



Hamilton

CITY OF HAMILTON

REQUEST FOR TENDERS

Contract Number: C13-32-24

**Prequalified Contractor Required for the Dundas
Wastewater Treatment Plant (WWTP) Health and
Safety Immediate Needs and Structural Repair
Upgrades**

**Closes: 3:00 PM, Hamilton time
Friday, January 24, 2025**

***** ELECTRONIC BID SUBMISSIONS ONLY *****

**Procurement Section
Corporate Services Department**

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COMMUNICATIONS

Revised: March 21, 2023

Contract Number: C13-32-24

Prequalified Contractor Required for the Dundas Wastewater Treatment Plant (WWTP) Health and Safety Immediate Needs and Structural Repair Upgrades

All questions related to this Request for Tenders (RFT) or for clarification on completing the Form of Tender shall be submitted through the Bidding System by clicking on the "Submit a Question" button for the specified Request for Tenders document and shall be directed to:

Jennifer Rahim
Procurement Specialist

All questions related to this Request for Tenders (RFT) or any clarification with respect to this RFT must be made no later than **3 Business Days prior** to the closing date of this RFT in order that City staff may have sufficient time to respond. The City reserves the right to extend the deadline for questions if required regarding this RFT.

Written answers or clarifications to issues of substance shall be shared with all bidders and issued as part of the RFT in the form of an Addendum. **All bidders are advised that any Addenda issued will only be posted on the following website:**

<https://hamilton.bidsandtenders.ca>

It is the sole responsibility of each bidder to check the website for any and all Addenda that have been issued for this Request for Tenders.



Hamilton

City of Hamilton
Corporate Services Department
Procurement Section
Email: procurement@hamilton.ca

Jennifer Rahim
Procurement Specialist
Email: jennifer.rahim@hamilton.ca

REQUEST FOR TENDERS NOTICE

Contract Number: C13-32-24

Prequalified Contractor Required for the Dundas Wastewater Treatment Plant (WWTP) Health and Safety Immediate Needs and Structural Repair Upgrades

**Closes: 3:00 PM, Hamilton time
Friday, January 24, 2025**

Only electronic bid submissions shall be accepted and received through the Bidding System by the closing date and time stated above.

There is no public opening for this Request for Tenders.

Bidders eligible to submit for this Request for Tenders have been previously selected through the process of Request for Prequalifications, issued under C14-11-23 which closed on January 26, 2024.

The following bidders have been prequalified:

1. ASCO Construction (Toronto) Ltd.
2. Bennett Mechanical Installations (2001) Ltd.
3. Bestco Construction Inc.
4. BGL Contractors Corp.
5. Clearway Construction Inc.
6. DeFaveri Group Contracting Inc.
7. Kingdom Construction Limited
8. Newman Bros. Limited
9. ROMAG Contracting Ltd.
10. Sona Constructor Inc.

1.0 SCOPE OF WORK

The scope of work for Dundas Wastewater Treatment Plant (WWTP) includes but is not limited to the following:

1. Repair concrete spalls, scaling and cracks on boardwalks and slabs throughout the plant;
2. Repair steel beam fireproofing in the basement of control building for Plant B;
3. Apply epoxy coating to the concrete within the ferric chemical containment area;
4. Replace the existing steel guardrail within the digester building, control buildings, and throughout Plant A with a new fiberglass reinforced plastic (FRP) guardrails that meets the current OBC requirements;
5. Install a new FRP guardrail around the plant inlet chamber;
6. Upgrade the existing aluminum railing throughout the plant to ensure it meets the OBC requirements including base plate modifications and kick plate installation;
7. Replace the four existing wooden baffles within the primary clarifier of Plant B with equivalent FRP baffles;
8. Replace the eight existing wooden baffles within the secondary clarifier of Plant B with equivalent FRP baffles;
9. Replace the entire existing wooden baffle within the grit building with an equivalent FRP baffle;
10. Replace the existing wooden baffle within the chlorine contact tank of Plant A with an equivalent FRP baffle;
11. Replace the existing handwheel actuated scum collection system within the primary clarifier of Plant B with a new lever actuated scum collection system;
12. Replace the existing return sludge piping above the aeration tanks in Plant B including the pipe hangers and two manually operated valves;
13. Replace the two existing access hatches above the basement of the Plant B control building with new access hatches that require a key/tool for external entry;
14. Install new railing mounted hatch locking system above six access hatches for buried chambers throughout the plant as identified in the contract documents;
15. Install steel clips to secure walkway grating throughout the plant;
16. Review completed DSS report and provide and implement a designated substance removal/ safe work plan
17. Remove the asbestos cladding on the outside of the digester valve building.
18. Replace the existing diffusers and associated piping in the Aeration Tanks of both Plant A and B including pipe/diffuser supports and isolation valves;

19. Provide temporary bypass pumping to support concrete repairs;
20. Provide temporary RAS piping to support aeration tank isolations;
21. Replace screening building inlet gate;
22. Replace sluice gate isolation valve between cell 1 and cell 2 of Plant A Aeration tanks;
23. Replace Plant A inlet channel slide plate;
24. Replace Plant B inlet channel slide plate;

25. Install aluminum stairs from the driveway to the west side of the Ferric building, inside the Ferric Building and within the Plant B control building; and
26. Replace the aluminum staircases in the basement of Plant B Control building.

2.0 CONTRACT REQUIREMENTS

Bidders are advised of the following contract requirements for this Request for Tenders:

2.1 Bid Security

Bid security: **\$250,000.00**

The City will only accept a digital bid bond in an electronically verifiable and enforceable (e-Bond) format.

2.2 Performance and/or Labour and Material Payment Security

Successful Bidder to provide:

Performance security (bond only accepted): **100%** of the Base Bid Price.

Labour and Material Payment security (bond only accepted): **50%** of the Base Bid Price.

3.0 SITE MEETINGS

3.1 Optional Site Meeting

There is an optional site meeting scheduled.

Location: 135 King Street East, Dundas ON (see location map attached)

Date: Thursday, December 12, 2024

Time: 9:00 am, Hamilton time
All attendees are required to wear CSA approved hard hats and safety boots. If an attendee does not have the required personal protection equipment they may not be allowed to attend the site meeting.

4.0 TO OBTAIN DOCUMENTS

4.1 Free Preview of Request for Tenders Documents

A complete set of Request for Tenders documents may be viewed for free on the City of Hamilton's bid opportunities website hamilton.bidsandtenders.ca.

4.2 Purchase of Request for Tenders Documents

The Request for Tenders documents are available for online purchase only.

Online: hamilton.bidsandtenders.ca

Fee: \$61.44 non-refundable, tax included + applicable bids&tenders™ fees

4.3 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 of Hamilton will accommodate for a disability, ensuring full and equitable participation throughout the bid process.

If a bidder requires this Request for Tenders in a different format to accommodate a disability, the bidder must contact the Tender Coordinator as soon as possible and in any event prior to the closing date. The Request for Tenders 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.

5.0 TRADE AGREEMENTS

This Request for Tenders is subject to the Canadian Free Trade Agreement (CFTA)

Procurement Manager
City of Hamilton

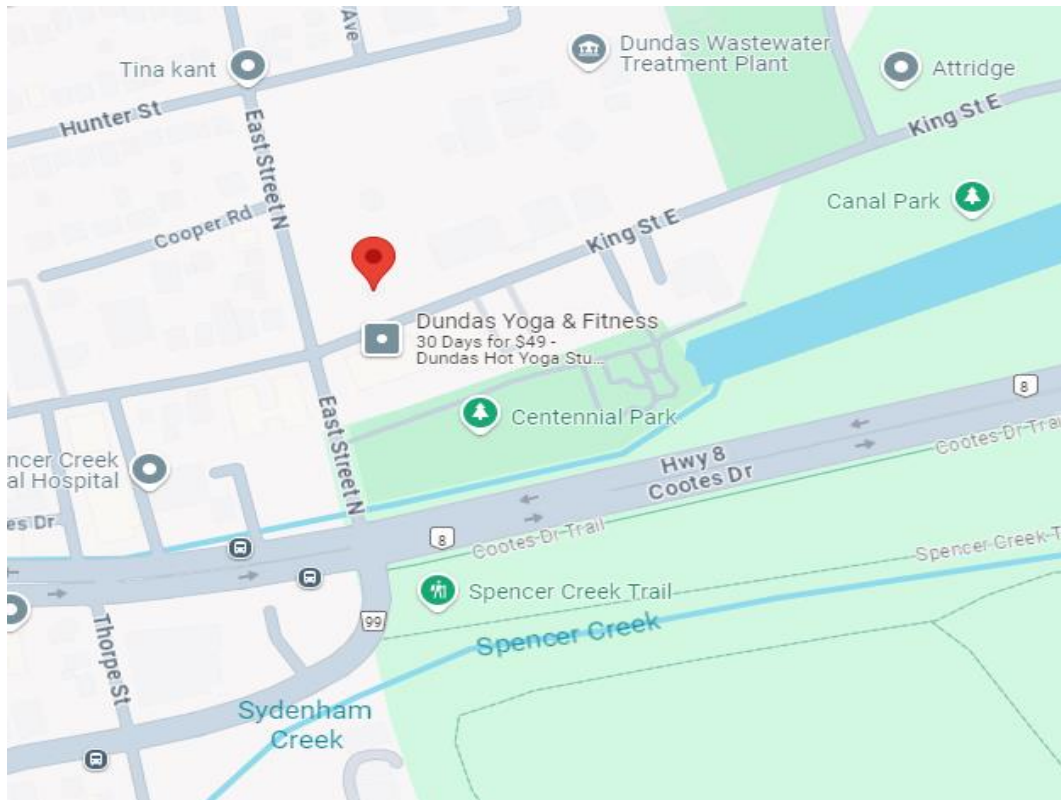
135 King Street East, Dundas ON

DISCLAIMER:

The following URL address and map have been provided for illustration purposes only and every effort has been made to ensure accuracy. The City of Hamilton cannot accept any responsibility for errors, omissions, or positional inaccuracy for this information.

Bidders must copy and paste the following URL address into a new web browser:

https://www.google.ca/maps/place/135+King+St+E,+Hamilton,+ON+L9H+7P8/@43.2668723,-79.9471386,17z/data=!3m1!4b1!4m6!3m5!1s0x882c849ed5e83291:0x332d3007a76ad3b8!8m2!3d43.2668723!4d-79.9445637!16s%2Fg%2F11cp7f1sbd?entry=ttu&g_ep=EgoyMDI0MDkwMi4xIKXMDS0ASAFQAw%3D%3D



Note: Bidders are to use parking lot next to Martino Park Field.

CITY OF HAMILTON
REQUEST FOR TENDERS
INSTRUCTIONS TO BIDDERS
Revised: October 7, 2022

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INSTRUCTIONS TO BIDDERS

Notice to prospective bidders: The Instructions set out herein define your obligations and limit your rights. Read carefully.

1 Interpretation

In these Instructions to Bidders,

- 1.1 the provisions shall be read with changes of gender, number or corporate status as the context may require;
- 1.2 a reference to any Act, by-law, rule, procedure or regulation shall be deemed to include a reference to any substitution or amendment thereof;
- 1.3 the headings to each section are inserted for convenience of reference only and do not form part of the Request for Tenders;
- 1.4 any reference to an officer of the City shall be construed to mean the person holding that office from time to time, the designate or deputy of that person, and shall be deemed to include a reference to any person holding a successor office or the designate or deputy of that person.
- 1.5 unless expressly stated to the contrary, the number of days shall be calculated by,
 - 1.5.1 counting all days including Saturdays, Sundays and public holidays, provided, however, that if the final day of any period shall fall on a Saturday, Sunday or public holiday, then the final day shall be deemed to be the next day which is not a Saturday, Sunday or public holiday;
 - 1.5.2 where “month” is referred to, it shall be a calendar month.

2 Definitions

Capitalized words and phrases used in these Instructions to Bidders, Supplementary Instructions to Bidders, and the Form of Tender shall have the following meanings, unless expressly stated otherwise.

“Addendum” means a written change issued to the Request for Tenders.

“Alternative” means anything for which bidders provide a price in a manner that gives the City options in determining the actual Work of the Contract and may include such items as an optional product, system, installation, method, design and requirement. The City shall not be obliged to purchase an Alternative when accepting a Bid, but may, at its discretion elect to purchase all, some or none of the Alternatives offered.

“Alternative Price” means the amount stipulated by the bidder for an Alternative, which can be stated as an addition, a deduction, or no change to the Base Bid Price. The Successful Bidder shall be obliged to adhere to the Alternative Price quoted in its Bid.

“Base Bid Price” means the amount stated in the Form of Tender by the bidder, for the Work without considering any Alternative or Alternative Price and includes all Provisional Items and Provisional Prices (if any).

“Bid” means a submission made by a bidder in response to the Request for Tenders.

“Bid Security” means the security submitted by a bidder with its Bid which provides financial protection to the City should the Successful Bidder not enter into the Contract or commence the Work following the issuance of a purchase order, and/or not provide the specified security required under the Contract.

“Bidding System” means the electronic system used by the City for the advertisement of public bid opportunities at the following website: <https://hamilton.bidsandtenders.ca>, and which is required to be used for all dissemination of information by or on behalf of the City and submissions from bidders for this Request for Tenders.

“Business Day” means a day which is not a Saturday, Sunday, public holiday or day when the administrative offices of the City are closed.

“City” means the City of Hamilton, and where an authority or discretion is conferred upon the City under the Request for Tenders, means the appropriate official of the City as designated or appointed under its governing by-laws, resolutions or policies from time to time.

“Contract” means the agreement by formal contract executed by both the City and the Successful Bidder, or 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 Tenders, and any written supplementary agreements which form part of the Contract.

“Electronic Bidding” means a method of issuing this Request for Tenders and/or receiving Bids where the process of using and/or receiving Bids by internet is considered appropriate, and in particular includes the Bidding System operated by bids&tenders™ system operated by eSolutions Group, 455 Philip Street, Waterloo, Ontario N2L 3X2.

“Form of Tender” means the City’s forms entitled Form of Tender and Schedule of Prices and any other documents that are supplied as part of the Request for Tenders and which are to be completed and confirmed by the bidder and submitted back to the City in their entirety through the Bidding System.

“Good” means any product of any description required to be installed, supplied or consumed in order to complete the Work.

“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 Tender.

“Procurement Manager” means the City’s Procurement Manager or his or her delegate or designate.

“Procurement Policy” includes those City procurement policies found at:
<https://www.hamilton.ca/build-invest-grow/buying-selling-city/bids-and-tenders/procurement-policy-by-law>

“Procurement Section Office” means 28 James Street North, 4th Floor, Hamilton, Ontario L8R 1A1.

“Project Manager” means the person designated by the City to administer and oversee the Work.

“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.

“Provisional Price” means the amount stipulated by the bidder for a Provisional Item which is to be included in the Base Bid Price.

“Request for Tenders” means all of the following documents, and in the event of a conflict between them, each shall enjoy priority against the others (subject to any express term or condition to the contrary) in accordance with the following successive order:

- (a) any Addendum;
- (b) any Supplementary General Conditions or Supplementary Conditions;
- (c) the General Conditions;
- (d) the Specifications, with any Supplementary Specifications (if any) taking priority over the standard Specifications;
- (e) any contract drawings;
- (f) the Supplementary Instructions to Bidders
- (g) these Instructions to Bidders;
- (h) the standard form text of the Form of Tender as prescribed by the City;
- (i) the sample Contract;
- (j) any other documents that form a part of the Request for Tenders.

“Service” means a service of any description required in order to complete the Work, whether commercial, industrial, trade or otherwise, and includes all professional, technical and artistic service, and the transporting, acquiring, supplying, storing and otherwise dealing in a Good.

“Specifications” means all written or printed requirements and standards forming part of the Request for Tenders 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.

“Stipulated Price” means a single, all inclusive, one price that applies to all of the Work.

“Successful Bidder” means the bidder to whom the City has awarded the Contract.

“Tender Coordinator” means the single point of contact for the Request for Tenders and will be the person named on the Communications page of the Request for Tenders.

“Tender Notice” means the public notification of the Request for Tenders.

“Total Contract Price” has the same meaning as Base Bid Price.

“Unit Price” means any component price as set out on the Form of Tender.

“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 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.

“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 Request for Tenders.

3 Guidelines Regarding Bid Irregularities

As a guide to the bidder, but without qualifying any rights and privileges reserved to the City, the bidders guidelines set out below is indicative of the manner in which discretion reserved by the City is to be exercised with respect to non-compliant Bids. However, the City shall not be liable to any bidder or other person where it elects to exercise a discretion, reserved privilege or right in a manner different from that indicated below. An irregularity that goes beyond the scope of the bidders Guidelines set out below shall be considered by the Procurement Manager.

BIDDERS GUIDELINES		
IRREGULARITY		RESPONSE
1.	Qualified or conditional Bid (A Bid restricted by a statement added to the Form of Tender or a covering letter or alterations to the Form of Tender).	Automatic rejection unless the Request for Tenders specifically permit such qualification or condition.
2.	A Bid received in a format not specified in the Request for Tenders such as hardcopy submission, fax, email, etc.	Automatic rejection.

BIDDERS GUIDELINES		
IRREGULARITY		RESPONSE
3.	A Bid received on documents other than those original documents supplied by the Bidding System.	Automatic rejection.
4.	Bid Security: Amount of Bid Security provided by bidder is insufficient, does not name correct Municipality as obligee, or no Bid Security is provided or is not otherwise in compliance with the Request for Tenders requirements.	Automatic rejection.
5.	Execution of Bid bond: Corporate seal or electronic signature of bidder, or both, are missing. Corporate seal or electronic signature of bonding company, or both, are missing.	Automatic rejection. Automatic rejection.
6.	Digital bid bond not provided or not an electronically verifiable and enforceable e-Bond.	Automatic rejection.
7.	Other irregularities.	An irregularity that goes beyond the scope of the Bidders Guidelines may be considered by the Procurement Manager.

4 Bid Submission and Form of Tender

4.1 Every Bid shall

- 4.1.1 be submitted on the City's prescribed Form of Tender in its entirety;
- 4.1.2 be completed in English;
- 4.1.3 have all of the required blank spaces provided on the Form of Tender completed by the bidder;
- 4.1.4 include all material, Goods, Services, equipment and labour, required to complete the Work; and
- 4.1.5 state all prices in Canadian funds, unless otherwise stipulated.

4.2 Electronic Bid submissions only, shall be accepted and received by the Bidding System, on or before the closing date and time stated in the Request for Tenders. A Bid submitted by mail, in person, fax, e-mail or other electronic means, other than through the Bidding System, will not be accepted.

4.3 Bidders shall have a Bidding System vendor account and must be registered as a plan taker for this Request for Tenders. Only plan takers will have access to download this Request for Tenders document, receive Addendum email notifications, download Addendum and to submit their Bid electronically through the Bidding System.

If a bidder has obtained the Request for Tenders document from a third party, the onus is on the bidder to create a Bidding System vendor account and register as a plan taker for the bid opportunity.

- 4.4 Time is of the essence with respect to the submission of a Bid. It is the **sole** responsibility of each bidder to ensure that its Bid is received by the Bidding System on or before the closing date and time stated in the Request for Tenders document. The closing time shall be determined by the Bidding System web clock.

Bidders are advised that the timing of their Bid submission is based on when the Bid is RECEIVED by the Bidding System, not when a Bid is submitted by a bidder, as Bid transmission can be delayed in an “internet traffic jam” due to file transfer size, transmission speed, etc.

Bidders shall allow sufficient time to upload their Bid submission, including any attachments. Late Bid submission shall not be accepted by the Bidding System.

- 4.5 The Bidding System will send a confirmation email to the bidder advising that their Bid was submitted successfully. If an email confirmation is not received, contact technical support at bids&tenders™ via email: support@bidsandtenders.ca or by telephone 1-800-594-4798.
- 4.6 It is the exclusive responsibility of each bidder to submit a complete Bid in accordance with the Request for Tenders.
- 4.7 All documents prepared and work carried out by a bidder in preparing a Bid, and all oral presentations to the City in connection with a Bid, shall be without cost to the City, and neither the City’s publication of a Request for Tenders nor the submission of a Bid shall be construed to oblige the City to award a Contract.
- 4.8 All words and phrases forming part of a Bid should be written out in full, and abbreviations should not be used.
- 4.9 No amendment may be made to a Bid after it has been submitted, except in the circumstances set out in Article 6.4 of these Instructions to Bidders.

5 Bid Security

- 5.1 Each bidder shall submit with its Bid a Bid Security in the form of a digital bid bond in an electronically verifiable and enforceable (e-Bond) format in the amount set out in the Supplementary Instructions to Bidders.

For additional information regarding e-Bonds, bidders should contact their surety company or visit the Surety Association of Canada website.

- 5.2 A scanned PDF copy of bonds, original certified cheque, bank draft, money order or any other format other than a digital bid bond is not acceptable and shall be rejected.

- 5.3 Bidders shall upload their Bid Security to the Bidding System, in the bid submission file labelled "Bid Bond". All instructions and details for assessing authentication shall be included with the digital bond uploaded in the Bidding System.
- 5.4 A Bid Security shall, include such terms, be in a form, be executed appropriately and be provided by an issuer authorized to do business in the Province of Ontario, satisfactory to the City in its reasonable discretion.
- 5.5 When a Bid is accepted by the City, the Successful Bidder will enter into a Contract for the performance of the Work. The Successful Bidder will commence the Work, following the issuance of a purchase order or notice to proceed, and will give the specified security required under the Request for Tenders and the Contract within 10 Business Days of request by the City.
- 5.6 The digital bid bond will not be returned to the bidder.
- 5.7 The term of the Bid Security shall be for a minimum period of 90 days after the closing date of the Request for Tenders. Where the irrevocability period for a Bid is extended in accordance with Article 10.2 of these Instructions to Bidder, the bidder shall also ensure that the term of the Bid Security is extended for the same period of time as the irrevocability period.
- 5.8 A Bid submitted without the required Bid Security will be rejected by the City.
- 5.9 Each bidder that submits a Bid will be deemed to have acknowledged and agreed that the amount of the Bid Security required with respect to a Bid constitutes a genuine pre-estimate on the part of the City of the damages that will be suffered by the City as a result of a failure or refusal on the part of the Successful Bidder to enter into a Contract, to commence the Work following the issue of a purchase order or notice to proceed, and/or to give the specified security required under the Request for Tenders and the Contract.
- 5.10 In the event of a failure or refusal on the part of the Successful Bidder to enter into the Contract, to commence the Work following the issue of a purchase order or notice to proceed, and/or to give the specified security required under the Request for Tenders and the Contract, the City shall declare the Bid Security forfeited and the Successful Bidder may be held responsible at the City's discretion for any increased costs or damages incurred by the City over and above the amount of that Bid Security.
- 5.11 In addition to the Reserved Privileges of the City set out at Article 16 of the Instructions to Bidders, the City may at its discretion, in the event of a failure, refusal or default on the part of the Bidder to enter into the Contract, to commence the Work following the issue of a purchase order or notice to proceed, and/or to give the specified security required under the Request for Tenders and the Contract, annul the award or terminate the Contract, accept the next lowest compliant Bid, advertise for new tenders, or carry out the Work in any manner deemed in the best interests of the City. In such a case, if required by the City, the bidder shall pay the City the difference between the Base Bid Price and any greater sum that the City may be

obligated to pay by reason of the failure, refusal or default of that bidder, including the cost of any advertisement for new tenders.

6 Addenda and Clarification of the Request for Tenders

6.1 The City reserves the right at any time prior to the award of the Contract,

6.1.1 to withdraw or cancel the Request for Tenders;

6.1.2 to extend the time for the submission of Bids; or

6.1.3 to modify the Request for Tenders,

by the publication of an Addendum, which shall become part of the Request for Tenders, 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.

6.2 Without limiting the City's right, Article 6.1 may apply to situations where no Bid is compliant or an insufficient number of bids have been received.

6.3 Any Addendum shall be posted on the following website and is sufficiently served upon any prospective bidder if so posted.

<https://hamilton.bidsandtenders.ca>

6.3.1 In addition to the above method of posting, the City may also notify prospective bidders of any Addendum by any other 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 Tenders from the City.

6.3.2 It is the sole responsibility of each bidder to check the website and ensure that it has received any and all Addenda issued by the City. Bidders shall confirm in the Form of Tender that they have received, examined and provided for all Addenda issued under the Request for Tenders. Bidders may in writing, seek confirmation of the number of Addenda issued under the Request for Tenders from the Tender Coordinator.

6.4 Where a bidder submits their Bid prior to the Request for Tenders closing date and time and an Addendum has been issued by the City, the Bidding System automatically **WITHDRAWS** the bidder's Bid submission and changes the Bid submission to an **INCOMPLETE STATUS (NOT accepted by the City)**. The withdrawn Bid can be viewed by the bidder in the "**MY BIDS**" section of the Bidding System. The bidder is solely responsible to:

6.4.1 make any required adjustments to their Bid;

- 6.4.2 acknowledge all Addenda that have been issued for this Request for Tenders; and
- 6.4.3 ensure the re-submitted Bid is **RECEIVED** by the Bidding System before the closing date and time stated in the Request for Tenders.

6.5 All communication between a bidder and the City (including requests for information or clarification) **shall** be set down in writing and directed to the Tender Coordinator named in the Communications page.

6.6 Any request directed to the City with respect to Article 6.5 prior to the closing date of the Request for Tenders must allow sufficient time for a written response or clarification to be issued by the City prior to the closing date, should the City consider it necessary to issue such response or clarification.

6.7 A written response or clarification of substance shall be shared with each bidder and issued in the form of an Addendum.

6.8 The City shall not be bound by any oral:

6.8.1 instruction;

6.8.2 amendment or clarification of the Request for Tenders;

6.8.3 information; or

6.8.4 advice or suggestion,

provided by any member of the City's staff or consultant to the City concerning the Request for Tenders or the manner in which the Work is to be carried out and the bidder bears any and all risk in relying on such representation.

6.9 Bidders shall acknowledge receipt of any Addenda when submitting their Bid through the Bidding System. Bidders shall check a box for all Addenda and any applicable attachments that have been issued before a bidder can re-submit their Bid submission online.

7 Bidder Responsibilities

7.1 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.

7.2 Each bidder shall be responsible for:

7.2.1 ensuring that it has conducted a thorough inspection of the site, has investigated and examined the Request for Tenders 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;

7.2.2 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 Tenders and shall be responsible for any site, subsurface or otherwise concealed physical condition set out in or inferable from any such report; and

7.2.3 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 Tenders 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.

7.3 The cost of any Work which results from encountering any condition that is described in or properly inferable from the information referred to in Article 7.2 above shall be included in the bidder's Base Bid Price.

8 Opening of Bids

There is no public opening for this Request for Tenders. All Bids shall be electronically opened and posted on the Bidding System, <https://hamilton.bidsandtenders.ca>, following the closing date and time of the Request for Tenders. The name of the bidder and the Base Bid Price shall be posted for each Bid received.

9 Review of Bids & Bid Verification

9.1 Following the electronic opening, each apparently eligible Bid will be examined by the Procurement Manager to confirm that they are compliant and otherwise complete.

9.2 Unless expressly stated otherwise, the City shall apply a standard of substantial compliance against each Bid.

9.3 The City is not obliged to seek verification of any aspect of a Bid, however, the City may, if it determines that it is appropriate to do so under the circumstances, verify any aspect of any Bid received, at any time, in order to resolve an ambiguity in either the language used or any other vague or uncertain aspect of the Bid.

9.4 Such verification shall not alter the Bid, constitute negotiation or re-negotiation of the price or any other aspect of the Bid, and all correspondence with a bidder for the purposes of such verification shall be conducted through the Procurement Manager.

9.5 The review or verification of a Bid with a bidder shall not oblige the City to enter into a Contract with a particular bidder, nor shall it constitute an acceptance of a Bid.

9.6 All verification under this section shall form part of the Bid, be in writing, and be in a form satisfactory to the City.

10 Acceptance & Irrevocability of Bid

- 10.1 A Bid shall be irrevocable and open for acceptance by the City of Hamilton for a period of 90 days following the closing date and time of the Request for Tenders.
- 10.2 Where the City is unable to award a Contract prior to the expiry of the irrevocability period, the City may, on or prior to that expiry date, make a request to each of the compliant bidders to confirm, in writing, their willingness to hold their Bid prices, extend the term of their Bid Security and extend the irrevocability period for the specific period of time requested by the City.

11 Award of Contract

- 11.1 The City shall notify the Successful Bidder as soon as practicable after the award of the Contract. Despite any requirement for the formal execution of a Contract, the Contract shall be deemed to arise upon the award of the Contract to the Successful Bidder.
- 11.2 Where a Request for Tenders is awarded to a bidder in respect of the Work and in accordance with the provisions of the Request for Tenders and Bid, the bidder shall be required to either:
 - 11.2.1 execute a Contract on the form set out in the Request for Tenders and approved by the City's Legal Services Division; or
 - 11.2.2 where the form of Contract in Article 11.2.1 is not required they shall be assigned a contract number and the Request for Tenders and the Bid shall become the Contract in respect of the Work.
- 11.3 The award letter will identify documents required by the City prior to being able to issue a purchase order, the timeline for providing those documents to the City and the name of the Project Manager who will coordinate the start date for the Work.
- 11.4 The Base Bid Price for each compliant Bid received as well as the Contract award information may be obtained from the following website:

<https://hamilton.bidsandtenders.ca>

12 Conflict of Interest, Lobbying and Collusion

- 12.1 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.
- 12.2 Other than as expressly permitted or required in the Request for Tenders a bidder and their representative shall not, with respect to the Request for Tenders or the Work, make any public comment, respond to questions in a public forum, or carry out any activities to publicly promote or advertise their qualifications, their Bid, or their interest in this competitive procurement process.

- 12.3 For greater certainty, a bidder shall not communicate with the City regarding this procurement except through the Tender Coordinator identified on the Communications page of the Request for Tenders who shall be the City's single point of contact for the bidder during this process.
- 12.4 The bidder acknowledges that this Bid is made without any connection, comparison of figures or arrangements with, or knowledge of, any other person making a Bid for the same work and is in all respects fair and without collusion or fraud.

13 Confidentiality

- 13.1 A bidder should be aware that all information submitted is being collected under 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. In this regard, the bidder should be aware that:
- 13.1.1 the bidder's name and Base Bid Price at a minimum will be made public. In addition, certain contractual information must be disclosed to Council and accordingly may become part of the public record; and
 - 13.1.2 all correspondence, documentation and information provided by a bidder to the City as part of a Bid may be reproduced for the purposes of reviewing the bidder's Bid and/or for the purposes of an audit of the procurement process.
- 13.2 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 such 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. In preparing the Bid, the bidder should note the following:
- 13.2.1 a bidder may mark as confidential any scientific, technical, commercial, proprietary or similar confidential information contained in its Bid, the disclosure of which could cause it injury, excluding the Base Bid Price and its name. A bidder shall not identify the whole of a Bid as confidential. A watermark or rubber stamp imprint is suitable to identify confidential parts of a Bid.
- 13.3 All correspondence, documentation and information provided by the City, its employees, agents or representatives to any bidder in connection with, or arising out of the Request for Tenders remains the property of the City and must not be used for any purpose other than for replying to the Request for Tenders. Confidentiality of records and information of the City relating to the Work described in the Request for Tenders must be maintained at all times. If any proprietary or confidential information belonging to, or in the care of, the City is disclosed to any bidder by the City's employees, agents, representatives and independent contractors, or any other

person at the request of the City in connection with the Request for Tenders, the bidder shall:

- 13.3.1 safeguard all such information;
- 13.3.2 maintain in strict confidence and not reproduce or disclose any such information to any person except as required by law or as expressly permitted in advance by the City in writing;
- 13.3.3 return forthwith all such information as may be in documentary form or recorded electronically by the closing date and time; and
- 13.3.4 not use any such information for any purpose other than the purpose for which it was provided by the City or by any other person at the request of the City.

14 Withdrawal of Bids by Bidder

- 14.1 Withdrawal of a Bid after it has been submitted and received by the Bidding System, is permitted only prior to the closing date and time of the Request for Tenders.
- 14.2 Requests made after the closing date and time of the Request for Tenders to withdraw a Bid received by the Bidding System will be disregarded.
- 14.3 A Bid withdrawn prior to the closing date and time of the Request for Tenders may be revised and re-submitted at any time prior to that closing date and time. Bidders are solely responsible to ensure:
 - 14.3.1 any required revisions are made to their Bid;
 - 14.3.2 acknowledge all Addenda that have been issued for this Request for Tenders; and
 - 14.3.3 ensure the re-submitted Bid is received by the Bidding System prior to the closing date and time of the Request for Tenders.

15 Price

- 15.1 No variation in Bid price(s) shall be permitted after the closing date and time of the Request for Tenders except where the City corrects an obvious computational or other mathematical error evident on the face of the Bid. Only extensions, subtotals and totals shall be corrected. No modification to individual prices, either Unit Price or Lump Sum Price, shall be made by the City.
- 15.2 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.
- 15.3 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.

- 15.4 The Base Bid Price and all other prices quoted on the Form of Tender shall be exclusive of Value Added Taxes. All other taxes shall be included in the prices submitted for this Request for Tenders.

Where there is a variation due solely to an increase or decrease in the rate of applicable Value Added Tax from a Canadian taxing authority, beyond the control of the Successful Bidder, occurring after the time and date of submission of its Bid, the variation shall alter the price of the Bid only to the extent of the Value Added Tax increase or decrease. The Successful Bidder must prove to the satisfaction of the City that the Successful Bidder will not benefit in any way by reason of any increase to the Base Bid Price.

- 15.5 As various parts of the Work may or may not be exempt from Value Added Taxes, the bidder is required to refer to the Supplementary Instructions to Bidders for details, if any, respecting payment exemptions, rebates and Value Added Taxes.

16 Reserved Privileges of the City

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

- 16.1 The City may reject a Bid on the following basis:

16.1.1 the City may reject any Bid, the lowest Bid or all Bids, may cancel the Request for Tenders or may cancel the Request for Tenders and require the submission of new Bids;

16.1.2 any extraordinary or unjustified disparity between the lowest Bid and the other Bids received by the City;

16.1.3 the need to avoid the use of unproven technology and methodologies;

16.1.4 the prior record of the bidder as a contractor to the City;

16.1.5 a Bid submitted by a person which in the opinion of the City or its professional advisors, does not possess the experience, or financial, technical, personnel or other resources that may reasonably be expected to be necessary in order to carry out the obligations that the bidder proposes to assume under the terms of its Bid.

- 16.2 Where the Contract is awarded to the lowest compliant bidder, the City may negotiate amendments to the Contract or to the Work to be done or Services or materials to be supplied under the Contract.

- 16.3 Where none of the Bids are compliant and in the opinion of the City it is impractical to reissue a new Request for Tenders, the City will reject all of the Bids and may permit Bids to be submitted without issuing a new Request for Tenders.

- 16.4 Where the Base Bid Price for the lowest compliant Bid received substantially exceeds the estimated procurement cost of the Work, the City may negotiate with the lowest compliant bidder for a reduction to the Base Bid Price.
- 16.5 The City maintains the right to verify any information provided or contained in any Bid.
- 16.6 The City reserves the ability to exercise the rights, privileges and authority contained in the Procurement Policy and procedures thereunder with respect to the Request for Tenders.

17 Notice to Proceed and Start Date

- 17.1 The City may issue a written notice to proceed to the Successful Bidder prior to the execution of any required Contract.
- 17.2 Work shall commence on the start date specified in the notice to proceed, unless otherwise agreed by the Successful Bidder and the City.

18 Applicable Law and Limit on Liability

- 18.1 The City shall not be liable, in any way, to the bidder for any delays, or costs associated with delays, in the Request for Tenders process.
- 18.2 The bidder agrees that,
 - 18.2.1 any action or proceeding relating to the Request for Tenders process shall be brought in an Ontario court of competent jurisdiction and any such action or proceeding shall be issued at the Hamilton, Ontario office of that Court and for that purpose each party irrevocably and unconditionally attorns and submits to the jurisdiction of that Ontario court at Hamilton, Ontario;
 - 18.2.2 it irrevocably waives any right to and will not oppose any Ontario action or proceeding relating to the Request for Tenders process on any jurisdictional basis, including forum non conveniens; and
 - 18.2.3 it will not oppose, in any other jurisdiction, the enforcement against it of any judgment or order duly obtained from an Ontario court in Hamilton, Ontario as set out above.
- 18.3 If a bidder is required by applicable law to hold or obtain a licence, permit, consent or authorization to carry on an activity contemplated in its Bid, neither acceptance of the Bid nor execution of the Contract shall be considered to be approval by the City of carrying on such activity without the requisite licence, permit, consent or authorization.
- 18.4 The bidder agrees that if the City commits a material breach of the Request for Tenders (that is, a material breach of Contract A), the City's liability to the bidder and the aggregate amount of damages recoverable against the City for any matter

relating to or arising from that material breach, whether based upon an action or claim in contract, warranty, equity, negligence, intended conduct or otherwise, including any action or claim arising from the acts or omissions, negligent or otherwise, of the City, shall be no greater than the Bid preparation costs that the bidder seeking damages from the City can demonstrate.

19 Accommodations for Bidders with Disabilities

- 19.1 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 of Hamilton will accommodate for a disability, ensuring full and equitable participation throughout the bid process.
- 19.2 If a bidder requires this Request for Tenders in a different format to accommodate a disability, the bidder must contact the Tender Coordinator as soon as possible and in any event prior to the closing date. The Request for Tenders 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.

SUPPLEMENTARY INSTRUCTIONS TO BIDDERS

Revised: January 25, 2023

1. OPTIONAL SITE MEETING

There is an optional site meeting scheduled.

Location: 135 King Street East, Dundas ON (see location map attached)

Date: Thursday, December 12, 2024

Time: 9:00AM, Hamilton time

Note: Bidders are to use parking lot next to Martino Park Field

All attendees are required to wear CSA approved hard hats and safety boots. If an attendee does not have the required personal protection equipment, they may not be allowed to attend the site meeting.

2. TAXES

There are no supplementary instructions regarding Value Added Taxes.

3. BID SECURITY

Bidders shall submit a Bid Security in accordance with Article 5 Bid Security of the Instructions to Bidders in the amount of not less than **\$250,000.00**.

4. JOINT VENTURES

Where a Contract is awarded to a joint venture, the total amount of incomplete Work under that Contract will be charged to each of the Bidders, jointly and severally, when and if they should submit a Bid in response to a further Request for Tenders on an individual basis unless they jointly declare in writing the specific percentage of contract value which they wish charged against the prequalification rating for each of the respective parties, and for this purpose, that percentage must be declared at the time of the submission of their Bid and may not be changed thereafter.

A joint venture Bid will only be accepted where the parties to the Joint Venture are in general partnership, without limited partners, and are registered as a general partnership under the Business Names Act, R.S.O. 1990. A joint venture, where the Bidder is a corporation, will not be accepted. Where a joint venture Bid is permitted, whether by joint venture or otherwise, each of the parties to the Bid shall be jointly and severally responsible and liable in all respects for the obligations and responsibilities of the Bid.

5. **RECORD AND REPUTATION**

See the City of Hamilton Procurement Policy for specific requirements and obligations at: <https://www.hamilton.ca/build-invest-grow/buying-selling-city/bids-and-tenders/procurement-policy-by-law>

6. **AWARD OF CONTRACT**

Subject to the Reserved Privileges of the City set out in Article 16 of the Instructions to Bidders, the Contract shall be awarded to the compliant Bid with the lowest Base Bid Price.

7. **SPECIFIED PRODUCTS OR SERVICES**

Specified product or service 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 or service, 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 or service required by the Specifications shall be made by the Successful Bidder without the prior written approval of the City.

8. **APPROXIMATE QUANTITIES/LOCATIONS**

Estimated quantities/locations are indicated in the Request for Tender for the sole purpose of comparing Bids. While these quantities/locations are based on past use and anticipated future requirements, the City is not bound to purchase these quantities or any minimum quantities. The City reserves the right to increase or decrease the estimated quantities at the prices quoted without penalty.

9. **POLICIES, REGULATIONS AND GUIDELINES**

The Successful Bidder shall be aware of and adhere to all of the applicable City Policies and Legislation set out on the City of Hamilton website at: <https://www.hamilton.ca/build-invest-grow/buying-selling-city/bids-and-tenders/procurement-policy-by-law>

10. **DECLARATION OF BIDDER COMPLIANCE WITH CITY BY-LAWS**

Should the Bidder's declaration in its Form of Tender 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 their Bid.

11. **RFPQ C14-11-23 – PREQUALIFICATION FORM AND APPLICATION**

All information provided by the Bidder or otherwise included in its Prequalification Form and Application, submitted in response to RFPQ C14-11-23, shall be deemed to be material representations by the Bidder to the City. The Bidder shall be deemed

to have warranted the truth of the representations so made, and that those representations remain current at the time of the submission of its Form of Tender. The Bidder who becomes the Successful Bidder shall further be deemed to have warranted the truth of the representations so made until the completion of the Contract.

LUMP SUM BREAKDOWN OF BASE BID PRICE

Revised: December 2, 2011

Contract Number: C13-32-24

LOCATION: 135 King Street East, Dundas			
DESCRIPTION: Dundas Wastewater Treatment Plant (WWTP) Health a Safety Immediate Needs and Structural Repair Upgrades			
After opening of the Bids, the two apparent low bidders are required to submit to the City, within two Business Days of the closing date of the Request for Tenders, the breakdown of their Base Bid Price. The breakdown shall be given according to the following Lump Sum Breakdown. The City may refuse to accept any breakdown, which contains prices considered to be unbalanced and request the bidder to adjust the breakdown to correct such unbalancing, and by submitting its Bid, the bidder agrees to do so upon such request by the City.			
SUMMARY			
SECTION "1"	Pre-Construction Items	TOTAL	\$
SECTION "2"	Construction Items	TOTAL	\$
SECTION "3"	Lump Sum for Other Requirements	TOTAL	\$
SECTION "4"	Provisional Items	TOTAL	\$
SECTION "5"	Commissioning, Training and Submittals	TOTAL	\$
Contingency Allowance			\$ 485,000.00
BASE BID PRICE			\$

CONTRACT NO. C13-32-24
LUMP SUM BREAKDOWN OF BASE BID PRICE

SECTION "1" - Pre-Construction Items

LOCATION: 135 King Street East, Dundas

DESCRIPTION: Dundas Wastewater Treatment Plant (WWTP) Health a Safety Immediate Needs and Structural Repair Upgrades

ITEM NO.	DESCRIPTION	LUMP SUM PRICES
1.1	Bonding	\$
1.2	Insurance	\$
1.3	Shop Drawings	\$
1.4	Mobilization/Demobilization	\$
1.5	Construction Sign	\$
Total of Section "1" \$ _____ (Carry to Summary on Lump Sum Breakdown of Base Bid Price)		

CONTRACT NO. C13-32-24

LUMP SUM BREAKDOWN OF BASE BID PRICE

	SECTION "2" - Construction Items				
	LOCATION: 135 King Street East, Dundas				
	DESCRIPTION: Dundas Wastewater Treatment Plant (WWTP) Health a Safety Immediate Needs and Structural Repair Upgrades				
ITEM NO.	DESCRIPTION	UNITS	EST'D QTY.	UNIT PRICE	TOTAL PRICE
1	General				
1.1	Project Management			LUMP SUM	\$
1.1.2	Project Meetings			LUMP SUM	\$
1.1.3	Construction Schedule and Sequence of Work			LUMP SUM	\$
1.1.4	All Other Division 1 Requirements			LUMP SUM	\$
1.1.5	Warranty Work			LUMP SUM	\$
2	Guardrails				
2.1	Supply and installation of new FRP guardrail around the plant inlet chamber (including kickplate).	l.m.	9	\$	\$
2.2	Supply and installation of Top Mount Base Connection for FRP guardrail -plant inlet chamber.	ea	6	\$	\$
2.3	Supply and installation of new FRP guardrail within the Grit Building. (including kickplate)	l.m.	15	\$	\$
2.4	Supply and installation of Top Mount Base Connection for FRP guardrail -Grit Building.	ea	10	\$	\$
2.5	Supply and installation of new FRP Guardrail within the Digester Valve Building. (including kickplate)	l.m.	15	\$	\$

2.6	Supply and installation of Top Mount Base Connection for FRP guardrail – Digester Valve Building.	ea.	10	\$	\$
2.7	Supply and installation of new FRP Guardrail around Plant A Primary Clarifiers (including kickplate).	l.m.	90	\$	\$
2.8	Supply and installation of Side Mount Base Connection for FRP guardrail -Plant A Primary Clarifiers.	ea.	36	\$	\$
2.9	Supply and installation of new FRP Guardrail around Plant A Aeration Tanks (including kickplate).	l.m.	150	\$	\$
2.10	Supply and installation of Top Mount Base Connection for FRP guardrail -Plant A Aeration Tanks.	ea.	100	\$	\$
2.11	Supply and installation of new FRP Guardrail around Plant A Secondary Clarifiers (including kickplate).	l.m.	150	\$	\$
2.12	Supply and installation of Top Mount Base Connection for FRP guardrail -Plant A Secondary Clarifiers.	ea.	36	\$	\$
2.13	Supply and installation of Side Mount Base Connection for FRP guardrail -Plant A Secondary Clarifiers.	ea.	60	\$	\$
2.14	Supply and installation of new FRP Guardrail around Plant A Chlorine Contact Tank (including kickplate).	l.m.	50	\$	\$
2.15	Supply and installation of Top Mount Base Connection for FRP guardrail -Plant A Chlorine Contact Tank.	ea.	20	\$	\$
2.16	Supply and installation of Side Mount Base Connection for FRP guardrail -Plant A Chlorine Contact Tank	ea.	8	\$	\$
2.17	Removal and safe disposal of the existing steel guardrail around Plant A Primary Clarifiers.	LUMP SUM			\$
2.18	Removal and safe disposal of the existing steel guardrail around Plant A Aeration Tanks.	LUMP SUM			\$

2.19	Removal and safe disposal of the existing steel guardrail around Plant A Secondary Clarifiers.	LUMP SUM			\$
2.20	Removal and safe disposal of the existing steel guardrail around Plant A Chlorine Contact Tanks.	LUMP SUM			\$
2.21	Removal and safe disposal of the existing steel guardrail within the Grit Building.	LUMP SUM			\$
2.22	Clean, surface preparation and paint the existing steel guardrail in and around the Ferric Building.	LUMP SUM			\$
2.23	Removal, safe disposal and replacement of the existing steel guardrail within Plant A Control Building as required per the tender documents.	LUMP SUM			\$
2.24	Base plate modification to aluminium guardrail post vertically mounted to concrete platform or boardwalk as required per the tender documents and as directed by the Engineer.	ea.	350	\$	\$
2.25	Base plate modification to aluminium guardrail post vertically mounted to concrete wall as required per the tender documents and as directed by the Engineer.	ea.	250	\$	\$
2.26	Supply and install aluminium guardrail hatch locking system as required per the tender documents.	ea.	6	\$	\$
2.27	Removal, safe disposal and replacement of existing chain gate with new double stainless-steel chain and eye hooks as required per the tender documents.	ea.	20	\$	\$
2.28	Supply and installation of FRP kickplate on existing aluminium guardrail as required per the tender documents and as directed by the Engineer.	l.m.	950	\$	\$
2.29	Repair broken sections of existing aluminium guardrail required per the tender documents and as directed by the Engineer.	ea.	4	\$	\$

3	Baffles				
3.1	Removal and safe disposal of existing wooden baffle wall within the grit building. Supply and installation of new FRP baffle wall as required per the tender documents.	ea.	1	\$	\$
3.2	Removal and safe disposal of existing wooden baffle wall in Plant A Chlorine Contact Tank. Supply and installation of new FRP baffle wall as required per the tender documents.	ea.	1	\$	\$
3.3	Removal and safe disposal of existing wooden baffle wall within Plant B Primary Clarifiers. Supply and installation of new FRP baffle wall as required per the tender documents.	ea.	4	\$	\$
3.4	Removal and safe disposal of existing wooden baffle wall within Plant B Secondary Clarifiers. Supply and installation of new FRP baffle wall as required per the tender documents.	ea.	8	\$	\$
4	Process Mechanical				
4.1	Removal and safe disposal of existing access hatches to the Plant B Control Building Basement and supply and installation of new hatches as required per the tender documents.	ea.	2	\$	\$
4.2	Removal and safe disposal of the existing handwheel actuated scum collection system within the Primary Clarifier of Plant B. Supply and installation of new scum collection system as required per the tender documents.	ea.	2	\$	\$
4.3	Removal and safe disposal of the existing 200mm diameter ductile iron RAS piping above the Aeration Tanks in Plant B and replacement with new 200mm diameter stainless steel piping as required per the tender documents. Including all	LUMP SUM			\$

	associated pipe supports.				
4.4	Mechanically clean and apply coating to existing ductile iron RAS piping as required per the tender documents.	LUMP SUM			\$
4.5	Supply and install new 200mm gate valves per the new RAS Piping as per the contract drawings	ea.	2	\$	\$
4.6	Disconnection, removal and safe disposal of existing spitter boxes beside Plant B Aeration Tanks as required per the tender documents. Including capping the existing 100mm waste activated sludge line.	ea.	2	\$	\$
4.7	Removal and safe disposal of existing diffusers and supply piping in Plant A as required per the tender documents.	LUMP SUM			\$
4.8	Removal and safe disposal of existing diffusers and supply piping in Plant B as required per the tender documents.	LUMP SUM			\$
4.9	Supply and install diffusers, air supply piping laterals, headers and drop pipes in Plant A as required per the tender documents.	LUMP SUM			\$
4.10	Supply and install diffusers, air supply piping laterals, headers and drop pipes in Plant B as required per the tender documents. Including any modifications to air supply piping to install new isolation valves.	LUMP SUM			\$
4.11	Supply and install 150mm isolation valve on air supply piping in Plant B as required per the tender documents.	ea.	4	\$	\$
4.12	Supply and install 200mm isolation valve on air supply piping in Plant B as required per the tender documents.	ea.	1	\$	\$
4.13	Removal and safe disposal of the existing stop gate at the inlet of the screening building. Supply and install new stop gate at the inlet to the mechanical screening building as required per the tender documents.	ea.	1	\$	\$

4.14	Removal and safe disposal existing sluice gate between Plant A Aeration tank cells. Supply and installation of new sluice gate as required per the tender documents.	ea.	1	\$	\$
4.15	Supply and install Plant A inlet channel slide plate as required per the tender documents.	ea.	1	\$	\$
4.16	Supply and install Plant B inlet channel slide plate as required per the tender documents.	ea.	1	\$	\$
5	Concrete				
5.1	Removal, preparation and remediation of deteriorated concrete as required per the tender documents and directed by the Engineer (deck edge).	l.m.	35	\$	\$
5.2	Removal, preparation and remediation of deteriorated concrete as required per the tender documents and directed by the Engineer (wall top).	l.m.	20	\$	\$
5.3	Removal, preparation and remediation of deteriorated concrete as required per the tender documents and directed by the Engineer (vertical patches below waterline).	sq.m.	110	\$	\$
5.4	Removal, preparation and remediation of deteriorated concrete as required per the tender documents and directed by the Engineer (horizontal patches below waterline).	sq.m.	100	\$	\$
5.5	Removal, preparation and remediation of deteriorated concrete as required per the tender documents and directed by the Engineer. (vertical patches above waterline)	sq.m.	60	\$	\$
5.6	Removal, preparation and remediation of deteriorated concrete as required per the tender documents and directed by the Engineer. (horizontal patches above waterline)	sq.m.	60	\$	\$
5.7	Removal, preparation and remediation of concrete fireproofing on steel beam in the basement of Plant A Control	LUMP SUM			\$

	Building as required per the tender documents and directed by the Engineer.				
5.8	Removal, preparation and remediation of concrete stairs in the Digester Valve Building as required per the tender documents and directed by the Engineer.	LUMP SUM			\$
5.9	Crack Injections as required per tender documents	l.m.	200	\$	\$
5.10	Clean and apply epoxy coating to chemical containment area as required per tender documents	sq.m.	50	\$	\$
5.11	Remove and safe disposal concrete cladding containing asbestos per the Digester Valve building and replace with new steel cladding as required per tender documents.	sq.m.	30	\$	\$
5.12	Supply and install concrete piers for Aluminium Staircase outside the Ferric tank containment area. Including any excavation, site restoration and rip rap installation as required per tender documents	LUMP SUM			\$
5.13	Supply and install concrete sidewalk beside the Ferric Building as required per tender documents.	LUMP SUM			\$
5.14	Supply and install additional concrete support in the basement of the Digester Valve building as required per the tender documents.	LUMP SUM			\$
6	Aluminium Staircase				
6.1	Removal and safe disposal of existing steel ladder and supply and install aluminium staircase inside the Ferric tank containment area as required per the tender documents.	LUMP SUM			\$
6.2	Supply and install aluminium staircase outside the Ferric tank containment area as required per the tender documents.	LUMP SUM			\$

6.3	Removal and safe disposal of existing aluminium platforms and supply and install new aluminium staircase with guardrails inside the basement of Plant B control building as required per the tender documents.	LUMP SUM			\$
7	Miscellaneous				
7.1	Draining and cleaning of Grit Chamber including sludge removal and disposal as required per the tender documents.	ea.	1	\$	\$
7.3	Draining and cleaning of Plant A Aeration Tank Cell including sludge removal and disposal as required in the tender documents	ea.	2	\$	\$
7.4	Draining and cleaning of Plant A Secondary Clarifier Cell including sludge removal and disposal as required in the tender documents	ea.	4	\$	\$
7.5	Draining and cleaning of Plant A Chlorine Contact Tank including sludge removal and disposal as required in the tender documents	ea.	1	\$	\$
7.6	Draining and cleaning of Plant B Primary Clarifier Cell including sludge removal and disposal as required in the tender documents.	ea.	2	\$	\$
7.7	Draining and cleaning of Plant B Aeration Tank Cell including sludge removal and disposal as required in the tender documents.	ea.	2	\$	\$
7.8	Draining and cleaning of Plant B Secondary Clarifier Cell including sludge removal and disposal as required in the tender documents	ea.	4	\$	\$
7.9	Draining and cleaning of Plant B Chlorine Contact Tank including sludge removal and disposal as required in the tender documents.	ea.	1	\$	\$

7.10	Removal, safe disposal and replacement of metal doors in the Digester Valve Building as required per the tender documents.	ea.	2	\$	\$
7.11	All necessary tools, equipment, draining systems (pumps, hoses, valves, etc.), lifting devices, scaffolding, tank access equipment required to provide the complete scope of work as required in the tender documents.	LUMP SUM			\$
7.12	Miscellaneous provision for control of valve leaks, including sandbagging, water management in below grade tanks as required to complete scope of work as required in the tender documents.	LUMP SUM			\$
7.13	Removal, safe disposal of existing and supply and install new Aluminium Grating Replacement as required in the tender documents and directed by the Engineer.	sq.m.	500	\$	\$
7.14	Supply and installation of Steel Clips to Secure Grating as required in the tender documents and directed by the Engineer.	l.m.	500	\$	\$
7.15	Supply and install temporary RAS Piping system (including any valve and flow control) Plant A as required per the tender documents.	LUMP SUM			\$
7.16	Temporary RAS Piping Plant B.	LUMP SUM			\$
7.17	Supply and installation of Bypass Pumping of Plant A Parshall Flume as required per the tender documents.	LUMP SUM			\$
7.18	Supply and installation of Bypass Pumping Mechanical Screening Building as required per the tender documents.	LUMP SUM			\$
7.19	Supply and installation of Bypass Pumping Inlet Channel Plant A as required per the tender documents.	LUMP SUM			\$

7.20	Preparation and implementation of safe work plan working around designated substances in the Digester Valve building.	LUMP SUM	\$
7.21	Removal, safe disposal of existing and supply and installation of new light fixtures within the digester valve building expected to contain PCBs.	LUMP SUM	\$
7.22	Removal, safe disposal of existing and supply and installation of new metal doors in the digester valve building.	LUMP SUM	\$
7.23	Removal and safe disposal of ceiling cladding within the digester valve building.	LUMP SUM	\$
7.24	Implement Air quality recommendations in the Digester Valve building as per required per the tender documents.	LUMP SUM	\$
<p>*The actual amount paid to the Successful Bidder will be the Unit Price multiplied by the actual quantities supplied, installed and approved by the consultant during the course of the Contract l.m. - linear metre sq. m. - square metre ea. - each</p> <p style="text-align: right;">Total of Section "2" \$ _____</p> <p style="text-align: center;">(Carry to Summary on Lump Sum Breakdown of Base Bid Price)</p>			

CONTRACT NO. C13-32-24

LUMP SUM BREAKDOWN OF BASE BID PRICE

SECTION "3" - Lump Sum for Other Requirements

LOCATION: 135 King Street East, Dundas
Dundas Wastewater Treatment Plant (WWTP) Health a Safety
DESCRIPTION: Immediate Needs and Structural Repair Upgrades

Section 3, "Lump Sum for Other Requirements", shall provide for such items as watchmen, permits and approvals (other than those specifically stated to be paid for by the City), items required by the Drawings or Specifications but which have been omitted from this breakdown, and other items required by the Contract but not specifically covered by or related to any item listed in this breakdown. Please provide details in the table below.

ITEM NO.	DESCRIPTION	LUMP SUM PRICES
3.1		\$
		\$
		\$
		\$
		\$
		\$
Total of Section "3"		\$ _____
(Carry to Summary on Lump Sum Breakdown of Base Bid Price)		

C13-32-24

LUMP SUM BREAKDOWN OF BASE BID PRICE

SECTION "4" - Provisional Items

LOCATION: 135 King Street East, Dundas
 Dundas Wastewater Treatment Plant (WWTP) Health a Safety Immediate
DESCRIPTION: Needs and Structural Repair Upgrades

ITEM NO.	DESCRIPTION	UNITS	EST'D QTY.	UNIT PRICE	TOTAL PRICES
4.1	Removal, safe disposal and replacement of existing expansion joint per the inlet channel west of the Plant B Primary Clarifier building. As indicated in the Specifications Section 01100 Summary of Work	LUMP SUM			\$
4.2	Additional Vacuum Truck Services including haulage and disposal. As directed by the Engineer. Over and above what is specified in the Specifications Section 01100 Summary of Work.	Hrs.	200	\$	\$
Total of Section "4"					\$ _____
(Carry to Summary on Lump Sum Breakdown of Base Bid Price)					

Notes:

If this Contract or Form of Tender contains a Provisional Item, the Contractor is not entitled to payment thereof except for the extra or additional work carried out by him, as directed by the City and in accordance with the Contract and only to the extent of such extra or additional work and payment approved by the City.

The City reserves the right to delete from the Base Bid Price one or more of the items identified in the Form of Tender as Provisional Items, for credit at the price shown in the table. All prices are inclusive of all duties and taxes applicable, except for Value Added Taxes.

CONTRACT NO. C13-32-24

LUMP SUM BREAKDOWN OF BASE BID PRICE

SECTION "5"- Commissioning, Training and Submittals

LOCATION: 135 King Street East, Hamilton
Dundas Wastewater Treatment Plant (WWTP) Health a Safety
DESCRIPTION: Immediate Needs and Structural Repair Upgrades

Section 5 shall provide for all items, equipment, services, testing, inspections, labour, energy, electrical power, fuel, security watchmen, reports, attendance of suppliers, sub-contractors, testing companies, consulting services contracted by the contractor, and any other requirements to complete the commissioning of all items required by this Contract to the satisfaction of the City, including any additional return visits, labour and materials; shall provide for training of City staff and its facilities operators; and shall provide for five complete sets of all required as-builts, Operation and Maintenance Manuals, reports, information literature and any other required submittals.

ITEM NO.	DESCRIPTION	LUMP SUM PRICES
5.1	Commissioning	\$
5.2	Training	\$
5.3	Submittals	\$
Total of Section "5"		\$ _____
(Carry to Summary on Lump Sum Breakdown of Base Bid Price)		

CCDC 2 - 2020 STIPULATED PRICE CONTRACT

A copy of the CCDC 2 – 2020 Stipulated Price Contract is not being reproduced for this RFT and the English version can be purchased at:

<https://www.ccdc.org/documents/>

Supplementary Conditions to Contract CCDC 2-2020

Dated: June 20, 2023

SC 1. GENERAL

These Supplementary Conditions presuppose the use of the Standard Construction Document CCDC 2-2020 Stipulated Price Contract, English version. These “Supplementary Conditions” void, supersede or amend the “Agreement”, “Definitions” and “General Conditions” as hereinafter provided, as the case may be.

Where a Definition, a General Condition or paragraph of the Agreement or a General Conditions of the Stipulated Price Contract is deleted by these Supplementary Conditions, the numbering of the remaining Agreement, Definitions, General Conditions or paragraphs shall remain unchanged, and the numbering of the deleted item will be retained, unused, unless noted otherwise.

SC 2. AGREEMENT

1. Delete the words “*Ready-for-Takeover*” from paragraph 1.3 Article A-1 THE WORK and replace with “*Substantial Performance Date*”.
2. Add new paragraph 1.4 to Article A-1 THE WORK, as follows:

“1.4 Provide all the labour, material, equipment, machinery, *Products* and work including, without limitation, all *Commissioning* services required by the *Contract Documents* in order to fully complete and construct the *Work* and in accordance with, and satisfaction of all *Applicable Laws* including, without limitation, those relating to occupational health and safety and any and all obligations, responsibilities and duties required by or set in any site plan agreement or approval, attributable to the *Place of the Work* and/or the proposed development therein, and furnish efficient business and construction administration and superintendence consistent with the interests of the *Owner*.”
3. Add documents to the existing list of *Contract Documents* in paragraph 3.1 of Article A-3 CONTRACT DOCUMENTS as follows:
 - Addenda, as issued
 - the Special Provisions
 - *Project* specific Supplementary Conditions to Contract CCDC 2-2020
 - Supplementary Conditions to Contract CCDC 2-2020
 - the *Form of Tender* as approved and accepted by the *Owner*
 - detailed *Contract Price Breakdown* or Lump Sum Breakdown of Base Bid Price
 - the *Specifications*
 - *Drawings*

4. Delete subparagraph 5.2.1 from Article A-5 PAYMENT in its entirety and replace with the following:
 - “5.2.1 Should either party fail to make payments as they become due under the terms of the *Contract* or in an award by arbitration or court, interest at the rate prescribed by the Construction Act (Ontario) on such unpaid amounts shall also become due and payable until payment. Such interest shall be compounded on a monthly basis.”
5. Add new paragraph 5.3 to Article A-5 PAYMENT as follows:
 - “5.3 In the event of loss or damage occurring where payment becomes due under the property and boiler insurance policies, payments shall be made to the *Contractor* in accordance with the provisions of GC 11.1 - INSURANCE.”
6. Add to the end of paragraph 6.5, the following:

“The only *Notices in Writing* which will be delivered by electronic communication are applications for progress payment, applications for final payment, and notices of non-payment. All other *Notices in Writing* will be delivered by hand, by courier, by prepaid first class mail or by facsimile.”
7. Delete Article A-7 LANGUAGE OF THE CONTRACT in its entirety.
8. Add new Article A-9 CONFLICT OF INTEREST as follows:

“ARTICLE A-9 CONFLICT OF INTEREST

- 9.1 The *Contractor*, all of the *Subcontractors*, and any of their respective advisors, partners, directors, officers, employees, and agents shall not engage in any activity or provide any services where such activity or the provision of such services creates a conflict of interest (actually or potentially, in the sole opinion of the *Owner*) with the provision of the *Work* pursuant to the *Contract*. The *Contractor* acknowledges and agrees that a conflict of interest includes the use of *Confidential Information* where the *Owner* has not specifically authorized such use.
- 9.2 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*.
- 9.3 The *Contractor* covenants and agrees that it will not hire or retain the services of any employee or previous employee of the City of Hamilton 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.
- 9.4 A breach of this Article or a contravention of the *Owner*’s Procurement Policy, 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.”

9. Add new Article A-10 CONFIDENTIALITY as follows:

"ARTICLE A-10 CONFIDENTIALITY

- 10.1 The *Contractor* agrees to ensure that it shall, both during or following the term of the *Contract*, maintain the confidentiality and security of all *Confidential Information* and *Personal Information*, and that it shall not directly or indirectly disclose, destroy, exploit, or use any *Confidential Information* or *Personal Information*, except where required by law, without first obtaining the written consent of the *Owner*. The *Contractor* may disclose any portion of the *Contract Documents* or any other information provided to the *Contractor* by the *Owner* to any *Subcontractor* or *Supplier* if the *Contractor* discloses only such information as is necessary to fulfill the purposes of the *Contract* and the *Contractor* has included a commensurate confidentiality provision in its contract with the *Subcontractor* or *Supplier*. The *Contractor* acknowledges that it will comply with all requirements of the *Personal Information Protection and Electronic Documents Act*. The *Contractor* acknowledges that the *Owner* is bound by the provisions of the *Municipal Freedom of Information and Protection of Privacy Act* (“*MFIPPA*”). The *Contractor* further acknowledges that the *Owner* may be required to disclose any or all of the *Confidential Information* and *Personal Information* in the event that it is compelled to do so by law, through a request under *MFIPPA*, or by the rules of any applicable regulatory authority.”

SC 3. DEFINITIONS

1. Add to the end of Definition *Consultant*, the following:

“The term *Consultant* means the *Consultant* or the *Consultant's* authorized representative.”
2. Add to the end of Definition *Contractor*, the following:

“The term *Contractor* means the *Contractor* or the *Contractor's* authorized representative as designated to the *Owner* in writing.”
3. Add to the end of Definition *Owner*, the following:

“The term *Owner* means the *Owner* or the *Owner's* authorized representative as designated to the *Contractor* in writing, but does not include the *Consultant*.”
4. Add after “The *Work* means the total construction” in Definition *Work*, the following:

“, *Products*, installation, *Commissioning*, checkout, start-up testing”
5. Delete Definition *Working Day* in its entirety and replace with the following:

“**Working Day** means a day when the *Owner’s* administrative offices are open, and does not include weekends or statutory holidays.”

6. Add new Definitions as follows:

“Applicable Laws

Applicable Laws and applicable laws means all public laws, statutes, regulations, transactions, codes, acts, orders, by-laws, rules, judgements, decrees, treaties, *Governmental Consents*, notices, protocols, binding policies and guidelines, and requirements of all *Governmental Authorities*, which now or hereafter, may be applicable to and enforceable against the *Work* or any part thereof, including those relating to employment, zoning, building, life/safety, environment and health, and includes, where appropriate, any interpretation of a rule, statute, regulation, order, decree, treaty or other requirement having the force of law by any person having jurisdiction over it, or charged with its administration or interpretation.

As-Built Drawings

As-Built Drawings means the *Drawings* and *Specifications* revised by the *Contractor* during the *Work*, showing any and all changes or variations to the *Work* from the requirements of the *Drawings* and *Specifications*.

Authorities Having Jurisdiction

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

Commission

Commission means and *Commissioning* refers to the procedure which includes checking, balancing, testing, adjusting and measuring *Work* performed by the *Contractor* to demonstrate and verify to the *Owner* and *Consultant*, the satisfactory installation, operation and performance of all components of the *Work* and that the *Project* is ready for use.

Confidential Information

Confidential Information means all the information or material of the *Owner* that is of a proprietary or confidential nature, whether it is identified as proprietary or confidential or not, including but not limited to information and material of every kind and description such as *Drawings* which is communicated to or comes into the possession or control of the *Contractor* at any time, but *Confidential Information* shall not include information that:

- (1) is or becomes generally available to the public without fault or breach on the part of the *Contractor*, including without limitation breach of any duty of confidentiality owed by the *Contractor* to the *Owner* or to any third party, but only after that information becomes generally available to the public;
- (2) the *Contractor* can demonstrate to have been rightfully obtained by the *Contractor* from a third party who had the right to transfer or disclose it to the *Contractor* free of any obligation of confidence;

- (3) the *Contractor* can demonstrate to have been rightfully known to or in the possession of the *Contractor* at the time of disclosure, free of any obligation of confidence; or
- (4) is independently developed by the *Contractor* without use of any *Confidential Information*.

Construction Act

The Construction Act, R.S.O. 1990, Chapter C.30 is the legislation covering construction in Ontario and is also referred to throughout the *Contract* as the Payment Legislation.

Construction Costs

Construction Costs means the direct costs of all the elements of the *Work* or a change in the *Work* as the case may be. A cost that can be applied wholly to a particular item of the *Work*, or a change in the *Work*, should be considered part of the *Construction Costs*, excluding all *Value Added Taxes*, *Overhead Costs*, and profit.

Contemplated Change Order

Contemplated Change Order means a standard document issued to the *Contractor* by the *Consultant* on behalf of the *Owner*, requesting that the *Contractor* provide pricing for a change to the scope of the *Work*. Authorization of the *Contemplated Change Order* is formalized by a *Change Order* prior to the *Work* proceeding.

Fair Wage Policy

Fair Wage Policy means the City of Hamilton's Fair Wage Policy and Fair Wage Schedule available on the City of Hamilton's website at: <https://www.hamilton.ca/build-invest-grow/buying-selling-city/bids-and-tenders/fair-wage-policy-fair-wage-schedule>

Final Completion of the Work

Final Completion of the Work shall have been reached when the *Work* has previously been deemed substantially performed as defined in these *Contract Documents*, and all deficiencies and incomplete *Work* have been completed and certified by the *Consultant*, prior to the release of final holdback monies on the *Project*.

Force Majeure

Force Majeure means a delay in the performance of the services occurring other than as a result of the deliberate act or negligence of either party respectively, and which:

- (1) could not have been reasonably foreseen, and
- (2) was caused by an event beyond the reasonable control of each party respectively, and
- (3) for the sake of greater certainty, shall include any one or more of the following:
 - (i) acts of God, His Majesty the King or His enemies;
 - (ii) civil war, insurrections or riots;
 - (iii) fires, floods, explosions, earthquakes, or serious accidents;
 - (iv) unusually severe weather, epidemics, or quarantine restrictions;
 - (v) governmental priorities or allocation regulations or orders affecting materials, labour, equipment and facilities;
 - (vi) fuel shortages or freight embargoes;

- (vii) strikes or labour troubles causing cessation, slowdown, interruption of work or other similar events relating to a person other than the *Contractor* (or any *Subcontractor*) or to the *Owner*.

Financial difficulties experienced by the *Contractor* will not be considered an occurrence of a *Force Majeure* under the *Contract*.

Form of Tender

Form of Tender means the City's forms entitled Form of Tender and Schedule of Prices and any other documents that were supplied as part of the request for tenders/request for proposals for the *Contract*, and were completed and submitted by the *Contractor* back to the *Owner*.

Governmental Authority

Governmental Authority means any federal, provincial, or municipal government and any agency, authority, body, board or commission established by any of them. It includes the police and fire departments.

Governmental Consent

Governmental Consent means any license, right, permit, franchise, privilege, registration, direction, decree, consent, order, permission, approval, or authority to be issued or provided by, or written contract between the *Owner* and a *Governmental Authority*.

Overhead Costs

Overhead Costs means those costs that cannot be attributed to a single task of *Work* and are exclusive of *Construction Costs*, *Value Added Taxes*, and profit. *Overhead Costs* include both general and administrative costs of the *Contractor* or *Subcontractor* together with any and all *Project* specific or office costs of the *Contractor* or *Subcontractor*. Without limiting the generality of the foregoing, *Overhead Costs* include costs associated with general conditions, administration, head office, field office, management, supervision, coordination, scheduling, purchasing, security, health and safety, general labour, accommodation, subsistence, travel, storage, inventory, loading and unloading, computers and electronics, software, printing, general tools and equipment, standby costs and charges, vehicles, engineering, drafting, shop drawings, submittals, surveying, temporary facilities, traffic control, fire safety, sanitation, site clean-up, utilities and services, controls, insurance, bonding, heating, winterization, permits, inspection, regulatory fees, mobilization, demobilization, and other costs of a similar reasonable nature.

Personal Information

Personal Information has the same definition as in subsection 2(1) of *MFIPPA* and includes an individual's name, address, telephone number, and date of birth, whether recorded in printed form, on film, by electronic means, or otherwise and disclosed to the *Contractor*.

Request for Information (RFI)

Request for Information ("RFI") means a standard document typically issued by the *Contractor* to the *Consultant*, requesting a clarification of the scope of *Work* provided in the *Contract Documents*. The response to the RFI typically results in a formal

Supplemental Instruction where there is no modification of the original scope of the *Work*, or a *Contemplated Change Order* from which the *Contractor* may provide pricing for the revision to the original scope of the *Work*.

Substantial Performance Date

Substantial Performance Date means the date by which the *Contractor* shall attain *Substantial Performance of the Work* as specified in Article A-1 – THE WORK.

Statutory Declaration

Statutory Declaration means the form of the statutory declaration to be delivered by the *Contractor* upon applications for progress payment, release of holdback and final payment, being CCDC 9A – 2001 Statutory Declaration (latest edition available).”

SC 4. GC 1.1 CONTRACT DOCUMENTS

1. Delete subparagraph 1.1.4 in its entirety.
2. Delete subparagraph 1.1.5.1 in its entirety and replace with the following:
 - “.1 the order of priority of documents, from highest to lowest, shall be
 - *Change Orders* and/or *Change Directives*
 - the executed Agreement between the *Owner* and the *Contractor*
 - detailed *Contract Price* breakdown or Lump Sum Schedule Breakdown
 - the *Form of Tender* as approved and accepted by the *Owner*
 - Addenda, as issued
 - Special Provisions
 - *Project* specific Supplementary Conditions
 - Supplementary Conditions to Contract CCDC 2-2020
 - Definitions
 - the General Conditions of the Stipulated Price Contract
 - the *Specifications*
 - *Drawings*”
3. Delete “and shall remain the *Consultant’s* property” from the first sentence of paragraph 1.1.10 and replace with the following:

“are not the *Contractor’s* property”

SC 5. GC 1.2 LAW OF THE CONTRACT

1. Add new paragraphs 1.2.2 and 1.2.3 as follows:
 - “1.2.2 The *Contractor* agrees that:
 - .1 any action or proceeding relating to the *Contract* shall be brought in a court of competent jurisdiction in the City of Hamilton and for that purpose each party irrevocably and unconditionally attorns and submits to the jurisdiction of that court;

- .2 it irrevocably waives any right to and will not oppose any action or proceeding relating to the *Contract* on any jurisdictional basis, including forum non conveniens; and
- .3 it will not oppose in any other jurisdiction, the enforcement against it, of any judgment or order duly obtained from a Hamilton court as set out above.

1.2.3 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* in accordance with GC7.1.2 and the *Owner* shall be entitled at its sole discretion to terminate the *Contract* and to pursue any other legal recourse the *Owner* deems appropriate."

SC 6. GC 1.3 RIGHTS AND REMEDIES

1. Add to the beginning of paragraph 1.3.2, the following:

"Except with respect to the notice requirements set out in paragraphs 6.4.1, 6.5.4, and 6.6.1,"

2. Add new paragraph 1.3.3 as follows:

"1.3.3 All rights and remedies of the parties for any breach by the other party of its obligations under the *Contract* shall be cumulative and not exclusive or mutually exclusive alternatives, 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 non-breaching party under the *Contract* or otherwise at law or in equity or by statute."

SC 7. GC 1.4 ASSIGNMENT

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

"1.4.1 The *Contractor* shall not assign the *Contract*, or any portion thereof, without the prior written consent of the *Owner*, which consent may not be unreasonably withheld. The *Owner* shall be entitled to assign the *Contract* to any person or other entity (the "Assignee"). Upon the assumption by the Assignee of the *Owner*'s obligations under the *Contract*, the *Owner* shall be released from its obligations arising under the *Contract*."

2. Add new paragraph 1.4.2 as follows:

"1.4.2 Neither the use of one or more *Subcontractors* to carry out part of the *Work*, nor the assignment of the whole or of any part of the *Contract* or the *Work* to be done under it shall relieve the *Contractor* of its obligations and liability to the *Owner*."

SC 8. GC 1.5 MUNICIPAL CONFLICT OF INTEREST

1. Add new general condition GC 1.5 MUNICIPAL CONFLICT OF INTEREST as follows:

“GC 1.5 MUNICIPAL CONFLICT OF INTEREST

- 1.5.1 The *Owner* may terminate the *Contract* where the *Contractor* is in contravention with the *Owner’s* Procurement Policy with respect to conflict of interest.”

SC 9. GC 1.6 ENTIRE CONTRACT, AMENDMENTS TO BE IN WRITING

1. Add new general condition GC 1.6 ENTIRE CONTRACT, AMENDMENTS TO BE IN WRITING as follows:

“GC 1.6 ENTIRE CONTRACT, AMENDMENTS TO BE IN WRITING

- 1.6.1 The *Contract Documents* (including all properly authorized *Change Directives* and *Change Orders*) constitute the entire *Contract* between the parties. Each of the parties,
 - .1 acknowledges that it is not relying upon any representation, warranty, promise, instruction, advice or information received from the other party or from any employee or agent of the other party, except as set out in the *Contract Documents*;
 - .2 shall not rely at any time in the future on any representations, warranty, instruction, advice or information purportedly received from the other party or any employee or agent of the other party, except as set out in a properly authorized *Change Order*, *Change Directive* or in an amendment as provided under this section.
- 1.6.2 The *Contract* shall not be deemed to be or construed as having been amended as a result of any oral communication between the parties or as a result of any practice of the parties, but all amendments to the *Contract* shall be in writing and shall be signed by both parties, provided that any such amendment may be executed in counterpart form.”

SC 10. GC 1.7 NON-DISCLOSURE AND NO COMMENT

1. Add new general condition GC 1.7 NON DISCLOSURE AND NO COMMENT as follows:

“GC 1.7 NON-DISCLOSURE AND NO COMMENT

- 1.7.1 The *Contractor* shall not disclose details relating to the *Contract*, *Work* or *Project* to any outside person not engaged in activities relating to the *Contract*, *Work* or *Project*, and shall restrain its employees from giving unauthorized information with respect thereto.

- 1.7.2 The *Contractor* shall refer all inquiries from whatever source relating to the works to be undertaken within the scope of the *Contract* to the *Consultant*.”

SC 11. GC 1.8 OWNER’S ACCESS TO SITE

1. Add new general condition GC 1.8 OWNER’S ACCESS TO SITE as follows:

“GC 1.8 OWNER’S ACCESS TO SITE

- 1.8.1 The *Owner* shall have the right to enter and occupy the *Place of the Work* in whole or in part, for the purpose of placing fittings and equipment or for other uses before the issuance of the certificate of the *Substantial Performance of the Work*, where in the opinion of the *Consultant*, such entry and occupancy will not interfere unreasonably with the *Contractor*’s delivery of the *Work*.
- 1.8.2 Notwithstanding paragraph 1.8.1, the parties agree that during the term of the *Contract*, the *Owner* may inspect any and all aspects of the *Project*, at all reasonable times, for the purpose of ensuring that the *Contractor* is carrying out the *Work* and other obligations in accordance with the *Contract*.”

SC 12. GC 1.9 PATENTS AND OTHER INTELLECTUAL PROPERTY

1. Add new general condition GC 1.9 PATENTS AND OTHER INTELLECTUAL PROPERTY as follows:

“GC 1.9 PATENTS AND OTHER INTELLECTUAL PROPERTY

- 1.9.1 Where the *Work* or *Project* to be carried out requires the installation or use of any patented or other protected intellectual property,
- .1 belonging to the *Contractor*, the *Contract Price* shall be deemed to include the grant of a perpetual license from the *Contractor* to the *Owner* to make use of that intellectual property;
 - .2 belonging to any other person, the *Contractor* shall obtain and assign to the *Owner* a perpetual license from the owner thereof entitling the *Owner* to make use of that intellectual property, and the cost thereof shall be deemed to be included in the *Contract Price*.”

SC 13. GC 2.1 AUTHORITY OF THE CONSULTANT

1. Delete from the end of paragraph 2.1.2, the following:

“, the *Consultant* and the *Contractor*”

SC 14. GC 2.2 ROLE OF THE CONSULTANT

1. Add to the beginning of subparagraph 2.2.4 the following:

“After receipt of the *Contractor*’s invoices for payment,”

2. Delete from the beginning of paragraph 2.2.6, the following:

“Except with respect to GC5.1 – FINANCING INFORMATION REQUIRED OF THE OWNER,”

3. Add to the end of paragraph 2.2.9, the following:

“and not more than forty-eight (48) hours after receipt of the written query unless otherwise agreed to by the parties.”

4. Add after “with reasonable promptness” in paragraph 2.2.12, the following:

“but not more than five (5) *Working Days* after receipt of a written Request for Information from the *Contractor*”

5. Add after “, the *Consultant* does not guarantee” in the second sentence of paragraph 2.2.16, the following:

“to the *Contractor*”

6. Add to the end of paragraph 2.2.17, the following:

“The *Consultant* shall ensure that all such warranties and documents submitted for approval and for the *Owner’s* records are in accordance with the *Contract Documents* prior to the documents being forwarded.”

7. Delete from paragraph 2.2.18, the following:

“against whom the *Contractor* makes no reasonable objection and”

8. Add new paragraph 2.2.19 as follows:

“2.2.19 The *Consultant* will provide the *Contractor* in writing with bench marks and points of reference to be used by the *Contractor* in setting out the *Work*. The *Owner* will be responsible only for the correctness of the information so supplied. From these bench marks and points of reference the *Contractor* will do its own setting out. The setting out by the *Contractor* shall include but shall not be limited to the preparation of grade sheets, the installation of centre lines stakes, grades stakes, offsets and site rails.”

SC 15. GC 2.3 REVIEW AND INSPECTION OF THE WORK

1. Add to end of paragraph 2.3.2, the following:

“Reasonable notice shall not be less than twenty-four (24) hours prior to the testing and inspection.”

2. Add after “inspection reports relating to the *Work*” in paragraph 2.3.3, the following:
“, and in any event no later than two (2) *Working Days* from the date of the inspection”

SC 16. GC 2.4 DEFECTIVE WORK

1. Add after “failing to conform to the *Contract Documents*” in paragraph 2.4.1, the following:
“at the *Contractor*’s expense”
2. Add new paragraphs 2.4.1.1, 2.4.1.2 as follows:
 - “2.4.1.1 The *Contractor* shall rectify, in a manner acceptable to the *Owner* and the *Consultant*, all defective work and deficiencies throughout the *Work*, whether or not they are specifically identified by the *Consultant*.
 - 2.4.1.2 The *Contractor* shall prioritize and schedule the correction of any defective *Work* which, in the sole discretion of the *Owner*, adversely affects the day to day operation of the *Owner*.”

SC 17. GC 3.1 CONTROL OF THE WORK

1. Add after “construction means, methods, techniques,” in paragraph 3.1.2, the following:
“schedule,”
2. Add new paragraph 3.1.3, as follows:
 - “3.1.3 Prior to commencing individual procurement, fabrication and construction activities, the *Contractor* shall verify, at the *Place of the Work*, all relevant measurements and levels necessary for proper and complete fabrication, assembly and installation of the *Work* and shall further carefully compare such field measurements and conditions with the requirements of the *Contract Documents*. Where dimensions are not included or exact locations are not apparent, the *Contractor* shall immediately notify the *Consultant* in writing and obtain written instructions from the *Consultant* before proceeding with any part of the affected work.”

SC 18. GC 3.2 CONSTRUCTION BY OWNER OR OTHER CONTRACTORS

1. Delete subparagraphs 3.2.2.1, 3.2.2.3 and 3.2.2.4 in their entirety.
2. Add to the end of subparagraph 3.2.2.2, the following:
“; the *Contractor* acknowledges that, if the *Owner* does not enter into any other contracts for the Project, the *Contractor* is the “constructor” and the “employer” within the meaning of the *Occupational Health and Safety Act (Ontario)* and the *Contractor* undertakes to carry out the duties, obligations and responsibilities of the constructor and the employer

with respect to the *Project*. In the event that the *Owner* enters into more than one contract for the *Project*, or when work is performed by the *Owner's* own forces, the *Owner* agrees to fulfill all of the duties, obligations and responsibilities required under the *Occupational Health and Safety Act (Ontario)*. Without restricting the generality of any other term or condition in the *Contract*, the *Contractor* shall indemnify and hold harmless the *Owner* from any liability for claims, damages or penalties, including reasonable legal fees to defend any offences, arising from the *Contractor's* failure to comply with the duties, responsibility and obligations of the constructor and the employer under the *Occupational Health and Safety Act (Ontario)*.”

3. Delete from the subparagraph 3.2.3.2, the following:

“that are identified in the *Contract Documents*”

4. Add new subparagraph 3.2.3.5 as follows:

“3.2.3.5 Subject to General Condition 6.1.1 Owners Right to Make Changes and GC 9.4 - CONSTRUCTION SAFETY, where paragraph 3.2.4 of GC 3.2 - CONSTRUCTION BY OWNER OR OTHER CONTRACTORS applies, for the *Owner's* own forces and for other contractors performing work within the construction site limits identified in the *Contract Documents*, assume overall responsibility for compliance with all aspects of the applicable health and safety legislation in the *Place of the Work*, including all of the responsibilities of the constructor as that term is defined in the *Occupational Health and Safety Act*.”

SC 19. GC 3.4 CONSTRUCTION SCHEDULE

1. Delete paragraph 3.4.1 in its entirety and replace with the following:

“3.4.1 The *Contractor* shall:

- .1 prior to the first application for payment, prepare and submit to the *Owner* and the *Consultant* for their 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, and any errors or omissions within that construction schedule not captured by the *Owner* and or *Consultant* as part of schedule acceptance does not alleviate the *Contractor* of their responsibility to meet the *Contract Time* and the *Contractor* shall be required to make the necessary corrections to the schedule immediately to comply with the *Contract Time*;

- .2 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* pursuant to GC 3.4 - CONSTRUCTION SCHEDULE;
 - .3 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* pursuant to GC 3.4 - CONSTRUCTION SCHEDULE, update the schedule on a monthly basis and advise the *Consultant* and the *Owner* in writing of any variation from the baseline or slippage in the schedule; and
 - .4 if, after applying the expertise and resources required under subparagraph 3.4.1.2, the *Contractor* forms the opinion that the variation or slippage in schedule reported pursuant to subparagraph 3.4.1.3 cannot be recovered by the *Contractor*, it shall, in the same notice, indicate to the *Consultant* and the *Owner* if the *Contractor* intends to apply for an extension of *Contract Time* as provided in PART 6 of the General Conditions - CHANGES IN THE WORK.”
2. Add new paragraphs 3.4.2, 3.4.3, 3.4.4, 3.4.5, 3.4.6, 3.4.7, 3.4.8, 3.4.9 and 3.4.10 as follows:
- “3.4.2 If, at any time, it should appear to the *Owner* or the *Consultant* that the actual progress of the *Work* is behind schedule or is likely to become behind schedule, or if the *Contractor* has given notice of such to the *Owner* or the *Consultant* pursuant to subparagraph 3.4.1.3, the *Contractor* shall take appropriate steps to cause the actual progress of the *Work* to conform to the schedule or minimize the resulting delay and shall produce and present to the *Owner* and the *Consultant* a recovery plan demonstrating how the *Contractor* will achieve the recovery of the schedule. If the *Contractor* intends to apply for a change in the *Contract Price* in relation to a schedule recovery plan, then the *Contractor* shall proceed in accordance with GC 6.5 – DELAYS.
 - 3.4.3 Where a *Force Majeure* occurs, the *Consultant* shall determine the number of days (if any) to be allowed by reason thereof for the *Substantial Performance of the Work*.
 - 3.4.4 An extension of time may be granted under this section by the *Consultant* where in the *Consultant’s* reasonable opinion it is appropriate in all of the circumstances to do so;
 - .1 by reason of the occurrence of a *Force Majeure*;
 - .2 by reason of a *Change Directive* or *Change Order*;
 - .3 where the *Owner*, for any reason, directs that *Work* be discontinued; provided that,
 - (1) an extension under subparagraph 3.4.4.1 shall not entitle the *Contractor* to any additional payment; and
 - (2) any other extension shall entitle the *Contractor* to additional overhead costs only to the extent that the *Consultant* is satisfied that such costs will increase by reason of the extension.
 - 3.4.5 Any extension of time so granted shall not exceed the amount that is reasonably required. Requests for extension will be evaluated collectively, rather than on an

individual *Change Directive* or *Change Order* basis, provided that the collective evaluation shall not be less frequently than at least once per quarter. There is no presumption that the time required to carry out a *Change Directive* or *Change Order* will necessarily extend the date of the *Substantial Performance of the Work* by the same length of time. Instead, the *Consultant* shall make an independent determination of whether an extension is required.

- 3.4.6 An extension of time under this section shall be for such time as the *Consultant* may prescribe as being fair and reasonable and the *Consultant* shall fix the terms on which the said extension may be granted.
- 3.4.7 An application for an extension of time as herein provided shall be made in writing by the *Contractor* to the *Consultant* through the *Change Order* process.
- 3.4.8 Any additional time granted for the completion of the *Contract* will be conditional upon the *Contractor* providing the *Owner* with evidence that all insurance, bonds or other securities, furnished to the *Owner* by the *Contractor*, have been increased and, if necessary, extended beyond the limit of the time extension.
- 3.4.9 Any extension of time that may be granted to the *Contractor* shall be so granted and accepted without prejudice to any rights of the *Owner* whatsoever under the *Contract* and all of such rights shall continue in full force and effect after the time limited in the *Contract* for the completion of the *Work*, and whenever in the *Contract* power and authority is given to the *Owner* or the *Consultant* or any person to take any action consequent upon the act, default, breach, neglect, delay, non-observance or non-performance by the *Contractor* in respect of the *Work* or *Contract*, or any portion thereof, such powers or authorities may be exercised from time to time and not only in the event of the happening of such contingencies before the time limited in the *Contract* for the completion of the *Work* but also in the event of the same happening after the time so limited in the case of the *Contractor* being permitted to proceed with the execution of the *Work* under an extension of time granted by the *Consultant*. In the event of the *Consultant* granting an extension of time, time shall continue to be deemed of the essence with respect to that extension.
- 3.4.10 Due to the time constraints regarding the *Project*, the *Contractor* shall maintain rigorous control of all elements of the *Work* for which the deadlines are indicated in the *Contract Documents*.”

SC 20. GC 3.5 SUPERVISION

1. Delete paragraph 3.5.1 in its entirety and replace with the following:

“3.5.1 The *Contractor* shall furnish a competent and adequate staff, who shall be in attendance at the *Place of the Work* at all times, as necessary, for the proper administration, co-ordination, supervision and superintendence of the *Work*; organize the procurement of all materials and equipment so that they will be available at the time they are needed for the *Work*, and keep an adequate force

of skilled workmen on the job to complete the *Work* in accordance with all requirements of the *Contract Documents*. The appointed representatives shall not be changed except for valid reasons, at no additional cost to the *Owner*, and upon the *Contractor* obtaining the *Owner's* written consent, which consent will not be unreasonably withheld. Further, the *Contractor* shall not employ or continue to employ on the *Work* anyone to whom the *Owner* may reasonably object.”

2. Add new paragraphs 3.5.3, 3.5.4, 3.5.5, 3.5.6, 3.5.7, 3.5.8 and 3.5.9 as follows:

- “3.5.3 The *Contractor* shall at all times have at the *Place of Work*, a full-time and competent construction superintendent who shall be capable of reading and thoroughly understanding plans and specifications and of adequately communicating with the *Consultant* and its representatives and who also must be thoroughly experienced in the type of *Work* being performed, and who shall be the recipient of all instructions from the *Consultant* or its authorized representatives. No work of any kind shall be carried out by the *Contractor* or its *Subcontractors* during prolonged absence of the construction superintendent.
- 3.5.4 The construction superintendent shall have full authority to execute the orders or directions of the *Consultant* without delay, and to promptly provide such materials, equipment, tools, labour and incidentals as may be required. The *Contractor* shall provide a superintendent regardless of the amount of *Work* subcontracted.
- 3.5.5 The *Contractor* shall provide the *Consultant* with the telephone and the address of its appointed representative(s), who could be contacted on matters relating to the *Contract*, (e.g. urgent messages or emergencies), and who shall be available within reasonable notice, twenty-four (24) hours a day, seven (7) days a week, on matters relating to the *Contract*.
- 3.5.6 The *Owner* may, at any time during the course of the *Work*, request the replacement of the appointed representative(s), where the grounds for the request involve incompetent or disorderly conduct or conduct which jeopardizes the safety and security of the site or the *Owner's* operations. Immediately upon receipt of the request, the *Contractor* shall make arrangements to appoint an acceptable replacement at no additional cost to the *Owner*.
- 3.5.7 The *Contractor* shall cause each *Subcontractor* at all times while the *Work* is being carried out, to have a fully competent supervisor at the *Place of the Work*, who is thoroughly familiar with all aspects of the *Project* for which that *Subcontractor* is responsible.
- 3.5.8 The superintendent shall not be employed in any other capacity at the *Place of Work*. Where it is necessary to employ a superintendent in some other capacity, the *Consultant* shall approve the extent to which a labour time charge may be claimed by the *Contractor* or a *Subcontractor* in respect of that superintendent.

- 3.5.9 The *Contractor* acknowledges that the replacement of the construction superintendent or project team members will have significant impacts on the *Project* schedule and quality of the *Work*; therefore, all measures will be taken by the *Contractor* in order to maintain the original team assigned to the *Project*. Replacement of any team members will result in a possible delay to the *Project* and will be the responsibility of the *Contractor* to make-up any such delays.”

SC 21. GC 3.6 SUBCONTRACTORS AND SUPPLIERS

1. Add to the end of paragraph 3.6.2, the following:

“Failure on the part of the *Contractor* to indicate in writing such *Subcontractors* and *Suppliers* to the *Owner*, shall be deemed to be a failure or refusal to enter into the *Contract*.”

2. Add to the end of paragraph 3.6.4, the following:

“at the discretion of the *Consultant*.”

3. Add new paragraph 3.6.7 as follows:

“3.6.7 The *Contractor* shall not change any of the *Subcontractors* or *Suppliers* proposed by the *Contractor* in writing and accepted by the *Owner* at the signing of the *Contract* without the *Owner’s* written consent or execute any subcontracts for the performance of the *Work* without the *Owner’s* prior written consent.”

SC 22. GC 3.7 LABOUR AND PRODUCTS

1. Add new paragraphs 3.7.4, 3.7.5, 3.7.6, 3.7.7, 3.7.8, 3.7.9, 3.7.10, 3.7.11, 3.7.12, 3.7.13, 3.7.14 and 3.7.15 as follows:

“3.7.4 The cost for overtime required beyond the normal *Working Day* to complete individual construction operations of a continuous nature, such as pouring or finishing of concrete or similar work, or work that the *Contractor* elects to perform at overtime rates without the *Owner* or the *Consultant* requesting it shall not be chargeable to the *Owner* and shall be at the sole cost and expense of the *Contractor*.

3.7.5 The *Contractor* shall comply with all requirements set out in the *Fair Wage Policy*. The *Owner* has adopted the *Fair Wage Policy*, respecting contractors and subcontractors that must be adhered to on this *Project*.

3.7.6 The *Contractor* shall comply in all respects with the *Fair Wage Policy* and is fully responsible for ensuring that all of its *Subcontractors* also comply in all respects with the *Fair Wage Policy*.

- 3.7.7 All workers employed by the *Contractor* and its *Subcontractors* in connection with the *Work* or *Project* shall be paid or provided with wages, benefits and hours of work in accordance with the *Fair Wage Policy* which were in effect on the date of the closing of the request for tenders/request for proposals for the *Contract*.
- 3.7.8 The *Contractor* is responsible for the safe on-site storage of *Products* and their protection (including *Products* supplied by the *Owner* and other contractors to be installed under the *Contract*) in such ways as to avoid dangerous conditions or contamination of the *Products* or other person or property and in locations at the *Place of the Work* to the satisfaction of the *Owner* and the *Consultant*. The *Owner* shall provide all relevant information on the *Products* to be supplied by the *Owner* within the *Contract Documents*.
- 3.7.9 The *Contractor* shall neither permit nor allow underage persons contrary to *Applicable Laws*, the introduction or use of alcoholic beverages or illegal narcotics on or about the *Place of the Work*.
- 3.7.10 At the request of the *Owner* or *Consultant*, the *Contractor* shall remove from the *Place of the Work*, any person (whether employed on the *Work* or not) who, in the opinion of the *Owner* or *Consultant*, is incompetent, intoxicated or otherwise impaired, or who is conducting himself (or herself) improperly, and the *Contractor* shall not permit any such person to remain on the *Place of the Work*, nor to return to the *Place of the Work* without the written approval of the *Owner* or *Consultant* as the case may be.
- 3.7.11 Where required by the *Consultant*, the *Contractor* shall furnish a complete written statement of the origin, composition and manufacture of all materials to be supplied by them, and shall furnish samples thereof for testing purposes, if so instructed by the *Consultant*.
- 3.7.12 The *Consultant's* approval of changed materials shall not be considered as waiver of objection to the *Work* or materials at any subsequent time due to their failure to conform to the *Specifications*.
- 3.7.13 The *Contractor* shall furnish for the *Consultant's* approval, such material tests, mock-ups, mix designs and tests of items and/or materials manufactured or fabricated off the *Place of the Work* as the *Consultant* may reasonably request.
- 3.7.14 Specified product by name, trade or company is regarded as the standard of quality required by the *Specifications*. No substitution shall be made by the *Contractor* without the prior written approval of the *Owner*.
- 3.7.15 By-law 07-170 (City of Hamilton Licensing Code) as amended from time to time, regulates the trade licensing process in Hamilton. The By-law regulates all businesses of plumbing, heating, ventilation and air-conditioning, drain laying and building repair. The City of Hamilton's Standards & Licensing Section is responsible for the licensing of contractors and masters. Licenses are issued to contractors and masters working in the above noted trades."

SC 23 GC 3.8 SHOP DRAWINGS

1. Delete the word “and” in subparagraph 3.8.3.2 and add the word “and” to the end of subparagraph 3.8.3.2.
2. Add new subparagraph 3.8.3.3 as follows:

“3.8.3.3 the *Contractor* shall ensure completeness and accuracy of all *Shop Drawings* in accordance with *the Contract Documents*.”
3. Add new paragraphs 3.8.8, 3.8.9, 3.8.10, 3.8.11 and 3.8.12 as follows:

“3.8.8 Upon request of the *Contractor* or the *Consultant*, they shall jointly prepare a schedule of the dates for provision, review and return of *Shop Drawings*.”

3.8.9 The *Contractor* shall provide *Shop Drawings* in the form specified, or if not specified, as directed by the *Consultant*.

3.8.10 *Shop Drawings* provided by the *Contractor* to the *Consultant* shall indicate by stamp, date and signature of the person responsible for the review that the *Contractor* has reviewed each one of them.

3.8.11 *Shop Drawings* which require approval of any legally constituted authority having jurisdiction shall be provided to such authority by the *Contractor* for approval.

3.8.12 The *Contractor* shall provide revised *Shop Drawings* to correct those which the *Consultant* rejects as inconsistent with the *Contract Documents*, unless otherwise directed by the *Consultant*. The *Contractor* shall notify the *Consultant* in writing of any revisions to the *Shop Drawings* other than those requested by the *Consultant*.”

SC 24. GC 3.9 DOCUMENT REVIEW

1. Add new general condition GC 3.9 DOCUMENT REVIEW as follows:

“GC 3.9 DOCUMENT REVIEW

- 1.9.1. The *Contractor* shall review the *Contract Documents* and shall report promptly to the *Consultant* any error, inconsistency or omission the *Contractor* may discover. Such review by the *Contractor* shall comply with the standard of care described in paragraph 3.14.1 of the *Contract*. Except for its obligation to make such review and report the result, the *Contractor* does not assume any responsibility to the *Owner* or to the *Consultant* for the accuracy of the *Contract Documents*. The *Contractor* shall not be liable for damage or costs resulting from such errors, inconsistencies, or omissions in the *Contract Documents*, which the *Contractor* could not reasonably have discovered. If the *Contractor* does discover any error, inconsistency or omission in the *Contract Documents*,

the *Contractor* shall not proceed with the work affected until the *Contractor* has received corrected or missing information from the *Consultant*.

- 1.9.2 The *Contractor* shall follow the procedures as set forth in the *Contract Documents*. All requests are to be formal, written, and tracked, beginning with a *Request for Information* from the *Contractor*. If the *Request for Information* results in a change to the *Work* as specified in the *Contract Documents*, the *Consultant* will then issue a written request for *Change Order*, as set forth in GC 6 - CHANGES IN THE WORK.
- 1.9.3 If, at any time, the *Contractor* finds errors, inconsistencies, or omissions in the *Contract Documents* or has any doubt as to the meaning or intent of any part thereof, the *Contractor* shall immediately notify the *Consultant*, through a *Request for Information*. The *Contractor* shall not proceed with the work until the *Consultant* has responded to the *Request for Information*, and in dealing with such error, inconsistency or omission the *Contractor* shall co-operate with the *Owner* and the *Consultant* in good faith to resolve such errors, inconsistency or omission so as to avoid any increase in the *Contract Price* or delay in the progress of the *Work*. Neither the *Owner* nor the *Consultant* will be responsible for the consequences of any action of the *Contractor* based on oral instructions.”

SC 25. GC 3.10 DOCUMENTS AT THE SITE

1. Add new general condition GC 3.10 DOCUMENTS AT THE SITE as follows:

“GC 3.10 DOCUMENTS AT THE SITE

- 3.10.1 The *Contractor* shall keep one copy of current *Contract Documents*, submittals, reports, and records of meetings at the *Place of the Work*, in good order and available to the *Owner* and the *Consultant*.”

SC 26. GC 3.11 USE OF THE WORK

1. Add new general condition GC 3.11 USE OF THE WORK as follows:

“GC 3.11 USE OF THE WORK

- 3.11.1 The *Contractor* shall confine *Construction Equipment*, *Temporary Work*, storage of *Products*, waste products and debris, and operations of employees and *Subcontractors* to limits indicated by laws, ordinances, permits, or the *Contract Documents* and shall not unreasonably encumber the *Place of the Work*.
- 3.11.2 The *Contractor* shall not load or permit to be loaded any part of the *Work* with a weight or force that will endanger the safety of the *Work*.
- 3.11.3 The *Contractor* shall abide by and enforce directives and policies regarding signs, advertisements, safety procedures, fires and smoking at the *Place of the Work* as directed by the *Owner*.”

SC 27. GC 3.12 CUTTING AND REMEDIAL WORK

1. Add new general condition GC 3.12 CUTTING AND REMEDIAL WORK as follows:

“GC 3.12 CUTTING AND REMEDIAL WORK

- 3.12.1 The *Contractor* shall perform the cutting and remedial work required to make the affected parts of the *Work* come together properly.
- 3.12.2 The *Contractor* shall co-ordinate the *Work* to ensure that the cutting and remedial work is kept to a minimum.
- 3.12.3 Should the *Owner*, the *Consultant*, other contractors or anyone employed by them be responsible for ill-timed work necessitating cutting or remedial work to be performed, the cost of such cutting or remedial work shall be valued as provided in GC 6.1 – OWNER’S RIGHT TO MAKE CHANGES, GC 6.2 - CHANGE ORDER and GC 6.3 - CHANGE DIRECTIVE.
- 3.12.4 Cutting and remedial work shall be performed by specialists familiar with the Products affected and shall be performed in a manner to neither damage nor endanger the *Work*.”

SC 28. GC 3.13 CLEANUP

1. Add new general condition GC 3.13 CLEANUP as follows:

“GC 3.13 CLEANUP

- 3.13.1 The *Contractor* shall maintain the *Work* in a safe and tidy condition and free from the accumulation of waste products and debris, other than that caused by the *Owner*, other contractors or their employees.
- 3.13.2 Before applying for *Substantial Performance of the Work* as provided in GC 5.4 – SUBSTANTIAL PERFORMANCE OF THE WORK, the *Contractor* shall remove waste products and debris, other than that resulting from the work of the *Owner*, other contractors or their employees, and shall leave the *Place of the Work* clean and suitable for use or occupancy by the *Owner*. The *Contractor* shall remove products, tools, *Construction Equipment*, and *Temporary Work* not required for the performance of the remaining work.
- 3.13.3 Prior to application for the final payment, the *Contractor* shall remove any remaining products, tools, *Construction Equipment*, *Temporary Work*, and waste products and debris, other than those resulting from the work of the *Owner*, other contractors or their employees.
- 3.13.4 The *Owner* shall have the right to set-off the cost of cleaning to the *Contractor* if it is not done within twenty-four (24) hours of written notice to clean and the *Owner* shall have the right to set-off the cost of damage to the *Place of the Work* caused by the *Contractor’s*, the *Subcontractor’s* or the *Supplier’s* transportation in and out of the *Place of the Work* if not repaired within five (5) *Working Days* of written notice to repair or before final payment, whichever is earlier.

- 3.13.5 All material delivered to the *Place of the Work* shall be neatly stored or contained upon delivery only in areas as approved by the *Owner* or the *Consultant* and shall be secured and remain in the *Contractor's* control until installed.
- 3.13.6 The *Contractor* shall legally dispose forthwith of any debris and surplus material accumulated at the *Place of the Work*, and where requested, the *Contractor* shall provide to the *Consultant* a true copy of the original certificate approval from a waste management system and a true copy of the original certificate of approval from the place of disposal for all debris and surplus material disposed of by the *Contractor* under the *Contract*.”

SC 29. GC 3.14 PERFORMANCE BY CONTRACTOR

1. Add new general condition GC 3.14 PERFORMANCE BY CONTRACTOR as follows:

“GC 3.14 PERFORMANCE BY CONTRACTOR

- 3.14.1 In performing its services and obligations under the *Contract*, the *Contractor* shall exercise a standard of care, skill and diligence that would normally be provided by an experienced and prudent contractor supplying similar services for similar projects. The *Contractor* acknowledges and agrees that throughout the *Contract*, the *Contractor's* obligations, duties and responsibilities shall be interpreted in accordance with this standard. The *Contractor* shall exercise the same standard of due care and diligence in respect of any *Products*, personnel, or procedures which it may recommend to the *Owner*.
- 3.14.2 The *Contractor* further represents, covenants and warrants to the *Owner* that:
- .1 the personnel it assigns to the *Project* are appropriately experienced;
 - .2 it has a sufficient staff of qualified and competent personnel to replace any vacancy, subject to the *Owner's* approval, resulting from death, incapacity, removal or resignation; and
 - .3 there are no pending, threatened or anticipated claims that would have a material effect on the financial ability of the *Contractor* to perform its work under the *Contract*.”

SC 30. GC 3.15 SECURITY

1. Add new general condition GC 3.15 SECURITY as follows:

“GC 3.15 SECURITY

- 3.15.1 The *Contractor* is responsible to provide and maintain the *Place of the Work* in a secure manner, free from public access, trespassing, or vandalism. This provision is to be maintained on a twenty-four (24) hours per day, seven (7) days per week basis and may require such items as fencing, hoarding, lighting, security guards or systems, and security cameras.”

SC 31. GC 4.1 CASH ALLOWANCES

1. Add after “*Contractor’s*,” in paragraph 4.1.2, the following:

“and *Subcontractor’s*”

2. Add new paragraph 4.1.8 as follows:

“4.1.8 The *Owner* reserves the right to call, or to have the *Contractor* call, for competitive bids for portions of the *Work* to be paid from cash allowances.”

SC 32. GC 4.2 CONTINGENCY ALLOWANCE

1. Add new paragraphs 4.2.5 and 4.2.6:

“4.2.5 Any contingency allowance specified in the *Contract Documents*, the *Owner’s* Council resolution with respect to the *Contract*, or elsewhere, shall be deemed to be solely a budgetary authorization by the *Owner*. The *Contractor* shall have no right to draw upon any such contingency allowance for payment unless specifically authorized to do so by way of *Change Order*.

4.2.6 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*.”

SC 33. GC 4.3 PROVISIONAL AMOUNTS

1. Add new general condition GC 4.3 PROVISIONAL AMOUNTS as follows:

“GC 4.3 PROVISIONAL AMOUNTS

4.3.1 The *Contract Price* includes provisional items, if any, as stated in the *Contract Documents*.

4.3.2 The *Contractor* is not entitled to payment of any provisional items except for the extra or additional work carried out by the *Contractor*, as directed by the *Owner* and in accordance with the *Contract* and only to the extent of such extra or additional work and payment approved by the *Owner*.

4.3.3 The *Owner* reserves the right to delete from the *Contract Price* any of the provisional items identified in the *Form of Tender*, for credit at the price shown. All prices are inclusive of all duties and taxes applicable, except *Value Added Taxes*.”

SC 34. GC 5.1 PROVISIONAL AMOUNTS

1. Delete GC 5.1 FINANCING INFORMATION REQUIRED OF THE OWNER in its entirety.

SC 35. GC 5.2 APPLICATIONS FOR PAYMENT

1. Add to the end of paragraph 5.2.1, the following:

“Applications for payment shall be in accordance with the Construction Act and made by way of a *Notice in Writing* delivered by electronic communication, or as may be otherwise agreed, to both the *Consultant* and the *Owner*.”

2. Add to the end of paragraph 5.2.3, the following:

“The *Contractor* shall review with the *Consultant* and the *Owner*, at a scheduled time, the percentage of work completed for each item indicated in the schedule of values. This procedure shall be complied with for each application for payment prior to submitting the formal application for payment.”

3. Delete paragraph 5.2.5 in its entirety and replace with the following:

“The schedule of values shall be made out in such form and supported by such evidence as the *Consultant* may reasonably direct and when accepted by the *Consultant*, shall be used as the basis for applications for payment, unless it is found to be in error.”

4. Delete paragraph 5.2.7 in its entirety and replace with the following:

“Each application for payment shall meet the requirements of a “proper invoice” as defined in the *Construction Act* (Ontario) if the *Contractor* includes the following:

- a statement based on the schedule of 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 by paragraph 5.2.9;
- any other requirement that the *Construction Act* (Ontario) prescribes for a proper invoice; and
- evidence of compliance with workers' compensation legislation at the *Place of the Work* and after the first payment, a declaration by the *Contractor* as to the distribution made of the amounts previously received using document CCDC 9A 'Statutory Declaration'.

5. Add to the end of paragraph 5.2.8, the following:

“Any *Products* delivered to the *Place of the Work* but not yet incorporated into the *Work* shall remain at the risk of the *Contractor* notwithstanding that title has passed to the *Owner* pursuant to General Condition 13.1 - OWNERSHIP OF MATERIALS.”

6. Add new paragraphs 5.2.9, 5.2.10, 5.2.11, 5.2.12, 5.2.13, 5.2.14 and 5.2.15, as follows:

- “5.2.9 The *Contractor* must provide with each application of a proper invoice after the first, a *Statutory Declaration*, 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.
- 5.2.10 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.
- 5.2.11 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 application for payment, subject to any amount that is disputed, and where the *Owner* has received notice of a lien, an amount sufficient to satisfy the lien may be retained , less previous payments, less the amount of any liens or any written notice of a lien of which the *Owner* has notice, plus 25% for security for costs, less the maintenance security referred to in GC 12.3 – WARRANTY, and less any amounts that the *Owner* deems necessary to retain for its protection against claims or liabilities or for any claim or claims the *Owner* may have against the *Contractor* under the *Contract*, other contracts, or otherwise, and such payments shall not in any way be construed as, nor shall it constitute, an acceptance of all or any part of the *Work* or material under the *Contract*. Once the reason for the *Owner* being entitled to withhold payment of any amount has been rectified, the amount withheld due to that reason will be paid by the *Owner* to the *Contractor*.
- 5.2.12 Deviation or incomplete submissions with respect to the breakdown of approved *Change Orders* and percentage completed of each will require resubmission of the application for payment.
- 5.2.13 If any *Work* or item under the *Contract* is included by the *Contractor* in its progress claims as partially or fully completed, but it is not completed in accordance with *Drawings* or *Specifications*, or is not completed to the *Consultant's* satisfaction, the *Consultant* shall omit the partial or total cost of such items from the certificates of payment and shall notify the *Contractor* in writing of its action and the reason for same, and shall withhold payments for such items, over, above and distinct from applicable construction lien holdbacks, until they are completed or corrected to its full satisfaction.
- 5.2.14 The *Consultant* and/or the *Owner* shall not be held responsible for any delays in payment due to a disagreement in the amounts shown by the *Contractor* on their payment application as submitted to the *Consultant* for review.
- 5.2.15 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.”

SC 36. GC 5.3 PAYMENT

1. Delete “10 calendar days” in subparagraph 5.3.1.1 and replace with “5 calendar days”.

SC 37. GC 5.4 SUBSTANTIAL PERFORMANCE OF THE WORK AND PAYMENT OF HOLDBACK

1. Add to the beginning of paragraph 5.4.1:

“When the *Contractor* considers that the *Work* is substantially performed, or if permitted by the lien legislation applicable to the *Place of the Work* a designated portion thereof which the *Owner* agrees to accept separately is substantially performed, the *Contractor* shall, within one *Working Day*, deliver to the *Consultant* and to the *Owner* a comprehensive list of items to be completed or corrected, together with a written application for a review by the *Consultant* to establish *Substantial Performance of the Work* or substantial performance of the designated portion of the *Work*. Failure to include an item on the list does not alter the responsibility of the *Contractor* to complete the *Contract*.”

2. Delete paragraphs 5.4.2 and 5.4.3 in their entirety.

3. Add new paragraph 5.4.2 as follows:

“The prerequisites to attaining Substantial Performance includes but is not limited to the following:

- .1 Evidence of compliance with the requirements for occupancy or occupancy permit as prescribed by the authorities having jurisdiction
- .2 Final cleaning and waste removal at the time of applying for *Ready-for-Takeover*, as required by the *Contract Documents*.
- .3 The delivery to the *Owner* of such operations and maintenance documents reasonably necessary for immediate operation and maintenance, as required by the *Contract Documents*.
- .4 Make available a copy of the as-built drawings completed to date on site.
- .5 Startup, testing required for immediate occupancy, as required by the *Contract Documents*.
- .6 Ability to secure access to the *Work* has been provided to the *Owner*, if required by the *Contract Documents*.”

4. Add to the end of paragraph 5.4.4, the following:

“and submit CCDC 9A ‘Statutory Declaration’ to state that all accounts for labour, subcontracts, *Products*, *Construction Equipment*, and other indebtedness which may have been incurred by the *Contractor* in the *Substantial Performance of the Work* and for which the *Owner* might in any way be held responsible have been paid in full, except for amounts properly retained as a holdback or as an identified amount in dispute.”

5. Add after “Where legislation” in subparagraph 5.4.5, the following:

“and the Contract”

SC 38. GC 5.5 FINAL PAYMENT

1. Delete paragraph 5.5.1 in its entirety and replace with the following:

“5.5.1 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 paragraph 5.4.2 and, for purposes of the *Construction Act*, the remaining *Work* is valued at more than \$5,000. The *Work* shall be deemed not to be performed until all of the aforementioned documents have been delivered. Application for final payment shall be made by way of *Notice in Writing* and shall be delivered by electronic communication to both the *Consultant* and the *Owner*. Application for final payment shall meet the requirements of a “proper invoice” as set out in paragraph 5.2.7.”

2. Delete “10 calendar days” in paragraph 5.5.2 and replace with “5 calendar days”.
3. Delete “5 calendar days after the issuance of a final certificate for payment” in paragraph 5.5.4 and replace with “the deadline prescribed by the *Construction Act* (Ontario)”.
4. Add new paragraph 5.5.5 as follows:

“5.5.5 Prior to the release of the holdback for finishing work under the *Construction Act*, the *Contractor* shall submit:
.1 *Contractor’s* written request for release of the holdback, including a statement that no written notices of lien have been received by it;
.2 a *Statutory Declaration*; and
.3 a final Workplace Safety & Insurance Board Clearance Certificate.”

SC 39. GC 5.6 WITHHOLDING OF PAYMENT

1. Delete “or if” in paragraph 5.6.1 and replace with “and where”.

SC 40. GC 5.8 LIENS

1. Add new general condition GC 5.8 LIENS as follows:

“GC 5.80 LIENS

5.8.1 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.

5.8.2 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*.

5.8.3 This GC 5.8 does not apply to construction liens claimed by the *Contractor*.”

SC 41. GC 5.9 PAYMENT BY ELECTRONIC FUNDS TRANSFER

1. Add new general condition GC 5.9 PAYMENT BY ELECTRONIC FUNDS TRANSFER as follows:

“GC 5.9 PAYMENT BY ELECTRONIC FUNDS TRANSFER

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

5.9.2 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* shall agree to accept payment by cheque or some other mutually agreeable method of payment.

5.9.3 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.
- .4 If the EFT information changes after submission of correct EFT information, the *Owner* shall have thirty (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.

5.9.4 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 thirty (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 and to comply with the Payment Legislation.

5.9.5 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.

5.9.6 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.”

