOR ELECTRICAL WORK (GENERATOR CONNECTIONS OF POWERING THE EQUIPMENT).
- ALL THE EQUIPMENT AND ASSOCIATED CONTROL POINTS SHOWN ON THESE DRAWING ARE NEW AND ARE TO BE PROVIDED AS PART OF THIS PROJECT.



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project projet
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AT PEEL YOUTH VILLAGE**
PEEL YOUTH VILLAGE, 99 ACORN PLACE
MISSISSAUGA, ON

drawing dessin

MECHANICAL DETAILS

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Scale Échelle
N.T.S

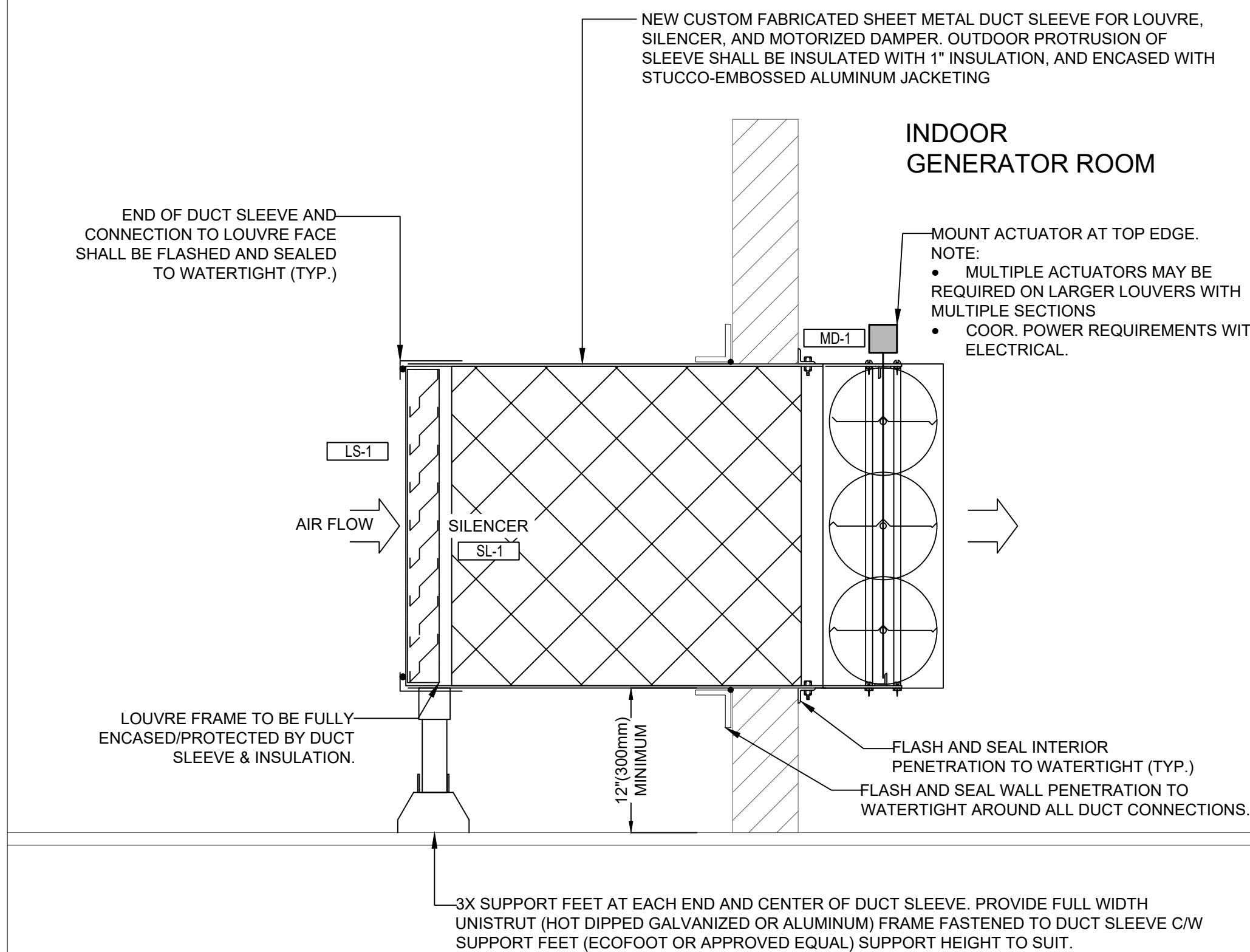
Drawing no. No. du dessin
M-501

1 GAS DETECTION SCHEMATIC

M-501 NTS

NOTES:

- THIS DETAIL IS SCHEMATIC AND IS INTENDED TO SHOW BASIC DESIGN INTENT ONLY. SHEET METAL CONTRACTOR IS RESPONSIBLE TO SUPPLY AND INSTALL ALL REQUIRED MATERIALS AND LABOUR TO ACHIEVE THE DESIGN INTENT.
- ALL FLASHING AND FASTENING MATERIALS SHALL BE ALUMINUM OR HOT DIPPED GALVANIZED.

