CITY OF HAMILTON

REQUEST FOR QUOTATIONS – CONSTRUCTION

Information Technology (IT) – UPS Relocation

Contract Number: R-15-25

Closes: July 18, 2025

Infrastructure & Security
Information Technology

Request for Quotations – Construction

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REQUEST FOR QUOTATIONS - CONSTRUCTION
Information Technology (IT) – UPS Relocation

Instructions to All Bidders

Notice to prospective bidders: The Instructions set out herein define your obligations and limit your rights. Failure to follow the instructions may result in the disqualification of your Bid. Read carefully.

1. Communication

All questions related to this Request for Quotations - Construction (RFQ) or for clarification of completing the Form of Quotation - Construction are to be directed to:

Melissa Dunham
Contract Administration/IT Operations/Information Technology
Tel: 905-546-2424 ext. 3778
E-mail: Melissa.Dunham@hamilton.ca

2. Accommodations for Bidders with Disabilities

In accordance with the Ontario Human Rights Code, Ontarians with Disabilities Act, 2001 (ODA) and Accessibility for Ontarians with Disabilities Act, 2005 (AODA), the City will accommodate for a disability, ensuring full and equitable participation throughout the bid process.

If a bidder requires this RFQ in a different format to accommodate a disability, the bidder must contact the contact person named above as soon as possible and in any event prior to the closing time. The RFQ in the different format will be issued only to the requesting bidder and all addenda will be issued in such different format only to the requesting bidder.

3. Request for Quotations – Construction Not Binding

The process described in this RFQ is not intended to create and shall not create a formal legally binding bidding process and as such, shall not give rise to any legally binding "Contract A" based tendering law duties or give any of the parties a cause of action against the other. However, a binding Contract shall come into effect upon award of the RFQ to the Successful Bidder.

4. Definitions

Capitalized words and phrases used in this Request for Quotations - Construction shall have the following meanings, unless expressly stated otherwise:

(a) "Base Bid Price" means the amount stated in the Form of Quotation - Construction by the bidder, for the Work and includes all Provisional Items and Provisional Prices (if any);

(b) "Bid" means a submission made by a bidder in response to the Request for Quotations – Construction;

(c) "City" means the City of Hamilton, and where an authority or discretion is conferred upon the City under the Request for Quotations - Construction, means the appropriate official of the City as designated or appointed under its governing by-laws, resolutions or policies from time to time;

(d) "Contract" means the agreement by purchase order issued by the City, to perform the Work, including the supply and delivery of all labour, goods, services, equipment and incidentals necessary for the proper and satisfactory execution of the Work, and the fulfillment of all other contractual obligations and undertakings, all in accordance with the Request for Quotations - Construction;

(e) "Contract Price" means the Base Bid Price, as adjusted in accordance with the provisions of the Contract Documents;

(f) "Consultant" means the architect, engineer or entity licensed to practice in the Province of Ontario that is engaged by the City, or where none is engaged by the City, then shall mean the City;

(g) "Contract Documents" shall mean those documents set out in section 1 of the General Contract Terms and Conditions to the RFQ;

(h) "Contractor" shall have the same meaning as Successful Bidder;

(i) "General Manager" means the City's General Manager or designate of the relevant department requesting the Work;

(j) "Lump Sum Price" means an all inclusive one price that applies to a single item, or specific service as set out on the Form of Quotation- Construction;

(k) "Owner" means the City or the person or entity identified as such in the RFQ, Contract or Contract Documents. The term Owner means Owner or the Owner's authorized agent or representative as designated by the City, but does not include the Successful Bidder;

(l) "Provisional Item" means Work or a portion of Work the City may wish to have performed but which may be removed, at no additional cost to the City from the scope of the Work at any time. Where such item is removed, the City will deduct the relevant Provisional Price from the Base Bid Price after the award of the Contract;

(m) "Provisional Price" means the amount stipulated by the bidder for a Provisional Item which is to be included in the Base Bid Price;

(n) "Request for Quotations – Construction" or "RFQ" shall mean the Request for Quotations – Construction of which these instructions form a part;

(o) **"**Specifications**"** means all written or printed requirements and standards forming part of the Request for Quotations - Construction and pertaining to the method and the manner of performing the Work or service, to the scope of Work and to the quality of a good to be furnished under the Contract;

(p) "Successful Bidder" means the bidder to whom the City has awarded the Contract;

(q) "Unit Price" means any component price as set out on the Form of Quotation – Construction;

(r) "Value Added Taxes" means such sum as shall be levied upon the Base Bid Price by the Federal or Provincial or Territorial Government and is computed as a percentage of the Base Bid Price and includes the Goods and Services Tax, the

Ontario Retail Sales Tax, the Quebec Sales Tax, the Harmonized Sales Tax, and any similar tax, the collection and payment of which have been imposed on the bidder by the tax legislation; and

(s) "Work" means the whole of the Work, the supply and delivery of a good, the delivery and performance of any services, the total construction and related services, material, matters and things required to be completed, supplied, mentioned or referred to in performing or executing the Work in full in accordance with the requirements set out in the Contract Documents and the Specifications.

5. Bid Submissions

Bids are to be submitted via email to the attention of the City Contact named in section 1 of the Instructions to Bidders.

Bids are requested by end of day July 18, 2025. Despite the closing date and time for this RFQ, the City reserves the right; to receive a Bid submitted after the closing date should a sufficient number of Bids not be received on or before the closing date.

6. Confidentiality

(a) A bidder should be aware that all information submitted is being collected under the authority of the *Municipal Act, 2001,* and may be used in the City's review of Bids and in the Contract that is entered into with the Successful Bidder.

(b) All such information is also subject to collection in accordance with the Municipal Freedom of Information and Protection of Privacy Act ("MFIPPA") and Personal Health Information Protection Act ("PHIPA") and City policies and procedures related to the collection and administration of such records. For greater particularity and direction regarding how issues of confidentiality will be handled and may affect a bidder's rights, the bidder should reference the City's policies related to Freedom of Information on the City's website under the Office of the City Clerk at hamilton.ca.

(c) After the award of the RFQ, the City will make available upon request, the award information for each compliant Bid received.

7. Conflict of Interest

The City may reject any Bid submitted where a bidder is in contravention of the City's Procurement Policy with respect to conflict of interest.

8. Time Open For Acceptance

(a) A Bid shall be irrevocable (i.e. open for acceptance by the City of Hamilton) for a period of 60 calendar days after the date of the submission of the Bid. The City may, at any time within the above 60 calendar day period, accept a Bid whether or not any other Bid had been previously accepted.

(b) The City reserves the right at any time prior to the award of the RFQ;

(i) to withdraw or cancel the RFQ;
(ii) to extend the time for the submission of Bids; or
(iii) to modify the RFQ;

by the issuance of an addendum or other notice, and the City shall not be liable for any expense, cost, loss or damage incurred or suffered by any bidder (or any other person) as a result of its so doing.

9. Price

(a) Where the bidder is instructed to price the Work on a stipulated price basis only, no corrections to the Base Bid Price shall be made by the City. Only extensions, subtotals or totals shall be corrected, where required to be submitted on the Form of Quotation - Construction. No modification to individual prices, either Unit Price or Lump Sum Price, shall be made by the City.

(b) The Base Bid Price must be quoted on an all-in basis and include the provision and delivery of all necessary labour, goods, materials, warranty and maintenance requirements, services, tools, equipment, supplies, utilities, levies and duties and other incidentals, and for performing all the Work and providing all services contemplated under the Contract.

(c) The Base Bid Price must be quoted exclusive of Value Added Taxes.

10. Award of the Contract

Subject to the City's reserved rights and privileges set out in this RFQ, the City intends to award the Contract resulting from this RFQ to the compliant Bid with the lowest Base Bid Price.

11. Reserved Privileges of the City

The City shall have the following reserved privileges, which may be exercised or waived in its absolute discretion:

(a) the City may reject any Bid, the lowest Bid or all Bids, or may cancel the RFQ and require the submission of new Bids;

(b) where in the view of the City, an insufficient number of Bids have been received in response to this RFQ, the City may publish a further such request (on the same or revised terms from the original request);

(c) the City reserves the ability to exercise the rights, privileges and authority contained in the Procurement Policy and procedures thereunder with respect to the RFQ. The City of Hamilton Procurement Policy can be found at:

https://www.hamilton.ca/build-invest-grow/buying-selling-city/bids-and-tenders/procurement-policy-by-law

12. Review of Bids by City

At its discretion, the City may not consider any Bid that does not substantially comply with the stated requirements of the RFQ. Where a minimum of three Bids are not received, the City reserves the right to request the bidder(s) to correct any deficiency contained in their Bid(s).

13. Bidder's Responsibilities

(a) The Contract shall only be between the City and the Successful Bidder. Neither the City nor its Consultant shall be construed to have any contractual relationship with the Successful Bidder's employees, subcontractors or material suppliers, or their respective employees or suppliers.

(b) Each bidder shall be responsible for:

(i) ensuring that it has conducted a thorough inspection of the site, has investigated and examined the Request for Quotations - Construction and any other document made available to the bidder by the City and has delivered to the City any request for information in respect of all questions arising out of the foregoing inspections, investigations and examinations in respect to the site;

(ii) reviewing all drawings, reports, tests and other documents with respect to site, subsurface or otherwise concealed physical conditions which have been provided or made available to the bidder by the City in relation to the Request for Quotations - Construction and shall be responsible for any site, subsurface or otherwise concealed physical condition set out in or inferable from any such report; and

(iii) ensuring that they have conducted a sufficient and appropriate scope of inquiry into the manner, method(s) and magnitude of the Work that is proposed in the Request for Quotations - Construction such that they have established a clear and full understanding of the Work being undertaken and are able to fully appreciate the consequences of that Work in preparing their Bid.

(c) The cost of any Work which results from encountering any condition that is described in or properly inferable from the information referred to in subsection (b) above shall be included in the bidder's Base Bid Price.

14. Notice to Proceed and Start Date

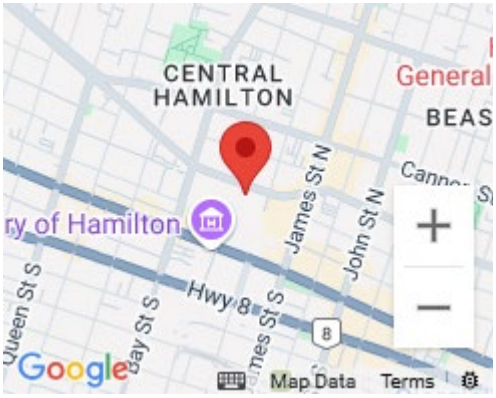
(a) The City may issue a written notice to proceed to the Successful Bidder.

(b) Work shall commence on the start date specified in the notice to proceed, unless otherwise agreed by the Successful Bidder and the City.

15. Optional Site Meeting

Location: ***55 York Boulevard, 6th floor, Hamilton ON L8N 4E4***
Please note: City of Hamilton IT department is located within Hamilton Public Library – Central Library
Date: ***Monday July 7, 2025***
Time: ***10:00 a.m. Hamilton Time***

MAP LOCATION OF HPL – Central Library



central library hpl - Search

16. Proposed Timeline (Change to match your particular RFQ)

Event	Anticipated Date
RFQ closing date	July 18, 2025
Anticipated award date	July 31, 2025
Commencement of Work	**3 weeks from award date**

17. Policies, Regulations and Guidelines

The Successful Bidder shall be aware of and adhere to all of the applicable laws, and City policies set out on the City of Hamilton website at: **hamilton.ca**

18. Addenda and Clarification of the Request for Quotations - Construction

(a) The City may notify prospective bidders of any Addendum by any method it deems appropriate, including email, telephone, fax, courier, hand-delivery or by personal delivery. The need for additional notification and the method(s) to be used shall be in the absolute discretion of the City and notification shall be to the co-ordinates provided by the bidder to the City at the time it obtained the Request for Quotations - Construction from the City.

(b) It is the sole responsibility of each bidder to ensure that it has received any and all addenda issued by the City. Bidders shall confirm in the Form of Quotation - Construction that they have received, examined and provided for all addenda issued under the Request for Quotations - Construction. Bidders may in writing,

seek confirmation of the number of addenda issued under the Request for Quotations - Construction from the City Contact as identified in Item 1.

19. Governing Law

(a) The City shall not be liable, in any way to the bidder for any delays, or costs associated with delays, in the RFQ process.
(b) The RFQ process shall be governed by and construed in accordance with the laws of the Province of Ontario and the federal laws of Canada applicable therein.

20. Specified Products

Specified product by name, trade or company is regarded as the standard of quality required by the Specifications. **No alternates or substitutes will be considered prior to the award of the Contract**. After the award of the Contract, should the Successful Bidder want the City to approve an alternate or substitute for a specified product, the Successful Bidder shall make such request in writing to the City, which the City may consider, in its sole discretion. No alternate nor substitution for a specified product required by the Specifications shall be made by the Successful Bidder without the prior written approval of the City.

21. DECLARATION OF BIDDER COMPLIANCE WITH CITY BY-LAWS

Should the bidder's declaration in its Form of Quotation – Construction that it is in compliance with all City of Hamilton by-laws be untrue or incorrect, the City shall be entitled at its sole discretion to reject the bidder's Bid.

FORM OF QUOTATION - CONSTRUCTION

To: Melissa Dunham
Information Technology/IT Operations/Contract Administration
(the "City")

Information Technology (IT) – UPS Relocation

Business structure of bidder (check one):

☐ corporation – specify where incorporated: _____

☐ partnership

☐ sole proprietorship

☐ other – specify: _____

Registered business name of bidder (if applicable): _____

The City of Hamilton reserves the right to verify the business name and structure of the

Legal Name of bidder: _____
(this name must exactly match the name on all documentation required of the Successful Bidder
eg; insurance certificate, WSIB certificate)

Business Address: _____
(include street, city, province and postal code)

Head Office Address: _____
(if different than above, include street, city, province and postal code)

GST/HST Registration Number: _____

Telephone Number: _____

Fax Number: _____

Email Address: _____

Date: _____

1. Submission of Bid

I/We the undersigned bidder, having examined the locality and site of the Work as well as all the Request for Quotations - Construction Documents, hereby submits a Bid and offers to furnish all material, labour, service, equipment, scaffolding and all incidentals, and to render all services and pay all applicable taxes (other than any Value Added Taxes) and all other charges as specified and/or as necessary for performance and completion of the above referred to Work, all in full accordance with the Request for Quotations - Construction Documents provided to the bidder by the City (receipt of which is hereby acknowledged) for the Base Bid Price of the following:

Item No.	Description	Lump Sum Price
1.	**Cost of Work – Excluding Cash Allowance**	**$**
2.	**Cash Allowance – UPS Supplier** - Relocating existing UPS and battery cabinet from existing location to temporary location to 1.2-m (4-ft) further away from wall, and extension cables if required. - Replace missing battery cabinet rear panel. - Review of final mounting locations and assistance with mount holes. - Relocating existing UPS and battery cabinet from temporary location to final location. - Turning on UPS and battery cabinet	**$ 10,000.00**
	Base Bid Price	**$**

- **Canadian funds**
- **Not including Value Added Taxes**

2. Addenda

I/We have made any necessary inquiries with respect to addenda issued by the City and have ensured that I/we have received, examined and provided for all addenda to the Request for Quotations - Construction in this Bid.

3. Commencement and Contract

If awarded the contract, I/we, the bidder, acknowledge and agree:

(a) to provide all necessary documents required as set forth prior to the commencement of the Work;
(b) that a binding contract shall come into being upon the award of this Request for Quotations – Construction to the Successful Bidder;
(c) that the Work must be conducted in a safe manner. Accordingly, I/we confirm that I/we and all subcontractors used on the Work for the City will comply with all applicable laws, regulations and by-laws of Canada, the Province of Ontario and the City of Hamilton, including but not limited to the *Occupational Health and Safety Act*, and all applicable regulations thereunder. Further, without limiting any of the foregoing, I/we confirm that I/we have both a written occupational health and safety policy and program to implement that policy, and that all of our employees, subcontractors and any other persons performing the Work are appropriately trained, licensed and certified, as required to perform the Work;
(d) that this Bid is irrevocable and is to continue open to acceptance by the City for a period of 60 calendar days after the date of Bid submission.

4. No Collusion / Conflict of Interest

I/we hereby declare that no person, firm or corporation other than me/us has any interest in this Bid or in the proposed Contract(s) for which this Bid is made. I/we further declare that this Bid is made without any connection to, comparison of figures, arrangements with or knowledge of, any other corporation, firm or persons making a Bid for the same Work and is in all respects fair and without fraud or collusion.

I/we declare that no member of the City of Hamilton, and no officer, employee or agent of the City of Hamilton has or will have an interest indirectly or directly as a contracting party, partner, shareholder, surety or otherwise in the performance of the Contract(s), or in the supply, Work or business to which they relate or in any portion of the profits thereof, or in any of the monies to be derived there from.

5. Interpretation

I/we confirm that I/we have received no oral information, instruction or advice from any officer, employee, agent or consultant of the City which changes the content of this Request for Quotations - Construction and all addenda thereto.

I/we acknowledge and agree that I/we have not assumed that any information concerning our operations, business or personnel or any other information required to
be provided by me/us when submitting our Bid is known to the City, regardless of whether such information may be actually previously known to the City or not. Further, I/we acknowledge and agree that all information to be provided by me/us is to be complete and full and in such detail as required.

6. Accessibility for Ontarians with Disabilities Act, 2005

I/We confirm that I/we and all subcontractors used on the Work for the City will comply with all applicable accessibility laws, regulations and by-laws of Canada, the Province of Ontario and the City of Hamilton, including but not limited to the Ontarians with Disabilities Act, 2001 (ODA), the Accessibility for Ontarians with Disabilities Act, 2005 (AODA), Ontario Regulation 429/07 (Accessibility Standards for Customer Service) and Ontario Regulation 191/11 (Integrated Accessibility Standards), throughout the term of the Contract. Without limiting the generality of the foregoing, I/we shall provide to the City, prior to commencing Work, a Statement of Acknowledgement that I/we have read and understand the City's AODA Integrated Accessibility Standards and Customer Service Standard Handbook (the "Handbook"), that I/we have provided the training required by the Handbook, and that I/we will comply with the requirements of the Handbook and applicable accessibility laws, regulations and by-laws.

See City of Hamilton's AODA Integrated Accessibility Standards and Customer Service Standard Handbook at: https://www.hamilton.ca/people-programs/equity-diversity-inclusion/accessibility-services/accessibility-guidelines-policies#policies-procedures

7. Compliance with City of Hamilton By-Laws

I/We declare that I/we are in compliance with all municipal by-laws as they pertain to the City of Hamilton in respect of the operation of my/our business and in respect of the Work described in the Request for Quotations - Construction. I/We understand and agree that if this statement is untrue or incorrect, the City of Hamilton shall be entitled at its sole discretion to reject this Bid, or if such untruth or incorrectness comes to light after this Bid is accepted, to terminate or refuse to enter into, as applicable, any Contract and to pursue any other legal recourse the City deems appropriate, and that such untruth or incorrectness shall be a default under the Contract.

8. Procurement Policy

In submitting a Bid in response to the RFQ, I/we agree and acknowledge that I/we have read and will be bound by the terms and conditions of the City's Procurement Policy. I/We understand that the City's Procurement Policy can be viewed on the City's website at: https://www.hamilton.ca/build-invest-grow/buying-selling-city/bids-and-tenders/procurement-policy-by-law

per:_____
(Signature)

_____
(Please print name and title)

I have the authority to bind the Bidder

GENERAL CONTRACT TERMS AND CONDITIONS

In addition to any other terms and conditions contained elsewhere in this RFQ, the following terms and conditions form part of any Contract(s) entered into between the Owner and any Successful Bidder(s) (the "Contractor") and are deemed to be incorporated into any purchase order(s) issued in connection with this RFQ.

1. Contract Documents

The Contract Documents are complementary, and what is required by any one shall be as binding as if required by all.

The intent of the Contract Documents is to include the labour, products and services necessary for the performance of the Work in accordance with these documents.

The Contract Documents consist of the award letter, Contractor's Bid, Contract, these General Contract Terms and Conditions, any Supplementary Contract Terms and Conditions, other documents, or parts thereof, contained in the Specifications which have application during performance of the Contract, the Specifications, shop drawings, schedules, and such other documents as may be identified as Contract Documents, and including amendments thereto made in accordance with provisions of the Contract.

2. Document Priority

The order of priority of documents, from highest to lowest, shall be

- change orders and/or change directives
- the Contract between the Owner and the Contractor
- the Form of Quotation as approved and accepted by the Owner
- Addenda, as issued
- Supplementary Contract Terms and Conditions
- the General Contract Terms and Conditions
- Instruction to Bidders
- the Specifications
- Drawings

3. Compliance with Laws

The Contractor will be required to comply with all federal, provincial and municipal laws and regulations in providing the goods and services including, without limitation, the *Occupational Health and Safety Act* and the *Workplace Safety and Insurance Act, 1997*, or any successor legislation, as applicable, and to provide to the Owner, upon request, periodic reports confirming such compliance.

The Contractor shall apply and pay for necessary permits or licences required for execution of the Work.

The Contract shall be governed by the laws of the Province of Ontario and the laws of Canada applicable therein.

The Contractor shall comply with all municipal by-laws as they pertain to the City of Hamilton in respect of the operation of the Contractor's business and the Work. Further, the Contractor shall, at all times that the Contract is in effect and upon request of the Owner, provide proof of compliance satisfactory to the Owner, at the Contractor's own cost. If the Contractor fails to do any of the foregoing, the Contractor shall be considered to be in default of the Contract the Owner shall be entitled at its sole discretion to terminate the Contract and to pursue any other legal recourse the Owner deems appropriate.

4. Non-Exclusivity

The awarding of a contract to a Contractor shall not be a guarantee of exclusivity.

5. Confidentiality

The Contractor shall treat as confidential all information of any kind which comes to the attention of the Contractor in the course of providing the goods and services and shall not disseminate such information for any reason without the express written permission of the Owner.

6. Conflict of Interest

The Contractor shall disclose to the Owner, in writing, without delay any actual or potential situation that may be reasonably interpreted as either a conflict of interest or a potential conflict of interest, including the retention of any subcontractor or supplier that is directly or indirectly affiliated with or related to the Contractor.

The Contractor covenants and agrees that it will not hire or retain the services of any employee or previous employee of the Owner where to do so constitutes a breach by such employee or previous employee of the Owner's conflict of interest policy, as it may be amended from time to time.

A breach of this section by the Contractor, any of the subcontractors, or any of their respective advisors, partners, directors, officers, employees, agents, and volunteers shall entitle the Owner to terminate the Contract, in addition to any other rights and remedies that the Owner has in the Contract, in law, or in equity.

7. Indemnification

(1) The Successful Bidder shall indemnify, defend, and hold the City, including its elected officials, officers, employees, agents, affiliates and representatives (collectively referred to as the "Indemnified Party") harmless against any and all claims, demands, costs (including legal costs on a substantial indemnity basis), penalties, fines, fees, royalties, damages (including indirect, special, remote, and/or consequential damages) and causes of action, including, without limitation, proprietary or personal injury (including death) that arise from, either directly or indirectly, or relate to,

(a) the Successful Bidder, its officials, directors, officers, employees, agents, affiliates, partners (general or limited), joint venturers, contractors, Subcontractors, and other representatives (collectively referred to as the "Indemnifying Party"), under this Contract,

(i) negligently carrying out any obligation to which it is subject,

(ii) failing to carry out any obligation to which it is subject,

(iii) negligently exercising any right to which it is entitled, or,

(iv) exercising any right to which it is entitled in a manner which is inconsistent with the terms and conditions of this Contract,

or any combination thereof, except to the extent that the same are caused by the negligence or deliberate wrong-doing of the Indemnified Party, or

(b) any patent, trademark, copyright infringement or other breach of any intellectual property right of any person, for which the Indemnifying Party is responsible.

(2) The City shall notify the Successful Bidder upon receipt of any such claim or demand that it receives. No settlement shall be made nor consent to judgment given without prior written approval of the Successful Bidder and its insurers, which approval shall not be unreasonably withheld.

(3) The rights to indemnity contained herein shall survive the early termination or expiry of this Contract.

(4) The City may enforce the rights of indemnity conferred on any Indemnified Party under subsection (1) on their behalf and to the same extent as if they were parties to this Contract.

(5) The rights to indemnity provided for in this section shall be deemed to be in addition to any rights with respect to insurance in favour of the Indemnified Party provided in this Contract.

8. Rights and Remedies

Except as expressly provided in the Contract Documents, the duties and obligations imposed by the Contract Documents and the rights and remedies available thereunder shall be in addition to and not a limitation of any duties, obligations, rights and remedies otherwise imposed or available by law.

No action or failure to act by the Owner or the Contractor shall constitute a waiver of any right or duty afforded any of them under the Contract, nor shall any such action or failure to act constitute an approval of or acquiescence in any breach thereunder, except as may be specifically agreed in writing.

9. Protection of Work and Property

The Contractor shall take all reasonable precautions necessary to protect the Work and the Owner's property (including property adjacent to the place of the work) from damage during performance of the contract and shall make good any damage to the Work or to Owner property caused by the Contractor or any of its subcontractors.

10. Use of Premises (Place of the Work)

The Contractor shall confine construction machinery and equipment, the storage of products, and the operations of workers to the place of the work and land and areas identified in and permitted by the Contract Documents and other land and areas permitted by regulatory requirements, rights-of-way, permits and easements, and shall not unreasonably encumber the premises with products or construction machinery and equipment.

11. Temporary Facilities and Controls

a) Operations considered by the Owner to generate vibrations, noise or safety concerns include, but are not limited to, the following: jack hammering; shotblasting; sandblasting; cutting and coring of concrete; and use of powder actuated fastners.
b) The Contractor shall do the following when work generating vibration, noise or safety concerns may affect user or user operations: coordinate with the Owner representative; schedule and coordinate hours of work with the Owner; and stop operations generating vibration, noise or safety concerns when instructed verbally or in writing by the Owner. The Contractor shall not resume such operations until authorized by the Owner.

12. Project Meetings

a) Prior to the start of any work, a pre-construction meeting shall be held by the Owner and the Contractor to examine and discuss the Work of the Contract.
b) The Contractors shall schedule regular construction progress meetings, at the site, every two weeks for the duration of the Contract, or as otherwise directed by the Owner.

13. Cleaning

The Contractor shall keep site free from unsightly or hazardous accumulations of waste material and shall leave site in a neat and tidy condition at completion of Work.

14. Waste Management

The Contractor shall ensure that Work is completed in an environmentally friendly manner using best practices that mitigate harmful environmental impacts. Waste materials resulting from the Contractor's activities under this contract must be disposed of as per provincially regulated recycling programs should they apply.

15. No Assignment

The Contractor shall not assign any part of the Contract nor any interest therein without the prior written consent of the Owner, which consent shall not be unreasonably withheld.

16. Subcontractors

The Contractor shall be solely responsible for the payment of every subcontractor employed, engaged, or retained by it for the purpose of assisting it in the performance of its obligations under the contract. The Contractor shall coordinate the provision of the goods and services

by its subcontractors in a manner acceptable to the Owner, and ensure that they comply with all the relevant requirements of the Contract.

The Contractor shall be liable to the Owner for all costs or damages arising from acts, omissions, negligence or willful misconduct of its subcontractors.

17. Personnel and Performance

The Contractor must make available appropriately skilled workers, consultants or subcontractors, as appropriate, and must be able to provide the necessary materials, tools, machinery and supplies to fulfill its obligations under the Contract.

The Contractor shall be responsible for its own staff resources and for the staff resources of any subcontractors and third-party service providers.

The Contractor will ensure that its personnel (including those of approved subcontractors), when using any Owner buildings, premises, equipment, hardware or software shall comply with all security policies, regulations or directives relating to those buildings, premises, equipment, hardware or software.

Personnel assigned by the Contractor to provide the goods and services (including those of approved subcontractors) may, in the sole discretion of the Owner, be required to sign non-disclosure agreement(s) satisfactory to the Owner.

18. Supervision

The Contractor shall employ a competent superintendent and necessary assistants who shall be in attendance at the place of the work while the Work is being performed.

The superintendent shall be satisfactory to the Owner and shall not be changed except for good reason and only then after consultation with the Owner.

The superintendent shall be the Contractor's representative at the place of the work and shall have authority to act on behalf of the Contractor. All communications given to the superintendent shall be as binding as if given to the Contractor.

19. Independent Contractor

The relationship of the Owner and the Contractor is one of owner and independent contractor and not one of employer-employee. Neither is there any intention to create a partnership, joint venture or joint enterprise between the Contractor and the Owner.

20. Warranties and Covenants

The Contractor represents, warrants and covenants to the Owner (and acknowledges that the Owner is relying thereon) that any deliverable resulting from or to be supplied or developed under the Contract will be in accordance with the Owner’s functional and technical requirements in the Specifications (as set out in the RFQ) and, if applicable, will function or otherwise perform in accordance with such requirements.

21. Defective Work

Defective work is work that has been rejected by the Owner or the Consultant as failing to conform to the Contract Documents. The Contractor shall promptly correct defective work, as required to conform to the Contract Documents, with no change in Contract Price.

22. Reporting of Conflicts, Errors and Discrepancies

If, during the performance of the Work, the Contractor finds a conflict, error or discrepancy in the Contract Documents, the Contractor shall so report to the Owner in writing at once and, before proceeding with the Work affected thereby, shall obtain a written interpretation or clarification from the Owner.

23. Warranty

Neither the final payment, nor any provisions in the Contract Document shall relieve the Contractor from responsibility for faulty materials or workmanship which appear within a period of one year from the date of acceptance of the Work, or such other warranty periods as may be specified for parts of the Work, and the Contractor shall remedy any defect due thereto and pay for any damage to other work resulting therefrom which appear within such warranty periods.

The Contractor will be responsible for extended warranty periods on equipment and materials as outlined in the Specifications. Warranties shall be provided for all-inclusive replacement including all costs for labour and materials upon failure.

Any extended warranties required beyond the one year warranty period shall be as specified in the Contract Documents. Extended warranties shall be issued by the warrantor to the benefit of the Owner. The Contractor's responsibilities with respect to extended warranties shall be limited to obtaining any such extended warranties from the warrantor.

24. Changes in the Work

The Owner, without invalidating the Contract, may make changes in the Work consisting of additions, deletions or other modifications, the Contract Price and Contract time being adjusted if required. Changes in the Work shall be authorized by written order from the Owner, such as change orders and change directives.

The Contractor is not entitled to any compensation for loss or loss of anticipated profit as a result of the deletion of any major item or major part of an item.

25. Valuation of Changes

In cases of extra work to be paid for under section 24 the Contractor shall keep and present in such form as the Owner may direct, a correct account of the actual cost of labour, materials, and equipment, together with vouchers. The Owner shall certify as to the amount due the Contractor.

On extra work authorized by the Owner, and to be paid for under section 24, the allowance for overhead and profit shall be based on the following schedule:

The cost to the Owner shall be the actual cost of the extra work plus a percentage covering overhead and profit, after all credits included in the change resulting from the extra work

have been deducted. An allowance covering overhead and profit shall be calculated as follows:

(1) 10% on Work performed by the Contractor's own forces,
(2) 5% on Work performed by subcontractors, and
(3) 5% on products supplied by suppliers.

No other overhead charges will be permitted.

If a change results in a decrease in cost, the amount of credit to be given to the Owner by the Contractor shall be the amount of the actual decrease without overhead and profit.

If a change involves both extras and credits and results in an increase in cost, overhead and profit shall be allowed on the increase only.

The Contractor shall include in its proposal for change a statement as to the effect the proposed change will have on the Contract time.

26. Contingency Allowance

The Contractor shall have no right to draw upon any contingency allowance for payment unless specifically authorized to do so by way of change order.

In the absence of a contingency allowance being shown on the Contract Documents, the Contractor is not to assume that there is one in place. The disclosure of any contingency allowances is at the discretion of the Owner.

27. Contract Time

Time and all time limits stated in the Contract Documents are of the essence of the Contract. Contractor shall perform work expeditiously and with adequate forces to complete Work of the Contract within time specified in the contract.

28. Construction Schedule

The Contractor shall:

a) prior to the first application for payment, prepare and submit to the Owner for its review and acceptance, a construction schedule that indicates the timing of the activities of the Work and provides sufficient detail of the critical events and their inter-relationship to demonstrate the Work will be performed in conformity with the Contract Time and in accordance with the Contract Documents. The Contractor shall employ construction scheduling software, where required by the Specifications, that permits the progress of the Work to be monitored in relation to the critical path established in the schedule. The Contractor shall provide the schedule and any successor or revised schedules in both electronic format and paper copy. Once accepted by the Owner and the Consultant, the construction schedule submitted by the Contractor shall become the baseline construction schedule;
b) provide the expertise and resources, such resources including manpower and equipment, as are necessary to maintain progress under the accepted baseline construction schedule or any successor or revised schedule accepted by the Owner; and

c) monitor the progress of the Work on a weekly basis relative to the baseline construction schedule, or any successor or revised schedule accepted by the Owner, update the schedule on a monthly basis and advise the Owner in writing of any variation from the baseline or slippage in the schedule.

29. Ownership of Project Documentation

All information, data, plans, specifications, reports, estimates, summaries, photographs and all other documentation prepared by the Contractor in the connection with the provision of the goods and services under the Contract, whether they be in draft or final format, shall be the property of the Owner.

30. Submittals

Prior to the start of work, the Contractor shall submit a schedule indicating scheduled start and completion dates for each construction activity. The Contractor shall also submit three copies of shop drawings and product data required by the Contract Documents and for such other items as the Owner may reasonably request. The Contractor shall not proceed with work until the related submission has been reviewed and accepted by the Owner and the Consultant (if applicable).

31. Shop Drawings

As the Work progresses, the Contractor shall keep a complete and accurate record of all changes or deviations from the Contract Documents and shop drawings, indicating the Work as actually installed. At the completion of the Work, the Contractor shall certify by endorsement thereof, that each of the revised prints of the Drawings and Specifications are complete and accurate. Prior to the Contractor's application for final payment, the record Drawings and Specifications, arranged in proper order, indexed and endorsed, and in the following form, shall be delivered to the Owner, namely:

a) one complete set of reproducible final versions of the As-Built Drawings; and
b) the final version of the As-Built Drawings stored on AutoCAD (latest version).

32. Contract Close-Out

a) The Contractor shall submit project record drawings indicating deviations from Contract Documents resulting from changed site conditions and changes ordered by the Owner.
b) The Contractor shall submit three copies of operation and maintenance data required by the Contract Documents and for such other items as the Owner may reasonably request.
c) The Contractor shall leave maintenance materials required by the Contract Documents where directed by the Owner and shall clearly label all items.

33. Termination Provisions

Upon giving the Contractor not less than 30 days' prior written notice, the Owner may, at any time and without cause, cancel the Contract, in whole or in part. In the event of such cancellation, the Owner shall not incur any liability to the Contractor apart from the payment for the goods, material, articles, equipment, work or services that have been satisfactorily delivered or performed by the Contractor at the time of cancellation.

Failure of the Contractor to perform its obligations under the Contract shall entitle the Owner to terminate the Contract upon 10 calendar days' written notice to the Contractor if a breach which is remediable is not rectified in that time. In the event of such termination, the Owner shall not incur any liability to the Contractor apart from the payment for the goods, material, articles, equipment, work or services that have been satisfactorily delivered or performed by the Contractor at the time of termination.

All rights and remedies of the Owner for any breach of the Contractor's obligations under the contract shall be cumulative and not exclusive or mutually exclusive alternatives and may be exercised singularly, jointly or in combination and shall not be deemed to be in exclusion of any other rights or remedies available to the Owner under the contract or otherwise at law.

No delay or omission by the Owner in exercising any right or remedy shall operate as a waiver of them or of any other right or remedy, and no single or partial exercise of a right or remedy shall preclude any other or further exercise of them or the exercise of any other right or remedy.

34. Application for Progress Payment

Applications for payment shall be made in writing to the Owner to the email address given by the Owner for this purpose at the commencement of the Contract.

The Contractor must provide with each application after the first, a Statutory Declaration (latest CCDC 9A form), certifying that all accounts for all subcontract, 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 or will be paid with the proceeds from such application for payment, except for amounts properly retained as holdback or as an identified amount in dispute.

After the first application for payment and with each subsequent application for payment the Contractor shall submit evidence of compliance with the applicable worker's compensation legislation at the place of the work, including payments due thereunder.

Each application for payment shall meet the requirements of a "proper invoice" as defined in the *Construction Act* if the Contractor includes the following:

- a statement of work performed and values, which statement shall include the Contract number, project name and purchase order number;
- breakdown of approved change orders and percentage completed of each;
- a Statutory Declaration as required above; and
- any other requirement that the *Construction Act* prescribes for a proper invoice.

Subject to the *Construction Act* and all other applicable laws, the Owner will pay to the Contractor ninety percent (90%) of the amount shown on such certificates, less previous payments, less the amount of any liens or any written notice of a lien of which the Owner has notice.

All progress payments are not conclusive as to the value or quality of Work performed, and are subject to reopening and readjustment, until and including the date that the Owner releases the holdback for finishing work under the *Construction Act.*

The Contractor shall not submit an application for payment between the period of December 14 to January 4, inclusive, in any year. The Contractor shall not submit an application for payment during any other reasonable period which the Owner advises the Contractor in writing due to downtime for payment system upgrades.

Notice of non-payment by the Owner shall be made to the Contractor to the email address set out on the Form of Quotation – Construction.

The determination of a matter by an adjudicator under the *Construction Act* may be submitted to the courts at any time.

35. Final Payment

Applications for progress payments shall be made in writing to the Owner to the email address given by the Owner for this purpose at the commencement of the Contract.

When the Contractor considers that the Work is completed, the Contractor shall submit an application for final payment. The Contractor's application for final payment shall be accompanied by any documents or materials not yet delivered pursuant to the Contract Documents. The Work shall be deemed not to be performed until all of the aforementioned documents have been delivered.

Application for final payment shall meet the requirements of a "proper invoice" as set out in section 34.

Prior to the release of the holdback for finishing work under the *Construction Act*, the Contractor shall submit: Contractor's written request for release of the holdback, including a statement that no written notices of lien have been received by it; a Statutory Declaration (latest CCDC 9A form); and a final Workplace Safety & Insurance Board Clearance Certificate.

Notice of non-payment by the Owner shall be made to the Contractor to the email address set out on the Form of Quotation – Construction.

36. Payment by EFT

The term "EFT" refers to electronic funds transfer and may also include the payment information transfer.

a) All payments by the Owner under the Contract shall be made by EFT as a direct deposit to a Canadian chartered bank, save and except where:
   .1 the funds payable under the terms of the Contract are only payable in a single lump sum and not payable by installments or progress payments or otherwise than a single lump sum payment; or
   .2 the Owner is unable to release one or more payments by EFT, in which case the Contractor agrees to either:
      (1) accept payment by cheque or some other mutually agreeable method of payment; or
      (2) request the Owner to extend payment due dates until such time as the Owner makes payment by EFT, subject to paragraph (c).

b) Mandatory Submission of the Contractor's EFT Information
   .1 The Contractor is required to provide the Owner with the information required for the Owner to make payment by EFT. A purchase order may not be issued to the Contractor without this requisite information.
   .2 In the event that the EFT information changes, the Contractor shall be responsible for providing forthwith the updated information to the Owner.
   .3 Where the Contractor provides changes to the EFT information more than once in a calendar year, the Contractor shall also pay any fee approved by the Council of the City of Hamilton for each additional change.

c) Suspension of Payment
   .1 The Owner is not required to make any payment under the Contract until its designated officer has received the correct EFT payment information from the Contractor. Until receipt of the correct EFT information, any invoice or contract payment request shall be deemed not to be a proper invoice or valid request for the purpose of payment under the Contract. No interest or any other manner of claim whatsoever for delayed or non-payment shall be permitted as a result of incorrect EFT information or improper delivery of EFT payment information.
   .2 If the EFT information changes after submission of correct EFT information, the Owner shall have 30 calendar days within which to update the changed EFT information after its receipt by the designated officer to the extent payment is made by EFT. However, the Contractor may request that no further payments be made until the updated EFT information is implemented by the Owner's payment office. If such suspension would result in a late payment under any payment terms of the Contract, the Contractor's request for suspension shall extend the due date for payment by the number of days of the suspension.

d) Liability for Uncompleted or Erroneous Transfers
   .1 If an uncompleted or erroneous transfer occurs because the Owner used the Contractor's EFT information incorrectly, the Owner remains responsible for making a correct payment.
   .2 If an uncompleted or erroneous transfer occurs because the Contractor's EFT information was incorrect, or was revised within 30 calendar days of the Owner's release of the EFT payment transaction instruction, and
   .3 Funds are no longer under the control of the Owner's payment office, the Owner is deemed to have made payment and the Contractor is responsible for recovery of any erroneously directed funds; or
   .4 If the funds remain under the control of the Owner's payment office, the Owner shall not make payment and the provisions of paragraph (c) shall apply.

e) EFT and Timely Payment
   A payment shall be deemed to have been made in a timely manner in accordance with the payment terms of the Contract if, in the Owner's EFT payment transaction instruction released to its bank, the date specified for settlement of the payment is on or before the last date for due payment under the terms of the Contract, provided the specified payment date is a valid date when the Owner's bank is open for business.

f) Liability for Change of EFT Information by Financial Agent
   The Owner is not liable for errors resulting from changes to EFT information provided by the Contractor's financial agent.

37. Construction Liens

(a) In the event that a construction lien arising from the performance of the work is claimed, 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.

(b) Without limiting any of the foregoing, the Contractor shall indemnify the Owner for all costs (including, without limitation, legal fees on a solicitor and client basis) it may incur in connection with the claim for lien or subsequent lawsuit brought in connection with the lien, or in connection with any other claim or lawsuit brought against the Owner by any person that provided services or materials to the project lands which constituted a part of the work.

(c) This section does not apply to construction liens claimed by the Contractor.

38. Occupational Health and Safety

a) The Contractor shall comply with all federal, provincial or municipal occupational health and safety legislative requirements, including, and without limitation, the Occupational Health and Safety *Act*, R.S.O., 1990 c.0.1 and all regulations thereunder, as amended from time to time (collectively the "OHSA").

b) Nothing in this section shall be construed as making the Owner the "employer" (as defined in the OHSA) of any workers employed or engaged by the Contractor for the Work, either instead of or jointly with the Contractor.

c) The Contractor agrees that it will ensure that all subcontractors engaged by it are qualified to perform the Work and that the employees of subcontractors are trained in the health and safety hazards expected to be encountered in the Work.

d) The Contractor acknowledges and represents that:

i) The workers employed to carry out the Work have been provided with training in the hazards of the Work to be performed and possess the knowledge and skills to allow them to work safely;

ii) The Contractor has provided, and will provide during the course of the agreement, all necessary personal protective equipment for the protection of workers;

iii) The Contractor's supervisory employees are competent, as defined in the OHSA, and will carry out their duties in a diligent and responsible manner with due consideration for the health and safety of workers;

iv) The Contractor has in place an occupational health and safety policy in accordance with the OHSA; and

v) The Contractor has a process in place to ensure that health and safety issues are identified and addressed and a process in place for reporting work-related injuries and illnesses.

e) The Contractor shall provide, at the request of the General Manager or designate, the following as proof of the representations made in paragraph d(i) and d(iv):

   i) documentation regarding the training programs provided or to be provided during the Work (i.e. types of training, frequency of training and re-training); and

   ii) the occupational health and safety policy.

f) The Contractor shall immediately advise the General Manager or designate in the event of any of the following:

   i) A critical injury that arises out of Work that is the subject of the Contract;

   ii) An order(s) is issued to the Contractor by the Ministry of Labour arising out of the Work that is the subject of this agreement;

   iii) A charge is laid or a conviction is entered arising out of the Work that is the subject of the Contract, including but not limited to a charge or conviction under the OHSA, the Criminal Code, R.S.C 1985, c. C-46, as amended and the Workplace Safety and Insurance Act, 1997, S.O. 1997, c. 16, Sched. A, as amended.

   iv) The Contractor shall be responsible for any delay in the progress of the Work as a result of any violation or alleged violation of any federal, provincial or municipal health and safety requirement by the Contractor, it being understood that no such delay shall be a force majeure or uncontrollable circumstance for the purposes of extending the time for performance of the Work or entitling the Contractor to additional compensation, and the Contractor shall take all necessary steps to avoid delay in the final completion of the Work without additional cost to the Owner.

g) The Contractor shall be solely responsible for construction safety at the place of the work and for compliance with the rules, regulations, and practices required by the applicable construction health and safety legislation and shall be responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the performance of the Work.

39. Toxic and Hazardous Substances

a) If the Contractor:
   .1 encounters toxic or hazardous substances at the place of the work, or
   .2 has reasonable grounds to believe that toxic or hazardous substances are present at the place of work, which were not brought to the place of work by the Contractor or anyone whom the Contractor is responsible and which were not disclosed by the Owner, the Contractor shall
   .3 take all necessary steps, including stopping the Work, to ensure that no person;s exposure exceeds any applicable time weighted levels prescribed by applicable law, and
   .4 immediately report the situation to the Owner and the Consultant.

b) If the Owner and Contractor do not agree on the existence, significance of, or whether the toxic or hazardous substances were brought onto the place of the work by the Contractor or anyone for whom the Contractor is responsible, or whether any toxic or hazardous substances or materials already at the place of the work (and which were then harmless or stored, contained or otherwise dealt with in accordance with legal and regulatory requirements) were dealt with by the Contractor or anyone for whom the Contractor is responsible in a manner which does not comply with legal and regulatory requirements, or which threatens human health and safety or the environment, or material damage to the property of the Owner or others, the Owner shall retain and pay for an independent qualified expert to investigate and determine such matters. The expert's report shall be delivered to the Owner and the Contractor.

c) If the Owner and Contractor agree or if the expert referred to in paragraph (b) determines that the toxic or hazardous substances were brought onto the place of the work by the Contractor or anyone for whom the Contractor is responsible OR that any toxic or hazardous substances or materials already at the place of the work (and which were then harmless or stored, contained or otherwise dealt with in accordance with legal and regulatory requirements) were dealt with by the Contractor or anyone for whom the Contractor is responsible in a manner which does not comply with legal and regulatory requirements, or which threatens human health and safety or the environment, or material damage to the property of the Owner or others, the Contractor shall promptly at the Contractor's own expense:
   .1 take all necessary steps, in accordance with applicable legislation in force at the place of the work, to safely remove and dispose the toxic or hazardous substances;
   .2 make good any damage to the work, the Owner's property or property adjacent to the place of the work;
   .3 reimburse the Owner for reasonable costs incurred under paragraph (a) and as a result of the delay; and
   .4 indemnify the Owner as required by this Contract.

40. Workplace Safety and Insurance Board

a) The Contractor shall be in good standing with the Workplace Safety and Insurance Board ("WSIB") throughout the term of the Contract. If requested by the General Manager or designate, the Contractor shall produce certificates issued by the WSIB to the effect that they have paid in full their assessment based on a true statement of the amount of payrolls. If the Contractor is exempt from WSIB coverage, the Contractor shall provide evidence of such exemption satisfactory to the General Manager or designate; and

b) The Contractor shall provide such evidence prior to commencing the Work, subsequently with each application for progress payment, and at any time during the term of the Contract when requested by the General Manager or designate.

41. Ontarians with Disabilities Act, 2001 (ODA) and the Accessibility for Ontarians with Disabilities Act, 2005 (AODA)

The Successful Bidder shall ensure that all of its employees, agents, volunteers and any subcontractors comply with all applicable accessibility laws, regulations and by-laws,

including but not limited to the Ontarians with Disabilities Act, 2001 (ODA), the Accessibility for Ontarians with Disabilities Act, 2005 (AODA), Ontario Regulation 429/07 (Accessibility Standards for Customer Service) and Ontario Regulation 191/11 (Integrated Accessibility Standards), during the term of the Contract.

Without limiting the generality of the foregoing, the Successful Bidder shall ensure that all of its employees, agents, volunteers and any subcontractors who, as part of the Contract:

(a) deal with members of the public or other third parties, or
(b) participate in developing policies, practices and procedures governing the provision of goods or services to members of the public or other third parties,

receive training about the provision of its goods or services to persons with disabilities. The Successful Bidder shall ensure that such training includes, without limitation, a review of the purposes of the AODA and the requirements of Ontario Regulation 429/07.

Prior to commencing Work, the Successful Bidder shall provide a Statement of Acknowledgement to the City that it has read and understands the City's AODA Integrated Accessibility Standards and Customer Service Standard Handbook; that it has provided the training required by said Handbook; and that it will comply with the requirements of said Handbook and applicable accessibility laws, regulations and by-laws.

The City reserves the right to inspect the Successful Bidder's training records relating to Ontario Regulation 429/07 and Ontario Regulation 191/11, which must describe its training policy and summarize the training, including to whom the training has been given and when the training was given. The City also reserves the right to require the Successful Bidder to amend its training policies, practices and procedures if the City deems the training is not compliant with the requirements of Ontario Regulation 429/07 and Ontario Regulation 191/11.

See City of Hamilton's AODA Integrated Accessibility Standards and Customer Service Standard Handbook at:
https://www.hamilton.ca/people-programs/equity-diversity-inclusion/accessibility-services/accessibility-guidelines-policies#policies-procedures

42. Set-off

(a) The parties agree that the Owner has the contractual right to set-off against any amounts owing by the Owner to the Contractor under this Contract, any amount owed to the Owner by the Contractor, whether such amount arises from this Contract or under any other contract between the Owner and the Contractor, irrespective of whether or not those contracts are related or arise at equity or law. This right of set-off shall be subject to the Construction Act, as applicable.

(b) The costs to the Owner of sending or publishing any notice or document required by the Construction Act shall constitute damages to the Owner and may be retained by the Owner in accordance with its set-off rights.

43. Notices

All notices, requests, demands and other communications under the Contract shall be in writing and shall be deemed to have been given:

(a) on the day of delivery when delivered by hand;

(b) if transmitted by facsimile or email (during the transmission of which no indication of failure of receipt is communicated to the sender), on the day of sending if sent during regular business hours (Monday to Friday, 8:30 a.m. to 4:30 p.m.), or on the next business day if sent after normal business hours or if sent on a day when the administrative offices of the Owner are closed; or

(c) on the fifth business day after posting, if sent, during normal postal conditions, by registered or certified mail to the party for which it is intended and addressed as follows:

to the Contractor at the address set out on the Form of Quotation - Construction

to the Owner at the address given by the Owner at the commencement of the Contract.

Each party may change any such address by giving five days' prior written notice of such change to the other party in the manner prescribed above.

SUPPLEMENTARY CONTRACT TERMS AND CONDITIONS

In addition to any other terms and conditions contained elsewhere in this RFQ, the following terms and conditions form part of any contract(s) entered into between the Owner and any Successful Bidder(s) (the "Contractor") and are deemed to be incorporated into any purchase order(s) issued in connection with this RFQ.

1. Insurance

Throughout the term of the Contract the Contractor shall obtain and maintain at its own expense, including the cost of any applicable deductible, the following policies of insurance:

a) Commercial General Liability Insurance, written on IBC Form 2100 or its equivalent, including but not limited to bodily and personal injury liability, property damage, products liability, completed operations liability, owners & contractors protective liability, blanket contractual liability, premises liability, broad form property damage, employer's liability and voluntary compensation and contingent employer's liability coverage, having an inclusive limit of not less than $5,000,000 per occurrence. If a policy has an aggregate limit, the amount of the aggregate shall be double the required per occurrence limit. Coverage shall be included for injury/loss/damage, due to pollution arising from "hostile fires". The policy shall be endorsed to include the City of Hamilton as additional insured; and

b) Standard Form Automobile Liability Insurance that complies with all requirements of the current legislation of the Province of Ontario, having an inclusive limit of not less than) $2,000,000 per occurrence for Third Party Liability, in respect of the use or operation of vehicles owned, operated or leased by the Contractor for the provision of services.

(c) Non-Owned Automobile Liability Insurance in standard form having an inclusive limit of not less than $2,000,000 per occurrence in respect of vehicles not owned by the Contractor, that are used or operated on its behalf for the provision of services under the Contract;

The Contractor shall deliver to the Owner certificates of insurance originally signed by authorized insurance representatives, or, if required by the Owner, certified copies of such policies at the time of execution of the Contract or in any event prior to commencing the Work, and thereafter during the term of the Contract no later than 20 business days prior to the renewal date of each applicable policy. Such policies shall also require at least 30 days' written prior notice of any change to or amendment, cancellation, expiration or termination of the coverage under such policies to be given to the Owner.

Certificate Holder will be addressed as the City of Hamilton, and certificates shall be mailed to City Hall, 71 Main Street West, Hamilton, Ontario L8P 4Y5 Attention: **Senior Project Manager/Information Technology/Enterprise Solutions.**

2. Construction Schedule

The Work under this Contract must be substantially performed by **December 24, 2025**.

CITY OF HAMILTON

INFORMATION TECHNOLOGY

55 YORK BOULEVARD
HAMILTON, ONTARIO
(HPL)

UPS RELOCATION

PROJECT SPECIFICATIONS

SECTION 01 00 00 PROJECT PROCEDURES

PART 1 GENERAL

1.1 WORK SUMMARY

.1 The following is an overview of Work and is not a complete list or description. Contract Documents in their entirety fully describe Work, including items that may only be listed here.

.2 Scope Summary

.1 Remove existing window and wall section around window.

.2 Make 1.2-m x 2.4-m (4-ft x 8-ft) opening in raised floor.

.3 Seal underfloor ventilation system. Add temporary sealed wall around opening and wider than Work area, without damaging surfaces to protect IT room components from Work.

.4 Add equipment stands for UPS-B and battery cabinet.

.5 Add door, door frame, and reinstate wall to match existing.

.6 Measure airflows in washrooms served by EF-8.

.7 Add transfer and exhaust grilles and associated ducting.

.8 Rebalance airflows as required with EF-8 in operation.

.9 Relocate existing disconnect into IT room.

.10 Relocate existing panel board into IT room.

.3 Designated Substances

.1 Owner has retained an environmental consultant. Refer to environment consultant documents for designated substances.