SC 42. GC 6.1 OWNER'S RIGHT TO MAKE CHANGES

1. Add new paragraph 6.1.3 as follows:

“6.1.3 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.”

SC 43. GC 6.2 CHANGE ORDER

2. Add after “in a form that can be reasonably evaluated” in subparagraph 6.2.1 and add “and is acceptable to the *Consultant*”.

SC 44. GC 6.3 CHANGE DIRECTIVE

1. Delete subparagraph 6.3.6.3 in its entirety and replace with the following:

“3 The *Contractor's* fee shall be as specified in GC 6.7 - EXTRA WORK, CLAIMS PAYMENT FROM CONTINGENCY or as otherwise agreed by the parties.”

2. Delete subparagraph 6.3.7 in its entirety and add the following:

“6.3.7 The cost of performing the work attributable to the Change Directive shall be limited to the actual cost of the following in as much as it contributes directly to the implementation of the Change Directive:

- .1 salaries, wages and benefits paid to personnel in the direct employ of the *Contractor* while directly engaged in the *Work* attributable to the change

under a salary or wage schedule agreed upon by the *Owner* and the *Contractor*, or in the absence of such a schedule, actual salaries, wages and benefits paid under applicable bargaining agreement, and in the absence of a salary or wage schedule and bargaining agreement, actual salaries, wages and benefits paid by the *Contractor* while directly engaged in the *Work* attributable to the change, for personnel

- (1) stationed at the *Contractor's* field office, in whatever capacity employed;
 - (2) engaged in the preparation or review of *Shop Drawings*, fabrication drawings, and coordination drawings; or
 - (3) engaged in the processing of changes in the *Work*;
- .2 contributions, assessments or taxes incurred for such items as employment insurance, provincial or territorial health insurance, workers' compensation, and Canada or Quebec Pension Plan, insofar as such cost is based on wages, salaries or other remuneration paid to employees of the *Contractor* and included in the cost of the *Work* as provided in paragraph 6.3.7.1;
 - .3 travel and subsistence expenses of the *Contractor's* personnel described in paragraph 6.3.7.1;
 - .4 all *Products* including cost of transportation thereof;
 - .5 materials, supplies, *Construction Equipment*, *Temporary Work*, exclusive of hand tools, including transportation and maintenance thereof, which are consumed in the performance of the *Work*; and cost less salvage value on such items used but not consumed, which remain the property of the *Contractor*;
 - .6 all tools and *Construction Equipment*, exclusive of hand tools used in the performance of the *Work*, whether rented from or provided by the *Contractor* or others, including installation, minor repairs and replacements, dismantling, removal, transportation, and delivery cost thereof;
 - .7 all equipment and services required for the *Contractor's* field office;
 - .8 deposits lost;
 - .9 the amounts of all subcontracts provided however that the cost included in such amounts shall be limited to the actual costs of the items described in this paragraph 6.3.7 changing "*Contractor*" to "*Subcontractor*" as necessary;
 - .10 quality assurance such as independent inspection and testing services;
 - .11 charges levied by authorities having jurisdiction at the *Place of the Work*;
 - .12 royalties, patent licence fees and damages for infringement of patents and cost of defending suits therefor subject always to the *Contractor's* obligations to indemnify the *Owner* as provided in paragraph 10.3.1 of GC 10.3 - PATENT FEES;
 - .13 any adjustment in premiums for all bonds and insurance which the *Contractor* is required, by the *Contract Documents*, to purchase and maintain;
 - .14 any adjustment in taxes, other than *Value Added Taxes*, and duties for which the *Contractor* is liable;
 - .15 charges for voice and data communications, courier services, expressage, transmittal and reproduction of documents, and petty cash items;
 - .16 incurred in relation to the performance of the *Work*;
 - .17 removal and disposal of waste products and debris; and

.18 safety measures and requirements not caused by the *Contractor* or anyone for whom it is responsible.”

3. Delete paragraph 6.3.9 in its entirety and replace with the following:

“6.3.9 The *Contractor* shall keep full and detailed accounts and records, including all documents and invoicing from the *Contractor*, *Subcontractor* and *Supplier*, for the documentation of the cost of performing the *Work* attributable to the *Change Directive* and shall provide the *Consultant* with copies upon submission of any claim for costs related to the *Change Directive* as included in an application for payment.”

4. Add to the end of paragraph 6.3.10, the following:

“The *Contractor* shall include all pertinent documentation as back-up with any claims for additional *Contract Time* and/or increase in *Contract Price* to the *Consultant* for review and approval.”

5. Add after “proposed adjustment in the *Contract Time* from paragraph 6.3.12, the following:

“and/or *Contract Price*”

SC 45. GC 6.4 CONCEALED OR UNKNOWN CONDITIONS

1. Add new paragraph 6.4.5 as follows:

“6.4.5 If the *Contractor* was given access to the *Place of the Work* prior to the submission of the bid on which the *Contract* was awarded, then the *Contractor* confirms that it carefully investigated the *Place of the Work* and, in doing so, applied to that investigation the degree of care and skill required by paragraph 3.14.1. In those circumstances, notwithstanding the provisions of paragraph 6.4.1, the *Contractor* is not entitled to an adjustment to the *Contract Price* or to an extension of the *Contract Time* for conditions which could reasonably have been ascertained by the *Contractor* by such careful investigation, or which could have been reasonably inferred from the material provided with the *Contract Documents*. In those circumstances, should a claim arise, the *Contractor* will have the burden of establishing that it could not have discovered the materially different conditions from a careful investigation, because of restrictions placed on its access or inferred the existence of the conditions from the material provided with the *Contract Documents*.”

SC 46. GC 6.5 DELAYS

1. Delete paragraph 6.5.1 in its entirety and replace with the following:

“6.5.1 If the *Contractor* is delayed in the performance of the *Work* by an action or omission of the *Owner*, *Consultant* or anyone employed or engaged by the

Owner directly, contrary to the provisions of the *Contract Documents*, then the *Contract Time* shall be extended for such reasonable time as the *Consultant* may recommend in consultation with the *Contractor*. The *Contractor* shall be reimbursed by the *Owner* for reasonable costs incurred by the *Contractor* as the result of such delay, provided that the *Owner* shall not be liable for any other costs or damages whatsoever including, without limitation, any indirect, consequential, or special damages, such as loss of profits, loss of opportunity or loss of productivity resulting from such delay.”

2. Delete the words “Ready-for-Takeover” in paragraph 6.5.2 and replace with “Substantial Performance”.

3. Add to the end of paragraph 6.5.2, the following:

“, provided that the *Owner* shall not be liable for any other costs or damages whatsoever including, without limitation, any indirect, consequential, or special damages, such as loss of profits, loss of opportunity or loss of productivity resulting from such delay.”

4. Delete paragraph 6.5.3 in its entirety and replace with the following:

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

1. Subject to the foregoing, each party shall be excused from performance so long as the *Force Majeure* persists, and shall not be considered to be in default under this section, if and to the extent that its failure of, or delay in performance is due to that *Force Majeure*.
2. Where a *Force Majeure* remains in effect for more than ninety (90) calendar days, either party may terminate the *Contract* upon thirty (30) calendar days written notice to the other party, provided at the time when that notice is given the *Force Majeure* is then continuing.
3. While a *Force Majeure* subsists which prevents the *Contractor* from proceeding with the *Work* under the *Contract*, the *Owner* may engage an alternate contractor on an interim basis, and the *Work* and the *Contract Price* will be adjusted accordingly.”

5. Add new paragraph 6.5.6 as follows:

“6.5.6 Where the *Project* is not totally completed within twenty (20) *Working Days* of the *Substantial Performance Date*, or at a time mutually agreed to by the parties, the *Owner* has the right to complete any remaining deficiencies or outstanding work and deduct the amount from monies that may be due or payable to the *Contractor*.”

SC 47. GC 6.6 CLAIMS FOR A CHANGE IN CONTRACT PRICE

1. Add new paragraph 6.6.7 as follows:

“6.6.7 The *Owner* may make claims against the *Contractor* arising out of the costs incurred for additional services provided by the *Consultant* resulting from the *Contractor*'s failure to reasonably perform the *Work* in accordance with the terms and conditions of the *Contract*.”

SC 48. GC 6.7 EXTRA WORK, CLAIMS, PAYMENT FROM CONTINGENCY

1. Add new general condition GC 6.7 EXTRA WORK, CLAIMS, PAYMENT FROM CONTINGENCY, as follows:

“GC 6.7 EXTRA WORK, CLAIMS, PAYMENT FROM CONTINGENCY.

6.7.1 When a change in the *Work* is proposed or required, the *Consultant* may, on behalf of the *Owner*, issue a *Contemplated Change Order* to the *Contractor*. The *Contractor* shall upon receipt of a *Contemplated Change Order* promptly present to the *Consultant* a method of adjustment or, pursuant to paragraph 6.7.2, an amount of adjustment for the *Contract Price*, if any, and the adjustment in the *Contract Time*, if any, for the proposed change in the *Work*.

6.7.2 When the *Contractor* submits an amount of adjustment in response to a *Contemplated Change Order* or a *Change Directive*, the following provisions shall apply:

- .1 Where the scope of *Work* identified by the *Contemplated Change Order* or *Change Directive* involves an adjustment in the *Contract Price*, the *Contractor* shall express and calculate the adjustment in the form of a written quotation with supporting documentation, including documentation and detailed invoicing from *Subcontractors*, and *Suppliers*, acceptable to the *Consultant*, and to include an amount:
 - (1) representing the net change in *Construction Costs* of the *Work*, taking into account all credits and scope reductions resulting from the change;
 - (2) for *Overhead Costs* and profit calculated in accordance with paragraph 6.7.3; and,
 - (3) for *Value Added Taxes*.
- .2 Where the scope of *Work* identified by the *Contemplated Change Order* or *Change Directive* involves an adjustment in the *Contract Time*, the *Contractor* shall express the number of *Working Days*, the reason and logic for the adjustment, and all the supporting documentation inclusive

of a *Project* schedule identifying the impacted activities, their inter-relationship, and changes to the critical path.

- .3 Notwithstanding any other provisions in the General Conditions or Supplementary Conditions of the *Contract*, it is the intention and agreement of the parties that the *Contractor's* submitted adjustment in *Contract Price*, if any, and the adjustment in *Contract Time*, if any, in response to a *Contemplated Change Order* or *Change Directive* shall be all-inclusive of any costs, claims, impacts, and liabilities of the *Contractor* and *Subcontractor(s)* whether known or unknown, direct or indirect, collective or cumulative.
- .4 The *Consultant* and *Owner* are entitled to rely on the accuracy, completeness, and all-inclusive nature of the *Contractor's* submitted adjustment(s), if any, in response to a *Contemplated Change Order* or *Change Directive*. Once a *Change Order* has been issued for the submitted adjustment(s) the *Contractor* shall not be entitled to any further claim or adjustment in the *Contract Price* or *Contract Time* associated, in part or whole, with the respective change.

6.7.3 Where an adjustment to the *Contract Price* and/or *Contract Time* is made for a change carried out by *Change Order* or *Change Directive*, the amount of *Overhead Costs* and profit for the *Contractor* and *Subcontractor* shall be calculated in accordance with the following provisions:

- .1 Where a change in the *Work* is performed by the *Contractor's* own forces, *Overhead Costs* and profit shall not exceed an amount equal to 15% of the first \$50,000.00 in additional *Construction Costs* and 5% thereafter;
- .2 Where a change in the *Work* is performed by a *Subcontractor's* forces:
 - (1) The *Subcontractor's Construction Costs* for the change in the *Work* shall be all-inclusive to perform the change and be identified separate and apart from any *Value Added Taxes*, *Overhead Costs*, or profit of the *Subcontractor* or *Contractor*.
 - (2) The *Subcontractor's Overhead Costs* and profit shall not exceed an amount equal to 15% of the first \$50,000.00 in additional *Construction Costs* and 5% thereafter; and
 - (3) The *Contractor's Overhead Costs* and profit shall not exceed an amount equal to 10% of the first \$50,000 in additional *Subcontractor Construction Costs* and 5% thereafter;
- .3 Where a change in the *Work* is performed both by the *Contractor's* own forces and a *Subcontractor's* forces the *Overhead Costs* and profit shall be calculated separately in accordance with paragraph 6.7.3.1 and 6.7.3.2 as the case may be, as applied proportionately to the total amount of change in *Construction Costs* being done by the *Contractor* and *Subcontractor*.”

SC 49. GC 7.1 OWNER'S RIGHT TO PERFORM THE WORK, TERMINATE THE CONTRACTOR'S RIGHT TO CONTINUE WITH THE WORK OR TERMINATE THE CONTRACT

- 1. Add before “OR TERMINATE THE CONTRACT” in the title of GC 7.1, the following:

“SUSPEND THE WORK”

2. Delete “however, if such cost of finishing the *Work* is less than the unpaid balance of the *Contract Price*, the *Owner* shall pay the *Contractor* the difference” from subparagraph 7.1.5.3.
3. Delete paragraph 7.1.6 in its entirety.
4. Add new paragraphs 7.1.6, 7.1.7, 7.1.8, 7.1.9 and 7.1.10 as follows:
 - “7.1.6 In addition to its right to terminate the *Contract* set out herein, the *Owner* may terminate the *Contract* at any time for any other reason and without cause upon giving the *Contractor Notice in Writing* to that effect. In such event, the *Contractor* shall be entitled to be paid for all *Work* performed including reasonable profit, for loss sustained upon *Products* and *Construction Equipment*, and such other damages as the *Contractor* may have sustained as a result of the termination of the *Contract*, but in no event shall the *Contractor* be entitled to be compensated for any loss of profit on unperformed portions of the *Work*, or indirect, special, or consequential damages incurred.
 - 7.1.7 The *Owner* may suspend *Work* under the *Contract* at any time for any reason and without cause upon giving the *Contractor Notice in Writing* to that effect. In such event, the *Contractor* shall be entitled to be paid for all *Work* performed to the date of suspension and be compensated for all actual costs incurred arising from the suspension, including reasonable profit, for loss sustained upon *Products* and *Construction Equipment*, and such other damages as the *Contractor* may have sustained as a result of the suspension of the *Work*, but in no event shall the *Contractor* be entitled to be compensated for any indirect, special, or consequential damages incurred. In the event that the suspension continues for more than one hundred and eighty (180) calendar days, the *Contract* shall be deemed to be terminated and the provisions of paragraph 7.1.6 shall apply.
 - 7.1.8 In the case of either a termination of the *Contract* or a suspension of the *Work* under GC 7.1 - OWNER'S RIGHT TO PERFORM THE WORK, TERMINATE THE CONTRACTOR'S RIGHT TO CONTINUE WITH THE WORK, SUSPEND THE WORK OR TERMINATE THE CONTRACT or GC 7.2 - CONTRACTOR'S RIGHT TO SUSPEND THE WORK OR TERMINATE THE CONTRACT, the *Contractor* shall use its best commercial efforts to mitigate the financial consequences to the *Owner* arising out of the termination or suspension, as the case may be.
 - 7.1.9 Upon the resumption of the *Work* following a suspension under GC 7.1 - OWNER'S RIGHT TO PERFORM THE WORK, TERMINATE THE CONTRACTOR'S RIGHT TO CONTINUE WITH THE WORK, SUSPEND THE WORK OR TERMINATE THE CONTRACT or GC 7.2 - CONTRACTOR'S RIGHT TO SUSPEND THE WORK OR TERMINATE

THE CONTRACT, the *Contractor* will endeavour to minimize the delay and financial consequences arising out of the suspension.

- 7.1.10 The *Contractor's* obligation under the *Contract* as to quality, correction, and warranty of the *Work* performed by the *Contractor* up to the time of termination or suspension shall continue after such termination of the *Contract* or suspension of the *Work*.”

SC 50. GC 7.2 CONTRACTOR'S RIGHT TO SUSPEND THE WORK OR TERMINATE THE CONTRACT

1. Delete “20 *Working Days*” in paragraph 7.2.2 and replace with the following:

“ninety (90) *Working Days*”

2. Delete paragraph 7.2.3 in its entirety and replace with the following:

“7.2.3 The *Contractor* may give *Notice in Writing* to the *Owner*, with a copy to the *Consultant*, that the *Owner* is in default of the *Owner's* contractual obligations if:

- .1 subject to the other terms and conditions of the *Contract* the *Owner* fails to pay the *Contractor* when due the amounts certified by the *Consultant* or awarded by adjudication, arbitration or court, except where the *Owner* has a bona fide claim for set-off, or
- .2 the *Owner* fails to comply with the requirements of the *Contract* to a substantial degree and the *Consultant*, confirms by written statement to the *Contractor* and the *Owner*, that sufficient cause exists.”

3. Delete paragraph 7.2.4 in its entirety and replace with the following:

“7.2.4 The *Contractor's Notice in Writing* to the *Owner* provided under paragraph 7.2.3 shall advise that if the default is not corrected within twenty (20) *Working Days* following the receipt of the *Notice in Writing*, the *Contractor* may, without prejudice to any other right or remedy the *Contractor* may have, suspend the *Work* until the default is corrected, provided, however, that in the event of such suspension, the provisions of paragraph 7.1.10 shall apply. If the *Contractor's Notice in Writing* to the *Owner* was given pursuant to paragraph 7.2.3, then, ninety (90) *Working Days* after the delivery of the *Notice in Writing*, the *Contractor* may terminate the *Contract*, provided, however, that in the event of such termination, the provisions of paragraph 7.1.10 shall apply.”

4. Delete paragraph 7.2.5 in its entirety and replace with the following:

“7.2.5. If the *Contractor* terminates the *Contract* **by giving a *Notice in Writing* to the *Owner*** under the conditions set out above, the *Contractor* shall be entitled to be paid for all *Work* performed to the date of termination and be compensated for all actual costs incurred arising from the suspension, including reasonable profit, for loss sustained upon *Products* and *Construction Equipment*, and such other

damages as the *Contractor* may have sustained as a result of the termination of the *Work*, but in no event shall the *Contractor* be entitled to be compensated for any indirect, special or consequential damages incurred.”

SC 51. GC 8.3 NEGOTIATION, MEDIATION AND ARBITRATION

1. Delete paragraphs 8.3.6, 8.3.7 and 8.3.8 in their entirety.
2. Add new paragraphs 8.3.6 and 8.3.7 as follows:
 - “8.3.6 When a dispute has not been resolved through negotiation or mediation, within ten (10) *Working Days* after the date of termination of the mediated negotiations under paragraph 8.3.5, either party may give a *Notice in Writing* to the other party and to the *Consultant* inviting the other party to agree to submit the dispute to be finally resolved by arbitration, pursuant to provisions of the *Arbitration Act, 1991*. If the other party wishes to accept the invitation to submit the dispute to arbitration, it shall so indicate by the delivery of a responding *Notice in Writing* within ten (10) *Working Days* of receipt of the invitation. If, within the required times, no invitation is made or, if made, is not accepted, either party may refer the dispute to the courts or to any other form of dispute resolution, including arbitration, which the parties may agree to use.
 - 8.3.7 The determination of a matter by an adjudicator under the *Construction Act* (Ontario) may be submitted to arbitration or the courts or other form of dispute resolution as provided in section 8.3.6 at any time.”

SC 52. GC 9.1 PROTECTION OF WORK AND PROPERTY

1. Delete “property adjacent to the *Place of the Work*” in paragraphs 9.1.1 replace with the following:

“property adjacent, in the vicinity of or proximate to the *Place of the Work*”
2. Delete subparagraph 9.1.1.1 in its entirety and replace with the following:

“.1 errors in the *Contract Documents* which the *Contractor* could not have reasonably discovered applying the standard of care described in paragraph 3.14.1;”
3. Delete paragraph 9.1.2 in its entirety and replace with the following:

“9.1.2 Before commencing any work, the *Contractor* shall determine the locations of all underground utilities and structures indicated in the *Contract Documents* or reasonably apparent from the *Contract Documents*, or that are reasonably apparent from an inspection of the *Place of the Work* exercising the degree of care and skill described in paragraph 3.14.1.”
4. Delete “property adjacent to the *Place of the Work*” in paragraphs 9.1.3 and replace with the following:

“property adjacent, in the vicinity of or proximate to the *Place of the Work*”

5. Add new paragraph 9.1.5 as follows:

“9.1.5 With respect to any damage to which paragraph 9.1.4 applies, the *Contractor* shall neither undertake to repair or replace any damage whatsoever to the work of other contractors, or to property adjacent, in the vicinity of or proximate to the *Place of the Work*, nor acknowledge that the same was caused or occasioned by the *Contractor*, without first consulting the *Owner* and receiving written instructions as to the course of action to be followed from either the *Owner* or the *Consultant*. Where, however, there is danger to life, the environment, or public safety, the *Contractor* shall take such emergency action as it deems necessary to remove the danger.”

SC 53. GC 9.2 TOXIC OR HAZARDOUS SUBSTANCES

1. Delete paragraph 9.2.6 in its entirety and replace with the following:

“9.2.6 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*.”

2. Delete subparagraph 9.2.7.4 in its entirety and replace with the following:

“9.2.7.4 indemnify the *Contractor* from and against claims, demands, losses, costs, damages, actions, suits or proceedings made, suffered or brought by third parties arising out of or resulting from exposure to, or the presence of, toxic or hazardous substances for which the *Contractor* is not responsible under GC 9.2 – TOXIC AND HAZARDOUS SUBSTANCES at the *Place of Work*. This obligation shall not be construed to negate, abridge or reduce other rights or obligations of indemnity set out in GC 13.1 – INDEMNIFICATION or that otherwise exist respecting a person or party described in this paragraph.”

3. Delete paragraph 9.2.8 in its entirety and replace with the following:

“9.2.8 If the *Owner* and *Contractor* agree or if the expert referred to in paragraph 9.2.6 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, 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* as provided in paragraph 9.1.3 of GC 9.1- PROTECTION OF WORK AND PROPERTY;
- .3 reimburse the *Owner* for reasonable costs incurred under paragraph 9.2.6; and as a result of the delay
- .4 indemnify the *Owner* as required by GC 13.1 - INDEMNIFICATION.”

SC 54. GC 9.4 CONSTRUCTION SAFETY

1. Delete GC 9.4. in its entirety and replace with the following:

“9.4.1 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*.

9.4.2 Prior to the commencement of the *Work*, the *Contractor* shall submit to the *Owner*:

- .1 documentation setting out the *Contractor's* in-house safety programs; and
- .2 a copy of the Notice of Project filed with the Ministry of Labour naming the *Contractor* as “constructor” under the *Occupational Health and Safety Act*.

9.4.3 The *Contractor* shall indemnify, defend and save harmless the *Owner*, its agents, officers, directors, employees, consultants, successors, appointees, and assigns from and against the consequences of any and all safety infractions committed by the *Contractor* under the *Occupational Health and Safety Act*, including the payment of legal fees and disbursements on a solicitor and client basis. Such indemnity shall apply to the extent to which the *Owner* is not covered by insurance, provided that the indemnity contained in this paragraph shall be limited to costs and damages resulting directly from such infractions and shall not extend to any consequential, indirect or special damages.

9.4.4 The *Owner* undertakes to include in its contracts with other contractors and in its instructions to its own forces the requirement that the other contractor or its own forces, as the case may be, comply with the policies and procedures of and the directions and instructions from the *Contractor* with respect to occupational health and safety and related matters. Prior to admission to the *Place of the*

Work, the *Contractor* may, as a condition of admission, require any other contractor or the *Owner's* own forces to sign a written acknowledgement in the following form:

Acknowledgement

The undersigned acknowledges that the *Work* it will perform on behalf of the *Owner* requires it to enter a *Place of the Work* which is under the total control of a *Contractor* that has a contract with the *Owner*, pursuant to which the *Contractor* has assumed overall responsibility for compliance with all aspects of the applicable health and safety legislation, including all the responsibilities of the "constructor" under the *Occupational Health and Safety Act*, as well as responsibility to co-ordinate and schedule the activities of our *Work* with the *Work* of the *Contractor* under its contract. The undersigned agrees to comply with the *Contractor's* directions and instructions with respect to health, safety, co-ordination, and scheduling and acknowledges that its failure to do so will be cause for termination of employment or of the undersigned's contract with the *Owner*, as the case may be. The undersigned also agrees to have the *Contractor* named as an additional insured on any commercial general liability insurance policy, where such insurance is required.

- 9.4.5 Without limiting any of the foregoing, prior to commencement of the *Work*, the *Contractor* shall have both a written occupational health and safety policy and program to implement that policy, and that all of its employees, *Subcontractors* and any other persons performing the *Work* shall be appropriately trained, licensed and certified, as required to perform the *Work*.
- 9.4.6 The *Contractor* and *Subcontractors* shall comply with the safety by-laws of the *Owner*, the *Employment Standards Act*, *Occupational Health and Safety Act* and all regulations thereunder, any other legislation governing construction or workplace safety, and all instructions issued by the *Consultant* or any inspector appointed by the Province of Ontario or City of Hamilton.
- 9.4.7 The *Contractor* shall be responsible for keeping the work free from trespassers and for protection of the work and the public from any loss or injury from commencement of the work to *Substantial Performance of the Work*.
- 9.4.8 The *Contractor* shall comply with all applicable occupational health and safety requirements in force during the time when *Work* is being carried out, and shall provide at the *Place of the Work*, such equipment and medical facilities as are necessary to furnish first aid to anyone who may be injured in connection with the *Work*.
- 9.4.9 Before commencing with any *Work*, the *Contractor*, the *Consultant* and the *Owner's* representative shall meet at the *Place of the Work*, and establish safe routes and routines for material deliveries, material storage locations, construction office location, and all other aspects of the execution of all *Work*.
- 9.4.10 The *Contractor* shall erect and maintain during construction, a dependable temporary fence, barricades, warning lights, and signage around the perimeter of

the *Place of the Work*, all hazardous areas and excavations, and the *Consultant* may give reasonable directions to the *Contractor* as to the type and extent of the fence, barriers, warning lights, and signage needed.

- 9.4.11 The *Contractor* shall, at its own expense, shore up or otherwise securely support or protect any buildings, walls, fences, pavement, boulevards or other structures at the *Place of the Work*, and on the adjoining properties which may be endangered or which may cause injury during the *Work*, and in case of damage, disturbance or injuries to any such structures during and attributable, whether directly or indirectly, to any work under the *Contract*, or to any extra work entering into the *Contract*, the *Contractor* shall at its own expense, repair, rebuild or other wise make good all damage, injuries or disturbance to said structures and put all such structures in a condition the same as, or equal to, that existing previous to its beginning that work.”

SC 55 GC 9.5 MOULD

1. Add to the end of subparagraph 9.5.2.3, the following:

“and incurred as a result of the delay”

2. Delete subparagraph 9.5.3.4 in its entirety and replace with the following:

“9.5.3.4 indemnify the *Contractor* from and against claims, demands, losses, costs, damages, actions, suits or proceedings made, suffered or brought by third parties arising out of or resulting from exposure to, or the presence of, mould for which the *Contractor* is not responsible under GC 9.5 – MOULD at the *Place of Work*. This obligation shall not be construed to negate, abridge or reduce other rights or obligations of indemnity set out in GC 13.1 – INDEMNIFICATION or that otherwise exist respecting a person or party described in this paragraph.”

SC 56 GC 10.1 TAXES AND DUTIES

1. Add to the end of paragraph GC 10.1.2 the following:

“The *Contractor* must prove to the satisfaction of the *Owner* that the *Contractor* will not benefit in any way by reason of any increase to the *Contract Price*.”

2. Add new paragraph 10.1.3 as follows:

“10.1.3 Where the *Owner* is entitled to an exemption or a recovery of sales taxes, customs duties, excise taxes or *Value Added Taxes* applicable to the *Contract*, the *Contractor* shall, at the request of the *Owner*, assist with application for any exemption, recovery or refund of all such taxes and duties and all amounts recovered or exemptions obtained shall be for the sole benefit of the *Owner*. The *Contractor* agrees to endorse over to the *Owner* any cheques received from the federal or provincial governments, or any other taxing authority, as may be required to give effect to this paragraph.”

SC 57 GC 10.2 LAWS, NOTICES, PERMITS, AND FEES

1. Add to the beginning of paragraph 10.2.5, the following:

“Subject to paragraph 3.4.1,”

SC 58 GC 10.3 PATENT FEES

1. Add before “hold the *Owner* harmless” in the second sentence of paragraph 10.3.1, the following:

“indemnify and”

2. Add after “which was supplied to the *Contractor*” in paragraph 10.3.2, the following:

“by the *Owner*”

SC 59 GC 10.4 WORKERS’ COMPENSATION

1. Add after the words “Prior to commencing the *Work*,” in the first line of paragraph 10.4.1, the following:

“and upon execution of the Agreement, again with each application for progress payment,”

2. Add new paragraph 10.4.2 as follows:

“The *Contractor* shall ensure that each *Subcontractor* complies with the workers' compensation legislation at the *Place of the Work*. At any time during the term of the *Contract*, when requested by the *Owner*, the *Contractor* shall provide such evidence of compliance by the *Contractor* and *Subcontractors*.”

SC 60 GC 11.1 INSURANCE

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

“GC 11.1 INSURANCE

11.1.1 The *Contractor* shall obtain and maintain at its own expense, including the cost of any applicable deductible, the following policies of insurance.

- .1 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, 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”. To achieve the desired limit,

Umbrella or Excess liability insurance may be used. Coverage shall be subject to the following:

- (1) where the *Work* involves one or more of the following activities:
 - (i) the use of explosives for blasting;
 - (ii) vibration from pile driving or caisson work;
 - (iii) the removal or weakening of support of any property, building or land whether such support be natural or otherwise, explosion, collapse and underground (“XCU”) coverages shall be added by endorsement to the policy and noted on the certificate of insurance;
 - (2) where the *Work* provides for or contemplates the handling of asbestos, coverage shall not contain an asbestos exclusion and same shall be noted on the certificate of insurance. Alternatively, coverage may be provided under Contractors Pollution Liability Insurance providing coverage in an amount of not less than \$1,000,000 per claim. Such Contractors Pollution Liability Insurance coverage shall remain in effect for 12 months following the completion of the *Work*.
 - (3) the policy shall include coverage for pollution from "hostile fires";
 - (4) unless otherwise approved by the *Owner*, the *Contractor's* deductible on the Commercial General Liability policy and, if applicable, Contractors Pollution Liability Insurance shall be not more than \$100,000; and
 - (5) the insurance coverage shall remain in effect throughout the time that the *Contract* is in effect, including the warranty period.
- .2 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 \$5,000,000 per occurrence for third party liability, in respect of the use or operation of vehicles owned, operated or leased by the *Contractor* for the performance of the *Work* under the *Contract*. The insurance coverage shall remain in effect throughout the time that the *Contract* is in effect, including the warranty period. To achieve the desired limit, Umbrella or Excess liability insurance may be used;
- .3 Non-Owned Automobile Liability Insurance in standard form having an inclusive limit of not less than \$1,000,000 per occurrence, in respect of vehicles not owned by the *Contractor*, that are used or operated on its behalf for the performance of the *Work* under the *Contract*. The insurance coverage shall remain in effect throughout the time that the *Contract* is in effect, including the warranty period. To achieve the desired limit, Umbrella or Excess liability insurance may be used;
- .4 Builders Risk Insurance which covers the *Place of Work* for the full amount of the *Contract Price* plus the full value of any optional features or other options that the *Owner* elects to order (but the *Owner* may require insurance up to the amount of the replacement cost of any building or structure in, on, or upon which any *Work* is to be done under the *Contract*, where in the reasonable opinion of the *Owner* there is a sufficient risk of damage to the same). Such policy shall:
- (1) apply to all risks of direct loss or damage (including theft and sinkhole) subject to the actual policy form;

- (2) unless otherwise directed in writing by the *Owner*, or stipulated elsewhere herein, be in force and be maintained from the commencement date of the *Contract* until the day of issue of the certificate of *Substantial Performance of the Work*;
 - (3) apply to all *Products*, labour, equipment and supplies of every nature, the property of the *Owner* or *Contractor* or for which the *Owner* or *Contractor* may have assumed responsibility (whether on site or in transit), that is to be used in or pertaining to site preparation, and the erection, fabrication, construction, reconstruction, re-modeling or repair of any building, structure, other fixture or thing;
 - (4) include the installation, testing and any subsequent use of machinery and equipment, including boilers, pressure vessels or vessels under vacuum;
 - (5) include damage to the *Work* caused by an accident to or the explosion of any boiler or other pressure vessel or equipment forming part of the *Work*;
 - (6) include off-site storage, transit and installation risks;
 - (7) include flood and earthquake insurance;
 - (8) include coverage for loss of income, extra expense and/or expediting expense if such exposures exist;
 - (9) be subject to a waiver of coinsurance;
 - (10) permit use and occupancy of the *Project*, or any part thereof, where such use and occupancy is for the purposes for which the *Project* is intended upon completion;
 - (11) be endorsed to cover the interest of the *Owner* ;
 - (12) unless otherwise approved by the *Owner*, provide for a deductible of not more than \$25,000; and
 - (13) provide that in the case of a loss or damage, payment shall be made to the *Owner* as their interest may appear. The *Contractor* shall act on behalf of the *Owner* for the purpose of adjusting the amount of such loss or damage payment with the insurer. When the extent of the loss or damage is determined, the *Contractor* shall proceed to restore the *Work*. Loss or damage shall not affect the rights and obligations of either party under the *Contract* except that the *Contractor* shall be entitled to a reasonable extension of *Contract Time*.
- .5 Property Insurance with respect to loss or damage (including fire, theft, burglary, etc.) of the *Contractor's* own property and property in its care, custody and control, including its equipment, tools and stock, used in connection with the *Contract*.

- 11.1.2 All policies of insurance required under paragraph 11.1.1 shall,
- .1 be recorded as being a primary policy and shall be in a form and issued by an insurance company satisfactory to the *Owner*, that is licensed to carry on business in Ontario;
 - .2 be maintained continuously during the course of carrying out the *Work*, or for such period of time as may be required after completion of the *Work* as deemed necessary by the *Owner*;
 - .3 except in the case of standard form automobile liability insurance and non-owned automobile liability insurance, include the *Owner* named as an

- additional insured, to the extent of the *Contractor's* obligations to the *Owner* under the *Contract Documents*;
- .4 contain cross liability and severability of interest provisions, as may be applicable;
 - .5 preclude subrogation claims against the *Owner* and any other person insured under the policy; and
 - .6 provide that at least 30 days prior written notice (15 days in the case of standard form automobile liability insurance, and 10 days in the event of non-payment of premiums) shall be given to the *Owner* by the insurer before the insurer or *Contractor* takes any steps to cancel, terminate, fail to renew, amend or otherwise change or modify the insurance or any part thereof.
- 11.1.3 The *Contractor* shall be responsible for deductible amounts under all of the policies of insurance required under paragraph 11.1.1.
- 11.1.4 The *Owner* reserves the right to require the *Contractor* to purchase such additional insurance coverage as the *Owner* may reasonably require. The *Owner* reserves the right to request such higher limits of insurance or otherwise alter the types of coverage requirements due to material or significant change arising from such matters as the nature of the work, agreement value, industry standards, and availability of insurance, as the *Owner* may reasonably require from time to time. Where such a right is exercised by the *Owner*, the *Owner* will compensate the *Contractor* for any resulting increase in applicable insurance premiums only where the *Contractor* can establish to the satisfaction of the *Owner*, acting reasonably, that such increase in applicable insurance premiums for the insurance required pursuant to the *Contract* does not result from the actions or omissions, negligence, claims history or reassessment by the insurer of the insurable risk posed by the *Contractor*.
- 11.1.5 Any insurance coverage acquired under the *Contract* shall in no manner discharge, restrict or limit the liabilities assumed by the *Contractor* under the *Contract*. The dollar limit of insurance coverage shall not be limited to the *Contract Price*.
- 11.1.6 The *Contractor* shall pay all premiums on the policies as they become due provided that the *Owner* may pay premiums as they become due and deduct the amount thereof from monies due from the *Owner* to the *Contractor* should the *Contractor* fail to do so.
- 11.1.7 The *Contractor* shall deposit with the *Owner* such evidence of its insurance policies required under paragraph 11.1.1 at the time of execution of the Agreement and thereafter during the term of the *Contract*, no later than 20 *Working Days* prior to the renewal date of each applicable policy, a certificate of insurance originally signed by an authorized insurance representative confirming thereon relevant coverage information including but not limited to the *Contract* name and description, name of insurer, name of insurance broker, name of insured, name of additional insureds as may be applicable, commencement and expiry dates of coverage, dollar limits of coverage,

deductible levels as may be applicable, cancellation/termination provisions; or at the *Owner's* election, a certified copy of the insurance policy or policies required under paragraph 11.1.1. The *Contractor* shall ensure that the certificate holder is identified on each certificate of insurance as the *Owner* at 71 Main Street West, Hamilton, Ontario L8P 4Y5, or at such other address as the *Owner* may advise in writing, and that all certificates, cancellation, nonrenewal or adverse change notices are mailed to that address.

- 11.1.8 The *Contractor* shall not do or omit to do anything that would impair or invalidate the insurance policies.
- 11.1.9 Delivery to and examination or approval by the *Owner* of any certificates of insurance or policies of insurance or other evidence of insurance does not relieve the *Contractor* of any of its indemnification or insurance obligations under the *Contract*. The *Owner* is not under a duty either to ascertain the existence of or to examine such certificates of insurance or policies of insurance, nor to advise the *Contractor* in the event such insurance coverage is not in compliance with the requirements set out in the *Contract*.
- 11.1.10 The *Contractor* shall promptly investigate claims reported to the *Contractor* by a third party or by the *Owner*. The *Contractor* shall make contact with the claimant within forty-eight (48) hours of the *Contractor's* receipt of notice of a claim. The *Contractor* shall initiate an investigation of the claim immediately upon notice, and advise the claimant by letter of its position regarding resolution of the claim within twenty (20) *Working Days* of the notice. The *Contractor* shall include in its letter of resolution the reasons for its position. Failing acceptance of the resolution by the claimant of the proposed resolution, the *Contractor* agrees to report the claim to its insurer for further review and response to the claimant. Should the *Contractor* fail to follow this procedure, the *Owner* may investigate and resolve such claims, and offset the resultant costs against any monies due to the *Contractor*, from time to time, under the *Contract*.”

SC 61 GC 11.2 CONTRACT SECURITY

1. Add new general condition GC 11.2 CONTRACT SECURITY

“GC 11.2 CONTRACT SECURITY

- 11.2.1 The *Contractor* shall, upon execution of the Agreement, provide to the *Owner*:
- .1 a performance bond , in an amount equal to 50% of the *Contract Price*, covering the performance of the *Contract*, including the warranty period and the *Contractor's* requirements with respect to the correction of deficiencies, excluding all extended warranties; and
 - .2 a labour and material payment bond, in the form set out in the *Contract Documents*, in an amount equal to 50% of the *Contract Price* covering payment for labour, *Products*, or both.

- 11.2.2 The bonds referred to in paragraph 11.2.1 shall be issued by a duly licensed surety company authorized to transact the business of suretyship in the Province of Ontario, using the prescribed forms set out in the *Construction Act*, and shall be maintained in good standing until the fulfillment of the *Contract*, including the warranty period.”

SC 62 GC 11.3 CERTIFICATE OF STATUS

1. Add new general condition GC 11.3 CERTIFICATE OF STATUS as follows:

“GC 11.3 CERTIFICATE OF STATUS

- 11.3.1 The *Contractor* shall, upon execution of the Agreement, provide to the *Owner* a certificate of status from the Companies and Personal Property Security Branch of the Ontario Ministry of Government Services, or other ministry acceptable to the *Owner*, which indicates that the *Contractor* is an existing corporation and has not been dissolved.”

SC 63 GC 12.1 READY-FOR-TAKEOVER

1. Delete subparagraphs 12.1.1.2 through to 12.1.1.8.
2. Delete subparagraph 12.1.2 in its entirety.
3. Add after the words “the *Work* is *Ready-for-Takeover*,” in the subparagraph 12.1.3, “and where the *Consultant* requests”
4. Delete the word “comprehensive” in subparagraph 12.1.3 and replace with “updated”.

SC 64 GC 12.2 EARLY OCCUPANCY BY THE OWNER

1. Delete GC 12.2 EARLY OCCUPANCY BY THE OWNER in its entirety.

SC 65 GC 12.3 WARRANTY

1. Delete paragraph 12.3.1 in its entirety and replace with the following:

“Except for extended warranties as described in paragraph 12.3.6, the warranty period under the *Contract* is one year from the date when *Substantial Performance of the Work* has been attained, unless the *Contract Documents* otherwise provide.”
2. Add to the beginning of paragraph 12.3.2, the following:

“Subject to paragraph 3.14.1,”
3. Delete “one year” from paragraph 12.3.3.
4. Delete “one year” from paragraph 12.3.4.

5. Delete “one year warranty period as described in paragraph 12.3.1” from paragraph 12.3.6 and replace with the following:

“warranty period”

6. Add new paragraphs 12.3.7, 12.3.8, 12.3.9, 12.3.10, 12.3.11, 12.3.12, 12.3.13, 12.3.14, 12.3.15, 12.3.16, 12.3.17 and 12.3.18 as follows:

“12.3.7 Any material or equipment requiring excessive servicing during the warranty period (or free maintenance period, if applicable) shall be considered defective and the warranty shall be deemed to take effect from the time that the defect has been corrected so as to cause excessive servicing to terminate. Where an extended warranty is provided beyond the warranty period, and any material or equipment requires excessive servicing during the first fifteen percent (15%) of the extended warranty period (or free maintenance period, if applicable) the material or equipment shall be considered defective and the extended warranty shall be deemed to take effect from the time that the defect has been corrected so as to cause excessive servicing to terminate.

12.3.8 The final payment certificate shall not relieve the *Contractor* from its responsibility under this GC 12.3 – WARRANTY.

12.3.9 Following *Substantial Performance of the Work*, and without limiting the *Contractor’s* warranty under this GC 12.3 WARRANTY, the *Contractor* shall assign to the *Owner*, to the extent assignable the benefit of all warranties and guarantees relating to the *Work*. The assignment shall expressly reserve the right of the *Contractor* to make any claims under such warranties and guarantees and such assignment shall in no way prejudice any rights of or benefits accruing to the *Contractor* pursuant to such warranties and guarantees.

12.3.10 The *Contractor* shall provide to the *Owner* for the duration of the warranty period, a maintenance security the value of which shall be derived from the following table:

CONTRACT PRICE		VALUE OF MAINTENANCE SECURITY \$
FROM \$	TO\$	
Less than \$100,000.00		4 % of final <i>Contract Price</i>
\$100,000.00	\$499,999.99	\$4,000.00 on first \$100,000.00 + 3.0% on next \$399,999.99
\$500,000.00	\$999,999.99	\$16,000.00 on first \$500,000.00 + 2.4% on next \$499,999.99
\$1,000,000.00	\$1,999,999.99	\$28,000.00 on first \$1,000,000.00 + 2.2% on next \$999,999.99
\$2,000,000.00	\$3,999,999.99	\$50,000.00 on first \$2,000,000.00 + 2.0% on

		next \$1,999,999.99
\$4,000,000.00	\$5,999,999.99	\$90,000.00 on first \$4,000,000.00 + 1.8% on next \$1,999,999.99
\$6,000,000.00	\$9,999,999.99	\$126,000.00 on first \$6,000,000.00 + 1.5% on next \$3,999,999.99
\$10,000,000.00 or Greater		\$186,000.00 on first \$10,000,000.00 + 1% on balance

- 12.3.11 The maintenance security, which is at no time a part of the statutory holdback, shall be retained by the *Owner* in increments from monies that would otherwise be payable to the *Contractor*, commencing during the latter part of the period of construction, so that by the date of *Substantial Performance of the Work* the full value of the required maintenance security has been retained.
- 12.3.12 Except as otherwise provided hereunder, the maintenance security, less any deductions made therefrom as provided for in the *Contract*, shall be paid to the *Contractor* following the issuance by the *Consultant* of a final certificate at the end of the warranty period, provided that all defects and deficiencies in the *Work* have been corrected by the *Contractor*. No interest shall be payable to the *Contractor* on such funds withheld in accordance with 12.3.10.
- 12.3.13 The *Contractor* may apply in writing to the *Owner* at the time of *Substantial Performance of the Work* to substitute for the monies retained as the maintenance security an alternative maintenance security of equivalent or greater value comprising:
- .1 one or more irrevocable letters of credit, or
 - .2 another readily negotiable security.
- 12.3.14 Acceptance of any such alternative shall be at the discretion of the *Owner*.
- 12.3.15 Following receipt and acceptance of any such alternative, the *Owner* shall release to the *Contractor* the monies previously retained for maintenance security purposes.
- 12.3.16 The *Owner* may, in its discretion, allow the total maintenance security to be made up in part of monies retained under the *Contract* and in part of an alternative maintenance security as indicated in paragraph 12.3.13 above provided that the total value of such parts, as determined by the *Owner*, shall be not less than the required value as derived from the table set out in paragraph 12.3.10 above.
- 12.3.17 Such alternative maintenance security or the monies derived therefrom, less any deductions made as provided for in the *Contract*, shall be released to the *Contractor* following the issuance by the *Consultant* of the final certificate at the end of the warranty period.
- 12.3.18 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. Warranties shall be provided irrespective of the standard manufacturers, *Suppliers* and vendors' warranties and are in addition to the standard construction warranty of one year for general construction, materials and equipment.”

SC 66 GC 13.1 INDEMNIFICATION

1. Delete GC 13.1 INDEMNIFICATION in its entirety and replace with the following:

“GC 13.1 INDEMNIFICATION

- 13.1.1 The *Contractor* shall indemnify, defend, and hold the *Owner*, 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 *Contractor*, 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.
- 13.1.2 The *Owner* shall notify the *Contractor* 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 *Contractor* and its insurers, which approval shall not be unreasonably withheld.
- 13.1.3 The rights to indemnity contained herein shall survive the early termination or expiry of this *Contract*.
- 13.1.4 The *Owner* may enforce the rights of indemnity conferred on any Indemnified Party under this GC 13.1 on their behalf and to the same extent as if they were parties to this *Contract*.

- 13.1.5 The rights to indemnity provided for in this GC 13.1 shall be deemed to be in addition to any rights with respect to insurance in favour of the Indemnified Party provided in this *Contract*.”

SC 67 GC 13.2 WAIVER OF CLAIMS

1. Delete GC 13.2 WAIVER OF CLAIMS in its entirety.

SC 68 GC 14 MISCELLANEOUS

1. Add new PART 14 MISCELLANEOUS as follows:

“PART 14 MISCELLANEOUS GC 14.1 OWNERSHIP OF MATERIALS

- 14.1.1 All *Work* and *Products* delivered to the *Place of the Work* by the *Contractor* shall be the property of the *Owner*. The *Contractor* shall remove all surplus or rejected materials when notified in writing to do so by the *Consultant*.

GC 14.2 REVIEW BY OWNER AND REVIEW BY CONSULTANT

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

GC 14.3 USE AND/OR OCCUPATION OF COMPLETED PORTIONS OF THE WORK

- 14.3.1 Upon the *Owners' request*, the *Owner* shall, at any time or times, have the right of occupying and/or using any part of parts of the *Work* (including, without limitation, for the purposes of installing and testing fittings and equipment), whether partially performed or entirely complete, or whether completed on schedule or not, before the completion of the *Work*.
- 14.3.2 In the event the *Owner* desires to exercise the privilege of occupancy and/or use of the *Work* as provided above, the *Contractor* shall co-operate with the *Owner* throughout in making available for the *Owners' use* such building services, as heating, ventilation, cooling, water, lighting, and telephone for the space or spaces to be occupied and/or used and if the equipment required to furnish such services is not entirely completed at the time the *Owner* desires to occupy and/or

use the aforesaid space or spaces, the *Contractor* shall make every reasonable effort to complete same as soon as possible to the extent that the necessary equipment can be put into operation and use and any extra costs beyond that originally required to complete the *Work* arising from such early occupancy and/or use shall be borne by the *Owner*.

- 14.3.3 In the event that the *Owner* exercises the privilege of occupancy and/or use of the *Work* as provided above, it agrees to do so, as not to materially interfere with the respective work of the *Contractor*, *Subcontractors* or *Suppliers* and under the understanding that the *Owner* will be occupying premises within a construction site which will require compliance with all normal construction site requirements including, without limitation, health and safety requirements.
- 14.3.4 It shall be understood, however, that the *Owner's* occupancy and/or use of such space or spaces of the *Work* shall not constitute the *Owner's* acceptance of any *Work*, material or equipment which are not in accordance with the requirements of the *Contract Documents*, nor affect the warranty period under the *Contract* nor relieve the *Contractor* from his obligations, duties, responsibilities and liabilities to complete the *Work*, nor for responsibility for loss or damage due to or arising out of defects in, or malfunctioning of, any *Work*, material or equipment, nor from any other unfulfilled duties, liabilities, obligation or responsibilities under the *Contract* nor from any other duty, liability obligation or responsibility under the *Contract* including, without limitation, the *Contractors' warranty* obligation. If however, damage results from any act by the *Owner*, the *Owner* shall assume its share of the responsibility for such damage.

GC 14.4 NON-INTERFERENCE

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

GC 14.5 LIQUIDATED DAMAGES

- 14.5.1 It is expressly agreed by the parties that if the date of *Substantial Performance of the Work* occurs later than the *Substantial Performance Date*, the *Contractor* shall pay to the *Owner* liquidated damages calculated as ONE THOUSAND DOLLARS (\$1,000.00) for each *Working Day* that *Substantial Performance of the Work* extends beyond the *Substantial Performance Date*.

- 14.5.2 It is expressly agreed that it is difficult to calculate the damages which would result from the *Contractor's* failure to attain *Substantial Performance of the Work* by the *Substantial Performance Date* and the parties agree that the liquidated damages are not intended to be penalties but rather represent the parties' best estimate of damages resulting from the delay.
- 14.5.3 The *Owner* may deduct any amount due under this paragraph from any monies that may be due or payable to the *Contractor* on any account whatsoever. The liquidated damages payable under this paragraph are in addition to and without prejudice to any other remedy, action or other right that may be available to the *Owner*.

GC 14.6 CONTRACTOR DISCHARGE OF LIABILITIES

- 14.6.1 In addition to the obligations assumed by the *Contractor* pursuant to General Condition 3.6 – SUBCONTRACTORS AND SUPPLIERS, the *Contractor* agrees to discharge all liabilities incurred by it for labour, materials, services, *Subcontractors* and *Products*, used or reasonably required for use in the performance of the *Work*, except for amounts withheld by reason of legitimate dispute which have been identified to the party or parties, from whom payment has been withheld.

GC 14.7 CONTRACTOR EVALUATION

- 14.7.1 In accordance with the *Owner's* policy for vendor performance evaluation, the *Owner* will evaluate the performance of the *Contractor* with respect to the *Work* using the following criteria:
- .1 general responsiveness of the work relationship;
 - .2 conformity of the work done, materials supplied and provision of services with the description of *Project* and *Specifications*;
 - .3 general dependability and quality of all work done and any goods or services supplied;
 - .4 timely performance;
 - .5 general conformity with the reasonable expectations of the *Owner* under the terms of the *Contract* in their entirety;
 - .6 supervision of subcontractors and the maintenance of an orderly, neat and secure job site;
 - .7 accuracy of carrying out instructions.
- 14.7.2 Where a performance review is conducted at *Final Completion of the Work*, the *Contractor's* performance shall be ranked by the *Owner* at one of the following standards:
- .1 Unacceptable (performance well below the general standard); or
 - .2 Satisfactory (performance in accordance of general standard).
- 14.7.3 Where at a performance review carried out prior to the completion of the *Contract*, one or more criteria of assessment are ranked as unacceptable:
- .1 the parties shall agree at the time of the conduct of the review or within ten (10) *Working Days* thereafter, on the measures to be taken by the

- Contractor* during the ensuing *Contract* review period to improve its performance to at least a good standard;
- .2 within ten (10) *Working Days* of agreeing on those measures, the *Contractor* shall confirm in writing that the measures in question have been implemented.

- 14.7.4 Where the *Contractor* fails or refuses to implement measures as provided in paragraph 14.7.3, it shall be deemed to be in default under the *Contract*, and the *Owner* may take such remedies as provided for in the *Contract Documents* or are otherwise available at law or in equity.
- 14.7.5 Where the unsatisfactory performance of the *Contractor* is not corrected as required under this section, that performance may be taken into account by the *Owner* with respect to the award of any future contract to the *Contractor*.

GC 14.8 RECORDS/DAILY REPORTS/DAILY LOGS

- 14.8.1 The *Contractor* shall maintain and keep accurate *Project* records (which means all tangible records, documents, computer printouts, electronic information, books, plans, *Drawings*, *Specifications*, accounts or other information relating to the *Work*) in its head office in accordance with requirements of *Applicable Laws*, but in any event for not less than four (4) years from *Substantial Performance of the Work* or until all claims have been settled. During this time, the *Contractor* shall allow the *Owner* access to the *Project* records during normal business hours upon the giving of reasonable notice. The *Contractor* shall ensure that equivalent provisions to those provided herein are made in each subcontract and shall require the *Subcontractors* and *Suppliers* to incorporate them into every level of contract thereunder for any part of the *Work*.

GC 14.9 ONTARIANS WITH DISABILITIES ACT, 2001 (ODA) AND THE ACCESSIBILITY FOR ONTARIANS WITH DISABILITIES ACT, 2005 (AODA)

- 14.9.1 The *Contractor* 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*.
- 14.9.2 Without limiting the generality of the foregoing, the *Contractor* 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 *Contractor* shall ensure that such training includes, without limitation, a review of the purposes of the AODA and the requirements of Ontario Regulation 429/07.

- 14.9.3 Prior to commencing the *Work*, the *Contractor* shall provide a Statement of Acknowledgement to the City of Hamilton that it has read and understands the City of Hamilton'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.
- 14.9.4 The *Owner* and the City of Hamilton reserve the right to inspect the *Contractor'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 *Owner* and the City of Hamilton also reserve the right to require the *Contractor* to amend its training policies, practices and procedures if the *Owner* or the City of Hamilton 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>

GC 14.10 SET-OFF

- 14.10.1 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.
- 14.10.2 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.”

Project Specific Supplementary Conditions to Contract CCDC 2-2020

Dated: June 20, 2023

These Project Specific Supplementary Conditions presuppose the use of the Standard Construction Document CCDC 2-2020 Stipulated Price Contract, English version. These “Project Specific Supplementary Conditions” void, supersede or amend the “Agreement”, “Definitions”, “General Conditions” and “Supplementary Conditions” as hereinafter provided, as the case may be.

GENERAL CONDITIONS OF THE STIPULATED PRICE CONTRACT

Where a General Condition or paragraph of the General Conditions of the Stipulated Price Contract is deleted by these Project Specific Supplementary Conditions, the numbering of the remaining General Conditions or paragraphs shall remain unchanged, and the numbering of the deleted item will be retained, unused, unless noted otherwise.

PSSC 1. DEFINITIONS

1. Add new Definitions as follows:

“Joint Venture

Joint Venture means an association of two or more persons who combine their expertise and resources in a single joint business enterprise to qualify for, bid on, and perform the *Contract*. *Joint Ventures*, sometimes referred to as consortiums, may take the form of a partnership or special purpose vehicle. All persons of a *Joint Venture* must be eligible persons.

Lead Member

Lead Member means, in the case of a *Joint Venture*, the primary contact and administrator for the coordination and administration of the *Contract* on behalf of the *Contractor*, who shall also have the authority to bind the *Joint Venture*.”

PSSC 2. GC 3.4 CONSTRUCTION SCHEDULE

1. Add new paragraphs 3.4.11 and 3.4.12 to SC19 of the Supplementary Conditions as follows:

“3.4.11 The *Work* under this *Contract* must achieve *Substantial Performance of the Work* within 15 months from the Notice to Proceed date.

- 3.4.12 Subsequent to award of *Contract* and prior to commencing with any *Work*, a site investigation with Plant Operations staff must be arranged. This is a mandatory meeting and all *Suppliers* and *Subcontractors* must be in attendance. *Contract* details such as procedures, delivery of equipment, etc. will be discussed at the meeting. A preconstruction safety review will also be conducted at that time.”

PSSC 3. GC 3.8 SHOP DRAWINGS

1. Add new paragraph 3.8.13 as follows:

“3.8.13 *Shop Drawings* shall be prepared and stamped by a professional engineer registered in the Province of Ontario for all of the *Work*, unless otherwise required by the *Owner*. The professional engineer whose stamp appears on the *Shop Drawings* shall inspect and approve in writing that all *Work* has been carried out in accordance with the drawings and to his/her own satisfaction.”

PSSC 4. GC 3.16 ADMINISTRATION WHERE CONTRACTOR IS A JOINT VENTURE

1. Add new general condition GC 3.16 ADMINISTRATION WHERE CONTRACTOR IS A JOINT VENTURE as follows:

“GC 3.16 ADMINISTRATION WHERE CONTRACTOR IS A JOINT VENTURE

3.16.1 Each of the members to the *Joint Venture* shall be jointly and severally responsible and liable in all respects for the obligations and responsibilities of the *Contractor*. This requirement is provided for the exclusive benefit of the *Owner* and may be waived by the *Owner* in its sole and absolute discretion.

3.16.2 Where the *Joint Venture* is:

3.16.2.1 Formally constituted as either a corporation or partnership, the corporation or partnership, as the case may be, shall be the “*Contractor*” and shall execute the *Contract*;

3.16.2.2. Not formally constituted as either a corporation or partnership, the *Lead Member* and all other members of the *Joint Venture* shall collectively comprise the “*Contractor*” and shall execute the *Contract*; and,

For additional clarity, where the *Contract* specifies a deliverable from the *Contractor*, it shall be interpreted as requiring the deliverable from each of the parties constituting the “*Contractor*”, on a joint and several basis.

3.16.3 The *Lead Member* shall be the primary contact for the *Contract*.

3.16.4 The parties constituting the *Joint Venture* and their constitution as a *Joint Venture* shall be exactly as set out in its bid submission. There will be no substitution of the *Lead Member* or any other member of the *Joint Venture* without the express consent of the *Owner*, such consent to be exercised in the *Owner*’s absolute discretion. There will be no change in the constitution of the *Joint Venture* (e.g. corporation, partnership or informal entity) without the express consent of the *Owner*, such consent to be exercised in the *Owner*’s absolute discretion.

3.16.5 The *Contractor*, and for clarity, each party constituting the “*Contractor*”, does hereby irrevocably acknowledge and agree to the authority of the *Lead Member* to:

3.16.5.1 Solely administer the *Contract* on behalf of the *Contractor*; and

- 3.16.5.2 To bind the *Contractor* in its contractual rights and obligations.
- 3.16.6 Where the *Contractor* is a *Joint Venture* that is not formally constituted as either a corporation or partnership, the *Lead Member* shall diligently administer the *Contract* and faithfully discharge the rights and obligations of the *Contractor*. The *Owner* may rely on the actions and inactions of the *Lead Member* as being the actions and inactions of the *Contractor*.
- 3.16.7 Neither the *Lead Member* nor any other member of the *Joint Venture* shall have any more rights or privileges than those expressly provided to the *Contractor*.
- 3.16.8 In the event of any incomplete *Work* under the *Contract*, the total amount of incomplete *Work* may be charged to each of the members of the *Joint Venture*, jointly and severally, when and if they should submit a bid in response to a further contract.
- 3.16.9 Where the *Joint Venture* is formally constituted as either a corporation or partnership, the corporation or partnership, as the case may be, shall provide:
- 3.16.9.1 Proof of the insurance requirements;
 - 3.16.9.2 One performance bond and one labour and material payment bond;
 - 3.16.9.3 Evidence of compliance with workers' compensation legislation;
 - 3.16.9.4 Statement of Acknowledgement regarding ODA and AODA;
 - 3.16.9.5 Fair Wage Policy submittals; and
 - 3.16.9.6 Any other requirements of the *Contract*;
- as set out in the *Contract Documents*, to the *Owner's* satisfaction.
- 3.16.10 Where the *Joint Venture* is not formally constituted as either a corporation or partnership,
- 3.16.10.1 Each member of the *Joint Venture* shall provide its own proof of the insurance requirements;
 - 3.16.10.2 The *Joint Venture* shall collectively provide one performance bond and one labour and material payment bond, such that all parties constituting the *Joint Venture* are named as the Principal where the default of one party is deemed as default by the other parties;
 - 3.16.10.3 Each member of the *Joint Venture* shall provide its own evidence of compliance with workers' compensation legislation;
 - 3.16.10.4 Each member of the *Joint Venture* shall provide its own Statement of Acknowledgement regarding ODA and AODA;
 - 3.16.10.5 Each member of the *Joint Venture* shall provide its own *Fair Wage Policy* submittals; and
 - 3.16.10.6 The *Joint Venture* and each member thereof shall provide any other requirements of the *Contract*;
- as set out in the *Contract Documents*, to the *Owner's* satisfaction.”

PSSC 5. GC 3.17 CONTRACTOR'S PREQUALIFICATION APPLICATION

1. Add new general condition GC 3.17 CONTRACTOR'S PREQUALIFICATION APPLICATION as follows:

“GC 3.17 CONTRACTOR'S PREQUALIFICATION APPLICATION

- 3.17.1 Where the *Owner* previously issued a Request for Prequalifications for the *Project*, the *Contractor* shall not change any key member of the *Contractor's* team identified in the *Contractor's* application for prequalification as assigned to the Project without the written consent of the *Owner*, which consent shall not be unreasonably withheld.”

PSSC 6. FAIR WAGE POLICY

1. Add new general condition GC 3.18 FAIR WAGE POLICY as follows:

“GC 3.18 FAIR WAGE POLICY

- 3.18.1 All references to the *Fair Wage Policy* shall only apply to the *Contract* where the *Contract Price* is FIVE HUNDRED THOUSAND DOLLARS (\$500,000.00) or greater.”

PSSC 7. GC 5.4 SUBSTANTIAL PERFORMANCE OF THE WORK AND PAYMENT OF

HOLDBACK

1. Delete GC 5.4 SUBSTANTIAL PERFORMANCE OF THE WORK AND PAYMENT OF HOLDBACK in its entirety and replace with the following:

“GC 5.4 SUBSTANTIAL PERFORMANCE OF THE WORK AND PAYMENT OF HOLDBACK

- 5.4.1 *Substantial Performance of the Work* will not be granted until *Commissioning* has been achieved and associated submittals as per the *Specifications* have been provided to the *Owner*.
 - 5.4.1.1. The *Contractor* is required to undertake Site Acceptance Testing (SAT) of the system to the satisfaction and approval of the *Consultant* and *Owner* prior to the start of the *Commissioning* period. If a problem arises during or as a result of the SAT, any deficiencies will have to be corrected and re-tested prior to the start of the *Commissioning* period at no additional cost to the *Owner*. Prior to undertaking the SAT, the *Contractor* is required to submit, as a minimum, the following documents for review and approval by the *Consultant* and *Owner*:
 - (1) Copies of PLC/RPU software
 - (2) PLC programs for all PLC or Panel view interfaces (Programs need to have comment in them so that their operation can be understood)
 - (3) Factory Acceptance Testing (FAT) documentation.
 - (4) As-Built Drawings (in Microstation/Autocad format)

- (i) Structural and Mechanical
 - (ii) Control Panel and Loop Diagrams
 - (iii) Electrical / Instrumentation / P&ID (The P&ID must reflect Tagging and wiring numbers as wired or tagged in the Field to the City standard)
 - (5) Operation and Maintenance Manuals
 - (6) Inspection Certificates
 - (7) Instrument Calibration sheets.
 - (8) Any setpoint parameters pertaining to VFD, Level controls, Pressure devices, Flow device or any other device that needs programming for its operations.
- 5.4.1.2 The following *Commissioning* requirements are in addition to any other *Commissioning* requirements that may be outlined in the *Specifications*:
- (1) *Commissioning* shall provide for all items, equipment, services, testing, inspections, labour, energy, electrical power, fuel, security watchmen, reports, attendance of *Suppliers, Subcontractors*, testing companies, consulting services contracted by the *Contractor*, and any other requirements to complete the *Commissioning* of all items required by this *Contract* to the satisfaction of the *Owner*, including any additional return visits, labour and materials.
 - (2) The duration for *Commissioning* is 14 consecutive calendar days. If a problem arises during the *Commissioning* period, the *Owner* may restart the *Commissioning* period after it is satisfied the problem has been corrected. The *Owner* may restart the *Commissioning* period as many times as it takes to have a 14 consecutive calendar day problem-free period, at no additional cost to the *Owner*.
 - (3) Provided that the *Owner* is satisfied that the *Contractor, Subcontractors, Suppliers* or anyone else recruited to provide service, material or labour for *Commissioning* the *Contract* have fulfilled their obligations, the *Owner* shall approve payment at its sole discretion. The *Owner* may approve payment in part, may hire or contract all or any part of this item to others, may purchase material, equipment or rent or lease items to complete this item on behalf of the *Contractor*, without notice.
 - (4) *Commissioning* is satisfactorily completed when approved in writing by the *Owner*.
- 5.4.1.3 The following minimum training requirements are in addition to any other training requirements that may be outlined in the *Contract Specifications*:
- (1) The *Contractor* shall provide for five separate training sessions of the *Owner's* staff and any other designated personnel.
 - (2) The *Contractor* shall arrange with *Suppliers* of equipment or *Subcontractors* for a qualified representative to provide training for the *Owner's* staff. The *Contractor* shall coordinate and establish with each *Supplier* and *Subcontractor* the time period necessary to complete training of the *Owner's* staff. The training schedule and date(s) is to be reviewed and approved by the *Owner*.

- (3) The *Contractor*, as a minimum, must demonstrate operations and maintenance of each piece of equipment, *instrument*, controls and system operation. The *Contractor* shall utilize operations and maintenance manuals as a basis for training, and review contents of the manuals with the *Owner's* staff in detail, to explain all aspects of operations and maintenance.
- (4) Turnover of the facility for operations by the *Owner* shall occur only upon completion and acceptance of all demonstration and training of the operations of the facility by the *Owner*.

5.4.1.4 All items related to section 5 of the Lump Sum Breakdown of Base Bid Price must be completed prior to *Substantial Performance of the Work* and the subsequent release of holdback.

5.4.2 When the *Contractor* considers that the *Work* is substantially performed, or if permitted by the lien legislation applicable to the *Place of the Work* a designated portion thereof which the *Owner* agrees to accept separately is substantially performed, the *Contractor* shall, within one *Working Day*, deliver to the *Consultant* and to the *Owner* a comprehensive list of items including estimated cost to be completed or corrected, together with a written application for a review by the *Consultant* to establish *Substantial Performance of the Work* or substantial performance of the designated portion of the *Work*. Failure to include an item on the list does not alter the responsibility of the *Contractor* to complete the *Contract*.

5.4.3 The *Consultant* will review the *Work* to verify the validity of the application and shall promptly, and in any event, no later than 30 calendar days after receipt of the *Contractor's* list and application:

5.4.3.1 advise the *Contractor* in writing that the *Work* or the designated portion of the *Work* is not substantially performed and give reasons why, or

5.4.3.2 state the date of *Substantial Performance of the Work* or a designated portion of the *Work* in a certificate and issue a copy of that certificate to each of the *Owner* and the *Contractor*.

5.4.4 Prior to the issuance of the certificate of *Substantial Performance of the Work*, the *Contractor* shall submit to the *Consultant* the following documents, and shall, in consultation with the *Consultant*, establish reasonable dates for correcting deficiencies and finishing the *Work*:

5.4.4.1 written undertaking by the *Contractor*, on its company letterhead, to complete expeditiously any outstanding *Work* and to discharge all unfulfilled obligations under the *Contract*;

5.4.4.2 the *Contractor's* final claim for all amounts incurred before and on the date of *Substantial Performance of the Work*;

5.4.4.3 a release by the *Contractor* in a form satisfactory to the *Owner* releasing the *Owner* from all further claims relating to the *Contract* (except in respect of outstanding *Work*) and other than claims relating to liens under the applicable lien legislation of the *Place of the Work*;

- 5.4.4.4 a *Statutory Declaration* which also includes provisions stating that all liabilities incurred by the *Contractor* and its *Subcontractors* in carrying out the *Contract* have been discharged and that all liens in respect of the *Contract* and subcontracts thereunder have expired or have been satisfied, discharged or provided for by payment in court; and
- 5.4.4.5 a satisfactory Certificate of Clearance from the Workplace Safety and Insurance Board.
- 5.4.5 At the time of issuance by the *Consultant* of the certificate of *Substantial Performance of the Work*, the *Consultant* shall:
 - 5.4.5.1 Notify the *Contractor* of the value of the maintenance security required by GC 12.3 - WARRANTY.
 - 5.4.5.2 Prepare a separate certificate (the “Substantial Performance Payment Certificate”) showing:
 - (1) the value of work completed to-date,
 - (2) the value of outstanding or uncompleted work,
 - (3) the value of the required maintenance security,
 - (4) the amount of the 10 percent holdback (allowing for any previous release of holdback to the *Contractor* in respect of completed subcontracts and deliveries of pre-selected equipment), and
 - (5) the amount due to the *Contractor*.
 - 5.4.5.3 Prepare a payment certificate releasing to the *Contractor* the 10 percent holdback due in respect of *Work* performed up to the date of *Substantial Performance of the Work*. Subject to the provisions of the *Construction Act* and the submission by the *Contractor* of the following document, such holdback shall become payable after 60 calendar days from the date of publication of the certificate of *Substantial Performance of the Work*:
 - (1) a declaration by the *Contractor*, in a form acceptable to the *Owner*, confirming that the *Contractor* and its *Sub-Contractors* have complied with the *Fair Wage Policy*.”

PSSC 8. GC 5.6 WITHHOLDING OF PAYMENT

1. Add new paragraph 5.6.2 as follows:

“5.6.2 Upon issuance of the certificate of *Substantial Performance of the Work*, normal payment of holdback procedures will apply. To cover any deficiencies not corrected to the satisfaction of the *Consultant* and *Owner*, a deficiency holdback in the amount of 200% of the value of the deficient *Work* will be held until all deficiencies are corrected and certified as acceptable by the *Consultant*. The deficiency holdback amount will be withheld from any future payments under the *Contract*.”

PSSC 9. GC 11.1 INSURANCE

1. Delete GC 11.1.1.1 as set out in SC 60 of the Supplementary Conditions and replace with the following:

- .1 Wrap-up Liability Insurance acceptable to the *Owner* having an inclusive limit of not less than \$10,000,000 per occurrence for third party bodily injury, personal injury and property damage. Such insurance shall be in the name of the *Contractor* and shall name its *Subcontractors*, agent, architects, landscape architects, engineers, consultants, planners, project managers and the *Owner* as additional insureds thereunder and also include other persons which the *Owner* may reasonably require to be added as additional insured parties. The insurance coverage shall remain in effect throughout the time that the *Contract* is in effect, including the warranty period.

The Policy must include the following:

- (1) personal injury liability, bodily injury and property damage;
- (2) premises and operations liability;
- (3) owner's and contractor's protective liability;
- (4) broad form products and completed operations liability;
- (5) cross liability;
- (6) severability of interest;
- (7) contingent employers liability;
- (8) blanket written and oral contractual liability;
- (9) all risks tenant's legal liability;
- (10) hoist liability;
- (11) fire fighting and forest fire fighting expense liability;
- (12) employers liability and voluntary compensation;
- (13) non-owned automobile liability;
- (14) directors, officers, employees, shareholders, legislators, and officials involved in the *Project* added as insureds and/or additional insureds;
- (15) shoring, blasting, excavating, under-pinning, demolition, pile driving and caisson work, work below and above ground surface, work below and above water, tunneling and grading, and similar operations associated with the construction work, as applicable;
- (16) sudden and accidental pollution liability with a discovery provision of not less than one hundred and twenty (120) hours and a subsequent reporting provision of not less than one hundred and twenty (120) hours;
- (17) 30 days written notice of cancellation;
- (18) coverage as unnamed insureds, for all contractors, *Subcontractors*, consultants and employees of the *Contractor* provided that the *Owner* reserves the right to require the *Contractor* to add further parties as additional unnamed insured persons;
- (19) with respect to "completed operations" work performed during the warranty period, premises and operations exposures from work that may need service, maintenance, correction, repair or replacement, but which is otherwise complete, will be treated as completed."

2. Delete GC 11.1.1.5 (property insurance) as set out in SC 60 of the Supplementary Conditions and add replace with the following:
 - “.5 Contractor’s Pollution Liability having an inclusive limit of not less than \$2,000,000 per occurrence to insure the *Contractor’s* liability for third-party claims caused by pollution events arising out of operations performed by or on behalf of the insured in the performance of the *Work* under the *Contract*. The insurance coverage shall remain in effect throughout the time that the *Contract* is in effect, including the warranty period.”

PSSC 10. GC 11.2 CONTRACT SECURITY

1. Delete GC 11.2 CONTRACT SECURITY as set out in SC 61 of the Supplementary Conditions in its entirety.

PSSC 11. GC 11.2 CONTRACT SECURITY

1. Delete subparagraph 11.2.1 as set out in SC 61 of the Supplementary Conditions and replace with the following:

“11.2.1 The *Contractor* shall, upon execution of the Agreement, provide to the *Owner*:

 - .1 a performance bond, in an amount equal to 100% of the *Contract Price*, covering the performance of the *Contract*, including the warranty period and the *Contractor’s* requirements with respect to the correction of deficiencies, excluding all extended warranties.

TECHNICAL SPECIFICATION SEAL SHEET



DATE OF ISSUE:

Dec 2, 2024

CLIENT	City of Hamilton	ISSUED FOR THE FOLLOWING PURPOSE(S) ONLY:	
PROJECT	Dundas Wastewater Treatment Plant (WWTP) Health and Safety Immediate Needs and Structural Repair Upgrades	MOE Approval	
		Tender	X
CLIENT REF No	Contract No. C13-32-24	Building Permit	
LOCATION	Community of Dundas	Construction	

NOTE: The Professional Seals on this page are in respect to the technical specifications comprising Divisions 1 through 16 inclusive. Each seal is limited to the discipline as noted below.

Sheet 1 of 1

PROCESS MECHANICAL		
STRUCTURAL		

CITY OF HAMILTON
C13-32-24
DUNDAS WASTEWATER TREATMENT
PLANT (WWTP) HEALTH AND SAFETY
IMMEDIATE NEEDS AND STRUCTURAL
REPAIR UPGRADES

DIVISION 01

- Section 01000 – General Requirements
- Section 01100 – Summary of Work
- Section 01130 – Abbreviations
- Section 01310 – Project Management
- Section 01315 – Project Meetings
- Section 01320 – Construction Schedule and Sequencing
- Section 01330 – Submittals
- Section 01350 – Special Project Procedures
- Section 01357 – Management of Hazardous Materials
- Section 01400 – Quality Assurance and Quality Control
- Section 01410 – Regulatory Requirements
- Section 01420 – Permits and Approvals
- Section 01500 – Traffic Control and Management
- Section 01510 – Temporary Facilities and Utilities
- Section 01515 – Temporary By-Pass Pumping
- Section 01561 – Environmental Control and Protections
- Section 01610 – Materials and Equipment
- Section 01630 – Substitutions and Alternatives
- Section 01640 – Manufacturers' Services
- Section 01705 – Health and Safety
- Section 01710 – Mobilization and Demobilization
- Section 01720 – Preparation
- Section 01740 – Site Cleaning and Maintenance
- Section 01770 – Closeout Procedures
- Section 01800 – Operation and Maintenance Data
- Section 01810 – Commissioning
- Section 01820 – Demonstration and Training
- Section 01830 – Warranty Work

SECTION 01000 – GENERAL REQUIREMENTS

1 GENERAL

1.1 GENERAL REQUIREMENTS

- 1.1.1 The Contractor and its Subcontractors shall comply with the requirements in this section. Each section within the Specifications is related and shall be read in conjunction with one another.

1.2 REFERENCES

- 1.2.1 Comply with the latest edition of the following statutes, standards, codes and regulations and all amendments thereto:
- .1 All applicable City of Hamilton By-laws
 - .2 Ontario Heritage Act
 - .3 National Building Code of Canada
 - .4 Ontario Building Code Act and Regulations
 - .5 Ontario Plumbing Code
 - .6 Boilers and Pressure Vessels Act Ontario
 - .7 Canada Labour Code, Part 2, Canada Occupational Safety and Health Regulations
 - .8 Occupational Health and Safety Act and Regulations for Construction Projects, O.Reg. 213
 - .9 Accessibility for Ontarians with Disabilities Act
 - .10 Environmental Protection Act
 - .11 Dangerous Goods Transportation Act
 - .12 Canadian Environmental Assessment Act
 - .13 Motor Vehicle Safety Act
 - .14 Export and Import of Hazardous Waste and Hazardous Recyclable Material Regulations
 - .15 National Fire Code of Canada
 - .16 Transportation of Dangerous Goods Regulations
 - .17 Technical Standards and Safety Act
 - .18 PCB Regulations
 - .19 PCB Waste Export Regulations
 - .20 Ozone-depleting Substances and Halocarbon Alternatives Regulations
 - .21 Environmental Code of Practice on Halons
 - .22 Environmental Code of Practice for Elimination of Fluorocarbon Emissions from Refrigeration and Air Conditioning Systems
 - .23 American Water Works Association Standards
 - .24 American Society of Testing and Materials International Standards
 - .25 CSA Group Standards
 - .26 Ontario Provincial Standards and Specifications
 - .27 American National Standards Institute

- .28 National Fire Protection Association
- .29 National Fire Prevention Standard for Safeguarding Building Construction Operations
- .30 Ministry of the Environment and Climate Change
- .31 Ontario Ministry of Transportation
- .32 Uniform Traffic Control Devices for Canada, Transportation Association of Canada
- .33 Manual of Uniform Traffic Control Devices for Streets and Highways, US FHWA, Part IV
- .34 All other applicable statutes, standards, codes and regulations.

1.3 SUBMITTALS

- 1.3.1 N/A

1.4 EXISTING CONDITIONS

- 1.4.1 The Contractor shall undertake a careful examination of the site to establish the conditions under which the Work are to be carried out.

1.5 DAMAGE TO EXISTING UTILITIES AND STRUCTURES

- 1.5.1 Obtain the necessary drawings and perform any necessary sub-surface investigations in order to determine the exact number and location of all existing utility services, structures, underground pipes, cables, utilities, and other similar items.
- 1.5.2 The locations for existing structures and underground pipes, cables, utilities, and other similar items as shown on the Contract Drawings do not relieve the Contractor of this responsibility. The Contractor is required to coordinate locates to confirm utilities prior to any digging using Ontario One. The City of Hamilton is not responsible for coordination of locates on behalf of the Contractor.
- 1.5.3 Take the necessary steps to ensure that no damage is caused to existing structures, buildings, foundations, roads, sidewalks, property, utility services, and other similar items during the progress of the Work.
- 1.5.4 If any damage is caused, repair and make good such damage at no additional cost within a reasonable time and to the complete satisfaction of the Consultant.

1.6 HOURS OF WORK

- 1.6.1 The Work shall be completed each week during consecutive weekdays, [Monday to Friday (Statutory Holidays excluded)]. Performance of Work shall not occur on weekends or outside the hours from 7 a.m. to 7 p.m. for the duration of the Contract, unless otherwise approved in writing by the City. Plant gate entrance is open for entry from 7 a.m. to 3 p.m.
- 1.6.2 Comply at all times with the Local Noise By-law. The Contractor shall be responsible for obtaining any noise by-law exemption that may be required for equipment that must be kept in continuous operation.
- 1.6.3 Requests for extension or modification to the above-specified hours of Work shall be submitted to the Consultant, in writing, for approval at least five (5) days in advance of the contemplated change.
- 1.6.4 Whenever, in the judgement of the Consultant and/or City, it may be necessary or expedient to conduct work at night or on weekends, or after or before normal working hours, the Contractor without any additional or extra cost to the Contract, shall perform the work. No work shall take place over Christmas Shutdown or Statutory Holidays.

1.7 CONTRACTOR USE OF PREMISES

- 1.7.1 Boundaries of the site are shown in the Contract Documents. Restrict operations to designated site in order to ensure the safety of the public.
- 1.7.2 Provide approved security fencing around the Work areas in accordance with OHSA and the Contract Documents.
- 1.7.3 As provided in the OHSA, the Contractor shall assume responsibility for all personnel within the Work area. The Consultant may request the Contractor to provide others with access to the Work area as necessary.
- 1.7.4 Obtain written authorization from the City to enter private lands, which are the subject of easements or rights-of-way obtained by the City.
- 1.7.5 Ascertain and abide by conditions pertaining to use of easements or rights-of-way.
- 1.7.6 Assume full responsibility for protection and safekeeping of Products and Construction Equipment under this Contract.
- 1.7.7 Obtain and pay for use of additional storage, access or Work areas needed for operations under this Contract. All storage areas shall be approved by the Consultant prior to use. Materials shall be stored so as to ensure the preservation of their quality and fitness for use.

- 1.7.8 Protect all newly constructed Work from damage of any form. Any portion of the Work, which is damaged, shall be rebuilt at the Contractor's expense to the satisfaction of the Consultant.

1.8 CITY OCCUPANCY

- 1.8.1 The City shall occupy premises during entire construction period for execution of normal operations.
- 1.8.2 Cooperate with the City in scheduling operations to minimize conflict and to facilitate the City's usage. Unless otherwise approved in writing by the City, maintaining the City's operations of the facility always takes precedence over construction activities.

1.9 PARTIAL CITY OCCUPANCY

- 1.9.1 Schedule designated portions of Work for the City's occupancy prior to Substantial Performance of the Work.
- 1.9.2 Cooperate with the City in scheduling operations to minimize conflict and to facilitate the City's usage. Unless otherwise approved in writing by the City, maintaining the City's operations of the facility always takes precedence over construction activities.
- 1.9.3 All upgrades specified to be completed in or around the Chlorine Contact Tanks shall be completed during their seasonal shutdown window of mid-November to the end of March.

1.10 CITY AVAILABILITY

- 1.10.1 A minimum of two (2) weeks written notice is required for all events which require the City's participation, unless otherwise noted.
- 1.10.2 City representatives will not be available for durations when their Offices are closed for recognized public holidays and the December Holiday Shutdown.
- 1.10.3 Staff training, Site Acceptance Testing (SAT), commissioning trial period, and other such activities which require the City's representatives to be available, shall not be scheduled for the week prior to or the week after the City of Hamilton December Holiday shutdown. No request for additional time due to the Contractor scheduling work over this timeframe will be granted.

1.11 SITE SECURITY

- 1.11.1 The Contractor shall assume full responsibility for protection and security of Products and Work at the site including any excavations. Security deemed necessary for protection against loss or damage of any Products and Construction Equipment on site in relation to the Project shall be the sole responsibility of the Contractor.

1.12 BASIS OF PAYMENT

- 1.12.1 The Contract Price shall include compensation in full for labour, material, equipment, power workmanship, and all other costs associated with this section.

1.13 MEASUREMENT FOR PAYMENT

- 1.13.1 The measurement of payment is a lump sum for all Work required under this Specification.
- 1.13.2 Payment shall be prorated on a monthly basis for the duration of the Contract.

2 PRODUCTS – N/A

3 EXECUTION – N/A

4 SUPPLEMENTS – N/A

END OF SECTION

SECTION 01100 – SUMMARY OF WORK

1 GENERAL

1.1 GENERAL REQUIREMENTS

- 1.1.1 The Contractor and its Subcontractors shall comply with the requirements in this section. Each section within the Specifications is related and shall be read in conjunction with one another.

1.2 REFERENCES

- 1.2.1 These Specifications form an integral part of the Contract Documents.
- 1.2.2 Refer also to all other parts of the Contract Documents to determine their effect on the Work of each section of these Specifications.
- 1.2.3 The requirements of this section and Division 1 apply to and govern the work under other divisions.
- 1.2.4 Comply with the latest edition of the statutes, standards, codes and regulations as identified in Section 01000.

1.3 SUBMITTALS

- 1.3.1 Submittals shall be in accordance with [Section 01330 – Submittals] and this section.

1.4 DESCRIPTION OF WORK

- 1.4.1 Generally, the Work under this Contract includes, but is not limited to, the following:
- .1 Repair concrete spalls, scaling and cracks on boardwalks and slabs throughout the plant.
 - .2 Repair steel beam fireproofing in the basement of control building for Plant B.
 - .3 Apply epoxy coating to the concrete within the ferric chemical containment area.
 - .4 Replace the existing steel guardrail within the digester building, control buildings, and throughout Plant A with a new fiberglass reinforced plastic (FRP) or aluminum guardrails that meets the current OBC requirements.
 - .5 Install a new FRP guardrail around the plant inlet chamber.
 - .6 Upgrade the existing aluminum railing throughout the plant to ensure it meets the OBC requirements including base plate modifications and kick plate installation.

- .7 Replace the four existing wooden baffles within the primary clarifier of Plant B with equivalent FRP baffles.
- .8 Replace the eight existing wooden baffles within the secondary clarifier of Plant B with equivalent FRP baffles.
- .9 Replace the entire existing wooden baffle within the grit building with an equivalent FRP baffle.
- .10 Replace the existing wooden baffle within the chlorine contact tank of Plant A with an equivalent FRP baffle.
- .11 Replace the existing handwheel actuated scum collection system within the primary clarifier of Plant B with a new lever actuated scum collection system.
- .12 Replace the existing return sludge piping above the aeration tanks in Plant B including the pipe hangers and two manually operated valves.
- .13 Replace the two existing access hatches above the basement of the Plant B control building with new access hatches that require a key/tool for external entry.
- .14 Install new railing mounted hatch locking system above six access hatches for buried chambers throughout the plant as identified in the contract documents.
- .15 Install steel clips to secure walkway grating throughout the plant.
- .16 Review completed DSS report and provide and implement a designated substance removal/ safe work plan.
- .17 Replace the existing diffusers and associated piping in the Aeration Tanks of both Plant A and B including pipe/diffuser supports and isolation valves.
- .18 Provide temporary bypass pumping to support concrete repairs.
- .19 Provide temporary RAS piping to support aeration tank isolations.
- .20 Replace screening building inlet gate.
- .21 Replace sluice gate isolation valve between cell 1 and cell 2 of Plant A Aeration tanks
- .22 Replace Plant A inlet channel slide plate.
- .23 Replace Plant B inlet channel slide plate.
- .24 Install aluminum stairs. inside the Ferric Building and within the Plant B control building
- .25 Install aluminum stairs from the driveway to the west side of the Ferric building.
- .26 Replace light fixtures within the Digester Valve building
- .27 Removal, safe disposal and replacement of existing expansion joint per the inlet channel west of the Plant B Primary Clarifier building (Provisional Item 4.1).
- .28 Draining & cleaning of each isolated cell prior to the existing condition inspection including any sludge removal and disposal.
- .29 Additional Vacuum Truck Services including haulage and disposal. As directed by the Engineer. Over and above what is specified within these specifications (Provisional Item 4.2).

1.4.2 Related Works also include, but are not limited to, the following:

- .1 Bonding and Insurance.
- .2 Mobilization and Demobilization.
- .3 Approvals and Permits.
- .4 Working constraints including Operational restrictions.
- .5 Arranging and paying for power, water, and other utilities from local service providers as required at the construction site.
- .6 Clearing of the site and restoration after construction.
- .7 Cleaning and general housekeeping during, and upon completion of construction activities.
- .8 Prevention of dust nuisance and the control of mud / debris.
- .9 Prevent tracking of mud and dust on roads according to City of Hamilton by-laws.
- .10 Observe noise restrictions according to City of Hamilton by-laws.
- .11 Site drainage and erosion control during construction.
- .12 Excavating, dewatering excavations, backfilling, compaction and disposal of surplus excavated materials.
- .13 Traffic management and control during construction.
- .14 Temporary site security during construction, electronic or onsite personnel.
- .15 Supply and installation of temporary fencing, lighting and security systems.
- .16 Furnishing of materials, equipment, tools, and labour.
- .17 Maintaining existing roads used during construction and leaving them in as good as, or better condition than that existing prior to commencement of the Work.
- .18 Placing the equipment supplied under this Contract into successful continuous operation.
- .19 Providing operational assistance to the City during start-up, commissioning, testing and initial operating periods of all equipment and processes installed under this Contract.
- .20 Supplying, installing, maintaining and removing upon construction completion, all temporary sheeting and shoring.
- .21 Testing for water tightness, gas tightness where applicable, and performance, all new water retaining structures and systems supplied, installed and constructed under this Contract.
- .22 Cleaning of all spillages, in particular those occurring during performance testing and initial operation.
- .23 Maintaining the Work free from deficiency for the duration of the warranty period.
- .24 Providing grass cutting, road cleaning, snow removal, and de-icing within the construction zone for the duration of the Contract.

- 1.4.3 For ease of reference, the Contract Documents have been divided into disciplines. However, all Contract Documents shall be read in conjunction with one another, since details applicable to one discipline may appear on the Contract Documents of another discipline.
- 1.4.4 Pay for additional copies of the Contract Documents if required.
- 1.4.5 Contract Documents provide general locations of existing facilities / utilities. The Contractor shall confirm the locations of the existing facilities / utilities, and identify any conflicts. Where conflicts are identified, the Contractor shall propose a possible solution addressing the conflict to the satisfaction of the Consultant.
- 1.4.6 Maintain and update one set of construction as-built drawings on site for the duration of construction. As-built drawings are to be made available to the Consultant for review anytime and shall be submitted to the Consultant upon Substantial Performance of the Work and continue updating through to completion of construction.
- 1.4.7 The Contractor shall be responsible for providing Operations and Maintenance Information using the City's internal forms as outlined in Section 01800 – Operations and Maintenance Data.
- 1.4.8 Where the Contractor engages the services of a Professional Engineer licensed in Ontario, the Contractor shall maintain and provide one set of record drawings as defined in the latest edition of the Use of the Professional Engineer's Seal Guideline published by Professional Engineers Ontario.

1.5 CONTRACTOR GENERAL RESPONSIBILITIES

- 1.5.1 The Contractor is responsible for the following but not limited to:
 - .1 Provide all necessary temporary power; bypass pumping facilities; pumping equipment, pipes, valves, fittings; diversions; and bulkhead systems, or other items necessary to facilitate the Works as required during construction and changeover of process flows from one tank, channel, or pipe to another.
 - .2 In general, place into service all new tankage, pumping facilities, piping, sewers, channels, and similar facilities before removing any existing parallel facilities from service.
 - .3 Permits shall be completed in accordance with [Section 01420 - Permits and Approvals].
 - .4 Hazardous waste shall be handled in accordance with [Section 01357 – Management of Hazardous Materials].
 - .5 Receive, unload and store Products at site according to manufacturer's instructions.

- .6 Inspect deliveries jointly with the Consultant, record shortages, and damaged or defective items.
- .7 Handle Products at site, including uncrating and storage.
- .8 Protect Products from damage, and from exposure to elements.
- .9 Assemble, install, connect, adjust, and finish all Products.
- .10 Facilitate installation inspections required by applicable authorities.
- .11 Repair or replace items damaged on site.

1.6 CITY RESPONSIBILITIES

- 1.6.1 Drawings and Specifications Furnished: Consultant shall:
 - .1 Provide one electronic copy of the approved building permit drawings to the Contractor.
 - .2 Provide one electronic copy of the issued-for-tender drawings and applicable addenda to the Contractor.
- 1.6.2 The City shall notify the Contractor if there are multiple contracts on the site.
- 1.6.3 Review shop drawings, Product data, samples, and other submittals as applicable. Submit to the Consultant, notification of any observed discrepancies or problems anticipated due to non-compliance with Contract Documents.
- 1.6.4 Arrange for delivery of shop drawings, Product data, samples, manufacturer's instructions, and certificates to the Contractor which were received prior to award of the Work, as applicable.
- 1.6.5 Deliver Supplier's bill of materials to the Contractor as applicable.
- 1.6.6 Obtain permits and approvals as outlined in [Section 01420 – Permits and Approvals].

1.7 WORK COMPLIANCE

- 1.7.1 All Work shall conform to the lines, levels and grades specified or shown on the Contract drawings.
- 1.7.2 Build all Work in a thoroughly substantial and complete manner, in accordance with the Contract Drawings and Specifications, subject to such modifications and additions as may be deemed necessary during its execution. In no case shall payment be made for any Work in excess of the requirements of the Drawings and Specifications, unless approved in writing by the Consultant and the City.

1.8 ENGINEERING DESIGN

- 1.8.1 Where Specifications require Work to be designed by a Professional Engineer, engage the services of an engineering firm holding a valid Certificate of Authorization from Professional Engineers Ontario to design such Work, and to stamp and sign any drawings and calculations forming part of that design.
- 1.8.2 The drawings or reports produced by the Professional Engineer shall be submitted as part of the O&M Manuals as Record Drawings and not As-Built Drawings.

1.9 WORK DONE IN COLD WEATHER

- 1.9.1 Protect structures, piping, sewers, and equipment that may be exposed to frost during the construction period until the Project is completed and accepted. Include such protective measures in the Contract Price and correct any damage sustained, to the satisfaction of the Consultant.
- 1.9.2 In keeping with the above requirements, submit to the Consultant in writing, before construction begins and by October 1st of each year of construction, an outline of specific frost protection measures to be implemented on this Project. Be responsible for the proper implementation of frost protection measures and for the repair or replacement of damages arising from freezing regardless of the review by the Consultant of the frost protection measures.
- 1.9.3 The Consultant may permit or order Work to be done when the minimum ambient temperature is at, about, or below 4°C. In such cases, the Contractor shall be responsible for maintaining temperatures of materials as needed in order for the materials to be used as intended and for furnishing sufficient temporary protection in the form of false Work and tarpaulins, or other temporary structures to adequately enclose the portion of the Work under construction. Supply, by approved means, sufficient temporary heat necessary to maintain a minimum temperature of 13°C in interior spaces for mechanical, electrical, masonry, painting and other work susceptible to frost damage.

1.10 PRE-SELECTED EQUIPMENT

- 1.10.1 The City has pre-selected with Suppliers for specific Products, to expedite the Work and for other purposes in the City's interests.
- 1.10.2 Refer to Section 11420 Aeration Diffuser System for details and installation.
- 1.10.3 On execution of the City/Contractor agreement, execute an agreement with designated Supplier in accordance with terms stated in attachment.

1.10.4 The Contractor's responsibility for purchase, handling, and installation for pre-selected Products shall be the same as for other Contractor-furnished Products.

1.10.5 Schedule of Pre-selected Products

.1 EDI FlexAir MiniPanel Aeration – Mixing System Fixed Grid Piping Configuration

1.10.6 Obtain necessary shop drawing from the Consultant for inclusion in maintenance manual in accordance with [Section 01330 – Submittals].

1.11 PRE-PURCHASED EQUIPMENT

1.11.1 N/A

1.12 BASIS OF PAYMENT

1.12.1 N/A

1.13 MEASUREMENT FOR PAYMENT

1.13.1 N/A

2 PRODUCTS – N/A

3 EXECUTION – N/A

4 SUPPLEMENTS – N/A

END OF SECTION

SECTION 01130 – ABBREVIATIONS

1 GENERAL

1.1 GENERAL REQUIREMENTS

- 1.1.1 The Contractor and its Subcontractors shall comply with the requirements in this section. Each section within the Specifications is related and shall be read in conjunction with one another

1.2 REFERENCES – N/A

- 1.2.1 N/A

1.3 SUBMITTALS – N/A

- 1.3.1 N/A

1.4 ABBREVIATIONS

- 1.4.1 The following table includes, but is not limited to, abbreviations of terms that may be included in the Contract Documents.
- 1.4.2 The following abbreviations shall be interpreted within the context of the document in which they are referenced.

AA	Aluminum Association
AASHTO	American Association of State Highway and Transportation Officials
ABS	Acrylonitrile Butadiene Styrene
AAR	Association of American Railroads
AATCC	American Association of Textile Chemists and Colorists
ACI	American Concrete Institute
ABMA	American Bearing Manufacturers Association
AGA	American Gas Association
AGMA	American Gear Manufacturer's Association
AHRI	Air-Conditioning, Heating, and Refrigeration Institute
AIEE	American Institute of Electrical Engineers
AISI	American Iron and Steel Institute
AITC	American Institute of Timber Construction

AMCA	Air Movement and Control Association Inc.
ANS	American Nuclear Society
ANSI	American National Standards Institute
AODA	Accessibility for Ontarians with Disabilities Act, Ontario Regulation, including amendments
APA	American Plywood Association
API	American Petroleum Institute
APWA	American Public Works Association
ARI	Air Conditioning and Refrigeration Institute
ASHRAE	American Society of Heating, Refrigeration and Air-Conditioning Engineers
ASA	American Standards Association
ASAE	American Society of Agricultural Engineers
ASCE	American Society of Civil Engineers
ASHRAE	American Society of Heating, Refrigerating and Air Conditioning Engineers
ASLE	American Society of Lubricating Engineers
ASME	American Society of Mechanical Engineers
ASQC	American Society for Quality Control
ASSE	American Society of Sanitary Engineers
ASTM	American Society for Testing and Materials
AWCI	Association of the Wall and Ceiling Industries
AWG	American Wire Gauge
AWI	Architectural Woodwork Institute
AWPA	American Wood Preservers Association
AWPI	American Wood Preservers Institute
AWMAC	Architectural Woodwork Manufacturers Association of Canada
AWS	American Welding Society

AWWA	American Water Works Association
BCLMA	British Columbia Lumber Manufacturer's Association
BHMA	Builders Hardware Manufacturer's Association
CBM	Certified Ballast Manufacturers
CBR	California Bearing Ratio
CCA	Canadian Construction Association
CCTV	Closed Circuit Television
CEAA	Canadian Environmental Assessment Agency
CEC	Canadian Electric Code
CEMA	Canadian Electrical Manufacturer's Association
CEPA	Canadian Environmental Protection Act
CESA	Canadian Engineering Standards Association
CETL	Canada Electric Test Laboratories
CFR	Council on Foreign Relations
CFRP	Carbon Fiber Reinforced Polymers
CGA	Canadian Gas Association
CGSB	Canadian General Standards Board
CISC	Canadian Institute of Steel Construction
CITC	Canadian Institute of Timber Construction
CLA	Canadian Lumberman's Association
CLFMI	Chain Link Fence Manufacturer's Institute
CMA	Concrete Masonry Association
CMB	Construction Materials Board
CPM	Critical Path Method
CRCA	Canadian Roofing Contractors Association
CRS	Cationic Rapid Setting
CSA	Canadian Standards Association

CSC	Construction Specifications Canada
CSDFMA	Canadian Steel Door and Frame Manufacturing Association
CSPI	Corrugated Steel Pipe Institute
CSSBI	Canadian Sheet Steel Building Institute
CWB	Canadian Welding Bureau
CWC	Canadian Wood Council
DCDMA	Diamond Core Drill Manufacturer's Association
DPDT	Double Pole Double Throw
DTI	Direct Tension Indicator
DWV	Drain Waste Vent
EEMAC	Electrical and Electronic Manufacturers' Association of Canada
ES	Earliest Start
EPA	Environmental Protection Agency
ESA	Electrical Safety Authority
ESC	Electrical Safety Code
ETL	Electrical Test Laboratories
FCAN	Full Capacity Above Normal
FCBN	Full Capacity Below Normal
FCC	Fire Commissioner of Canada
FOB	Freight on Board
FOPP	Fiber Optic Patch Panel
FPM	Feet per Minute
FS	Federal Specifications and/or Federal Standards
GPR	Ground Penetrating Radar
HART	Highway Addressable Remote Transducer
HCA	Hamilton Conservation Authority
HDPE	High Density Polyethylene

HEPC	Hydro Electric Power Commission
HI	Hydraulic Institute
HVAC	Heating, Ventilation and Air Conditioning
HWP	Hazardous Waste Program
ICBO	International Conference of Building Officials
ICPI	Interlocking Concrete Pavement Institute
IEEE	Institute of Electrical and Electronics Engineers
IES	Illuminating Engineering Society
IFI	International Fasteners Institute
ISO	International Organization for Standardization
IP	Institute of Petroleum (London)
IPC	Institute of Printed Circuits
ISA	Instrument Society of America
LAN	Local Area Network
LF	Late Finish
MADC	Multiplexer Analog-To-Digital Converter
MBMA	Metal Building Manufacturer's Association
MCA	Metal Construction Association
MCAO	Mechanical Contractors Association of Ontario
MCCR	Ministry of Consumer and Commercial Relations
MECP	Ministry of the Environment, Conservation and Parks
MIL	Military Specifications (Naval Publications and Forms Centre)
MNRF	Ministry of Natural Resources and Forestry
MTO	Ministry of Transportation Ontario
MOL	Ministry of Labour
MSS	Manufacturers Standardization Society of the Valve and Fittings Industry

MVSA	Motor Vehicle Safety Act
SDS	Safety Data Sheet
NAAMM	National Association of Architectural Metal Manufacturers
NACE	National Association of Corrosion Engineers
NBFU	National Board of Fire Underwriters
NBC	National Building Code
NBS	National Bureau of Standards
NFC	National Fire Code
NaEC	National Electrical Code
NiEC	Niagara Escarpment Commission
NEMA	National Electrical Manufacturers Association
NFPA	National Fire Protection Association
NFSA	National Fire Sprinkler Association
NHLA	National Hardwood Lumber Association
NLGA	National Lumber Grades Authority
NLGI	National Lubricating Grease Institute
NMA	National Microfilm Association
NRC	National Research Council of Canada
NRCA	National Roofing Contractors Association
NSC	National Standards of Canada
NSF	National Sanitation Foundation
O&M	Operations and Maintenance
OBC	Ontario Building Code "The Building Code", Ontario Regulation, including amendments
OCWA	Ontario Clean Water Agency
OESCGUC	Ontario Erosion and Sediment Control Guidelines for Urban Construction

OFM	Ontario Fire Marshall
OESC	Ontario Electrical Safety Code
OHSA	Ontario Occupational Health and Safety Act
OIRCA	Ontario Industrial Roofing Contractors' Association
OPSD	Ontario Provincial Standard Drawings
OPSS	Ontario Provincial Standard Specifications
PCA	Portland Cement Association
PCB	Polychlorinated biphenyl
PCI	Prestressed Concrete Institute
PEI	Porcelain Enamel Institute
PGAC	Performance Grade Asphalt Cement
PPE	Personal Protective Equipment
PPV	Peak Particle Velocity
QA/QC	Quality Assurance and Quality Control
RFFRK	Reinforced Foil Flame Retardant Kraft
RWMA	Resistance Welder Manufacturer's Association
RS	Rapid Setting
SAMA	Scientific Apparatus Makers Association
SCADA	Supervisory Control and Data Acquisition
SCC	Standards Council of Canada
SJI	Steel Joist Institute
SMACCNA	Sheet Metal and Air Conditioning Contractors' National Association
SPDT	Single Pole Double Throw
SPMDD	Standard Proctor Maximum Dry Density
SSPC	Steel Structures Painting Council
TAPPI	Technical Association of the Pulp and Paper Industry
TC	Tension Control

TDD	Total Demand Distortion
TDGA	Transportation of Dangerous Goods Act
TFI	The Fertilizer Institute
TSSA	Technical Standards and Safety Authority
TTMAC	Terrazzo, Tile and Marble Association of Canada
UL	Underwriters' Laboratories
ULC	Underwriters' Laboratories of Canada
UNS	Unified Numbering System for Metals and Alloys
USB	Universal Serial Bus
VAC	Voltage Alternating Current
WBS	Work Breakdown Structure
WCA	Workers Compensation Act
WHMIS	Workplace Hazardous Materials Information System
WHSCC	Workplace Health, Safety and Compensation Commission
WRI	Wire Reinforcement Institute, Inc.

1.5 UNITS OF MEASUREMENT

- 1.5.1 The following table includes, but is not limited to, units of measurement that may be included in the Contract Documents.
- 1.5.2 The following units shall be interpreted within the context of the document in which they are referenced.

A	Amperes
°C	Degrees Celsius
dB	Decibels
ga	Gauge
hr	Hour
Hz	Hertz
kA	Kilo Amperes

kg	Kilograms
kN	Kilo Newtons
kPa	Kilopascals
kV	Kilovolts
kVA	Kilovolt Amps
kW	Kilowatts
L	Litres
L/s	Litres per second
m	Metres
m ²	Square metres
m ³	Cubic metres
mm	Millimetres
mils	Mils (1/1000 inch)
µm	Micrometres
ML/d	Megalitres per day
N	Newtons
Ph	Phase
Psi	Pounder per square inch
rpm	Revolutions per minute
s	Second
SI	International System of Units
T	Metric Tonnes (1,000 kg)
V	Volts

1.6 BASIS OF PAYMENT

1.6.1 N/A

1.7 MEASUREMENT OF PAYMENT – N/A

1.7.1 N/A

2 PRODUCTS – N/A

3 EXECUTION – N/A

4 SUPPLEMENTS – N/A

END OF SECTION

SECTION 01310 – PROJECT MANAGEMENT

1 GENERAL

1.1 GENERAL REQUIREMENTS

- 1.1.1 The Contractor and its Subcontractors shall comply with the requirements in this section. Each section within the specifications is related and shall be read in conjunction with one another.

1.2 REFERENCES

- 1.2.1 These Specifications form an integral part of the Contract Documents.
- 1.2.2 Refer also to all other parts of the Contract Documents to determine their effect on the Work of each section of these Specifications.
- 1.2.3 The requirements of this section and Division 1 apply to and govern the Work under other divisions.
- 1.2.4 Comply with the latest edition of all applicable statutes, standards, codes, and regulations.

1.3 SUBMITTALS

- 1.3.1 Submittals shall be in accordance with [Section 01330 – Submittals] and this section.

1.4 SITE SUPERVISION

- 1.4.1 Site supervision shall be accordance with the Contract Documents.

1.5 SUBCONTRACTORS AND SUPPLIERS

- 1.5.1 The Contractor shall be responsible for the Subcontractors and Suppliers in accordance with the Contract Documents.

1.6 ELECTRONIC CORRESPONDENCE

- 1.6.1 The Contractor, when communicating with the Consultant and the City in electronic format, is to utilize Microsoft Outlook for email and scheduling of meetings, Microsoft Office for word processing and spreadsheets, and Microsoft Project for schedules.

1.7 SITE RECORDS

- 1.7.1 The Contractor shall document any and all changes or variations to the Work from the requirements of the Contract Documents on the issued-for-construction drawing set.

- 1.7.2 Use different colour waterproof ink for each service.
- 1.7.3 The Contractor shall document any and all changes or variations to the Work from the requirements of Drawings where the Contractor retained the Services of a Professional Engineer to prepare the Drawings. Upon completion of the Contract, the Contractor shall provide these Drawings, labeled as "RECORD DRAWINGS."
- 1.7.4 Store as-built and record documents and samples in field office separately from documents used for construction.
- 1.7.5 Label as-built and record documents and file in accordance with Specification section number. Label each document "CONSTRUCTION RECORD" in neat, large, printed letters. Label each as-built drawing with "AS-BUILT" in neat, large, printed letters.
- 1.7.6 Maintain as-built and record documents in clean, dry and legible condition.
- 1.7.7 Keep as-built and record documents and samples available for inspection by the Consultant on a monthly basis. This shall be reviewed as part of the monthly progress payment application with monies withheld for incomplete as-built and record drawings.
- 1.7.8 The Contractor shall transfer all items in Change Orders, site instructions and Change Directives to the as-built drawings. Referrals to the Change Orders, site instructions and Change Directives are not acceptable on the as-built drawings.
- 1.7.9 Maintain at job site, one copy of the following:
 - .1 Contract drawings
 - .2 As-built drawings
 - .3 Record drawings
 - .4 Specifications
 - .5 Addenda
 - .6 Reviewed shop drawings
 - .7 Change Orders
 - .8 Other modifications to Contract
 - .9 Field test reports
 - .10 Copy of approved Work schedule
 - .11 Manufacturers' installation and application instructions
 - .12 Contractor's Health and Safety policy
 - .13 Labour conditions and wage schedules

1.8 PUBLIC RELATIONS

- 1.8.1 Appoint a competent representative to receive any complaints from the public in regard to safety, noise, protection of traffic, condition of road surfaces along the line of Work, or nuisances on account of the Work.
- 1.8.2 Provide the Consultant and the City with the name, contact information and nature of the incident from the public within two hours of the complaint. Complaints that are deemed to be an emergency shall be dealt with immediately by the Contractor.
- 1.8.3 Deal promptly with and document in writing all complaints received and carry out remedial actions as directed by the Consultant, in order to prevent further complaints.

1.9 PUBLIC NOTICES

- 1.9.1 The City shall provide all communication to the Public.
- 1.9.2 Assist the City with the preparation of any communication related to the construction activity with respect to the Public.
- 1.9.3 Provide a two-week written notice to the City of the schedule (time and location) of the movement of materials, construction activities, maintenance, and repairs to affected land, City-owned properties and occupants of properties adjacent to the Work areas and along primary access routes.
- 1.9.4 Notify the Consultant and the City as soon as possible of action taken with respect to any complaints and the outcome of such actions.
- 1.9.5 Notify the Consultant and the City prior to any blockages of driveways and make any necessary arrangements for alternative access.

1.10 CONSTRUCTION ORGANIZATION AND STARTUP

- 1.10.1 Comply with the Consultant's allocation of mobilization areas of site, for field offices and sheds, access, traffic, and parking facilities.
- 1.10.2 Comply with Consultant's instructions for use of temporary utilities and construction facilities.
- 1.10.3 Coordinate field engineering and layout Work with the Consultant.
- 1.10.4 Coordinate pre-construction survey with the Consultant.

1.11 PROJECT MEETINGS

1.11.1 Project meetings to be in accordance with [Section 01315 – Project Meetings].

1.12 BASIS OF PAYMENT

1.12.1 The Contract Price shall include compensation in full for labour, material, equipment, power workmanship, and all other costs associated with this section.

1.13 MEASUREMENT FOR PAYMENT

1.13.1 The measurement of payment is a lump sum for all Work required under this Specification.

2 PRODUCTS – N/A

3 EXECUTION – N/A

4 SUPPLEMENTS – N/A

END OF SECTION

SECTION 01315 – PROJECT MEETINGS

1 GENERAL

1.1 GENERAL REQUIREMENTS

- 1.1.1 The Contractor and its Subcontractors shall comply with the requirements in this section. Each section within the specifications is related and shall be read in conjunction with one another.

1.2 REFERENCES

- 1.2.1 These Specifications form an integral part of the Contract Documents.
- 1.2.2 Refer also to all other parts of the Contract Documents to determine their effect on the Work of each section of these Specifications.
- 1.2.3 The requirements of this section and Division 1 apply to and govern the Work under other divisions.

1.3 SUBMITTALS

- 1.3.1 Submittals shall be in accordance with [Section 01330 – Submittals] and this section.

1.4 MEETINGS

- 1.4.1 The Consultant will lead the preconstruction meeting and progress meetings. Other meetings including, but not limited to, coordination and commissioning meetings shall be led by the appropriate party.
- 1.4.2 The Contractor's superintendent, and senior representatives of major Subcontractors, as required, shall attend all meetings unless directed otherwise by the Consultant.
- 1.4.3 Representatives of the Contractor, Subcontractor and Suppliers attending meetings shall be qualified and authorized to act on behalf of the party each represents.
- 1.4.4 The Contractor shall administer all construction health and safety meetings in accordance with local labour laws and the Contractor's corporate health and safety program.
- 1.4.5 Health and safety meetings shall be completed in accordance with the requirements of [Section 01705 – Health and Safety] and this section.

- 1.4.6 The Consultant shall record minutes of meetings and circulate to attending parties and affected parties not in attendance within five (5) Working Days of each meeting.

1.5 PRECONSTRUCTION MEETING

- 1.5.1 Within fifteen (15) Working Days of Notice to Proceed, a preconstruction meeting shall be scheduled between all parties in contract to discuss and resolve administrative procedures and responsibilities.
- 1.5.2 Representatives of the City, the Consultant and the Contractor shall be in attendance.
- 1.5.3 If deemed necessary, representatives of the Subcontractors, equipment representatives and/or other parties whom the Contractor or the Consultant may request shall be in attendance.
- 1.5.4 The City shall establish time and location of meeting and notify parties concerned a minimum of five (5) Working Days before meeting.
- 1.5.5 Agenda items shall include, but is not limited to, the following:
- .1 Appointment of official representative of participants in the Work.
 - .2 Barricades and Enclosures.
 - .3 Contemplated changes, change orders, procedures, approvals required, mark-up percentages permitted, time extensions, overtime and administrative requirements in accordance with the Contract Documents.
 - .4 City-supplied Products.
 - .5 City-retained Products.
 - .6 Monthly progress claims, administrative procedures, progress photographs and holdbacks in accordance with Contract Documents and the City's Progress Payment Certificate template.
 - .7 Bonding and insurance in accordance with Contract Documents.
 - .8 Health and Safety issues in accordance with Contract Documents.
 - .9 Environmental issues, including spills reporting in accordance with Contract Documents.
 - .10 Other items of discussion.

1.6 PROGRESS MEETINGS

- 1.6.1 During course of Work, progress meetings shall be held on a monthly basis. The Consultant or the City can adjust meeting occurrence based on necessity or as requested.
- 1.6.2 Representatives of the City, the Consultant and the Contractor shall be in attendance.

- 1.6.3 If deemed necessary, representatives of the Subcontractors, equipment representatives and/or other parties whom the Contractor or the Consultant may request shall be in attendance.
- 1.6.4 Agenda items shall include, but is not limited to, the following:
- .1 Review, approval of minutes of previous meeting.
 - .2 Review of any health safety items.
 - .3 Review of Work progress since previous meeting.
 - .4 Field observations, problems and conflicts.
 - .5 Problems that shall impede construction schedule.
 - .6 Review of off-site fabrication delivery schedules.
 - .7 Corrective measures and procedures to regain projected schedule.
 - .8 Revisions to construction schedule.
 - .9 Progress, schedule, during succeeding Work period.
 - .10 Review submittal schedules: expedite as required.
 - .11 Proposed sequencing and commissioning, as required.
 - .12 Proposed and anticipated shutdowns.
 - .13 Maintenance of quality standards.
 - .14 Pending changes and substitutions.
 - .15 Review proposed changes affecting construction schedule and completion date.
 - .16 Health and Safety issues.
 - .17 Environmental issues.
 - .18 Public relations.
 - .19 Other business.

1.7 PRE-STARTUP MEETING

- 1.7.1 During course of Work, the Contractor shall convene a pre-startup meeting for the Work. The Contractor cannot commence pre-startup activities until the meeting has been held. The Contractor shall provide all appropriate parties a minimum of twenty (20) Working Days notice for the meeting.
- 1.7.2 Attendance shall be required of parties directly affecting, or affected by, the Work. Failure of the Contractor, Subcontractor, or Supplier to attend the pre-startup meeting may result in a charge to the Contractor for rescheduling costs incurred by the City and/or the Consultant. These costs will be permanently deducted from the next Progress Payment Certificate. Schedule delays as a result of the failure of the Contractor, Subcontractor, or Supplier to attend will not be considered.
- 1.7.3 The Consultant shall prepare an agenda and preside at the meeting to discuss the following:
- .1 Review conditions of equipment identification, cleaning, and disinfection procedures where applicable.

- .2 Review of expectations required for pre-commissioning of equipment phase.
- .3 Other pre-startup activities and documents detailed in [Section 01810 – Commissioning].
- .4 Schedule for pre-startup activities.
- .5 Any required City of Hamilton documents.
- .6 Any required shutdowns.
- .7 Any required participation by the City and the Consultant.

1.7.4 The Consultant will record the minutes and distribute copies to all participants within five (5) Working Days after the meeting.

1.8 STARTUP MEETING

1.8.1 Following completion of all pre-startup activities detailed in [Section 01810 – Commissioning], the Contractor shall convene a startup meeting for the Work. The Contractor cannot commence any startup activities until a startup plan has been submitted and the startup meeting has been held. The Contractor shall provide all appropriate parties a minimum of twenty (20) Working Days notice for the startup meeting.

1.8.2 Attendance will be required of parties directly affecting, or affected by, the Work. Failure of the Contractor, Subcontractor, or Supplier to attend the startup meeting shall result in a charge to the Contractor for rescheduling costs incurred by the City and/or the Consultant. These costs will be permanently deducted from the next Progress Payment Certificate. Schedule delays as a result of the failure of the Contractor, Subcontractor, or Supplier to attend will not be considered.

1.8.3 The Consultant will prepare an agenda and preside at the meeting to discuss the following:

- .1 Review the Contractor's startup plan.
- .2 Schedule for startup activities and training sessions.
- .3 Any required City of Hamilton documents.
- .4 Any required shutdowns.
- .5 Any required participation by the City and the Consultant.

1.8.4 The Consultant will record the minutes and distribute copies to all participants within five (5) Working Days after the meeting.