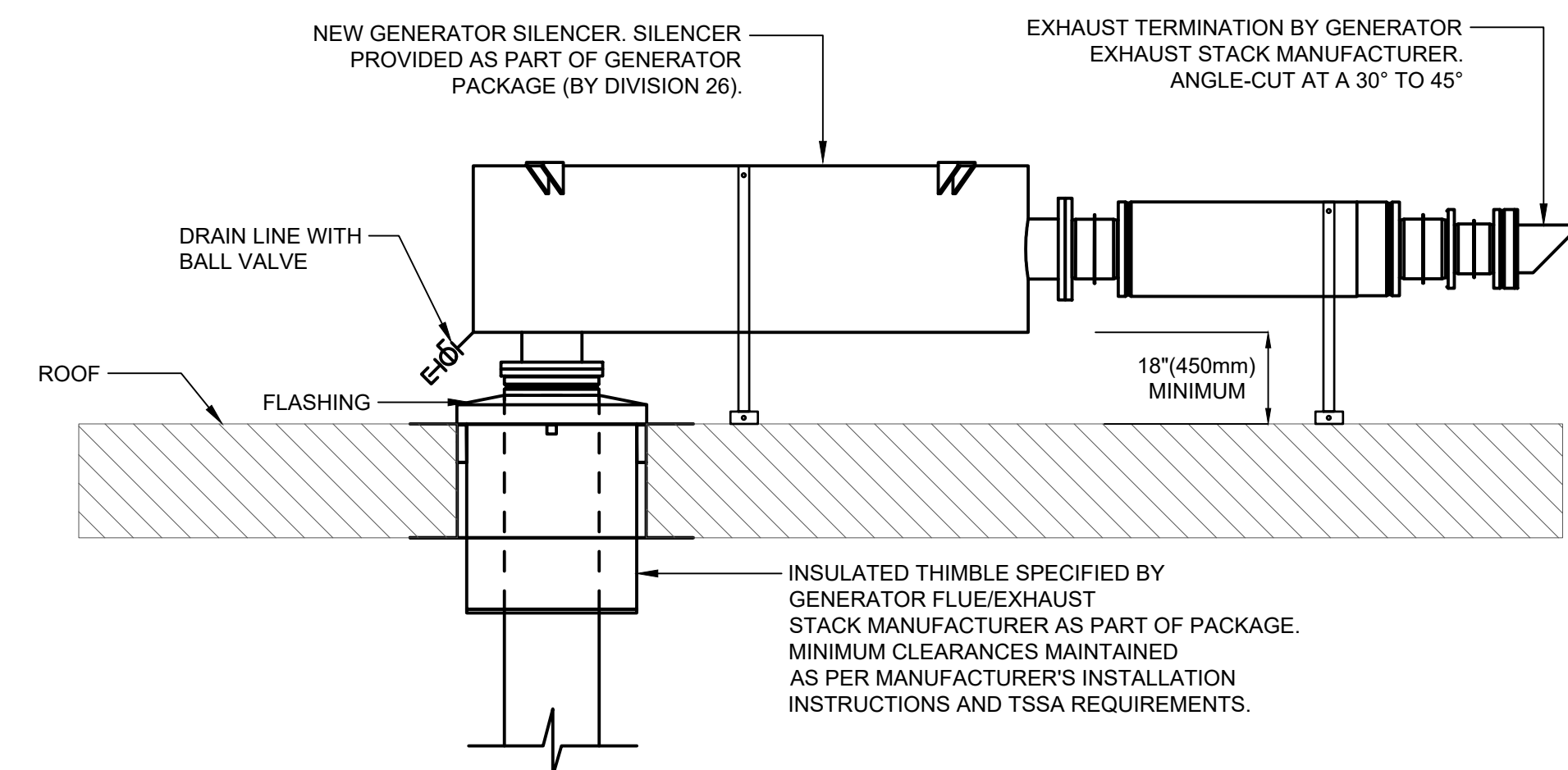


2 OUTDOOR INTAKE LOUVRE / SILENCER DETAIL

M-501 NTS

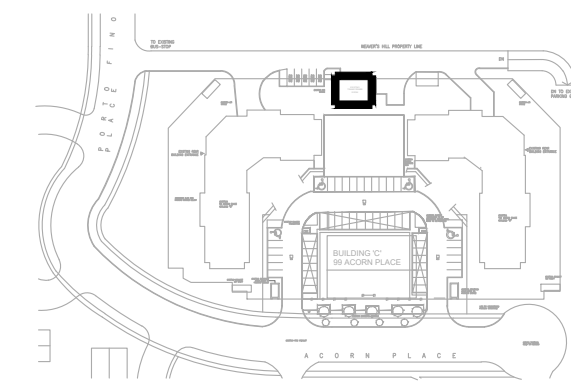
NOTES:

- FINAL DESIGN AND SIZING, INCLUDING THE ANCHORING POINTS FOR THIS APPLICATION AS PER GENERATOR FLUE/EXHAUST STACK MANUFACTURER MANUFACTURER INSTRUCTION AND SITE CONDITIONS. FINAL LOCATION CONNECTION TO GENERATOR APPROVED BY GENERATOR'S OF ANCHORING POINTS CONNECTION TO BUILDING STRUCTURE TYP. SUSPENSION SYSTEMS, HANGERS AND SUPPORTS, ULC-LISTED APPROVED.

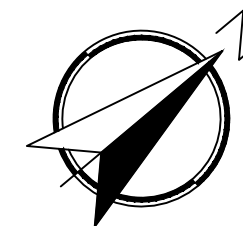


3 GENERATOR EXHAUST PIPE DETAIL

M-501 NTS



KEY PLAN



Contractor to verify all dimensions & conditions on site and immediately notify the departmental representative of all discrepancies.

5	ISSUED FOR TENDER	04/04/25
4	ISSUED FOR ESA	28/02/25
3	ISSUED FOR IFT REVIEW	21/02/25
2	ISSUED FOR 90%	20/06/24
1	ISSUED FOR 33%	29/01/24

revisions	description	date

A	A detail no.	A
C	B location drawing no.	B
	C drawing no.	C

project
NEW GENERATOR INSTALLATION
AT PEEL YOUTH VILLAGE
PEEL YOUTH VILLAGE, 99 ACORN PLACE
MISSISSAUGA, ON

drawing
GAS PIPING SCHEMATIC

Designed By	DR	Conçu par
Date		(yyyy/mm/dd)
Drawn By	DR	Dessiné par
Date		(yyyy/mm/dd)
Reviewed By	CM	Examiné par
Date		(yyyy/mm/dd)
Approved By	BR	Approuvé par
Date		(yyyy/mm/dd)
Tender		Soumission

Project Manager
Project no.
2022-677P (ON10121.3)