.4 Allowances

.1 Cash Allowances - Disbursement Type

.1 UPS supplier.

.1 Relocating existing UPS and battery cabinet from existing location to temporary location to 1.2-m (4-ft) further away from wall, and extension cables if required.

.2 Replace missing battery cabinet rear panel.

.3 Review of final mounting locations and assistance with mount holes.

.4 Relocating existing UPS and battery cabinet from temporary location to final location.

.5 Turning on UPS and battery cabinet.

.5 Multiple Contracts

.1 Owner Provided During

.1 Owner has other ongoing or concurrent separate contracts.

.2 Coordinate and cooperate with other contractors responsible for project health and safety in compliance with the Occupational Health and Safety Act, with the following:

.1 Building control system:

.1 Schedule EF-8 to operate 24-h, 7-day/week.

.2 Environmental consultant.

.3 Designated substances abatement.

.6 General

.1 Provide Work as required, including configuration, testing, calibration, measurements, troubleshooting.

.2 Modify and remove existing services and components as required.

.3 Provide temporary services as required.

.4 Provide fully functional systems that are complete and ready for intended use and effect.

.7 Design Boundaries

.1 Project scope is limited to UPS and battery relocation and does not include any UPS or battery replacement or modification.

.2 Project requires use of EF-8 to operate 24-h, 7-day/week.

1.2 USE OF SITE AND PREMISES

.1 Schedule Restrictions
  .1 Arrange daily and weekly construction activities as required by Owner.
  .2 Arrange Work around:
    .1 Work being performed by others under separate contracts with Owner.
    .2 Normal use of the facility, including in areas affected by Work.
  .3 Arrange Work outside of occupied hours for:
    .1 Work in occupiable areas.
    .2 Work that may disrupt or disturb occupants.
    .3 Work requiring disruption of services to occupiable areas.
    .4 Work requiring disruption of services to critical systems as deemed by Owner.
    .5 Work involving disruption to building utility services.

.2 Request clarification of all matters regarding the use of site and premises that may impact construction activities.

.3 Meet Owner requirements during construction including:
  .1 Allowable construction hours.
  .2 Notices and scheduling of Work.
  .3 Notices and scheduling of disruption of services.
  .4 Facilities and utilities use.
  .5 Parking.
  .6 Security requirements.
  .7 Identification requirements.
  .8 Access requirements including availability and requirements of use for elevators, loading areas and pathways.
  .9 Disruption mitigation requirements including noise, vibration, dust, combustion gases, and smoke.
  .10 Submission of written plans for various aspects of Work for review by Owner, including phase-in planning, disruption mitigation, emergency procedures, MOP.
  .11 Hazardous materials.
  .12 Storage requirements.
  .13 Disposal requirements including for garbage and debris.
  .14 Cleanliness and organization of work areas including for tools, materials, equipment.
  .15 Cleanliness and visual appearance of areas affected by Work.
  .16 Protection of surfaces and other items affected by Work.
  .17 Specific Limitations
    .1 Construction Hours
      .1 Work is required to be completed outside of normal facility operating hours.
      .2 Work in various areas is required to be completed outside of normal facility operating hours.
      .3 Work in occupiable spaces is required to be completed outside of normal occupied hours.
      .4 Work in some areas is required to be completed during arranged shutdown periods.
      .5 Prior to the beginning of arranged site operations each day, remove visual evidence of Work from occupied areas such that occupants should be unable to visually determine that areas were impacted by Work.
    .2 Disruption Notices: Disruption of any services for any duration requires advance notice and approval by Owner. Adhere to advance notice requirements stipulated by Owner.
    .3 Parking Lot Use
      .1 No parking spaces available.

.2 Site has limited parking spaces available except for loading and unloading materials to site.
.3 A limited quantity of parking spaces may be temporarily blocked off at 1 time for loading and unloading and must be coordinated with Owner.
.4 Storage use in parking and driving areasis available only for placement of 1 shipping container with dimensions of 6.10-m long x 2.44-m wide x 2.59-m high (20-ft x 8-ft x 8.5-ft), in furthest corner, and must be coordinated with Owner.

.4 Building Storage Use
.1 Not available.

.5 Identification Requirements: Contractor company and name tags for every individual must be worn readily visible and at all times while on site.
.6 Access Requirements: Minimize use of public access entrances and exits where possible, otherwise coordinate and arrange use.
.7 Fire Watch: Fire watch required for Work requiring temporary bypassing or interference to fire alarm system including fire detection and fire suppression.

.4 Emergency and Egress: Maintain facility emergency and means of egress characteristics during construction as required by Owner and AHJ, including system operations, access and clearances including pathways, doors, gates.

.5 Disruption
.1 Do not disrupt facility except as specifically identified in Contract Documents.
.2 Disruption of facility includes interference with:
.1 Maintenance activities, site staff, Engineer or Owner's access to facility.
.2 Normal use of facility, including activities that may be temporarily suspended as a result of Work, either within or outside of areas affected by Work.
.3 Activities temporarily suspended as a result of Work may resume at various milestone dates, including full resumption of normal facility use in all areas as is required to be achieved by Contract Time, regardless of whether or not Work completion required is actually achieved by this date.

1.3 WORK PROGRESSION

.1 The following is an overview of specific Work progression limitations and is not a complete description. Contract Documents in their entirety fully describe Work, including items that may only be listed here. Work progression limitations include:

.2 General
.1 Work may require use of particular means, methods, sequences, techniques, or procedures of construction not explicitly described in Contract Documents, which may require use of particular or specialty trades.
.2 Available space for new products and services is limited. Modify layouts, routing, mounting and existing services as required by Work. Modify new products mounting, supporting structures and frames, and nearby existing services as required by Work.
.3 Work may affect operational systems and components. Minimize disruption of operational systems and components by completing Work in portions with all materials for Work ready and at location before disrupting systems and components.

.3 Phase-In Completion Specific Limitations
.1 Investigation
.1 Considerable investigation may be required to become familiar with details and systems affected by and required of Work.
.2 Access and Openings
.1 Temporary removal of components on surfaces and separations and/or temporary openings larger than sizes of finished access components may be required to facilitate completing Work.

.4 Coordination With Others Additional Specific Considerations
.1 AHJ

.1 Work requires specific review and inspection.

.5 Site Characteristics Additional Specific Considerations
.1 Site is an active and occupied building.

.6 Operating Systems Additional Disruption Limitations and Considerations
.1 Electrical circuits disruptions are limited as indicated, otherwise to 2 shutdowns of 30-min duration for each separate circuit when loads on circuit are required to stay operating and when temporary utilities or services are not provided.

1.4 REFERENCED DOCUMENTS

.1 ASA-S12.2: ASA/ANSI-S12.2-2019 Criteria for Evaluating Room Noise.
.2 ASHRAE-62.1: ANSI/ASHRAE-62.1-2022 Ventilation and Acceptable Indoor Air Quality, including User's Manual.
.3 ASHRAE-62.2: ANSI/ASHRAE-62.2-2022 Ventilation and Acceptable Indoor Air Quality in Low-Rise Residential.
.4 ASHRAE-90.1: ANSI/ASHRAE/IES-90.1-2022 Energy Standard for Buildings Except Low-Rise Residential, including User's Manual.
.5 ASHRAE-90.2: ANSI/ASHRAE-90.2-2018 Energy-Efficient Design of Low-Rise Residential.
.6 ASHRAE-HBA: ASHRAE Handbook, HVAC Applications, 2023.
.7 ASHRAE-HBF: ASHRAE Handbook, Fundamentals, 2021.
.8 ASHRAE-G-4: ASHRAE-G-4-2019 Preparation of Operating and Maintenance Documentation for Building Systems.
.9 ASME-Y14.1: ASME-Y14.1-2020 Drawing Sheet Size and Format.
.10 ASTM-B258: ASTM-B258-2018 Standard Specification for Standard Nominal Diameters and Cross-Sectional Areas of AWG Sizes of Solid Round Wires Used as Electrical Conductors.
.11 ASTM-C423: ASTM-C423-2022 Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.
.12 ASTM-D1418: ASTM-D1418-2022 Standard Practice for Rubber and Rubber Latices - Nomenclature.
.13 ASTM-E84: ASTM-E84-2023 Standard Test Method for Surface Burning Characteristics of Building Materials.
.14 ASTM-E631: ASTM-E631-2015 (R2024) Standard Terminology of Building Constructions.
.15 CSA-C22.2-0.17: CSA-C22.2 No. 0.17-2022 Evaluation of Properties of Polymeric Materials.
.16 CSA-C22.2-60529: CSA-C22.2 No. 60529-2016 (R2021) Degrees of Protection Provided by Enclosures (IP Code).
.17 IEC-61672: IEC-61672-2013 Series: Electroacoustics - Sound Level Meters.
.18 ISO-10918-1: ISO/IEC-10918-1-1994 (R2017) Information Technology - Digital Compression and Coding of Continuous-Tone Still Images: Requirements and Guidelines.
.19 ISO-10918-1: ISO/IEC-10918-1-1994 (R2017) Information Technology - Digital Compression and Coding of Continuous-Tone Still Images: Requirements and Guidelines.
.20 ISO-32000-1: ISO-32000-1-2008 (R2023) Document Management - Portable Document Format, Part 1: PDF 1.7.
.21 ISO-80000: ISO-80000-2022 Series: Quantities and Units.
.22 MTO-OTM-B7: MTO Ontario Traffic Manual - Book 7 - Temporary Conditions, 2022.
.23 NECA-200: NECA-200-2016 Installing and Maintaining Temporary Electric Power.
.24 NECA-404: ANSI/NECA-EGSA-404-2014 Installing Generator Sets.
.25 NECA-405: NECA-405-2001 Installing and Commissioning Interconnected Generation Systems.
.26 SMACNA-008: ANSI/SMACNA-008-2008 Guidelines for Occupied Buildings Under Construction.
.27 UL-94: ANSI/UL-94-2023 Tests for Flammability of Plastic Materials for Parts in Devices and Appliances.

.28 UL-723: ANSI/UL-723-2018 Test for Surface Burning Characteristics of Building Materials.
.29 UL-2043: ANSI/UL-2043-2023 Fire Test for Heat and Visible Smoke Release for Discrete Products and Their Accessories Installed in Air-Handling Spaces.
.30 ULC-S101: CAN/ULC-S101-2014 Standard Methods of Fire Endurance Tests of Building Construction and Materials.
.31 ULC-S102: CAN/ULC-S102-2018 Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies.
.32 ULC-S102.2: CAN/ULC-S102.2-2018 Standard Method of Test for Surface Burning Characteristics of Flooring, Floor Coverings, and Miscellaneous Materials and Assemblies.
.33 ULC-S102.3: CAN/ULC-S102.3-2018 (R2023) Standard Method of Fire Test of Light Diffusers and Lenses.
.34 ULC-S102.4: CAN/ULC-S102.4-2017 (R2022) Standard Method of Test for Fire and Smoke Characteristics of Electrical Wiring, Cables and Non-Metallic Raceways.
.35 ULC-S104: CAN/ULC-S104-2015 (R2020) Standard Method for Fire Tests of Door Assemblies.
.36 ULC-S105: CAN/ULC-S105-2016 (R2020) Standard Specification for Fire Door Frames Meeting the Performance Required by CAN/ULC-S104.
.37 ULC-S106: CAN/ULC-S106-2015 (R2020) Standard Method for Fire Tests of Window and Glass Block Assemblies.
.38 ULC-S109: CAN/ULC-S109-2014 (R2019) Flame Tests of Flame Resistant Fabrics and Films.
.39 ULC-S110: CAN/ULC-S110-2013 (R2023) Standard Methods of Test for Air Ducts.
.40 ULC-S111: CAN/ULC-S111-2013 (R2018) Standard Method of Fire Tests for Air Filter Units.
.41 ULC-S112: CAN/ULC-S112-2010 (R2021) Standard Method of Fire Test of Fire Damper Assemblies.
.42 ULC-S112.1: CAN/ULC-S112.1-2010 (R2021) Leakage Rated Dampers for Use in Smoke Control Systems.
.43 ULC-S113: CAN/ULC-S113-2016 (R2020) Standard Specification for Wood Core Doors Meeting the Performance Required by CAN/ULC-S104 for Twenty Minute Fire Rated Closure Assemblies.
.44 ULC-S114: CAN/ULC-S114-2018 Standard Method of Test for Determination of Non-Combustibility in Building Materials.
.45 ULC-S115: CAN/ULC-S115-2023 Standard Method of Fire Tests of Firestop Systems.
.46 ULC-S139: CAN/ULC-S139-2017 Fire Test for Evaluation of Integrity of Electrical Power, Data and Optical Fibre Cables.
.47 ULC-S143: CAN/ULC-S143-2014 (R2019) Fire Tests for Non-Metallic Electrical and Optical Fibre Cable Raceway Systems.
.48 ULC-S144: CAN/ULC-S144-2012 (R2022) Standard Method of Fire Resistance Test - Grease Duct Assemblies.

1.5 DEFINITIONS, BREVITY AND INCLUSIVENESS

.1 Acronyms and Abbreviations Definition: May include single words that are definitions. May not include distinct and separate definitions used, such as with product options.
  .1 AABC: Associated Air Balance Council.
  .2 AAMA: American Architectural Manufacturers Association (currently Fenestration & Glazing Industry Alliance).
  .3 ACI: American Concrete Institute.
  .4 Acrylic: May refer to various compounds, acids, polymers, resins, fibers, paints. May include PMMA.
  .5 AFCI: Allowance Furnished Contractor Installed During Contract.
  .6 AHJ: Authorities having jurisdiction over regulatory requirements, including local and governing.

.7 AISI: American Iron and Steel Institute.
.8 AMCA: Air Movement and Control Association International, Inc..
.9 ANSI: The American National Standards Institute, Inc..
.10 APD: Allowance Provided During Contract.
.11 ASA: The Acoustical Society of America.
.12 ASHRAE: American Society of Heating, Refrigerating and Air-Conditioning Engineers.
.13 ASJ: All-service-jacket. Generally a reinforced paper laminated to aluminum foil.
.14 ASME: American Society of Mechanical Engineers.
.15 ASTM: ASTM International (previously American Society for Testing and Materials International).
.16 AWG: American wire gauge. Also known as the Brown & Sharpe wire gauge. To ASTM-B258.
.17 AWPA: American Wood Protection Association (previously American Wood Preservers' Association).
.18 AWS: American Welding Society.
.19 BHMA: Builders Hardware Manufacturers Association.
.20 CAA: Clean Air Act (United States).
.21 CAABC: Canadian Associated Air Balance Council.
.22 CARB: California Air Resources Board.
.23 CGC: Canadian GeoExchange Coalition.
.24 CEPA: Canadian Environmental Protection Act.
.25 CGSB: Canadian Government Standards Board.
.26 CISC: Canadian Institute of Steel Construction.
.27 CSA: CSA Group (previously Canadian Standards Association).
.28 CSDMA: Canadian Steel Door Manufacturer's Association.
.29 cUL: UL listing and classification mark for product tested by UL and meeting applicable standards for Canada.
.30 cULus: UL listing and classification mark for product tested by UL and meeting applicable standards for Canada and United States.
.31 CWB: The Canadian Welding Bureau.
.32 dBA: Decibel A-weighting. A form of frequency weighting relating to the measurement of sound pressure level in decibels, and applied to instrument-measured sound levels to account for the relative loudness perceived by the human ear. To IEC-61672.
.33 dBC: Decibel C-weighting. A form of frequency weighting relating to the measurement of sound pressure level in decibels, and applied to instrument-measured sound levels to account for the relative loudness perceived by the human ear. To IEC-61672.
.34 DFT: Dry film thickness.
.35 DOD: Department of Defense (United States).
.36 DVD: Digital versatile disc. A digital optical disc storage format. In a formal sense may be referred to as “digital video disc”.
.37 EGSA: The Electrical Generating Systems Association.
.38 EMC: Electromagnetic compatibility.
.39 EPA: Environmental Protection Agency (United States).
.40 EPDM: Ethylene propylene diene monomer. A type of synthetic rubber. To ASTM-D1418.
.41 ESA: Electrical Safety Authority (Ontario).
.42 EUL: European Union Legislation.
.43 FDA: Food and Drug Administration (United States).
.44 FSK: Foil-scrim-kraft facing. Generally a kraft paper layered onto a fiberglass scrim layered onto an aluminum foil.
.45 GA: Gypsum Association.
.46 GPS: Global Positioning System. A satellite-based radio navigation system. Owned by DOD.

.47 GSI: Green Seal, Inc..
.48 HCHO: Formaldehyde.
.49 HMMA: Hollow Metal Manufacturers Association (a division of The National Association of Architectural Metal Manufacturers).
.50 HPVA: Hardwood Plywood and Veneer Association (currently Decorative Hardwoods Association).
.51 HVAC: Heating, ventilating and air-conditioning. Including outdoor air, air quality, pressurization, cooling, humidification, de-humidification.
.52 IEC: International Electrotechnical Commission.
.53 IES: Illuminating Engineering Society (previously Illuminating Engineering Society of North America).
.54 IETF: Internet Engineering Task Force, operating under ISOC.
.55 IP: May refer to ingress protection. May refer to Internet Protocol, a foundational protocol of IPS, standardized and maintained by IETF.
.56 IPS: Internet Protocol Suite. A framework for organizing the set of communication protocols used in the internet and similar computer networks according to functional criteria and standardized and maintained by IETF with foundational protocols of IP, TCP, UDP. Commonly referred to as TCP/IP.
.57 ISO: The International Organization for Standardization.
.58 ISOC: The Internet Society.
.59 IUPAC: International Union of Pure and Applied Chemistry. An international federation of National Adhering Organizations working for the advancement of the chemical sciences, especially by developing nomenclature and terminology.
.60 JPEG: Joint Photographic Experts Group. Image file format to ISO-10918-1.
.61 LBC: Local building code, including OBC, local by-laws including municipality.
.62 LFC: Local fire code, including OFC, local by-laws including municipality.
.63 MECP: Ministry of the Environment, Conservation and Parks (Ontario).
.64 MOL: Ministry of Labour (Ontario).
.65 MOP: Method(s) of procedure.
.66 MPI: Master Painters Institute Inc..
.67 MTO: Ministry of Transportation Ontario.
.68 NAAMM: The National Association of Architectural Metal Manufacturers.
.69 NACE: National Association of Corrosion Engineers International (currently The Association for Materials Protection and Performance).
.70 NACMA: The National Armored Cable Manufacturers Association.
.71 NC: May refer to normally closed. May refer to noise criteria. Noise criteria is based on a measurement of sound pressure levels across 10 1/3 octave bands from at 16/31.5/63/125/250/500/1,000/2,000/4,000/8,000-Hz that defines the limits of the octave band spectra that must not be exceeded to meet the occupants acceptance in the actual spaces, based on permitting occupant speech communication satisfactorily without annoyance and noticing noise, resulting in a chart with a set of sound pressure criteria curves typically in steps of 5-NC. To ASA-S12.2.
.72 NEBB: National Environmental Balancing Bureau.
.73 NECA: National Electrical Contractors Association.
.74 NEMA: National Electrical Manufacturers Association.
.75 Neoprene: A family of synthetic rubbers that are produced by polymerization of chloroprene (polychloroprene), made in rubber or latex form. Also referred to as polychloroprene or chloroprene rubber.
.76 NFPA: National Fire Protection Association.
.77 NIST: The National Institute of Standards and Technology.
.78 NRC: Noise reduction coefficient. The average of the sound absorption coefficients of a test specimen for the 4 1/3 octave bands at 250/500/1,000/2,000-Hz rounded to the nearest multiple of 0.05. To ASTM-C423.

.79 NSF: NSF International (previously National Sanitation Foundation).
.80 OBC: Ontario Building Code, including regulation under OBCA.
.81 OBCA: Ontario Building Code Act, including OBC regulation.
.82 OBOSTA: Ontario Building Opportunities in the Skilled Trades Act.
.83 OFC: Ontario Fire Code, including regulation under OFPPA.
.84 OFCI: Owner Furnished Contractor Installed During Contract.
.85 OFPPA: Ontario Fire Prevention and Protection Act, including OFC regulation.
.86 OPD: Owner Provided During Contract.
.87 OPL: Owner Provided Later Not During Contract.
.88 OSMCA: Ontario Sheet Metal Contractors Association.
.89 OTC: Ozone Transport Commission (United States). A multi-state organization created under CAA.
.90 PDF: Portable Document Format. File format to ISO-32000-1.
.91 PEX: Cross-linked polyethylene. A form of polyethylene with cross-links. Also referred to as XLPE.
.92 PMMA: Polymethyl methacrylate (example: Acrylite, Lucite, Plexiglass). A synthetic polymer thermoplastic derived from methyl methacrylate. Also referred to as acrylic, acrylic glass.
.93 POM: Polyoxymethylene (example: Celcon, Delrin). A copolymer of formaldehyde or a homopolymer of anhydrous formaldehyde thermoplastic. Also referred to as acetal, polyacetal, polyformaldehyde.
.94 PTFE: Polytetrafluoroethylene (example: Teflon). A synthetic fluoropolymer of tetrafluoroethylene.
.95 PTW: Permit(s) to work.
.96 PVC: Polyvinyl chloride. A type of synthetic polymer.
.97 RFC: Request for clarification.
.98 RFS: Request for substitution.
.99 ROHS: Restriction of Hazardous Substances.
.100 SAE: SAE International (previously Society of Automotive Engineers).
.101 SCAQMD: South Coast Air Quality Management District.
.102 SCC: Standards Council of Canada.
.103 SDI: The Steel Door Institute.
.104 SMACNA: Sheet Metal and Air Conditioning Contractors' National Association, Inc..
.105 SOR: Canada Federal Statutory Orders and Regulations.
.106 SSD: Solid-state drive.
.107 SSPC: The Society for Protective Coatings (currently The Association for Materials Protection and Performance).
.108 TAB: Testing, adjusting, and balancing. Generally used to describe requirements of testing including procedures for adjusting and balancing of systems, equipment and components, including for HVAC.
.109 TCP: Transmission Control Protocol. A foundational protocol of IPS. Standardized and maintained by IETF.
.110 UDP: User Datagram Protocol. A foundational protocol of IPS. Standardized and maintained by IETF.
.111 UL: Underwriters Laboratories Inc..
.112 ULC: Underwriters Laboratories of Canada.
.113 ULE: UL Environment, a wholly owned subsidiary of UL.
.114 UPS: Uninterruptible power supply.
.115 USB: Universal Serial Bus. An industry based standard for a digital port on components such as computers and used for connection of peripheral connected components.
.116 USDA: United States Department of Agriculture.
.117 VOC: Volatile organic compound.

.118 WDMA: Window & Door Manufacturers Association.
.119 WFT: Wet film thickness.
.120 XLPE: Cross-linked polyethylene. A form of polyethylene with cross-links. Also referred to as PEX.

.2 Words and Terms Brevity
.1 Specific words or terms including the following have been omitted for brevity or replaced for brevity, the absence of which in no way limits the scope of the description:
.1 "All" may be omitted.
.2 "To" may have replaced "in accordance with" or "in accordance to".
.3 The word "including" or the word "includes" is defined as "including but not limited to".

.3 Words and Terms Inclusiveness
.1 Lists of products, qualities, or requirements may be listed after inclusive statements for various purposes including for clarification or examples. The absence of list items does not limit the inclusiveness of such statements.

.4 Words and Terms Definition
.1 "AFCI" or "Allowance Furnished Contractor Installed During Contract": Products furnished by Contractor that are paid for within allowances during Contract Time and may include specific execution activities where indicated, with remaining Work by Contractor included in Contract Documents and Contract Price.
.2 "APD" or "Allowance Provided During Contract": Construction and related activities that are part of Work that are paid for within allowances during Contract Time, with remaining Work by Contractor included in Contract Documents and Contract Price.
.3 "air handling spaces": Unless specifically differentiated within each separate Article of Paragraph, this term includes various spaces that have regulatory limitations, including LBC and LFC, or are similar to spaces that have regulatory limitations. Limitations may include ratings that are more stringent than other ratings such as on materials only. Includes plenums, horizontal service spaces, vertical service spaces, shafts, connected spaces.
.4 "applicable": As appropriate for the particular condition, circumstance or situation.
.5 "approve(d)": Approval action limited to the duties and responsibilities of the party giving approval, as stated in Contract Documents. Approvals are valid only if obtained in writing and do not apply to matters regarding means, methods, techniques, sequences and procedures of construction. Approval does not relieve Contractor from responsibility to fulfill requirements of Contract Documents. Where party giving approval is not indicated, request clarification from Engineer on who approving party is, including potentially Owner or AHJ.
.6 "capability": Provide products as required including equipment and components ready to make Work perform and/or operate as specified, for future intent purpose and configuration.
.7 "code": Refer to "regulation".
.8 "component": When used in a specific sense, a product or assembly that is described in Specifications or Drawings, is ancillary to equipment, or is connected to services or systems. When used in a general sense, may be referring to any product or assembly not specifically only a system, service, equipment.
.9 "concealed": Equipment, services and components that are not immediately exposed to view from a standing position on the normal walking path, including those that may be located behind doors, hatches, covers, access panels, inside enclosures, or in areas not easily accessible and visible without crouching, passing through spaces narrower than 61-cm (24-in), or using assistive devices not permanently mounted including ladders, lifts, illumination.

.10 "configure": Complete activities required to meet performance and functionality requirements including initialization, jumper and dip switch setting, software parameter selection, programming, testing, commissioning, tuning and adjusting.
.11 "Consultant": Same as "Consultant" as defined in Contract Documents. Otherwise the administrator of the Contract Documents.
.12 "Contract Documents": Same as "Contract Documents" as defined in Contract Documents. Otherwise the documents which form the Contract, including the bid documents.
.13 "Contract Time": Same as "Contract Time" as defined in Contract Documents. Otherwise the date identified in Contract Documents as Ready-for-Takeover.
.14 "Contractor": Same as "Contractor" as defined in Contract Documents. Otherwise the entity named to complete Work including construction and related activities required to meet Contract Documents.
.15 "Correction Period": Same as "Correction Period" as defined in Contract Documents. Otherwise as defined in this document.
.16 "Crown": The Crown in right of Canada and in right of all Canadian provinces.
.17 "delegated professional design": Provision of Contractor retained professional designers such as architecture and engineering with design documents with licensed and insured personnel and companies. Otherwise as described in this document.
.18 "directed": Limited to duties and responsibilities of Owner or Engineer as stated in Contract Documents, meaning as instructed by Owner or Engineer, in writing, regarding matters other than means, methods, techniques, sequences and procedures of construction. Terms such as "directed," "requested," "authorized," "selected," "approved," "required," and "permitted" mean "directed by Owner," "directed by Engineer," "requested by Owner," and similar phrases. No implied meaning to be interpreted to extend responsibility of Owner, Engineer or other professional designers as indicated into Contractor's supervision of construction.
.19 "Drawings": The electronic version of that portion of Contract Documents, wherever located and whenever issued, generally containing quantitative aspects of Work, generally including notes, schedules, graphic representations, diagrams, plans, details.
.20 "equal" or "equivalent": As determined by Engineer or other indicated responsible professional designer as being equivalent, considering various attributes including durability, finish, suitability, quality, utility, aesthetics, functionality, performance.
.21 "equipment": When used in a specific sense, a product or assembly that is described in Specifications or Drawings, or is connected to services or systems. When used in a general sense, may be referring to any product or assembly not specifically only a system, service, component.
.22 "Engineer": Same as "Engineer" as defined in Contract Documents. Otherwise the publisher of the technical documents.
.23 "exposed": Means not "concealed".
.24 "functional": Same as "functionality".
.25 "functionality": Provide Work as required to be complete in every respect and fully operational to meet requirements and intent, including installation, finishing, configuring, programming, calibrating, testing, commissioning, training, servicing.
.26 "furnish": Supply and deliver to site, ready for unloading, unpacking, assembly, installation, and similar operations.
.27 "indicated": Refers to content within Contract Documents including Specifications or Drawings, including graphic representations, schedules, descriptions, notes. Terms such as "shown", "noted", "scheduled", and "specified" are used to help the reader locate the reference. There is no limitation on location of reference within Contract Documents.
.28 "install": Describes activities and operations to make fully functional systems that are completed and ready for intended use and effect, often on site, including the unloading,

unpacking, assembly, erection, placing, anchoring, applying, curing, finishing, labelling, documenting, verifying, inspecting, testing, demonstrating, cleaning, protecting, adjusting.

.29 "installation": May refer to either portions of activities and operations related to install, or a portion of new or existing products fully installed.

.30 "installer": Contractor or an entity engaged by Contractor, including an employee, subcontractor or sub-subcontractor, for performance of a particular construction activity, including installation, erection, similar operations. Installers to be experienced in the operations they are engaged to perform.

.31 "intent": Refer to "functionality".

.32 "municipality": Generally referring to the local municipality, including as applicable single-tier or both upper-tier and lower-tier, and includes municipal services provided across municipal borders, including for geographic areas such as territories without municipal organization.

.33 "OFCI" or "Owner Furnished Contractor Installed During Contract": Products furnished by others under separate contract during Contract Time and may include specific execution activities where indicated, with remaining Work by Contractor included in Contract Documents and Contract Price.

.34 "OPD" or "Owner Provided During Contract": Construction and related activities not part of Work that are provided by Owner or others under separate contract during Contract Time, with remaining Work by Contractor included in Contract Documents and Contract Price.

.35 "OPL" or "Owner Provided Later Not During Contract": Same as OPD, but where the construction and related activities provided by Owner or others are provided at a later date not during Contract Time.

.36 "or approved equal" or "or approved equivalent": Applicable for substitutions achieving the result of being accepted to Substitutions Article in this Section.

.37 "Owner": Same as "Owner" as defined in Contract Documents. Otherwise the entities that are the actual Owner, or the Owner's authorized agent or representative or other retained entities, and that have authority in the Contract Documents.

.38 "products": Same as "Product" as defined in Contract Documents. Otherwise materials including equipment and components forming Work.

.39 "project": Same as "Project" as defined in Contract Documents. Otherwise construction and related services of which Work may be the whole or a part.

.40 "proper": As determined by Engineer or other indicated responsible professional designer as being proper for Work, excluding matters which are solely Contractor's responsibility to determine such as means, methods, techniques, sequences and procedures of construction.

.41 "provide": Completion of Work fully functioning and fully performing, including existing to be removed, relocated, modified.

.42 "Ready-for-Takeover": Same as "Ready-for-Takeover" as defined in Contract Documents. Otherwise as indicated in Contract Documents. Otherwise, halfway in between Substantial Performance and Total Performance. Otherwise, 2-week after Substantial Performance. In all cases, requires various operational aspects fully complete, including commissioning, closeouts, training, demonstrations.

.43 "regulation": Includes laws, statutes, regulations, orders, ordinances, codes, and standards issued or used by AHJ over Work. Includes federal, provincial and municipal governmental agencies, governing and AHJ, utilities, utility districts and other agencies serving the site. Includes rules, practices, conventions and agreements of AHJ and within the construction industry that control requirements and performance of Work.

.44 "regulatory": As required by regulation.

.45 "required": Necessary for Work to be complete and fully functioning and fully performing to requirements of Contract Documents, including:

.1 Duties and responsibilities indicated or inferred in Contract Documents.
.2 Specific indicated requirements, including:
.1 In Specifications, including descriptions, references.
.2 In Drawings, including schedules, graphic representations, notes.
.3 General indicated requirements, including:
.1 In Specifications, including methodologies, approaches, procedures.
.2 In Drawings, including convenience warnings.
.4 Direct referenced requirements, including regulation, referenced documents, manufacturer literature.
.5 Indirect referenced requirements, including regulation, referenced documents, manufacturer literature, specific trade and construction industry best practices.
.6 Inferred requirements, including regulation, recognized trade and construction industry good practices.

.46 "requirements": Aspects of Work that are required.

.47 "selected": As selected by Owner, Engineer or other indicated responsible professional designer from the full selection of the manufacturer's products, unless specifically limited in Contract Documents to a particular aspect, including quality, colour, texture or price range.

.48 "service": When used as a noun in a specific sense, a collection of products including components that is described in Specifications or Drawings, may be and may form a portion of a system. When used as a noun in a general sense, may be referring to any aspect not specifically only a system, equipment, component. May also be referring to ongoing activities to be completed and/or by specific entities, including on systems, equipment, components.

.49 "shop drawings": Same as "shop drawings" as defined in Contract Documents, and additionally including all submittals as defined in Specifications and Drawings. Otherwise, a type of submittal, may be generally referring to drawings of assemblies to be fabricated.

.50 "site": Same as "site of work" or "project site" or "job site". The area or areas or spaces occupied by project and including adjacent areas and other related areas occupied or used by Contractor for construction activities, either exclusively or with others performing other construction on project.

.51 "Specifications": The electronic version of that portion of Contract Documents, wherever located and whenever issued, generally containing both qualitative and quantitative aspects of Work, including products, execution, activities, procedures, requirements.

.52 "submittals": Same as "shop drawings" as defined in Contract Documents, and additionally including all submittals as defined in Specifications and Drawings. Otherwise, submittals as defined in Specifications and Drawings.

.53 "Substantial Performance": Same as "Substantial Performance of the Work" as defined in Contract Documents. Otherwise to substantial performance requirements of local construction regulation.

.54 "Substantial Performance Review": The review to assess if Work is substantially performed.

.55 "standby power": Electrical power generated on site and used during periods of utility power failure, whether or not the site generated power is used only during periods of utility power failure, and whether or not the site generated power is used for loads required to be supplied by emergency power.

.56 "statute": Same as "regulation".

.57 "statutory": Same as "regulatory" but for statutes.

.58 "supply": Refer to "furnish".

.59 "system": When used in a specific sense, a collection of services and products including equipment and components that is described in Specifications or Drawings. When used

in a general sense, may be referring to any aspect not specifically only a service, equipment, component.

.60 "user": The person authorized to use the system, equipment, components, including Owner staff, operators, manufacturers, manufacturer's representatives, service providers.

.61 "Warranty Period": Same as "Warranty Period" as defined in Contract Documents. Otherwise as defined in this document and minimum for 1-year from Ready-for-Takeover.

.62 "Work": Same as "Work" as defined in Contract Documents. Otherwise includes construction and related activities required to meet Contract Documents.

.5 Names Definition: Names for manufacturers and products are defined in the following order:

.1 As determined by Engineer.

.2 As generally recognized by construction industry practice.

.6 Other Definition: Abbreviations, acronyms, other names, other words, other terms, other names, measurement units, and any other not otherwise specifically defined in this Section or in Contract Documents are defined in the following order:

.1 As determined by Engineer when a potential or perceived conflict exists between Specifications and Drawings.

.2 As determined by Engineer when a potential or perceived conflict exists between Contract Documents and any of the following.

.1 As required by regulation.

.2 As described by indicated referenced documents.

.3 As described by the following referenced documents.

.1 ASTM-E631.

.2 ISO-80000.

.4 As described in specialty dictionaries in the following order:

.1 Dictionary of Architecture and Construction, Latest Edition (Cyril M. Harris, McGraw-Hill Professional).

.2 Encyclopedia of Associations, online directory by Thomson Gale, accessible through many public libraries.

.3 As determined by Engineer when a potential or perceived conflict has been evaluated. Input may be provided by Contractor on definitions based on the following in the following order:

.1 As generally recognized by construction industry practice.

.2 As generally recognized by trade practice.

.3 As generally recognized by trade licensing, training, education.

.4 As included in referenced documents by publishing organizations generally recognized as suitable references. Examples: Nomenclature and terminology to ASHRAE handbooks, IUPAC.

1.6 MULTIPLE CONTRACTS SUMMARY

.1 Other Contracts

.1 To the extent Contractor has control over or must coordinate with or must complete Work in same or related areas and systems, manage and report on Work completed or to be completed under separate contracts, related contracts, subcontracts that have indicated specific requirements. Manage and report includes planning, scheduling, progress made, completion, invoicing projections.

.2 Owner Provided During

.1 Owner has other ongoing or concurrent separate contracts.

.2 Coordinate and cooperate with other contractors responsible for project health and safety in compliance with the Occupational Health and Safety Act, with the following:

.1 Building control system:

.1 Schedule EF-8 to operate 24-h, 7-day/week.

.2 Building control system supervisory controller panel configuration, start-up.
.2 Environmental consultant.
.3 Designated substances abatement.
.3 Regularly meet with other contractors, and coordinate activities with other contractors as required.
.3 Other Construction and Related Activities
.1 Construction and related activities are fully part of Work unless otherwise indicated by AFCI, OFCI, OPD and OPL.
.2 OFCI Products
.1 Owner duties and responsibilities:
.1 Arrange for delivery of submittals, product data, samples, manufacturers' requirements, and certificates to Contractor.
.2 Deliver supplier's bill of materials to Contractor.
.3 Arrange and pay for delivery to site if not being picked up by Contractor to progress schedule.
.4 Inspect deliveries jointly with Contractor.
.5 Submit claims for transportation damage.
.6 Arrange for replacement of damaged, defective, or missing items.
.7 Arrange for manufacturer's field services, arrange for and deliver manufacturer's warranties to Contractor.
.2 Contractor duties and responsibilities for Work other than above including:
.1 Designate submittals and delivery date for each product in progress schedule.
.2 Prepare submittals, including submittals, layouts, products. Submit to Engineer notification of any observed discrepancies or problems anticipated due to non-conformance with Contract Documents.
.3 Ship from Owner's preferred location to site if not being delivered to site by Owner.
.4 Receive and unload products at site.
.5 Inspect deliveries jointly with Owner. Record shortages and damages or defective items.
.6 Handle products at site, including un-crating and storage.
.7 Protect products from damage, and exposure to elements.
.8 Install products as indicated, including assembling, hoisting, rigging, moving, mounting.
.9 Arrange for and participate in manufacturer activities, including start-up.
.10 Arrange for and participate in site reviews and required inspections reviews by AHJ.
.11 Repair or replace items damaged by Contractor.
.12 Assume product warranties unless otherwise indicated.
.3 AFCI Products
.1 Owner duties and responsibilities:
.1 Inspect deliveries jointly with Contractor.
.2 Contractor duties and responsibilities:
.1 Remaining Work.
.4 OPD
.1 Provide necessary Work to make concurrent OPD construction and related activities complete and fully functional in every respect, including field finishing, configuration, and commissioning, except to the extent such related activities have been specifically identified as included with OPD.
.5 OPD Products
.1 Contractor additional duties and responsibilities:

.1 Review shop drawings, submittals, product data. Submit to consultant notification of any observed discrepancies or problems anticipated due to non-conformance with Contract Documents.
.2 Arrange for and participate in manufacturer activities including start-up.
.3 Arrange for and participate in site reviews and required inspections reviews by AHJ.

.6 APD
.1 Contractor duties and responsibilities: Same as Work.
.7 OPL
.1 Provide necessary consideration and coordination to make future OPL construction and related activities constructable and complete and fully functional in every respect, including field finishing, configuration, and commissioning.
.8 Cash Allowance Work Description: Refer to separate Article in this Section.

1.7 CASH ALLOWANCES

.1 Work Included in Cash Allowance Amounts
.1 Work described under this Article except as follows.
.1 Contractor other costs related to Work performed under cash allowances include Contractor overhead, profit, management, supervision, coordination, administration. Such other costs are already covered within Contract Price and outside of cash allowance amounts.
.2 Work described under this Article is separate and additional to Work described elsewhere in Contract Documents except as specifically indicated in this Article.
.2 Cash Allowance Work - Disbursement Type
.1 Description: This type of allowance includes Work listed as follows, is for specific disbursements, may involve products or labour, may involve multiple entities with multiple expenditures for each cash allowance. Owner may limit sources or choice of disbursement including labour as well as extent of Work.
.2 Specific Work List
.1 UPS Supplier
.1 Service Provider: Potencia Technologies Inc.
.1 Address: 7700 Hurontario Street, Unit 503, Brampton, Ontario L6Y 4M3
.2 Contact: N: Franz Heide, T: (519) 914-5713, M: (519) 550-9422, E: fheide@potenciatech.com
.2 Scope
.1 Relocating existing UPS and battery cabinet from existing location to temporary location to 1.2-m (4-ft) further away from wall, and extension cables if required.
.2 Replace missing battery cabinet rear panel.
.3 Review of final mounting locations and assistance with mount holes.
.4 Relocating existing UPS and battery cabinet from temporary location to final location.
.5 Turning on UPS and battery cabinet.
.3 Scheduling of Cash Allowance Work: Complete site reviews and investigations within 14-day after contract award.
.4 Authorization to Proceed with Cash Allowance Work: Contractor to not proceed with Work under cash allowance without written authorization or a written agreement to waive specific written authorizations per expenditure. Written authorization format as determined by Engineer, and format will exclude other documents issued for specific purposes, including submittal reviews, change documents, payment certification.
.5 Invoicing for Cash Allowance Work: Attach all details of all costs related to invoicing amounts against any cash allowance.

1.8 REGULATORY

.1 General Regulatory Requirements
  .1 Edition Dates: The edition date of applicable laws, regulations, orders and ordinances are that of the date of performance of Work. The edition date of applicable codes, standards and practices are that adopted at the time of issuance of documents or approvals by AHJ, and include modifications, additions and interpretations adopted by each AHJ.
  .2 Precedence
    .1 Where specified requirements differ from the requirements of applicable regulation, the more stringent requirements take precedence.
    .2 Where Specifications or Drawings require products or execution of better quality, higher standard or greater size than required by regulation, then Specifications and Drawings take precedence, so long as such requirements or descriptions comply with regulation.
    .3 Where potential or perceived conflicts still may exist from the above, or where no requirements are identified in Specifications and Drawings, comply with the following in order:
      .1 As determined by Engineer. Input may be provided by Contractor on potential or perceived conflicts based on the following in the following order:
        .1 As generally recognized by construction industry practice.
        .2 As generally recognized by trade practice.
        .3 As generally recognized by trade licensing, training, education.
      .2 As determined by AHJ.
      .3 As required by regulation.

.2 Approvals
  .1 Obtaining: Obtain approvals for Work from AHJ including preparing and submitting application documents and supporting documents. Approvals may include reviews, permits, certificates, licenses, variances. Approvals may include corresponding with AHJ to receive written confirmation of requirements, including receiving written confirmation of no approvals required for Work.
    .1 Include obtaining the following, which may include items to complete on behalf of Owner:
      .1 ESA electrical permits.
      .2 ESA electrical plans reviews (pre-construction design review).
        .1 Including preparation and marked-up drawings, adding additional information as required.
      .3 ESA deviations.
      .4 ESA field evaluations and special inspections.
      .5 Others as required.
    .2 Exclude obtaining the following, which may be obtained by others:
      .1 Municipality building permits.
      .2 MOL pre-renovation designated substances and hazardous materials assessment.
  .2 Reviews, Tests, and Inspections
    .1 Despite which entity obtained approvals listed above, make arrangements for and ensure completion of reviews, tests, and inspection by AHJ including serving utilities, regardless if Owner or others have the responsibility to communicate with AHJ and serving utilities over specific matters. Owner and Engineer may inform Contractor of same. Notify Owner and Engineer of reviews, tests, inspection, or other site activities by AHJ minimum 48-h prior to activities taking place.
    .2 Includes reviews, tests, and inspection that may be required to be completed, or voluntary requested by Contractor, Owner, Engineer.

.3 Upon approval from Owner, arrange for reviews, tests, and inspection, and coordinate dates and times acceptable to Owner and Engineer.
.4 Participate in and be present during reviews, tests, and inspection, and as well as additional follow-up reviews, tests, and inspection.

1.9 REFERENCES

.1 Referenced Documents: Specifications and Drawings contain various references, including to various codes, standards, practices, requirements. Such references are used for various purposes, including for products, execution, tests, inspections.
.2 Relationship to Specifications and Drawings: Referenced documents in Specifications and Drawings are made a part of Specifications and Drawings, and have the full force and effect as though printed in their entirety in Specifications, including design and installation requirements.
  .1 Where referenced documents are indicated, requirements within referenced documents are fully applicable to Work regardless of whether such referenced documents or portions of them may otherwise be exempt from applicability to Work.
  .2 Where referenced documents are indicated, including in a referenced documents list, adhere to requirements of referenced documents in their entirety including installation and design requirements, whether or not use of referenced documents is specifically identified elsewhere.
  .3 Details and choices to be included with submittals, including as related to layouts, sizing, ratings.
.3 Completeness: Referenced documents include, whether specifically referred to or not, addenda, errata, interpretations, supplements, handbooks and guidelines as issued or used by:
  .1 Referenced document issuing body(s).
  .2 AHJ.
.4 References Within References: Referenced documents include additional references to other reference documents. Adhere to requirements of these other referenced documents in their entirety to the extent applicable, including installation and design requirements. Details and choices related to layouts, sizing and ratings are to be included with submittals.
.5 Convenience
  .1 Specific references may be for convenience only and do not limit completeness. Such references are made notwithstanding the specific inclusiveness of each requirement within specific Specification Sections.
  .2 Convenience references include:
    .1 Showing Section Includes: Specifications Sections may generally describe requirements and components included within Section. The absence of such paragraphs does not exclude meeting requirements of Section contents.
    .2 Referencing Other Specification Sections: Specification Sections may contain references to other Sections, including Sections, Articles, Paragraphs. The absence of such references does not exclude meeting examples of requirements in other Sections. Example: Other Sections may describe example requirements, including finishing with paints and coatings, including accessories with mounts, anchors, fasteners, adhesives.
    .3 Referencing Other Documents: References may include additional references to related documents, including addenda, errata, interpretations, supplements, handbooks and guidelines. The absence of such references does not exclude meeting requirements of such other documents.
    .4 Referencing Regulatory Requirements: References within Contract Documents may be included with regulatory requirements and may only be indicated in Contract Documents for convenience. The absence of such references does not exclude meeting requirements of regulation.

.6 Copies: Referenced documents are not furnished with Specifications and Drawings as it is presumed that Contractor, subcontractors, manufacturers, suppliers, trades and crafts are familiar with these generally recognized standards of the construction industry.

.7 Names

.1 References may no longer be available or recognized for various reasons including:

.1 Reference has changed publishing organization or body, including reference being revised, updated or replaced.

.2 Reference is no longer available from or recognized by publishing organization or body, including reference being obsolete, repealed or withdrawn.

.3 Reference name has changed by publishing organization or body, including number, code or title.

.4 Reference has changed publishing organizations or bodies.

.2 In the event a referenced document is no longer available or recognized, reference will be in the following order:

.1 Latest edition of replacement reference from replacement publishing organization or body.

.2 Latest edition of replacement reference from same publishing organization or body.

.3 Latest edition of listed reference.

.8 Edition Dates

.1 Where an edition or effective date of a referenced document is given, reference will be to the more stringent of:

.1 As indicated.

.2 Latest edition adopted by AHJ.

.2 Where an edition or effective date of a referenced document is not given, reference will be to the more stringent of:

.1 Latest edition adopted by AHJ.

.2 Latest edition published at time of issuance of permits, certificates, licenses, or approvals by AHJ.

.3 Latest edition published at time of execution of Contract Documents, whether or not reference has been adopted by AHJ.

.3 Previous Edition Related Referenced Documents: Related reference documents from previous editions of references are to be used in the absence of updates to related documents with indicated reference edition.

.9 Referenced Grades Classes and Types: Where an alternative or optional grade, class or type of product or execution is included in a reference but is not identified in Specifications or Drawings, provide the highest, best and greatest of the alternatives or options for the intended use and prevailing conditions.

.10 Conflicting Requirements: Where requirements to meet 2 or more references are specified, or requirements from 2 or more references and/or related reference documents are present, and these references establish different or conflicting requirements including for minimum quantities or quality levels, comply with the most stringent requirement. Refer uncertainties and requirements that are different, but apparently equal, to decision by Engineer before proceeding.

1.10 DESIGN DOCUMENTS CONTENT

.1 Means, Methods, Sequences, Techniques, and Procedures of Construction

.1 Intent of Specifications and Drawings are primarily to describe design intent including extent and quality of Work in a finished state. Contractor is solely responsible for means, methods, sequences, techniques, and procedures of construction to complete Work as so described. Should Specifications and Drawings indicate specific means, methods, sequences, techniques, and procedures of construction, such specifics are for the purposes of conveying the general intent for how Work is to be completed with respect to minimum performance or minimizing risk, including occurrence of disruption, damage, interference, disturbance.

.2 Warnings and Specific Limitations
  .1 Should Specifications and Drawings indicate certain types of warnings and specific limitations, such specifics in no way imply authorization of Work that otherwise does not meet requirements of Contract Documents when such warnings and statements are not made elsewhere, including:
    .1 Convenience Warnings: Cautionary notes or warnings or specific limitations are made for the purposes of convenience. Such warnings may include highlighting Contractor's attention to matters that may relate to means, methods, sequences, techniques, and procedures of construction.
    .2 Prohibited Work: Statements on specific prohibited work, including words such as unacceptable, are made for the purposes of highlighting specific limitations, and in no way allow other non-indicated Work as being acceptable.

.3 Inconsistencies
  .1 Report to Engineer immediately if inconsistencies are found in Contract Documents including Specifications and Drawings or in other documents issued for construction, including if design intent is unclear, or if elements essential to proper execution or function of Work appear to be missing or not specifically detailed. Where requirements are not specifically indicated in Contract Documents but are reasonably inferable, provide elements of Work to meet functional intent. Where necessary, Engineer may issue an Instruction Supplement to clarify requirements of Work.
  .2 In case of inconsistency(s) between or within Specifications and Drawings, provide the following unless interpreted otherwise by Engineer:
    .1 For differences in indicated quality, adhere to better quality of Work.
    .2 For differences in indicated quantity, adhere to greater quantity of Work.
    .3 For other differences, adhere to the more stringent requirement as determined by Engineer.

1.11 ADDITIONAL TECHNICAL INFORMATION

.1 The following information is provided with Contract Documents:
  .1 Environmental
    .1 Pre-renovation designated substances and hazardous materials assessment.

.2 The following information is not necessarily provided with Contract Documents, but is to be reviewed by Contractor as part of Contract Documents:
  .1 Site Information: The following information may be available from Owner or on site:
    .1 Supplemental project and renovation drawings.
    .2 Asbestos reports.
    .3 Hazardous materials reports.
    .4 Operating and maintenance manuals.
    .5 Other reports and plans.
  .2 Specification Information: The following information will be available for review at Engineer's business address when scheduled with adequate notice:
    .1 Referenced documents.
    .2 Other Owner requirements documents.

1.12 ADMINISTRATION

.1 Requirements Review Meeting with Engineer: Conduct requirements review meeting at Engineer's preferred location early in construction phase.
  .1 Attendees: Prepare meeting structure to suit the following required attendees:
    .1 Engineer.
    .2 Contractor.
    .3 Other Contractor individuals as requested by Owner, including from Contractor, subcontractors and suppliers.
    .4 Owner.
    .5 Other individuals as defined by Owner, including project stakeholders and other parties.

.2 Arrangement and Notification: Notify Engineer and Owner of proposed meeting dates and times. Provide 2-week notification. Confirm with each entity dates and times acceptable to each entity.
.3 Duration: Up to 2-h long.
.4 Agenda: Review of general requirements within Contract and Contract Documents. May include the following topics:
.1 Milestone dates and work progression.
.2 Specification Sections are Work results, each Section applies for all Work, Work results are to be coordinated amongst Specifications as well as Drawings as well as Contract Documents.
.3 Submittal procedures.
.4 Multiple consultants.
.5 Allowance authorization procedures.
.6 Invoicing procedures.
.5 Minutes: None.

.2 Project Meetings With Owner: Conduct project meetings at Owner's preferred location at 1-week intervals.
.1 Attendees: Prepare meeting structure to suit the following required attendees:
.1 Owner.
.2 Other individuals as defined by Owner, including project stakeholders and other parties.
.3 Engineer.
.4 Contractor.
.5 Other Contractor individuals as requested by Owner, including from Contractor, subcontractors and suppliers.
.2 Arrangement and Notification: Notify Owner and Engineer of proposed meeting dates and times. Provide 1-week notification. Confirm with Owner dates and times acceptable to Owner.
.3 Coordination
.1 Contractor Individuals: Inform individuals whose presence is required of date and time of each meeting, including individuals from Contractor, subcontractors and suppliers. Inform individuals whose presence may not specifically be required but are involved in the project of date and time of each meeting to be available by phone during the meeting, including individuals from Contractor, subcontractors and suppliers.
.2 Owner Individuals: Inform Owner of individuals whose presence is requested of date and time of each meeting. Should Owner individuals not attend meetings, discuss in meeting correspondence to be sent to Owner individuals and agree with Owner on related action items for submitting correspondence.
.4 Agenda: Prepare meeting agenda. Distribute meeting agenda not less than 2 working days before the meeting to invited attendees.
.5 Minutes: Prepare meeting minutes. Distribute meeting minutes within 2 working days of meeting to invited attendees and appropriate stakeholders as determined by Owner. Include the following information:
.1 Attendance.
.2 Discussions.
.3 Agreements.
.4 Action items in a separate list, including responsible parties and individuals, and required completion dates.
.6 Modifications: Owner may modify project meeting requirements, including Engineer to prepare project meeting minutes, at no change to Contract Price or Contract Time.

.3 Contractor Progress Meetings: Conduct progress meetings at Contractor's preferred location at 1-week intervals.