1.9 COMMISSIONING MEETING

- 1.9.1 Following completion of all startup activities detailed in [Section 01810 – Commissioning], the Contractor shall convene a commissioning meeting for the Work. The Contractor cannot commence any commissioning activities until each piece of equipment has been successfully started and tested, and a Green Tag has been applied. The Contractor shall schedule the initial commissioning meeting a minimum of two (2) months prior to commencing any commissioning activities. The Contractor shall provide all appropriate parties a minimum of five Working Days notice for the Commissioning meeting.
- 1.9.2 Attendance will be required of parties directly affecting, or affected by, the Work. Failure of the Contractor, Subcontractor, or Supplier to attend the Commissioning meeting shall result in a charge to the Contractor for rescheduling costs incurred by the City and/or the Consultant. Schedule delays as a result of the failure of the Contractor, Subcontractor, or Supplier to attend will not be considered.
- 1.9.3 The Consultant will prepare an agenda and preside at the meeting to discuss the following:
- .1 Review of commissioning period activities and timelines, including the City's Transfer of Assets procedure.
 - .2 Review of draft closeout submittals.
 - .3 Any required participation by the City and the Consultant.
- 1.9.4 The Consultant will record the minutes and distribute copies to all participants within five (5) Working Days after the meeting.

1.10 COORDINATION MEETINGS

- 1.10.1 Work shall be completed in accordance with [Section 01100 – Summary of Work] and this section.
- 1.10.2 Coordination with other Contractors who may be intending to Work in the same area at the same time will be required. In the event of this occurring, the City and the Consultant will decide which Contractor's Work will take precedence. There shall be no extra claim on the Contract due to delays as a result of this occurring.
- 1.10.3 The Contractor shall make themselves available for weekly coordination and health and safety meetings.
- 1.10.4 Weekly coordination meetings during specific activities of the Work, such as tie-ins, startup and commissioning, will be held at a mutually agreed upon time and day with representatives of the Contractor, the City and the Consultant. Topics to be discussed include, but is not limited to, the following items:

- .1 Review of construction activities planned for next two weeks (i.e. Look Ahead schedule.)
- .2 Review of the City's and Subcontractor activities that shall affect Contract Work.
- .3 Identification and review of projected shutdowns and other activities requiring participation of the City personnel. The City's shutdown notification request/coordination form shall be submitted for all shutdowns (in accordance with Section 01320 – Construction Schedule and Sequence of Work).
- .4 Outstanding and/or deficient Work.

1.11 OTHER MEETINGS

- 1.11.1 In accordance with Contract Documents and as required by the City and the Consultant.

1.12 BASIS OF PAYMENT

- 1.12.1 The Contract Price shall include compensation in full for labour, material, equipment, power workmanship, and all other costs associated with this section.

1.13 MEASUREMENT FOR PAYMENT

- 1.13.1 The measurement of payment is a lump sum for all Work required under this Specification.
- 1.13.2 Payment shall be prorated on a monthly basis for the duration of the Contract.

2 PRODUCTS – N/A

3 EXECUTION – N/A

4 SUPPLEMENTS – N/A

END OF SECTION

SECTION 01320 – CONSTRUCTION SCHEDULE AND SEQUENCE OF WORK

1 GENERAL

1.1 GENERAL REQUIREMENTS

- 1.1.1 The Contractor and its Subcontractors shall comply with the requirements in this section. Each section within the specifications is related and shall be read in conjunction with one another.
- 1.1.2 This section describes suggested general sequencing of construction activities. The sequencing presented in this section outlines the intent of the design, and operational constraints, with respect to the general progress of construction work, but is not intended to be all-inclusive. Many other construction activities and work components, although not specifically noted in this section, are integral parts of the Work and shall be scheduled and completed by the Contractor.
- 1.1.3 The Work shall be carried out in a logical sequence. All effort shall be made to ensure compliance with all appropriate regulations. Coordinate all construction activities through the Consultant with the City's plant staff and verify that these activities do not interfere with the existing facilities. Maintaining plant operation shall have priority over all construction activities at no additional cost to the City.
- 1.1.4 The Consultant reserves the right to review and comment on the Contractor's schedule and sequence of construction for compliance with the operational / regulatory requirements and other constraints defined in this section. The Contractor may be required to modify the schedule to address these comments. Such changes will be at no additional cost to the City.
- 1.1.5 The City and the Consultant availability is limited to Monday to Friday, 8am to 4pm unless prior arrangements have been made, in advance, for Work outside of these working hours.

1.2 REFERENCES

- 1.2.1 These Specifications form an integral part of the Contract Documents.
- 1.2.2 Refer also to all other parts of the Contract Documents to determine their effect on the Work of each section of these Specifications.
- 1.2.3 The requirements of this Section and Division 1 apply to and govern the Work under other divisions.

1.3 SUGGESTED SEQUENCE OF WORK

- 1.3.1 Refer to suggested construction sequence included in contract documents. Although a suggested sequence of work is provided the contractor is responsible for the review of the scope of work and preparation of their own project schedule as required under the contract documents.
- 1.3.2 The contractor will not be permitted to begin work nor will any processes of the plant be shut down until all product is on site.
- 1.3.3 Sequence of work should consider the following list of site limitations:
 - .1 Only one cell in the plant can be offline at one time.
 - .2 Plant B Aeration tank upgrades must be completed in cell 1 before cell 2.
 - .3 Plant A Aeration upgrades must be completed in cell 2 before cell 1.
 - .4 Temporary RAS piping must be installed and tested before Plant A Aeration cell 1 will be permitted to be offline.
 - .5 Temporary RAS piping must be installed and tested before Plant B Aeration cell 1 will be permitted to be offline.
 - .6 Temporary RAS piping must be installed and tested before Plant B Aeration cell 2 will be permitted to be offline.
 - .7 Bypass pumping system must be installed and tested before screening building will be permitted to be isolated.
 - .8 Bypass pumping must be installed and tested before Plant A Parshall Flume will be permitted to be isolated.
 - .9 Bypass pumping must be installed and tested before Plant A inlet channel will be permitted to be isolated

1.4 SUBMITTALS

- 1.4.1 Submission of the schedules (including baseline and progress schedules) referred to in this section, and any subsequent updates to such schedules, shall constitute the Contractor's representation that:
 - .1 The Contractor and its Subcontractors intend to execute the Work in the sequence indicated in such schedule.
 - .2 The Contractor has distributed the proposed schedule to Subcontractors and Pre-purchased equipment Suppliers, as applicable, for their review and comment, and has obtained their concurrence.
 - .3 All elements of the Work required for the performance of the Contract are included. Failure to include any such element shall not excuse the Contractor from completing the Work within the milestone dates and Contract Time and from meeting all other constraints specified in the Contract Documents.
 - .4 Seasonal weather conditions have been taken into consideration in the planning and scheduling of the Work including high and low ambient temperatures and/or precipitation.

- .5 The Contractor has thoroughly inspected the site, considered the Work of other Contractors and, where necessary, coordinated its plan with other Contractors retained by the City.
 - .6 The Contractor has incorporated any other special conditions in planning the Work such as specified or required work restriction periods, plant operations, compliance, redundancies, long lead time production, critical path items, etc.
 - .7 No claims will be considered for delays, or other/related costs, as a result of delayed submissions of schedules, staging and sequencing plans, or as a result of modifications required to those submissions due to the City's and the Consultant's review.
 - .8 The express or implied acceptance by the City and/or the Consultant of the final as-planned schedule and any progress schedules shall not constitute an acceptance of the Contractor's construction means, methods, or sequencing or its ability to complete the Work in a timely manner, and shall not place any obligation or responsibility on the City toward the Contractor nor shall it, in any way, relieve the Contractor of his/her obligations and responsibilities under the Contract. The City and/or the Consultant's acceptance shall demonstrate agreement that:
 - .1 Contract time, including dates of Substantial Performance of the Work, Final Completion of the Work and all intermediate milestones are within the specified times
 - .2 Specified Work constraints are shown as specified in the Contract Documents
 - .3 Access restrictions are accurately reflected
 - .4 Submittal review times are as specified in the Contract Documents
 - .5 Start-up, testing and facility commissioning times are as specified in the Contract Documents
 - .6 Training durations are as specified in the Contract Documents and timing is acceptable.
- 1.4.2 The Contractor shall submit the following information in accordance to this section and Section 01330 – Submittals.
- 1.4.3 Monthly Cash Flow
- .1 On a monthly basis a cash flow graph shall be provided with the invoice. The cash flow graph shall compare the targeted to achieved progress to date. Cash flow shall be from the Notice to Proceed date to the contract Substantial Performance of the Work date. All approved Contract changes shall be incorporated into the cash flow graph.
- 1.4.4 Baseline schedules

- .1 Detailed preliminary baseline schedule:
 - .1 Shall be submitted to the Consultant and the City by the Contractor within ten (15) Working Days after the Notice to Proceed or fifteen (15) Working Days prior to the first progress payment, whichever occurs first.
 - .2 The detailed preliminary baseline schedule shall cover all phases of the Work, and shall represent the Contractor's practical original plan to complete the Work, considering restrictions of access and availability of Work areas, and availability and use of workforce, materials and equipment. It is to be a fully resource-loaded schedule, with labour, material and equipment resources provided at an activity level or as required by the City.
 - .3 The activities defined in the detailed preliminary baseline schedule shall represent the planned durations in anticipation of required workforce and equipment utilization in durations of whole Working Days.
 - .4 In calculating activity durations, restrictions imposed by inclement weather shall be considered. The Contractor shall schedule the Work to minimize the effect of adverse weather, and to allow for protection of the site from such effects.
 - .5 Shall be submitted with accompanying narrative report.
 - .6 Electronic copy shall be submitted as a Shop Drawing in accordance with [Section 01330 – Submittals].
 - .7 The detailed preliminary baseline schedule shall show the sequence and interdependencies of construction and commissioning activities, as well as Project-related activities reasonably required to complete the Work, and shall address the following, at a minimum:
 - .1 The City's issuance and the Contractor's receipt of the Notice to Proceed.
 - .2 Acquisition of all applicable permits, design drawings, specifications and Shop Drawing submittals for early Product procurement, and long lead time items. Refer to [Section 01330 – Submittals].
 - .3 Mobilization and other preliminary activities.
 - .4 Site access.
 - .5 Any initial site Work as applicable, including environmental and security measures.
 - .6 Specified work sequences, constraints, and milestones, including but not limited to:
 - .1 Startup, site acceptance testing, and commissioning date(s), training of operators and Substantial Performance of the Work,

- .2 Type of Work to be performed by the Subcontractor(s) involved.
- .3 Type of Work to be performed by the City and tasks where the City's operations staff are needed.
- .4 Major equipment design, fabrication, factory testing, and delivery dates.
- .5 Submittals such as Shop Drawings that are critical or near critical to schedule completion. Refer to [Section 01330 – Submittals].
- .6 Major components of the Work and other relevant details.
- .8 The required revisions shall be made, and the detailed preliminary baseline Schedule finalized to the satisfaction of the City and the Consultant, whereupon it will become the detailed final baseline schedule, against which progress will be measured.

1.4.5 Detailed final baseline schedule:

- .1 Shall be submitted to the Consultant and the City by the Contractor within ten (10) Working Days after the Consultant acceptance of the detailed preliminary baseline schedule.
- .2 Shall be developed according to the same requirements and format as specified above for detailed preliminary baseline schedule.
- .3 The detailed final baseline schedule shall be accompanied by a narrative that provides a detailed description of the labour, materials, station, means and methods that the Contractor intends to use to carry out the Work and achieve the planned rate of production required to support the activity durations shown in the schedule. The narrative shall also provide explanations supporting the use of lead-lag relationships and constrained dates.

1.4.6 Progress schedules:

- .1 Detailed progress schedules:
 - .1 Shall be submitted to the Consultant and the City by the Contractor appended to the monthly Progress Payment Certificate or as requested by the Consultant. The progress payment application will not be reviewed until the schedule update is submitted.
 - .2 Shall be subject to the same requirements and format as specified above for the detailed final baseline schedule.

- .3 Each detailed progress schedule shall record and report data and report actual completion and/or start dates for each completed or in-progress activity, activity percent complete for in-progress activities and forecast completion dates for all activities that are not yet complete. As-built logic will be adjusted as required to reflect the actual sequence of the Work. The detailed progress schedule will show the projected completion date of the Work based on the progress information inserted into it, without changes to the schedule logic or the original duration of any activity. The Contractor shall use the retained logic option when executing schedule calculation. The detailed progress schedule (or an accepted revision thereto) will be shown as a target schedule to indicate whether the current progress schedule remains on target, has slipped or is ahead of schedule.
- .4 The Contractor to revise schedule to reflect delivery dates as they become available.
- .5 If it appears that the progress schedule submitted by the Contractor no longer represents the actual sequencing and progress of the Work, the Consultant may instruct the Contractor to revise the progress schedule.
- .6 The Contractor shall provide a revised copy of the schedule within ten (10) Working Days from the date of receipt of comments from the Consultant.
- .7 A complete schedule update submission (to be submitted along with each monthly progress payment application) shall include the following schedule and progress reports:
 - .1 An updated progress schedule, comparing actual and target progress.
 - .2 A cash flow graph, comparing the targeted to achieved progress.
 - .3 A schedule narrative, including a detailed description of progress, including comparison of planned to actual rates of production, key deliveries to the site, construction, erection, testing, and commissioning.
 - .4 A discussion of the basis for any Work sequencing, logic, interdependencies or original activity duration revisions incorporated into an updated schedule.
 - .5 Comparisons of actual and planned progress, with a brief commentary on any actual or forecast delays or problems that might have an impact on the completion date of the Work, and a discussion of the measures being (or to be) adopted to overcome these.

- .6 Any other information specifically required by the Consultant.
 - .2 If requested by the Consultant, the Contractor shall incorporate and logically connect approved Contract changes into the Critical Path Method (CPM) schedule. Each change will be identified by number and description, and activities/milestones will be added to record the following:
 - .1 Date the change was identified
 - .2 Date the change was priced (if applicable)
 - .3 Start and finish dates of the changed Work
 - .3 In the case of a potentially critical delay occurring between the regular schedule updates, and if requested by the Consultant, the Contractor shall update the schedule at the beginning of the delay event and at the resolution of the delay issue.
 - .4 In order to further define (beyond the level of detail shown in the detailed final baseline schedule) critical portions of the Work such as facility shutdowns, the Contractor shall, if requested, develop detailed schedule fragments.
- 1.4.7 Look-Ahead Schedule:
- .1 The Contractor shall provide short interval “look ahead” schedules bi-weekly, identifying Work that has been performed during the past two weeks and activities that are planned for the next four weeks. The short interval schedule shall be consistent with the progress schedule currently in force.
 - .2 The Contractor shall provide the Consultant with a complete weekly list of personnel, station and construction equipment as well as production rates actually achieved on all major activities, and labour hours for all major trades such as, for example, the formwork, mechanical, and electrical trades.
 - .3 The Contractor shall provide the electronic copy of the schedule as both a Microsoft Project file and PDF file submitted through the City’s SharePoint site.
 - .4 The look-ahead schedules shall generally reflect the Work associated with the detailed progress schedule. The activities in the look-ahead schedules shall be identified by the same number coding as the detailed progress schedule and revised as necessary.
- 1.4.8 Testing and commissioning schedules
- .1 The Contractor shall submit commissioning schedules in accordance with [Section 01650 – Equipment Start-up and Commissioning].

1.5 SCHEDULE COMPLIANCE

- 1.5.1 The Contractor shall not proceed with any site Work until the Baseline Schedule, staging and sequencing plans have been accepted by the Consultant and the City, unless instructed otherwise.
- 1.5.2 The City has set out a Substantial Performance of the Work date. This date shall be strictly adhered to. Requests for extension shall be submitted by the Contractor to the Consultant and the City for review in accordance with the Contract Documents.
- 1.5.3 Float shall not be for the exclusive use of either the Contractor or the City.
- 1.5.4 Use of float suppression techniques such as software constraints, preferential sequencing, special lead/lag logic restraints, extended activity times, or imposed dates, other than as required by the Contract, shall be a cause for the rejection of any schedule submitted by the Contractor.
- 1.5.5 The Contractor shall comply with the latest schedule accepted by the City and the Consultant.
- 1.5.6 If, at any time, the Work is behind schedule with respect to the progress schedule currently in force, and if the Consultant believes there is a risk of the Work not being completed within the Contract time as a result of such delay, the Contractor shall take all necessary measures to make up for such delay either by increasing staff, station or facilities, or by amending its Work methods, whichever is applicable, with no change to the Contract Price.
- 1.5.7 In all cases of delay or potential delay, the Contractor shall keep the Consultant informed of its intentions with regard to mitigation of such delay and the Consultant shall, if in its sole opinion it is deemed necessary, require the Contractor to revise all or part of its current progress schedule.
- 1.5.8 If the Contractor fails to complete an activity by the latest accepted scheduled completion date and it is anticipated that this failure will extend the Contract Time (or any Milestone(s)), the Contractor shall, within five (5) Working Days of such failure, submit a written statement as to how the Contractor intends to recover the schedule shortfall and achieve targeted completion.
- 1.5.9 The City may order the Contractor to increase its station, equipment, labour force, or working hours, at no additional cost, if the Contractor fails to:
 - .1 Complete a milestone activity by the stipulated completion date; or
 - .2 Satisfactorily execute the Work as necessary to prevent delay to overall completion.

1.6 COORDINATION

- 1.6.1 Prior to developing the schedule, staging, and sequencing plans, the Contractor shall review the suggested sequence of construction included in the Contract Documents. Prior to the start of construction, the Contractor shall conduct a workshop with the City, the Consultant, and key stakeholders to go over the proposed schedule, staging and sequencing plans.
- 1.6.2 Any required shut-downs shall be coordinated with the City's staff at regular coordination meetings. The City's staff shall be given ten (10) Working Days advance notice of any required involvement. In addition, required involvement shall be confirmed two (2) Working Days in advance of the actual work. Operation of the existing facility shall take precedence over construction activities in order not to violate regulatory authority operating permits. Delays resulting from operational / compliance requirements that may impact the Contractor's construction sequencing will not entitle the Contractor to additional compensation.
- 1.6.3 Do not close lines, open valves, or take any other actions that affect the operation of new and existing systems. The City and the Consultant shall be given at least ten (10) Working Days advance written notice of any activities that will affect operation of the facility.
- 1.6.4 Where the Contract Documents indicate connections to existing piping, it shall be the Contractor's responsibility to drain such piping after agreeing upon appropriate procedures and isolation points with the City. Any hosing or cleaning of the pipe, if considered necessary by the Contractor, shall be undertaken at the sole discretion of the Contractor to suit the specified construction requirements and to protect the health and safety of construction personnel.
- 1.6.5 Prior to making the tie-ins to existing systems, demonstrate that all new equipment installed meets the requirements of the commissioning plan. Connections to existing systems will not be permitted until all new equipment operates to the satisfaction of the City.
- 1.6.6 For any facility-related equipment and / or materials delivery or pickup to and from site, the Contractor is responsible for unloading / loading, transferring, storing, installing, testing, and placing into operation at no additional cost to the City.
- 1.6.7 It is the Contractor's responsibility to become informed of all routine facility deliveries at the beginning of the assignment in order develop and manage the traffic control plan during construction as required.

1.6.8 The Contractor shall perform the Work continuously and expeditiously during critical connections and changeovers and as required to minimize interruption of the City's operations.

1.6.9 Under no circumstances shall the Contractor cease Work at the end of a normal working day if this will result in an interruption to any existing operation. In such cases, the Contractor shall remain on site until necessary work is completed.

1.7 COORDINATION WITH OTHER CONTRACTORS

1.7.1 Other contracts may be awarded to construct adjacent Work to which the Work under this Contract connects.

1.7.2 At the interface with other contracts, jointly plan and coordinate the Work with other contractors at no additional cost to the Contract so that the Work:

- .1 Meet all requirements of Ministry of Labour Regulations.
- .2 Will not be delayed.
- .3 Will not be adversely compromised in any way.
- .4 Will be correctly connected.
- .5 Will be properly delineated, signed, and have separate access / egress to avoid constructor conflict.
- .6 Will not cause the City to be designated as the "Constructor" as set out in the Occupational Health and Safety Act.

1.8 COORDINATION WITH UTILITIES

1.8.1 Coordinate the Work with various utilities within Project limits. Notify applicable utilities:

- .1 Prior to commencing Work,
- .2 If damage occurs, or
- .3 If conflicts or emergencies arise during Work.

1.8.2 The Contractor to secure and pay for the services of the various utilities required for the completion of the Work.

1.9 BASIS OF PAYMENT

1.9.1 The Contract Price shall include compensation in full for labour, material, equipment, power workmanship, and all other costs associated with this section.

1.10 MEASUREMENT FOR PAYMENT

1.10.1 The measurement of payment is a lump sum for all Work required under this Specification.

1.10.2 Payment shall be prorated on a monthly basis for the duration of the Contract.

2 PRODUCTS – N/A

3 EXECUTION – N/A

4 SUPPLEMENTS

4.1 SUPPLEMENTAL DOCUMENTS

4.1.1 The supplements listed below, and following the “End of Section”, form part of this specification section:

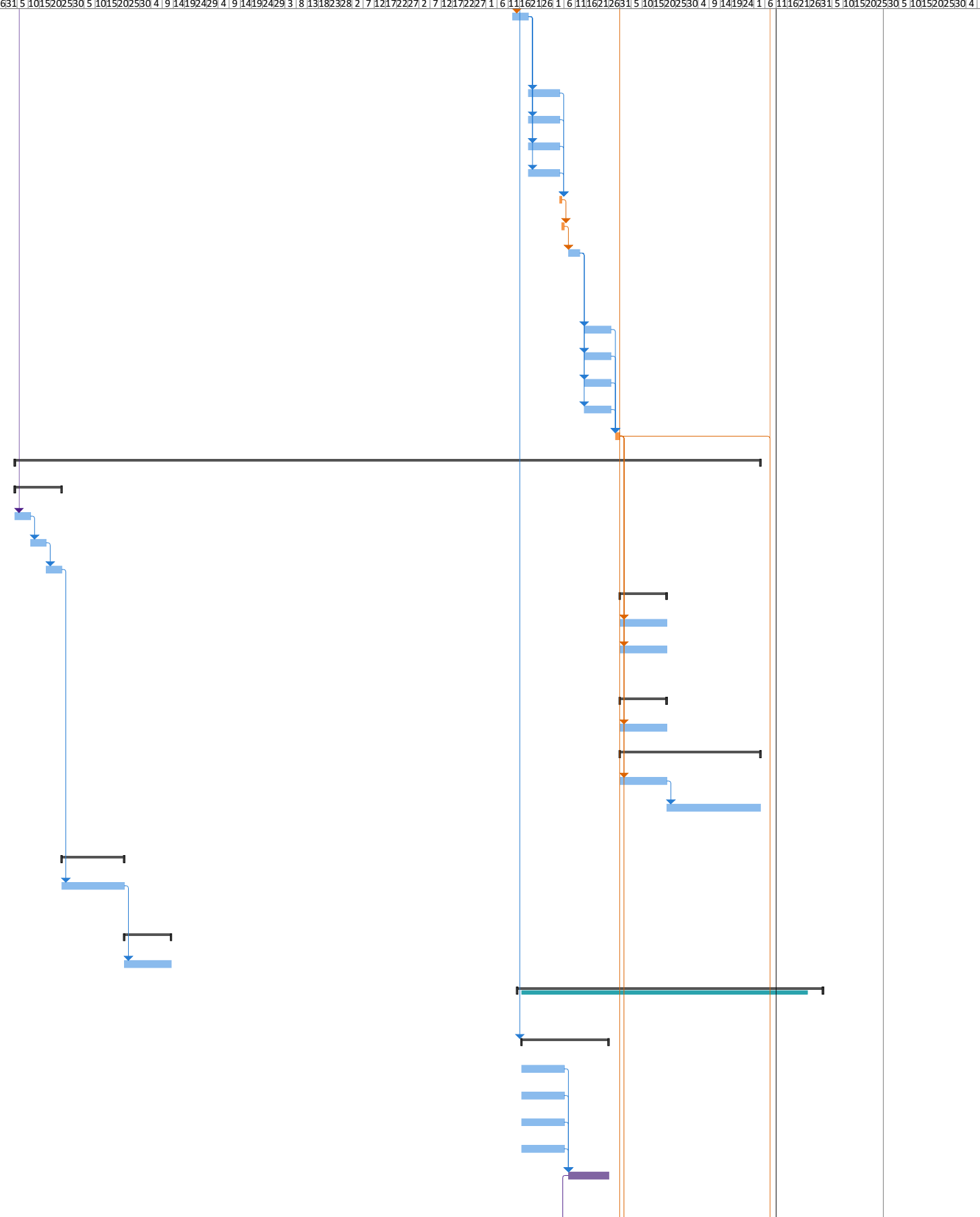
- .1 Suggested sequencing plan
- .2 Operator Maintenance Request for Assistance (RFA) and Request for Equipment Outage (RFEO) Form PW-WW-F-011-007 V.6.4

END OF SECTION

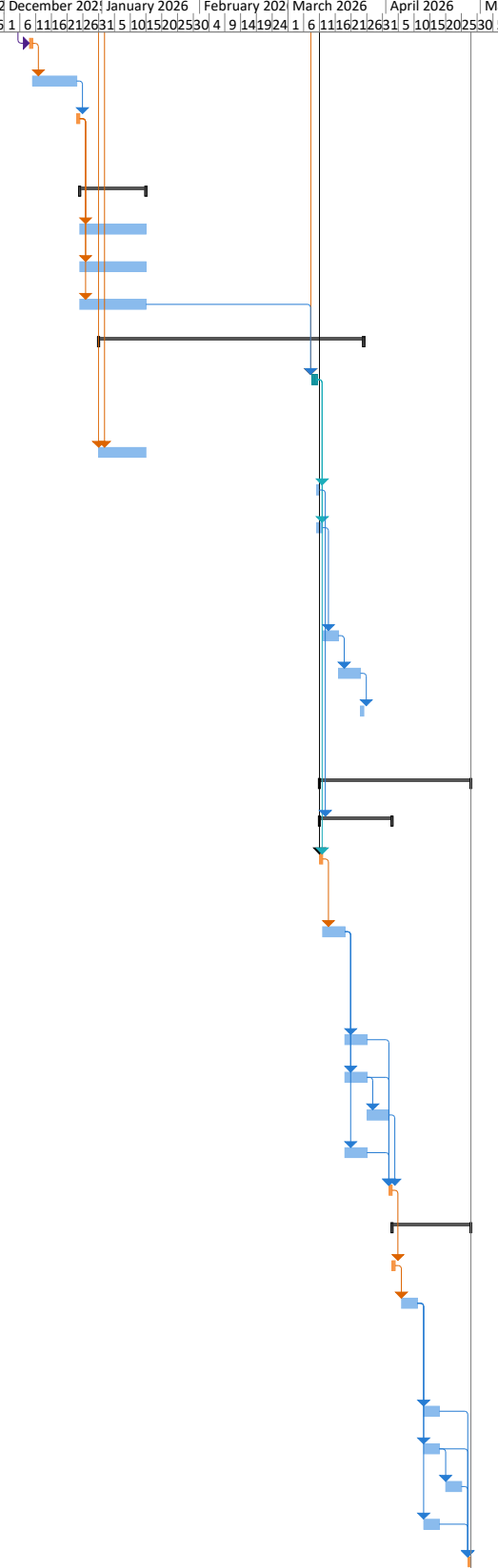
ID	Task Name	Duration	Start	Finish	Task Mod	Predecessors	August 2024	September 2024	October 2024	November 2024	December 2024	January 2025	February 2025	March 2025	April 2025	May 2025	June 2025	July 2025	August 2025	September 2025	October 2025	November 2025	December 2025	January 2026	February 2026	March 2026	April 2026	May 2026	June 2026
1	Submit Request for Shutdown Plan	6 days	Mon 1/20/25	Mon 1/27/25																									
2	Operations Review	15 days	Tue 1/28/25	Mon 2/17/25		1																							
3	Submission of Approved Shutdown Plan and Site Mobilization	10 days	Tue 2/18/25	Mon 3/3/25		2																							
4	Works Requiring Isolation	206 days	Tue 3/18/25	Tue 12/30/25																									
5	Inlet Gates and Grit Building	22 days	Tue 3/18/25	Wed 4/16/25																									
6	Contractor Mobilize, Install and Test Bypass Pumping System from Inlet Chamber to Bar Screens	5 days	Tue 3/18/25	Mon 3/24/25		3FS+10 days																							
7	Bypass Pumping from Inlet Chamber to Bar Screens	8 days	Tue 3/25/25	Thu 4/3/25		6																							
8	Operations Isolate Plant Inlet Gate	1 day	Tue 3/25/25	Tue 3/25/25		6																							
9	Operations Coordinate the Relocation of Dosing and Sampling Lines	5 days	Mon 3/24/25	Fri 3/28/25		8FS-2 days																							
10	Install New Stop Gate on Screening Building Inlet Channel	5 days	Wed 3/26/25	Tue 4/1/25		8																							
11	Operations Open Plant Inlet Gate and Isolate Grit Building	1 day	Wed 4/2/25	Wed 4/2/25		10																							
12	Remove Remaining Water and Clean the Grit Building. Pre-construction inspection and scope confirmation	5 days	Wed 3/26/25	Tue 4/1/25		8																							
13	Replace Guardrails	5 days	Wed 4/2/25	Tue 4/8/25		12																							
14	Repair Concrete	5 days	Wed 4/2/25	Tue 4/8/25		12																							
15	Concrete Cure Time	5 days	Wed 4/9/25	Tue 4/15/25		14																							
16	Replace Wooden Baffle with FRP	5 days	Wed 4/2/25	Tue 4/8/25		12																							
17	Operations Return Screening Building and Grit Building to Service	1 day	Wed 4/16/25	Wed 4/16/25		13,14,16,15																							
18	Plant A Aeration and Secondary Clarifiers	75 days	Thu 4/17/25	Wed 7/30/25																									
19	Operations Temporarily Isolate Plant A	1 day	Thu 4/17/25	Thu 4/17/25		17																							
20	Pump Down Aeration Tanks and Install Temporary Board Over Aeration Tank Interconnect Channel	1 day	Thu 4/17/25	Thu 4/17/25		17																							
21	Operations Isolate Cell 2 of Aeration Tanks and Cells 1 and 4 of the Secondary Clarifier	1 day	Fri 4/18/25	Fri 4/18/25		20,19																							
22	Pump out Isolated Aeration Tank and Clarifiers to Inlet Channel, Pre-construction inspection and scope confirmation	5 days	Mon 4/21/25	Fri 4/25/25		21																							
23	Remove Existing Diffusers and Supply Piping	5 days	Mon 4/28/25	Fri 5/2/25		22																							
24	Replace Tank Interconnect Isolation Valve	5 days	Mon 4/28/25	Fri 5/2/25		22																							
25	Replace Guardrails	15 days	Mon 4/28/25	Fri 5/16/25		22																							
26	Repair Concrete, and Cure Concrete	15 days	Mon 4/28/25	Fri 5/16/25		22																							
27	Repair Grating	15 days	Mon 4/28/25	Fri 5/16/25		22																							
28	Install Diffusers and Supply Piping	10 days	Mon 5/12/25	Fri 5/23/25		22FS+10 days																							
29	Commission Diffusers	10 days	Mon 5/26/25	Fri 6/6/25		28																							
30	Install Temporary RAS Piping	43 days	Mon 6/2/25	Wed 7/30/25		29FS-5 days																							
31	Operations Return Cell 2 Aeration Tank and Cells 1 and 4 of Secondary Clarifier to Service	1 day	Mon 6/9/25	Mon 6/9/25		29																							
32	Operations Isolate Cell 1 of Aeration Tanks and Cells 2 and 3 of the Secondary Clarifier	1 day	Tue 6/10/25	Tue 6/10/25		31																							

ID	Task Name	Duration	Start	Finish	Task Mod	Predecessors	August 2024	September 2024	October 2024	November 2024	December 2024	January 2025	February 2025	March 2025	April 2025	May 2025	June 2025	July 2025	August 2025	September 2025	October 2025	November 2025	December 2025	January 2026	February 2026	March 2026	April 2026	May 2026	June 2026
33	Pump out Isolated Aeration Tank and Clarifiers to Inlet Channel, Pre-construction inspection and scope confirmation	5 days	Wed 6/11/25	Tue 6/17/25		32																							
34	Remove Temporary Board Over Interconnect Channel	1 day	Wed 6/18/25	Wed 6/18/25		33																							
35	Remove Existing Diffusers and Supply Piping	5 days	Wed 6/18/25	Tue 6/24/25		33																							
36	Replace Guardrails	15 days	Wed 6/18/25	Tue 7/8/25		33																							
37	Repair Concrete, and Cure Concrete	15 days	Wed 6/18/25	Tue 7/8/25		33																							
38	Repair Grating	15 days	Wed 6/18/25	Tue 7/8/25		33																							
39	Install Diffusers and Supply Piping	10 days	Wed 7/2/25	Tue 7/15/25		33FS+10 days																							
40	Commission Diffusers	10 days	Wed 7/16/25	Tue 7/29/25		39																							
41	Operations Return Cell 1 Aeration Tank and Cells 2 and 3 of the Secondary Clarifier to Service	1 day	Wed 7/30/25	Wed 7/30/25		40																							
42	Plant B Aeration and Secondary Clarifiers	74 days	Thu 7/31/25	Tue 11/11/25																									
43	Operations Isolate Cell 1 of Aeration Tanks and Cells 1 and 2 of the Secondary Clarifier	1 day	Thu 7/31/25	Thu 7/31/25		41																							
44	Install Temp Sludge Piping	40 days	Fri 8/1/25	Thu 9/25/25		43																							
45	Pump out Isolated Aeration Tank and Clarifiers to Inlet Channel, Pre-construction inspection and scope confirmation	5 days	Fri 8/1/25	Thu 8/7/25		43																							
46	Remove Existing Diffusers and Supply Piping	5 days	Fri 8/8/25	Thu 8/14/25		45																							
47	Replace Guardrails	15 days	Fri 8/8/25	Thu 8/28/25		45																							
48	Repair Concrete, and Cure Concrete	15 days	Fri 8/8/25	Thu 8/28/25		45																							
49	Replace Return Sludge Process Piping	15 days	Fri 8/8/25	Thu 8/28/25		45																							
50	Replace wooden Baffle with FRP	15 days	Fri 8/8/25	Thu 8/28/25		45																							
51	Repair Grating	15 days	Fri 8/8/25	Thu 8/28/25		45																							
52	Install Diffusers and Supply Piping	10 days	Fri 8/22/25	Thu 9/4/25		45FS+10 days																							
53	Commission Diffusers	10 days	Fri 9/5/25	Thu 9/18/25		52																							
54	Operations Return Cell 1 to Service	1 day	Fri 9/19/25	Fri 9/19/25		53																							
55	Operations Isolate Cell 2 of Aeration Tanks and Cells 3 and 4 of the Secondary Clarifier	1 day	Mon 9/22/25	Mon 9/22/25		54																							
56	Pump out Isolated Aeration Tank and Clarifiers to Inlet Channel, Pre-construction inspection and scope confirmation	5 days	Tue 9/23/25	Mon 9/29/25		55																							
57	Remove Existing Diffusers and Supply Piping	5 days	Tue 9/30/25	Mon 10/6/25		56																							
58	Replace Guardrails	15 days	Tue 9/30/25	Mon 10/20/25		56																							
59	Repair Concrete, and Cure Concrete	15 days	Tue 9/30/25	Mon 10/20/25		56																							
60	Replace Return Sludge Process Piping	15 days	Tue 9/30/25	Mon 10/20/25		56																							
61	Replace wooden Baffle with FRP	15 days	Tue 9/30/25	Mon 10/20/25		56																							
62	Repair Grating	15 days	Tue 9/30/25	Mon 10/20/25		56																							
63	Install Diffusers and Supply Piping	10 days	Tue 10/14/25	Mon 10/27/25		56FS+10 days																							
64	Commission Diffusers	10 days	Tue 10/28/25	Mon 11/10/25		63																							
65	Operations Return Cell 2 Aeration Tank and Cell 3 and 4 of Secondary Clarifier to Service	1 day	Tue 11/11/25	Tue 11/11/25		64																							
66	Plant B Primary Clarifiers	35 days	Wed 11/12/25	Tue 12/30/25																									
67	Operations Isolate Cell 1 of Clarifier	1 day	Wed 11/12/25	Wed 11/12/25		65																							

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68	Pump out Isolated Clarifier to Inlet Channel, Pre-construction inspection and scope confirmation	5 days	Thu 11/13/25	Wed 11/19/25		67																							
69	Replace Guardrails	10 days	Thu 11/20/25	Wed 12/3/25		68																							
70	Repair Concrete, and Cure Concrete	10 days	Thu 11/20/25	Wed 12/3/25		68																							
71	Replace Scum Collection Trough	10 days	Thu 11/20/25	Wed 12/3/25		68																							
72	Replace wooden Baffle with FRP	10 days	Thu 11/20/25	Wed 12/3/25		68																							
73	Operations Return Cell 1 to Service	1 day	Thu 12/4/25	Thu 12/4/25		69,70,71,72																							
74	Operations Isolate Cell 2 of Clarifier	1 day	Fri 12/5/25	Fri 12/5/25		73																							
75	Pump out Isolated Clarifier to Inlet Channel, Pre-construction inspection and scope confirmation	5 days	Mon 12/8/25	Fri 12/12/25		74																							
76	Replace Guardrails	10 days	Mon 12/15/25	Fri 12/26/25		75																							
77	Repair Concrete, and Cure Concrete	10 days	Mon 12/15/25	Fri 12/26/25		75																							
78	Replace Scum Collection Trough	10 days	Mon 12/15/25	Fri 12/26/25		75																							
79	Replace wooden Baffle with FRP	10 days	Mon 12/15/25	Fri 12/26/25		75																							
80	Operations Return Cell 2 to Service	2 days	Mon 12/29/25	Tue 12/30/25		76,77,78,79																							
81	Works That Can Happen Anytime During Construction	238 days	Fri 4/4/25	Tue 3/3/26																									
82	Inlet Chamber/ Ferric Building	15 days	Fri 4/4/25	Thu 4/24/25																									
83	Guardrail Installation	5 days	Fri 4/4/25	Thu 4/10/25		7																							
84	Install Aluminum Stairs Near Ferric Tank	5 days	Fri 4/11/25	Thu 4/17/25		83																							
85	Install Aluminum Stairs within the Ferric Tank	5 days	Fri 4/18/25	Thu 4/24/25		84																							
86	Plant A Control Building	15 days	Wed 12/31/25	Tue 1/20/26																									
87	Replace Guardrails	15 days	Wed 12/31/25	Tue 1/20/26		80																							
88	Repair Concrete (should correspond with work in isolated tank on opposite sides of the wall)	15 days	Wed 12/31/25	Tue 1/20/26		80																							
89	Plant B Control Building	15 days	Wed 12/31/25	Tue 1/20/26																									
90	Replace Guardrails	15 days	Wed 12/31/25	Tue 1/20/26		80																							
91	Digester Valve Building	45 days	Wed 12/31/25	Tue 3/3/26																									
92	Acquire Safe Work Plan Approval	15 days	Wed 12/31/25	Tue 1/20/26		80																							
93	DSS Removal, Guardrail Replacement, Concrete Repairs	30 days	Wed 1/21/26	Tue 3/3/26		92																							
94	Chemical Containment	20 days	Fri 4/25/25	Thu 5/22/25																									
95	Guardrail Replacement/Modifications, Concrete Repairs	20 days	Fri 4/25/25	Thu 5/22/25		85																							
96	Filter Building	15 days	Fri 5/23/25	Thu 6/12/25																									
97	Modify Guardrail, Concrete Protection	15 days	Fri 5/23/25	Thu 6/12/25		95																							
98	Chlorine Contact Tank Isolation (Mid Nov to End of Mar)	98 days?	Sat 11/15/25	Tue 3/31/26																									
99	Plant A Chlorine Contact Tank	29 days	Mon 11/17/25	Thu 12/25/25		3																							
100	Replace Guardrails	15 days	Mon 11/17/25	Fri 12/5/25																									
101	Repair Concrete	15 days	Mon 11/17/25	Fri 12/5/25																									
102	Repair Grating	15 days	Mon 11/17/25	Fri 12/5/25																									
103	Replace Wooden Baffle with FRP	15 days	Mon 11/17/25	Fri 12/5/25																									
104	Install Bypass Pumping around Parshall Flume	14 days	Mon 12/8/25	Thu 12/25/25		100,101,102,103																							



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105	Operations Isolate Parshall Flume Plant A	1 day	Tue 12/9/25	Tue 12/9/25	104SS+1 day																								
106	Repair Concrete Around Parshall Flume	10 days	Wed 12/10/25	Tue 12/23/25	105																								
107	Operations Return Flow Through Parshall Flume	1 day	Wed 12/24/25	Wed 12/24/25	106																								
108	Plant B Chlorine Contact Tank	15 days	Thu 12/25/25	Wed 1/14/26																									
109	Replace Guardrails	15 days	Thu 12/25/25	Wed 1/14/26	107																								
110	Repair Concrete	15 days	Thu 12/25/25	Wed 1/14/26	107																								
111	Repair Grating	15 days	Thu 12/25/25	Wed 1/14/26	107																								
112	Plant A Primary Clarifier Inlet Channel	60 days	Wed 12/31/25	Tue 3/24/26																									
113	Contractor Mobilize, Install and Test Bypass Pumping System from SPV103 to Plant A Primary	1 day	Mon 3/9/26	Mon 3/9/26	17,80,111																								
114	Bypass Pumping from SPV103 to Plant A F	11 days	Wed 12/31/25	Wed 1/14/26	17,80																								
115	Operators Install SPV103 to Isolate Plant A	1 day	Tue 3/10/26	Tue 3/10/26	113																								
116	Drain and Clean Inlet Channel to Plant A. Pre-Construction inspection and scope confirmation	2 days	Tue 3/10/26	Wed 3/11/26	113																								
117	Complete Concrete Repairs in the Channel	3 days	Thu 3/12/26	Mon 3/16/26	116																								
118	Concrete Curing Time	5 days	Tue 3/17/26	Mon 3/23/26	117																								
119	Operators Open SPV103 and Return Flow to Plant A Inlet Channel	1 day	Tue 3/24/26	Tue 3/24/26	118																								
120	Works Following Inlet Channel Isolation	34 days	Wed 3/11/26	Mon 4/27/26																									
121	Plant A Primary Clarifiers	17 days	Wed 3/11/26	Thu 4/2/26	115																								
122	Operations Open SPV103 and Isolate Cell 1 of Clarifier	1 day	Wed 3/11/26	Wed 3/11/26	113,4																								
123	Pump out Isolated Clarifier to Inlet Channel, Pre-construction inspection and scope confirmation	5 days	Thu 3/12/26	Wed 3/18/26	122																								
124	Replace Guardrails	5 days	Thu 3/19/26	Wed 3/25/26	123																								
125	Repair Concrete	5 days	Thu 3/19/26	Wed 3/25/26	123																								
126	Concrete Cure Time	5 days	Thu 3/26/26	Wed 4/1/26	125																								
127	Repair Grating	5 days	Thu 3/19/26	Wed 3/25/26	123																								
128	Operations Return Cell 1 to Service	1 day	Thu 4/2/26	Thu 4/2/26	124,125,126,1																								
129	Plant A Primary Clarifiers	17 days	Fri 4/3/26	Mon 4/27/26																									
130	Operations Isolate Cell 2 of Clarifier	1 day	Fri 4/3/26	Fri 4/3/26	128																								
131	Pump out Isolated Clarifier to Inlet Channel, Pre-construction inspection and scope confirmation	5 days	Mon 4/6/26	Fri 4/10/26	130																								
132	Replace Guardrails	5 days	Mon 4/13/26	Fri 4/17/26	131																								
133	Repair Concrete	5 days	Mon 4/13/26	Fri 4/17/26	131																								
134	Concrete Cure Time	5 days	Mon 4/20/26	Fri 4/24/26	133																								
135	Repair Grating	5 days	Mon 4/13/26	Fri 4/17/26	131																								
136	Operations Return Cell 2 to Service	1 day	Mon 4/27/26	Mon 4/27/26	132,133,134,1																								



Operator/Maintenance Request for Assistance (RFA) and Request for Equipment Outage (RFEO) Form

RFA's require a minimum of 7 working days' notice

Section A (RFA and RFEO-Planned)

Location ID:	
Date Requested:	Duration of Request:
Assistance/Outage Start Date:	Assistance/Outage Start Time:
Requestor	
Project Manager:	Trades Staff:
PO Representative	Woodward WWTP supervisor <input type="checkbox"/>
Dundas WWTP supervisor	Woodward WTP supervisor <input type="checkbox"/>
Request Details	MOE Regulatory Device (RFEO-Planned only) <input type="checkbox"/>
Project scope & work to be performed: <i>(provide detailed information on work to be performed, processes/equipment involved, criticality)</i>	

Section B (RFA Only)

Request for Assistance: (check appropriate boxes)

Plant Ops Operator (<input type="checkbox"/>)	Distribution and Collections Operator (<input type="checkbox"/>)
Electrical (<input type="checkbox"/>)	Mechanical (<input type="checkbox"/>)
Instrumentation (<input type="checkbox"/>)	SCADA (<input type="checkbox"/>)
Operator assistance: <i>(provide details regarding work required and processes / equipment involved)</i>	
Maintenance assistance: <i>(provide details regarding work required and processes / equipment involved)</i>	
Work request created: <input type="checkbox"/> YES <input type="checkbox"/> NO	
WR #: _____	
Water Distribution and Wastewater Collection assistance: <i>(provide details regarding work required and processes / equipment involved)</i>	
Does this request require an Inspector, PMATS PM, or CD PM to be present <i>(select one)</i> <input type="checkbox"/> YES <input type="checkbox"/> NO	
Name of PMATS PM or CD PM to be present:	
Name of Inspector to be present:	

Section C (RFA and RFEO-Planned)

Comments:
List of Attachments if required:

Section D: Notification of Equipment Outage (Emergency/Breakdown Work)

MOE Regulatory Device <input type="checkbox"/>	
Date Notified:	Location ID:
Outage Start Date:	PO Rep Notified:
Outage Start Time:	Duration of Outage:
Notification Details:	
Comments: <i>(provide detailed information on work to be performed and processes/equipment involved, criticality, WR# and other staff or stakeholders notified)</i>	

Requester	Approver/Acknowledgement	Additional notifications
Name	Name	<ul style="list-style-type: none"> • _____ • _____ • _____ • _____
Sign and Date	Sign and Date	

SECTION 01330 – SUBMITTALS

1 GENERAL

1.1 GENERAL REQUIREMENTS

- 1.1.1 The Contractor and its Subcontractors shall comply with the requirements in this section. Each section within the specifications is related and shall be read in conjunction with one another.

1.2 REFERENCES

- 1.2.1 These Specifications form an integral part of the Contract Documents.
- 1.2.2 Refer also to all other parts of the Contract Documents to determine their effect on the Work of each section of these Specifications.
- 1.2.3 The requirements of this Section and Division 1 apply to and govern the Work under other divisions.

1.3 SUBMITTALS

- 1.3.1 Electronic Submittals:
- .1 Each electronic submittal shall be in Adobe Acrobat Portable Document Format (PDF).
 - .2 Include a copy of the Transmittal of Contractor's Submittal form with each electronic submittal.
- 1.3.2 Within ten working days of receiving a Notice to Proceed, submit a comprehensive list of all required submittals for the Works to the Consultant.
- 1.3.3 Review submittals prior to submission to the Consultant. This review confirms that each submittal has been checked and coordinated with requirements of the Work and Contract Documents. Submittals not stamped, signed, dated and identified as to specification section will be returned without being examined and shall be considered rejected.
- 1.3.4 No deviation from the Contract Documents is permitted without the City's approval. Submittals of proposed alternatives must comply with the requirements herein as well as [Section 01630 – Substitutions & Alternatives]. The City and the Consultant reserve the right to reject any and all submittals of proposed alternatives not meeting the requirements of [Section 01630 – Substitutions & Alternatives]. Any delays in the Work schedule resulting from the Contractor's submission of proposed substitutions or alternatives shall be at the Contractor's own risk, with no additional cost to the Contract or extension to the Work schedule.

- 1.3.5 The Consultant's review will not relieve the Contractor of their responsibilities under the Contract. The review of methods of Work, or information regarding materials or equipment the Contractor proposes to provide, shall not relieve the Contractor of their responsibility for errors therein and shall not be regarded as an assumption of risks or liability by the City, or by any representative officer, employee or agent thereof. The Contractor shall have no claim under the contract on account of the failure, or partial failure, of the material, or equipment so reviewed.
- 1.3.6 Submittals provide information concerning features and characteristics of materials, equipment, and methods of operation selected based on the Contractor's judgment of their conformance to the specified requirements. Review of submittals does not extend to means, methods, techniques, sequences or procedures of construction, or to verifying quantities, dimensions, weights or gauges, or fabrication processes, except where specifically indicated or required by the Project requirements or to safety precautions or programs incident thereto. Review of a separate item, as such, will not indicate approval of the assembly in which the item functions.
- 1.3.7 Claims for additional compensation in time or funds due to delays in resubmissions and review of submissions will not be considered.
- 1.3.8 Verify that field measurements and affected adjacent Work have been coordinated.
- 1.3.9 Keep one reviewed copy of each submission on site.
- 1.3.10 Provide and file one PDF copy of each Shop Drawing submittal onto the City's SharePoint system within five Working Days of receipt of the reviewed submittal from the Consultant. PDF copy shall be of the reviewed copy retained on site with the Consultant's comments.
- 1.3.11 The following defines necessary submittals to be made to the Consultant, before, during and after construction. These include but are not limited to:
 - .1 Construction Work plans such as:
 - .1 Sequence of construction plan package (as per Section 01320)
 - .2 Health and safety plan (as per Section 01705)
 - .3 Temporary Facilities plan (as per Section 01510)
 - .4 Traffic control (as per Section 01500)
 - .5 Facility commissioning plan package (as per Section 01810)
 - .6 Project closeout application
 - .7 Payment schedule
 - .8 Monthly Cash Flow
 - .9 Safe Work Plan (Digester Valve Building)
 - .2 Contract drawings such as:

- .1 Shop Drawing (excluding Temporary Work) (as per Sections 03600, 06610, 08100, 09910, 11100, 11340, 11420, 15220)
 - .2 Shop Drawing (Including Temporary Work) (Sections 01515, 03600, 15220)
 - .3 The Consultant's office trailer (as per Section 01510)
 - .4 Interference drawings
 - .5 Mock-Ups (if applicable)
 - .3 Record of information:
 - .1 Tests and reports (as applicable)
 - .2 Record drawings (as applicable)
 - .3 As-Built Drawings (as applicable)]
 - .4 Operating and Maintenance Manual (as per 01800)
 - .5 Construction photographs
 - .6 Training Schedule and Lesson Plans (as per Section 01820)
 - .7 Product samples (as applicable)
 - .4 Other specific submittals as requested in individual specification sections.
- 1.3.12 The Contractor shall not purchase any materials or equipment without the final acceptance of Shop Drawings by the Consultant. Purchasing materials or equipment prior to final acceptance of the Shop Drawings by the Consultant is at the Contractors risk.
- 1.3.13 The Contractor shall generate and submit all required submittal documents promptly and in an orderly sequence to the Consultant for review and acceptance.
- 1.3.14 Project delays caused by late submittals by the Contractor will be not considered as an acceptable reason for an Extension to Contract time.
- 1.3.15 Refer to the specified named acceptable Products as appropriate.
- 1.3.16 Indicate materials, methods of construction and attachment or anchorage, erection diagrams, connections, explanatory notes and other information necessary for evaluation of the submittal. Where articles or equipment attach or connect to other articles or equipment, indicate that such items have been coordinated, regardless of where they are specified or on which drawings the Work appears. Indicate cross-references to Contract drawings and Specifications.
- 1.3.17 If an alternative submittal has not been submitted in accordance with [Section 01630 – Substitutions and Alternatives], the Consultant reserves the right to reject the alternative submittal.

- 1.3.18 Submit within 120 working days of Notice to Proceed one electronic MS Excel copy of a completed form entitled "Inventory of Spare Parts and Tools", template appended to the end of Section 01800 – Operation and Maintenance Data. Update and submit this form where required.
- 1.3.19 Submit within 120 working days of Notice to Proceed one electronic MS Excel copy of a completed computerized maintenance management system (CMMS) form from a City supplied template. Update and submit this form where required.
- 1.3.20 All commissioning related documentation shall be uploaded to SharePoint in the appropriate folder and follow the file naming convention provided by the Consultant. All relevant commissioning forms completed by the equipment supplier must be appended to these forms. These forms are to be up to date and may need to be revised after commissioning and testing activities to reflect final settings and parameters. These forms are to be completed and submitted at least four (4) months prior to the scheduled site commissioning. Revised forms are to be submitted seven (7) working days after successful commissioning.

1.4 SHOP DRAWINGS

- 1.4.1 Develop and maintain throughout the Work a registry of Shop Drawings as agreed to by the Consultant.
- 1.4.2 All Shop Drawings and calculations provided by the Contractor shall be shown in SI Metric units unless otherwise specified by the Consultant. The Contractor shall be responsible for converting all imperial units to SI Metric unit within acceptable digits specified by the Consultant.
- 1.4.3 Unless otherwise specified, within ten (10) –] Working Days after receipt of a Shop Drawing submittal for review and comment, the Consultant shall review the submittal and return one (1) copy of the marked-up Shop Drawing bearing the Consultant's Shop Drawing Review stamp. The Contractor shall note that this review period may be longer depending on the completeness of the submittal and number of submittals being issued. The returned submittal shall indicate one of the following actions:
 - .1 If the review indicates that the submittals comply with the Construction Contract, the submittal will be marked "REVIEWED". In this event, the Contractor may begin to incorporate the material or equipment covered by the submittal into the Work.
 - .2 If the review indicates limited corrections are required, the submittal will be marked "REVIEWED AS MODIFIED". The Contractor may begin incorporating the material or equipment covered by the submittal in accordance with the noted corrections.

- .3 If the review reveals that the submittal is insufficient or contains incorrect data, the submittal will be marked "REVISE AND RESUBMIT". Make the changes to the Shop Drawings that the Consultant and/or the City may require and identify changes on resubmissions, indicating the revision number and revision date. Re-submit revised submittals within ten (10) Working Days. Accept all risks associated with undertaking Work covered by this submittal until it has been revised, resubmitted and returned marked either "REVIEWED" or "REVIEWED AS MODIFIED". Delay claims resulting from Shop Drawing re-submittals will not be entertained.
- 1.4.4 Submittals that are primarily for record information only will be marked "NOT REVIEWED ". Such submissions may be as follows:
 - .1 Information that is not subject to the Consultant's review such as: methods of construction, Work plans, field conformance test reports, and health and safety plans.
 - .2 Design calculations and drawings that are stamped and sealed by a Professional Engineer licensed to practice in the Province of Ontario.
- 1.4.5 Adjustments made on Shop Drawings by the Consultant do not address the issue of Contract Price. If adjustments affect the value of the Work, state this in writing to the Consultant within five (5) Working days of receiving the Consultant's adjustments and prior to proceeding with the Work.
- 1.4.6 Make all changes to Shop Drawings as required by the Consultant and consistent with Contract Documents. When resubmitting, notify the Consultant in writing of any revisions other than those requested.
- 1.4.7 Accompany submissions with transmittal letter containing:
 - .1 Date
 - .2 Project title and number
 - .3 Contractor's name and address
 - .4 Identification and quantity of each Shop Drawing, Product data and sample.
 - .5 Other pertinent data
- 1.4.8 Submissions shall include
 - .1 Date and revision dates
 - .2 Project title and number
 - .3 Contract drawing and/or Specification reference (Including clause number).
 - .4 Name and address of:
 - .1 Subcontractor
 - .2 Supplier

- .3 Manufacturer
- .4 Contractor's stamp, signed by Contractor's authorized representative certifying approval of submissions, verification of field measurements and compliance with Contract Documents.
- .5 Submissions shall not include numerous photocopied pages from catalogues and other literature not directly essential to the evaluation of the Shop Drawings subject matter. Submissions including such material will be returned to the Contractor marked 'REVISE AND RESUBMIT'.

1.4.9 Submissions

- .1 Shop Drawings shall be submitted electronically through the City's Project site (Microsoft SharePoint).

1.5 PROJECT PHOTOGRAPHS

1.5.1 The Contractor shall photographically document all phases of the Contract including pre-construction, construction progress (weekly as a minimum), and post-construction.

1.5.2 The Contractor shall ensure that a digital camera with a minimum resolution of 10 megapixels is available at the site for its own use and for the use of the Consultant.

1.5.3 Copies of all digital photographs shall be uploaded weekly to the City's Project site (Microsoft SharePoint) and identified in folders indicating Week01_dd/mm/yyyy, Week02_dd/mm/yyyy, etc. until completion of the Work and shall be identified with the following information:

- .1 Date and time when photograph was taken
- .2 Location (i.e., grid lines, room, building name, etc.)
- .3 Contractor's photo file number (so that each photo may be readily identified)

1.5.4 After the Notice to Proceed and before the Work at the site has begun, and again upon issuance of Substantial Performance of the Work, take photographs of the construction site as well as the properties adjacent to the perimeter of the construction site, this includes properties which are on the opposite side of a roadway, path, trail, etc. As confirmed with the Consultant.

1.6 WEEKLY NEWSLETTERS

1.6.1 The Contractor shall prepare weekly newsletters using the template provided under Section 01330A – Supplement – Construction Newsletter Template.

- 1.6.2 A PDF copy of the newsletter shall be sent to the Consultant and the City and to the City's Capital Delivery email address, capdeliver@hamilton.ca, every Monday morning by 10 a.m. The PDF shall also be uploaded onto the City's Project site (Microsoft SharePoint).
- 1.6.3 Newsletters shall summarize the Work completed the previous week and shall include photographs associated with the Work completed. Preferably 1 page, maximum 2 pages in length.
- 1.6.4 Throughout the Project, the City and the Consultant can request the raw (non-PDF) electronic copies of any newsletters, including photographs.
- 1.6.5 Prior to Substantial Performance, all the raw (non-PDF) and PDF copies shall be uploaded onto the City's Project site (Microsoft SharePoint).
- 1.6.6 Any Work completed between Substantial Performance of the Work and end of warranty period shall also be included in newsletters. A PDF copy of the newsletter shall be sent to the Consultant, the City and to the City's Capital Delivery email address, capdeliver@hamilton.ca, every Monday morning. The PDF shall also be uploaded onto the City's Project site (Microsoft SharePoint).

1.7 BASIS OF PAYMENT

- 1.7.1 The Contract Price shall include compensation in full for labour, material, equipment, power workmanship, and all other costs associated with this section.

1.8 MEASUREMENT FOR PAYMENT

- 1.8.1 The measurement of payment is a lump sum for all Work required under this Specification.
- 1.8.2 Payment shall be prorated on a monthly basis for the duration of the Contract.

2 PRODUCTS – N/A

3 EXECUTION – N/A

4 SUPPLEMENTS

4.1 SUPPLEMENTAL DOCUMENTS

- 4.1.1 The supplements listed below, and following the "End of Section", form part of this specification section:
 - .1 Section 01330A – Supplement – Construction Newsletter Template

CITY OF HAMILTON

C13-32-24

DUNDAS WASTEWATER TREATMENT
PLANT (WWTP) HEALTH AND SAFETY
IMMEDIATE NEEDS AND STRUCTURAL
REPAIR UPGRADES

01330

SUBMITTALS

Page **8** of **8**

END OF SECTION

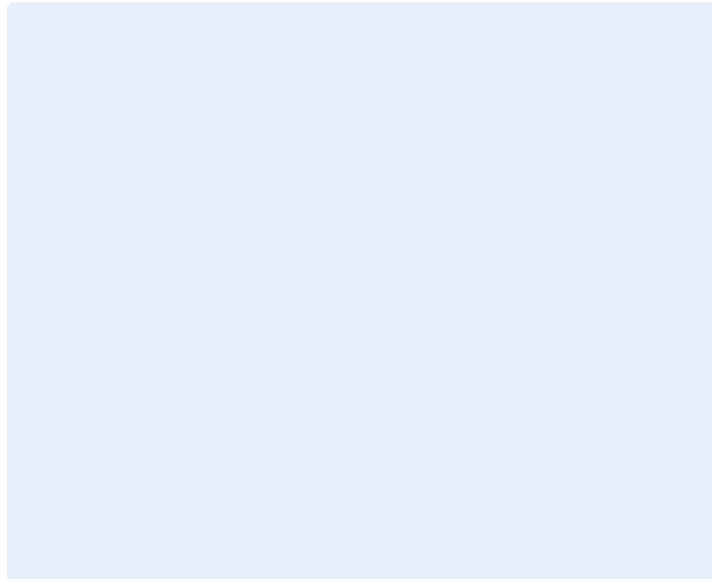
Contract Name

Weekly Site Update

Contract #: [Enter Contract Number]

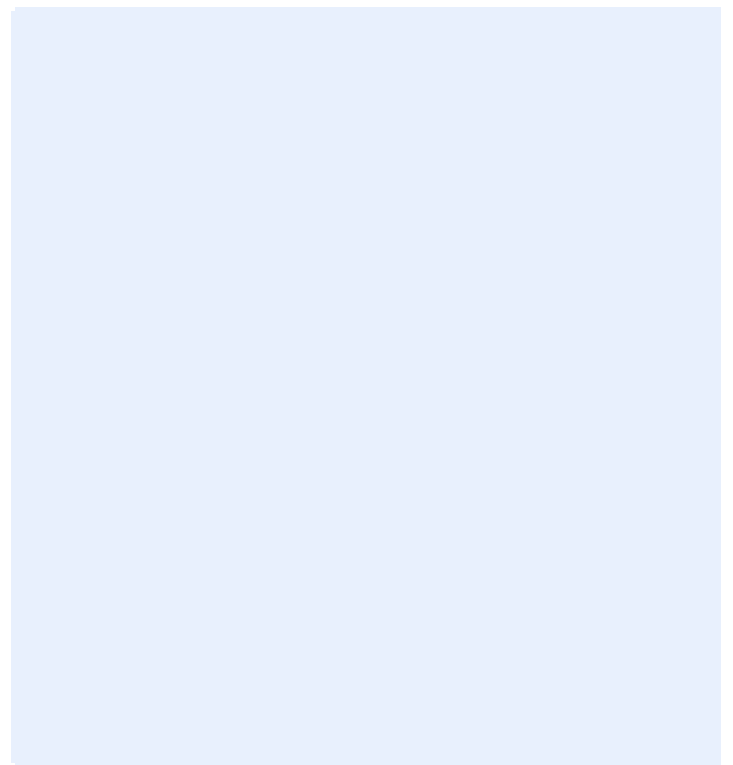
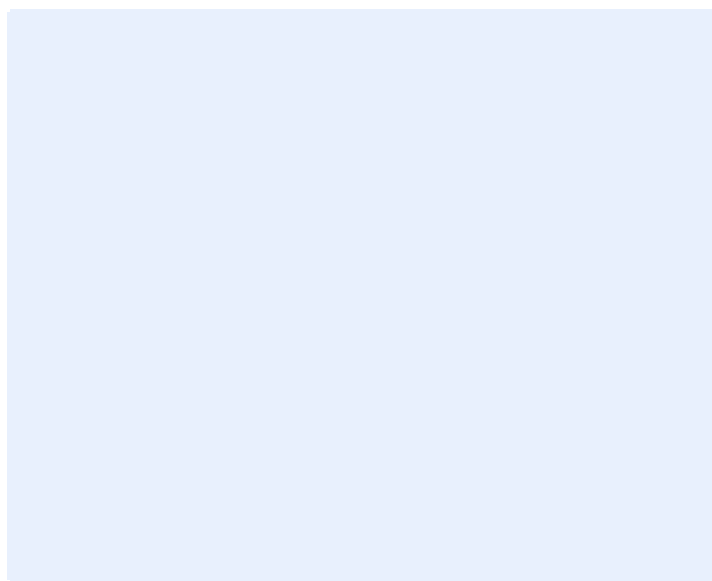
Week of: Date-Date

Issue #: [insert #] – Page: [insert #]



Brief description of project site update.

Top Left Picture Caption



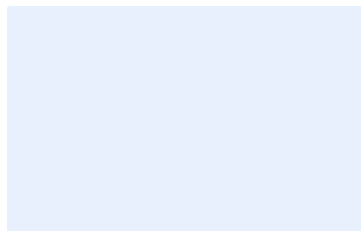
Bottom Left Picture Caption

Right Picture Caption



Hamilton

Water

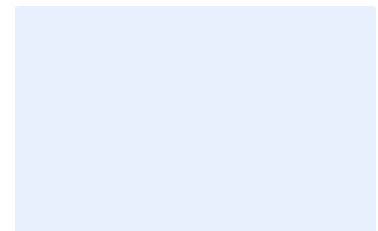


Contract Number: #

GC Project Manager: Name

Phone Number: #

Superintendent: Name



Contract Number: #

Consultant Project Manager: Name

Phone Number: #

Sponsor: Name

City Project Manager: Name

Sponsor: Name

SECTION 01350 – SPECIAL PROJECT PROCEDURES

1 GENERAL

1.1 GENERAL REQUIREMENTS

- 1.1.1 The Contractor and its Subcontractors shall comply with the requirements in this section. Each section within the specifications is related and shall be read in conjunction with one another.

1.2 REFERENCES

- 1.2.1 These Specifications form an integral part of the Contract Documents.
- 1.2.2 Refer also to all other parts of the Contract Documents to determine their effect on the Work of each section of these Specifications.
- 1.2.3 The requirements of this section and Division 1 apply to and govern the Work under other divisions.

1.3 SUBMITTALS

- 1.3.1 Submittals shall be in accordance with [Section 01330 – Submittals] and this section.

1.4 EXPLOSION PROOF CONSTRUCTION

- 1.4.1 Certain areas may be designated on the drawings as "explosion proof", "hazardous", or may be classified under Section 18 of Canadian Standards Association (CSA) C22.1. Where areas have such designation, provide explosion proof electrical equipment which meets the requirements of CSA C22.1, Section 18.
- 1.4.2 In hazardous areas as defined above, provide intrinsically safe mechanical devices and equipment.

1.5 MONITORING EXISTING STRUCTURE ELEVATIONS

- 1.5.1 At the locations indicated on the drawings, and prior to commencing excavation or blasting rock, establish temporary benchmarks on the top of existing structures. Monitor any change in elevation. Refer elevations to an existing benchmark established on the site.
- 1.5.2 Engage a qualified survey technician to record the initial elevations and monitor elevation changes on a weekly basis. Provide a copy of the report to the Consultant.

1.6 NEW OPENINGS IN EXISTING CONCRETE

- 1.6.1 Provide GPR to locate reinforcing bars in existing concrete.
- 1.6.2 Locate reinforcing in the vicinity of new opening and anchor locations.
- 1.6.3 Do not drill into primary reinforcing bars.
- 1.6.4 Make new holes in existing concrete for pipes, conduits, cables or equipment using either of the methods described below:
 - .1 Chip with an electric hammer with chisel point. Adjust the location of holes as necessary to avoid electrical conduits if encountered. Request permission from the Consultant where primary reinforcing bars are to be cut.
 - .2 Core-drill holes after GPR procedure of locating the reinforcing bar is carried out.

1.7 PROTECTION, SOUNDNESS, AND REPAIR OF NEW CONSTRUCTION

- 1.7.1 Protect newly constructed Work from damage. Prevent heavy loading of newly constructed Work and repair any resultant damage. Construct Work to be watertight and correct rejected Work.
- 1.7.2 If, in the final inspection, deficiencies are found, repair or replace defective work at no additional cost to the City.
- 1.7.3 Be responsible for satisfactory maintenance and repair of Work undertaken for the duration of the specified warranty period.
- 1.7.4 Protect and store equipment supplied under this Contract according to the manufacturer's recommendations and instructions.

1.8 LEAKAGE TEST – ROOFS

- 1.8.1 N/A.

1.9 CLEANING AND DISINFECTION

- 1.9.1 N/A.

1.10 RELAMPING

- 1.10.1 If the permanent lighting fixtures and lamps are used during the construction period prior to the date of Substantial Performance of the Work, supply and install new lamps in fixtures or turn over to the City a complete set of spare lamps.
- 1.10.2 Replace incandescent lamps except in emergency lighting system, or turn over to the City a complete set of lamps.

- 1.10.3 Replace fluorescent lamps or supply that number of lamps as spares, which are proportional to the approximate hours used. Supply lamps of equal lifetime rating.
- 1.10.4 Replace high intensity discharge or similar lamps which fail during the one-year warranty period.

1.11 MAINTAINING EXISTING FLOWS

- 1.11.1 Be responsible for maintaining existing flows, including but not limited to, storm, sanitary wastewater, sludge, water, and chemical flows when connecting new channels, conduits, tunnels, pipelines to existing for the duration of the construction period and until the new Work is secure.
- 1.11.2 Provide and maintain temporary pumps and generator sets of number and capacity sufficient to handle expected flows and operational requirements.

1.12 DEWATERING EXISTING STRUCTURES AND PIPELINES

- 1.12.1 No dewatering of existing structures, channels, pipelines and tanks will be allowed without the City's approval.
- 1.12.2 The City will remove from service and empty process units, tanks, channels, pipelines, and similar facilities only once, unless otherwise specified. The Contractor shall be responsible for cleaning facilities taken out of service and emptied by the City, including removal of solids, grit, sludge, and all other debris. If the Contractor requires that a process unit, tank, channel, pipeline, or similar facility be removed from service more than once during the Contract, he/she shall bear all costs for such removal from service, emptying, cleaning, and placing back into service.
- 1.12.3 A minimum of four (4) weeks notice shall be provided to the City prior to the need to dewater any structures or pipelines.
- 1.12.4 Dewatering plan shall be integrated into the overall construction schedule.
- 1.12.5 Refer to Shutdown Request in [Section 01320 – Construction Schedule and Sequence of Work / Section 01330 - Submittals.]

1.13 STORAGE AND PROTECTION OF MATERIALS AND EQUIPMENT

- 1.13.1 Provide additional climate-controlled warehouse storage facilities to protect equipment from damage prior to installation in accordance with the manufacturer's written instructions for temporary storage.

- 1.13.2 Protect materials and equipment after unloading from weather, dust, dirt and moisture both before and after erection and placing. Observe manufacturer's written instructions for temporary storage.
- 1.13.3 Provide temporary housing for pumps, motors, valves and other equipment or materials which may be damaged by weather, dust, dirt or moisture in accordance to the manufacturer's written instructions.
- 1.13.4 Maintain shafts and bearings in good condition by rotating weekly or as prescribed by the original equipment manufacturer.
- 1.13.5 Provide manufacturer's written instructions for the storing of equipment during the construction period well in advance of equipment delivery.
- 1.13.6 Store specialty items to ensure protection from damage to materials or finish.
- 1.13.7 Store materials subject to water absorption off the ground. Protect materials from other damage due to environmental conditions using waterproof covers.
- 1.13.8 Be conscious when placing equipment in pipe galleries or subgrade structures with operational tanks or process areas above.
- 1.13.9 As Work proceeds and upon completion, promptly clean up and remove from site, surplus materials resulting from foregoing Work.

1.14 PROTECTION OF EXISTING STRUCTURES AND PROPERTY

- 1.14.1 The Contractor will be held fully responsible by the City for any damage to utilities, properties, buildings, homes or structures adjacent to or in the general area of the Work, through settlement of ground, vibration or shock resulting from any cause relating to the Work carried out under this Contract. Make good and repair such damage at own expense.
- 1.14.2 Control of Vibrations
 - .1 Control vibration levels during construction to prevent damage to existing structures, equipment, and utilities.
 - .2 Control use of vibration producing construction techniques or equipment so that the ground adjacent to existing structures, equipment and utilities has a resultant PPV not exceeding the following limits: 1.0 mm/s
 - .3 Schedule concrete placements such that a minimum distance of 40 m is maintained between the newly placed concrete and the vibration source for the period 8 hours following concrete placement.

- .4 The Contractor will retain the services of an independent inspection agency to monitor vibration effects.
 - .5 The Consultant reserves the right to require additional restrictive limits for vibration control if recommended by the inspection agency.
 - .6 Permissible vibration shall not exceed limits specified above. Maintain and protect from direct or indirect damage, water and gas mains, public and private sewers and drains, conduits, cables, service pipes, poles, sidewalks, curbs, embankments, structures, equipment and other property in the vicinity of the Work. The Contractor is responsible for obtaining all locates pertaining to utilities and other existing services.
- 1.14.3 Maintain and protect all structures that are uncovered, weakened, or otherwise vulnerable or susceptible to damage.
 - 1.14.4 Prevent dust and dirt from entering existing buildings or areas where equipment is stored or is operating. The Contractor is responsible for clean-up and any resultant damage.
 - 1.14.5 Prevent dust, water and other deleterious substances from entering areas with existing electrical, heating, ventilating, pumping or other equipment. The Contractor is responsible for clean-up and any resultant damage.
 - 1.14.6 Where existing wall sections are removed or where pipes are installed through existing walls or where any dust-generating operation is necessary, provide a suitable temporary wall or enclosure suitably reinforced and sealed to prevent dust from entering the existing area. Upon completion of Work, temporary dust control device shall be removed, and all areas affected by the Work shall be thoroughly cleaned.
 - 1.14.7 Provide safety protection around the existing transformers to protect them from damage where applicable. Refer to electrical drawings for details of location and proximity to transformers where applicable.

1.15 RELICS, ANTIQUITIES AND ARCHAEOLOGICAL FINDINGS

- 1.15.1 Relics and antiquities and items of historical or scientific interest such as cornerstones and contents, commemorative plaques, inscribed tablets, and similar objects found on site or in buildings to be demolished, remain the property of the City.

- 1.15.2 The discovery of archaeological resources may subject the site to the requirements of Section 48(1) of the *Ontario Heritage Act*. Upon discovery of the archaeological resources, alteration of the site shall cease immediately, and a licensed archaeologist be engaged to carry out the archaeological fieldwork, in compliance with Section 48(1) of the *Ontario Heritage Act*.
- 1.15.3 Upon discovery of archaeological resources at a site, it is an offence under Sections 48 and 69 of the *Ontario Heritage Act* for any party other than a licensed archaeologist to make any alteration to the site or to remove any artifact or other physical evidence of past human use or activity from the site, until such time as a licensed archaeologist has completed archaeological fieldwork on the site, submitted a report to the Minister stating that the site has no further cultural heritage value or interest, and notification by the Consultant or the City that the report has been filed in the Ontario Public Register of Archaeological Reports referred to in Section 65.1 of the *Ontario Heritage Act*.
- 1.15.4 Notify the City and the Consultant immediately if evidence of archaeological finds are encountered and cease fieldwork or construction activity until further notice.
- 1.15.5 Should human remains be uncovered at any stage of Work, fieldwork or construction activities shall immediately cease and the discovery shall be reported to the City, the Consultant, and the police. This is a mandatory requirement of the *Cemeteries Act*, R.S.O. 1990 c. C.4 and the *Funeral, Burial and Cremation Services Act*, 2002, S.O. 2002, c.33, (when proclaimed in force).

1.16 BASIS OF PAYMENT

- 1.16.1 The Contract Price shall include compensation in full for labour, material, equipment, power workmanship, and all other costs associated with this section.

1.17 MEASUREMENT FOR PAYMENT

- 1.17.1 The measurement of payment is a lump sum for all Work required under this Specification.
- 1.17.2 Payment shall be prorated on a monthly basis for the duration of the Contract.

2 PRODUCTS – N/A

3 EXECUTION – N/A

4 SUPPLEMENTS – N/A

CITY OF HAMILTON

C13-32-24

DUNDAS WASTEWATER TREATMENT
PLANT (WWTP) HEALTH AND SAFETY
IMMEDIATE NEEDS AND STRUCTURAL
REPAIR UPGRADES

01350

SPECIAL PROJECT PROCEDURES

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END OF SECTION

SECTION 01357 – MANAGEMENT OF HAZARDOUS MATERIALS

1 GENERAL

1.1 GENERAL REQUIREMENTS

- 1.1.1 The Contractor and its Subcontractors shall comply with the requirements in this section. Each section within the specifications is related and shall be read in conjunction with one another.
- 1.1.2 Maintain HWP Registry for all hazardous and liquid industrial wastes, if required. The Contractor shall be designated by the City to complete and sign the waste manifests for this Work for the duration of the Contract. This will be monitored by the Consultant. All supporting documentation shall be provided to the City as required by Ontario Regulation 347 under the Environmental Protection Act.

1.2 REFERENCES

- 1.2.1 These specifications form an integral part of the Contract Documents.
- 1.2.2 Refer also to all other parts of the Contract Documents to determine their effect on the Work of each section of these Specifications.
- 1.2.3 The requirements of this section and Division 1 apply to and govern the Work under other divisions.
- 1.2.4 Comply with the latest edition of the following statutes, standards, codes and regulations and all amendments thereto:
 - .1 OHSA and Regulations for Construction Projects O.Reg 213
 - .2 O.Reg. 347 – General – Waste Management
 - .3 All other applicable statutes, standards, codes, and regulations

1.3 DEFINITIONS

- 1.3.1 Dangerous Goods: Product, substance, or organism that is specifically listed or meets the hazard criteria established in Transportation of Dangerous Goods Regulations.
- 1.3.2 Hazardous Material: Product, substance, or organism that is used for its original purpose; and that is either dangerous goods or a material that may cause adverse impact to the environment or adversely affect health of persons, animals, or plant life when released into the environment.
- 1.3.3 Hazardous Waste: Any hazardous material that is no longer used for its original purpose and that is intended for recycling, treatment, or disposal. This includes toxic waste.

- 1.3.4 PCB: includes any chlorinated biphenyls referred to in Column I of Item 1 of the List of Toxic Substances in Schedule I of the CEPA.
- 1.3.5 Toxic: For the purposes of this specification, a substance is considered toxic if it is listed on the Toxic Substances List found in Schedule 1 of the CEPA.
- 1.3.6 List of Toxic Substances: found in Schedule 1 of the CEPA, lists all substances that have been assessed as toxic. The federal government can make regulations with respect to a substance specified on the List of Toxic Substances. Column II of the list identified the type of regulation applicable to each substance.
- 1.3.7 Workplace WHMIS: A Canada wide system designed to give employers and workers information about hazardous materials used in the workplace. Under WHMIS, information on hazardous materials is to be provided on container labels, SDS, and in worker education programs. WHMIS is put into effect by a combination of federal and provincial laws.

1.4 SUBMITTALS

- 1.4.1 Submittals shall be in accordance with [Section 01330 – Submittals] and this section.
- 1.4.2 Submit hazardous materials management plan to the Consultant that identifies all hazardous materials, their use, their location, personal protective equipment requirements, and disposal arrangements.
- 1.4.3 Submit photocopy of shipping documents, waste manifests and export notices, as applicable to the Consultant when shipping toxic wastes off site.
- 1.4.4 Maintain one (1) copy of Product data in readily accessible file on site.

1.5 BASIS OF PAYMENT

- 1.5.1 The Contract Price shall include compensation in full for labour, material, equipment, power workmanship, and all other costs associated with this section.

1.6 MEASUREMENT FOR PAYMENT

- 1.6.1 The measurement of payment is a lump sum for all Work required under this Specification.
- 1.6.2 Payment shall be prorated on a monthly basis for the duration of the Contract.

2 PRODUCTS

2.1 MATERIALS

- 2.1.1 Only bring on site the quantity of hazardous materials required to perform Work.
- 2.1.2 Maintain SDSs in proximity to where the materials are being used. Communicate this location to personnel who may have contact with hazardous materials. Provide a copy of the SDS to the PM to be forwarded to the Plant Operations, Health and Safety Coordinator prior to any chemical being brought on site.

3 EXECUTION

3.1 STORAGE AND HANDLING

- 3.1.1 Store and handle hazardous materials and wastes in accordance with applicable federal and provincial laws, regulations, codes, and guidelines.
- 3.1.2 Observe smoking regulations at all times. Smoking is prohibited in any area where hazardous materials are stored, used, or handled.
- 3.1.3 Store and handle flammable and combustible materials in accordance with current National Fire Code of Canada requirements.
- 3.1.4 Transfer of flammable and combustible liquids within buildings is prohibited.
- 3.1.5 Coordinate storage of toxic wastes with the Consultant and abide by internal requirements for labeling and storage of wastes.
- 3.1.6 Report spills or accidents involving toxic wastes immediately to the Consultant and to appropriate regulatory authorities. Take all reasonable measures to contain the release while ensuring health and safety is protected.
- 3.1.7 Use only an authorized/licensed carrier to transport toxic waste.
- 3.1.8 Coordinate transportation and disposal of toxic wastes with the Consultant.
- 3.1.9 Notify appropriate regulatory authorities and obtain all required permits and approvals prior to exporting a toxic waste.
- 3.1.10 Ensure personnel have been trained in accordance with WHMIS requirements.
- 3.1.11 Report spills or accidents immediately to the Consultant. Submit a written spill report to the Consultant within 24 hours of incident.

3.2 WASTE MANAGEMENT AND DISPOSAL

- 3.2.1 Dispose of hazardous waste materials in accordance with applicable federal and provincial acts, regulations, and guidelines.
- 3.2.2 Ensure that hazardous wastes are shipped only to authorized hazardous waste disposal, recycling, or treatment facilities and that all liability insurance requirements are met.
- 3.2.3 Burning, diluting, or mixing hazardous wastes for purpose of disposal is prohibited.
- 3.2.4 Disposal of hazardous materials in waterways, storm or sanitary sewers, or in municipal solid waste landfills is prohibited.
- 3.2.5 Dispose of hazardous wastes in a timely fashion in accordance with applicable provincial regulations.
- 3.2.6 Transport hazardous materials and wastes in accordance with federal Transportation of Dangerous Goods Act, Transportation of Dangerous Goods Regulations, and applicable provincial regulations.
- 3.2.7 If exporting hazardous waste to another country, ensure compliance with federal Export and Import of Hazardous Waste Regulations.
- 3.2.8 If hazardous waste is generated on site:
 - .1 Coordinate transportation and disposal with the Consultant.
 - .2 Complete Delegation of Waste Manifest letter.
 - .3 Ensure compliance with applicable provincial laws and regulations for generators of hazardous waste.
 - .4 Use only a licensed carrier authorized by provincial authorities to accept subject material.
 - .5 Prior to shipping material, obtain written notice from intended hazardous waste treatment or disposal facility that it will accept material and that it is licensed to accept this material.
 - .6 Label container(s) with legible, visible safety marks as prescribed by federal and provincial regulations.
 - .7 Ensure that only trained personnel handle, offer for transport, or transport dangerous goods.
 - .8 Provide a photocopy of all shipping documents and waste manifests to the Consultant.
 - .9 Track receipt of completed manifest from consignee after shipping hazardous materials. Provide a photocopy of completed manifest to the Consultant and uploaded to the City's SharePoint project site.

- .10 Report any discharge, emission, or escape of hazardous materials immediately to the Consultant and appropriate provincial authority. Take reasonable measures to control release.

4 SUPPLEMENTS – N/A

END OF SECTION

SECTION 01400 – QUALITY ASSURANCE AND QUALITY CONTROL

1 GENERAL

1.1 GENERAL REQUIREMENTS

- 1.1.1 The Contractor and its Subcontractors shall comply with the requirements in this section. Each section within the specifications is related and shall be read in conjunction with one another.

1.2 REFERENCES

- 1.2.1 These Specifications form an integral part of the Contract Documents.
- 1.2.2 Refer also to all other parts of the Contract Documents to determine their effect on the Work of each section of these Specifications.
- 1.2.3 The requirements of this section and Division 1 apply to and govern the Work under other divisions.
- 1.2.4 Comply with the latest edition of the following statutes, standards, codes and regulations and all amendments thereto:
- .1 Occupational Health and Safety Act and Regulations for Construction Projects O.Reg 213
 - .2 All other applicable statutes, standards, codes, and regulations

1.3 SUBMITTALS

- 1.3.1 The Contractor shall submit the following information in accordance to this section and [Section 01330 – Submittals]:
- .1 Submit electronic copies of completed inspection and test reports promptly to the Consultant. Provide copies of Work being inspected / tested to Subcontractor's as required.

1.4 MANUFACTURER'S INSPECTION

- 1.4.1 Products, materials, and equipment may be subject to inspection and factory testing to be witnessed by the City and/or the Consultant at the place of manufacture, as specified by the Contract Documents.
- 1.4.2 The Contractor shall be responsible for organizing and scheduling with the manufacturers all inspections / tests requested by the City and the Consultant at the place of manufacture. The Contractor will provide the City and the Consultant with ten (10) Working Days advance notice of the scheduled inspection / testing and will confirm the inspection / testing date two (2) Working Days prior to the date.

1.5 SAMPLING AND TESTING

- 1.5.1 Carry out sampling and testing in accordance with specified methods in current industry standards, as applicable to class and nature of article or materials. The City, however, reserves right to use generally accepted system of sampling and testing that, in opinion of the Consultant, will ensure the City that quality of workmanship meets requirements of Contract Documents.
- 1.5.2 The Consultant reserves the right to conduct independent investigations and tests. If it is determined by the Consultant that any portion of the Work fails to meet the requirements of the Contract Documents, the Consultant may at their discretion require removal, correction, and reconstruction of the Work in accordance with the Contract Documents.
- 1.5.3 The City or the Consultant may engage agencies for independent inspection, including but not limited to:
- .1 Roadways - compaction of asphalt pavement, granular-base and sub-base.
 - .2 Earthwork - compaction of backfill for all materials, and vibration monitoring.
 - .3 Structural steel - report on field welding and high strength bolt connections.
 - .4 Waterproofing and roofing.
 - .5 CCTV inspection.
 - .6 Paint inspection.
 - .7 Cast-in-place concrete – conduct in-situ measurement for concrete air content and slump as well as lab testing for aggregate analysis and cylinder compression tests.
 - .8 Precast concrete - testing and reporting on concrete air content analysis and sample core compression tests.
 - .9 Mechanical - report on field and shop welding of steel and stainless-steel pipe and equipment.
 - .10 Anchor pull tests
 - .11 Coating pull test
- 1.5.4 The City's independent inspection agencies will perform random tests of areas previously completed and inspected by the Contractor. Any other independent inspection tests required by Contract Documents or referenced by the codes and standards remain the responsibility of the Contractor, unless otherwise noted.
- 1.5.5 All testing reports shall be submitted by the Contractor's testing laboratories to the Consultant, indicating observations, results of tests, and compliance or non-compliance with Contract Documents.

- 1.5.6 At all times the Contractor shall cooperate with the Consultant and/or the testing laboratory agencies. The Contractor shall furnish samples of materials, design mix, equipment, tools, storage, and assistance as requested.
- 1.5.7 Notify the Consultant a minimum of two (2) Working Days prior to any site operations requiring inspection and laboratory testing services.
- 1.5.8 The Contractor shall bear all additional testing costs incurred where the Contractor did not use specified materials, or procedures or when Work has proceeded without acceptance, or inspection by the Consultant. The Contractor shall arrange for additional testing or retesting by independent testing agencies approved by the City.
- 1.5.9 Any retesting required because of non-conformance to specified requirements will be performed by the same testing laboratory on instructions by the Consultant. The Contractor shall bear all costs associated with retesting at no additional cost to the City.

1.6 CONTRACTOR'S QUALITY CONTROL

- 1.6.1 Arrange and pay for:
 - .1 Testing, adjusting and balancing of electrical and mechanical equipment and systems.
 - .2 Mill tests and certificates of compliance.
 - .3 Inspection and testing required by laws, rules, regulations, ordinances or orders of public authorities.
 - .4 Inspection and testing performed exclusively for the Contractor's convenience.
 - .5 All costs associated with retesting should initial test fail to meet specified requirements.
 - .6 All costs associated with rework to ensure conformance with the contract documents.

1.7 INSPECTION

- 1.7.1 See Section 1.8 Access to Work
- 1.7.2 The Contractor shall provide a minimum of two (2) Working Days advance notice requesting inspection if Work is designated for special tests, inspections or acceptance by the Consultant's instructions.

- 1.7.3 Any Work designated for special tests, inspections or approvals that has been covered or permitted to be covered by the Contractor, shall be uncovered and made fully accessible to the City, the Consultant and / or other inspection agencies by the Contractor at no additional cost to the City, in order to allow for all tests and/or inspections to be satisfactorily completed.
- 1.7.4 The City may conduct Quality Assurance testing on materials and equipment to be incorporated into permanent Work.
- 1.7.5 Any additional testing required to prove the adequacy of construction shall be at the Contractor's expense, where the routine test shows the construction to be inadequate, or where the Contractor's materials and procedures have not been as specified, or when Work has proceeded without approval or inspection.
- 1.7.6 If the City's Quality Assurance testing is different from the Contractor's Quality Control results, the City's results shall govern.

1.8 ACCESS TO WORK

- 1.8.1 Allow inspection / testing agencies and the Consultant access to the Work on-site at all times. If part of the Work is completed at locations other than the job site, allow access to such Work whenever it is in progress.
- 1.8.2 Allow inspection / testing agencies and the Consultant access to the Work off-site manufacturing, and fabrication plants.

1.9 PROCEDURES

- 1.9.1 Notify appropriate agencies and the Consultant a minimum of two (2) days in advance of requirement for tests, in order that attendance arrangements can be made unless otherwise stated in the contract documents.
- 1.9.2 Submit samples and / or materials required for testing, as requested in the Specifications. Submit with reasonable promptness and in an orderly sequence so as not to cause delay in Work.
- 1.9.3 Provide labour and facilities to obtain and handle samples and materials on site. Provide sufficient space to store and cure test samples.

1.10 BASIS OF PAYMENT

- 1.10.1 The Contract Price shall include compensation in full for labour, material, equipment, power workmanship, and all other costs associated with this section.

1.11 MEASUREMENT FOR PAYMENT

1.11.1 The measurement of payment is a lump sum for all Work required under this Specification.

1.11.2 Payment shall be prorated on a monthly basis for the duration of the Contract.

2 PRODUCTS – N/A

3 EXECUTION – N/A

4 SUPPLEMENTS – N/A

END OF SECTION

SECTION 01410 – REGULATORY REQUIREMENTS

1 GENERAL

1.1 GENERAL REQUIREMENTS

- 1.1.1 The Contractor and its Subcontractors shall comply with the requirements in this section. Each section within the specifications is related and shall be read in conjunction with one another.

1.2 REFERENCES

- 1.2.1 Comply with the latest edition of the following statutes, standards, codes and regulations and all amendments thereto:
- .1 Federal and Provincial environmental acts and regulations
 - .2 OBC
 - .3 NBC
 - .4 OHS and Regulations for Construction Projects O.Reg 213
 - .5 Ontario ESC
 - .6 All applicable City of Hamilton by-laws
 - .7 All other applicable statutes, standards, codes, and regulations
- 1.2.2 Refer to all other parts of the Contract Documents to determine their effect on the Work of each section of these Specifications.
- 1.2.3 The requirements of this section and Division 1 apply to and govern the Work under other divisions.

1.3 SUBMITTALS

- 1.3.1 Submittals shall be in accordance with [Section 01330 – Submittals] and this section.

1.4 COMPLIANCE WITH REGULATIONS

- 1.4.1 Ascertain requirements and regulations of authorities listed above.
- 1.4.2 Comply with all such requirements and regulations as applicable to the Work.
- 1.4.3 Requirements set out in this section are for guidelines and information and are not necessarily complete.
- 1.4.4 Perform Work in accordance with the latest named published editions of codes and standards.

- 1.4.5 Provide materials and workmanship, which meet or exceed the specifically named code or standard.
- 1.4.6 Execute Work in accordance with the applicable Federal, Provincial, Territorial and Municipal statutes, laws, regulations to the location of the Work to be performed.
- 1.4.7 In the event of conflict of above statutes, laws, regulations, and codes execute Work in accordance with the requirements of the authority having jurisdiction.
- 1.4.8 Enforce all safety measures in accordance with the OHSA and applicable local Construction Safety.
- 1.4.9 Enforce all safety measures in accordance with the WHMIS.
- 1.4.10 The Contractor shall conform to and enforce strict compliance with the Occupational Health and Safety Act (OHSA). For the purposes of the OHSA, the Contractor for the Work will be designated "Constructor" and shall assume the responsibility of the Constructor as set out in the Act and its regulations. The Consultant will monitor the quality and quantity of Work, undertake progress payment inspections and inspections for compliance with specifications and plans. The City will NOT be a "Constructor" by reason thereof.
- 1.4.11 Provide the Director of Construction Health and Safety Branch of the Ministry of Labour with the information required under Section 4 of the Ontario Regulation 691/80 prior to commencing Work.

1.5 SMOKING ON CITY PROPERTY

- 1.5.1 The Contractor and its Subcontractors and Suppliers shall comply with smoking restrictions identified in City of Hamilton By-laws and policies.

1.6 LABOUR

- 1.6.1 The Contractor shall conform to all requirements of the Contract Documents.

1.7 BASIS OF PAYMENT

- 1.7.1 The Contract Price shall include compensation in full for labour, material, equipment, power workmanship, and all other costs associated with this section.

1.8 MEASUREMENT FOR PAYMENT

- 1.8.1 The measurement of payment is a lump sum for all Work required under this Specification.
- 1.8.2 Payment shall be prorated on a monthly basis for the duration of the Contract.

- 2 PRODUCTS – N/A**
- 3 EXECUTION – N/A**
- 4 SUPPLEMENTS – N/A**

END OF SECTION

SECTION 01420 – PERMITS AND APPROVALS

1 GENERAL

1.1 GENERAL REQUIREMENTS

- 1.1.1 The Contractor and its Subcontractors shall comply with the requirements in this section. Each section within the specifications is related and shall be read in conjunction with one another.
- 1.1.2 The Contractor shall be responsible to apply for, obtain and pay for all necessary permits as required by the Contract Documents prior to the commencement of construction. Also, it is the Contractor's responsibility to meet all permit and approval conditions at no additional cost to the City.

1.2 REFERENCES

- 1.2.1 Comply with the latest edition of the following statutes, standards, codes and regulations and all amendments thereto:
 - .1 Federal and Provincial environmental acts and regulations
 - .2 OBC
 - .3 NBC
 - .4 OHS and Regulations for Construction Projects O.Reg 213
 - .5 Ontario ESC
 - .6 All applicable City of Hamilton by-laws
 - .7 All other applicable statutes, standards, codes, and regulations
- 1.2.2 Refer to all other parts of the Contract Documents to determine their effect on the Work of each section of these Specifications.
- 1.2.3 The requirements of this section and Division 1 apply to and govern the Work under other divisions.

1.3 SUBMITTALS

- 1.3.1 Submittals shall be in accordance with [Section 01330 – Submittals] and this section.
- 1.3.2 Permits required may include but shall not be limited to the following:
 - .1 Plumbing
 - .2 Electrical permit
 - .3 Building Permits (Guardrail)
 - .4 Excavation permit
 - .5 Dump site permit
 - .6 Noise and Emission exemptions
 - .7 Occupancy permit

- .8 Ministry of Labour
- .9 Electrical Supply and Inspection Authorities
- .10 Ontario Electrical Safety Authority
- .11 Technical Standards and Safety Authority
- .12 Permit to remove and dispose offsite of hazardous materials (GC and City) [Section 01357 – Management of Hazardous Materials]
- .13 Permit for water meter and backflow prevention

1.3.3 The Contractor shall allow for inspections required by permitting and approval authorities and agencies at all times during construction.

1.3.4 The Contractor shall submit copies of the inspection certificates received from authorities and agencies during their site inspection to the Consultant for review and record.

1.3.5 When required by the permitting agencies, the Contractor shall maintain a copy of the permit onsite at all times.

1.4 BASIS OF PAYMENT

1.4.1 The Contract Price shall include compensation in full for labour, material, equipment, power workmanship, and all other costs associated with this section.

1.5 MEASUREMENT FOR PAYMENT

1.5.1 The measurement of payment is a lump sum for all Work required under this Specification.

1.5.2 Payment shall be prorated on a monthly basis for the duration of the Contract.

2 PRODUCTS – N/A

3 EXECUTION – N/A

4 SUPPLEMENTS – N/A

END OF SECTION

SECTION 01500 – TRAFFIC CONTROL AND MANAGEMENT

1 GENERAL

1.1 GENERAL REQUIREMENTS

- 1.1.1 The Contractor and its Subcontractors shall comply with the requirements in this section. Each section within the specifications is related and shall be read in conjunction with one another.

1.2 REFERENCES

- 1.2.1 These Specifications form an integral part of the Contract Documents.
- 1.2.2 Refer also to all other parts of the Contract Documents to determine their effect on the Work of each section of these Specifications.
- 1.2.3 The requirements of this section and Division 1 apply to and govern the Work under other divisions.
- 1.2.4 Comply with the latest edition of the following statutes, standards, codes and regulations and all amendments thereto:
- .1 OHSA and Regulations for Construction Projects O.Reg 213
 - .2 Manual of Uniform Traffic Control Devices for Ontario.
 - .3 Ontario Traffic Manual, Book 7 – Temporary Conditions
 - .4 Applicable City of Hamilton by-laws
 - .5 All other applicable statutes, standards, codes and regulations

1.3 SUBMITTALS

- 1.3.1 The Contractor shall submit the following information in accordance to this section and [Section 01330 – Submittals]:
- .1 Submit the Traffic Control Plan to the Consultant for review within ten (10) Working Days after issuance of the Notice to Proceed. The Consultant and the City reserves the right to observe the Traffic Control Plan once implemented and make changes as field observations warrant. Any changes succeeding these plans shall be at the Contractor's Expense.

1.4 PROTECTION OF PUBLIC TRAFFIC

- 1.4.1 Prepare a Traffic Control Plan as required by the Occupational Health and Safety Act and the Ministry of Labour. The Plan shall be submitted to the Consultant prior to the pre-construction meeting for acceptance.

- 1.4.2 Comply with requirements of Acts, Regulations and By-Laws in force for regulation of traffic or use of roadways upon or over which it is necessary to carry out Work or haul materials or equipment.
- 1.4.3 When working on travelled way:
 - .1 Place equipment in positions to present minimal interference and hazard to the travelling public.
 - .2 Keep equipment units as close together, as working conditions will permit and preferably on the same side of travelled way.
 - .3 Do not leave equipment on travelled way overnight.
 - .4 Do not close any lanes of road or highway without the approval of the Consultant. Before re-routing traffic erect suitable signs and devices in accordance with instructions contained in the Ontario Traffic Manual, Book 7 – Temporary Conditions. Provide sufficient crushed gravel to ensure a smooth riding surface during Work.
- 1.4.4 Keep travelled way well graded, free of potholes and of sufficient width to allow for traffic to pass.
- 1.4.5 When deemed necessary by the Consultant, provide well graded, gravelled detours or temporary roads to facilitate passage of traffic around restricted construction areas. Provide and maintain all necessary equipment, signs, lights and roadway.
- 1.4.6 Provide and maintain reasonable road access and egress to property fronting along or in the vicinity of Work under the Contract unless other reasonable means of road access exist.

1.5 CONSTRUCTION PARKING CONTROL

- 1.5.1 The Contractor's personnel to park vehicles in areas agreed to by the Consultant and the City. If sufficient space is not available in the parking area, arrange for parking elsewhere at no additional cost to the City.
- 1.5.2 Do not park construction vehicles, equipment or cars on roads or grass areas within the site unless otherwise directed by the Consultant.
- 1.5.3 Control temporary vehicular parking to prevent interference with public traffic and parking, access by emergency vehicles and the City's operations.
- 1.5.4 Monitor parking of construction personnel's vehicles at all times.
- 1.5.5 No construction personnel vehicles will be permitted to park on site beyond designated construction parking areas as shown on the contract drawings.

- 1.5.6 Provide and maintain one (1) parking spot for the City and one (1) parking spot for the Consultant as shown on the contract drawings.

1.6 TEMPORARY COVER

- 1.6.1 Provide temporary cover by means of steel plates over unfilled excavations as required.
- 1.6.2 Typically, steel plates shall be ramped using asphalt to avoid shifting as a result of traffic. During winter months, steel plates shall be counter sunk into asphalt to allow for snow plowing.
- 1.6.3 Provide steel plates for street and highway crossings conforming to requirements of authority having jurisdiction in each case. Adopt designs furnished by authority for steel plates, or submit designs to authority for approval, as required.

1.7 INFORMATIONAL AND WARNING DEVICES

- 1.7.1 Provide and maintain signs and other devices required to indicate construction activities or other temporary and unusual conditions resulting from Project Work, which may require road user response.
- 1.7.2 Supply and erect signs, delineators, barricades and miscellaneous warning devices as specified in the Ontario Traffic Manual, Book 7 – Temporary Conditions.
- 1.7.3 Continually maintain traffic control devices in use by:
- .1 Checking signs daily for legibility, damage, suitability and location. Clean, repair or replace to ensure clarity and reflectance.
 - .2 Removing or covering signs which do not apply to conditions existing from day to day.

1.8 CONTROL OF PUBLIC TRAFFIC

- 1.8.1 The supply, erection and removal of all temporary and permanent traffic control devices shall be undertaken by qualified traffic control personnel in conformance with the Ontario Traffic Manual.
- 1.8.2 Provide trained flag persons, properly equipped as specified in the Ontario Traffic Manual, in the following situations:
- .1 When public traffic is required to pass working vehicles or equipment, which may block all or part of the travelled roadway.
 - .2 When it is necessary to institute one-way traffic system through construction area or other blockage where traffic volumes are heavy, approach speeds are high and traffic signal system is not in use.

- .3 When workers or equipment are employed on travelled way over brow of hills, around sharp curves or at other locations where oncoming traffic would not otherwise have adequate warning.
- .4 Where temporary protection is required while other traffic control devices are being erected or taken down.
- .5 For emergency protection when other traffic control devices are not readily available.
- .6 In situations where complete protection for workers, working equipment and public traffic is not provided by other traffic control devices.
- .7 At each end of restricted sections where pilot cars are required.

1.9 TRAFFIC CONTROL

- 1.9.1 Provide trained flag persons, paid duty police, portable variable message signs or signalized traffic control as required, to regulate traffic when construction operations occupy public traffic lanes or when construction interferes with day to day logistic operations.
- 1.9.2 Use flares and lights during hours of low visibility to delineate traffic lanes and to guide traffic.
- 1.9.3 Remove all traffic control signs, cones, barricades, and other devices upon construction completion.

1.10 TEMPORARY ROAD CLOSURES

- 1.10.1 N/A

1.11 HAUL ROUTES

- 1.11.1 Identify proposed haul routes in advance of the pre-construction meeting.
- 1.11.2 Confine construction traffic to City of Hamilton Designated Truck Routes
- 1.11.3 Provide traffic control at critical areas of haul routes to regulate traffic and to minimize interference with public traffic.
- 1.11.4 The Contractor to make themselves aware of, and comply with, the requirements of half load season and to allow for this accordingly.

1.12 OPERATIONAL REQUIREMENTS

- 1.12.1 A minimum of ONE LANE OF TWO-WAY traffic shall be maintained during construction at all times. All measures of traffic control shall be as specified herein and shall be approved by the Consultant in order to protect and control public traffic.

- 1.12.2 Backfill all trench cuts at the end of the day's operations so that two-way traffic can be maintained at night.
- 1.12.3 All hazards and obstructions shall be properly barricaded and delineated with flashers in accordance with the Ontario Traffic Manual.
- 1.12.4 Advise the Emergency Services on a daily basis, the current status of the construction as it pertains to passage of traffic within the Contract limits.
- 1.12.5 Maintain driveway access and provide safe pedestrian access at all times during construction in an acceptable manner.
- 1.12.6 All deliverables are to be delivered to the construction access gates in accordance with [Section 01510 – Temporary Facilities and Utilities]. No deliveries are permitted to the City's office or through the City's access gates.
- 1.12.7 Do not allow any un-authorized vehicles to enter the existing construction site. All vehicles shall be registered at the Contractor's site trailer to obtain access to the site.
- 1.12.8 Storage and laydown areas shall be submitted to the City for approval.

1.13 BASIS OF PAYMENT

- 1.13.1 The Contract Price shall include compensation in full for labour, material, equipment, power workmanship, and all other costs associated with this section.

1.14 MEASUREMENT FOR PAYMENT

- 1.14.1 The measurement of payment is a lump sum for all Work required under this Specification.
- 1.14.2 Payment shall be prorated on a monthly basis for the duration of the Contract.

2 PRODUCTS – N/A

3 EXECUTION – N/A

4 SUPPLEMENTS – N/A

END OF SECTION

SECTION 01510 – TEMPORARY FACILITIES AND UTILITIES

1 GENERAL

1.1 GENERAL REQUIREMENTS

- 1.1.1 The Contractor and its Subcontractors shall comply with the requirements in this section. Each section within the specifications is related and shall be read in conjunction with one another.

1.2 REFERENCES

- 1.2.1 These Specifications form an integral part of the Contract Documents.
- 1.2.2 Refer also to all other parts of the Contract Documents to determine their effect on the Work of each section of these Specifications.
- 1.2.3 The requirements of this section and Division 1 apply to and govern the Work under other divisions.
- 1.2.4 Comply with the latest edition of the following statutes, standards, codes and regulations and all amendments thereto:
- .1 OHSA and Regulations for Construction Projects O.Reg 213.
 - .2 All other applicable statutes, standards, codes, and regulations.

1.3 SUBMITTALS

- 1.3.1 The Contractor shall submit the following information in accordance to this section and [Section 01330 – Submittals]:
- .1 Submit for review by the Consultant a draft temporary facilities and site delineation plan five (5) Working Days prior to the scheduled pre-construction meeting. Draft plan shall include but not be limited to the following:
 - .1 The Contractor's field office, storage yard, and storage building plans, including gravel surfaced area.
 - .2 Temporary construction roads and areas.
 - .3 Drainage plans.
 - .4 Fencing and protective barrier locations and details and site security arrangements including delineation of different areas of the plant expected throughout the project. Contractor should delineate the active isolated cell from the rest of the plant.
 - .5 Staging area location plan.
 - .6 Preliminary servicing plan – Temporary electric power supply and distribution plans, water supply and distribution plans and sanitary facilities plan

- .2 The Contractor to provide the following remaining items of the temporary facilities plan five (5) Working Days prior to the first progress meeting:
 - .1 Refinements to above items in Section 1.3.1.1.
 - .2 Servicing plan – Temporary electric power supply and distribution plans, Water supply and distribution plans and sanitary facilities plan.
 - .3 Maintain temporary facilities plan on site throughout Contract duration.

1.4 TEMPORARY FACILITIES

- 1.4.1 The temporary facilities shall be installed and furnished as required by the MCA, MOL, and OHSA.
- 1.4.2 Maintain temporary buildings clean and free from nuisances to avoid danger to the City's personnel, property or structures, prevent complaints from the Consultant and prohibit interference with the operation of the existing plant.
- 1.4.3 The Contractor shall make themselves aware of, and adhere to, all Provincial regulations, City of Hamilton by-laws, and local by-laws regarding workplace smoking.
- 1.4.4 All temporary storage buildings / facilities shall meet, at a minimum, all manufacturers' storage recommendations for all Project related materials and equipment as well as all materials and equipment storage recommendations specified in the Contract Documents.
- 1.4.5 When temporary buildings / facilities are no longer required, promptly dismantle and remove from the site, unless otherwise specified or directed. Restore areas damaged to original or better conditions to the satisfaction of the Consultant.
- 1.4.6 Furnish and maintain all apparatus and equipment, such as ladders, scaffolds, ramps, runways, temporary stairs, derricks, hoists, elevators, chutes, etc., as required for the proper execution and progress of the Work. Such facilities shall be strong and substantial and safe for the purpose for which they are intended and shall meet all applicable requirements of governing regulations and authorities.
- 1.4.7 The Contractor shall provide all temporary equipment necessary to complete the Work.
- 1.4.8 The Contractor shall not be permitted to use / operate any existing City-owned equipment for the duration of the Contract.

- 1.4.9 The Contractor shall not use any existing City-owned water, sanitary, power, and lunchroom facilities available onsite. Contractor shall rely entirely on its own temporary facilities provided onsite. Effluent water is available to support the cleaning of different tanks around the facility. The contractor shall only connect to the effluent water piping when written approval is given. Temporary power for the site trailers could be pulled from the Filter Building MCC. Contractor to coordinate with the Owner through the Engineer before connecting.

1.5 SITE ACCESS

- 1.5.1 The Contractor shall maintain adequate access to site all at times in accordance with the Contract Documents.
- 1.5.2 Build and maintain temporary roads where indicated or directed and provide snow removal during period of Work.
- 1.5.3 If authorized to use existing roads for access to site, maintain such roads for duration of Contract and make good damage resulting from the Contractors' use of roads, as required, without any cost to the City.
- 1.5.4 Prior to final inspection, obtain and submit to the Consultant written signed releases from the City of all roads used for site access, verifying that roads have been adequately restored and left in a satisfactory condition. The Contractor to pay for any damage or mess resulting from the Contractors' use of on site or Municipal-owned roads as related to the Works.
- 1.5.5 Trim loads of trucks hauling excavated material, cement, sand, stone, gravel, debris or other loose material before leaving the site, and ensure that the bodies of such vehicles are tight so that no spillage of loads occurs.

1.6 CONSTRUCTION PARKING AND ROADWAYS

- 1.6.1 Build and maintain temporary roads within the Contract limits agreed to by the City and the Consultant.
- 1.6.2 The Contractor is responsible to repair damages made during construction to any existing roads and parking lots used during construction, to existing or better condition without any cost to the City.
- 1.6.3 Do not store materials on, or otherwise modify, roads such that maintenance or snow removal is adversely affected. Any costs or damages incurred on existing roadways as a result of the Contractor's activities shall be the responsibility of the Contractor.

1.7 TEMPORARY FACILITIES FOR PLANT STAFF

- 1.7.1 Where the Project work necessitates the disruption of existing operational facilities the Contractor shall:
- .1 Provide temporary administration, control, laboratory, lunchroom, SCADA, and server areas.
 - .2 Provide separate temporary male and female shower and washroom facilities for the exclusive use of plant operations and maintenance staff.
 - .3 Provide separate temporary male and female locker facilities for the exclusive use of plant operations and maintenance staff, that are AODA compliant, as required.
- 1.7.2 All such temporary facilities shall be, at a minimum, sized to match the existing conditions.
- 1.7.3 A relocation plan shall be provided to the Consultant and the City for review, and all relocations will be coordinated with the City prior to undertaking the work.]

1.8 PROJECT SIGN BOARDS

- 1.8.1 A project sign board will be supplied by the City. The Contractor shall install the sign at a location to be confirmed by the Consultant.
- 1.8.2 Relocate as necessary or as directed by the Consultant.

1.9 CONSULTANT'S FIELD OFFICE

- 1.9.1 Provide for the sole use of the Consultant and the City, a field trailer as specified.
- .1 Supply and maintain a trailer, satisfactory to the Consultant and the City, for the exclusive use of the Consultant and the City for the duration of the Contract until at least three (3) months following Substantial Performance of the Work.
 - .2 Trailer to consist of a minimum of the following rooms:
 - .1 Office for the Consultant with own door with lock and key
 - .2 Meeting Room to fit a minimum of 12 chairs and persons
 - .3 Washroom
 - .3 The trailer to be set up in approved location within seven (7) days of Notice to Proceed or actual work commencement whichever occurs first. Failure to comply will result in the City providing the required office and back charging the Contractor.
 - .4 Locate the trailer within the work area as directed by the Consultant, physically separated from any other structure.
 - .5 Make all necessary applications, obtain permits and pay for all fees, charges for service and use.

- .6 Provide and pay for all temporary telephone, potable water, power, heating, air conditioning, high speed internet equipment and services and lighting required during construction.
- .7 Provide a windproof, weather tight structure at least 300 mm above ground level and having a floor area of not less than [50]m² and 2.6 m ceiling height.
- .8 Equip the main room with:
 - .1 One plan table with sloping top approximately 2.0 m long, 1.0 m wide and 960 mm high; with smooth plywood top
 - .2 Two stools, approximately 710 mm high for the above plan table
 - .3 Three, three tier wooden bookcases
 - .4 Shelves, plan racks, and a lockable steel wardrobe and storage cabinet, 1900 mm high 900 mm wide and 500 mm deep for storing instruments and clothing.
- .9 Equip each office with:
 - .1 one standard office desk having three lockable drawers
 - .2 one swivel type office chair with adequate ergonomic and lumbar support
 - .3 high speed internet connection from independent telephone line, including Wi-Fi internet service
 - .4 one wastepaper basket
- .10 Equip meeting room with:
 - .1 a 3.0 m x 1.25 m meeting table
 - .2 12 standard office chairs
 - .3 fire extinguisher and first aid kit
 - .4 whiteboard with two sets of markers
 - .5 portable projector screen
 - .6 one telephone with one phone line (separate to others) complete with voicemail, caller ID and call waiting. Phone to be supplied is capable of call display and speaker.
 - .7 one wastepaper basket
- .11 Equip kitchen with:
 - .1 one combination hot and cold-water cooler.
 - .2 one standard refrigerator, minimum 0.5m³ (18 ft³)
 - .3 one standard microwave
 - .4 one hot and cold-water sink with dishwashing soap and rags
 - .5 cabinetry with drawers to store napkins, paper towels, dishes, and cutlery along with a minimum set of six plates, cups, knives, forks, and spoons
 - .6 one waste basket]
- .12 The trailer to be insulated, electrically heated, air-conditioned, and electrically lighted as follows:

- .1 wall-mounted electrical heaters sized to maintain an interior temperature of 21 degrees Celsius when the outside temperature is –30 degrees Celsius.
- .2 wall mounted air conditioning units
- .3 temperature to be controlled at 21 degrees Celsius year round
- .4 adequate lighting with supplementary lighting in each area, including over the plan table and desks
- .5 electrical outlets in each office, storage room and meeting room (4 minimum) as required
- .13 Provide doors to the trailer and to each office with suitable locks. Main door to the trailer shall come with at least eight sets of keys.
- .14 Provide at least two windows within the meeting room and one window within each office and the kitchen, each window having a size of at least 2.0 m² on the opposite wall in which the exterior door is located. Provide window shades with screens.
- .15 Provide washroom facilities with hot and cold sink, toilet, waste basket and mirror for the sole use of the Consultant and the City. Maintain a supply of paper towels, toilet paper, and soap throughout the duration of the project. Heat trace all exterior plumbing, where required.
- .16 Provide weekly janitorial services and all washroom supplies.
- .17 Provide one printer/copier/scanner multi-function machine to meet the following specifications:
 - .1 Required functions- colour copying, printing, scanning, colour digital sending, with multi-tasking capability
 - .2 Print speed- 40 pages per minute (colour or black and white)
 - .3 Monthly duty cycle 5,000-20,000 pages
 - .4 Processor speed 800 mHz
 - .5 Memory 1 GB RAM
 - .6 Hard disk 320 GB
 - .7 Print technology and quality -laser, up to 600 x 600 dpi
 - .8 Number of cartridges- 4 (1 each high yield cyan, magenta, yellow)
 - .9 Number of paper trays- 4 (letter, legal, 11x17, with 1 multi-purpose adjustable tray)
 - .10 Duplex printing – automatic
 - .11 Document finishing sheet fed, job separator, stacking, stapling
 - .12 Scanner type – flattened
 - .13 Scanner resolution - up to 600 dpi with scan resolution software
 - .14 Task speed- 5.6 seconds, 600 x 600 dpi
 - .15 Maximum scan size 11x17
 - .16 Automatic document feeder capacity- 50 sheets
 - .17 Copier- resolution of 600x600 dpi for colour, copy reduce/enlarge settings of 25 to 400%, with number of copies up to 999 copies maximum

- .18 Fax- resolution of 300 x 300 dpi for black, polling
- .19 Connectivity- internal and external print servers, plus wireless print servers
- .20 Software - print drivers and installation software
- .18 Pay the lease or purchase costs for printer/copier/scanner/fax machine, and associated equipment, including maintenance, technical support, paper, cartridge and supply services.
- .19 Provide Wi-Fi and high-speed mobile Internet (minimum internet speed of 5 Gbps download and 1 Gbps upload) access suitable for a minimum of 100 GB monthly usage. Pay for the monthly charges by the Internet service provider. Internet access shall be designated for the Consultant's trailer and shall not be shared with the Contractor's trailer.
- .20 Provide connection services in each office and meeting room for the printer. Provide technical services to assist the Consultant, the City, and its representatives to connect to the Wi-Fi and printing system.
- .21 Provide and pay for the services of a security alarm system and take every reasonable precaution to protect the office and its contents against fire and theft, or other damage. Indemnify the Consultant and its agents against loss by fire, theft, and injury to the building, to the office or its contents.
- .22 Maintain the field office and the performance of the office equipment as specified until at least [three (3) months after Substantial Performance of the Work.
- .23 Parking is limited within the facility, the City can not guarantee availability of any parking area, contractor to coordinate parking within the City facility with the Engineer

1.10 TEMPORARY UTILITIES

1.10.1 Installation / removal:

- .1 Provide construction facilities and temporary controls in order to execute work expeditiously.
- .2 Remove from site all such Work after use.