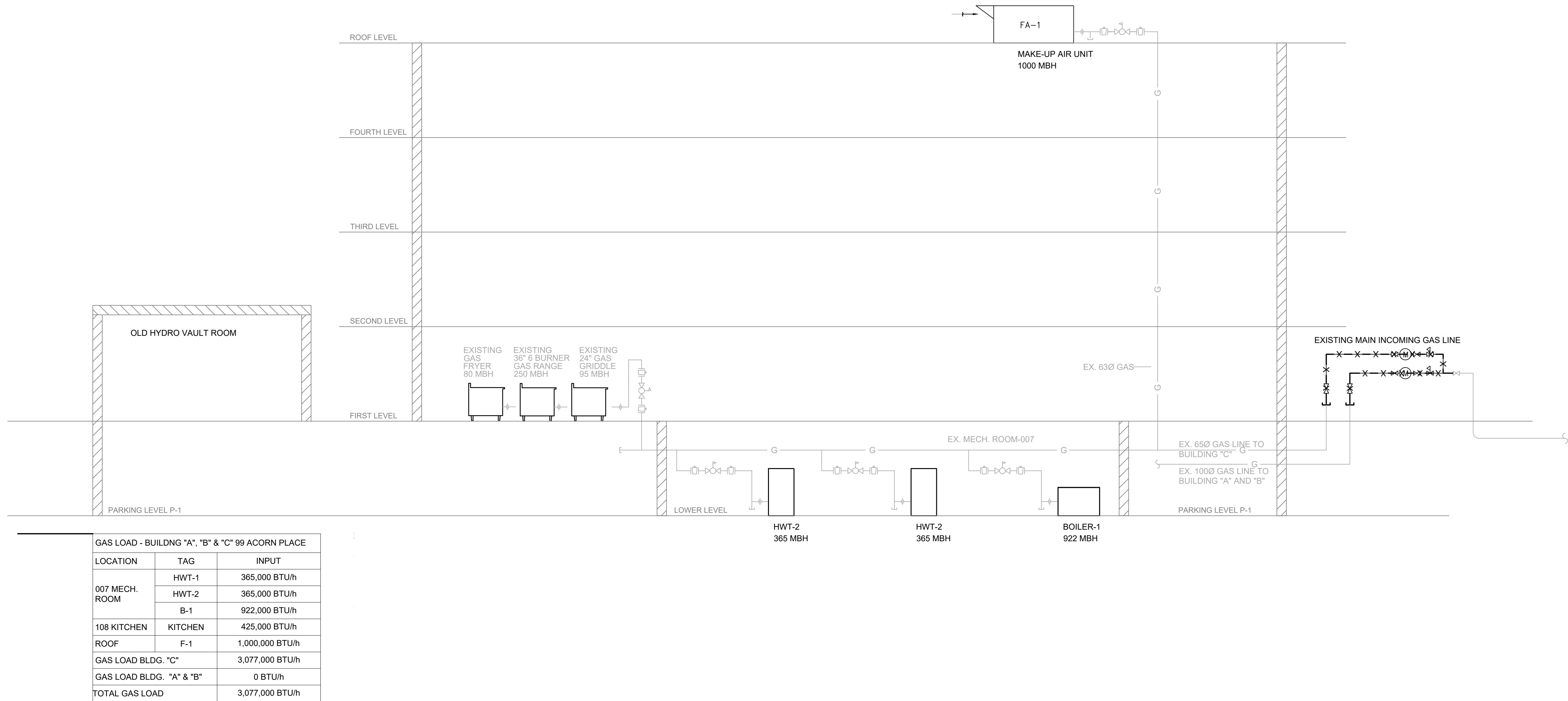
Scale
AS SHOWN

Drawing no.
M-601

1 GAS PIPING SCHEMATIC - DEMOLITION

M-601

N.T.S.

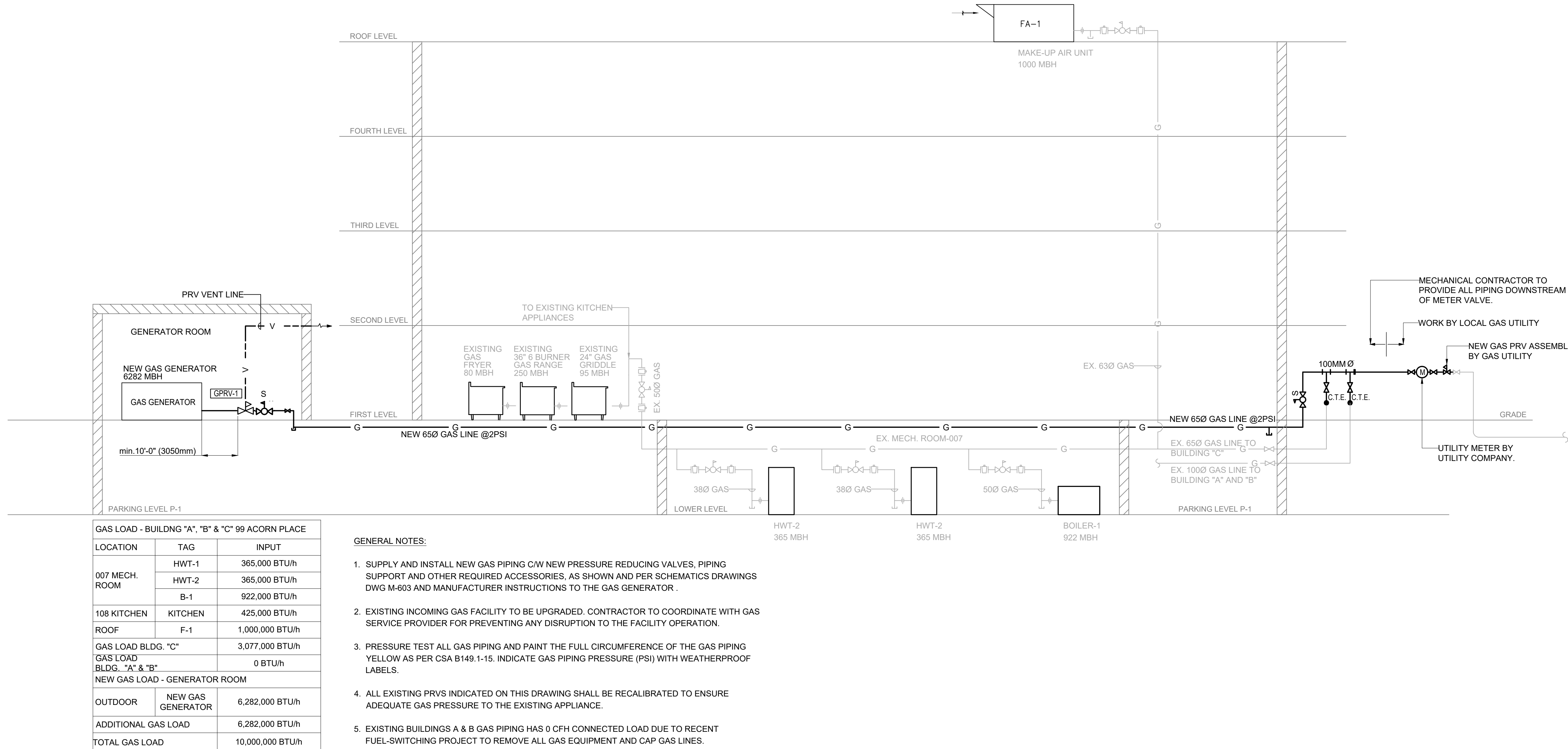


GAS LOAD - BUILDING "A", "B" & "C" 99 ACORN PLACE		
LOCATION	TAG	INPUT
007 MECH. ROOM	HWT-1	365,000 BTU/h
	HWT-2	365,000 BTU/h
	B-1	922,000 BTU/h
108 KITCHEN	KITCHEN	425,000 BTU/h
ROOF	F-1	1,000,000 BTU/h
GAS LOAD BLDG. "C"		3,077,000 BTU/h
GAS LOAD BLDG. "A" & "B"		0 BTU/h
TOTAL GAS LOAD		3,077,000 BTU/h

2 GAS PIPING SCHEMATIC - NEW CONSTRUCTION

M-601

N.T.S.