.1 Attendees: Contractor personnel familiar with or required to be familiar with Work and authorized to conclude matters relating to Work.
.2 Agenda
  .1 Review and approve minutes of previous progress meeting, including modifications to minutes.
  .2 Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Work.
  .3 Review progress since last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule in relation to Contractor's construction schedule.
  .4 Determine how construction schedule will be expedited.
  .5 Secure commitments from parties involved to do so.
  .6 Discuss whether construction schedule revisions are required to ensure that current and subsequent activities will be completed within Contract Time.
.3 Construction Schedule
  .1 Project Construction Schedule: Update planned project construction schedule after each progress meeting.
  .2 Near Period Construction Schedule: Update detailed construction schedule for the next immediate 4-week showing specific activities each separate day and shift for each affected portion of facility including areas and systems. Confirm notices have been submitted and accepted by Owner for planned interim activities for minimum next immediate 2-week period.
  .3 Dates and Duration: Construction schedule to include important aspects, minimum as follows, additional to Owner requirements:
    .1 Critical path.
    .2 Contract start.
    .3 Permits and approvals.
    .4 Submittals.
    .5 Site work start.
    .6 Temporary services start.
    .7 Major deliveries.
    .8 Planned disruptions.
    .9 Other milestones.
    .10 Startups.
    .11 Closeout documents.
    .12 Training.
    .13 Commissioning.
    .14 Substantial Performance.
    .15 Ready-for-Takeover.
    .16 Total Performance.
  .4 Distribution
    .1 Submit updated construction schedule in colour ledger sized paper format concurrently with each progress meeting report.
    .2 Transmit updated construction schedule in electronic format to Engineer.
  .5 Revisions: Review and evaluate construction schedule regularly during construction. Revise construction schedule as necessary as a result of review, and resubmit within 2 working days.
  .6 Format: Software generated Gantt chart as acceptable to Engineer including for ease of use of data.
    .1 File Type: Microsoft Project and PDF of file.
.4 Reporting: Provide brief narrative progress report to define problem areas, potential yet not yet claimed clarifications and substitutions and changes, concealed work, anticipated delays, and impact on the construction schedule. Report actions taken or

proposed, and its effect including impacts on separate contracts. Identify modifications since previous submittal, including activities and changes.

.5 Distribution

.1 Distribute reports and construction schedules within 2 working days of the meeting.

.2 Distribute to Contractor's site file, to subcontractors, suppliers, Engineer, Owner, and other concerned parties.

.3 Instruct recipients to promptly report, in writing, problems anticipated by projections shown in construction schedule.

.4 Progress Completed Reporting: Conduct progress completed updates at site daily at Owner's choice of time of day for each normal operating day on site.

.1 Attendees: Owner, Contractor, and project stakeholders as defined by Owner.

.2 Duration: As required.

.3 Agenda

.1 Review Work completed, which affected systems and areas are ready for use, which affected systems and areas are not fully operational.

.2 Discuss whether interim operating procedures are requested of Owner.

.4 Reporting: Provide verbal or written or both verbal and written summary as required by Owner.

.5 Progress Planned Reporting: Conduct progress planned updates at site daily at Owner's choice of time of day for each normal operating day on site.

.1 Attendees: Owner, Contractor, and project stakeholders as defined by Owner.

.2 Duration: As required.

.3 Agenda

.1 Review Work planned, which systems and areas will be affected, which other systems and areas may be affected.

.2 Discuss whether interim operating procedures are requested of Owner.

.4 Reporting: Provide verbal or written or both verbal and written summary as required by Owner.

.6 Other Meetings: As indicated.

1.13 SUBMITTALS

.1 Format

.1 Provide submittals and other transmittals in electronic format unless otherwise indicated.

.2 Electronic Format

.1 Transmit to recipients' e-mail addresses, or alternate means for large electronic file submissions.

.2 Transmit photographs in JPEG format acceptable to Engineer, including resolution, focus and light levels.

.3 Transmit other submittals in file formats as indicated. Where file formats are not indicated, use PDF format acceptable to Engineer, including clarity, alignment, unsecured, provided with original PDF source files where available, converted to PDF with original source files. Where PDF files contain scaled content or are may be printed, indicate intended scale and paper size. PDF files generated from scanning of paper based source files may be acceptable where source files are only available in paper format or where paper mark-ups are indicated.

.4 File Naming: Name electronic files appropriately and consistently. Electronic file naming convention subject to review and approval by Engineer.

.5 Multiple Electronic File Submission: Maintain separate subject matter in separate electronic files.

.3 Paper Format

.1 Transmit to recipients at recipients' business addresses.

.2 Transmit in paper format acceptable to Engineer, including size, colour, clarity, alignment.

.2 Submission
.1 Recipients: As required.

.3 Response
.1 Allow 10 working days for responses from Engineer unless otherwise indicated.

.4 General Requirements: Provide the following.
.1 Submittal Preparation
.1 Submittals to be prepared are indicated and defined in this Section, or in submittal articles of each Section, or as indicated in products or execution articles of each Section.
.2 Submittals to be prepared in a timely manner as well as in an orderly sequence.
.3 Submittals to be prepared comprehensively and completed fully, whether submitted or not.
.4 Submittals to be prepared to all requirements of Work, including after full detailed investigations, including assessments, evaluations, examination, measurements, tests, verification, coordination of Work requirements.
.5 Owner or Engineer may require submittals be submitted before proceeding further with Work.
.6 Submittals not submitted before proceeding with Work will be interpreted as Contractor fully understanding all requirements of Work to the same results as if all submittals were submitted and reviewed.
.7 Procedures for requests for substitutions and requests for clarifications are described in other articles in this Section.
.8 In the event Work with specific submittal requirements has been completed without Engineer's written review of information including submittals, Contractor to modify Work as required, including as indicated by Engineer, with no changes to Contract Price or Contract Time.

.2 Submittal Types: General submittal types are described as follows, and additional specific information may be described in each Section. Use of specific words in submittals types such as product or service is intended to identify a grouping and separation of submittal types within each Section, and is not intended to limit the quantity and extent of submittals required. Additional details of various activities that may be related to submittals may be present within each Section. Specific submittal types are also listed as follows, but may only be described in each Section.
.1 Site Aspects
.1 Examination and Investigations Information: Including indicated examination, full detailed investigations, others as required. Including assessments, evaluations, examination, measurements, tests, verification, coordination of Work requirements. Including plans, reports, documentation, findings, notes, comments, drawings, sketches.
.2 Product Aspects
.1 Existing Products Modification Data: Original manufacturer documentation for modified products that are intended to remain, including modified portions of products, with markups and annotations to clearly indicate parts that will be been removed, modified, and remain.
.2 Existing Products Refurbished Data: Documentation for refurbished products, including re-certification.
.3 Product Characteristics Data: Product manufacturer information, including application, features, appearance, sizes, capacities, efficiency, options, performance, ratings, limitations, certifications, labels, signs, characteristics at differing loads and conditions.

.4 Product Schedule Data: Project information, including product details, tag, description, quantities. Product manufacturer information including makes, models, parts, sizes, capacities, features and options selected, custom aspects, modifications. Other information as required from other schedules including on Drawings.

.5 Product Fabrication Data: Product manufacturer information, including shop drawings, custom aspects, modifications.

.6 Product Factory Testing Data: Product manufacturer information, including factory tests, quality control results.

.7 Product Certification Documentation Data: Product manufacturer information, including references to specific certifications, listings, registrations, testing reports, testing agencies.

.8 Product Mounting Plans: Mounting components and details, including bases, frames, anchors, fasteners, supports, guides, hangers.

.3 Service Aspects

.1 Service Sizing Plans: Isometric sketches indicating sizing, ratings.

.2 Service Routing Plans: Isometric sketches or scaled drawings indicating component types and locations, elevation levels, buried and encased, fittings, clearances, interferences, and relocation of interfering services, components, objects, and structures. Isometrics to be dimensional double line for larger services, where using prefabricated products, where layout requires review by product manufacturer, where layout may affect warranty.

.3 Service Components Plans

.1 Service Penetrations: Location of penetrations, including fire separations, exterior envelope, non-standard assemblies. Installation details at penetrations, including sleeves, sealing, firestops, smoke seals.

.2 Service Elevation and Opening Details: Details of applicable slope angles, traps, pockets, openings.

.3 Service Expansion Compensation: Location and types of expansion control measures.

.4 Service Vibration Isolation: Location and types of vibration isolation connectors.

.5 Service Connections: Quantity and location of connections to equipment and components, including limits, protection, safety.

.4 Service Mounting Plans: Mounting components and details, including bases, frames, anchors, fasteners, supports, guides, hangers.

.4 System Aspects

.1 System Layout Plans: Isometric sketches or scaled drawings indicating component types and locations, elevation levels, buried and encased, fittings, clearances, interferences, and relocation of interfering services, components, objects, and structures. Isometrics to be dimensional double line for larger services, where using prefabricated products, where layout requires review by product manufacturer, where layout may affect warranty.

.2 System Interlocks and Interfaces Plans: Including schematics and wiring diagrams detailing interlocks, interfaces to other controls and control systems, interfaces to life safety system.

.3 System Field Documentation Plans: Scaled drawings indicating documentation physical characteristics, content, layouts, locations.

.5 Product Application

.1 Product Application Plans Certificate Letter: Product manufacturers letter certifying each planned service to equipment and other components including loads meets equipment manufacturer's requirements and installing trades

requirements, including sizing, routing, elevations, slopes, compatibility, warranty conditions.

.2 Product Installation Information: Product manufacturer information, including installation manuals, ratings, limitations, warranties. Contractor's information on custom aspects, modifications, field interfacing and connections.

.3 Product Start-up Forms and Certificate Letter: Product manufacturer forms completed to confirm functionality and performance, proper operation, warranty provisions met.

.4 Product Installation Completed Certificate Letter: Product manufacturer letter certifying each started service to equipment and other components including loads meets equipment manufacturer's requirements, including sizing, routing, elevations, clearances, slopes, components, warranty conditions.

.5 Product Operation Information: Product manufacturer and installer information, including operation manuals, interfacing and connections, health and safety information, normal operation procedures, emergency instructions and procedures, troubleshooting procedures, configuration and settings, operating sequences.

.6 Product Maintenance Information: Product manufacturer information, including lists of spare parts, maintenance procedures, maintenance and service schedules for preventive and routine maintenance, procedures and schedules for inspection and testing requirements.

.7 Product Spare Parts and Materials: As recommended by manufacturer, as indicated, as necessary for normal operation of 1-year.

.6 Service Application

.1 Service Installation Plans Certificate Letter: Installer letter certifying each planned service to equipment and other components including loads meets equipment manufacturer's requirements and installing trades requirements, including sizing, routing, elevations, slopes, compatibility, warranty conditions.

.2 Service Installation Information: Product manufacturer and installer information, including installation manuals, ratings, limitations, warranties, custom aspects, modifications, field interfacing and connections.

.3 Service Start-up Forms: Installer forms completed to confirm functionality and performance, proper operation, warranty requirements met.

.4 Service Installation Completed Certificate Letter: Installer letter certifying each installed service to equipment and other components including loads meets equipment manufacturer's requirements and installing trades requirements, including sizing, routing, elevations, slopes, components, warranty conditions.

.7 System Application

.1 System Testing Plans: Including reviews, plans, reports, documentation, notes, comments.

.2 System Examination Results: Including indicated inspections, evaluations, others as required. Including findings, data, measurements, configuration, notes, comments, documents.

.3 System Preparation Tests Results: Including indicated tests, others as required. Including findings, data, measurements, configuration, notes, comments, documents.

.4 System Mounting and Supports Completed Certificate Letter: Installer letter certifying mounting components meet requirements and are suitable for application, including bases, frames, anchors, fasteners, supports, guides, hangers.

.5 System Verification Results: Including indicated inspections, field certifications, tests, others as required. Including findings, data, measurements, configuration, notes, comments, documents.
.6 System Documentation: Including indicated reports, drawings, files, others based on results of activities.
.7 System Tools and Access
.1 Physical tools to allow for full functionality and performance, normal use, updates and changes and upgrades. Including access, testing, calibration, measurement, troubleshooting. Includes keys.
.2 Software and digital tools to allow for full functionality and performance, normal use, updates and changes and upgrades. Including configuration and programming, user interfacing, components interfacing or integration, communications and/or network management and expansion. Includes new and existing parts affected by Work.
.3 Licenses to use and own software, tools, utilities and documentation for an unlimited duration without additional fees. Licenses to include required software updates to maintain functionality.
.4 Digital copies of software including firmware and databases complete with system manuals for all aspects, including configuring, programming, testing, calibrating. Manuals to include detailed description of each software feature including editing and writing control configuration and programming, reading or modifying printouts and logs, passwords management and creation including level setting, adding, deleting, modifying.
.5 Archive copy of site-specific databases, software, configuration and sequences.
.6 Editable electronic files for drawings in both AutoCAD and Visio format.
.7 Passwords including highest level passwords and security access to modify and implement full functions, including configuration, programming, updates, and upgrades.
.8 System Operation Information: Including operation manuals, interfacing and connections, health and safety information, normal operation procedures, emergency instructions and procedures, troubleshooting procedures, configuration and settings, operating sequences.
.9 System Maintenance Information: Including lists of spare parts, maintenance procedures, maintenance and service schedules for preventive and routine maintenance, procedures and schedules for inspection and testing requirements.
.8 Project Application
.1 Record Documentation: Including indicated reports, drawings, files, others based on results of activities.
.2 Salvaged Components Information: List of components salvaged, condition, location stored at.
.3 Disposal Records: Including indicated disposal records, others as required.
.3 Specific Additional Content: Identify relevant and required information, including:
.1 Project name.
.2 Entities related to Work, including Contractor, subcontractor and supplier, as applicable.
.3 Pertinent design documents references, including drawing and detail number, specification section articles.
.4 Bill of materials for products or system features included in submittal. Bill of materials to include identification, tags, descriptions, quantities, makes, and model numbers or part to be ordered. Model numbers to be complete, including selected

features and options, special instructions or custom aspects. Provide notes to describe special instructions or custom aspects, as well as notes on who is responsible and where to provide, i.e. at factory by manufacturer or in field by Contractor. Indicate selected features and options on each submittal page or product sheet by using annotation boxes or highlights.

.5 Notes to describe special instructions or custom aspects, as well as notes on who is responsible and where to provide, i.e. at factory by manufacturer or in field by Contractor. Indicate selected features and options on each submittal page or product sheet by using annotation boxes or highlights.

.6 Variations from Contract Documents.

.7 Extent of impacts on requirements due to variations from Contract Documents, including performance requirements.

.8 Product or system limitations that may be detrimental to successful performance of completed Work.

.9 Fabrications or assemblies that are standard or custom.

.10 Aspects or parts that require professional engineering services.

.11 Modifications made to submittal from previous submission.

.4 Submission

.1 Format: Transmit submittals in electronic format unless otherwise indicated.

.2 Cover: Transmit each submittal with a transmittal cover.

.3 Stamp: Apply Contractor's stamp to submittal documents stating submittal has been reviewed, complete with Contractor review date and Contractor reviewer name. Contractor stamp applied to submittal documents certifies Contractor has:

.1 Completed detailed investigations, including examination, assessments, evaluations, measurements, tests, verification.

.2 Coordinated with and complied with Work requirements.

.4 Quantity: Unless otherwise indicated, submit 4 copies of submittals in paper format when printed or paper format is indicated.

.5 Order: Arrange submittals and coordinate submission including with related items as required for Work.

.5 Distribution: Engineer will transmit reviewed submittals with further action as required to Contractor and others at Engineer's discretion. Submittals with completed review actions to be distributed by Contractor as appropriate.

.6 Submittal Review Types: Additional submittal types may be described in each Section indicating the nature of review.

.1 Submittals For Action

.1 Submit as indicated to Engineer and Owner for review. Reviews are limited for the purpose of reviewing general conformance with the design concept expressed in Contract Documents. Submittal comments or lack thereof do not relieve Contractor's responsibility for meeting requirements of Contract Documents.

.2 Engineer may not review information provided if such information is incomplete or not comprehensive.

.3 Engineer may comment on incomplete or missing submittal information.

.4 Engineer may provide commentary, notes or warnings on submittal review. Carefully read submittal review, complete investigations as required to address submittal review contents, and re-submit submittal prior to ordering products or proceeding.

.2 Submittals For Information

.1 Submit as indicated to Engineer and Owner on behalf of Commissioning Authority and/or Owner. Submittals of this type are not a Submittal for Action and are not intended to be reviewed by Engineer.

.3 Submittals For Closeout

.1 Submit as indicated to Engineer and Owner on behalf of Commissioning Authority and/or Owner. Submittals of this type are not a Submittal for Action and are not intended to be reviewed by Engineer.

.4 Other Submittals

.1 Submit other submittals as indicated to Engineer and Owner. Submittals of this type are not a Submittal for Action and are not intended to be reviewed by Engineer unless indicated otherwise.

.7 Modifications: Engineer may at Engineer's discretion choose to:

.1 Require a specific submittal under any submittal type to be submitted.

.2 Require specific information to be submitted as a submittal where specifically indicated under submittals of each Section.

.3 Require a specific submittal to be submitted before proceeding further with Work.

.4 Review an incomplete submittal.

.5 Review submittals other than Submittals for Action.

.6 Review a portion of a submittal as its own submittal, and separate other portions of same submittal into separate submittals and each may require resubmission. Including a submittal split into:

.1 Products, report data.

.2 System layouts including schematics and quantities, report contents.

.3 Product or system configuration and programming and sequences, report recommendations.

.7 Re-designate the submittal type, such as a Submittal for Information into a Submittal for Action.

.8 Designate a transmittal as not a submittal, and instead another document form, including a request for substitution, request for clarification, or formal change.

1.14 TRADES

.1 General Requirements: Provide the following.

.1 Qualifications

.1 Work requiring trades includes on site and off site activities, including examining, preparing, executing, verifying, inspecting, testing, measuring, adjusting.

.2 Work to be completed by trades where any portion of Work relates to trades defined or listed by:

.1 As indicated.

.2 As required by regulation.

.1 As applicable for company and personnel.

.3 As identified in OBOSTA for all trades that can be applicable to required Work based on the scope of practice of a trade as described in OBOSTA:

.1 OBOSTA described trades are required for Work regardless of specific sector indicated in OBOSTA such as construction and industrial.

.2 OBOSTA described trades are required for Work regardless of classification indicated in OBOSTA such as compulsory or voluntary (non-compulsory).

.3 Where any portion of Work requires trades, Work on the entire system, service, equipment, or component to be completed by trades.

1.15 PRODUCTS

.1 General Requirements: Provide the following.

.1 Specification Methods

.1 By Name: Where Specifications describe one or more manufacturer names, brand names, series names, model number, catalogue number, or identification number, provide product(s) to meet these requirements.

.2 By Description: Where Specifications describe a product characteristics, including suitability, capability, functionality, provide product(s) to meet these requirements

as determined by Engineer, including quality, serviceability, other relevant characteristics.

.3 By Performance Requirements and/or Future Requirements: Where Specifications describe compliance with performance requirements or intent, provide product(s) to meet these requirements and are recommended by the manufacturer for the intended application. Verification of manufacturer's recommendations may be by product literature or by certification of stated performance from manufacturer.

.4 By Referenced Documents: Where Specifications describe compliance with a referenced document including certifications, provided product(s) that fully comply with the referenced document.

.5 By Combination of Methods: Where Specifications describe requirements by a combination of the above methods and other attributes, provide products to meet these requirements.

.2 Specification Requirements

.1 Provide products complete with specified requirements, including requirements under all articles and paragraphs despite use of differentiating paragraphs such as tests, ratings, certifications. Differentiating paragraphs are intended for organization, may each include aspects of other paragraphs used, and may generally be based on the following:

.1 Options: Characteristics provided or available with product. May be characteristics native with selected product or may be options with selected product that can be optionally furnished. Contractor to recommend each listed option and characteristic that is most suitable for application after completing investigations.

.1 Options: Provide the following.

.1 Provide specific characteristics.

.2 Options: Provide selections from each of the following available characteristic types as most suitable for each application.

.1 Select or choose from each characteristic that is most suitable for application.

.2 Provide product lines that are available with remaining non-selected characteristics not specifically yet planned to be used for Work.

.3 Options: Provide from the following available characteristics where indicated.

.1 Provide specific characteristics where indicated. Example: Options to be provided may be indicated with product type, or may be indicated in execution.

.2 Provide product lines that are available with remaining non-indicated characteristic not specifically yet planned to be used for Work.

.4 Options: Other characteristics that are available but not furnished.

.1 Provide product lines that are available with non-furnished characteristics not specifically yet planned to be used for Work.

.2 Tests: Generally indicating characteristics to referenced documents and available with certifications.

.3 Ratings: Generally indicating characteristics that may or may not have specific indicated certifications or to referenced documents.

.4 Certifications: Generally indicating certifications that may or may not have specific indicated characteristics.

.2 Provide certifications, including listings and registrations, by recognized SCC accredited body.

.3 Sourcing

.1 Standard Products: Where specific products are not specified or required be regulation, provide standard products of types and kinds that are suitable for

intended purposes, use and effect, and that are usually and customarily used on similar projects under similar conditions.

.2 New Products: Provide products that are new, original, current and are supported, unused, undamaged, no obsolete.

.3 Restoration or Repair: Where restoration, repair, modifications, retrofits of existing products are indicated or required:

.1 Review with manufacturers.

.2 Use new original manufacturer parts where possible.

.3 Provide certifications, including listings and registrations, required for original parts sent to a third party for refurbishment. Submit parts re-certification as required.

.4 Provide certifications, including listings and registrations, and testing required when modifying existing products including equipment and components.

.5 Provide additional inspections, testing, modifications, and other recertification activities to meet safety and product standards as required.

.4 General Requirements

.1 Completeness: Provide products complete with specific features needed for a complete installation and for intended purposes, use and effect, including accessories, trim, finish, safety guards, structural supports, platforms, braces, tie-rods, controls, operating limit devices and interlocks, safety devices and interlocks, interfaces. Provide products with services and components connections of type(s) and configuration required to match the requirements for mating services and components, and routing and installation choices made. Provide products coordinated with Work requirements, including connections to services and components, clearances.

.2 Customization: Product features specifically indicated or otherwise required may require additional standard or custom features, options and arrangements from product manufacturer.

.3 Consistency: Provide products of the same kind from the same manufacturer and from a single source over duration of Work. Provide specified product options from same manufacturer as product and native to product to the fullest extent possible.

.4 Appearance: Where requirements include the phrase “as selected from manufacturer’s standard colours, patterns and textures” or a similar phrases relating to options and features, selections of products will be made by indicated party or, if not indicated, by either Owner or Engineer. Either Owner or Engineer will select options and features from product line of submitted manufacturer if all other specified requirements are met. Appearance requirements may be different per location or application.

.5 Visual Matching: Where sample matching is required, acceptance on the extent of matching will be made by either Owner or Engineer. Where sample matching is not specifically required, choice of matching will be made by either Owner or Engineer. Where no product visually matches but the product complies with other requirements, comply with provisions for substitutions for selection of a matching product in another category. Visual matching requirements may be different per location or application.

.6 Secure Entry: Provide products of same types with same keys, tools, or other secure access means. Provide products with same secure entry system including keys or tools where available. Unless otherwise indicated, provide 1 key or tool set per secure entry.

.7 Settings Maintained: Maintain configuration and programming settings on loss of power or communications, minimum 72-h unless otherwise indicated.

.8 Start-up Control Requirements: Provide the following to limit total start-up current including due to power failure:
.1 Less than 200-% of full load current upon start-up.
.2 Built-in configurable random or pre-set start-up delay.

.5 Manufacturer Resources and Proximity
.1 Manufacturer
.1 Product literature publicly available from functioning website, including submittals, product data, maintenance data, operating data, parts and service requirements.
.2 Located at a physical dedicated facility for manufacturing and offices and warehouse.
.3 Maintains inventory of spare parts and necessary test and diagnostic equipment required for installation, commissioning, training and servicing.
.4 Readily available delivery of standard and non-standard parts.
.5 Minimum 4 individuals available and assignable to project, each individual with minimum 5-year experience being regularly engaged in the supply, support, and manufacturer activities required for providing fully functional systems that are complete and ready for intended use and effect. Includes installation, finishing, configuring, programming, calibrating, testing, commissioning, training, servicing.
.6 Individuals available for direct phone contact 12-h/day normal business hours, 5-day/week weekdays, 260-weekdays/year basis.
.2 Manufacturer Representative
.1 Located at a physical dedicated facility for offices and warehouse, within a 3-h travel distance of site.
.2 Maintains inventory of spare parts and necessary test and diagnostic equipment required for installation, commissioning, training and servicing.
.3 Readily available delivery of standard and non-standard parts.
.4 Minimum 2 individuals available and assignable to project, each individual with minimum 5-year experience providing being manufacturer trained and regularly engaged in the supply, support, and manufacturer activities required for providing fully functional systems that are complete and ready for intended use and effect. Includes installation, finishing, configuring, programming, calibrating, testing, commissioning, training, servicing.
.5 Individuals available for direct phone contact 24-h/day, 7-day/week, 365-day/year basis.
.6 Individuals available to send individual representative to site as required within 3-h of being notified.

.6 Manufacturer Activities: Provide products capable of specific manufacturer activities as indicated, and as required where not indicated. Includes manufacturer activities required for providing fully functional systems that are complete and ready for intended use and effect. Includes installation, finishing, configuring, programming, calibrating, testing, commissioning, training, servicing.
.1 Installation Supervision: Manufacturer to supervise field assembly of products to ensure requirements are met, including completeness, functionality, performance.
.2 Start-up Supervision: Manufacturer to approve installation, to supervise start-up, and to provide instructions to Owner
.3 Start-up Completion: Manufacturer to approve installation, to complete start-up, and to provide instructions to Owner, unless otherwise indicated.
.4 Adjusting Completion: Manufacturer to complete adjusting.

.7 Precedence: Meet the following for submittal and substitution procedures where conflicts may exist including with product requirements:
.1 Adhere to the more stringent requirement as determined by Engineer.

.2 Otherwise meet product requirements in the following order of precedence:
.1 Product requirements to this Article above, precedence in order of listing.
.2 Substitution limitations to no substitutions.
.3 Specific compliance to referenced documents.
.4 General compliance to referenced documents.
.5 Dates of referenced documents.
.6 Where multiple manufacturers are indicated:
.1 Manufacturer name.
.2 Manufacturer and manufacturer representative services and proximity.
.3 Manufacturer product series.
.4 Manufacturer product model.
.7 Other substitution limitations.
.8 Where single manufacturer is indicated:
.1 Manufacturer name.
.2 Manufacturer and manufacturer representative services and proximity.
.3 Manufacturer product series.
.4 Manufacturer product model.

.2 Specific Additional Requirements: Provide the following in addition to indicated requirements. Where potential or perceived conflicts exist, refer to procedures throughout this Section, including regulatory, precedence, clarifications.
.1 Noise and Sound
.1 Provide products and installations to not exceed in design guidelines for HVAC related background sound in Chapter 48 of ASHRAE-HBA as well as ASHRAE-HBF, including:
.1 NC and dBA and dBC levels.
.2 Using this as a guide for application to actual spaces on site where specific space types are not described.
.2 Additionally provide products and installations to the following:
.1 Maximum 35-NC for office spaces whether enclosed or open.
.2 Maximum 50-NC for service spaces whether enclosed or open.
.3 No intermittent noticeable sounds to occupied or public spaces, including rattling, clicking, drumming, humming, whether from within space or transmitting through separations past space.
.1 Where such intermittent sounds are capturable with sound measurements over time including smaller time increments, interpretation of noticeable may be based on Owner and occupants in addition to Engineer.
.2 Efficiency
.1 To LBC.
.2 To ASHRAE-90.1 and ASHRAE-90.2 to facility major occupancy or to specific portions of facility in specific cases
.3 Ventilation
.1 To ASHRAE-62.1 and ASHRAE-62.2 to facility major occupancy or to specific portions of facility in specific cases.
.4 Suitability and Ratings: Provide products of types and kinds that are suitable for intended purposes, use and effect, including to meet required ratings, including to regulatory requirements, including to provisions of regulatory requirements with or without permitting such as LBC building permits. Various product requirements apply, including:
.1 Environment and Application: Provide products that are suitable and rated for the extremes conditions to which they may be exposed to or subjected to, including within the system or service to which they may be applied to and operating with, including:

.1 Typical operation and extreme ranges, safety limits and extreme ranges, other potential extremes.
.2 Temperature, heat, humidity, condensation, freeze, pressure, splash, dust, explosion, wet, damp, light, corrosion, abrasion, scaling.
.3 Providing only where indicated additional features and components for heating and cooling or other forms of conditioning to allow product to be properly applied.

.2 Ingress Protection: Provide products rated to CSA-C22.2-60529 to ensure products are suitable for application.

.3 Locations: Provide products that are suitable for the location and space they are installed in, in part or in whole, as indicated and that meet requirements, including regulatory requirements, including to provisions of regulatory requirements with or without permitting such as LBC building permits, including:
.1 Air handling spaces, plenums, horizontal service spaces, vertical service spaces, shafts, connected spaces. Includes within:
.1 Ceilings used as return or transfer air paths.
.2 Raised floors used as supply or return air paths.
.3 Vertical spaces between floors used as air paths.
.4 Vertical spaces between floors used as service shafts.
.5 Horizontal spaces between fire separations.
.6 Service rooms where ducting is not directly connected to ventilation units and room may be connected to other spaces.
.7 Ventilation terminal units with covers and unit may be connected to space.
.2 Sprinklered and unsprinklered.
.3 Concealed and enclosed spaces.

.4 Combustible Materials: Provide products as indicated and that meet regulatory requirements including LBC, including to provisions of regulatory requirements with or without permitting such as LBC building permits, including where building is or is required to be of noncombustible construction to LBC, including:
.1 Non-combustible materials and components, including meeting acceptance criteria of ULC-S114.
.2 As indicated, with additional components applied for assembly to meet non-combustible materials and components and maximum indicated fire resistance and performance ratings as required.
.3 Minor combustible components where specifically described. Where not specifically described, “minor” is otherwise interpreted as few quantities of small volume or small area of materials or components across facility and not limited to fewer and/or smaller spaces. Follow substitutions procedures for components not specifically described and that may potentially meet LBC or OBC definition of “minor” and “similar minor components”.
.4 Combustible materials and components and their application where specifically described. Follow substitutions procedures for materials and components not specifically described where such materials and components are planned to be used in other locations, applications, environments.

.5 Fire Resistance and Fire Performance and Surface Burning Ratings: Where materials and assemblies do or are required or may be required to have fire resistance or fire performance and surface burning ratings, provide products as indicated and that meet regulatory requirements, including to multiple AHJ including to provisions of LBC and LFC even should LBC or LFC not apply, including:
.1 As indicated, with additional components applied for assembly to meet maximum fire resistance and performance ratings as required.

.1 May include full encasement within suitable enclosures or covers, including metal of specific weight and sealing characteristics.

.2 Materials and components meeting the following and tested to referenced documents acceptable by regulatory requirements and AHJ, including to ULC standards, if acceptable by AHJ, otherwise to similar referenced documents if acceptable by AHJ which may require submissions of documents and rationales to AHJ.

.1 Materials in air handling spaces and non-air handling spaces to maximum 25 flame spread rating and maximum 50 smoke developed classification.

.2 Components in air handling spaces and non-air handling spaces to maximum 25 flame spread rating and maximum 50 smoke developed classification.

.3 Materials in non-air handling spaces to maximum 25 flame spread rating and maximum 50 smoke developed classification, unless acceptable to vary from strict requirements where LBC and LFC specifically describe other limits and certifications for specific materials and components. Example: Materials for ceilings for plenums with allowed for reduced ratings, materials encased within envelope with allowed for reduced ratings.

.4 Components in non-air handling spaces to maximum 25 flame spread rating and maximum 50 smoke developed classification unless acceptable to vary from strict requirements if rated with certifications as an assembly and recognized by AHJ and where LBC and LFC specifically describe other limits and certifications for specific materials and components. Example: Plastic handles on equipment with ratings that are less.

.3 To regulatory requirements for determination of ratings and minimum ratings.

.1 Including flame spread rating and smoke developed classification.

.2 Including general ULC standards:

.1 ULC-S101.

.2 ULC-S102.

.3 ULC-S114.

.3 Including other ULC standards for specific components which may be in addition to above or alternatively to above including:

.1 Various Materials: ULC-S102.2, ULC-S109.

.2 Firestops: ULC-S115.

.3 Ducting, Venting: ULC-S110, ULC-S111, ULC-S112, ULC-S112.1, ULC-S144.

.4 Wiring, Cabling, Raceway: ULC-S102.4, ULC-S139, ULC-S143.

.5 Luminaires: ULC-S102.3.

.6 Doors, Windows: ULC-S104, ULC-S105, ULC-S106, ULC-S113.

.4 To regulatory exceptions and exposure conditions of ratings.

.1 Including flame spread rating and smoke developed classification.

.5 To alternate requirements if acceptable to AHJ and Engineer and where indicated including the following locations and types:

.1 Materials in Air Handling Spaces

.1 To ASTM-E84 and UL-723 where maximum flame spread rating is substantially less than 25 and maximum smoke developed index is substantially less than 50.

.2 To ASTM-E84 and UL-723 where maximum flame spread rating is less than 25 and maximum smoke developed index is less than 50, and where additionally encased in a rated material or component.

.2 Components in Air Handling Spaces

.1 To CSA-C22.2-0.17 or UL-94 with V-0 or VTM-0 for specific components, and where mounted within a suitable encasement, which may include metal enclosures.
.2 To UL-2043 for specific components.
.3 Materials in Other Spaces
.1 To ASTM-E84 and UL-723 where maximum flame spread rating is less than 25 and maximum smoke developed index is less than 50.
.2 To ASTM-E84 and UL-723 where maximum flame spread rating is near or at 25 and maximum smoke developed index is near or at 50, and where additionally encased in a rated material or component.
.4 Components in Other Spaces
.1 To CSA-C22.2-0.17 or UL-94 with V-0 or VTM-0 for specific components.
.2 To UL-2043 for specific components.
.3 To suitable ratings for portable components.
.6 Substitution Limitations
.1 Characteristics Limited: Specific characteristics are limited as follows, and may be accepted to Substitutions Article in this Section and where requirements can be demonstrated to be met:
.1 To Other Requirements: To other referenced documents and ratings where acceptable to both AHJ and Engineer, including for components within assemblies, portable components.
.2 Requirements Waived: Specific requirements may be acceptable to be waived, and may be accepted to Substitutions Article in this Section and where requirements can be demonstrated to be met:
.1 Match Existing May Be Acceptable: Where not indicated for spaces with very minor alterations or repairs of existing, components or elements with a single use may match or exceed ratings of existing.

1.16 EXECUTION

.1 General Requirements: Provide the following:
.1 Examination
.1 Examine existing conditions which Work depends on, including surfaces, substrata, structural construction, hazardous materials, existing services.
.2 Drawings are diagrammatic and intended to convey scope of Work and indicate general and approximate location, arrangement and sizes of equipment and services including piping, ducting, venting, and wiring.
.2 Preparation
.1 Obtain more accurate information about locations, arrangement and sizes from:
.1 Site inspection and measurement.
.2 Documentation review and coordination, including existing building drawings, base building drawings, supplemental project and renovation drawings, existing products information for components, equipment, services, systems.
.2 Determine exact location and routes for Work including services, equipment, components.
.3 Temporary Parts and Additional Construction
.1 Various aspects of Work related to means, methods, sequences, techniques, and procedures of construction may require additional planning and implementation considerations and requirements, including:
.1 Temporary supports or structures including shoring, bracing, hoarding, underpinning, scaffolding.
.2 Hoisting, rigging, moving components on surfaces or structures before final location.

.3 Temporary or permanent modifications or alterations to surfaces or structures to permit installation of Work, including doorways, walls, floors, ceilings, roofs, openings.
.4 As required by regulation and Owner policies, including matters related to health and safety.
.2 Complete the following where indicated and for the above aspects of Work:
.1 Engage services of a professional engineer under delegated professional design to provide design documents on Work related to means, methods, sequences, techniques, and procedures of construction that requires professional engineering.
.2 Submit written plans for review by Owner, including phase-in planning, disruption mitigation, emergency procedures, MOP.

.4 Removal and Demolition
.1 Remove existing as required, including systems, equipment, components.
.2 Remove existing and obsolete parts to satisfaction of Owner within affected areas including:
.1 Services, equipment and components affected by Work, including interference modifications.
.2 Services, equipment and components not affected by Work.
.3 As indicated including markings on site.
.3 Refrain from dismantling by cutting whenever possible. If cutting is required, submit demolition MOP for Owner review before proceeding.
.4 Reinstate temporary modifications or alterations to surfaces or structures to permit installation of Work, including doorways, walls, floors, ceilings, roofs, openings.
.5 Patch openings and refinish surfaces where parts are removed or relocated.
.1 Subject to Owner approval, openings in occupiable spaces with special finished surfaces that are not practical to match may be covered by plates matching existing décor. Covering plate material and finish subject to Owner approval.

.5 Relocation
.1 Relocate existing services, equipment, components as required, including piping, ducting, venting, electrical, controls, fire protection including sprinklers and detection.
.2 Modify routing and/or relocate components, equipment and services as required.

.6 Application
.1 Service Connections: Coordinate requirements and types of connections to services and components by matching requirements for such services and components as indicated, or as required where not indicated.
.2 Configuration and Settings: Record configuration and settings used.

.7 Reinstatement
.1 Reinstate systems and components that may have been modified or relocated due to Work to satisfaction of Owner and Engineer.
.2 In addition, reinstate the following areas and with indicated frequency:
.1 Minimum daily and more frequently as required for the following:
.1 Occupied and visible areas.
.2 As required for remaining areas to not interfere with building operations.

.8 Products Installation
.1 Comply with manufacturers' requirements, including limitations, instructions, recommendations, for full installation and operation of products, except where more stringent requirements are specified, are necessary due to Work, or are required by AHJ.
.2 Anchor each product securely in place, accurately located and aligned with other Work.
.3 Provide sufficient clearances for servicing and maintenance access.

.4 Protect installed products from damage during construction, including surface marring, vibration, dust. Provide protective wrappings as required.
.5 Use required manufacturer activities and entities described in this Section.

.9 Manufacturer Activities: Provide specific manufacturer activities as indicated, and as required where not indicated. Includes manufacturer activities required for providing fully functional systems that are complete and ready for intended use and effect. Includes installation, finishing, configuring, programming, calibrating, testing, commissioning, training, servicing.
.1 Installation Supervision: Manufacturer to supervise field assembly of products to ensure requirements are met, including completeness, functionality, performance.
.2 Start-up Supervision: Manufacturer to approve installation, to supervise start-up, and to provide instructions to Owner.
.3 Start-up Completion: Manufacturer to approve installation, to complete start-up, and to provide instructions to Owner, unless otherwise indicated.
.4 Adjusting Completion: Manufacturer to complete adjusting.

.10 Disposal
.1 Separate and dispose of construction waste as required and in compliance with Owner requirements, applicable laws, regulations, orders and ordinances, codes, standards, and practices, including waste management and environmental protection laws.
.2 Conduct disposal operations as required, including Owner requirements, applicable laws, regulations, orders and ordinances, codes, standards, practices, waste management laws, and environmental protection laws.
.3 Provide waste removal facilities and services as required to maintain the site and existing facilities in clean and orderly condition.
.4 Provide containers with lids. Dispose of waste off-site periodically.
.5 Provide closed chutes. Terminate closed chutes into appropriate containers with lids.

.11 Reviews, Tests, and Inspections
.1 Includes reviews, tests, and inspections that may be required to be completed, or requested by Owner or Engineer. Includes for providing fully functional systems that are complete and ready for intended use and effect. Includes installation, finishing, configuring, programming, calibrating, testing, commissioning, training, servicing.
.2 Inform Owner of arranged reviews, tests, and inspections required, regardless if Owner has responsibility to communicate with other entities over specific matters. Owner and Engineer may inform Contractor of same.
.3 Upon approval from Owner, arrange for reviews, tests, and inspections, and coordinate dates and times acceptable to Owner and Engineer.
.4 Provide reviews, tests, and inspections, as well as additional follow-up reviews, tests, and inspections. As a minimum, participate in and be present during reviews, tests, and inspections related to Work.

.12 Transportation, Delivery and Handling
.1 Comply with manufacturers' requirements, including limitations, instructions, recommendations.
.2 Provide all equipment and personnel as required.
.3 Coordinate with Owner for delivery and acceptance.
.4 Arrange delivery to minimize long-term storage and prevent overcrowding construction spaces. Coordinate with installation to ensure minimum holding time for items that are flammable, hazardous, easily damaged or sensitive to deterioration, theft and other losses.

.13 Cleaning

.1 Conduct cleaning operations as required, including to Owner requirements, applicable laws, regulations, orders and ordinances, codes, standards, and practices, including waste management and environmental protection laws.
.2 Clean areas, equipment, fixtures, surfaces, and products affected by construction including:
.1 Exterior finished surfaces including parking, sidewalks, walkways, driveways, streets.
.2 Exterior unfinished surfaces, including grounds, gardens.
.3 Interior areas.
.4 Horizontal and vertical surfaces.
.5 Ceiling components including lighting, detectors, annunciators.
.6 Floor surfaces.
.7 Finished surfaces including glass, mirrors, metalwork.
.1 Free of soiling and fingerprints including glass, mirrors.
.2 Mirror finished metal to be buffed to high lustre.
.3 Cleaning Agents and Materials
.1 Non hazardous to health or property and as required by Owner.
.2 Use only those cleaning agents and materials suitable for surface and as recommended by cleaning product manufacturer of the surface materials to be cleaned.
.3 Adhere to cleaning methods as recommended by cleaning product manufacturer and as suitable for surface and location including space or room use.
.4 Cleaning Frequency
.1 Minimum daily and more frequently as required for the following:
.1 Occupiable and visible areas.
.2 Minimum weekly and more frequently as required for remaining areas.
.5 Contract Completion Review Cleaning: Provide a thorough cleaning and review with Owner prior to Contract Completion review. Complete final cleaning before submitting final Application for Payment.

.14 Adjusting
.1 Mounts and Isolation Including Supports, Frames, Hangers, Springs, Isolation
.1 Adjust as required throughout the full normal range of operating conditions. Adjust including the following:
.1 To maintain orientation, including during thermal expansion.
.2 To equalize loads.
.3 To eliminate vibration and noise, including rattling or drumming. Including under various operating conditions including extreme minimum and maximum loading under extreme conditions.
.2 Operable Components
.1 Adjust as required throughout the full normal range of operating conditions. Adjust including the following:
.1 To maintain function.
.3 Functionality and Performance
.1 Adjust as required, including to meet all requirements complete and coordinated for required performance and functionality. Adjust including the following:
.1 Operating modes.
.2 Limitations.
.3 Limits, safeties.
.4 Parameters, settings, configuration, programming.
.5 Control loops, tuning, overshoot, undershoot, response times.
.6 Interfaces.

.7 Sound, noise, vibration, rattling, drumming.
.8 Operational aspects between zones and ambient environment, including conditions, transmission, migration including dust, debris, gases, odours.
.9 Smooth transitions.
.10 Operation at extreme loads, including minimum and maximum, extreme conditions.
.11 Efficiency.
.12 Longevity.

.15 Handover
.1 Operational Responsibility
.1 For systems, equipment, and components affected by Work, Contractor's operational responsibility includes all duties and responsibilities that would otherwise fall to Owner, including operation to be safe, reliable, performing to expectations. Contractor duties and responsibilities include coordination with Owner regarding operational requirements. Operational responsibility for new or existing affected systems, equipment, or components, remains with Contractor until such duties and responsibilities are transferred to Owner.
.2 Transfer of Operational Responsibility
.1 When Contractor has achieved a level of completion appropriate for transferring operational responsibility to Owner, Contractor to:
.1 Provide written notice that Contractor intends on transferring operational responsibility to Owner, including clear indication of which specific aspects of Work are covered by the notice.
.2 Provide Owner with a detailed list of any outstanding items of Work related to the equipment or systems being transferred to Owner's responsibility.
.3 Provide a date and time acceptable to Owner for when the transfer of responsibility is to be become effective. Such date to not be less than 7-day nor more than 31-day from the date the notice is provided to Owner.
.4 Provide confirmation acceptable to Owner that required training, documentation, regulatory approvals, functional testing, and commissioning have been completed and submitted to Owner as required.
.2 Should Owner choose to waive any such requirements for the purpose of interim operations, Contractor is not relieved of duties and responsibilities for meeting such requirements at a later date.
.3 Demonstration of Interim Operation
.1 Based on Owner's discretion of completion level, including completion of specific areas or elements of Work, when Contractor has achieved a level of completion appropriate for demonstration to Owner for the purpose of operation by Owner, Contractor to:
.1 Provide to Owner a summary of Work completed.
.2 Show Owner Work completed.
.3 Provide to Owner required training and documentation necessary for Owner to operate in the interim until final training is provided.
.4 Review and document logging and reporting requirements of Owner during interim operation.
.2 Should Owner choose to waive any such requirements for the purpose of interim operations, Contractor is not relieved of duties and responsibilities for meeting such requirements at a later date.

.16 Storage
.1 Provide temporary off site storage for products until ready for installation.
.2 Store and protect products to manufacturers' requirements, including limitations, instructions, recommendations.

.3 Store sensitive products in weather-tight enclosures or covered with an impervious sheet covering. Provide adequate ventilation, temperature and humidity control to avoid condensation, corrosion and damage due to temperature and humidity limits.
.4 Periodically inspect storage areas to ensure that products are undamaged and are maintained under required conditions.
.5 Products damaged by improper storage or protection to be removed and replaced with new products, with no changes to Contract Price or Contract Time.

.2 Specific Additional Requirements: Provide to the following unless otherwise indicated:
.1 Service Penetrations, Grouts and Mortars, Joint Sealants
.1 Provide penetration holes and openings as required for routing of services. Penetrations include through structures, separations and envelope, including roofs, walls, foundations, ceilings, floors.
.2 Unless otherwise indicated, provide the following:
.1 Steel sleeve of suitable material for environment including corrosion, and of suitable thickness and strength as suitable for structural integrity. Size sleeve as required, including for insulation, firestops and smoke seals.
.2 Fill or pack cavity between sleeve and surface with rigid materials to grouts and mortars to buildup surface to sleeve.
.3 Fill or pack cavity between sleeve and service with flexible joint sealants.
.4 Seal between service and surface with flexible joint sealants.
.5 Cover plant or escutcheon on exposed-to-view sides.
.3 Provide grouts and mortars as required for patching and filling, to repair or buildup surfaces and to provide protection.
.1 Provide grouts and mortars suitable for application, including location, contamination, thermal and moisture protection.
.2 Match surface profiles and finishes unless otherwise indicated.
.4 Provide joint sealants as required for patching and filling, and to provide protection.
.1 Provide joint sealants suitable for application, including location, contamination, thermal and moisture protection.
.2 Apply appropriately sized continuous beads, and tool finish.
.5 Clean and repair surfaces as required to relevant ACI and SSPC standards.
.6 Mask components and surrounding areas as required.
.1 Includes meeting above requirements and installation quality.

1.17 SUBSTITUTIONS

.1 Request for Substitution (RFS) is a written request submitted by Contractor to deviate from specified requirements, including products, execution.
.2 RFSs are only to be submitted after Contractor has completed thorough investigations and planning to incorporate substitution into Work properly, including achieving full use and effect.
.3 RFSs will only be considered when submitted in sufficient time to permit review by Engineer.
.4 Substitutions are generally limited as follows, which may reduce or increase Contractor efforts related to substitution procedures. Additional specific limitations may be indicated in Specification.
.1 Substitution Limitations
.1 Characteristics Review Waived: Specific characteristics are acceptable without additional review as follows:
.1 Generally: Not applicable.
.2 Specifically: As indicated.
.2 Characteristics Limited: Specific characteristics are limited as follows, and may be accepted to substitution requirements in this Article and where requirements can be demonstrated to be met:

.1 Generally: Various required and indicated characteristics, including:
.1 Performance requirements, including capacity, efficiency, selection states, maximum and minimum operating states, flow limitations, temperature limitations, pressure drops, sound, wind loading.
.2 Physical characteristics, including weight, height, length, width, service connection locations.
.3 Services requirements and connections, including piping, ducting, venting, wiring, controls.
.4 Application requirements, including mounting, surface temperatures, heat rejection into space, condensation and precipitation protection, sound, noise, vibration, expansion, contraction.
.5 Suitability requirements, including operating existing service liquid quality, makeup water quality.
.6 Comparable characteristics, including features, materials, tests, ratings, certifications, warranties.
.7 Aesthetics, including colours, finishes, similarity.
.8 Maintenance.
.2 Specifically: As indicated.
.3 Other Work Required: Specific other Work including re-design is required as follows, and may be accepted to substitution requirements in this Article and where requirements can be demonstrated to be met:
.1 Generally: Re-design may be required to be completed:
.1 By Contractor if acceptable to Engineer.
.2 By Engineer. This may result in additional costs incurred by Owner.
By Contractor with other professional engineer0 Delegated Professional Design if this method is acceptable to Engineer.

.2 Specifically: As indicated.
.4 Requirements Waived: Specific requirements may be acceptable to be waived, and may be accepted to substitution requirements in this Article and where requirements can be demonstrated to be met:
.1 Generally: Not applicable.
.2 Specifically: As indicated.

.5 Substitutions may additionally be limited to no substitutions.
.6 RFSs to include differences between specified requirements and substitution, including the following:
.1 Clear title denoting the document as a “Request for Substitution”.
.2 Reasons for requesting substitution that are reasonable and justifiable.
.3 A summarized comparison of characteristics for specified requirements and substitution, and clearly highlighting variations.
.4 Indication of reductions to Contract Price and Contract Time.
.5 Verification that substitution will not result in additions to Contract Price or Contract Time, or a reduction in performance to Work including direct affected portions of affected Work or other portions of Work.
.6 Additional information for products including:
.1 Identification, including manufacturer’s name, addresses, telephone numbers, web sites, emails.
.2 Manufacturer’s data sheets, including material descriptions, compliance with regulation and referenced documents and applicable standards, performance data, test data, ratings, certifications.
.3 Indication of availability of maintenance services and sources of replacement materials and parts, including associated costs, time frames.
.7 Additional information for labour not from Contractor personnel including:

.1 Identification, including subcontractor or sub-subcontractor name, address, telephone numbers, web site address.
.2 Trades licenses and certifications.
.3 Indication of availability for response times, troubleshooting, service.

.7 Provide additional information requested by Engineer, including:
.1 Demonstration that substitution will perform equally as well or better than specified requirements.
.2 Demonstration that other provisions of this Article will be met.

.8 RFSs may not be reviewed for various reasons, including:
.1 Substitutions were limited to no substitutions.
.2 RFS does not meet submission requirements or other provisions described in this Article.
.3 Substitution was implied within submittals or other documents.
.4 Opinion of quality and functionality from either Owner or Engineer.

.9 RFSs may be rejected for various reasons, including:
.1 Proposed substitution is not equivalent to or better than the specified requirements, as determined by Engineer.
.2 Opinion of value and risk from either Owner or Engineer.
.3 Owner chooses not to entertain RFS.
.4 Opinion of re-design of differences.

.10 Failure to complete Work or portions of Work in adequate time to meet time requirements, including dates and durations, will not be a valid reason to submit RFSs. Delays remain responsibility of Contractor, with no changes to Contract Price or Contract Time.

.11 In the event a substitution has been incorporated into Work without obtaining written acceptance of the RFS:
.1 Contractor to remove the substitution and replace it with specified requirements, with no changes to Contract Price or Contract Time.
.2 Alternatively, should substitution be reviewed by Engineer and later accepted by Owner, Contract Price to be reduced by the sum of:
.1 The amount that the installed price of specified requirements exceeds that of substitution, as determined by Engineer.
.2 Engineer fees required to review and evaluate the substitution, regardless if substitution is accepted.
.3 Additional Engineer fees as required including administering substitution procedures, documentation.
.4 The net present value of lifecycle costs resulting from substitution, as determined by Engineer, including energy efficiency, maintenance costs, fees related to application and approval of permits, and modifications to related Work resulting from substitution.

.12 Substitutions to not result in any delay in completion of Work, including other activities and projects under separate contracts by Owner.

.13 Substitutions to not result in any increase in Contract Price and Contract Time.

.14 Should changes be required due to substitutions, such changes to be completed by Contractor, with no changes to Contract Price or Contract Time, whether or not such changes are known at the time substitution is accepted. Changes may result in additional costs incurred by Owner.

1.18 QUALITY

.1 General Requirements: Provide the following:
.1 Quality Assurance: Confirm products, services, workmanship and site conditions comply with requirements by planning, examining, inspecting, preparing, submitting, reviewing.

.2 Quality Control: Ensure products, services, workmanship and site conditions comply with requirements by coordinating, supervising, inspecting, and testing Work, and by utilizing only suitably qualified personnel.

.3 Manufacturers' Requirements: Comply with manufacturers' requirements, including limitations, instructions, recommendations, in completing Work, including preparing, fabricating, erecting, installing, applying, connecting, finishing, unless more stringent requirements are required, indicated or specified.

.4 Installation: Produce Work plumb, level, square and true, or true to indicated angle, and with proper alignment and relationship between the various elements. Ensure Work is properly related to form close joints and appropriately aligned junctions, edges and surfaces and is free of warp, twist, wind, wave or other irregularities.

.5 Defects and Blemishes: Correct defects, blemishes and other aesthetic issues identified by Engineer.

.6 Deviations: Document and explain deviations from requirements via the substitution process, including applicable standards, referenced documents, building code research report requirements, and manufacturer's product installation instructions and recommendations. Include written acknowledgment by manufacturer that such deviations are acceptable and appropriate for Work. Ensure Work does not infringe on applicable patents or intellectual property rights.

.7 Logs: Maintain daily sign in and sign out logs for all personnel on site. Owner may determine location of logs.

.8 Photo Documentation

.1 Photo document areas affected by Work before construction begins.

.2 Photo document Work Progression at each stage of concealment including:

.1 Opening.

.2 Sleeving.

.3 Mounting.

.4 Layering parts onto other parts.

.5 Finishing.

.6 Painting.

.7 Insulating.

.8 Sealing.

.9 Other obstructions or concealment.

.3 Photo document areas affected by Work after each major phase of construction.

.9 Reviews, Tests and Inspection

.1 Inform Owner and Engineer of required reviews, tests, and inspection, including those required by:

.1 Warranty conditions.

.2 Product manufacturers.

.3 Certification of Work.

.4 Commissioning.

.5 Contract Documents.

.6 AHJ.

.7 Regulation.

.2 Work being concealed or hidden may require additional coordination to provide various parties opportunity to view Work before being concealed or hidden.

.3 Contact manufacturers, suppliers, AHJ, and others as required sufficiently in advance to confirm which, if any, reviews, tests and inspection are required, including when required as a condition of permits, certificates, and licences not obtained by Contractor.

.4 Make arrangements for required reviews, tests and inspection. Coordinate dates and times that are acceptable to Owner and Engineer.