1.10.2 Sanitary facilities

- .1 Provide sufficient sanitary facilities in accordance with the MOL requirements for all persons employed on Contract subject to approval of type, size and location by the local Public Health authorities, the Ontario MECP, and the Consultant.
- .2 Maintain facilities with all required toilet room supplies in a clean and sanitary condition and disinfect frequently.
- .3 Remove any contaminated soil and replace with fresh clean material. Leave site in a clean sanitary condition.

1.10.3 Temporary heating and ventilation:

- .1 Any construction heaters used inside building shall be vented to the outside or be flameless type. Solid fuel salamanders are not permitted.
- .2 Provide temporary heat and ventilation in enclosed areas as required to:
 - .21 Facilitate progress of the Work.
 - .22 Protect the Work and Products against dampness and cold.
 - .23 Prevent moisture condensation on surfaces.
 - .24 Provide ambient temperatures and humidity levels for storage, installation and curing of materials.
 - .25 Provide adequate ventilation to meet health regulations for safe working environment.
- .3 Maintain inside temperatures above a minimum of 10°C in areas where construction is in progress.
- .4 Prevent accumulations of dust, fumes, mists, vapors or gases in areas occupied during construction.
- .5 Provide local exhaust ventilation to prevent harmful accumulation of hazardous substances into atmosphere of occupied areas.
- .6 Dispose of exhaust materials in a manner that will not result in harmful exposure to persons.
- .7 Ventilate storage spaces containing hazardous or volatile materials.
- .8 Ventilate temporary sanitary facilities.
- .9 Continue operation of ventilation and exhaust system for some time after the cessation of all Work processes to assure removal of harmful contaminants.
- .10 The permanent heating system of the building may be used when available. The Contractor will be responsible for damage and all associated consumables to the heating system if use is permitted.
- .11 Date of Substantial Performance and warranties for heating system will not commence until the entire system is in as near original condition as possible and is certified by the Consultant.
- .12 Maintain strict supervision of operation of temporary heating and ventilating equipment to:
 - .26 Conform with applicable codes and standards.
 - .27 Enforce safe practices.
 - .28 Prevent abuse of services.
 - .29 Prevent damage to finishes.
 - .30 Vent direct-fired combustion units to outside.
- .13 Be responsible for damage to the Work due to failure in providing adequate heat and protection during construction.

1.10.4 Temporary power:

- .1 Provide temporary electrical wiring meeting requirements of the OESC.
- .2 Properly install and maintain wiring for temporary electric light and power.
- .3 Install temporary hydro meter and pay costs for electrical system installation. The Contractor to monitor and provide the City with monthly hydro usage. The City to pay usage charges associated with Work operations.
- .4 Temporary connections to existing hydro services are subject to approval from the Consultant and power company representative. The Contractor shall remove all temporary connections prior to final acceptance of Work by the City.
- .5 Provide weatherproof, grounded, temporary power distribution system sufficient to accommodate performance of Work, including but not limited to:
 - .31 Temporary electrical heating.
 - .32 Operation of test equipment and test operation of building equipment and systems that cannot be delayed until permanent power connections are operable.
 - .33 Temporary operation of other temporary facilities, including permanent equipment and systems that shall be placed in operation prior to use of permanent power connections (pumps, HVAC equipment, and other similar equipment).
 - .34 Power for temporary operation of existing facilities (if applicable) at site during change over to new permanent power system.
 - .35 Provide circuits of adequate size and proper power characteristics for each use.
 - .36 Generally, run circuit wiring overhead, and rise vertically in locations where it will be least exposed to possible damage from construction operations and result in least interference with Work.
 - .37 Provide rigid steel conduit or equivalent raceways for wiring, exposed on grade, floor, decks or other recognized exposures to damage or abuse.
- .6 Provide temporary power outlets with transformers, branch wiring and distribution boxes located safely and conveniently for construction activities. Provide flexible power cords as required.
- .7 Do not use permanent convenience receptacles during construction unless approved by the Consultant.

1.10.5 Temporary Lighting:

- .1 Provide suitable lighting for Work conducted at night where permitted by the Consultant or under conditions of deficient daylight to ensure proper Work and to provide adequate facilities for inspection and safe working conditions.

- .2 Provide general, weatherproof, grounded temporary lighting systems in construction areas, as soon as is practically feasible.
- .3 Provide sufficient illumination for safe Work and traffic conditions.
- .4 Run temporary circuit wiring generally overhead and rise vertically in locations where it will be least exposed to damage from construction operations on grade, floors, decks, or other recognized areas of possible damage or abuse.
- .5 Provide temporary branch wiring from power source to distribution boxes with lighting conductors, pigtails, and lamps as required.
- .6 Maintain lighting and provide routine repairs.

1.10.6 Temporary telephone:

- .1 Provide and pay for temporary telephones necessary for own use.

1.11 SECURITY AND CONSTRUCTION FENCING

- 1.11.1 Provide construction fencing around the perimeter of the Contract and working limits as shown on the drawings and as required by applicable codes, regulations and by-laws. Contractor to install delineation fencing around each isolated area of the plant throughout construction.
- 1.11.2 The Contractor shall remove and dispose offsite of all construction fences at the end of the construction.
- 1.11.3 Security deemed necessary for protection against loss of or damage to any equipment, temporary materials, tools or permanent materials on site, in relation to the Contract, shall be the sole responsibility of the Contractor. Provide and maintain security gate at entrance to this Contract as shown in the Contract drawings.
- 1.11.4 Maintain content and liability insurance on materials and equipment.
- 1.11.5 If latches, doors, fencing or other openings leading into the construction site are not secure, the Contractor is responsible for maintaining continuously manned site security at no additional cost to the City.
- 1.11.6 Visual identification shall be worn at all times and be monitored by the Consultant. Any person without valid identification will be removed from the site. No additional cost shall be incurred by the City for persons removed from site.
- 1.11.7 Where the Contractor utilizes the existing facility fencing and gate, they shall provide their own lock to be "daisy chained" to the City's lock.

- 1.11.8 The Contractor shall be responsible for maintenance of all fences surrounding the Work area, and the surveillance of the Work, in order to provide security at all times against vandalism of the Work and injury to persons not involved with construction. Any repairs due to vandalism will be the responsibility of the Contractor.

1.12 SECURITY HUT

- 1.12.1 N/A

1.13 FIRST AID FACILITIES

- 1.13.1 Provide on-site first-aid supplies in accordance with the OHSA. Maintain in a clean and orderly condition and make readily accessible to all staff at all times.

1.14 BASIS OF PAYMENT

- 1.14.1 The Contract Price shall include compensation in full for labour, material, equipment, power workmanship, and all other costs associated with this section.
- 1.14.2 No additional payment shall be made for temporary facilities or utilities not identified in the Contract Documents. The Contractor shall bear all costs associated with additional temporary facilities and utilities that are required to facilitate the construction of the Work.

1.15 MEASUREMENT FOR PAYMENT

- 1.15.1 The measurement of payment is a lump sum for all Work required under this Specification.
- 1.15.2 Payment shall be prorated on a monthly basis for the duration of the Contract.

2 PRODUCTS – N/A

3 EXECUTION – N/A

4 SUPPLEMENTS – N/A

END OF SECTION

SECTION 01515 – TEMPORARY BY-PASS PUMPING

1 GENERAL

1.1 GENERAL REQUIREMENTS

- 1.1.1 The Contractor and its Subcontractors shall comply with the requirements in this section. Each section within the specifications is related and shall be read in conjunction with one another.
- 1.1.2 Equipment furnished under this section shall be fabricated, assembled, erected, and placed in proper operating condition in full conformity with drawings, specifications, Consulting date, instructions, and recommendations of the pump supplier, unless exceptions are noted by the Consultant.

1.2 REFERENCES

- 1.2.1 These Specifications form an integral part of the Contract Documents.
- 1.2.2 Refer also to all other parts of the Contract Documents to determine their effect on the Work of each section of these Specifications.
- 1.2.3 The requirements of this section and Division 1 apply to and govern the Work under other divisions.
- 1.2.4 Comply with the latest edition of the following statutes, standards, codes and regulations and all amendments thereto:
 - .1 OHSA and Regulations for Construction Projects O.Reg 213
 - .2 CSA- Canadian Standards Association
 - .3 All other applicable statutes, standards, codes and regulations

1.3 SUBMITTALS

- 1.3.1 Submittals shall be in accordance with [Section 01330 – Submittals] and this section.
- 1.3.2 Submit shop drawings and test plan for temporary equipment and systems within three (3) weeks of the Notice to Proceed. Shop drawings will be reviewed by the Consultant and the City.
- 1.3.3 The Contractor shall submit detailed contingency plans for station operation for review by the Consultant and the City.
- 1.3.4 The shop drawing submission shall include, but not be limited to, the following:

- .1 Drawings showing proposed pump and piping layout plan, including all connections to existing infrastructure.
- .2 Design information on the proposed pumps including manufacturer curves, noise information, temporary pipe supports, and anchoring required, etc.
- .3 Information on power supply source for the pumps (diesel, electric, etc.)
- .4 System head curves for the proposed installation.
- .5 Controls and instrumentation for the installation.
- .6 Anticipated duration and schedule of temporary pumping.
- .7 Standby power generator size and location.
- .8 Downstream discharge plan.
- .9 Method of protecting discharge manholes or structures from erosion and damage.
- .10 Method of noise control for each pump and/or generator.
- .11 Method of temperature control for temporary piping system as required.
- .12 Controls and instrumentation and alarming telemetry for the installation.
- .13 Contingency plan and contingency measures to be implemented (i.e. standby pumps, vacuum trucks).
- .14 Spill Containment plan specifically for temporary by-pass pumping.

1.4 TEMPORARY BY-PASS PUMPING

- 1.4.1 The Contractor shall furnish all materials, labour, equipment, power, operations, maintenance, etc., to implement a temporary by-pass pumping system for the purpose of diverting the existing flow around the work area during the construction period of this project.
- 1.4.2 The Contractor is responsible for overall coordination of the equipment and controls to ensure a reliable and functional system.
- 1.4.3 The Contractor shall verify that the proposed installation is compatible with the design of the pump over the entire range of flows considered. The Contractor is responsible for overall coordination of the temporary bypass pumping system.
- 1.4.4 Operation of pumping stations during construction, including:
 - .1 Temporary pumping facility.
 - .2 Temporary power.
 - .3 Temporary controls.
 - .4 Temporary pumping operation.
 - .5 Temporary communications.
 - .6 Operation of all temporary equipment associated with the temporary by-pass pumping.

1.5 SITE ACCESS

- 1.5.1 The Contractor shall maintain adequate access to site all at times in accordance with the Contract Documents.
- 1.5.2 Build and maintain temporary roads where indicated or directed and provide snow removal during period of Work.

1.6 BASIS OF PAYMENT

- 1.6.1 The Contract Price shall include compensation in full for labour, material, equipment, power workmanship, and all other costs associated with this section.
- 1.6.2 No additional payment shall be made for temporary facilities or utilities not identified in the Contract Documents. The Contractor shall bear all costs associated with additional temporary facilities and utilities that are required to facilitate the construction of the Work.

1.7 MEASUREMENT FOR PAYMENT

- 1.7.1 The measurement of payment is a lump sum for all Work required under this Specification.
- 1.7.2 Payment shall be prorated on a monthly basis for the duration of the Contract.

2 PRODUCTS

2.1 SERVICE CONDITIONS

- 2.1.1 The temporary pumping equipment will be located outside in climatic conditions consistent with southern Ontario.
- 2.1.2 The pumps shall be capable of pumping raw, unscreened sanitary wastewater, biosolids, rags, fibrous materials and other solids materials, without clogging. The pumps shall be competent to handle 75 mm (3") solids.

2.2 DURATION

- 2.2.1 The temporary by-pass pumping systems shall be installed and tested at least two days before the expected operation day.

2.2.2 The Contractor shall be responsible for determining the duration that the temporary pumping system is required for construction activities. No additional payment will be made for the temporary pumping facilities as a result of delays caused by the Contractor's own forces or performance. Refer to Construction Sequence for more details. As minimum, the temporary pumping facility shall be operated during:

- .1 The period when the inlet channels and parshall flume are out of service due to the installation new equipment and/or concrete repairs and until the equipment and associated devices have undergone a satisfactory commissioning period and Substantial Performance has been granted.

2.2.3 The bypass pumping arrangement must remain functional at all times during temporary by-passes, 24 hours per day, 7 days per week.

2.2.4 The Contractor shall maintain the temporary pump facility in operational condition and ready for operation at any time during the relevant construction period.

2.3 LOCATION

2.3.1 Install the temporary pumping system and related piping in the area indicated in the contract Drawings.

2.3.2 The temporary pumping facilities shall be designed to pump raw wastewater from the following locations:

- .1 Plant inlet chamber to the primary bar screens.
- .2 Grit building discharge to Plant A Primary Clarifier inlet.
- .3 Plant A Secondary Clarifier outlet to downstream effluent MH.

2.3.3 The temporary pumping system shall be capable of operation over the range of flows and heads indicated below. The Contractor shall ensure that the pumps can operate over an entire system curve. The Contractor is responsible for installation of temporary sewers or pump discharge lines as required.

Parameter	Bypass #1 Under Section 2.3.2	Bypass #3 Under Section 2.3.2	Bypass #3 Under Section 2.3.2
Minimum Number of Pumps	Two	Two	Two
Rated Flow	210 L/s	35 L/s	35 L/s
Rated TDH (Range)	5m	5m	5m
Temporary Pipe Size	Min 300mm	Min 150mm	Min 150mm
Temporary Pipe Material	Galvanized or Stainless Steel		

- 2.3.4 Provide a temporary cover over the inlet chamber for the purposes of fall protection and odour control and venting during the construction period.
- 2.3.5 Provide one valved header connection to 200mm flanged bypass connection.
- 2.3.6 Noise from the pumping system shall be limited to 50dBa at 1.5 m free field.

2.4 TEMPORARY POWER

- 2.4.1 The design of the temporary equipment and systems used for station power, operation of the temporary power equipment during construction is the full responsibility of the Contractor.
- 2.4.2 The Contractor is responsible to supply power and/or fuel to all temporary pumping equipment for the duration of construction.
- 2.4.3 Make any temporary electrical connections as required in compliance with Electrical Safety Authority.
- 2.4.4 Any electrical power feed from the facility shall be metered to allow billing to the contractor.

- 2.4.5 The Contractor shall provide temporary power in order to execute work properly, safely and expeditiously.
- 2.4.6 Remove temporary power from site after construction is complete and the stations are fully operational.
- 2.4.7 Make all necessary applications, obtain permits and pay for all hook-ups, fees, charges for service and use.
- 2.4.8 100% standby power shall be available on the site when temporary pumping is being undertaken.
- 2.4.9 No delay claims will be accepted by any delays caused by utilities and/or coordination of such utilities.

2.5 TEMPORARY CONTROLS

- 2.5.1 The by-pass pumping arrangement must be fully monitored by the Contractor on a continuous basis when in operation, 24 hours per day, 7 days per week.
- 2.5.2 The temporary controls shall be housed in a weatherproof, lockable enclosure.
- 2.5.3 Location of temporary controls enclosure to be approved by the Consultant.
- 2.5.4 Detailed submission for proposed temporary controls to be submitted to the Consultant and the City for review. Submission of shop drawings for temporary controls and equipment is required fifteen (15) working days in advance of installing temporary controls and equipment.
- 2.5.5 At a minimum, provide the following:
 - .1 Continuous monitoring of chamber liquid levels - local and remote display
 - .2 Automatic pump on/off controls based on level setpoints within the chamber. Pump ON/OFF shall consider the maximum level permitted, pump cycle time and sanitary wastewater storage time as recommended in the MECP Design Guidelines for Sanitary wastewater Works.
 - .3 High-level and low-level alarms sent through auto-dialer to the representatives of following parties:
 - .1 The Contractor.
 - .2 By-pass pumping subcontractor.
 - .3 The City (Operations Staff).
 - .4 The Consultant.

2.5.6 The controls must be able to switch from duty to standby pump automatically on a duty pump fail condition.

2.6 TEMPORARY PHONE LINES

2.6.1 The Contractor shall coordinate the installation of the temporary phone lines with local service providers.

2.7 ACCEPTABLE SUPPLIERS

2.8.1 Acceptable temporary pumping facility suppliers are:

- .1 Xylem
- .2 Aquatech Dewatering
- .3 Atlas Dewatering
- .4 Rain for Rent
- .5 Approved Equal

3 EXECUTION

3.1 MOBILIZATION, INSTALLATION, AND MAINTENANCE

- 3.1.1 Install the temporary pumping system as outlined within this specification and Contract Drawings and indicated on the submittals to the Consultant.
- 3.1.2 Provide a qualified representative to inspect each temporary pumping system installation to ensure proper functionality. Inspect and repair any leaks in the piping and connections to no leakage of wastewater to the surrounding property. Perform site simulation tests to verify that all alarms and controls are functioning properly.
- 3.1.3 Test and commission the by-pass pumping facility, including standby pump and power before the shutdown of existing pump station.
- 3.1.4 Maintain all equipment as required to ensure trouble free operation for the duration of temporary pumping.
- 3.1.5 The Contractor shall be responsible for all MECP regulations for the by-pass pumping.
- 3.1.6 The design, installation and operation of the temporary pumping system shall be the Contractor's responsibility. The system shall meet the requirements of all codes and regulatory agencies having jurisdiction

3.2 OPERATION

- 3.2.1 The Contractor shall provide the following during construction:
 - .1 24/7 remote monitoring capabilities of levels and temporary pump status.
 - .2 Auto-dialer and dedicated phone line at the site to handle alarm call-outs.
 - .3 Test auto-dialer at least one per week.
 - .4 Guaranteed response time within thirty (30) minutes for a dialed-out alarm.
 - .5 Daily reporting when the temporary bypass pump facility is in operation. The report shall include:
 - .5 Numbers of pumps in operation;
 - .6 Logs of pumping start and stop time;
 - .7 Flow discharged;
 - .8 Logs of alarms;
 - .9 Confirmation of the level in the upstream manhole not exceed the overflow level by visual observation;
 - .10 Complaints received.

3.2.2 Responsibilities of the Contractor and the City:

- .1 When the existing pumps are still in operation, the City will have monitoring and control capabilities of the pump stations via the SCADA and will control the station and respond to any alarms.
- .2 Once the temporary by-pass pumps have been installed, the Contractor shall respond to any and all alarms from the auto-dialer resulting from the new equipment. The City will still have monitoring and control capabilities of the pump station.
- .3 During wet well by-pass pumping and shutdowns, the Contractor shall be fully responsible for operation and maintenance of the temporary by-pass pumps.

3.2.3 Licensed Wastewater Collection Operator:

- .1 The temporary by-pass pumping system shall be monitored at all times by the Contractor. The Contractor's employee operating the temporary by-pass pumping system must be a licensed Wastewater Collection Operator Class 1 in Ontario and must have the knowledge, experience, and skill to maintain and operate all equipment and to switch to standby equipment if the need arises.
- .2 The temporary by-pass system shall not be in operation unless it is monitored by the Contractor's employees that are licensed Wastewater Collection Operators in Ontario.
- .3 A licensed wastewater collection operator must be present on site for initial start-up and shut down of the temporary bypass pumping system to evaluate and inspect the process and the redirection of wastewater flow within the wastewater collection system. Consultant to approve any proposed changes to the bypass system after the initial set up. A licensed wastewater collection operator must be present on site to witness the changes.
- .4 Immediately after the flow is redirected, the licensed operator must be present on site during the flow redirection. The licensed operator shall also confirm that the locations of the sewer by-pass suction and discharge points are in compliance with the approved By-pass Plan.

3.2.4 Provide all labour, energy and materials to maintain and provide a reliable, operating system. The Contractor shall be responsible for all costs relating to power or fuel to run the temporary pumping system. Inspect the system daily to ensure there are no leaks and that the system is functioning properly.

3.2.5 The Contractor shall provide 100% pumping capacity during all by-pass operations. Two (2) temporary bypass pumps (1 duty, 1 standby) should always be kept on-site during construction.

- 3.2.6 The Contractor shall provide 100% standby power during all by-pass operations. The Contractor shall make provisions for the supply of an on-site diesel generator to power the pumps in the event of a utility power failure if connected to utility power. If using an on-site diesel generator to provide power for the temporary by-pass pumping arrangement, the Contractor shall make provision to have access to a second diesel generator in the event of a failure of the primary diesel generator. The second diesel generator must arrive in the Site within one hour when it is needed. Any on-site diesel generator must be provided with acoustical noise attenuation covers.
- 3.2.7 The Contractor shall provide all necessary means to safely convey the sanitary wastewater past the work area. The Contractor will not be permitted to stop or impede the main flows under any circumstances,
- 3.2.8 The Contractor shall maintain sewer flow around the work area in a manner that will not cause surcharging of sewers, damage to sewers and that will protect public and private property from damage and flooding.
- 3.2.9 The Contractor shall protect water resources and other natural resources.

3.3 DEMOBILIZATION

- 3.3.1 Once the temporary pumping system is no longer required, decommission all components and restore the property and operations. Remove all temporary electrical connections as required.

4 SUPPLEMENTS – N/A

END OF SECTION

SECTION 01561 – ENVIRONMENTAL CONTROL AND PROTECTION

1 GENERAL

1.1 GENERAL REQUIREMENTS

- 1.1.1 The Contractor and its Subcontractors shall comply with the requirements in this section. Each section within the specifications is related and shall be read in conjunction with one another.

1.2 REFERENCES

- 1.2.1 These Specifications form an integral part of the Contract Documents.
- 1.2.2 Refer also to all other parts of the Contract Documents to determine their effect on the Work of each section of these Specifications.
- 1.2.3 The requirements of this section and Division 1 apply to and govern the Work under other divisions.
- 1.2.4 Comply with the latest edition of the following statutes, standards, codes and regulations and all amendments thereto:
- .1 Ontario Erosion and Sediment Control Guidelines for Urban Construction (2019)
 - .2 All other applicable statutes, standards, codes, and regulations

1.3 SUBMITTALS

- 1.3.1 The Contractor shall submit the following information in accordance to this section and [Section 01330 – Submittals]:
- .1 Submit the erosion and sedimentation control plan to the City for acceptance a minimum of ten (10) Working Days after issuance of the Notice to Proceed. The City reserves the right to revise the erosion and sedimentation control plan once implemented as field observations warrant. Any changes succeeding these plans shall be at the Contractor's expense.

1.4 ENVIRONMENTAL MEASURES

- 1.4.1 Meet or exceed the requirements of environmental legislation and regulations, including amendments in force for the duration at the Work provided that in case of conflict or discrepancy, the more stringent requirements apply.
- 1.4.2 Construct this Project in accordance with construction and restoration guidelines established by the MECP, MNRF, HCA and other applicable agencies.

1.5 INSPECTION

- 1.5.1 Be advised that inspectors from the City, MECP, HCA and other authorities having jurisdiction may make periodic visits to the site during construction. They have the authority to order the Contractor to stop Work if, in their opinion, the Work is not being completed so as to ensure compliance with the environmental objectives. Acceptance of the Work by the Consultant may be withheld until the City and other authorities have issued their approval.
- 1.5.2 Ensure adequate environmental protection and take precautions at times of inclement weather (i.e. ensure erosion and sedimentation control measures are functioning effectively and install additional measures as necessary).

1.6 FIRES

- 1.6.1 Do not light fires or burn rubbish on site.

1.7 DISPOSAL OF WASTES

- 1.7.1 Do not bury rubbish and waste materials on site.
- 1.7.2 Do not dispose of waste or volatile materials, such as mineral spirits, oil or paint thinner into waterways, storm or sanitary sewers.
- 1.7.3 Provide sufficient suitable refuse containers throughout the site to receive and control construction wastes. Keep containers closed to prevent contents from blowing around site.

1.8 DRAINAGE

- 1.8.1 Provide temporary drainage and pumping as necessary to keep excavations and site free from water.
- 1.8.2 Do not pump water containing suspended materials into waterways, sewer or drainage systems.
- 1.8.3 Control disposal or runoff of water containing suspended materials or other harmful substances in accordance with local authority requirements.
- 1.8.4 Re-excavate settling ponds or silt traps or otherwise maintain as required from time to time. Re-excavate in such a manner as to ensure that no deleterious materials are introduced into adjacent watercourses. Dispose of excavated deleterious materials off site in accordance with applicable regulations.

- 1.8.5 Regularly inspect and clean protective devices. Replace clogged filter materials such as filter fabric, crushed stone or straw bales as required and as directed by the Consultant.
- 1.8.6 Ensure that stockpiles of topsoil, excess excavated material, etc., are located and protected so that no environmental damage occurs. Cover stockpiles with plastic sheeting and construct perimeter drainage ditches to intercept and divert run-off to adjacent settling ponds.
- 1.8.7 Have additional materials such as rip-rap, filter cloth, clear stone, silt fencing, erosion control blankets and filter bags readily available in case they are needed quickly for erosion and deleterious materials control.
- 1.8.8 Regrade temporary ditches and remove and dispose of sediment controls after restored areas have an established ground cover and upon approval from the Consultant.

1.9 DISPOSAL OF WATER

- 1.9.1 Provide temporary ditches and /or sedimentation ponds of sufficient capacity to contain site run-off and truck wash water. Provide ditches and ponds with silt traps built up with silt fence, straw bales and rock check dams as shown on the drawings and specified in Division 2 required to retard and filter run-off before it is discharged to a watercourse.
- 1.9.2 Discharge pumped water through a geotextile filter bag or through a system of a geotextile filter cloth layer on either side of a minimum 300 mm clear-stone layer.
- 1.9.3 Do not pump or drain water containing deleterious materials into waterways and sewers. Intercept concentrated run-off from unstabilized areas and divert to a temporary ditch or other stabilized areas under sheet flow conditions. Pump water from excavations to an "upstream" location on the temporary ditch, to allow maximum settling and filtration prior to discharging to a natural watercourse.

1.10 SITE CLEARING AND PLANT PROTECTION

- 1.10.1 Protect trees and plants on site and adjacent properties where indicated.
- 1.10.2 Wrap in burlap, trees, and shrubs adjacent to construction Work, storage areas and trucking lanes, and encase with protective wood framework from grade level to height of 2 m.
- 1.10.3 Protect roots of designated trees to dripline during excavation and site grading to prevent disturbance or damage. Avoid unnecessary traffic, dumping and storage of materials over root zones.

- 1.10.4 Minimize stripping of topsoil and vegetation.
- 1.10.5 Restrict tree removal to areas indicated or designated by the Consultant and the City.

1.11 WORK ADJACENT TO WATERWAYS

- 1.11.1 Do not operate construction equipment in waterways.
- 1.11.2 Do not use waterway beds for borrow material without written approval from the appropriate authority.
- 1.11.3 Do not dump excavated fill, waste material or debris in waterways.
- 1.11.4 Design and construct temporary crossings to minimize erosion to waterways.
- 1.11.5 Do not skid logs or construction materials across waterways.
- 1.11.6 Do not dispose of volatile or hazardous wastes such as mineral spirits, oil, or paint thinner in storm or sanitary drains.
- 1.11.7 Do not discharge wastes into streams or waterways.

1.12 POLLUTION CONTROL

- 1.12.1 Maintain temporary erosion and pollution control features installed under this Contract.
- 1.12.2 Control emissions from equipment and plant to local authority's emission requirements.
- 1.12.3 Prevent sandblasting and other extraneous materials from contaminating air beyond application area, by providing temporary enclosures.
- 1.12.4 Cover or wet down dry materials and rubbish to prevent blowing dust and debris. Provide dust control for temporary roads.
- 1.12.5 Maintain all construction equipment properly, to minimize exhaust emissions.
- 1.12.6 Clean all construction equipment prior to entering public roadways to avoid spilling of construction debris. Collect construction debris in a designated area, for ultimate disposal off site.

1.13 DUST AND MUD CONTROL

- 1.13.1 Take such steps as required to prevent dust and mud nuisance resulting from construction operations within the site. Carry out dust control practices at all locations on site and on adjacent roads.
- 1.13.2 Permitted dust control measures include the application of water. Do not initiate chemical means of dust control without the prior written approval of the Consultant. The use of petroleum products will not be allowed at any time.
- 1.13.3 Transport excessively dusty materials in covered haulage vehicles.
- 1.13.4 Where the Work requires saw-cutting of the asphalt or the saw-cutting or grinding of concrete, use blades and grinders of the wet type together with sufficient water to prevent the incidence of dust.
- 1.13.5 Ensure that all debris and mud tracked upon traveled roadways resulting from construction operations or the delivery of materials to the site are removed at the end of a day's operation.

1.14 NOISE CONTROL

- 1.14.1 Ensure that all vehicles and equipment are equipped with efficient muffling devices to minimize noise levels in the Work area. Provide noise barriers as required to limit the noise level at site boundaries in accordance with local by-laws.
- 1.14.2 Establish and maintain site procedures consistent with the objective that noise levels from the construction area be minimized, and in accordance with local by-laws.

1.15 EQUIPMENT MAINTENANCE AND REFUELLING

- 1.15.1 Undertake a detailed review of the construction site to plan access routes and fuelling areas. Do not refuel or maintain equipment in or adjacent to watercourses. Establish suitable fuelling and maintenance areas subject to the approval of the Consultant and restrict maintenance and fuelling to these areas. Submit procedures for the interception and rapid clean up, and disposal and reporting of spillage that does occur to the Consultant for review prior to starting Work. Keep materials required for cleanup of fuel spillages readily accessible on site.
- 1.15.2 Generators, cranes, backhoes, or shovels may be fuelled at other than the designated fuelling areas. However, do not refuel equipment within 30 metres of any watercourse.

1.16 NON-MAINTENANCE RELATED SPILLS

- 1.16.1 Non-maintenance related spills are spills that occur due to mishandling of fuels during the fuelling process, failure of hoses or other components on equipment.
- 1.16.2 Submit a contingency plan for dealing with such occurrences to the Consultant for approval.
- 1.16.3 The plan shall describe in detail the action to be taken and the persons and the agencies to be notified in the event of such a spill, including a spill reporting procedure.
- 1.16.4 Report immediately any spills causing damage to environment to:
 - .1 Spills Action Centre of the Ministry of the Environment, Conservation and Parks, Tel: 1 (800) 268-6060.
 - .2 City of Hamilton Spills Reporting Line.
 - .3 Any other authority having jurisdiction or an interest in the spill including any Conservation Authority, drainage authority, road authority, fire department, etc.
 - .4 The Consultant.

1.17 PESTICIDES AND HERBICIDES

- 1.17.1 The use of pesticides and herbicides is prohibited.

1.18 SENSITIVE AREAS

- 1.18.1 Inform the Consultant in writing of the particular schedule for each water crossing, channelizing or other Work in the designated sensitive areas.
- 1.18.2 Avoid encroachment on unique natural areas and establish boundary protection and signage to avoid such encroachment.
- 1.18.3 Do not disturb habitats of rare or endangered species. Agree and implement mitigative measures with the Consultant.
- 1.18.4 Protect wetland sites used as feeding or breeding areas by migratory birds or as habitats for other animals and establish boundary protection and signage to avoid such encroachment.
- 1.18.5 Schedule construction in sensitive areas so that there will be minimal interference with water uses including fish migration or spawning, or disruption of incubation period of eggs.
- 1.18.6 Keep removal of vegetation to a minimum.

- 1.18.7 Contain and deposit on land all aquatic plants uprooted or cut prior to or during construction.

1.19 BASIS OF PAYMENT

- 1.19.1 The Contract Price shall include compensation in full for labour, material, equipment, power workmanship, and all other costs associated with this section.

1.20 MEASUREMENT FOR PAYMENT

- 1.20.1 The measurement of payment is a lump sum for all Work required under this Specification.
- 1.20.2 Payment shall be prorated on a monthly basis for the duration of the Contract.

2 PRODUCTS – N/A

3 EXECUTION– N/A

4 SUPPLEMENTS – N/A

END OF SECTION

SECTION 01610 – MATERIALS AND EQUIPMENT

1 GENERAL

1.1 GENERAL REQUIREMENTS

- 1.1.1 The Contractor and its Subcontractors shall comply with the requirements in this section. Each section within the specifications is related and shall be read in conjunction with one another.

1.2 REFERENCES

- 1.2.1 These Specifications form an integral part of the Contract Documents.
- 1.2.2 Refer also to all other parts of the Contract Documents to determine their effect on the Work of each section of these Specifications.
- 1.2.3 The requirements of this section and Division 1 apply to and govern the Work under other divisions.
- 1.2.4 Include for water facilities work All Products to be provided as part of the Works that come into contact with potable water within the system shall meet all applicable standards set forth by both the AWWA and the ANSI safety criteria standards NSF/60 and NSF/61.

1.3 SUBMITTALS

- 1.3.1 The Contractor shall submit the following information in accordance to this section and [Section 01330 – Submittals]:
- .1 Include for water facilities work Provide four (4) copies of the NSF certification, where applicable.
 - .2 Submit Inspection and testing reports for Products tested at the Supplier premise.
 - .3 Submit an updated material procurement/ expediting record clearly indicating the status of material delivery and fabrication, as requested.

1.4 QUALITY OF PRODUCTS

- 1.4.1 Products, materials, equipment, and articles (referred to as Products throughout the specifications) incorporated in the Work shall be new, not damaged, or defective, and of best quality (compatible with specifications) for purposes intended. If requested, furnish evidence as to type, source and quality of Products provided.

- 1.4.2 Remove and replace defective Products at own expense and be responsible for delays and expenses caused by the rejection of defective Products.
- 1.4.3 Defective Products, whenever identified prior to the completion of the Work, will be rejected, regardless of previous inspections. Inspection does not relieve responsibility but is a precaution against oversight or error. Remove and replace rejected products and be responsible for delays and expenses caused by rejection.
- 1.4.4 Should any dispute arise as to the quality or fitness of Products, the decision rests strictly with the Consultant based upon the requirements of the Contract Documents.
- 1.4.5 Unless otherwise indicated in the Specifications, maintain uniformity of manufacturer for any particular or like item throughout the Work.
- 1.4.6 Permanent labels, trademarks and nameplates on Products are not acceptable in prominent locations, except where required for operating instructions, or when located in mechanical or electrical rooms.
- 1.4.7 If there is question as to whether any Product or system is in conformance with applicable standards, the Consultant reserves the right to have such Products or systems tested to prove or disprove conformance. The cost for such testing will be borne by the City in the event of conformance with Contract Documents or by the Contractor in the event of non-conformance.
- 1.4.8 Have the equipment conform to the requirements of the applicable standards CSA and ESA.
- 1.4.9 When material or equipment is specified to standard or performance specifications, at request of the Consultant, obtain from the manufacturer an independent laboratory testing report stating that the material or equipment meets or exceeds the specified requirements.
- 1.4.10 Provide ancillary parts, fittings, connections, piping, nuts and bolts, gaskets, wiring, and other items necessary to properly install the component and equipment into a complete system.

1.5 QUALITY OF WORK

- 1.5.1 Ensure quality of the Work is of the highest standard and is executed by workers experienced and skilled in their respective trades for which they are employed. Immediately notify the Consultant if the nature of the Work is such as to make it impractical to produce required results.

- 1.5.2 Do not employ anyone unskilled in his or her required duties. The Consultant reserves the right to require dismissal from the Work of any workers deemed incompetent or careless.
- 1.5.3 Decisions as to standard or fitness or the quality of Work, in cases of dispute, rest solely with the Consultant, whose decision is final.

1.6 AVAILABILITY

- 1.6.1 Immediately upon receiving the Notice to Proceed, review Product delivery requirements and anticipate foreseeable supply delays for any items, including those items supplied by the City. Notify the Consultant of delays in supply of Products, in order that substitutions or other remedial action may be authorized in ample time to prevent delay in performance of the Work.
- 1.6.2 In the event of failure to notify the Consultant at commencement of the Work and should it subsequently appear that the Work may be delayed for such reason, the Consultant reserves the right to substitute more readily available Products of similar character, at no increase in Contract Price.
- 1.6.3 Submit when requested by the Consultant, an updated material procurement/ expediting record clearly indicating the status of material delivery and fabrication. Particulars to be covered by this record shall include the item identification, Subcontractor, order date, order number, Shop Drawing submission date(s) and review date(s), required delivery date, promised delivery date, date received, date checked and general remarks.
- 1.6.4 Accumulate and submit similar records from Subcontractors and ensure that Subcontractors are properly and frequently expediting all equipment and material to meet delivery deadlines to suit installation schedule.

1.7 STORAGE, HANDLING AND PROTECTION

- 1.7.1 Handle and store Products in a manner to prevent damage, alteration, deterioration, and soiling, all in accordance with manufacturer's instructions.
- 1.7.2 Store packaged or bundled Products in original and undamaged condition with manufacturer's seal and labels intact. Do not remove from packaging or bundling until they are to be incorporated in the Work.
- 1.7.3 Store Products subject to damage from weather in weatherproof enclosures.
- 1.7.4 Store cementitious Products clear of earth or concrete floors, and away from walls.

- 1.7.5 Keep sand, when used for grout or mortar materials, clean and dry. Store sand on wooden platforms in well-drained area and cover with waterproof tarpaulins during inclement weather.
- 1.7.6 Store sheet materials, lumber and drywall on flat, solid supports and keep clear of ground. Slope to shed moisture.
- 1.7.7 Store and mix paints in heated and ventilated areas. Remove oily rags and other combustible debris from the site daily. Take every precaution necessary to prevent spontaneous combustion.
- 1.7.8 Remove and replace damaged Products at own expense and to the satisfaction of the Consultant.
- 1.7.9 Touch-up damaged factory finished surfaces to the Consultant's satisfaction. Use touch-up materials to match original. Do not paint over names plates.
- 1.7.10 Review storage locations with the Consultant. Locations shall be coordinated with the on-going operations of the Facility.

1.8 TRANSPORTATION

- 1.8.1 Pay the cost of transportation of products required in performance of the Works.

1.9 MANUFACTURER'S INSTRUCTIONS

- 1.9.1 Unless otherwise indicated in the specifications, install or erect Products in accordance with manufacturer's instructions. Do not rely on labels or enclosures provided with Products. Obtain written instructions directly from manufacturers.
- 1.9.2 Notify the Consultant in writing of conflicts between Specifications and manufacturer's instructions within three (3) Working days of discovery. The Consultant will clarify or establish the most appropriate solution to the conflict.
- 1.9.3 Improper installation or erection of Products, due to failure in complying with manufacturer's instructions, authorizes the Consultant to require removal and re-installation at no increase in the Contract Price and at no change to the Contract time.

1.10 COORDINATION

- 1.10.1 Ensure the cooperation of all work in the layout of the Works. Maintain efficient and continuous supervision over the entire Works.

- 1.10.2 Be responsible for construction and placement of openings, sleeves, accessories, and any materials or work necessary to fully coordinate all the Works outlined in the Specifications.
- 1.10.3 Before installation, inform the Consultant of all potential interferences and complete installation as directed by the Consultant.

1.11 CONCEALMENT

- 1.11.1 In finished areas, conceal pipes, ducts and wiring in floors, walls and ceilings or as indicated in the Contract Documents and drawings.
- 1.11.2 Before installation, inform the Consultant if there is interference. Install as directed by the Consultant.

1.12 REMEDIAL WORK

- 1.12.1 Perform remedial Work required to repair or replace parts or portions of the Work identified as defective or unacceptable. Coordinate adjacent affected Work as required.
- 1.12.2 Perform remedial Work by specialists familiar with materials affected. Perform in a manner to neither damage nor put at risk any portion of the Work.

1.13 LOCATION OF FIXTURES

- 1.13.1 Consider location of fixtures, outlets and mechanical and electrical items indicated as approximate and fully coordinate their final placement and positioning.
- 1.13.2 Where in doubt, or in the case of potential interferences, inform the Consultant and install as directed.

1.14 MATERIAL FASTENERS

- 1.14.1 Provide material fastenings and accessories in same texture, colour and finish as adjacent materials, unless indicated otherwise.
- 1.14.2 Prevent electrolytic action between dissimilar metals and materials.
- 1.14.3 Use non-corrosive hot dip galvanized steel fasteners and anchors for securing Work, unless stainless steel or other materials are specifically requested in the affected Specifications.
- 1.14.4 Space anchors within the individual load limit or shear capacity and ensure that they provide positive permanent anchorage. Wood or any other organic material plugs are not acceptable.

- 1.14.5 Keep exposed fastenings to a minimum, space evenly and install neatly.
- 1.14.6 Fastenings that cause spalling or cracking of material to which anchorage is made are not acceptable.

1.15 EQUIPMENT ANCHORAGE

- 1.15.1 Use anchors of standard commercial sizes and patterns with material and finish suitable for service.
- 1.15.2 Use heavy hexagon head bolts, semi-finished unless otherwise specified. Use Type 316 stainless steel for exterior, wet or damp areas, unless specified otherwise.
- 1.15.3 Bolts shall not project more than one diameter beyond nuts.
- 1.15.4 Use plain type washers on equipment, sheet metal and soft gasket lock type washers where vibrations occur. Use resilient washers with stainless steel.

1.16 CONTRACTOR FURNISHED PRODUCTS

- 1.16.1 Inspect equipment during manufacture where possible. Inform the Consultant of manufacturer's progress and arrange for the Consultant to visit equipment manufacturer's plant when requested. Action taken as a result of factory inspection shall not be construed as final acceptance.
- 1.16.2 Where inspection and testing of Products is carried out at the premises of Suppliers, submit Test Reports to the Consultant. Repair or replace items with defects revealed as a result of inspection or tests.

1.17 BASIS OF PAYMENT

- 1.17.1 The Contract Price shall include compensation in full for labour, material, equipment, power workmanship, and all other costs associated with this section.

1.18 MEASUREMENT FOR PAYMENT

- 1.18.1 The measurement of payment is a lump sum for all Work required under this Specification.
- 1.18.2 Payment for Product(s) shall be based on receipt of equipment at the Place of Work and shall not exceed 80% of the line value until such time as equipment is installed and tested.

2 PRODUCTS – N/A

CITY OF HAMILTON

C13-32-24

DUNDAS WASTEWATER TREATMENT
PLANT (WWTP) HEALTH AND SAFETY
IMMEDIATE NEEDS AND STRUCTURAL
REPAIR UPGRADES

01610

MATERIALS AND EQUIPMENT

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3 EXECUTION – N/A

4 SUPPLEMENTS – N/A

END OF SECTION

SECTION 01630 – SUBSTITUTIONS AND ALTERNATIVES

1 GENERAL

1.1 GENERAL REQUIREMENTS

- 1.1.1 The Contractor and its Subcontractors shall comply with the requirements in this section. Each section within the specifications is related and shall be read in conjunction with one another.
- 1.1.2 Substitution or alternatives submissions will be received only after Contract award from the General Contractor and not any Subcontractors or Suppliers.
- 1.1.3 The Contractor shall demonstrate the overall financial and/or time savings associated with any proposed substitutions. The City and the Consultant reserve the right to reject any proposed substitutions.

1.2 REFERENCES

- 1.2.1 These Specifications form an integral part of the Contract Documents.
- 1.2.2 Refer also to all other parts of the Contract Documents to determine their effect on the Work of each section of these Specifications.
- 1.2.3 The requirements of this section and Division 1 apply to and govern the Work under other divisions.
- 1.2.4 Comply with the latest edition of all other applicable statutes, standards, codes and regulations and all amendments thereto.

1.3 SUBMITTALS

- 1.3.1 Submittals shall be in accordance with [Section 01330 – Submittals] and this section.
- 1.3.2 Substitution or alternative solutions for any specified or designated material or equipment will only be made upon written approval of the Consultant in accordance with this section.
- 1.3.3 Substitute or alternative Products may be accepted by the Consultant if sufficient information is submitted by the Contractor to allow the Consultant to determine if the proposed Products are equivalent or equal to the named Products. The Contractor shall include the following information in their substitution or alternative application(s):
 - .1 Certify that the proposed substitute or alternative will meet or exceed the requirements of the Contract Documents.

- .2 Certify that the proposed substitute or alternative is equivalent to the specified item and is suited for the same use as the specified item.
 - .3 Associate proposed substitute or alternative with the relevant Specification Section and / or drawing number in the Contract Documents.
 - .4 Expected time of delivery for the substitute Product.
 - .5 Indicate maintenance, repair, and replacement services availability for the proposed substitutes. Indicate if the substitute manufacturer has a certified local service agency that maintains properly trained personnel and adequate spare parts and is able to respond and complete the repair within 24 hours.
 - .6 Any requirement for modified piping, controls, electrical, structural or any other item required for the complete installation and commissioning of the proposed Product.
 - .7 If incorporation or use of a substitute or alternative in connection with Work is subject to payment of any license fee or royalty.
 - .8 An itemized cost estimate that will result directly or indirectly from the acceptance of such substitute, including but not limited to the cost of redesign, construction, and claims by other contractors affected by the resulting change.
- 1.3.4 Failure to provide the above noted information will result in an automatic rejection of the proposed alternate.
- 1.3.5 The Contractor shall reimburse (by means of contract change order credit) the City for the charges of the Consultant for any additional reviews of the proposed substitution or alternative after the first and any engineering modifications required to accommodate the proposed alternative.
- 1.3.6 The Consultant is the sole judge of the type, function, and quality of the substitute or alternative Product. The City's decision regarding any substitution or alternative suggested by the Contractor shall be final.
- 1.3.7 The Consultant may require the Contractor to furnish at the Contractor's expense, additional data about the proposed substitute or alternative Product.
- 1.3.8 The City may require the Contractor to furnish at the Contractor's expense, a special performance guarantee, additional Product warranty period or other surety with respect to the substitute or alternative.
- 1.3.9 Acceptance of the substitute or alternative by the Consultant shall not relieve the Contractor of its responsibility for full compliance with the Contract Documents and for the adequacy of the substitute or alternative Product.

- 1.3.10 The Contractor will be responsible for all resultant changes, associated with any Product substitution or alternative solution, including but not limited to design and construction changes and their associated design and construction fees.
- 1.3.11 The Contractor shall assure that the accepted equipment and materials fit and match adjacent spaces, equipment, and materials. Any requirement for modified piping, controls, electrical, structural or any other item required for the complete installation and commissioning of any proposed alternative shall be included in the overall financial savings offered to the City.
- 1.3.12 The Contractor shall assume all liabilities and additional costs that may subsequently arise as a result of accepted substitution or alternative.
- 1.3.13 Evaluation and acceptance of proposed substitute or alternative shall not prejudice the Contractor's achievement of Substantial Performance of the Work on time.

1.4 BASIS OF PAYMENT

- 1.4.1 The basis of payment for any Product substitution shall comply with the requirements of the applicable specification section.
- 1.4.2 Any changes caused by a Product substitution or alternative solution shall be at no cost to the City.

1.5 MEASUREMENT FOR PAYMENT

- 1.5.1 N/A

2 PRODUCTS – N/A

3 EXECUTION – N/A

4 SUPPLEMENTS – N/A

END OF SECTION

SECTION 01640 – MANUFACTURERS' SERVICES

1 GENERAL

1.1 DEFINITIONS

- 1.1.1 Person-Day: One person for eight (8) hours within regular Contractor working hours.

1.2 SUBMITTALS

- 1.2.1 Submit Training Schedule and Lesson Plans in accordance with [Section 01330 – Submittals].

1.2.2 Informational Submittals:

- .1 Training Schedule: Submit schedule of time and dates to City's staff at least fifteen (15) Working Days prior to designated training dates and revise as necessary for acceptance.
- .2 Lesson Plans: Submit proposed lesson plan at least fifteen (15) Working Days prior to scheduled training and revise as necessary for acceptance.
- .3 Operation and Maintenance Manual shall be submitted as specified in Section 01800 – Operation and Maintenance Data.
- .4 Training Session Video Recordings: Furnish the City with a digital video file recording of the training sessions, appropriately labeled and including presentation materials through USB, internet-based file transfer service or the City's SharePoint Project site. Training submittals shall be submitted as specified in Section 01820 – Demonstration and Training.

1.3 QUALIFICATION OF MANUFACTURER'S REPRESENTATIVE

- 1.3.1 Authorized representative of the manufacturer, factory trained, and experienced in the technical applications, installation, operation, and maintenance of respective equipment, subsystem, or system. The manufacturer's representative cannot be a sales representative unless the individual(s) are capable of conducting applicable technical training. Additional qualifications may be specified elsewhere.
- 1.3.2 Representative subject to acceptance by the City and the Consultant. No substitute representatives will be allowed unless prior written approval by such has been given.

2 PRODUCTS – N/A

3 EXECUTION

3.1 FULFILLMENT OF SPECIFIED SERVICES

- 3.1.1 Furnish manufacturers' services when required by an individual specification section, to meet the requirements of this Section.
- 3.1.2 For the pump and soft starter manufacturers, coordinate the manufacturers' services outlined in the specifications. Where time is necessary in excess of that stated in the Specifications for manufacturers' services, or when a minimum time is not specified, the time required to perform the specified services shall be considered incidental.
- 3.1.3 Schedule manufacturer's services to avoid conflict with other on-site testing or other manufacturers' on-site services.
- 3.1.4 Determine, before scheduling services, that all conditions necessary to allow successful testing have been met.
- 3.1.5 Only those days of service approved by the Consultant will be credited to fulfill the specified minimum services.
- 3.1.6 Unless otherwise specified in the individual specification sections, manufacturer's on-site services shall include:
 - .1 Assistance during Product (system, subsystem, or component) installation to include observation, guidance, instruction of the Contractor's assembly, erection, installation or application procedures.
 - .2 Inspection, checking, and adjustment as required for product (system, subsystem, or component) to function as warranted by manufacturer and necessary to furnish Manufacturer's Certificate of Proper Installation.
 - .3 On-site assistance during Pre-Site Acceptance Testing (Pre-SAT) and/or I/O checks. If multiple Pre-SATs are required, the manufacturer (e.g., pump manufacturer) will be required to be on site for all pre-SATs.
 - .4 On-site assistance during Site Acceptance Testing (SAT, functional and performance testing, and facility start-up and evaluation). The Contractor will be required to have the manufacturer on site and the test requirements will include any items confirmed in the Pre-SAT. The Contractor and Subcontractor are to be aware of this requirement as items in the field can change between Pre-SAT completion and the final SAT.
 - .5 Training of the City's personnel in the operation and maintenance of respective product as required.
 - .6 See individual specification sections for further details.
- 3.1.7 Other onsite services by the manufacturer may include:

- .1 Revisiting the site as required to correct problems and until installation and operation are acceptable to the Consultant.
- .2 Resolution of assembly or installation problems attributable to or associated with, respective manufacturer's products and systems.
- .3 Additional requirements as may be specified elsewhere.
- .4 Manufacturer shall sign off on Red Tag that equipment meets requirements (in accordance with the City's Transfer of Assets procedure) and sign off on required documentation (e.g. calibration sheets, start up sheets).

3.2 MANUFACTURER'S CERTIFICATE OF COMPLIANCE

- 3.2.1 When specified in individual Specification section, submit prior to shipment of product or material.
- 3.2.2 The Consultant may permit use of certain materials or assemblies prior to sampling and testing if accompanied by accepted certification of compliance.
- 3.2.3 Signed by product manufacturer certifying that product or material specified conforms to or exceeds specifications. Attach supporting reference data, affidavits, and certifications as appropriate.
- 3.2.4 May reflect recent or previous test results on material or product, if acceptable to the Consultant.

3.3 MANUFACTURER'S CERTIFICATE OF PROPER INSTALLATION

- 3.3.1 When so specified, a Manufacturer's Certificate of Proper Installation form, a copy of which is attached to this section, shall be completed, and signed by the equipment manufacturer's representative.
- 3.3.2 Such form shall certify that the signing party is a duly authorized representative of the manufacturer, is empowered by the manufacturer to inspect, approve, and operate their equipment and is authorized to make recommendations required to assure that the equipment is complete and operational.

3.4 VIDEO RECORDING

- 3.4.1 The City may themselves record or retain the services of a commercial videotaping service to record each training session. After taping, the material may be edited and supplemented with professionally produced graphics to provide a permanent record.

- 3.4.2 The Contractor shall advise all manufacturers providing training sessions that the material may be video recorded, and they must be available to participate in the video training.

4 SUPPLEMENTS – N/A

END OF SECTION

SECTION 01705 – HEALTH AND SAFETY

1 GENERAL

1.1 GENERAL REQUIREMENTS

- 1.1.1 The Contractor and its Subcontractors shall comply with the requirements in this section. Each section within the specifications is related and shall be read in conjunction with one another.

1.2 REFERENCES

- 1.2.1 These Specifications form an integral part of the Contract Documents.
- 1.2.2 Refer also to all other parts of the Contract Documents to determine their effect on the work of each section of these Specifications.
- 1.2.3 The requirements of this section and Division 1 apply to and govern the work under other divisions.
- 1.2.4 Comply with the latest edition of the following statutes, standards, codes and regulations and all amendments thereto:
- .1 OSHA and all applicable Regulations
 - .2 All other applicable statutes, standards, codes, regulations and industry best practices relating to health and safety.

1.3 SUBMITTALS

- 1.3.1 Submit Health and Safety Plan in accordance with [Section 01330 – Submittals].
- 1.3.2 The Contractor shall prepare and submit a site-specific Health and Safety Plan based on site specific safety hazard assessment and shall be made available for discussion during the Pre-Construction meeting.

1.4 CONTRACTOR RESPONSIBILITY

- 1.4.1 The Contractor shall perform site specific safety hazard assessment related to site. Hazard assessments for different building on site can be provided and are only provided for information purposes. The contractor will be responsible for completing their own hazard assessment as specified in the contract documents.

- 1.4.2 The Contractor shall complete a site-specific Health and Safety Plan based on site specific safety hazard assessment prior to commencing any site Work and continue to review, implement, maintain, and enforce the plan until final demobilization from site. The Plan shall be in accordance with the Contractor's health and safety policy and OHSA and its regulations and shall be made available on site throughout the duration of the Contract.
- 1.4.3 Be solely responsible for safety of the Work under this Contract and for complying with and ensuring that every person on the site complies with the health and safety requirements contained within the Contract documents and regulatory requirements.
- 1.4.4 Perform the Work or ensure that it is performed, in a manner to avoid risk of injury, security or damage to persons or property, adjacent property, or the environment.
- 1.4.5 Enforce the use of personal protective equipment by all employees, subcontractors, and visitors as per the applicable regulatory requirements and the site-specific Health and Safety Plan.
- 1.4.6 The Contractor and affected parties shall comply with all applicable federal, provincial, and local statutes, regulations, and ordinances, and with the City's site-specific Plant Operations Contractor Health and Safety Program.
- 1.4.7 Provide the required notification regarding the project to all health and safety, and labour, authorities and agencies required prior to initiation of the Work.
- 1.4.8 In the event of conflict between any provisions of above authorities, the most stringent provision shall govern.
- 1.4.9 The Contractor shall be designated as the "Constructor" as defined by OHSA and all applicable Regulations of Ontario.
- 1.4.10 The Contractor shall provide health and safety orientation training seminars, as deemed necessary by the Contractor's health and safety policy, to all personnel working for the Contractor, and subcontractors, as required by the Contractor.
- 1.4.11 The Contractor and its subcontractors must participate in the City's Plant Operations Contractor Health and Safety Program Orientation. This is to be completed electronically and on a yearly basis, by the Contractors Project Manager, Site Superintendent, and Health & Safety Manager/Coordinator and any other applicable staff.

- 1.4.12 Components of the City's Plant Operations Contractor Health and Safety Program Orientation shall be included in the Contractors site specific H&S program at their discretion.
- 1.4.13 Meetings to be conducted in accordance with [Section 01315 – Project Meetings].

1.5 HEALTH AND SAFETY COORDINATOR

- 1.5.1 The Contractor shall employ and assign a competent and authorized representative as Health and Safety Coordinator with working knowledge of Occupational Health and Safety Act and its regulations and shall be responsible for implementing, enforcing daily and monitoring the site-specific Contractor's Health and Safety Plan. The Contractor is expected to ensure this trained representative is onsite during important activities.

1.6 POSTING OF DOCUMENTS

- 1.6.1 Ensure applicable items, articles, notices and orders are posted in conspicuous location(s) on site in accordance with Acts and Regulations of Ontario having jurisdiction, and in consultation with the Consultant.

1.7 SAFETY EQUIPMENT

- 1.7.1 Ensure workers on the jobsite use Personal Protective Equipment (PPE) appropriate to the hazards identified in the site specific Health and Safety Plan and those workers are trained in the proper care, use, and maintenance of such equipment.
- 1.7.2 PPE selections shall be based on an evaluation of the performance characteristics of the PPE relative to the requirements and limitations of the site, task-specific conditions, duration and hazards and potential hazards identified on site.
- 1.7.3 Provide safety equipment such as ropes, fall protection equipment, portable combustible/hazardous gas and oxygen depletion/enrichment gas detectors for the use of the Consultant and the City's site staff. Provide assistance to the Consultant and the City's site staff when confined space entries are required. The Consultant and the City's staff are not permitted to enter such areas alone.

1.8 UNFORESEEN HAZARDS

- 1.8.1 Should any unforeseen or peculiar safety-related factors, additional hazards or site altering conditions become evident during performance of the Work, follow procedures in place for Employee's Right to Refuse Work in accordance with OHSA. Immediately advise the Consultant verbally and in writing of any issues. The Contractor is responsible to review and revise the site-specific Health and Safety Plan and provide additional training as required.

1.9 WORK IN HAZARDOUS AREAS

- 1.9.1 Work shall be performed by a competent worker as defined by OHSA and all applicable Regulations of Ontario.
- 1.9.2 Before commencing the day's Work and while working in areas which may contain an explosive, toxic or oxygen deficient atmosphere test for explosive or toxic gases, or oxygen deficiency. If a hazardous condition is found, make the Work area safe in accordance with applicable safety regulations, statutes and best safety practices before commencing or continuing Work .
- 1.9.3 Where an explosive, toxic or oxygen deficient/enriched atmosphere potential exists, test for explosive or toxic gases (i.e. fluoride, chlorine), or oxygen deficient/enriched atmosphere with an appropriate monitor. If a hazardous condition is found, make the Work area safe in accordance with applicable safety regulations, statutes and best safety practices before commencing or continuing Work.
- 1.9.4 Post warning signs at hazardous areas or where hazardous materials are stored, and install protective barriers. Instruct personnel in proper safety procedures. Inform the City and the Consultant of these materials. The Contractor shall ensure that these materials are not kept stored or used on site without the City's prior consent or approval.
- 1.9.5 Identify all areas considered to be hazardous locations and comply with all requirements of the Ministry of Labour.

1.10 HAZARDOUS MATERIALS SURVEY

- 1.10.1 Refer to the Site/Facility General Hazard Assessment and any applicable SDS.

1.11 HAZARDOUS EVENT PROCEDURE

- 1.11.1 Should a hazardous event occur where an alarm is triggered and/or emergency evacuation occurs, the Consultant and the City shall be notified immediately.

1.12 WORKING AT HEIGHTS

- 1.12.1 Ensure that fall protection devices are used by all workers working at heights in accordance with Acts and Regulations of Ontario having jurisdiction, and in consultation with the Consultant, where alternate fall protection systems are not provided in accordance with OHS.A.
- 1.12.2 All workers performing Work at Heights and who will be required to utilize a fall protection device shall be trained in a fall protection program certified by the MOL in accordance with the OHS.A.

1.13 WORK IN CONFINED SPACE

- 1.13.1 Hazardous locations are to be classified and managed as Confined Spaces (as defined by O. Reg. 628/05, OHS.A). All Work and entry into the identified Confined Spaces is to be done in accordance with the Regulation (O. Reg. 628/05).
- 1.13.2 Where workers are required to enter a confined space, as defined by the OHS.A, O. Reg. 632/05 Section 221.2, ensure that workers of the Contractor and all subcontractors follow the requirements of the above legislation, including but not limited to:
 - .1 Having a method for recognizing each confined space to which the program applies
 - .2 Having a method for assessing the hazards to which workers may be exposed
 - .3 Having a method for the development of confined space entry plans (which include on-site rescue procedures)
 - .4 Having a method for training workers
 - .5 Having an entry-permit system.
- 1.13.3 The Contractor is responsible for all confined space entry permitting, hazard assessments, entry, coordination documents, rescue planning and control of access to the confined space in accordance with applicable regulations.
- 1.13.4 The Contractor shall maintain all appropriate documentation required under the regulation and provide daily copies to the Consultant.
- 1.13.5 The Contractor shall supply all required safety, control and personal protective equipment required for confined space entry operation, including, but not limited to entry and rescue equipment, atmosphere monitors and breathing apparatus/respiratory protection.
- 1.13.6 The Contractor shall ensure that all workers entering or interacting with the identified confined spaces are appropriately trained and that proof of training is supplied to the City.

- 1.13.7 The Contractor shall make provisions for the Consultant to enter the identified confined spaces, if needed and as required, under the Contractor's confined space entry permits and plans with one (1) days notice (or less under emergency conditions).

1.14 BLASTING

- 1.14.1 Blasting or other use of explosives is not permitted without prior receipt of written instruction by the Consultant.
- 1.14.2 Authorized blasting shall be completed in accordance with all applicable federal, provincial, and local codes and regulations and shall be coordinated through the City.

1.15 POWDER ACTUATED DEVICES

- 1.15.1 Use powder actuated devices only after receipt of written permission from the Consultant.

1.16 CORRECTION OF NON-COMPLIANCE

- 1.16.1 Immediately address health and safety non-compliance issues identified by authority having jurisdiction or by the Consultant.
- 1.16.2 Provide the Consultant with written report of action taken to correct non-compliance of health and safety issues identified.
- 1.16.3 The Consultant may stop Work if non-compliance of health and safety regulations is not corrected.

1.17 BASIS OF PAYMENT

- 1.17.1 The Contract Price shall include compensation in full for labour, material, equipment, power workmanship, and all other costs associated with this section.

1.18 MEASUREMENT FOR PAYMENT

- 1.18.1 The measurement of payment is a lump sum for all Work required under this Specification.
- 1.18.2 Payment shall be prorated on a monthly basis for the duration of the Contract.

2 PRODUCTS – N/A

3 EXECUTION – N/A

4 SUPPLEMENTS

4.1 SUPPLEMENTAL DOCUMENTS

4.1.1 The supplements listed below, and following the “End of Section”, form part of this specification section:

- .1 Section 01705A - Site/Facility General Hazard Assessment
- .2 Section 01705B – Site DSS

END OF SECTION



Hamilton

PUBLIC WORKS DEPARTMENT

City of Hamilton
Water & Wastewater – Plant Operations
700 Woodward Avenue
Hamilton, Ontario L8H 6P4
www.hamilton.ca
P. 905-546-2424
F. 905-546-2569

To be completed by the Project Manager, Plant Operations Representative or Health and Safety Coordinator and communicated to the Consultant, Contractor or Service Provider prior to work commencing.

FACILITY/SITE GENERAL HAZARD ASSESSMENT

Location: Filter Building (DSFIL) Tertiary Treatment/Effluent Filtration - 135 King St. E., Dundas – Dundas WWTP
Provided to (Person / Company Name):

Assessment Completed By: Adriano La Vella

Date of Assessment (DD/MM/YY): 28/10/16

IDENTIFY ALL KNOWN HAZARDS EXISTING AT THE TIME OF THE HAZARD ASSESSMENT
(checkbox check off if applicable. Any items checked require mandatory comment)
Table with hazard categories and checkboxes.
Additional / Mandatory Comments:
• Three (3) Exterior hatches to tanks
• Locked electrical room; 600 V, 600 A, 3ph, 3w, 60 HZ
Minimum PPE: [x] Hard Hat [x] Work Boots [] Safety Vest [] Work Gloves [] Other:

This form lists potential hazards that exist or may exist at the Work Site at the time of the completion of this hazard assessment. The above list is not comprehensive and changes to the Work Site may occur subsequent to the completion of this form. The Contractor/Consultant must perform his or her own assessment of potential hazards prior to the commencement of work. The intent of this form is to promote hazard awareness and accident prevention but it is not a substitute for your ongoing vigilance regarding hazards which are not listed.

For the purposes of the work that you are required to complete, you will need to assess the areas to determine if they meet the definition of a Confined Space per the Occupational Health and Safety Act and implement the appropriate procedures and controls as determined by your company.

By signing this form, I acknowledge the hazards outlined above in this pre-work hazard assessment, willingly assume the risks of working in this hazardous environment, and agree to take every precaution reasonable in the circumstances to protect employees from the hazards listed at all times. I will Comply with all requirements under the Occupational Health and Safety Act and Regulations and ensure that our own hazard assessment is conducted and the appropriate controls put in place prior to work commencing.
Name and Title of Authorized Representative (Please Print):
Signature of Authorized Representative: Date and Time:



Dundas WWTP Digester Building

Designated Substance Audit Report

Project Location:

135 King Street East, Dundas, ON

Prepared for:

City of Hamilton
28 James Street North, Hamilton, ON

Prepared by:

MTE Consultants
1016 Sutton Drive, Unit A,
Burlington, ON L7L 6B8

October 6, 2020

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MTE File No.: 48174-100





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1.0 Introduction

MTE Consultants Inc. (MTE) was retained by the City of Hamilton (the Client) to conduct a Designated Substance Audit for the Digester Building of the Dundas Waste Water Treatment Plant located at 135 King Street East in Dundas, Ontario.

The purpose of the audit was to identify the presence of Designated Substances within the building(s) in accordance with Section 30 of the Occupational Health & Safety Act (OHSA), in advance of building renovation. This report meets the requirements of Section 30 of the OHSA and the requirements of Ontario Regulation (O. Reg.) 278/05.

2.0 Scope of Work

The Scope of Work for this assessment was completed by MTE and included the following activities:

- Visual inspection of all accessible areas within the building and all accessible exterior finishes and elements to identify the following suspect Designated Substances and Hazardous Building Materials:
 - Asbestos;
 - Lead
 - Mercury;
 - Silica;
 - Mould growth;
 - Ozone Depleting Substances; and
 - Polychlorinated Biphenyls limited to fluorescent light ballasts.
- The following Designated Substances are not expected to be present due to the building use or in a form that is hazardous: Acrylonitrile, Arsenic, Benzene, Coke Oven Emissions, Ethylene Oxide, Isocyanates, and Vinyl Chloride;
- Collection of bulk building material samples suspected to contain asbestos;
- Collection of paint scrape samples suspected to contain lead;
- Collection of bulk mould samples of materials that are suspected of mould growth;
- Submission of samples to an accredited and/or qualified laboratory;
- Interpretation of laboratory results; and
- Preparation of this report of findings and recommendations.

3.0 Methodology and Assessment Criteria

This audit was conducted using visual and laboratory identification methods for the assessment of materials outlined in Section 2.0 and their corresponding location and use. Materials that are determined to be asbestos-containing materials (ACM) are further classified by their friability and condition. The areas outlined in Section 2.0 were inspected and limited to building components, materials and service connections. Notwithstanding that reasonable attempts were made to identify all Designated Substances, the possibility of concealed substances and material exists and may not become visible until substantial demolition has occurred and

therefore are currently undocumented. All work was conducted in accordance with industry accepted methods and MTE Standard Operating Procedures and did not include the following:

- Materials indicated in this report as “Potentially Concealed”;
- Locations that may be hazardous to the surveyor (located at heights, electrical equipment, confined spaces);
- Where invasive inspection could cause consequential damage to the property or impair the integrity of the equipment, such as roof system, sealants, exterior finishes, underground services or components of mechanical equipment;
- Locations concealed by building finishes that require substantial demolition or removal for access or determination of quantities (plumbing or electrical lines);
- Non-permanent items or personal contents, furnishings; and
- Settled dust or airborne agents unless otherwise stated.

4.0 Assessment and Results

An inspection of the building was conducted by MTE on September 21, 2020. MTE returned to the Site on Oct 20, 2020 to conduct sampling of roofing materials.

A description of the building and assessed finishes is provided below. Refer to Section 4.1 for a summary of findings.

Item	Description
Exterior Finishes	Concrete Stucco Brick and Mortar Sealants
Building Structure	Concrete
Building Insulations	None Identified
Mechanical Systems/Insulations	Fibreglass duct insulation with canvas wrap Fiberglass insulation on pipes
Electrical/Plumbing Systems	Fluorescent Light tubes and light ballasts
	Solder on copper pipe joints
Floor Finishes	Concrete
Wall Finishes	Concrete Plaster
Ceiling Finishes	Plaster Concrete

4.1 Findings and Analytical Results

A summary of sampling locations and analytical results are included in **Appendix A**.

Laboratory certificates of analysis are included in **Appendix B**.

A photographic log of Site conditions is included in **Appendix C**.

Figures of inspected areas are included in **Appendix D**.

A detailed summary of findings and recommended actions is provided in **Table 4.4 of Appendix A**.

4.1.1 Asbestos

Asbestos was used in building materials throughout the years with a peak usage in the 1950s and 1960s. While the manufacture of most ACM, was banned in the 1970s, buildings constructed in the 1980s have the potential for ACM as well. In 1986 legislation limiting the use of asbestos in consumer products was introduced.

As part of this inspection, a total of 21 bulk samples of suspect ACM were submitted for asbestos analysis with a total of 19 analyses being performed. The difference between the number of samples submitted and the number of samples analysed can be a function of either the stop-positive method or the requirement of analyzing multiple layers, performed by the laboratory, from a single sample reported as additional samples or subsets of a sample.

Bulk samples were submitted for asbestos analysis to Paracel Laboratories Ltd. (Paracel), in Mississauga, Ontario. Paracel is certified under the National Voluntary Laboratory Accreditation Program to perform asbestos analysis of bulk samples. Laboratory analysis was conducted in accordance with the United States Environmental Protection Agency (USEPA), Test Method EPA/600-R-93/116: Method for the Determination of Asbestos in Bulk Building Materials, June, 1993 by Polarized Light Microscopy (PLM) as prescribed by O. Reg. 278/05.

Based on the laboratory results and visual identification, ACM was confirmed present at the time of the inspection.

4.1.2 Lead

Lead was historically used in mortar pigments, ceramic glazing; plumbing solder, electrical equipment and electronics solder, in pipe gaskets as packing in cast iron bell and spigot joints of sanitary drains, flexible plumbing connections, flashing panels, acoustical dampeners, phone cable casing and some architectural applications. In buildings constructed after 1990, these applications are no longer applicable outside of specialized uses (shielding for medical imaging etc.).

As part of this inspection, a total of 9 paint scrape samples were collected from surfaces and represent the paint colours observed throughout the Site building.

Samples were submitted for laboratory analysis by ASTM D3335-85A "Standard Method to Test for Low Concentrations of Lead in Paint by Atomic Absorption Spectrophotometry" following MOE Method E3470 Inductively Coupled Plasma Optical Emission Spectrometry to Paracel Laboratories Ltd., in Hamilton, Ontario. Paracel is accredited by the Canadian Association of Laboratory Accreditation to perform bulk lead analysis of paint.

Based on the laboratory results and visual identification, lead-containing materials were confirmed present at the time of the inspection. In addition, lead-containing solder on copper pipe connections were observed.

4.1.3 Mercury

Mercury is typically used in building service applications such as fluorescent light tubes, compact fluorescent bulbs, metal halide (sodium halide) lamp bulbs, and neon lights as a vapour. Mercury may exist in thermostats and pipe or mechanical equipment thermometers as a liquid. Mercury is presumed to be present in the above materials.

Mercury-containing materials were visually identified at the time of the inspection.

4.1.4 Silica

Silica is present in rock, stone, soil, and sand. Masonry products such as concrete block, brick, and mortar, as well as concrete and associated products contain silica. Due to its ubiquitous nature, silica was historically used in a wide variety of building materials and is still used today in new construction.

Building materials that are presumed to contain silica were visually identified at the time of the inspection.

4.1.5 Mould

Water damaged building materials and suspect mould growth was identified during the inspection, and therefore bulk sampling was warranted.

Water damage was identified on the interior walls of the building, and suspect mould growth was identified on pipe wrap in multiple locations.

Bulk mould samples were submitted for laboratory analysis to Paracel Laboratories Ltd. (Paracel), in Mississauga, Ontario. Analysis included the identification to genus or group of all fungal spores present in the bulk sample.

Based on the laboratory results mould growth was confirmed present at the time of the inspection.

4.1.6 Polychlorinated Biphenyls (PCB)

Suspect PCB-containing light ballasts were visually identified during the inspection. All live electrical equipment that could not be properly and safely de-energized was not assessed, therefore light ballasts were not inspected. Light ballasts which were not accessed, will require additional investigation to determine their PCB content when removed from service.

4.1.7 Ozone-Depleting Substances (ODS)

ODS are chemical compounds that include chlorofluorocarbons (cfcs), hydrochlorofluorocarbons (hcfcs), halons, methyl bromide, carbon tetrachloride, hydrobromofluorocarbons, chlorobromomethane, and methyl chloroform which are widely used in cooling and refrigeration. The use of ODS is regulated under Ontario Regulation 463/10 *Ozone Depleting Substances and Other Halocarbons* Made under the Environmental Protection Act.

No building components presumed to contain ODS were identified at the time of the inspection.

4.2 Conclusions and Recommendations

A detailed summary of recommended actions is provided in **Table 4.3 of Appendix A**.

In accordance with Section 30 of OHSA and Section 8 of O. Reg. 278/05 the owner must provide a copy of this report to all contractors doing work at the building. The owner must also provide a copy of this report to all prospective contractors.

Should any additional suspect Designated Substances be discovered during building renovation demolition, work in the vicinity should cease and the materials should not be disturbed until proper notification, testing and abatement instructions are provided. All waste generated as a result of any and all work at the Site must be handled, transported and disposed of in accordance with Ontario Regulation 347 made under the Environmental Protection Act and local by-laws. Based on the assessment findings and analytical results, the following abatement measures are presented. It should be noted that the recommended actions are the minimum required actions, as prescribed by the appropriate Acts, regulations, guidelines, standards, codes and general best practice measures.

4.2.1 Asbestos

ACMs were identified during the assessment. If these materials, including those deemed or suspected, will be disturbed, or will likely be disturbed, during building maintenance, renovations, construction, or demolition activities, they must be handled and disposed of in accordance with the procedures prescribed by O. Reg. 278/05.

At the time of the audit, all ACM at the building was noted to be in good condition and no abatement action is required at this time.

4.2.2 Lead

Lead-containing paint, and lead-containing solder on plumbing connections were identified. As such special requirements for the management, handling and disposal of lead-containing materials by the owner, constructor, contractor, sub-contractors and workers apply. The abatement contractor should consult Environmental Abatement Council of Ontario's (EACO) *Lead Guideline for Construction, Renovation, Maintenance or Repair (October 2014)* for the procedures and methods required to remove and dispose of lead-containing materials.

Low level lead-containing paint is present and the following general procedures are recommended as a precautionary measure as per Environmental Abatement Council of Ontario's (EACO) *Lead Guideline for Construction, Renovation, Maintenance or Repair (October 2014)*:

- General dust control;
- The washing of hands and face at on-site facilities;
- No smoking, eating, chewing gum or drinking in the work area; and
- No removal of painted surfaces by means of abrasive blasting.

4.2.3 Mercury

Mercury-containing materials were identified. All mercury containing materials or sources should be removed, intact, prior to any work which may disturb or damage them and cause worker exposure to mercury liquid and/or vapour.

On-site crushing of mercury-containing materials should not occur. Care should be taken to ensure safe storage of the above until recycling or disposal can be coordinated. Under current legislation, mercury waste requires handling and disposal in accordance with Ontario Regulation 490/09 of the OHSA and Ontario Regulation 347 of the Environmental Protection Act.

4.2.4 Silica

Silica is presumed to be present; therefore, special requirements for management and handling are required. The contractor should also consult MOL Occupational Health and Safety Branch's Guideline: *Silica on Construction Projects* (April 2011) for the procedures and methods required to remove and dispose of silica-containing materials.

4.2.5 Mould

Mould growth requires remediation in accordance with current industry standards to protect occupant and worker health and safety. Mould removal should be conducted in advance of maintenance, renovation, construction or demolition activities. All remedial activities must be conducted following the Environmental Abatement Council of Ontario (EACO) *2015 Mould Abatement Guidelines* or other industry accepted standard.

It should be noted that the passage of time can alter conditions as they existed at the time the assessment and future water intrusions, water damage and associated mould growth may occur. Immediate response to future water intrusions by a professional consultant or restoration contractor is recommended.

4.2.6 Polychlorinated Biphenyls (PCB)

Suspect PCB-containing fluorescent light ballasts were identified but could not be conclusively classified as PCB-containing or non-PCB-containing.

It is the responsibility of the owner to inspect, or ensure the inspection of all light ballasts as they are removed from service to make certain they are properly classified as PCB-containing or non-PCB containing. Fixtures will require dismantling to access date stamps (located on the back of the ballast) in order to be correctly classified in accordance with Environment Canada's document "*Identification of Lamp Ballasts Containing PCBs, Report EPS 2/CC/2 (revised), August 1991*".

Statutory Orders and Regulations (SOR)/2008-273, the *PCB Regulations*, made under the *Canadian Environmental Protection Act*, permits continued use of in-service PCB-containing light ballasts until the end of service life or until December 31, 2025.

4.2.7 Ozone Depleting Substances (ODS)

No building components presumed to contain ODS were identified and no special requirements for management, handling and disposal by the owner, constructor, contractor, sub-contractors and workers apply.

5.0 Limitations

Services performed by **MTE Consultants Inc.** (MTE) were conducted in a manner consistent with the level of care and skill ordinarily exercised by members of the Environmental Engineering & Consulting profession. No other representation expressed or implied as to the accuracy of the information, conclusions or recommendations is included or intended in this report.

This report was completed for the sole use of MTE and the Client. It was completed in accordance with the approved Scope of Work referred to in Section 2.0. As such, this report may not deal with all issues potentially applicable to the site and may omit issues that are or may be of interest to the reader. MTE makes no representation that the present report has dealt with all-important environmental features, except as provided in the Scope of Work. All findings and conclusions presented in this report are based on site conditions, as they existed during the time period of the investigation. This report is not intended to be exhaustive in scope or to imply a risk-free facility.

Any use which a third party makes of this report, or any reliance on, or decisions to be made based upon it, are the responsibility of such third parties. MTE accepts no responsibility for liabilities incurred by or damages, if any, suffered by any third party as a result of decisions made or actions taken, based upon this report. Others with interest in the site should undertake their own investigations and studies to determine how or if the condition affects them or their plans.

It should be recognized that the passage of time might affect the views, conclusions and recommendations (if any) provided in this report because environmental conditions of a property can change. Should additional or new information become available, MTE recommends that it be brought to our attention in order that we may re-assess the contents of this report.

All of which is respectfully submitted,

MTE Consultants Inc.

Yours Truly,

MTE Consultants Inc.



Michael VanRuyven, B.E.S, C.E.T, CRSP

Project Manager, Indoor Environments

905-639-2552 ext. 2433

mvanruyven@mte85.com

MJV:

M:\48174\100\Revised Oct 22, 2020\48174-100_Dundas WWTP Designated Substance Audit_2020-10-06_axd.docx

Appendix A

Tables

TABLE 4.1: BULK ASBESTOS SAMPLE SUMMARY TABLE

Sample #	Location	Material Description	Asbestos Results (Type %)	Is Material ACM
S01A	Ext. Door and Window Frames	Sealant	5% Chrysotile	Yes
S01B	Ext. Door and Window Frames	Sealant	NA	Yes
S01C	Ext. Door and Window Frames	Sealant	NA	Yes
S02A	Exterior Tank Walls	Stucco	ND	No
S02B	Exterior Tank Walls	Stucco	ND	No
S02C	Exterior Tank Walls	Stucco	ND	No
S03A	Interior Walls and Ceilings	Plaster	ND	No
S03B	Interior Walls and Ceilings	Plaster	ND	No
S03C	Interior Walls and Ceilings	Plaster	ND	No
S05A	Roof	Membrane Layer	ND	No
S05B	Roof	Membrane Layer	ND	No
S05C	Roof	Membrane Layer	ND	No
S06A	Roof	Vapour Barrier Layer	ND	No
S06B	Roof	Vapour Barrier Layer	ND	No
S06C	Roof	Vapour Barrier Layer	ND	No
S07A	Roof	Brown Vent Sealant	ND	No
S07B	Roof	Brown Vent Sealant	ND	No
S07C	Roof	Brown Vent Sealant	ND	No
S08A	Roof	Black Tar on Perimeter	ND	No
S08B	Roof	Black Tar on Perimeter	ND	No
S08C	Roof	Black Tar on Perimeter	ND	No

NA: Not Analyzed due to stop positive method **ND:** No asbestos fibres detected above the laboratory minimum detection limit

A bulk material sample containing 0.5% or more asbestos therefore establishes that material as asbestos-containing. In accordance with Table 1 of O. Reg. 278/05, a minimum number of samples for the material to be classified as non asbestos. A homogeneous material is defined by O. Reg. 278/05 "as material that is uniform in colour and texture". Homogeneous samples are identified by an alphabetical suffix to sample names to represent multiple samples of a homogeneous material. When a homogeneous material is analysed it is determined to be asbestos-containing upon the first positive detection of asbestos equal to or greater than 0.5%. Subsequent samples of the same material are therefore not analysed. Some bulk samples are comprised of multiple layers and as such will require multiple analysis. In such cases each layer is isolated at the laboratory and analysed individually to determine asbestos content. As a result the laboratory may report additional samples beyond the submitted number of samples or include multiple analyses as subsets within a sample.

TABLE 4.2: LEAD IN PAINT SAMPLE SUMMARY TABLE

Sample #	Location	Colour	Material	Lead Content (ug/g)	Classification
LP01	Floors and Railings	Grey	Paint on Concrete	32,900	Lead-Based
LP02	Tank Roof	White	Paint on Concrete	36	Low Level Lead-Containing
LP03	Interior Walls	Yellow	Paint on Plaster	23,600	Lead-Based
LP04	Interior Ceilings	White	Paint on Plaster	2,670	Lead-Containing
LP05	Doors	Orange	Paint on Doors	23,800	Lead-Based
LP06	Pipes	Red	Paint on Pipes	7,490	Lead-Based
LP07	Pipes	Green	Paint on Pipes	7,730	Lead-Based
LP08	Interior Walls	Cream	Paint on Plaster	2,160	Lead-Containing
LP9	Interior Walls	Brown	Paint on Plaster	2,160	Lead-Containing

"<": The samples analysed reported concentrations of lead to be less than 1000 ug/g and are therefore classified as low level lead-containing. However, no lead concentrations were reported above the sample specific laboratory detection limit.

As outlined in EACO's Lead Guideline for Construction, Renovation, Maintenance or Repair (October 2014), for the purpose of classifying surface coatings and mortars by laboratory analysis, any material containing lead at a concentration:

- Greater than 0.5% by weight (5,000 µg/g, mg/kg, ppm) is considered lead-based;
- Between 0.1 % and 0.5% by weight (1,000 to 5,000 µg/g, mg/kg, ppm) is considered lead-containing; or
- Less than 0.1% (1,000 µg/g, mg/kg, ppm) is considered low level lead-containing.

TABLE 4.3: BULK MOULD SAMPLE SUMMARY TABLE

Sample #	Location	Results	Is Mould Growth Present
BM01	Pipe Wrap - Basement	Stachybotrys, Cladosporium, and Aspergillus/Penicillium spores and/or propagules present.	Yes
BM02	Interior Wall - Main Room	ND	No
BM03	Interior Wall - Back Entrance	ND	No
ND - No fungal propagules detected, below limit of detection (LOD)			

Table 4.4 - Summary of Designated Substances and Recommended Actions

Dundas WWTP - Digester Building

Material	Location	Material Description	Management Requirements If No Impacts to Material	Recommended Actions If Material Will Be Or Likely Be Impacted By Maintenance, Renovation, Construction or Demolition Activities
Asbestos Non-Friable	Roof	Asbestos Cement Roof Vent Pipe	In place management in accordance with O. Reg. 278/05	Removal in accordance with O. Reg. 278/05 as a Type 1 Operation
Asbestos Non-Friable	Exterior Doors and Windows	Exterior Sealants	In place management in accordance with O. Reg. 278/05	Removal in accordance with O. Reg. 278/05 as a Type 1 Operation
Suspect Asbestos Non-Friable	Roof	Roofing Materials (Paper/Felts/Mastics/Sealants)	In place management in accordance with O. Reg. 278/05	Sample prior to maintenance/renovations/ construction/demolition activities and if confirmed ACM, removal in accordance with O. Reg. 278/05
Lead-Based Paint	Floors and Railings	Grey Paint	In place management in accordance with EACO's Lead Guideline	Removal as required prior to maintenance, renovations, construction or demolition activities in accordance with EACO's Lead Guideline as a: Class 1, Class 2A, Class 3A, or a Class 3B Operation If paint is not removed prior to disposal of building finishes, these materials require analysis of Leachable Lead according to Ontario Regulation 558/00. If confirmed or deemed hazardous, materials must then be manifested and disposed of off-site at a Ministry of Environment facility that is licensed to accept hazardous waste.
	Interior Walls	Yellow Paint		
	Doors	Orange Paint		
	Pipes	Red Paint		
	Pipes	Green Paint		
Lead-Containing Paint	Interior Ceilings	White Paint	In place management in accordance with EACO's Lead Guideline	Removal as required prior to maintenance, renovations, construction or demolition activities in accordance with EACO's Lead Guideline as a: Class 1, Class 2A, Class 3A, or a Class 3B Operation
	Interior Walls	Cream Paint		
	Interior Walls	Brown Paint		
Low Level Lead-Containing Paint	Tank Roof	White Paint	None	General hygiene procedures during renovation activities: <ul style="list-style-type: none"> • General dust control, • Washing of hands and face at on-site facilities, • No smoking, eating, chewing gum or drinking in the work area, and • No abrasive blasting

Table 4.4 - Summary of Designated Substances and Recommended Actions

Dundas WWTP - Digester Building

Material	Location	Material Description	Management Requirements If No Impacts to Material	Recommended Actions If Material Will Be Or Likely Be Impacted By Maintenance, Renovation, Construction or Demolition Activities
Lead	Throughout Interior of Building on Plumbing Connections	Lead Solder on Copper Pipe	In place management in accordance with EACO's Lead Guideline	Removal prior to renovation/demolition activities in accordance with EACO's Lead Guideline as a: Class 1 Operation
Mercury	Throughout Interior of Building in Light Fixtures	Fluorescent Light Tubes in Light Fixtures	None	Intact removal and storage with no on-site crushing and disposal of materials to a licensed facility
Silica	Throughout Interior and Exterior of Building	Brick and Mortar, Terrazzo, Stucco, Refractory Brick; Concrete, Ceramic Tile and Grout, Granite, Sandstone, Quartzite and Slate, Fill and Hardscaping	None	Conduct any work during renovation, demolition activities in accordance with the Ministry of Labour Guideline Silica on Construction Projects
Mould	Throughout Site on Pipe Wrap Materials	Black Mould Growth on Pipe Wrap Insulation	Removal in accordance with EACO 2015 Mould Abatement Guidelines	Removal in accordance with EACO 2015 Mould Abatement Guidelines
Potential PCBs	Light Fixtures Throughout	Fluorescent Light Ballasts in Light Fixtures	SOR/2008-273, the PCB Regulations, permits continued use of in-service PCB-containing light ballasts until the end of service life or until December 31, 2025	Assess Each Ballast Upon Removal From Service Appropriate storage and disposal of any PCB-containing ballasts in accordance with SOR/2008-273

Notes:

- 1) A copy of this report should be provided to all prospective contractors prior to quotation, in accordance with Section 30 of the Occupational Health and Safety Act.
- 2) Recommended actions are the minimum required actions, as prescribed by the appropriate Acts, regulations, guidelines, standards, codes and general best practice measures. Prior to demolition, the Contractor may choose to alter the approach and combine or break out sections of work. This is acceptable provided that the appropriate Acts, regulations, guidelines, standards and codes are followed and afford protection for the health and safety of workers, occupants and the public that is at least equal to the protection that would be provided by complying with the minimum requirements.
- 3) All waste generated is subject to characterization and disposal in accordance with Ontario Regulation 347.

Appendix B

Laboratory Certificates of Analysis

Certificate of Analysis

MTE Consultants Inc. (Burlington)

1016 Sutton Drive, Unit A
Burlington, ON L7L 6B8
Attn: Mike VanRuyven

Client PO:

Project: Dundas WWTP

Custody:

Report Date: 28-Sep-2020

Order Date: 23-Sep-2020

Order #: 2039251

This Certificate of Analysis contains analytical data applicable to the following samples as submitted :

Parcel ID	Client ID
2039251-01	S01 A - Door Sealant
2039251-02	S01 B - Door Sealant
2039251-03	S01 C - Door Sealant
2039251-04	S02 A - Ext. Stucco
2039251-05	S02 B - Ext. Stucco
2039251-06	S02 C - Ext. Stucco
2039251-07	S03 A - Plaster
2039251-08	S03 B - Plaster
2039251-09	S03 C - Plaster

Approved By:



Emma Diaz

Senior Analyst

Any use of these results implies your agreement that our total liability in connection with this work, however arising, shall be limited to the amount paid by you for this work, and that our employees or agents shall not under any circumstances be liable to you in connection with this work.

Certificate of Analysis
 Client: MTE Consultants Inc. (Burlington)
 Client PO:

Report Date: 28-Sep-2020
 Order Date: 23-Sep-2020
 Project Description: Dundas WWTP

Asbestos, PLM Visual Estimation **MDL - 0.5%**

Parcel ID	Sample Date	Colour	Description	Asbestos Detected	Material Identification	% Content
2039251-01	21-Sep-20	Grey	Sealant	Yes	Client ID: S01 A - Door Sealant	
					Chrysotile	5
					Non-Fibers	95
2039251-02	21-Sep-20	Grey	Sealant		Client ID: S01 B - Door Sealant	
					not analyzed, positive stop	
2039251-03	21-Sep-20	Grey	Sealant		Client ID: S01 C - Door Sealant	
					not analyzed, positive stop	
2039251-04	21-Sep-20	Grey	Stucco	No	Client ID: S02 A - Ext. Stucco	
					Non-Fibers	100
2039251-05	21-Sep-20	Grey	Stucco	No	Client ID: S02 B - Ext. Stucco	
					Non-Fibers	100
2039251-06	21-Sep-20	Grey	Stucco	No	Client ID: S02 C - Ext. Stucco	
					Non-Fibers	100
2039251-07	21-Sep-20	Grey	Plaster	No	Client ID: S03 A - Plaster	
					Non-Fibers	100
2039251-08	21-Sep-20	Grey	Plaster	No	Client ID: S03 B - Plaster	
					Non-Fibers	100
2039251-09	21-Sep-20	Grey	Plaster	No	Client ID: S03 C - Plaster	
					Non-Fibers	100

**** Analytes in bold indicate asbestos mineral content.**

Certificate of Analysis

Client: MTE Consultants Inc. (Burlington)

Client PO:

Report Date: 28-Sep-2020

Order Date: 23-Sep-2020

Project Description: Dundas WWTP

Analysis Summary Table

Analysis	Method Reference/Description	Lab Location	Lab Accreditation	*	Analysis Date
Asbestos, PLM Visual Estimation	by EPA 600/R-93/116	1 - Mississauga	NVLAP 200863-0		26-Sep-20

* Reference to the NVLAP term does not permit the user of this report to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.

Mississauga Lab: 15 - 6800 Kitimat Rd Mississauga, Ontario, L5N 5M1

Work Order Revisions | Comments

None



100
St. Laurent Blvd.
Ontario K1G 4J8
749-1947
info@paracellabs.com

Chain of Custody
(Lab Use Only)

Page 1 of 1

Client Name: MTE Consultants Inc
Project Reference: Dundasg WWTP

Contact Name: Mike VanRuyven
Quote #:

Address: 1016 Sutton Drive, Unit A
Burlington, ON
PO #:

Telephone: 905-639-2552
Email Address: mvanruyven@mte85.com

Turnaround Time:

Immediate 1 Day
 4 Hour 2 Day
 8 Hour 3 Day
 Regular

Date Required: _____

ASBESTOS & MOLD ANALYSIS

Matrix: Air Bulk Tape Lift Swab Other
Regulatory Guideline: ON QC AB SK Other:

Analyses: Microscopic Mold Culturable Mold Bacteria GRAM PCM Asbestos PLM Asbestos Chatfield Asbestos TEM Asbestos

Parcel Order Number: 2039251

Sample ID	Sampling Date	Air Volume (L)	Analysis Required	Asbestos - Bulk	
				Identify Distinct Building Materials to Be Analyzed (if not specified, all materials identified will be analyzed) *	Positive Stop?
1	21-09-20		PLM	Sealant	<input checked="" type="checkbox"/>
2	↓		↓	Stucco	<input checked="" type="checkbox"/>
3	↓		↓	Plaster	<input checked="" type="checkbox"/>
4					<input type="checkbox"/>
5					<input type="checkbox"/>
6					<input type="checkbox"/>
7					<input type="checkbox"/>
8					<input type="checkbox"/>
9					<input type="checkbox"/>
10					<input type="checkbox"/>
11					<input type="checkbox"/>
12					<input type="checkbox"/>

* If left blank, all distinct materials identified in the samples will be analyzed and reported separately as per EPA 600/R-93/116. Additional charges will apply.

Comments: _____ Method of Delivery: **Fedex**

Relinquished By (Sign): <i>[Signature]</i>	Received at Depot:	Received at Lab: <i>[Signature]</i>	Verified By: <i>[Signature]</i>
Relinquished By (Print): Mike VanRuyven			
Date/Time: 22-09-20 4pm	Date/Time:	Date/Time: Sept 23/20 9:00	Date/Time: Sept 23/20

Certificate of Analysis

MTE Consultants Inc. (Burlington)

1016 Sutton Drive, Unit A
Burlington, ON L7L 6B8
Attn: Mike VanRuyven

Client PO:

Project: 48174-100

Custody: 45106

Report Date: 21-Oct-2020

Order Date: 20-Oct-2020

Order #: 2043284

This Certificate of Analysis contains analytical data applicable to the following samples as submitted :

Parcel ID	Client ID
2043284-01	S05A - Roof Membrane
2043284-02	S05B - Roof Membrane
2043284-03	S05C - Roof Membrane
2043284-04	S06A - Vapour Barrier
2043284-05	S06B - Vapour Barrier
2043284-06	S06C - Vapour Barrier
2043284-07	S07A - Brown Vent Sealant
2043284-08	S07B - Brown Vent Sealant
2043284-09	S07C - Brown Vent Sealant
2043284-10	508A - Grey Edging Tar
2043284-11	508B - Grey Edging Tar
2043284-12	508C - Grey Edging Tar

Approved By:



Emma Diaz

Senior Analyst

Any use of these results implies your agreement that our total liability in connection with this work, however arising, shall be limited to the amount paid by you for this work, and that our employees or agents shall not under any circumstances be liable to you in connection with this work.

Certificate of Analysis
 Client: MTE Consultants Inc. (Burlington)
 Client PO:

Report Date: 21-Oct-2020
 Order Date: 20-Oct-2020
 Project Description: 48174-100

Asbestos, PLM Visual Estimation **MDL - 0.5%**

Parcel ID	Sample Date	Colour	Description	Asbestos Detected	Material Identification	% Content
2043284-01	20-Oct-20	Black	Roof Membrane	No	Client ID: S05A - Roof Membrane	[AS-PRE]
					Cellulose	10
					MMVF	2
					Non-Fibers	88
2043284-02	20-Oct-20	Black	Roof Membrane	No	Client ID: S05B - Roof Membrane	[AS-PRE]
					Cellulose	10
					MMVF	0.7
					Non-Fibers	89.3
2043284-03	20-Oct-20	Black	Roof Membrane	No	Client ID: S05C - Roof Membrane	[AS-PRE]
					Cellulose	10
					MMVF	2
					Non-Fibers	88
2043284-04	20-Oct-20	Black	Vapour barrier	No	Client ID: S06A - Vapour Barrier	[AS-PRE]
					Cellulose	10
					MMVF	1
					Non-Fibers	89
2043284-05	20-Oct-20	Black	Vapour barrier	No	Client ID: S06B - Vapour Barrier	[AS-PRE]
					Cellulose	10
					MMVF	1.32
					Non-Fibers	88.68
2043284-06	20-Oct-20	Black	Vapour barrier	No	Client ID: S06C - Vapour Barrier	[AS-PRE]
					Cellulose	10
					MMVF	0.68
					Non-Fibers	89.32
2043284-07	20-Oct-20	Brown	Sealant	No	Client ID: S07A - Brown Vent Sealant	
					MMVF	1
					Non-Fibers	99

Certificate of Analysis
 Client: MTE Consultants Inc. (Burlington)
 Client PO:

Report Date: 21-Oct-2020
 Order Date: 20-Oct-2020
 Project Description: 48174-100

Asbestos, PLM Visual Estimation **MDL - 0.5%**

Parcel ID	Sample Date	Colour	Description	Asbestos Detected	Material Identification	% Content
2043284-08	20-Oct-20	Brown	Sealant	No	Client ID: S07B - Brown Vent Sealant	
					MMVF	1
					Non-Fibers	99
2043284-09	20-Oct-20	Brown	Sealant	No	Client ID: S07C - Brown Vent Sealant	
					MMVF	1
					Non-Fibers	99
2043284-10	20-Oct-20	Black	Tar	No	Client ID: 508A - Grey Edging Tar	[AS-PRE]
					Non-Fibers	100
2043284-11	20-Oct-20	Black	Tar	No	Client ID: 508B - Grey Edging Tar	[AS-PRE]
					Non-Fibers	100
2043284-12	20-Oct-20	Black	Tar	No	Client ID: 508C - Grey Edging Tar	[AS-PRE]
					Non-Fibers	100

* MMVF: Man Made Vitreous Fibers: Fiberglass, Mineral Wool, Rockwool, Glasswool

Analysis Summary Table

Analysis	Method Reference/Description	Lab Location	Lab Accreditation *	Analysis Date
Asbestos, PLM Visual Estimation	by EPA 600/R-93/116	1 - Mississauga	NVLAP 200863-0	21-Oct-20

* Reference to the NVLAP term does not permit the user of this report to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.

Mississauga Lab: 15 - 6800 Kitimat Rd Mississauga, Ontario, L5N 5M1

Qualifier Notes

Sample Qualifiers :

AS-PRE: Due to the difficult nature of the bulk sample (interfering fibers/binders), additional NOB preparation was required prior to analysis

Certificate of Analysis

Client: MTE Consultants Inc. (Burlington)

Client PO:

Report Date: 21-Oct-2020

Order Date: 20-Oct-2020

Project Description: 48174-100

Work Order Revisions | Comments

None



Client Name: <u>MTE Consultants</u>	Project Reference: <u>48174-100</u>
Contact Name: <u>Mike Van Ruyven</u>	Quote #:
Address: <u>1016 Sutton Dr. Unit A Burlington, ON</u>	PO #:
Telephone: <u>905-639-2552</u>	Email Address: <u>mvanruyven@mte85.com</u>

Turnaround Time:

Immediate 1 Day
 4 Hour 2 Day
 8 Hour 3 Day
 Regular

Date Required: _____

ASBESTOS & MOLD ANALYSIS

Matrix: Air Bulk Tape Lift Swab Other Regulatory Guideline: ON QC AB SK Other:

Analyses: Microscopic Mold Culturable Mold Bacteria GRAM PCM Asbestos PLM Asbestos Chatfield Asbestos TEM Asbestos

Parcel Order Number:		Asbestos - Bulk				
<u>2043284</u>		Sampling Date	Air Volume (L)	Analysis Required	Identify Distinct Building Materials to Be Analyzed (if not specified, all materials identified will be analyzed) *	Positive Stop?
Sample ID						
1	<u>S05ABC - Roof Membrane</u>	<u>20-10-20</u>		<u>PLM</u>	<u>Membrane Analyze as one</u>	<input checked="" type="checkbox"/>
2	<u>S06ABC - Vapour Barrier</u>	<u>↓</u>		<u>↓</u>	<u>Analyze as one</u>	<input checked="" type="checkbox"/>
3	<u>S07ABC - Brown vent sealant</u>	<u>↓</u>		<u>↓</u>	<u>Sealant</u>	<input checked="" type="checkbox"/>
4	<u>S08ABC - Grey edging tar</u>	<u>↓</u>		<u>↓</u>	<u>Tar</u>	<input checked="" type="checkbox"/>
5						<input type="checkbox"/>
6						<input type="checkbox"/>
7						<input type="checkbox"/>
8						<input type="checkbox"/>
9						<input type="checkbox"/>
10						<input type="checkbox"/>
11						<input type="checkbox"/>
12						<input type="checkbox"/>

* If left blank, all distinct materials identified in the samples will be analyzed and reported separately as per EPA 600/R-93/116. Additional charges will apply.

Comments: _____ Method of Delivery: walk-in

Relinquished By (Sign): <u>[Signature]</u>	Received at Depot: <u>[Signature]</u>	Received at Lab: <u>[Signature]</u>	Verified By: <u>[Signature]</u>
Relinquished By (Print): <u>Mike Van Ruyven</u>	Date/Time: <u>Oct 20/20 3pm</u>	Date/Time: <u>Oct 21/20</u>	Date/Time: <u>Oct 21/20</u>

Certificate of Analysis

MTE Consultants Inc. (Burlington)

1016 Sutton Drive, Unit A
Burlington, ON L7L 6B8
Attn: Mike VanRuyven

Client PO:
Project: Dundas WWTP
Custody:

Report Date: 25-Sep-2020
Order Date: 22-Sep-2020

Order #: 2039212

This Certificate of Analysis contains analytical data applicable to the following samples as submitted:

Parcel ID	Client ID
2039212-01	LP01- Grey Floors/ Railings
2039212-02	LP02- White tank v00A
2039212-03	LP03- Yellow Walls
2039212-04	LP04- White ceilings
2039212-05	LP05- Orange Doors
2039212-06	LP06- Red Pipes
2039212-07	LP07- Green Pipes
2039212-08	LP08- Cream Walls
2039212-09	LP09- Brown Walls

Approved By:



Alex Enfield, MSc
Lab Manager

Any use of these results implies your agreement that our total liability in connection with this work, however arising shall be limited to the amount paid by you for this work, and that our employees or agents shall not under circumstances be liable to you in connection with this work

Certificate of Analysis

Report Date: 25-Sep-2020

Client: MTE Consultants Inc. (Burlington)

Order Date: 22-Sep-2020

Client PO:

Project Description: Dundas WWTP

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
Metals, ICP-MS	EPA 6020 - Digestion - ICP-MS	23-Sep-20	23-Sep-20

Sample Data Revisions

None

Work Order Revisions/Comments:

None

Other Report Notes:

n/a: not applicable

ND: Not Detected

MDL: Method Detection Limit

Source Result: Data used as source for matrix and duplicate samples

%REC: Percent recovery.

RPD: Relative percent difference.

Certificate of Analysis
 Client: MTE Consultants Inc. (Burlington)
 Client PO:

Report Date: 25-Sep-2020
 Order Date: 22-Sep-2020
 Project Description: Dundas WWTP

Sample Results

Lead				Matrix: Paint
				Sample Date: 21-Sep-20
Parcel ID	Client ID	Units	MDL	Result
2039212-01	LP01- Grey Floors/ Railings	ug/g	5	32900
2039212-02	LP02- White tank v00A	ug/g	5	36
2039212-03	LP03- Yellow Walls	ug/g	5	23600
2039212-04	LP04- White ceilings	ug/g	5	2670
2039212-05	LP05- Orange Doors	ug/g	5	23800
2039212-06	LP06- Red Pipes	ug/g	5	7490
2039212-07	LP07- Green Pipes	ug/g	5	7730
2039212-08	LP08- Cream Walls	ug/g	5	2160
2039212-09	LP09- Brown Walls	ug/g	5	2160

Laboratory Internal QA/QC

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Matrix Blank									
Lead	ND	5	ug/g						
Matrix Duplicate									
Lead	265	5	ug/g	272			2.50	50	
Matrix Spike									
Lead	1440	5	ug/g	272	93.8	70-130			



TRUSTED.
RESPONSIVE
RELIABLE.

Parcel ID: 2039212



Chain of Custody
(Lab Use Only)

Page 1 of 1

Turnaround Time:

- 1 Day 3 Day
 2 Day Regular

Date Required: _____

Client Name: MTE Consultants Inc
 Contact Name: Michael VanRuyven
 Address: 1016 Sutton Drive, Unit A
 Burlington, Ontario
 Telephone: 905-639-2552

Project Reference: Dundas WWTP
 Quote #
 PO #
 Email Address: mvanruyven@mte85.com

Criteria: O. Reg. 153/04 (As Amended) Table RSC Filing O. Reg. 558/00 PWQO CCME SUB (Storm) SUB (Sanitary) Municipality: _____ Other: _____

Matrix Type: S (Soil/Sed.) GW (Ground Water) SW (Surface Water) SS (Storm/Sanitary Sewer) P (Paint) A (Air) O (Other)

Required Analyses

Parcel Order Number:

2039212

Sample ID/Location Name	Matrix	Air Volume	# of Containers	Sample Taken		PHCs F1-F4+BTEX	VOCs	PAHs	Metals by ICP	Hg	CrVI	B (HWS)	Lead in Paint							
				Date	Time															
1 LPO1 - Grey Floors/Railings	P			21-09-20	1pm								<input checked="" type="checkbox"/>							
2 LPO2 - White tank roof													<input checked="" type="checkbox"/>							
3 LPO3 - Yellow Walls													<input checked="" type="checkbox"/>							
4 LPO4 - White ceilings													<input checked="" type="checkbox"/>							
5 LPO5 - Orange Doors													<input checked="" type="checkbox"/>							
6 LPO6 - Red Pipes													<input checked="" type="checkbox"/>							
7 LPO7 - Green Pipes													<input checked="" type="checkbox"/>							
8 LPO8 - Cream Walls													<input checked="" type="checkbox"/>							
9 LPO9 - Brown Walls													<input checked="" type="checkbox"/>							
10													<input checked="" type="checkbox"/>							

Comments:

Method of Delivery:

Walk-in

Relinquished By (Sign): *Mike VanRuyven* Received by Driver/Depot: _____ Received at Lab: *PC* Verified By: *PC*

Relinquished By (Print): Mike VanRuyven Date/Time: _____ Date/Time: *22/09/20 16:10* Date/Time: *22/09/20 16:10*

Date/Time: 22-09-20 4pm Temperature: _____ °C Temperature: _____ °C pH Verified [] By: _____

Certificate of Analysis

MTE Consultants Inc. (Burlington)

1016 Sutton Drive, Unit A
Burlington, ON L7L 6B8
Attn: Mike VanRuyven

Client PO:
Project: Dundas WWTP
Custody:

Report Date: 29-Sep-2020
Order Date: 23-Sep-2020

Order #: 2039265

This Certificate of Analysis contains analytical data applicable to the following samples as submitted:

Parcel ID	Client ID
2039265-01	BM01 - Pipe Wrap
2039265-02	BM02 - Main Room
2039265-03	BM03 - Back Entrance

Approved By:



Emma Diaz
Senior Analyst

Certificate of Analysis

Report Date: 29-Sep-2020

Client: MTE Consultants Inc. (Burlington)

Order Date: 23-Sep-2020

Client PO:

Project Description: Dundas WWTP

Microscopic - Bulk

Sample I.D.	Sample Date	Background Debris**	Propagule Summary	Relative Amount*
2039265-01	21-Sep-20	Low	Client Sample Name:BM01 - Pipe Wrap <i>Cladosporium</i> spores <i>Stachybotrys</i> spores pigmented mycelial fragments <i>Stachybotrys</i> spp. <i>Aspergillus/Penicillium-like</i> spores hyaline mycelial fragments	High High Moderate Moderate Low Low
2039265-02	21-Sep-20	Moderate	Client Sample Name:BM02 - Main Room ND	Trace
2039265-03	21-Sep-20	Moderate	Client Sample Name:BM03 - Back Entrance ND	Trace

**Relative Amount:*

Trace = 2 propagules or less on entire slide

Low = < than 10 propagules noted per mm² of slide surface

Moderate = 11-100 propagules noted per mm² of slide surface

High = > than 101 propagules noted per mm² of slide surface

***Background Debris - Definitions:*

Low = occupying < 10% of microscopic field

Moderate = 11-30% of microscopic field

High = > 31% of microscopic field

Analysis Summary Table

Analysis	Method Reference/Description	Lab Location	Analysis Date
Microscopic Fungal - Bulk	In House - Microscopic Bulk	Mississauga	28-Sep-20

Mississauga Lab: 15 - 6800 Kitimat Rd Mississauga, Ontario, L5N 5M1

Qualifier Notes

None

Work Order Revisions / Comments

Information on common indoor/outdoor fungi may be found on our website at the link below; however, interpretation of the results is the responsibility of the client.

[Paracel Species Ecology List](#)

Report Notes:

ND - No fungal propagules detected, below limit of detection (LOD).

NA - Not applicable; calculations cannot be performed on non-numerical data.



Chain of Custody
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Page 1 of 1

Client Name: MTE Consultants Inc	Project Reference: Dundas WWTP	Turnaround Time: <input type="checkbox"/> Immediate <input type="checkbox"/> 1 Day <input type="checkbox"/> 4 Hour <input type="checkbox"/> 2 Day <input type="checkbox"/> 8 Hour <input checked="" type="checkbox"/> 3 Day <input checked="" type="checkbox"/> Regular
Contact Name: Mike VanRuyven	Quote #:	
Address: 1016 Sutton Drive, Unit A Burlington, ON	PO #:	
Telephone: 905-639-2552	Email Address: mvanruyven@mte85.com	
Date Required: _____		

ASBESTOS & MOLD ANALYSIS

Matrix: Air Bulk Tape Lift Swab Other Regulatory Guideline: ON QC AB SK Other:
 Analyses: Microscopic Mold Culturable Mold Bacteria GRAM PCM Asbestos PLM Asbestos Chatfield Asbestos TEM Asbestos

Paracel Order Number: 2039265		Asbestos - Bulk			
Sample ID	Sampling Date	Air Volume (L)	Analysis Required	Identify Distinct Building Materials to Be Analyzed (if not specified, all materials identified will be analyzed) *	Positive Stop?
1	21-09-20			Mould on pipe wrap	<input type="checkbox"/>
2	↓			Mould on wall material	<input type="checkbox"/>
3				Mould on wall material	<input type="checkbox"/>
4					<input type="checkbox"/>
5					<input type="checkbox"/>
6					<input type="checkbox"/>
7					<input type="checkbox"/>
8					<input type="checkbox"/>
9					<input type="checkbox"/>
10					<input type="checkbox"/>
11					<input type="checkbox"/>
12					<input type="checkbox"/>

* If left blank, all distinct materials identified in the samples will be analyzed and reported separately as per EPA 600/R-93/116. Additional charges will apply.

Comments: _____ Method of Delivery: **Fedex**

Relinquished By (Sign): <i>Mike VanRuyven</i>	Received at Depot:	Received at Lab: <i>[Signature]</i>	Verified By: <i>[Signature]</i>
Relinquished By (Print): Mike VanRuyven	Date/Time: 22-09-20 4pm	Date/Time: Sept 23/20 9:00	Date/Time: Sept 23/20

10-16

Appendix C

Photographic Log



Photograph No. 1 – Exterior door sealant was confirmed to be ACM through laboratory analysis.



Photograph No. 2 – A transite roof ventilation pipe was observed and is deemed ACM.



Photograph No. 3 – Laboratory analysis of discolouration on pipe wrap confirmed the presence of mould growth.



Photograph No. 4 – Laboratory analysis of discolouration on interior walls was confirmed not to be mould growth.



Photograph No. 5 – Lead-based, and lead-containing paints were confirmed present throughout the Site building.



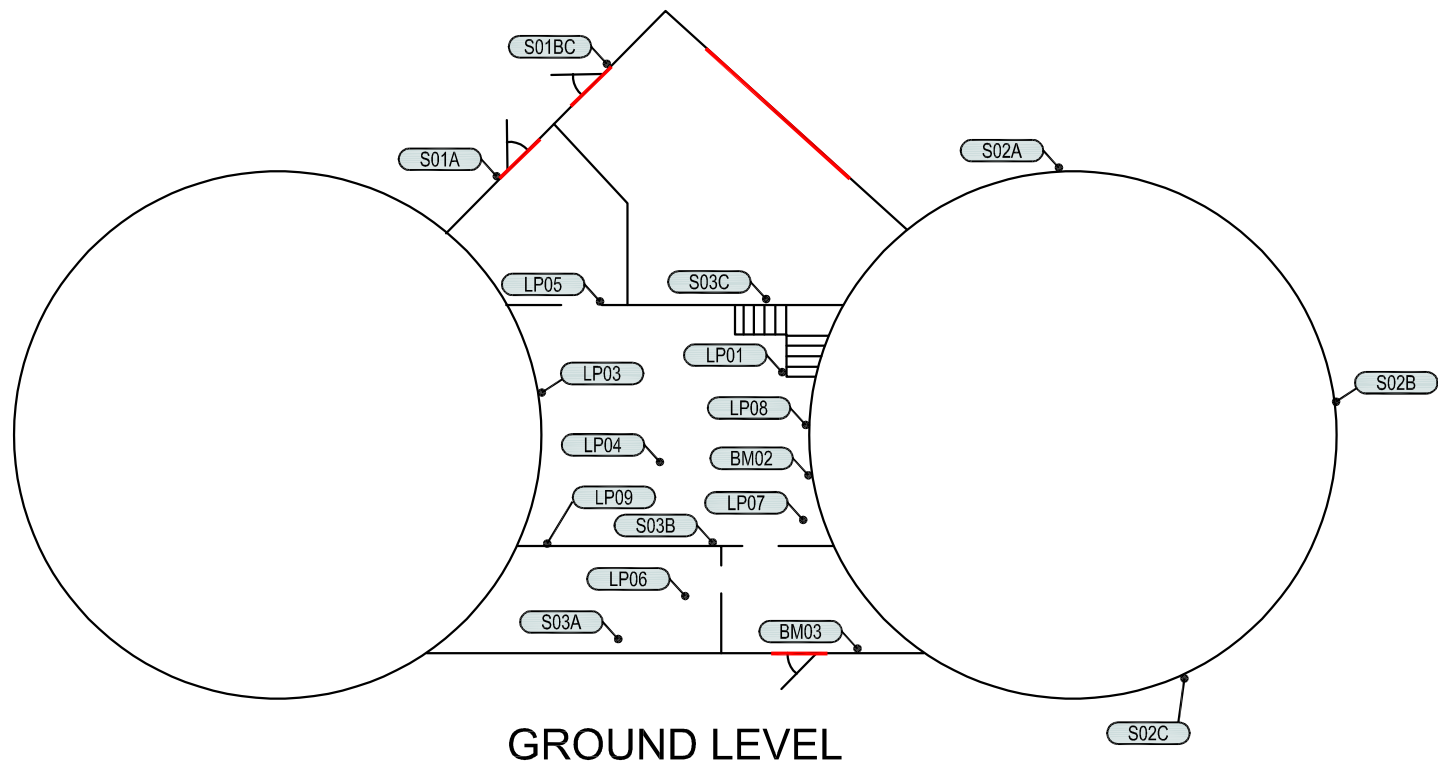
Photograph No. 6 – Solder on copper pipe joints is suspected of containing lead.