GAS LOAD - BUILDING "A", "B" & "C" 99 ACORN PLACE		
LOCATION	TAG	INPUT
007 MECH. ROOM	HWT-1	365,000 BTU/h
	HWT-2	365,000 BTU/h
	B-1	922,000 BTU/h
108 KITCHEN	KITCHEN	425,000 BTU/h
ROOF	F-1	1,000,000 BTU/h
GAS LOAD BLDG. "C"		3,077,000 BTU/h
GAS LOAD BLDG. "A" & "B"		0 BTU/h
NEW GAS LOAD - GENERATOR ROOM		
OUTDOOR	NEW GAS GENERATOR	6,282,000 BTU/h
ADDITIONAL GAS LOAD		6,282,000 BTU/h
TOTAL GAS LOAD		10,000,000 BTU/h

GENERAL NOTES:

- SUPPLY AND INSTALL NEW GAS PIPING C/W NEW PRESSURE REDUCING VALVES, PIPING SUPPORT AND OTHER REQUIRED ACCESSORIES, AS SHOWN AND PER SCHEMATICS DRAWINGS DWG M-603 AND MANUFACTURER INSTRUCTIONS TO THE GAS GENERATOR.
- EXISTING INCOMING GAS FACILITY TO BE UPGRADED. CONTRACTOR TO COORDINATE WITH GAS SERVICE PROVIDER FOR PREVENTING ANY DISRUPTION TO THE FACILITY OPERATION.
- PRESSURE TEST ALL GAS PIPING AND PAINT THE FULL CIRCUMFERENCE OF THE GAS PIPING YELLOW AS PER CSA B149.1-15. INDICATE GAS PIPING PRESSURE (PSI) WITH WEATHERPROOF LABELS.
- ALL EXISTING PRVS INDICATED ON THIS DRAWING SHALL BE RECALIBRATED TO ENSURE ADEQUATE GAS PRESSURE TO THE EXISTING APPLIANCE.
- EXISTING BUILDINGS A & B GAS PIPING HAS 0 CFH CONNECTED LOAD DUE TO RECENT FUEL-SWITCHING PROJECT TO REMOVE ALL GAS EQUIPMENT AND CAP GAS LINES.

EXHAUST FAN												
TAG	MANUFACTURER	MODEL	LOCATION	QUANTITY	DESCRIPTION / SERVICE	AIR FLOW (CFM)	ROUGH OPENING (INCH)	MOTOR		ELECTRIC SUPPLY		NOTES
								(HP)	RPM	[V / PH / Hz]	NEC FLA (Amps)	
EF-1	GREENHECK OR APPROVED EQUAL	SBE-2H20-5	GENERATOR ROOM - SIDEWALL	1	VENTILATION	2050	27 ½ x 27 ½	½	1725	115 / 1 / 60	9.8	1, 2, 3
NOTES: 1. MOUNTED 7" ABOVE THE GROUND. 2. FAN SHOULD BE SUPPLIED WITH DAMPER MOUNTED GRAVITY OPERATED, NOT COATED, SHORT WALL HSG, FLUSH EXTERIOR, W/OSHA GRD., FACTORY INSTALLED, CTD WITH PERMATECTOR. 3. MOTOR ACCESS: FROM INT. OF BLDG. SWITCH, NEMA-1, TOGGLE, JUNCTION BOX MOUNTED & WIRED WEATHERHOOD, GALVANIZED 90 DEG. WITH BIRD SCREEN.												

LOUVER SCHEDULE

TAG	MANUFACTURER	MODEL	LOCATION	QUANTITY	DESCRIPTION / SERVICE	DIMENSION (INCH)	DEPTH (INCH)	ELECTRIC SUPPLY [V / PH / Hz]	NOTES
LD-1	GREENHECK OR APPROVED EQUAL	ECD-601	GENERATOR ROOM-SIDE WALL	1	VENTILATION	24 x 36	6	120 / 1 / 60	1,2
LD-2	GREENHECK OR APPROVED EQUAL	ECD-601	GENERATOR ROOM-SIDE WALL	1	COOLING GENERATOR EXHAUST	84 x 90	6	120 / 1 / 60	1, 2, 4
LS-1	GREENHECK OR APPROVED EQUAL	ESD-635	GENERATOR ROOM-SIDE WALL	1	COOLING GENERATOR INTAKE	120 x 120	6	-	4
NOTES: 1. OUTDOOR LOUVER C/W MOTORIZED DAMPER. 2. SUPPLIED WITH ACTUATOR. 3. MOTORIZED DAMPER SHALL FAIL IN OPEN POSITION. 4. ALL LOUVERS SHALL BE EXTRUDED ALUMINUM, DRAINABLE AND WEATHERPROOF, COLOR TO MATCH EXISTING.									

ELECTRIC UNIT HEATER

TAG	MANUFACTURER	MODEL	LOCATION	QUANTITY	DESCRIPTION / SERVICE	POWER (KW)	AIR FLOW (CFM)	DIMENSION HxWxL (INCH)	WEIGHT (LBS)	ELECTRIC SUPPLY [V / PH / Hz]	NOTES
EUH-1	MODINE OR APPROVED EQUAL	HER 50B 3101	GENERATOR ROOM	1	HEATING	5	380	17 ½ x 14 ¼ x 20	34	208/3/60	1,2
NOTES: 1. MINIMUM CLEARANCES 12" TO SIDES AND TOP, 24" TO BOTTOM. 2. MAXIMUM MOUNTING HEIGHT 8 FEET.											

SILENCER SCHEDULE

TAG	MANUFACTURER	MODEL	WIDTH (mm)	HEIGHT (mm)	LENGHT (mm)	DUCT SYSTEM INFORMATION				DYNAMIC INSERTION LOSS (dB)							
						AIR DIRECTION	FLOW (L/s)	VELOCITY (m/s)	PD (Pa)	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz
SL-1	EH PRICE OR APPROVED EQUAL	RL35/1F	3000	3000	900	REVERSE	16518	1.8	22	7	13	22	41	44	38	28	19
NOTES: GALVANIZED, CL1 (22GA), 22GA PERF LINER, FIBERGLASS, INLET: 2" SLIP, OUTLET: 2" SLIP																	

MOTORIZED DAMPER SCHEDULE

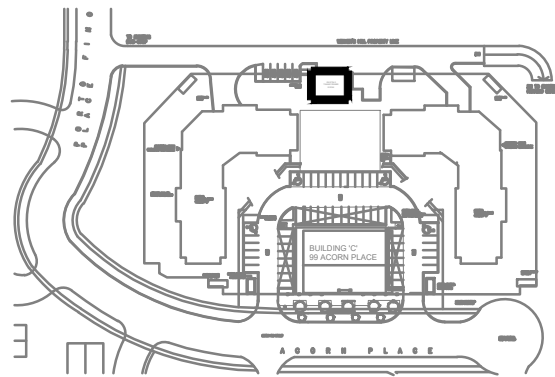
TAG	MANUFACTURER	MODEL	WIDTH (mm)	HEIGHT (mm)	SERVICE	FUNCTION	CONTROL	OPERATION	ELECTRIC [V / PH / Hz]	NOTES
MD-1	GRRENHECK OR APPROVED EQUAL	ICD 45	3000	3000	GENERATOR ROOM	AIR INTAKE	OPEN / CLOSE	FAIL SAFE OPEN	120 / 1 / 60	1, 2, 3, 4, 5, 6
NOTES: 1. NEW MULTI-SECTION DAMPER C/W ACTUATOR. 2. ACTUATOR SHALL BE EQUIPPED WITH END LIMIT SWITCHES. 3. ACTUATOR SHALL BE PROVIDED WITH MANUAL OVERRIDE. 4. CONTROL WIRING BY CONTROLS CONTRACTOR. 5. POWER WIRING AND DISCONNECT SWITCH BY OTHERS (DIVISION 26). 6. PROVIDE LAMACOID IDENTIFICATION LABEL TO UNIT. CONFIRM NAMING CONVENTION WITH OWNER PRIOR TO PRODUCTION OF LABEL AND AFFIXATION TO NEW EQUIPMENT.										