.5 Complete and participate in and be present during reviews, tests and inspections, as well as additional follow-up reviews, tests and inspections.
.1 Arrange and pay for the presence and participation of manufacturers, suppliers, service representatives, subcontractors, AHJ, and others that may be required to be present during such activities.
.10 Verification: Work may require various verification activities, and additionally may be subject to additional verification by Owner or Engineer. Support verification activities by Owner or Engineer.
.11 Monitoring: Owner may monitor construction site including video surveillance to document construction progress and to provide evidence for valuing Change Directives.
.2 Specific Additional Requirements: Provide the following unless otherwise indicated:
.1 Minimum Quality: Where no quality basis is prescribed, quality to be to the more stringent of:
.1 Best accepted practices of construction industry for projects of this type, and in this location.
.2 Quality of latest changes and renovations to existing building installation, as it exists now.
.3 Quality of existing base building installation, as it existed when newly installed.
.2 Protection: Take measures necessary to preserve and protect existing and completed Work free from damage, deterioration, soiling and staining, until acceptance by Owner.

1.19 TEMPORARY FACILITIES AND CONTROLS

.1 General Requirements: Provide the following:
.1 Existing Parts Protection
.1 Migration Protection
.1 Provide protective systems and barriers at services and systems, including at air inlets and grilles, to prevent maintenance and operational impacts outside of working area. Includes noise, sound, vibration, dust, debris, fumes, smoke, gases, odours.
.2 Contaminants migration plan and implementation to SMACNA-008 between areas requiring Work to neighbour spaces whether neighbour spaces are occupied or occupiable or in use or not in use.
.2 Spills Protection
.1 Provide protective systems to prevent spills from leaving area or entering drains including:
.1 Materials.
.2 Fluids that are not normal as described above.
.2 Submit spill protection plan and review with Owner for fluids that may meet MECP generators of liquid industrial and hazardous waste, including:
.1 Oils, solvents, fuels, acids, ethylene glycol.
.3 Report on any spills that have occurred and measures taken for cleanup and to protect systems.
.3 Surfaces Protection
.1 Protect existing surfaces from soiling and damage, including floors, with protective covering as required.
.1 Minimum for Floors: 2 layers of 0.08-mm (3-in/1,000) polyethylene sheets, extending sheets 460-mm (18-in) up the side walls. Cover polyethylene sheets with minimum 25-mm (1-in) fire-retardant plywood.
.2 Provide mats to clean dust and debris from traffic entering and existing Work space.
.2 Temporary Utilities
.1 Provide temporary utilities as required, including electrical, lighting, water, heating, cooling, ventilation, drainage, sanitary facilities as required.

.2 Coordinate utility disruption and provision of temporary utilities as required by Owner to prevent interruption of building occupant activities.
.3 Coordinate with Owner for points of connection, protection and payment of service charges.
.4 Exercise measures to conserve energy.
.5 Provide emergency backup power in the event of interruption of existing power including backup standby power.
.6 Provide generators to:
.1 To NECA-404
.2 To NECA-405.
.7 Provide temporary electrical power to NECA-200.

.3 Temporary Services: Provide temporary services as required, including lighting, pumping, heating, ventilation, cooling, and de-humidification. Temporary services may be required of Work space or other spaces. Purposes of temporary services include:
.1 Maintain occupant comfort.
.2 Maintain building environment.
.3 Maintain equipment and system redundancy requirements.
.4 Maintain safety systems.
.5 Maintain protection.
.6 Prevent interference or disruption of occupant operations.
.7 Prevent damage, including to areas, systems, services, equipment, components, finishes.
.8 Provide adequate temperature and humidity levels for storage, curing or drying.
.9 Prevent migration and accumulation of dust, debris, fumes, smoke, gases, or odours.
.10 Prevent flooding and standing water.
.11 Prevent spills.
.12 Prevent draining or washing of materials or fluids that are considered abnormal for site storm or sanitary drains.
.1 Facility sanitary drains may be used for disposal of normal fluids if tests have been completed to identify fluid composition and characteristics as meeting the following:
.1 Not exceeding any restrictions or limitations due to regulatory requirements, including to municipality sewer use by-laws, local water utility requirements.
.2 Acceptable by Owner requirements and other regulatory requirements.
.2 Submit completed tests to Owner before use of sanitary drains, and Owner review and acceptance of use of sanitary drains.

.4 Work Protection
.1 Provide temporary protection for installed products and services. Control traffic in immediate area to minimize damage.
.2 Provide temporary closures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations and similar activities.
.3 Provide temporary weather-tight enclosure for building exterior.

.5 Work Separation
.1 Provide temporary fencing, barriers and guardrails as necessary to provide for public safety, to prevent unauthorized entry to construction areas, and to protect existing facilities and adjacent properties from damage from construction operations.
.2 Minimize duration of use of work separation systems.
.3 Obtain approval from Owner for types, aesthetics, locations, durations.

.6 Work Support Facilities

.1 Provide temporary trailers, sanitary facilities, and other structures as necessary for the performance of the Work.

.7 Traffic Controls

.1 Provide traffic controls where work separation systems or temporary interference will impede, restrict or affect normal traffic flow.

.2 Provide traffic controls:

.1 To MTO-OTM-B7.

.2 To minimize interference with existing local traffic while also allowing Work to progress.

.3 To maintain means for emergency vehicle access at all times.

.4 To include illuminated signs, for construction activities and warnings signs, using battery operated flashing amber lights.

.3 Provide qualified personnel to flag and direct traffic during all periods but light traffic.

.4 Provide qualified personnel to inspect and monitor traffic control measures to be in working order during periods when construction is not active.

.8 Other Temporary Provisions

.1 Maintain safety systems and occupant protection.

.2 Coordinate with Owner for fire watch requirements for disruption of portions of fire protection systems. Fire watch completed with:

.1 To requirements of AHJ and practices.

.2 To Owner requirements.

.3 Submit fire watch plans for review with Owner.

.9 Supervision: Provide supervision of temporary facilities and controls where disruption or failure of such services may impact occupants, cause interruption of critical services, cause safety concerns, increase risk to life and property, cause other damages.

.10 Removal of Temporary Facilities and Controls

.1 Remove temporary facilities and controls, including utilities, equipment, materials, prior to Ready-for-Takeover Review.

.2 Remove underground installations to a minimum depth of 610-mm (2-ft). Grade site as required.

.3 Clean and repair damage caused by installation or use of temporary facilities and controls.

.4 Restore existing and permanent facilities used during construction to original condition. Restore permanent facilities used during construction to condition equal to or better than at commencement of construction.

.2 Specific Additional Requirements: Provide the following unless otherwise indicated:

.1 Temporary Communications: Provide temporary communications as required for proper performance of the Work.

1.20 GENERAL REVIEWS

.1 Definitions

.1 “general review”: In Contract Documents is same as defined by regulation, including LBC, professional practice guidelines, or the same as other terms such as “conformance review” or “general assessment” for the whole of or any part of Work as determined by Engineer, including general review not specifically required by regulation including LBC.

.2 “Engineer”: In this article is either Engineer as already defined, or professional engineer under delegated professional design, as required for the whole of or any part of Work.

.2 Purpose: General reviews are completed by Engineer as required for the purpose of reviewing whether Work is in general conformance with the design concept, and completed to regulatory requirements.

.1 No implied approval or acceptance of submittals, substitutions, or changes may be inferred from general reviews.

.2 No implied approval or acceptance of changes in Contract Price and Contract Time may be inferred from general reviews.
.3 General reviews are not to be relied upon for testing, commissioning, and required inspections by AHJ or other quality assurance purposes.
.4 General reviews do not relieve Contractor of duties and responsibility for meeting all requirements of Contract Documents.

.3 Frequency: Frequency of general reviews determined by Engineer during Contract Time or after Contract Time.
.1 General reviews will continue to be made until the final general review.

.4 Reports: Engineer will submit a report for each general review.
.1 General review reports may include references to other documents that are considered as part of the general review report.
.2 Notify Engineer in writing within 3 working days of receiving general review report should Contractor disagree with items noted in report including references.

.5 Punch Lists: Prepare and maintain on site a comprehensive list of items to be completed and corrected to make Work ready for acceptance by Owner.
.1 Update punch list with items described in general review reports.
.2 Immediately correct deficiencies and incomplete items described in general review reports at no change in Contract Price or Contract Time.

.6 Final General Review
.1 Submit written request for final general review indicating completion of Work. Include date and signature.
.2 Final general review request will imply, whether stated or not, the following:
.1 Statement that all outstanding general review items have been rectified.
.2 Declaration that Contractor has prepared and completed all final completion submittals as described below.
.3 Upon receipt of request, Engineer will proceed with final general review.
.4 In the absence of written request for final general review, final general review will be completed after Ready-for-Takeover Review has been first requested.

1.21 CONCEALED OR UNKNOWN CONDITIONS

.1 If all of the following exist, Contractor to provide written notice of potential or suspected concealed or unknown conditions, and in no event later than 5 working days or as otherwise indicated after first observance of potential or suspected conditions.
.1 Nature of condition is hidden or concealed including from inspection requirements from Contract Documents, including visual, scanning, making openings.
.2 Nature of condition is such that proper application of requirements from Contract Documents is unclear.
.3 Condition is materially different from those indicated in Contract Documents.
.4 Condition is materially different from those indicated in other information, including Additional Technical Information, available site information including drawings, report.
.5 Condition is extraordinary and unexpected and is materially different from those normally encountered with Work of this nature in facilities and systems of this nature.
.6 Condition has been reviewed with site staff.
.7 Potential solutions including alternatives and substitutions have been investigated and proposed.

.2 Written notice to include:
.1 Description of condition.
.2 Explanation of why this condition is viewed by Contractor as concealed or unknown.
.3 Photographs.
.4 Dimensional sketches.
.5 Recommendations, including alternatives and substitutions.

.3 Contract dates including Contract Time may be considered for change only when all of the following exist:
.1 Work is complete in other areas without completing Work in potential or suspected concealed or unknown condition areas.
.2 Contractor is not able to complete Work in areas with potential or suspected concealed or unknown conditions.
.3 Addressing issues related to potential or suspected unknown or concealed conditions has a material impact on the project critical path, including if Owner has not completed addressing any issues surrounding such potential or suspected unknown or concealed conditions.

1.22 CLARIFICATIONS

.1 Request for Clarification (RFC): A document submitted by Contractor requesting clarification of a portion of Contract Documents, hereinafter referred to as an RFC.
.1 Submit a written RFC when any of the following occur:
.1 Requirement Unclear: Exact material, process, or system to be installed is unclear.
.2 Interference: Elements of construction are required to occupy the same space.
.3 Requirements Conflict: Work is described differently in more than 1 place.
.2 RFCs to not be used for the following purposes:
.1 To request interpretation where requirements are reasonably clear after ample efforts are given by Contractor.
.2 To request review of submittals.
.3 To request approval or acceptance of substitutions.
.4 To request changes that only involve change in Contract Price and Contract Time.
.5 To request methods of performing Work different than as indicated.
.3 Requested Information: RFCs that request interpretation of requirements clearly indicated in Contract Documents will be returned without interpretation.
.1 In cases in which RFCs are issued to request clarification of issues related to means, methods, sequences, techniques, and procedures of construction, Contractor to furnish information required for Engineer to analyze and/or understand the circumstances causing the RFC and prepare a clarification or direction as to how Contractor to proceed. Examples include services routing, specific locations of Work shown diagrammatically, clearances indicated or required, apparent interferences.
.2 If information included with this type of RFC by Contractor is insufficient, the RFC will not be answered.
.2 Disputed Requirements: In the event that Contractor believes that a clarification by Engineer results in changes to Contract Price or Contract Time, resubmit RFC with additional information and explanations and request additional review.

1.23 COMMISSIONING

.1 Definitions
.1 “commissioning”: A planned program of tests, procedures and checks carried out systematically on systems and integrated systems of Work.
.2 “commissioning authority”: The entity named for defining commissioning requirements, and may include witnessing.
.1 Commissioning Authority is Engineer.
.3 “commissioning plan”: A plan that details the intent, responsibilities, extent and submittals of commissioning that will be used to meet commissioning objectives. May be detailed through meetings, verbal discussions, electronic correspondence, documents.
.1 Commissioning plan will be developed by Commissioning Authority. Commissioning plan may be periodically modified and updated. Review submitted commissioning plan updates and incorporate into Work.

.4 "demonstrations": A test or simulation whereby evidence of properly functioning equipment or systems is witnessed.
.5 "system state": A recorded snapshot of the system operation, including temperature, humidity, pressure, flow, amperes, actuator position, efficiency.
.6 "witnessing": An entity or person(s) that observes activities in person.
.1 Witnessing entity may be a defined entity which may include Commissioning Authority, or in absence of a specific defined entity will be a person(s) from Contractor team not specifically involved with installation.

.2 Extent
.1 Contractor administers and coordinates commissioning activities.
.2 Commissioning is additional to activities required, including start-up, quality control, quality assurance, testing, verification, adjusting, troubleshooting, deficiency correction.
.3 Commissioning is a prerequisite requirement for Ready-for-Takeover application.

.3 Quantities
.1 Activities and implementation time and efforts may be specifically limited as indicated. Where not otherwise indicated, implementation time and efforts are not specifically limited, including not being specifically limited to resolve issues identified by Commissioning Authority, Engineer or Owner.
.2 Commissioning Submittals: As required.
.3 Commissioning Administrative Requirements: As required.
.4 Installation Verification: As required.
.5 Operation Verification: As required.
.6 Performance Verification: As required.
.7 Seasonal Performance Verification Implementation: As required.
.8 Issues and Adjustments Required Reviews: Provide 2 full days commissioning time before Ready-for-Takeover for discussions and reviews on commissioning results for issues raised and adjustments required. Excludes resources related to resolving issues and correcting deficiencies.

.4 Commissioning Submittals for Action
.1 Commissioning Implementation Plan
.1 Schedule for commissioning activities, including chronological sequence of activities.
.2 List of participants for each activity.
.3 Details of roles and responsibilities for each participant.
.4 List of materials, test equipment, configurations, required to perform commissioning activities, including who is responsible for providing those items.
.5 Details of load states, weather conditions, or other parameters required to perform commissioning activities, including how schedule will be adjusted if such conditions are not present.
.6 List of actions required by Owner, Contractor, or by others, in advance of commissioning in order to facilitate commissioning activities.
.7 Details of commissioning activities that may impact building systems or building operation. Provide plan for how commissioning activities can be completed in accordance with Contract Documents and Owner requirements.

.5 Commissioning Submittals for Information
.1 Installation Verification
.1 Installation check sheets planned to be used.
.2 Installation check sheets completed.
.2 Operation Verification
.1 Start-up and operating check sheets planned to be used.
.2 Start-up and operating check sheets completed.
.3 Performance Verification

.1 Performance verification forms and reports planned to be used.
.2 Required data collection.
.3 Required documentation of system states, including at full and part load conditions for the following states and modes of operation:
.1 Start-up conditions.
.2 Normal operating conditions.
.3 Simulated maximum capacity.
.4 Simulated minimum capacity.
.5 Interlocks and failure modes.
.6 All other modes of operation.

.6 Commissioning Submittals for Closeout
.1 Certificates
.1 Letter certifying that Work has been installed and commissioned according to Contract Documents.
.2 Demonstrations: Form describing completed demonstrations including:
.1 Time and date.
.2 Description of demonstration.
.3 Parties present.
.4 Initials of third party witnesses.
.3 Documentation
.1 Completed submittals and commissioning forms.

.7 Meetings
.1 Adjustments Required Review
.1 For specific performance and functionality issues, provide the following to proceed with necessary adjustments.
.2 Preparation: Prepare a written journal of observations, adjustments made, results.
.3 Review
.1 Meet with Owner and Engineer to demonstrate how requirements including performance and functionality are not currently being achieved.
.2 Identify and detail proposed additional and alternate implementation approaches and methods.

.8 Witnessing and demonstrations
.1 Coordinate and schedule witnessing and demonstrations as required. Confirm attendees required before proceeding. Witnessing entity may be defined at discretion of Engineer, and may differ with each activity. Demonstrations to be planned and implemented without in person witnessing.
.2 Demonstrations
.1 Demonstrations to be witnessed by Engineer, Owner, or approved third party Commissioning Authority.
.2 Demonstrate the following quantity of components, equipment and systems unless otherwise indicated.
.1 Quantity 5 or 10-% of the total quantity, whichever is greater, of each distinct type of component, equipment and system as determined by Engineer.
.2 In addition to above:
.1 Zone Conditions: 10 or 20-%, whichever is greater.
.2 Flow Readings: 10 or 20-%, whichever is greater.
.3 Demonstrate performance including:
.1 System is working to design intent.
.2 Capacity, staging control, and efficiency of equipment at full and part load scenarios.
.3 Modes of operation for all equipment and systems.

.4 Interlocks including fire alarm, equipment fail-safe, over-current, over-vibration, flow, low level, over temperature, over pressure, gas detection, and other life safety interlocks or safeties required for safe operation.
.5 Equipment and component failure and fail-over modes and test consequences and responses.
.6 Other demonstrations upon request.

1.24 FINAL COMPLETION SUBMITTALS

.1 Project Drawings: Provide drawing types and formats as follows.
  .1 Formats
    .1 Paper Format
      .1 Bound sets with durable paper cover sheets.
      .2 Paper size to ASME-Y14.1, size ANSI D paper unless otherwise indicated.
      .3 Colour print.
      .4 Organize into manageable sets.
      .5 Cover sheets with identification information.
    .2 Electronic: PDF format of drawing contents.
  .2 Type: Contractor As-Built Marked-Up Drawings
    .1 Mark up prints to show the actual installation where installation varies from that shown in previous and most recent complete drawing sets.
    .2 Provide complete details on concealed elements that cannot be readily identified and recorded later, including layouts, schematics, products, components, installation methods.
    .3 Markups to be made with non-erasable red colour lines. Use other colours to distinguish between changes for different categories of Work at the same location.
    .4 Prominently cross out the following components from each drawing sheet:
      .1 Engineer's logo and address.
      .2 Engineering seal(s).
    .5 Identify and date each drawing sheet including the designation "AS-BUILT DRAWING" in a prominent location, whether or not there are markups on each sheet.
    .6 Apply Contractor stamp in red non-erasable ink to each drawing sheet.
  .3 Type: Project Design Drawings
    .1 Drawings provided by Engineer in electronic format to reflect consolidation of agreed changes to Contract Documents for which Engineer is assuming design responsibility.
    .2 Format: Printed
  .4 Type: Project As-Built Drawings
    .1 Drawings provided by Engineer in electronic format based on Contractor As-Built Marked-up Drawings.
    .2 Format: Printed
.2 Project Binders: Provide binders in the formats, types, and with contents as follows.
  .1 Formats
    .1 Paper Format
      .1 Bound and indexed binder volume sets.
      .2 Paper size to ASME-Y14.1, generally ANSI A size, or ANSI B size as required including for diagrams, unless otherwise indicated.
      .3 Colour print.
      .4 Maximum 76-mm (3-in) depth, unless otherwise approved by Owner or accepted by Engineer.
      .5 Add table of contents located on front page.
      .6 Add section dividers of heavier weight paper and durable paper tabs.
      .7 For multiple binders:

.1 Front cover and spine indexed, formatted and containing content including binder volume number, client project number, project name, date of substantial completion, site name, site address, and client site ID number.
.2 Include contents of multiple binder volume set in table of contents.
.8 Electronic version of all contents, contained in a sleeved inside each binder type, in both DVD(s) and USB flash drive(s).
.2 Electronic Format
.1 Format: PDF.
.2 Organization: Individual folders and files, with appropriate and representative names for recognition and ordering.
.2 Type: Project Record Manual
.1 Contract: Contract Documents, including signed contracts, bonding and insurance documentation.
.2 Drawings: All required drawings sets including those issued for tender, permits, changes.
.1 Paper Format: To ASME-Y14.1, ANSI C size, or smaller as acceptable to Engineer.
.3 Specifications.
.4 Meetings: Meeting agendas, minutes, memos, and communications.
.5 Submittals: Contract submittal information including submittals and reviews.
.6 Methods: Phase-in planning, disruption mitigation, emergency procedures, MOP, PTW.
.7 Instructions and Clarifications: Contract instruction supplements including clarification information.
.8 Changes: Contract change documentation including notices, proposals, reviews, orders, directives.
.9 Notices: Contract notices in writing, written statements.
.10 Site Reviews: Site reviews, reports, deficiency lists, observation lists.
.11 Payments: Contract payment documentation including certification, reviews.
.12 Permits: Application documents and approvals for permits, certificates, licenses, testing and inspections required including regulatory.
.13 Certificates: Other documents including certificates demonstrating compliance with requirements including regulatory.
.14 Guaranties and Warranties: Contract and overall project.
.15 Lien Documentation
.3 Type: Operating and Maintenance Manual
.1 Warranties
.1 Overall project.
.2 Additional warranties from subcontractors and sub-subcontractors.
.2 Products
.1 Product Characteristics
.2 Product Schedules
.3 Product Fabrication Data
.4 Product Installation Data
.5 Product Operation Data
.6 Product Maintenance Data
.7 Product warranties.
.8 Owner forms completed, including for maintenance, asset management.
.9 Other submittals as required.
.3 Systems
.1 System Information
.2 Investigations Information

.3 Testing Information
.4 Commissioning Information
.5 System Operating Data
.6 System Maintenance Data
.7 Other submittals as required.

.4 Type: Training Manual
.1 Software user manuals.
.2 Software training manuals.
.3 Training documentation, presentation slides, and other training related documentation.
.4 Sleeve containing DVD(s) of training videos, tutorial software, and other media related to training.

.3 Provide other closeout items including:
.1 Spare parts and materials.
.2 Software and license codes, including specific assignment of ownership to Owner requirements.
.3 Tools.
.4 Keys.

.4 Acceptance Procedures and Final Copies
.1 Prior to Ready-for-Takeover application, complete and submit each binder type to Engineer, Owner, and Commissioning Authority for review and acceptance. Submit electronic copies, as well as printed copies if required by Owner.
.2 Acceptance Criteria
.1 To the more stringent of the following, including quality, content, and format:
.1 ASHRAE-G-4.

Additional requirements indicated in commissioning requirements1.231.23CommissioningCommissioning.

.3 Create, add or modify and resubmit as required, including quality, content, and format.
.4 Upon written acceptance, provide 3 final copies of each document, binder and drawings set, in addition to electronic formats.

1.25 TRAINING

.1 General
.1 Provide sufficient training to deliver a thorough understanding of operation and maintenance of affected systems, services, equipment, and components, and their interrelationship with other parts.
.2 Provide training on the following affected parts:
.1 Systems, equipment, components and services.
.2 Systems, equipment and components requiring manufacturer's start-up activities.
.3 As indicated.
.3 Provide training to meet various requirements throughout Contract Documents.

.2 Ongoing Training
.1 Provide to Owner as necessary for installed parts as they are completed.
.1 Provide to Owner required training and documentation necessary for Owner to operate in the interim until final training is provided.
.2 Review and document logging and reporting requirements of Owner during interim operation.

Additional requirements as indicated in Commissioning Article in this Section.

1.26 ADDITIONAL RESPONSIBILITIES

.1 Adherence to Procedures
.1 Failure to adhere to procedures, including submittals and changes, in no way relieves Contractor of their duties and responsibilities for Work.

.2 Site Investigations Before Proceeding

.1 Contractor to complete site visits to complete detailed investigations and inspect the general and local conditions of site and areas that could affect Work.

.3 Non-conforming Work

.1 When Contractor seeks additional opinion regarding conformance of Work, Contractor to retain and pay for a representative(s) from applicable entity to review or inspect Work for such entity to provide opinion. Opinion from such entity will be subject to review by Engineer, as well as resubmission by entity. Entities include:

.1 Products: Manufacturer's representative.

.2 Regulatory: AHJ.

.3 Service: Owner's service contractor.

.2 Correct non-conforming Work, with no changes to Contract Price or Contract Time.

.4 Additional Fees from Engineer

.1 Specific actions or omissions by Contractor during project may result in Engineer charging additional fees to Owner, even though such actions or omissions may not necessarily represent a failure by Contractor to meet provisions of Contract Documents. These additional fees may include for Engineer's time, travel costs, and other related expenses. Refer to Contract Document for provisions governing claims for change in Contract Price by either Owner or Contractor.

.1 Failing to meet construction schedule including milestone dates. Activities of Engineer that may contribute to additional fees charged to Owner may include:

.1 Additional project or commissioning meetings.

.2 Additional site visits.

.3 Additional deficiency lists and deficiency reviews.

.4 Additional general reviews.

.5 Additional payment certifications.

.6 Administration of additional related changes to Contract.

.2 Submission of Request for Substitution, whether or not such request is in the prescribed form. Activities of Engineer that may contribute to additional fees charged to Owner may include:

.1 Reviewing and responding to Request for Substitution.

.2 Redesigning aspects of Work as a result of substitution.

.3 Actions or omissions resulting in Engineer repeating activities that may include:

.1 Commissioning activities.

.2 Project or commissioning meetings.

.3 Site visits.

.4 Deficiency lists and deficiency reviews.

.5 General reviews.

.6 Payment certifications.

.5 Contract Dates

.1 Owner may incur significant costs as a result of Contractor failing to meet contractual obligations, including:

.1 Milestone dates.

.2 Disruption of services beyond permitted durations.

END OF SECTION 01 00 00

SECTION 05 80 00 STRUCTURAL METAL

PART 1 GENERAL

1.1 SECTION INCLUDES

.1 Structural metal components, including shop and field fabricated.

1.2 REFERENCED DOCUMENTS

.1 ASTM-A123: ASTM-A123/A123M-2024 Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
.2 ASTM-A153: ASTM-A153/A153M-2023 Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
.3 ASTM-F3125: ASTM-F3125/F3125M-2023 Standard Specification for High Strength Structural Bolts, Steel and Alloy Steel, Heat Treated, 120 ksi (830 MPa) and 150 ksi (1040 MPa) Minimum Tensile Strength, Inch and Metric Dimensions.
.4 AWS-A5.4: ANSI/AWS-A5.4/A5.4M-2012 (R2022) Specification for Stainless Steel Electrodes for Shielded Arc Welding.
.5 AWS-A5.5: ANSI/AWS-A5.5/A5.5M-2022 Specification for Low-Alloy Steel Electrodes for Shielded Metal Arc Welding.
.6 AWS-A5.9: ANSI/AWS-A5.9/A5.9M-2022 Specification for Bare Stainless Steel Welding Electrodes and Rods.
.7 CISC-CSPSS: CISC Code of Standard Practice for Structural Steel, 2022 (9th Edition).
.8 CSA-G40.20: G40.20/G40.21-2013 (R2023) General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
.9 CSA-S16: CSA-S16-2024 Design of Steel Structures.
.10 CSA-W47.1: CSA-W47.1-2019 Certification of Companies for Fusion Welding of Steel.
.11 CSA-W47.2: CSA-W47.2-2011 (R2020) Certification of Companies for Fusion Welding of Aluminum.
.12 CSA-W48: CSA-W48-2023 Filler Metals and Allied Materials for Metal Arc Welding.
.13 CSA-W55.3: CSA-W55.3-2008 (R2023) Certification of Companies for Resistance Welding of Steel and Aluminum.
.14 CSA-W59: CSA-W59-2024 Welded Steel Construction (Metal Arc Welding).
.15 CSA-W59.2: CSA-W59.2-2024 Welded Aluminum Construction.
.16 CSA-W117.2: CSA-W117.2-2019 (R2023) Safety in Welding, Cutting, and Allied Processes.
.17 CSA-W186: CSA-W186-2021 Welding of Reinforcing Bars in Reinforced Concrete Construction.

1.3 SUBMITTALS FOR ACTION

.1 Product Aspects
  .1 Existing Products Modification Data
  .2 Existing Products Refurbished Data
  .3 Product Characteristics Data
  .4 Product Schedule Data

1.4 SUBMITTALS FOR INFORMATION

.1 Product Aspects
  .1 Product Fabrication Data
  .2 Product Certification Documentation Data
  .3 Product Mounting Plans
.2 System Aspects
  .1 System Layout Plans
  .2 System Field Documentation Plans
.3 Product Application
  .1 Product Application Plans Certificate Letter
  .2 Product Installation Information
.4 System Application

.1 System Testing Plans
.2 System Examination Results
.3 System Preparation Tests Results
.4 System Mounting and Supports Completed Certificate Letter
.5 System Verification Results
.6 System Documentation

1.5 SUBMITTALS FOR CLOSEOUT

.1 Product Application
  .1 Product Installation Completed Certificate Letter
  .2 Product Maintenance Information
.2 System Application
  .1 System Maintenance Information

1.6 QUALIFICATIONS

.1 Welding
  .1 General: Company certified by CWB to CSA-W55.3.
  .2 Aluminum: Company and personnel certified by CWB to CSA-W47.2 and CSA-W59.2, with personnel employed by company.
  .3 Steel: Company and personnel certified by CWB to CSA-W47.1 and CSA-W59, with personnel employed by company.
  .4 Steel Reinforcing Bars: Company and personnel certified by CWB to CSA-W186, with personnel employed by company.

1.7 MEETINGS

.1 Arrange and conduct meetings. Document decisions, and revise submittals and documentation as required.
.2 Phase-in Coordination Review
  .1 Meet with Owner to review and plan installation and migration plan from existing building systems to new or modified building systems.
  .2 Review requirements and findings from investigations.

1.8 WARRANTIES

.1 Extended Warranty Period
  .1 2-year.

PART 2 PRODUCTS

2.1 CHARACTERISTICS

.1 Provide products as required, and additionally to the following.
  .1 Manufactured, tested, certified, registered and listed to regulatory requirements and standards related to the functionality and performance or other relevant characteristics of the product, including proper application, including:
    .1 In the following order:
      .1 To CSA-S16.
      .2 To CISC-CSPSS.
  .2 Materials
    .1 General
      .1 Steel to CSA-G40.20, minimum grade 50W (350W).
      .2 As required.
    .2 Galvanized Coating
      .1 Iron and steel components, excluding stainless steel, hot-dip galvanize to ASTM-A123 and ASTM-A153.

2.2 FASTENERS - BOLTS, NUTS, WASHERS

.1 Provide as required.
.2 Features
  .1 Type, material and size labelled with markings.

.3 Materials
  .1 As indicated, otherwise as follows.
  .2 Locations
    .1 Interior and Conditioned Both Sides: Hot-dip galvanized carbon steel.
    .2 Interior Other: 316 stainless steel.
    .3 Other: 316 stainless steel.
.4 Certifications
  .1 To ASTM-F3125.
  .2 To CSA-S16.

2.3 DATA CENTER FLOOR STANDS

.1 Provide as required.
.2 Features
  .1 Fully customizable stand dimensions, including width, depth, and height.
  .2 Adjustable height +/-25-mm (1-in) for alignment with raised floor.
  .3 Top plate.
  .4 Pre-cut anchor holes in top plate.
  .5 Solid steel top plate.
  .6 Fully welded, all steel assembly.
  .7 Powder coated finish.
  .8 Levelling feet with anchoring holes allowing anchoring to floor.
  .9 Stands can be bolted together adjacently.
.3 Options: Provide selections from each of the following available characteristic types as most suitable for each application.
  .1 C·TP: Top plate cutout holes.
    .1 Top plate cutout holes with customizable dimensions and locations.
  .2 A·SP: Side panels.
    .1 Side panels with conduit knockouts.
.4 Manufacturers
  .1 IntraPack Industries, Inc., Data Centre Floorstands Series, or approved equivalent

2.4 ACCESSORIES

.1 Provide as required.
.2 Joints
  .1 Welded
    .1 Filler Metals and Allied Materials
      .1 To CSA-W48.
    .2 Electrodes: To relevant AWS standards and referenced documents including:
      .1 Carbon Steel: To AWS-A5.5, minimum to E70xx.
      .2 Stainless Steel: To AWS-A5.4, AWS-A5.9.

PART 3 EXECUTION

3.1 EXAMINATION

.1 Existing Inspection
  .1 Thoroughly review and measure existing parts, including dimensions, spacing.
  .2 Photograph and document and existing deficiencies in affected systems, equipment, services and surrounding areas.
.2 Pre-Installation Evaluation
  .1 Confirm the condition, installation, location, quantity and type of applicable equipment.
  .2 Complete x-ray scans, consultation, and other investigations as required to verify structural member construction, verify suitable locations, and ensure drilling and coring through structural members will not affect integrity.
  .3 Confirm final parts to be mounted, including equipment and components, including for weights, dimensions.

3.2 NOTIFICATION

.1 Early Installation Sampling Reviews
  .1 Notify Engineer of scheduled start and duration of each the following Work by minimum 2-day in advance of scheduled start:
    .1 Welded connections.
    .2 Torque applied to bolt tightening.
    .3 Grouting of drilled inserts.

3.3 INSTALLATION

.1 Install as required.
.2 Selection and Application
  .1 Unless otherwise indicated or required, provide Work:
    .1 To CSA-S16.
    .2 To CISC-CSPSS.
.3 Mounting and Supports
  .1 Design and provide as required, including fasteners, anchors, hangers, guides, frames.
  .2 Provide mounting and supports:
    .1 To make products level.
    .2 To protect products from water damage, including floods, spills, leaks, drips.
    .3 To withstand greater of:
      .1 Seismic events with seismic mounts and restraints as required.
      .2 Concentrated loads of 100-% of system weight applied at any point in any direction.
    .4 To minimize noise and vibration transmitted to services and building structure, including transients.
.4 Joining
  .1 Holes
    .1 Drill holes at factory or shop.
    .2 Substitution Limitations
      .1 Characteristics Limited: Specific characteristics are limited as follows, and may be accepted to Substitutions Article in Section 01 00 00 Project Procedures and where requirements can be demonstrated to be met:
        .1 Applications
          .1 Field drilling of holes to same accuracy and tolerances as in factory.
  .2 Drilled Inserts
    .1 Provide as required.
    .2 Blow out holes to remove dust and debris from drill hole prior to grouting.
    .3 Grout to fill in voids as required.
    .4 Tighten structural bolts with torque wrench.
  .3 Welding
    .1 To CSA-W59.
    .2 To CSA-W117.2.
    .3 Prepare components before welding including scraping surface.
    .4 Inspect and test each weld, and report on results.

3.4 DATA CENTER FLOOR STANDS

.1 Fasten to floor as required.

END OF SECTION 05 80 00

SECTION 06 91 00 BACKING BOARDS

PART 1 GENERAL

1.1 SECTION INCLUDES

.1 Backing boards for mounting of components, typically on stands, standoffs.

1.2 REFERENCED DOCUMENTS

.1 ASTM-D2898: ASTM-D2898-2010 (R2024) Standard Practice for Accelerated Weathering of Fire-Retardant-Treated Wood for Fire Testing.
.2 ASTM-D3201: ASTM-D3201/D3201M-2020 Standard Test Method for Hygroscopic Properties of Fire-Retardant Wood and Wood-Based Products.
.3 ASTM-D5516: ASTM-D5516-2018 Standard Test Method for Evaluating the Flexural Properties of Fire-Retardant Treated Softwood Plywood Exposed to Elevated Temperatures.
.4 ASTM-D5664: ASTM-D5664-2017 Standard Test Method for Evaluating the Effects of Fire-Retardant Treatments and Elevated Temperatures on Strength Properties of Fire-Retardant Treated Lumber.
.5 ASTM-D6305: ASTM-D6305-2021 Standard Practice for Calculating Bending Strength Design Adjustment Factors for Fire-Retardant-Treated Plywood Roof Sheathing.
.6 ASTM-D6841: ASTM-D6841-2021 Standard Practice for Calculating Design Value Treatment Adjustment Factors for Fire-Retardant-Treated Lumber.
.7 ASTM-E84: ASTM-E84-2023 Standard Test Method for Surface Burning Characteristics of Building Materials.
.8 ASTM-E119: ASTM-E119-2024 Standard Test Methods for Fire Tests of Building Construction and Materials.
.9 ASTM-E2768: ASTM-E2768-2011 (R2018) Standard Test Method for Extended Duration Surface Burning Characteristics of Building Materials (30 min Tunnel Test).
.10 AWPA-U1: AWPA-U1-2024 Use Category System: User Specification for Treated Wood.
.11 CSA-O80: CSA-O80-Series-2021 Wood Preservation.
.12 CSA-O121: CSA-O121-2017 (R2022) Douglas Fir Plywood.
.13 CSA-O151: CSA-O151-2017 (R2022) Canadian Softwood Plywood.
.14 CSA-O153: CSA-O153-2019 Poplar Plywood.
.15 HPVA-HP-1: ANSI/HPVA-HP-1-2020 Hardwood and Decorative Plywood.
.16 NFPA-703: NFPA-703-2024 Standard for Fire-Retardant-Treated Wood and Fire-Retardant Coatings for Building Materials.
.17 UL-263: ANSI/UL-263-2011 Fire Tests of Building Construction and Materials.
.18 UL-723: ANSI/UL-723-2018 Test for Surface Burning Characteristics of Building Materials.
.19 ULC-S102: CAN/ULC-S102-2018 Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies.
.20 ULE-2818: ULE-2818-2022 GREENGUARD Certification Program for Chemical Emissions for Building Materials, Finishes and Furnishings.
.21 ULE-2821: ULE-2821-2022 GREENGUARD Certification Program Method for Measuring and Evaluating Chemical Emissions from Building Materials, Finishes and Furnishings.

1.3 SUBMITTALS FOR ACTION

.1 Site Aspects
  .1 Examination and Investigations Information
.2 Product Aspects
  .1 Product Characteristics Data
  .2 Product Schedule Data

1.4 SUBMITTALS FOR INFORMATION

.1 Product Aspects
  .1 Product Certification Documentation Data
  .2 Product Mounting Plans
.2 System Aspects

.1 System Layout Plans
.3 Product Application
.1 Product Application Plans Certificate Letter
.2 Product Installation Information

1.5 SUBMITTALS FOR CLOSEOUT

.1 Product Application
.1 Product Installation Completed Certificate Letter

PART 2 PRODUCTS

2.1 PLYWOOD

.1 Provide as required.
.2 Features
.1 Pressure-impregnated fire-retardant treated plywood.
.2 Suitable for use on dry surfaces.
.3 Available with various application data, including spans for each thickness in each of minimum 3 climate zones with temperatures and snow loads.
.3 Materials
.1 Treated douglas fir basswood, lauan red oak, southern pine, or red pine.
.2 No VOC, HCHO.
.3 Kiln-dried to maximum moisture content of 15-%.
.4 Options: Provide selections from each of the following available characteristic types as most suitable for each application.
.1 Thickness
.1 16/19/25/29-mm (0.625/0.75/1/1.125-in).
.2 Painted: To Owner preference.
.1 Type: Select paint type to provide protection from water or moisture contact.
.2 Colours: To Owner preference.
.3 Documentation: Where paints or coatings are applied, photo document product labels including manufacturer and ratings. Print photos, attach to side of product.
.5 Options: Other characteristics that are available but not furnished.
.1 Thickness
.1 16/19/25/29-mm (0.375/0.469/0.5/0.594/0.719/0.875-in).
.6 Tests
.1 Properties
.1 Flexure properties determined to ASTM-D5516. Adjustment factors and maximum loads and spans to ASTM-D6305.
.2 High temperatures and high humidities to ASTM-D5664 and ASTM-D6841.
.2 Weathering: No increase based on ASTM-D2898 Standard Rain Test.
.3 Moisture Retaining: Maximum 28-% to ASTM-D3201 at 92-%RH.
.4 Fire
.1 To ASTM-E119, ASTM-E2768.
.2 To UL-263, UL-723.
.7 Ratings
.1 Low-hygroscopicity to ASTM-D3201.
.2 Low-corrosivity.
.3 Non-blooming.
.8 Certifications
.1 Surface Burning
.1 Flame spread maximum 25 and smoke developed maximum 25 to ASTM-E84, UL-723.
.2 Flame spread maximum 25 and smoke developed maximum 50 to ULC-S102.
.3 To UL-723 FR-S.
.2 To AWPA-U1 UCFA Use Category, P50 Standard Reference.

.3 To CSA-O80.
.4 To CSA-O121, CSA-O151, or CSA-O153.
.5 To HPVA-HP-1.
.6 To NFPA-703.
.7 To ULE-2818, ULE-2821.
.9 Warranties
.1 Minimum 50-year.
.10 Manufacturers
.1 Viance LLC, D-Blaze Fire Retardant Treated Wood Series, or approved equivalent

2.2 ACCESSORIES

.1 Provide as required.

PART 3 EXECUTION

3.1 INSTALLATION

.1 Install as required.
.2 Selection and Application
.1 Size: Select dimensions as required and to the following:
.1 For components to be mounted for full service and repairs under any event.
.2 Minimum 30-cm (12-in) length between mounted components and board edges on all sides.
.3 Completeness
.1 Provide components as required.
.2 Replace services around products to suit product requirements, including clearances, operation, inspection, maintenance, servicing, repairs.
.4 Layouts, Locations and Clearances
.1 Provide clearances around products to prevent interference with adjacent systems, services, equipment and components. Minimum clearance of 305-mm (1-ft).
.2 Provide clearances between products and surfaces to allow air movement and eliminate humidity or moisture buildup, unless surface is known to be completely dry at all times, such as on surfaces between conditioned interior spaces.
.5 Mounting and Supports
.1 Design and provide as required, including frames, stands, bases, curbs.
.2 Support products such that no loads are transmitted to services.
.3 Performance: Provide mounting:
.1 To make products level.
.2 To protect products from water damage, including floods, spills, leaks, drips.
.3 To withstand greater of:
.1 Seismic events with seismic mounts and restraints as required.
.2 Concentrated loads of 100-% of system weight applied at any point in any direction.
.4 To minimize noise and vibration transmitted to services and building structure, including transients.

END OF SECTION 06 91 00

SECTION 08 11 13 STEEL DOORS AND FRAMES

PART 1 GENERAL

1.1 SECTION INCLUDES

.1 Hardware.

1.2 REFERENCED DOCUMENTS

.1 ASTM-A653: ASTM-A653/A653M-2023 Standard Specification for Steel Sheet, Zinc Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

.2 ASTM-A924: ASTM-A924/A924M-2022 Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process.

.3 ASTM-E330: ASTM-E330/E330M-2014 (R2021) Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference.

.4 AWS-A5.4: ANSI/AWS-A5.4/A5.4M-2012 (R2022) Specification for Stainless Steel Electrodes for Shielded Arc Welding.

.5 AWS-A5.5: ANSI/AWS-A5.5/A5.5M-2022 Specification for Low-Alloy Steel Electrodes for Shielded Metal Arc Welding.

.6 AWS-A5.9: ANSI/AWS-A5.9/A5.9M-2022 Specification for Bare Stainless Steel Welding Electrodes and Rods.

.7 BHMA-A156.1: ANSI/BHMA-A156.1-2021 Butts and Hinges.

.8 BHMA-A156.2: ANSI/BHMA-A156.2-2022 Bored and Preassembled Locks and Latches.

.9 BHMA-A156.7: ANSI/BHMA-A156.7-2016 Template Hinge Dimensions.

.10 CSA-A440: AAMA-101-2022/WDMA-I.S.2-2022/CSA-A440-2022 North American Fenestration Standard/Specification for Windows, Doors, and Skylights, including Canadian Supplement.

.11 CSA-A440.4: CSA-A440.4-2019 (R2024) Window, Door, and Skylight Installation.

.12 CSA-G40.20: CSA-G40.20/G40.21-2013 (R2023) General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.

.13 CSA-W47.1: CSA-W47.1-2019 Certification of Companies for Fusion Welding of Steel.

.14 CSA-W48: CSA-W48-2023 Filler Metals and Allied Materials for Metal Arc Welding.

.15 CSA-W55.3: CSA-W55.3-2008 (R2023) Certification of Companies for Resistance Welding of Steel and Aluminum.

.16 CSA-W59: CSA-W59-2024 Welded Steel Construction (Metal Arc Welding).

.17 CSA-W117.2: CSA-W117.2-2019 (R2023) Safety in Welding, Cutting, and Allied Processes.

.18 CSA-W186: CSA-W186-2021 Welding of Reinforcing Bars in Reinforced Concrete Construction.

.19 CSDMA-RDS: CSDMA Recommended Dimensional Standards, 2000.

.20 CSDMA-RS: CSDMA Recommended Specifications for Commercial Steel Doors and Frames, 2006.

.21 CSDMA-SUG: CSDMA Recommended Selection and Usage Guide for Commercial Steel Doors, 2009.

.22 HMMA-801: ANSI/NAAMM-HMMA-801-2012 Glossary of Terms for Hollow Metal Doors and Frames.

.23 NFPA-80: NFPA-80-2022 Fire Doors and Other Opening Protectives.

.24 SDI-108: SDI-108-2023 Recommended Selection and Usage Guide for Standard Steel Doors.

.25 SDI-134: SDI-134-2020 Glossary of Terms for Hollow Metal Doors and Frames.

.26 SDI-A250.7: ANSI/SDI-A250.7-1997 (R2002) Nomenclature for Standard Steel Doors and Steel Frames.

.27 UL-10C: ANSI/UL-10C-2016 Positive Pressure Fire Tests of Door Assemblies.

.28 ULC-S104: CAN/ULC-S104-2015 (R2020) Standard Method for Fire Tests of Door Assemblies.

.29 ULC-S701: CAN/ULC-S701-2011 Thermal Insulation, Polystyrene, Boards and Pipe Covering.
.30 ULC-S701.1: CAN/ULC-S701.1-2022 Thermal Insulation, Polystyrene Boards.
.31 ULC-S702: CAN/ULC-S702-2014 Mineral Fibre Thermal Insulation for Buildings.
.32 ULC-S702.1: CAN/ULC-S702.1-2021 Mineral Fibre Thermal Insulation for Buildings, Part 1: Material Specification.
.33 ULC-S704: CAN/ULC-S704-2011 Thermal Insulation, Polyurethane and Polyisocyanurate, Boards, Faced.
.34 ULC-S704.1: CAN/ULC-S704.1-2017 Thermal Insulation, Polyurethane and Polyisocyanurate, Boards, Faced.

1.3 DEFINITIONS

.1 Additional definitions to HMMA-801, SDI-134 and SDI-A250.7.

1.4 SUBMITTALS FOR ACTION

.1 Product Aspects
  .1 Existing Products Modification Data
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1.5 SUBMITTALS FOR INFORMATION

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.2 System Aspects
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1.6 SUBMITTALS FOR CLOSEOUT

.1 Product Application
  .1 Product Installation Completed Certificate Letter
  .2 Product Operation Information
  .3 Product Maintenance Information
  .4 Product Spare Parts and Materials
.2 System Application
  .1 System Tools and Access
  .2 System Operation Information
  .3 System Maintenance Information

1.7 QUALIFICATIONS

.1 Labour
  .1 Company specializing in Work with 5-year documented experience.
  .2 Company specializing in full application of products with 5-year documented experience and verified by product manufacturer.

.3 Personnel with proof of having completed manufacturer training within 12-month.

.2 Welding

.1 General: Company certified by CWB to CSA-W55.3.

.2 Steel: Company and personnel certified by CWB to CSA-W47.1 and CSA-W59, with personnel employed by company.

.3 Steel Reinforcing Bars: Company and personnel certified by CWB to CSA-W186, with personnel employed by company.

1.8 WARRANTIES

.1 Extended Warranty Period

.1 2-year.

PART 2 PRODUCTS

2.1 CHARACTERISTICS

.1 Provide products as required, and additionally to the following.

.1 Manufactured, tested, certified, registered and listed to regulatory requirements and standards related to the functionality and performance or other relevant characteristics of the product, including proper application, including:

.1 To CSA-A440.

.2 To CSDMA-RDS, CSDMA-RS, CSDMA-SUG.

2.2 STEEL DOORS

.1 Provide as required.

.2 Features

.1 General

.1 Unless otherwise indicated, provide swing type doors, flush, with provision for openings as required, including glazing, grilles, hardware, accessories.

.2 Designed, constructed and tested as part of fully operable assembly, including door, core, frame, gaskets, hardware.

.1 Exterior: To ASTM-E330.

.2 Materials

.1 Hot dip galvanized steel, minimum ZF75 (A25) to ASTM-A653.

.2 Tension leveled steel to ASTM-A924, galvanneal to ASTM-A653, Commercial Steel (CS) Type B, coating designation ZF120 (A40).

.3 Thickness: Unless otherwise indicated, minimum to minimum requirements of:

.1 CSDMA-RS, Table 1 Thickness for Component Parts.

.2 SDI-108, Table 1 Standard Steel Door Grades and Models and Table 2 Suggested Door Levels and Applications.

.4 Size: Unless otherwise indicated or required, match existing.

.5 Fastenings: Concealed unless otherwise indicated.

.3 Type: Insulated Steel Door

.1 Features

.1 Door faces with single sheet of steel with no visible seams.

.2 Edges square seamless on vertical seams.

.2 Options: Provide the following.

.1 Steel Thickness

.1 1.6-mm (16-gauge)

.2 Edges

.1 E·WI·DS

.3 Door Cores: C·I·PS

.3 Options: Other characteristics that are available but not furnished.

.1 Steel Thickness

.1 1.3-mm (18-gauge)

.2 2.0-mm (14-gauge)

.2 Edges

.1 E·F·DS
.2 E·WC·DS
.3 Door Cores: C·I·PU
.4 Options: Provide the following.
.1 Labels
.1 A·L·C: Concealed labels.
.1 On hinge side of frame concealed from view when door closed.
.2 Edges
.1 E·W: Welded.
.5 Options: Provide selections from each of the following available characteristic types as most suitable for each application.
.1 Ratings
.1 R·FR: Fire resistance rated.
.1 Features
.1 Labels metal riveted onto door from factory.
.2 Certifications
.1 Fire resistance as required.
.2 To ULC-S104.
.2 Adhesives
.1 A·S: Standard adhesive.
.1 Heat resistant, spray grade, resin reinforced neoprene based, low viscosity contact cement.
.2 A·E: Epoxy adhesive.
.1 Heat resistant, epoxy resin based, low viscosity contact cement.
.3 A·FR: Fire resistant rated adhesive.
.1 Fire resistant, resin reinforced neoprene based, high viscosity sealant/adhesive.
.6 Options: Provide from the following available characteristics where indicated.
.1 Stiffening
.1 Features
.1 1.0-mm (20-gauge) interlocking vertical stiffeners. To CSA-G40.20, Type 44W, hot dip galvanized steel, minimum ZF75 (A25) to ASTM-A653.
.2 Maximum 152-mm (6-in) centres.
.2 Options: Provide from the following available characteristics where indicated.
.1 S·A: Adhesive mounted stiffener reinforcement.
.2 S·W: Spot welded mounted stiffener reinforcement.
.2 Door Cores
.1 C·H: Honeycomb core.
.1 Features
.1 Honeycomb construction, structural small cell, maximum 25-mm (1-in) kraft paper honeycomb, minimum 36.3-kg/ream (80-lb/ream) paper weight, minimum 16-kg/m3 (1.0-lb/ft3) density sanded to required thickness.
.2 Adhesives standard or fire resistant type as required.
.2 C·I·F: Fibreglass insulated core.
.1 Features
.1 Semi-rigid, Type 3, 24-kg/m3 (1.5-lb/ft3) density.
.2 Adhesives standard or fire resistant type as required.
.2 Certifications
.1 To ULC-S702.1.
.3 C·I·PS: Expanded polystyrene insulated core.
.1 Features
.1 Type 3, 16-kg/m3 to 32-kg/m3 (1.0-lb/ft3 to 2.0-lb/ft3) density.
.2 Adhesives epoxy or fire-resistant type as required.

.2 Certifications
.1 To ULC-S701.1.
.4 C·I·PU: Polyurethane insulated core.
.1 Features
.1 Rigid, modified polyisocyanurate, closed cell board, 32-kg/m3 (2.0-lb/ft3) density.
.2 Adhesives epoxy or fire resistant type as required.
.2 Certifications
.1 To ULC-S704.1.
.5 C·TR: Temperature rise rated core.
.1 Features
.1 Adhesives as required.
.2 Ratings
.1 Core composition to limit temperature rise on unexposed side of door to 250-°C (482-°F) at 60-min.
.3 Certifications
.1 To ULC-S104 with door assembly.
.7 Options: Other characteristics that are available but not furnished.
.1 Labels
.1 A·L·N: No labels including nameplates.
.2 Edges
.1 E·LS·AA: Locked seamed adhesive assisted with visible seams.
.2 E·LS: Locked seamed with visible seams.
.3 E·F·DS: Vertical seams edge filled, dressed smooth.
.4 E·WI·DS: Intermittently welded seams edge filled, dressed smooth.
.5 E·WC·DS: Continuously welded seams, dressed smooth.

2.3 DOOR FRAMES

.1 Provide as required.
.2 Applications: As required, including for masonry, gypsum separations.
.3 Features
.1 Materials: Match door material requirements unless otherwise indicated.
.2 Jam Depth: As indicated, otherwise as required where not indicated.
.3 Handing: As indicated, otherwise as required where not indicated.
.4 Fastenings: Concealed unless otherwise indicated.
.4 Type: Thermally Broken
.1 Options: Provide the following.
.1 Thickness
.1 1.6-mm (16-gauge)
.2 Construction: C·TB
.2 Options: Other characteristics that are available but not furnished.
.1 Thickness
.1 1.2-mm (18-gauge)
.5 Options: Provide the following.
.1 Labels
.1 A·L·C: Concealed labels.
.1 On hinge side of frame concealed from view when door closed.
.2 Pattern
.1 P·SR: Double rabbet.
.6 Options: Provide selections from each of the following available characteristic types as most suitable for each application.
.1 Ratings
.1 R·FR: Fire resistance rated.
.7 Options: Provide from the following available characteristics where indicated.

.1 Construction
.1 C·KD: Knocked-down construction.
.1 Frames with mechanical joints that inter-lock securely and provide functionally satisfactory performance when assembled and installed to meet requirements including to CSDMA-SUG.
.2 C·SO: Slip-on construction.
.1 Frames with mechanical joints that inter-lock securely and provide functionally satisfactory performance when assembled and installed to meet requirements including to CSDMA-SUG. Wall anchorage comprising single, adjustable tension type per jamb and provision for secure attachment of each jamb base to stud runners.
.3 C·W: Welded construction.
.1 As required.
.4 C·TB: Thermally broken construction.
.1 Thermally broken frames separating exterior parts from interior parts with continuous interlocking thermal break.
.8 Options: Other characteristics that are available but not furnished.
.1 Labels
.1 A·L·N: No labels including nameplates.
.2 Pattern
.1 P·SR: Single rabbet.
.2 P·DE: Double egress.
.9 Certifications
.1 To CSDMA-RS.