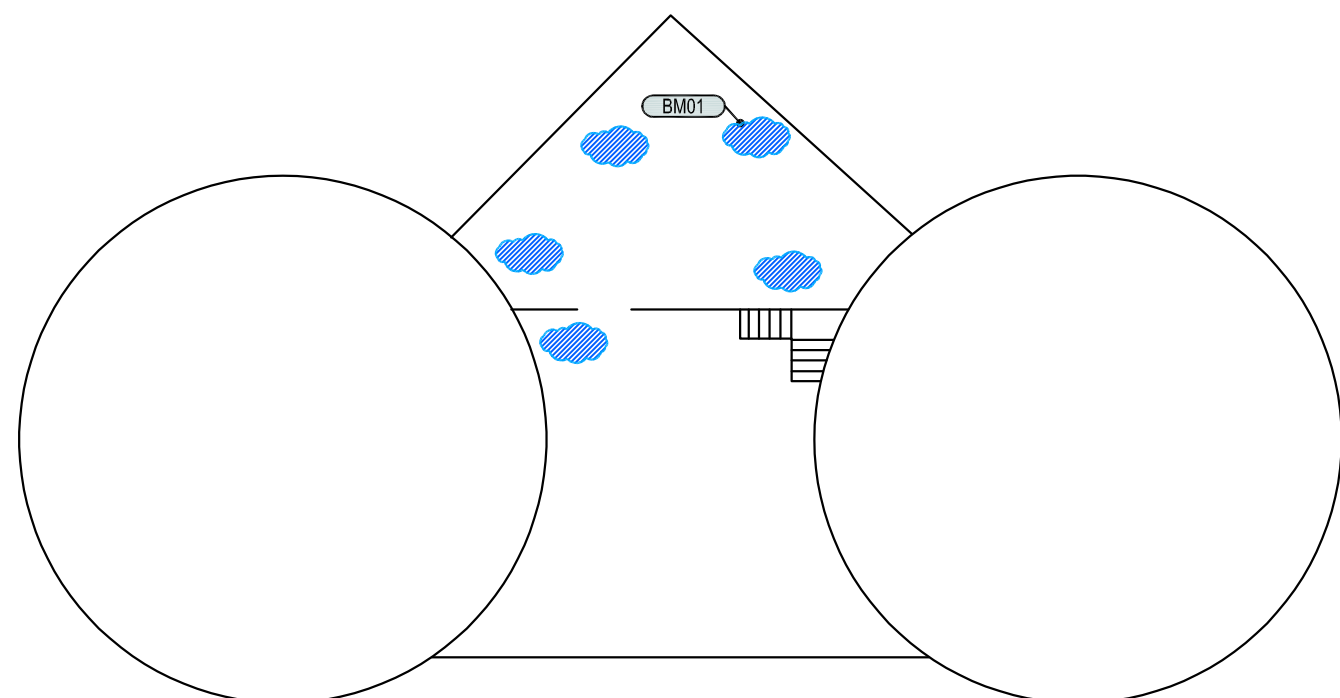
Photograph No. 7 – Fluorescent light tubes are suspected of containing mercury and fluorescent light ballasts are suspected of containing PCBs.

Appendix D

Figures



GROUND LEVEL



BASEMENT LEVEL

Notes:
 ALL DRAWINGS TO BE REFERENCED WITH THE DSA REPORT. LOCATIONS AND QUANTITIES ARE APPROXIMATE.
 ALL KNOWN OR SUSPECT DESIGNATED SUBSTANCES ARE NOT DEPICTED ON THIS FIGURE. REFER TO THE DSA REPORT FOR A COMPLETE LIST OF IDENTIFIED KNOWN AND SUSPECT DESIGNATED SUBSTANCES.
 THIS FIGURE IS COLOUR DEPENDENT. PHOTOCOPIES MAY ALTER INTERPRETATION OF FIGURE. ALWAYS REFER TO ORIGINAL DRAWINGS AND DSA REPORT.

Designated Substances and Hazardous Materials Legend

- Sample Identification
- ACM Sealant
- Mould Growth



Ph. (905) 639-2552 www.mte85.com

CLIENT
 CITY OF HAMILTON

PROJECT
 DESIGNATED SUBSTANCE AND HAZARDOUS MATERIALS SURVEY

DRAWING
 DUNDAS WWTP
 DIGESTER BUILDING
 135 KING STREET EAST
 DUNDAS, ONTARIO

Project Manager	G. OAKES	Date	OCTOBER 2020
Baseplan By	MTE	Project No.	48174-100
Figure By	MJV	Drawing No.	1.0
Scale	N.T.S.		



Hazardous Building Materials Assessment (Pre-construction)

Dundas Wastewater Treatment
Plant Control Building
135 King Street East, Dundas,
Ontario

Prepared for:

**GM BluePlan Engineering
Limited**

650 Woodlawn Road West, Block C, Unit 2
Guelph, Ontario, N1K 1B8

December 1, 2022

Pinchin File: 310040.000



Issued to: GM BluePlan Engineering Limited
Issued on: December 1, 2022
Pinchin File: 310040.000
Issuing Office: Hamilton, ON

Author: Justin Appleby, ADip.T.(Arch)
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Reviewer: Leslie Heywood, BEng Mgt
Senior Project Manager
289.237.4294
lheywood@pinchin.com



EXECUTIVE SUMMARY

GM BluePlan Engineering Limited (Client) retained Pinchin Ltd. (Pinchin) to conduct a hazardous building materials assessment at Control Building located at 135 King Street East, Dundas, Ontario. Pinchin performed the assessment on November 8, 2022.

The objective of the assessment was to identify specified hazardous building materials in preparation for building renovation activities. The proposed work as identified by the Client includes repairs to cracked/damaged concrete and plaster walls, ceilings, and floors.

The results of this assessment are intended for use with a properly developed scope of work or performance specifications and safe work procedures.

SUMMARY OF FINDINGS

The following is a summary of significant findings; refer to the body of the report for detailed findings:

Asbestos:

- Stucco / Texture coat

Lead:

- Lead is present in paints and coatings.
- Batteries of emergency lights contain solid lead.

Silica: Crystalline silica is present in concrete and other materials such as masonry stucco, and plaster.

Mercury: Mercury vapour is present in lamp tubes.

Polychlorinated Biphenyls (PCBs): Based on the date of construction, PCBs may be present in light ballasts. PCB caulking is present.

Mould and Water Damage: Visible mould and water damage was not observed.



SUMMARY OF RECOMMENDATIONS

The following is a summary of significant recommendations; refer to the body of the report for detailed recommendations.

1. Conduct further investigation of the following items, which was not completed during this assessment:
 - a. Any items listed as exclusions in this report, prior to disturbance.
2. Prepare a scope of work or specifications and safe work procedures for the hazardous materials removal required for the planned work.
3. Do not disturb suspected hazardous building materials discovered during the planned work, which have not been identified in this report and arrange for further evaluation and testing.
4. Remove and properly dispose of asbestos-containing materials prior to demolition or renovation activities.
5. Remove and properly dispose of PCB ballasts when fixtures are decommissioned. All PCB lamp ballasts must be removed from service and properly disposed of by December 31, 2025.
6. Remove and properly dispose of PCB caulking.
7. Recycle mercury-containing lamp tubes when removed from service.
8. Follow appropriate safe work procedures when handling or disturbing asbestos, lead, silica, and mould.

This Executive Summary is subject to the same standard limitations as contained in the report and must be read in conjunction with the entire report.



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APPENDICES

APPENDIX I	Drawings
APPENDIX II-A	Asbestos Analytical Certificates
APPENDIX II-B	Lead Analytical Certificates
APPENDIX II-C	PCB Analytical Certificates
APPENDIX III	Methodology
APPENDIX IV	Location Summary Report
APPENDIX V	Hazardous Materials Summary Report / Sample Log
APPENDIX VI	HMIS All Data Report



1.0 INTRODUCTION AND SCOPE

GM BluePlan Engineering Limited (Client) retained Pinchin Ltd. (Pinchin) to conduct a hazardous building materials assessment at Control Building located at 135 King Street East, Dundas, Ontario.

Pinchin performed the assessment on November 8, 2022. The surveyor was unaccompanied during the assessment. The assessed area was unoccupied at the time of the assessment.

The objective of the assessment was to identify specified hazardous building materials in preparation for building renovation activities. The results of this assessment are intended for use with a properly developed scope of work or performance specification.

1.1 Scope of Assessment

The **assessed area** is limited to the portion(s) of the building to be renovated, as described by the Client, and identified in the drawings in Appendix I.

The assessment was performed to establish the type of specified hazardous building materials, locations and approximate quantities incorporated in the structure(s) and its finishes.

For the purpose of the assessment and this report, hazardous building materials are defined as follows:

- Asbestos
- Lead
- Silica
- Mercury
- Polychlorinated Biphenyls (PCBs)
- Mould

The following Designated Substances are not typically found in building materials in a composition/state that is hazardous and were not included in this assessment:

- Arsenic
- Acrylonitrile
- Benzene
- Coke oven emissions
- Ethylene oxide
- Isocyanates
- Vinyl chloride monomer



2.0 METHODOLOGY

Pinchin conducted a room-by-room assessment to identify the hazardous building materials as defined in the scope.

The assessment included limited demolition of wall and ceiling finishes (drywall or plaster) to view concealed conditions at representative areas as permitted by the current building use. Limited destructive testing of flooring was conducted where possible (under ceramic tiles, carpets, or multiple layers of flooring). Demolition of exterior building finishes, masonry walls (chases, shafts etc.), and structural surrounds was not conducted.

Limited demolition of masonry block walls (core holes) was conducted to investigate for loose fill vermiculite insulation. Sampling of roofing materials was not conducted.

For further details on the methodology including test methods, refer to Appendix III.

3.0 BACKGROUND INFORMATION

3.1 Building Description

Description Item	Details
Use	Control Building
Number of Floors	The building is 1 storey plus 1 level below grade.
Total Area	The total area of the building is 1,600 square feet.
Year of Construction	The building was constructed in the 1960's.
Structure	Concrete
Exterior Cladding	Brick veneer
HVAC	Forced air
Roof	Not assessed
Flooring	Concrete
Interior Walls	Poured concrete, concrete block, and plaster
Ceilings	Poured concrete and plaster

3.2 Existing Reports

Pinchin was provided with the following reports, which have been reviewed as part of this assessment:

- “Dundas WWTP Digester Building Designated Substance Audit Report”, October 6, 2020. Prepared by MTE Consultants.

4.0 FINDINGS

The following section summarizes the findings of the assessment and provides a general description of the hazardous building materials identified. For details on approximate quantities, condition, friability, accessibility, and locations of hazardous building materials; refer to the Hazardous Material Summary / Sample Log and All Data Report in Appendices V and VI.

Any quantities listed in this report or data tables are estimated based on visual approximations only and are subject to variation.

4.1 Asbestos

Pipes in the assessed area are either uninsulated or insulated with non-asbestos fiberglass or other non-asbestos insulation such as mineral fibre or elastomeric foam insulation.

Pipes insulated with asbestos-containing insulations may be present in inaccessible spaces such as above solid ceilings, in chases, in column enclosures and within shafts.

4.1.1 Duct Insulation and Mastic

Ducts are either uninsulated or insulated with non-asbestos fiberglass (foil-faced or canvas jacketing).

Mastic was not observed on ducts assessed.

4.1.2 Mechanical Equipment Insulation

Mechanical equipment (hot water tank) is insulated with non-asbestos fiberglass (photo 1).



Photo 1

4.1.3 Vermiculite

Destructive testing was conducted of a representative selection of masonry block walls, including creating penetrations at three locations. The locations of destructive testing have been indicated on the drawings in Appendix I.

Loose fill vermiculite was not observed within the cavities.

4.1.4 Plaster

Plaster present on walls and ceilings throughout the assessed area does not contain asbestos (samples S0005A-C, photo 1).

Stucco, containing asbestos in the texture coat layer, is present as exterior cladding (samples S0003A-C, photo 2). The stucco is applied to concrete.



Photo 1



Photo 2

4.1.5 Caulking

The following is a summary of sealants, caulking, and putties sampled, for a complete list of locations, refer to Appendix V.

Material, Description and Application	Sample Location (Location #)	Sample Number	Asbestos
Caulking, grey on door frames	Exterior (Location 1)	S0001A-C	No
Caulking, light grey on window frames	Exterior (Location 1)	S0004A-C	No



Photo 1



Photo 2

4.1.6 Other Building Materials

Description, Photo #	Sample Location (Location #)	Sample Number	Asbestos
Paint on concrete block walls, Photo 1	Ground Floor (Location 2)	S0002A-E	No



Photo 1

4.1.7 Excluded Materials

The following is a list of materials which may contain asbestos and was excluded from the assessment.

These materials are presumed to contain asbestos until otherwise proven by sampling and analysis:

- Roofing felts and tar, mastics
- Electrical components
- Mechanical packing, ropes, and gaskets
- Paper products
- Fire resistant doors

- Ropes and gaskets in cast-iron bell and spigot joints
- Sealants on pipe threads
- Transite exhaust ducting on roof

4.2 Lead

4.2.1 Paints and Surface Coatings

The following table summarizes the analytical results of paints sampled and presumed lead containing paints.

Sample Number, Photo #	Colour, Substrate Description	Sample Location	Lead (%)
L0001, Photo 1	Cream, poured concrete wall	Ground Floor (Location 2)	0.78
L0002, Photo 2	Brown, poured concrete wall	Ground Floor (Location 2)	0.31
L0003, Photo 3	Green, metal pipes	Ground Floor (Location 2)	0.72
L0004, Photo 4	White, poured concrete wall	Ground Floor (Location 2)	0.51
L0005, Photo 5	Grey, poured concrete floor	Ground Floor (Location 2)	0.0025
L0006, Photo 6	Red, metal pipes	Ground Floor (Location 2)	2.6
Not sampled, Photo 7	Orange, metal doors	N/A	Labelled, >0.5
Not sampled, Photo 8	Yellow, gas pipes	N/A	Presumed >0.1



Photo 1



Photo 2



Photo 3



Photo 4



Photo 5



Photo 6



Photo 7



Photo 8

Results above 0.1% (1,000 mg/kg) are considered lead-containing, and over 0.5% (5,000 mg/kg) are considered lead-based.

Results less than or equal to 0.1% (1,000 mg/kg), but equal to or greater than 0.009% (90 mg/kg), are considered low-level lead paints or surface coatings in accordance with the EACC guideline.

Paint containing less than 0.009% (90 mg/kg) lead is assumed to be insignificant.

4.2.2 *Lead Products and Applications*

Lead-containing batteries are present in emergency lighting (photo 1).



Photo 1

4.2.3 *Excluded Lead Materials*

Lead is known to be present in several materials which were not assessed or sampled. The following materials, where found, should be presumed to contain lead.

- Electrical components, including wiring connectors, grounding conductors, and solder
- Solder on pipe connections

4.3 **Silica**

Crystalline silica is assumed to be a component of the following materials where present in the building.

- Concrete
- Masonry and mortar
- Plaster

4.4 **Mercury**

4.4.1 *Lamps*

Mercury vapour is present in fluorescent lamp tubes.

4.4.2 *Mercury-Containing Devices*

Mercury-containing devices were not found during the assessment.

4.5 Polychlorinated Biphenyls

4.5.1 Caulking

The following table presents a summary of caulking sampled:

Material, Colour, Application	Sample Location (Location #)	Sample Number	PCB (mg/kg)
Caulking, grey on door frames, Photo 1	Exterior (Location 1)	P0001	95,300
Caulking, light grey on window frames, Photo 2	Exterior (Location 1)	P0002	121,000

Caulking is considered a PCB solid based on the threshold (50 mg/kg).

Due to the high concentrations of PCBs in the caulking, PCBs may have leached into the substrate (masonry, mortar, brick).



Photo 1



Photo 2

4.5.2 Lighting Ballasts

The building has not been comprehensively re-lamped with energy efficient light fixtures (evidence of T-12 fixtures, and as such, a percentage of light ballasts may be manufactured prior to 1980 and may contain PCBs.

4.5.3 Transformers

Transformers were not found during the assessment.

4.5.4 Excluded PCB Materials

PCBs are known to be present in several materials and equipment which were not assessed or sampled. The following materials, where found, should be presumed to contain PCBs until sampling proves otherwise.

- Capacitors within or associated with electrical equipment
- Oil impregnated cables
- High voltage electrical terminals (potheads) and bushings
- Voltage regulators and capacitors
- Hydraulic fluids
- Paints
- Lubricants

4.6 Mould and Water Damage

Water damage and staining is present on asbestos-containing texture coat/stucco and on interior plaster ceilings (photos 1 and 2).



Photo 1



Photo 2

5.0 RECOMMENDATIONS

5.1 General

1. Prepare scope of work or performance specifications for hazardous material removal required for the planned work. The specifications should include safe work practices, personal protective equipment, respiratory protection, and disposal of waste materials.
2. If suspected hazardous building materials are discovered during the planned work, which are not identified in this report, do not disturb, and arrange for further testing and evaluation.
3. Conduct further investigation of the following items, areas, or locations, which were not completed during this assessment:
 - a. Any items listed as exclusions in this report, prior to disturbance.

4. Provide this report and the detailed plans and specifications to the contractor prior to bidding or commencing work.
5. Retain a qualified consultant to specify, observe and document the successful removal of hazardous materials.
6. Update the asbestos inventory upon completion of the abatement and removal of asbestos-containing materials and any other relevant findings.

5.2 Remedial Work

The following remedial work is recommended regardless of the planned construction work due to the condition and location of the material.

Material, Quantity & Condition, Photo No.	Location	Recommended Procedure
Texture coat/ stucco, 2000sf of damaged material, poor condition, Photo 1	Exterior (Location 1)	Type 3 removal and disposal.



Photo 1

5.3 Building Renovation Work

The following recommendations are made regarding renovation involving the hazardous materials identified.

5.3.1 Asbestos

Remove asbestos-containing materials (ACM) prior to renovation, alteration, or maintenance if ACM may be disturbed by the work. Remove all asbestos-containing materials (ACM) prior to demolition work following safe work procedures. If the identified ACM will not be removed prior to commencement of the



work, any potential disturbance of ACM must follow asbestos precautions appropriate for the type of work being performed.

Asbestos-containing materials must be disposed of at a landfill approved to accept asbestos waste.

5.3.2 *Lead*

For lead-containing or lead-based paints (i.e., greater than the EACC guideline of 0.1% (1,000 mg/kg) for lead-containing paints, and 0.5% (5,000 mg/kg) for lead-based), construction disturbance may result in over-exposure to lead dust or fumes. The need for work procedures, engineering controls and personal protective equipment should be assessed on a site-specific basis to comply with Ministry of Labour, Training and Skills Development regulations and guidelines.

For paints identified as having low levels of lead (i.e., equal to or above 0.009% (90 mg/kg) but less than or equal to the EACC guideline of 0.1% (1,000 mg/kg) for lead-containing paints) special precautions are not recommended unless aggressive disturbance (grinding, blasting, torching) is planned. Exposure from construction disturbance of paints containing lead less than 0.009% (90 mg/kg) is assumed to be insignificant.

Lead-containing items should be recycled when taken out of service.

5.3.3 *Silica*

Construction disturbance of silica-containing products may result in excessive exposures to airborne silica, especially if performed indoors and dry. Cutting, grinding, drilling or demolition of materials containing silica should be completed only with proper respiratory protection and other worker safety precautions that comply with applicable regulations and guidelines.

5.3.4 *Mercury*

Do not break lamps. Recycle and reclaim mercury from fluorescent lamps when taken out of service. Mercury is classified as a hazardous waste and must be disposed of in accordance with applicable regulations.

5.3.5 *PCBs*

As light fixtures are removed from service, examine light ballasts for PCB content. If ballasts are not clearly labelled as "non-PCB" or are suspected to contain PCBs, package, and ship ballasts for destruction at a federally permitted facility. As per the PCB Regulation (SOR/2008-273), all PCB light ballasts must be removed from service and properly disposed of by December 31, 2025.



Remove PCB caulking if affected by the renovation work. PCB caulking is a hazardous waste, package, and ship for destruction at a federally permitted facility.

6.0 TERMS AND LIMITATIONS

This work was performed subject to the Terms and Limitations presented or referenced in the proposal for this project.

Information provided by Pinchin is intended for Client use only. Pinchin will not provide results or information to any party unless disclosure by Pinchin is required by law. Any use by a third party of reports or documents authored by Pinchin or any reliance by a third party on or decisions made by a third party based on the findings described in said documents, is the sole responsibility of such third parties. Pinchin accepts no responsibility for damages suffered by any third party as a result of decisions made or actions conducted. No other warranties are implied or expressed.

7.0 REFERENCES

The following legislation and documents were referenced in completing the assessment and this report:

1. Asbestos on Construction Projects and in Buildings and Repair Operations, Ontario Regulation 278/05.
2. Designated Substances, Ontario Regulation 490/09.
3. Lead on Construction Projects, Ministry of Labour Guidance Document.
4. The Environmental Abatement Council of Canada (EACC) Lead Guideline for Construction, Renovation, Maintenance or Repair.
5. Ministry of the Environment Regulation, R.R.O. 1990 Reg. 347 as amended.
6. Ministry of the Environment Regulation, R.R.O. 1990 Reg. 362 as amended.
7. Silica on Construction Projects, Ministry of Labour Guidance Document.
8. Alert – Mould in Workplace Buildings, Ontario Ministry of Labour.

All jurisdictions

1. PCB Regulations, SOR/2008-273, Canadian Environmental Protection Act.
2. Surface Coating Materials Regulations, SOR/2016-193, Canada Consumer Product Safety Act.
3. Consolidated Transportation of Dangerous Goods Regulations, including Amendment SOR/2019-101, Transportation of Dangerous Goods Act.

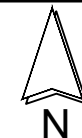


4. Mould Guidelines for the Canadian Construction Industry, Standard Construction Document CCA 82 – 2004 (Revised 2018), Canadian Construction Association.







\\PIN-HAM-FS02\job\310000s\0310040.000 GMBP,DundasWWTP,135KingStE,HAZ,ASSMT\Deliverables\310040 Report HBMA Dundas WWTP 135 King St E Hamilton GMBP December 1 2022.docx

Template: Master Report for Hazardous Materials Assessment (Pre-Construction), HAZ, October 31, 2022

APPENDIX I
Drawings



LEGEND

-  PINCHIN LOCATION NUMBER
-  ASBESTOS BULK SAMPLE
-  LEAD BULK SAMPLE
-  PCB BULK SAMPLE
-  INTRUSIVE INSPECTION
- ASBESTOS-CONTAINING MATERIALS:
 -  TEXTURED WALL

NOT ALL KNOWN OR SUSPECTED HAZARDOUS BUILDING MATERIALS MAY BE DEPICTED ON THE DRAWING. REFER TO THE HAZARDOUS BUILDING MATERIALS ASSESSMENT REPORT FOR A COMPLETE LIST OF KNOWN AND SUSPECTED HAZARDOUS BUILDING MATERIALS.

LEGEND IS COLOUR DEPENDENT. NON-COLOUR COPIES MAY ALTER INTERPRETATION.



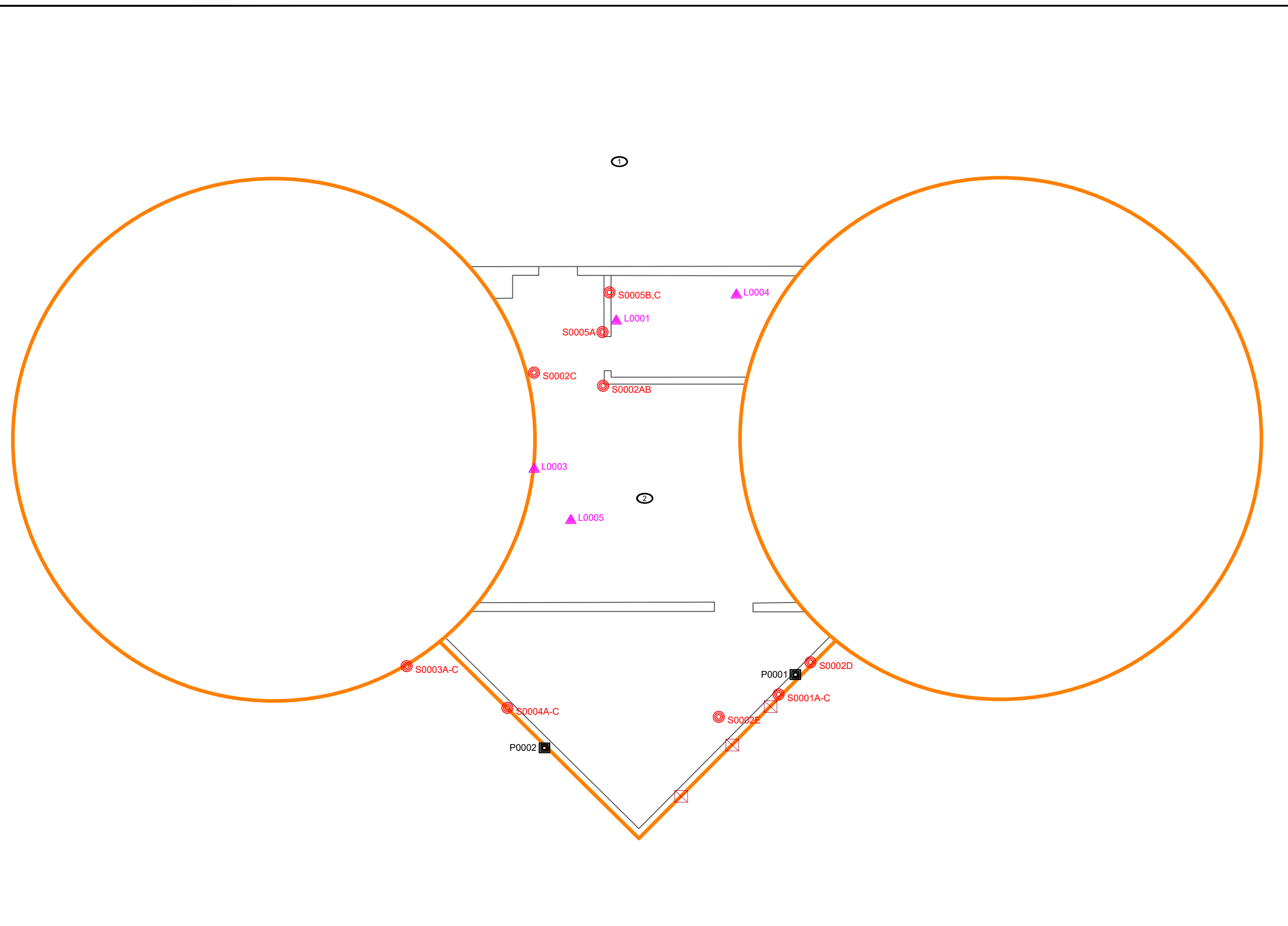
PROJECT NAME:
HAZARDOUS BUILDING MATERIALS ASSESSMENT

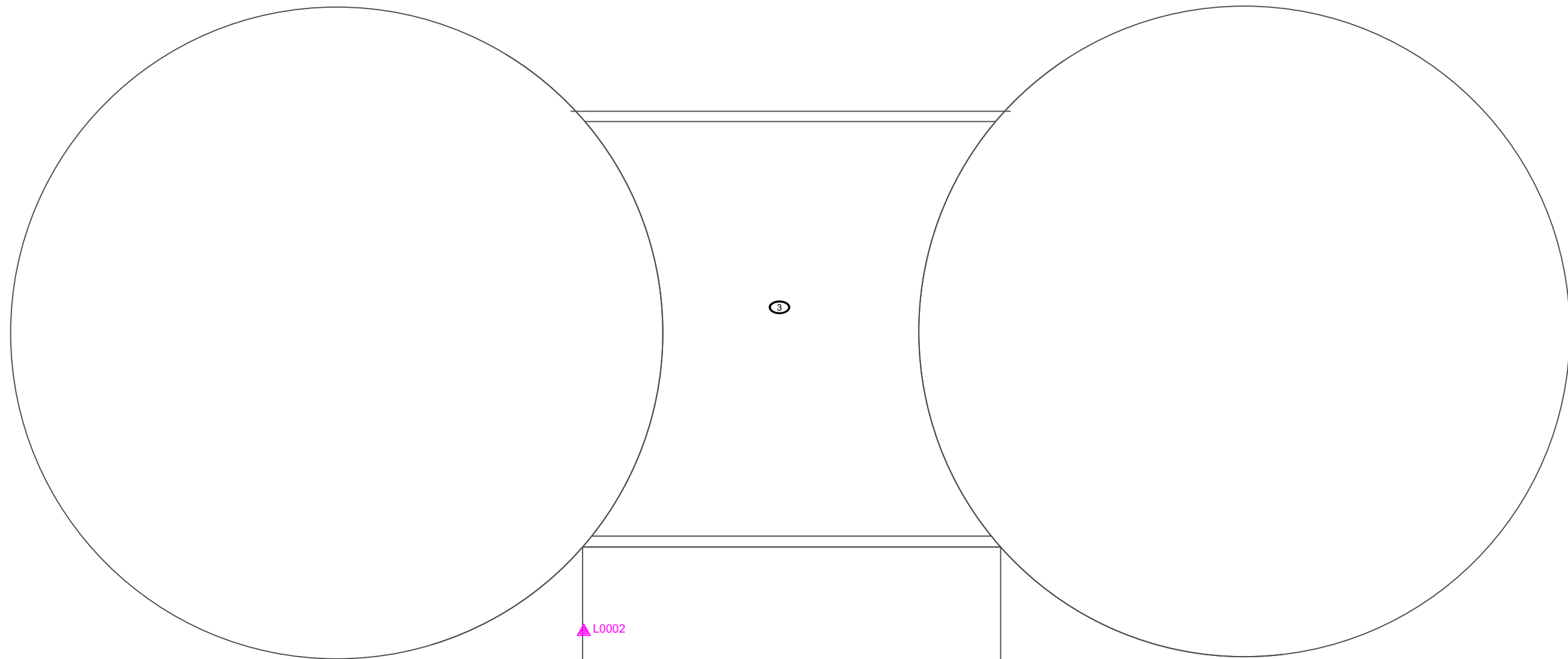
CLIENT NAME:
GM BLUEPLAN ENGINEERING LIMITED







PROJECT LOCATION:
**WASTEWATER TREATMENT PLANT
135 KING STREET
DUNDAS, ONTARIO**

FIGURE NAME:
FIRST FLOOR

PROJECT NUMBER: 310040	SCALE: NOT TO SCALE
DRAWN BY: GC	REVIEWED BY: JA
DATE: NOVEMBER 2022	FIGURE NUMBER: 1 OF 2





- LEGEND**
-  PINCHIN LOCATION NUMBER
 -  ASBESTOS BULK SAMPLE
 -  LEAD BULK SAMPLE
 -  PCB BULK SAMPLE
 -  INTRUSIVE INSPECTION
- ASBESTOS-CONTAINING MATERIALS:**
-  TEXTURED WALL

NOT ALL KNOWN OR SUSPECTED HAZARDOUS BUILDING MATERIALS MAY BE DEPICTED ON THE DRAWING. REFER TO THE HAZARDOUS BUILDING MATERIALS ASSESSMENT REPORT FOR A COMPLETE LIST OF KNOWN AND SUSPECTED HAZARDOUS BUILDING MATERIALS.

LEGEND IS COLOUR DEPENDENT. NON-COLOUR COPIES MAY ALTER INTERPRETATION.



PROJECT NAME:
HAZARDOUS BUILDING MATERIALS ASSESSMENT

CLIENT NAME:
GM BLUEPLAN ENGINEERING LIMITED

PROJECT LOCATION:
**WASTEWATER TREATMENT PLANT
 135 KING STREET
 DUNDAS, ONTARIO**

FIGURE NAME:
BASEMENT

PROJECT NUMBER: 310040	SCALE: NOT TO SCALE
DRAWN BY: GC	REVIEWED BY: JA
DATE: NOVEMBER 2022	FIGURE NUMBER: 2 OF 2

APPENDIX II-A
Asbestos Analytical Certificates



Your Project #: 310040
Your C.O.C. #: n/a

Attention: Damian Palus

Pinchin Ltd
Unit 6
875 Main St W
Hamilton, ON
CANADA L8S 4R9

Report Date: 2022/11/15
Report #: R7389271
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C2W8421

Received: 2022/11/09, 09:54

Sample Matrix: Solid
Samples Received: 14

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Asbestos by PLM - 0.5 RDL (1)	14	N/A	N/A	COR3SOP-00002	EPA 600R-93/116

Remarks:
Bureau Veritas is accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Bureau Veritas are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Bureau Veritas' profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Bureau Veritas in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

Bureau Veritas liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Bureau Veritas has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Bureau Veritas, unless otherwise agreed in writing. Bureau Veritas is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.

Results relate to samples tested. When sampling is not conducted by Bureau Veritas, results relate to the supplied samples tested. This Certificate shall not be reproduced except in full, without the written approval of the laboratory.

Bureau Veritas' Asbestos Laboratory is accredited by NVLAP for bulk asbestos analysis by polarized light microscopy, NVLAP Code 600136-0.

This report may not be reproduced, except in full, without the written approval of Bureau Veritas Canada. This report may not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST or any other agency of the U.S. Government.

Bureau Veritas' scope of accreditation includes EPA -- 40 CFR Appendix E to Subpart E of Part 763, "Interim Method for the Determination of Asbestos in Bulk Insulation Samples" and EPA-600/R-93/116: "Method for the Determination of Asbestos in Bulk Building Materials".

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

(1) P.O.B. - Percent of Bulk



Your Project #: 310040
Your C.O.C. #: n/a

Attention: Damian Palus

Pinchin Ltd
Unit 6
875 Main St W
Hamilton, ON
CANADA L8S 4R9

Report Date: 2022/11/15
Report #: R7389271
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C2W8421

Received: 2022/11/09, 09:54

When Asbestos data is reported with other data, this report contains data that are not covered by the NVLAP accreditation.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to:

Julie Clement, Technical Account Manager
Email: Julie.CLEMENT@bureauveritas.com
Phone# (613)868-6079

=====

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BUREAU
VERITAS

Bureau Veritas Job #: C2W8421
Report Date: 2022/11/15

Pinchin Ltd
Client Project #: 310040
Sampler Initials: JA

Asbestos Analytical Results

EPA/600R-93/116 by Polarized Light Microscopy

S0001A DOOR,CAULKING,GREY,LOC:1,EXTERIOR					
Bureau Veritas ID: UGE533		Date Analyzed: 2022/11/11			
	<u>P.O.B</u>	<u>Sample Morphology</u>	<u>Asbestos</u>	<u>Other Fibres</u>	<u>Particulate</u>
Layer 1	100	Homogeneous grey caulking	Not Detected		Non-Fibrous

S0001B DOOR,CAULKING,GREY,LOC:1,EXTERIOR					
Bureau Veritas ID: UGE534		Date Analyzed: 2022/11/11			
	<u>P.O.B</u>	<u>Sample Morphology</u>	<u>Asbestos</u>	<u>Other Fibres</u>	<u>Particulate</u>
Layer 1	100	Homogeneous grey caulking	Not Detected		Non-Fibrous

S0001C DOOR,CAULKING,GREY,LOC:1,EXTERIOR					
Bureau Veritas ID: UGE535		Date Analyzed: 2022/11/11			
	<u>P.O.B</u>	<u>Sample Morphology</u>	<u>Asbestos</u>	<u>Other Fibres</u>	<u>Particulate</u>
Layer 1	100	Homogeneous grey caulking	Not Detected		Non-Fibrous

The limit of quantitation is 0.50%, although asbestos may be qualitatively detected at concentrations less than 0.50%. Samples for which asbestos is detected at <0.50% are reported as trace, "<0.50%". "Not Detected" indicates that no asbestos fibres were observed.

Calibrated Visual Estimate (%)
Date Format : yyyy/mm/dd



Asbestos Analytical Results

EPA/600R-93/116 by Polarized Light Microscopy

S0002A WALL,PAINT,CONCRETE BLOCK,LOC:2,GROUND FLOOR					
Bureau Veritas ID: UGE536		Date Analyzed: 2022/11/11			
	<u>P.O.B</u>	<u>Sample Morphology</u>	<u>Asbestos</u>	<u>Other Fibres</u>	<u>Particulate</u>
Layer 1	50	Homogeneous off-white paint	Not Detected		Non-Fibrous
Layer 2	50	Homogeneous grey concrete	Not Detected		Non-Fibrous

S0002B WALL,PAINT,CONCRETE BLOCK,LOC:2,GROUND FLOOR					
Bureau Veritas ID: UGE537		Date Analyzed: 2022/11/14			
	<u>P.O.B</u>	<u>Sample Morphology</u>	<u>Asbestos</u>	<u>Other Fibres</u>	<u>Particulate</u>
Layer 1	50	Homogeneous off-white paint	Not Detected		Non-Fibrous
Layer 2	50	Homogeneous grey concrete	Not Detected		Non-Fibrous

The limit of quantitation is 0.50%, although asbestos may be qualitatively detected at concentrations less than 0.50%. Samples for which asbestos is detected at <0.50% are reported as trace, "<0.50%". "Not Detected" indicates that no asbestos fibres were observed.

Calibrated Visual Estimate (%)
 Date Format : yyyy/mm/dd



Asbestos Analytical Results

EPA/600R-93/116 by Polarized Light Microscopy

S0002C WALL,PAINT,CONCRETE BLOCK,LOC:2,GROUND FLOOR					
Bureau Veritas ID: UGE538		Date Analyzed: 2022/11/14			
	<u>P.O.B</u>	<u>Sample Morphology</u>	<u>Asbestos</u>	<u>Other Fibres</u>	<u>Particulate</u>
Layer 1	50	Homogeneous off-white paint	Not Detected		Non-Fibrous
Layer 2	50	Homogeneous grey concrete	Not Detected		Non-Fibrous

S0002D WALL,PAINT,CONCRETE BLOCK,LOC:2,GROUND FLOOR					
Bureau Veritas ID: UGE539		Date Analyzed: 2022/11/14			
	<u>P.O.B</u>	<u>Sample Morphology</u>	<u>Asbestos</u>	<u>Other Fibres</u>	<u>Particulate</u>
Layer 1	50	Homogeneous off-white paint	Not Detected		Non-Fibrous
Layer 2	50	Homogeneous grey concrete	Not Detected		Non-Fibrous

The limit of quantitation is 0.50%, although asbestos may be qualitatively detected at concentrations less than 0.50%. Samples for which asbestos is detected at <0.50% are reported as trace, "<0.50%". "Not Detected" indicates that no asbestos fibres were observed.

Calibrated Visual Estimate (%)
 Date Format : yyyy/mm/dd



Asbestos Analytical Results

EPA/600R-93/116 by Polarized Light Microscopy

S0002E WALL,PAINT,CONCRETE BLOCK,LOC:2,GROUND FLOOR					
Bureau Veritas ID: UGE540		Date Analyzed: 2022/11/14			
	<u>P.O.B</u>	<u>Sample Morphology</u>	<u>Asbestos</u>	<u>Other Fibres</u>	<u>Particulate</u>
Layer 1	50	Homogeneous off-white paint	Not Detected		Non-Fibrous
Layer 2	50	Homogeneous grey concrete	Not Detected		Non-Fibrous

S0003A WALL,WALL COVERING,WALL COATING,LOC:1,EXTERIOR					
Bureau Veritas ID: UGE541		Date Analyzed: 2022/11/14			
	<u>P.O.B</u>	<u>Sample Morphology</u>	<u>Asbestos</u>	<u>Other Fibres</u>	<u>Particulate</u>
Layer 1	20	Homogeneous brown texture coat	Chrysotile 1%		Non-Fibrous
Layer 2	30	Non-homogeneous light grey/beige cementitious material	Not Detected		Non-Fibrous
Layer 3	50	Homogeneous dark grey cementitious material	Not Detected		Non-Fibrous

The limit of quantitation is 0.50%, although asbestos may be qualitatively detected at concentrations less than 0.50%. Samples for which asbestos is detected at <0.50% are reported as trace, "<0.50%". "Not Detected" indicates that no asbestos fibres were observed.

Calibrated Visual Estimate (%)
 Date Format : yyyy/mm/dd



BUREAU VERITAS

Bureau Veritas Job #: C2W8421
Report Date: 2022/11/15

Pinchin Ltd
Client Project #: 310040
Sampler Initials: JA

Asbestos Analytical Results

EPA/600R-93/116 by Polarized Light Microscopy

S0003B WALL,WALL COVERING,WALL COATING,LOC:1,EXTERIOR					
Bureau Veritas ID: UGE542		Date Analyzed: 2022/11/14			
	<u>P.O.B</u>	<u>Sample Morphology</u>	<u>Asbestos</u>	<u>Other Fibres</u>	<u>Particulate</u>
Layer 1	20	Homogeneous brown texture coat	N/A		
		Comment: Not Analyzed - Positive Stop			
Layer 2	30	Non-homogeneous light grey/beige cementitious material	Not Detected		Non-Fibrous
Layer 3	50	Homogeneous dark grey cementitious material	Not Detected		Non-Fibrous

S0003C WALL,WALL COVERING,WALL COATING,LOC:1,EXTERIOR					
Bureau Veritas ID: UGE543		Date Analyzed: 2022/11/14			
	<u>P.O.B</u>	<u>Sample Morphology</u>	<u>Asbestos</u>	<u>Other Fibres</u>	<u>Particulate</u>
Layer 1	20	Homogeneous brown texture coat	N/A		
		Comment: Not Analyzed - Positive Stop			
Layer 2	30	Non-homogeneous light grey/beige cementitious material	Not Detected		Non-Fibrous
Layer 3	50	Homogeneous dark grey cementitious material	Not Detected		Non-Fibrous

The limit of quantitation is 0.50%, although asbestos may be qualitatively detected at concentrations less than 0.50%. Samples for which asbestos is detected at <0.50% are reported as trace, "<0.50%". "Not Detected" indicates that no asbestos fibres were observed.

Calibrated Visual Estimate (%)
Date Format : yyyy/mm/dd



Asbestos Analytical Results

EPA/600R-93/116 by Polarized Light Microscopy

S0004A WINDOW,CAULKING,LIGHT					
GREY,LOC:1,EXTERIOR					
Bureau Veritas ID: UGE544		Date Analyzed: 2022/11/14			
	<u>P.O.B</u>	<u>Sample Morphology</u>	<u>Asbestos</u>	<u>Other Fibres</u>	<u>Particulate</u>
Layer 1	100	Homogeneous light grey caulking	Not Detected		Non-Fibrous

S0004B WINDOW,CAULKING,LIGHT					
GREY,LOC:1,EXTERIOR					
Bureau Veritas ID: UGE545		Date Analyzed: 2022/11/14			
	<u>P.O.B</u>	<u>Sample Morphology</u>	<u>Asbestos</u>	<u>Other Fibres</u>	<u>Particulate</u>
Layer 1	100	Homogeneous light grey caulking	Not Detected		Non-Fibrous

S0004C WINDOW,CAULKING,LIGHT					
GREY,LOC:1,EXTERIOR					
Bureau Veritas ID: UGE546		Date Analyzed: 2022/11/14			
	<u>P.O.B</u>	<u>Sample Morphology</u>	<u>Asbestos</u>	<u>Other Fibres</u>	<u>Particulate</u>
Layer 1	100	Homogeneous light grey caulking	Not Detected		Non-Fibrous

The limit of quantitation is 0.50%, although asbestos may be qualitatively detected at concentrations less than 0.50%. Samples for which asbestos is detected at <0.50% are reported as trace, "<0.50%". "Not Detected" indicates that no asbestos fibres were observed.

Calibrated Visual Estimate (%)
 Date Format : yyyy/mm/dd



**BUREAU
VERITAS**

Bureau Veritas Job #: C2W8421
Report Date: 2022/11/15

Pinchin Ltd
Client Project #: 310040
Sampler Initials: JA

GENERAL COMMENTS

Results relate only to the items tested.



BUREAU
VERITAS

Bureau Veritas Job #: C2W8421
Report Date: 2022/11/15

Pinchin Ltd
Client Project #: 310040
Sampler Initials: JA

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by:

Jon Delos Santos, Laboratory Supervisor

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09-Nov-22 09:54

Julie Clement



C2W8421

SPJ ENV-728

**Pinchin Ltd. - Asbestos Laboratory
Internal Asbestos Bulk Sample Chain of Custody**

Client Name:		Project Address:	
Portfolio/Building No:		Pinchin File:	310040
Submitted by:	Justin Appleby	Email:	jappleby@pinchin.com
CC Results to:	Damian Palus	CC Email:	dpalus@pinchin.com
Date Submitted:	November 08 2022	Required by:	November 16 2022
# of Samples:	14	Priority:	Select
Year of Building Construction (Mandatory, Years ONLY):		1960	
Do NOT Stop on Positive (Sample Numbers):			
Pinchin Group Company (Mandatory Field):		Pinchin	
HMIS2 Building Reference #:		112591/202210833307914	
To be Completed by Lab Personnel Only:			
Lab Reference #:		Time: 0954	24 hour clock
Received by:	<i>Mustafa Smy</i>	Date: 10/14/0	Month Day Year
Name(s) of Analyst(s):			
Sample Prefix	Sample No.	Sample Suffix	Sample Description/Location (Mandatory)
S	0001	A	Door,Caulking,Grey,Loc:1,Exterior
S	0001	B	Door,Caulking,Grey,Loc:1,Exterior
S	0001	C	Door,Caulking,Grey,Loc:1,Exterior
S	0002	A	Wall,Paint,Concrete Block,Loc:2,Ground Floor
S	0002	B	Wall,Paint,Concrete Block,Loc:2,Ground Floor
S	0002	C	Wall,Paint,Concrete Block,Loc:2,Ground Floor
S	0002	D	Wall,Paint,Concrete Block,Loc:2,Ground Floor
S	0002	E	Wall,Paint,Concrete Block,Loc:2,Ground Floor
S	0003	A	Wall,Wall Covering,Wall Coating,Loc:1,Exterior

Sample Prefix	Sample No.	Sample Suffix	Sample Description/Location (Mandatory)
S	0003	B	Wall,Wall Covering,Wall Coating,Loc:1,Exterior
S	0003	C	Wall,Wall Covering,Wall Coating,Loc:1,Exterior
S	0004	A	Window,Caulking,Light Grey,Loc:1,Exterior
S	0004	B	Window,Caulking,Light Grey,Loc:1,Exterior
S	0004	C	Window,Caulking,Light Grey,Loc:1,Exterior



Pinchin Ltd. Asbestos Laboratory *Certificate of Analysis*

Project No.: 0310040.000
Prepared For: J. Appleby

Lab Reference No.: b283146
Analyst(s): M. Tiggos

Date Received: November 25, 2022 **Samples Submitted:** 3
Date Analyzed: November 30, 2022 **Phases Analyzed:** 4

The Pinchin Ltd. Mississauga asbestos laboratory is accredited by the National Institute of Standards and Technology, National Voluntary Laboratory Accreditation Program (NVLAP Lab Code 101270-0) for the 'EPA – 40 CFR Appendix E to Subpart E of Part 763, Interim Method of the Determination of Asbestos in Bulk Insulation Samples,' and the 'EPA 600/R-93/116: Method for the Determination of Asbestos in Bulk Building Materials'; and meets all requirements of ISO/IEC 17025:2017. The Pinchin asbestos laboratory uses the aforementioned methods of analysis.

Bulk samples are checked visually and scanned under a stereomicroscope. Slides are prepared and observed under a Polarized Light Microscope (PLM) at magnifications of 40X, 100X or 400X as appropriate. Asbestos fibres are identified by a combination of morphology, colour, refractive index, extinction, sign of elongation, birefringence and dispersion staining colours. A visual estimate is made of the percentage of asbestos present. A reported concentration of less than (<) the regulatory threshold indicates the presence of confirmed asbestos in trace quantities, limited to only a few fibres or fibre bundles in an entire sample. This method complies with provincial regulatory requirements where applicable. Multiple phases within a sample are analyzed and reported separately.

All bulk samples submitted to this laboratory for asbestos analysis are retained for a minimum of three months. Samples may be retrieved, upon request, for re-examination at any time during that period.

This report relates only to the items tested.

This report relates only to the items tested and is valid only when signed with a protected, authorized, electronic signature. This report may not be reproduced, except in full, without the written approval of Pinchin Ltd. The client may not use this report to claim product endorsement by NVLAP or any agency of the U.S. Government. Internal verification studies, quality assurance / control data and laboratory documentation on measurement uncertainty are available upon request.



Pinchin Ltd. Asbestos Laboratory
Certificate of Analysis

Project No.: 0310040.000
Prepared For: J. Appleby

Lab Reference No.: b283146
Date Analyzed: November 30, 2022

BULK SAMPLE ANALYSIS

SAMPLE IDENTIFICATION	SAMPLE DESCRIPTION	% COMPOSITION (VISUAL ESTIMATE)	
		ASBESTOS	OTHER
S0005A Wall,Plaster,Loc:2,Ground Floor	Homogeneous, grey, hard, cementitious plaster material.	None Detected	Non-Fibrous Material > 75%
S0005B Ceiling,Plaster,Loc:2,Ground Floor	2 Phases: a) Homogeneous, grey, hard, cementitious plaster material.	None Detected	Non-Fibrous Material > 75%
	b) Homogeneous, beige, finishing or texture coat.	None Detected	Mica 0.5-5% Other Non-Fibrous > 75%
S0005C Wall,Plaster,Loc:2,Ground Floor	Homogeneous, grey, hard, cementitious plaster material.	None Detected	Non-Fibrous Material > 75%

Reviewed by:

Reporting Analyst:

Analyzed by: MT 11/30/2022
 Reviewed by: KB
 Report Sent by: [Signature]

**Pinchin Ltd. - Asbestos Laboratory
 Internal Asbestos Bulk Sample Chain of Custody**

Client Name:		Project Address:	
Portfolio/Building No:	Control Building- WWTP	Pinchin File:	310040
Submitted by:	Justin Appleby	Email:	jappleby@rogers.com
CC Results to:		CC Email:	
Date Submitted:	November 22 2022	Required by:	November 28 2022
# of Samples:	3	Priority:	3 Day Turnaround
Year of Building Construction (Mandatory, Years ONLY):		1960	
Do NOT Stop on Positive (Sample Numbers):			
Pinchin Group Company (Mandatory Field):		Pinchin	
HMIS2 Building Reference #:		112591/202210833307914	
To be Completed by Lab Personnel Only:			
Lab Reference #:	0283146 KB		Time: 24 hour clock
Received by:	NOV 25 2022		Date: Month Day Year
Name(s) of Analyst(s):			
Sample Prefix	Sample No.	Sample Suffix	Sample Description/Location (Mandatory)
S	0005	A	Wall,Plaster,Loc:2,Ground Floor NO
S	0005	B	Ceiling,Plaster,Loc:2,Ground Floor all NO b) NO
S	0005	C	Wall,Plaster,Loc:2,Ground Floor NO

APPENDIX II-B
Lead Analytical Certificates



Your Project #: 310040
Your C.O.C. #: n/a

Attention: Justin Appleby

Pinchin Ltd
Unit 6
875 Main St W
Hamilton, ON
CANADA L8S 4R9

Report Date: 2022/11/15
Report #: R7388959
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C2W8390

Received: 2022/11/09, 09:54

Sample Matrix: Paint
Samples Received: 6

Analyses	Quantity	Date	Date	Laboratory Method	Analytical Method
		Extracted	Analyzed		
Metals in Paint	1	2022/11/11	2022/11/11	CAM SOP-00408	EPA 6010D m
Metals in Paint	5	2022/11/12	2022/11/14	CAM SOP-00408	EPA 6010D m

Remarks:

Bureau Veritas is accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Bureau Veritas are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Bureau Veritas' profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Bureau Veritas in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

Bureau Veritas liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Bureau Veritas has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Bureau Veritas, unless otherwise agreed in writing. Bureau Veritas is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.

Results relate to samples tested. When sampling is not conducted by Bureau Veritas, results relate to the supplied samples tested.

This Certificate shall not be reproduced except in full, without the written approval of the laboratory.

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.



Your Project #: 310040
Your C.O.C. #: n/a

Attention: Justin Appleby

Pinchin Ltd
Unit 6
875 Main St W
Hamilton, ON
CANADA L8S 4R9

Report Date: 2022/11/15
Report #: R7388959
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C2W8390
Received: 2022/11/09, 09:54

Encryption Key

Please direct all questions regarding this Certificate of Analysis to:

Julie Clement, Technical Account Manager
Email: Julie.CLEMENT@bureauveritas.com
Phone# (613)868-6079

=====

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BUREAU
VERITAS

Bureau Veritas Job #: C2W8390
Report Date: 2022/11/15

Pinchin Ltd
Client Project #: 310040
Sampler Initials: JA

ELEMENTS BY ATOMIC SPECTROSCOPY (PAINT)

Bureau Veritas ID		UGE437		UGE438	UGE438		
Sampling Date		2022/11/08 10:00		2022/11/08 10:00	2022/11/08 10:00		
COC Number		n/a		n/a	n/a		
	UNITS	L0001, CREAM,LOC:2,GROUN D FLOOR	QC Batch	L0002, BROWN,LOC:2,GROU ND FLOOR	L0002, BROWN,LOC:2,GROU ND FLOOR Lab-Dup	RDL	QC Batch

Metals							
Lead (Pb)	%	0.78	8342166	0.31	0.27	0.0010	8340330
RDL = Reportable Detection Limit QC Batch = Quality Control Batch Lab-Dup = Laboratory Initiated Duplicate							

Bureau Veritas ID		UGE439	UGE440		UGE441		
Sampling Date		2022/11/08 10:00	2022/11/08 10:00		2022/11/08 10:00		
COC Number		n/a	n/a		n/a		
	UNITS	L0003, GREEN,LOC:2,GROUN D FLOOR	L0004, WHITE,LOC:2,GROUN D FLOOR	RDL	L0005, GREY,LOC:2,GROUND FLOOR	RDL	QC Batch

Metals							
Lead (Pb)	%	0.72	0.51	0.0010	0.0025	0.00010	8342166
RDL = Reportable Detection Limit QC Batch = Quality Control Batch							

Bureau Veritas ID		UGE442		
Sampling Date		2022/11/08 10:00		
COC Number		n/a		
	UNITS	L0006, RED,LOC:2,GROUND FLOOR	RDL	QC Batch
Metals				
Lead (Pb)	%	2.6	0.025	8342166
RDL = Reportable Detection Limit QC Batch = Quality Control Batch				



BUREAU
VERITAS

Bureau Veritas Job #: C2W8390
Report Date: 2022/11/15

Pinchin Ltd
Client Project #: 310040
Sampler Initials: JA

GENERAL COMMENTS

Sample UGE442 [L0006, RED,LOC:2,GROUND FLOOR] : Metals: Due to limited amount of sample available for analysis, a smaller than usual portion of the sample was used. Detection limits were adjusted accordingly.

Results relate only to the items tested.



BUREAU
VERITAS

Bureau Veritas Job #: C2W8390
Report Date: 2022/11/15

Pinchin Ltd
Client Project #: 310040
Sampler Initials: JA

QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
8340330	JWK	Matrix Spike [UGE438-01]	Lead (Pb)	2022/11/11		NC	%	75 - 125
8340330	JWK	QC Standard	Lead (Pb)	2022/11/11		98	%	75 - 125
8340330	JWK	Method Blank	Lead (Pb)	2022/11/11	<0.00010		%	
8340330	JWK	RPD [UGE438-01]	Lead (Pb)	2022/11/11	12		%	35
8342166	GR1	Matrix Spike	Lead (Pb)	2022/11/14		92	%	75 - 125
8342166	GR1	QC Standard	Lead (Pb)	2022/11/14		102	%	75 - 125
8342166	GR1	Method Blank	Lead (Pb)	2022/11/14	<0.00010		%	
8342166	GR1	RPD	Lead (Pb)	2022/11/14	8.6		%	35

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)



BUREAU
VERITAS

Bureau Veritas Job #: C2W8390

Report Date: 2022/11/15


Pinchin Ltd

Client Project #: 310040

Sampler Initials: JA

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by:

Eva Pranjic


Ewa Pranjic, M.Sc., C.Chem, Scientific Specialist

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6740 Campobello Road, Mississauga, Ontario L5N 2L8
 Phone: 905-817-5700 Fax: 905-817-5779 Toll Free: 800-563-6266
 CAM FCD-01191/6

CHAIN OF CUSTODY RECORD

Page ____ of ____

Invoice Information		Report Information (if differs from invoice)				Project Information (where applicable)				Turnaround Time (TAT) Required						
Company Name: Pinchin Ltd.		Company Name: _____				Quotation #: _____				<input checked="" type="checkbox"/> Regular TAT (5-7 days) Most analyses						
Contact Name: Justin Appleby / Damian Palus		Contact Name: _____				P.O. #/ AFE#: _____				PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS						
Address: _____		Address: _____				Project #: 310040				Rush TAT (Surcharges will be applied)						
Phone: _____ Fax: _____		Phone: _____ Fax: _____				Site Location: _____				<input type="checkbox"/> 1 Day <input type="checkbox"/> 2 Days <input type="checkbox"/> 3-4 Days						
Email: jappleby@pinchin.com / dpalus@pinchin.com		Email: _____				Site #: _____				Date Required: _____						
MOE REGULATED DRINKING WATER OR WATER INTENDED FOR HUMAN CONSUMPTION MUST BE SUBMITTED ON THE BUREAU VERITAS DRINKING WATER CHAIN OF CUSTODY						Site Location Province: <u>Ontario</u>				Rush Confirmation #: _____						
Regulation 153 <input type="checkbox"/> Table 1 <input type="checkbox"/> Res/Park <input type="checkbox"/> Med/ Fine <input type="checkbox"/> Table 2 <input type="checkbox"/> Ind/Comm <input type="checkbox"/> Coarse <input type="checkbox"/> Table 3 <input type="checkbox"/> Agri/ Other <input type="checkbox"/> Table _____ FOR RSC (PLEASE CIRCLE) Y / N		Other Regulations <input type="checkbox"/> CCME <input type="checkbox"/> Sanitary Sewer Bylaw <input type="checkbox"/> MISA <input type="checkbox"/> Storm Sewer Bylaw <input type="checkbox"/> PWQO <input type="checkbox"/> Region _____ <input type="checkbox"/> Other (Specify) _____ <input type="checkbox"/> REG 558 (MIN. 3 DAY TAT REQUIRED) <input type="checkbox"/> REG 406 Table _____				Analysis Requested <input type="checkbox"/> FIELD FILTERED (CIRCLE) Metals / Hg / CrVI <input type="checkbox"/> BITEX / PHC F1 <input type="checkbox"/> PHCS F2 - F4 <input type="checkbox"/> VOCs <input type="checkbox"/> REG 153 METALS & INORGANICS <input type="checkbox"/> REG 153 ICPCMS METALS <input type="checkbox"/> REG 153 METALS (Hg, Cr VI, ICPCMS Metals, HWS - B) <input type="checkbox"/> Lead (pb) in Paints <input type="checkbox"/> PCBs				LABORATORY USE ONLY CUSTOMER SEAL Y / N COOLER TEMPERATURES Present Intact COOLING MEDIA PRESENT: Y / N						
Include Criteria on Certificate of Analysis: Y / N		SAMPLES MUST BE KEPT COOL (< 10 °C) FROM TIME OF SAMPLING UNTIL DELIVERY TO BUREAU VERITAS														
SAMPLE IDENTIFICATION		DATE SAMPLED (YYYY/MM/DD)	TIME SAMPLED (HH:MM)	MATRIX	# OF CONTAINERS SUBMITTED	FIELD FILTERED (CIRCLE) Metals / Hg / CrVI	BITEX / PHC F1	PHCS F2 - F4	VOCs	REG 153 METALS & INORGANICS	REG 153 ICPCMS METALS	REG 153 METALS (Hg, Cr VI, ICPCMS Metals, HWS - B)	Lead (pb) in Paints	PCBs	HOLD-DO NOT ANALYZE	COMMENTS
L0001, Cream, Loc:2, Ground Floor		(2022/11/08)	(10:00)	BULK												
L0002, Brown, Loc:2, Ground Floor		(2022/11/08)	(10:00)	BULK												
L0003, Green, Loc:2, Ground Floor		(2022/11/08)	(10:00)	BULK												
L0004, White, Loc:2, Ground Floor		(2022/11/08)	(10:00)	BULK												
L0005, Grey, Loc:2, Ground Floor		(2022/11/08)	(10:00)	BULK												
L0006, Red, Loc:2, Ground Floor		(2022/11/08)	(10:00)	BULK												
RELINQUISHED BY: (Signature/Print)		DATE: (YYYY/MM/DD)	TIME: (HH:MM)	RECEIVED BY: (Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)										
				<i>Justin Appleby</i>	2022/11/09	0954										

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09-Nov-22 09:54
 Julie Clement
 C2W8390
 SPJ ENV-1982

APPENDIX II-C
PCB Analytical Certificates



Your Project #: 310040
Your C.O.C. #: n/a

Attention: Justin Appleby

Pinchin Ltd
Unit 6
875 Main St W
Hamilton, ON
CANADA L8S 4R9

Report Date: 2022/11/24
Report #: R7402195
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C2W8402

Received: 2022/11/09, 09:53

Sample Matrix: Solid
Samples Received: 2

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Polychlorinated Biphenyl in Solids (1)	2	2022/11/22	2022/11/23	CAM SOP-00309	EPA 8082A m

Remarks:
Bureau Veritas is accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Bureau Veritas are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Bureau Veritas' profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Bureau Veritas in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

Bureau Veritas liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Bureau Veritas has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Bureau Veritas, unless otherwise agreed in writing. Bureau Veritas is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.

Results relate to samples tested. When sampling is not conducted by Bureau Veritas, results relate to the supplied samples tested. This Certificate shall not be reproduced except in full, without the written approval of the laboratory.

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

(1) Analysis was conducted according to Bureau Veritas method CAM SOP-00309 and modified where applicable based on the sample matrix. This test is not Standards Council of Canada accredited for this matrix.



Your Project #: 310040
Your C.O.C. #: n/a

Attention: Justin Appleby

Pinchin Ltd
Unit 6
875 Main St W
Hamilton, ON
CANADA L8S 4R9

Report Date: 2022/11/24
Report #: R7402195
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C2W8402
Received: 2022/11/09, 09:53

Encryption Key

Please direct all questions regarding this Certificate of Analysis to:

Julie Clement, Technical Account Manager
Email: Julie.CLEMENT@bureauveritas.com
Phone# (613)868-6079

=====

This report has been generated and distributed using a secure automated process.

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BUREAU
VERITAS

Bureau Veritas Job #: C2W8402
Report Date: 2022/11/24

Pinchin Ltd
Client Project #: 310040
Sampler Initials: J.A

POLYCHLORINATED BIPHENYLS BY GC-ECD (SOLID)

Bureau Veritas ID		UGE477	UGE478		
Sampling Date		2022/11/08 11:00	2022/11/08 11:00		
COC Number		n/a	n/a		
	UNITS	P0001, GREY AROUND DOORS,LOC:1,EXTERI OR	P0002, LIGHT GREY AROUND WINDOWS,LOC:1,EXT ERIOR	RDL	QC Batch
PCBs					
Aroclor 1262	ug/g	<10000	<10000	10000	8360867
Aroclor 1016	ug/g	<10000	<10000	10000	8360867
Aroclor 1221	ug/g	<10000	<10000	10000	8360867
Aroclor 1232	ug/g	<10000	<10000	10000	8360867
Aroclor 1242	ug/g	<10000	<10000	10000	8360867
Aroclor 1248	ug/g	<10000	<10000	10000	8360867
Aroclor 1254	ug/g	95300	121000	10000	8360867
Aroclor 1260	ug/g	<10000	<10000	10000	8360867
Aroclor 1268	ug/g	<10000	<10000	10000	8360867
Total PCB	ug/g	95300	121000	10000	8360867
Surrogate Recovery (%)					
Decachlorobiphenyl	%	NC (1)	NC (1)		8360867
RDL = Reportable Detection Limit QC Batch = Quality Control Batch (1) NC: Due to high concentration of the target analytes, surrogate could not be calculated.					



BUREAU
VERITAS

Bureau Veritas Job #: C2W8402
Report Date: 2022/11/24

Pinchin Ltd
Client Project #: 310040
Sampler Initials: J.A

GENERAL COMMENTS

PCB analysis: Due to high concentrations of the target analytes, samples required dilution. Detection limits were adjusted accordingly. Values were calculated on a wet weight basis.

Results relate only to the items tested.



QUALITY ASSURANCE REPORT

QA/QC	Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
8360867	SVS	Matrix Spike		Decachlorobiphenyl	2022/11/23		96	%	30 - 130
				Aroclor 1260	2022/11/23		119	%	30 - 130
				Total PCB	2022/11/23		119	%	30 - 130
8360867	SVS	Spiked Blank		Decachlorobiphenyl	2022/11/23		105	%	30 - 130
				Aroclor 1260	2022/11/23		123	%	30 - 130
				Total PCB	2022/11/23		123	%	30 - 130
8360867	SVS	RPD		Aroclor 1260	2022/11/23	32		%	50
				Total PCB	2022/11/23	32		%	50
8360867	SVS	Method Blank		Aroclor 1262	2022/11/23	<0.1		ug/g	
				Decachlorobiphenyl	2022/11/23		91	%	30 - 130
				Aroclor 1016	2022/11/23	<0.1		ug/g	
				Aroclor 1221	2022/11/23	<0.1		ug/g	
				Aroclor 1232	2022/11/23	<0.1		ug/g	
				Aroclor 1242	2022/11/23	<0.1		ug/g	
				Aroclor 1248	2022/11/23	<0.1		ug/g	
				Aroclor 1254	2022/11/23	<0.1		ug/g	
				Aroclor 1260	2022/11/23	<0.1		ug/g	
				Aroclor 1268	2022/11/23	<0.1		ug/g	
Total PCB	2022/11/23	<0.1		ug/g					

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.



BUREAU
VERITAS

Bureau Veritas Job #: C2W8402
Report Date: 2022/11/24

Pinchin Ltd
Client Project #: 310040
Sampler Initials: J.A

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by:

Eva Pranjic

Ewa Pranjic, M.Sc., C.Chem, Scientific Specialist

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09-Nov-22 09:53

Julie Clement



C2W8402



SPJ ENV-728

CAM FCD-01191/6

Mississauga, Ontario L5N 2L8

Fax: 905-817-5779 Toll Free: 800-563-6266

CHAIN OF CUSTODY RECORD

Page ____ of ____

Invoice Information		Report Information (if differs from invoice)				Project Information (where applicable)				Turnaround Time (TAT) Required	
Company Name: Pinchin Ltd.		Company Name: _____				Quotation #: _____				<input checked="" type="checkbox"/> Regular TAT (5-7 days) Most analyses	
Contact Name: Justin Appleby / Damian Palus		Contact Name: _____				P.O. #/ AFE#: _____				PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS	
Address: _____		Address: _____				Project #: 310040				Rush TAT (Surcharges will be applied)	
Phone: _____ Fax: _____		Phone: _____ Fax: _____				Site Location: _____				<input type="checkbox"/> 1 Day <input type="checkbox"/> 2 Days <input type="checkbox"/> 3-4 Days	
Email: jappleby@pinchin.com / dpalus@pinchin.com		Email: _____				Site #: _____				Date Required: _____	
MOE REGULATED DRINKING WATER OR WATER INTENDED FOR HUMAN CONSUMPTION MUST BE SUBMITTED ON THE BUREAU VERITAS DRINKING WATER CHAIN OF CUSTODY										Date Required: _____	
Regulation 153		Other Regulations				Analysis Requested				LABORATORY USE ONLY	
<input type="checkbox"/> Table 1 <input type="checkbox"/> Res/Park <input type="checkbox"/> Med/ Fine <input type="checkbox"/> Table 2 <input type="checkbox"/> Ind/Comm <input type="checkbox"/> Coarse <input type="checkbox"/> Table 3 <input type="checkbox"/> Agri/ Other <input type="checkbox"/> Table _____ FOR RSC (PLEASE CIRCLE) Y / N		<input type="checkbox"/> CCME <input type="checkbox"/> Sanitary Sewer Bylaw <input type="checkbox"/> MISA <input type="checkbox"/> Storm Sewer Bylaw <input type="checkbox"/> PWQD <input type="checkbox"/> Region _____ <input type="checkbox"/> Other (Specify) _____ <input type="checkbox"/> REG 558 (MIN. 3 DAY TAT REQUIRED) <input type="checkbox"/> REG 406 Table _____				# OF CONTAINERS SUBMITTED FIELD FILTERED (CIRCLE) Metals / Hg / Cr VI BTEX/ PHC F1 PHCS F2 - F4 VOCs REG 153 METALS & INORGANICS REG 153 ICPMS METALS REG 153 METALS (Hg, Cr VI, ICPMS Metals, HWS - B) Lead (Pb) in Paints PCBs				CUSTODY SEAL Y / N Present Intact COOLER TEMPERATURES COOLING MEDIA PRESENT: Y <input checked="" type="checkbox"/> N	
Include Criteria on Certificate of Analysis: Y / N										COMMENTS	
SAMPLES MUST BE KEPT COOL (< 10 °C) FROM TIME OF SAMPLING UNTIL DELIVERY TO BUREAU VERITAS											
SAMPLE IDENTIFICATION		DATE SAMPLED (YYYY/MM/DD)	TIME SAMPLED (HH:MM)	MATRIX							
P0001, Grey Around Doors, Loc:1, Exterior		(2022/11/08)	(11:00)	BULK					X		
P0002, Light Grey Around Windows, Loc:1, Exterior		(2022/11/08)	(11:00)	BULK					X		
RELINQUISHED BY: (Signature/Print)		DATE: (YYYY/MM/DD)	TIME: (HH:MM)	RECEIVED BY: (Signature/Print)		DATE: (YYYY/MM/DD)	TIME: (HH:MM)	BV JOB #			
				<i>Mustafa / ms</i>		2022/11/09	0953				

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APPENDIX III
Methodology



1.0 GENERAL

An inspection was conducted to identify the type of Hazardous Building Materials incorporated in the structure and its finishes.

Information regarding the location and condition of hazardous building materials encountered and visually estimated quantities were recorded. The locations of any samples collected were recorded on small-scale plans. As-built drawings and previous reports were referenced where provided.

Sample collection was conducted in accordance with our Standard Operating Procedures.

1.1 Asbestos

The inspection for asbestos included friable and non-friable asbestos-containing materials (ACM). A friable material is a material that when dry can be crumbled, pulverized, or powdered by hand pressure.

A separate set of samples was collected of each type of homogenous material suspected to contain asbestos. A homogenous material is defined by the US EPA as material that is uniform in texture and appearance, was installed at one time, and is unlikely to consist of more than one type or formulation of material. The homogeneous materials were determined by visual examination and available information on the phases of construction and prior renovations.

Samples were collected at a rate that is in compliance with the requirements of local regulations and guidelines. The sampling strategy was also based on known ban dates and phase out dates of the use of asbestos; sampling of certain building materials is not conducted after specific construction dates. In addition, to be conservative, several years past these dates are added to account for some uncertainty in the exact start / finish date of construction and associated usage of ACM. In some cases, manufactured products such as asbestos cement pipe were visually identified without sample confirmation.

The asbestos analysis was completed using a stop-positive approach. Only one result meeting the regulated criteria was required to determine that a material is asbestos-containing, but all samples must be analyzed to conclusively determine that a material is non-asbestos. The laboratory stopped analyzing samples from a homogeneous material once a result equal to or greater than the regulated criteria is detected in any of the samples of that material. All samples of a homogeneous material were analyzed if no asbestos is detected. In some cases, all samples were analyzed in the sample set regardless of result.

The analysis was performed in accordance with Test Method EPA/600/R-93/116: Method for the Determination of Asbestos in Bulk Building Materials, July 1993.

Analytical results were compared to the following criteria.

Jurisdiction*	Friable	Non-Friable
Ontario	0.5%	0.5%

* If there is a conflict between federal and provincial criteria, the more stringent will apply.

Where building materials are described in the report as “non-asbestos” or “does not contain asbestos”, this means that either no asbestos was detected by the analytical method utilized in any of the multiple samples or, if detected, it is below the lower limit of an asbestos-containing material in the applicable regulation. Additionally, these terms are used for materials which historically are known to not include asbestos in their manufacturing.

1.2 Lead

Samples of distinctive paint finishes, and surface coatings present in more than a limited application, where removal of the paint is possible was collected. The samples were collected by scraping the painted finish to include base and covering applications.

Analysis for lead in paints or surface coatings was performed in accordance with EPA Method No. 3050B/Method No. 7420, flame atomic absorption.

Analytical results were compared to the following criteria.

Jurisdiction*	Units (%)	Units (ppm) / (mg/kg)
Ontario	0.1	1000

* If there is a conflict between federal and provincial criteria, the more stringent will apply.

Other lead building products (batteries) were identified by visual observation only.

1.3 Silica

Building materials known to contain crystalline silica (e.g. concrete, cement, tile, brick, masonry, mortar) were identified by visual inspection only. Pinchin did not perform sampling of these materials for laboratory analysis of crystalline silica content.

1.4 Mercury

Building materials, products or equipment (lamp tubes), suspected to contain mercury was identified by visually inspection only. Dismantling of equipment suspected of containing mercury was not performed. Sampling of these materials for laboratory analysis of mercury content was not performed.



1.5 Polychlorinated Biphenyls

The potential for light ballast and oil filled transformers to contain PCBs was based on the age of the building, a review of maintenance records and examination of labels or nameplates on equipment, where present and accessible. The information was compared to known ban dates of PCBs and Environment Canada publications.

Dry type transformers were presumed to be free of dielectric fluids and hence non-PCB.

Fluids (mineral oil, hydraulic, Aroclor or Askarel) in transformers or other equipment were not sampled for PCB content.

Caulking, sealants, or paints were sampled and submitted for PCB analysis following EPA 3550C/8082A.

Sample results are compared to the criteria of 50 mg/kg for solids as stated in the PCB Regulation, SOR/2008-273.

1.6 Visible Mould

The presence of mould or water damage was determined by visual inspection of exposed building surfaces. If any mould growth or water damage was concealed within building cavities it was not addressed in this assessment.

Template: Methodology for Hazardous Building Materials Assessment, HAZ, November 23, 2021

APPENDIX IV
Location Summary Report

Client:Dundas Wastewater Treatment Plant
Building Name: Wasterwater Treatment Plant
Survey Date:

Site: 135 King Street East, Dundas, ON

Last Re-Assessment:

Location No.	Name or Description	Area ft ²	Floor No.	Bldg. Phase	Notes
1	Exterior	0		A	
2	Ground Floor	800	G	A	
3	Basement	800	B	A	

APPENDIX V

Hazardous Materials Summary Report / Sample Log

Client: Dundas Wastewater Treatment Plant Site: 135 King Street East, Dundas, ON

Building Name: Wastewater Treatment Plant

Survey Date:

HAZMAT	Sample No	System/Component/Material/Sample Description	Locations	Bldg. Phase	LF	SF	EA	%	Type	Positive	Friability
Asbestos	S0001 ABC	Other Door Caulking Grey	1	A	60	0	0	0	None Detected	No	
Asbestos	S0002 ABCDE	Wall Paint Concrete Block	2,3	A	0	2000	0	0	None Detected	No	
Asbestos	S0003 ABC	Wall Texture Coat Wall Coating	1	A	0	2000	0	0	Chrysotile	Yes	F
Asbestos	S0004 ABC	Other Window Caulking Light Grey	1	A	90	0	0	0	None Detected	No	
Asbestos	S0005 ABC	Ceiling, Wall Plaster	2,3	A	0	755	0	0	None Detected	No	
Paint	L0001	Wall Concrete (poured) Cream	2,3	A	0	1200	0	0	Lead (High)	Yes	-
Paint	L0002	Wall Concrete (poured) Brown	2,3	A	0	400	0	0	Lead (High)	Yes	-
Paint	L0003	Piping Metal Green	2,3	A	0	800	0	0	Lead (High)	Yes	-
Paint	L0004	Wall Concrete (poured) White	2,3	A	0	1800	0	0	Lead (High)	Yes	-
Paint	L0005	Floor Concrete (poured) Grey	2,3	A	0	4200	0	0		No	-
Paint	L0006	Piping Metal Red	2,3	A	200	0	0	0	Lead (High)	Yes	-
Paint	V9500	Other Metal Orange door	2,3	A	0	0	3	0	Presumed Lead	Yes	-
Paint	V9500	Piping Metal Yellow gas line	2,3	A	40	0	0	0	Presumed Lead	Yes	-
Lead Product	V9000	Batteries In Emer. Lights	2,3	A	0	0	2	0	Lead Product	Yes	-
PCB	P0001	Caulking Grey Around Doors	1	A	20	0	0	0	-	Yes	-
PCB	P0002	Caulking Light Grey Around Windows	1	A	30	0	0	0	-	Yes	-
PCB	V9500	Light Ballasts	2,3	A	0	0	6	0	Presumed PCB	Yes	-
Hg	V9000	Fluorescent Light Tube	2,3	A	0	0	6	0	Hg	Yes	-

Legend:

Sample number		Units		
S####	Asbestos sample collected	SF	Square feet	NF Non Friable material.
L####	Paint sample collected	LF	Linear feet	F Friable material
P####	PCB sample collected	EA	Each	PF Potentially Friable material
M####	Mould sample collected	%	Percentage	
V####	Material visually similar to numbered sample collected			
V0000	Known non Hazardous Material			
V9000	Material is visually identified as Hazardous Material			
V9500	Material is presumed to be Hazardous Material			
[Loc. No.]	Abated Material			

APPENDIX VI
HMIS All Data Report

Client: Dundas Wastewater Treatment Plant
Location: #1 : Exterior
Survey Date: 2022-11-08

Site: 135 King Street East, Dundas, ON
Floor: Basement (0)

Building Name: Wastewater Treatment Plant
Room #:
Last Re-Assessment: 0000-00-00

Area (sqft): 0

ASBESTOS																
System	Component	Material	Item	Covering	A*	V*	AP*	Good	Fair	Poor	Unit	Sample	Asbestos Type	Amount	Hazard	Friable
Other	Door	Caulking, Grey			A	Y		60			LF	S0001ABC	None Detected	N.D.	None	
Other	Window	Caulking, Light grey			A	Y		90			LF	S0004ABC	None Detected	N.D.	None	
Wall		Masonry, Brick			A	Y										
Wall ¹		Texture Coat, Wall coating			A	Y		1000(5)		1000(3)	SF	S0003ABC	Chrysotile	0.5-5%	Confirmed Asbestos	F

1 - Texture coat / stucco

Client: Dundas Wastewater Treatment Plant
Location: #1 : Exterior
Survey Date: 2022-11-08

Site: 135 King Street East, Dundas, ON
Floor: Basement (0)

Building Name: Wastewater Treatment Plant
Room #:
Last Re-Assessment: 0000-00-00

Area (sqft): 0

PCB						
Component	Quantity	Unit	Sample	Sample Description	Amount	PCB
Caulking	20	LF	P0001	Grey around doors	95300 mg/kg	Yes
Caulking	30	LF	P0002	Light grey around windows	121000 mg/kg	Yes

Client: Dundas Wastewater Treatment Plant
Location: #2 : Ground Floor
Survey Date: 2022-11-08

Site: 135 King Street East, Dundas, ON
Floor: G

Building Name: Wastewater Treatment Plant
Room #:
Last Re-Assessment: 0000-00-00

Area (sqft): 800

ASBESTOS																
System	Component	Material	Item	Covering	A*	V*	AP*	Good	Fair	Poor	Unit	Sample	Asbestos Type	Amount	Hazard	Friable
Ceiling		Plaster			A	Y		30			SF	S0005B	None Detected	N.D.	None	
Ceiling		None Found														
Duct		Not Insulated			A	Y										
Floor		Concrete (poured)			A	Y										
Piping		Metal			A	Y										
Piping		Plastic			A	Y										
Structure		Concrete (poured)			C	Y										
Wall		Concrete (poured)			A	Y										
Wall		Plaster			A	Y		500	25		SF	S0005AC	None Detected	N.D.	None	
Wall		Masonry			A	Y										
Wall		Paint, Concrete block			A	Y		1000			SF	S0002ABC DE	None Detected	N.D.	None	

Client: Dundas Wastewater Treatment Plant
Location: #2 : Ground Floor
Survey Date: 2022-11-08

Site: 135 King Street East, Dundas, ON
Floor: G

Building Name: Wastewater Treatment Plant
Room #:
Last Re-Assessment: 0000-00-00

Area (sqft): 800

PAINT									
System	Item	Good	Poor	Unit	Sample	Sample Description	Amount	Hazard	
Wall	Concrete (poured)	600		SF	L0001	Cream	Pb: 0.78 %	Lead (High)	
Wall	Concrete (poured)	200		SF	L0002	Brown	Pb: 0.31 %	Lead (High)	
Piping ¹	Metal	400		SF	L0003	Green	Pb: 0.72 %	Lead (High)	
Wall	Concrete (poured)	100		SF	L0004	White	Pb: 0.51 %	Lead (High)	
Ceiling	Concrete (poured)	800		SF	V0004	White	Pb: 0.51 %	Lead (High)	
Piping	Metal	20		LF	V9500	Yellow gas line		Presumed Lead	
Other	Metal	2		EA	V9500	Orange door		Presumed Lead	
Floor	Concrete (poured)	1600		SF	L0005	Grey	Pb: 0.0025 %	No	
Wall	Concrete (poured)	500		SF	V0005	Grey	Pb: 0.0025 %	No	
Piping	Metal	100		LF	L0006	Red	Pb: 2.6 %	Lead (High)	

1 - On metal pipes and concrete walls

Client: Dundas Wastewater Treatment Plant
Location: #2 : Ground Floor
Survey Date: 2022-11-08

Site: 135 King Street East, Dundas, ON
Floor: G

Building Name: Wastewater Treatment Plant
Room #:
Last Re-Assessment: 0000-00-00

Area (sqft): 800

PB PRODUCTS				
Component	Quantity	Unit	Sample	Hazard
Batteries In Emer. Lights	1	EA	V9000	Yes

Client: Dundas Wastewater Treatment Plant
Location: #2 : Ground Floor
2022-12-01

Site: 135 King Street East, Dundas, ON
Floor: G

Building Name: Wastewater Treatment Plant
Room #:

Area (sqft): 800

Survey Date: 2022-11-08

Last Re-Assessment: 0000-00-00

MERCURY				
Component	Quantity	Unit	Sample	Hazard
Fluorescent Light Tube	3	EA	V9000	Yes

Client: Dundas Wastewater Treatment Plant
Location: #2 : Ground Floor
Survey Date: 2022-11-08

Site: 135 King Street East, Dundas, ON
Floor: G

Building Name: Wastewater Treatment Plant
Room #:
Last Re-Assessment: 0000-00-00

Area (sqft): 800

PCB						
Component	Quantity	Unit	Sample	Sample Description	Amount	PCB
Light Ballasts	3	EA	V9500			Presumed

Client: Dundas Wastewater Treatment Plant
Location: #3 : Basement
Survey Date: 2022-11-08

Site: 135 King Street East, Dundas, ON
Floor: B

Building Name: Wastewater Treatment Plant
Room #:
Last Re-Assessment: 0000-00-00

Area (sqft): 800

ASBESTOS																
System	Component	Material	Item	Covering	A*	V*	AP*	Good	Fair	Poor	Unit	Sample	Asbestos Type	Amount	Hazard	Friable
Ceiling		None Found														
Duct		Not Insulated			A	Y										
Floor		Concrete (poured)			A	Y										
Piping		Metal			A	Y										
Piping		Plastic			A	Y										
Structure		Concrete (poured)			C	Y										
Wall		Concrete (poured)			A	Y										
Wall		Plaster			A	Y		200			SF	V0005	None Detected	N.D.	None	
Wall		Masonry			A	Y										
Wall		Paint, Concrete block			A	Y		1000			SF	V0002	None Detected	N.D.	None	

Client: Dundas Wastewater Treatment Plant
Location: #3 : Basement
Survey Date: 2022-11-08

Site: 135 King Street East, Dundas, ON
Floor: B

Building Name: Wastewater Treatment Plant
Room #:
Last Re-Assessment: 0000-00-00

Area (sqft): 800

PAINT									
System	Item	Good	Poor	Unit	Sample	Sample Description	Amount	Hazard	
Wall	Concrete (poured)	600		SF	V0001	Cream	Pb: 0.78 %	Lead (High)	
Wall	Concrete (poured)	200		SF	V0002	Greenish gold	Pb: 0.31 %	Lead (High)	
Piping ¹	Metal	400		SF	V0003	Green	Pb: 0.72 %	Lead (High)	
Wall	Concrete (poured)	100		SF	V0004	White	Pb: 0.51 %	Lead (High)	
Ceiling	Concrete (poured)	800		SF	V0004	White	Pb: 0.51 %	Lead (High)	
Piping	Metal	20		LF	V9500	Yellow gas line		Presumed Lead	
Other	Metal	1		EA	V9500	Orange door		Presumed Lead	
Floor	Concrete (poured)	1600		SF	V0005	Grey	Pb: 0.0025 %	No	
Wall	Concrete (poured)	500		SF	V0005	Grey	Pb: 0.0025 %	No	
Piping	Metal	100		LF	V0006	Red	Pb: 2.6 %	Lead (High)	

1 - On metal pipes and concrete walls

Client: Dundas Wastewater Treatment Plant
Location: #3 : Basement
Survey Date: 2022-11-08

Site: 135 King Street East, Dundas, ON
Floor: B

Building Name: Wastewater Treatment Plant
Room #:
Last Re-Assessment: 0000-00-00

Area (sqft): 800

PB PRODUCTS				
Component	Quantity	Unit	Sample	Hazard
Batteries In Emer. Lights	1	EA	V9000	Yes

Client: Dundas Wastewater Treatment Plant
Location: #3 : Basement
Survey Date: 2022-11-08

Site: 135 King Street East, Dundas, ON
Floor: B

Building Name: Wastewater Treatment Plant
Room #:
Last Re-Assessment: 0000-00-00

Area (sqft): 800

MERCURY				
Component	Quantity	Unit	Sample	Hazard
Fluorescent Light Tube	3	EA	V9000	Yes

Client: Dundas Wastewater Treatment Plant
Location: #3 : Basement
Survey Date: 2022-11-08

Site: 135 King Street East, Dundas, ON
Floor: B

Building Name: Wastewater Treatment Plant
Room #:
Last Re-Assessment: 0000-00-00

Area (sqft): 800

PCB						
Component	Quantity	Unit	Sample	Sample Description	Amount	PCB
Light Ballasts	3	EA	V9500			Presumed

Legend:



Sample number		Units		Other	
S####	Asbestos sample collected	SF	Square feet	A	Access
L####	Paint sample collected	LF	Linear feet	V	Visible
P####	PCB sample collected	EA	Each	AP	Air Plenum
M####	Mould sample collected	%	Percentage	F	Friable material
V####	Material is visually identified to be identical to S####	LF	Linear feet	NF	Non Friable material
V0000	Known non hazardous material			PF	Potentially Friable material
V9000	Material visually identified as a Hazardous Material			Pb	Lead
V9500	Material is presumed to be a hazardous material			Hg	Mercury
				As	Arsenic
				Cr	Chromium

Access	
A	Accessible to all building occupants
B	Accessible to maintenance and operations staff without a ladder
C	Accessible to maintenance and operations staff with a ladder. Also rarely entered, locked areas
D	Not normally accessible

Condition	
Good	No visible damage or deterioration
Fair	Minor, repairable damage, cracking, delamination or deterioration
Poor	Irreparable damage or deterioration with exposed and missing material

Visible	
Y	The material is visible when standing on the floor of the room, without the removal or opening of other building components (e.g. ceiling tiles or access panels).
N	The material is not visible to view when standing on the floor of the room and requires the removal of a building component (e.g. ceilings tiles or access panels) to view and access. Includes rarely entered crawlspaces, attic spaces, etc. Observations will be limited to the extent visible from the access points.

Air Plenum	
Yes or No	The material is in a return air plenum or in a direct airstream or there is evidence of air erosion (e.g. duct for heating or cooling blowing directly on or across an ACM). This field is only completed where Air Plenum consideration is required by regulation.

Colour Coding	
	The material is known to contain regulated concentrations of asbestos; either by analytical results or visible identification (use of the V9000 code).
	The material is presumed to contain asbestos; based on visual appearances; typically a material known to historically contain asbestos; however, not sampled due to limited access or the destructive nature of the sampling.

Action					
(1)	Clean up of ACM Debris	(2)	Precautions for Access Which may Disturb ACM Debris	(3)	ACM removal
(4)	Precautions for Work Which may Disturb ACM in Poor Condition	(5)	Proactive ACM removal (Minimum repair required for fair condition)	(6)	ACM repair
(7)	Management program and surveillance				

SECTION 01710 – MOBILIZATION AND DEMOBILIZATION

1 GENERAL

1.1 GENERAL REQUIREMENTS

- 1.1.1 The Contractor and its Subcontractors shall comply with the requirements in this section. Each section within the specifications is related and shall be read in conjunction with one another.

1.2 REFERENCES

- 1.2.1 These Specifications form an integral part of the Contract Documents.
- 1.2.2 Refer also to all other parts of the Contract Documents to determine their effect on the Work of each section of these Specifications.
- 1.2.3 The requirements of this section and Division 1 apply to and govern the Work under other divisions.
- 1.2.4 Comply with the latest edition of the following statutes, standards, codes and regulations and all amendments thereto:
- .1 OHSA and Regulations for Construction Projects O.Reg 213
 - .2 All other applicable statutes, standards, codes, and regulations

1.3 SUBMITTALS

- 1.3.1 N/A

1.4 MOBILIZATION AND DEMOBILIZATION

- 1.4.1 The Contractor shall provide for the mobilization/demobilization of the site in accordance with these Contract Documents. Specific plans shall be in accordance with [Section 01510 – Temporary Facilities and Utilities] and [Section 01500 – Traffic Control and Management].
- 1.4.2 Comply with the Consultant's and the City's instructions with regard to the allocation of the laydown areas of the site; field offices and storage areas; access and parking facilities.
- 1.4.3 Supply and erect all signs, barricades, flashers, delineators, flag persons, and such other protection as required to protect the public during construction in accordance with contract documents.
- 1.4.4 Move onto site and set up offices, storage facilities, plant, sanitary facilities, temporary fencing, hydro and telephone as specified.

- 1.4.5 Provide all necessary access to the Project including haul roads as required and restoration of surface to original condition or better after haul roads are removed.
- 1.4.6 Move off site and remove offices, storage facilities, and all temporary facilities and restore the site to original condition or better condition.

1.5 BASIS OF PAYMENT

- 1.5.1 Without limiting the requirements of any other sections of the Contract, the payment for mobilization shall be included in the first payment certificate issued for the Contract subject to the City or the Consultant being satisfied that full mobilization has been carried out. If the City or the Consultant is not satisfied, then an adjustment to the payment certificate that reflects the degree of mobilization, in the opinion of the City or the Consultant, will be made.
- 1.5.2 Up to a maximum of 60% of the lump sum price for this item shall be allowed for mobilization with the balance to demobilization.
- 1.5.3 Payment for demobilization shall become due following completion of the Work and subject to the City or the Consultant being satisfied that full demobilization has been carried out. If the City or the Consultant is not satisfied, then an adjustment to the payment certificate that reflects the degree of demobilization, in the opinion of the City or the Consultant, will be made.

1.6 MEASUREMENT FOR PAYMENT

- 1.6.1 The measurement of payment is a lump sum for all Work required under this Specification.

2 PRODUCTS – N/A

3 EXECUTION – N/A

4 SUPPLEMENTS – N/A

END OF SECTION

SECTION 01720 – PREPARATION

1 GENERAL

1.1 GENERAL REQUIREMENTS

- 1.1.1 The Contractor and its Subcontractors shall comply with the requirements in this section. Each section within the specifications is related and shall be read in conjunction with one another.

1.2 REFERENCES

- 1.2.1 These Specifications form an integral part of the Contract Documents.
- 1.2.2 Refer also to all other parts of the Contract Documents to determine their effect on the work of each section of these Specifications.
- 1.2.3 The requirements of this section and Division 1 apply to and govern the work under other divisions.
- 1.2.4 The City's identification of existing survey control points and property limits.
- 1.2.5 Comply with the latest edition of all applicable statutes, standards, codes and regulations and all amendments thereto.

1.3 SUBMITTALS

- 1.3.1 The Contractor shall submit the following information in accordance to this section and [Section 01330 – Submittals]:
- .1 Submit to the Consultant the contact information, including name and address of the Qualified Land Surveyor.
 - .2 Submit documentation to verify accuracy of field engineering work.
 - .3 Submit certificate signed by surveyor certifying and noting those elevations and locations of completed Work that conform with and vary from the Contract Documents.
 - .4 Submit field drawings to indicate relative position of various services and equipment when required by the Consultant.

1.4 SURVEY REQUIREMENTS

- 1.4.1 N/A

1.5 PRECONSTRUCTION SURVEY

- 1.5.1 N/A

1.6 EXISTING SERVICES

- 1.6.1 The Contract Documents provide general locations of existing facilities / utilities. The Contractor shall confirm the locations of existing subsurface utilities and identify any conflicts. Where conflicts are identified, the Contractor shall propose a possible solution addressing the conflict to the satisfaction of the Consultant.
- 1.6.2 Promptly notify the Consultant in writing if subsurface conditions differ from those indicated in Contract Documents, or a reasonable assumption of probable conditions based thereon.
- 1.6.3 Remove abandoned service lines within two (2) metres of structures. Cap or otherwise seal lines at cut-off points as directed by the Consultant.

1.7 EXISTING EQUIPMENT AND FIXTURES

- 1.7.1 Location of equipment, fixtures and outlets indicated or specified are to be considered as approximate.
- 1.7.2 The Contractor shall locate equipment, fixtures and distribution systems to provide minimum interference and maximum usable space and in accordance with manufacturer's recommendations for safety, access and maintenance.
- 1.7.3 Inform the Consultant of impending installation and obtain approval for actual location.
- 1.7.4 Submit field drawings to indicate relative position of various services and equipment when required by the Consultant.

1.8 ENVIRONMENTAL CONTROLS

- 1.8.1 The Contractor to provide and install environmental controls and measures in accordance with [Section 01561 – Environmental Control and Protection].

1.9 GEOTECHNICAL INVESTIGATIONS

- 1.9.1 N/A

1.10 RECORDS

- 1.10.1 Maintain a complete, accurate log of control and survey work as it progresses.
- 1.10.2 On completion of foundations and major site improvements, prepare a certified survey showing dimensions, locations, angles and elevations of Work.
- 1.10.3 Record locations of maintained, re-routed and abandoned service lines.

1.11 BASIS OF PAYMENT

1.11.1 The Contract Price shall include compensation in full for labour, material, equipment, power workmanship, and all other costs associated with this section.

1.12 MEASUREMENT FOR PAYMENT

1.12.1 The measurement of payment is a lump sum for all Work required under this Specification.

1.12.2 Payment shall be prorated on a monthly basis for the duration of the Contract.

2 PRODUCTS – N/A

3 EXECUTION – N/A

4 SUPPLEMENTS – N/A

END OF SECTION

SECTION 01740 – SITE CLEANING AND MAINTENANCE

1 GENERAL

1.1 GENERAL REQUIREMENTS

- 1.1.1 The Contractor and its Subcontractors shall comply with the requirements in this section. Each section within the specifications is related and shall be read in conjunction with one another.

1.2 REFERENCES

- 1.2.1 These Specifications form an integral part of the Contract Documents.
- 1.2.2 Refer also to all other parts of the Contract Documents to determine their effect on the Work of each section of these Specifications.
- 1.2.3 The requirements of this section and Division 1 apply to and govern the Work under other divisions.
- 1.2.4 Comply with the latest edition of the following statutes, standards, codes and regulations and all amendments thereto:
- .1 OSHA and Regulations for Construction Projects O.Reg 213
 - .2 All other applicable statutes, standards, codes, and regulations

1.3 SUBMITTALS

- 1.3.1 Submittals shall be in accordance with [Section 01330 – Submittals] and this section.

1.4 PROJECT CLEANLINESS

- 1.4.1 Maintain Work in tidy condition, free from accumulation of waste products and debris, including that caused by the City or other contractors.
- 1.4.2 Remove waste materials from site at regularly scheduled times or dispose of as directed by the Consultant. Do not burn waste materials on site.
- 1.4.3 Clear snow and ice from access to building, bank/pile snow in designated areas only.
- 1.4.4 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.
- 1.4.5 Provide on-site containers for collection of waste materials and debris.
- 1.4.6 Provide and use clearly marked separate bins for recycling.

- 1.4.7 Remove waste material and debris from site at minimum on a weekly basis.
- 1.4.8 Clean interior areas prior to start of finish Work, and maintain areas free of dust and other contaminants during finishing operations.
- 1.4.9 Store volatile waste in covered metal containers, and remove from premises at end of each Working Day.
- 1.4.10 Provide adequate ventilation during use of volatile or noxious substances. Use of building ventilation systems is not permitted for this purpose.
- 1.4.11 Use only cleaning materials recommended by manufacturer of surface to be cleaned, and as recommended by cleaning material manufacturer.
- 1.4.12 Schedule cleaning operations so that resulting dust, debris and other contaminants will not fall on wet, newly painted surfaces nor contaminate building systems.

1.5 FINAL CLEANING

- 1.5.1 Clean and polish glass, mirrors, hardware, wall tile, stainless steel, chrome, porcelain enamel, baked enamel, plastic laminate, and mechanical and electrical fixtures. Replace broken, scratched, or disfigured glass.
- 1.5.2 Remove stains, spots, marks and dirt from decorative Work, electrical and mechanical fixtures, furniture fitments, walls, and floors.
- 1.5.3 Clean lighting reflectors, lenses, and other lighting surfaces.
- 1.5.4 Vacuum clean and dust building interiors, behind grilles, louvres, and screens.
- 1.5.5 Wax, seal, shampoo or prepare floor finishes, as recommended by manufacturer.
- 1.5.6 Inspect finishes, fitments and equipment and ensure specified workmanship and operation.
- 1.5.7 Broom clean and wash exterior walks, steps, and surfaces; rake clean other surfaces of grounds.
- 1.5.8 Remove dirt and other disfiguration from exterior surfaces.
- 1.5.9 Clean and sweep roofs, gutters, areaways, and sunken wells.
- 1.5.10 Sweep and wash clean paved areas.

- 1.5.11 Clean equipment and fixtures to a sanitary condition; clean or replace filters of mechanical equipment.
- 1.5.12 Clean roofs, downspouts, and drainage systems.
- 1.5.13 Remove debris and surplus materials from crawl areas and other accessible concealed spaces.

1.6 SNOW REMOVAL AND CLEANING

- 1.6.1 The Contractor shall be responsible for the snow removal and de-icing of all construction areas, construction access roads and designated parking areas during the winter months.

1.7 GRASS CUTTING

- 1.7.1 The Contractor shall be responsible for maintaining the grassy areas at a length that meets By-law requirements.

1.8 BASIS OF PAYMENT

- 1.8.1 The Contract Price shall include compensation in full for labour, material, equipment, power workmanship, and all other costs associated with this section.

1.9 MEASUREMENT FOR PAYMENT

- 1.9.1 The measurement of payment is a lump sum for all Work required under this Specification.
- 1.9.2 Payment shall be prorated on a monthly basis for the duration of the Contract.

2 PRODUCTS – N/A

3 EXECUTION – N/A

4 SUPPLEMENTS – N/A

END OF SECTION

SECTION 01770 – CLOSEOUT PROCEDURES

1 GENERAL

1.1 GENERAL REQUIREMENTS

- 1.1.1 The Contractor and its Subcontractors shall comply with the requirements in this section. Each section within the specifications is related and shall be read in conjunction with one another.

1.2 REFERENCES

- 1.2.1 These Specifications form an integral part of the Contract Documents.
- 1.2.2 Refer also to all other parts of the Contract Documents to determine their effect on the work of each section of these Specifications.
- 1.2.3 The requirements of this section and Division 1 apply to and govern the work under other divisions.
- 1.2.4 Comply with the latest edition of all applicable statutes, standards, codes and regulations and all amendments thereto.

1.3 SUBMITTALS

- 1.3.1 The Contractor shall submit a Closeout Package that includes the following information in accordance to this section and [Section 01330 – Submittals]:
- .1 Pre and post-condition assessment reports including photos.
 - .2 Written warranties and service agreements.
 - .3 Final as-built red line drawings.
 - .4 Final as-constructed survey.
 - .5 All construction progress photographs.
 - .6 Certificates of inspection and acceptance by local governing agencies, Ministries, and agencies having authority (i.e. building occupancy permit, etc.).
 - .7 Releases or waivers of liens and claims.
 - .8 Releases from agreements.
 - .9 Application for final payment.
 - .10 Provide spare parts, special tools, and maintenance materials record list as required by individual Specification sections.
 - .11 Transfer of Assets documentation to be completed as per procedure.

1.4 INSPECTION AND DECLARATION

- 1.4.1 The Contractor and all Subcontractors shall first conduct an inspection of Work, identify deficiencies and defects, and repair as required to conform to Contract Documents.

- .1 Notify the Consultant in writing of satisfactory completion of the Contractor's Inspection and that corrections have been made.
 - .2 Request the Consultant's Inspection.
- 1.4.2 The Consultant and the Contractor will perform an inspection of Work to identify obvious defects or deficiencies. The Contractor shall correct Work accordingly.
- 1.4.3 The Contractor shall submit written certificate that following have been performed:
 - .1 Work has been completed and inspected for compliance with Contract Documents.
 - .2 Deficiencies have been corrected and deficiencies have been completed. In the event the Consultant identifies significant deficiencies during the final inspection, Substantial Performance of the Work will not be granted until such deficiencies are corrected to the satisfaction of the Consultant. The Contractor will have to cover all costs associated with service interruptions caused by such deficiency repairs as well as additional final inspections by the Consultant and the City.
 - .3 Equipment and systems have been tested, adjusted, and balanced and are fully operational.
 - .4 Operation of systems have been demonstrated to the City's personnel.
 - .5 Work is complete and ready for final inspection.
- 1.4.4 When items noted above are completed, the Contractor shall request final inspection of Work by the City, the Consultant, and the Contractor. If Work is deemed incomplete by the City and the Consultant, complete outstanding items and request re-inspection.
- 1.4.5 When the City and the Consultant consider deficiencies and defects have been corrected and it appears requirements of Contract have been met, The Contractor shall submit application for Substantial Performance of the Work.
- 1.4.6 Date of the City's acceptance of submitted declaration of Substantial Performance of the Work shall be date for commencement for warranty period and commencement of lien period unless required otherwise by lien statute of Place of Work. The Contractor shall be responsible for providing extended warranty periods as required by the Contract Documents at no additional cost to the City.

1.5 FINAL CLEANING

- 1.5.1 Leave the Work and adjacent affected areas in clean condition to the satisfaction of the Consultant and the City.
- 1.5.2 Remove grease, dirt, dust, paint or plaster splatter, stains, labels, fingerprints, and other foreign materials from exposed surfaces.
- 1.5.3 Clean all windows.
- 1.5.4 Clean and wax wood, vinyl, or painted floors.
- 1.5.5 Broom clean exterior paved driveways and parking areas.
- 1.5.6 Hose clean sidewalks, loading areas, and others contiguous areas with major structures.
- 1.5.7 Rake clean all other surfaces.
- 1.5.8 Remove snow and ice from access to buildings.
- 1.5.9 Replace air-handling filters, and clean ducts, blowers, and coils of ventilation units operated during construction.
- 1.5.10 Leave water courses, gutters, and ditches open and clean.
- 1.5.11 Remove all temporary facilities from site on completion of the Work.

1.6 FINAL SURVEY

- 1.6.1 The Contractor shall carry out the final survey of the Work in conjunction with closeout submittals.

1.7 BASIS OF PAYMENT

- 1.7.1 The Contract price shall be compensation in full for labour, material, equipment and workmanship associated with this Section.

1.8 MEASUREMENT FOR PAYMENT

- 1.8.1 The measurement of payment is a lump sum for all Works required under this specification.
- 1.8.2 Full payment will be released with the final payment certificate.

2 PRODUCTS – N/A

3 EXECUTION – N/A

4 SUPPLEMENTS – N/A

CITY OF HAMILTON

C13-32-24

DUNDAS WASTEWATER TREATMENT
PLANT (WWTP) HEALTH AND SAFETY
IMMEDIATE NEEDS AND STRUCTURAL
REPAIR UPGRADES

01770

CLOSEOUT PROCEDURES

Page 4 of 4

END OF SECTION

SECTION 01800 – OPERATION AND MAINTENANCE DATA

1 GENERAL

1.1 GENERAL REQUIREMENTS

- 1.1.1 The Contractor and its Subcontractors shall comply with the requirements in this section. Each section within the Specifications is related and shall be read in conjunction with one another.

1.2 REFERENCES

- 1.2.1 These Specifications form an integral part of the Contract Documents.
- 1.2.2 Refer also to all other parts of the Contract Documents to determine their effect on the Work of each section of these Specifications.
- 1.2.3 The requirements of this section and Division 1 apply to and govern the Work under other divisions.
- 1.2.4 Comply with the latest edition of all applicable statutes, standards, codes and regulations and all amendments thereto.

1.3 SUBMITTALS

- 1.3.1 The Contractor shall submit information in accordance to this section and [Section 01330 – Submittals] and [Section 01810 – Commissioning].
- 1.3.2 The Contractor shall submit one (1) electronic PDF version of draft Operations and Maintenance (O&M) manuals at least twenty (20) working days prior to the commencement of Commissioning, for the Consultant's review and acceptance. Submission of individual data will not be accepted unless so directed by the Consultant.
- 1.3.3 The Contractor will familiarize and comply with the specific requirements of this section in conjunction with Section 01810 - Commissioning and the City's Transfer of Assets Procedure.
- 1.3.4 In construction projects where work is carried out in multiple distinct stages of Commissioning, the relevant portions of the manual shall be submitted for that section of the work prior to commencement of Commissioning.
- 1.3.5 Make changes as required and re-submit as directed by the Consultant.

- 1.3.6 Upon acceptance of draft submission by the Consultant, compile, submit and maintain hard copy, hard bound set of the draft O&M manuals including all equipment information, Shop Drawings, calibration information, startup reports, etc. onsite to assist the Consultant and the City during the Commissioning period, and until the final draft O&M manual is received by the City.
- 1.3.7 The Red Tag Commissioning phase shall not commence without the draft O&M manual available on site.
- 1.3.8 Supply two (2) hard copies and an electronic PDF version of the final draft O&M manuals. Final draft submission and acceptance of operation and maintenance data is a requirement in achieving Substantial Performance of the Work.
- 1.3.9 Electronic version of O&M Manuals shall be exact duplicates of the Consultant accepted draft submission and will be fully functional, viewable, indexed and searchable in the latest version of the Adobe Acrobat PDF file format.
 - .1 The electronic form of the manual shall contain a Table of Contents, with bookmarks created for each section and subsection as outlined in the attached Table of Contents templates.
 - .2 Each PDF file should be configured in the same way so that users are presented with a standard interface for all manuals regardless of Vendor. To accomplish this, each PDF file shall be set to open "Bookmarks and Page" view.

1.4 DATA FORMAT

- 1.4.1 Prepare operation and maintenance data in the form of an instructional manual as described in Section 1.4.2.
- 1.4.2 Operations and Maintenance Manual format:
 - .1 Binder: Commercial quality, permanent, three ring or three post binders with clear vinyl pockets on the front cover and on the spine for the insertion of labels.
 - .1 Three-hole punch data for binding and composition and arrange printing so that punched holes do not obscure data.
 - .2 Size: 8 ½ inches by 11 inches, minimum.
 - .3 Inserts: Both the spine and the front pockets are to contain light coloured or white inserts showing the following information as outlined in the attached Table of Contents templates:
 - .1 City of Hamilton Name and Logo (in colour)
 - .2 Contract Number
 - .3 Title of project

- .4 Volume Number and Title
- .5 Date of Issue
- .1 All lettering on the cover pages must be typed or printed. Hand-written or laser originals are unacceptable.
- .2 Drawings will be folded and inserted in labelled clear plastic binder type pockets/sleeves (page protectors).
- .2 Organization: The manuals are to be organized in volumes as described below. Provide a separate binder and PDF file(s) for each volume unless directed otherwise by the Consultant:
 - .3 Volume 1 – Consultant (contents to be prepared by the Consultant).
 - .4 Volume 2 – Facility (Divisions 1-10, 12) (by the Contractor)
 - .5 Volume 3 – Maintenance (Divisions 11, 13-16) (by the Contractor)
- .3 The Contractor shall prepare and organize Volumes 2 and 3 according to the 16 Divisions of Construction as defined by the Construction Specifications Institute Masterformat using the section numbering adopted in these Contract specifications – master list of sections, titles and numbers utilizing laminated Mylar plastic divider tabs and shall reference the attached supplemental Table of Contents templates.
- .4 Index – List of all sections under the applicable Division, in the order of appearance and included in the binder as referenced:
 - .6 List of all Subcontractors and Suppliers with contact information
 - .7 Equipment Maintenance Data Sheet
 - .8 Device Manual
 - .9 Maintenance Recommendations
 - .10 Health & Safety Information
 - .11 Instrument Parameter Files & Reports
 - .12 Critical Spare Parts and Specialty Tools
 - .13 Equipment Start Up & Instrumentation Calibration Documentation
 - .14 Vendor Training Documentation
- 1.4.3 The following information will be required for each system and major piece of equipment. Each piece of equipment will be referenced by its name and tag number. Where manufacturer’s literature covers several models or options, the applicable information will be highlighted and included, while inapplicable or redundant information shall be removed.

- .1 Description of each system: Provide a complete description of each process, mechanical, electrical and instrumentation systems. Include an explanation of each component comprising the system and a description of how each component interfaces with others. Indicate the location to energize, switches and controls and sequence of operation. At the end of each system list the manufacturer, type, designation, and location for each mechanical component.
- .2 Commissioning forms, test results and reports. Test date for piping systems (degreasing, flushing, disinfecting). Equipment alignment certificates. Inspection approval certificates/permits for all types of systems, plumbing and piping, hot air and ventilating, electrical supervisory, etc.
- .3 Performance curves, engineering data, nameplate data, and test reports for all pumps.
- .4 Original manufacturer's parts list, illustrations, detailed assembly drawings showing each part with part numbers and a sequentially numbered parts list, and diagrams required for maintenance.
- .5 Installation instructions including alignment, adjusting, calibrating, and checking.
- .6 Maintenance and operating instructions including:
 - .1 Start-up, break-in, routine, and normal operating instructions and adjustment procedures.
 - .2 Regulation, control, stopping, and emergency instructions.
 - .3 Description of the operation sequence by the control manufacturer.
 - .4 Shutdown instructions for both short and extended durations along with storage and handling instructions.
 - .5 Summer and winter operating instructions, as applicable.
 - .6 Safety precautions and procedures.
 - .7 List of electrical relay settings and control and alarm contact settings.
 - .8 Electrical interconnection wiring diagram for equipment furnished, including all control systems.
 - .9 Special operating procedures.
- .7 Preventative maintenance procedures complete with:
 - .1 List of specifications, tolerances, torques, fits, etc. necessary to conduct a complete overhaul, disassembly, removal, repair, reinstallation, reassembly as well as any troubleshooting information.
 - .2 Detailed lubrication instructions and diagrams, which shall list points to be greased or oiled; shall recommend type, grade, and temperature range of lubricants and frequency of lubrication.

- .3 Manufacturer's data including model numbers, colour codes and maintenance and care instructions for all applied materials, products, finishes and architectural features, such as metal roofing, paints, brick, etc.
- .4 Include any specific information on maintenance required in order to comply with and maintain the warranty.
- .8 Certification of guarantees and warranty. Supply equipment shim, expansion, alignment calculations, certificates and vibration testing results.
 - .1 List of replacement part suppliers and service representatives, names, addresses and telephone numbers.
 - .2 Assemble and include a recommended spare parts and specialty tools list where required in table format as referenced in the attached supplemental Critical Spare Parts and Specialty Tools template and include original manufacturer's spare parts and recommended quantities to be maintained in storage.
 - .3 Electrical schematic, single line diagrams, instrumentation and control wiring drawings, MCC/PLC and local control panel layouts and wiring.
 - .4 Cable and software for use on City computers for revising/downloading the settings and software associated with any programmable devices, components or sub-systems.
 - .5 Charts of valve tag numbers, with the location and function of each valve.
 - .6 As installed, colour coded piping diagrams.
- 1.4.4 The final shop drawings included in the O&M cannot contain any redlines. All shop drawings must be edited in CAD and finalized for inclusion in the O&M.
- 1.4.5 Separate each warranty or bond with index tab sheets keyed to the Table of Contents listing.
- 1.4.6 Warranties, quantities certification. Provide a list of all warranty items in a table formatted with the following columns:
 - .1 Equipment Tag No.
 - .2 Description
 - .3 Equipment Serial and Model No.
 - .4 Service Area
 - .5 Installation Date
 - .6 Warranty Date
 - .7 Contractor
 - .8 Manufacturer
 - .9 Manufacturer's Contact Information

1.5 BASIS OF PAYMENT

- 1.5.1 The Contract Price shall include compensation in full for labour, material, equipment, power workmanship, and all other costs associated with this section.

1.6 MEASUREMENT FOR PAYMENT

- 1.6.1 The measurement of payment is a lump sum for all Work required under this Specification.
- 1.6.2 Payment shall be prorated on a monthly basis for the duration of the Contract.

2 PRODUCTS – N/A

3 EXECUTION – N/A

4 SUPPLEMENTS

4.1 SUPPLEMENTAL DOCUMENTS

- 4.1.1 The supplements listed below, and following the “End of Section”, form part of this specification section. They show the acceptable format of the manuals to follow. Only sample of sections are shown. The Contractor shall list all applicable sections in the Contract.

- .1 Section 01800A – Supplement – Contractor O&M Template

END OF SECTION



Hamilton

Water

Contract No. CXX-XX-XX

Name/Identifier Title of Project

VOLUME 2

**Facility O&M Manual
Prepared by:**

**Consulting Engineer:
CONSULTING ENGINEERING COMPANY**

**General Contractor:
GENERAL CONTRACTOR COMPANY**

CXX-XX-XX: Name/Identifier Title of Project

Asset Name (Identifier)

Address of Site/Station/Area

FACILITY O&M MANUAL

Prepared by:

Consulting Engineer:

Consulting Engineering Company

Contractor:

General Contractor Company

Document Version History

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Version #	Date	Reason	Implemented By	Approved By	Approval Date
1.0	<mm/dd/yy>	Draft O&M	<Author name>	<Author name>	<mm/dd/yy>
2.0		Added revisions as required			
3.0		Final Draft O&M			

Note to the Author

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- 2. To add any new subsections to the document, ensure that the appropriate header and body text styles are maintained. Styles used for the Section Headings are 1 Main Heading and 2 Subheading. Style used for boilerplate text is Text.*
- 3. Refer to **Division 3 – Concrete**, and the sectional subheadings for the required information that should be included for each applicable division/section as outlined in the project Terms of Reference.*
- 4. Remove <N/A> from all Division titles as applicable to the specific project and add relevant sections following the project Terms of Reference.*
- 5. To update the Table of Contents, right-click and select “Update field” and choose the option- “Update entire table”*
- 6. Before submission of the first draft of this document, delete this “Document Purpose” page and all instructions to the author, which appear throughout the document as blue italicized text enclosed in square brackets.*

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GENERAL OVERVIEW

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DIVISION 3 – CONCRETE

SECTION 03100 – CONCRETE FORMWORK

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DIVISION 4 – MASONRY – N/A



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DIVISION 5 – METALS – N/A



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DIVISION 6 – WOOD & PLASTICS – N/A



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**DIVISION 7 – THERMAL & MOISTURE
PROTECTION – N/A**



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DIVISION 8 – DOORS & WINDOWS – N/A



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DIVISION 9 – FINISHES – N/A



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DIVISION 10 – SPECIALTIES – N/A



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DIVISION 12 – FURNISHINGS – N/A



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Contract No. CXX-XX-XX

Name/Identifier Title of Project

VOLUME 3

**Maintenance Manual
Prepared by:**

**Consulting Engineer:
CONSULTING ENGINEERING COMPANY**

**General Contractor:
GENERAL CONTRACTOR COMPANY**

CXX-XX-XX: Name/Identifier Title of Project

Asset Name (Identifier)

Address of Site/Station/Area

MAINTENANCE MANUAL

Prepared by:

Consulting Engineer:

Consulting Engineering Company

Contractor:

General Contractor Company

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SYSTEM TRIAL RESULTS



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DIVISION 14 – CONVEYING SYSTEMS – N/A



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DIVISION 15 – MECHANICAL/PLUMBING – N/A



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DIVISION 16 – ELECTRICAL, I&C

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SECTION 01810 – COMMISSIONING

1 GENERAL

1.1 GENERAL REQUIREMENTS

- 1.1.1 This section contains requirements for the Contractor's performance in conducting and documenting all equipment inspection and testing required as applied to all mechanical, electrical, instrumentation, and HVAC equipment and systems provided under this Contract.
- 1.1.2 The sequence of procedures to undertake this portion of the work will be:
 - .1 Pre-Commissioning
 - .10 Local Equipment Startup Phase
 - .2 Commissioning
 - .11 Red Tag Phase – Pre-SAT / Contractor Startup (Site Acceptance Testing)
 - .12 Green Tag Phase - Ready for System Trial Period
 - .13 System Trial Period
- 1.1.3 Each step of the above sequence will be completed to the satisfaction of the Consultant prior to proceeding to the next step in the sequence.
- 1.1.4 The City reserves the right to be present for and observe all inspection, testing and commissioning activities. The Contractor shall notify the City and Consultant and provide a testing schedule 7 working days in advance of each step in the sequence.
- 1.1.5 Refer to the City's Transfer of Assets Procedure appended to this Section. All tags shall be supplied by the Contractor.