GAS DETECTION PANEL SCHEDULE

TAG	MANUFACTURER	MODEL	LOCATION	QUANTITY	DESCRIPTION / SERVICE	ELECTRIC SUPPLY [V / PH / Hz]	NOTES
GD-1	HONEYWELL OR APPROVED EQUAL	E3POINT E3SA	GENERATOR ROOM	1	CO & CH4 GAS DETECTION	120 / 1 / 60	STANDALONE DUAL GAS DETECTION PANEL SYSTEM C/W INTERNAL SENSORS, ALARM BUZZER, STROBE LIGHT, LED SCREEN

GAS SERVICE PRESSURE REDUCING VALVE SCHEDULE

TAG	MANUFACTURER	CAPACITY (ft³/Hr)	INLET PRESSURE (PSIG)	OUTLET PRESSURE (IN W.G.)
GPRV-1	AMERICAN METER SERIES 3000 (3" DIA) OR APPROVED EQUAL	6282	2	14-20



KEY PLAN



Contractor to verify all dimensions & conditions on site and immediately notify the departmental representative of all discrepancies.

5	ISSUED FOR TENDER	04/04/25
4	ISSUED FOR ESA	28/02/25
3	ISSUED FOR IFT REVIEW	21/02/25
2	ISSUED FOR 90%	20/06/24
1	ISSUED FOR 33%	29/01/24

revisions	description	date

A

C

A detail no.
no. du detail

A

B

C

B location drawing no.
sur dessin no.
C drawing no.
dessin no.

project

NEW GENERATOR INSTALLATION
AT PEEL YOUTH VILLAGE
PEEL YOUTH VILLAGE, 99 ACORN PLACE
MISSISSAUGA, ON

projet

drawing

dessin

MECHANICAL EQUIPMENT SCHEDULES

Designed By	DR	Conçu par
Date		(yyyy/mm/dd)
Drawn By	DR	Dessiné par
Date		(yyyy/mm/dd)
Reviewed By	MS	Examiné par
Date		(yyyy/mm/dd)
Approved By	BR	Approuvé par
Date		(yyyy/mm/dd)
Tender		Soumission
Project Manager		Administrateur de projets
Project no.	2022-677P (ON10121.3)	No. du projet
Scale	NTS	Échelle
Drawing no.	M-801	No. du dessin

2.11 IT IS THE RESPONSIBILITY OF BOTH THE OWNER AND THE CONTRACTOR TO NOTIFY THE ENGINEER OF CONSTRUCTION PROGRESS SO THE ENGINEER CAN COMPLETE GENERAL REVIEWS. THE CONTRACTOR SHALL PROVIDE THE ENGINEER WITH A CONSTRUCTION SCHEDULE PRIOR TO STARTING THE WORK. GENERALLY, REVIEWS BY THE ENGINEER WILL BE REQUIRED FOR REBAR PRIOR TO CONCRETE PLACEMENT. THE ENGINEER WILL ALSO NEED TO REVIEW ALL ABOVE GRADE FRAMING PRIOR TO INSTALLATION OF INTERIOR FINISHES.

3 DEFECTIVE MATERIALS AND WORK

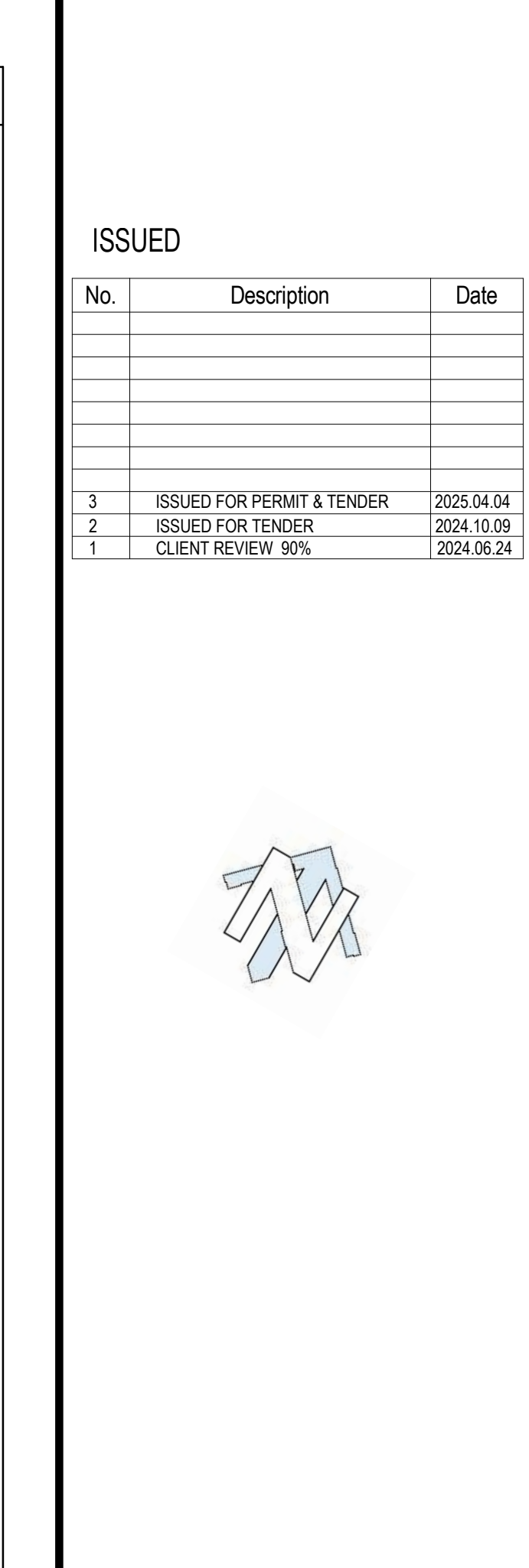
3.1 WHERE EVIDENCE EXISTS THAT DEFECTIVE WORK HAS OCCURRED OR THAT WORK HAS BEEN CARRIED OUT INCORPORATING DEFECTIVE MATERIALS, THE CONSULTANT MAY HAVE TESTS, INSPECTIONS OR SURVEYS PERFORMED, ANALYTICAL CALCULATIONS OF STRUCTURAL STRENGTH MADE, AND THE LIKE, IN ORDER TO HELP DETERMINE WHETHER THE WORK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