2.4 FRAME ANCHORS

.1 Provide as required.
.2 Locations: As required, including to frame, to surfaces including floors and walls.

2.5 DOOR FRAME ANCHORS

.1 Provide as required.
.2 Locations: As required, including to frame, to surfaces including floors and walls.

2.6 DOOR HINGES

.1 Provide as required.
.2 Type: Full Mortise Butt Hinges
.1 Features
.1 Concealed.
.2 Anti-friction bearing 5 knuckle.
.3 Suitable for standard weight doors with medium frequency use.
.4 Suitable for doors with closing devices.
.5 8 holes. Suitable for machine screws 13-mm (0.5-in) x #12-24 and wood screws 32-mm (1.25-in) x #12.
.2 Options: Provide the following.
.1 Pins
.1 P·NR: Non-removeable pins. Suitable for secure locations.
.2 Pin Tips
.1 T·S: Standard tip.
.3 Optional Non-Removable Pin (NRP) and Safety Stud Feature (SSF)
.4 Ball, steeple, and hospital tips available
.3 Options: Provide selections from each of the following available characteristic types as most suitable for each application.
.1 Dimensions
.1 D·4540: 114.3-mm x 104.6-mm (4.5-in x 4-in). 3.4-mm (0.134-in) thickness.

.2 D·4545: 114.3-mm x 114.3-mm (4.5-in x 4.5-in). 3.4-mm (0.134-in) thickness.
.3 D·5045: 127-mm x 114.3-mm (5-in x 4.5-in). 3.7-mm (0.146-in) thickness.
.4 D·5050: 127-mm x 127-mm (5-in x 5-in). 3.7-mm (0.146-in) thickness.
.2 Shape
.1 S·S: Square shape.
.2 S·R25: 6.3-mm (0.25-in) radius round corner shape.
.3 S·R25: 15.9-mm (0.625-in) radius round corner shape.
.3 Safety Stud Mount: Additional hole for additional mounting to safety studs.
.4 Finishes: Select from 9 different materials and finishes to Owner preference.
.4 Options: Other characteristics that are available but not furnished.
.1 Pins
.1 P·R: Removable pins. Suitable for non-secure locations.
.2 Pin Tips
.1 T·RB: Round ball tip.
.2 T·BP: Ball point tip.
.3 T·A: Angled tip.
.3 Electrical: Wires with connector leads or snaps, tamper resistant with no external wires.
.1 E·MM: Magnetic monitoring.
.2 E·W2: 2 #18-AWG wires.
.3 E·W4: 4 #18-AWG wires.
.4 E·W6: 6 #18-AWG wires.
.5 E·W8: 8 #18-AWG wires.
.6 E·W10: 10 #18-AWG wires.
.7 E·W12: 12 #18-AWG wires.
.5 Certifications
.1 To NFPA-80.
.2 To BHMA-A156.1.
.3 Certifications
.1 To BHMA-A156.7.
.4 Manufacturers
.1 ASSA ABLOY Accessories and Door Controls Group, Inc., an ASSA ABLOY Group company, Mckinney Hinge Series, or approved equivalent

2.7 DOOR OPENING SYSTEMS

.1 Provide as required.
.2 Locations: As required, including for passages, exits, entries, patios, privacy spaces, store rooms, closets, classrooms.
.3 Type: Knob Lock - Grade 1
.1 Features
.1 Interchangeable lock cylinders.
.2 Door Depth: As indicated, otherwise as required where not indicated.
.3 Handing: As indicated, otherwise as required where not indicated.
.4 Fastenings: Concealed unless otherwise indicated.
.2 Options: Provide the following.
.1 Latches
.1 L·SL: Spring latch.
.3 Options: Provide selections from each of the following available characteristic types as most suitable for each application.
.1 Handle Styles: Select from 7 different styles to Owner preference.
.2 Face Plates: Select from different plate styles to Owner preference.
.3 Strike Plates: Select from different plate styles to Owner preference.
.4 Finishes: Select from 6 different materials and finishes to Owner preference.

.5 Cylinder Pins: Select to Owner preference including to each separate application and to match types on site.
.1 C·P5: 5 pin cylinder.
.2 C·P6: 6 pin cylinder.
.3 C·P7: 7 pin cylinder.
.4 Options: Other characteristics that are available but not furnished.
.1 Latches
.1 L·DL: Dead latch.
.5 Certifications
.1 To UL-10C, 3-h, A label.
.2 To BHMA-A156.2, Grade 1.
.4 Warranties
.1 Minimum 10-year.
.5 Manufacturers
.1 Allegion plc, Falcon Series, or approved equivalent

2.8 ACCESSORIES

.1 Provide as required.
.2 Door Silencers
.1 Type: Single stud rubber/neoprene.
.1 Quantities: Minimum 3 for each door, additional 2 at head for double door.
.3 Sealants
.1 Provide as required for location, environment, application.
.4 Joints
.1 Welded
.1 Filler Metals and Allied Materials
.1 To CSA-W48.
.2 Electrodes: To relevant AWS standards and referenced documents including:
.1 Carbon Steel: To AWS-A5.5, minimum to E70xx.
.2 Stainless Steel: To AWS-A5.4, AWS-A5.9.

2.9 WARRANTIES

.1 Extended Warranty Period
.1 2-year.

PART 3 EXECUTION

3.1 PREPARATION

.1 Surfaces Preparation
.1 Prepare surfaces for adhesion.

3.2 INSTALLATION

.1 Install as required.
.2 Selection and Application
.1 Unless otherwise indicated or required, provide Work:
.1 To CSA-A440, CSA-A440.4.
.2 To CSDMA-SUG.
.3 To NFPA-80.
.2 Provide fire rated assemblies where required.
.3 Select products in coordination with sound attenuation requirements.
.3 Joining
.1 Welding
.1 To CSA-W59.
.2 To CSA-W117.2.
.3 Prepare components before welding including scraping surface.
.4 Inspect and test each weld, and report on results.

3.3 DOORS

.1 Hardware: Prepare door for hardware, including blank, reinforce, drill and tap frames for hardware, including for mortised, templated, electric and electronic. Use templates provided by hardware manufacturer. Reinforce doors as required for surface mounted hardware.

.2 Clearances: Provide even margins with the following as a guideline between doors and jambs, and other surfaces including floors and thresholds.

.1 Hinge Side: 1.0-mm (40-in/1,000)

.2 Latch Side and Head: 1.5-mm (60-in/1,000)

.3 Finished Floor: 13-mm (0.5-in)

.4 To Threshold or Finished Floor

.1 0.79-mm to 1.59-mm (31-in/1,000 to 62-in/1,000) for doors requiring fire ratings.

.2 11.43-mm to 12.7-mm (0.45-in to 0.5-in) for doors with undercuts for transfer ventilation air.

.3 Otherwise 5.1-mm to 7.6-mm (0.2-in to 0.3-in).

.3 Other: Add fire dampers as required at openings.

3.4 DOOR FRAMES

.1 Hardware: Prepare frame for hardware, including blank, reinforce, drill and tap frames for hardware, including for mortised, templated, electric and electronic. Use templates provided by hardware manufacturer. Reinforce frames as required for surface mounted hardware.

.2 Accessories: Prepare frame for accessories, including door silencers.

.3 Frame Construction

.1 Welded

.1 Welding to CSA-W59.

.2 Mitre or mechanically joint frame accurately, and securely weld on inside of profile.

.3 Cope accurately, and securely weld butt joints of mullions, transom bars, centre rails and sills.

.4 Grind welded joints and corners to a flat plane, fill with metallic paste and sand to uniform smooth finish.

.5 Install floor anchors to inside of each jamb profile.

.4 Frame Anchors: Provide the following in addition to manufacturer's requirements:

.1 Hinges: Install wall anchors immediately above or below each hinge reinforcement on hinge jamb and directly opposite on strike jamb.

.2 Rebates: Install 2 anchors for rebate opening heights up to 1520-mm (60-in), and 1 additional anchor for each additional 760-mm (30-in) of height or fraction thereof.

.3 Existing Openings: For existing openings in concrete, masonry or steel, install frame anchors not more than 152-mm (6-in) from top and bottom of each jamb and intermediate at maximum 660-mm (26-in) on centre.

.5 Layouts: Install frames and door assemblies including accessories:

.1 Set frames plumb, square, level and at correct elevation.

.2 Secure anchorages and connections to adjacent construction.

.3 Brace frames rigidly in position while building-in. Install temporary horizontal spreader at third points of door opening to maintain frame width. Provide vertical support at centre of head for openings over 1200-mm wide (48-in). Remove temporary spreaders after frames are built-in.

.4 Make allowances for deflection of structure to ensure structural loads are not transmitted to frames.

.5 Maintain continuity of wall assembly including air barrier and vapour retarder.

.6 Sealing: Caulk perimeter of frames between frame and adjacent material.

.7 Insulating: Insulate voids between frames and wall components to suit performance of door assembly.

.8 Filling: Fill exposed frame anchors and imperfections with metallic paste filler and sand to a uniform smooth finish before painting.

3.5 DOOR HINGES

.1 Provide 3 per door unless otherwise indicated.

3.6 FINISHING

.1 Paint door assemblies with 2 coats of primer paint, 2 coats of finish paint. Paint type to match existing unless otherwise required including for exterior paint.

END OF SECTION 08 11 13

SECTION 09 20 00 BOARD SEPARATIONS

PART 1 GENERAL

1.1 REFERENCED DOCUMENTS

.1 AISI-S201: ANSI/AISI-S201-2017 North American Standard for Cold-Formed Steel Framing - Product Data.
.2 ASTM-A510: ASTM-A510/A510M-2024 Standard Specification for General Requirements for Wire Rods and Coarse Round Wire, Carbon Steel, and Alloy Steel.
.3 ASTM-A653: ASTM-A653/A653M-2023 Standard Specification for Steel Sheet, Zinc Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
.4 ASTM-B117: ASTM-B117-2019 Standard Practice for Operating Salt Spray (Fog) Apparatus.
.5 ASTM-C303: ASTM-C303-2021 Standard Test Method for Dimensions and Density of Preformed Block and Board-Type Thermal Insulation.
.6 ASTM-C423: ASTM-C423-2023 Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.
.7 ASTM-C473: ASTM-C473-2024 Standard Test Methods for Physical Testing of Gypsum Panel Products.
.8 ASTM-C475: ASTM-C475/C475M-2017 (R2022) Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board.
.9 ASTM-C645: ASTM-C645-2018 Standard Specification for Nonstructural Steel Framing Members.
.10 ASTM-C665: ASTM-C665-2023 Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.
.11 ASTM-C754: ASTM-C754-2020 Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products.
.12 ASTM-C840: ASTM-C840-2023 Standard Specification for Application and Finishing of Gypsum Board.
.13 ASTM-C954: ASTM-C954-2022 Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs from 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness.
.14 ASTM-C1002: ASTM-C1002-2022 Standard Specification for Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs.
.15 ASTM-C1047: ASTM-C1047-2019 Standard Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base.
.16 ASTM-C1396: ASTM-C1396/C1396M-2017 Standard Specification for Gypsum Board.
.17 ASTM-C1513: ASTM-C1513-2024 Standard Specification for Steel Tapping Screws for Cold-Formed Steel Framing Connections.
.18 ASTM-C1629: ASTM-C1629/C1629M-2024 Standard Classification for Abuse-Resistant Nondecorated Interior Gypsum Panel Products and Fiber-Reinforced Cement Panels.
.19 ASTM-E84: ASTM-E84-2023 Standard Test Method for Surface Burning Characteristics of Building Materials.
.20 ASTM-E119: ASTM-E119-2024 Standard Test Methods for Fire Tests of Building Construction and Materials.
.21 ASTM-E136: ASTM-E136-2022 Standard Test Method for Assessing Combustibility of Materials Using a Vertical Tube Furnace at 750 °C.
.22 CSA-A82.27: CAN/CSA-A82.27-M1991 Gypsum Board.
.23 CSA-A82.31: CAN/CSA-A82.27-M1991 Gypsum Board Application.
.24 GA-214: GA-214-2021 Levels of Finish for Gypsum Panel Products.
.25 GA-216: GA-216-2024 Application and Finishing of Gypsum Panel Products Package.
.26 GA-600: GA-600-2024 Fire Resistance and Sound Control Design Manual.
.27 ISO-3892: ISO-3892-2000 Conversion Coatings on Metallic Materials - Determination of Coating Mass per Unit Area - Gravimetric Methods.

.28 UL-723: ANSI/UL-723-2018 Test for Surface Burning Characteristics of Building Materials.
.29 ULC-S101: CAN/ULC-S101-2014 Standard Methods of Fire Endurance Tests of Building Construction and Materials.
.30 ULC-S102: CAN/ULC-S102-2018 Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies.
.31 ULC-S114: CAN/ULC-S114-2018 Standard Method of Test for Determination of Non-Combustibility in Building Materials.
.32 ULC-S129: CAN/ULC-S129-2015 Standard Method of Test for Smoulder Resistance of Insulation (Basket Method).
.33 ULC-S702.1: CAN/ULC-S702.1-2021 Standard for Mineral Fibre Thermal Insulation for Buildings, Part 1: Material Specification.
.34 ULE-2818: ULE-2818-2022 GREENGUARD Certification Program for Chemical Emissions for Building Materials, Finishes and Furnishings.
.35 ULE-2821: ULE-2821-2022 GREENGUARD Certification Program Method for Measuring and Evaluating Chemical Emissions from Building Materials, Finishes and Furnishings.

1.2 SUBMITTALS FOR ACTION

.1 Product Aspects
  .1 Product Characteristics Data
  .2 Product Schedule Data

1.3 SUBMITTALS FOR INFORMATION

.1 Product Aspects
  .1 Product Fabrication Data
  .2 Product Factory Testing Data
  .3 Product Certification Documentation Data
  .4 Product Mounting Plans
.2 System Aspects
  .1 System Layout Plans
.3 Product Application
  .1 Product Application Plans Certificate Letter
  .2 Product Installation Information

1.4 SUBMITTALS FOR CLOSEOUT

.1 Product Application
  .1 Product Installation Completed Certificate Letter
.2 Project Application
  .1 Disposal Records

1.5 MEETINGS

.1 Arrange and conduct meetings. Document decisions, and revise submittals and documentation as required.
.2 Phase-in Coordination Review
  .1 Meet with Owner to review and plan installation and migration plan from existing building systems to new or modified building systems.
  .2 Review requirements and findings from investigations.

1.6 WARRANTIES

.1 Extended Warranty Period
  .1 2-year.

PART 2 PRODUCTS

2.1 CHANNEL STUDS

.1 Provide as required.
.2 Applications: For wall assembly support.
.3 Features

.1 Knock-out service holes at 460-mm (18-in) centres.
.4 Type: Non-load Bearing
.1 Features
.1 Size: Match existing, or 64-mm (2.5-in) unless otherwise indicated or required for services.
.2 Thickness: 1.09-mm (18-gauge) unless otherwise indicated.
.2 Materials: Hot dip galvanized steel, minimum Z120 (G40) to ASTM-A653.
.5 Type: Load Bearing
.1 Features
.1 Size: 64-mm (2.5-in) unless otherwise indicated or required for services.
.2 Thickness: 2.46-mm (12-gauge) unless otherwise indicated.
.2 Materials: Hot dip galvanized steel, minimum Z180 (G60) to ASTM-A653.
.6 Certifications
.1 To AISI-S201.
.2 To ASTM-C645.

2.2 HORIZONTAL TRACKS

.1 Provide as required.
.2 Applications: For ceiling assembly support.
.3 Features
.1 Size: To suit channel stud sizes.
.2 Thickness: Match channel stud framing.
.4 Materials: Hot dip galvanized steel, minimum Z120 (G40) to ASTM-A653.
.5 Certifications
.1 To AISI-S201.
.2 To ASTM-C645.

2.3 CHANNEL STIFFENERS

.1 Provide as required.
.2 Applications: For assembly supports and stiffening.
.3 Type: Non-load Bearing Truss Stud Framing
.1 Features
.1 Size: Minimum 19-mm (0.75-in).
.2 Thickness: Minimum 1.40-mm (16-gauge).
.2 Materials
.1 Metal.
.2 Coated with rust inhibitive coating.

2.4 GYPSUM BOARDS

.1 Provide as required.
.2 Type: Standard
.1 Features
.1 100-% recycled heavy duty face and back paper, tightly adhering, maximum 1-mm (39-in/1,000) thick, folded around long edges.
.2 Tapered long edges.
.3 Suitable for steel drill screws fastening.
.2 Options: Provide selections from each of the following available characteristic types as most suitable for each application.
.1 Lengths
.1 L·8: 2.44-m (8-ft).
.2 L·12: 3.66-m (12-ft).
.2 Thickness: Match existing.
.1 T·13: 12.7-mm (0.5-in).
.2 T·16: 15.9-mm (0.625-in).
.3 Tests

.1 Hardness: Core hardness at ends and edges minimum 49-N (11-lb) to ASTM-C473 Method B.
.2 Flexural Strength
.1 Parallel: Minimum 205-N (46-lb) to ASTM-C473 Method B.
.2 Perpendicular: Minimum 654-N (147-lb) to ASTM-C473 Method B.
.3 Humidified Deflection: Maximum 15.9-mm (0.625-in) to ASTM-C473 Method B.
.4 Nail Pull Resistance: Minimum 387-N (87-lb) to ASTM-C473 Method B.
.5 Abrasion Resistance: Maximum depth 1.5-mm (0.059-in) to ASTM-D4977 and ASTM-C1629 Level 2.
.6 Indentation Resistance: Maximum depth 3.8-mm (0.150-in) to ASTM-D5420 and ASTM-C1629 Level 1.
.7 Impact Resistance
.1 Soft Body: Minimum to structural failure 265-J (195-ft·lb) to ASTM-C1629 Level 2.
.2 Hard Body: Minimum to structural failure 68-J (50-ft·lb) to ASTM-C1629 Level 1.

.4 Ratings
.1 Installation Temperatures: Minimum to 52-°C (125-°F) for sustained temperatures.
.5 Certifications
.1 Fire Resistance: Certified within fire rated assemblies to ULC-S101, ASTM-E119.
.2 Surface Burning: Flame spread maximum 15 and smoke developed maximum 5 to ULC-S102, ASTM-E84.
.3 Flammability: Noncombustible to ULC-S114, ASTM-E136.
.4 To ASTM-C1396.
.5 To ASTM-C1396 Type X.
.6 cUL listed.
.7 To ULE-2818, ULE-2821.
.6 Manufacturers
.1 CGC Inc., Sheetrock AR Firecode X Panel Series, or approved equivalent

2.5 FURRING

.1 Provide as required.
.2 Type: Furring channels.
.1 Applications: For screw attachment of boards.
.2 Features
.1 Size: As required.
.2 Thickness: 0.7-mm (22-gauge) core thickness unless otherwise indicated.
.3 Materials: Hot dip galvanized steel, minimum Z120 (G40) to ASTM-A653.
.3 Type: Hangers, tie wires, inserts, anchors.
.1 Applications: For support of gypsum boards and assemblies.
.2 Materials: Metal, corrosion resistant.

2.6 TRIM

.1 Provide as required.
.2 Applications: Casing beads, corner beads, control joints, edge trim.
.3 Features
.1 Size: As required. Single piece of components per location.
.2 Thickness: 0.7-mm (22-gauge) core thickness unless otherwise indicated.
.4 Materials: Hot dip galvanized steel.
.5 Certifications
.1 To ASTM-C1047.

2.7 ACOUSTICAL INSULATION - MINERAL

.1 Provide as required.

.2 Features
.1 Lightweight and semi-rigid stone wool insulation.
.2 Suitable for interior walls, ceilings, floors.
.3 Suitable for friction fits between surfaces.
.4 Suitable as part of fire rated assemblie.
.5 Available in 76.2/152.4-mm (3/6-in) thicknesses.
.3 Tests
.1 Acoustic Performance: To ASTM-C423.
.1 76-mm (3-in) Thick: NRC=1.05.
.2 152-mm (6-in) Thick: NRC=1.15.
.2 Density: 38-kg/m3 (2.4-lb/ft3) to ASTM-C303.
.3 Smoulder Resistance: Maximum 0.091-% to ULC-S129.
.4 Ratings
.1 Ignition Temperature: None.
.2 Melting Temperature: Minimum to 1,177-°C (2,150-°F).
.3 Behavior During Fire Explosion: Stays in place.
.4 Resistance: Resistant to water, rot, mould, mildew, bacterial growth.
.5 Certifications
.1 Surface Burning: Flame spread maximum 0 and smoke developed maximum 0 to ULC-S102, ASTM-E84, UL-723.
.2 UL listed.
.3 ULC listed.
.4 To ULC-S114 and ASTM-E136 for non-combustible building materials.
.5 To ULC-S702.1 Type 1 for mineral fiber blanket thermal for buildings.
.6 To ASTM-C665 Type 1 for mineral fiber blanket thermal insulation.
.7 To ULE-2818, ULE-2821.
.6 Manufacturers
.1 Roxul Inc., Roxul Safe'n'Sound Series, or approved equivalent

2.8 ACCESSORIES

.1 Provide as required.
.2 Fasteners - Gypsum Boards
.1 Applications: To secure gypsum boards to backing systems, including studs, tracks, furring channels.
.2 Features
.1 Philips bugle head style.
.2 Available with various data, including ultimate tensile strength, ultimate shear strength, minimum torsional strength, load bearing area lengths.
.3 Materials
.1 Carbon steel to ASTM-A510 Grade 1018 or Grade 1022.
.2 Case hardened and tempered.
.4 Options: Provide selections from each of the following available characteristic types as most suitable for each application.
.1 Styles
.1 S·SP: Self-piercing.
.1 Features
.1 Available in various sizes from #6-9 through to #6-20.
.2 Available in various lengths from 25-mm to 57-mm (1-in to 2.25-in).
.2 Certifications
.1 To ASTM-C1002 Type S.
.2 S·SD: Self-drilling.
.1 Features
.1 Available in various sizes from #6-9 through to #6-20, #8-18.
.2 Available in various lengths from 25-mm to 76-mm (1-in to 3-in).

.2 Certifications
.1 To ASTM-C954.
.2 To ASTM-C1513.
.2 Coatings
.1 C·P·G: Grey phosphate coating.
.1 Tests: Corrosion: Minimum rating of 24-h to 5-% red rust to ASTM-B117.
.2 Certifications: To ISO-3892.
.2 C·P·Z: Electroplated zinc coating.
.1 Tests: Corrosion: Minimum rating of 48-h to 5-% red rust to ASTM-B117.
.3 C·P·ZO: Electroplated zinc coating and final organic coating.
.1 Tests: Corrosion: Minimum rating of 1,000-h to 5-% red rust to ASTM-B117.
.5 Certifications
.1 ECCES evaluated.
.6 Manufacturers
.1 Hilti Corporation, Philips Bugle Head S/SD Drywall Screw Series, or approved equivalent
.3 Board Joint Tapes
.1 Provide as required.
.2 Type: Gypsum Board Standard
.1 Features
.1 Suitable for gypsum boards.
.2 Self-adhesive tape.
.3 Available in 51-mm (2-in).
.2 Materials
.1 Cross fiberglass construction.
.3 Ratings
.1 Application Temperature: Above 13-°C (55-°F).
.2 Resistance: Resists shrinking, tearing, stretching and distortion, joint cracking.
.4 Certifications
.1 Fire Resistance: Certified within fire rated assemblies to ULC-S101, ASTM-E119.
.5 Manufacturers
.1 CGC Inc., Fiberglass Drywall Tape Series, or approved equivalent
.4 Board Joint Compounds
.1 Provide as required.
.2 Type: Standard
.1 Features
.1 Setting-type.
.2 Suitable for gypsum boards, concrete surfaces.
.3 Exceptional bonding.
.4 Minimal shrinkage.
.2 Materials
.1 Calcium sulfate with vinyl binder.
.3 Options: Provide the following.
.1 Set Times
.1 S·90: 85-min to 130-min set time.
.4 Options: Other characteristics that are available but not furnished.
.1 Set Times
.1 S·45: 30-min to 80-min set time.
.5 Ratings

.1 Application Temperature: Above 7-°C (45-°F).
.2 Resistance
.1 Virtually unaffected by humidity.
.2 Extremely high crack resistance including in heavy fills.
.3 Not sensitive to freezing after setting.
.6 Certifications
.1 Fire Resistance: Certified within fire rated assemblies to ULC-S101, ASTM-E119.
.2 To ASTM-C475.
.7 Manufacturers
.1 CGC Inc., Sheetrock Durabond Joint Compound Series, or approved equivalent
.5 Board Finishing Surfacers
.1 Features
.1 High build spray for final finish before painting.
.2 Suitable for ceilings, high lit areas.
.3 Suitable for gypsum boards, concrete, plaster.
.4 Dries white.
.5 Tintable.
.2 Materials
.1 Vinyl acrylic latex based.
.3 Options: Provide the following.
.4 Options: Provide selections from each of the following available characteristic types as most suitable for each application.
.5 Options: Provide from the following available characteristics where indicated.
.6 Options: Other characteristics that are available but not furnished.
.7 Tests
.1 Abrasion: Pass minimum to 1,000-cycle to ASTM-D4977.
.2 Washability: Pass to ATM-D3450.
.3 Scrubability: Pass to ASTM-D2486.
.8 Ratings
.1 Application Conditions: Above 13-°C (55-°F) and no drafts.
.2 Thickness: Per coat applied:
.1 WFT: Between 381-µm (15-in/1,000) and 508-µm (20-in/1,000).
.2 DFT: Between 229-µm (9-in/1,000) and 305-µm (12-in/1,000).
.3 Drying Times
.1 For 25-°C (77-°F) and 50-%RH conditions and 381-µm (15-in/1,000) WFT:
.1 To Touch: Maximum 60-min.
.4 Fire Resistance: Listed with board manufacturer fire rated assemblies.
.5 Finish: Suitable for smooth and even surfaces ready for painting, to ASTM-C840 Level 5 and GA-214 Level 5.
.9 Manufacturers
.1 CGC Inc., Sheetrock Tuff-Hide Primer-Surfacer Series, or approved equivalent
.6 Sealants
.1 Provide as required for location, environment, application.

PART 3 EXECUTION

3.1 PREPARATION

.1 Existing Protection
.1 Protect surfaces from debris including dust and compound droppings, including new partitions, existing surfaces.
.2 Demolition and Removal
.1 Remove broken, cracked, and otherwise damaged units, in exposed partitions for replacement with undamaged products.

.3 Surfaces Preparation
.1 Gypsum Boards
.1 To ASTM-C840.
.2 To GA-216.

3.2 INSTALLATION

.1 Install as required.
.2 Selection and Application
.1 Unless otherwise indicated or required, provide Work:
.1 Provide and select materials, components and assemblies as required, including for:
.1 Fire rated assemblies.
.2 Humidity and water resistant assemblies.
.3 Water proof assemblies.
.4 Sound attenuated assemblies.
.2 Provide and select materials, components and assemblies as required, including for:
.1 Minimum 1-h fire resistance rating to ULC-S101, ATM-E119.
.3 Gypsum Boards
.1 To CSA-A82.31.
.2 To ASTM-C754.
.3 To ASTM-C840.
.4 To GA-216.
.5 To GA-600.
.3 Layouts, Locations and Clearances
.1 Install partitions including other accessories:
.1 In alignment with existing surfaces.
.2 Plumb, level, true to line.
.3 With joints tight, accurately aligned and rigidly secured.
.4 With mitred and fitted corners, free from rough edges.
.5 Free from waves and other defects and ready for surface finish.
.6 With smooth surface so as to be invisible after surface finish is completed.
.7 With no easily observable defects as determined by Owner.

3.3 FRAMING

.1 Tracks
.1 Align partition tracks at other surfaces including floors and ceilings, and secure at 600-mm (24-in) on centre maximum.
.2 Extend partitions to upper surfaces including ceilings unless otherwise indicated.
.3 Maintain clearance under structural components including beams and slabs to avoid transmission of structural loads to studs. Use double track slip joint.
.2 Insulating Strips
.1 Provide continuous insulating strips as required, including between uninsulated surfaces, around perimeter of sound control partitions, including at edges of boards and casing beads.
.3 Studs
.1 Position studs in tracks at other surfaces including floors and ceilings.
.2 Install studs vertically at 400-mm (16-in) on centre and not more than 51-mm (2-in) from abutting walls and at each side of openings and corners.
.3 Provide cross bracing of studs as required to provide rigid installation to products requirements.
.4 Openings
.1 Provide 2 studs extending between other surfaces including floors and ceilings, at each side of openings wider than required stud centres. Secure studs together 51-mm (2-in) apart using column clips or other approved means of fastening placed alongside frame anchor clips.
.2 Provide heavy gauge single jamb studs at openings as required.

.3 Provide track at head and sills of openings to accommodate intermediate studs. Secure track to studs at each end to products requirements. Provide intermediate studs above and below openings.
.4 Provide furring channels as required, including at perimeter of openings for components and services, including access panels, light fixtures, diffusers, grilles, electrical and boxes.
.5 Additional Supports
.1 Wall Components: Including plumbing fixtures, grab bars, towel rails. Provide additional 40-mm (1.5-in) stud or furring channel secured between studs for attachment of component to wall.
.2 Ceiling Components: Including luminaires. Provide additional support around components by providing additional ceiling suspension hangers within 152-mm (6-in) of each corner, and at maximum 600-mm (24-in) around perimeter of component.
.6 Furring
.1 Provide furring for board faced vertical bulkheads within and at termination of other surfaces including ceilings.
.2 Provide furring above suspended ceilings for board fire and sound stops and to form plenum areas as required.

3.4 BOARDS

.1 Layouts
.1 Install in direction that will minimize quantity of end-butt joints. Stagger end joints minimum 250-mm (10-in).
.2 Provide control and expansion joints with space between edges of adjoining boards.
.3 Provide layouts as required for fire rated assemblies.
.2 Casing Beads
.1 Provide casing beads at:
.1 Where boards butt against surfaces having no trim concealing junction.
.2 Around perimeter of suspended ceilings.

3.5 ACCESSORIES

.1 Fasteners
.1 Apply fasteners with maximum 300-mm (12-in) on centre spacing.
.2 Joint Compounds and Tapes
.1 Finish surfaces flat, smooth, even, ready for painting.
.2 Finish fastening and other openings and indentations with joint and finishing compounds and feathered out onto board faces.
.3 Finish board joints and internal angles with joint compound prefill coat, joint tape, joint compound embed coat, joint compound fill coat, joint compound finish coat, and feathered out onto board faces. Including corner beads, control and expansion joints, trim.

3.6 FINISHING

.1 Finish surfaces flat, smooth, even, ready for painting.
.1 Occupied or Public Accessed Areas: To ASTM-C840 Level 5 and GA-214 Level 5. Apply finishing surfacer as required.
.2 Other Areas: To ASTM-C840 Level 5 and GA-214 Level 4. Apply finishing surfacer as required.
.2 Painting as required, including prime, patching filler, base and finish coat.

3.7 VERIFICATION

.1 Pre-Completion Tests
.1 Flatness
.1 Measure with a straight edge throughout boards and in each direction to measure profile variation for:
.1 Maximum 6.4-mm (0.25-in) over 3-m (9.8-ft).

.2 Maximum 3.2-mm (0.125) over 1-m (3.3-ft).
.3 Maximum 1.6-mm (0.063) over 0.5-m (1.64-ft).

END OF SECTION 09 20 00

SECTION 09 90 00 PAINTS AND COATINGS

PART 1 GENERAL

1.1 REFERENCED DOCUMENTS

.1 ASTM-C840: ASTM-C840-2024 Standard Specification for Application and Finishing of Gypsum Board.
.2 ASTM-D56: ASTM-D56-2022 Standard Test Method for Flash Point by Tag Closed Cup Tester.
.3 ASTM-D93: ASTM-D93-2020 Standard Test Methods for Flash Point by Pensky-Martens Closed Cup Tester.
.4 ASTM-D522: ASTM-D522/D522M-2017 (R2021) Standard Test Methods for Mandrel Bend Test of Attached Organic Coatings.
.5 ASTM-D523: ASTM-D523-2014 (R2018) Standard Test Method for Specular Gloss.
.6 ASTM-D562: ASTM-D562-2010 (R2018) Standard Test Method for Consistency of Paints Measuring Krebs Unit (KU) Viscosity Using a Stormer-Type Viscometer.
.7 ASTM-D714: ASTM-D714-2002 (R2017) Standard Test Method for Evaluating Degree of Blistering of Paints.
.8 ASTM-D1210: ASTM-D1210-2005 (R2022) Standard Test Method for Fineness of Dispersion of Pigment-Vehicle Systems by Hegman-Type Gage.
.9 ASTM-D1653: ASTM-D1653-2013 (R2021) Standard Test Methods for Water Vapor Transmission of Organic Coating Films.
.10 ASTM-D1654: ASTM-D1654-2024 Standard Test Method for Evaluation of Painted or Coated Specimens Subjected to Corrosive Environments.
.11 ASTM-D1729: ASTM-D1729-2022 Standard Practice for Visual Appraisal of Colors and Color Differences of Diffusely-Illuminated Opaque Materials.
.12 ASTM-D2197: ASTM-D2197-2016 (R2022) Standard Test Method for Adhesion of Organic Coatings by Scrape Adhesion.
.13 ASTM-D2457: ASTM-D2457-2021 Standard Test Method for Specular Gloss of Plastic Films and Solid Plastics.
.14 ASTM-D2485: ASTM-D2485-2022 Standard Test Methods for Evaluating Coatings For High Temperature Service.
.15 ASTM-D2794: ASTM-D2794-1993 (R2024) Standard Test Method for Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact).
.16 ASTM-D3359: ASTM-D3359-2023 Standard Test Methods for Rating Adhesion by Tape Test.
.17 ASTM-D3363: ASTM-D3363-2022 Standard Test Method for Film Hardness by Pencil Test.
.18 ASTM-D3928: ASTM-D3928-2000 (R2018) Standard Test Method for Evaluation of Gloss or Sheen Uniformity.
.19 ASTM-D4060: ASTM-D4060-2019 Standard Test Method for Abrasion Resistance of Organic Coatings by the Taber Abraser.
.20 ASTM-D4258: ASTM-D4258-2023 Standard Practice for Surface Cleaning Concrete for Coating.
.21 ASTM-D4400: ASTM-D4400-2018 Standard Test Method for Sag Resistance of Paints Using a Multinotch Applicator.
.22 ASTM-D4541: ASTM-D4541-2022 Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers.
.23 ASTM-D4585: ASTM-D4585/D4585M-2018 Standard Practice for Testing Water Resistance of Coatings Using Controlled Condensation.
.24 ASTM-D5894: ASTM-D5894-2021 Standard Practice for Cyclic Salt Fog/UV Exposure of Painted Metal, (Alternating Exposures in a Fog/Dry Cabinet and a UV/Condensation Cabinet).
.25 ASTM-D6677: ASTM-D6677-2018 (R2022) Standard Test Method for Evaluating Adhesion by Knife.

.26 ASTM-D7234: ASTM-D7234-2022 Standard Test Method for Pull-Off Adhesion Strength of Coatings on Concrete Using Portable Pull-Off Adhesion Testers.
.27 ASTM-F21: ASTM-F21-2020 Standard Test Method for Hydrophobic Surface Films by the Atomizer Test.
.28 ASTM-F22: ASTM-F22-2021 Standard Test Method for Hydrophobic Surface Films by the Water-Break Test.
.29 CARB-SCM: CARB Suggested Control Measure, 2020.
.30 CEPA-SOR-2009-264: CEPA-SOR-2009/264 Architectural Coatings and their VOC Concentration Limits.
.31 CGSB-1-GP-72: CGSB-1-GP-72-1981 Guide to the Selection of Paint Standards on Use Basis.
.32 EPA-EMC-M24: EPA Air Emission Measurement Center Method 24 Determination of Volatile Matter Content, Water Content, Density, Volume Solids, and Weight Solids of Surface Coatings.
.33 GA-216: GA-216-2024 Application and Finishing of Gypsum Panel Products Package.
.34 GSI-11: Green Seal 11 Paints, Coatings, Stains, and Sealers, 2021 (Edition 4.0).
.35 ISO-8502-3: ISO-8502-3-2017 Preparation of Steel Substrates Before Application of Paints and Related Products - Tests for the Assessment of Surface Cleanliness - Part 3: Assessment of Dust on Steel Surfaces Prepared for Painting (Pressure-sensitive Tape Method).
.36 ISO-14025: ISO-14025-2006 Environmental Labels and Declarations - Type III Environmental Declarations - Principles and Procedures.
.37 ISO-14040: ISO-14040-2006 Environmental Management - Life Cycle Assessment - Principles and Framework.
.38 ISO-14044: ISO-14044-2006 Environmental Management - Life Cycle Assessment - Requirements and Guidelines.
.39 MPI-APL: MPI Approved Products List.
.40 MPI-ASM: MPI Architectural Painting Specifications Manual.
.41 MPI-GPS-1: MPI-GPS-2014 Green Performance Standard Level 1 to EPA-EMC-M24.
.42 MPI-GPS-2: MPI-GPS-2014 Green Performance Standard Level 2 to MPI Levels.
.43 MPI-MPG: The Master Painter's Glossary.
.44 MPI-RSM: MPI Maintenance Repainting/Restoration Manual.
.45 NEMA-Z535.1: ANSI/NEMA-Z535.1-2022 Safety Colors.
.46 NSF-EPD: NSF Environmental Product Declaration (including to ISO-14040, ISO-14044, ISO-14025).
.47 OTC-2001: OTC Model Rule 2001, 2011 - Architectural & Industrial Maintenance (AIM) Coatings Phase I.
.48 OTC-2010: OTC Model Rule 2010, 2011 - Architectural & Industrial Maintenance (AIM) Coatings Phase II.
.49 SCAQMD-1113: SCAQMD Rule 1113 Architectural Coatings, 2016.
.50 SSPC-PM1-PP: SSPC Painting Manual, Volume 1, Good Painting Practice, 2016 (5th Edition).
.51 SSPC-PM2-SS: SSPC Painting Manual, Volume 2, Systems and Specifications.
.52 SSPC-SP1: SSPC-SP-1-2016 Solvent Cleaning.
.53 SSPC-SP2: SSPC-SP-2-2018 Hand Tool Cleaning.
.54 SSPC-SP3: SSPC-SP-3-2018 Power Tool Cleaning.
.55 SSPC-SP6: SSPC-SP-6-2006/NACE-3-2006 Commercial Blast Cleaning.
.56 SSPC-SP10: SSPC-SP-10-2015/NACE-2-2015 Near-White Wet Abrasive Blast Cleaning.

1.2 DEFINITIONS

.1 Additional definitions to MPI-MPG.

1.3 EXTENT

.1 Extent of Work to this Section includes the following in addition to other required Work:
  .1 Paint or coat new surfaces and affected existing surfaces including:

.1 Doors and accessways, including openings and frames, hardware and accessories if required.
.2 Modifications to doors including openings and frames, hardware and accessories if required.
.3 Space separations and assemblies, including floors, separations, walls.
.4 Modifications to space separations and assemblies, including floors, separations, walls.
.5 Ducting exposed in occupied spaces.
.6 Previously unexposed surfaces now exposed due to Work, where exposed surface does not match nearby surfaces, including where an existing component was replaced with a component that has a smaller contact area.

.2 Where not otherwise indicated, paint or coat surfaces, to match existing, including systems, equipment, services, components.

1.4 SUBMITTALS FOR ACTION

.1 Product Aspects
.1 Product Characteristics Data
.2 Product Schedule Data
.2 Service Aspects
.1 Service Sizing Plans

1.5 SUBMITTALS FOR INFORMATION

.1 Product Aspects
.1 Product Certification Documentation Data
.2 Product Mounting Plans
.2 Product Application
.1 Product Application Plans Certificate Letter
.2 Product Installation Information
.3 System Application
.1 System Testing Plans
.2 System Examination Results
.3 System Preparation Tests Results
.4 System Mounting and Supports Completed Certificate Letter
.5 System Verification Results
.6 System Documentation

1.6 SUBMITTALS FOR CLOSEOUT

.1 Product Application
.1 Product Installation Completed Certificate Letter
.2 Product Maintenance Information
.3 Product Spare Parts and Materials
.2 System Application
.1 System Maintenance Information

1.7 MOCK-UPS

.1 Representative Areas
.1 Interior Occupied Spaces
.1 Provide paints and coatings, complete with surface preparation and primers, on representative areas, for approval by Owner before commencing with full installation.
.2 Complete the following Work for affected areas.
.1 Per Site: 1 of each type where quantity is greater than 10-m (33-ft) of each type.
.2 Additional Per Typical Area: 1 of each type where quantity is greater than 20-m (66-ft) of each type throughout site.

.3 Additional Per Specific Area: 1 of each type where quantity is greater than 20-m (66-ft) of each type in each specific area.

.3 Hold mock-up review meeting on site. Review and verify quantities and types applicable for mock-ups as well as locations.

.4 Obtain written approval from Owner before proceeding with Work in each area.

1.8 QUALIFICATIONS

.1 Paints and Coatings

.1 Company and personnel members of and in good standing with MPI.

1.9 WARRANTIES

.1 Extended Warranty Period

.1 2-year.

PART 2 PRODUCTS

2.1 CHARACTERISTICS

.1 Provide products as required, and additionally to the following.

.1 Manufactured, tested, certified, registered and listed to regulatory requirements and standards related to the functionality and performance or other relevant characteristics of the product, including proper application, including:

.1 To the following in order:

.1 CEPA-SOR-2009-264.

.2 MPI-GPS-1.

.3 MPI-GPS-2.

.4 CARB-SCM.

.5 OTC-2010.

.6 SCAQMD-1113.

.7 GSI-11.

.2 Listed to:

.1 MPI-APL.

.3 Compatible with substrate to MPI-RSM, MPI-ASM, SSPC-PM1-PP and SSPC-PM2-SS.

.2 Features

.1 Mixing: Pre-mixed and pre-tinted unless otherwise indicated.

2.2 PAINTS - SOLVENT BASED - FERROUS METAL SURFACES - WEATHER RESISTANT - PRIMER COAT

.1 Provide as required.

.2 Features

.1 Suitable for various interior and exterior surfaces for various metals, including carbon steel, iron.

.2 Suitable for high resistance to sand blasting.

.3 Suitable for marine applications.

.4 Suitable for all top coatings, including urethanes, epoxies.

.5 Corrosion protector and inhibitor.

.6 Water resistant.

.7 Strong solvent resistant.

.8 Flat finish.

.3 Materials

.1 Phenolic alkyd.

.4 Options: Provide selections from each of the following available characteristic types as most suitable for each application.

.1 Colour

.1 Grey.

.2 Off white.

.3 Red oxide.

.5 Tests
  .1 Flash Point: 38-°C (71-°F) to ASTM-D56 Tag Closed Cup Method.
  .2 Based on application to steel surface with surface preparation to SSPC-SP6, 1 primer coat with DFT 121+/-6.4-µm (4.75+/-0.25-in/1,000).
    .1 Adhesion: Minimum rating 4B to ASTM-D3359.
    .2 Corrosion Resistance: Pass after 1,008-h to ASTM-D5894.
    .3 Dry Heat Resistance: Minimum 93.3-°C (200-°F) to ASTM-D2485.
    .4 Flexibility: Pass 6.4-mm (0.25-in) mandrel test to ASTM-D522.
    .5 Grind Fineness: Minimum 4 Hegman Units or maximum 51-µm (2-in/1,000) to ASTM-D1210.
    .6 Sag: Maximum 31-µm (12-in/1,000) to ASTM-D4400.
    .7 Viscosity: 100+/-5-KU to ASTM-D562.

.6 Ratings
  .1 Application Conditions: Suitable between 4.4-°C to 49-°C (40-°F to 120-°F) at maximum 85-%RH and 2.8-°C (5-°F) above dewpoint.
  .2 Thickness: Per coat applied:
    .1 WFT: Between 76-µm (3.0-in/1,000) and 203-µm (8.0-in/1,000).
    .2 DFT: Between 46-µm (1.8-in/1,000) and 122-µm (4.8-in/1,000).
  .3 Drying Times: With WFT of 102-µm (4.0-in/1,000):
    .1 For 4-°C (40-°F) and 50-%RH conditions:
      .1 To Touch: Maximum 1-h.
      .2 Tack Free: Maximum 3-h.
      .3 To Recoat
        .1 Maximum 6-h for this primer and alkyd additional coats.
        .2 Maximum 24-h for epoxy top coats.
        .3 Maximum 24-h for urethane top coats.
      .4 To Cure: Maximum 5-d.
  .4 VOC: Maximum 336-g/L (2.81-lb/USgal).
  .5 Volume Solids: 60+/-2-%.
  .6 Weight Solids: 79+/-2-%.
.7 Certifications
  .1 To CEPA-SOR-2009-264.
  .2 To MPI-GPS-1.
  .3 To OTC-2001.
.8 Manufacturers
  .1 The Sherwin-Williams Company, Kem Bond HS Primer Series, or approved equivalent

2.3 PAINTS - SOLVENT BASED - VARIOUS SURFACE MATERIALS - HIGH ABRASION RESISTANT - BASE AND FINISH COAT

.1 Provide as required.
.2 Features
  .1 Suitable for various interior and exterior surfaces with high abrasion resistance, including:
    .1 Doors, railings, frames, supports, piping.
    .2 Masonry, poured concrete, concrete block, plaster, aluminum, iron, steel, galvanized steel, wood floors and other wood surfaces.
  .2 High gloss finish.
.3 Materials
  .1 Alkyd enamel.
.4 Options: Provide selections from each of the following available characteristic types as most suitable for each application.
  .1 Colour: As indicated, otherwise matching connecting surfaces where not indicated and as required by Owner.
    .1 Various colours available including white, black, safety colours to NEMA-Z535.1.

.5 Tests
.1 Flash Point: 38-°C (101-°F) to ASTM-D93 Pensky-Martens Closed Cup Method.
.2 Based on application to steel surface with surface preparation to SSPC-SP10, 1 primer coat with DFT 48-µm (1.9-in/1,000), 1 finish coat with DFT 79-µm (3.1-in/1,000).
.1 Gloss: Average 80 gloss units at 60-° gloss viewing incident angle to ASTM-D523.
.2 Abrasion Resistance: Maximum 70-mg (0.0025-oz) loss to ASTM-D4060.
.3 Adhesion: Minimum 6.29-MPa (912-psi) to ASTM-D4541.
.4 Weathering Resistance
.1 Minimum rating 8 for blistering to ASTM-D714 and 10 cycles to ASTM-D5894.
.2 Minimum rating 9 for corrosion to ASTM-D1654.
.5 Direct Impact Resistance: Minimum 11.3-N·m (100-in·lb) to ASTM-D2794.
.6 Dry Heat Resistance: Minimum 93.3-°C (200-°F) to ASTM-D2485.
.7 Flexibility: Pass 3.2-mm (0.125-in) mandrel test to ASTM-D522.
.8 Humidity Resistance
.1 Minimum rating 4 for blistering to ASTM-D714 and 500-h to ASTM-D4585.
.2 Minimum rating 10 for corrosion to ASTM-D1654.
.9 Hardness: Pencil hardness minimum rating 4H to ASTM-D3363.
.6 Ratings
.1 Application Conditions: Suitable between 4.4-°C to 49-°C (40-°F to 120-°F) at maximum 85-%RH and 2.8-°C (5-°F) above dewpoint.
.2 Thickness: Per coat applied:
.1 WFT: Between 114-µm (4.5-in/1,000) and 229-µm (9.0-in/1,000).
.2 DFT: Between 48-µm (1.9-in/1,000) and 99-µm (3.9-in/1,000).
.3 Drying Times: With WFT of 117-µm (4.6-in/1,000):
.1 For 10-°C (50-°F) and 50-%RH conditions:
.1 To Touch: Maximum 3-h.
.2 Tack Free: Maximum 8-h.
.3 To Recoat: Maximum 12-h.
.4 To Cure: Maximum 7-d.
.4 VOC: Maximum 441-g/L (3.68-lb/USgal).
.5 Volume Solids: 43+/-2-%.
.6 Weight Solids: 58+/-2-%.
.7 Manufacturers
.1 The Sherwin-Williams Company, Pro Industrial Alkyd Enamel B54-100 Series, or approved equivalent

2.4 PAINTS - SOLVENT BASED - VARIOUS SURFACE MATERIALS - BASE AND FINISH COAT

.1 Provide as required.
.2 Features
.1 Suitable for various interior and exterior surfaces, including aluminum, steel, poured and precast concrete, masonry, gypsum boards, plaster, wood.
.3 Materials
.1 Alkyd enamel.
.4 Options: Provide the following.
.1 F·S: Satin finish.
.1 Gloss: 30+/-10 gloss units at 85-° gloss viewing incident angle to ASTM-D523.
.5 Options: Provide selections from each of the following available characteristic types as most suitable for each application.
.1 Colour: As indicated, otherwise matching connecting surfaces where not indicated and as required by Owner.
.1 Various colours available including white, black, safety colours to NEMA-Z535.1.
.6 Options: Other characteristics that are available but not furnished.
.1 F·G: Gloss finish.

.1 Gloss: 80 gloss units at 60-° gloss viewing incident angle to ASTM-D523.

.7 Tests
.1 Flash Point: 38-°C (101-°F) to ASTM-D93 Pensky-Martens Closed Cup Method.

.8 Ratings
.1 Application Conditions: Above 10-°C (50-°F).
.2 Thickness: Per coat applied:
.1 WFT: 102-µm (4.0-in/1,000).
.2 DFT: 43-µm (1.7-in/1,000).
.3 Drying Times
.1 For 25-°C (77-°F) and 50-%RH conditions:
.1 To Touch: Maximum 2-h.
.2 To Recoat: Maximum 8-h.
.4 VOC: Less than 441-g/L (3.68-lb/USgal) to EPA-EMC-M24.
.5 Volume Solids: 43+/-2-%.
.6 Weight Solids: 58+/-2-%.

.9 Manufacturers
.1 The Sherwin-Williams Company, All Surface Enamel Interior-Exterior Alkyd Series, or approved equivalent

2.5 PAINTS - WATER BASED - ZINC RICH COATED METAL SURFACES - PRIMER COAT

.1 Provide as required.

.2 Features
.1 Suitable for various interior and exterior surfaces for various metals, including aluminum, galvanized steel, stainless steel, including over zinc rich primers.
.2 Suitable for small profile blasted surfaces.
.3 Suitable for all top coatings, including urethanes, epoxies.
.4 Flat finish.

.3 Materials
.1 Water based.

.4 Tests
.1 Gloss: 6+/-2 gloss units at 60-° gloss viewing incident angle to ASTM-D523.

.5 Ratings
.1 Application Conditions: Suitable between 10-°C to 49-°C (50-°F to 110-°F) at maximum 85-%RH and 2.8-°C (5-°F) above dewpoint.
.2 Thickness: Per coat applied:
.1 WFT: Between 86-µm (3.4-in/1,000) and 163-µm (6.4-in/1,000).
.2 DFT: Between 18-µm (0.7-in/1,000) and 36-µm (1.4-in/1,000).
.3 Drying Times: With WFT of 152-µm (6.0-in/1,000):
.1 For 10-°C (50-°F) and 50-%RH conditions:
.1 To Touch: Maximum 3-h.
.2 Tack Free: Maximum 3-h.
.3 To Recoat: Maximum 6-h.
.4 To Cure: Maximum 7-d.
.4 VOC: Maximum 97-g/L (0.81-lb/USgal).
.5 Volume Solids: 21+/-2-%.
.6 Weight Solids: 30+/-2-%.

.6 Certifications
.1 To CEPA-SOR-2009-264.
.2 To CARB-SCM.
.3 To OTC-2001, OTC-2010.
.4 To SCAQMD-1113.

.7 Manufacturers
.1 The Sherwin-Williams Company, Pro Industrial DTM Wash Primer Series, or approved equivalent

2.6 PAINTS - WATER BASED - GYPSUM BOARDS, PLASTER, WOOD SURFACES - PRIMER COAT

.1 Provide as required.
.2 Features
  .1 Suitable for various interior surfaces, including gypsum boards, plaster, wood, primed metal, previously painted surfaces.
  .2 Suitable for various surfaces, including walls, doors, trim.
  .3 White colour.
  .4 Tintable.
.3 Materials
  .1 Vinyl acrylic latex.
.4 Tests
  .1 Gloss: 2.5+/-2.5 gloss units at 85-° gloss viewing incident angle to ASTM-D523.
  .2 Water Vapour Transmission: Maximum 2.77-µg/(s·m2·Pa) (46.36-USperm) to ASTM-D1653.
.5 Ratings
  .1 Application Conditions: Above 10-°C (50-°F).
  .2 Thickness: Per coat applied:
    .1 WFT: 102-µm (4.0-in/1,000).
    .2 DFT: 38-µm (1.5-in/1,000).
  .3 Drying Times
    .1 For 25-°C (77-°F) and 50-%RH conditions:
      .1 To Touch: Maximum 30-min.
      .2 To Sand: Maximum 2-h.
      .3 To Recoat: Maximum 2-h.
  .4 VOC: Less than 50-g/L (0.42-lb/USgal) to EPA-EMC-M24.
  .5 Volume Solids: 38+/-2-%.
  .6 Weight Solids: 54+/-2-%.
.6 Certifications
  .1 To CEPA-SOR-2009-264.
  .2 To CARB-SCM.
  .3 To OTC-2001, OTC-2010.
  .4 To SCAQMD-1113.
.7 Manufacturers
  .1 The Sherwin-Williams Company, Premium Wall & Wood Interior Latex Primer Series, or approved equivalent

2.7 PAINTS - WATER BASED - METAL, MASONRY - BASE AND FINISH COAT

.1 Provide as required.
.2 Features
  .1 Suitable for various interior and exterior surfaces, including steel, galvanized steel, aluminum, concrete masonry.
  .2 Suitable for various surfaces, including walls, doors, trim.
  .3 White colour.
  .4 Tintable.
.3 Materials
  .1 Acrylic.
.4 Options: Provide the following.
  .1 F·S: Egg shell finish.
    .1 Gloss: 15+/-5 gloss units at 85-° gloss viewing incident angle to ASTM-D523.
    .2 Volume Solids: 37+/-2-%.
    .3 Weight Solids: 51+/-2-%.
.5 Options: Provide selections from each of the following available characteristic types as most suitable for each application.