1.2 REFERENCES

- 1.2.1 These Specifications form an integral part of the Contract Documents.
- 1.2.2 Refer also to all other parts of the Contract Documents to determine their effect on the Work of each section of these Specifications.
- 1.2.3 The requirements of this section and Division 1 apply to and govern the Work under other divisions.
- 1.2.4 Comply with the latest edition of the following statutes, standards, codes and regulations and all amendments thereto:
 - .1 OHSA and Regulations for Construction Projects O.Reg 213.
 - .2 All other applicable statutes, standards, codes and regulations.

1.3 DEFINITIONS

- 1.3.1 Local Start-up and Commissioning consists of placing all the various systems into continuous operation in an orderly manner, operating the system for 14 consecutive calendar days as the System Trial Period, and conducting full range performance testing to fully verify and validate that the systems and the facility perform in the manner intended as per the design.
- 1.3.2 Red Tag Phase: The Red Tag Phase is where mechanical, electrical, I/O startup testing and calibration checks have all been completed. In this phase, the equipment is under the care and control of the Contractor. The intent of the Red Tag is to signify that the Contractor Local Equipment Startup has been completed for the equipment.
- 1.3.3 Green Tag Phase: The intent of the Green Tag is to signify that the Local Equipment Startup and performance testing are complete, and that the equipment is ready for the System Trial Period of Commissioning. In this phase, the equipment remains under the care and control of the Contractor while the City is in control of the equipment for the purposes of operations.
- 1.3.4 System Trial Period: This phase consists of placing all the various systems into continuous operation in an orderly manner, operating the system for a period of time as identified in the Contract Documents, while conducting full range of testing to fully verify and validate that the systems and the facility perform in the manner intended as per the design.

1.4 QUALITY ASSURANCE

- 1.4.1 The Contractor shall assemble a commissioning team under the direction of an individual duly authorized to commit the Contractor's personnel and resources to respond to requests for assistance on the part of the Consultant.
- 1.4.2 The commissioning team shall consist of a Commissioning Manager, representatives of the Contractor's mechanical, electrical, and instrumentation subcontractors, and others as appropriate. The Contractor shall appoint an engineer or qualified operations specialist as Commissioning Manager to manage, coordinate and supervise the Contractor's Commissioning Plan. The Commissioning Manager shall have at least five (5) years' experience in managing startup and commissioning of mechanical, electrical, instrumentation, HVAC, building and piping systems. The Contractor shall forward a copy of the Commissioning Manager's resume to the Consultant for review prior to acceptance of proposed Commissioning Manager and commencement of the Commissioning phase.

- 1.4.3 The commissioning team shall be available at the site of the Work during normal working hours and will be available within four (4) hours' notice at all other times upon notice by telephone.
- 1.4.4 The commissioning team shall at all times be equipped and ready to provide for emergency repairs, adjustments, and corrections to the equipment and systems installed and modified as a part of this Contract.
- 1.4.5 The quality assurance program will include:
- .1 A calibration program for all instruments, gauges, meters, etc. used for determining the performance of equipment and systems installed under this Contract. All test equipment gauges, meters, instruments, and other equipment used for calibrating or verifying the performance of equipment installed under this Contract will be calibrated to within plus or minus 2 percent of actual value at full scale.
 - .2 A testing plan detailing how all testing work required will be implemented. The test plan will be divided into process systems or areas for ease of preparation and implementation. The test plan will include test procedures for the Local Equipment Startup, Equipment Pre-SAT, and System Trial Period.
 - .3 A testing schedule detailing sequence, time and duration of Local Equipment Startup, Equipment Pre-SAT and System Trial Period. The schedule will follow the critical path method and will be updated as required to reflect changes.
 - .4 A testing program for all mechanical, electrical, HVAC, and instrumentation and controls equipment and systems installed under this contract.
 - .5 A documentation program to record the results of all equipment and system inspection and tests.
 - .6 For the purposes of this section, a system will include all items of equipment, devices and appurtenances connected in such a fashion as their operation or function complements, protects, or controls the operation or function of the others. The Contractor will coordinate the activities of all subcontractors and suppliers to implement the requirements of this section.
 - .7 Test equipment employed for individual test runs will be selected so that expected values as indicated by the detailed performance specifications will fall between 60 and 85 percent of full scale.
 - .8 Pressure gauges will be calibrated in accordance with ANSI/ASME B40.1.
 - .9 All mechanical, electrical, instrumentation and HVAC equipment shall be installed as per the contract specifications and drawings with I/O and/or SCADA connection as specified.

1.5 SUBMITTALS

- 1.5.1 Provide one (1) electronic and one (1) hard copy of all submittals to the Consultant, except where noted otherwise.
- 1.5.2 The following material shall be submitted for review a minimum of two (2) weeks in advance of the commencement of the earliest of the activities to which the material applies:
 - .1 A detailed schedule, listing equipment and calendar dates when the Contractor plans to commence Local Equipment Startup, Equipment Pre-SAT and System Trial Period of the completed systems, along with a description of the temporary systems and installations planned to allow operational testing to take place. Similar types of equipment should be grouped together.
 - .2 Detailed testing plans, setting forth step-by-step descriptions of the procedures proposed by the Contractor for the systematic testing of all equipment and systems installed under this contract.
 - .3 Sample forms for documenting the results of all Local Equipment Startup, Equipment Pre-SAT, and System Trial Period.
 - .4 A description of the Contractor's proposed plan for documenting the calibration of all test instruments.
 - .5 The credentials and certification of the testing laboratory proposed by the Contractor for calibration of all test equipment.
 - .6 All tags to be filled in by each applicable trade verifying that all appropriate checks have been made, including but not limited to, cleaning, inspection, insulation testing, leakage testing, lubrication, rotation, calibration, adjustment, and wire loop checks.
 - .7 Local Equipment Startup Reports containing all Equipment Startup documentation, including but not limited to check-out lists, calibration forms, inspection reports, verification forms, etc., which are signed off by all parties, including the Contractor, Consultant, City, and Manufacturer's Representative, following successful Equipment Pre-SAT for each piece of equipment or system and prior to commencement of the System Trial Period.
 - .8 Draft Contractor's Operations and Maintenance Manuals as per [Section 01800 – Operation and Maintenance Data] are to be submitted during the Local Equipment Startup stage, prior to the System Trial Period. Product data will be included in the appropriate sections of the Manual(s).
 - .9 System Trial results must be submitted and reviewed by the Consultant prior to Substantial Performance of the Work.

2 PRODUCTS

2.1 DOCUMENTATION

- 2.1.1 The Contractor will develop and implement a record keeping system to document compliance with the requirements of this Section. Calibration documentation will include identification (by make, manufacturer, model, and serial number), Tag No. of all test equipment, date of original calibration, subsequent calibrations, calibration method, and test laboratory.
- 2.1.2 Equipment and system documentation as a minimum will include date of test, equipment number Tag No., nature of test (equipment startup or performance), test objectives, test results, test instruments employed for the test and signature spaces for the Consultant's witness and the Contractor's Commissioning Manager. A file will be established for each system and item of equipment. It is suggested that files be maintained separately for pipe pressure testing, mechanical equipment performance testing, instrumentation equipment performance testing (loops), and electrical equipment. These files will include the following information as a minimum:
- .1 Metallurgical tests (if required)
 - .2 Factory performance tests (if required)
 - .3 Local Equipment Start-up tests
- 2.1.3 The Contractor shall produce test documentation forms specific for each system and associated equipment items installed under this Contract. Acceptable documentation forms for all systems and items of equipment shall be produced for review by the Consultant a minimum of four (4) weeks prior to any Startup and performance testing. Sample City of Hamilton start up forms are appended as a supplement at the end of this Section. Once the Consultant has reviewed and taken no exception to the forms proposed by the Contractor, the Contractor will produce sufficient forms, at his expense, to provide documentation of all testing work to be conducted as a part of this Contract.
- 2.1.4 The Contractor will develop test plans detailing the coordinated, sequential testing of each item of equipment and system installed under this Contract. Each test plan will be specific to the item of equipment or system to be tested. Test plans will identify by specific equipment or tag number each device or control station to be manipulated or observed during the test procedure and the specific results to be observed or obtained. Test plans will also be specific as to support systems required to complete the test Work, temporary systems required during the test Work, subcontractors', and manufacturers' representatives to be present and expected test duration. As a minimum, the test plans will include the following features:
- .1 Step-by-step proving procedure (ring-out) for all control and control loops and electrical circuits by imposing low voltage currents and using appropriate indicators to affirm that the circuit is properly identified and connected to the proper device.

- .2 Calibration of all analysis instruments and control sensors.
 - .3 Performance testing of each individual item of mechanical, electrical, and instrumentation equipment associated with a system.
 - .4 Performance system tests designed to duplicate, as closely as possible, operating conditions.
- 2.1.5 Test plans shall contain a complete description of the procedures employed to achieve the desired test environment.
- 2.1.6 Four (4) weeks in advance of the date the Contractor wishes to begin Startup and performance testing of equipment and/or systems (whichever occurs earliest in the project schedule), the Contractor shall have submitted the test plan(s) required for the systematic functional tests for the equipment and / or system installed under this Contract. Once the Consultant has reviewed and taken no exception to the Contractor's test plan(s), the Contractor shall reproduce the plan(s) in sufficient number for the Contractor's purposes and an additional two (2) hard copies and electronic copies for delivery to the Consultant. No test Work for the equipment, system or facility shall begin until the Contractor has delivered the specified number of approved final test plans to the Consultant.
- 2.1.7 The Contractor shall produce a testing schedule setting forth the sequence contemplated for performing the test Work. The schedule shall be in bar chart form, plotted against calendar time, and shall detail the equipment and or systems to be tested. The schedule shall show the contemplated start date, duration of the test and completion of each test. The test schedule shall be submitted no later than four (4) weeks in advance of the date testing is to begin. The Consultant will not witness any testing Work for the purpose of acceptance until the Contractor has submitted a schedule to which the Consultant takes no exception. The test schedule will be updated weekly, showing actual dates of test Work, indicating systems and equipment testing completed satisfactorily.
- 2.1.8 The Contractor shall conduct commissioning meetings with the City's representatives and the Consultant to identify and integrate activities of all parties in preparation for Local Equipment Startup of the Work. Considerations to be made of the following:
- .1 Plan objectives.
 - .2 Facilities to be started.
 - .3 Sequence of events and startup schedule.
 - .4 Responsibilities of each party.
 - .5 List of individuals involved complete with contact telephone numbers.
 - .6 English language description of each systems' intended means of operation.
 - .7 Initial operating conditions and parameters.

- .8 Intended final operating conditions and parameters.
- .9 Laboratory requirements and arrangements for outside testing services.
- .10 Sampling and monitoring requirements.
- .11 Contingency plans to respond to potential emergencies.
- .12 Safety and environmental considerations.
- .13 City staff training plan.

3 EXECUTION

3.1 GENERAL

- 3.1.1 The Contractor's Commissioning Manager will organize teams made up of qualified representatives of equipment manufacturers, subcontractors, the Contractor's independent testing laboratory, and others, as appropriate, to efficiently calibrate and test the equipment and systems installed and constructed under this Contract. The objective of the testing program will be to demonstrate, to the Consultant's complete satisfaction that the structures, systems, and equipment constructed and installed under this Contract meet all performance requirements and the facility is ready for the System Trial Period to commence. In addition, the testing program will produce a record of baseline operating conditions for the City to use in their preventive maintenance program.
- 3.1.2 The Contractor will provide, at no expense to the City, all power, fuel, compressed air supplies, potable water, all labour, temporary piping, heating, ventilating, air conditioning and all other items and work required to complete the installed tests. Temporary facilities will be maintained until permanent systems are in service.
- 3.1.3 Commissioning is to be generally conducted in Local mode first, followed by plant manual mode and thereafter plant automatic mode.
- 3.1.4 Startup and commissioning shall be completed in accordance with the manufacturer's recommendations and the Contract Documents.
- 3.1.5 The Contractor is required to follow tagging procedures as outlined in the Transfer of Assets Procedure appended to the end of this Section.
- 3.1.6 The Contractor to conduct testing and commissioning as required by the Contract Documents and under the witness of the Consultant.
- 3.1.7 The City reserves the right to be present to witness any and all phases of testing and commissioning.

- 3.1.8 Deficiency Lists will be updated by the Consultant. Deficiencies that are uncovered will be corrected by the Contractor and retesting will be conducted by the Contractor as required.

3.2 ROLE OF CONTRACTOR

- 3.2.1 System Trial will not begin until completion of the Equipment Pre-SAT, including sign-off by the Contractor, Manufacturer's Technical Service Representative, the Consultant, the City and System Integrator where applicable, that the systems met all test requirements.
- 3.2.2 The Contractor will remove all temporary piping, bulkheads, controls and other alterations to the permanent systems that may have been needed during the Local Equipment Start-up testing and will perform the tasks necessary to make the improvements constructed under this contract fully operational.
- 3.2.3 The System Trial is considered to be complete when all systems have been operating continuously for a period of fourteen (14) calendar days without fault and in accordance with the full range of specified performance requirements.
- 3.2.4 Failure of any part of the Work during the period of continuous automatic operation will require restart of that portion or system of the Work, following recertification of the fault or failure.
- 3.2.5 Substantial Performance of the Work date is subject to successful completion of the System Trial to the satisfaction and acceptance of the Consultant and the City.

3.3 CONTRACTOR'S RESPONSIBILITY

- 3.3.1 The Contractor will be available at all times during Commissioning period to provide immediate assistance in case of failure of any portion of the system being operated. The Contractor will be prepared to make modifications to the system or individual components in order to meet the requirements of the Contract.
- 3.3.2 During the System Trial Period, the City will be responsible for all normal operational costs and the Contractor will bear the costs of repairs or replacements, including labour and materials, required to keep the portion of the facility being commissioned, operational.

- 3.3.3 If, as a result of the actions of the Contractor, it is necessary to suspend Local Equipment Startup, Equipment Pre-SAT or System Trial due to deficiencies or failure in any system, the full cost of interruption, call-back, testing and resumption of start-up, commissioning or continuous operation will be paid by the Contractor.

3.4 PRE-COMMISSIONING PHASE – LOCAL EQUIPMENT STARTUP

- 3.4.1 Obtain all approvals and clearances from authorities prior to energizing any components of the Work.
- 3.4.2 Ensure that all relevant operations and maintenance instructions and related documentation are available on site within the physical draft O&M manual copy.
- 3.4.3 Obtain Consultant's approval to proceed with Pre-commissioning checks of relevant systems in accordance with the test plan(s). The Consultant will make all necessary arrangements for the City's personnel to be present at testing.
- 3.4.4 Perform all necessary Pre-commissioning checks and tests prior to commissioning any components of the Work in accordance with the test plan(s), including:
- .1 Equipment supplier's representatives to inspect equipment in accordance with applicable individual sections. Certify equipment has been properly installed and is ready to start.
 - .2 Check all piping connections and related piping systems are complete and pressure tested.
 - .3 Check all electrical, instrumentation and control cable connections, wiring and related power and control panels are complete and tested.
 - .4 Check and ensure that all electrical, instrumentation and control cables and wires are properly labelled as per the City's SCADA Standards.
 - .5 Install lamacoids on all equipment and instruments and provide proper identification for all piping and equipment.
 - .6 Check and calibrate all related protective devices and instruments.
 - .7 Check that all pre-run maintenance and installation conditions have been completed such as oil and grease addition.
 - .8 Clean and flush all related piping systems, including specific requirements to protect the Works. Conduct a walk-through with the Consultant and City for inspection of the Work after cleaning prior to disinfection.
 - .9 Conduct disinfection procedures in accordance with requirements of individual sections.
 - .10 Check rotation and alignment of all rotating equipment.

- .11 Obtain clearance from suppliers to place equipment or systems in operation.
- 3.4.5 All red tags to be filled in by each applicable trade verifying that all appropriate checks have been made, including but not limited to, cleaning, inspection, leakage testing, lubrication, rotation, alignment, calibration, adjustment, and wire loop checks.
- 3.4.6 The Contractor to submit equipment checkout list to the Consultant. Equipment checkout list to include the following:
 - .1 System description.
 - .2 Equipment name and tag no. of each component within system.
 - .3 Supplier's name of each equipment component, complete with sign-off where applicable.
 - .4 Mechanical trade sign-off (red cards and applicable forms completed).
 - .5 Electrical/ instrumentation trades sign-off (red cards and applicable forms completed).
 - .6 Contractor sign-off (red cards and applicable forms completed).
- 3.4.7 Attach the following to equipment checkout listing:
 - .1 Equipment Supplier's representatives' installation certification form.
 - .2 Disinfection certification forms where applicable.
 - .3 Listing of outstanding Contract deficiencies for each system.
- 3.4.8 Request, in writing, a pre-startup inspection by the Consultant. Once the Consultant has conducted the pre-startup inspection, reviewed the pre-startup forms, and is satisfied that each piece of equipment has been properly checked-out, pre-startup phase shall be complete.

3.5 COMMISSIONING – RED TAG – CONTRACTOR STARTUP

- 3.5.1 The Contractor shall conduct inspections and testing of all equipment components and sub-components and arrange for inspections of the installations by qualified equipment Manufacturer's Technical Service Representatives as required by the Contract Documents.
- 3.5.2 The inspection and testing includes and is not limited to cleaning, leakage and pressure testing, alignment checks, system flushing, lubrication, rotation checks, wiring loop checks, insulation testing, load testing, supply and demand testing, functional testing, etc.
- 3.5.3 This stage is witnessed by the Consultant and a Deficiency List shall be prepared by the Consultant.

- 3.5.4 The Contractor is required to remedy outstanding incomplete or incorrect Work in accordance with terms of Contract.
- 3.5.5 The Contractor shall obtain completed equipment installation certification forms, calibration, and signoff sheets for each piece of equipment and submit these to the Consultant for review. Successful Local Equipment Startup will not be achieved until the Consultant and Manufacturer's Technical Service Representatives are satisfied and have signed the signoff sheets.
- 3.5.6 During this phase, the City reserves the right to observe the Local Equipment Startup proceedings.
- 3.5.7 Commissioning will not proceed to the next stage until the Local Equipment Startup has been successfully completed to the satisfaction of a qualified Manufacturer's Technical Service Representative and the Consultant. This includes all I/O checks and proving of equipment communication with SCADA.
- 3.5.8 Verification tests will consist of but may not be limited to the following:
- .1 Pressure and/or leakage tests.
 - .2 Insulation tests for all electrical equipment and electrical systems.
 - .3 Functional checkout of all electrical systems.
 - .4 Component calibration, loop test, loop commissioning and tuning.
 - .5 Preoperational check-out for all mechanical and HVAC equipment.
 - .6 Functional testing of all mechanical, electrical, HVAC, and instrumentation and controls equipment and systems to demonstrate compliance with the performance requirements.
- 3.5.9 In general, tests for any individual system will be performed in the order listed above. The order may be altered as authorized by the Consultant in writing after receipt of a written request, complete with justification of the need for the change in sequence.
- 3.5.10 Pressure and Leakage Tests: Pressure and leakage tests will be conducted in accordance with applicable portions of these contract specifications. All tests will be witnessed by the Consultant. Evidence of successful completion of the pressure and leakage tests will be the Consultant's signature on the test forms prepared by the Contractor.
- 3.5.11 Electrical Checkout: Prior to energization (in the case of electrical systems and equipment) all circuits will be insulation tested with a minimum acceptable limit of 1,000 megohms.

- 3.5.12 Component Calibration and Loop Testing: Prior to energization (in the case of instrumentation system and equipment) all loops, and associated instruments will be calibrated and tested in accordance with the procedures required in Division 16.
- 3.5.13 Electrical Resistance: Electrical equipment and all cables will be subject to megger testing in accordance with the requirements of Division 16. The minimum acceptable test results will be 1,000 megohms.
- 3.5.14 Preoperational check-out will include the following:
- .1 Alignment of equipment using the reverse dial indicator method.
 - .2 Pre-operation lubrication.
 - .3 Manufacturers' recommendations for prestart preparation.
 - .4 Without exception, all rotating equipment will be checked and tested for:
 - .1 Equipment base is to be true and levelled.
- 3.5.15 Once all affected equipment has been subjected to the required checkout procedures and the Consultant has witnessed and has not found deficiencies in that portion of the Work, individual items of equipment and systems may be started and operated under simulated operating conditions to determine as nearly as possible whether the equipment and systems meet the requirements of these specifications.
- 3.5.16 Potable water will be employed for the testing of all liquid systems at the Contractor's expense.
- 3.5.17 The equipment will be operated a sufficient period of time to determine machine operating characteristics, including noise, temperatures, and vibration; to observe and document performance characteristics; and to permit initial adjustment of operating controls.
- 3.5.18 When testing requires the availability of auxiliary systems such as looped piping, electrical power, compressed air, control air, or instrumentation which have not yet been placed in service, the Contractor will provide acceptable substitute sources, capable of meeting the requirements of the machine, device, or system at no additional cost to the City.
- 3.5.19 During the Local Equipment Startup test period, the Contractor will obtain baseline operating data on all equipment with motors greater than 0.75 kW to include amperage, bearing temperatures, and vibration as required. This baseline data will be collected for the City to enter into a preventive maintenance program.

- 3.5.20 Test results will be within the tolerances set forth in the detailed specification sections. If no tolerances have been specified, test results will conform to tolerances established by recognized industry practice. Where, in the case of an otherwise satisfactory installed test, any doubt, dispute, or difference should arise between the Consultant and the Contractor regarding the test results or the methods or equipment used in the performance of such test, the Consultant may order the test to be repeated.
- 3.5.21 Re-testing: If under test, any portion of the work should fail to fulfill the contract requirements and is adjusted, altered, renewed, or replaced, tests on that portion when so adjusted, altered, removed, or replaced, together with all other portions of the work as are affected thereby, will, unless otherwise directed by the Consultant, be repeated within reasonable time and in accordance with the specified conditions. The Contractor will pay all reasonable expenses incurred by the City as a result of repeating such tests.
- 3.5.22 Post-Test Inspection: Once testing has been completed; all rotating machines will be rechecked for proper alignment. If equipment does not meet the specified alignment requirement, realign equipment, and submit final alignment report. All equipment will be checked for loose connections, unusual movement, or other indications of improper operating characteristics. Any deficiencies will be corrected to the satisfaction of the Consultant. All machines or devices, which exhibit unusual or unacceptable operating characteristics, will be disassembled, and inspected. Any defects found during the course of the inspection will be repaired or the specific part or entire equipment item will be replaced to the complete satisfaction of the Consultant at no cost to the City.
- 3.5.23 Place Red Tags on equipment tested that have all required documentation readily available. The Contractor is required to have all equipment confirmed operational prior to the SAT. Consultant confirmation of I/O points must occur prior to the SAT. Failure to prove out all equipment will result in SAT being cancelled and impacting the Substantial Performance date. Scheduled delays for equipment which have not been completed and verified will not be at the responsibility of the City.

3.6 COMMISSIONING – GREEN TAG – READY FOR SYSTEM TRIAL PERIOD

- 3.6.1 Following acceptance by all parties that the Work has passed the Ready for System Trial Period, a Green Tag will be placed on the equipment designating that this phase is complete. Documentation to support the acceptance will be submitted by the Contractor. The Contractor will be required to provide proof of all equipment maintenance prior to handover to the City.

- 3.6.2 All Training of City staff must be completed (or, with approval, scheduled) in advance of the System Trial Period.
- 3.6.3 All process units will be brought to full operating conditions, including temperature, pressure, and flow and must meet the individual performance requirements stipulated in the Contract.
- 3.6.4 Failure by the Contractor to provide adequate notice prior to System Trial Period may result in the City having the Contractor repeat the test at no cost to the City. All equipment must be verified to be operational at least one (1) week prior to the System Trial Period. If equipment is not operational, the System Trial Period will be rescheduled at no Cost to the City.

3.7 COMMISSIONING –SYSTEM TRIAL PERIOD

- 3.7.1 Period of time for continuous automatic operation for acceptance of commissioning is 336 hours (fourteen (14) days), for all systems.
- 3.7.2 Failure of any part of Work during the period of continuous automatic operation will require restart of that portion or system of Work, following rectification of the fault or failure.
- 3.7.3 If it is necessary to suspend startup, commissioning, or continuous operation during the commissioning period due to deficiencies or failure in any system, the full cost of interruption, call-back, testing and resumption of startup, commissioning, or continuous operation shall be paid by the Contractor.
- 3.7.4 Once the facility has successfully completed the 14-day System Trial period to the satisfaction of the City and the Consultant and the works are fully operational and performing all functions for which it was designed, the City's operation and maintenance personnel will be responsible for operating and controlling all Green Tag equipment.

3.8 COMPLETION OF FACILITY COMMISSIONING

- 3.8.1 At the end of the facility commissioning period and when all systems have been proven to function as per the design intention to the satisfaction of the Consultant and the City, application for Substantial Performance of the Work may be made as outlined in the Contract Documents. Each of the items outlined in the Contract shall be fully complied with before Substantial Performance of the Work.

- 3.8.2 Upon Completion of Contract and the start of the warranty period, a yellow “Warranty Period” tag shall be placed on all equipment, designating the start date and duration of the warranty period. Refer to [Section 01830 - Warranty Work].

3.9 SCHEDULE OF SYSTEMS REQUIRING TESTING, ADJUSTING, AND BALANCING SERVICES

- 3.9.1 Aeration Diffusers

3.10 BASIS OF PAYMENT

- 3.10.1 The Contract Price shall include compensation in full for labour, material, equipment, power workmanship, and all other costs associated with this section.

3.11 MEASUREMENT FOR PAYMENT

- 3.11.1 The measurement of payment is a lump sum for all Work required under this Specification.
- 3.11.2 Payment for this item will be provided only upon receipt and acceptance of the final draft operation and maintenance manual(s) by the Consultant.

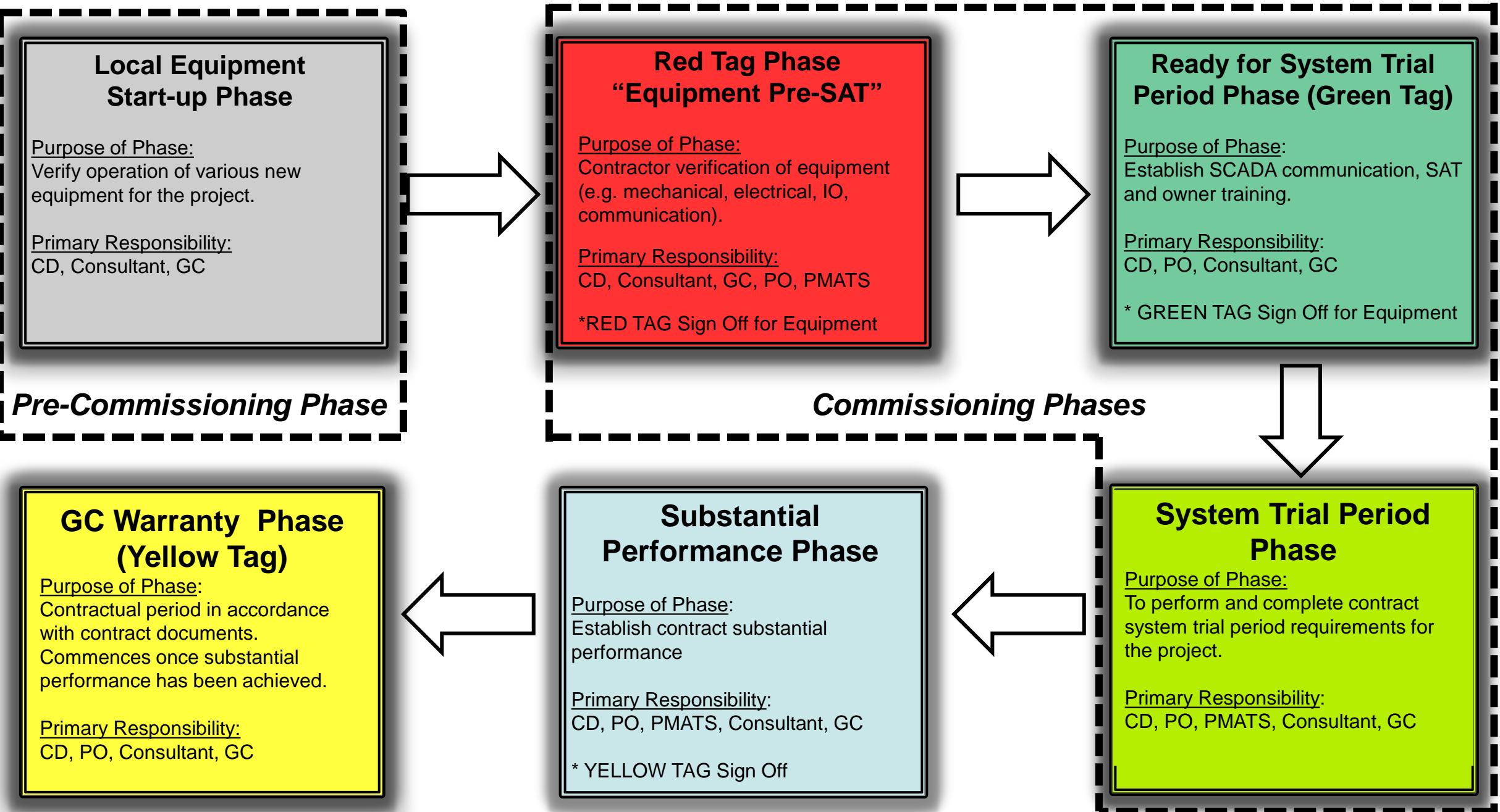
4 SUPPLEMENTS

- 4.1.1 The supplements listed below, and following the “End of Section”, form part of this specification section:
- .1 Section 01810A – Supplement – Transfer of Assets Procedure V13
 - .2 Section 01810B – Supplement – Sample Start Up Forms

END OF SECTION

CD TRANSFER OF ASSETS PROCEDURE

PW-WW-CD-P-026-001



[Link to Definitions](#)

[Link to HW Transfer of Assets Procedure](#)

KEY DOCUMENTS REQUIRED FOR CD TRANSFER OF ASSETS



ITEM	Draft O&M and SOP	CMMS List & Spare Parts List	PCN	Director's Notification	ToA Handover Meeting	Final DRAFT Project O&M and SOP	ToA Memo	Lessons Learned	Building Permit C/O	Record Drawings	Final Project O&M and SOP	Closeout Checklist	Keys Collected	Vendor Performance
PHASE	Pre-Commissioning	Pre-Commissioning	Pre-Commissioning	Commissioning	Prior to Substantial	Substantial	Substantial	Post-Substantial	Warranty	Warranty	Warranty	Warranty	Warranty	Warranty
REQUIRED TIMING:	Required before commissioning	Required before commissioning	Must be completed prior to SCADA FAT. Further updates to PCN as required with version control.	As defined by MECP Approval Document	Prior to Substantial completion (Before sign-off of TOA Memo)	Prior to Substantial completion (Before sign-off of TOA Memo)	Submitted to PO/PMATS within 2 calendar weeks post substantial	Meeting to be held soon after Substantial Performance	During warranty	During warranty	During warranty	Draft Completed with TOA Memo (Prior to SP) Final Prior to end of Warranty	Prior to end of warranty with signed Key Transmittal from GC and Consultant	Prior to end of warranty
CD PM to Submit To:	PO Rep/PMATS Rep	Send to CD Tech	Send to CD Tech to send to PO QA Supervisor	Notify PM Q&SP CC: CD Tech	Invite PO Rep, PMATS Rep, Consultant, GC, CD Tech	Transmittal to PO QA Supervisor CC: CD Tech	Send per Memo Template	Invite CD Tech	Consultant to Coordinate CC: CD Tech	Send to CD Tech to send to SPIDER	Transmittal to PO QA Supervisor CC: CD Tech	PO/PMATS Reps CC: CD Tech	Transmittal to PMATS CC: CD Tech	PMO CC: CD Tech

*All files to be saved on project SharePoint sites. For files that are required to be submitted to BCOS, this will be coordinated with CD Tech/PM Q&SP.

DEFINITIONS

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Hamilton

Water

Term	Definition
Capital Close-out Checklist	A checklist used by Capital Delivery / Plant Operations staff to verify that all required project tasks have been completed. A draft / unsigned Capital Close-out checklist is required when the equipment / facility is ready for the System Trial Period and when the Transfer of Asset Memo is provided to the Plant Operations representative. A final / signed Capital Close-out checklist is required at the end of warranty.
CD	Capital Delivery
CMMS List	Computer Maintenance and Management System List
Commissioning Phases	Phases that include the Red Tag Phase (Equipment Pre-SAT), Green Tag Phase (Ready for System Trial) and System Trial Period Phase.
Consultant	City agent for design and contract administration
CSG	Compliance Support Group
C&R	Compliance and Regulation Group
Deficiency	Work that does not comply with standard, regulation or specification.
Deficiency List	Any noted deficiencies related to the project identified during and following the commissioning phases . Deficiencies impacting the system operation as intended must be addressed prior to the start of System Trial Period. Deficiencies may be noted as major / minor.
ECA	Environmental Compliance Approval
FAT	Factory Acceptance Testing
GC	General Contractor
Green Tag Phase	Phase at which pre-system trial period activities are completed (e.g., training, draft Project O&M Manual, Pre-SAT/SAT). In this phase, the equipment / facility is under the care and control of the Contractor. Plant Operations runs the facility, but the Contractor still retains responsibility for the facility.
I/O	Input Output
Mgr. C&R	Manager of Compliance & Regulation
MECP	Ministry of the Environment, Conservation & Parks
Outstanding Work List	Any major / minor outstanding work that must be completed for the project (e.g., punch list)
PCN	Process Control Narrative
Performance Testing	Red Tag Phase: Activities for equipment inspection and testing required under the contract as applied to all mechanical, electrical, instrumentation, SCADA and HVAC equipment and systems.

DEFINITIONS

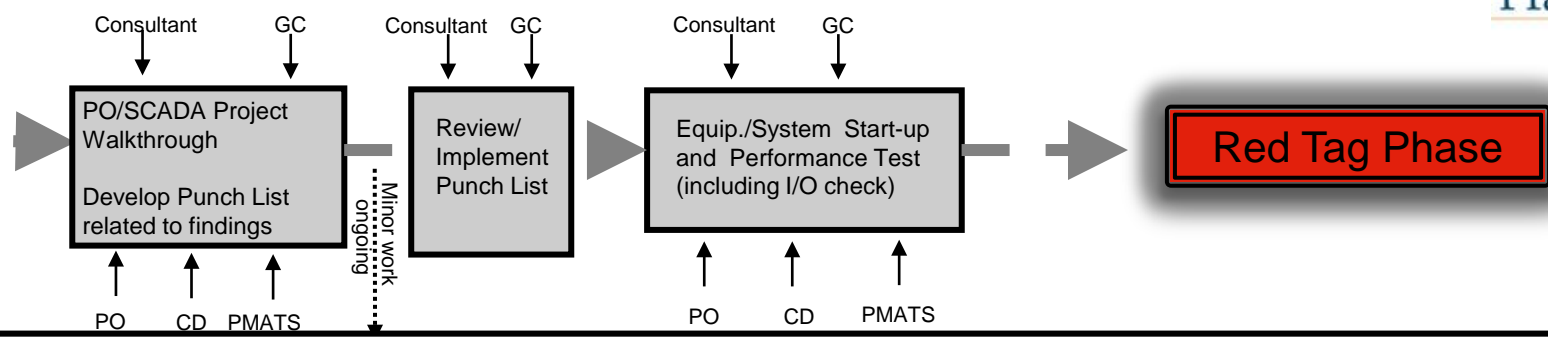

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Term	Definition
PMATS	Plant Maintenance and Technical Services. Includes SCADA group.
PMO	Project Management Office
PO	Plant Operations
Pre-SAT	The Pre-SAT activity is the collective sign-off of equipment Red Tags in advance of the System Trial or SAT. The Contractor, Consultant, and City Representatives sign off each red card to conclude that each piece of equipment included in the project scope is fully functional and all of the supporting documentation (ie. Start-Up forms, Calibration Reports) is complete and enclosed in the draft Operations and Maintenance manual.
Project O&M	Project Operations & Maintenance Manuals
Punch List	Captures the required outstanding items in order to satisfy the requirements of the Commissioning Phases.
QA Supervisor	Quality Assurance Supervisor for Plant Operations and PMATS
Red Tag Phase	Phase at which mechanical, electrical, I/O startup testing and calibration checks have all been completed. In this phase, the equipment / facility is under the care and control of the Contractor, with assistance from the Consultant.
SAT	Site Acceptance Testing
SCADA	Supervisory Control and Data Acquisition (SCADA) refers to an industrial control system: a computer system monitoring and controlling a process.
Substantial Performance	Successful completion of the "System Trial Period" operating period, and provided the Contractor has provided all specified deliverables, the Consultant will prepare the Certificate of Substantial Performance, after which the project will be "Assumed by the City" and the warranty period will commence.
System Trial Period Phase	This phase consists of placing all the various systems into continuous operation in an orderly manner, operating the system for a period of time as identified contractually (typically 14 days), and conducting full range testing to fully verify and validate that the systems and the facility perform in the manner intended as per the design.
Yellow Tag Phase	Phase at which the equipment / facility has been handed over and accepted by the Plant Operations representative. The equipment / facility is in the General Contractor warranty period.
WWWSP	Water & Wastewater Systems Planning

PRE-COMMISSIONING PHASE: LOCAL EQUIPMENT STARTUP



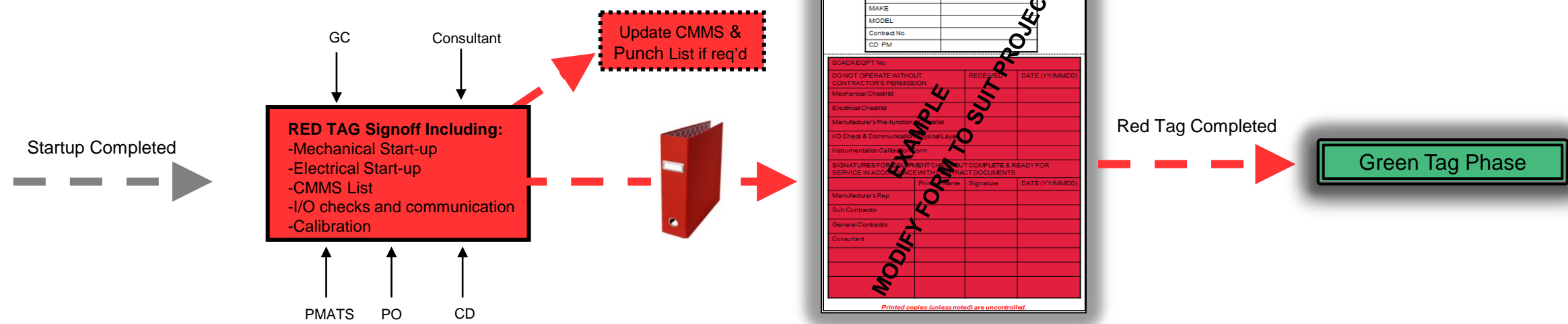
Construction works largely installed
 SCADA & Equipment
 FAT complete (Panel FAT & Software FAT)
 Finalize SAT Plan.
 Draft Project O&M submission approx. 70% complete – 1 site copy, 1 electronic copy (Signed Transmittal)



Startup Phase Summary

Task	Task Notes	Action	Review Req'd by
Risk Management	Must be reviewed during design and throughout construction phase.	Consultant	CD/PO/PMATS/GC
Process Control Narrative	Must be completed prior to SCADA FAT. Licensing information – no proprietary software. If any changes made during FAT, update PCN as required.	Consultant	CD PO/PMATS
Facility SOP	Draft SOP to be completed prior to commissioning. To be finalized after Substantial Completion.	Consultant	CD PO
SCADA FAT	SCADA FAT completed by programmer with City & Consultant present. Reports submitted to City. Graphics confirmed and tested against code, programming and operation tested using simulation software to prove operation in accordance with PCN. After successful FAT, finalize SAT plan in conjunction with SCADA Standard.	Consultant	CD PMATS
Equipment FAT	Equipment FAT conducted by GC equipment manufacturer – City and Consultant attendance not mandatory – project by project review depending on complexity of equipment.	GC	Consultant CD/PO/PMATS – optional
CMMS FAT	Provide technical information to PMATS for CMMS integration of assets using CMMS template. CD PM to confirm form is filled out properly before sending to PMATS.	GC	Consultant PMATS
Draft Project O&M received from Contractor	Must be submitted, as per timeframes specified in the Contract documents, prior to equipment startup (approximately 70% complete construction). Due to the complexity of the manuals, it is acceptable for the GC to submit draft O&M (1 hard/site copy with an accompanying electronic version) initially during the review stage. Clear information on spare parts (onsite) and asset inventory (transmittal required).	GC	Consultant PO/PMATS CD
	CD PM to ensure physical copy is stored on site. Electronic copy provided to PO Rep and PMATS Rep (through SharePoint) requires a Signed Transmittal to be stored on SharePoint in the project folder.	PM	PO PMATS
Arc Flashing	Arc flash coordination study (in accordance with CSA Z462) submitted by GC, reviewed by Consultant.	GC	Consultant
Lockout Procedures	Ensure Contractor has an equipment lockout procedure in place. Advise PMATS if any requirements for City Lockout/Tagout.	GC	Consultant
List for Scope Items (Startup Punch List)	Developed by PO/PMATS, Consultant, CD and GC to determine equipment necessary to startup main process equipment. As well, this will provide an opportunity for PO/PMATS to comment on the configuration of the systems.	Consultant GC	PO/PMATS CD
Equipment & System Startup & Performance Testing	GC to coordinate all activities / scheduling related to startup & performance testing of equipment. For example, bump test for pump motors, valve operation, etc. It is not necessary for SCADA to be communicating to Woodward during this phase. However, all I/O & communication must be fully PLC integrated and checked.	GC	Consultant

COMMISSIONING PHASE: RED TAG "PRE-SAT / CONTRACTOR START-UP"



Red Tag Phase Summary

Task	Task Notes	Action
Draft Project O&Ms	All mechanical, electrical and instrumentation equipment documentation, etc. to be stored on site in draft Project O&M binders clearly separated with tabs for equipment start-up sheets and other related documentation. Electronic copy also to be prepared.	GC
Mechanical Start-up	Mechanical (sub)contractor confirms all components complete and functional and ready for operation.	GC
Electrical Start-up	Electrical (sub)contractor confirms all components functional and ready for operation. A report is to be created and provided to the City.	GC
Manufacturer's Prefunctional Start-up	Equipment manufacturer performs pre-functional checklist.	GC
Calibration Forms	GC to ensure that all instruments have been calibrated (appropriately timed for upcoming system trial period, i.e., not too far in advance, < 1 month).	GC
CMMS List	Complete CMMS template for all new and removed equipment and submit to CD PM in Excel format. CD PM to review and submit to City CMMS Rep. PMATS E&I Planner to apply equipment CMMS stickers to equipment.	GC Consultant
I/O Check & Local/Remote Communication Verification	System integrator confirms all I/O components are installed and tagged correctly. Verification of tagging is required by the Consultant.	GC
Communication / Remote Operation Confirmed	Communication physical layer tested; internal and/or external (internal fibre or wireless). SCADA communication with Woodward must be confirmed. Graphics, database, reporting installed and operational on the SCADA backend (servers, historian, etc.).	GC

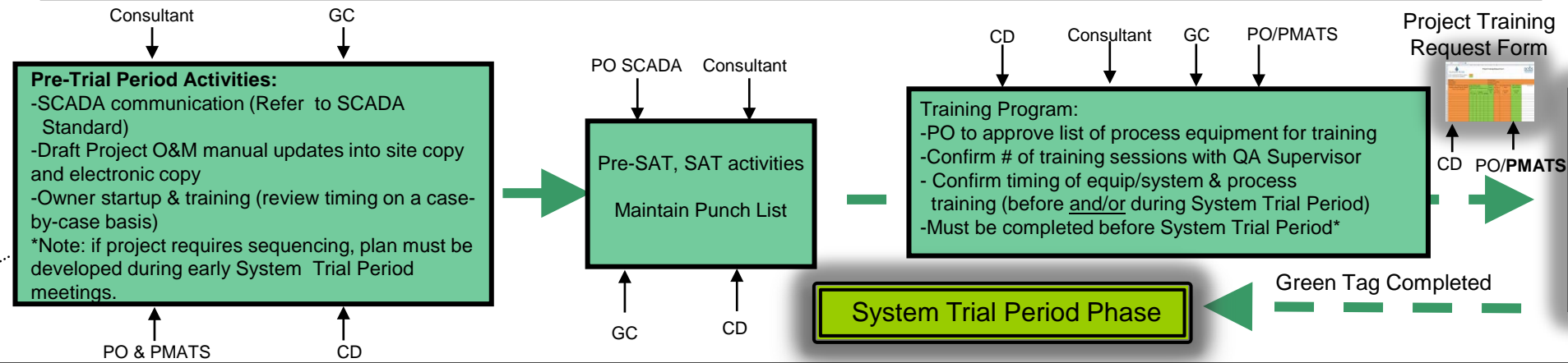
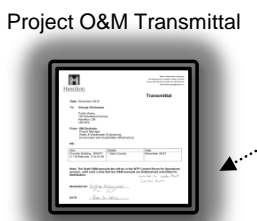
- Note:
- 1) If multiple system trial period events are required, the same process shall be followed, recognizing that the red and green tagging would be placed separately for each event. However, the intent shall be to complete one substantial performance process, thus one warranty date for all equipment in the project.
 - 2) Red Tag Phase is under the care and control of the Contractor.
 - 3) Sign-off indicates only that documentation is complete. Does not indicate equipment is working. This will be done during SAT/operational testing

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COMMISSIONING PHASE: GREEN TAG "READY FOR SYSTEM TRIAL PERIOD"



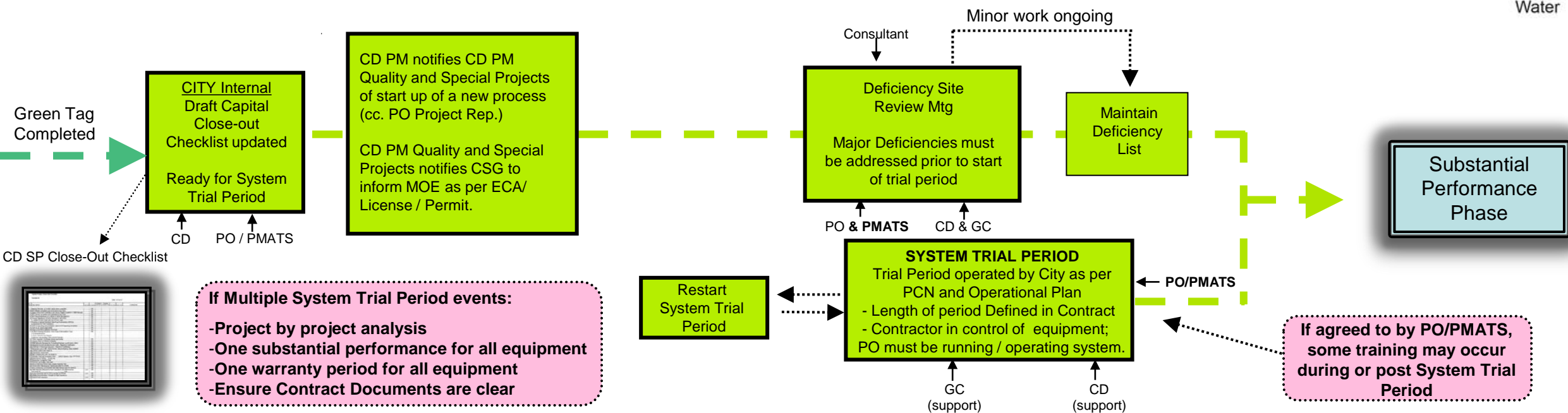
Red Tag Completed



Green Tag Phase Summary

Task	Task Notes	Action
Pre-System Trial Period and System Trial Period Meetings	Early action regarding pre-system trial coordination with all parties. SAT / System Trial plan development; ensure that an Organizational / Action matrix is included.	GC/ Consultant/ CD/ PO/PMATS
Red Tag Completed	Prior to commencing green tag tasks, confirm completion and signoff of red tag.	Refer to Red Tag Phase
CMMS Verification	Perform CMMS verification. Add CMMS stickers (PMATS E&I Planner).	GC/ Consultant/ CD
Finalize SAT Plan	SAT plan finalized. COH SCADA Standards must be followed for FAT / SAT requirements. If project requires sequencing, the plan must be developed during early System Trial Period meetings.	GC/Consultant/CD/ PMATS/PO
Pre-SAT, SAT and Punch List	In accordance with final SAT plan, perform SCADA Pre-SAT, SAT activities. Maintain punch list and action items. Full functional/performance testing of equipment including checking all SCADA hardware, code, graphics, alarming, and reports, etc. Other issues may be noted. (Note: Pre-SATs are not considered final SATs). Maintenance requires Calibration Certificate as part of SAT (copied into O&Ms).	GC Consultant CD PO/PMATS
H&S Deliverables	Provide to PO any pre-start health and safety reviews and any known updates to the Site/Facility General Hazard Assessment Form.	PO
Owner Training Complete	CD to provide Project Training Request Form with list of process equipment to be trained on for PO & PMATS review and acceptance. Confirm if equipment is same or different from existing installations. If equipment is the same, PO/PMATS staff require awareness training of equipment. If equipment is different, PO/PMATS staff require full training on equipment. Confirm # of training sessions with the QA Supervisor – City standard is 5 sessions spread over 5 weeks. City's discretion to delay training of non-process related equipment during or post system trial period – case by case basis. <u>Training must be completed before system trial period, unless agreed to by PO/PMATS.</u>	GC Consultant CD PO/PMATS
Project O&M (Draft) Updated	Draft Project O&M manuals (1 site copy, 1 electronic copy) must be as complete as possible, recognizing that there is some information that is not yet available, such as system trial period reports, etc. If there are updates to the Draft Project O&M Manuals, the QA Supervisor will need to be notified via transmittal and version control will need to be applied to the O&M.	GC
Identification Complete	All equipment must be secured and properly identified in accordance with the tagging system noted in the specifications/drawings.	GC

COMMISSIONING PHASE: SYSTEM TRIAL PERIOD



System Trial Period Summary			
Task	Task Notes	Action	Review Req'd by
Capital SP Close-out Checklist	CD generated document indicating items requiring update in order to transfer assets over to Operations/PMATS. Each section of SP Close-Out Checklist to be completed.	CD	PO/PMATS
CD/CSG Notify MOE	CD PM must notify the CD PM Quality and Special Projects (cc. PO Project Rep. and CD Tech) of start up of a new process. The CD PM Quality and Special Projects will notify CSG (who will then notify the appropriate authorities re: operation of new system in accordance with the ECA, License or Permit) and WWWSP.	CD	CD PM Quality and Special Projects CSG
Deficiency Review	Conduct deficiency review meeting with PO/PMATS, CD, GC and Consultant. List to be formally tracked by Consultant and GC. CD PM to provide list to PO/PMATS Reps. *All major deficiencies must be addressed prior to the start of the System Trial Period. The General Contractor must be aware that this is not the final review for deficiencies.	GC Consultant PO/PMATS CD	Consultant CD
Design Improvements	Design improvements may arise. Budget and schedule constraints shall be reviewed. Any changes are not considered deficiencies, rather outstanding work.	PO/PMATS	CD
System Trial Period	Operate facility uninterrupted, as intended for duration noted in Contract Documents (typically 14 days). If there is a failure, restart test in accordance with Contract Documents. SCADA SAT confirmation ongoing throughout system trial period and advising CD PM of any operational deficiencies. Operation of the facility should be as per the PCN and Operational Plan.	GC Consultant CD PO/PMATS	Consultant CD PO/PMATS

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SUBSTANTIAL PERFORMANCE PHASE



System Trial Period Complete



Project O&M Transmittal



Lessons Learned



Substantial Performance Process:

- Final Draft Project O&M (including PCN & calibration records) – 2 hard copies & electronic copy (1 QA Supervisor - signed Transmittal required, 1 site copy)
- QA Supervisor to be notified of Project O&M updates
- As-built Contractor markups
- 3-2-1 calculation (Lien Act)
- All other contract requirements
- MECP Permit Admin Changes

Advise WWWSP

Advise PMO

TOA Memo



Transfer of Asset Memo to PO/ PMATS/ WWWSP/PMO with supporting documentation attached (e.g. draft Capital Close-out checklist, Deficiency List) (Signed Memo)

CD – Operations Handover Summary Meeting with confirmation of acceptance prior to handover

CD SP Close-Out Checklist



GC Warranty Phase

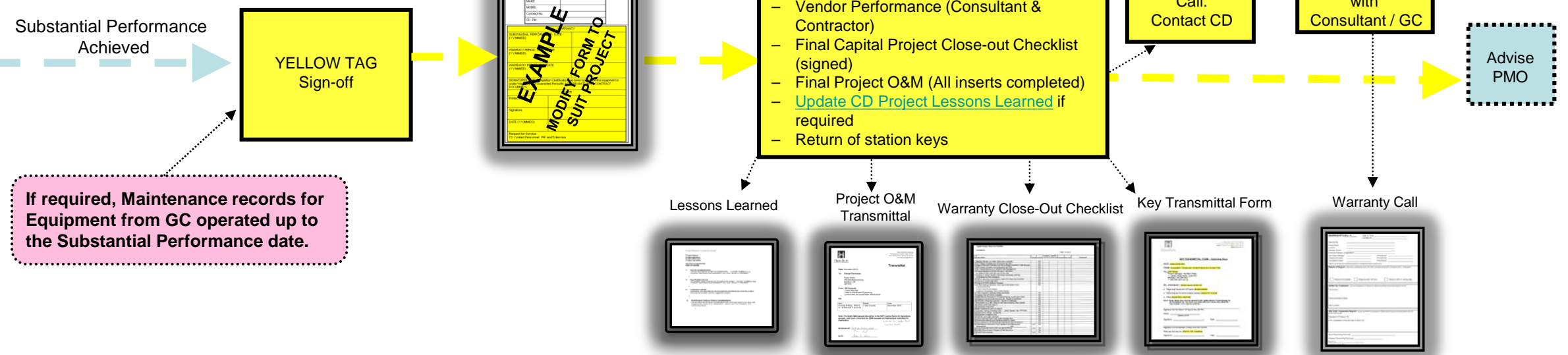
Project O&M Manual Distribution at Substantial Performance:

- Final Draft – 2 hard copies (1 site, 1 QA Supervisor)
- Signed Transmittal required for Project O&M transfer to QA Supervisor.

Substantial Performance Phase Summary

Task	Task Notes	Action	Review Req'd by
Transfer of Asset Memo to PO/PMATS	Memo to PO/PMATS (cc. Mgr. C&R, WWWSP) containing all relevant information and dates for asset transfer (e.g., substantial performance date, warranty period, training, Project O&M location, etc.). The following will be attached to the Memo: Draft SP Close-Out Checklist, approved Outstanding Deficiency List, final technical deliverables, and any other relevant information. The PO and PMATS Project Rep. will sign off on the Transfer of Asset Memo through BCOS. The Memo is to be stored in the SharePoint project folder.	CD	PO/PMATS
Single Line Diagrams and P&IDs	Single line diagrams and P&IDs are to be posted at site. Provide Consultant-reviewed Single Line Diagram in its final version. Single Line Diagram shall be of size 24-inch by 36-inch, laminated, mounted on wood board and installed by GC in respective electrical room.	GC Consultant	CD
Substantial Performance	Basic steps (follow Contract Documents for complete requirements): CD PM to ensure the following Project O&Ms are provided to PO/PMATS: <ul style="list-style-type: none"> • 2 hard copies and electronic copy (SharePoint) Final Draft Project O&M - 1 hard copy to QA Supervisor, 1 site • A Transmittal signed by QA Supervisor is required for all Project O&Ms provided to PO/PMATS. Signed Transmittals are to be stored in SharePoint in the project folder. • QA Supervisor is to be notified of any updates for Project O&Ms. As-built markups received (and verified by Consultant): hard copy and scanned. 3-2-1 calculation (Construction Act). Facility operating as intended.	CD	CD
CD Lessons Learned	CD Project Lessons Learned completed within 2 months of substantial performance and to be stored in SharePoint. Lessons Learned meeting is to include the Consultant, Contractor and relevant COH staff (e.g., CD, PO, PMATS, and WWWSP).	All Parties	All Parties
MECP Admin Changes	Advise MECP of any minor administrative changes. Coordinate any communication with MECP through CD Q&SP PM and C&R.	CD/C&R	C&R
PO/PMATS Handover Summary Meeting	Review of handover of asset information with PO/PMATS prior to Substantial Performance. Ensure all team members are accepting of handover documents (TOA Memo/Close-out Checklist). This is to include a review of handover documentation (O&Ms). Meeting minutes distributed.	CD	PO/PMATS

GC WARRANTY PERIOD PHASE



GC Warranty Period Phase Summary

Task	Task Notes	Action	Review Req'd by
Yellow Tag	Warranty Period in accordance with Contract Documents; commences once substantial completion has been achieved. Tags to be removed by CD PM at end of Warranty Period and filed accordingly.	GC	PO/PMATS
GC Warranty Period	PO/PMATS to notify CD PM of issue, CD PM will issue Warranty Call Form based on information received. CD PM communicates with Consultant who in turn advises the GC to correct issue.	PO/PMATS	CD Consultant GC
Warranty Inspection	Schedule inspection approximately 1 month prior to the end of the warranty period.	Consultant / GC	PO / PMATS / CD
Collection of Station Keys	Station keys are to be given back to CD PM and the Key Transmittal Form – Returning Keys is to be filled out, signed and submitted to PMATS.	CD/GC/Consultant	CD
Store As-Builts/Record Drawings on SPIDER	CD PM to submit Final As-Builts or Record Drawings (PDF) to Survey & Technical Services Section for incorporation into SPIDER. CD PM to notify Plant Operations representative and Manager of Customer Service & Community Outreach of SPIDER Drawing #. <u>SPIDER Drawing # to be noted on Capital Close-Out Checklist.</u>	CD	CD
Capital Warranty Close-out Checklist	Complete CD Capital Project Warranty Close-Out checklist and formally submit to PO/PMATS. The Capital Project Warranty Close-out Checklist is to be reviewed by the PO & PMATS Project Rep as part of ToA package within BCOS/InteleX with a formal record of approval saved on SharePoint.	CD	PO/PMATS
Final Project O&M	Insert any updated Project O&M material into the Final Draft Project O&M and electronic version to complete the Final Project O&M. QA Supervisor to be notified via transmittal.	CD	CD
Lessons Learned	Update CD Project Lessons Learned if required.	CD	N/A
Warranty Completion and Close Out	Formally notify GC that warranty period is complete. Warranty completion and close out documentation in accordance with contractual requirements. Advise PMO. For extended warranty, see CMMS.	CD	CD

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Common Information for all tags (i.e. red, green and yellow)

Perforated to remove after red tag phase completed.

All tags (red, green and yellow) are to be collected and stored/protected on-site in the vicinity of the Project O&M Manuals.

Place Tag in protective transparent plastic sleeve

Note: Sign-off by City Representatives indicates only that documentation is complete. Does not indicate equipment is working. This will be done during SAT/operational testing.

Red Tag Phase

RED TAG "PRE-SAT/ CONTRACTOR START-UP"

SCADA EQPT No.:	
Equipment Description	
Serial No.	
MAKE	
MODEL	
Contract No.	
CD PM	

SCADA EQPT No:			
DO NOT OPERATE WITHOUT CONTRACTOR'S PERMISSION	RECEIVED	DATE (YY/MM/DD)	
Mechanical Start-up			
Electrical Start-up			
Manufacturer's Pre-functional Start-up			
I/O Check & Local/Remote Communication Verification			
Instrumentation Calibration Form			
CMMS List			
SIGNATURES FOR EQUIPMENT START-UP COMPLETE & READY FOR SERVICE IN ACCORDANCE WITH CONTRACT DOCUMENTS. SIGNATURES BY CITY REPRESENTATIVES INDICATES ONLY THAT DOCUMENTATION IS COMPLETE			
	Printed Name	Signature	DATE (YY/MM/DD)
Manufacturer's Rep			
Sub Contractor			
General Contractor			
Consultant			
City PM			
SCADA Rep (if no SCADA, PO Rep signature is sufficient)			
PO Rep			

Printed copies (unless noted) are uncontrolled.

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Common Information for all tags (i.e. red, green and yellow)

Perforated to remove after green tag completed.

All tags (red, green and yellow) are to be collected and appropriately stored/protected on-site in the vicinity of the Project O&M Manuals.

Place Tag in protective transparent plastic sleeve

Green tag – facility still under Contractor’s control. PO signoff is confirmation that everything has been done and System Trial Period is starting. Facility can be run by PO but Contractor is still responsible for the facility. Signoff by PO is required before facility is run.

Green Tag Phase

GREEN TAG “COMISSIONING/ READY FOR SYSTEM TRIAL PERIOD”

READY FOR SERVICE	
SCADA EQPT No.:	
Equipment Description	
Serial No.	
MAKE	
MODEL	
Contract No.	
CD PM	

SCADA EQPT No:			
DO NOT OPERATE WITHOUT CONTRACTOR’S PERMISSION			DATE (YY/MM/DD)
Red Tag Completed			
Performance Test			
CMMS Asset Verification Completed			
CMMS Integration Completed (by PMATS)			
SAT Test			
Owner Training Required	Yes	No	N/A
Owner Training Completed (list sessions)			
Project O&M Received Submission of Start-up Reports			
Identification Completed (Location and Asset Tag)			
Remote Operation Confirmed Recalibration (if required) <small>*Not signed until SCADA SAT completed</small>			
SIGNATURES FOR EQUIPMENT CHECKOUT COMPLETE & READY FOR SERVICE IN ACCORDANCE WITH CONTRACT DOCUMENTS			
	Printed Name	Signature	DATE (YY/MM/DD)
General Contractor			
Consultant			
CD PM			
PO Rep			
SCADA Rep (If no SCADA, PO Rep signature is sufficient)			

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Common Information for all tags (i.e. red, green and yellow)

CD PM to remove tag from equipment after warranty period has completed.

All tags (red, green and yellow) are to be collected and appropriately stored/protected on-site in the vicinity of the Project O&M Manuals.

Place Tag in protective transparent plastic sleeve

GC Warranty Phase

YELLOW TAG "WARRANTY PERIOD"



SCADA EQPT No.:	
Equipment Description	
Serial No.	
MAKE	
MODEL	
Contract No.	
CD PM	

GC WARRANTY	
SUBSTANTIAL PERFORMANCE DATE (YY/MM/DD)	
WARRANTY PERIOD START DATE (YY/MM/DD)	
WARRANTY PERIOD END DATE (YY/MM/DD)	
SIGNATURES FOR Completion Certificates has been issued and the equipment is under GC Warranty and Guarantee Period IN ACCORDANCE WITH CONTRACT DOCUMENTS	
OWNER (CD PM)	
Printed Name	
Signature	
DATE (YY/MM/DD)	
Request for Warranty Call CD Contact Personnel: PM and Extension	

Printed copies (unless noted) are uncontrolled.

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Project O&M Transmittal

		Capital Delivery Section 77 James Street Hamilton, Ontario, L8R-2K2 Phone: 905-546-2424 ext. 4444 Fax: 905-546-2746 Email: insert.name@hamilton.ca
		<h3>Transmittal</h3>
Date: Month Date, Year		
To: Insert Name Plant Operations – Quality Assurance Supervisor		
Public Works 700 Woodward Avenue Hamilton, ON L8H-6P4		
From: Insert Name Title Capital Delivery Hamilton Water Division		
RE: Insert Project Name / Description Insert Contract #		
Item	Details	Date
Insert Document Name	<ul style="list-style-type: none"> Insert Document Details Draft O&M, Final O&M # of copies provided # of copies per O&M Set Details of O&M Volumes (e.g. Consultant, Electrical, Mechanical...) The more details the better.	Insert Manual Date
Note: Insert any additional notes related to the O&M Manual.		
RECEIVED BY: _____		
DATE: _____		
Electronic copy available on SharePoint		
Issue Date: December 2015		

Note:

- 1) Transmittal must include a detailed description of the Project O&M being transferred to the QA Supervisor. Description to include:
 - Project Location
 - Project Contract Number
 - Status of Project O&M Manual (Draft / Final)
 - Other details (e.g., number of sets, number of binders in set, etc.)
- 2) Signature by QA Supervisor required for all Project O&M Manuals transferred to PO/PMATS by CD.

[Link to Form](#)

Transfer of Asset Memorandum

Transfer of Assets Memorandum

Date: (Insert Month Date, Year)

To: (Insert Operations Representative Name), Plant Operations

From: (Insert PM Name), (Insert Position Title), Capital Delivery

Copy: Mark Bainbridge, Director of Water & Wastewater Planning & Capital
Stuart Leitch, Manager of Capital Delivery
Deborah Goudreau, Manager of Plant Operations
Amanda Dubeckyj, QA Supervisor, Plant Operations
Cary MacDonald, H&S Coordinator, Plant Operations
Danny Locco, Manager of Plant Maintenance & Technical Services
Fernando Gonzalez, Superintendent, Plant Maintenance & Technical Services
Senior Project Manager, Plant Maintenance & Technical Services
Miro Kutlesa, PMATS Electrical & Instrumentation Planner
Michael Srbjanin, Capital Delivery Technologist
Manager, WWW Systems Planning
(Water Project) Udo Ehrenberg, Senior Project Manager, WWW Systems Planning
HW_WBU@hamilton.ca
(Wastewater Project), Senior Project Manager, WWW Systems Planning
Susan Girt, Manager of Compliance & Regulations
Wendy Jackson, Senior Regulatory Coordinator, Compliance & Regulations
Andrea Bazzard, Manager of Customer Service & Community Outreach
Sanaz Hafezian, Senior Project Manager, Water Information Systems
Water Information Systems (WIS) Group (dl-hansen8@hamilton.ca)
Shawna Carrick, PMO Projects Coordinator
(Insert name), (Insert Position Title)

Subject: Substantial Performance and Transfer of (Insert Project Name), (Insert Contract Number)

This Transfer of Asset Memo provides notification that the above referenced project has been successfully commissioned with substantial performance (in accordance with the Construction Act) (anticipated to be granted) or (granted) on (Insert Month Date, Year). As such, the project will be officially transferred to Plant Operations on (Insert Month Date, Year), at which time Plant Operations will be responsible for the complete operation and maintenance of the new system.

Specific Project Details:

- Substantial Performance Date: (Insert Month Date, Year)
- Placed into Service Date: (Insert Month Date, Year)
- 1 Year General Contractor Warranty Period (Insert Month Date, Year) to (Insert Month Date, Year)
- List extended warranty items and period:
 - (Insert item and Month Date, Year)
- General Contractor: (Insert Contractor Name)
- (Insert Consultant Company Name) Project Manager: (Insert Project Manager Name)
- City Project Manager: (Insert Project Manager Name)
- City Plant Operations Lead: (Insert Lead Name)
- City Plant SCADA Lead: (Insert Lead Name)

Note:

1)

Transfer of Asset Memo detailing key aspects of project must be provided to PO Project Rep at the end of Substantial Performance. The draft Capital Close-out Checklist and Deficiency List must be attached to the Memo provided to PO. Review and approval shall occur through Intelx / BCOS approval process.

Please be advised of the following project details pertaining to the new (Insert Project Description):

- Insert relevant project information related to partial or full commissioning
- Insert relevant project information related to risk or controls
- Insert relevant project information related to outstanding deficiencies including estimated cost and anticipated completion times. In accordance with the Construction Act and Contract Documents, the contractor is still responsible for completing some minor site works and deficiencies that are anticipated to be completed over (insert period).
- Insert relevant project information related to Asset Management and / or growth requirements (e.g. inventory of new equipment installed/ attach CMMS excel spread sheet, break down of asset to identify if immediate / long term requirement, notice of new civil / site infrastructure, contract costs broken down into common disciplines).
- If available, provide a detailed description of relevant drawings, drawing numbers and storage locations. Staff can attach a list as an appendix rather than inserting information into table.

Transfer of Assets handover meeting was held on (month, day, year). Below is an update on Transfer of Asset Deliverables: (PM to provide update on each of the following items)

- Staff Training: (insert date complete/# of training sessions, link/location of training video if available)
- O&M Manuals: (PM to provide status, location of copies, date delivered, etc)
- As-Built/Record Drawings: (insert Spider number if available)
- CMMS List: (insert date sent to PMATS Planner)
- PCN (PDF and Word): (insert latest version number)
- Lessons Learned:
- Spare Parts: (PM to attach to memo)
- Final technical deliverables (including pump curves and pump performance test): (insert link to file location)

Latest O&M manuals, record drawings (in PDF and CAD), PCN, and CMMS list can be found in our CD Record Drawing Library located on SharePoint here: <http://hw.prod.hamilton.technology/PWA/Archive/CD%20Project%20Record%20Drawing/Forms/AllItems.aspx>

The contractor and consultant will be working diligently over the next few weeks to submit the complete finalized set of O&M manuals, record drawings, final P&IDs and PCNs in PDF and Word, and all other remaining project close-out documentation. Once received, copies of the finalized sets of documentation will be forwarded to Plant Operations.

The warranty details will be included in the O&M manuals. Should issues arise during the 1-year warranty period, please provide written service request details to the Capital Delivery's project manager, who will complete the Warranty Call form and coordinate with the General Contractor as required. Please ensure the issue has been fully investigated and determined to be a warranty item prior contacting the City's project manager. Should the issue be investigated by the contractor &/or supplier and determined not to be a warranty claim, they may seek financial compensation. For issues associated with extended warranties outside of the 1-year warranty period, please contact the supplier directly.

Relevant project information stored on Capital Delivery's SharePoint server, in the Transfer Folder, will be removed at the end of the warranty period. The Plant Operations project representative must ensure that

Issue Date: Fall 2022

Substantial Performance Close-Out Checklist

 Project Name: C(xx-xx) Station # Project Name Example Contract #: Cxx-xx-xx

Reviewed and approved via Intalex, no signatures required.

Capital Delivery Project Manager:

Plant Operations Representative:

PMATS Representative:

SCADA Representative:

ID	Task Name	Submitted To	% Complete	Anticipated Completion Date	Actual Finish	Comments
All Phases						
1	Action Log	PO/PMATS	0%			
Pre-Commissioning						
2	FAT Sheets completed and reviewed by SCADA	PMATS	0%			
3	Draft Process Control Narrative to SCADA Standard in MS Word	PO/PMATS Reps	0%			PCN Version #:
	• update SCADA Code with new SCADA tags	PMATS	0%			
4	ECA / License (Form 2 and/or 3) / Permit & supporting documentation, Approval & Reporting completed	CSG	0%			
5	ECA for air (where applicable)	CSG	0%			
6	MECP Waste Manifest	CD	0%			
7	Copy of PLC/RPU Software	PMATS	0%			
8	TSSA Inspection Certificate (where applicable)	PO/PMATS	0%			
9	Building Permit Occupancy Letter from Mechanical, Structural (both sealed) and Architectural	P&E (Building)	0%			
10	Electrical Safety Association (ESA) - Reports & Certificates	PO/PMATS	0%			
Commissioning Phase						
11	Instrument Calibration and Start-up Sheets Supplied in Project O&M Manuals	PMATS	0%			
12	SAT Sheets completed and reviewed by SCADA	PMATS	0%			
13	SAT Report delivered to SCADA & Asset Management	PMATS	0%			
14	Labeling (Electrical and Mechanical) Complete	PMATS	0%			
15	Draft Project O&M Manuals Reviewed by Consulting Engineer (confirmation letter) and received on-site. (Required for Substantial Performance)	PO/PMATS	0%			
16	CMMS Data (in MS - Excel format), New & Existing -Date installed	PMATS	0%			
17	Deficiency List – Pre-Substantial Performance (e.g. Major Deficiencies)	PO/PMATS	0%			
18	Training Completed (Date: xx/xx/xx, attach Operator/Tech Sign-Off Sheet(s))	PO/PMATS	0%			
19	Performance Testing & Commissioning – 14-day System Trial Period	PO/PMATS	0%			
20	Minor Deficiency List – Post-Substantial Performance	PO/PMATS	0%			
Substantial Performance						
21	As-Built Drawings (markup/redline) Received, Digital and Hard Copy	PO/PMATS	0%			
22	Final P&IDs and PCNs in MS Word and PDF	PO/PMATS	0%			PCN Version #:
23	Substantial Performance Date	PO/PMATS	0%			
24	Final Draft Project O&M Manuals	PO/PMATS	0%			
25	Maintenance records for equipment from GC operated prior to warranty period	PMATS	0%			
26	Final technical deliverables including pump curves and pump performance test results (if applicable)	WWWSP SPM	0%			

Note:

1) Draft Capital Close-out Checklist is to be attached to the Transfer of Asset Memo provided to PO when the project is Substantially Performed.

End of Warranty Close-Out Checklist

[Home Page](#)Project Name: C(xx-xx) Station # Project Name Example Contract #: Cxx-xx-xx**Reviewed and approved via Intelex-BCOS, no signatures required.**

Capital Delivery Project Manager:

Plant Operations Representative:

PMATS Representative:

SCADA Representative:

ID	Task Name	Submitted To	% Complete	Anticipated Completion Date	Actual Finish	Comments
1	Action Log	PO/PMATS	0%			
Warranty						
27	Complete Lessons Learned Meeting (within 2 months of Substantial Performance)	CD	0%			
28	End of Warranty Period Date, see Warranty Call form	PO/PMATS	0%			
29	Final Project O&M Manuals delivered to QA Supervisor Plant Operations during Warranty Period	PO/PMATS	0%			
30	As-Built or Record drawings sent to GIS to be filed in SPIDER. CAD files submitted to CD. *Full Set of As-Built drawings due by the end of the Warranty Period.	SPIDER	0%			
31	Formal Final Warranty Inspection	PO/PMATS	0%			
32	Return of Station Keys (Key Submittal)	PMATS	0%			
33	Scanning and saving of Red / Green / Yellow Tags in SharePoint Project Site	CD	0%			

Note: Document will be combined with any additional applicable documents and uploaded to Intelex / BCOS for review and approval by the following project team members: Capital Delivery Project Manager, Plant Operations Representative, PMATS Representative & SCADA Representative.

Note:

- 1) Final Warranty Close-out Checklist is required for all projects at the end of the Warranty Period.
- 2) Review and approval shall occur through Intelex / BCOS approval process.

[Link to Form](#)

Lessons Learned

Project Review / Lessons Learned

Project Name: (Insert Project Name)
Project Number: (Insert Project Number)
Project Manager: (Insert Project Manager Name)
Project Sponsor: (Insert Project Sponsor Name)

Survey Completed By: (Insert Name)
Date of Survey: (Insert Date)

1. Key Accomplishments

List and describe key project accomplishments. Consider qualitative (e.g. customer satisfaction) and quantitative (e.g. cost - actual vs. estimated).

- XXX
- XXX
- XXX

2. Key Problem Areas

List problem areas experienced throughout the project. Consider qualitative (e.g. customer satisfaction) and quantitative (e.g. cost - actual vs. estimated).

- XXX
- XXX
- XXX

3. Lessons Learned

Summarize and describe key lessons learned and takeaways from the project. Describe the problem and the suggested solution.

- XXX
- XXX
- XXX

4. Post Project Tasks or Future Considerations

List and describe all future considerations and work that needs to be done with respect to the project (e.g. maintenance, actions yet to be completed, and outstanding items).

- XXX
- XXX
- XXX

Warranty Call Form

Issue Date: December 2018

WARRANTY CALL # _____ **Date & Time:** _____
Contract #: _____

Note: In the event of an emergency, Plant Operations Representative will contact the Contractor directly.

Reported By: _____
Project Name: _____
Location: _____
Warranty Period: _____
Extended Warranty (if applicable)*: _____
City Project Manager: _____ Phone/Email: _____
Contractor/Contact: _____ Phone/Email: _____
Consultant/Contact: _____ Phone/Email: _____

*Refer to Specifications and Operating Manuals for extended warranties to specific items

Section 1 – Nature of Report • Description of Warranty Issue (City PM to complete and email to Contractor and cc. Consultant):

Respond immediately Respond within 3 days Respond within 5 working days

Section 2 – Site Visit / Inspection Report • To be completed by Contractor or Responding Personnel and delivered to City PM prior to leaving Site.

Resolution of Problem Y/N: _____

If "N", explanation of why and date of return call: _____

Section 3 – Corrective Action by Contractor • To be completed by Contractor (or Responding Personnel) and emailed to City PM.

Assessment: _____

Corrective action proposed or taken: _____

Date of repair: _____

Contractor Responding Personnel: _____

Signature Responding Personnel: _____

Date/Time: _____ / _____

Home Page

Key Transmittal Form



Hamilton Water, Public Works Department
77 James St. N. Suite 400, Hamilton, Ontario, L8R 2K3
Phone: 905-546-2424 Ext: [] Fax: 905-546-4491
Email: []@hamilton.ca

KEY TRANSMITTAL FORM – Issuing Keys

DATE: []

TO: Contractor Name/Consultant Name []
Company Name []
Email Address []
Phone Number []

FROM: []
Project Manager, Hamilton Water
77 James Street North, Suite 400
Hamilton, ON L8R 2K3
T: 905.546.2424 ext. []

RE: STATION KEYS: Station Name [] (Station Code) []

Key was received from []

Station Keys Issued: []
Gate Keys Issued: []

- Issuing Key at start of Project estimated project duration: []
- Issuing key for short duration: []
- Other: []

NOTE: Pump Station Keys must be returned to the Capital Delivery Project Manager by the Consultant / GC. Any costs associated with lost or stolen keys will be the responsibility of the General Contractor.

Signature for Receipt of Keys from the CD PM:

Name []
(please print)

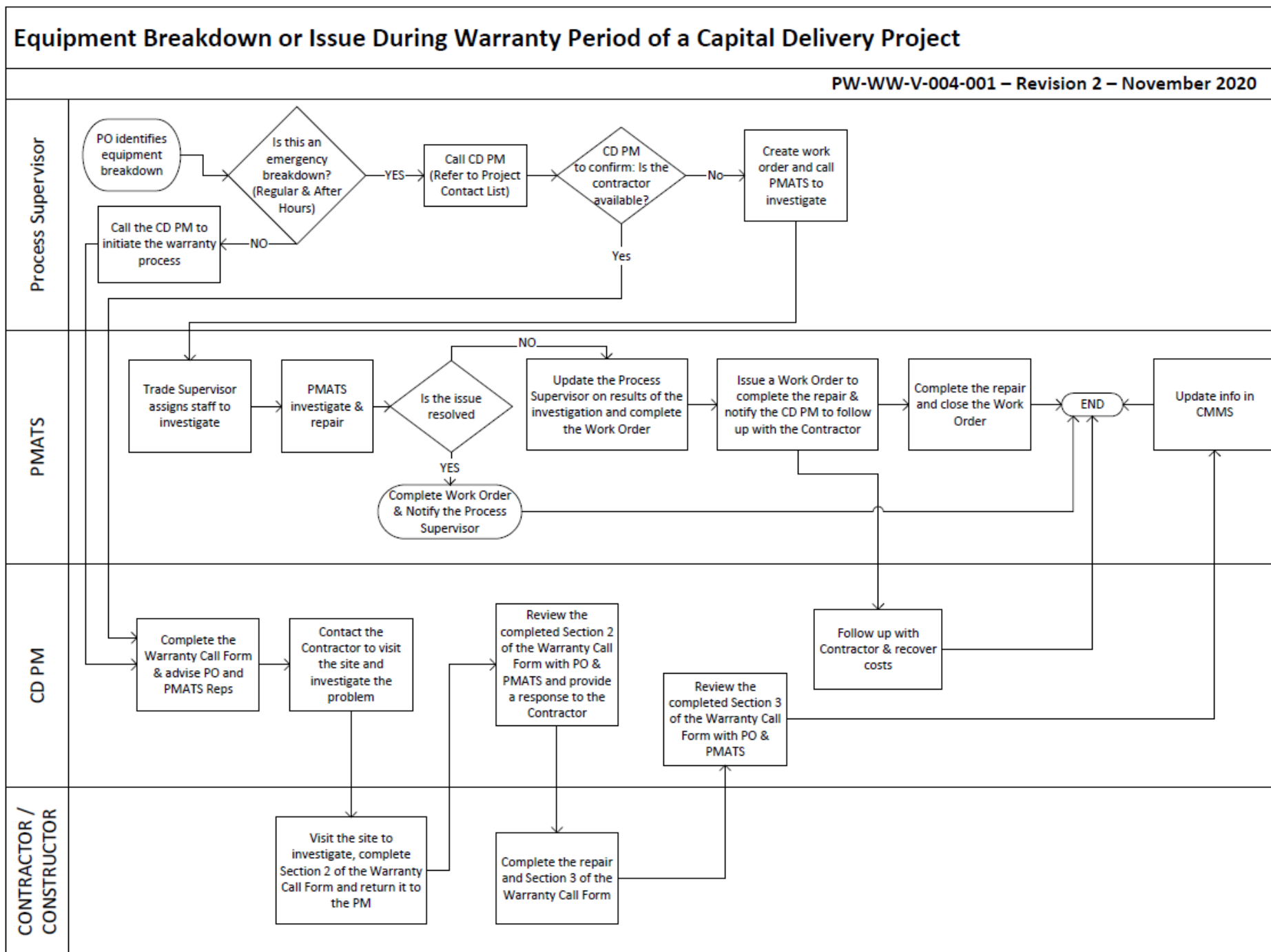
Signature []

Date []

Issue Date: August 2020

Link to Form

Equipment Breakdown or Issue During Warranty Period of a Capital Delivery Project Flow Chart



*After Hours = 5pm to 7am Monday thru Fridays & all day on weekends and holidays



GENERIC Installation and Pre-SAT Checklist

Project Name:	0	
Project Number:	0	
Outstation or Plant Area ID :	0	
Contractor:		
Inspector:		

Asset Description:	
--------------------	--

Class Description	Category	Sub Cat 1	Sub Cat 2
-------------------	----------	-----------	-----------

Equipment Checklist <i>*indicate NA if not applicable</i>	Insert Scada ID #	Insert Scada ID #	Insert Scada ID #	Insert Scada ID #	Insert Scada ID #	RECORDED VALUE / REMARKS
---	-------------------	-------------------	-------------------	-------------------	-------------------	---------------------------------

General Compliance Checks

Device/Parts Supplied per Contract Data Sheet									
Manufacturer Rep in Attendance									
Installed in Accordance with Manufacturer's Recommendations									
Lamacoid Check (device tag)									
Certification on Device Labeled									
O&M Manuals Received									
Spare Parts Received									
Contractor IO Check Complete (on IO Check Form)									
Red Tag Attached									

Installation / Start up Checks

Inspected, Checked, and Adjusted.									
Serviced with Proper Initial Lubricants.									
Installed per ESA Requirements									
Mechanical Checks									
Safety Equipment Installed									
Performance Tested									
Display Mounted at Working Height									

COMMENTS: *General Comments - irregularities/additional details*

Inspection Result (circle)	Passed - Equipment certified ready for SAT	Failed – Correct for Re inspection
Signatures/Dates	Sign	Date
Contractor Rep		
Supplier Rep		
Consultant Rep		



INSTRUMENT

Installation and Pre-SAT Checklist

Project Name:	0	
Project Number:	0	
Outstation or Plant Area ID :	0	
Contractor:		
Inspector:		

Asset Description:	
--------------------	--

Class Description	Category	Sub Cat 1	Sub Cat 2
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Equipment Checklist <i>*indicate NA if not applicable</i>	Insert Scada ID #	Insert Scada ID #	Insert Scada ID #	Insert Scada ID #	Insert Scada ID #	RECORDED VALUE / REMARKS
--	-------------------	-------------------	-------------------	-------------------	-------------------	--------------------------

General Compliance Checks

Correct Device Supplied						
Manufacturer Rep in Attendance						
Lamacoid Check (Device Tag)						
Red Tag Attached						
Vendor Inspection Certificate Provided						
Certification on Instrument Labelled						
O&M Manuals Received						
Spare Parts Received						
Instrument Parameter File Provided						
Contractor IO Check Complete (on IO Check Form)						

Instrument Parameter Setup

Display Status / Alarm indicator functional						
Display Engineering Units Correct						
Instrument Span Correct						

Mechanical Checks

Installed per Product Manual						
Isolation/Bypass Valves Installed Correctly						

Electrical Checks

Power Source and CB/Fuse per Drawings						
Installed per ESA Requirements						
Test (Ground Loop, Continuity, Installation)						
Signal Wire Shield Properly Terminated						

IO Checks

Signals Wired per SCADA Drawings						
Alarm Contacts Wired per SCADA Drawings						
Signal Wire Polarity Check						

Asset Description:						
Class Description		Category	Sub Cat 1	Sub Cat 2		
Equipment Checklist <i>*indicate NA if not applicable</i>		Insert Scada ID #	Insert Scada ID #	Insert Scada ID #	Insert Scada ID #	Insert Scada ID #
		RECORDED VALUE / REMARKS				
Transmitter Checks						
Display Mounted at Working Height						
Signal Optimization						
Relay Output Function						
Sensor Checks						
Head is Clean / Scratch Free						
Insulated (Outdoor Application*)						
Installed per Product Manual						
Calibration Certification Sticker is Present						
Liquid Tight Seal at Cable Entry						
Flange Gasket Properly Centered						
Proper Torque on Flange Bolts						
COMMENTS: <i>General Comments - irregularities/additional details</i>						
Inspection Result (circle)		Passed - Equipment certified ready for SAT			Failed – Correct for Re inspection	
Signatures/Dates		Sign		Date		
Contractor Rep						
Supplier Rep						
Consultant Rep						



VALVE

Installation and Pre-SAT Checklist

Project Name:	0	
Project Number:	0	
Outstation or Plant Area ID :	0	
Contractor:		
Inspector:		

Asset Description:	
--------------------	--

Class Description	Category	Sub Cat 1	Sub Cat 2
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Equipment Checklist <i>*indicate NA if not applicable</i>	Insert Scada ID #	Insert Scada ID #	Insert Scada ID #	Insert Scada ID #	Insert Scada ID #	RECORDED VALUE / REMARKS
--	-------------------	-------------------	-------------------	-------------------	-------------------	--------------------------

General Compliance Checks

Correct Device Supplied						
Lamacoid Check (Device Tag)						
Red Tag Attached						
Vendor Inspection Certificate Provided						
O&M Manuals Received						
Spare Parts Received						

Physical Checks

Accessible / Obstruction Free						
Orientation Matches Design						
O-ring Installed to Seal Electronics						

Valve Body

Type/Body Size						
Port Size/End Connection						
Trim Form						
Packing/Stem Seal Adjustment						
Lubrication						
Exterior Finish						

Electric Actuator

Size						
Type (Discrete / Analog)						
Handwheel Functional						

Electric Actuator Power

Installed per ESA Requirements						
Wiring Check						
Voltage Check						

Asset Description:						
Class Description		Category	Sub Cat 1	Sub Cat 2		
Equipment Checklist <i>*indicate NA if not applicable</i>		Insert Scada ID #	Insert Scada ID #	Insert Scada ID #	Insert Scada ID #	Insert Scada ID #
		RECORDED VALUE / REMARKS				
Analog Data (if applicable)						
Open Position						
Closed Position						
Fail Position (on Signal Loss)						
Handwheel/Manual Override Position						
Open/Closed Position Stop Adjustment						
Positioner						
Function						
Input Signal/Output Signal						
Performance						
Manufacturer's Rep in Attendance						
Maximum Flow						
Value % Open @ Max Flow						
Inlet Pressure @ Max Flow						
Pressure Drop @ Max Flow						
Minimum Flow						
Valve % Open @ Min Flow						
Inlet Pressure @ Min Flow						
Pressure Drop @ Min Flow						
Relief Pressure (Safety Valves)						
Reseating Pressure (Safety Valves)						
Manufacturer's Install Letter Received						
COMMENTS: <i>General Comments - irregularities/additional details</i>						
Inspection Result (circle)		Passed - Equipment certified ready for SAT			Failed – Correct for Re inspection	
Signatures/Dates		Sign	Date			
Contractor Rep						
Supplier Rep						
Consultant Rep						



PUMP

Installation and Pre-SAT Checklist

Project Name:	0	
Project Number:	0	
Outstation or Plant Area ID :	0	
Contractor:		
Inspector:		

Asset Description:	
--------------------	--

Class Description	Category	Sub Cat 1	Sub Cat 2

Equipment Checklist <i>*indicate NA if not applicable</i>	Insert Scada ID #	Insert Scada ID #	Insert Scada ID #	Insert Scada ID #	Insert Scada ID #	RECORDED VALUE / REMARKS
--	-------------------	-------------------	-------------------	-------------------	-------------------	--------------------------

General Compliance Checks

Manufacturer's Rep in Attendance						
Correct Device Supplied						
Lamacoid Check (Device Tag)						
Red Tag Attached						
Vendor Inspection Certificate Provided						
O&M Manuals Received						
Approvals (CSA, NEMA, etc.)						
Spare Parts Received						
Electrical Components						
Motor Megger						
Installed per ESA Requirements						
Motor Rotation						
Supply/Starter Fuse Size						
Supply/Starter O/L Size						
Interlock Checked						
Grounding Installation						
Cable or Conduit Installation						
Control - Local Run						
Control - Remote Run						
Confirm Starter Reset Function with PMATS						

Asset Description:												
Class Description						Category	Sub Cat 1	Sub Cat 2				
Equipment Checklist <i>*indicate NA if not applicable</i>					Insert Scada ID #	Insert Scada ID #	Insert Scada ID #	Insert Scada ID #	Insert Scada ID #	RECORDED VALUE / REMARKS		
Mechanical Components												
Foundation or Base												
Mounting Bolts												
Couplings, Belts, Chains												
Shaft Alignment												
Gaskets												
General Condition												
Bearing Temperature												
Seals, Packing												
Valves, Check Valves												
Connecting Rods												
Couplings, Belts, Chains												
Lubrication												
Seal Lubrication												
Shafting, Universal												
Clutch												
Gear Drives												
Alignment/Level												
Removal of Shipping Materials												
Interior Free of Debris												
Equipment Safety Devices and Guards												
Free Rotation of Shafts												
COMMENTS: <i>General Comments - irregularities/additional details</i>												
Inspection Result (circle)					Passed - Equipment certified ready for SAT					Failed – Correct for Re inspection		
Signatures/Dates					Sign			Date				
Contractor Rep												
Supplier Rep												
Consultant Rep												



VFD

Installation and Pre-SAT Checklist

Project Name:	0			
Project Number:	0			
Outstation or Plant Area ID :	0			
Contractor:				
Inspector:				

Asset Description:				
--------------------	--	--	--	--

Class Description	Category	Sub Cat 1	Sub Cat 2

Equipment Checklist <i>*indicate NA if not applicable</i>	Insert Scada ID #	Insert Scada ID #	Insert Scada ID #	Insert Scada ID #	Insert Scada ID #	RECORDED VALUE / REMARKS
--	-------------------	-------------------	-------------------	-------------------	-------------------	--------------------------

General Compliance Checks

Correct Device Supplied						
Manufacturer Rep in Attendance						
Lamacoid check (Device Tag)						
Red Tag Attached						
Vendor Inspection Certificate Provided						
O&M Manuals Received						
Spare Parts Received						

Installation

General Condition						
Installed per ESA Requirements						
Wiring/Conduit Termination						
Fuse/Overload Ratings Checked						
Drive Properly Grounded						
Direction of Motor Rotation						
Input Voltage						
Speed Control Signal						
Output Voltage						
Horsepower Rating						
Max Speed Setting						
Min Speed Setting						
Acceleration Rate Setting						
Deceleration Rate Setting						

Asset Description:												
Class Description						Category	Sub Cat 1	Sub Cat 2				
Equipment Checklist <i>*indicate NA if not applicable</i>					Insert Scada ID #	Insert Scada ID #	Insert Scada ID #	Insert Scada ID #	Insert Scada ID #	RECORDED VALUE / REMARKS		
START-UP												
Manual Start/Stop												
Auto Start/Stop												
Manual Speed Selection												
Auto Speed Selection												
Drive Run/Fault Indication												
Confirm Starter Reset Function with PMATS												
Manufacturer's Letter Provided												
Display status / Alarm indicator functional												
COMMENTS: <i>General Comments - irregularities/additional details</i>												
Inspection Result (circle)						Passed - Equipment certified ready for SAT			Failed – Correct for Re inspection			
Signatures/Dates						Sign			Date			
Contractor Rep												
Supplier Rep												
Consultant Rep												



Maintenance Data Sheet

ELECTRICAL

	Equipment/Device Name	
	TYPE OF EQUIPMENT	Electrical
	Division Number	
<i>Identifier Information</i>	ASSET NUMBER(s) CMMS Tag(s)	
	SCADA TAG(s)	
	ASSET STATUS	
	CLASS DESCRIPTION	As Identified in CMMS
	MANUFACTURER	Name as it appears on product and manual (if different)
	MODEL NUMBER	Record full model number as per order form
	SERIAL NUMBER(S)	
	INSTALLATION DATE	
<i>Shop Drawing / Equipment Information</i>	NAME PLATE INFORMATION (Including Make, Model, Manufacturer, Specifications, etc.)	
	Equipment Photo(s) Photo to be clear with adequate lighting Include Asset Tag and/or Lamacoid where practical Photo to include entire device	
	Maintenance Recommendations	O&M Section #: Click to View
	Critical Spare Parts and Specialty Tools Form	O&M Section #: Click to View
	H&S Information	O&M Section #: Click to View
	Certification Requirements	O&M Section #: Click to View
	Device Manual	O&M Section #: Click to View
	Start Up Forms	O&M Section #: Click to View
	Software Programmable Parameters	O&M Section #: Click to View
	Relay Protection	O&M Section #: Click to View
	Warranty Period and Expiry	Manufacturer's Warranty
	Life Expectancy (Years)	Manufacturer's suggested maximum service life

SECTION 01820 – DEMONSTRATION AND TRAINING

1 GENERAL

1.1 GENERAL REQUIREMENTS

- 1.1.1 The Contractor and its Subcontractors shall comply with the requirements in this section. Each section within the specifications is related and shall be read in conjunction with one another.

1.2 REFERENCES

- 1.2.1 These Specifications form an integral part of the Contract Documents.
- 1.2.2 Refer also to all other parts of the Contract Documents to determine their effect on the work of each section of these Specifications.
- 1.2.3 The requirements of this section and Division 1 apply to and govern the work under other divisions.
- 1.2.4 Refer also to [Section 01650 - Equipment Start-Up and Commissioning, Supplemental Documents].
- 1.2.5 Comply with the latest edition of the following statutes, standards, codes and regulations and all amendments thereto:
- .1 OHSA and Regulations for Construction Projects O.Reg 213.
 - .2 All other applicable statutes, standards, codes, and regulations

1.3 SUBMITTALS

- 1.3.1 The Contractor shall submit the following information in accordance to this section and [Section 01330 – Submittals]:
- .1 Submit an equipment training outline and schedule of time and date for all demonstration and training sessions twenty (20) Working Days prior to the planned start dates for the Consultant's approval.
 - .2 Training schedule shall be separate from startup and pre-commissioning work.
 - .3 Maintain a record of attendance for all demonstration and training sessions and submit to the Consultant, along with a report on all sessions prior to Substantial Performance of the Work.
 - .4 Allow sufficient time in the construction schedule and test plan for completion of demonstration and training.
 - .5 Coordinate attendance of demonstration and training specialists with availability of the City's personnel.

- .6 Where the same personnel are used for testing and commissioning and for demonstration and training, ensure that the testing and commissioning work is completed to the satisfaction of the Consultant before the demonstration and training commences and that sufficient time is set aside to complete the demonstration and training.
- 1.3.2 All factory training programs and classroom-training programs, if required, shall be completed prior to start of testing and commissioning and use equipment similar to that being supplied.
- 1.3.3 All training shall be completed prior to Substantial Performance of the Work. Feedback training sessions may be required at a later date.
- 1.3.4 All field-training programs shall be fully coordinated with construction, testing and commissioning. All training sessions shall be conducted on Tuesdays, Wednesdays, and Thursdays between 7 a.m. and 3 p.m. Manufacturer operation and maintenance manuals shall be available to the City's personnel prior to the training session.

1.4 DEMONSTRATION AND TRAINING

- 1.4.1 The Contractor shall provide training to the City's personnel/operators by skilled trainers retained by the Contractor specifically for the purpose, in the proper operation and maintenance of the equipment and systems provided and installed under this Contract.
- 1.4.2 Coordinate and schedule demonstration and training Work for each component of the system assuming two separate operation staff shifts are available per day (morning and afternoon).
- 1.4.3 Components shall be pre-commissioned, started up and ready for final testing and commissioning in accordance with [Section 01810 – Commissioning].
- 1.4.4 Submit manufacturer's startup reports to the Consultant prior to training.
- 1.4.5 Equipment and instruments shall be capable of operating as intended, during demonstration and training sessions.
- 1.4.6 Training materials will be approved by the Consultant and made available to trainees prior to training session.
- 1.4.7 Draft operation and maintenance manuals shall be complete.
- 1.4.8 Two (2) identical and comprehensive training sessions will be required for each component.

1.5 QUALIFICATIONS OF TRAINERS

- 1.5.1 The Contractor shall provide the specified on-the-job training of the City's operating and maintenance staff for the maintenance of equipment. The training sessions shall be conducted by qualified, experienced factory-trained, technical representatives from the various equipment manufacturers. Training shall include instruction of operation personnel in equipment operation and preventative maintenance and instruct plant mechanics, electricians, and electronics technicians in normal maintenance up to major repair.
- 1.5.2 The following information shall be submitted to the Consultant in one submittal. If phased testing and startup activities are required, separate submittals can be prepared for equipment items or systems. The material shall be reviewed and accepted by the Consultant no later than ten (10) working days prior to delivery of the first training session.
- .1 Lesson planned for each training session by the manufacturer's representatives.
 - .2 All training manuals, handouts, visual aids, and other reference materials shall be provided to attendees.
 - .3 Date, time, and subject of each training session and identity and qualifications of individuals to be conducting the training.
 - .4 Concurrent classes will not be allowed in training schedule.

1.6 TRAINING REQUIREMENTS

- 1.6.1 The Contractor shall conduct training sessions for the City's staff to instruct on the proper operation, care and maintenance of the equipment and systems installed under this Contract. Training shall take place at the site of the Work and under the conditions as specified.
- 1.6.2 Formal written lesson plans shall be prepared for each training session. Lesson plans shall contain an outline of the material presented along with a description of visual aids to be utilized during the session. Each plan shall contain a time allocation for each subject. One complete set of the originals of the lesson plans; training manuals, handouts, visual aids and reference material shall be the property of the City and shall be properly bound and organized for easy reproduction of any section as required. The Contractor shall furnish ten (10) copies of training manuals, handouts, visual aids and reference materials to the City's personnel at least five (5) days prior for each training session.
- 1.6.3 Field training session shall take place at the site of the equipment.
- 1.6.4 Classroom training sessions shall be permitted to take place in a virtual setting or sit-down classroom setting.

1.6.5 Each training session shall be comprised of time spent both in the classroom and on-site training sessions and shall cover the following topics for each item of equipment or system:

- .1 Familiarization
- .2 Safety
- .3 Operation
- .4 Troubleshooting
- .5 Preventive maintenance
- .6 Corrective maintenance
- .7 Parts
- .8 Local representatives
- .9 Operation and maintenance manuals

1.6.6 Recording:

- .1 The Contractor shall advise all manufacturers or Suppliers who are providing training sessions that the training sessions shall be recorded.
- .2 The Contractor may retain the services of a video recording service provider to record the training session. After completion of the video recording, the material may be edited and supplemented with professionally produced sound and visuals to provide a permanent training recording.
- .3 Recorded with a high definition camera with a resolution of 1080 X 1920 or better (DSLR, SONY DVCAM, smart phone turned horizontally) that can be connected to an external microphone.
- .4 Presenters will wear an externally clipped microphone. Internal microphones in cameras and phones are not acceptable.
- .5 Video conferencing software such as Microsoft Teams or Webex by Cisco which can allow for a video voice over recording along with a PowerPoint presentation, supporting project photographs, site-specific videos and a question and answer live session will all be permitted as part of the permanent training recording.
- .6 PowerPoint presentation slides to be in 1080 X 1920 (16:9) format and high resolution. Pictures should be 1080 X 1920 high resolution.
- .7 Video files shall be labelled and submitted in the MP4 video format.

1.6.7 The Consultant shall specify the time required for the proper training of the City's Operating and Maintenance staff that is required for each equipment or process system. To permit shift Operators to attend training sessions, the Contractor shall provide for off-hours and multiple sessions.

1.7 CLASSROOM EQUIPMENT TRAINING FOR OPERATIONS STAFF

1.7.1 As a minimum, the Contractor shall provide classroom equipment training for operations staff and shall include the following:

- .1 Videos, slides and/or drawings, for discussion of the specific equipment, its location in the plant and an operation overview.
- .2 Purpose and function of the equipment.
- .3 A working knowledge of the operating theory of the equipment.
- .4 Startup, shutdown, normal operation, and emergency operation procedures, including a discussion on system integration and electrical interlocks, if any.
- .5 Identify and discuss safety items and procedures.
- .6 Routine preventative maintenance, including specific details on lubrications and maintenance of corrosive protection of the equipment and ancillary components.
- .7 Operator detection, without test instruments, of specific equipment trouble symptoms.
- .8 Required equipment exercise procedures and intervals.
- .9 Routine disassembly and assembly of equipment, if applicable, (as judged by the City on a case-by-case basis) for purposes such as operator inspection of equipment.

1.8 HANDS-ON TRAINING FOR OPERATIONS STAFF

- 1.8.1 Hands-on training of equipment shall include:
 - .1 Location of the equipment in the facility and review its function
 - .2 Identify piping and flow options
 - .3 Identify valves and its function
- 1.8.2 Identify field instrumentation, particularly with respect to:
 - .1 Location of primary element.
 - .2 Location of instrument readout.
 - .3 Discuss purpose, basic operation and interpretation of operating data.
- 1.8.3 Discuss, demonstrate, and perform standard operating procedures and routine checks.
- 1.8.4 Discuss and perform the preventative maintenance activities.
- 1.8.5 Discuss and perform startup and shutdown procedure.
- 1.8.6 Perform routine equipment exercise procedure.
- 1.8.7 Perform disassembly and assembly of equipment if applicable.
- 1.8.8 Identify and review hazardous operation and demonstrate safety procedures, where applicable.

1.9 CLASSROOM EQUIPMENT TRAINING FOR MAINTENANCE STAFF

- 1.9.1 Classroom equipment training for the maintenance and repair personnel will include:
- .1 Theory of operation.
 - .2 Description and function of equipment.
 - .3 Startup and shutdown procedures.
 - .4 Normal and major repair procedures.
 - .5 Equipment inspection and troubleshooting procedure including the use of applicable test instruments and the “pass” and “no pass” test instrument readings.
 - .6 Routine and long-term calibration procedures.
 - .7 Safety procedures.
 - .8 Preventative maintenance such as lubrication; normal maintenance such as belt, seal, and bearing replacement; and up to major repairs such as replacement of major equipment part(s) with the use of special tools, welding jigs, etc.
 - .9 Review of spare parts supplied for specific equipment.

1.10 HANDS-ON TRAINING FOR MAINTENANCE STAFF

- 1.10.1 Hands-on equipment maintenance and repair training for Maintenance staff shall include:
- .1 Locate and identify equipment components.
 - .2 Review the equipment function and theory of operation.
 - .3 Review normal repair procedures.
 - .4 Perform startup and shutdown procedures.
 - .5 Review and perform the safety procedures.
 - .6 Perform City-approved practice maintenance and repair job(s), including mechanical and electrical adjustments and calibration and troubleshooting equipment problems.
 - .7 Review and use equipment manufacturer’s manual in the hands-on training.

1.11 BASIS OF PAYMENT

- 1.11.1 The Contract Price shall include compensation in full for labour, material, equipment, power workmanship, and all other costs associated with this section.
- 1.11.2 All training requirements under this contract shall be accounted for in this Division.

1.12 MEASUREMENT FOR PAYMENT

- 1.12.1 The measurement of payment is a lump sum for all Work required under this Specification.

1.12.2 Payment shall be provided upon completion of all training sessions.

- 2 PRODUCTS – N/A**
- 3 EXECUTION – N/A**
- 4 SUPPLEMENTS – N/A**

END OF SECTION

SECTION 01830 – WARRANTY WORK

1 GENERAL

1.1 GENERAL REQUIREMENTS

- 1.1.1 The Contractor and its Subcontractors shall comply with the requirements in this section. Each section within the specifications is related and shall be read in conjunction with one another.

1.2 REFERENCES

- 1.2.1 These Specifications form an integral part of the Contract Documents.
- 1.2.2 Refer also to all other parts of the Contract Documents to determine their effect on the Work of each section of these Specifications.
- 1.2.3 Refer also to [Section 01810 - Commissioning, Supplemental Documents].
- 1.2.4 The requirements of this section and Division 1 apply to and govern the Work under other divisions.
- 1.2.5 Comply with the latest edition of the following statutes, standards, codes and regulations and all amendments thereto:
- .1 OHSA and Regulations for Construction Projects O.Reg 213.
 - .2 All other applicable statutes, standards, codes and regulations

1.3 SUBMITTALS

- 1.3.1 Inform the Consultant in writing of the arrangements made for carrying out warranty work during the Warranty Period.
- 1.3.2 Provide all maintenance records for all equipment guaranteed under the Contractor's warranty prior to Substantial Performance.
- 1.3.3 Provide a telephone number and address for receipt of notices relating to matters requiring action by the Contractor during the Warranty Period.

1.4 WARRANTY WORK

- 1.4.1 Provide all warranties outlined in the Contract Documents from the time of Substantial Performance of the Work.
- 1.4.2 Perform warranty work required during progress of the Work and during the warranty period.

- 1.4.3 Extend warranties on any component of the Work that is required to be placed in operation prior to Substantial Performance for the purpose of complying with the sequence of construction.

1.5 INSPECTION AND DECLARATION OF FINAL COMPLETION

- 1.5.1 Request inspection for final completion no later than [thirty (30) Working Days before the expiry of the Warranty Period.
- 1.5.2 Participate in a joint inspection of the Works for the purpose of establishing final completion. Arrange, coordinate and pay for any special access required to inspect the Work, [which will include confined space entry, working at heights.
- 1.5.3 Review the status of all Warranty items carried out during the Warranty Period with the Consultant.
- 1.5.4 Complete all outstanding deficiencies, repair noted defects, complete all outstanding Warranty items within thirty (30) working days of inspection and obtain the Consultant's written agreement that all Works are complete in accordance with the Contract Documents.
- 1.5.5 Apply for Final Completion.

1.6 WORK DURING WARRANTY PERIOD

- 1.6.1 Perform all warranty Work required upon receipt of verbal or written notices from the Consultant within twenty-four (24) hours unless otherwise noted.
- 1.6.2 Repair or make good settlements and defects on surfaces of backfilled trench or excavations.
- 1.6.3 Repair all damages to structures caused by settlement of ground adjacent to or over excavation.
- 1.6.4 Maintain all trees and shrubs either planted or relocated for the duration of the warranty period.

1.7 REPAIR BY CITY

- 1.7.1 The City will, without giving notice to the Contractor, repair shrinkages or defects that are dangerous in nature, that constitute an extreme emergency, present a health and safety risk or that affect the operation of the Work. The Contractor will be notified of less serious conditions prior to Work being performed.

1.7.2 The Consultant will notify the Contractor of emergency Work performed by the City.

1.7.3 The cost of labour, equipment and material to perform emergency Work will be charged to the Contractor and removed from the final payment.

1.8 BASIS OF PAYMENT

1.8.1 The Contract Price shall be compensation in full for labour, material, equipment, power and workmanship associated with this section. All warranty and service costs shall be incorporated into the Contract Price for that Contract Item.

1.8.2 No separate payment shall be made to the Contractor for repairs during the warranty period or upon final Inspection before maintenance holdback is released.

1.9 MEASUREMENT FOR PAYMENT – N/A

2 PRODUCTS – N/A

3 EXECUTION – N/A

4 SUPPLEMENTS

4.1 SUPPLEMENTAL DOCUMENTS

4.1.1 The supplements listed below, and following the “End of Section”, form part of this specification section:

- .1 Section 01830A – Supplement – Warranty Call Form

END OF SECTION

WARRANTY CALL # _____

Date & Time: _____

Contract #: _____

Note: In the event of an emergency, Plant Operations Representative will contact the Contractor directly.

Reported By: _____

Project Name: _____

Location: _____

Warranty Period: _____

Extended Warranty (if applicable)*: _____

City Project Manager: _____

Phone/Email: _____

Contractor/Contact: _____

Phone/Email: _____

Consultant/Contact: _____

Phone/Email: _____

*Refer to Specifications and Operating Manuals for extended warranties to specific items

Section 1 – Nature of Report • *Description of Warranty Issue (City PM to complete and email to Contractor and cc. Consultant):*

Respond immediately Respond within 3 days Respond within 5 working days

Section 2 – Site Visit / Inspection Report • *To be completed by Contractor or Responding Personnel and delivered to City PM prior to leaving Site.*

Resolution of Problem Y/N: _____

If No, explanation of why and date of return call: _____

Section 3 – Corrective Action by Contractor • *To be completed by Contractor (or Responding Personnel) and emailed to City PM.*

Assessment: _____

Corrective action proposed or taken: _____

Date of repair: _____

Contractor Responding Personnel: _____

Signature Responding Personnel: _____

Date/Time: _____

CITY OF HAMILTON

C13-32-24

DUNDAS WASTEWATER TREATMENT
PLANT (WWTP) HEALTH AND SAFETY
IMMEDIATE NEEDS AND STRUCTURAL
REPAIR UPGRADES

DIVISION 02

Section 02050 – Basic Site Materials and Methods

SECTION 02050 – BASIC SITE MATERIALS AND METHODS

1 GENERAL

1.1 SECTION INTENT

1.1.1 This Section describes basic requirements for site materials and methods.

1.2 RELATED SECTIONS

1.2.1 Section 01330 – Submittals.

1.3 LINES AND LEVELS

1.3.1 Establish lines and elevations from control points shown on Drawings.

1.3.2 Have lines and levels established by a Registered Ontario Land Surveyor or a qualified Registered Civil Engineer.

1.4 HAULAGE

1.4.1 Surplus excavated material not required or suitable for backfill shall be taken off site and disposed of at an approved site.

1.4.2 All sludge and grit removed from the different cells on site shall be taken off site and disposed of at an approved site.

1.4.3 The Owner has the right of first refusal for excess material that is to be removed.

1.5 TESTING AND INSPECTION

1.5.1 Be responsible for compaction throughout the work of this Contract, as it progresses and on completion to ensure required densities are obtained.

1.5.2 Owner may appoint an independent testing company at its own expense for checking or approval of the placing and compaction work. The Contractor shall pay charges for re-testing after making good defective areas. Coordinate construction schedule with Engineer so that testing company can be notified in advance.

1.5.3 Contractor to schedule inspection with the Engineer following the draining and cleaning of each isolated cell.

1.6 PROJECT CONDITIONS

1.6.1 Existing Buried Utilities and Structures

- .1 Size, depth and location of existing utilities and structures as indicated on contract drawings are for guidance only. Completeness and accuracy are not guaranteed.
- .2 Prior to commencing excavation work, notify Owner or authorities having jurisdiction, and establish location and state of use of buried utilities and structures. Owner or authorities having jurisdiction to clearly mark such locations to prevent disturbance during work.
- .3 Notify utilities prior to excavating if required.
- .4 Confirm locations of buried utilities by careful test excavations.
- .5 Repair damage to existing utility lines and services resulting from work under this Section at no cost to the Owner.
- .6 Maintain and protect from damage, water, sewer, gas, electric, telephone and other utilities and structures encountered.
- .7 Verify that existing services, in particular, existing watermains are not damaged by the construction procedure.
- .8 Record location of maintained, re-routed and abandoned underground lines.

1.6.2 Other Contracts, Existing Buildings and Surface Features

- .1 Protect work of other trades or of other Contracts in progress or completed and protect Owner's existing properties, stored products, services and utilities from damage.

1.7 SAMPLING

- 1.7.1 Submit samples in accordance with Section 01330- Submittals.

2 PRODUCTS – N/A

3 EXECUTION – N/A

4 SUPPLEMENTS – N/A

END OF SECTION

CITY OF HAMILTON

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DUNDAS WASTEWATER TREATMENT
PLANT (WWTP) HEALTH AND SAFETY
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DIVISION 03

Section 03100 – CONCRETE FORMS AND ACCESSORIES

Section 03200 – CONCRETE REINFORCEMENT

Section 03300 – CAST IN PLACE CONCRETE

Section 03600 – GROUT AND MISCELLANEOUS CONCRETE WORK

SECTION 03100 – CONCRETE FORMS AND ACCESSORIES

1 GENERAL

1.1 SECTION INCLUDES

- 1.1.1 This section describes permanent and temporary forms and falsework for structural and architectural cast-in-place concrete.

1.2 RELATED SECTIONS

- 1.2.1 Section 01330 – Submittals.
- 1.2.2 Section 03200 – Concrete Reinforcement.
- 1.2.3 Section 03300 – Cast-In-Place Concrete.
- 1.2.4 Section 03600 – Grout

1.3 REFERENCES

- 1.3.1 OPSS.MUNI 928.
- 1.3.2 OPSS.MUNI 929.
- 1.3.3 OPSS.MUNI 930.
- 1.3.4 Canadian Standards Association (CSA)
- .1 CSA A23.1/A23.2-14 Concrete Materials and Methods of Concrete Construction/Methods of Test for Concrete.
 - .2 CSA O121-17 - Douglas Fir Plywood.
 - .3 CSA S269.1-16 - Falsework and formwork.
 - .4 CSA O86:19 - Engineering Design in Wood.
 - .5 CSA S269.2-16 - Access scaffolding for construction purposes.
- 1.3.5 Council of Forest Industries of British Columbia (COFI)
- .1 COFI Exterior Plywood for Concrete Formwork
- 1.3.6 American Concrete Institute (ACI)
- .1 ACI 350-06, Environmental Engineering Concrete Structures.
- 1.3.7 The releases of standards referenced in the Ontario Building Code 2012 Table 1.3.1.2 will prevail over the codes releases mentioned herein.

1.4 MEASUREMENT AND PAYMENT

- 1.4.1 No measurement will be made under this section. Include costs in items of the Work for which concrete formwork and falsework is required.

1.5 DESIGN REQUIREMENTS

- 1.5.1 Design falsework and formwork in accordance with CSA S269.1, S269.2, and CSA A23.1 to provide specified finishes.
- 1.5.2 Design formwork and falsework to carry dead loads and construction live loads.
- 1.5.3 When high range water reducer (superplasticizer) is used in concrete mix, design forms for full hydrostatic pressure.
- 1.5.4 Make joints in forms watertight.
- 1.5.5 Design formwork to meet variations from a reference system specified in CSA A23.1.
- 1.5.6 Formwork and falsework Shop Drawings will not be reviewed for structural adequacy.

1.6 SUBMITTALS

- 1.6.1 General: Refer to Section 01330 – Submittals for submittal requirements and procedures.

1.7 DELIVERY, STORAGE AND HANDLING

- 1.7.1 Materials shall be stored on site in a manner to prevent deterioration or intrusion of foreign matter. Protect from the weather and comply with CSA A23.1.
- 1.7.2 Protect the Work of this section from damage and protect other Work from damage resulting from the Work of this section. Replace damaged Work which cannot be satisfactorily repaired at no extra cost to the Owner.

1.8 TOLERANCES

- 1.8.1 Construct forms to produce plumb and level concrete, and true to linear building lines. Maximum variations (not accumulative) shall conform to CSA A23.1.
- 1.8.2 A permitted variation in one (1) part of the construction or in one (1) Section of the Specification shall not be construed as permitting violation of more stringent requirements for any other part of the construction, or in any other Specification Section.

2 PRODUCTS

2.1 MATERIALS

2.1.1 Formwork materials:

- .1 For concrete without special architectural features, use new wood and wood product formwork materials to CSA O121 and CSA O86.

2.1.2 Form ties:

- .1 For concrete not designated 'Architectural', use removable or snap-off metal ties, fixed or adjustable length, free of devices leaving holes larger than 25mm diameter in concrete surface.
- .2 Ties used in walls below grade or for water retaining structures must be complete with waterstop.

2.1.3 Form Panels:

- .1 Plywood for Formwork: high density overlay (plastic overlay) Douglas Fir to CSA A23.1 No.1 grade, square edge, 20mm thick.