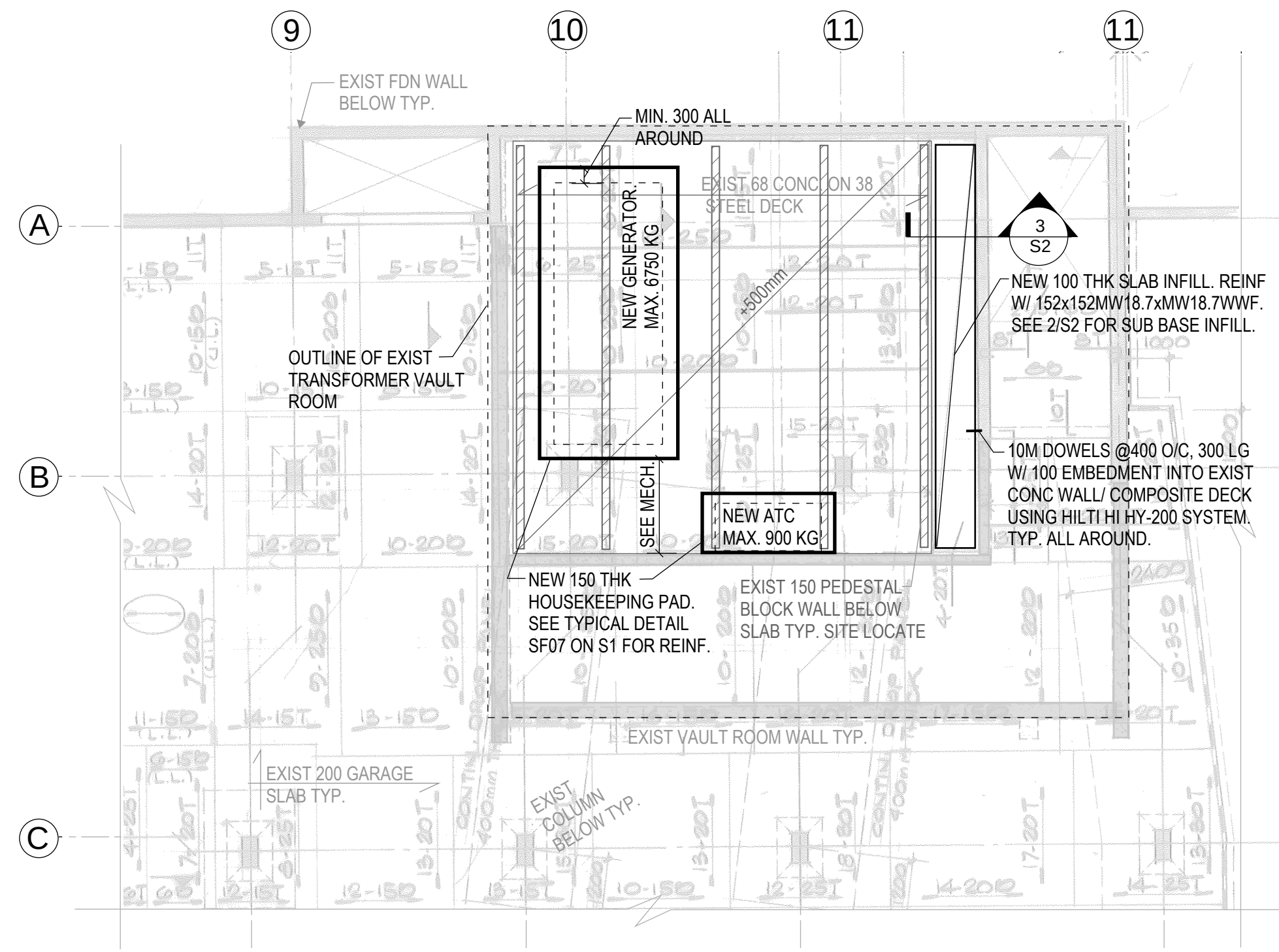
3.2 ALL TESTING SHALL BE CONDUCTED IN ACCORDANCE WITH THE REQUIREMENTS OF THE ONTARIO BUILDING CODE, EXCEPT WHERE THIS WOULD, IN THE CONSULTANT'S OPINION, CAUSE UNDUE DELAY OR GIVE RESULTS NOT REPRESENTATIVE OF THE REJECTED MATERIAL IN PLACE. IN THIS CASE, THE TESTS SHALL BE CONDUCTED IN ACCORDANCE WITH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

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

A technical site plan labeled 'KEY PLAN - NTS' (Not To Scale). The plan shows a central rectangular area labeled 'PEEL YOUTH VILLAGE 99 ACCORN PL.'. To the left and right of this central area are two larger, irregularly shaped building footprints. The left footprint is labeled 'BUILDING "A" 85 ACCORN PL.' and the right footprint is labeled 'BUILDING "B" 121 ACCORN PL.'. Above the central area, there is a small rectangular area labeled 'TRANS. VAULT' with a dashed border. A line points from the text 'SEE S2' to this vault area. The entire site is surrounded by a boundary line, and there are some smaller, less distinct shapes representing other structures or landscaping. The text 'ACCORN PLACE' is written at the bottom of the plan.