.1 Colour: As indicated, otherwise matching connecting surfaces where not indicated and as required by Owner.
.1 Various colours available including white, black, safety colours to NEMA-Z535.1.
.6 Options: Other characteristics that are available but not furnished.
.1 F·SG: Semi-gloss finish.
.1 Gloss: 40+/-5 gloss units at 60-° gloss viewing incident angle to ASTM-D523.
.2 Volume Solids: 37+/-2-%.
.3 Weight Solids: 50+/-2-%.
.2 F·G: Gloss finish.
.1 Gloss: 70 gloss units at 60-° gloss viewing incident angle to ASTM-D523.
.2 Volume Solids: 39+/-2-%.
.3 Weight Solids: 52+/-2-%.
.7 Tests
.1 Adhesion: Minimum 8.36-MPa (1,212-psi) to ASTM-D4541.
.2 Abrasion Resistance: Maximum 65-mg (1.00-grain) loss to ASTM-D4060 CS17 Abrading Wheel method at 1,000-cycles and 1-kg (2.21-lb) load.
.3 Weathering Resistance
.1 Minimum rating 10 for blistering to ASTM-D714 and 5 cycles to ASTM-D5894.
.2 Minimum rating 7 for corrosion to ASTM-D1654 and 5 cycles to ASTM-D5894.
.4 Direct Impact Resistance: Minimum 3.6-N·m (28-in·lb) to ASTM-D2794.
.5 Dry Heat Resistance: Minimum 149-°C (300-°F) to ASTM-D2485.
.6 Flexibility: Pass 3.2-mm (0.125-in) mandrel test to ASTM-D522.
.7 Hardness: Pencil hardness minimum rating H to ASTM-D3363.
.8 Water Vapour Transmission: Maximum 1.30-µg/(s·m2·Pa) (22.74-USperm) to ASTM-D1653.
.8 Ratings
.1 Application Conditions: Between 10-°C (50-°F) and 38-°C (100-°F) and minimum 2.8-°C (5-°F) above dewpoint and maximum 85-%RH.
.2 Thickness: Per coat applied:
.1 WFT: Between 95-µm to 152-µm (3.75-in/1,000 and 6.0-in/1,000).
.2 DFT: Between 36-µm to 56-µm (1.4-in/1,000 and 2.2-in/1,000).
.3 Drying Times: With WFT of 127-µm (5.0-in/1,000):
.1 For 10-°C (50-°F) and 50-%RH conditions:
.1 To Touch: Maximum 1-h.
.2 To Handle: Maximum 2-h.
.3 To Recoat: Maximum 4-h.
.4 To Drywall: Maximum 4.6-m (15-ft).
.2 For 25-°C (77-°F) and 50-%RH conditions:
.1 To Touch: Maximum 30.min.
.2 To Handle: Maximum 1-h.
.3 To Recoat: Maximum 2-h.
.4 To Drywall: Maximum 3.1-m (10-ft).
.4 VOC: Less than 50-g/L (0.42-lb/USgal) to EPA-EMC-M24.
.5 Volume Solids: 37+/-2-%.
.6 Weight Solids: 51+/-2-%.
.9 Certifications
.1 To CEPA-SOR-2009-264.
.2 To CARB-SCM.
.3 To MPI-GPS-1.
.4 To NSF-EPD.
.5 To OTC-2001, OTC-2010.
.6 To SCAQMD-1113.
.7 Suitable for USDA facilities.

.10 Manufacturers
.1 The Sherwin-Williams Company, Pro Industrial Multi-Surface Acrylic B66 Series, or approved equivalent

2.8 PAINTS - WATER BASED - VARIOUS SURFACE MATERIALS - BASE AND FINISH COAT - INTERIOR

.1 Provide as required.
.2 Features
.1 Suitable for various interior surfaces, including gypsum boards, plaster, wood, masonry, primed metal.
.2 Suitable for various surfaces, including walls, doors, trim.
.3 White colour.
.4 Tintable.
.3 Materials
.1 Vinyl acrylic latex.
.4 Options: Provide the following.
.1 F·S: Satin finish.
.1 Gloss: 10 gloss units at 60-° gloss viewing incident angle to ASTM-D523.
.2 Volume Solids: 40+/-2-%.
.3 Weight Solids: 41+/-2-%.
.5 Options: Provide selections from each of the following available characteristic types as most suitable for each application.
.1 Colour: As indicated, otherwise matching connecting surfaces where not indicated and as required by Owner.
.1 Various colours available including white, black, safety colours to NEMA-Z535.1.
.6 Options: Other characteristics that are available but not furnished.
.1 F·F: Flat finish.
.1 Gloss: 2.5+/-2.5 gloss units at 85-° gloss viewing incident angle to ASTM-D523.
.2 Volume Solids: 38+/-2-%.
.3 Weight Solids: 55+/-2-%.
.2 F·V: Velvet finish.
.1 Gloss: 4 gloss units at 60-° gloss viewing incident angle to ASTM-D523.
.2 Volume Solids: 40+/-2-%.
.3 Weight Solids: 50+/-2-%.
.3 F·SG: Semi-gloss finish.
.1 Gloss: 30+/-5 gloss units at 60-° gloss viewing incident angle to ASTM-D523.
.2 Volume Solids: 37+/-2-%.
.3 Weight Solids: 49+/-2-%.
.7 Ratings
.1 Application Conditions: Above 10-°C (50-°F).
.2 Thickness: Per coat applied:
.1 WFT: 102-µm (4.0-in/1,000).
.2 DFT: 41-µm (1.6-in/1,000).
.3 Drying Times
.1 For 25-°C (77-°F) and 50-%RH conditions:
.1 To Touch: Maximum 1-h.
.2 To Recoat: Maximum 4-h.
.4 VOC: Less than 50-g/L (0.42-lb/USgal) to EPA-EMC-M24.
.5 Volume Solids: 40+/-2-%.
.6 Weight Solids: 41+/-2-%.
.8 Certifications
.1 To CEPA-SOR-2009-264.
.2 To CARB-SCM.
.3 To MPI-GPS-1.

.4 To OTC-2001, OTC-2010.
.5 To SCAQMD-1113.
.9 Manufacturers
.1 The Sherwin-Williams Company, SuperPaint Interior Latex Satin Series, or approved equivalent

2.9 ACCESSORIES

.1 Provide as required.

PART 3 EXECUTION

3.1 EXAMINATION

.1 Existing Inspection
.1 Inspect and verify to MPI-RSM, MPI-ASM, SSPC-PM1-PP, SSPC-PM2-SS.
.2 Inspect surfaces for areas requiring cleaning and decontamination.
.3 Inspect surfaces for localized weak or deteriorated or damaged surfaces before each stage of painting or coating.
.4 Inspect for surface conditions that may require extraordinary preparation or additional repair before proceeding.

3.2 PREPARATION

.1 Existing Tests
.1 Color Matching: To ASTM-D1729 with product manufacturer colour standards and samples.
.2 Gloss Matching: To ASTM-D2457 with product manufacturer visual confirmation.
.3 Sheen Matching: To ASTM-D3928 with product manufacturer visual confirmation.
.2 Surfaces Preparation
.1 Remove surface mounted components prior to painting or coating, and replace after painting, including hardware, plates.
.2 Clean and prepare surfaces:
.1 To MPI-RSM, MPI-ASM, SSPC-PM1-PP, SSPC-PM2-SS.
.2 To paint or coating product manufacturers' requirements.
.3 Removal of coverings, including paint, sealants, dirt, dust, debris, scale, corrosion. Minimum to SSPC-SP3 unless otherwise indicated.
.4 Removal of contaminants, including oils, grease, wax, fatty acids. Minimum to SSPC-SP1 unless otherwise required, including scraping, rag application, washing, steam cleaning with detergents or other cleaners. Include methods to SSPC-SP2 as required.
.5 Surface cleaning for removal of contaminants, including dust. To ASTM-D4258, including broom cleaning, vacuum cleaning, air blast cleaning, water cleaning, detergent water cleaning, steam cleaning.
.3 Surface profile preparation to paint or coating product manufacturers' requirements.

3.3 INSTALLATION

.1 Install as required.
.2 Selection and Application
.1 Unless otherwise indicated or required, provide Work:
.1 Painting to MPI-RSM, MPI-ASM, SSPC-PM1-PP, SSPC-PM2-SS.
.2 Repainting of existing finishes to MPI-RSM.
.3 Use the following as indicated, otherwise as required where not indicated:
.1 Tack coats.
.2 Corrosion protective coats.
.3 Fillers.
.4 Primer coats
.5 Base coats.
.6 Finish coats.
.7 Protective finish coats.

.2 Mask required legible components including nameplates before painting.
.3 Mask surrounding areas before painting.
.4 Unless otherwise indicated or required by finish type, provide painting with:
.1 Type
.1 Solvent based paint, exterior grade.
.2 Colour and Texture
.1 Colour and texture including application methods to match existing or adjacent surfaces if acceptable by Owner, otherwise as required by Owner.
.3 Coats
.1 General
.1 1 primer coat, 1 patching filler coat, 1 base coat, 1 finish coat.
.2 to be applied in mannerEach coat to be uniform over entire area of continuous or connected surfaces at one time.
.3 DFT of each coat of paint or coating manufacturer's maximum DFT.
.2 Primer Coat Application
.1 Apply primer coat of colour lighter than and that contrasts with base coats.
.3 Patching Filler Application
.1 Fill voids and transitions as required for surface finish with filler approved by paint or coating manufacturer.
.4 Base Coat Application
.1 Apply base coat after primer coat is completely dry.
.5 Finish Coats Application
.1 Apply finish coats after base coat is completely dry.
.2 Apply multiple coats such that dried finish coats are uniform in appearance and colour, and free of imperfections, including dirt, coarse particles, other foreign matter.

.3 Ambient Conditions: Ensure environmental conditions are acceptable before painting. Complete Work under the following conditions in addition to manufacturer requirements including limitations except with written instructions from manufacturer for:
.1 Affected area not exposed to condensation or precipitation.
.2 Ambient conditions and affected surface at no less than as required by products, otherwise:
.1 Dry Bulb Temperature: Between 10-°C (50-°F) and 30-°C (95-°F).
.2 Dew Point: Dry bulb temperature above dew point temperature by minimum 2.8-°C (5-°F).
.3 Relative Humidity: Maximum 80-%RH.
.4 Solar: No direct sun.
.5 Wind: Air speeds maximum 5-km/h (250-ft/min).
.6 Air Contaminants: No physical contaminants, including dust, debris. No gas contaminants that may impact paints or coatings.

3.4 GYPSUM BOARD SURFACES - PAINTS

.1 Preparation
.1 Surfaces Preparation
.1 To ASTM-C840.
.2 To GA-216.
.3 Minimum to SSPC-SP2 for new pristine surfaces, otherwise to SSPC-SP6.
.4 Previously painted or coated surfaces chalking as defined by CGSB-1-GP-72 to be thoroughly washed and wiped free of all chalking and related surface formations prior to application of paints and coatings.
.2 Installation
.1 Selection and Application
.1 Unless otherwise indicated or required, provide Work:

.1 To ASTM-C840.
.2 To GA-216.
.2 Patching Filler
.1 Application: Fill voids, including holes and indentations, greater than 0.8-mm (0.031-in) with filler approved by paint or coating manufacturer. Includes:
.1 Rough surfaces.
.2 To smooth seams.
.3 Holes, cavities, indentations.
.4 Surface defects.
.5 Any orientation, including horizontal, vertical, overhead surfaces.
.2 Type: To Board Joint Compounds in Section 09 20 00 Board Separations.
.3 Primer Coat
.1 Application: Apply to 75+/-10-% of product DFT thickness range.
.2 Type: Paints - Water Based - Gypsum Boards, Plaster, Wood Surfaces - Primer Coat
.4 Base Coat
.1 Application: Apply to 75+/-10-% of product DFT thickness range.
.2 Type: Either as indicated, matching existing where not indicated, otherwise solvent based.
.1 Paints - Solvent Based - Various Surface Materials - Base and Finish Coat
.2 Paints - Water Based - Various Surface Materials - Base and Finish Coat - Interior
.5 Finish Coats
.1 Application: Apply 1 or more finish coats as required for suitable finish, each coat to 75+/-10-% of product DFT thickness range.
.2 Type: To base coat type.
.6 Substitution Limitations
.1 Characteristics Limited: Specific characteristics are limited as follows, and may be accepted to Substitutions Article in Section 01 00 00 Project Procedures and where requirements can be demonstrated to be met:
.1 Match Existing
.1 Where existing products are known, and use of same existing products is acceptable to Owner.

3.5 GALVANIZED STEEL - PAINTS

.1 Preparation
.1 Surfaces Preparation
.1 Minimum to SSPC-SP2 for new pristine surfaces, to SSPC-SP10 for surfaces with any degree of corrosion, otherwise to SSPC-SP3.
.2 Installation
.1 Selection and Application
.1 Primer Coat
.1 Application: Apply to 75+/-10-% of product DFT thickness range.
.2 Type: Paints - Water Based - Zinc Rich Coated Metal Surfaces - Primer Coat
.2 Patching Filler
.1 Application: Fill voids and transitions greater than 3-mm (0.125-in) with filler approved by paint or coating manufacturer. Includes:
.1 Seams, including riveted, lapped, welded.
.2 Corrosion pits.
.3 Chine coves and sharp angles.
.4 Any orientation, including horizontal, vertical, overhead surfaces.
.2 Type: To primer coat type.
.3 Base Coat Application
.1 Application: Apply to 75+/-10-% of product DFT thickness range.

.2 Type: Paints - Water Based - Metal, Masonry - Base and Finish Coat
.4 Finish Coat Application
.1 Application: Apply to 75+/-10-% of product DFT thickness range.
.2 Type: Paints - Water Based - Metal, Masonry - Base and Finish Coat

3.6 NON-GALVANIZED STEEL, NON-DUCTILE IRON - PAINTS

.1 Preparation
.1 Surfaces Preparation
.1 Minimum to SSPC-SP2 for new pristine surfaces, to SSPC-SP10 for surfaces with any degree of corrosion, otherwise to SSPC-SP3.
.2 Installation
.1 Selection and Application
.1 Primer Coat
.1 Application: Apply to 75+/-10-% of product DFT thickness range.
.2 Type: Paints - Solvent Based - Ferrous Metal Surfaces - Weather Resistant - Primer Coat
.2 Patching Filler
.1 Application: Fill voids and transitions greater than 3-mm (0.125-in) with filler approved by paint or coating manufacturer. Includes:
.1 Seams, including riveted, lapped, welded.
.2 Corrosion pits.
.3 Chine coves and sharp angles.
.4 Any orientation, including horizontal, vertical, overhead surfaces.
.2 Type: To primer coat type.
.3 Base Coat Application
.1 Application: Apply to 75+/-10-% of product DFT thickness range.
.2 Type: Paints - Solvent Based - Various Surface Materials - High Abrasion Resistant - Base and Finish Coat
.4 Finish Coat Application
.1 Application: Apply to 75+/-10-% of product DFT thickness range.
.2 Type: Paints - Solvent Based - Various Surface Materials - High Abrasion Resistant - Base and Finish Coat

3.7 OTHER SURFACES - PAINTS AND COATINGS

.1 Preparation
.1 Surfaces Preparation
.1 As required. To most similar surface indicated, or to most suitable product indicated that is suitable for surface.
.2 Installation
.1 Selection and Application
.1 Various Coats
.1 As required. To most similar surface indicated, or to most suitable product indicated that is suitable for surface.
.2 Substitution Limitations
.1 Characteristics Limited: Specific characteristics are limited as follows, and may be accepted to Substitutions Article in Section 01 00 00 Project Procedures and where requirements can be demonstrated to be met:
.1 Match Existing
.1 Where existing products are known, and use of same existing products is acceptable to Owner.

3.8 DISPOSAL

.1 Paints and coatings, including stains, preservative, thinners, solvents, are regarded as hazardous products and are subject to regulations for disposal.

.2 Material which cannot be reused must be treated as hazardous waste and disposed of in an appropriate manner.
.3 Place materials defined as hazardous or toxic waste, including used sealant and adhesive tubes and containers, in containers or areas designated for hazardous waste.
.4 Eliminate risk of contaminants entering waterways, sanitary or storm drain systems, or into ground. Including the following:
  .1 Retain cleaning water for water-based materials to allow sediments to be filtered out.
  .2 Retain cleaners, thinners, solvents and excess paint to be placed in designated containers and ensure proper disposal.
  .3 Return solvent and oil soaked rags used during painting operations for contaminant recovery, proper disposal, or appropriate cleaning and laundering.
  .4 Dispose of contaminants as required including hazardous waste requirements.
  .5 Ensure empty or remaining paint containers are fully dry prior to disposal or recycling.

3.9 PROTECTION

.1 Progress Activities
  .1 Protect newly painted exterior surfaces from elements, condensation and contamination until paint coatings are completely dry. Erect barriers or screens and post signs to warn, limit and/or direct traffic.

3.10 CLEANING

.1 Progress Activities
  .1 Remove spilled, splashed, splattered and over-sprayed paint. Remove waste materials and keep area free from accumulation of tools, equipment, surplus materials and debris.

3.11 VERIFICATION

.1 Progress Inspection
  .1 Cleaning: Verify cleaning results as follows.
    .1 All Surfaces: Wiping minimum 25-% of surface area with a clean and dry white cloth and examine for visible residue.
    .2 Additional
      .1 Metal Surfaces: To ISO-8502-3.
      .2 Plastic Surfaces: To ASTM-F22.
      .3 High Temperature Surfaces: To ASTM-F22.
  .2 Contaminants: Verify contaminants removal as follows.
    .1 To ASTM-D4258.
    .2 To ASTM-F21.
.2 Post-Start-up Tests
  .1 Adhesion Test
    .1 Concrete Surfaces: To ASTM-D7234.
    .2 Metal Surfaces: To ASTM-D4541, or ASTM-D3359 where portable adhesion testers are not able to fit.
    .3 Other Flat Panel Surfaces: To ASTM-D2197.
    .4 Other Surfaces: To ASTM-D6677.
.3 Pre-Completion Inspection
  .1 Horizontal Surfaces: No defects visible from floor at 45-° to surface.
  .2 Vertical Surfaces: No defects visible from a distance of 1-m (40-in) at 90-° to surface.
  .3 Other Surfaces: To both horizontal and vertical surfaces.
  .4 Final coat to exhibit uniformity across full surface area, including colour, gloss, sheen.

END OF SECTION 09 90 00

SECTION 23 05 93 BALANCING

PART 1 GENERAL

1.1 REFERENCED DOCUMENTS

.1 AABC-TSB: ANSI/AABC National Standards for Total System Balance, 2016 (7th Edition).
.2 ASHRAE-111: ASHRAE-111-2008 (R2017) Measurement, Testing, Adjusting and Balancing of Building HVAC Systems.
.3 NEBB-TABES: NEBB Procedural Standards for Testing, Adjusting, Balancing of Environmental Systems, 2019 (9th Edition).

1.2 EXTENT

.1 Extent of Work to this Section includes the following in addition to other required Work:
  .1 Perform TAB such that indicated systems, services, equipment and components achieve required functionality and performance.
  .2 Perform TAB on new systems, services, equipment and components, as well as affected existing systems.
  .3 Perform TAB on the following new and existing systems, services, equipment and components:
    .1 Air Systems
      .1 Generally:
        .1 Air distribution systems affected by Work.
        .2 All exhaust systems including fans, main and branch ducting, air measurement stations, controls, and exhaust grilles.
        .3 Dampers measurements and settings.
        .4 Zone pressures measurements.

1.3 SUBMITTALS FOR INFORMATION

.1 System Aspects
  .1 System Field Documentation Plans
.2 System Application
  .1 System Testing Plans
  .2 System Examination Results
  .3 System Preparation Tests Results
  .4 System Mounting and Supports Completed Certificate Letter
  .5 System Verification Results
  .6 System Documentation
.3 Project Application
  .1 Record Documentation

1.4 QUALIFICATIONS

.1 Labour
  .1 Company specializing in Work with 5-year documented experience.
.2 Balancing
  .1 Company certified to AABC and CAABC, or NEBB, with its personnel certified to AABC or NEBB and employed by company.

1.5 MEETINGS

.1 Arrange and conduct meetings. Document decisions, and revise submittals and documentation as required.
.2 Pre-Submittal Review
  .1 Meet with Engineer to review Specifications and Drawings in detail before preparation of submittals.
  .2 Review products and execution requirements in detail, and provide commentary to convey understanding of requirements including performance and functionality.
  .3 Notify Engineer of problems or concerns with meeting requirements including performance and functionality.

.4 Follow request for clarification procedures to clarify issues regarding requirements including performance and functionality.
.5 Document written detailed explanations and justifications for how requirements including performance and functionality will be met.
.3 Field Documentation Review
.1 Arrange meeting no later than 1-week after submittals have been submitted.
.2 Meet with Owner to provide a description of the following for review:
.1 Field labelling and identification method, names, format, and information.
.2 Field marking method, format, and information.
.4 Testing Plan Review
.1 Submit testing plan for review 20-day prior to testing.
.2 Meet with Owner and Engineer to review testing plan.
.5 Adjustments Required Review
.1 For specific performance and functionality issues, provide the following to proceed with necessary adjustments.
.2 Preparation: Prepare a written journal of observations, adjustments made, results.
.3 Review
.1 Meet with Owner and Engineer to demonstrate how requirements including performance and functionality are not currently being achieved.
.2 Identify and detail proposed additional and alternate implementation approaches and methods.
.6 Record Documentation Review
.1 Arrange meeting no later than 1-week after documentation has been submitted
.2 Meet with Owner to provide a description of the following for review:
.1 Work completed.
.2 Deficiencies noted.

PART 2 PRODUCTS

.1 Not used.

PART 3 EXECUTION

3.1 EXAMINATION

.1 Existing Inspection
.1 Existing Documentation Review: Review existing reports, building drawings, data on systems, services, equipment and components.
.2 Existing Systems Review: Complete thorough evaluation of systems, services, equipment and components.
.1 Confirm physical access to concealed components are present and adequate.
.2 Confirm clearances and maintenance access to components are adequate.
.3 Add access hatches and access doors as required to access components, including where access hatches and access doors are missing or inadequate.
.4 Confirm if available documentation has correctly and accurately identified distribution system components.
.5 Confirm if prime mover adjustment as well as balancing devices and components affecting balancing and distribution systems isolation are present.
.6 Assess prime movers for range of adjustment available and if suitable for project requirements.
.7 Inspect condition of balancing devices and components to discover improperly installed, missing, defective or failed components.
.8 Confirm if test ports and locations are present and adequate.
.9 Investigate and review possible system installation deficiencies, including openings, connections.
.10 Record settings for controlled components, including motor speed controller settings/position, variable or fixed.

.2 Pre-Installation Evaluation
.1 Pre-TAB Inspection Report: Provide written report including photographs and descriptions of deficiencies, conditions that may impact Work.
.2 TAB Plan: Provide written plan including:
.1 Methodology and procedures for performing TAB.
.2 Highlighting specific procedures different from referenced documents and other Sections.
.3 Test instruments list with test instrument specifications.

3.2 PREPARATION

.1 Existing Tests
.1 Existing Control Flows and Pressures Settings
.1 Measure existing conditions and compare to control settings to document existing settings, compare accuracy, including those replaced or modified components with settings matched as part of Work, including:
.1 Air Systems
.1 Air terminals.
.2 Existing Flows and Pressures Measurement
.1 Measure existing including:
.1 Air Systems
.1 Zone inlets and outlets, including louvers, transfer openings.
.2 Space inlets and outlets, including diffusers, grilles.
.2 Services Preparation
.1 Prior to starting TAB, confirm:
.1 Equipment and systems have been properly started up.
.2 Equipment and systems have been verified for proper, normal and safe operation of mechanical and associated electrical and control systems.
.3 Status of related and potentially related components and systems within or near the vicinity of affected systems and zones that may impact measurements and results of TAB, including open or closed doors, operational ventilation systems, neighbour zone conditions, outdoor ambient conditions.

3.3 INSTALLATION

.1 Install as required.
.2 Selection and Application
.1 Unless otherwise indicated or required, provide Work to:
.1 AABC-TSB, or NEBB-TABES.
.2 ASHRAE-111.
.3 Equipment and component manufacturers recommendations.
.2 Test Instruments
.1 Provide instruments with scale ranges, accuracies, and resolutions to NEBB-TABES minimum requirements unless otherwise specified.
.2 Calibrate instruments within 3-month of TAB.
.3 Balance flows:
.1 As indicated.
.2 Where flows are not indicated:
.1 Balance equal sized terminals or equipment with equal flows.
.2 Proportion flows between unequal sized terminals or equipment proportional to approximate or estimated capacity.
.3 Adjust flows as required to minimize overall noise.
.4 Balance existing systems to the most recent document available, including from the following:
.1 Balanced flows from most recent Owner accepted balancing report.
.2 Design flows from supplemental project and renovation drawings.
.3 Design flows from building drawings.

.3 Completeness
.1 Perform TAB on:
.1 All applicable control components as required.
.2 All affected equipment, components, including balancing devices, including:
.1 Air Systems: Control dampers, manual dampers, draft dampers, fire dampers, balancing dampers.
.2 Liquid Systems: Control valves, shutoff valves, check valves, balancing valves.
.2 Balance to optimize system, including as follows.
.1 Open existing balancing devices and components to reduce required pressure drops before balancing.
.2 Rebalance balancing devices and components to reduce pressure drops, including at energy sinks and sources and loads, throughout distribution systems.
.3 Document adjustment factors including measurement and calibration results. Example: K factors.

3.4 AIR DUCTING

.1 Determine branch and main duct air flows by using multiple pitot tube traverse method.
.2 Confirm leakage by comparing sum of zone inlets and outlets to total air flow from both ventilation units and air terminals.

3.5 AIR DIFFUSER, GRILLS AND REGISTERS

.1 Determine diffuser, grills and register air flows by using a flow measuring hood, calibrated using pitot tube traverse.
.2 Measure noise levels at maximum air flows, using the noise criteria method.
.3 Report on areas having a noise criteria measurement of 35 or greater.

3.6 ZONES

.1 Measure zone pressure at existing zone pressure sensor with backdraft dampers set, and under air fans including supply and exhaust systems peak operation, mid operation, low operation.

3.7 FIELD DOCUMENTATION

.1 Settings Field Markings
.1 Applications: Add markings to balancing components to document properly balanced positions. Permanent marker.
.2 Substitution Limitations
.1 Requirements Waived: Specific requirements may be acceptable to be waived, and may be accepted to Substitutions Article in Section 01 00 00 Project Procedures and where requirements can be demonstrated to be met:
.1 Markings Waived
.1 Markings may be waived where suitable for Work, and where all of the following are true:
.1 Occupied spaces. Example: Ducting in spaces without drop ceilings.
.2 As acceptable to Owner.

3.8 VERIFICATION

.1 Post-Start-up Tests
.1 After settings and adjustments are completed, repeat completing all measurements throughout equipment and systems without making adjustments.
.2 Document status of related and potentially related components and systems within or near the vicinity of affected systems and zones that may impact measurements and results of TAB, including open or closed doors, operational ventilation systems, neighbour zone conditions, outdoor ambient conditions.
.2 Post-Start-up Inspection
.1 Provide personnel to verify up to 20-% of reported results, unless otherwise indicated higher.
.3 Pre-Completion Tests

.1 Re-balancing
.1 Re-balance system and repeat Work after both additional repairs and major adjustments have been implemented.

3.9 RECORD DOCUMENTATION

.1 TAB Reports
.1 Balancing reports compliant with AABC-TSB, and NEBB-TABES recommendations, including measurements, including flows, pressures, temperatures.
.2 Include:
.1 System schematic diagrams with recorded measurements and information. Include date and time of measurements, operating components throughout affected areas and site, conditions including system, zone, ambient.
.2 Flows, pressures, and temperatures across components, including inlets, outlets, transfers.
.3 Calibration certificates for test instruments used.

END OF SECTION 23 05 93

SECTION 23 30 00 AIR DUCTING

PART 1 GENERAL

1.1 REFERENCED DOCUMENTS

.1 AMCA-500-D: ANSI/AMCA-500-D-2018 Laboratory Methods of Testing Dampers for Rating.
.2 AMCA-511: AMCA-511-2021 Certified Ratings Program - Product Rating Manual for Air Control Devices.
.3 ASHRAE-HBA: ASHRAE Handbook, HVAC Applications, 2023.
.4 ASHRAE-HBF: ASHRAE Handbook, Fundamentals, 2021.
.5 ASHRAE-HBS: ASHRAE Handbook, HVAC Systems and Equipment, 2024.
.6 ASTM-A480: ASTM-A480/A480M-2024 Standard Specification for General Requirements for Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet, and Strip.
.7 ASTM-A653: ASTM-A653/A653M-2023 Standard Specification for Steel Sheet, Zinc Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
.8 ASTM-B211: ASTM-B211/B211M-2023 Standard Specification for Aluminum and Aluminum-Alloy Rolled or Cold Finished Bar, Rod, and Wire.
.9 ASTM-B221: ASTM-B221/B221M-2021 Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric).
.10 ASTM-D1475: ASTM-D1475-2013 (R2020) Standard Test Method for Density of Liquid Coatings, Inks, and Related Products.
.11 ASTM-D2240: ASTM-D2240-2015 (R2021) Standard Test Method for Rubber Property - Durometer Hardness.
.12 ASTM-D2369: ASTM-D2369-2024 Standard Test Method for Volatile Content of Coatings.
.13 ASTM-E84: ASTM-E84-2023 Standard Test Method for Surface Burning Characteristics of Building Materials.
.14 ASTM-G21: ASTM-G21-2015 (R2021) Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi.
.15 CSA-W47.1: CSA-W47.1-2019 Certification of Companies for Fusion Welding of Steel.
.16 CSA-W47.2: CSA-W47.2-2011 (R2020) Certification of Companies for Fusion Welding of Aluminum.
.17 CSA-W55.3: CSA-W55.3-2008 (R2023) Certification of Companies for Resistance Welding of Steel and Aluminum.
.18 CSA-W59: CSA-W59-2024 Welded Steel Construction (Metal Arc Welding).
.19 CSA-W59.2: CSA-W59.2-2024 Welded Aluminum Construction.
.20 DOD-MIL-DTL-18255: DOD's Military Detail Specification 18255-1989, Calking Compound, Synthetic Rubber Base, Wooden Deck Seam Application.
.21 NFPA-90A: NFPA-90A-2024 Installation of Air-Conditioning and Ventilating Systems.
.22 NFPA-90B: NFPA-90B-2024 Installation of Warm Air Heating and Air-Conditioning Systems.
.23 SCAQMD-1168: SCAQMD Rule 1168 Adhesives and Sealants Applications, 2022.
.24 SMACNA-001: ANSI/SMACNA-001-2008 Seismic Restraint Manual Guidelines for Mechanical Systems.
.25 SMACNA-006: ANSI/SMACNA-006-2020 HVAC Duct Construction Standards - Metal and Flexible.
.26 SMACNA-016: ANSI/SMACNA-016-2012 HVAC Air Duct Leakage Test Manual.
.27 UL-94: ANSI/UL-94-2023 Tests for Flammability of Plastic Materials for Parts in Devices and Appliances.
.28 UL-181: ANSI/UL-181-2013 Factory-Made Air Ducts and Air Connectors.
.29 UL-555: ANSI/UL-555-2006 Fire Dampers.
.30 UL-723: ANSI/UL-723-2018 Test for Surface Burning Characteristics of Building Materials.
.31 ULC-S110: CAN/ULC-S110-2013 (R2023) Standard Methods of Test for Air Ducts.

.32 ULC-S112: CAN/ULC-S112-2010 (R2021) Standard Method of Fire Test of Fire-Damper Assemblies.
.33 ULC-S505: CAN/ULC-S505-2015 Fusible Links for Fire Protection Service.

1.2 DEFINITIONS

.1 "ducting": Generally refers to the service for distribution of air, including joints, turning vanes, transitions, flanges, hangers, insulation mounts, and other accessories making up a duct section or sections.
.2 "ductwork": Same as "ducting".
.3 Additional definitions to SMACNA.

1.3 SUBMITTALS FOR ACTION

.1 Product Aspects
  .1 Existing Products Modification Data
  .2 Existing Products Refurbished Data
  .3 Product Characteristics Data
  .4 Product Schedule Data
.2 Service Aspects
  .1 Service Sizing Plans

1.4 SUBMITTALS FOR INFORMATION

.1 Product Aspects
  .1 Product Fabrication Data
  .2 Product Factory Testing Data
  .3 Product Certification Documentation Data
  .4 Product Mounting Plans
.2 Service Aspects
  .1 Service Routing Plans
  .2 Service Components Plans
  .3 Service Mounting Plans
.3 System Aspects
  .1 System Layout Plans
  .2 System Interlocks and Interfaces Plans
  .3 System Field Documentation Plans
.4 Product Application
  .1 Product Application Plans Certificate Letter
  .2 Product Installation Information
.5 Service Application
  .1 Service Installation Plans Certificate Letter
  .2 Service Installation Information
.6 System Application
  .1 System Testing Plans
  .2 System Examination Results
  .3 System Preparation Tests Results
  .4 System Mounting and Supports Completed Certificate Letter
  .5 System Verification Results
  .6 System Documentation

1.5 SUBMITTALS FOR CLOSEOUT

.1 Product Application
  .1 Product Start-up Forms and Certificate Letter
  .2 Product Installation Completed Certificate Letter
  .3 Product Operation Information
  .4 Product Maintenance Information
  .5 Product Spare Parts and Materials
.2 Service Application

.1 Service Start-up Forms
.2 Service Installation Completed Certificate Letter
.3 System Application
.1 System Tools and Access
.2 System Operation Information
.3 System Maintenance Information
.4 Project Application
.1 Salvaged Components Information
.2 Disposal Records

1.6 QUALIFICATIONS

.1 Ducting
.1 Company member of and in good standing with SMACNA and OSMCA.
.2 Noise and Vibration
.1 Company certified to NEBB, with its personnel sound and vibration certified professionals by NEBB and employed by company.
.3 Welding
.1 General: Company certified by CWB to CSA-W55.3.
.2 Aluminum: Company and personnel certified by CWB to CSA-W47.2 and CSA-W59.2, with personnel employed by company.
.3 Steel: Company and personnel certified by CWB to CSA-W47.1 and CSA-W59, with personnel employed by company.

PART 2 PRODUCTS

2.1 CHARACTERISTICS

.1 Provide products as required, and additionally to the following.
.1 Features
.1 Dimensions
.1 Indicated duct dimensions are clear inside dimensions. Adjust duct sizes to accommodate liners and other obstructions.
.2 Otherwise provide duct dimensions as required.
.2 Types
.1 Round Ducting: Spiral duct.
.2 Rectangular Ducting: As required.
.3 Ratings
.1 To ASHRAE-HBF, ASHRAE-HBA, ASHRAE-HBS.
.2 To SMACNA standards.
.3 To ULC-S110 Class 1.
.4 Pressure and Leakage: Greater of the following unless other indicated:
.1 Applications
.1 Interior Mains: To SMACNA-006 and SMACNA-016 Duct Class 2.5-kPa (10-inWC) and Seal Class A.
.2 Interior Supply in Occupied Zones: To SMACNA-006 and SMACNA-016 Duct Class 1.5-kPa (6-inWC) and Seal Class A.
.3 Interior Return in Occupied Zones: To SMACNA-006 and SMACNA-016 Duct Class 0.75-kPa (3-inWC) and Seal Class B.
.4 Interior Combustion Air in Same Zone as Appliance: To SMACNA-006 and SMACNA-016 Duct Class 0.75-kPa (3-inWC) and Seal Class B.
.5 Exterior: To SMACNA-006 and SMACNA-016 Duct Class 2.5-kPa (10-inWC) and Seal Class A.
.6 Other: To SMACNA-006 and SMACNA-016 Duct Class 2.5-kPa (10-inWC) and Seal Class A.
.2 Indicated ratings are for both positive and negative ranges unless otherwise stated.

2.2 DUCTING MATERIALS

.1 Provide as required.
.2 Materials: Provide the following unless otherwise indicated.
  .1 Buried Ducting: Galvanized steel with non-combustible corrosion protection coating on inside and outside.
  .2 Uninsulated Unpainted Exterior Ducting: Stainless steel 304 to ASTM-A480.
  .3 Unpainted Ducting: Galvanized steel with Z275 (G90) zinc coating to ASTM-A653, unless otherwise indicated.
  .4 Painted Ducting: Galvanized steel with ZF75 (A25) zinc coating to ASTM-A653, unless otherwise indicated.

2.3 FITTINGS

.1 Provide as required.
.2 Materials
  .1 1 gauge heavier than duct thickness of adjacent duct.
.3 Types
  .1 Joints and Seams
    .1 Including ducting transverse and longitudinal joints and seams, fittings joints and seams.
    .2 Provide Pittsburgh Lock joints and seams unless otherwise required, tightly closed along full length of seam.
  .2 Elbows
    .1 Radius Elbows: Provide smooth radius elbows as indicated, including as suitable for layouts and free space.
      .1 Radius: Inner radius equal to greater of elbow width or 1.5-times duct diameter unless otherwise indicated.
      .2 Rectangular: Sectional piece construction may be used for systems at or below 152-m/min (500-ft/min) average velocity.
        .1 90-° Elbows: 5-piece construction.
        .2 45-° Elbows: 3-piece construction.
    .2 Mitred Elbows: Provide mitred elbows as indicated, or as required including in locations with restricted free space.
      .1 Provide air turning vanes as required.

2.4 TURNING VANES

.1 Provide as required.
.2 Applications: At elbows without smooth radius and for systems above 152-m/min (500-ft/min) average velocity and 305-mm (12-in) or larger.
.3 Options: Provide the following.
  .1 Sizes
    .1 S·4·D: Double wall, with 114-mm (4.5-in) inner wall radius from corner, 57-mm (2.25-in) outer wall radius.
      .1 Blades minimum 24-ga metal weight.
      .2 Mounting rail with 83-mm (3.25-in) spacing between each vane.
      .3 Rail minimum 22-ga metal weight.
.4 Options: Provide selections from each of the following available characteristic types as most suitable for each application.
  .1 Materials
    .1 M·AL: Aluminum.
    .2 M·GA: Galvannealed.
    .3 M·GS: Galvanized steel with Z183 (G60) zinc coating to ASTM-A653.
    .4 M·SS: Stainless steel 304 to ASTM-A480.
.5 Options: Other characteristics that are available but not furnished.
  .1 Sizes

.1 S·2·S: Single wall, with 51-mm (2-in) inner wall radius from corner.
.1 With trailing edge.
.2 S·2·D: Double wall, with 51-mm (2-in) inner wall radius from corner, 25-mm (1-in) outer wall radius.
.1 Minimum 26-ga metal weight.
.2 Mounting rail with 38-mm (1.5-in) spacing between each vane.
.3 Rail minimum 22-ga metal weight.
.3 S·4·S: Single wall, with 114-mm (4.5-in) inner wall radius from corner.
.1 With trailing edge.
.2 Materials
.1 M·BI: Black iron.
.2 M·PVC: PVC coated.
.6 Ratings
.1 Pressure: Rail pressure tested to minimum 3.73-kPa (15-inWC).
.7 Certifications
.1 To SMACNA-006.
.8 Manufacturers
.1 Ductmate Industries, a DMI Companies, Inc. brand, Turning Vane Series, or approved equivalent

2.5 DAMPERS - BACKDRAFT - RECTANGULAR

.1 Provide as required.
.2 Features
.1 Suitable for horizontal mounting with airflow in up direction, and non-horizontal installation.
.2 Parallel blade action.
.3 Blade orientation horizontal where damper mounted not horizontally.
.4 Duty weight of damper as indicated, otherwise where not indicated select frame type for required duty and to minimize airflow restriction.
.5 Linkage hardware mounted on frame side out of airstream.
.6 Design
.1 Frames: Duct mounting flanges on both sides of entire frame.
.2 Blade and Frame Seals: Secured in integral slots and mechanically fastened to prevent shrinkage and movement over life of damper.
.3 Linkages: Cup-point trunnion screws to prevent linkage slippage.
.4 Bearings: Designed to eliminate action between metal-to-metal or metal-to-plastic riding surfaces. Dual bearing system composed of an inner bearing fixed around hexagon blade pivot pin, rotating within an outer bearing inserted in the frame.
.7 Data available on velocity vs. pressure drop, size vs. face velocity, size vs. pressure.
.3 Materials
.1 Frame Seals: Extruded silicone.
.2 Blade Seals: Extruded silicone.
.4 Type: Medium Duty
.1 Features
.1 Frames
.1 Depth: 63-mm (2.5-in).
.2 Material Thickness: Minimum 1.52-mm (0.060-in) thick.
.2 Blades
.1 Depth: 125-mm (5-in).
.2 Material Thickness: Minimum 1.52-mm (0.060-in) thick.
.2 Options: Provide the following.
.1 Mount
.1 M·FF
.2 Balance

.1 B·CWA
.3 Temperature and Resistance
.1 T·ST, R·MR
.3 Options: Other characteristics that are available but not furnished.
.1 Mount
.1 M·ID
.2 M·FR
.2 Balance
.1 B·S
.2 B·WA
.3 Temperature and Resistance
.1 T·ST, R·SR
.2 T·ST, R·SWR
.4 Ratings
.1 Pressure: Upper suitable limit minimum to 1.49-kPa (6-inWC) at 300-mm (12-in) blade length, to 1.00-kPa (4-inWC) at 914-mm (36-in), linearly scaled in between.
.2 Velocity: Upper suitable limit minimum to 17.8-m/s (3,500-ft/min) at 300-mm (12-in) blade length, to 12.7-m/s (2,500-ft/min) at 914-mm (36-in), linearly scaled in between.
.5 Options: Provide from the following available characteristics where indicated.
.1 Mount
.1 M·ID: In-duct. For low velocity systems.
.1 Features
.1 16-mm (0.625-in) flange on both sides.
.2 Flange fully within duct.
.2 M·FF: Front flange. For non-ducted openings.
.1 Features
.1 48-mm (1.825-in) extended flange on front side.
.2 16-mm (0.625-in) flange on rear side.
.3 M·FR: Rear flange. For non-ducted openings.
.1 Features
.1 48-mm (1.825-in) extended flange on rear side.
.2 16-mm (0.625-in) flange on front side.
.4 M·FER: Heavy duty extended rear flange.
.1 Features
.1 51-mm (2-in) total, with 25-mm (1-in) covered flange both sides, and 25-mm (1-in) extended flange on rear.
.2 Balance
.1 B·S: Standard balanced.
.1 Ratings
.1 Leakage
.1 Maximum 35.20-L/s/m2 (6.93-ft3/min/ft2) at 0.25-kPa (1-inWC) differential static pressure for dampers at 610-mm x 610-mm (24-in x 24-in) or greater in size.
.2 Maximum 57.81-L/s/m2 (11.38-ft3/min/ft2) at 0.25-kPa (1-inWC) differential static pressure for dampers at less than 610-mm x 610-mm (24-in x 24-in) in size.
.3 Certified to AMCA-500-D.
.2 B·WA: Weighted and adjustable.
.1 Features
.1 Counterbalance weights mounted on front of each blade, fully adjustable.
.2 Materials
.1 Weights: 6061-T6 aluminum to ASTM-B211.

.3 Ratings
.1 Differential Pressure: Adjustable to resist air pressure differentials up to 20-Pa (0.08-inWC).
.2 Leakage: Maximum 21.95-L/s/m2 (4.32-ft3/min/ft2) at 0.25-kPa (1-inWC) differential static pressure for dampers at 610-mm x 610-mm (24-in x 24-in).

.3 B·CWA: Counter-weighted and adjustable.
.1 Features
.1 Counterbalance weights mounted on rear of each blade, fully adjustable.
.2 Additionally suitable for airflow in down direction.
.2 Materials
.1 Weights: 6061-T6 aluminum to ASTM-B211.
.3 Ratings
.1 Differential Pressure: Adjustable to relieve air pressure differentials down to 3-Pa (0.01-inWC).
.2 Leakage: Maximum 21.95-L/s/m2 (4.32-ft3/min/ft2) at 0.25-kPa (1-inWC) differential static pressure for dampers at 610-mm x 610-mm (24-in x 24-in).

.4 B·CW: Counter-weighted.
.1 Features
.1 Counterbalance weights mounted on rear of each blade.
.2 Additionally suitable for airflow in down direction.
.2 Materials
.1 Weights: 6061-T6 aluminum to ASTM-B211.
.3 Ratings
.1 Differential Pressure: Relieve air pressure differentials up to 12-Pa (0.05-inWC).

.3 Temperature
.1 T·ST: Standard temperature.
.1 Materials
.1 Main Bearings: POM inner bearing, polycarbonate outer bearing.
.2 Linkage Bearings: POM inner bearing, polycarbonate outer bearing.
.2 Ratings: Temperature: -40-°C to 100-°C (-40-°F to 212-°F).

.2 T·HT: High temperature.
.1 Materials
.1 Main Bearings: Self lubricated inner and outer bearings, bronze alloy impregnated with turbine oil and fine particles of PTFE.
.2 Linkage Bearings: Self lubricated trunnion bearings, bronze alloy impregnated with turbine oil and fine particles of PTFE.
.2 Ratings: Temperature: -40-°C to 149-°C (-40-°F to 300-°F).

.4 Resistance
.1 R·SR: Standard resistance.
.1 Materials
.1 Frames: Extruded aluminum 6063-T5 to ASTM-B221.
.2 Blades: Extruded aluminum 6063-T5 to ASTM-B221.
.3 Frame Mounting Fasteners: Zinc-plated steel.
.4 Linkage Hardware: 6005-T6 aluminum to ASTM-B211 for crank arms. Aluminum pivot rods. 6065-T6 aluminum to ASTM-B211 for linkage rods.
.5 Trunnion Fasteners: Zinc-plated steel screws.

.2 R·MR: Moisture resistance.
.1 Materials
.1 Frames: Extruded aluminum 6063-T5 to ASTM-B221.

.2 Blades: Extruded aluminum 6063-T5 to ASTM-B221.
.3 Frame Mounting Fasteners: Stainless steel.
.4 Linkage Hardware: 6005-T6 aluminum to ASTM-B211 for crank arms. Stainless steel pivot rods. Stainless steel linkage rods.
.5 Trunnion Fasteners: Stainless steel screws.

.3 R·SWR: Salt water resistance.
.1 Materials
.1 Frames: Clear anodized aluminum to minimum thickness of 18-µm (0.7-in/1,000) deep.
.2 Blades: Clear anodized aluminum to minimum thickness of 18-µm (0.7-in/1,000) deep.
.3 Frame Mounting Fasteners: Stainless steel.
.4 Linkage Hardware: Clear anodized 6005-T6 aluminum to ASTM-B211 for crank arms. Stainless steel pivot rods. Stainless steel linkage rods.
.5 Trunnion Fasteners: Stainless steel screws.

.6 Certifications
.1 To AMCA-511.

.7 Manufacturers
.1 Tamco Dampers, a brand of SPX Technologies, Inc., 7000/7600 Series, or approved equivalent

2.6 DAMPERS - CONTROL - RECTANGULAR

.1 Provide as required.

.2 Features
.1 Linkage hardware mounted on frame side out of airstream.
.2 Design
.1 Frames: Duct mounting flanges on both sides of entire frame.
.2 Blade and Frame Seals: Secured in integral slots and mechanically fastened to prevent shrinkage and movement over life of damper.
.3 Linkages: Cup-point trunnion screws to prevent linkage slippage.
.4 Bearings: Designed to eliminate action between metal-to-metal or metal-to-plastic riding surfaces. Dual bearing system composed of an inner bearing fixed around hexagon blade pivot pin, rotating within an outer bearing inserted in the frame.
.3 Data available on velocity vs. pressure drop, size vs. face velocity, size vs. pressure.
.4 Options: Provide the following.
.1 Profile: P·S
.1 Mount
.1 M·FD
.2 Temperature and Resistance
.1 T·ST, R·MR

.5 Options: Other characteristics that are available but not furnished.
.1 Profile: P·S
.1 Mount
.1 M·ID
.2 M·FER
.3 M·SRT
.4 M·SRT+R
.2 Profile: P·N
.1 Mount
.1 M·FD
.2 M·ID
.3 M·FER
.4 M·SRT
.5 M·SRT+R

.2 Ratings
.1 Leakage: Maximum 11.9-L/s/m2 (2.35-ft3/min/ft2) at 0.25-kPa (1-inWC) differential static pressure for dampers at 915-mm x 915-mm (36-in x 36-in).
.3 Profile: P·W
.1 Mount
.1 M·FD
.2 Ratings
.1 Leakage: Maximum 9.9-L/s/m2 (1.95-ft3/min/ft2) at 0.25-kPa (1-inWC) differential static pressure for dampers at 610-mm x 610-mm (24-in x 24-in).
.4 Temperature and Resistance
.1 T·ST, R·SR
.2 T·ST, R·SWR
.3 T·HT, R·SR
.3 Type: Thermally Broken Blades and Thermally Broken Frames
.1 Features
.1 Frame: Entire frame is thermally broken with polyurethane resin pockets and thermal cuts.
.2 Blade Insulation: Internally insulated with expanded polyurethane foam and thermally broken, with complete blade insulating factor of 0.4-m2·°C/W RSI-value (2.29-h·ft2·°F/(BTU·in) R-value).
.2 Options: Provide the following.
.1 Profile P·S
.2 Mount
.1 M·FD
.3 Temperature and Resistance
.1 T·ST, R·MR
.3 Options: Other characteristics that are available but not furnished.
.1 Profile: P·N
.1 Ratings
.1 Leakage: Maximum 5.4-L/s/m2 (1.07-ft3/min/ft2) at 0.25-kPa (1-inWC) differential static pressure for dampers at 1,220-mm x 915-mm (48-in x 36-in).
.2 Mount
.1 M·ID
.2 M·FER
.3 M·SRT
.4 M·SRT+R
.3 Temperature and Resistance
.1 T·ST, R·SR
.2 T·ST, R·SWR
.3 T·ELT, R·SR
.4 Options: Provide from the following available characteristics where indicated.
.1 Blade Action
.1 B·O: Opposed blade for modulating control dampers.
.2 B·P: Parallel blade for on/off control dampers.
.2 Profile
.1 P·S: Standard profile.
.1 Features
.1 Frame: 100-mm (4-in) depth.
.2 Blades: 152-mm (6-in) depth.
.2 Ratings

.1 Pressure: Upper suitable limit minimum to 2.99-kPa (12-inWC) at 300-mm (12-in) blade length, to 0.75-kPa (3-inWC) at 1.524-m (60-in), linearly scaled in between.
.2 Leakage
.1 Meets or exceeds leakage class 1A with maximum 15.2-L/s/m2 (3.0-ft3/min/ft2) at 0.25-kPa (1.0-inWC) differential static pressure.
.2 Meets or exceeds leakage class 1 with maximum 40.6-L/s/m2 (8.0-ft3/min/ft2) at 1.0-kPa (4.0-inWC) differential static pressure.

.2 P·N: Narrow profile.
.1 Features
.1 Frame: 102-mm (4-in) depth.
.2 Blades: 112-mm (4.4-in) depth.
.2 Ratings
.1 Pressure: Upper suitable limit minimum to 2.49-kPa (10-inWC) at 300-mm (12-in) blade length, to 0.37-kPa (1.5-inWC) at 1.524-m (60-in), linearly scaled in between.

.3 P·W: Wide profile.
.1 Features
.1 Frame: 163-mm (6.4-in) depth.
.2 Blades: 165-mm (6.5-in) depth.
.2 Ratings
.1 Pressure: Upper suitable limit minimum to 2.99-kPa (12-inWC) at 300-mm (12-in) blade length, to 0.75-kPa (3-inWC) at 1.524-m (60-in), linearly scaled in between.

.3 Mount
.1 M·FD: Flanged to duct. For non-low velocity systems.
.1 Features
.1 25-mm (1-in) extended flange on both sides.
.2 Flange external to duct.

.2 M·ID: In-duct. For low velocity systems.
.1 Features
.1 25-mm (1-in) extended flange on both sides.
.2 Flange fully within duct.

.3 M·FER: Extended rear flange. For non-ducted openings.
.1 Features
.1 51-mm (2-in) total, with 25-mm (1-in) covered flange both sides, and 25-mm (1-in) extended flange on rear.

.4 M·SRT: Square to round duct transition. For square or rectangular dampers onto round duct.
.1 Features
.1 Suitable for 100-mm.dia to 1.47-m.dia (4-in.dia to 58-in.dia) round ducts.
.2 Round duct fittings available in standard sizes, and 6.35-mm.dia (0.25-in.dia) less than connecting duct.
.2 Materials
.1 304 stainless steel transition and damper blank fittings.

.5 M·RDT+R: Square to round duct transition combined with R·MR or R·SW options. For square or rectangular dampers onto round duct.
.1 Features
.1 Suitable for 100-mm.dia to 1.47-m.dia (4-in.dia to 58-in.dia) round ducts.
.2 Round duct fittings available in standard sizes, and 6.35-mm.dia (0.25-in.dia) less than connecting duct.