2.1.4 Form release agent:

- .1 Non-toxic, biodegradable, low VOC
- .2 Use form release agent on all cast-in-place concrete except where form liners are used. Release agent shall not bond with, leave residue on, stain, or adversely affect concrete surfaces, and does not impair subsequent treatments of concrete surfaces when applied to forms.
- .3 For Potable Water Structures without form liners (only for the specific areas approved by the project Engineer): A ready-to-use water based material formulated to reduce or eliminate surface imperfections, containing no mineral oil or organic solvents. Environmentally safe, meeting all regulations and that can be used in potable water facilities.

2.1.5 Falsework Materials: CSA S269.1, Where patented accessories, fabricated forms, shoring or scaffolding units are to be used, follow manufacturer's instructions for load carrying capacity and bracing.

3 EXECUTION

3.1 FABRICATION AND ERECTION

- 3.1.1 Verify lines, levels and centres before proceeding with formwork/falsework and ensure dimensions agree with the Contract Drawings.

- 3.1.2 Fabricate and erect formwork in accordance with CAN/CSA-S269.1 and S269.2 to produce finished concrete conforming to shape, dimensions, locations, and levels indicated within tolerances required by CAN/CSA-A23.1.
- 3.1.3 Align form joints and make watertight. Keep form joints to minimum.
- 3.1.4 Use 25mm chamfer strips on external corners and/or 25mm fillets at interior corners, unless specified otherwise on the Contract Drawings.
- 3.1.5 Form chases, slots, openings, drips, recesses, expansion, and control joints as indicated.
- 3.1.6 Build in anchors, sleeves, and other inserts required to accommodate the Work specified in other sections. Assure that all anchors and inserts will not protrude beyond surfaces designated to receive applied finishes, including painting.
- 3.1.7 All required cast in pipe sections and openings must be field verified by the Vendor.
- 3.1.8 Clean formwork in accordance with CAN/CSA-A23.1, before placing concrete.

3.2 REMOVAL AND RESHORING

- 3.2.1 Leave formwork in place for the following minimum periods of time after placing concrete.
 - .1 Seven (7) days for walls and sides of beams, and Concrete Thrust Blocks
 - .2 Three (3) days for columns and concrete pipe supports
- 3.2.2 The ambient conditions may require additional form curing at the discretion of the Engineer.
- 3.2.3 After removing formwork, provide shoring under beams and suspended slabs for a minimum of twenty-one (21) days, or to leave the formwork on for twenty-eight (28) days after concrete placement.
- 3.2.4 Re-use formwork and falsework subject to requirements of CAN/CSA-A23.1
- 3.2.5 The Contractor is responsible for the safety of structure, both before and after removal of formwork.
- 3.2.6 Exercise caution when removing formwork to ensure no damage occurs.

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DUNDAS WASTEWATER TREATMENT
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03100

CONCRETE FORMS AND ACCESSORIES

Page **5** of **5**

4 SUPPLEMENTS – N/A

END OF SECTION

SECTION 03200 – CONCRETE REINFORCEMENT

1 GENERAL

1.1 SECTION INCLUDES

- 1.1.1 This section describes procedures and requirements for reinforcement of concrete.

1.2 RELATED SECTIONS

- 1.2.1 Section 01330 – Submittals.
- 1.2.2 Section 03100 – Concrete Forms and Accessories
- 1.2.3 Section 03300 – Cast-in-Place Concrete

1.3 MEASUREMENT OF PAYMENT

- 1.3.1 No measurement will be made under this section. Include costs in items of concrete Work for which reinforcement is required.

1.4 REFERENCES

- 1.4.1 OPSS.MUNI 928.
- 1.4.2 OPSS.MUNI 929.
- 1.4.3 OPSS.MUNI 930.
- 1.4.4 Canadian Standards Association
 - .1 CAN/CSA A23.1/A23.2-14, Concrete Materials and Methods of Concrete Construction/Methods of Test for Concrete
 - .2 CAN/CSA G30.18-09 (R2019) Carbon steel bars for concrete reinforcement Bars for Concrete Reinforcement.
 - .3 CAN3 A23.3 -14 Design of Concrete Structures.
 - .4 .4 ASTM A1064/A1064M-18a Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete.
 - .5 CSA G40.20-13/G40.21-13 (R2018) General requirements for rolled or welded structural quality steel / Structural quality steel.
 - .6 CSA W186-M1990 (R2016) - Welding of Reinforcing Bars in Reinforced Concrete Construction.ASTM A775/A775M-19 Standard Specification for Epoxy-Coated Steel Reinforcing Bars.
 - .7 ASTM A775/A775M-19 Standard Specification for Epoxy-Coated Steel Reinforcing Bars.

1.5 SUBMITTALS

- 1.5.1 General: Refer to Section 01330 – Submittals for submittal requirements and procedures.
- 1.5.2 Submit certification from reinforcing steel manufacturer confirming compliance of supplied products to specified CSA Standard.

1.6 PRODUCT DELIVERY, STORAGE, AND HANDLING

- 1.6.1 Store materials on site in a manner to prevent damage thereto. Protect from the weather. Comply with CSA-A23.1
- 1.6.2 Protect the Work of this section from damage and protect other Work from damage resulting from the Work of this section. Replace damaged Work which cannot be satisfactorily repaired at no extra cost to the Owner.

1.7 QUALITY CONTROL

- 1.7.1 Upon request, provide Engineer with certified copy of mill test report of reinforcing steel, showing physical and chemical analysis, minimum four (4) weeks prior to commencing reinforcing Work.
- 1.7.2 Upon request, inform Engineer of proposed source of material to be supplied.

2 PRODUCTS

2.1 MATERIALS

- 2.1.1 Reinforcing steel: billet steel, grade 400MPa, deformed bars to CAN/CSA-G30.18, unless indicated otherwise.
- 2.1.2 Welded steel wire fabric: to ASTM A1064/A1064M-18a. Provide in flat sheets only.
- 2.1.3 Plain round bars: to CAN/CSA-G40.21.
- 2.1.4 Mechanical Threaded Connections or Splices: Furnish metal coupling sleeve with internal threads engaging threaded ends of bars, capable of developing in tension or compression one hundred and twenty-five (125) per cent of yield strength of bar, subject to approval of Engineer.

2.2 FABRICATION OF REINFORCING STEEL

- 2.2.1 Fabricate reinforcing steel in accordance with CAN/CSA-A23.1, ACI SP-66-04 and Reinforcing Steel Manual of Standard Practice by the Reinforcing Steel Institute of Canada, unless indicated otherwise.
- 2.2.2 Obtain Engineer's approval for locations of reinforcement splices other than those shown on placing Drawings.
- 2.2.3 Upon approval of Engineer, weld reinforcement in accordance with CSA W186-M1990.
- 2.2.4 Ship bundles of bar reinforcement clearly identified in accordance with bar bending details and lists.

3 EXECUTION

3.1 FIELD BENDING

- 3.1.1 Do not field bend or field weld reinforcement, except where authorized in writing by Engineer.
- 3.1.2 When field bending is authorized, bend without heat, applying a slow and steady pressure.
- 3.1.3 Replace bars that develop cracks or splits.

3.2 PLACING REINFORCEMENT

- 3.2.1 Place reinforcing steel as indicated on the Structural Drawings, on reviewed placing Drawings and in accordance with CAN/CSA-A23.1.
- 3.2.2 Use plumb lines and string lines to ensure the required cover will be maintained.
- 3.2.3 Use chairs and spacers to ensure cover to reinforcement is maintained during concrete pour.
- 3.2.4 Use plain round bars as slip dowels in concrete. Paint portion of dowel intended to move within hardened concrete with one coat of asphalt paint. When paint is dry, apply a thick even film of mineral lubricating grease.
- 3.2.5 Prior to placing concrete, provide seventy-two (72) hours notice to Engineer and facilitate access for Engineer to review reinforcement placement. Make all necessary corrections before concrete is placed and allow re-inspection by Engineer, if requested.
- 3.2.6 Touch-up damaged and cut ends of epoxy coated with compatible finish to provide continuous coating.

3.2.7 Splicing: Use lap splices, unless otherwise shown or permitted in writing by Engineer. Stagger splices in adjacent bars.

4 SUPPLEMENTS – N/A

END OF SECTION

SECTION 03300 – CAST-IN PLACE CONCRETE

1 GENERAL

1.1 SECTION INCLUDES

- 1.1.1 All concrete poured-in-place including, but not limited to, footings, foundations, suspended slabs, columns, beams, curbs, walls, slabs-on-grade.
- 1.1.2 Provide the Work of this Section in accordance with the Contract Documents.
- 1.1.3 Comply with requirements of CSA A23.1 and A23.2, except where noted otherwise herein.

1.2 RELATED SECTIONS

- 1.2.1 Section 01330 – Submittals.
- 1.2.2 Section 03100 - Concrete Forms and Accessories
- 1.2.3 Section 03200 - Concrete Reinforcement
- 1.2.4 Section 03600 – Grout and Miscellaneous Concrete Work

1.3 REFERENCES

- 1.3.1 OPSS.MUNI 928.
- 1.3.2 OPSS.MUNI 929.
- 1.3.3 OPSS.MUNI 930.
- 1.3.4 American Society for Testing and Materials (ASTM):
 - .1 ASTM C260/C260M-10a (2016) – Standard Specification for Air-Entraining Admixtures for Concrete
 - .2 ASTM C 309-19 – Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete
 - .3 ASTM C494/494M-19 – Standard Specification for Chemical Admixtures for Concrete
- 1.3.5 Canadian General Standards Board (CGSB):

- .1 CAN/CGSB-37-GP-9Ma - Emulsified Asphalt, Mineral Colloid-Type, Unfilled, for damp proofing and Waterproofing and for Roof Coatings

1.3.6 Canadian Standards Association (CSA):

- .1 CAN/CSA-A3000-18 - Cementitious materials compendium
- .2 CAN/CSA A23.3- 14 - Design of concrete structures
- .3 CAN/CSA-A23.1-14/A23.2-14 - Concrete materials and methods of concrete construction / Test methods and standard practices for concrete

1.4 SUBMITTALS

1.4.1 General: Refer to Section 01330 – Submittals for submittal requirements and procedures.

1.4.2 Product Data Sheets:

- .1 Submit manufacturer's product data sheets including installation, application, and maintenance instructions for: Chemical admixtures, bonding agent, crack injection material, repair materials, sealant, curing compound.

1.4.3 Concrete Mix Design:

- .1 Submit proposed performance mix and supplier's applicable standard deviations.
- .2 Tabulate concrete mixes. Indicate range of cementitious materials content, type of cements, size of coarse aggregate, water/cementitious material ratio, admixtures used, air content, slump, and locations of use for each mix.
- .3 Submit detailed plan for cold weather curing and protection of concrete placed and cured in weather below five degrees Celsius.
- .4 Submit detailed plan for hot weather placements including curing and protection for concrete placed in ambient temperatures over twenty-seven (27) degrees Celsius.
- .5 Concrete must be designed to match the construction site preparations and the set-up of concrete placing methodologies on site.
- .6 Concrete mix designs will be reviewed for conformance with requirements of the Specifications and will be returned with Engineer's comments.

1.4.4 Concrete Placing Schedule:

- .1 Submit concrete placing schedule in accordance with the Contract Drawings.

1.5 PERFORMANCE OF CONCRETE MIXES

- 1.5.1 Concrete will be tested as identified in the mix performance part of this specification which includes Section 1.7 "Prequalification Test Results", Section 1.9 "Inspection and Tests", and Section 3.13 "Concrete Quality Assurance".
- 1.5.2 Cracking of concrete in the structure is generally considered to be detrimental to the long-term performance. All cracks resulting in any visible leakage must be repaired. All non-actively leaking cracks at the time of Engineer's inspection will be repaired to Engineer's satisfaction. Even though "low shrinkage concrete" is specified, cracking will occur and must be repaired by the Contractor at no cost to the Owner.

1.6 CERTIFICATION OF MATERIALS AND CONCRETE PRODUCER

- 1.6.1 Submit to the Consulting Engineer for review of the following statements identifying the sources and certifying:
 - .1 Cement types, sources, and conformance to CSA A23.1, and CSA A3000 consolidated
 - .2 Aggregates comply with CSA A23.1 and are from M.T.O. designated sources list; submit gradations
 - .3 Admixture product names and certification that they comply with CSA A23.1 and ASTM C260, C494, or C1017. State type or class of admixture
 - .4 Materials, plant, and equipment to be used in concrete work comply with the requirements of CSA A23.1
 - .5 Compliance with Ontario Water Resources Act with respect to toxicity
- 1.6.2 Proposed mix designs including complete details of product additives and certification that all additives are compatible with all other additives.

1.7 PREQUALIFICATION TEST RESULTS

- 1.7.1 Submit prequalification test results to the Engineer for each Ready-Mix Concrete Mix proposed, showing adequate performance for:
 - .1 Compressive strength
 - .2 The standard deviation for the concrete compressive strength tests in conformance with A.C.I. 214.3 "Recommended Practice for Evaluation of Compression Test Results of Concrete."
 - .3 Linear shrinkage
 - .4 Alkali-Aggregate Reactivity (AAR) test results
 - .5 Air entrainment

1.8 INSPECTION AND TESTS

- 1.8.1 Testing will be performed by an independent testing agency arranged by and as required by the Owner.
- 1.8.2 Testing of Ready-Mix Concrete trucks on delivery will include:
 - .1 Slump
 - .2 Air content
 - .3 Concrete temperature
- 1.8.3 Samples will be cast for laboratory testing for:
 - .1 Compressive strength
 - .2 Linear shrinkage
- 1.8.4 Initially one (1) – three (3) day, two (2) – seven (7) day, two (2) -twenty-eight (28) day and one (1) – fifty-six (56) day compression samples will be taken and tested.
- 1.8.5 Samples may be taken for other testing as determined by the Engineer.
- 1.8.6 Copies of all concrete testing carried out by the Engineer will be made available to the Contractor upon request.
- 1.8.7 The use of testing services does not relieve the Contractor of the responsibility to furnish materials and construction in compliance with the performance requirements of the contract documents.
- 1.8.8 The Contractor shall take samples and carry out testing as part of their quality control procedures to verify that the concrete satisfies the performance requirements set out in these specifications. Where possible, these tests shall be carried out on the same batches as tested by the independent testing agency.
- 1.8.9 Copies of the test results for all tests carried out by the Contractor must be made available to the Engineer for review and records.

1.9 MEASUREMENT AND PAYMENT

- 1.9.1 The total volume of the Cast-in-Place concrete will not be measured, and the Work will be paid for at the price included in the bid form for this section based on the percentage of the Work completed.
- 1.9.2 Heating of water and aggregates and providing cold weather protection will not be measured but considered incidental to the Work.

- 1.9.3 Cooling of concrete and providing hot weather protection will not be measured but considered incidental to the Work.
- 1.9.4 Coordination with other trades for the supply of hardware, pipe sleeves, and other embedded materials including the related layout drawing and installation will not be measured but considered incidental to the Work.
- 1.9.5 Supply and installation of waterstops, construction joints, and expansion joints will not be measured but considered incidental to the Work.
- 1.9.6 Repair of any deficiencies in the concrete will not be measured but considered incidental to the Work.

2 PRODUCTS

2.1 MATERIALS FOR CONCRETE MIX

- 2.1.1 Use materials conforming to CSA A23.1, and to the performance requirements which have been established in this section.
- 2.1.2 Cement
 - .1 Normal Portland Cement General Use (GU) blended with cementitious slag. Use Portland cement and Slag cement conforming to CSA A3000 and comply with the following conditions and requirements:
 - .1 For structural and architectural concrete mixes, the supplier's use of slag into the proposed mix design, as a replacement for up to thirty-five (35) per cent by mass of the quantity of GU Portland cement, is acceptable.
 - .2 For lean concrete, slag is not acceptable to replace any of the Portland cement.
- 2.1.3 Additives
 - .1 Conform to CSA A23.1 and ASTM C260, C 494, or C1017. State type or class of admixture.
 - .2 Use admixtures from one manufacturer; follow the intent and, where practical, the specific manufacturer's recommendations.
 - .3 Ensure admixtures are compatible with each other and with any construction materials used in contact with concrete. Ensure that the mix remains workable with the inclusion of such admixtures.
 - .4 Do not use calcium chloride or admixtures containing chlorides.
 - .5 Shrinkage Reducing Admixture (not covered by CSA or ASTM standards).
 - .1 Utilize shrinkage reducing admixture for all topping mixes and in elements with thickness of 125mm or less.

- .2 A shrinkage compensating admixture may be used where appropriate or as necessary to meet linear shrinkage testing requirements specified herein.
- .3 Acceptable products Tetraguard AS20 by Master Builders added at a rate of two point five (2.5) per cent by weight of cementitious materials, or Eclipse by Grace Construction Products added at a rate of two (2) per cent by weight of cementitious materials.

2.1.4 Aggregate

- .1 All mixes for concrete elements with thicknesses of 125mm or less shall contain 13mm or 10mm aggregate.
- .2 Use 20mm aggregate in the remainder of the mixes, unless approved or otherwise specified by the Engineer.

2.2 CONCRETE MIXES

- 2.2.1 Supply concrete to meet the project performance requirements. Structural Concrete specified herein is required to be "High Performance Concrete".
- 2.2.2 For the purpose of this specification, high performance concrete with improved durability, reduced shrinkage, reduced cracking, and increased watertightness shall be manufactured and tested in accordance with Clause 8.8 "Low Shrinkage Concrete" of CSA A23.1.
- 2.2.3 Proportion in accordance with CSA A23.1 Table 5 Alternative (1) Performance
- 2.2.4 Meet or exceed the requirements as indicated on the Contract Drawings.
- 2.2.5 The maximum water-to-cementitious ratios and minimum compressive strengths are dictated on the Contract Drawings.
- 2.2.6 Provide certification of mix performance based on material certifications, prequalification testing results, trial mix results, and ongoing testing.
- 2.2.7 Additional superplasticizer may be added on site to meet the workability requirements of the Contractor placing the concrete in accordance with the manufacturers published recommendations.
- 2.2.8 Utilize the same mix proportions throughout the project.

- 2.2.9 Where the performance of a mix deteriorates to values ten (10) percent below the reviewed and approved concrete strength values during the shop drawing review, cease supply of the mix. Re-evaluate the mix, propose revised proportions to improve the performance of the mix, submit trial mix results, and after review, utilize the revised, improved mix throughout the rest of the project. In no circumstances the concrete compressive strength will be allowed to go below the specified strength within the Specifications and the Contract Drawings.
- 2.2.10 No concrete repairs shall be carried out without the approval of the Engineer.
- 2.2.11 For the exterior concrete curbing surrounding the electrical conduits as indicated on the Contract Drawings, follow the requirements for OPSS 1350.

3 EXECUTION

3.1 STANDARD OF WORKMANSHIP

- 3.1.1 Comply with CSA A23.1- 'Concrete materials and methods of concrete construction.
- 3.1.2 Obtain Engineer's approval before placing concrete.

3.2 EXAMINATION

- 3.2.1 Confirm surfaces on which concrete is to be placed are free of frost, water, and debris before placing concrete.
- 3.2.2 Ensure reinforcement, inserts and other built-in works are in place and secured before pouring concrete.

3.3 PREPARATION

- 3.3.1 Read the following in conjunction with the Contract Drawings specified concrete surface preparation requirements.
- 3.3.2 Obtain the Engineer's approval before placing concrete. Provide three (3) working days' notice of the proposed time of commencing of concrete pouring. The Contractor will be responsible for the Engineer's and testing companies' standby time costs in the event a concrete pour does not commence within ninety (90) minutes of the proposed time on the three (3) day notice.
- 3.3.3 Ensure reinforcement and inserts are not disturbed during concrete placement.

- 3.3.4 Two (2) weeks (fourteen (14) calendar days) prior to placing of concrete, obtain the Engineer's approval of proposed method for protection of concrete during placing and curing in adverse weather.
- 3.3.5 Maintain accurate records of poured concrete items to indicate date, location and size of pour, quality, air and concrete temperature, previously placed concrete temperature, batch ticket, and test samples taken.
- 3.3.6 Do not place load upon new concrete until authorized by the Engineer.
- 3.3.7 Complete and submit the Concrete Pour Release Form twenty-four (24) hours prior to placing any concrete.
- 3.3.8 Coordinate with the concrete supplier with respect to the workability requirements for the concrete. Do not add water to the mix at the site or during transport after the initial batching without written approval from Engineer and approval of the concrete supplier. If approval is granted, a record of the amount of water added and the location of the poured concrete must be mapped out and submitted to the Engineer within three (3) days of pour.

3.4 SETTING AND BUILDING-INSERTS

- 3.4.1 Set and build in inserts, anchors, frames, conduits, angles, sleeves, plates, etc. supplied by other trades. Advise trades well in advance of scheduled pours to allow adequate time for supply of items to be built in. Have respective trades verify location of items supplied by them.
- 3.4.2 No inserts will be accepted in water retaining structures.
- 3.4.3 Wet setting dowels, anchors, plates or angles will not be allowed for all structures.

3.5 HOT WEATHER CONCRETING

- 3.5.1 The projected project schedule is expected to require concrete works to be completed between June 1st and September 30th. The contractor shall complete all scheduled concrete works during this time as per the following requirements under this section at no additional cost to the owner.
- 3.5.2 When Incorporating a Formliner

- .1 Between June 1st and September 30th, except when the air temperature is below three (3) degree Celsius and winter concrete requirements dictate, the Contractor must prepare and submit their procedures for curing the concrete based on and to suit the ambient conditions anticipated during the curing period. Most cracking is a result of excessive water content in the concrete, rapid drying and thermal effects that including thermal shock during or shortly after the removal of the formwork, ambient conditions or shape considerations. The requirements are designed to minimize those effects and, thereby, to minimize the cracking of the concrete.
- .2 The maximum temperature of the concrete delivered to the site must be maintained at or below twenty-five (25) degree Celsius . This may require the addition of ice to the mix at the Ready-Mix Concrete Plant. An amount of water, equivalent to the volume of the ice, must be removed from the mixing water.
- .3 Provide and install temperature probes to measure the temperature of the concrete for each pour exceeding 20m³. The probes must be installed to measure the temperature of the concrete, 150mm below the surface, at two locations established by the Engineer. These probes shall be used to measure the temperature of the concrete prior to the removal of the forms. In addition, the probes shall be maintained to establish the temperature of that concrete when new concrete is placed against it. The probes must be of a type that will record the temperature continuously and will allow for the downloading of that data by the Engineer.
- .4 The forms for walls and related structures and for suspended slabs shall remain in place for a minimum period of seven days after placing the concrete. If the temperature differential between the concrete and the ambient air is greater than ten (10) degree Celsius , the forms shall remain in place until the temperature differential is less than ten (10) degree Celsius .
- .5 The surface of slabs, against which new concrete is to be placed, shall be cooled using intermittent wetting techniques and the temperature shall not be more than five (5°) degree Celsius greater than the new concrete at the time of placing the new concrete.
- .6 When the ambient air temperature is at or below thirty (30) degree Celsius :
 - .1 For formed structures: the requirements of clause 3.5.1.4 must be satisfied. However, no additional curing is required for walls and related structures.

- .2 For slabs: the requirements of clause 3.5.1.5 must be satisfied. In addition, the slabs must be misted during the placing and finishing the Work. After the finishing has been completed, the slab must be flooded and be covered completely with tarpaulins for seven (7) days. However, upon completion of the seven (7) days, no additional curing is required.
- .7 When the ambient air temperature is above thirty (30) degree Celsius:
 - .1 For formed structures: the requirements of clause 3.5.1.4 must be satisfied. In addition, immediately after the removal of a form, the concrete shall be thoroughly wetted down and be covered with a 10mil polyethylene sheet or equivalent and this sheet shall remain in place for a minimum of seven (7) days.
 - .2 For slabs: the requirements of clause 3.5.1.6.2 must be satisfied. However, the slab must be covered for a total of fourteen (14) days.
- .8 The use of curing compounds is not to be considered normal practice and the use will be at the discretion of the Engineer. However, the curing compound, where approved for use shall be suitable for use in potable water unless specified otherwise. Curing compound shall be applied immediately after the removal of the forms for walls and similar structures. In addition, its use may be considered for slabs after the initial seven (7) day curing period has been completed.

3.5.3 Areas not Incorporating a Formliner

- .1 The requirements in this clause are the same as those noted under clause 3.5.1 "Hot Weather Concreting – When Incorporating a Form Liner" except as noted below.
- .2 Clause 3.5.1.6.1 must be replaced by the following:
 - .3 For formed structures: the requirements of clause 3.5.1.4 must be satisfied. In addition, the concrete shall be thoroughly wetted down and immediately covered with a 10mil polyethylene sheet or equivalent and remain in place for an additional seven (7) days.

3.6 COLD WEATHER CONCRETING

- 3.6.1 The projected project schedule is expected to require concrete works to be completed between October 1st and May 31st. The contractor shall complete all scheduled concrete works during this time as per the following requirements under this section at no additional cost to the owner.
- 3.6.2 Incorporating a Form Liner

- .1 Between October 1st and May 31st of the following year, and at any time when the air temperature is below three (3) degree Celsius, or when, in the opinion of the Engineer, there is a probability of its falling to that limit during the placing period, place concrete in accordance with the requirements of CSA A23.1, "Cold Weather Requirements".
- .2 The temperature of the concrete, when deposited, shall not be less than 10°C and not more than twenty-five(25) degree Celsius. To accomplish this, the mixing water and, if necessary, the aggregates, shall be heated. Aggregates shall not be heated above eighty-five (85) degree Celsius.
- .3 Provide and install temperature probes to measure the temperature of the concrete for each pour exceeding 20m³. The probes must be installed to measure the temperature of the concrete 150mm below the surface at two locations established by the Engineer. These probes shall be used to measure the temperature of the concrete prior to the removal of the forms. In addition, the probes shall be maintained to establish the temperature of that concrete when new concrete is placed against it. The probes must be of a type that will record the temperature continuously and will allow for the downloading of that data by the Engineer.
- .4 The forms for walls and suspended slabs shall remain in place for a minimum for seven days after placing the concrete. If the temperature differential between the concrete and the ambient air is greater than ten (10) degree Celsius, the forms shall be in place until the temperature differential is less than ten (10) degree Celsius.
- .5 The temperature difference between concrete being placed and the concrete against which it is placed is of primary importance during winter concreting. The temperature of the base concrete, measured 150mm below the contact surface, must be within five (5) degree Celsius of the concrete being placed against it, but no lower than five (5) degree Celsius. The Contractor, to satisfy this requirement, must provide a five (5) meter wide under slab heating system. This system must:
 - .1 Be continuous along the full length of the wall;
 - .2 Heat the slab from bottom up;
 - .3 Include insulated tarpaulin placed on the slab over the area which is to be heated;
 - .4 Meet the above temperature requirements before the new concrete is placed;
 - .5 Be left in operation for at least seventy-two (72) hours after the new concrete has been placed; and
 - .6 Include the insulated tarpaulins being left in place over the heated area until the forms are removed.

- .6 If uninsulated metal forms are to be used or if the temperature within the form falls below minus five (-5) degree Celsius prior to placing the concrete, an insulated cover must be provided over the formwork and heat must be provided to raise the temperature to five (+5) degree Celsius before pouring the concrete. Notwithstanding all snow or ice must be removed from the form prior to placing the concrete. If the form is uninsulated metal, an insulated tarpaulin must be placed over the entire surface of the forms after the concrete is placed and must remain in place for a minimum of seven (7) days.
 - .7 The temperature of the concrete shall be monitored and when the form is to be removed, the temperature differential between the concrete and the ambient conditions shall be recorded and:
 - .1 If the temperature differential is less than ten (10) degree Celsius and the winds is less than 20km/h, no protection needs to be provided.
 - .2 If the temperature differential is ten (10) degree Celsius or greater, the concrete must be protected by insulated tarpaulins, placed over the concrete immediately after each section of formwork is removed, and tied down tightly around the concrete. This cover must remain in place for a minimum of seven (7) days.
 - .3 If the temperature differential is less than ten (10) degree Celsius but the wind is 20km/h or greater, the concrete must be protected by insulated tarpaulins placed over the concrete immediately after each section of formwork is removed. The tarpaulin must be tied down and must be left in place for twenty-four (24) hours.
 - .4 If the temperature differential is greater than ten (10) degree Celsius and the winds are 20km/h or greater, the form must not be removed until the conditions meet the requirements of clauses 3.6.1.7.1 through 3.6.1.7.3.
 - .8 If an enclosure is required to meet the requirements of clauses 3.6.1.3 through 3.6.1.6, the enclosure shall be kept at ten (10) degree Celsius or above for a minimum period of seven (7) days after placing the concrete. The temperature shall be gradually reduced at the end of the period at a rate not greater than ten (10) degree Celsius per day until the outside ambient temperature is reached.
- 3.6.3 Areas Not Incorporating a Form Liner
- .1 The requirements in this clause are the same as those noted under clause 3.6.1 "Winter Concreting" for pours incorporating a form liner except as noted below.

- .1 Clause 3.6.1.7.1 must be replaced with “If the temperature differential is less than ten (10) degree Celsius, the forms must be left on for seven (7) days and when they are removed, the concrete must be wetted down immediately and be covered tightly with a 10mil polyethylene sheet or suitable new tarpaulin. The covering must remain in place for a minimum of seven (7) days”.
- .2 Clause 3.6.1.7.2 must be replaced with “If the temperature differential is greater than ten (10) degree Celsius, under any wind conditions, the forms cannot be removed until ambient conditions meet the requirements of point 3.6.2.1.1 above. After those requirements are met, the actions described in that clause must be taken”.

3.7 VIBRATORS

- 3.7.1 The use of mechanical vibrators is required.
- 3.7.2 A sufficient number of vibrators shall be employed so complete compaction is ensured.
- 3.7.3 At least one (1) extra gasoline powered vibrator shall be on hand for emergency use.
- 3.7.4 Vibration shall not be continued to the extent that water forms on the surface.
- 3.7.5 Avoid any disturbance to concrete that has become too stiff to regain plasticity when vibrated.
- 3.7.6 Vibration shall not be applied directly to steel which extends into partially hardened concrete.
- 3.7.7 Vibration is intended as a method to consolidate the concrete and is to be used for that purpose. Therefore, all floor slabs, walls and roof slabs must be adequately vibrated to consolidate the concrete around the reinforcement.

3.8 CONSTRUCTION

- 3.8.1 Cast-in-place concrete Work shall be in accordance with CAN/CSA-A23.1- Laitance must be mechanically removed from the face of concrete from previous castings at construction joints before adjacent concrete is placed.
- 3.8.2 Sleeves and Inserts:

- .1 No sleeves, ducts, pipes, conduits, or other openings shall pass through joists, beams, column capitals, or columns, except where indicated or approved by the Engineer.
- .2 Where approved by the Engineer, set sleeves, ties, pipe hangers, and other inserts and openings as indicated or specified elsewhere. Sleeves and openings greater than 100mm x 100mm not indicated must be approved by the Engineer.
- .3 Do not eliminate or displace reinforcement to accommodate hardware. If inserts cannot be located as specified, obtain approval of modifications from the Engineer before placing of concrete.
- .4 Check locations and sizes of sleeves and openings shown on the Contract Drawings.
- .5 Sleeves and openings shall be placed at a minimum of three (3) sleeve diameters centre to centre unless noted otherwise.

3.8.3 Anchor Bolts:

- .1 Set anchor bolts to templates under supervision of appropriate trade prior to placing concrete.
- .2 Under special circumstances, with approval of the Engineer, grouted anchor bolts may be installed into preformed holes or holes drilled after concrete has set. Formed holes or sleeves to be minimum 100mm diameter and be deformed.
- .3 Protect anchor bolt holes from water accumulations, snow, and ice build-ups.
- .4 When using proprietary anchor systems set bolts and fill holes with epoxy grout, in accordance with the manufacturer's requirements. All proprietary anchors must be approved by the Engineer.
- .5 Locate anchor bolts used in connection with expansion shoes, rollers, and rockers with due regard to ambient temperature at time of erection.

3.8.4 Drainage Holes and Weep Holes:

- .1 Form weep holes and drainage holes in accordance with Section 03100 – Concrete Forms and Accessories. If wood forms are used, remove them after concrete has set.
- .2 Install weep hole tubes and drains as indicated.

3.8.5 Coordination:

- .1 Adjust the Work to suit final Shop Drawings of the equipment being supplied. Verify all sizes with the trade supplying and installing the equipment. Obtain, utilize, and submit data on relevant sizes to suit any change in equipment. Confirm the adjustments with the Engineer.

3.8.6 Grouting:

- .1 Grout under base plates, machinery, or both, using procedures in accordance with manufacturer's recommendations that result in one hundred (100) per cent contact over grouted area. Install bleed holes in base plates to ensure full coverage of grout.

3.8.7 Slip-Sheet:

- .1 Install 6/10 mil polyethylene slip-sheet under the concrete slabs-on-grade as indicated on the drawings.
- .2 Lap slip-sheet a minimum of 300mm at joints and seal.

3.8.8 Dampproof Membrane

- .1 Install 10mil dampproof membrane under concrete slabs-on-grade for all occupied spaces as indicated.
- .2 Lap dampproof membrane a minimum of 600mm at joints and seal.
- .3 Seal punctures in dampproof membrane before placing concrete. Use patching material at least 300mm larger than puncture and seal.

3.8.9 Walls:

- .1 A grout starter, 100mm to 150mm thick minimum, layer must be provided at the base of all walls.

3.9 EXAMINATION OF COMPLETED STRUCTURES

- 3.9.1 Undertake, with the Engineer, review of concrete surfaces for defects and finishes.
- 3.9.2 Undertake, with the Engineer, assessments and measurements of the concrete structures for cracking.
- 3.9.3 Provide a written summary of defects noted complete with a plan showing locations of each defect.
- 3.9.4 Submit a plan for repair of each defect in accordance with these specifications.
- 3.9.5 Undertake, with the Engineer, to test all liquid retaining structures for water tightness in accordance with applicable standards.

3.10 PATCHING OR REPAIRS

- 3.10.1 Laitance must be removed from the face of concrete from previous castings at construction joints before adjacent concrete is placed.

- 3.10.2 No patching or repairing shall be carried out without the approval of the Engineer. Submit a detailed construction sequence and details for Engineer review before beginning any repair including injections.
- 3.10.3 All honeycombing shall be chipped out to sound concrete. The edge around the perimeter of the area shall be saw-cut vertically to a depth of 20mm minimum to eliminate all "feather" edges. All repairs of honeycomb shall be a proprietary repair material. If honeycombing extends to the depth of the reinforcement, the chipping shall be continued to a depth of 1.4 times the diameter of the largest reinforcing bar and 40mm minimum beyond the layer of reinforcement.
- 3.10.4 The patch shall be continuously covered with a 6 mil polyethylene sheet and heated to above fifteen (15) degree Celsius for fourteen (14) days.
- 3.10.5 Chips and edge breaks in the concrete shall be repaired as noted above.
- 3.10.6 All cracks in buried structures including existing reservoir wall and slab shall be repaired. Submit a detailed plan and details for Engineer review before beginning any repair or injection. As the standard repair methodology, cracks shall be dried and injected with epoxy. Clean the surface of the concrete after injection is complete.
- 3.10.7 All exposed existing reservoir wall and slab surfaces will need to be inspected by contractor and project engineer. Follow the procedures listed under 3.10.6 through 3.10.8 to do necessary crack injections and Overcoat the repaired cracks with approved protective coating system. If the existing wall and slab construction joints need to be repaired, after confirmed by project engineer, all wall construction joint slot and concrete surfaces along the joint will need to be thoroughly prepared, cleaned sealed with selected protective coating system. Contractor must strictly follow the manufacturer's specifications to prepare the concrete surface, provide environmental control, apply primer products and protective coating system and cure the newly installed material.

3.11 FINISHES

- 3.11.1 Formed finishes specified herein shall be finished as defined by CSA A23.1.
 - .1 The surfaces exposed to view shall be given a "sack-rubbed finish", except where a controlled permeability formliner is specified.
 - .2 All buried surfaces shall be given a rough form finish, except where a controlled permeability formliner is specified.
 - .3 All exposed and non-exposed corners shall be rubbed with a carborundum stone to remove any loose concrete and to create a smooth and rounded profile.

- .4 The surfaces exposed to view where a controlled permeability formliner is specified, for all the ripples and folds must be prepared and finished flush with the rest of flat concrete surfaces.

3.11.2 Unformed surfaces shall be finished as defined by CSA Standard A23.1.

- .1 The floor surface of occupied spaces, specified on the contract drawings only, shall be “floated” and “trowelled” to create a Class A Floor finish as defined by Table 21 in CSA Standard A23.1.
- .2 The floor surface of exterior or interior walkways and tankage or chambers, not included in point No. 1 above, shall be “swirl trowelled” to create a non-slip surface.

3.12 SITE TOLERANCES

3.12.1 Concrete tolerance in accordance with CSA A23.1.

3.12.2 The Contractor shall survey the site and shall provide a drawing layout of the concrete Work to be included in the “as built” Drawings.

3.13 CONCRETE QUALITY ASSURANCE

3.13.1 Monitor the performance of each concrete mix as Work proceeds. Where performance remains appropriate, maintain the mix proportions and continue the monitoring. Where performance does not meet the standards set at the outset of the project, or it is unacceptable for any reason, propose and test revised mixes to improve performance or correct deficiencies. Submit proposed revised mixes and laboratory test results as soon as possible.

4 SUPPLEMENTS

4.1 SUPPLEMENTAL DOCUMENTS

4.1.1 The supplements listed below, and following the “End of Section” of “Section 03600 Grout and Miscellaneous Concrete Work”, form part of this specification section:

- .1 Grout and Concrete Repair Details

END OF SECTION

SECTION 03600 – GROUT AND MISCELLANEOUS CONCRETE WORK

1 GENERAL

1.1 SECTION INCLUDES

- 1.1.1 Cementitious, epoxy grout and epoxy adhesive.

1.2 RELATED SECTIONS

- 1.2.1 Section 01330 – Submittals.

1.3 REFERENCES

- 1.3.1 OPSS.MUNI 928.
- 1.3.2 OPSS.MUNI 929.
- 1.3.3 OPSS.MUNI 930.
- 1.3.4 ASTM C109 - Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or 50-mm Cube Specimens).
- 1.3.5 ASTM C157 - Test Method for Length Change of Hardened Hydraulic-Cement Mortar and Concrete.
- 1.3.6 ASTM C579 - Test Methods for Compressive Strength of Chemical-Resistant Mortars, Grouts, Monolithic Surfacing and Polymer Concretes.
- 1.3.7 ASTM C827 - Test Method for Change in Height at Early Ages of Cylindrical Specimens from Cementitious Mixtures.
- 1.3.8 ASTM C1090 - Test Method for Measuring Changes in Height of Cylindrical Specimens from Hydraulic-Cement Grout.
- 1.3.9 ASTM C1107 - Specification for Packaged Dry, Hydraulic-Cement Grout (Non-shrinkable).

1.4 SUBMITTALS

- 1.4.1 General: Refer to Section 01330 – Submittals for submittal requirements and procedures.
- 1.4.2 Product Data: Submit manufacturer's product data and installation instructions.

1.5 PERFORMANCE OF GROUT

- 1.5.1 Cracking of concrete in the structure is generally considered to be detrimental to the long-term performance. All cracks resulting in any visible leakage must be repaired. All non-actively leaking cracks at the time of Engineer's inspection will be repaired to Engineer's satisfaction. Any cracking that occurs must be repaired by the Contractor at no cost to the Owner.

1.6 ENVIRONMENTAL REQUIREMENTS

- 1.6.1 Grout shall be handled at the same temperature and curing conditions as Portland cement and manufacture requirements.

1.7 MEASUREMENT AND PAYMENT

- 1.7.1 The total volume of the grout will not be measured, and the Work will be paid for at the price included in the bid form for this section based on the percentage of the Work completed.
- 1.7.2 Heating of water and aggregates and providing cold weather protection will not be measured but considered incidental to the Work.
- 1.7.3 Cooling of concrete and providing hot weather protection will not be measured but considered incidental to the Work.
- 1.7.4 Coordination with other trades for the supply of hardware, pipe sleeves, and other embedded materials including the related layout drawing and installation will not be measured but considered incidental to the Work.
- 1.7.5 Supply and installation of waterstops, construction joints, and expansion joints will not be measured but considered incidental to the Work.
- 1.7.6 Repair of any deficiencies in the concrete will not be measured but considered incidental to the Work.

2 PRODUCTS

2.1 MATERIALS

- 2.1.1 Cementitious Grout: Provide non-shrink, non-metallic, non-corrosive cement-based grout conforming to the following requirements:
- .1 Applicable Standards: ASTM C1107 and CRD-C621
 - .2 Grout shall be manufactured specifically for use in filling voids or cavities and be capable of supporting heavy loads (loads in excess of 300 pounds per square foot concentrated load or 100 pounds per square foot uniform load). Grout: ASTM C1107, Grade A, B, or C, as appropriate for the condition or circumstance.
 - .3 Shrinkage at 28days shall not exceed 0.5 per cent.

- .4 Compressive strength, minimum:
 - .1 At one day: 7MPa.
 - .2 At three days: 17MPa.
 - .3 At seven days: 24MPa.
 - .4 At 28days 32MPa.
- .5 Initial setting time, after addition of water: 4 to 6hours at 20°C.
- .6 Provide non-sag trowelability or flowability as necessary for the particular application.

2.1.2 Water: Clean and potable, free of impurities detrimental to grout.

2.1.3 Epoxy Grout: Provide non-shrink, non-metallic, non-corrosive epoxy grout conforming to the following requirements:

- .1 Grout shall be manufactured specifically for use in supporting heavy loads.
- .2 Shrinkage at 28days: None (0.00 shrinkage when tested in accordance with ASTM C827 modified procedure) with a minimum effective bearing area (EBA) of 95 per cent coverage of the tested base plate.
- .3 Compressive strength, minimum: 69MPa (10,000 psi) at seven days, when tested in accordance with ASTM C579.
- .4 Initial setting time: Approximately one hour at 20 degrees Celsius.
- .5 Provide flowable consistency as necessary for the particular application.
- .6 Epoxy grouts which are volatile and which give off noxious fumes are not acceptable.

2.1.4 Epoxy Adhesive: ASTM C881, Type V, epoxy-based bonding agent.

2.2 MIXING

2.2.1 Mix grout ingredients for both cementitious grout and epoxy grout in accordance with the respective manufacturer's mixing instructions and recommendations. Mix grout materials in proper mechanical mixers.

2.2.2 Mix grout as close to work area as possible.

2.3 SOURCE QUALITY CONTROL

2.3.1 Visual Inspections: Perform visual inspection of the grout mixing and placement to determine and verify that grout consistency, slump, and stiffness are appropriate and proper for the location and type of installation.

2.3.2 Shrinkage Tests:

- .1 Cementitious Grout: Grout shall meet the following performance requirements:
 - .1 Expansion: 0.4 per cent maximum at three, 14, and 28days. Grout shall exhibit no displacement when tested in accordance with ASTM C157.
 - .2 Shrinkage: Non (0.00 shrinkage at 28days when tested in accordance with ASTM C827 and ASTM C1090). There shall be no vertical volume shrinkage of grout in the plastic or hardened stage at any time.
 - .2 Epoxy Grout: Grout shall meet the following performance requirements:
 - .1 Expansion: Grout shall exhibit no displacement when tested in accordance with ASTM C827 and ASTM C157, modified procedures.
 - .2 Shrinkage: None (0.00 shrinkage when tested in accordance with ASTM C827, modified procedure; specific gravity of indicator ball will be changed to approximately 1.0).
 - .3 Effective Bearing Area: 95 per cent minimum coverage of the tested base plate.
- 2.3.3 Strength Tests: Compressive strength of grout shall meet the following requirements:
- .1 Cementitious Grout: 34.5MPa minimum at 28days when tested in accordance with ASTM C109.
 - .2 Epoxy Grout: 69MPa minimum at 7days when tested in accordance with ASTM C579.

3 EXECUTION

3.1 SURFACE PREPARATION

- 3.1.1 Concrete surfaces to receive grout shall be prepared by chipping, sandblasting, water blasting, or other accepted methods to remove defective concrete, laitance, dirt, oil, grease, and other foreign matter to achieve sound, clean concrete surfaces. Lightly roughen concrete for bond, but not enough to interfere with proper placement of grout.
- 3.1.2 Remove foreign matter from steel surfaces to be in contact with grout. Clean contact steel surfaces as necessary by wire brushing and wiping dust clean.
- 3.1.3 Align and level components to be grouted and maintain in final position until grout placement is complete and accepted.

- 3.1.4 Remove protective waterproof covering and clean contaminated surfaces immediately before grouting.
- 3.1.5 Saturate concrete surfaces with clean water, and remove excess water immediately before grouting.
- 3.1.6 Where necessary or appropriate for better bond, epoxy adhesive may be applied to clean, dry substrate surfaces in accordance with applicable requirements of ACI 503.2.

3.2 PLACING GROUT

- 3.2.1 Place grout in accordance with the respective manufacturer's installation instructions and recommendations. Pour or inject grout from one side only until grout rises above outlet at opposite ends of pipeline. Strapping and plunging or other recommended method may be used to force grout to flow into the entire area.
- 3.2.2 Contractor to verify volume of void or cavity to be filled, and continuously monitor and compare against volume of grout placed during the grouting operation for quality assurance.
- 3.2.3 Do not use grout which has begun to set or if more than one hour has elapsed after initial mixing.

3.3 CURING

- 3.3.1 As recommended by the grout manufacturer.

4 SUPPLEMENTS

4.1 SUPPLEMENTAL DOCUMENTS

- 4.1.1 The supplements listed below, and following the "End of Section", form part of this specification section:
 - .1 Grout and Concrete Repair Details

END OF SECTION

Concrete Removals – Partial Depth Type A (Horizontal)

General

Concrete removals to conform to OPSS.MUNI 928, OPSS.MUNI 929, Special Provisions.

Construction

Removals are to be completed as per the following requirements and costs included in the relative concrete repair item. This work shall include all labour, equipment and material required to remove poor/deteriorated concrete, abrasive blast all exposed reinforcing steel and dispose of all debris from the concrete removals specified on the Contract Drawings and as directed by the Design Engineer. Concrete shall be removed in a manner so as not to damage the remaining structure. Should damage occur, which in the opinion of the Design Engineer was a result of inappropriate removal means on the part of the Contractor, the deficient area(s) shall be reconciled at the expense of the Contractor. All surfaces where concrete removal is to occur are to be swept and air blasted clean.

Concrete may be removed by hammering or other methods as approved by the Design Engineer. Prior to removal of concrete, the Design Engineer will “sound” all concrete surfaces in order to identify delaminated areas requiring removal. The concrete will again be “sounded” by the Design Engineer at the end of removal to ensure that all delaminated concrete has been removed. The Contractor is to remove concrete to the depth of reinforcing steel, where present, or to a maximum depth of 76mm below the original face of the concrete where reinforcement has not been located, unless directed otherwise by the Design Engineer. Areas where the condition of concrete is poor beyond this depth are to be brought to the attention of the Design Engineer immediately.

All exposed reinforcing steel, which is to be preserved in place for incorporation into the final work shall be abrasive blast cleaned conforming to the requirements of OPSS.MUNI 929. Debris from the cleaning operation shall be contained and disposed of. For reinforcing steel that is exposed, concrete shall be removed to a minimum depth of 25 mm around the reinforcing steel in all directions. Areas of concrete demarcated for repairs shall be sawcut 25mm deep or to the first layer of reinforcing steel, whichever is less, around the perimeter of the repair area prior to concrete removals.

The Design Engineer in conjunction with the Contractor shall establish the areas of removals in the field. The Contractor is not to begin with removals until the Design Engineer has verified all final limits of removals.

Concrete removals from the following areas shall be considered as **Type ‘A’**:

- Top surface of deck
- Base of tank structures
- Stair treads
- Wall tops
- All other horizontal concrete surfaces

Concrete Removals – Partial Depth Type C (Vertical)

General

Concrete removals to conform to OPSS.MUNI 928, OPSS.MUNI 929, Special Provisions.

Construction

Removals are to be completed as per the following requirements and costs included in the relative concrete repair item. This work shall include all labour, equipment and material required to remove poor/deteriorated concrete, abrasive blast all exposed reinforcing steel and dispose of all debris from the concrete removals specified on the Contract Drawings and as directed by the Design Engineer. Concrete shall be removed in a manner so as not to damage the remaining structure. Should damage occur, which in the opinion of the Design Engineer was a result of inappropriate removal means on the part of the Contractor, the deficient area(s) shall be reconciled at the expense of the Contractor. All surfaces where concrete removal is to occur are to be swept and air blasted clean.

Concrete may be removed by hammering or other methods as approved by the Design Engineer. Prior to removal of concrete, the Design Engineer will “sound” all concrete surfaces in order to identify delaminated areas requiring removal. The concrete will again be “sounded” by the Design Engineer at the end of removal to ensure that all delaminated concrete has been removed. The Contractor is to remove concrete to the depth of reinforcing steel, where present, or to a maximum depth of 76mm below the original face of the concrete where reinforcement has not been located, unless directed otherwise by the Design Engineer. Areas where the condition of concrete is poor beyond this depth are to be brought to the attention of the Design Engineer immediately.

All exposed reinforcing steel, which is to be preserved in place for incorporation into the final work shall be abrasive blast cleaned conforming to the requirements of OPSS.MUNI 929. Debris from the cleaning operation shall be contained and disposed of. For reinforcing steel that is exposed, concrete shall be removed to a minimum depth of 25 mm around the reinforcing steel in all directions. Areas of concrete demarcated for repairs shall be sawcut 25mm deep or to the first layer of reinforcing steel, whichever is less, around the perimeter of the repair area prior to concrete removals.

The Design Engineer in conjunction with the Contractor shall establish the areas of removals in the field. The Contractor is not to begin with removals until the Design Engineer has verified all final limits of removals.

Concrete removals from the following areas shall be considered as **Type ‘C’**:

- Vertical face of tank structures
- Stair risers
- Face of walls
- All other vertical surfaces not noted above

Concrete Patching – Deck Edge

General

Concrete repairs to conform to Division 3, OPSS.MUNI 930, and Special Provisions.

Construction

The unit price bid for this item shall be compensation in full for all labour, equipment and materials necessary to complete concrete repairs along the deck edge as indicated on the Contract Drawings and as directed by the Design Engineer. The Contractor shall provide the Design Engineer with a concrete mix design a minimum of 7 days prior to the start of construction. All concrete patching shall be completed in accordance with OPSS.MUNI 930.

In addition to the work mentioned above this item shall also include:

- Supply and installation of all formwork and associated accessories where required.
- Supply and installation of new steel reinforcing where existing reinforcing steel deemed to be in poor condition or where removals areas are deemed to have insufficient exposed reinforcing as directed by the Design Engineer.
- Surface preparation of concrete substrate prior to patching.
- Supply and application of a concrete bonding agent immediately prior to concrete patching operations in accordance with manufacturer specifications.
- Supply, place, and cure concrete patching material in accordance with manufacturer specifications.
- Removal of formwork as required.

All concrete used for deck edge patches shall be as noted in the Contract Documents and shall be supplied from a RMCAO Certified plant. Provide clean, uncoated sand and coarse aggregates from approved sources that conform to CSA A3000-13. Nominal size of coarse aggregates is 14 mm for all patch work. Concrete shall have a minimum 28-day strength of 32 MPa and shall have an A-2 exposure class with a maximum water to cementing materials ratio of 0.45, and air entrainment between 5% and 8%.

For the purposes of this Contract, concrete curing for exposed patches shall be by means of burlap and water combined with moisture vapour barrier. The moisture vapour barrier shall be placed immediately on the wet burlap as soon as the surface will support it without deformation. Where possible, forms shall be left on for a minimum of 96 hours.

This item shall include the cost for all cleaning and preparation of the existing concrete surface before the placement of new concrete in accordance with the Contract Drawings to the satisfaction of the Design Engineer. This shall include air blast cleaning and sweeping, wetting of the concrete for a minimum of 24 hours prior to concrete placement, removal of standing water prior to bonding agent application, and application of the bonding agent.

The following is a list of pre-approved bonding agents. All bonding agents are to be placed in accordance with Manufacturer recommendations.

1. SikaTop® Armatec®-110 EpoCem® Anti-Corrosion Coating and Bonding Agent
2. SikaLatex® R Acrylic Latex Bonding Agent
3. CPD® Concentrated Latex Adhesive
4. Belzona 4981

Finishing of deck patches shall be in accordance with OPSS.MUNI 930 and shall have a similar finished texture as the existing deck surface. Crossfall and longitudinal slope of deck is to be maintained.

Concrete Patching – Wall Top

General

Concrete repairs to conform to Division 3, OPSS.MUNI 930, and Special Provisions.

Construction

The unit price bid for this item shall be compensation in full for all labour, equipment and materials necessary to complete concrete repairs along the top of walls as indicated on the Contract Drawings and as directed by the Design Engineer. The Contractor shall provide the Design Engineer with a concrete mix design a minimum of 7 days prior to the start of construction. All concrete patching shall be completed in accordance with OPSS.MUNI 930.

In addition to the work mentioned above this item shall also include:

- Supply and installation of all formwork and associated accessories where required.
- Supply and installation of new steel reinforcing where existing reinforcing steel deemed to be in poor condition or where removals areas are deemed to have insufficient exposed reinforcing as directed by the Design Engineer.
- Surface preparation of concrete substrate prior to patching.
- Supply and application of a concrete bonding agent immediately prior to concrete patching operations in accordance with manufacturer specifications.
- Supply, place, and cure concrete patching material in accordance with manufacturer specifications.
- Removal of formwork as required.

All concrete used for deck edge patches shall be as noted in the Contract Documents and shall be supplied from a RMCAO Certified plant. Provide clean, uncoated sand and coarse aggregates from approved sources that conform to CSA A3000-13. Nominal size of coarse aggregates is 14 mm for all patch work. Concrete shall have a minimum 28-day strength of 32 MPa and shall have an A-2 exposure class with a maximum water to cementing materials ratio of 0.45, and air entrainment between 5% and 8%.

For the purposes of this Contract, concrete curing for exposed patches shall be by means of burlap and water combined with moisture vapour barrier. The moisture vapour barrier shall be placed immediately on the wet burlap as soon as the surface will support it without deformation. Where possible, forms shall be left on for a minimum of 96 hours.

This item shall include the cost for all cleaning and preparation of the existing concrete surface before the placement of new concrete in accordance with the Contract Drawings to the satisfaction of the Design Engineer. This shall include air blast cleaning and sweeping, wetting of the concrete for a minimum of 24 hours prior to concrete placement, removal of standing water prior to bonding agent application, and application of the bonding agent.

The following is a list of pre-approved bonding agents. All bonding agents are to be placed in accordance with Manufacturer recommendations.

1. SikaTop® Armatec®-110 EpoCem® Anti-Corrosion Coating and Bonding Agent
2. SikaLatex® R Acrylic Latex Bonding Agent
3. CPD® Concentrated Latex Adhesive
4. Belzona 4911

Finishing of wall top patches shall be in accordance with OPSS.MUNI 930 and shall have a similar finished texture as the existing wall surface. Crossfall and longitudinal slope of the wall is to be maintained.

Concrete Patching – Vertical Patches Below Waterline

General

Concrete repairs to conform to Division 3, OPSS.MUNI 930, and Special Provisions.

Construction

The unit price bid for this item shall be compensation in full for all labour, equipment and materials necessary to complete vertical face concrete repairs below the waterline as indicated on the Contract Drawings and as directed by the Design Engineer. For the purpose of this contract the waterline is considered to be 0.3m below the top of the lowest overflow point within the structure. All concrete patching shall be completed in accordance with OPSS.MUNI 930.

In addition to the work mentioned above this item shall also include:

- Supply and installation of all access equipment required to complete the work
- Supply and installation of all formwork and associated accessories where required.
- Supply and installation of new steel reinforcing where existing reinforcing steel deemed to be in poor condition or where removals areas are deemed to have insufficient exposed reinforcing as directed by the Design Engineer.
- Surface preparation of concrete substrate prior to patching.
- Supply and application of a concrete bonding agent immediately prior to concrete patching operations in accordance with manufacturer specifications.
- Supply, place, and cure concrete patching material in accordance with manufacturer specifications.
- Removal of formwork as required.

All concrete used for vertical patches below the waterline shall be non-sag, cementitious mortar containing silica fume approved for exposure to effluent. The patch material shall have a minimum 28-

day strength of 32MPa and shall be applied in accordance with manufacturer specifications. The patch material must reach the 28 day specified strength prior to the tanks being returned to service and shall be cured in accordance with the manufacturer specifications.

This item shall include for the cost for all cleaning and preparation of the existing concrete surface before placement of the patch material in accordance with the Contract Drawings, manufacturer specifications, and to the satisfaction of the Design Engineer. This shall include air blast cleaning and sweeping, wetting of the concrete for a minimum of 24 hours prior to concrete placement, removal of standing water prior to bonding agent application, and application of the bonding agent.

The following is a list of pre-approved concrete repair products. All concrete repair products are to be placed in accordance with Manufacturer recommendations.

1. SikaTop®-123 Plus
2. Belzona 4141
3. Or approved equal

The following is a list of pre-approved bonding agents. All bonding agents are to be placed in accordance with Manufacturer recommendations.

1. SikaTop®-123-Plus (Applied as a scrub coat only)
2. SikaTop® Armatec®-110 EpoCem® Anti-Corrosion Coating and Bonding Agent
3. SikaLatex® R Acrylic Latex Bonding Agent
4. CPD® Concentrated Latex Adhesive
5. Belzona 4911

Finishing of patches shall be in accordance with OPSS.MUNI 930 and shall have a similar finished texture as the existing wall surface.

Concrete Patching – Horizontal Patches Below Waterline

General

Concrete repairs to conform to Division 3, OPSS.MUNI 930, and Special Provisions.

Construction

The unit price bid for this item shall be compensation in full for all labour, equipment and materials necessary to complete horizontal concrete repairs below the waterline as indicated on the Contract Drawings and as directed by the Design Engineer. For the purpose of this contract the waterline is considered to be 0.3m below the top of the lowest overflow point within the structure. All concrete patching shall be completed in accordance with OPSS.MUNI 930.

In addition to the work mentioned above this item shall also include:

- Supply and installation of all access equipment required to complete the work
- Supply and installation of all formwork and associated accessories where required.

- Supply and installation of new steel reinforcing where existing reinforcing steel deemed to be in poor condition or where removals areas are deemed to have insufficient exposed reinforcing as directed by the Design Engineer.
- Surface preparation of concrete substrate prior to patching.
- Supply and application of a concrete bonding agent immediately prior to concrete patching operations in accordance with manufacturer specifications.
- Supply, place, and cure concrete patching material in accordance with manufacturer specifications.
- Removal of formwork as required.

All concrete used for vertical patches below the waterline shall be non-sag, cementitious mortar containing silica fume approved for exposure to effluent. The patch material shall have a minimum 28-day strength of 32MPa and shall be applied in accordance with manufacturer specifications. The patch material must reach the 28 day specified strength prior to the tanks being returned to service and shall be cured in accordance with the manufacturer specifications.

This item shall include for the cost for all cleaning and preparation of the existing concrete surface before placement of the patch material in accordance with the Contract Drawings, manufacturer specifications, and to the satisfaction of the Design Engineer. This shall include air blast cleaning and sweeping, wetting of the concrete for a minimum of 24 hours prior to concrete placement, removal of standing water prior to bonding agent application, and application of the bonding agent.

The following is a list of pre-approved concrete repair products. All concrete repair products are to be placed in accordance with Manufacturer recommendations.

1. SikaTop®-123 Plus
2. Belzona 4141
3. Or approved equal

The following is a list of pre-approved bonding agents. All bonding agents are to be placed in accordance with Manufacturer recommendations.

1. SikaTop®-123-Plus (Applied as a scrub coat only)
2. SikaTop® Armatec®-110 EpoCem® Anti-Corrosion Coating and Bonding Agent
3. SikaLatex® R Acrylic Latex Bonding Agent
4. CPD® Concentrated Latex Adhesive
5. Belzona 4911

Finishing of patches shall be in accordance with OPSS.MUNI 930 and shall have a similar finished texture as the existing surface.

Concrete Patching – Vertical Patches Above Waterline

General

Concrete repairs to conform to Division 3, OPSS.MUNI 930, and Special Provisions.

Construction

The unit price bid for this item shall be compensation in full for all labour, equipment and materials necessary to complete vertical concrete repairs above the waterline as indicated on the Contract Drawings and as directed by the Design Engineer. For the purpose of this contract the waterline is considered to be 0.3m below the top of the lowest overflow point within the structure. All concrete patching shall be completed in accordance with OPSS.MUNI 930.

In addition to the work mentioned above this item shall also include:

- Supply and installation of all access equipment required to complete the work.
- Supply and installation of all formwork and associated accessories where required.
- Supply and installation of new steel reinforcing where existing reinforcing steel deemed to be in poor condition or where removals areas are deemed to have insufficient exposed reinforcing as directed by the Design Engineer.
- Surface preparation of concrete substrate prior to patching.
- Supply and application of a concrete bonding agent immediately prior to concrete patching operations in accordance with manufacturer specifications.
- Supply, place, and cure concrete patching material in accordance with manufacturer specifications.
- Removal of formwork as required.

All concrete used for vertical patches above the waterline shall be as noted in the Contract Documents and shall be supplied from a RMCAO Certified plant. Provide clean, uncoated sand and coarse aggregates from approved sources that conform to CSA A3000-13. Nominal size of coarse aggregates is 14 mm for all patch work. Concrete shall have a minimum 28-day strength of 32 MPa and shall have an A-2 exposure class with a maximum water to cementing materials ratio of 0.45, and air entrainment between 5% and 8%.

For the purposes of this Contract, concrete curing for exposed patches shall be by means of burlap and water combined with moisture vapour barrier. The moisture vapour barrier shall be placed immediately on the wet burlap as soon as the surface will support it without deformation. Where possible, forms shall be left on for a minimum of 96 hours.

This item shall include the cost for all cleaning and preparation of the existing concrete surface before the placement of new concrete in accordance with the Contract Drawings to the satisfaction of the Design Engineer. This shall include air blast cleaning and sweeping, wetting of the concrete for a minimum of 24 hours prior to concrete placement, removal of standing water prior to bonding agent application, and application of the bonding agent.

The following is a list of pre-approved bonding agents. All bonding agents are to be placed in accordance with Manufacturer recommendations.

1. SikaTop® Armatec®-110 EpoCem® Anti-Corrosion Coating and Bonding Agent
2. SikaLatex® R Acrylic Latex Bonding Agent

3. CPD® Concentrated Latex Adhesive
4. Belzona 4911

Finishing of wall top patches shall be in accordance with OPSS.MUNI 930 and shall have a similar finished texture as the existing wall surface.

Concrete Patching – Horizontal Patches Above Waterline

General

Concrete repairs to conform to Division 3, OPSS.MUNI 930, and Special Provisions.

Construction

The unit price bid for this item shall be compensation in full for all labour, equipment and materials necessary to complete horizontal concrete repairs above the waterline as indicated on the Contract Drawings and as directed by the Design Engineer. For the purpose of this contract the waterline is considered to be 0.3m below the top of the lowest overflow point within the structure. All concrete patching shall be completed in accordance with OPSS.MUNI 930.

In addition to the work mentioned above this item shall also include:

- Supply and installation of all access equipment required to complete the work
- Supply and installation of all formwork and associated accessories where required.
- Supply and installation of new steel reinforcing where existing reinforcing steel deemed to be in poor condition or where removals areas are deemed to have insufficient exposed reinforcing as directed by the Design Engineer.
- Surface preparation of concrete substrate prior to patching.
- Supply and application of a concrete bonding agent immediately prior to concrete patching operations in accordance with manufacturer specifications.
- Supply, place, and cure concrete patching material in accordance with manufacturer specifications.
- Removal of formwork as required.

All concrete used for horizontal patches above the waterline shall be as noted in the Contract Documents and shall be supplied from a RMCAO Certified plant. Provide clean, uncoated sand and coarse aggregates from approved sources that conform to CSA A3000-13. Nominal size of coarse aggregates is 14 mm for all patch work. Concrete shall have a minimum 28-day strength of 32 MPa and shall have an A-2 exposure class with a maximum water to cementing materials ratio of 0.45, and air entrainment between 5% and 8%.

For the purposes of this Contract, concrete curing for exposed patches shall be by means of burlap and water combined with moisture vapour barrier. The moisture vapour barrier shall be placed immediately on the wet burlap as soon as the surface will support it without deformation. Where possible, forms shall be left on for a minimum of 96 hours.

This item shall include the cost for all cleaning and preparation of the existing concrete surface before the placement of new concrete in accordance with the Contract Drawings to the satisfaction of the Design Engineer. This shall include air blast cleaning and sweeping, wetting of the concrete for a minimum of 24 hours prior to concrete placement, removal of standing water prior to bonding agent application, and application of the bonding agent.

The following is a list of pre-approved bonding agents. All bonding agents are to be placed in accordance with Manufacturer recommendations.

1. SikaTop® Armatec®-110 EpoCem® Anti-Corrosion Coating and Bonding Agent
2. SikaLatex® R Acrylic Latex Bonding Agent
3. CPD® Concentrated Latex Adhesive
4. Belzona 4911

Finishing of wall top patches shall be in accordance with OPSS.MUNI 930 and shall have a similar finished texture as the existing surface.

Concrete Patching – Concrete Fire Protection Over Steel

General

Concrete repairs to conform to Division 3, OPSS.MUNI 930, and Special Provisions.

Construction

The lump sum bid for this item shall be compensation in full for all labour, equipment and materials necessary to complete patching repairs to the concrete fire protection on the steel beam located in the basement of the Plant A Control Building. The concrete patching shall be completed in accordance with OPSS.MUNI 930.

In addition to the work mentioned above this item shall also include:

- Supply and installation of all access equipment required to complete the work.
- Supply and installation of all formwork and associated accessories where required.
- Supply and installation of new steel reinforcing where existing reinforcing steel deemed to be in poor condition or where removals areas are deemed to have insufficient exposed reinforcing as directed by the Design Engineer.
- Surface preparation of steel substrate prior to patching.
- Supply and application of a concrete bonding agent immediately prior to concrete patching operations in accordance with manufacturer specifications.
- Supply, place, and cure concrete patching material in accordance with manufacturer specifications.
- Removal of formwork as required.

All concrete used for fire protection patches shall be as noted in the Contract Documents and shall be supplied from a RMCAO Certified plant. All patches shall be completed using Type N concrete in which the coarse aggregate is limestone, calcareous gravel, traprock, sandstone, blast furnace slag, or similar dense

material containing not more than 30% quartz, chert or flint. Provide clean, uncoated sand and coarse aggregates from approved sources that conform to CSA A3000-13. Nominal size of coarse aggregates is 14 mm for all patch work. Concrete shall have a minimum 28-day strength of 25 MPa and shall have an A-2 exposure class with a maximum water to cementing materials ratio of 0.45, and air entrainment between 5% and 8%.

For the purposes of this Contract, concrete curing for exposed patches shall be by means of burlap and water combined with moisture vapour barrier. The moisture vapour barrier shall be placed immediately on the wet burlap as soon as the surface will support it without deformation. Where possible, forms shall be left on for a minimum of 96 hours.

This item shall include the cost for all cleaning and preparation of the existing steel surface before the placement of new concrete in accordance with the Contract Drawings to the satisfaction of the Design Engineer. This shall include abrasive blast cleaning of all steel surfaces receiving new concrete patches in accordance with OPSS.MUNI 929, and application of the bonding agent.

The following is a list of pre-approved bonding agents. All bonding agents are to be placed in accordance with Manufacturer recommendations.

1. SikaTop® Armatec®-110 EpoCem® Anti-Corrosion Coating and Bonding Agent
2. SikaLatex® R Acrylic Latex Bonding Agent
3. CPD® Concentrated Latex Adhesive
4. Belzona 4911

Finishing of wall top patches shall be in accordance with OPSS.MUNI 930 and shall have a similar finished texture as the existing surface.

Concrete Patching – Digester Valve Building Stairs

General

Concrete repairs to conform to Division 3, OPSS.MUNI 930, and Special Provisions.

Construction

The unit price bid for this item shall be compensation in full for all labour, equipment and materials necessary to complete vertical and horizontal concrete repairs on the concrete stairs (tread and riser) within the Digester Valve Building. All concrete patching shall be completed in accordance with OPSS.MUNI 930.

In addition to the work mentioned above this item shall also include:

- Supply and installation of all formwork and associated accessories where required.
- Supply and installation of new steel reinforcing where existing reinforcing steel deemed to be in poor condition or where removals areas are deemed to have insufficient exposed reinforcing as directed by the Design Engineer.
- Surface preparation of concrete substrate prior to patching.

- Supply and application of a concrete bonding agent immediately prior to concrete patching operations in accordance with manufacturer specifications.
- Supply, place, and cure concrete patching material in accordance with manufacturer specifications.
- Removal of formwork as required.

All concrete used for patching of the stairs shall be as noted in the Contract Documents and shall be supplied from a RMCAO Certified plant. Provide clean, uncoated sand and coarse aggregates from approved sources that conform to CSA A3000-13. Nominal size of coarse aggregates is 14 mm for all patch work. Concrete shall have a minimum 28-day strength of 32 MPa and shall have an A-2 exposure class with a maximum water to cementing materials ratio of 0.45, and air entrainment between 5% and 8%.

For the purposes of this Contract, concrete curing for exposed patches shall be by means of burlap and water combined with moisture vapour barrier. The moisture vapour barrier shall be placed immediately on the wet burlap as soon as the surface will support it without deformation. Where possible, forms shall be left on for a minimum of 96 hours.

This item shall include the cost for all cleaning and preparation of the existing concrete surface before the placement of new concrete in accordance with the Contract Drawings to the satisfaction of the Design Engineer. This shall include air blast cleaning and sweeping, wetting of the concrete for a minimum of 24 hours prior to concrete placement, removal of standing water prior to bonding agent application, and application of the bonding agent.

The following is a list of pre-approved bonding agents. All bonding agents are to be placed in accordance with Manufacturer recommendations.

1. SikaTop® Armatec®-110 EpoCem® Anti-Corrosion Coating and Bonding Agent
2. SikaLatex® R Acrylic Latex Bonding Agent
3. CPD® Concentrated Latex Adhesive
4. Belzona 4911

Finishing of stair patches shall be in accordance with OPSS.MUNI 930 and shall have a similar finished texture, and shape (including nosing radius) as the existing stair surface.

Concrete Crack Epoxy Pressure Injection

General

Epoxy injection to conform to Special Provisions.

Construction

The unit price bid for this item shall be compensation in full for all labour, equipment and materials necessary to complete the epoxy pressure injection of concrete cracks as noted on the Construction Drawings.

In addition to the work mentioned above this item shall also include:

- Supply and installation of all access equipment required to complete the work.
- Preparation and cleaning of the concrete crack in conformance with Manufacturer specifications including "V" notch along full length of crack, each side, where accessible.
- Drilling of injection ports.
- Sealing of the existing crack at the exterior surface as recommended by the Manufacturer.
- Supply, inject, and cure epoxy resin material in accordance with manufacturer specifications.
- Removal of formwork, and injection ports as required.

The epoxy resin used for concrete crack repair shall be a low viscosity epoxy resin approved for exposure to effluent and associated gases. Prior to returning the any tanks to service, the epoxy resin must be cured until the shear strength of the epoxy has exceeded that of the existing concrete (32 MPa).

For all through crack repairs, where the crack is visible on each side of the concrete element, the contractor is directed to drill injection ports adjacent to the crack on a 45 degree angle from the exposed surface to the center of the crack depth. The ports shall be spaced and sealed to the concrete surface in accordance with Manufacturer recommendations. The crack will be sealed at the surface along the entire length with no interruptions. For crack repair where the crack is visible on one surface only, injection ports shall be installed directly above the crack, with sealant installed between.

Approved Products

1. Sikadur®-35 Hi-Mod LV Epoxy Adhesive
2. Belzona 4151
3. Approved Equal

Clean and Apply Epoxy Coating to Chemical Containment Area

General

Epoxy Coatings to conform to Division 9, and Special Provisions.

Construction

The unit price bid for this item shall be compensation in full for all labour, equipment and materials relating to the supply and application of epoxy floor coatings. The Contractor shall supply labour, materials and equipment for the complete installation of epoxy flooring on all interior concrete floors as listed on the Contract Drawings. General floor coating shall form a coved 150mm curb along all walls and cover all maintenance pads in all rooms.

In addition to the work mentioned above this item shall also include:

- Preparation of Substrates.
- Sealing of sawcut and control joints.
- Trowel applied coating with coved bases and slip resistant top coating.
- Temporary protection of completed systems.

The following is a list of pre-approved high build epoxy resin based floor coatings. Impact resistant stainproof floor coating alternatives which meet the minimum material specifications outlined in Division 9, may be submitted to the Engineer for review prior to construction.

1. Two coats Sikafloor 261, at a final thickness of 20 mils, finished with slip resistant aggregate.
2. Two coats StonKote HT4, at a final thickness of 20 mils, finished with slip resistant aggregate.
3. Two coats Tnemec-Glaze Series S281, at a final thickness of 20 mils.
4. Belzona 4311, at a final thickness of 20 mils, finished with slip resistant aggregate

All coatings shall be installed in accordance with Manufacturer specifications including surface preparation and primers. The final colour of the floor coating shall be selected by the Owner from the Manufacturers standard colour range.

Concrete Pier

General

Concrete pier construction to conform to Division 3, OPSS.MUNI 904, OPSS.MUNI 905, and Special Provisions.

Construction

The lump sum price bid for this item shall be compensation in full for all labour, equipment and materials necessary to complete the construction of the concrete pier as indicated on the Contract Drawings and as directed by the Design Engineer.

In addition to the work mentioned above this item shall also include:

- Supply and installation of all access equipment required to complete the work.
- Supply and installation of all formwork and associated accessories where required.
- Supply and installation of steel reinforcing.
- Anchoring of vertical bars to existing concrete slab.
- Supply, place, and cure concrete pier.
- Removal of formwork as required.
- Supply and installation of steel beam support and anchors.

All concrete used for pier construction shall be as noted in the Contract Documents and shall be supplied from a RMCAO Certified plant. Provide clean, uncoated sand and coarse aggregates from approved sources that conform to CSA A3000-13. Concrete shall have a minimum 28-day strength of 32 MPa and shall have an A-2 exposure class with a maximum water to cementing materials ratio of 0.45, and air entrainment between 5% and 8%.

Reinforcing steel shall be 400MPa grade black steel. Reinforcing steel shall be installed free of corrosion and stored on site to prevent exposure to moisture. Reinforcing steel bars displaying excessive amounts of corrosion may be rejected by the Engineer. Rejected reinforcing steel shall be the Contractor's responsibility to clean or replace at no extra cost to the Owner.

All reinforcing steel is to be secured in place and spaced using standard accessories so that there is no movement during concrete placement. Reinforcing is to be placed in general conformance with the Reinforcing Steel Institute of Canada, Manual of Standard Practice. All splices shall be Class B, unless otherwise noted. All reinforcing steel placed shall be made available to the Design Engineer for review prior to placing the concrete. Provide at least 48 hours' notice when a review is required.

For the purposes of this Contract, concrete curing for exposed patches shall be by means of burlap and water combined with moisture vapour barrier. The moisture vapour barrier shall be placed immediately on the wet burlap as soon as the surface will support it without deformation. Where possible, forms shall be left on for a minimum of 96 hours.

All exposed concrete shall be finished uniform in colour, pattern and texture. All air holes and imperfections in the concrete surface shall be parged with adhesive cement slurry immediately after forms are stripped. All exposed surfaces shall have a Class 'A' hand rubbed finish to fill all air holes.

All Structural steel shall conform to the requirements of CSA Specifications S16.1 (Latest Edition) and CSA Specification G40.21, Type 350W for beams and 300W for plates. Steel shall be thoroughly cleaned and given one shop coat of anti-corrosive primer. Areas affected by weathering, damage due to handling, etc., shall have the rust removed and be "touched up" in the field at no additional cost to the owner. No splices in beams will be allowed without written approval from the Engineer. All base plates and bearing plates shall be grouted with a minimum of 38mm of 35MPa non-shrink grout.

CITY OF HAMILTON

C13-32-24

DUNDAS WASTEWATER TREATMENT
PLANT (WWTP) HEALTH AND SAFETY
IMMEDIATE NEEDS AND STRUCTURAL
REPAIR UPGRADES

DIVISION 05

Section 05500 – Miscellaneous Metal

SECTION 05500 – MISCELLANEOUS METAL

1 GENERAL

1.1 SECTION INTENT

- 1.1.1 This Section describes procedures and requirements for metal items manufactured to conventional details from standard metal shapes and plates.

1.2 RELATED SECTIONS

- 1.2.1 Sections 01330 – Submittals.
- 1.2.2 Sections 15050 – Basic Mechanical Materials and Couplings

1.3 REFERENCES

- 1.3.1 ASTM A53 - Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.
- 1.3.2 ASTM A307 - Standard Specifications for Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength.
- 1.3.3 ASTM A325M - High-Strength Bolts for Structural Steel Joints [Metric].
- 1.3.4 CSA-G40.20/ - General Requirements for Rolled or Welded Structural.
- 1.3.5 G40.21-MQuality Steel/Structural Quality Steel.
- 1.3.6 CAN/CSA-S16.1 - Limit States Design of Steel Structures.
- 1.3.7 CSA W47.1 - Certification of Companies for Fusion Welding of Steel Structures.
- 1.3.8 CSA W48 Series – Electrodes.
- 1.3.9 CSA W59-M - Welded Steel Construction (Metal Arc Welding).
- 1.3.10 CSA-W117.2 - Safety in Welding, Cutting and Allied Processes.
- 1.3.11 CISC/CPMA 2.75 - Canadian Institute of Steel Construction/Canadian Paint Manufacturers Association "A Quick-Drying Primer for Use on Structural Steel".
- 1.3.12 CISC - Canadian Institute of Steel Construction, "Code of Standard Practice".

- 1.3.13 SSPC - Steel Structures Painting Council, "Steel Structures Painting Manual, Vol. 2".
- 1.3.14 ANSI B18.6.4-[1981], Screws, Tapping and Metallic Drive, Inch Series, Thread Forming and Cutting.
- 1.3.15 ASTM D 2369-[98], Standard Test Method for Volatile Content of Coatings.
- 1.3.16 ASTM D 2832-[92(R1994)], Standard Guide for Determining Volatile and Nonvolatile Content of Paint and Related Coatings.
- 1.3.17 ASTM D 5116-[90], Standard Guide For Small-Scale Environmental Chamber Determinations of Organic Emissions From Indoor Materials/Products.
- 1.3.18 CAN/CGSB-51.32-[M77], Sheathing, Membrane, Breather Type.
- 1.3.19 CAN/CGSB-93.2-[M91], Prefinished Aluminum Siding, Soffits and Fascia, for Residential Use.
- 1.3.20 CAN/CGSB-93.3-[M91], Prefinished Galvanized and Aluminum-Zinc Alloy Steel Sheet for Residential Use.
- 1.3.21 CAN/CGSB-93.4-[92], Galvanized Steel and Aluminum-Zinc Alloy Coated Steel Siding Soffits and Fascia, Prefinished, Residential.
- 1.3.22 CGSB 93.5-[92], Installation of Metal Residential Siding, Soffits and Fascia.
- 1.3.23 CAN/CSA-A247-[96], Insulating Fibreboard.
- 1.3.24 CSA B111-[1974], Wire Nails, Spikes and Staples.
- 1.3.25 ECP-45-[92], Sealants and Caulking Compounds.
- 1.3.26 ECP-69-[94], Polyethylene Plastic Film Products.

1.4 SUBMITTALS

- 1.4.1 Submit shop drawings for fabrication and erection of miscellaneous metals in accordance with Section 01330 - Submittals.
- 1.4.2 Clearly indicate materials, core thicknesses, finishes, connections, joints, method of anchorage, number of anchors, supports, reinforcement, details and accessories.

1.5 QUALITY ASSURANCE

- 1.5.1 Retain a firm certified in accordance with CSA W47.1 Division 1 or 2.1 to perform welding.
- 1.5.2 Employ welding operators licensed per CSA W47.1 for types of welding required by the Work.
- 1.5.3 Fabricators Qualifications: Firm experienced in successfully producing metalwork similar to that indicated for this Project, with sufficient production capacity to produce required units without causing delay in Work.
- 1.5.4 Installer Qualifications: Arrange for installation of metalwork specified in this section by same firm that fabricated unit.
- 1.5.5 Manufacturer Qualifications: Minimum of 8 years experience in supplying and installing of major jobs in custom metal work. Prospective manufacturer shall supply list (prior to bid acceptance time) of jobs Architect or Owner may inspect, in order to ascertain this manufacturer's ability to both manufacture and perform in full compliance with this specification.
- 1.5.6 Verify dimensions by field measurement before fabrication. Design units to provide for adjustment and fitting of components during field installation. Preassemble units at shop to minimize mechanical joints, splicing and field assembly of units.
- 1.5.7 Qualify welding processes and welding operators in accordance with the following:
- 1.5.8 AWS D1.1 Structural Welding Code - Steel.
- 1.5.9 Certify that each welder employed in unit of Work of this section has satisfactorily passed AWS qualification tests for welding processes involved and, if pertinent, has undergone recertification.

1.6 COORDINATION

- 1.6.1 Supply materials requiring setting and/or building-in in concrete, masonry or other trades. This includes inserts, anchors, frames, sleeves, etc. Verify locations of said materials.

1.7 SHOP FABRICATION

- 1.7.1 Fit and assemble work in shop where possible. Execute work in accordance with details and reviewed shop drawings. Where shop fabrication is not possible, make trial assembly in shop.
- 1.7.2 Execute shop welding conforming with welding requirements specified under "Quality Assurance" and "Welding" herein.

- 1.7.3 Accurately cut, machine and fit joints so that finished work presents a neat appearance.
- 1.7.4 Assemble members without twists or open joints.
- 1.7.5 Drill properly sized holes for connecting the work of other trades where such can be determined prior to fabrication. Where possible, show such holes on shop drawings. Place holes so not to cause an appreciable reduction in strength of member.

2 PRODUCTS

2.1 MATERIALS

- 2.1.1 General: Metals shall be free from defects which impair strength or durability, or which are visible. Metals shall be new, of best quality and free from rust, waves or buckles, and clean, straight throughout entire length, sharply defined profiles and true in web and flange.
- 2.1.2 Structural Shapes, Plates, etc.: New material conforming to CSA-G40.20/G40.21-M, Grade 350W for W and H shapes, and Grade 300W for other shapes, and plates.
- 2.1.3 Where anchors, lifting hooks, screws, bolts, nuts, washers, hangers and other fasteners are not specifically shown or specified, provide such items with at least the strength and corrosion resistance properties of the metal fabrication for which they are required.
- 2.1.4 Bolts and anchorbolts: to ASTM A307-82a.
- 2.1.5 Welding Materials: Conforming to CSA W48.1-M and CSA W59-M.
- 2.1.6 Aluminum shall conform to the following alloy designations of the Aluminum Association:
 - .1 Extruded Shapes – Structural: 6061-T6.
 - .2 Smooth Plates: 5083-H34.
 - .3 Rivets and Bolts: 6061-T6.
 - .4 Checkered or Tread Plate: 6061-T6.
- 2.1.7 Isolate aluminum from dissimilar metals (except stainless steel, zinc or white bronze), concrete, mortar and masonry with bituminous paint according to CAN/CGSB-1.108.
- 2.1.8 All stainless steel: to ASTM A276, Type 316.

- 2.1.9 Grout: non-shrink, non-metallic, flowable, 24H, 15 MPa at 24 hours, pull-out strength 7.9 MPa.

2.2 ACCESSORIES:

- 2.2.1 Welding Electrodes and Filler Metal: Type and alloy of filler metal and electrodes as recommended by producer of metal to be welded, complying with applicable AWS specifications, and as required for color match, strength and compatibility in fabricated items.
- 2.2.2 Nonshrink Nonmetallic Grout: Pre-mixed, factory packaged, nonstaining, noncorrosive, nongaseous grout complying with CE CRD C621. Provide grout specifically recommended by manufacturer for interior and exterior applications of type specified in this section.
- 2.2.3 Anchors and Inserts: Provide anchors of type, size, and material required for type of loading and installation condition shown, as recommended by manufacturer, unless otherwise indicated.
- .1 Provide custom anchor to stringer as shown on drawings.
- 2.2.4 Concrete Materials and Properties: Comply with requirements in Division 3 Section "Cast-in-Place Concrete" for normal-weight, air-entrained, ready-mix concrete with a minimum 28-day compressive strength of 3000 psi (20 MPa), unless otherwise indicated.
- 2.2.5 Welded Wire Fabric: ASTM A 185, 6 by 6 inches (152 by 152 mm)--W1.4 by W1.4, unless otherwise indicated for reinforcing in stair treads.

2.3 ANCHORS AND FASTENERS

- 2.3.1 Anchors, Studs, Taps and Bolts:
- .1 For structural connections at platforms, support frames and similar items, use ASTM A325 carbon steel high strength bolts with nuts and washers.
- .2 Where such structural connections will be normally exposed to atmospheric conditions use ASTM A325 carbon steel bolts hot-dip galvanized to ASTM A153.
- .3 Unless otherwise specified or detailed use hot-dip galvanized or stainless steel anchors and fasteners.
- .4 Railing anchors for side mounted railing on concrete wearing slabs: Length to meet design requirements.
- .5 Use corrosion resistant fasteners of stainless steel or aluminum for corrosion resistant items to be fastened.

- 2.3.2 Nuts: Recommended nut grade and style listed in Appendix X1, Table X1 of ASTM A563. Where connections will be normally exposed to atmospheric conditions use Grade C3 or DH3.
- 2.3.3 Washers: Bolted connections - hardened steel washers conforming to ASTM F436. Hot-dip galvanized washers with galvanized or cadmium-plated bolts.
- 2.3.4 Common or Ordinary Bolts and Anchor Bolts for General Applications: Unfinished bolts conforming with ASTM A307, Grade A, with hexagon heads and nuts where exposed in the finish work. Use hot dipped galvanized in exterior connections or in unheated areas inside the building:
- .1 Common Bolts: Lengths required to suit thickness of material being joined, but not projecting more than 6mm beyond nut, without the use of washers.
 - .2 Anchor Bolts: Of lengths noted, but projecting not less than 13mm beyond nut unless otherwise noted.
- 2.3.5 Grout: Set by Master Builders Technologies Ltd. M-Bed Standard by Sternson Ltd., Sika Grout 212 by Sika Canada Inc.
- 2.3.6 Drilled anchors: Hilti stainless steel HVA, HSL, or Kwik bolts as indicated or accepted. Hilti "HSL" heavy-duty anchors installed in accordance with manufacturer's directions, to sizes shown.
- 2.3.7 Anchor grout for submerged and exterior conditions: Epoxy acrylate resin HVA by Hilti Ltd. Load capacity when embedded in 25 MPa concrete shall not be less than:
- | <u>Diameter (mm)</u> | <u>Pullout (kN)</u> | <u>Shear (kN)</u> |
|----------------------|---------------------|-------------------|
| 13 | 53.6 | 82.8 |
| 16 | 83.6 | 149.6 |
| 20 | 119.6 | 205.6 |
- 2.3.8 Unless otherwise indicated on the drawings, anchors and anchor bolts shall be 316 stainless steel.

2.4 WELDING

- 2.4.1 Welders shall be certified under CSA W59-M for F4 (all positions).

- 2.4.2 Execute welding to avoid damage or distortion to the Work. Should there be, in the opinion of Engineer or Inspection and Testing company, doubt as to adequacy of welds, such welds shall be tested for efficiency and any work not meeting specified Standards shall be removed and replaced with new work satisfactory to Engineer. Execute welding in accordance with the following standards:
- .1 CSA W48-M - for Electrodes. If rods are used, only coated rods are allowed.
 - .2 CSA W59-M - for design of connections and workmanship.
 - .3 CAN/CSA-W117.2-M - for safety.
- 2.4.3 Thoroughly clean welded joints and expose steel for a sufficient space to perform welding operations. Neatly finish welds. Where exposed to view and finish painted, apply weld continuously and grind to a uniformly smooth finish.
- 2.4.4 Contractor to complete as much welding within a shop prior to mobilizing materials to site. Any field welding required must be in compliance with AWS D1.1, CSA W47.1 and W59

2.5 FINISHES, CLEANING AND SHOP PRIMING

- 2.5.1 Shop coat primer: to CGSB 1-GP-40M.
- 2.5.2 Galvanizing: Hot dipped galvanizing with minimum zinc coating of 600 g/sq.m. to CSA G164-1965 (M1981).
- 2.5.3 Shop coat primer: to CGSB 1-GP-40M.
- 2.5.4 Galvanized primer: zinc rich, ready mix to CGSB 1-GP-181M. For galvanized fabrications touchup to remain unpainted in finished work, use W.R. Meadows of Canada Ltd. "Galvafruid" or Kerry Industries "Z.R.C." or Niagara Paint Inc. "PL052898" zinc rich coating.
- 2.5.5 Clean steel to SSPC SP6 and remove loose mill scale, weld flux and splatter.
- 2.5.6 Shop prime with one coat of primer paint to dry film thickness of 0.025mm. Paint on dry surfaces, free from rust, scale, grease. Do not paint when temperature is lower than 7 degrees Celsius (45 degrees F). Paint items under cover and leave under cover until primer is dry. Follow paint manufacturer's recommendations regarding application methods, equipment, temperature, and humidity conditions.
- 2.5.7 Clean but do not paint surfaces being welded in field.

2.5.8 Do not paint surfaces embedded in concrete.

2.5.9 Do not paint surfaces in friction connections.

2.6 ACCESS HATCHES

2.6.1 Furnish and install aluminum access hatches of sizes and locations where indicated on the Contract Drawings. Access door shall be pre-assembled from the manufacturer. Unit shall carry a minimum 25 year guarantee against defects in material and/or workmanship.

2.6.2 Unless otherwise notes, access hatched shall be surface mount 'mushroom' design with insulated cover, watertight seal and channel drain connection.

2.6.3 Frame shall be minimum 6.4mm extruded aluminum with anchor tabs around perimeter.

2.6.4 Hatches shall be fabricated of Aluminum. Use raised pattern checker plate, made out of a single piece of plate with a minimum thickness of 6.4mm for hatch surfaces. Reinforce hatches with welded reinforcing ribs or angles to limit the deflection to the lesser of 3mm or 1/150th of the span under a minimum live load 7.5 kN/m² or concentrated load of 1.1 kN at the center.

2.6.5 Hatches shall be fitted with lifting springs in order to facilitate lifting of the hatch by a single operator and to check the downward motion when being lowered. Hatches shall be equipped with hold open arms, which will lock the hatch when in a fully open position.

2.6.6 Safety Grate: Each hatch shall come complete with a safety grate as per the following specifications:

- .1 Safety grate rated at 14.4 kN/m².
- .2 Grate openings shall allow for visual inspection, limited maintenance and float adjustment while the safety grate fall through protection is left in place.
- .3 Each grate shall be provided with a permanent hinging system and pull opening arm, which will lock the grate in the 90 degree position once opened.
- .4 Each safety grate shall be coated with a safety orange colour promoting visual awareness of the hazard.

2.6.7 All miscellaneous hardware shall be 316 stainless steel.

2.6.8 Hinges: Heavy Gauge forged aluminum

- 2.6.9 Insulated hatches shall be covered with metal sheet liner of same material as hatch.
- 2.6.10 Provide neoprene rubber sealing gaskets for water tight seal.
- 2.6.11 Seal hatches to exterior surface of chamber to prevent all moisture penetration.
- 2.6.12 Finishes: Factory finish shall be mill finished aluminum with bituminous coating applied to the exterior of the frame.
- 2.6.13 Acceptable Manufacturers:
 - .1 MSU Mississauga Ltd. (MG Hatch)
 - .2 BILCO Canada (JD-AL)
 - .3 Halliday

2.7 GUARDRAIL

- 2.7.1 Design guardrail in accordance with Ontario Building Code and for additional requirements specified.
- 2.7.2 Shop drawings for stairs and support members shall bear the seal and signature of a Professional Structural Engineer responsible for their design.
- 2.7.3 General:
 - .1 The aluminum railings shall be round pipe railing system unless otherwise indicated. Railing system shall be deck base or side bracket mounted unless indicated otherwise.
 - .2 Railings and handrail brackets shall be capable of withstanding either of the following loading conditions without exceeding the allowable working stress of the material and without permanent deformation: one a 200-pound concentrated load applied to any point in any direction two a 50-pound per linear foot loading applied perpendicular to the top rail.
 - .3 The allowable working stress shall be 60 per cent of the material yield stress for materials that are more than 3 inches from a weld and 40 per cent of the yield stress for all materials within 3 inches of any weld.
 - .4 Design railing system in accordance with the Ontario Building Code last edition.
 - .5 Design handrail arrangements to eliminate tubing projections at the upper and lower ends.
 - .6 Railings to be neatly curved at stair ends, at change in direction and the like, with no posts directly places at such change in direction.

- .7 Railings shown at curved structures, elements or other areas such as the following: tanks, retaining walls, stairs, process units and ramps shall be bent to the radius necessary to install where indicated.

2.7.4 Fabrication

- .1 Pipe cuts shall be clean, straight, square and accurate for minimum 1/8-inch joint gap. WORK shall be done in conformance with the handrail manufacturer's instructions. WORK shall be free from blemishes, defects, and misfits of any type which can affect durability, strength, or appearance.
- .2 Railing and handrail brackets shall be connected by screws or bolts. Holes shall be punched 1/16-inch larger than the nominal size of the fasteners, unless otherwise indicated. Wherever needed because of the thickness of the metal, holes shall be subpunched and reamed or drilled. Handrail components with mismatched holes shall be replaced. No drifting of bolts nor enlargement of holes will be allowed to correct misalignment.
- .3 Aluminum items in contact with concrete or steel or embedded in concrete shall be provided with an electrolysis protective material. The protective material shall be applied to the aluminum surface which will be in contact with the dissimilar material. Protection material shall be pressure tapes, coatings, or isolators.
- .4 Metal to be embedded in concrete shall be placed accurately and held in correct position while the grout is placed. Railing post shall not be installed until after concrete has attained its design strength.
- .5 Posts, except for removable railings, shall be provided with weep holes for condensation drainage within 3/16-inch of the finish deck.
- .6 Contractor to complete as much welding within a shop prior to mobilizing materials to site. Any field welding required must be in compliance with AWS D1.1, CSA W47.1 and W59.

2.7.5 Materials:

- .1 Aluminum tubing minimum Schedule 40 for railing and Schedule 80 for posts with shop welded connections.
- .2 Rail Section: Railings and handrails shall be round pipe design railing system unless otherwise indicated.
- .3 Rail Material: Aluminum shall be U.S. Alloy 6063, T-5 or T-6. Aluminum pipe rail shall be not less than 38mm diameter, Schedule 40 pipe.
- .4 Welding Rods: Aluminum welding rods shall be of type recommended by the aluminum manufacturer for anodized finished products.
- .5 Protective Coating: Electrolysis protective material shall comply with manufacturers recommendations.

- .6 Fasteners: Fasteners, screws, and bolts shall be concealed and shall be of type 316 stainless steel (316 alloy). Handrail bracket fasteners and fasteners over water basins shall be of type 316 stainless steel.
- .7 Brackets: Handrail brackets shall be aluminum with a finish that matches the handrail or railing of which they are a part.
- .8 Toeboards: Toeboards shall match railing system and shall be fabricated of 4.8mm (minimum) aluminum and not less than 100mm in height. Toeboards for picket railings shall be a special extrusion if a snap-in centered type toeboard is not standard with the railing manufacturer. Toeboards for pipe railing shall be channel section for strength.

2.7.6 Finishes

- .1 Pipe Railing System: Pipe railing system including handrails, railings, tube caps, and other miscellaneous parts of rails shall be provided with a 0.7-mil clear anodized finish, AA- M12-C22-A
- .2 Height Requirements: Top of upper railing shall be 1200mm above the working surface or finish grade. Toeboards shall be installed not more than 6mm off the working surface. Handrail heights shall be per standards.

2.8 STAIRS

- 2.8.1 Design stairs in accordance with Ontario Building Code and for additional requirements specified.
- 2.8.2 Shop drawings for stairs and support members shall bear the seal and signature of a Professional Structural Engineer responsible for their design.
- 2.8.3 Material:
 - .1 Aluminum: ASTM B632, Alloy 6060-T6
- 2.8.4 Minimum Thickness:
 - .1 Aluminum: 10mm, unless shown otherwise on Drawings.
- 2.8.5 Fabricate stairs as detailed on drawings and install using stainless steel anchor bolts.
- 2.8.6 Design the tread sections to limit deflection to 1/180th of the span under a concentrated load of 1.0 kN at the centre.
- 2.8.7 Fabricate stairs with open grating treads of welded grating with slip-resistant, 32mm cross hatch solid nosing.

- 2.8.8 Provide complete stair assemblies, including metal framing, hangers, struts, railings, clips, brackets, bearing plates, and other components necessary to support and anchor stairs and platforms on supporting structure.
- 2.8.9 Fabricate treads and platforms of exterior stairs so finished walking surfaces slope to drain.
- 2.8.10 Preassembled Stairs: Assemble stairs in shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.
- 2.8.11 Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch (1 mm), unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
- 2.8.12 Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
- 2.8.13 Form exposed work true to line and level with accurate angles and surfaces and straight edges.
- 2.8.14 Weld connections to comply with the following:
- 2.8.15 Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
- 2.8.16 Obtain fusion without undercut or overlap.
- 2.8.17 Remove welding flux immediately
- 2.8.18 Weld exposed corners and seams continuously at stairs and railings in jail areas.
- 2.8.19 Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) screws or bolts unless otherwise indicated. Locate joints where least conspicuous.
- 2.8.20 Fabricate joints that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.
- 2.8.21 Consider clearances with adjacent materials and provide correct procedures for erection. Provide supports, anchoring devices, anchor bolts, screws, clips, seals and gaskets, and other accessories.

2.8.22 Contractor to complete as much welding within a shop prior to mobilizing materials to site. Any field welding required must be in compliance with AWS D1.1, CSA W47.1 and W59

2.8.23 Acceptable Manufacturers:

- .1 Borden Metal Products Ltd.
- .2 Fisher & Ludlow Ltd.
- .3 Approved Equal

2.9 GRATING

2.9.1 Aluminum Grating: Aluminum grating shall be pressure locked type, with cross bars deformed or swaged to prevent turning. Bearing bars shall be at least 5mm thick flat stock or equivalent I-bars, with centre-to-centre spacing of 30mm. Cross bar centre-to-centre spacing shall be 100mm maximum. Grating shall be a mill finish. All cuts in aluminum grating shall be sawed or sheared and banded. Supply and install aluminum grating in accordance with recommendations in the "Metal Bar Grating Manual" of the National Association of Architectural Metal Manufacturers (NAAMM). Grating depth shall be as indicated on the Contract Drawings.

2.9.2 Grating Fasteners: Manufacturer's standard, ANSI Type 316 stainless steel.

2.9.3 Clips, Bolts, Nuts, Washers: Manufacturer's standard, ANSI Type 316 stainless steel.

2.9.4 Grating shall be fabricated in panels that can be easily handled by plant personnel. Unless otherwise indicated on the drawings, the weight of individual panels shall not exceed 35 kg.

2.9.5 Grating panels shall be arranged so that openings are centered on a joint between panels and toe plates extending the full depth of the grating.

2.9.6 Steel frames anchored to or cast in concrete to support grating shall be stainless steel or hot-dipped galvanized after fabrication.

2.9.7 Unless otherwise indicated on the Contract Drawings grating shall be galvanized steel pressure locked Borden Type B grating or equivalent.

2.10 STEEL CLADDING AND COMPONENTS

2.10.1 Sheet siding: to CGSB 93.4, Type A vertical: VicWest CL6025 or equal, wide profile outward or approved equal.

2.10.2 Finish coating: Series 8000

- 2.10.3 Colour: colours from standard range to be approved by Engineer.
- 2.10.4 Thickness: 24ga base metal thickness minimum
- 2.10.5 Accessories
 - .1 Exposed trim: inside corners, outside corners, cap strip, drip cap, undersill trim, starter strip and window/door trim of same material, colour and gloss as cladding, with fastener holes pre-punched.
- 2.10.6 Fasteners
 - .1 To be in accordance with manufacturer specifications.
 - .2 Fastener colour to match steel siding.
- 2.10.7 Sheathing Paper
 - .1 Spun-bond polyester fabric "Tyvar" or spun bond olefin "Tyvec" or approved equal.
- 2.10.8 Profiles/Colours
 - .1 Equal to VicWest CL6025, colour from standard 8000 series range.

2.11 MISCELLANEOUS ITEMS

- 2.11.1 All aluminum and/or steel angles, channels, beams and related connection hardware as indicated.
- 2.11.2 Review all drawings and include all other metal fabrication not included in the above noted list.

3 EXECUTION

3.1 INSPECTION

- 3.1.1 Examine areas and conditions under which metal items are to be installed. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to installer.

3.2 PREPARATION

- 3.2.1 Coordinate setting drawings, diagrams, templates, instructions and directions for installation of items having integral anchors which are to be embedded in concrete or masonry construction. Coordinate delivery of such items to project site.

3.3 INSTALLATION

- 3.3.1 Provide anchorage device and fasteners where necessary for securing metal items to in-place construction; including threaded fasteners for concrete and masonry inserts, toggle bolts, through bolts, lag bolts, wood screws and other connectors as required.
- 3.3.2 Perform cutting, drilling and fitting required for installation of metalwork. Set products accurately in location, alignment and elevation, plumb, level, true and free of rack, measured from established lines and levels. Provide temporary bracing or anchors in form work for items which are to be built into concrete, masonry or similar construction.
- 3.3.3 Fit exposed connections accurately together to form tight hairline joints, or where indicated, with uniform reveals and spaces for sealants and joint fillers. Where cutting, welding and grinding are required for proper shop fitting and jointing for metal items, restore finishes to eliminate any evidence of such corrective work.
- 3.3.4 Anchor securely in manner shown, using concealed anchorages wherever possible.
- 3.3.5 Do not cut or abrade finishes which cannot be completely restored in the field. Return items with such finishes to the shop for required alterations, followed by complete refinishing or provide new units as required.
- 3.3.6 Restore protective coverings that have been damaged during shipment or installation of work. Remove protective coverings only when there is no possibility of damage from other work yet to be performed at same location.
- 3.3.7 Retain protective coverings intact and remove simultaneously from similarly finished items to preclude non-uniform oxidation and discoloration.
- 3.3.8 Field Welding: Comply with applicable AWS specification for procedures of manual shielded metal-arc welding, for appearance and quality of welds made, and for methods used in correcting welding work. Weld connections which are not to be left as exposed joints, but cannot be shop welded because of shipping size limitations. Grind exposed welds smooth and flush and restore finish to match finish of adjacent rail surfaces.
- 3.3.9 Install cladding in accordance with CGSB 93.5, and manufacturer's written instructions
- 3.3.10 Install one layer exterior wall sheathing paper horizontally by stapling lapping edges 150mm.
- 3.3.11 Install continuous starter strips, inside and outside corners, edgings, soffit, drip, cap, sill and window/door opening flashings as indicated.

- 3.3.12 Install outside corners, fillers and closure strips with carefully formed and profiled work.
- 3.3.13 Install soffit and fascia cladding as indicated.
- 3.3.14 Maintain joints in exterior cladding, true to line, tight fitting, hairline joints.
- 3.3.15 Attach components in manner not restricting thermal movement.

3.4 ERECTION

- 3.4.1 Fit joints and intersecting members accurately. Make work in true planes with adequate fastenings. Build and erect work plumb, true, square, straight, level and accurate to sizes detailed, with tight joints and intersections, free from distortion or defects detrimental to appearance or performance.
- 3.4.2 Provide suitable means of anchorage acceptable to Engineer such as dowels, anchor clips, bar anchors, expansion bolts and shields, chemically anchored bolts and toggles.
- 3.4.3 Fit door frames and jambs with temporary steel spreaders to prevent springing frames and jambs out of shape.
- 3.4.4 Weld as specified herein.
- 3.4.5 All grating shall lie flat, with no tendency to rock when installed. Poorly fitting or damaged grating shall be rejected.

3.5 CONNECTIONS

- 3.5.1 Weld or high strength bolt main member connections. Use CISC double angle header connections wherever possible. High strength bolted connections shall be bearing type using 19mm (3/4") diameter bolts conforming to ASTM A325M. Secondary members may be bolted with machine bolts.
- 3.5.2 Perform high tensile bolted connections in accordance with CSA-S16.1. Accurately space holes of size 1.6mm larger than the nominal diameter of the bolt. Install bearing type high tensile bolted connections unless shown otherwise on Drawings. Provide compressor or electrical equipment capable of supplying and maintaining required pressure at the wrench. Make connections without the use of erection bolts, some high tensile bolts will serve that purpose. Prevent nuts on bolts, except high tensile bolts, from becoming loose by burring bolt thread, by welding or by lock washers or lock nuts.

- 3.5.3 Execute welding as specified under shop welding in Part 2 and as follows:
- .1 Provide continuous welds on exterior work to provide proper weathering.
 - .2 Take necessary safety precautions in accordance with CSA Standards when welding is carried out in cold weather.

3.6 HOT DIP GALVANIZING

- 3.6.1 Galvanize members exposed to exterior elements when in final location; members embedded on the exterior side of exterior walls; members imbedded in concrete; members specified in this Section or noted on Drawings.
- 3.6.2 Perform hot dip galvanizing after fabrication. Plug relief vents air tight. After galvanizing, remove plugs, ream holes to proper size and re-tap threads. Straighten shapes and assemblies true to line and plane after galvanizing. Repair damaged galvanized surfaces with galvanize primer in accordance with manufacturer's printed directions.
- 3.6.3 Wet Storage Stain: Remove wet storage stain that may have developed in the coating before installation so that premature failure of the coating does not occur. Remove wet storage stain in accordance with galvanizer's recommendations.
- 3.6.4 Repair of Galvanized Items: Repair coatings damaged by welding, cutting, or during handling, transport or erection using cold galvanizing compound specified, and as follows:
- .1 Ensure surface is clean, dry, and free of oil, grease and corrosion.
 - .2 Power clean surface to near white metal condition, extending into undamaged galvanized coating.
 - .3 Apply touch up material to a dry film thickness of 0.203mm minimum. If touched up work is to remain exposed in the finished work, apply a finish coat of aluminum paint to provide a colour blend with the surrounding galvanizing.
 - .4 Coating shall be continuous, adherent, as smooth and evenly distributed.

3.7 FIELD TOUCH-UP

- 3.7.1 Paint bolt heads, washers, nuts, field welds and previously unprimed items. Touch up shop primer and galvanizing damaged during transit and installation with material to match shop primer.
- 3.7.2 Clean off dirt on installed miscellaneous metal surfaces.

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MISCELLANEOUS METAL

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4 SUPPLEMENTS – N/A

END OF SECTION

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DIVISION 06

Section 06610 – FRP Fabrications

1 GENERAL

1.1 SECTION INCLUDES

1.1.1 The Contractor shall furnish, fabricate (where necessary), and install all fiberglass reinforced plastic (FRP) items, with all appurtenances, accessories and incidentals necessary to produce a complete, operable and serviceable installation as shown on the Contract Drawings and as specified herein, and in accordance with the requirements of the Contract Documents.

1.1.2 Section includes: Structural shapes and handrails

1.2 RELATED SECTIONS

1.2.1 Section 01330 – Submittals

1.2.2 Section 05500 – Metal Fabrications

1.3 REFERENCES

1.3.1 The publications listed below (latest revision applicable) form a part of this specification to the extent referenced herein. The publications are referred to within the text by the designation only.

- .1 ASTM D-495-High Voltage, Low-Current, Dry Arc Resistance of Solid Electrical Insulation
- .2 ASTM D 635 - Rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position
- .3 ASTM D-638 - Tensile Properties of Plastics
- .4 ASTM D-696 - Coefficient of Linear Thermal Expansion of Plastics Between -30°C and 30°C with a Vitreous Silica Dilatometer.
- .5 ASTM D-790 - Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials
- .6 ASTM D-2344 – Short-Beam Strength of Polymer Matrix Composite Materials and their Laminates
- .7 ASTM E-84-Surface Burning Characteristics of Building Materials
- .8 ASTM D-2996 Filament-Wound “Fiberglass” (Glass-Fiber-Reinforced Thermosetting Resin) Pipe.
- .9 The Ontario Building Code
- .10 The Occupational Health and Safety Administration (OSHA)

1.4 SUBMITTALS

- 1.4.1 The Contractor shall furnish manufacturer's shop drawings clearly showing material sizes, types, styles, part or catalogue numbers, complete details for the fabrication and erection of components including, but not limited to, location, lengths, type and sizes of fasteners, clip angles, member sizes, and connection details in accordance with Section 01330 - Submittals.
- 1.4.2 The Contractor shall submit the manufacturer's published literature including structural design data, structural properties data, grating load/deflection tables, corrosion resistance tables, certificates of compliance, test reports as applicable, concrete anchor systems and their allowable load tables, and design calculations for systems not sized or designed in the contract documents.
- 1.4.3 The Contractor may be requested to submit sample pieces of each item specified herein for acceptance by the Engineer as to quality and color. Sample pieces shall be manufactured by the method to be used in the Work.
- 1.4.4 The Contractor shall provide calculations and drawings sealed by a registered professional Engineer for all fabricated items. Contractor shall coordinate and provide any documentation requested to support building permit requirements.

1.5 QUALITY ASSURANCE

- 1.5.1 All items to be provided under this Section shall be furnished only by manufacturers having a minimum of ten years experience in the design and manufacture of similar products and systems. If requested, a record of at least five previous, separate, similar successful installations in the last five years shall be provided.
- 1.5.2 Manufacturer shall offer a 3 year limited warranty on all FRP products against defects in materials and workmanship.
- 1.5.3 Manufacturer shall be certified to the ISO 9001-200 standard.

1.6 PRODUCT DELIVERY AND STORAGE

- 1.6.1 Delivery of Materials: Manufactured materials shall be delivered in original, unbroken pallets, packages, containers, or bundles bearing the label of the manufacturer. Adhesives, resins and their catalysts and hardeners shall be crated or boxed separately and noted as such to facilitate their movement to a dry indoor storage facility.

- 1.6.2 Storage of Products: All materials shall be carefully handled to prevent them from abrasion, cracking, chipping, twisting, other deformations, and other types of damage. Store items in an enclosed area and free from contact with soil and water. Store adhesives, resins and their catalysts and hardeners in dry indoor storage facilities between 21 to 29°C until they are required.

2 PRODUCTS

2.1 MANUFACTURER

- 2.1.1 Acceptable Handrail Manufacturers:
- .1 Fibergrate Composite Structures Inc. (Dynarail™ system)
 - .2 Equivalent Strongwell fiberglass system (SAFRAIL™)
 - .3 Approved equal.
- 2.1.2 Acceptable FRP Baffle Manufactures:
- .1 Strongwell Fiberglass Baffle Panels
 - .2 Bedford Reinforced Plastics (PROForms© Structural Shapes Baffle Panels)
 - .3 Enduro Composites

2.2 GENERAL

- 2.2.1 All FRP items furnished under this Section shall be composed of fiberglass reinforcement and resin in qualities, quantities, properties, arrangements and dimensions as necessary to meet the design requirements and dimensions as specified in the Contract Documents.
- 2.2.2 Fiberglass reinforcement shall be continuous roving, continuous strand mat and surfacing veil depending on the material, in sufficient quantities as needed by the application and/or physical properties required.
- 2.2.3 Resin shall be Isophthalic Polyester for all systems except materials used in chemical storage or containment areas which may require Vi-Corr® (vinyl ester resin system), with chemical formulations as necessary to provide the corrosion resistance, strength and other physical properties as required. For potable water areas, materials shall be manufactured using an NSF-61 approved resin system.
- 2.2.4 The visual quality of the pultruded shapes shall conform to ASTM D4385.
- 2.2.5 If required, after fabrication, all cut ends, holes and abrasions of FRP shapes shall be sealed with a compatible resin coating.

- 2.2.6 All exposed surfaces shall be smooth and true to form, consistent with ASTM D4385.
- 2.2.7 All finished surfaces of FRP items and fabrications shall be smooth, resin rich, free of voids and without dry spots, cracks, crazes or unreinforced areas. All glass fibers shall be well covered with resin to protect against their exposure due to wear or weathering.
- 2.2.8 All FRP products shall have a tested flame spread rating of 25 or less per ASTM E 84 Tunnel Test. Gratings shall also have tested burn time of less than 30 seconds and an extent of burn rate of less than or equal to 10mm per ASTM D635.
- 2.2.9 All mechanical grating clips shall be manufactured of Type 316SS (stainless steel).
- 2.2.10 All items shall be new, of current design, from reputable manufacturers specializing in such products.
- 2.2.11 Supports and Fasteners: Bolts, anchor bolts, washers and supports shall be fabricated of Type 316 stainless steel, unless otherwise indicated.
- 2.2.12 In direct UV condition, FRP products shall be shop coated with a protective coating system, i.e. two-part polyurethane coating, 3 mils thick minimum, for improved durability and UV resistance.

2.3 STRUCTURAL SHAPES

- 2.3.1 In addition to the requirements specified under 2.2 General, comply with the following:
- 2.3.2 All structural shapes are to be manufactured by the pultrusion process with a glass content minimum of 45 per cent, maximum of 55 per cent by weight for maximum sunlight and chemical resistance.
- 2.3.3 For outdoor exposures, all pultruded structural shapes shall be further protected from ultraviolet (UV) attack with integral UV inhibitors in the resin, synthetic surfacing veil to produce a resin rich surface.
- 2.3.4 Pultruded structural shapes are to have the minimum longitudinal mechanical properties listed below:

Property	ASTM Method	Value	Units
Tensile Strength	D-638	30,000 (206)	psi (MPa)

Tensile Modulus	D-638	2.5 x 10 ⁶ (17.2)	psi (GPa)
Flexural Strength	D-790	30,000 (206)	psi (MPa)
Flexural Modulus	D-790	1.8 x 10 ⁶ (12.4)	psi (GPa)
Flexural Modulus (Full Section)	N/A	2.8 x 10 ⁶ (19.3)	psi (GPa)
Short Beam Shear (Transverse)	D-2344	4,500 (31)	psi (MPa)
Shear Modulus (Transverse)	N/A	4.5 x 10 ⁵ (3.1)	psi (GPa)
Coefficient of Thermal Expansion	D-696	8.0 x 10 ⁻⁶ (1.4 x 10 ⁻⁶)	in/in/°F (cm/cm/°C)
Flame Spread	E-84	25 or less	N/A

2.4 GUARDRAIL

- 2.4.1 In addition to the requirements specified under 2.2 General and 2.3 Structural Shapes comply with the following:
- 2.4.2 All handrail systems shall be compliant to OSHA 1910.29, OSHA 1910.23 and the Ontario Building Code.
- 2.4.3 Pultruded structural shapes used in the handrail are to comply with Section 2.3.4
- 2.4.4 The completed handrail design and installation must meet the most recent edition of the Ontario Building Code and OSHA loading requirement.
- 2.4.5 Top and mid rails are to be 44.4mm x 3.2mm square tube, the posts are to be 53.9mm x 4.8mm square tube and kickplate is to be 12mm deep x 100mm high with two reinforcing ribs.
- 2.4.6 The handrail post/rail connection is to be fabricated such that the rails are unbroken and continuous through the post without the use of packs or splices. The mid rail is to be installed through the post at a prepared hole made to fit the outside dimensions of the rail. The top rail is to fit into a machined, u-shaped pocket formed into top of the post such that the rail is located at the center of the post. All exposed post corners are to be radiused to eliminate sharp edges. The rails are to be joined to the post through a combination of bonding and riveting. No sharp, protruding edges are to remain after assembly of the handrail. Spacing of the posts shall not exceed 1.5 m.
- 2.4.7 All rails, posts, and kick plates are to be integrally pigmented yellow.
- 2.4.8 Handrails to be located outdoors shall be further protected from ultraviolet (UV) attack with
- .1 integral UV inhibitors in the resin,
 - .2 synthetic surfacing veil to produce a resin rich surface.,
- 2.4.9 All fasteners used in the railing system are to be 316 SS. Rivets will be 18-8 stainless steel rivets.
- 2.4.10 Guardrail installation works shall be coordinated with concrete repair works to ensure guardrail posts are mounted securely.