KEY PLAN - NTS

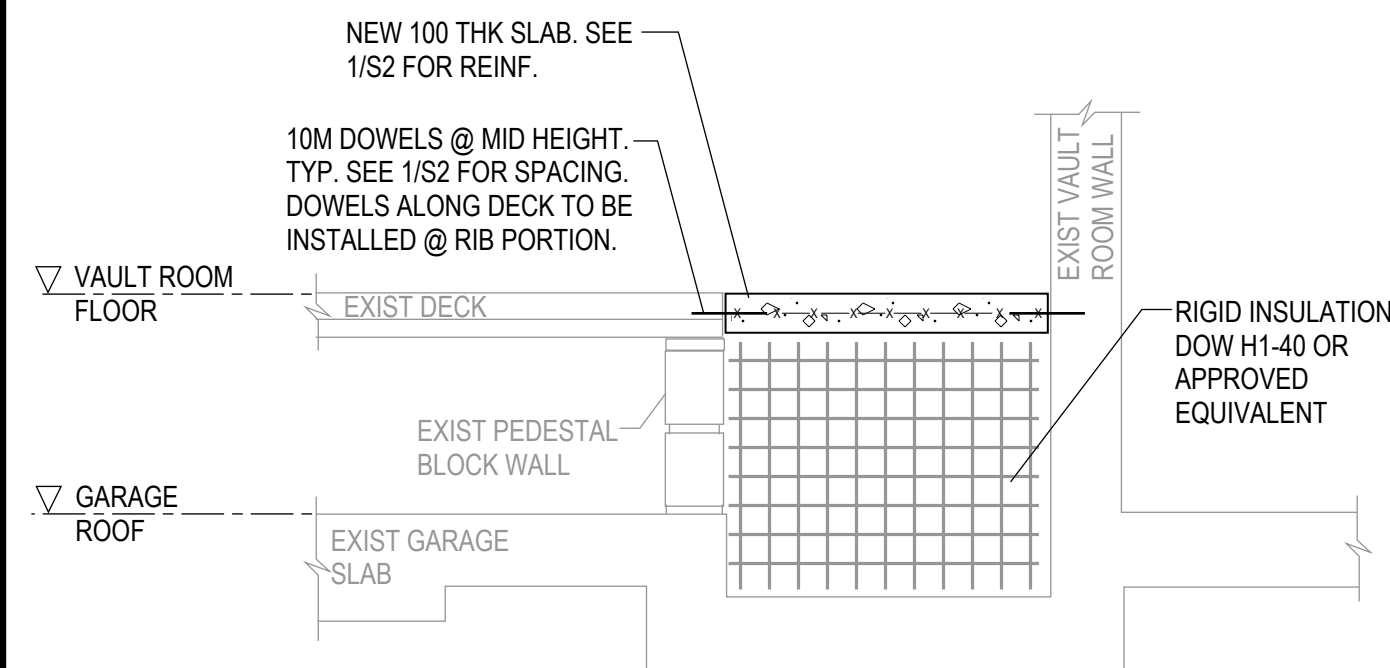
Project number
20230317 | S1



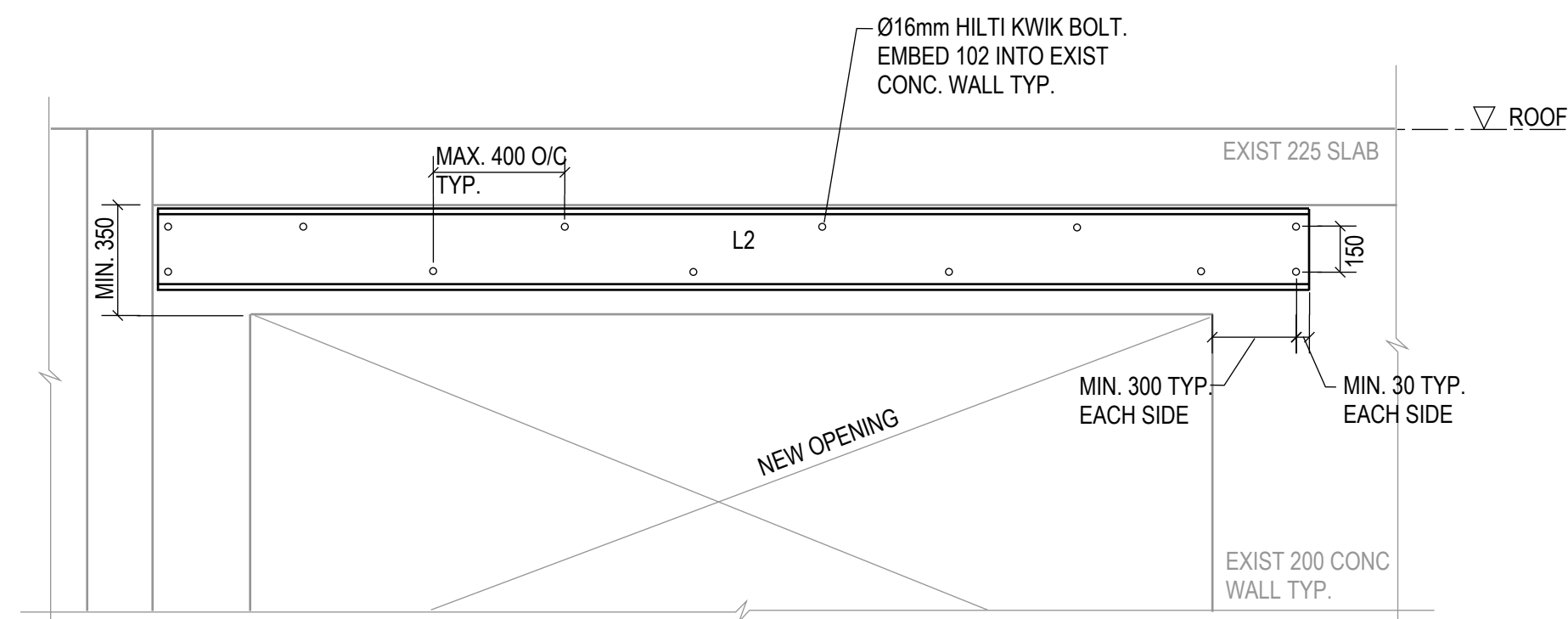
1
S2
GROUND FLOOR
FRAMING PLAN
1:100

GROUND FLOOR PLAN NOTES:

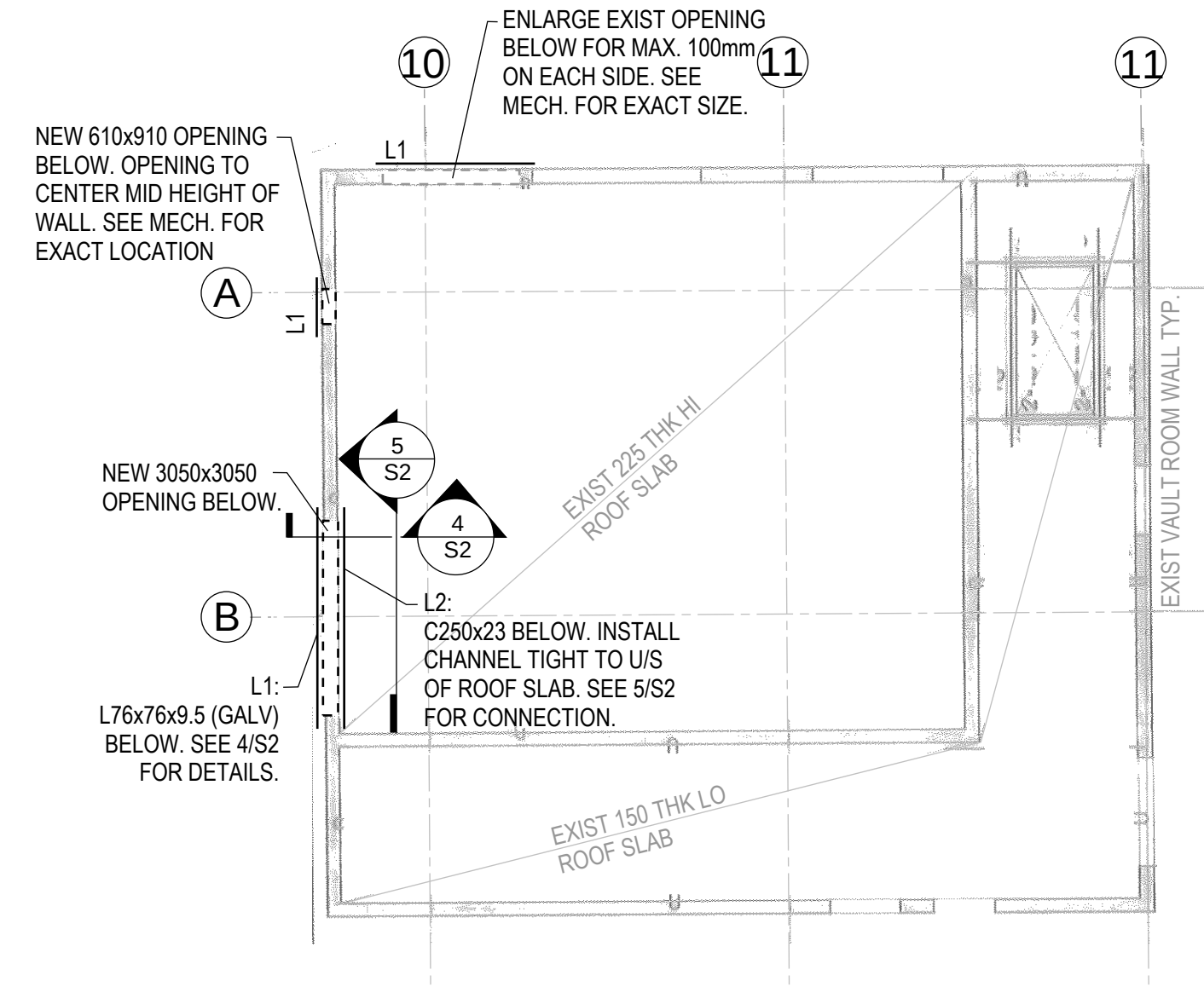
1. READ IN CONJUNCTION WITH GENERAL NOTES AND ALL OTHER CONTRACT DOCUMENTS.
2. BASE BUILDING DESIGN LOAD FOR GARAGE ROOF:
a. LIVE LOAD = 12kPa
b. SUPERIMPOSED DEAD LOAD = 6kPa
3. THE STRUCTURAL WORK DESCRIBED IN THESE DRAWINGS HAS BEEN DESIGNED TO COMPLY WITH THE REQUIREMENTS OF THE ONTARIO BUILDING CODE 2012, LATEST EDITION.
4. GIVEN DIMENSIONS AND MEMBER SIZES RELATED TO THE BASE BUILDING SHOULD BE SITE VERIFIED BEFORE COMMENCING THE WORK. CONTRACTOR TO NOTIFY OUR OFFICE OF ANY DISCREPANCY NOTED BETWEEN THE AS-BUILT CONDITION AND WHAT IS SHOWN ON THIS DRAWING.
5. CO-ORDINATE ALL DIMENSIONS WITH THE MECHANICAL DRAWINGS AND REPORT ANY DISCREPANCIES TO THE ENGINEER PRIOR TO PROCEEDING WITH ANY WORK.
6. THE EXISTING STRUCTURE HAS BEEN REVIEWED AGAINST THE LOADS IMPOSED BY THE NEW GENERATOR & NEW ATC MACHINE. IN OUR OPINION, THE EXISTING STRUCTURE IS ADEQUATE TO SUSTAIN THESE LOADS.