.2 Materials
.1 304 stainless steel transition and damper blank fittings.
.4 Temperature
.1 T·ST: Standard temperature.
.1 Materials
.1 Frame Seals: Extruded EPDM.
.2 Blade Seals: Extruded EPDM.
.3 Main Bearings: POM inner bearing, polycarbonate outer bearing.
.4 Linkage Bearings: POM inner bearing, polycarbonate outer bearing.
.2 Ratings
.1 Temperature: -40-°C to 100-°C (-40-°F to 212-°F).
.2 T·HT: High temperature.
.1 Materials
.1 Frame Seals: Extruded silicone.
.2 Blade Seals: Extruded silicone.
.3 Main Bearings: Self lubricated inner and outer bearings, bronze alloy impregnated with turbine oil and fine particles of PTFE.
.4 Linkage Bearings: Self lubricated trunnion bearings, bronze alloy impregnated with turbine oil and fine particles of PTFE.
.2 Ratings
.1 Temperature: -40-°C to 149-°C (-40-°F to 300-°F).
.3 T·LT: Low temperature.
.1 Materials
.1 Frame Seals: Extruded silicone.
.2 Blade Seals: Extruded silicone.
.3 Main Bearings: POM inner bearing, polycarbonate outer bearing.
.4 Linkage Bearings: POM inner bearing, polycarbonate outer bearing.
.2 Ratings
.1 Temperature: -40-°C to 149-°C (-40-°F to 300-°F).
.4 T·ELT: Extreme low temperature.
.1 Materials
.1 Frame Seals: Extruded silicone.
.2 Blade Seals: Extruded silicone.
.3 Main Bearings: POM inner bearing, polycarbonate outer bearing.
.4 Linkage Bearings: POM inner bearing, polycarbonate outer bearing.
.2 Ratings
.1 Temperature: -73-°C (-100-°F) to 100-°C (212-°F)
.5 Resistance
.1 R·SR: Standard resistance.
.1 Materials
.1 Frames: Extruded aluminum 6063-T5 to ASTM-B221.
.2 Blades: Extruded aluminum 6063-T5 to ASTM-B221.
.3 Frame Mounting Fasteners: Zinc-plated steel.
.4 Linkage Hardware: 6005-T6 aluminum to ASTM-B211 for crank arms. Aluminum pivot rods. 6065-T6 aluminum to ASTM-B211 for linkage rods.
.5 Trunnion Fasteners: Zinc-plated steel screws.
.2 R·MR: Moisture resistance.
.1 Materials
.1 Frames: Extruded aluminum 6063-T5 to ASTM-B221.
.2 Blades: Extruded aluminum 6063-T5 to ASTM-B221.
.3 Frame Mounting Fasteners: Stainless steel.

.4 Linkage Hardware: 6005-T6 aluminum to ASTM-B211 for crank arms. Stainless steel pivot rods. Stainless steel linkage rods.
.5 Trunnion Fasteners: Stainless steel screws.
.3 R-SWR: Salt water resistance.
.1 Materials
.1 Frames: Clear anodized aluminum to minimum thickness of 18-µm (0.7-in/1,000) deep.
.2 Blades: Clear anodized aluminum to minimum thickness of 18-µm (0.7-in/1,000) deep.
.3 Frame Mounting Fasteners: Stainless steel.
.4 Linkage Hardware: Clear anodized 6005-T6 aluminum to ASTM-B211 for crank arms. Stainless steel pivot rods. Stainless steel linkage rods.
.5 Trunnion Fasteners: Stainless steel screws.
.5 Certifications
.1 To AMCA-500-D.
.2 To AMCA-511.
.6 Manufacturers
.1 Tamco Dampers, a brand of SPX Technologies, Inc., 1000/1500/9000/9000BF Series, or approved equivalent

2.7 DAMPERS - FIRE

.1 Provide as required.
.2 Locations: As required, through separations, including in ducting.
.3 Features
.1 Suitable for various separations, including gypsum board.
.2 Available with performance data for any size, including free area, pressure drops.
.3 Available with detailed guides on maintenance, testing, and inspection recommendations.
.4 Type: Dynamic - Type A - Rectangular
.1 Locations: Where flow is less than 381-m/min (1,250-ft/min) average velocity, and where duct size is greater than 305-mm (12-in).
.2 Features
.1 Curtain type interlocking blades fire damper with closure spring.
.2 Type A to UL-555.
.3 Suitable for mounting vertically, horizontally.
.3 Materials
.1 Frame: Roll formed galvanized steel.
.2 Blades: Roll formed galvanized steel.
.3 Springs: Stainless steel.
.4 Options: Provide selections from each of the following available characteristic types as most suitable for each application.
.1 Ratings
.1 1.5-h rating to UL-555.
.2 3-h rating to UL-555.
.2 Sizes
.1 Vertical: From 152-mm x 152-mm (6-in x 6-in), up to 914-mm x 914-mm (36-in x 36-in) with a single section, and up to 1,828-mm wide x 914-mm high (72-in x 36-in) with multiple sections.
.2 Horizontal: From 152-mm x 152-mm (6-in x 6-in), up to 610-mm x 610-mm (24-in x 24-in) with a single section, and up to 914-mm x 914-mm (36-in x 36-in) with multiple sections.
.3 Action and Temperature
.1 Vertical: Either:
.1 Fusible link closure temperature ratings of minimum to 74-°C (165-°F).

.2 Fusible link closure temperature ratings of minimum to 100-°C (212-°F).
.2 Horizontal: Fusible link closure temperature ratings of minimum to 74-°C (165-°F).
.5 Options: Other characteristics that are available but not furnished.
.1 Sleeve
.1 Various lengths available.
.2 Various weights available in 20/18/16/14/10-ga.
.6 Ratings
.1 Free Area
.1 78-% at 305-mm x 305-mm (12-in x 12-in).
.2 83-% at 508-mm x 508-mm (20-in x 20-in).
.3 86-% at 762-mm x 762-mm (30-in x 30-in).
.2 Pressure Drop
.1 3.7-Pa (0.015-inWC) at 244-m/min (800-ft/min).
.2 5.0-Pa (0.02-inWC) at 274-m/min (1,000-ft/min).
.3 22.4-Pa (0.09-inWC) at 610-m/min (2,000-ft/min).
.4 47.3-Pa (0.19-inWC) at 915-m/min (3,000-ft/min).
.7 Certifications
.1 To UL-555, ULC-S112, ULC-S505.
.2 cULus listed.
.3 To NFPA-90A.
.8 Manufacturers
.1 Price Industries Limited, FDD-A-SL Series, or approved equivalent
.5 Type: Dynamic - Type B - Rectangular
.1 Locations: Where flow is less than 381-m/min (1,250-ft/min) average velocity, and where duct size is 305-mm (12-in) or less.
.2 Features
.1 Curtain type interlocking blades fire damper with closure spring.
.2 Type B to UL-555, with curtain recessed out of flow, with additional frame around curtain portion, and 2 flanges.
.3 Suitable for mounting vertically, horizontally.
.3 Materials
.1 Frame: Roll formed galvanized steel.
.2 Blades: Roll formed galvanized steel.
.3 Springs: Stainless steel.
.4 Options: Provide selections from each of the following available characteristic types as most suitable for each application.
.1 Ratings
.1 1.5-h rating to UL-555.
.2 3-h rating to UL-555.
.2 Sizes
.1 Vertical: From 152-mm x 102-mm (6-in x 4-in), up to 914-mm wide x 813-mm high (36-in x 32-in) with a single section, and up to 1,828-mm wide x 813-mm high (72-in x 32-in) with multiple sections.
.2 Horizontal: From 152-mm x 102-mm (6-in x 4-in), up to 610-mm wide x 533-mm high (24-in x 21-in) with a single section, and up to 914-mm x 813-mm (36-in x 32-in) with multiple sections.
.3 Action and Temperature
.1 Vertical: Either:
.1 Fusible link closure temperature ratings of minimum to 74-°C (165-°F).
.2 Fusible link closure temperature ratings of minimum to 100-°C (212-°F).
.2 Horizontal: Fusible link closure temperature ratings of minimum to 74-°C (165-°F).

.5 Options: Other characteristics that are available but not furnished.
.1 Sleeve
.1 Various lengths available.
.2 Various weights available in 20/18/16/14/10-ga.
.6 Ratings
.1 Free Area
.1 88-% at 305-mm x 305-mm (12-in x 12-in).
.2 92-% at 508-mm x 508-mm (20-in x 20-in).
.3 95-% at 762-mm x 762-mm (30-in x 30-in).
.2 Pressure Drop
.1 2.5-Pa (0.010-inWC) at 305-m/min (1,000-ft/min).
.2 13.4-Pa (0.054-inWC) at 610-m/min (2,000-ft/min).
.3 37.3-Pa (0.15-inWC) at 915-m/min (3,000-ft/min).
.7 Certifications
.1 To UL-555, ULC-S112, ULC-S505.
.2 cULus listed.
.3 To NFPA-90A.
.8 Manufacturers
.1 Price Industries Limited, FDD-B-SL Series, or approved equivalent
.6 Type: Dynamic - Type C - Various Shapes
.1 Locations: Based on shapes, or where flow is above 381-m/min (1,250-ft/min) average velocity.
.2 Features
.1 Curtain type interlocking blades fire damper with closure spring.
.2 Type C to UL-555, with curtain recessed out of flow, with additional frame around ducted portion and curtain portion.
.3 Suitable for mounting vertically, horizontally.
.3 Materials
.1 Frame: Roll formed galvanized steel.
.2 Blades: Roll formed galvanized steel.
.3 Springs: Stainless steel.
.4 Options: Provide selections from each of the following available characteristic types as most suitable for each application.
.1 Ratings
.1 1.5-h rating to UL-555.
.2 3-h rating to UL-555.
.2 Sizes
.1 Vertical: From 127-mm wide x 76-mm high (5-in x 3-in), up to 889-mm wide x 813-mm high (35-in x 32-in) with a single section, and up to 1,803-mm wide x 813-mm high (71-in x 32-in) with multiple sections.
.2 Horizontal: From 127-mm wide x 76-mm high (5-in x 3-in), up to 584-mm wide x 508-mm high (23-in x 20-in) with a single section, and up to 889-mm wide x 813-mm high (35-in x 32-in) with multiple sections.
.3 Action
.1 Vertical: Either:
.1 Fusible link closure temperature ratings of minimum to 74-°C (165-°F).
.2 Fusible link closure temperature ratings of minimum to 100-°C (212-°F).
.2 Horizontal: Fusible link closure temperature ratings of minimum to 74-°C (165-°F).
.5 Options: Other characteristics that are available but not furnished.
.1 Sleeve
.1 Various lengths available.
.2 Various weights available in 18/16/14/10-ga.

.6 Ratings
.1 Free Area: 100-%.
.2 Pressure Drop
.1 4.2-Pa (0.017-inWC) at 305-m/min (1,000-ft/min).
.2 10.5-Pa (0.042-inWC) at 610-m/min (2,000-ft/min).
.3 18.4-Pa (0.074-inWC) at 915-m/min (3,000-ft/min).
.7 Certifications
.1 To UL-555, ULC-S112, ULC-S505.
.2 cULus listed.
.3 To NFPA-90A.
.8 Manufacturers
.1 Price Industries Limited, FDD-C/FDD-C-S Series, or approved equivalent

2.8 DAMPERS - BALANCING

.1 Provide as required.
.2 To control dampers in this Section. Additionally or alternatively, provide the following.
.1 With manual locking mechanism to this Section instead of control actuator.
.2 Suitable for addition of control actuator.
.3 Substitution Limitations
.1 Characteristics Review Waived: Specific characteristics are acceptable without additional review as follows:
.1 Suitable balancing dampers provided with other components, including diffusers, grilles.

2.9 ACCESS DOORS

.1 Provide as required.
.2 Type: Duct Service Access
.1 Applications: In ducting for servicing, inspections, maintenance.
.2 Features
.1 Double walled insulated door.
.2 14-ga door frame.
.3 24-ga door panels.
.3 Options: Provide selections from each of the following available characteristic types as most suitable for each application.
.1 Ratings
.1 P·4: 1.1-kPa (4.5-inWC) pressure rated.
.2 P·10: 2.5-kPa (10-inWC) pressure rated.
.2 Sizes
.1 Standard sizes from 152-mm x 152-mm (6-in x 6-in) up to 914-mm x 914-mm (36-in x 36-in).
.2 Custom sizes.
.3 Materials
.1 M·AL: Aluminum.
.2 M·GS: Galvanized steel.
.3 M·SS304: 304 stainless steel.
.4 M·SS316: 316 stainless steel.
.4 Insulation: Match insulation to that of service.
.1 I·1: 25-mm (1-in) thick fiberglass insulation.
.5 Mounts
.1 Round duct adapter suitable for flat door.
.2 Oval duct adapter suitable for flat door.
.6 Latches
.1 L·C: Cam latches.
.1 Applications: For access doors maximum 508-mm (20-in) in any dimension.

.2 Options: Provide selections from each of the following available characteristic types as most suitable for each application.
.1 Chain.
.2 L·HC: Piano hinge and cam latches.
.1 Applications: For access doors at or above 508-mm (20-in) in any dimension.
.2 Options: Provide selections from each of the following available characteristic types as most suitable for each application.
.1 Lock, cylinder cam.
.2 Padlock hasp.
.3 Padlock eyes.
.3 L·HL: Piano hinge and lever handles.
.4 Options: Other characteristics that are available but not furnished.
.1 View Ports
.1 A·VP·A: Acrylic view port.
.2 A·VP·PC: Polycarbonate view port.
.3 A·VP·G: Laminated safety glass view port.
.5 Manufacturers
.1 Kees Incorporated, ADH/ADC Duct Access Doors Series, or approved equivalent
.3 Options: Provide the following.
.1 Gaskets
.1 To joint and opening gaskets in this Section.
.4 Options: Other characteristics that are available but not furnished.
.1 Gaskets
.1 Neoprene. To UL-94 V-0.

2.10 ACCESSORIES

.1 Provide as required.
.2 Joint and Opening Gaskets
.1 Applications: For ducting flanges, ducting component flanges, openings.
.2 Features
.1 Dimensions of 4.8-mm (0.188-in) thick and 16-mm (0.625-in) wide.
.2 Suitable for a moisture and vapour tight seal.
.3 Grey colour.
.4 Paintable.
.3 Materials
.1 Non-drying synthetic polymer.
.2 Permanently soft caulking compound.
.3 Non-corrosive.
.4 Ratings
.1 Service Temperature: -40-°C to 121-°C (-40-°F to 249-°F).
.2 Application Temperature: -18-°C to 38-°C (0-°F to 100-°F).
.3 Adhesive Tensile Strength: Minimum 69-kPa (10-psi).
.4 Specific Gravity: 1.45-g/cm3 (90.5-lb/ft3).
.5 Flexibility: Flexible down to -29-°C (-20-°F).
.6 Resistance: Excellent resistance to water, alcohol, mild acids, mild bases.
.5 Certifications
.1 Surface Burning: Flame spread maximum 5 and smoke developed maximum 5 to ASTM-E84, UL-723.
.2 To DOD-MIL-DTL-18255.
.3 FDA approved.
.4 USDA acceptable.
.6 Manufacturers
.1 Duro-Dyne Canada Inc., BTL500 Series, or approved equivalent

.3 Joint Sealants
.1 Applications: For rigid and flexible ducting sealing.
.2 Type: Standard
.1 Applications: Where Work progression does not require use of no odour joint sealants, including use of indoor air quality management methods.
.2 Features
.1 Tough and flexible sealant and adhesive.
.2 Suitable for indoor and outdoor.
.3 Suitable for low and medium and high velocity systems.
.4 Suitable for insulation sealing, including rigid boards.
.5 Suitable for insulation jacket sealing, including ASJ, FSK.
.6 Suitable for application with brush, trowel, glove, power extrusion, caulking gun.
.7 Grey colour.
.8 Mild odour when wet.
.3 Materials
.1 Water based.
.2 Non-fibrated.
.4 Tests
.1 Weight: 1.4-kg/L (11.7-lb/USgal) to ASTM-D1475.
.2 VOC
.1 Average non-volatile minimum 56-% by weight and 70-% by volume to ASTM-D2369.
.2 Volatile content maximum 24-g/L (0.24-lb/USgal).
.3 Fungal resistance: No fungal growth on surface to ASTM-G21 Rating 0.
.4 Hardness: Shore hardness measurement of 72 durometer to ASTM-D2240 Shore A Method.
.5 Pressure and Leakage: Meets SMACNA-006 and SMACNA-016 Duct Class 2.73-kPa (15-inWC) and Seal Classes A, B, C.
.5 Ratings
.1 Service Temperature: -7-°C to 93-°C (20-°F to 200-°F).
.2 Adhesion
.1 Adheres to various vapour barriers, jackets, insulation materials.
.2 Adheres to most substrates commonly found in construction, including aluminum, galvanized steel, stainless steel.
.3 Drying Time: At 23-°C (73-°F) and 50-%RH.
.1 To Touch: Maximum 1-h.
.2 To Cure: Maximum 16-h.
.4 Flash Point: No flash to boiling at 99-°C (210-°F).
.5 Resistance: UV resistant.
.6 Certifications
.1 Surface Burning: Flame spread maximum 0 and smoke developed maximum 0 to ASTM-E84.
.2 To UL-181.
.3 To NFPA-90A.
.4 To NFPA-90B.
.7 Manufacturers
.1 Foster, a brand of H.B. Fuller Construction Products Inc., DUCT-FAS Duct Sealant Series, or approved equivalent
.3 Type: No Odour
.1 Applications: Where Work progression requires no odour due to occupied spaces, and where accepted by Owner and Engineer including if it is accepted where

indoor air quality management methods are impractical, and where accepted by AHJ.

.2 Features
.1 Tough and flexible sealant and adhesive.
.2 Suitable for indoor and outdoor.
.3 Suitable for low and medium and high velocity systems.
.4 Suitable for insulation sealing, including rigid boards.
.5 Suitable for insulation jacket sealing, including ASJ, FSK.
.6 Suitable for application with brush, trowel, glove, power extrusion.

.3 Materials
.1 Water based.
.2 Fibrated.

.4 Options: Provide selections from each of the following available characteristic types as most suitable for each application.
.1 Colour
.1 Black, grey, white.
.2 Additives
.1 Mesh reinforcement additive for UL-181 closure applications.

.5 Tests
.1 Weight: 1.44-kg/L (12.0-lb/USgal) to ASTM-D1475.
.2 VOC: Average non-volatile minimum 69-% by weight to ASTM-D2369.
.3 Pressure and Leakage: Meets SMACNA-006 and SMACNA-016 Duct Class 2.5-kPa (10-inWC) and Seal Classes A, B, C.

.6 Ratings
.1 Service Temperature: -7-°C to 93-°C (20-°F to 200-°F).
.2 Adhesion
.1 Adheres to various vapour barriers, jackets, insulation materials.
.2 Adheres to most substrates commonly found in construction, including aluminum, galvanized steel, stainless steel.
.3 Drying Time: At 23-°C (73-°F) and 50-%RH.
.1 To Touch: Maximum 1-h.
.2 To Cure: Maximum 16-h.
.4 Flash Point: No flash to boiling at 99-°C (210-°F).

.7 Certifications
.1 Surface Burning: Flame spread maximum 20 and smoke developed maximum 15 to ASTM-E84.
.2 To UL-181.
.3 To NFPA-90A.
.4 To NFPA-90B.
.5 To SCAQMD-1168.

.8 Manufacturers
.1 Foster, a brand of H.B. Fuller Construction Products Inc., FDS-181 AIR-TIGHT Duct Sealant Series, or approved equivalent

.4 Damper Manual Locking Mechanism
.1 Applications: Locking mechanism for balancing and manual dampers for opening, closing, and positioning in place and locking.
.2 Options: Provide selections from each of the following available characteristic types as most suitable for each application.
.1 Handle Sizes
.1 H·S: Small handle.
.1 Locations: Generally for smaller balancing dampers in lower pressure systems.
.2 Features

.1 Shaft size 13-mm.dia (0.5-in.dia)
.2 Handle minimum 13-cm (5-in) long.
.3 Quadrant frame with handle and locking mechanism.
.4 Mounting components.
.5 Suitable with extended support bracket for insulated ducting.
.6 Available in galvanized steel or stainless steel to match ducting materials.
.3 Manufacturers
.1 Ruskin Company, HQR/HQRSS Series, or approved equivalent
.2 H·L: Large handle.
.1 Locations: Generally for manual dampers and larger dampers or higher pressure systems.
.2 Features
.1 Mounting components.
.2 Handle minimum 32-cm (12.5-in) long.
.3 Quadrant frame with handle and locking mechanism.
.4 Suitable with extended support bracket for insulated ducting.
.5 Suitable for various shaft sizes including 13/1925-mm.dia (0.5/0.75/1-in.dia).
.3 Manufacturers
.1 Ruskin Company, HDHQ Series, or approved equivalent

PART 3 EXECUTION

3.1 EXAMINATION

.1 Existing Inspection
.1 Investigate fire separations and non-fire-resistance rated assemblies in affected areas for existing fire stopping or smoke sealing that is improperly sealed or defective, as well as for penetrations not fire stopped or smoke sealed.
.2 Pre-Installation Evaluation
.1 Determine exact location and routes for ducting. Assess to eliminate ducting dead legs and sections that cannot be drained down Modify routing and/or relocate existing services as required.
.2 Complete x-ray scans, consultation, and other investigative work as required to verify structural member construction, verify suitable locations, and ensure drilling and coring through structural members will not affect integrity.

3.2 INSTALLATION

.1 Install as required.
.2 Selection and Application
.1 Unless otherwise indicated or required, provide Work:
.1 General
.1 To SMACNA-006.
.2 To SMACNA-001.
.3 To NFPA-90A.
.4 To NFPA-90B.
.2 Pressure and Leakage: Greater of the following unless other indicated:
.1 To SMACNA-006 and SMACNA-016 Duct Class 2.5-kPa (10-inWC) and Seal Class A.
.2 To ULC-S110 Class 1.
.3 Completeness
.1 Unless otherwise indicated, provide and install ducting and components to meet connected to product manufacturer's requirements.
.2 Provide air sealing to meet requirements, including leakage at required duct class and seal class.

.3 Provide cathodic protection wherever dissimilar ducting materials are connected together.
.4 Provide screens of 13-mm (0.5-in) mesh x 2.7-mm (0.105-in) diameter removable galvanized wire for air intakes, exhausts and open ends of ducting, unless otherwise indicated or unless insect screen is required.

.4 Layouts, Locations and Clearances
.1 Provide required offsets and transitions, whether specifically indicated or not, to facilitate duct arrangement and to avoid interference with building structure, piping, equipment and services.
.2 Install concealed ducting to minimize furring space, maximize headroom, and conserve space.
.3 Install ducting as close as possible to walls, partitions and overhead structures to attain maximum headroom and clearance.
.4 Group ducting wherever possible.
.5 Install ducting size transitions such that angle between the transition and straight run does not exceed 15-°, unless otherwise indicated.
.6 In occupied areas, paint interior of ducting for at least 600-mm (2-ft) behind supply and exhaust grilles with matte black paint so as to render ducting invisible from occupied space.
.7 Slope exhaust ducting up away from register and without seams in bottom of duct for at least 3-m (10-ft) of duct run behind register.
.8 Slope exterior air intake ducts down at 1:100 to permit moisture induced by air intake to be drained. Install 38-mm (1.5-in) drain flange in bottom of duct at low point and run drain line to nearest floor drain unless otherwise indicated.
.9 Relocate and extend fire protection systems as required, including fire detection and adding sprinkler heads as required.
.10 Locate access doors and hatches able to fully open including with other nearby operable components and components requiring servicing and inspection. Review with Owner for preferred access door and hatch locations.

.5 Mounting and Supports
.1 Design and provide as required, including fasteners, anchors, hangers, guides, frames.
.2 Design and provide to SMACNA standards.
.3 Performance: Provide mounting:
.1 To make products level.
.2 To protect products from water damage, including floods, spills, leaks, drips.
.3 To withstand greater of:
.1 Seismic events with seismic mounts and restraints as required.
.2 Concentrated loads of 100-% of system weight applied at any point in any direction.
.4 To minimize noise and vibration transmitted to services and building structure, including transients.
.4 Design and provide for adjusting and removal.
.5 Prevent ducting and ducting components noise and vibration from being transferred to supporting structures and components.
.6 Ensure ducting and ducting components not supported from other services, including other ducting systems.
.7 Ensure other services are not supported from ducting and ducting components.
.8 Separately support ducting components from venting, including dampers, fans. Support vibrating components to protect venting from vibration, torque, shutting/closing, start/stop.
.9 Adjust support system including hangers to equalize load.
.10 Fasteners: Wedge, sleeve or epoxy type anchor bolts. Refrain from using self-drilling or power-driven anchor bolts.

.11 Anchors: Locate anchors at suitable locations, including away from edges, stress joints, existing fractures, overloaded surfaces, product requirements on minimum anchor spacing.
.12 Hangers
.1 Unless otherwise indicated, install at intervals not over 2.4-m (8-ft) centres for ducts up to 1.5-m (5-ft) in width and at 1.2-m (4-ft) centres for ducting 1.2-m (5-ft) in width and over.
.2 For ducts over 760-mm (30-in) in any dimension:
.1 Provide metal horizontal supports across bottom of duct attached to rods, minimum 38-mm x 38-mm x 3-mm (1.5-in x 1.5-in x 0.125-in) steel angle across bottom of duct, attached to steel rods.
.3 For remaining ducts:
.1 Provide metal strap hangers around duct, minimum 3-mm x 25-mm (0.125-in x 1-in).
.1 Bend strap hanger around bottom of duct with a minimum of 38-mm (1.5-in) overlap and attach to sides and bottom of duct.
.4 Provide metal vertical rods attached to building structure, minimum 10-mm.dia (0.375-in.dia) for, otherwise minimum 6.4-mm.dia (0.25-mm.dia).
.1 Provide adjustable rods with locking feature.
.2 Angularity of rods resulting from service horizontal movement including from expansion to be maximum 2-° from vertical.
.5 Provide miscellaneous metal angles or channels as required between building structure elements including joists for support of duct where building structure elements spacing does not coincide with the required hanger spacing.
.13 Materials
.1 For outdoor locations or locations that may be subject to moisture or temperatures that may induce condensation, provide stainless steel or hot dipped galvanized steel.
.2 For other locations, provide corrosion resistant material suitable for the application.
.14 Insulation: Plan layouts and mounting for insulation required.
.15 Other
.1 Cross-break ducting flat surfaces as required to prevent vibration or buckling.
.6 Seams
.1 Openings
.1 Provide ducting gaskets.
.2 Fixed Joints
.1 Exterior including outdoor air intakes:
.1 Continuously solder, braze or weld to prevent liquids entering joints.
.2 Other locations
.1 Provide joint gaskets at flange joints, including duct connections, to components.
.2 Provide joint sealants at every joint, or joint tapes if acceptable to Engineer.

3.3 DAMPERS - BALANCING

.1 Locations
.1 Air Terminations: Provide at supply terminations including diffusers and grilles. May be part of supply termination component.
.2 Constant Volume Systems: Provide at each branch duct and where necessary for proper balancing of system.
.3 Variable Air Volume Systems: Provide at each main branch duct and where necessary for proper balancing of system.

3.4 ACCESS DOORS

.1 Locations

.1 Inspection access, including fire dampers, control devices such as air flow.
.2 Maintenance access, including fans, filters.
.3 Cleaning access, including coils.

3.5 VERIFICATION

.1 Progress Inspection
  .1 Leakage Inspection
    .1 Inspect ducting for air leakage at joints and connections to equipment, under normal operating conditions.
.2 Pre-Start-up Tests
  .1 Leak Testing
    .1 Leak test ducting to SMACNA-016.
    .2 Repair leaks as required to meet performance requirements.
.3 Post-Start-up Tests
  .1 Leak Testing
    .1 Repeat leak testing until performance requirements are met.

3.6 MAINTENANCE

.1 Additional Spare Parts and Materials
  .1 Dampers - Fire
    .1 Spare fusible links per type and ratings, 1 set for each quantity of 50, minimum 1.

3.7 TRAINING

.1 Operation Demonstration
  .1 Dampers - Fire
    .1 Maintenance, inspection, testing.

END OF SECTION 23 30 00

SECTION 23 37 13 AIR DIFFUSERS, REGISTERS, AND GRILLES

PART 1 GENERAL

1.1 REFERENCED DOCUMENTS

.1 ASHRAE-70: ANSI/ASHRAE-70-2023 Method of Testing for Rating the Performance of Air Outlets and Air Inlets.
.2 ASTM-B117: ASTM-B117-2019 Standard Practice for Operating Salt Spray (Fog) Apparatus.
.3 ASTM-D523: ASTM-D523-2014 (R2018) Standard Test Method for Specular Gloss.
.4 ASTM-D610: ASTM-D610-2008 (R2019) Standard Practice for Evaluating Degree of Rusting on Painted Steel Surfaces.
.5 ASTM-D714: ASTM-D714-2002 (R2017) Standard Test Method for Evaluating Degree of Blistering of Paints.
.6 ASTM-D1308: ASTM-D1308-2020 Standard Test Method for Effect of Household Chemicals on Clear and Pigmented Coating Systems.
.7 ASTM-D1654: ASTM-D1654-2008 (R2016) Standard Test Method for Evaluation of Painted or Coated Specimens Subjected to Corrosive Environments.
.8 ASTM-D2794: ASTM-D2794-1993 (R2024) Standard Test Method for Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact).
.9 ASTM-D3363: ASTM-D3363-2022 Standard Test Method for Film Hardness by Pencil Test.
.10 ASTM-D4572: ASTM-D4572-2021 Standard Test Method for Rubber Chemicals - Wet Sieve Analysis of Sulfur.
.11 ASTM-G151: ASTM-G151-2019 Standard Practice for Exposing Nonmetallic Materials in Accelerated Test Devices that Use Laboratory Light Sources.
.12 ASTM-G154: ASTM-G154-2023 Standard Practice for Operating Fluorescent Ultraviolet (UV) Lamp Apparatus for Exposure of Materials.
.13 NFPA-90A: NFPA-90A-2024 Installation of Air-Conditioning and Ventilating Systems.
.14 NFPA-90B: NFPA-90B-2024 Installation of Warm Air Heating and Air-Conditioning Systems.
.15 SMACNA-001: ANSI/SMACNA-001-2008 Seismic Restraint Manual Guidelines for Mechanical Systems.
.16 SMACNA-006: ANSI/SMACNA-006-2020 HVAC Duct Construction Standards - Metal and Flexible.
.17 UL-181: ANSI/UL-181-2013 Factory-Made Air Ducts and Air Connectors.

1.2 DEFINITIONS

.1 “diffusers”: Generally refers to components that are used for supplying air into a space, with airflow direction and patterning considerations.
.2 “grilles”: Generally refers to components that are used for removing air from a space, but may also be used for supplying air to a space.
.3 “registers”: Generally refers to components that can be used for supplying air into a apace, and not necessarily having specific airflow direction and patterning considerations, but may also be used for removing air from a space.
.4 Additional definitions to SMACNA.

1.3 SUBMITTALS FOR ACTION

.1 Product Aspects
  .1 Product Characteristics Data
  .2 Product Schedule Data
.2 Service Aspects
  .1 Service Sizing Plans

1.4 SUBMITTALS FOR INFORMATION

.1 Product Aspects
  .1 Product Fabrication Data

.2 Product Factory Testing Data
.3 Product Certification Documentation Data
.4 Product Mounting Plans
.2 Product Application
.1 Product Application Plans Certificate Letter
.2 Product Installation Information
.3 System Application
.1 System Testing Plans
.2 System Examination Results
.3 System Preparation Tests Results
.4 System Mounting and Supports Completed Certificate Letter
.5 System Verification Results
.6 System Documentation

1.5 SUBMITTALS FOR CLOSEOUT

.1 Product Application
.1 Product Start-up Forms and Certificate Letter
.2 Product Installation Completed Certificate Letter
.3 Product Operation Information
.4 Product Maintenance Information
.5 Product Spare Parts and Materials
.2 System Application
.1 System Tools and Access
.2 System Operation Information
.3 System Maintenance Information

1.6 QUALIFICATIONS

.1 Noise and Vibration
.1 Company certified to NEBB, with its personnel sound and vibration certified professionals by NEBB and employed by company.

1.7 MEETINGS

.1 Phase-in Coordination Review
.1 Meet with Owner to review and plan installation and targeted airflow direction and patterning per diffuser, register and grille. Identify components that may impact occupants, whether only periodically or for longer durations, that may require specific additional considerations with targeted airflow direction and patterning of best overall occupant satisfaction.

PART 2 PRODUCTS

2.1 CHARACTERISTICS

.1 Provide products as required, and additionally to the following.
.1 Ratings
.1 Pressure Class: Constructed to pressure classification of the greater of unless otherwise indicated:
.1 SMACNA 3-inWC

2.2 GRILLES - BLADE - TRANSFER

.1 Provide as required.
.2 Features
.1 Suitable for high capacity return or exhaust outlet with high free area and low sound and pressure drop.
.2 Low pressure drop and sound generation.
.3 Suitable for various mounting locations including doors.
.3 Type: Sight Proof
.1 Options: Provide the following.

.1 Materials
.1 M·AL
.1 Horizontal chevron style blades, 29-mm (1.125-in) deep, blocking view through grille.
.2 Sizes available between 127-mm x 102-mm (5-in x 4-in) and 813-mm x 914-mm (32-in x 36-in).
.2 Finishes
.1 F·PC, F·PC·AL
.3 Borders
.1 B·FF2
.2 Options: Other characteristics that are available but not furnished.
.1 Materials
.1 M·AL·H
.1 Horizontal angled and flat style blades, 29-mm (1.125-in) deep, blocking view through grille.
.2 Sizes available between 127-mm x 102-mm (5-in x 4-in) and 1,219-mm x 762-mm (48-in x 30-in).
.2 M·S
.1 Horizontal chevron style blades, 29-mm (1.125-in) deep, blocking view through grille.
.2 Sizes available between 152-mm x 102-mm (6-in x 4-in) and 1,219-mm x 914-mm (48-in x 36-in).
.2 Finishes
.1 F·PC·S
.2 F·N
.3 Borders
.1 B·FF1
.2 B·C
.4 Options: Provide from the following available characteristics where indicated.
.1 Materials
.1 M·AL: Extruded aluminum.
.2 M·AL·H: Heavy duty extruded aluminum.
.3 M·S: Steel.
.2 Finishes
.1 F·PC: Powder coat finish.
.1 Features
.1 Baked on powder coat.
.2 Minimum thickness 50-µm (2-in/1,000).
.2 Options: Provide selections from each of the following available characteristic types as most suitable for each application.
.1 Colour to Owner choice.
.3 Ratings
.1 Gloss Surface Tests: To ASTM-D523 and to ASTM-G151 and ASTM-G154 Common Exposure Conditions of Cycle 6, 500-h, gloss reduction maximum 30-%.
.2 Salt Spray Exposure Tests: To ASTM-B117 Salt Spray Exposure. To ASTM-D1654 as follows:
.1 Procedure A (Evaluation of Scribed Specimens), Method 2 (Scraping), 500-h, creepage or delamination size rating 8 or better.
.3 To ASTM-D610 and to ASTM-D714 as follows:
.1 1,000-h, no rusting or blistering.
.4 Durability Tests
.2 F·PC·AL: Powder coat finish on aluminum.

.1 Durability Tests
.1 To ASTM-D1308, with no degradation.
.2 To ASTM-D4572, with no degradation.
.3 To ASTM-D3363, with no marks minimum to 2H.
.2 Impact Resistance Tests
.1 Minimum to 9.0-N·m (80-in·lb) to ASTM-D2794.
.3 F·PC·S: Powder coat finish on steel.
.1 Durability Tests
.1 To ASTM-D3363, with no marks minimum to 2H.
.2 Impact Resistance Tests
.1 Minimum to 11.3-N·m (100-in·lb) to ASTM-D2794.
.4 F·N: No finish.
.3 Borders
.1 B·FF1: Flat face border on 1 face, 32-mm (1.25-in) wide borders, with countersunk fasteners
.2 B·FF2: Flat face border on both faces, 32-mm (1.25-in) wide borders, with countersunk fasteners
.3 B·C: Channel border, with no fasteners.
.5 Certifications
.1 To ASHRAE-70.
.6 Manufacturers
.1 Price Industries Limited, ATG/STG Series, or approved equivalent

2.3 GRILLES - EGGCRATE - RETURN/EXHAUST

.1 Provide as required.
.2 Features
.1 Cubical grid core.
.2 Suitable for high capacity return or exhaust outlet with high free area and low sound and pressure drop.
.3 Low pressure drop and sound generation.
.3 Type: Standard
.1 Features
.1 Sizes available between 152-mm x 102-mm (6-in x 4-in) and 2,438-mm x 610-mm (96-in x 24-in), with mullions used above 1,219-m x 610-mm (48-in x 24-in).
.2 Materials
.1 Frame: Aluminum.
.2 Border: Extruded aluminum.
.3 Options: Provide the following.
.1 Core Styles
.1 S·C55·0
.2 Finishes: F·PC, F·PC·AL
.3 Balancing Dampers: A·BD·AL
.4 Options: Provide selections from each of the following available characteristic types as most suitable for each application.
.1 Mounts
.1 I·TF
.1 Borders
.1 B·FN
.2 Fasteners: F·N
.2 I·TBS
.1 Borders
.1 B·N
.2 Fasteners: F·N
.3 I·S

.1 Borders
.1 B·FF
.2 Fasteners
.1 F·SC
.4 I·D
.1 Borders: B·DE
.2 Fasteners: F·SS
.5 Options: Other characteristics that are available but not furnished.
.1 Core Styles
.1 S·C510·0
.2 S·C1010·0
.3 S·C55·45
.2 Finishes: F·N
.3 Mounts
.1 I·TF
.1 Borders
.1 B·FF
.2 B·FF, A·RSPD
.3 B·FF, A·RSPDC
.4 B·PEA
.5 B·PES
.6 B·C
.7 B·N
.2 I·TBS
.1 Borders
.1 B·PE·AL
.2 B·PE·S
.3 I·S
.1 Borders
.1 B·FF, B·MF
.2 B·FN
.3 B·FC
.2 Fasteners
.1 F·BC
.2 F·N
.4 Balancing Dampers: A·BD·S
.4 Options: Provide from the following available characteristics where indicated.
.1 Core Styles
.1 S·C55·0: 13-mm x 13-mm x 13-mm (0.5-in x 0.5-in x 0.5-in) grid spacing and height, with 0-° angle core.
.2 S·C510·0: 13-mm x 13-mm x 25-mm (0.5-in x 0.5-in x 1-in) grid spacing and height, with 0-° angle core.
.3 S·C1010·0: 25-mm x 25-mm x 25-mm (1-in x 1-in x 1-in) grid spacing and height, with 0-° angle core.
.4 S·C55·45: 13-mm x 13-mm x 13-mm (0.5-in x 0.5-in x 0.5-in) grid spacing and height, with 45-° angle core.
.2 Finishes
.1 F·PC: Powder coat finish.
.1 Features
.1 Baked on powder coat.
.2 Minimum thickness 50-µm (2-in/1,000).
.2 Options: Provide selections from each of the following available characteristic types as most suitable for each application.

.1 Colour to Owner choice.
.3 Ratings
.1 Gloss Surface Tests: To ASTM-D523 and to ASTM-G151 and ASTM-G154 Common Exposure Conditions of Cycle 6, 500-h, gloss reduction maximum 30-%.
.2 Salt Spray Exposure Tests: To ASTM-B117 Salt Spray Exposure. To ASTM-D1654 as follows:
.1 Procedure A (Evaluation of Scribed Specimens), Method 2 (Scraping), 1,000-h, creepage or delamination size rating 8 or better.
.2 Procedure B (Evaluation of Unscribed Areas), 5,000-h, blister size and frequency size rating 8 or better, degree of rusting rating of 10.
.3 To ASTM-D610 and to ASTM-D714 as follows:
.1 1,000-h, no rusting or blistering.
.2 F·PC·AL: Powder coat finish on aluminum.
.1 Durability Tests
.1 To ASTM-D1308, with no degradation.
.2 To ASTM-D4572, with no degradation.
.3 To ASTM-D3363, with no marks minimum to 2H.
.2 Impact Resistance Tests
.1 Minimum to 9.0-N·m (80-in·lb) to ASTM-D2794.
.3 F·PC·S: Powder coat finish on steel.
.1 Durability Tests
.1 To ASTM-D3363, with no marks minimum to 2H.
.2 Impact Resistance Tests
.1 Minimum to 11.3-N·m (100-in·lb) to ASTM-D2794.
.4 F·N: No finish.
.3 Mounts
.1 I·TF: Flat t-bar layin.
.2 I·TBS: Bolt slot t-bar layin.
.3 I·S: Surface mount installation.
.4 I·D: Duct mount installation.
.4 Borders
.1 B·FF: Flat face border.
.2 B·FN: Narrow face border.
.3 B·FC: Curved face border.
.4 B·C: Channel border.
.5 B·N: No border (core only).
.6 B·PE·AL: Panel extension. Aluminum. May be used where grille is less in dimension than t-bar, and additional t-bar and ceiling tiles are not being used. Sizes available between 305-mm x 305-mm (12-in x12-in) and 1,219-mm x 610-mm (48-in x 24-in), with grille size 102-mm (4-in) less in each dimension.
.7 B·PE·S: Panel extension. Steel. May be used where grille is less in dimension than t-bar, and additional t-bar and ceiling tiles are not being used. Sizes available between 305-mm x 305-mm (12-in x12-in) and 1,219-mm x 610-mm (48-in x 24-in), with grille size 102-mm (4-in) less in each dimension.
.8 B·DE: Exposed duct border.
.9 B·MF: Mounting frame.
.5 Fasteners
.1 F·SS: Straight screw holes.
.2 F·SC: Countersunk screw holes.
.3 F·BC: Concealed mounting bracket.
.4 F·N: No additional fasteners.
.6 Balancing Dampers

.1 Opposed blade balancing damper. Mounted on back of grille.
.1 A·BD·S: Coated steel.
.2 A·BD·AL: Aluminum with mill finish.
.3 A·BD·SS: Stainless steel.
.7 Filters
.1 A·FH·AL·1: Filter frame, hinged, aluminum, suitable for 25-mm (1-in) thick filter media.
.1 Aluminum hinge and quarter turn quick release fasteners for complete removal of grille. Hinge available on long or short dimension to Owner preference, otherwise to long dimension.
.2 A·FR·S·1: Filter frame, release, steel, suitable for 25-mm (1-in) thick filter media.
.1 Steel hinge-tab mechanism for complete removal of grille.
.3 A·FR·S·2: Filter frame, release, steel, suitable for 51-mm (2-in) thick filter media.
.1 Steel hinge-tab mechanism for complete removal of grille.
.4 A·FFR: Filter frame, fire rated.
.8 Sound Reduction
.1 A·RSPD: Return air sound power dissipator.
.1 To provide sound power insertion loss across full range of frequencies.
.2 Mounted above grille in return air plenum.
.3 Suitable for ceiling or wall mounts.
.4 Nominal 559-mm x 559-mm (22-in x 22-in) size.
.5 Data available on insertion loss and transmission loss performance.
.6 Welded galvanized steel.
.2 A·RSPDC: Return air sound power dissipator, painted.
.1 To A·RSPD option, with satin coat paint.
.9 Ratings
.1 R·FR: Fire rated.
.1 Damper Assembly
.1 Features: Non-adjustable butterfly type.
.2 Ratings: 3-h rated.
.2 Thermal Blanket
.1 Features
.1 Thermal blanket over entire border and attached frame.
.2 13-mm (0.5-in) thick fiberglass with FSK vapour barrier.
.3 Non-asbestos.
.3 Options: Provide selections from each of the following available characteristic types as most suitable for each application.
.1 Fusible Links
.1 R·FR·T·S: 74-°C (165-°F) standard temperature rated fusible link.
.2 R·FR·T·H: 100-°C (212-°F) high temperature rated fusible link.
.4 Certifications
.1 UL and ULC listed.
.2 To UL-181.
.3 To NFPA-90A.
.5 Certifications
.1 To ASHRAE-70.
.6 Manufacturers
.1 Price Industries Limited, 80 Series, or approved equivalent

2.4 ACCESSORIES

.1 Provide as required.

PART 3 EXECUTION

3.1 EXAMINATION

.1 Existing Inspection
  .1 Investigate fire separations and non-fire-resistance rated assemblies in affected areas for existing fire stopping or smoke sealing that is improperly sealed or defective, as well as for penetrations not fire stopped or smoke sealed.

.2 Pre-Installation Evaluation
  .1 Determine exact location and routes for ducting. Assess to eliminate ducting dead legs and sections that cannot be drained down Modify routing and/or relocate existing services as required.
  .2 Complete x-ray scans, consultation, and other investigative work as required to verify structural member construction, verify suitable locations, and ensure drilling and coring through structural members will not affect integrity.

3.2 INSTALLATION

.1 Install as required.

.2 Selection and Application
  .1 Unless otherwise indicated or required, provide Work:
    .1 To SMACNA-006.
    .2 To SMACNA-001.
    .3 To NFPA-90A.
    .4 To NFPA-90B.

.3 Completeness
  .1 Unless otherwise indicated, provide and install ducting and components to meet connected to product manufacturer's requirements.
  .2 Provide necessary gaskets.
  .3 Provide air sealing gaskets between flanged joints at connections to components.
  .4 Provide cathodic protection wherever dissimilar ducting materials are connected together.
  .5 Provide screens of 13-mm (0.5-in) mesh x 2.7-mm (0.105-in) diameter removable galvanized wire for air intakes, exhausts and open ends of ducting, unless otherwise indicated or unless insect screen is required.

.4 Mounting and Supports
  .1 Design and provide as required, including fasteners, anchors, hangers, guides, frames.
  .2 Design and provide to SMACNA standards.
  .3 Performance: Provide mounting:
    .1 To make products level.
    .2 To protect products from water damage, including floods, spills, leaks, drips.
    .3 To minimize noise and vibration transmitted to services and building structure, including transients.
  .4 Design and provide for adjusting and removal.
  .5 Prevent ducting and ducting components noise and vibration from being transferred to supporting structures and components.
  .6 Ensure ducting and ducting components not supported from other services, including other ducting systems.
  .7 Ensure other services are not supported from ducting and ducting components.
  .8 Adjust support system including hangers to equalize load.

3.3 VERIFICATION

.1 Progress Inspection
  .1 Leakage Inspection
    .1 Inspect ducting for air leakage at joints and connections to equipment, under normal operating conditions.

.2 Pre-Start-up Tests

.1 Leak Testing
  .1 Leak test ducting to SMACNA requirements.

END OF SECTION 23 37 13

SECTION 26 05 00 WIRING

PART 1 GENERAL

1.1 REFERENCED DOCUMENTS

.1 ASHRAE-90.1: ANSI/ASHRAE/IES-90.1-2022 Energy Standard for Buildings Except Low-Rise Residential, including User's Manual.
.2 ASTM-D570: ASTM-D570-2022 Standard Test Method for Water Absorption of Plastics.
.3 ASTM-D638: ASTM-D638-2022 Standard Test Method for Tensile Properties of Plastics.
.4 ASTM-D792: ASTM-D792-2020 Standard Test Methods for Density and Specific Gravity (Relative Density) of Plastics by Displacement.
.5 ASTM-D876: ASTM-D876-2021 Standard Test Methods for Nonrigid Vinyl Chloride Polymer Tubing Used for Electrical Insulation.
.6 CSA-C22.1: CSA-C22.1-2024 Canadian Electrical Code, Part 1, Safety Standard for Electrical Installations, including Handbook (25th Edition).
.7 CSA-C22.2: CSA-C22.2 Canadian Electrical Code, Part 2, Electrical Equipment.
.8 CSA-C22.2-0.3: CSA-C22.2 No. 0.3-2009 (R2023) Test Methods for Electrical Wires and Cables.
.9 CSA-C22.2-38: CSA-C22.2 No. 38-2018 (R2022) Thermoset-Insulated Wires and Cables.
.10 CSA-C22.2-45: CSA-C22.2 No. 45-M1981 (R2008) Rigid Metal Conduit.
.11 CSA-C22.2-45.2: CSA-C22.2 No. 45.2-2008 (R2023) Electrical Rigid Metal Conduit - Aluminum, Red Brass, and Stainless Steel.
.12 CSA-C22.2-56: CSA-C22.2 No. 56-2017 (R2022) Flexible Metal Conduit and Liquid-Tight Flexible Metal Conduit.
.13 CSA-C22.2-83: CSA-C22.2 No. 83-M1985 (R2022) Electrical Metallic Tubing.
.14 CSA-C22.2-83.1: CSA-C22.2 No. 83.1-2007 (R2022) Electrical Metallic Tubing - Steel.
.15 CSA-C22.2-188: CAN/CSA-C22.2 No. 188-2004 (R2009) Splicing Wire Connectors.
.16 CSA-C22.2-198.1: CAN/CSA-C22.2 No. 198.1-2021 Extruded Insulating Tubing.
.17 CSA-Z462: CSA-Z462-2024 Workplace Electrical Safety.
.18 ESA-OESC: ESA Ontario Electrical Safety Code, 2024 (29th Edition).
.19 EUL-ROHS: EUL 2015/863/EU Restriction of Hazardous Substances (RoHS) Directive.
.20 NECA-1: ANSI/NECA-1-2015 Good Workmanship in Electrical Construction.
.21 NECA-101: ANSI/NECA-101-2020 Installing Steel Conduits (Rigid, IMC, EMT).
.22 NECA-102: ANSI/NECA-102-2004 Installing Aluminum Rigid Metal Conduit.
.23 NECA-111: ANSI/NECA-111-2017 Installing Nonmetallic Raceways.
.24 NECA-120: ANSI/NECA/NACMA-120-2018 Installing Armored Cable (AC) and Metal-Clad Cable (MC).
.25 NECA-605: ANSI/NECA/NEMA-605-2018 Recommended Practice for Installing Underground Nonmetallic Utility Duct.
.26 SAE-AS-23053-5: SAE Aerospace Standards 23053/5-2018 Insulation Sleeving, Electrical, Heat Shrinkable, Polyolefin, Flexible, Crosslinked.
.27 UL-4: ANSI/UL-4-2004 Armored Cable.
.28 UL-94: ANSI/UL-94-2023 Tests for Flammability of Plastic Materials for Parts in Devices and Appliances.
.29 UL-224: ANSI/UL-224-2021 Extruded Insulating Tubing.
.30 UL-486C: ANSI/UL-486C-2023 Splicing Wire Connectors.

1.2 DEFINITIONS

.1 "cable": A manufactured assembly of one or more conductors or optical fibers, which may also include fillers, strength members, insulating and protective materials, and with a continuous overall outer jacket providing some degree of protection including for electrical, mechanical, environmental.
.2 "cable, armoured": Same as "cable", but providing a high degree of protection including for electrical, mechanical, environmental.

.3 "cabling": When used in a general sense, same as "wiring". When used in a specific sense, refers to a system of cables, including fittings.
.4 "conductor": A conductive material that is constructed for carrying electric current, including conductors that are bare, covered, insulated.
.5 "conductor, bare": A conductor having no covering or electrical insulation.
.6 "conductor, covered": A conductor covered with a dielectric material having no rated dielectric strength.
.7 "conductor, insulated": A conductor covered with a dielectric material having a rated dielectric strength.
.8 "conduit": A type of raceway with a circular cross-section and generally with a wall thickness thicker than that of tubing.
.9 "raceway": A channel for holding services such as conductors and cables, and providing a high degree of protection including for electrical, mechanical, environmental, and may include conduit, tubing, cable trays, surface raceways, underfloor raceways.
.10 "trade size": As defined in ESA-OESC for conduits.
.11 "tubing": A type of raceway with a circular cross-section and generally with a wall thickness thinner than that of conduit.
.12 "wire": Same as "conductor".
.13 "wiring": When used in a general sense, may refer to a system of conductors, cables, raceways. When used in a specific sense, refers to a system of wires, including fittings.
.14 "wiring components": Additional products required to complete a fully functional wiring system, including wiring, fittings, connectors, anchors, guides, supports, hangers, strain relief, expansion, electrical distribution components.
.15 Additional definitions to ESA-OESC and CSA-C22.1.

1.3 SUBMITTALS FOR ACTION

.1 Product Aspects
  .1 Existing Products Modification Data
  .2 Existing Products Refurbished Data
  .3 Product Characteristics Data
  .4 Product Schedule Data
.2 Service Aspects
  .1 Service Sizing Plans

1.4 SUBMITTALS FOR INFORMATION

.1 Product Aspects
  .1 Product Fabrication Data
  .2 Product Factory Testing Data
  .3 Product Certification Documentation Data
  .4 Product Mounting Plans
.2 Service Aspects
  .1 Service Routing Plans
  .2 Service Components Plans
  .3 Service Mounting Plans
.3 System Aspects
  .1 System Layout Plans
  .2 System Interlocks and Interfaces Plans
  .3 System Field Documentation Plans
.4 Product Application
  .1 Product Application Plans Certificate Letter
  .2 Product Installation Information
.5 Service Application
  .1 Service Installation Plans Certificate Letter
  .2 Service Installation Information
.6 System Application

.1 System Testing Plans
.2 System Examination Results
.3 System Preparation Tests Results
.4 System Mounting and Supports Completed Certificate Letter
.5 System Verification Results
.6 System Documentation

1.5 SUBMITTALS FOR CLOSEOUT

.1 Product Application
  .1 Product Start-up Forms and Certificate Letter
  .2 Product Installation Completed Certificate Letter
  .3 Product Operation Information
  .4 Product Maintenance Information
  .5 Product Spare Parts and Materials
.2 Service Application
  .1 Service Start-up Forms
  .2 Service Installation Completed Certificate Letter
.3 System Application
  .1 System Tools and Access
  .2 System Operation Information
  .3 System Maintenance Information
.4 Project Application
  .1 Salvaged Components Information
  .2 Disposal Records

1.6 QUALIFICATIONS

.1 Electrical
  .1 Company to be licensed electrical contractor by ESA, with its personnel to be certified electricians by ESA and employed by company.
  .2 On site activities, off site fabrication and trades Work to be supervised by a master electrician by ESA.