3
S2
SECTION
1:20



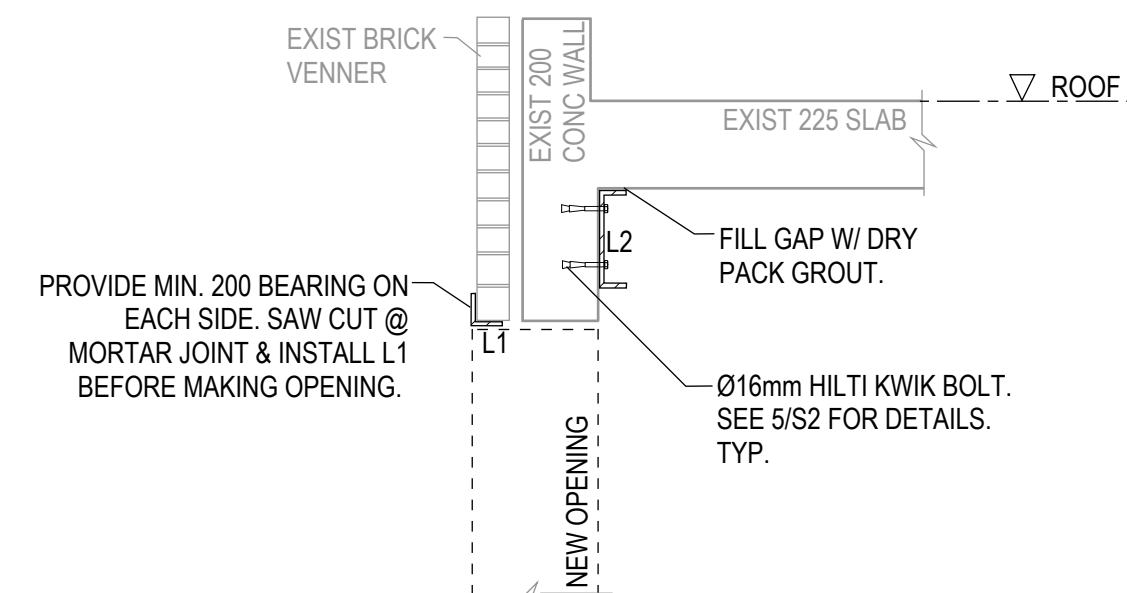
5
S2
ELEVATION
1:20



2
S2
TRANSFORMER VAULT
ROOF FRAMING PLAN
1:100

ROOF PLAN NOTES:

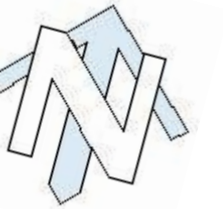
1. BASE BUILDING DESIGN LOAD FOR TRANSFORMER VAULT ROOF:
a. LIVE LOAD = 2kPa
2. INSTALL ALL LINTEL BEAMS BEFORE CREATING OPENING.
3. THE STRUCTURAL WORK DESCRIBED IN THESE DRAWINGS HAS BEEN DESIGNED TO COMPLY WITH THE REQUIREMENTS OF THE ONTARIO BUILDING CODE 2024, LATEST EDITION.
4. CO-ORDINATE ALL DIMENSIONS WITH THE MECHANICAL DRAWINGS AND REPORT ANY DISCREPANCIES TO THE ENGINEER PRIOR TO PROCEEDING WITH ANY WORK.
5. PRIOR TO SAWCUTTING THE NEW WALL OPENING, SCAN ALL AROUND THE WALL PERIMETER TO IDENTIFY ANY EMBEDDED SERVICES. ANY LIVE CONDUIT IS TO BE IDENTIFIED, DEACTIVATED PRIOR TO SAWCUTTING, AND REROUTED AFTERWARD BY THE CONTRACTOR'S FORCES.



4
S2
SECTION
1:20

ISSUED

No.	Description	Date
3	ISSUED FOR PERMIT & TENDER	2025.04.04
2	REVISED	2025.02.24
1	ISSUED FOR TENDER	2024.10.09



THE CONTRACTOR SHALL CHECK ALL DIMENSIONS WITH THE LATEST ISSUE OF ARCHITECTURAL, MECHANICAL AND ELECTRICAL DRAWINGS. REPORT ANY DISCREPANCIES TO THE ARCHITECT BEFORE PROCEEDING WITH WORK.



2235 Sheppard Ave. E.
Suite No. 1100
Toronto, ON M2J 5B5
Stephenson Engineering, a company of Salas O'Brien

NEW GENERATOR INSTALLATION
AT PEEL YOUTH VILLAGE

Peel Youth Village
99 Acorn Place, Mississauga



Drawn by: AD Date: OCTOBER 09, 2024
Checked by: DC Scale: AS NOTED

Drawing Title
EXISTING TRANSFORMER
VAULT GENERATOR

Project number:
20230317

S2