PART 2 PRODUCTS

2.1 CHARACTERISTICS

.1 Provide products as required, and additionally to the following.
  .1 Manufactured, tested, certified, registered and listed to regulatory requirements and standards related to the functionality and performance or other relevant characteristics of the product, including proper application, including:
    .1 To ESA requirements for product certification.
    .2 To ESA-OESC.
    .3 To ESA requirements for field certification.
    .4 To ESA deviations.
    .5 To CSA, ULC, UL, NEMA, ANSI.
    .6 To ESA acceptable equivalent product certification referenced documents without conflicting with other requirements, including flame spread and smoke developed.
  .2 Sizing: Unless otherwise indicated, account for an additional length of 10-% for wiring and wiring components, including conductors, cables, raceway assemblies, raceways.
  .3 Ratings: Unless otherwise indicated or required, provide the following for conductors, cables, cables and raceways, cable and raceway assemblies.
    .1 Fault Current: Unless otherwise indicated, match or exceed fault current ratings of upstream over-current protection device at same voltage.
  .4 Certifications: Unless otherwise indicated or required, provide the following for conductors, cables, cables and raceways, cable and raceway assemblies.
    .1 Flammability and Surface Burning: Either FT6 to CSA-C22.2-0.3, or flame spread maximum 0 and smoke developed maximum 0 to ULC standards.

2.2 CONDUCTORS

.1 Provide as required.
.2 Materials: Unless otherwise indicated:
  .1 Copper including integral ground/bonding wires.
  .2 Stranded for #10-AWG and larger, solid for #12-AWG and smaller.

2.3 CONDUCTORS AND CABLES

.1 Provide as required.
.2 Size: To the larger of as indicated or as follows:
  .1 To ESA-OESC.
  .2 To ASHRAE-90.1.
  .3 2-% voltage drop.
  .4 Above requirements including for an additional length of 10-%.
.3 Ratings
  .1 Temperature: Minimum 90-°C (200-°F) unless otherwise indicated or required.

2.4 POWER WIRING

.1 Provide as required.
.2 Applications: Generally for conductors for services, feeders, branch circuits, power generation circuits, where requirements exceed that of limited power conductors and cables.
.3 Ratings
  .1 Voltage: Minimum 600-V unless otherwise indicated or required.
.4 Conductor Types
  .1 Type: RW90. Rubber-like insulation, wet rated.
    .1 Locations: Suitable for wet and dry locations.
    .2 Features
      .1 Copper conductors.
      .2 Insulated conductors to CSA-C22.2-38 type RW90, with thermoset conductor insulation material to CSA-C22.2-38 type XL and chemically cross-linked XLPE.
    .3 Ratings
      .1 Operating Temperature: Minimum 90-°C (194-°F).
      .2 Voltage: Minimum 600-V.
    .4 Certifications: Flammability: FT4 to CSA-C22.2-0.3.
.5 Cable Types
.6 Substitution Limitations
  .1 Other Work Required: Specific other Work including re-design is required as follows, and may be accepted to Substitutions Article in Section 01 00 00 Project Procedures and where requirements can be demonstrated to be met:
    .1 Certifications
      .1 Fire Resistance: Waived fire ratings or reduction to 1-h fire ratings may be used instead of 2-h if LBC AHJ accepts this for the application including for building type and size, service room location, equipment loads served, distribution loads served, conductor locations.
      .2 Flammability: FT4 to CSA-C22.2-0.3 may be used instead of FT6 to CSA-C22.2-0.3 if LBC AHJ accepts this for the application including for plenums, air handling spaces, non-combustible construction.

2.5 RACEWAYS

.1 Provide as required.
.2 Size: Minimum 13-mm.dia (0.5-in.dia) size.
.3 Raceway Types
  .1 Type: EMT·G. Electrical metallic tubing, hot dipped galvanized steel, rigid.
    .1 Certifications: To CSA-C22.2-83.1.
  .2 Type: FMC. Flexible metal conduit.

.1 Certifications: To CSA-C22.2-56.
.3 Type: LFMC. Liquid tight flexible metal conduit.
.1 Certifications: To CSA-C22.2-56.
.4 Type: RMC·A. Rigid metal conduit, aluminum.
.1 Certifications: To CSA-C22.2-45.2.
.5 Type: RTRC·AG. Reinforced thermosetting resin conduit, rigid, above ground rated.
.4 Substitution Limitations
.1 Other Work Required: Specific other Work including re-design is required as follows, and may be accepted to Substitutions Article in Section 01 00 00 Project Procedures and where requirements can be demonstrated to be met:
.1 Certifications
.1 Flammability: FT4 to CSA-C22.2-0.3 may be used instead of FT6 to CSA-C22.2-0.3 if LBC AHJ accepts this for the application including for plenums, air handling spaces, non-combustible construction.

2.6 ACCESSORIES

.1 Provide as required.
.2 Conductor Splicing Connectors
.1 Type: Twist On Connector - Junction Boxes - #12 to #14
.1 Applications: Within junction boxes not normally accessed except for non-standard repairs, for #12-AWG to #14-AWG copper conductors, where other connectors are not able to fit are not able to fit and where there is no leak or condensation risk.
.2 Features
.1 Suitable for solid or standard copper from #6-AWG to #22-AWG conductors.
.2 Suitable for 2/3/4 conductors.
.3 Swept wing for improved twisting leverage and torque.
.4 Flexible skirt around entry to improve protection of conductors.
.5 Shell expands with progressive tightening.
.6 Suitable for termination dead-ends from #6-AWG to #18-AWG.
.3 Materials
.1 Housing: Polypropylene with thermoplastic elastomer.
.2 Plating: Zinc.
.3 Inserts: Steel.
.4 Ratings
.1 Voltage: Minimum to 1,000-VAC.
.2 Temperature: Minimum to 105-°C (221-°F).
.5 Certifications
.1 To CSA-C22.2-188, UL-486C.
.2 To UL-94 V-2.
.3 To EUL-ROHS.
.6 Manufacturers
.1 Ideal Industries, Inc., Twister ProFLEX Series, or approved equivalent
.2 Type: Lug Terminal Block - Enclosures and Boxes - Larger Than #12
.1 Applications: Within enclosures and boxes, for larger than #12-AWG copper conductors.
.2 Provide as required.
.3 Conductor and Cable Labels
.1 Type: Heat Shrink Tube - Various Size Text
.1 Locations: Within service rooms that are not air handling spaces and not UV exposed, within enclosures and boxes.
.2 Features
.1 Printable heat shrink tube, available on sheets with printer system.
.2 1 or 2 rows of text.
.3 Materials

.1 Cross-linked polyolefin.

.4 Options: Provide selections from each of the following available characteristic types as most suitable for each application.

.1 Heat Shrink Tube Colours

.1 Black, blue, green, grey, orange, red, violet, yellow, custom.

.2 Lengths

.1 38-mm (1.5-in).

.2 51-mm (2.0-in).

.3 Shrink Ratio

.1 2 to 1

.1 Sizes: Available in 1.2/1.6/2.4/3.2/4.8/6.4/9.5/12.7/15.9/19.1/25.4/31.8/38.1/50.8/76.2/101.6-mm.dia (0.046/0.063/0.093/0.125/0.187/0.250/0.375/0.500/0.625/0.750/1.000/1.250/1.500/2.000/3.000/4.000-in.dia) diameters before shrink, with 0.40/0.43/0.51/0.51/0.51/0.64/0.64/0.64/0.69/0.76/0.89/0.97/1.02/1.14/1.27/1.40-mm (0.016/0.017/0.020/0.020/0.020/0.025/0.025/0.025/0.027/0.030/0.035/0.038/0.040/0.045/0.050/0.055-in) wall thicknesses after shrink.

.2 Tests: Longitudinal Change: +/-5-% to SAE-AS-23053-5.

.2 3 to 1

.1 Sizes: Available in 1.5/3.0/6.0/9.0/12.0/18.0/24.0/40.0/50.0/75.0-mm.dia (0.060/0.120/0.240/0.360/0.480/0.720/0.945/1.575/2.000/3.000-in.dia) diameters before shrink, with 0.50/0.60/0.70/0.80/0.85/1.0/1.2/1.25/1.50/1.65-mm (0.020/0.024/0.028/0.031/0.033/0.039/0.048/0.050/0.059/0.065-in) wall thicknesses after shrink.

.2 Tests: Longitudinal Change: +5-% to -15-% to SAE-AS-23053-5.

.4 Text Colours

.1 Black, yellow, white.

.5 Text Fonts

.1 Various.

.5 Tests

.1 Tensile Strength: Minimum 10.3-MPa (1,500-psi) to ASTM-D638.

.2 Elongation: Maximum 200-% to ASTM-D638.

.3 Specific Gravity: Maximum 1.35 to ASTM-D792.

.4 Low Temperature Flex: No cracking down to -55-°C (-67-°F) to SAE-AS-23053-5.

.5 Heat Shock: No cracking at 250-°C (482-°F) for 4-h to SAE-AS-23053-5.

.6 Heat Resistance: Maximum 100-% elongation at 175-°C (347-°F) for 168-h to ASTM-D638.

.7 Secant Modulus: Maximum 172-MPa (25,000-psi) to SAE-AS-23053-5.

.8 Dielectric Strength: Minimum 12.7-V/mm 500-V/(in/1,000)) to ASTM-D876.

.9 Volume Resistivity: Minimum 1.0x10^14-ohm/cm (0.39x10^14-ohm/in) to ASTM-D876.

.10 Corrosion Resistance: No corrosion at 175-°C (347-°F) for 16-h to SAE-AS-23053-5.

.11 Water Absorption: Maximum 0.5-% to ASTM-D570.

.12 Fluid Resistance: Minimum 6.9-MPa (1,000-psi) at 23-°C (73.4-°F) for 24-h to SAE-AS-23053-5.

.6 Ratings

.1 Operating Temperature

.1 Continuous: -55-°C to 135-°C (-67-°F to 275-°F).

.2 Intermittent: Up to 200-°C (392-°F).

.2 Shrink Temperature: 90-°C (194-°F).

.3 Resistance: Label text permanence and resistant to various aggressive fluids, lubricants, solvents.

.7 Certifications

.1 To UL-224 VW-1, 125-°C (257-°F), 600-V.

.2 To CSA-C22.2-198.1.

.3 To SAE-AS-23053-5 Class 1 and Class 3.

.8 Manufacturers

.1 Impact, Inc., Advanced Wire Marking System Heat Shrink Markers B2/B2(3X) Series, or approved equivalent

.2 Type: Stainless Steel - Small Size Text

.1 Locations: Within air handling spaces, not within enclosures and boxes.

.2 Features

.1 Suitable for mounting on 9.7-mm (0.38-in) wide cable ties or carriers.

.2 Individual letters and numbers, 11.4-mm (0.45-in) long, 9.7-mm (0.38-in) wide.

.3 Character size 5.53-mm (0.218-in).

.3 Materials

.1 316 stainless steel, 0.64-mm (0.025-in) thick.

.4 Manufacturers

.1 ABB Ltd., Stainless Steel Sleeve Markers Series, or approved equivalent

PART 3 EXECUTION

3.1 EXAMINATION

.1 Existing Inspection

.1 Photograph, document and submit descriptions of existing deficiencies in the affected wiring, raceway, panels, and support systems prior to commencing Work.

.2 Complete x-ray scans, consultation, and other investigative work as required to verify structural member construction, verify suitable locations, and ensure drilling and coring through structural members will not affect integrity.

.3 Investigate fire separations and non-fire-resistance rated assemblies in affected areas for existing fire stopping or smoke sealing that is improperly sealed or defective, as well as for penetrations not fire stopped or smoke sealed.

.2 Pre-Installation Evaluation

.1 Verify characteristics of indicated components, including sizes and types, including raceways, wiring and cables, insulation, and over-current protection.

.2 Complete electrical risk assessment to CSA-Z462.

.3 Based on investigations and submittals, plan for correcting sizing and selection as required.

3.2 PREPARATION

.1 Existing Tests

.1 Electrical Distribution Testing

.1 Perform electrical distribution testing of existing. Test requirements as indicated in this Section.

.2 Electrical Loads Testing

.1 Perform electrical loads testing of existing. Test requirements as indicated in this Section.

.3 Insulation Testing
.1 Perform wiring insulation testing of existing. Test requirements as indicated in this Section.
.4 Circuit Tracing
.1 Perform circuit tracing of existing. Test requirements as indicated in this Section.
.2 Demolition and Removal
.1 In affected areas where Work is occurring:
.1 Remove existing unused plenum cable.
.2 Remove existing unused and obsolete services and components including wiring and raceway, and resupport systems.

3.3 INSTALLATION

.1 Install as required.
.2 Selection and Application
.1 The precise type, rating, quantity, and location of electrical products depend, in part, on routing and installation choices made by Contractor.
.2 Provide Work:
.1 To ESA requirements for product certification.
.2 To ESA-OESC.
.3 To ESA requirements for field certification.
.4 To NECA-1 unless otherwise indicated.
.5 Armoured Cables: To NECA-120.
.6 Raceways
.1 Steel: To NECA-101.
.2 Rigid Metallic Conduit: To NECA-102.
.3 Nonmetallic: To NECA-111, NECA-605.
.3 Completeness
.1 Grounding and Bonding: Provide a separate insulated conductor for grounding and bonding in raceways containing power circuits, even if such separate conductor may not otherwise be required to ESA-OESC due to raceway material construction.
.2 Power Surges: Protect upstream loads and components from power line, voltage transients and damage during construction power surges.
.3 Enclosures
.1 Use dedicated enclosures.
.2 Document enclosures that contain mixed voltages, and/or circuits operating under separate control.
.4 Junctions and Splicing: Unless otherwise indicated or required:
.1 When modifying or extending existing wiring, maximum 1 junction or splice allowed for each conductor and cable, excluding terminations at required components and accessories.
.2 Otherwise, install wiring in continuous lengths, free from junctions and splices, except for terminations at required equipment, accessories, and other components. Select wiring for continuous lengths to the more stringent of requirements including types, ratings, service, location, environment.
.4 Layouts, Locations and Clearances
.1 Install products in locations providing appropriate ambient conditions for its operation, and allowing for adequate ventilation.
.2 Install products to allow maintenance access and to prevent interference with adjacent components.
.3 Install products to facilitate various activities including maintenance and inspection:
.1 Provide sufficient additional wiring lengths.
.2 Provide wiring quick disconnecting means.
.4 Install in a manner to not interfere with normal traffic patterns.

.5 Install above 152-mm (6-in) of floor and other similar surfaces, including surface of housekeeping pads and other similar horizontal surfaces.
.6 Install above snow drift region, including surface of ground and roof and other similar surfaces, including products mounting curbs and flashing.
.7 Install and layout to account for extremes of expansion and contraction that system may be subject to.

.5 Mounting and Supports
.1 Design and provide as required, including fasteners, anchors, hangers, guides, frames.
.2 Design and provide to ESA-OESC and NECA standards.
.3 Performance: Provide mounting:
.1 To make products level.
.2 To protect products from water damage, including floods, spills, leaks, drips.
.3 To withstand greater of:
.1 Seismic events with seismic mounts and restraints as required.
.2 Concentrated loads of 100-% of system weight applied at any point in any direction.
.4 To minimize noise and vibration transmitted to services and building structure, including transients.
.4 Prevent wiring and cabling and components noise and vibration from being transferred to supporting structures and components.
.5 Ensure wiring and cabling and components are not supported from other services, including other ducting systems.
.6 Ensure other services are not supported from wiring and cabling and components.
.7 Separately support components from wiring and cabling, including devices, electrical distribution. Support vibrating components to protect venting from vibration, torque, shutting/closing, start/stop.
.8 Adjust support system including hangers to equalize load.
.9 Fasteners: Wedge, sleeve or epoxy type anchor bolts. Refrain from using self-drilling or power-driven anchor bolts.
.10 Anchors: Locate anchors at suitable locations, including away from edges, stress joints, existing fractures, overloaded surfaces, product requirements on minimum anchor spacing.
.11 Hangers: Provide adjustable roller hangers or trapeze hangers for expansion compensation unless otherwise indicated. Provide adjustable rods with locking feature. Provide additional metal supports as required to support hangers from building structure. Angularity of rods resulting from service horizontal movement including from expansion to be maximum 2-° from vertical.
.12 Materials
.1 For outdoor locations or locations that may be subject to moisture or temperatures that may induce condensation, provide stainless steel or hot dipped galvanized steel.
.2 For other locations, provide corrosion resistant material suitable for the application.

3.4 POWER WIRING AND RACEWAYS

.1 Locations: Provide the following.
.1 Indoor high traffic and damage subject areas, including pathways, corridors and hallways within rooms, subject to moving objects including forklifts, carts, and vehicles:
.1 RW90 conductors in RMC·A raceway.
.2 Indoor wet or damp locations, including locations not clearly defined as dry locations unconditioned or not fully conditioned spaces and not fully ventilated:
.1 RW90 conductors in RMC·A raceway.
.3 Indoor service rooms, exposed or concealed, excluding high traffic and damage subject areas:

.1 #10-AWG and smaller:
.1 RW90 conductors in EMT·G raceway.
.2 #8-AWG and larger:
.1 RW90 conductors in EMT·G raceway.
.4 Indoor vertical service spaces:
.1 RW90 conductors in EMT·G raceway.
.5 Indoor air handling spaces and return air plenums:
.1 RW90 conductors in EMT·G raceway.
.6 Indoor computer room raised floors, excluding air handling spaces and return air plenums:
.1 RW90 conductors in EMT·G raceway.
.7 Indoor ceiling cavities, excluding air handling spaces and return air plenums:
.1 #12-AWG and smaller:
.1 RW90 conductors in EMT·G raceway.
.2 #10-AWG and larger:
.1 RW90 conductors in EMT·G raceway.
.8 Indoor concealed walls, excluding air handling spaces and return air plenums:
.1 RW90 conductors in FMC raceway.
.9 Indoor other concealed chases and behind other surfaces, excluding air handling spaces and return air plenums:
.1 RW90 conductors in EMT·G raceway.
.10 Exposed wiring not in raceway or not armoured cabling:
.1 Prohibited, unless specifically indicated above.
.2 Service: Terminations to Loads, Equipment, and Other Components: Provide the following additional requirements where requirements are not affected, including ratings.
.1 Junction Boxes
.1 Provide junction boxes from raceways located not more that 3-m (10-ft) from equipment.
.2 Vibration Terminations: Cables serving vibrating loads including equipment in:
.1 Service rooms not air handling spaces:
.1 LFMC raceway.
.2 Other spaces not subject to splashing or condensation including air handling spaces:
.1 FMC raceway.
.3 Vibration Isolation: Terminations intended for vibration isolation:
.1 Provide anti-vibration mounts or anti-vibration couplings at terminations including at equipment.
.2 Minimum length 1-m (40-in).
.4 Removable: Cables serving physical parts that are expected to normally be removed from mounting, regardless of frequency of removal, including for service or inspection in:
.1 Service rooms not air handling spaces:
.1 LFMC raceway.
.2 Other spaces not subject to splashing or condensation including air handling spaces:
.1 FMC raceway.
.5 Component Terminations with Flexible Cords or Plugs or Similar: For products that have flexible cords or plugs or similar, provide wiring and raceway matching requirements of field provided wiring and raceway. Remove flexible cords or plugs or similar from products and replace with permanent wiring and raceway. Provide transformers and disconnects as required.
.1 Substitution Limitations

.1 Other Work Required: Specific other Work including re-design is required as follows, and may be accepted to Substitutions Article in Section 01 00 00 Project Procedures and where requirements can be demonstrated to be met:
  .1 Water Exposed, Leak Risk, Submersed: Flexible cords or similar connected to equipment may remain as follows:
    .1 Provide LFMC over flexible cords or similar as suitable for location and environment, including secured to components, and provide junction boxes in field to connect to permanent wiring.
  .2 Product Requires Flexible Cords To Remain: Where flexible cords or similar cannot be removed from within components without violating certifications, a portion of flexible cords or similar connected to equipment may remain, and installation is made fully compliant to ESA-OESC, provide either of the following:
    .1 Provide junction box at equipment with connection to permanent wiring.
    .2 Provide LFMC over flexible cords or similar as suitable for location and environment, including secured to components, and provide junction boxes in field to connect to permanent wiring.
.2 Requirements Waived: Specific requirements may be acceptable to be waived, and may be accepted to Substitutions Article in Section 01 00 00 Project Procedures and where requirements can be demonstrated to be met:
  .1 Flexible Cords and Plugs Not Modified or Replaced: Where not specifically indicated, flexible cords and plugs with products may remain where any of the following are met, and installation is made fully compliant to ESA-OESC:
    .1 Occupied space with permanent receptacles, maximum 120-VAC and 15-A, non-permanent components, located at or on furniture or counters, and existing space has similar installations. Example: Computer workstations, small printer, small copier.
    .2 Occupied space with permanent receptacles, maximum 240-VAC and 50-A, cord and plug fully protected from damage and disruption. Example: Mounted microwave, small stove.
    .3 Non-occupied spaces with permanent receptacles that are protected, including concealed spaces and service spaces, maximum 120-VAC and 5-A, component located fully within protected enclosures or located behind other components at such arrangement and distance such that damage or disruption is fully prevented. With Owner acceptance. Example: Small UPS serving electronics, small injection pumps.

.3 Other
  .1 For other locations, terminations, and parts served, match to most similar indicated above, with minimum as follows:
    .1 RW90 conductors in RMC·A raceway.

3.5 RACEWAYS

.1 Size: To the following maximum allowable per cent fill or less as required by ESA-OESC and CSA-C22.1.
  .1 For power wiring: 40-% unless otherwise indicated.
  .2 For other wiring: 30-% unless otherwise indicated.
.2 Installation and Routing
  .1 Conceal raceways, except within service rooms raceways may be exposed, or other service areas where existing raceways are exposed.
  .2 Install and layout raceways for drainage.

.3 Maintain minimum 152-mm (6-in) clearance from other services including piping, ducting or venting.
.4 Install raceways level, plumb, at right angles to building lines. Follow contours of supporting surfaces.
.5 Provide raceways bends with minimum radius of 10-times nominal diameter of raceway.
.6 Provide bends and offsets uniformly without flattening.
.3 Pull Wires: Provide non-abrasive pull wire in each raceway, with 300-mm (12-in) of slack at either end, and ends terminated under a fastener.
.4 Fittings
.1 Features and Performance: Match that of raceway characteristics unless otherwise indicated, including features, protection, ingress, mechanical, environmental ratings and limits, vandal, anti-ligature.
.2 Materials: Match raceway materials unless otherwise indicated.
.3 Connections and Couplings: Provide throughout raceway installation, including at enclosures, boxes, and final terminations.
.4 Liquid Tight Connectors: Use for the following:
.1 Locations: Damp, wet, corrosive.
.2 Terminations: Final terminations to moving or vibrating equipment, including motors.
.5 Ends
.1 Provide insulated bushings on raceway ends.
.2 Cap and seal top end of vertical raceways.
.6 Expansion: Provide telescoping joints where raceways cross building expansion joints, complete with flexible copper ground jumper.
.7 Enclosures and Boxes
.1 Pull Boxes: Provide pull boxes in raceways such that no conductor or cable will have to be pulled more than 2 90-° bends or 30-m (100-ft) of raceways in 1 pulling operation.
.2 Junction Boxes: Provide as required, including for junctions and splices.
.3 Missing Covers: Provide new covers and fasteners to enclosures or boxes missing covers.
.4 Supports: Support enclosures and boxes independently of raceways and wiring.
.5 Substitution Limitations
.1 Characteristics Limited: Specific characteristics are limited as follows, and may be accepted to Substitutions Article in Section 01 00 00 Project Procedures and where requirements can be demonstrated to be met:
.1 Wiring Concealed Within Walls
.1 Raceway types may be substituted as follows where wiring and cabling are routed concealed within walls and walls are not accessible.
.1 Outdoor or ambient conditions exposed walls not part of air handling spaces:
.1 LFMC raceway.
.2 Indoor walls conditioned space:
.1 FMC raceway.
.2 Maximum length 3-m (10-ft).

3.6 OTHER WIRING AND RACEWAYS

.1 General
.1 Provide raceway for conductors or cables, including in separate raceways or as part of an indicated armoured cable type for location and service specifics. Match raceway requirements to that of Power Wiring in this Section, including for location and service specifics, except as follows.
.1 Provide raceway type to the more stringent requirements of the following:
.1 As indicated above.

.2 To other specific requirements for limited power wiring, control wiring, control networks cabling:
.1 Wiring types and ratings requirements may be specifically indicated in other Articles in this Section or in other Sections.
.2 Raceway types and ratings requirements may be specifically indicated in other Articles in this Section.
.3 To ESA-OESC.
.4 Raceway substitutions as specifically indicated in this Article, where the above requirements do not supersede substitution limitations.

3.7 ACCESSORIES

.1 Conductor Splicing Connectors
.1 Meet quantity limitations of junctions and splicing for each wire or cable type, service, location. Otherwise use continuous lengths of wiring and cabling.
.2 Select connectors to protect from terminations from liquids, including leaks, condensation, including mounting vertically.
.2 Cable Supports
.1 Select quantities to eliminate cable sagging.

3.8 FIELD DOCUMENTATION

.1 Conductor and Cable Labels
.1 Applications: Provide labels on conductors and cables.
.2 Locations
.1 At both ends.
.2 At enclosures and boxes, including junction and pull boxes.
.3 At other terminations.
.3 Contents: Power source panel tag, circuit tag.
.4 Type: To Conductor and Cable Labels in this Section.
.5 Substitution Limitations
.1 Characteristics Limited: Specific characteristics are limited as follows, and may be accepted to Substitutions Article in Section 01 00 00 Project Procedures and where requirements can be demonstrated to be met:
.1 Locations
.1 Alternate locations to Owner requirements, including the following (example shown for occupiable spaces):
.1 Mounted at non-exposed portions instead of visible.
.2 Not mounted.

3.9 VERIFICATION

.1 Post-Start-up Tests
.1 Electrical Distribution Testing
.1 For electrical source to electrical loads, including motor control centers, panelboards, distribution panels.
.2 Energize all loads to simulate full load conditions.
.3 Measure line to line, and line to neutral currents, voltage, and power factor before installation.
.4 Report on components that may become loaded more than 80-%.
.2 Electrical Loads Testing
.1 For equipment and components, including motors, heaters.
.2 Energize loads to simulate full load conditions.
.3 Measure line to line, and line to neutral currents, voltage, and power factor, before and after adjustments.
.3 Insulation Testing
.1 Test insulation integrity on circuits before powering:
.1 Visually inspect insulation.

.2 Complete meg-ohm meter (megger) measurements to confirm quality and integrity of insulation.

.2 Test Instruments: Manufacturers: Fluke Corporation, 1503 Insulation Resistance Tester

.4 Circuit Tracing

.1 Test individual circuits to confirm connected loads to power sources, and to additionally determine labelling at power sources.

.1 In addition, complete insulation testing to this Section.

.2 Test Instruments: Manufacturers: Fluke Corporation, 2062 Advanced Pro Wire Tracer Kit

END OF SECTION 26 05 00

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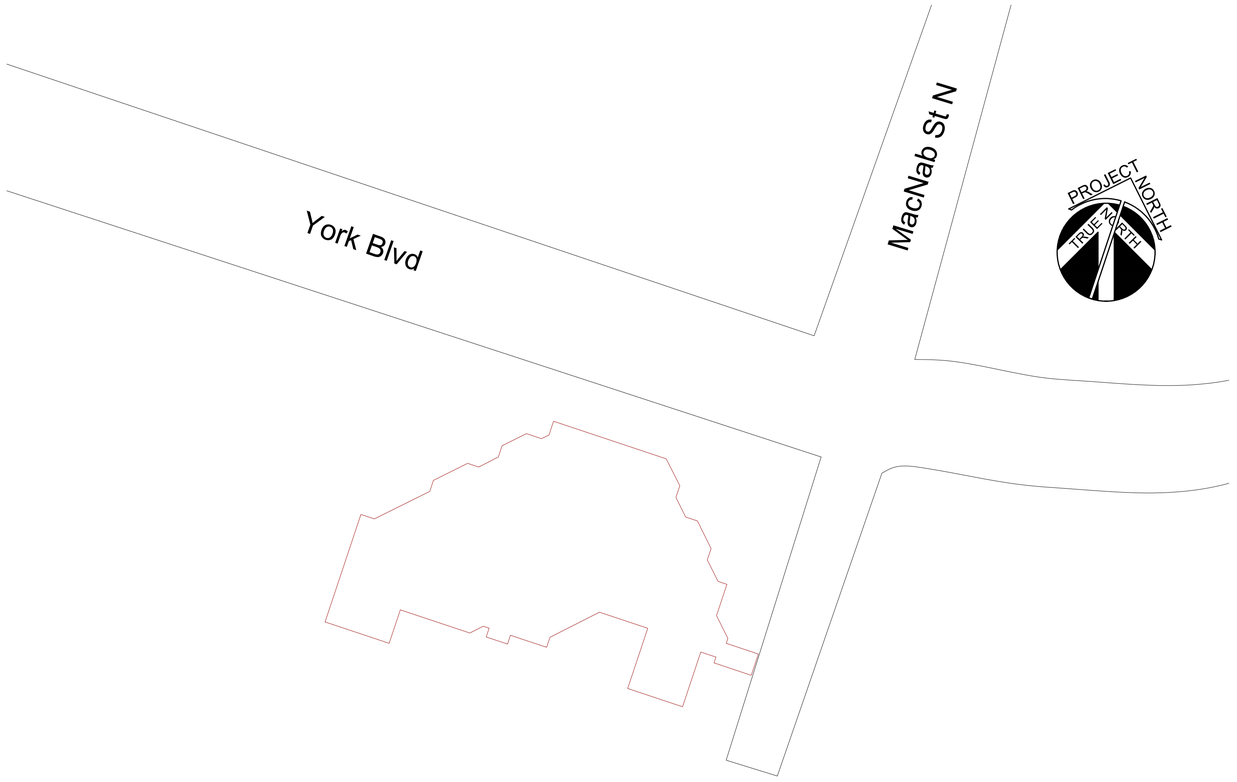
UPS RELOCATION

MARCH 2025



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PROJECT
Hamilton Public Library
UPS Relocation

LOCATION
55 York Blvd
Hamilton, Ontario, L8N 4E4

DRAWING NAME
Drawing Set

SHEET NAME
Title

DATE CREATED	SCALE	SHEET NO.
Sep 16, 2024	NTS	01 of 05

FILE NO.	DRAWING NO.	REV
BI 4740 DD 055-000-0101 (ACCT / PROJECT / TYPE / BUILDING / MEASURE / SET / SHEET)	D01	C

Drawing List

DRAWING & DRAWING NAME	REV	SHEET & SHEET NAME	DRAWING SET
D01 Drawing Set	C	01 Title 02 Legends & Schedules 03 6th Floor Electrical Existing-Remove 04 6th Floor Electrical New-Retrofit 05 Schematics	BI 4740 DD055-000-01

Scope Definition

Existing: Existing to remain.
Provide: New furnished and installed.
Provide* or Included: Same as Provide, but may be provided as part of other products.
Remove: Existing to be removed with other parts modified.
Locate: Existing to be reLocated, and installed with other parts modified.
Modify: Existing to be modified with new parts or reworked.
AFCI: Allowance Furnished Contractor Installed (Cash or Contingency Allowance).
APD: Allowance Provided During Contract (Cash or Contingency Allowance).
OFCI: Owner Furnished Contractor Installed.
OPD: Owner Provided During Contract.
OPL: Owner Provided Later Not During Contract.

Line and Label Legend

REPRESENTATION	NAME
	Remove
	Existing (to remain)
	Provide (including new)
	Not in Current Viewing Plane
	Boundary: Indicating a separation of differing requirements.
Description	Remove
Description	Existing (to remain)
Description	Provide (including new, modify, locate)
Description	Boundary: Colour may be used for APD.
Description	Boundary: Colour may be used for OPL.
	Services Typical Flow Direction
	Control Signal(s) (may be wiring including power)
	Control Signal(s) Internal To Controller/Equipment/Component
	Block Interconnection (non-specific type and/or service)
	Multiple Services (displayed as a single line)

NOTES:
1. Drawings use graphical and text representations as generally defined to this sheet. Specific drawing sheets or details may use alternate definitions.

Work Summary

.1 The following is an overview of Work and is not complete. Contract Documents in their entirety fully describe Work, including items that may only be listed here. Work includes:
.2 Scope Summary
.1 Remove existing window and wall section around window.
.2 Make 1.2-m x 2.4-m (4-ft x 8-ft) opening in raised floor.
.3 Seal underfloor ventilation system. Add temporary sealed wall around opening and wider than Work area, without damaging surfaces to protect IT room components from Work.
.4 Add equipment stands for UPS-B and battery cabinet.
.5 Add door, door frame, and reinstate wall to match existing.
.6 Measure airflows in washrooms served by EF-8.
.7 Add transfer and exhaust grilles and associated ducting.
.8 Rebalance airflows as required with EF-8 in operation.
.9 Relocate existing disconnect into IT room.
.10 Relocate existing panel board into IT room.
.3 Designated Substances
.1 Owner has retained an environmental consultant. Refer to environment consultant documents for designated substances.
.4 Allowances
.1 Cash Allowances - Disbursement Type
.1 UPS supplier.
.1 Relocating existing UPS and battery cabinet from existing location to temporary location 1.2-m (4-ft) further away from wall, and extension cables if required.
.2 Replace missing battery cabinet rear panel.
.3 Review of final mounting locations and assistance with mount holes.
.4 Relocating existing UPS and battery cabinet from temporary location to final location.
.5 Turning on UPS and battery cabinet.
.5 Multiple Contracts
.1 Owner Provided During
.1 Owner has other ongoing or concurrent separate contracts.
.2 Coordinate and cooperate with other contractors responsible for project health and safety in compliance with the Occupational Health and Safety Act, with the following:
.1 Building control system:
.1 Schedule EF-8 to operate 24-h, 7-days/week.
.2 Environmental consultant.
.3 Designated substances abatement.

General
.1 Provide Work as required, including configuration, testing, calibration, measurements, troubleshooting.
.2 Modify and remove existing services and components as required.
.3 Provide temporary services as required.
.4 Provide fully functional systems that are complete and ready for intended use and effect.

Design Boundaries
.1 Project scope is limited to UPS and battery relocation and does not include any UPS or battery replacement or modification.
.2 Project requires use of EF-8 to operate 24-h, 7-days/week.

Symbol Legend

NOTES:
1. Drawings use graphical and text representations as generally defined to this sheet. Specific drawing sheets or details may use alternate definitions.

Ducting

- Exhaust Air Rectangular Opening
- Neck Size / Tag / Flow — Diffuser or Register Tag (units in ft3/min)
- OED — Open End Duct
- GD — Gravity Damper
- BD — Balancing Damper
- FD — Fire Damper

Electrical

- Fused Disconnect
- Fused Disconnect
- Circuit Breaker
- Security Camera

AIR DUCTING SCHEDULE 1,2,3

SERVICE					DUCTS					INSULATION				JACKETS		OTHER
TAG/ COLOUR	DESCRIPTION	FLUID	OPERATING		TYPE	MATERIAL	CLASS 6		FINISH	TYPE	THICKNESS 4	R-VALUE	FACING	TYPE 5	FINISH	
		TYPE	PRESS. [inWC]	TEMP. [°F]			PRESS. [inWC]	SEAL	TYPE/ COLOUR		[in]	[hft2·°F/ Btu] min.	TYPE		TYPE/ COLOUR	
Beige	Transfer	Air		>= 50 to < 105	Rectangular	GS	1	C	Paint/TBD	FG-L	INC: 1					
Red	Exhaust	Air		>= 50 to < 105	Rectangular	GS	6 or 3	A or B	Paint/TBD							

NOTES & DEFINITIONS:

Seal: To SMACNA.

1. Refer to specifications and other design documents for other requirements, including definitions of terms, words, and acronyms.
2. Environment types for locations: IN=Indoor space (either INC or INU). INC=Indoor conditioned to >= 60-°F to < 85-°F. INU=Indoor unconditioned to >= 50-°F to < 105-°F. AMB=Ambient or near ambient outdoor temperature and humidity. OUT=Outdoor.
3. Other location types: INP=Indoor plenum. INV=Indoor vertical service space. Refer to other design documents for other location types.
4. For indicated IN passing through INU, add 0.5-in additional insulation thickness. For indicated IN passing through AMB, add 1-in additional thickness. For services within 6-ft of exterior and unconditioned openings, add 1-in to indicated insulation thickness.
5. Jackets for indicated environments. Where not specifically indicated: For IN locations with high ambient/radiant temperatures to warp jackets, provide jacket Type AL; otherwise for IN, provide jacket Type PVC; otherwise for other environments, provide jacket Type AL.
6. Where 2 values shown, 2nd value is for final terminals, 1st value is for other including mains.

GS=Galvanized Carbon Steel TBD: To Be Determined
FG=Fibreglass
-L=Liner

AIR DIFFUSER, REGISTER, GRILLE SCHEDULE

TAG	DESCRIPTION	QUAN.	TYPE	LOCATION	SCOPE	SELECT STATE	SERVICE AIR			DIMENSION		NECK		FRAME		PERFORMANCE									OTHER
							TEMP.	FLOW	PRESS.	WIDTH	LENGTH	WIDTH OR DIA.	LENGTH	MOUNT	DEPTH	THROW VELOCITY @ DISTANCE								SOUND	
																HORIZONTAL				VERTICAL				NC	
		[#]					[°F]	[ft3/min]	Δ[inWC]	[in]	[in]	[in]	[in]		[in]	[ft/min] @ [ft]	[ft/min] @ [ft]	[ft/min] @ [ft]	[ft/min] @ [ft]	[ft/min] @ [ft]	[ft/min] @ [ft]	[ft/min] @ [ft]	[ft/min] @ [ft]		
TAG	Transfer Air Grille	2	Grilles - Blade - Transfer	See Dwgs.	**Provide**		70.0	70				9	6	Surface										<15	
EAG	Exhaust Air Grille	1	Grilles - Eggcrate - Exhaust	See Dwgs.	**Provide**		70.0	70				7	4	Surface										<15	

AIR DAMPER SCHEDULE

TAG	DESCRIPTION	QUAN.	TYPE	LOCATION	SCOPE	SERVICE GAS				OPEN DIMENSION		FRAME		BLADE			OTHER
						TYPE	TEMP.	FLOW	PRESS.	WIDTH	HEIGHT	MOUNT	DEPTH	ORIENT.	DEPTH	ACTION	
		[#]					[°F]	[ft3/min]	Δ[inWC]	[in]	[in]		[in]		[in]		
GD	Exhaust Fan Damper	1	Backdraft - Medium Duty	See Dwgs.	**Provide**	Air		70		7	4	In Duct	3	Horizontal	5	Parallel	

DOOR ASSEMBLY SCHEDULE

TAG	DESCRIPTION	QUAN.	TYPE	DIMENSIONS		LOCATION	DOOR		HARDWARE		FRAME			FIRE RESIST. RATING [hr]	OTHER
				WIDTH	HEIGHT		SCOPE	FINISH	SCOPE	TYPE	SCOPE	TYPE	FINISH		
		[#]		[in]	[in]			TYPE/ COLOUR					TYPE/ COLOUR		
D-1	Double Door	1	Insulated Steel Door	60	84	Server Room	**Provide**	Paint/TBD	**Provide**	Knob Lock - Grade 1, Full Mortise Butt Hinges, Threshold, Silencers	**Provide**	Thermally Broken	Paint/TBD		Door knob and lock only on one side of door.

WORK PROGRESSION LIMITATIONS SUMMARY 1,2,3,4,5

STEP	DESCRIPTION	DISRUPTION LIMITATIONS	NOTES	CONSIDERATIONS
1	Temporary Wall Construction	No disruption to IT services. Work to be completed after normal working hours.	Relocate existing equipment as per owner directions. Remove 4-ft by 8-ft floor section. Construct temporary wall.	Seal under-floor air system.
2	Temporary UPS-B and Battery Cabinet Relocation and Panelboard and Disconnect Relocation	Maximum 1 4-h shutdown. Work to be completed after normal working hours.	Temporarily relocate UPS-B and battery cabinet away from wall. Coordinate with UPS supplier to move UPS B as required to not impede wall construction. Relocate panelboard and disconnect.	Provide temporary floor protection for UPS to prevent carpet damage. Provide new cables as required.
3	Wall and Door Construction	No disruption to IT services. Work to be completed after normal working hours.	Demolish window and wall section below window. Reinstate wall, including new door.	
4	Finishing	No disruption to IT services. Work to be completed after normal working hours.	Maintain temporary wall dust barrier until finishing is complete.	Owner to provide new carpet tiles. Contractor to install.
5	UPS-B Relocation	Maximum 1 4-h shutdown. Work to be completed after normal working hours.	Install equipment platform. Owner-provided contractor will relocate UPS-B. Reconnect power supply and feeds.	Seal under-floor air system to new platform.

NOTES:
1. This schedule is an overview of specific Work progression limitations and is not a complete description.
2. Specific indicated means, methods, sequences, techniques, and procedures of construction are for the purpose of conveying the general intent for how Work is to be completed with respect to minimum performance or minimizing risk including the occurrence of damage, disruption, interference, disturbance.
3. Normal working hours defined as 6am to 6pm, weekdays.
4. Refer to specifications and other design documents for other requirements, including definitions of terms, words, and acronyms.
5. All work to be completed within 3-week period.

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PROJECT
Hamilton Public Library
UPS Relocation

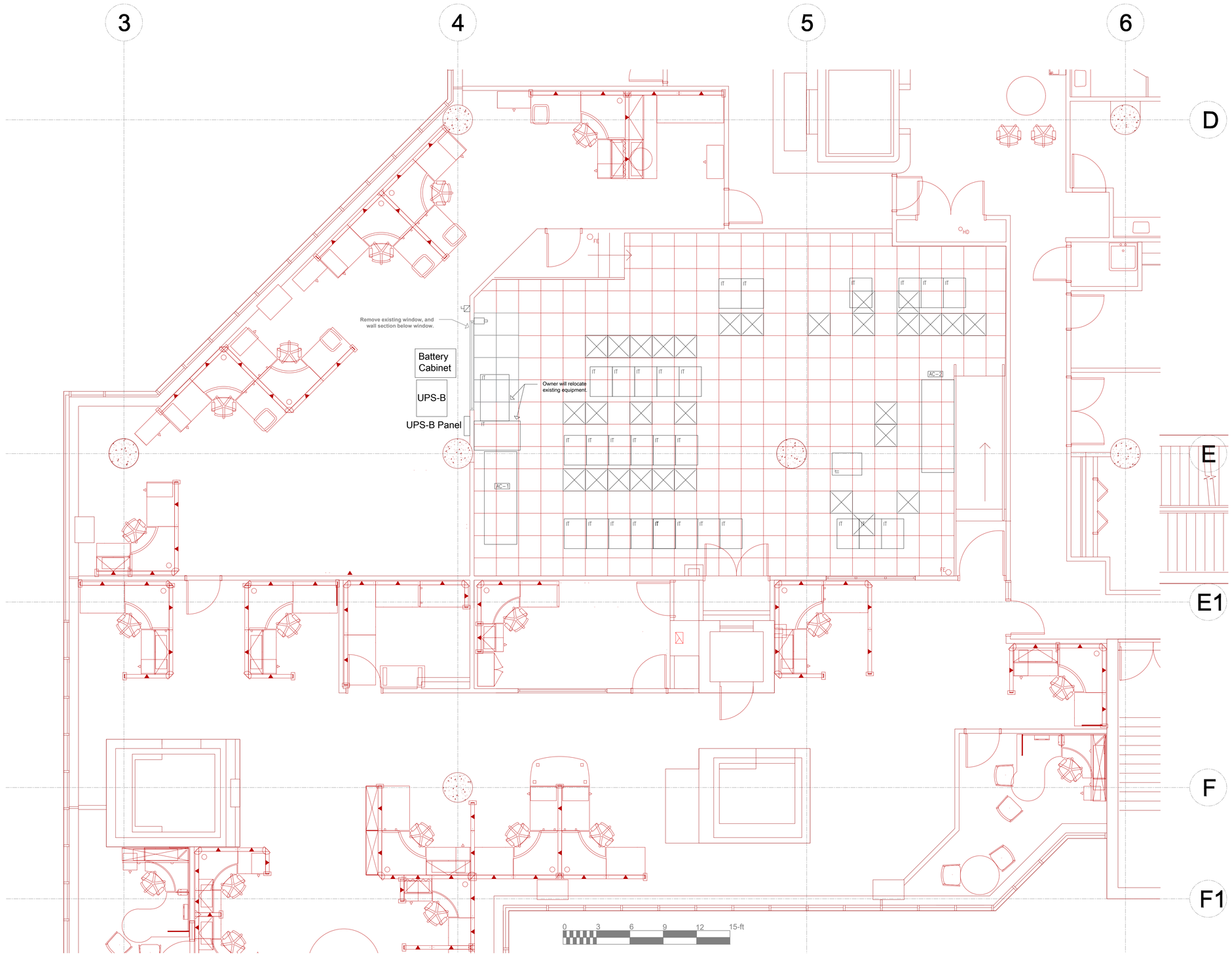
LOCATION
55 York Blvd
Hamilton, Ontario, L8N 4E4

DRAWING NAME
Drawing Set

SHEET NAME
Legends & Schedules

DATE CREATED	SCALE	SHEET NO.
Sep 16, 2024	NTS	02 of 05

FILE NO.	DRAWING NO.	REV
BI 4740 DD055-000-0102 ACCT PROJECT TYPE BUILDING MEASURE SET SHEET	D01	C



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PROJECT
Hamilton Public Library
UPS Relocation

LOCATION
55 York Blvd
Hamilton, Ontario, L8N 4E4

DRAWING NAME
Drawing Set

SHEET NAME
6th Floor Electrical Existing - Remove

DATE CREATED	SCALE	SHEET NO.
Sep 16, 2024	As Shown	03 of 05

FILE NO.	DRAWING NO.	REV
BI 4740 DD055-000-0103	D01	C
ACCT PROJECT TYPE BUILDING MEASURE SET SHEET		

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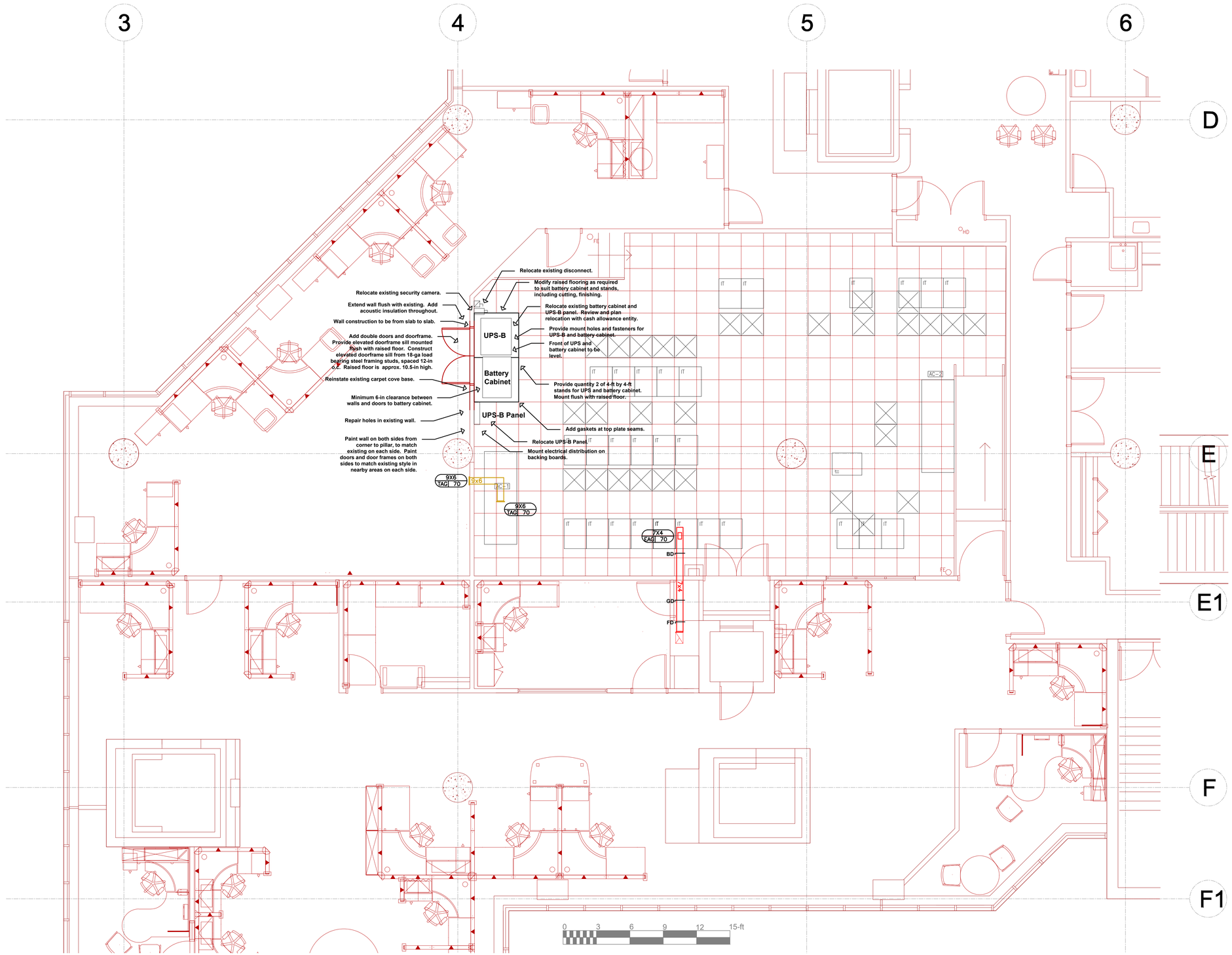

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PROJECT
Hamilton Public Library
UPS Relocation

LOCATION
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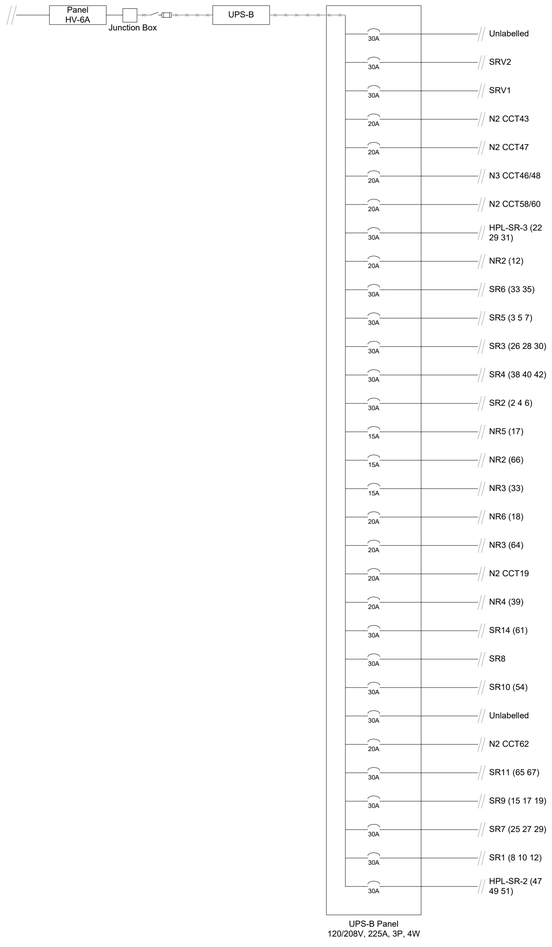
DRAWING NAME
Drawing Set

SHEET NAME
6th Floor Electrical New-Retrofit

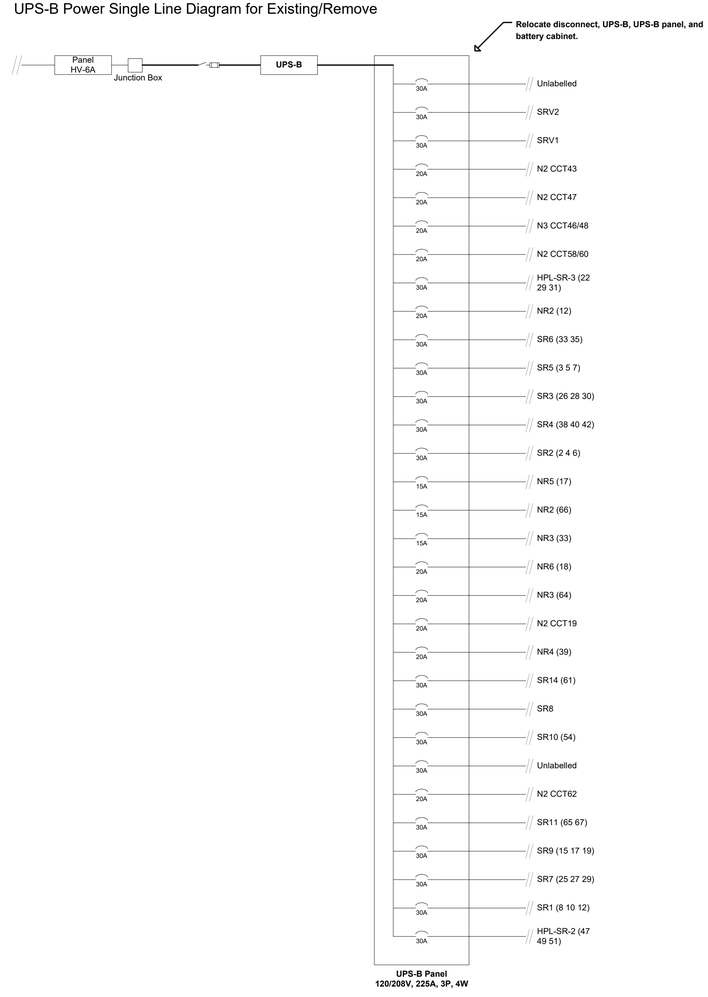
DATE CREATED	SCALE	SHEET NO.
Sep 16, 2024	As Shown	04 of 05

FILE NO.	DRAWING NO.	REV
BI 4740 DD055-000-0104 ACCT PROJECT TYPE BUILDING MEASURE SET SHEET	D01	C

UPS-B Power Single Line Diagram for Existing/Remove



UPS-B Power Single Line Diagram for Existing/Remove



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DRAWING NAME
Drawing Set

SHEET NAME
Schematics

DATE CREATED	SCALE	SHEET NO.
Sep 16, 2024	NTS	05 of 05

FILE NO. (ACCT / PROJECT / TYPE / BUILDING / MEASURE / SET / SHEET)	DRAWING NO.	REV
BI 4740 DD055-000-0105	D01	C