2.5 BAFFLE WALL PANEL

- 2.5.1 Materials

- .1 FRP baffle panels shall be manufactured by Strongwell using the pultrusion process. Resin shall be (isophthalic polyester) (isophthalic polyester with fire retardant additive) (vinyl ester) (NSF 61 resin certified for potable water applications) with ultraviolet (UV) inhibitor additives. A minimum 7 mil. synthetic surface veil shall be the outermost layer covering the exterior surface.
- .2 Baffle Wall Panels shall possess the following characteristic coupon properties:

Properties	ASTM Test Method	Units	Value
Tensile Strength, LW	D638	PSI	52,200
		kPa	3.60×10^5
Flexural Strength, LW	D790	PSI	63,700
		kPa	4.39×10^5
Flexural Modulus, LW	D790	PSI	1.91×10^6
		kPa	1.32×10^7
Compressive Strength	D695	PSI	52,100
		kPa	3.59×10^5
IZOD Impact Strength	D256	ft.lbs./in.	33.3
		J/mm	1.77

2.5.2 Design

- .1 24" (610mm) nominal Baffle Wall Panel Design Properties
 - .1 $I_{xx} = 11.388 \text{ in}^4$ or 474 cm^4
 - .2 Modulus of Elasticity = 2.94×10^6 mpsi or 20.2×10^6 kPa
 - .3 Moment Capacity = 65,700 in-lb/ft or 2,260 N-m/m
 - .4 Stiffness EI = 33.55×10^6 lb-in²/ft or 29.35×10^9 N-mm²/m
- .2 24" (610mm) nominal Baffle Wall Panel Deflection (Static Differential Head of Water)

2.5.3 Hardware

- .1 All fasteners, anchors, and structural hardware shall be 316 stainless steel.
- .2 All connections of Baffle Wall Panels to fiberglass columns or super structure shall be as shown on the approved shop drawings.

3 EXECUTION

3.1 GENERAL

3.1.1 Measurements

- .1 FRP Structures and systems supplied shall meet the dimensional requirements and tolerances as shown or specified. The Contractor shall provide and/or verify measurements in field for work fabricated to fit field conditions as required by manufacturer to complete the work. When field dimensions are not required, Contractor shall determine correct size and locations of required holes or cutouts from field dimensions before grating fabrication.

3.1.2 Sealing

- .1 All shop fabricated cuts, drilled holes, etc. shall be coated with vinyl ester resin to provide maximum corrosion resistance. All field fabricated cuts, drilled holes, etc. shall be coated similarly by the Contractor in accordance with the manufacturer's instructions.

3.1.3 Hardware

- .1 All hardware, except rivets in the handrail system, shall be type 316SS. Rivets in handrail shall be 18.8 stainless steel. Type 316 stainless steel hold down clips shall be provided and spaced at a maximum of four feet apart with a minimum of four per piece of grating, or as recommended by the manufacturer.

3.2 GUARDRAIL

- 3.2.1 The bases of the posts are to be attached according to the contract drawings.
- 3.2.2 To avoid embrittlement at cold temperatures at high temperatures, no PVC or CPVC connections should be used as a load carrying component of the handrail system.

3.3 STRUCTURAL SYSTEMS

- 3.3.1 Structural systems shall be assembled and erected in accordance with the manufacturers erection drawings. The Contractor shall ascertain that plumbness, level and alignment are within acceptable tolerances.
- 3.3.2 Normal erection operations include the correction of minor misfits by moderate amounts of reaming or cutting to draw the elements into line. Errors which cannot be corrected by the foregoing means or require major changes in member configuration should be immediately reported to the Owner and fabricator to enable whoever is responsible to either correct the error or approve the most efficient and economic method of correction to be used.

3.4 INSPECTION

- 3.4.1 Shop inspection is authorized as required by the Owner and shall be at Owner's expense. The fabricator shall give ample notice to Contractor prior to the beginning of any fabrication work so that inspection may be provided. The grating shall be as free, as commercially possible, from visual defects such as foreign inclusions, delamination, blisters, resin burns, air bubbles and pits. The surface shall have a smooth finish (except for grit top surfaces).

3.5 GENERAL INSTALLATION

- 3.5.1 Contractor shall install FRP structures in accordance with manufacturers assembly drawings. Lock grating panels securely in place with hold down fasteners as specified herein. Field cut and drill fiberglass reinforced plastic products with carbide or diamond tipped bits and blades. Seal cut or drilled surfaces in accordance with manufacturer's instructions. Follow manufacturer's instructions when cutting or drilling fiberglass products or using resin products; provide adequate ventilation.
- 3.5.2 Fastening to in-place construction: Provide anchorage devices and fasteners where necessary for securing miscellaneous FRP fabrications to in-place construction; include threaded fasteners for concrete and masonry inserts, toggle bolts, through-bolts, lag bolts and other connectors as determined by the Design Engineer.

- 3.5.3 Cutting, fitting and placement: Perform cutting, drilling and fitting required for installation of miscellaneous FRP fabrications. Set FRP fabrication accurately in location, alignment and elevation; with edges and surfaces level, plumb, true and free of rack; measured from established lines and levels.
- 3.5.4 Provide temporary bracing or anchors in form work for items that are to be built into concrete masonry or similar construction.
- 3.5.5 If required, all field cut and drilled edges, holes and abrasions shall be sealed with a catalyzed resin compatible with the original resin as recommended by the manufacturer.
- 3.5.6 Install items specified as indicated and in accordance with manufacturer's instructions.

4 SUPPLEMENTS – N/A

END OF SECTION

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DIVISION 08

Section 08100 – Hollow Metal Doors and Frames

Section 08710 – Finish Hardware

SECTION 08100 – HOLLOW METAL DOORS AND FRAMES

1 GENERAL

1.1 SECTION INTENT

- 1.1.1 This Section describes the requirements for supply and installation of metal doors complete with frames, fasteners, lag screws, anchors, etc., as indicated on the Contract Drawings and specified herein as required to complete the work.

1.2 RELATED SECTIONS

- 1.2.1 Section 01330 – Submittals.
- 1.2.2 Section 08710 – Finish Hardware.
- 1.2.3 Section 09900 – Painting.

1.3 REFERENCES

- 1.3.1 The latest edition of the following standards shall govern the work of this section:
- .1 ASTM A653/A653M – Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvannealed) by the Hot-Dip Process.
 - .2 ASTM A924 – Standard Specification for General Requirements for Steel Sheet, Metallic-coated by the Hot-dip Process.
 - .3 CSA W47.1 – Certification of Companies for Fusion Welding of Steel Structures.
 - .4 CSA W59-M – Welded Steel Construction (Metal Arc Welding).
 - .5 ANSI A250.8 – Standard Steel Doors and Frames.
- 1.3.2 Canadian Steel Door and Frame Manufacturers' Association, CSDFMA
- .1 CSDFMA, Specifications for Commercial Steel Doors and Frames, 1990.
 - .2 CSDFMA, Recommended Selection and Usage Guide for Commercial Steel Doors, 1990.

1.4 SUBMITTALS

- 1.4.1 Provide Shop Drawings of the metal doors and frames to be furnished under this Section in accordance with Section 01330 - Submittals.

- 1.4.2 Clearly indicate type of door and frame, the material being supplied, gauges of metal work, the type and mil thickness of primer, cutouts and reinforcement for hardware and anchors.

1.5 DELIVERY, STORAGE AND HANDLING

- 1.5.1 Take all necessary precautions to protect work against rust, damage and distortion during manufacturing and delivery.
- 1.5.2 Protect hollow metal work from damage. Replace damaged work which cannot be satisfactorily repaired, restored or cleaned at no increase in contract price.
- 1.5.3 Store materials on site in a manner to prevent damage thereto.

2 PRODUCTS

2.1 DESCRIPTION AND SOURCE

- 2.1.1 Doors are of the insulated/sound deadened, steel-stiffened type using the spot welding or adhesive method to attach face sheets to the rib stiffeners.
- 2.1.2 Frames are of the welded type. Knockdown frames are not permitted.
- 2.1.3 Existing door dimensions to be confirm on site by the contractor.
- 2.1.4 Source doors and frames from one of the following:
- .1 S.W. Fleming.
 - .2 Artek Door.
 - .3 Baron Metal Industries.
 - .4 Daybar Industries Limited.
 - .5 Approved equivalent.

2.2 DOOR MATERIALS

- 2.2.1 Steel: commercial grade cold rolled roller sheet steel to ASTM A366-72, Class 1, or commercial grade to ASTM A526--71 (1975) with G90 zinc finish, in 1.22mm.
- 2.2.2 Exterior doors to be Z275 zinc coated 1.22mm thick steel, with waterproof head rail.
- 2.2.3 Exterior door core: urethane insulation unless fire rated.
- 2.2.4 Interior doors to be zinc wipe coated 0.91mm thick steel.
- 2.2.5 Interior door core: structural kraft paper honeycomb of 20mm cell size.

2.2.6 Glazing stops: minimum 1mm base thickness sheet steel with G90 zinc finish to ASTM A525-78 tamperproof screw fixed.

2.2.7 Primer: for touch up to CGSB 1-GP-181M.

2.3 FRAME MATERIALS

2.3.1 Sheet steel: commercial grade hot rolled to ASTM A569-72, or commercial grade to ASTM A526-71 (1975) with wipe coat zinc finish.

- .1 Frames: 1.22mm thick.
- .2 Floor and wall anchors: minimum 1.6mm base thickness steel.
- .3 Guard boxes: minimum 0.8mm base thickness steel.

2.4 DOOR FABRICATION

2.4.1 Fabricate steel doors as detailed, to Canadian Steel Door and Frame Manufacturer's Association, "Canadian Manufacturing Specifications for Steel Doors and Frames", 1978.

2.4.2 Fabricate fire-rated doors in accordance with ULC requirements and provide ULC labels.

2.4.3 Mortise, reinforce, drill and tap doors and reinforcements to receive hardware using templates provided by finish hardware supplier. Refer to Section 08710 for mounting heights.

2.4.4 Make provision for louvres and glazing as indicated and provide necessary glazing stops.

2.4.5 Construct rail and stile doors in same manner as flush doors.

2.4.6 Construct matching panels in same manner as doors.

2.4.7 Touch up doors with primer where galvanized finish damaged during fabrication.

2.5 FRAME FABRICATION

2.5.1 Fabricate frames as detailed, to Canadian Steel Door and Frame Manufacturers Association, "Canadian Manufacturing Specifications for Steel Doors and Frames", 1978, except where specified otherwise.

2.5.2 Fabricate fire-rated frames in accordance with ULC standards and provide ULC labels.

2.5.3 Use three piece "knockdown" frames for interior.

- 2.5.4 Provide adjustable jamb anchors, welded centre anchor and welded floor anchor at each jamb section for interior.
- 2.5.5 Mortise, reinforce, drill and tap for hinges and strikes. Protect strike reinforcing with guard box.
- 2.5.6 Install three bumpers on strike jamb for each door.

2.6 HARDWARE

- 2.6.1 As per Section 08710 - Finish Hardware.
- 2.6.2 Manufacturers' catalogue numbers specified, denote standard of quality, style and function of items required.
- 2.6.3 Finish of Hardware: To match colour and finish specified for doors and/or to the Engineer's acceptance. Finish of fastenings: Complementary to related hardware.

2.7 FINISH

- 2.7.1 Give all surfaces one coat of shop primer prior to shipment.
- 2.7.2 Finish painting will be performed as specified in Section 09900 - Painting.

3 EXECUTION

3.1 INSTALLATION

- 3.1.1 Erect assemblies plumb, true and square, in accordance with manufacturer's printed instructions.
- 3.1.2 Accurately fit assemblies to provide air-tight and watertight installation and provide clearance required due to expansion, contraction and deflection of building structures and frames. Anchor units securely to building structure.
- 3.1.3 Seal hairline joints at junction of frame members on interior side.
- 3.1.4 Install doors to operate freely and close tightly.
- 3.1.5 Installation Tolerances for Each Unit:
 - .1 Vertical position; ± 3 mm.
 - .2 Horizontal position; ± 3 mm.
 - .3 Deviation from plumb; 3mm maximum each plane.
 - .4 Racking of face; 6mm maximum.
 - .5 Racking in elevation; nil.

- 3.1.6 Install existing assemblies reclaimed for installation.
- 3.1.7 Install frames to allow for drywall thickness. Verify that double jamb studs secured to floor and deck have been provided.
- 3.1.8 Install frames plumb, square, level and at correct elevation.
- 3.1.9 Secure anchorages and connections to adjacent construction.

3.2 CLEANING

- .1 Wipe clean doors and frames of dust created from the door and hardware installation process.

4 SUPPLEMENTS – N/A

END OF SECTION

SECTION 08710 – FINISH HARDWARE

1 GENERAL

1.1 SECTION INCLUDES

- 1.1.1 This Section describes procedures and requirements for the supply and installation of door hardware.

1.2 RELATED SECTIONS

- 1.2.1 Section 01330 - Submittals

1.3 SCOPE OF WORK

- 1.3.1 Perform work of this Section in accordance with the Contract Documents including but not limited to the following:
- .1 Supply and install finish hardware for this project, complete with templates, installation instructions, screws, expansion shields, anchors and other related accessories, and schedule delivery to avoid delaying the progress of the work.
 - .2 Deliver hardware to the job site packaged, labelled and cross-referenced to the hardware schedule in such a manner that all items may be readily located to their scheduled location on the work. Hardware is listed in Part 3 of this Section.
 - .3 Final adjustment on door closers including closing speed, latching speed and backcheck.
 - .4 Obtain up-to-date Finish Hardware Schedule and keep a copy in a 3-ring binder at the jobsite. Make Schedule available to the Consultant upon request. Record any changes made to Hardware Schedule at the site.
 - .5 Keep a copy of all reviewed catalogue cuts and samples, if any, and have same readily available to the Consultant upon request.

1.4 SUBMITTALS

- 1.4.1 Submit the following as Shop Drawings in accordance with Section 01330-Submittals:
- .1 Manufacturer's specifications, catalogue cuts, templates, samples and other data required to demonstrate compliance with specified requirements.
 - .2 Each hardware item shall be identified by manufacturer, manufacturer's catalogue number, material, function, finish and location of item in Work.

- 1.4.2 As specified in Section 01330- Submittals, provide operational, maintenance and parts list data for all mechanically operated hardware items for incorporation into the maintenance manual.

1.5 QUALITY ASSURANCE

- 1.5.1 Comply with standards specified in this Section.
- 1.5.2 Products supplied under this section shall be from manufacturers regularly engaged in the manufacture of similar items and with history of successful production acceptable to the Consultant.
- 1.5.3 The Subcontractor performing the work of this Section shall be a firm specializing in the installation of commercial doors and high quality building finish hardware.

1.6 MANUFACTURER'S WARRANTY

- 1.6.1 Provide one year Manufacturer's warranty for equipment specified in this Section.
- 1.6.2 Provide extended Manufacturer's warranty as follows on the following equipment:
- | | | |
|----|----------------|-------------|
| .1 | Mortise Hinges | Lifetime |
| .2 | Exit Devices | Three years |
| .3 | Door Closers | 10 years |
- 1.6.3 The warranty shall include coverage for defects in workmanship and materials and fitness for purpose intended.
- 1.6.4 Fill out original warranty forms in Owner's name and register with Manufacturer.

1.7 HARDWARE SCHEDULE

- 1.7.1 The Supplier shall thoroughly check the Hardware Schedule to bring any errors or omissions to the attention of the Consultant.
- 1.7.2 Degrees of swing should be confirmed for Door Holders and Closers.

1.8 DOOR SCHEDULES

- 1.8.1 Door Schedules and Working Drawings shall be thoroughly checked by the Supplier to ensure that all hardware listed can be used as specified in accordance with building codes and function. Bring any errors or omissions to attention of the Consultant.

- 1.8.2 Doors shown on drawings and omitted from the schedules shall be included on the detailed Finish Hardware Schedule.

2 PRODUCTS

2.1 DOOR HARDWARE

- 2.1.1 Door hardware shall be supplied based on the approved Hardware Schedule detailed under this Section.

- 2.1.2 Supplier is to ensure that the hardware as specified is suitable in both dimension and function for the intended purpose. Advise the Consultant of any errors or omissions herein.

- 2.1.3 Acceptable Manufacturers:

.1	Mortise Hinges:	Stanley
.2	Locksets/Latchsets/Deadlocks:	Schlage L Series
.3	Exit Devices	Von Duprin
.4	Door Closers:	LCN
.5	Wall/Floor Stops:	Standard Metal
.6	Flatware:	Standard Metal
.7	Surface Bolts:	Standard Metal
.8	Weatherstrip/Threshold/Sweeps:	K.N. Crowder Manufacturing

- 2.1.4 Acceptable Alternative Manufacturers:

.1	Mortise Hinges:	McKinney, Hager, Ives
.2	Flatware:	CBH, Hager, CDH
.3	Weatherstrip/Threshold/Sweeps:	Pemko, National Guard, Zero Intl.
.4	Approved equivalent.	

- 2.1.5 Manufacturers that are not listed above will not be accepted unless approved by the Consultant.

2.2 HARDWARE FINISH CODE AND DESCRIPTION

- 2.2.1 The Finish Code shall be as follows:

Hinges	600
Satin Chrome, plated	626
Extruded satin aluminum/Brush	628/B
Extruded satin aluminum/Neoprene	628/N
Extruded satin aluminum/Pile	628/P

Stainless Steel	630
Stain chrome, plated	652
Aluminum (Paint)	689
Aluminum (Paint) c/w Special Rust Inhibitor	689/SRI

2.3 HARDWARE COMPONENTS

2.3.1 Door Closers

- .1 Furnish parallel arm or “Push Side” mount door closers at out-swinging exterior doors and interior doors where noted as “PA MNT” or “SCUSH”.
- .2 Furnish regular arm or “Pull Side” mount door closers on interior doors where noted as “REG MNT”.
- .3 Door closers are to be supplied on pull side (interior room side) of door wherever possible for aesthetic appearance.
- .4 All door closers specified with integral stop arm are to be supplied with an auxiliary spring to protect closer arm stop.

2.3.2 Door Seals/Thresholds

- .1 Doors specified with parallel arm mount door closers are to be supplied with KN Crowder W20N head seal, solid aluminum bar, installed uncut in a continuous, uncut length.
- .2 Labelled doors are to be supplied complete with adhesive smoke seal, astragals on pairs of doors and door sweeps to control smoke.
- .3 Confirm sizes of all weatherstrip, door sweeps, gasketing and thresholds prior to ordering.

2.4 FASTENERS AND FINISHES

- 2.4.1 Furnish all products with the necessary screws, bolts and other fasteners of suitable size and type to anchor all products in position.
- 2.4.2 All door closers are to be securely fastened with thru-bolts.
- 2.4.3 All fasteners shall be uniform in finish and material to the products as specified.
- 2.4.4 All exposed screws for installing hardware shall have Phillips or Robertson heads.
- 2.4.5 Unless specified otherwise by notation within the hardware set all flatware is to be fastened with 3M pressure sensitive tape.
- 2.4.6 Where a door is specified on one side of the door and push plate on the other side, install push plate to cover fasteners.
- 2.4.7 Finishes: base finish of all hardware is stainless steel (630) and/or satin brush chrome (626 and/or 652) as specified.

3 EXECUTION

3.1 DELIVERY AND STORAGE

- 3.1.1 Store finish hardware in a locked, clean and dry area on site and in a manner to allow easy access to each item group as needed without disruption of the storage arrangement.
- 3.1.2 Package each item of hardware including fastenings and installation instructions separately or in like groups of hardware. Label each package as to hardware heading number, item number and door number in correspondence with the Hardware Schedule.
- 3.1.3 Maintain a current inventory with the Hardware Schedule with each shipment to the site.
- 3.1.4 In the event of damage during shipping to the site, immediately make all repairs and replacements necessary to the approval of the Consultant and at no additional cost to the Owner.

3.2 PRODUCT HANDLING

- 3.2.1 Each unit of finish hardware shall be individually packaged, complete with proper fastenings and appurtenances, clearly marked on outside to indicate contents and specific locations in the Work.
- 3.2.2 In the event of damage, immediately make all repairs and replacements necessary to the approval of the Consultant and at no additional cost to the Owner.

3.3 INSTALLATION NOTES

- 3.3.1 Supply metal door and frame Manufacturers with complete instructions and templates for preparation of their work to receive hardware.
- 3.3.2 For each hardware component, supply Manufacturer's complete instructions to the installer.
- 3.3.3 The finish hardware installer is to ensure that all locksets, latchsets, deadlocks are of the correct hand before installation to ensure that the cylinder is in the correct position.
- 3.3.4 The finish hardware installer is to ensure that all exist devices are of the correct hand prior to installation.
- 3.3.5 All non-sized and/or universal door closers are to be fully adjusted in strict accordance with the Manufacturer's installation instructions. Adjustment is inclusive of spring power, latching speed and back-check at the time of installation.

3.3.6 All delayed action door closers are to be adjusted to a 40 second delay for handicapped accessibility and/or movement of materials.

3.3.7 All integral door closer arm stops are to be installed for 90 degree dead stop.

3.4 MOUNTING HEIGHTS

3.4.1 Hardware dimensions with respect to mounting heights shall be the distance from the finish floor to the centre line of the finish hardware unless indicated otherwise.

.1	Locksets/Latchsets (centre line of strike)	965mm
.2	Deadlocks	1524mm
.3	Exit devices (centre line of strike)	965mm
.4	Push plates/Door pulls	1067mm

3.4.2 Hardware locations are to pre-determined standard industry recommendations. On doors with intermediate rails and/or designs, all hardware should be mounted on centre to meet architectural design considerations.

3.4.3 Confirm all mounting heights prior to supply of doors and/or frames to ensure conformance with barrier free design.

3.5 DOOR/HARDWARE SET INDEX

3.5.1 Refer to Door Schedule for door/frame details and sizes, adjust hardware to suit.

3.5.2 All sized product is length to suit door size as detailed in the Door Schedule or site conditions.

3.5.3 Hardware sets specify typical application which should be read in conjunction with Door Schedule to ensure conformance to door/frame criteria.

3.5.4 Hardware application on all pairs of doors is to suit RHR or RH active application.

3.6 EXAMINATION

3.6.1 Confirm all mop/kick/armour plate sizes before ordering.

3.6.2 Confirm all weather/sound/odour/smoke seal sizes before ordering.

3.6.3 Use no wall stops on drywall or de-mountable partitions or floor stops.

3.7 ADJUSTMENT AND CLEANING

- 3.7.1 All items of hardware shall be adjusted to operate smoothly. If a manufacturer's representative has done this work, forward written confirmation of same.
- 3.7.2 Upon final completion of this project, clean and polish all items of hardware and leave free from disfigurement. Prepare or replace any hardware found defective.
- 3.7.3 Dust created from the door and hardware installation process shall be wiped clean.

3.8 MAINTENANCE

- 3.8.1 Instruct maintenance staff regarding proper care, cleaning and general maintenance of hardware.

3.9 HARDWARE SCHEDULE

- 3.9.1 Interior Single Doors each with:

Quantity	Description	Finish Code
4	Hinges (CB199 114 X 101)	630
1	Privacy Set (L9044 03B)	630
1	Door Closer (4041S/CUSH DEL 90DEG X CTB)	652 (PLATED)
2	Kickplates (K10A 400 X LTS X 3M TAPE)	630
1	Head Seal (W21 X LTS)	BLACK
2	Jamb Seals (W21 X LTS)	BLACK
1	Door Bottom (CT54 X LTS)	628

CITY OF HAMILTON

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DUNDAS WASTEWATER TREATMENT
PLANT (WWTP) HEALTH AND SAFETY
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FINISH HARDWARE

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END OF SECTION

CITY OF HAMILTON

C13-32-24

DUNDAS WASTEWATER TREATMENT
PLANT (WWTP) HEALTH AND SAFETY
IMMEDIATE NEEDS AND STRUCTURAL
REPAIR UPGRADES

DIVISION 09

Section 09900 – Painting

Section 09910 – Piping and Equipment Coatings

SECTION 09900 – PAINTING

1 GENERAL

1.1 SECTION INTENT

- 1.1.1 This Section describes products and procedures required for supply and application of architectural paints, coatings and finishes.

1.2 RELATED SECTIONS

- 1.2.1 Section 09910 - Piping and Equipment Coatings.

1.3 REFERENCES

- 1.3.1 Ontario Painting Contractors Architectural Painting Specification Manual, latest edition, available from the Ontario Painting Contractors Association (OPCA) and referenced herein as OPCA Manual.

1.4 JOB CONDITIONS

- 1.4.1 Inspect all surfaces requiring painting, and notify the Engineer in writing of any defects or problems, prior to commencing work.

1.5 SUBMITTALS

- 1.5.1 The Engineer will select colours and sheens from standard colour range except as specified herein.
- 1.5.2 Include a complete list of paint and finish materials to be used, showing the paint code and name of the manufacturer, the catalogue number, and certification to grade and quality of the materials.

1.6 CERTIFICATION

- 1.6.1 Certification: Submit to Engineer, a certification from the paint manufacturer stating that materials supplied are of paint manufacturers' premium quality. Likewise, submit a list showing manufacturers' trade names and corresponding CGSB numbers for review before purchasing any materials.

1.7 QUALIFICATIONS

- 1.7.1 Qualifications of Applicators: Work of this section is to be performed by qualified applicators experienced in the type of work to be done.

1.8 COLOUR SCHEDULE

- 1.8.1 A colour schedule giving approved colour scheme will be prepared by the Engineer.

- 1.8.2 The final selection of colours and surface textures of all finishes rests solely with the Engineer.

1.9 SUBMITTALS

- 1.9.1 Submit a complete list of all materials to the Engineer for review before proceeding with work. List shall state areas or type of surfaces where material is to be applied, name of manufacturer, exact name of product and code number or identification, if applicable.

1.10 PRODUCT HANDLING

- 1.10.1 Delivery: Deliver paint materials to the job site in sealed original labelled containers bearing manufacturer's name, type of paint, brand name, colour designation and instructions for mixing and/or reducing.
- 1.10.2 Storage: Provide adequate storage facility. Store paint materials at a minimum ambient temperature of 7°C in a well ventilated and heated single designated area.
- 1.10.3 Fire Hazard and Safety
- .1 Store containers of paint, thinner and other volatile materials in well ventilated places where they will not be exposed to excessive heat or direct sun rays. Keep tightly closed when not in actual use. Remove used cloths from building at the end of every working shift and when not in use, take precautions against spontaneous combustion, by drenching with water, or placing in air-tight covered metal containers.
 - .2 Be totally responsible for the prevention of fire or explosion caused by improper storage of paints, solvents, rags, etc. Post "No Smoking" signs in areas of storage and mixing and strictly enforce this requirement. Provide and maintain CO₂ fire extinguishers of minimum 9 kg (20 pound) capacity. Repair damage to storage area or surrounding area at no increase in Contract Price.
- 1.10.4 Toxic Materials: Where toxic materials, and explosive solvents are used, take appropriate precautions as a regular procedure. Do not smoke in areas where such materials are being used.

1.11 JOB CONDITIONS

- 1.11.1 Conform to OPCA Manual and the following.
- 1.11.2 Execute work in dust free conditions suitable for production of best results.
- 1.11.3 Do not paint exterior surfaces during frost, rainy or foggy weather.

- 1.11.4 Lighting: Do not proceed with painting unless a minimum of 1.4 candela/m² lighting is provided on the surfaces to be painted.
- 1.11.5 Heating/Ventilation: Continuously ventilate and sufficiently heat all areas where painting is being carried out to maintain temperatures above 7°C for 24 hours before and after paint application.
- 1.11.6 Temperatures:
 - .1 Do not paint when temperatures on the surface, or the air in the vicinity of the painting work are below the following:
 - .2 Exterior work: 5°C for solvent based paint; 10°C for water based paint.
 - .3 Interior work: 5°C for solvent based paint; 7°C for water based paint; 18°C for varnish.
 - .4 Maintain temperatures and adequately controlled ventilation during drying period on internal surfaces.
- 1.11.7 Relative humidity:
 - .1 Do not paint when relative humidity is higher than 85 per cent.
- 1.11.8 Moisture content of surfaces:
 - .1 Plaster and gypsum board: maximum moisture content: 12 per cent.
 - .2 Concrete and masonry: maximum moisture content: 12 per cent.
 - .3 Wood: maximum moisture content: 15 per cent.

1.12 SIGNS

- 1.12.1 Protect finished areas subject to contact during drying by "Wet Paint" signs and bar from traffic where necessary.

2 PRODUCTS

2.1 MATERIALS

- 2.1.1 Acceptable products: Per Chapter 5 of OPCA Manual and as listed.
- 2.1.2 Paint and finishing materials: Highest grade, first line quality of the manufacturer.
- 2.1.3 Paint and coating materials for each system shall be products of a single manufacturer.
- 2.1.4 All paint shall have a Fire Hazard Classification of:
 - .1 Flame Spread Rating: 25 or less.
 - .2 Smoke Developed: 50 or less.

- 2.1.5 Paints shall be factory tinted to required colours, and thoroughly mixed before application.
- 2.1.6 In instances where materials specified are not suitable for a particular job application or are contrary to Manufacturer's recommendations for use on a particular surface, such condition shall be brought to the attention of the Engineer for clarification and instructions.
- 2.1.7 Paint and related materials: Glidden Paints by ICI Paints (Canada) Inc, Sherwin-Williams Company, PPG Canada Inc. or Para Paints are acceptable.

3 EXECUTION

3.1 EXAMINATION

- 3.1.1 Examine surfaces which are to be finished including existing surfaces that require refinishing.
- 3.1.2 Report surfaces which are defective, or which cannot be prepared by usual sanding and cleaning. Report unsatisfactory site and environmental conditions.
- 3.1.3 Commence work after corrective work has been completed.

3.2 PREPARATION

- 3.2.1 Prepare surfaces to receive paint and coatings per Chapter 3 of OPCA Manual.
- 3.2.2 Check all surfaces with electric moisture meter to determine whether they are dry enough to receive paint or finish specified and do not proceed if reading is higher than maximum specified without written permission from the Engineer or the Manufacturer's representative.
- 3.2.3 Commencement of work means acceptance of job site and substrate conditions.
- 3.2.4 Protect work performed under separate Sections from paint splatter, overspray and accidental spill.
- 3.2.5 Remove soiled and used rags, waste and empty containers from the building daily.
- 3.2.6 Take precautions to prevent fire.

- 3.2.7 Exercise special precautions for safety of workers applying coating in enclosed areas by meeting requirements outlined in Ontario Regulation 691 Occupational Health and Safety Act and Regulations for Construction Projects.
- 3.2.8 Comply with instructions on paint manufacturer's Safety Data Sheets.
- 3.2.9 Related Work: Surface preparation and prime coat of metal surfaces are specified to form part of the permanent protective coating in Division 5- Metals, Division 8- Doors and Windows, Division 11- Equipment, Division 15- Mechanical, Division 16- Electrical, including responsibility for surface preparation, shop painting, and field touch-ups after erection. Be responsible for field painting of steel items which will remain exposed, after completion of erection and touch-up of shop primer, including items shop finished with a protective coating, unless specified otherwise.
- 3.2.10 Remove grilles, covers, access panels, for mechanical and electrical systems, from location and paint separately. Paint to match adjacent walls and ceilings, unless otherwise directed, and replace when dry. If items are not removable, mask adjacent areas before painting.
- 3.2.11 Test surfaces for moisture content. Do not apply materials to substrate when allowable moisture content is exceeded, as determined by accepted moisture testing device. Allowable moisture content of surfaces is 12 per cent for plaster, gypsum board, concrete or masonry and 15 per cent for wood.

3.3 APPLICATION

- 3.3.1 Apply all materials according to the manufacturer's printed instructions, OPCA Manual and as specified.
- 3.3.2 Sand and dust between each coat to remove defects visible from distance up to 1.5m.
- 3.3.3 Apply materials evenly, uniform in sheen, colour and texture, free from roller or brush marks, sags, runs or other defects.
- 3.3.4 Mask surfaces where necessary, to prevent contamination or marring of adjacent material, or different protective coating system.
- 3.3.5 Prevent overspray onto adjacent surfaces or properties.
- 3.3.6 Do not apply paint over sealant.
- 3.3.7 Verify that fabric jacketed pipes and ducts have been sized prior to painting.

- 3.3.8 Confirm piping and ducting systems have successfully passed tests specified, prior to painting.
- 3.3.9 Any surface exhibiting incomplete or unsatisfactory coverage shall have entire surface re-painted. Patching will not be accepted.
- 3.3.10 Allow paint to dry in accordance with manufacturer's specifications prior to applying succeeding coats.
- 3.3.11 Unless otherwise indicated apply one coat of primer and two coats of finishing paint.

3.4 ITEMS TO BE PAINTED

- 3.4.1 Building Items:
 - .1 New interior doors as identified on contract drawings.

3.5 PAINTING SCHEDULE – INTERIOR FINISHES

- 3.5.1 Steel: INT. 12-A, semi-gloss.
- 3.5.2 Steel-high heat: INT. 14-A, 14-0, or 14-G, as required, semi-gloss.
- 3.5.3 Galvanized Steel: INT. 13-A, semi-gloss.
- 3.5.4 Wet Area Surfaces: One coat latex primer-sealer, two coats low VOC alkyd semi-gloss paint.

3.6 COLOUR SCHEDULE - GENERAL

- 3.6.1 The Engineer will provide a complete colour schedule during the course of construction. Submit standard colour chips for selection.

3.7 CLEANING UP

- 3.7.1 Remove masking and other protection provided under this Section.
- 3.7.2 Painting work will not be considered complete until all splatters, drippings, smears and overspray have been cleaned and removed to the satisfaction of Engineer.
- 3.7.3 Make good any damage to building surfaces or furnishings resulting from painting operations at no expense to Owner.

END OF SECTION

SECTION 09910 – PIPING AND EQUIPMENT COATINGS

1 GENERAL

1.1 SECTION INTENT

- 1.1.1 This Section describes products and procedures required for the supply and application of painting coatings to process piping, fittings, valves and equipment.

1.2 RELATED SECTIONS

- 1.2.1 Section 01330 – Submittals.

1.3 REFERENCES

- 1.3.1 ASTM B 117: Test Method of Salt Spray [Fog] Testing.
- 1.3.2 ASTM D 3359: Standard Test Methods for Measuring Adhesion by Tape Test.
- 1.3.3 ASTM D 2794: Standard Test Method for Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact).
- 1.3.4 ASTM D 4585: Standard Practice for Testing Water Resistance of Coatings Using Controlled Condensation.
- 1.3.5 AWWA C210 – Liquid Epoxy Coating Systems for the Interior and Exterior of Steel Water Pipelines.
- 1.3.6 SSPC-SP 2: Hand Tool Cleaning.
- 1.3.7 SSPC-SP 3: Power Tool Cleaning.
- 1.3.8 SSPC-SP 5: White Metal Blast Cleaning.
- 1.3.9 SSPC-SP 10: Near White Blast Cleaning.
- 1.3.10 SSPC-SP 11: Power Tool Cleaning to Bare Metal.
- 1.3.11 SSPC-SP 13: Surface Preparation of Concrete.
- 1.3.12 NSF/ANSI 61: Drinking Water System Components – Health Effects
- 1.3.13 1.3.13 NSF/ANSI/CAN 600: 2018 Health Effects Evaluation and Criteria for Chemicals in Drinking Water

1.4 SUBMITTALS

- 1.4.1 Submit the following documentation in accordance with Section 01330 - Submittals.
- .1 A complete list of coating materials to be used, showing the paint code and name of the manufacturer, the catalogue number, and certification of grade and quality of the materials to the Engineer prior to the purchase of any materials.
 - .2 A full range of colour chips to the Engineer/Owner for approval.

1.5 ENVIRONMENTAL CONDITIONS

- 1.5.1 The following environmental conditions shall be strictly adhered to:
- .1 Minimum surface temperature: 2°C (35°F)
 - .2 Maximum surface temperature: 49°C (120°F)
 - .3 The surface should be dry and at least 3°C (5°F) above the dew point.
 - .4 Minimum ambient humidity: 20 per cent
 - .5 Maximum ambient humidity: 90 per cent
- 1.5.2 Use indirect-fired dry heat, ventilate and dehumidify areas as required to obtain and maintain specified conditions.
- 1.5.3 Environmental conditions shall be maintained until the coating is fully cured.

1.6 JOB CONDITIONS

- 1.6.1 Inspect all surfaces requiring painting and notify the Engineer in writing of any defects or problems, prior to commencing work.

1.7 PRODUCT DELIVERY, STORAGE AND HANDLING

- 1.7.1 Deliver materials to the job site in sealed original labelled containers bearing manufacturer's name, type of paint, brand name, colour designation and instructions for mixing and/or reducing.
- 1.7.2 Store materials in a well-ventilated area at the recommended conditions as stated by the manufacturer's product data sheets.
- 1.7.3 Keep containers tightly sealed when not in use. Remove used rags and empty containers from site daily.

1.8 PROTECTION OF SURFACES

- 1.8.1 Drop cloths shall be provided in all areas where coating is performed to fully protect other surfaces.

1.8.2 Protect finished areas during drying/curing by posting "Wet Paint" signs.

1.9 PROTECTION OF EQUIPMENT (DUST CONTROL)

1.9.1 Existing equipment and instrumentation shall be protected from dust due to abrasive blast cleaning or grinding operations to the satisfaction of the Engineer. Instruments to be protected include but are not limited to the following:

- .1 Flow Transmitters
- .2 Pressure Transmitters
- .3 Local disconnect switches
- .4 Any electrical enclosures with a rating of Nema 12 or lower.

1.10 WORKER HEALTH AND SAFETY

1.10.1 Exercise special precautions for safety of workers applying coating in enclosed areas by meeting requirements outlined in Ontario Regulation 691 Occupational Health and Safety Act (OHSA) and Regulations for Construction Projects.

1.10.2 The contractor shall make provisions to safely enter and work within confined spaces according to the OHSA.

2 PRODUCTS

2.1 MATERIALS

2.1.1 Coatings shall be rated such that no blistering, cracking, rusting or delamination of film occurs after 5,000 hours exposure, tested in accordance with ASTM D4585.

2.1.2 All coatings in contact with potable water shall be NSF 61/NSF 600 listed and rated for the sizing of design pipe.

2.1.3 Primer

- .1 Primer shall pass 10,000 hours salt fog corrosion resistance in accordance with ASTM B117.
- .2 Primer and complete coating system shall have a rating not less than 5 in accordance with ASTM D3359.
- .3 Primer shall exhibit no visible cracking or delamination of film after 1.1 MPa (160 inch-pounds) or less direct and indirect impact in accordance with ASTM D2794.
- .4 Apply primer to achieve specified coverage.
- .5 Approved products:
 - .1 Process piping in contact with sewage:

- i. If Tnemec Series 431 is selected as the intermediate and final coat then no primer is required.
- ii. Approved equivalent.

2.1.4 Intermediate and Finish Coating

- .1 Apply intermediate and finish coats to achieve specified coverage.
- .2 Approved products:
 - .1 Process piping in contact with sewage:
 - iii. Tnemec Series 431 at 20 to 30 mils total DFT
 - iv. Approved equivalent.

2.2 PAINT COLOUR

2.2.1 Piping containing potable water shall be painted blue.

2.2.2 Piping containing sewage shall be painted brown.

2.2.3 Submit complete range of colour chips to the Engineer/Owner for review for all other piping applications.

2.3 APPROVED MANUFACTURERS

2.3.1 Tnemec Company Inc.

2.3.2 Devoe Coatings

2.3.3 Belzona

3 EXECUTION

3.1 ITEMS TO BE PAINTED

3.1.1 All remaining ductile iron return activated sludge (RAS) piping, fittings, flanges and couplings in the Plant B Aeration tanks are to be painted. Do not paint over equipment tags or factory applied epoxy coatings.

3.1.2 Stainless steel materials shall not be painted.

3.2 CLEANING AND PREPARATION OF SURFACES

3.2.1 Iron and steel surfaces that are not galvanized and will be subject to normal exterior or interior atmospheric exposure:

- .1 Remove all prior coatings and rust from existing process piping by power tool cleaning to bare metal in accordance with SSPC-SP11.

- .2 Where deemed appropriate and approved by the Engineer, clean either in the field or in the shop by means of solvents, emulsions, cleaning compounds, steam cleaning, or similar materials or methods in accordance with SSPC-SP1. After solvent cleaning, blast the metal with abrasives to standards specified by SSPC-SP10, Near White.
 - .3 Prime cleaned surfaces as soon as practicable after cleaning with the appropriate specified primer.
 - .4 Do not leave bare metal surfaces overnight. If shop primed, prior to applying subsequent coats, clean and reprime all welds and other damaged areas of shop primed surfaces. Neutralize and remove all slag and weld spatter by-acid washing.
- 3.2.2 All iron and steel surfaces that are not galvanized and will be subject to immersion or direct burial, or which will be wet by spray or condensation, or as specified in the schedule:
- .1 Remove all prior coatings and rust from existing process piping by solvent cleaning to specification SSPC-SP1 issued by the Steel Structures Painting Council and then blast clean to Standard SSPC-SP10, Near White. Carry out blast cleaning using abrasives of such particular shape, hardness and gradation as to effectively clean the metal and leave a roughened surface suitable for adequate bonding of subsequent coatings. Achieved angular profile shall meet manufacturers recommendations for the selected coating system.
 - .2 As soon after cleaning as practicable, and prior to the formation of any corrosion from atmospheric moisture or other causes, clean all blast-cleaned metal surfaces of dust and coat with the specified primer. Do not leave blast cleaned surfaces overnight prior to receiving the primer coat.
- 3.2.3 Prior to field application of subsequent coats, thoroughly clean the surfaces of shop applied coating with mineral spirits.
- 3.2.4 Properly clean and prepare all welds as specified for the adjacent area. Apply one coat of primer as specified.
- 3.2.5 Newly galvanized surfaces: Remove any oil or soap film with neutral detergent or emulsion cleaner. Use zinc treatment recommended by the manufacturer, or lightly blast with fine sand. Prime cleaned surfaces as soon as possible after cleaning with the appropriate specified primer.
- 3.2.6 Weathered galvanized surfaces: If galvanized has been exposed to exterior weathering for six months or more, remove corrosion with hand or power sander. Prepare surface as specified above for new galvanized surfaces.

- 3.2.7 Damage to interior coatings of pipelines shall be repaired according to manufacturer's instructions.
- 3.2.8 Mask surfaces where necessary, to prevent contamination or marring of adjacent material. Prevent overspray onto adjacent surfaces or properties.

3.3 SAMPLING

- 3.3.1 In areas where the piping is considered to be in relatively good condition and only minor spot repairs are specified or directed by the Engineer, collect a sample of the existing coating and forward to coating manufacturer for testing and recommendation regarding compatibility of proposed coating.

3.4 EXAMINATION

- 3.4.1 Examine surfaces which are to be finished.
- 3.4.2 Report surfaces which are defective or which cannot be satisfactorily prepared and unsatisfactory site or environmental conditions. Commencement of work means acceptance of job site and substrate conditions.

3.5 MIXING

- 3.5.1 Mix products in accordance with manufacturer's recommendations.
- 3.5.2 Stir thoroughly making sure no pigment remains on the bottom of the can. Use a power mixer and keep material under constant agitation while mixing.

3.6 APPLICATION

- 3.6.1 Notify Engineer 24 hours in advance of coating applications.
- 3.6.2 Apply coating materials to specified surfaces by brush, coating or spray, free from defects and in accordance with manufacturer's instructions.
- 3.6.3 Surfaces shall be clean, dry and free of oil, grease and other contaminants at the time of application.
- 3.6.4 Sand and dust between each coat to remove defects visible from a distance up to 1.5m.

- 3.6.5 Finish tops, bottoms, edges and areas not readily visible. The coating application should include wrapping of the external coating around the bell and spigot ends of the pipe (if bell and spigot used) into the internal surface area by a minimum of 1 inch. If restraints are used for pipe installation, the coating should be applied to all restraint mechanism external surfaces as above.
- 3.6.6 Apply each coat by brush unless specifically recommended otherwise by the manufacturer.
- 3.6.7 Follow manufacturer's recommendations for thinning, coverage and film thickness.
- 3.6.8 Permit all removable parts such as access panels, covers, etc. separately.
- 3.6.9 Each coat shall be allowed to cure as reflected on the manufacturers technical data sheet of the material utilized.
- 3.6.10 Curing time shall be construed to mean "under normal conditions." Where conditions other than normal exist, because of weather or because of confined space, longer curing times will be necessary.

3.7 QUALITY CONTROL

- 3.7.1 Contractor shall arrange to have a representative of the coating manufacturer attend the site during application to verify the coating has been applied in accordance with recommended procedures.
- 3.7.2 Contractor shall maintain a Daily Quality Control Log to:
 - .1 Verify coatings and other materials are as specified.
 - .2 Verify surface preparation and application are as specified.
 - .3 Verify DFT of each coat and total DFT of each coating system are as specified using wet film and dry film gauges.
 - .4 Check coatings for film characteristics or defects that would adversely affect performance or appearance of coating systems.
 - .5 Complete holiday testing and repair with retest until compliance is met for a holiday free surface in accordance with NACE SP0274.
- 3.7.3 Contractor shall prepare and submit to Engineer written reports describing inspections made, actions taken to correct nonconforming work, and nonconforming work not corrected.

3.8 QUALITY ASSURANCE

- 3.8.1 The Engineer or Owner may select an independent coating inspector to verify quality assurance.

3.8.2 Coating Inspector shall confirm and report:

- .1 Verify coatings and other materials are as specified.
- .2 Verify surface preparation and application are as specified.
- .3 Verify DFT of each coat and total DFT of each coating system are as specified using wet film and dry film gauges.
- .4 Check coatings for film characteristics or defects that would adversely affect performance or appearance of coating systems.

3.9 CLEAN UP

3.9.1 Remove masking and other protection provided under this Section.

3.9.2 Painting work will not be considered complete until all splatters, drippings, smears and overspray have been cleaned and removed to the satisfaction of Engineer.

3.9.3 Make good any damage to building surfaces or furnishings resulting from painting operations at no expense to Owner.

3.10 TOUCH-UP

3.10.1 Inspect all areas of work for damage.

3.10.2 Remove all splattering, finger marks, rust, water marks, scratches, blemishes.

3.10.3 Touch-up damaged or cleaned areas to leave whole job in perfect condition.

4 SUPPLEMENTS – N/A

END OF SECTION

CITY OF HAMILTON

C13-32-24

DUNDAS WASTEWATER TREATMENT
PLANT (WWTP) HEALTH AND SAFETY
IMMEDIATE NEEDS AND STRUCTURAL
REPAIR UPGRADES

DIVISION 11

Section 11000 – Equipment General Requirements

Section 11005 – Identification of Equipment and Valves

Section 11100 – Valves

Section 11340 – Rotating Scum Skimming Troughs

Section 11420 – Aeration Diffuser System

SECTION 11000 – EQUIPMENT GENERAL REQUIREMENTS

1 GENERAL

1.1 SECTION INTENT

- 1.1.1 This Section describes general procedures and requirements for the supply and installation of equipment and valves.

1.2 RELATED SECTIONS

- 1.2.1 Section 01330 – Submittals.
- 1.2.2 Section 01810 – Testing and Commissioning.
- 1.2.3 Section 01820 - Demonstration and Training.
- 1.2.4 Section 03300 – Cast-In-Place Concrete.
- 1.2.5 Section 03600 – Grout and Miscellaneous Concrete Work.

1.3 DESCRIPTION

- 1.3.1 The work of this Section covers the general clauses for the supply and installation of all equipment and other works as specified herein and/or indicated on the Drawings.

1.4 REQUIREMENTS

- 1.4.1 Provide all labour and materials, obtain all necessary permits and pay all fees as may be required.
- 1.4.2 The Contractor shall be fully acquainted with all work involved in the complete installation of all equipment. At no time shall the Contractor make any claim that any misunderstanding existed in regard to the nature or amount of work to be done in relation to the installation, testing and commissioning of all specified equipment.
- 1.4.3 Fully coordinate the work of all related specification sections. Use equipment specifications together with all site work, concrete, building, electrical and controls specifications as necessary in order to produce a fully coordinated product meeting all necessary specifications.
- 1.4.4 For Product Substituting Procedures see Section 01630 - Product Substituting Requirements.

- 1.4.5 Obtain all necessary details from Equipment suppliers including dimensions and other information pertinent to the Work of this Contract.
- 1.4.6 Delay in delivery of equipment or installation materials does not relieve the Contractor of the responsibility to complete the Contract within the agreed date for contract completion.

1.5 SUBMITTALS

- 1.5.1 Submit the following in accordance with Section 01330 - Submittals:
 - .1 Shop Drawings.
 - .2 Operating and Maintenance Data.
 - .3 As-built Information.
 - .4 Spare Parts.
 - .5 Special Tools and Accessories.
 - .6 Warranties and Bonds.

1.6 STANDARDS

- 1.6.1 The materials and workmanship employed in the manufacture of all equipment shall conform to the applicable standards established by the ASTM, AWWA, CEC, COSB, BS and CSA.
- 1.6.2 All electrical motors and equipment shall be built to EEMAC (Electrical and Electronic Manufacturers' Association of Canada) standards with Canadian threads and bearings throughout and all motorized and electrical equipment shall be CSA approved or supplied in accordance with the rules and regulations of the local inspection authority and subject to its approval.

1.7 FACTORY TESTING

- 1.7.1 Where witnessed factory testing is specified, the Supplier is to give 10 working days of notice of the date when equipment will be ready for testing. Confirmation of the test date and time is to be provided three working days in advance of the tests. Equipment is not to be delivered to the site until factory testing has been satisfactorily completed.
- 1.7.2 When certified factory testing of the equipment or any component is specified, the supplier shall provide the Consultant with two copies of required certified test reports showing that the equipment complies with the Specification, before the equipment is delivered to site. Additional copies are required for the Maintenance Data Manuals.

2 PRODUCTS – NOT APPLICABLE

3 EXECUTION

3.1 DELIVERY, RECEIVING AND STORAGE

- 3.1.1 Arrange with the suppliers for delivery of all items of equipment to the site of the work as required to meet the schedule.
- 3.1.2 Arrange for delivery of all anchor bolts, templates, embedded metals, and other materials required during the concreting placement and assembly of equipment.
- 3.1.3 Receive equipment at the site, unload and examine it upon arrival for damage or defects and be responsible for its safekeeping, storage and installation. Immediately notify the Consultant and the supplier of any damages or defects in the equipment delivered.
- 3.1.4 If not required for immediate use, adequately store and protect all equipment against weather damage and theft. Store mechanical and electrical equipment as recommended by the manufacturer and to the satisfaction of the Consultant.
- 3.1.5 Special measures shall be taken to ensure that electrical motors do not suffer from moisture, dust, dirt or mechanical damage if stored or installed and inactive.
- 3.1.6 Equipment storage, safekeeping and relocation of equipment from one area of the site to another, for whatever reason, shall be the sole responsibility of the Contractor from the time of initial off-loading at the site until the date of completion and acceptance by the Owner.

3.2 INSTALLATION

- 3.2.1 Furnish any appurtenant fittings and materials, not herein or elsewhere specifically mentioned or included, but necessary for the installation and operation of the equipment without additional payment.
- 3.2.2 Provide all materials, labour and equipment to install complete and in full operation all the equipment specified herein.
- 3.2.3 Install the equipment in strict accordance with the manufacturer's instructions and to the satisfaction of the Consultant.
- 3.2.4 Install all instruments with an in-line isolating valve and a tee and valve on their sample line to allow easy isolation from the process for maintenance and to allow air or moisture removal.
- 3.2.5 Be fully acquainted with all Work involved in the complete installation of all equipment. Misunderstandings in regard to the nature or amount of Work to be done will not constitute grounds for extra payment.

- 3.2.6 Ensure that no unnecessary strain is introduced into equipment due to connections with piping or other appurtenances.

3.3 MANUFACTURER'S SERVICES AND CERTIFICATION OF INSTALLATION

- 3.3.1 Provide for all necessary services and expenses of trained personnel representing the manufacturers of various pieces of specified equipment, to ensure correctness of installation and include any start-up costs required by suppliers necessary to ensure satisfactory installation, testing and commissioning of the equipment.
- 3.3.2 Provide all materials, labour and equipment necessary to make any adjustments to the installation as required by the manufacturer or the Consultant until the equipment is fully tested and commissioned.
- 3.3.3 On completion of installation and testing, obtain from the suppliers or the manufacturers concerned, certification that the equipment is installed correctly, is in full operational condition, and is operating in accordance with its design rating. Submit the original certificate to the Consultant and all copies necessary to comply with other submitted requirements. Certificates are to include a statement to the effect that any adjoining pipe is properly and independently supported and does not cause undue stress that would be detrimental to the equipment performance.
- 3.3.4 Co-ordinate the work of all equipment suppliers, fully commission all equipment and provide representatives from various manufacturers during plant testing and commissioning as required by the Consultant.

3.4 MATERIAL AND WORKERSHIP

- 3.4.1 Material and equipment is to conform to the latest edition of applicable standards in force at the time of tendering. In the case of any conflict between the Specifications with any standards, the more stringent of the two applies.
- 3.4.2 Provide materials and equipment in conformance with the following:
- .1 First class in every respect.
 - .2 Constructed and finished in a workerlike manner.
 - .3 Fully suitable for the service intended.
 - .4 Selected and fabricated to best engineering practice.
- 3.4.3 Furnish safety devices, including shear pins, flexible coupling guards, belt guards and other pertinent items with the equipment.
- 3.4.4 Design machinery such that working parts are readily accessible for inspection and repair, and each part is suitable for the service required.

- 3.4.5 Carefully pack and crate equipment for shipment. Protect polished and machined metal surfaces from corrosion and damage during shipment. Specially pack electrical equipment to prevent damage by moisture. Cover equipment having exposed bearings and glands to exclude foreign matter.
- 3.4.6 Design equipment to have adequate strength, power and capacity for both continuous and intermittent service and have motors and other parts capable of starting and operating under any conditions or loading likely to occur under normal plant operating conditions.
- 3.4.7 Design the general mechanical and electrical equipment and particularly gearings, contacts and other wearing parts to satisfy the need for long periods of operation without frequent maintenance or attention.
- 3.4.8 Provide adequate and, as far as practicable, authentic means of lubrication for working parts. Arrange lubrication grease nipples, grease boxes and other lubrication devices so that they are readily accessible for routine greasing. Indicate on the working Drawings submitted, the type of lubricants to be used (readily available in UAE). Use grease nipples of a consistent type (Alemite button head type or equivalent).
- 3.4.9 Make lubrication points readily accessible using grease nipples and Type 316 stainless steel or copper tubing extensions where required. Secure the nipples and tubing to the equipment at appropriate locations.
- 3.4.10 Design equipment installed outdoors for service under climatic conditions typical for the area. Give particular attention to winter operating conditions.

3.5 TEMPORARY SUPPORTS

- 3.5.1 Provide all necessary temporary supports and bracing to prevent the overloading of all floors and walls, while equipment is being installed. Ascertain the weights of all pieces of equipment from the manufacturer, and move equipment into position in a manner and at a time approved by the Consultant.
- 3.5.2 Provide eye bolts or hooks for the safe handling of the equipment during installation. Eye bolts are to be left in place.

3.6 LUBRICANTS, GREASE, OIL AND FUEL

- 3.6.1 Provide the complete initial lubrication of all equipment in accordance with the manufacturer's recommendations. Provide a complete schedule of all manufacturer's recommended lubricants. Fill grease, oil and fuel tanks, as required for the initial operation of the equipment.

3.7 SMALL PIPING

- 3.7.1 Supply and install all small connecting pipework, fittings and valves whether shown on the Drawings or not. Perform all such Work strictly in accordance with the instructions of the manufacturer whose equipment is being installed or connected.

3.8 ANCHOR BOLTS

- 3.8.1 Unless otherwise specified, supply all stainless steel anchor bolts, such anchor bolts being of a diameter and size as recommended by the manufacturers of the equipment and machinery being installed. Generally use expansive type anchorages in setting small equipment. Set large pumps (flow rate > 40 L/s) by means of bolts with sleeves cast into the concrete to a minimum depth of 150mm. Elsewhere, cast in place anchor bolts may be used subject to the approval of the Consultant; these must be properly positioned by means of substantial templates.

3.9 ALIGNMENT

- 3.9.1 All rotating equipment is to be set and aligned in accordance with the more stringent requirements of either the equipment manufacturer's instructions or the following:
- .1 Base is to be true and levelled.
 - .2 Alignment of shafts, soft foot or motor and couplings shall be performed by reverse dial, rim-to-rim and face-to-face. Soft foot will be rim-to-rim vertical and horizontal mode.
 - .1 Soft foot of motor shall be checked to be within a tolerance of 0.03m.
 - .2 Shaft to be aligned within a tolerance of 0.025mm to 0.070mm.
 - .3 Piping strains to pump shall be within a tolerance of $\pm 0.025\text{mm}$ to 0.070mm .
 - .3 Provide Consultant with alignment report.

3.10 TRAINING, TESTING AND COMMISSIONING

- 3.10.1 Unless otherwise specified, provide commissioning and startup in accordance with Section 01810 - Testing and Commissioning.
- 3.10.2 Unless otherwise specified, provide Demonstration and Training in accordance with Section 01820 - Demonstration and Training.

4 SUPPLEMENTS – N/A

END OF SECTION

SECTION 11005 – IDENTIFICATION OF EQUIPMENT AND VALVES

1 GENERAL

1.1 SECTION INTENT

- 1.1.1 This Section describes procedures and requirements for the identification and labelling of equipment and valves.

1.2 REFERENCE STANDARDS

- 1.2.1 Perform identification work in accordance with CGSB 24-GP-3A-67 and NFPA 20 except where specified otherwise.
- 1.2.2 Provide Underwriters Laboratories of Canada (ULC) or equivalent registration plates, as required by respective agency.
- 1.2.3 Supply identification as required in Division 01 and the City of Hamilton's Design Manual and SCADA Design Guidelines.

1.3 REQUIREMENTS

- 1.3.1 Submit proposed wording for all labels and tags to the Consultant for approval before engraving.
- 1.3.2 Any discrepancies between the following specifications and either the City's Design Manual or SCADA Design Standards shall be noted to the Engineer for approval on how to proceed.

2 PRODUCTS

2.1 EQUIPMENT INSTALLATION STATUS TAGS

- 2.1.1 All equipment that is being installed by the Contractor will be tagged with a red tag, which is an indication that the equipment is in the process of being installed and is under the direct control of the Contractor.
- 2.1.2 Owner's operating staff will not operate the equipment until it has been verified that it has been installed in accordance with the manufacturer's instructions and has passed the equipment start-up protocol.
- 2.1.3 When the equipment has passed the start-up procedure, it is ready to be placed on-line. At this time, the equipment will be tagged with a green tag to indicate that it is fully operable and can be operated by the Owner's Operating staff.

2.2 NAMEPLATES

- 2.2.1 Provide metal nameplates on each piece of equipment, mechanically fastened complete with raised or recessed letters.
- 2.2.2 Indicate size, equipment model, manufacturer's name, serial number, voltage, cycle, phase and power of motors, pump capacity and date of manufacture.
- 2.2.3 Locate nameplates to facilitate easy reading from operating floor and to properly identify equipment and/or system. Do not insulate or paint over plates.
- 2.2.4 Provide stand-offs for nameplates on hot surfaces.
- 2.2.5 Colour:
- .1 Hazardous: red letters, white background.
 - .2 Elsewhere: black letters, white background (except where required otherwise by applicable codes).
- 2.2.6 Construction: 3mm thick, laminated plastic or white anodized aluminum, matte finish, square corners, letters accurately aligned and machine engraved into core.
- 2.2.7 Sizes shall conform to the following table:

Size No.	Dimensions (mm x mm)	No. of Lines	Letter Height (mm)
1	10 x 50	1	3
2	13 x 75	1	5
3	13 x 75	2	3
4	20 x 100	1	8
5	20 x 200	1	8
6	20 x 100	2	5
7	25 x 125	1	12
8	25 x 125	2	8
9	35 x 200	1	20

- .1 Use average of 25 letters/numbers (maximum).
- .2 Use Size no. 6 for terminal cabinets and control panels.
- .3 Use Size no. 9 for equipment in mechanical rooms.

2.2.8 All motors to be supplied with corrosion-resistant nameplates indicating the following information:

- .1 Supply voltage (V).
- .2 Full load current (A).
- .3 Phase (□).
- .4 Frequency (Hz).
- .5 Power (kW).
- .6 Service Factor.
- .7 Rated Speed (RPM).
- .8 Insulation class.
- .9 Bearing numbers.
- .10 Model number.
- .11 Serial number.

2.3 VALVES AND CONTROLLERS

2.3.1 Identification tags or nameplates listed the valve alpha-numerical symbols of non-ferrous metals of punched non-ferrous metal type or the laminated Lamacoid type, size minimum 25mm □ 50mm, black background with white custom engrave lettering bevelled edges, one 6mm diameter fastening hole, mechanically fastened to valve or controller. May be attached by a chain in an appropriate location.

2.3.2 Furnish the Engineer with five identification flow diagrams of approved size for each system. Include valve tag schedule, designation number, service, functions and location of each tagged item and normal operating position of valves.

2.3.3 Valves and Controllers identification shall include process description and SCADA Tag No.

2.3.4 Valve sample identification:

- .1 V201001.
- .2 200mm.
- .3 Water.
- .4 Normally Open.

3 EXECUTION

3.1 NAMEPLATES

- 3.1.1 Locate nameplates so that they are easily read. Do not insulate or paint over plates.
- 3.1.2 Mount in conspicuous locations to facilitate easy reading from operating floor and to properly identify equipment and/or system.
- 3.1.3 Provide stand-offs for nameplates on hot surfaces and insulated surfaces.

3.2 VALVES AND CONTROLLERS

- 3.2.1 Secure tags with non-ferrous chains or closed “s” hooks for valves and operating controllers.
- 3.2.2 Install one copy of flow diagram and valve schedule mounted in frame with non-glare glass where directed by the Engineer. Provide one copy in each operating and maintenance instruction manual.
- 3.2.3 Number valves in system as indicated on drawings.

4 SUPPLEMENTS

4.1 SUPPLEMENTAL DOCUMENTS

- 4.1.1 The supplements listed below, and following the “End of Section”, form part of this specification section:
 - .1 Project Tagging List

END OF SECTION

City of Hamilton

Dundas WWTP

Section 11005 - Identification and Labelling of Equipment and Valves

Appendix - Equipment Tagging List

Not printed No.	Line 1	Line 2 / Line 3
	New Tagging	Asset Description
1	DS HDS SG01	Isolation Gate Screening Building Inlet
2	DS AER ATK SG01	Isolation Gate Plant A Aeration Tank Interconnect
3	DS AER RAP IG01	Isolation Valve Plant B Aeration Tank RAS Piping #1
4	DS AER RAP IG02	Isolation Valve Plant B Aeration Tank RAS Piping #2
5	DS AER AHD IG01	Isolation Valve Plant B Aeration Tank Air Supply Piping #1
6	DS AER AHD IG02	Isolation Valve Plant B Aeration Tank Air Supply Piping #2
7	DS AER AHD IG03	Isolation Valve Plant B Aeration Tank Air Supply Piping #3
8	DS AER AHD IG04	Isolation Valve Plant B Aeration Tank Air Supply Piping #4
9	DS AER AHD IG05	Isolation Valve Plant B Aeration Tank Air Supply Piping #5
10	DS PRI SCL STG01	Scum Collection Trough Plant B Primary Settling Tank 1
11	DS PRI SCL STG02	Scum Collection Trough Plant B Primary Settling Tank 2
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SECTION 11100 – VALVES

1 GENERAL

1.1 SECTION INTENT

- 1.1.1 This Section describes procedures and requirements for the supply and installation of all process valves specified on the Contract Drawings.

1.2 RELATED SECTIONS

- 1.2.1 Section 01330 – Submittals
- 1.2.2 Section 11005 - Identification and Labelling of Equipment and Valves
- 1.2.3 Section 15220 - Process Piping and Fittings

1.3 REFERENCES

- 1.3.1 American Society of Mechanical Engineers (ASME) and American National Standards Institute (ANSI):
- .1 B16.1, Cast Iron Pipe Flanges and Flanged Fittings.
 - .2 B16.5, Pipe Flanges and Flanged Fittings.
 - .3 Boiler and Pressure Vessel Code, Section VIII.
- 1.3.2 American Society for Testing and Materials (ASTM):
- .1 A564, Standard Specification for Hot Rolled and Cold Finished Age Hardening Stainless Steel Bars and Shapes.
 - .2 B43, Standard Specification for Seamless Red Brass Pipe, Standard Sizes
 - .3 B61, Standard Specification for Steam or Valve Bronze Castings.
 - .4 B62, Standard Specification for Composition Bronze or Ounce Metal Castings.
 - .5 B98, Standard Specification for Copper Silicon Alloy Rod, Bar, and Shapes.
 - .6 B127, Standard Specification for Nickel Copper Alloy (UNS N04400) Plate, Sheet, and Strip.
 - .7 B139, Standard Specification for Phosphor Bronze Rod, Bar, and Shapes.
 - .8 B164, Standard Specification for Nickel Copper Alloy Rod, Bar, and Wire.
 - .9 B194, Standard Specification for Copper Beryllium Alloy Plate, Sheet, Strip, and Rolled Bar.
 - .10 B584, Standard Specification for Copper Alloy Sand Castings for General Applications.

- 1.3.3 American Water Works Association (AWWA):
- .1 C207, Steel Pipe Flanges for Waterworks Service – Sizes 4 In. Through 144 In. (100mm Through 3,600mm)
 - .2 C213, Fusion-Bonded Epoxy Coating for the Interior and Exterior of Steel Water Pipelines
 - .3 C500, Metal Seated Gate Valves for Water Supply Service.
 - .4 C504, Rubber Seated Butterfly Valves, 3 In. (75mm) through 72 In (1800mm).
 - .5 C509, Resilient Seated Gate Valves for Water Supply Service.
 - .6 AWWA C515 Reduced-Wall, Resilient-Seated Gate Valves for Water Supply Service
 - .7 C516, Large Diameter Rubber-Seated Butterfly Valves, Sizes 78 In. (2000mm) and Larger
 - .8 C519, High Performance Waterworks Butterfly Valves, 3 In. (75mm) through 60 In. (1500mm)
 - .9 C550, Protective Epoxy Interior Coatings for Valves and Hydrants.
 - .10 C606, Grooved and Shouldered Joints.
 - .11 C651, Disinfecting Water Mains
 - .12 C800, Underground Service Line Valves and Fittings.
 - .13 M49, Butterfly Valves: Torque, Head Loss and Cavitation Analysis.
- 1.3.4 International Organization for Standardization (ISO): ISO 9001:2008, Quality Management Systems—Requirements.
- 1.3.5 NSF/ANSI 61: Drinking Water System Components – Health Effects.
- 1.3.6 NSF/ANSI/CAN 600: 2018 Health Effects Evaluation and Criteria for Chemicals in Drinking Water.

1.4 GENERAL

- 1.4.1 Provide all accessories required for complete installation of fully operational valves.
- 1.4.2 All valves shall be designed for a minimum of 1034kPa (150 psi) cold working pressure.
- 1.4.3 Provide limit switches on valves where specified herein or shown on the Contract Drawings.
- 1.4.4 The nominal size, serial number, pressure rating, year of manufacture and manufacturer's name or mark shall be cast onto each valve body or be on a permanently attached nameplate. In addition, valves shall be identified according to Section 11005.

- 1.4.5 All coatings or materials in contact with potable water shall be NSF/ANSI/CAN 61 and NSF/ANSI/CAN 600 approved.

1.5 SUBMITTALS

- 1.5.1 Submit valve shop drawings and operation and maintenance data in accordance with Section 01330 - Submittals.
- .1 Summary list showing valve tag number, size, type of operator, valve class and material.
 - .2 Product data sheet for make and model.
 - .3 Complete catalogue information, descriptive literature, specifications, torque requirements, and identification of materials of construction.
 - .4 Installation drawings as outlined in the following specifications.
- 1.5.2 Tests and inspection procedures and information.
- 1.5.3 Manufacturer's Certificate of Proper Installation and field report.

2 PRODUCTS

2.1 KNIFE GATE VALVES (QUANTITY TWO)

- 2.1.1 Knife Gates to comply with Section 11.3.08 of the City of Hamilton Wastewater Design Manual. If any discrepancy between the following specifications and the City's Manual, the City Design Manual shall take precedence.
- 2.1.2 Supply and install Knife Gate Valves of size and location as shown on the Contract Drawings and as specified herein.
- 2.1.3 Knife Gate Valves shall have stainless steel body, stainless steel gate and stainless-steel rising stem (unless otherwise specified), viton or EPDM "O" ring, operator as indicated in Schedule and specified below.
- 2.1.4 Lug style valves drilled to connect to ANSI B16.1, Class 125 flanges.
- 2.1.5 Approved Manufacturers
- .1 Orbinox
 - .2 Trueline
 - .3 Bray
 - .4 Dezurik
- 2.1.6 Knife Gate Valve Schedule:
- .1 As shown on the Contract Drawings

2.2 AWWA SLIDE GATE (QUANTITY ONE)

- 2.2.1 Slide Gate to comply with Section 11.3.07 of the City of Hamilton Wastewater Design Manual. If any discrepancy between the following specifications and the City's Manual, the City Design Manual shall take precedence.
- 2.2.2 General
- .1 The stainless-steel slide gates as specified in the Contract Drawings and herein shall be designed and fabricated in accordance with ANSI/AWWA C561 – Fabricated Stainless Steel Slide Gates.
 - .2 Supply and install stainless steel Slide Gates, size and location shown on the Contract Drawings and described herein shall be self-contained gate frame construction and rising stem arrangement in which the thrust developed during the gate operation is transferred to the lateral gate guides.
 - .3 Gates shall be four sides sealing.
- 2.2.3 Design Heads
- .1 Slide gates shall be designed for a seating head (face pressure) of 1.5m and an unseating head (back pressure) of 1.5m, both measured from the maximum corresponding water levels to the centre line of the gate openings.
 - .2 Gate lift mechanisms shall be designed to operate under a maximum differential head of 1.5m, measured between the upstream and downstream water levels and the centre line of the gate openings.
- 2.2.4 Sealing
- .1 Watertightness of slide gates under maximum design heads shall be according to AWWA C561.
- 2.2.5 Fabrication and Materials
- .1 Slide gates shall be fabricated from Type 316 stainless steel, as per ASTM standards A240 and A276.
 - .2 Gate shall be heavy duty construction with stiffeners to limit deflection. Stiffeners are to be welded to the slide horizontally and vertically. The gate shall not deflect more than 1/360 of the span or 1.58 mm, whichever is smaller, under maximum design head.
 - .3 All gate frame assembly bolts as well as fasteners and retainer bars for attaching elastomer seals shall be of stainless steel.
 - .4 Slide gate seals shall be of an elastomer compound having a high degree of resistance to immersion, abrasion, corrosive products and aging. They shall be installed in such a way as to be readily replaceable, even if the gate inverts are imbedded in concrete.

- .5 A neoprene gasket shall be provided for installation between the back of the gate frames and the surfaces to which they are to be bolted.
- .6 UV stabilized ultra-high molecular weight polyethylene (UHMW) shall be used to reduce frictional resistance between sliding surfaces of the gates.

2.2.6 Anchorage

- .1 The quantity, layout, diameter and length of anchor bolts and/or studs required to install slide gates and accessories shall be as per manufacturer's recommendations.
- .2 Slide gates shall be anchored directly to the concrete with chemical setting anchor studs fabricated from Type 316 stainless steel.

2.2.7 Operation

- .1 Gate shall be supplied with a straight floor stand with handwheel actuator.
- .2 The stem shall have a slenderness ratio (L/R) not exceeding 200.
- .3 All gates having widths in excess of 1.83m and widths greater than twice their height shall have two stems and two interconnected gearboxes for simultaneous stem operation.

2.2.8 Installation Drawings

- .1 Before commencing fabrication, installation drawings showing dimensions and details required for a complete and proper installation of each gate, stem, lifting device and related accessory shall be submitted for approval.

2.2.9 Slide gates shall be provided by:

- .1 Orbinox (Model MU Penstock), or
- .2 Approved equivalent by
 - .1 Fontaine Aquanox Dynamic or
 - .2 Hydro Gate.

2.3 STAINLESS STEEL STOP PLATES (QUANTITY ONE)

2.3.1 General

- .1 Supply and install stop plates of size and location as shown on the Contract Drawings and as specified herein.
- .2 All stop plates shall be fully assembled by the manufacturer prior to delivery to ensure that all parts fit together properly. The factory operation and leak test reports shall be submitted to the Engineer.
- .3 Contractor to verify existing channel size before submitting stop gate shop drawing.

2.3.2 Design and Materials

- .1 Plates shall be designed for the maximum design head as measured from the base of the channel to the maximum liquid level. Stop plates shall no leak more than 1.25 litres per minute per meter of sealed perimeter under maximum head conditions.
- .2 Plates shall be fabricated from Type 316 stainless steel as per ASTM standard A240 and A276 with a minimum thickness of 6.4mm. All stop plates shall conform to AWWA C513. All stainless steel shall be pickled at the mill in accordance with ASTM A380 before being shipped. All Stainless steel shall be given a uniform abrasive grit blast to ensure a uniform matte finish.
 - .1 All seals and frames shall be fabricated from fibreglass and the frame shall be embedded in concrete.
 - .2 The stop plates shall have a maximum deflection of 1/720 of the plate's width at maximum design head.
 - .3 Seals shall maintain an effective seal in any position in the frame and allow liquid to flow only through the open portion of the gate.
 - .4 Seals shall be capable of being removed on site without removing the frame. The bottom seal shall be set into the bottom of the frame and form a flush bottom.
 - .5 Seal material: EPDM.
 - .6 Each stop plate shall be provided with lifting lugs designed to carry the whole load of the gate, regardless of the length of time the gates have sat in the frame.
 - .7 Minimum slide height: 1370mm

2.3.3 Stop plates shall be provided by

- .1 Orbinox (Model AG-FM Stop Gate)
- .2 Fontaine Aquanox Dynamic.
- .3 Approved Equal

2.4 BUTTERFLY VALVES (PROCESS AIR SERVICE)

- 2.4.1 Butterfly Valves to comply with the City of Hamilton Wastewater Design Manual. If any discrepancy between the following specifications and the City's Manual, the City Design Manual shall take precedence.
- 2.4.2 Body – Ductile Iron ASTM A536 Lug Body, Fusion Bonded Epoxy Coated
- 2.4.3 Seat – Viton (FKM)
- 2.4.4 Stem – 416 Stainless Steel

- 2.4.5 Disc – 316 Stainless Steel ASTM A351 CF8M
- 2.4.6 Actuator shall be manual or automatic as indicated in Contract Drawings. Unless otherwise specified, Manual Actuator shall be lever type for valves 300mm and smaller, gear type for valves larger than 300mm, with stainless steel extension stem where indicated in Contract Drawings.
- 2.4.7 Flange locating holes shall meet ANSI Class 125/150 drillings
- 2.4.8 Valve shall be equipped with non-corrosive bushing and self-adjusting stem seal
- 2.4.9 Bi-directional and tested to 110% of full rating
- 2.4.10 Bi-directional pressure ratings:
 - .1 50 – 300mm: 175 psi
 - .2 350 – 500mm: 150 psi
- 2.4.11 No field adjustment necessary to maintain optimum field performance
- 2.4.12 Approved Manufacturers
 - .1 Bray Series 31
 - .2 Milwaukee
 - .3 Val-Matic
- 2.4.13 Butterfly Valve Schedule: As shown on Contract Drawings

2.5 MANUAL VALVE OPERATORS

- 2.5.1 General: All valves shall be equipped with operators. The valve operator types, as specified herein, describe only the general characteristics of the operator. The operator shall be compatible with the valve with which it will be used and shall be of the same manufacturer, or a product that is recommended by the valve manufacturer. The operator shall be sized to operate the valve for the full range of pressures and velocities imposed by the service. All valve operators shall be opened by turning counterclockwise.
- 2.5.2 Manual handwheel operators shall be provided unless otherwise shown or specified. Ferrous handwheels shall be epoxy coated the same colour as the valve and associated pipeline. Lever operators may be supplied on quarter turn type valves 300mm and smaller, if recommended by the manufacturer; however, operator force shall not exceed initial breakaway.

- 2.5.3 When the maximum force required to operate a valve under full operating head exceeds 175N (40 pounds), gear reduction operations shall be provided. Gear operators shall be totally enclosed and lubricated.
- 2.5.4 On quarter turn valves, the valve operators shall be of the self locking type to prevent the disc or plug from creeping and shall be provided with position indicators to show the position of the valve disc or plug.
- .1 Operators of the worm and gear type shall have self locking worm gears, one piece design, of bronze material, and accurately machine cut. The worm shall be hardened alloy steel, with thread ground and polished.
 - .2 Operators of the geared travelling nut type shall have threaded steel reach rods with an internally threaded bronze or ductile iron nut.
 - .3 All valves less than 100mm shall be equipped with a 50mm (2 inch) square nut for direct quarter turn operation.
 - .4 All valves 100mm and larger shall be supplied with a totally enclosed and sealed worm gear actuator with position indicator (above ground service only) and externally adjustable open and closed stops. The worm segment gear shall be ASTM A536 Grade 65-45-12 ductile iron with a precision bore and keyway for connection to the valve shaft.
 - .5 All gear actuators shall be designed to withstand, without damage, a rim pull of 890N (200 pounds) on the handwheel and an input torque of 400Nm (300 foot-pound) for nuts.
- 2.5.5 Buried service actuators shall be packed with grease to no less than 90% full and sealed for continuous submerged conditions. Exposed worm shafts shall be stainless steel. Valves located more than 1.8m (6 feet) above finish floor elevation shall be fitted with chain wheels and guides. Chain wheels and guides shall be galvanized or cadmium plated. Chains shall be of the size recommended by the valve manufacturer and shall extend to within 1.2m (4 feet) of the operating floor. Where chains hang in normally travelled areas, appropriate "L" type tie back anchors shall be provided and located as approved by the Engineer.
- 2.5.6 Lever type operators shall have some means of being fixed in any given position to prevent accidental movement; shall be of rugged, noncorrosive construction; and shall be fully compatible with the valve.
- 2.5.7 Provide sufficient lubrication of all bearing gears and other moving parts.
- 2.5.8 Provide a stainless steel stem extension for the valve operator as required.
- 2.5.9 Provide floor stand / pedestal handwheel operators as indicated in the Contract Drawings.

2.6 BALL VALVES (QUANTITY TWO)

- 2.6.1 Ball Valves to comply with Section 11.3.09 of the City of Hamilton Wastewater Design Manual. If any discrepancy between the following specifications and the City's Manual, the City Design Manual shall take precedence.
- 2.6.2 Supply and install NSF 61 approved, full port stainless steel ball valves of size and location as shown on the Contract Drawings and specified herein.
- 2.6.3 Type 316 SS ball, stem and packing unit.
- 2.6.4 Ball valves shall be lever operated, two-piece body construction with threaded NPT end connections. Handle shall be lockable.
- 2.6.5 Each valve shall be tested by the manufacturer in the open and closed position at 550kPa to 700kPa (80 to 100 psi).
- 2.6.6 All valves shown on the contract drawings as 50mm diameter or smaller shall be ball valves.
- 2.6.7 Approved Manufacturers
 - .1 Watts Canada
 - .2 Trueline.
 - .3 Approved equivalent.

3 EXECUTION

3.1 DELIVERY

- 3.1.1 Vendor shall be responsible for offloading and storing valves in a secure enclosure storage area.
- 3.1.2 Provide all necessary equipment and cranes.

3.2 INSTALLATION

- 3.2.1 The piping, valves, fittings and accessories shall be installed as indicated on the Contract Drawings, in accordance with the Manufacturer's recommendations and as approved by the Engineer.
- 3.2.2 Wherever possible, source valves from one manufacturer.
- 3.2.3 Provide the services of factory-trained representatives to inspect, operate, test, adjust, and troubleshoot the installation.

- 3.2.4 The factory-trained representatives mentioned above will certify that the valves are ready for operation before use. In addition, the factory-trained representatives shall instruct the Owner's operation personnel in the proper operation and maintenance of the valves supplied.
- 3.2.5 Provide for additional supervision of installation by Equipment Supplier as required.
- 3.2.6 Arrange with the Engineer a mutually agreeable date when the representative(s) should be on the site.
- 3.2.7 Submit a field report, signed by the Manufacturer's representative, describing in detail the inspection undertaken, verification of installation and adjustments made. Provide recommendations for proper maintenance.
- 3.2.8 Inspection to include checking for:
 - .1 Cracks and other damaged or defective parts. The equipment must be undamaged, without cracks and free of defective parts.
 - .2 Completeness of installation as specified and as recommended by the Manufacturer.
 - .3 Correctness of setting, alignment and relative arrangement of various parts of the system.
- 3.2.9 Leakage test newly installed valves in accordance with Section 15955 - Piping Leakage Testing.

3.3 QUALITY ASSURANCE

- 3.3.1 The valve supplier shall provide the services of a factory-trained technician to supervise installation and commissioning of each valve. The valve supplier shall allow for a minimum of four full working days, eight hour each including travel time, for supervision of installation, testing, and commissioning of the valves.
- 3.3.2 The Contractor shall coordinate inspection with the Test Plan in accordance with the requirements of Section 01815 – Commissioning and Pre-Commissioning.
- 3.3.3 The valve shall be covered by a minimum two year warranty against defects in materials and workmanship.

3.4 TRAINING AND DEMONSTRATION:

- 3.4.1 The valve supplier shall provide training on the use, operation, and maintenance of the valve in accordance with the requirements of Section 01815 – Commissioning and Pre-Commissioning.

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4 SUPPLEMENTS – N/A

END OF SECTION

SECTION 11340 – ROTATING SCUM SKIMMING TROUGHS

1 GENERAL

1.1 SCOPE OF WORK

- 1.1.1 Contractor shall provide all labor, materials, equipment, installation and assembly hardware supports and appurtenances required to furnish, install and place in satisfactory operation the scum skimming troughs for the rectangular clarifiers as shown on the Drawings and as specified herein.
- 1.1.2 Scope of supply shall consist of two (2) tank(s), with each tank containing:
 - .1 One (1) Scum skimming trough mechanism(s) approximately 6096mm long x 305mm in diameter.

1.2 QUALITY ASSURANCE

- 1.2.1 Manufacture's Experience
 - .1 All equipment shall be furnished by manufacturers with at least ten (10) years experience in the manufacture and design of scum skimming troughs and components as specified.
 - .2 Manufacture shall have at least Ten (10) operating installations in actual service for a period of not less than ten (10) years. Engineer may require this data.
 - .3 Manufacturer shall be ISO 9001 certified.

1.3 SUBMITTALS

- 1.3.1 Contractor to complete field measurements of the existing settling tank prior to providing the required shop drawings for this section.
- 1.3.2 Shop drawing should identify any modifications required to be installed in the existing clarifier.

2 PRODUCTS

2.1 MANUFACTURERS

- 2.1.1 Brentwood Industries, Inc., of Reading, PA.
- 2.1.2 Or engineered approved Equal. Engineer approved "Or Equals" shall be considered only if materials of construction exactly meet specification requirements.

2.2 EQUIPMENT

- 2.2.1 Each trough shall consist of a 300mm nominal diameter, 304 Stainless Steel pipe having a minimum wall thickness of 6.35mm.
- 2.2.2 Sixty (60) degree V-notch slots shall be cut symmetrically about the vertical axis of the pipe with the edges cut parallel to the longitudinal axis of the pipe.
- 2.2.3 Each V-notch slot shall be no more than 762mm long separated by a 50.8mm wide band along the full pipe periphery to act as stiffeners.
- 2.2.4 Each trough shall operate independently of adjoining trough(s).
- 2.2.5 The rotating scum trough shall be supported on each end by 304 Stainless Steel bearing housings welded to vertically and horizontally adjustable wall plates.
- 2.2.6 The trough shall be designed in such a manner that a slight vertical or horizontal misalignment shall not interfere with the smooth operation of the trough.
- 2.2.7 The trough shall rotate on 76.2mm wide water lubricated UHMW-PE bearings.
- 2.2.8 Lubrication lines shall not be required.
- 2.2.9 The trough shall be sealed to the bearing housing by a 25.4mm wide, Nitrile D-seal.
- 2.2.10 The seal shall remain effective with a slight misalignment between the pipe and bearing housing. The seal material shall be capable of withstanding grease, mild acids, or alkalis. The seal shall be replaceable without removing the pipe from the bearing housing and shall not prevent the smooth action of the rotating pipe.
- 2.2.11 A 304 stainless steel, 38.1mm angle set collar shall be placed on the outside of each D-seal to keep the scum pipe in place horizontally.
- 2.2.12 The bearing housing assembly shall be mounted to the wall with chemical anchors. Dual neoprene gasket sheets, shall be used to provide a watertight seal between the bearing housing assemblies and the walls.
- 2.2.13 The trough shall be manually operated through the use of a lever operator.
- 2.2.14 The lever shall be 38.1mm 304 Stainless Steel pipe.

- 2.2.15 It shall be possible to rotate the pipe a minimum of 60° in either direction from the "off" position where the slot is at top dead center.
- 2.2.16 Pipe wall sleeves, if required, shall be of the same diameter and material as the scum trough and shall extend through the walls.
- 2.2.17 The consultant engineer shall specify any water stop requirements for the wall sleeves, and their tank location.

3 EXECUTION

3.1 INSTALLATION

- 3.1.1 Contractor shall furnish, inspect, store, and install scum troughs in accordance with manufacturer's written instructions and approved submittals.
- 3.1.2 Contractor shall be responsible for cleanliness of piping and may be required to manually clean pipe, or air or water flush piping as required.

3.2 START-UP

- 3.2.1 After installation is completed, the Contractor shall perform the following field tests in the presence of the Engineer and the Owner.
 - .1 Fill trough with water to confirm no leaks.
 - .2 Operate the trough through its full range of motion to confirm function.
- 3.2.2 MANUFACTURER'S FIELD SERVICES
 - .1 A manufacturer's representative shall be present at the job site to inspect the installation of the equipment, start-up the system, and train operations and maintenance personnel on the supplied equipment.
 - .2 Services including a total of four (4) trips with a total of four (4) days onsite shall be provided (2 trips for each cell).
 - .3 Any corrections identified during the first visit for each cell must be rectified prior to the following visit.

4 SUPPLEMENTS – N/A

END OF SECTION

SECTION 11420 – AERATION DIFFUSER SYSTEM

1 GENERAL

1.1 SCOPE OF WORK

- 1.1.1 This section includes the design, manufacture, installation and start-up of a flexible membrane, fine pore aeration system including in-basin aeration components as shown on the Drawings and as specified herein.
- 1.1.2 The aeration system manufacturer shall provide single source responsibility for the complete aeration system including in-basin piping, diffuser assemblies and support components.

1.2 DEFINITIONS

- 1.2.1 Tank: Vertical walled reactor within which aeration occurs.
- 1.2.2 Diffuser Unit: Fabricated unit including diffuser support frame and flexible membrane which releases air to the water.
- 1.2.3 Diffuser Assembly: Fabricated assembly including two diffuser units and assembly mounting components.
- 1.2.4 Air Drop Pipe: Vertical piping section from out-of-basin header stub to in-basin aeration system.
- 1.2.5 Air Manifold Piping: Air distribution piping from drop pipe to air distribution headers.
- 1.2.6 Air Header Distribution Piping: Air distribution piping from air manifold and diffuser assemblies.
- 1.2.7 Air Header Piping: Out-of-basin air distribution piping from the blower building to the header stubs.
- 1.2.8 Blower Manifold Piping: Air distribution piping between the blower discharge and air header piping.
- 1.2.9 Aeration Grid: Associated piping and diffuser components connected to a single drop pipe.
- 1.2.10 Standard Cubic Feet per Minute (scfm): Air at 68°F (20°C), 14.7 psia (101.35 kPa) and 36% relative humidity.

- 1.2.11 Maximum Pressure: Pressure in blower manifold piping at the specified airflow rate.
- 1.2.12 Oxygen Transfer Efficiency: Percent of oxygen in the air stream that is dissolved to the wastewater under specified conditions of temperature, barometric pressure, airflow rate, and dissolved oxygen concentration.
- 1.2.13 Standard Oxygen Transfer Efficiency: Percent of oxygen in the air stream that is dissolved to clean water under conditions of 68°F (20°C), 14.7 psia (101.35 kPa), and zero dissolved oxygen.
- 1.2.14 Air Distribution Uniformity: Variation in air distribution between diffuser assemblies.

1.3 SYSTEM DESCRIPTION

- 1.3.1 Design Requirements:
 - .1 Design in-basin air piping and diffusers to diffuse air throughout the aeration tank(s) in accordance with the specifications.
 - .2 Design each diffuser assembly to provide uniform air release over the specified airflow range.
 - .3 Design the aeration system to provide the minimum specified oxygen transfer efficiency at the specified airflow and operating pressure.

1.4 SUBMITTALS

- 1.4.1 General:
 - .1 A detailed engineering submittal package including dimensional shop drawings shall be provided in sufficient detail and scope to confirm compliance with the requirements of this section. Submittals shall be complete for all required COMPONENTS. PARTIAL SUBMITTALS WILL NOT BE ACCEPTED.
- 1.4.2 Shop Drawings:
 - .1 Detailed layout drawings for in-basin aeration components. Layout drawings shall include:
 - .1 Layout and configuration of aeration system.
 - .2 Detail dimensional drawings of diffuser assemblies showing components, method of construction, and attachment mechanism to air header distribution piping.
 - .3 Detail dimensional drawings of all piping connections including drop to manifold, manifold to header and inline connections for manifold and headers.
 - .4 Detail drawings of pipe support components.

- 1.4.3 Product Data:
 - .1 Detailed listing of materials and materials of construction.
 - .2 Product literature.
- 1.4.4 System Design and Performance Data:
- 1.4.5 Design calculations showing oxygen transfer based on guaranteed performance. If required information can be provided on the existing blower system during the shop drawing review phase.
- 1.4.6 Include complete air headloss calculations for the aeration equipment from the top of the dropleg to the farthest diffuser bubble release point.
- 1.4.7 Design calculations showing uniform air distribution (+10% maximum variation) through lateral piping and diffuser element orifice system.
- 1.4.8 Design calculations for piping and support components.
- 1.4.9 Product Experience:
 - .1 The supplier shall have experience in the design, manufacture, supply and commissioning of fine pore, flexible membrane aeration equipment identical to the type specified for this project.
 - .2 The equipment submitted shall be of proven design and shall be referenced by at least three installations of similar size, having been in successful operation for a period of not less than four (4) years prior to bid date.
- 1.4.10 Guarantee:
 - .1 All equipment furnished under this contract shall be warranted to be free from defects in materials and workmanship for twelve (12) months from startup of the equipment or eighteen (18) months from shipment, whichever occurs first. Defective part(s) shall be remedied by repair or replacement of the defective part(s) only shipped freight included, FOB original shipping point, by the Manufacturer. Labor is excluded in this warranty.

1.5 INSTALLATION INSTRUCTIONS:

- 1.5.1 Installation requirements and guidelines for all proposed equipment shall be provided.
- 1.5.2 Information on the aeration system shall include but not be limited to:
 - .1 Diffuser unit assembly.
 - .2 Diffuser assembly attachment.
 - .3 Piping components and assembly.

.4 Piping support components.

1.5.3 Operation and Maintenance Data:

- .1 Operations and maintenance data for all proposed equipment shall be provided.
- .2 Information on the aeration system shall include but not be limited to:
- .3 Air flow balancing.
- .4 Diffuser assembly maintenance and membrane replacement.

2 PRODUCTS

2.1 MANUFACTURERS

2.1.1 Environmental Dynamics International, Columbia, Missouri.

2.1.2 Pre-approved equal.

- .1 Information on alternate manufacturers shall be submitted to the Design Engineer no less than 2 weeks prior to the bid date. Only pre-approved, named manufacturers are acceptable.

2.2 MATERIALS

2.2.1 Welded Stainless Steel Components:

- .1 Sheets and plates of Type 304L stainless steel conforming to AISI 304L and ASTM A240.
- .2 Limit carbon content to 0.30% maximum.

2.2.2 Non-welded Stainless Steel Components:

- .1 Sheets and plates of Type 304 stainless steel conforming to AISI 304 and ASTM A240.

2.2.3 Fasteners and Anchorage Components:

- .1 18-8 series stainless steel.

2.2.4 PVC Pipe and Fittings (Schedule 80):

- .1 Base material shall be ASTM D-1784.
- .2 Pipe shall be manufactured in accordance with ASTM D-1785 and ASTM D-2665.

2.3 AERATION EQUIPMENT

2.3.1 System Performance:

- .1 The aeration-mixing system shall be designed with the following diffuser quantities:

	Drop Size	Manifold Size	Lateral Quantity	Lateral Size	Diffuser Quantity (Duplex)
Aeration Tank A1	6"	6" X 4"	5	4"	35
Aeration Tank A2	6"	6" X 4"	3	4"	33
Anoxic Zone A1	4"	N/A	1	4"	11
Anoxic Zone A2	4"	N/A	1	4"	9

- .1 Side Water Depth = 15.10 ft maximum
- .2 Design Diffuser Submergence = 13.75 ft maximum
- .2 The diffusers shall not exceed the following:
 - .1 Active Surface Area = 2.64 ft² minimum per membrane
 - i. Active surface area shall be defined as the net perforated area of the media or membrane and shall reflect only that portion of the membrane which can be demonstrated to produce uniform air discharge under the full operating range proposed for the diffuser.

2.3.2 Flexible Membrane, Fine Pore Diffusers:

- .1 The EDI FlexAir MiniPanel diffuser assembly shall be furnished and installed.
- .2 Each diffuser assembly shall be factory assembled and include two diffuser units and mounting saddle.
- .3 Diffusers unit shall have nominal dimensions of 4.5 inches (114.3 mm) in diameter and 53.5 inches (1359 mm) long.
- .4 The diffuser membrane shall be fully supported over full length and circumference with a 4.5 inch (114.3 mm) PVC membrane support frame.
 - .1 Use of a non-fully supported diffuser membrane is not acceptable.
- .5 The diffuser support frame shall be approximately 53.5 inches (1359 mm) long and have a full diameter mounting connection.
 - .1 Use of non-full diameter mechanical connections including threaded connections is not acceptable.
- .6 The diffuser membrane shall be held in place by two 304 stainless clamps.
 - .1 Retainer clamps shall be crimp type. Worm gear type clamps are not acceptable.
- .7 Installation of the diffuser membrane shall be accomplished with the removal and installation of the membrane clamps.

- .1 Disassembly of diffuser assembly to remove and install membranes is not acceptable.
- .8 Individual diffuser units shall be provided with an internal end cap.
 - .2 Internal end cap placement shall minimize the operating uplift weight of the assembly.
- .9 The diffuser unit shall be fully capable of operating under continuous or intermittent conditions and shall be designed with check valve capabilities to prevent entry of mixed liquor into the diffuser unit or air piping on air shutdown or interruption of air supply. A minimum of three (3) check valve features shall be provided, not limited to the following:
 - .1 Membrane shall be elastic and allow openings to close when the air supply is interrupted.
 - .2 Membrane shall contract and close around full diameter support frame.
 - .3 Membrane shall employ a non-perforated section that is aligned and seals against the support frame, air distribution orifices.
 - .4 Use of independent or internal check valve components is not acceptable.
- .10 Diffuser assemblies shall be completely factory assembled with diffuser units, membranes and mounting saddle factory installed.
 - .1 Field solvent welding or assembly of diffuser is not acceptable.
- .11 Diffuser assemblies shall be shipped to the jobsite assembled and properly crated and protected for shipment and handling.
- .12 Diffuser saddle mount shall be ABS or PVC construction and shall be capable of withstanding an external force of 7,500 inch-pounds (850 N-m) without structural failure of the air distribution pipe, diffuser unit connection or mounting saddle.
 - .1 Small diameter threaded connections to attach diffusers to the air distribution header are not acceptable.
 - .2 Saddle mount shall fully encompass the air distribution header and reinforce the pipe section at the diffuser assembly connection.
 - .3 Alignment plug shall be provided to ensure proper alignment and resistance to rotation.
 - .4 An O-ring gasket shall be provided to ensure an air tight seal between the mounting saddle and air header.
- .13 A minimum 3.5 inch (88.9 mm) diameter connection shall be provided between the saddle mount and diffuser assembly.

2.3.3 Flexible Membrane:

- .1 Membrane material for the diffuser unit shall be EPDM rubber.
 - .1 Alternate membrane materials are not acceptable.

- .2 Membrane shall be extruded in a single piece with the following characteristics.
 - .1 Membrane shall be 117 mm inside diameter with an overall length of 1359 mm.
 - .2 Perforated length on diffuser membrane shall be 1308 mm.
 - .3 Membrane shall be perforated on the top half of the sleeve.
 - .4 Non-perforated membrane section shall be provided to seal off air distribution orifices on the diffuser support structure.

2.3.4 Aeration System Piping:

- .1 Out-of-basin air piping including blower manifold, air header, and header stubs are required and are to be supplied by the Contractor.
 - .1 Header stubs shall extend to the inside top of the wall and terminate with a full diameter, horizontal face, flange.
 - .2 Out-of-basin piping may be unlined ductile iron, galvanized steel, stainless steel, or painted carbon steel.
 - .3 The Contractor shall provide an isolating/balancing valve for control and distribution of air to the aeration grid and to allow isolating of the grid for inspection and maintenance on the header stub.
 - .4 Isolation/balancing valve shall be positioned for accessibility from the top of the tank.
- .2 Drop pipe shall be provided with a flanged top connection and plain end.
 - .1 Drop pipe shall extend from the top connection to within 2 feet (0.61 m) of the air manifold.
 - .2 Material of construction for the drop pipe shall be schedule 5, stainless steel.
 - .3 Drop pipe shall connect to air manifold piping by means of a wrap-around clamp adapter.
- .3 All submerged manifolds and header components shall be Schedule 40 PVC minimum.
 - .1 Use of PVC piping shall only be employed when the expected mean wall temperature is less than 140°C. If temperature exceeds this limit, alternate materials shall be used or cooling loops added until the temperature is at the appropriate level.
 - .2 Use of PVC piping shall only be employed when diffuser mounting system reinforces pipe wall at each mounting location.
 - .3 Use of non-reinforced diffuser connections including threaded diffuser mounts is not acceptable.
- .4 Pipe supports shall be all stainless steel construction.

- .1 Supports shall accommodate longitudinal movement in the piping components due to the thermal expansion and contraction over a temperature range of 100°F (37.7°C).
- .2 Supports shall restrain the axial and rotational movement of the pipe while providing for unrestrained longitudinal movement.
- .3 Supports shall allow leveling of the air piping with 2 inch (50.8 mm) minimum vertical adjustment at each support.
- .4 Each pipe support shall be connected to basin floor by at least 2 anchor bolts.
- .5 The integrated pipe support assembly shall be designed to withstand the associated uplift force of the piping and diffuser assemblies with a minimum design factor of safety equal to ten (10).

2.3.5 Spare Parts:

- .1 The Contractor shall furnish the following spare parts and store as directed:
 - .1 Two (2) - EDI FlexAir MiniPanel diffuser assemblies completely factory assembled.
 - .2 Five (5) – Membrane sleeves and stainless steel membrane clamps.

Manufacture to provide a recommended 5 year spare parts and proposed price as part of the shop drawing submission.

3 EXECUTION

3.1 INSTALLATION

- 3.1.1 Contractor shall furnish, inspect, store, and install aeration system in accordance with manufacturer's written instructions and approved submittals.
- 3.1.2 Contractor to coordinate material delivery and storage to support required construction sequencing of one cell offline at a time. The contractor is responsible for the supply, installation and commissioning of the diffuser system and any coordination effort with the air diffuser supplier.
- 3.1.3 Diffuser assemblies on a common grid shall be installed within an elevation tolerance of $\pm 1/2$ inch (12.7 mm).
- 3.1.4 Contractor shall provide all valves, air header piping, wall sleeves with seals, wall pipes, and concrete pedestals as necessary to complete the system as shown on the plans.

- 3.1.5 Air piping including blower manifold, header, and in-basin piping must be clean prior to delivering air up the diffusers.
- 3.1.6 Contractor shall be responsible for cleanliness of piping and may be required to manually clean pipe, or air or water flush piping as required.

3.2 START-UP

3.2.1 Upon the completion of installation the manufacture shall inspect the installation and provide written confirmation that the equipment is installed per manufactures requirements for each cell separately. After installation is completed, the Contractor shall perform the following field tests in the presence of the Engineer and the Owner.

- .1 Fill the reactor to the bottom of the diffuser assemblies with clean water.
- .2 Adjust the pipe supports and diffuser assemblies such that all diffuser units are installed within $\pm 1/2$ inch (12.7 mm) of the design diffuser elevation.
- .3 Fill the reactor to a level of 2 feet (0.61 m) above the top of the diffusers.
- .4 Release air to the system and inspect the system for air leaks at all piping or diffuser connections.
- .5 Check all membrane for cuts or tears that may have occurred during the installation.
- .6 Adjust any piping or diffusers that show leaks or disproportionate amount of airflow.
- .7 Operate the blowers at the design air rate and observe air release and air distribution patterns.
- .8 All water, air, power and labour associated with testing and adjustment of diffuser assemblies are to be supplied by Contractor.

3.2.2 MANUFACTURER'S FIELD SERVICES

- .1 A manufacturer's representative shall be present at the job site to inspect the installation of the equipment, start-up the system, and train operations and maintenance personnel on the supplied equipment.
- .2 Minimum services including a total of four (4) trips (one for each cell being upgraded) with a total of eight (8) days onsite shall be provided.

4 SUPPLEMENTS – N/A

END OF SECTION

CITY OF HAMILTON

C13-32-24

DUNDAS WASTEWATER TREATMENT
PLANT (WWTP) HEALTH AND SAFETY
IMMEDIATE NEEDS AND STRUCTURAL
REPAIR UPGRADES

DIVISION 15

Section 15050 – Basic Mechanical Materials and Couplings

Section 15220 – Process Piping and Fittings

SECTION 15050 – BASIC MECHANICAL MATERIALS AND COUPLINGS

1 GENERAL

1.1 SECTION INTENT

- 1.1.1 This section describes procedures and requirements for the supply and installation of pipes and fittings, pipe anchors and supports, sleeves, miscellaneous grout, pipe jointing and couplings.

1.2 RELATED SECTIONS

- 1.2.1 Section 01310 – Project Management and Coordination.
- 1.2.2 Section 01330 –Submittals.
- 1.2.3 Section 01450 Quality Control.
- 1.2.4 Section 01780 – Closeout Submittals.
- 1.2.5 Section 03300 – Cast-In-Place Concrete.
- 1.2.6 Section 05500 – Metal Fabrications.
- 1.2.7 Section 09900 – Painting.
- 1.2.8 Section 15220 – Process Piping and Fittings.

1.3 REFERENCES

- 1.3.1 American Society of Mechanical Engineers (ASME):
- .1 B1.20.1 Pipe Threads, General Purpose (Inch).
 - .2 B16.21 Non Metallic Flat Gaskets for Pipe Flanges.
 - .3 B18.2.1 Square and Hex Bolts and Screws Inch Series.
- 1.3.2 American Society for Testing and Materials (ASTM):
- .1 A53 Standard Specification for Pipe, Steel, Black and Hot Dipped, Zinc Coated, Welded and Seamless.
 - .2 B32 Standard Specification for Solder Metal.
 - .3 B813 Standard Specification for Liquid and Paste Fluxes for Soldering of Copper and Copper Alloy Tube.
 - .4 B828 Standard Practice for Making Capillary Joints by Soldering of Copper and Copper Alloy Tube and Fittings.
 - .5 C1107 Standard Specification for Packaged Dry, Hydraulic Cement Grout (Nonshrink).

- .6 C1173 Standard Specification for Flexible Transition Couplings for Underground Piping Systems.
 - .7 D1785 Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120.
 - .8 D2235 Standard Specification for Solvent Cement for Acrylonitrile Butadiene Styrene (ABS) Plastic Pipe and Fittings.
 - .9 D2564 Standard Specification for Solvent Cements for Poly (Vinyl Chloride) (PVC) Plastic Piping Systems.
 - .10 D2657 Standard Practice for Heat Fusion Joining of Polyolefin Pipe and Fittings.
 - .11 D2661 Standard Specification for Acrylonitrile Butadiene Styrene (ABS) Schedule 40 Plastic Drain, Waste, and Vent Pipe and Fittings.
 - .12 D2672 Standard Specification for Joints for IPS PVC Pipe Using Solvent Cement.
 - .13 D2846 Standard Specification for Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Hot and Cold Water Distribution Systems.
 - .14 D2855 Standard Practice for Making Solvent Cemented Joints with Poly (Vinyl Chloride) (PVC) Pipe and Fittings.
 - .15 D3138 Standard Specification for Solvent Cements for Transition Joints Between Acrylonitrile Butadiene Styrene (ABS) and Poly (Vinyl Chloride) (PVC) Non Pressure Piping Components.
 - .16 D3139 Standard Specification for Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals.
 - .17 D3212 Standard Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals.
 - .18 F402 Standard Practice for Safe Handling of Solvent Cements, Primers, and Cleaners Used for Joining Thermoplastic Pipe and Fittings.
 - .19 F493 Standard Specification for Solvent Cements for Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe and Fittings.
 - .20 F656 Standard Specification for Primers for Use in Solvent Cement Joints of Poly (Vinyl Chloride) (PVC) Plastic Pipe and Fittings.
 - .21 F1476 - Standard Specification for Performance of Gasketed Mechanical Couplings for Use in Piping Applications.
- 1.3.3 American Water Works Association (AWWA):
- .1 C110 Standard for Ductile Iron and Gray Iron Fittings 76mm Through 1219mm, for water.
 - .2 C219 Bolted, Sleeve Type Couplings for Plain End Pipe.
 - .3 C606 – Grooved and Shouldered Joints.
- 1.3.4 American Welding Society, Inc. (AWS):
- .1 A5.8 Filler Metals for Brazing and Braze Welding.
 - .2 D1.1 Structural Welding Code Steel.
 - .3 Brazing Handbook.

- 1.3.5 The Copper Development Association, Inc. (CDA): Copper Tube Handbook.
- 1.3.6 Canadian Gas Association (CGA): B105 Code for Digester Gas and Landfill Gas Installations.
- 1.3.7 Canadian Standards Association (CSA): B51 Boiler, Pressure Vessel, and Pressure Piping Code.
- 1.3.8 Manufacturers Standardization Society of the Valve and Fittings Industry (MSS): SP 107 Transition Union Fittings for Joining Metal and Plastic Products.

1.4 SUBMITTALS

- 1.4.1 Refer to Section 01330 Submittals for progress submittal requirements.
- 1.4.2 Product Data: Submit detailed catalogue information on selection, identification, shop and/or site fabrication procedures, installation, and adjusting, for the following products, including components:
 - .1 Pipes.
 - .2 Flanges, couplings and dismantling joints.
 - .3 Fittings.
 - .4 Expansion joints, flexible hoses, and hose adapters.
 - .5 Mechanical sleeve seals.
 - .6 Supports, hangers, guides, and anchors.
- 1.4.3 Shop Drawings:
 - .1 Include descriptive information as required to fully describe the materials and procedures to be used in fabrication of the piping system.
 - .2 Clearly specify pipe material and joint type selected for each pipeline, where alternatives are specified.
 - .3 Include Shop Drawings for fabricated components of pipe, fittings, anchors, and guides.
 - .4 Include a complete laying plan and section, detailing dimensions, location of each pipe section and each special length, special fittings, bends, coatings, and other pertinent information.
 - .5 Include double lined to scale drawings of each pipe support system to the scale stated on the Drawings.
 - .6 Locate each support and hanger, identify with type of catalogue number or Shop Drawing detail number. Show anchor locations and identify them by Shop Drawing detail number.

- .7 Include detailed installation drawings, catalogue information, and complete component selection list for tie rods and thrust restraints systems.
- .8 No change in material or joint selection will be permitted after submittal of Shop Drawings and their final review by Engineer.

1.4.4 Certificates and Reports:

- .1 Certify that products meet or exceed specified requirements.
- .2 Indicate results of field hydrostatic testing.

1.5 CLOSEOUT SUBMITTALS

- 1.5.1 Refer to Section 01780 – Closeout Submittals for closeout submittal requirements.
- 1.5.2 Record Documents: Indicate location, size, and service of piping systems.
- 1.5.3 Warranties: Completed original warranty forms filled out in Owner's name and registered with manufacturer.

1.6 QUALIFICATIONS

- 1.6.1 Fabricator: Company specializing in the works of this Section, and supplementary individual piping specification sections, with minimum three years documented experience.
- 1.6.2 Installer: Company specializing in performing the work of this Section, and supplementary individual piping Sections, with minimum three years documented experience.
- 1.6.3 Designer: Drawings for piping and supports are stamped by a Professional Engineer experienced in design of the work of this Section and is licensed in the Province of Ontario.
- 1.6.4 Fabrication of flanged, threaded, and grooved piping shall be in accordance with ASME and AWWA standards.
- 1.6.5 Independent Testing Firm: Company specializing in inspection of AWWA piping material, fabrication final pressure testing, with minimum five years documented experience.

1.7 CERTIFICATIONS

- 1.7.1 Provide certificate of compliance from applicable regulatory authority, indicating approval of piping design, fabrication, installation or laying, and testing.

1.8 DELIVERY, STORAGE AND HANDLING

- 1.8.1 Handle piping items strictly in accordance with manufacturer instructions during all stages of delivery, storage and installation.
- 1.8.2 Prevent damage to exterior, interior, shape of pipe during activities prior to fabrication and installation.
- 1.8.3 Deliver pipes and tubes with factory applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe end damage and to prevent entrance of dirt, debris, and moisture.
- 1.8.4 Protect the products from dirt, damage, deformation, non compatible materials, heat, cold, sunlight exposure, rain, and moisture.
- 1.8.5 Receive the products in factory finish condition. Inspect for damage or deterioration of product quality. Replace damaged or deteriorated quality product as required and directed by Engineer.

1.9 SEQUENCING AND SCHEDULING

- 1.9.1 Refer to Section 01310 – Project Management and Coordination for coordination requirements.
- 1.9.2 Coordinate with work of other trades for piping fabrication, supporting, installation, insulation, connection to equipment and packages, and testing.
- 1.9.3 Coordinate installation of required in line instrumentation and control valves.
- 1.9.4 Arrange for pipe spaces, chases, slots, and openings in building structure during progress of construction, to allow for mechanical installations.
- 1.9.5 Coordinate installation of required supporting devices and set wall pipes or sleeves in cast in place concrete and other structural components as they are constructed.
- 1.9.6 Coordinate requirements for access panels and doors for mechanical items requiring access that are concealed behind finished surfaces.

1.10 GENERAL MECHANICAL REQUIREMENTS

- 1.10.1 Provide all labour, materials, equipment and services to complete the work specified and shown on the drawings.
- 1.10.2 Provide all accessories and appurtenances as required to ensure complete and operational systems.

- .1 All grooved joint couplings, fittings, valves, and specialties shall be of a single manufacturer. Grooving tools shall be of the same manufacturer as the grooved components.
 - .2 All castings used for fittings, couplings, valve bodies, etc., shall include a cast date stamp for quality assurance and traceability.
- 1.10.3 The plans and specifications are intended to set the acceptable minimum and shall not be construed to relieve this Contractor of the responsibility of:
- .1 Installing complete, trouble free system.
 - .2 Good workmanship.
- 1.10.4 Comply with Municipal or Provincial Codes, Rules and Regulations and/or Authorities having jurisdiction.
- 1.10.5 Permits and Inspections
- .1 Obtain permits and inspections required for the installation of mechanical trades work including: Sprinkler System inspection, Electrical inspection and Plumbing inspection.
 - .2 Arrange for inspections and tests and pay all fees and costs for the permits, inspections and tests. Obtain permits immediately after notification of award of Contract.
 - .3 Obtain copies of Drawings from the Consultant for submission with application for permits.
- 1.10.6 Coordinate Work of Division 15 such that items will properly interface with Work of other Divisions. Prepare installation drawings of critical locations and submit to the Consultant for review.
- 1.10.7 Tie-in to Existing Services
- .1 Do not shut down or make tie-in connections to any existing service without written permission of the Owner and/or the Consultants.
 - .2 Be responsible for any damage to existing systems, including insulation and coverings, when making connections.
 - .3 Keep existing buildings in operation with minimum length of shut-down periods.
 - .4 Route pipes, conduits and other services to avoid interference with existing installation.
 - .5 Cut back and cap existing services not being used, so that finished work presents a neat and clean appearance.
 - .6 Unless noted otherwise, fixtures and materials being removed become the property of the Contractor and are to be removed from site.
- 1.10.8 Structural Integrity

- .1 Obtain prior written Consultant's approval before drilling, cutting or welding of the building steel or building structure for erection of materials or equipment.
- .2 During installation of mechanical work, do not load any part of the building structure with a load greater than it is capable of bearing.
- .3 Should any accident occur or damage result through the violation of this requirement, the contractor shall be held solely responsible.
- .4 Design temporary supports used during installation as being equivalent to permanent supports.
- .5 Remove temporary supports at completion of Work.

1.11 WORKING DRAWINGS AND DOCUMENTS

- 1.11.1 Where any parts of the mechanical work are specifically located by dimensions on the Drawings, check and verify these dimensions on site prior to installation.
- 1.11.2 Before installing piping, review architectural, structural and electrical drawings with mechanical drawings.
 - .1 Where interference may occur and departures from arrangements as shown are required, consult with other trades involved, come to agreement as to changed locations or elevations and obtain approval of the Consultant for proposed changes before proceeding with the work.
- 1.11.3 Examine work of other trades or contractors, prior to commencement of mechanical installations.
 - .1 Report in writing, to the Consultant, any discrepancies which will affect mechanical installations.
 - .2 Failure to do so shall be considered acceptance of the conditions.
- 1.11.4 Where site conditions require minor deviations from indicated arrangements or locations, make such changes on approval of the Consultant without additional cost to the Owner.
- 1.11.5 Should any discrepancies occur during installation of mechanical work which will necessitate major revisions to the mechanical trades work or the work of other trades or contractors, notify the Engineer immediately and obtain written authorization before proceeding with the work.

2 PRODUCTS

2.1 GENERAL

- 2.1.1 Piping Sizes and Materials: As shown on the Drawings and as specified in Section 15220 – Process Piping and Fittings.

- 2.1.2 Specific process pipe material, fabrication, inspection, construction, and testing requirements are provided in Section 15220 – Process Piping and Fittings.
- 2.1.3 All couplings shall be rated for 1,035 kPa (150 psi) and full vacuum conditions unless otherwise specified.
- 2.1.4 All couplings in contact with potable water shall be NSF-61 certified.
- 2.1.5 Refer to the Drawings for end to end piping connectivity details.
- 2.1.6 Refer to the Drawings for location and overall arrangement of piping systems.
- 2.1.7 Provide pipe anchors, expansion joints, and flexible couplings where shown on the Drawings. Contractor may install additional pipe anchors and flexible couplings to facilitate piping installation, provided that completed details describing location, pipe supports, and hydraulic thrust protection are submitted to Engineer for review.
- 2.1.8 Provide stainless steel thrust tie rods for non-restrained flexible couplings, transition couplings, and flanged coupling adapters on all pressure piping except at expansion joints in accordance with AWWA M-11 manual. Thrust protection shall be adequate to sustain the force developed by 1.5 times the operating pressures and the test pressure specified. Utilize epoxy coated ductile iron restraint lugs Robar 4499, 4800 and 4900 or approved equal to provide adequate clearance from couplings as required.

2.2 MODULAR ANNULAR MECHANICAL SEALING UNIT

- 2.2.1 Provide Link-Seal Model C with 316 SS bolts and nuts.

2.3 GROOVED COUPLINGS

- 2.3.1 Restrained flexible grooved couplings are intended to provide limited linear and angular pipe movement at the pipe joint for flexibility. Provide adequate pipe supports on either side of all flexible couplings.
- 2.3.2 Restrained rigid grooved couplings are intended to provide rigidity with limited to no flexibility.
- 2.3.3 Provide couplings compatible with pipe material as indicated on the Contract Drawings
- 2.3.4 Roll, cut or advanced grooved ends as appropriate to the pipe material, wall thickness, pressure, size and method of joining. Use roll sets specifically designed for grooving schedule 5 or 10 stainless steel pipe.

- 2.3.5 Provide coupling adaptors or build-up pipe material to match coupling dimensions as required.
- 2.3.6 Housing shall be stainless steel or fusion bonded epoxy coated ductile iron.
- 2.3.7 Gaskets, seals and or-rings shall be pressure-responsive synthetic rubber, grade to suit the intended service, conforming to ASTM D-2000. Gaskets used on potable water systems shall be ANSI/NSF-61 certified for potable water service. Gaskets used for hot air applications shall be Grade "L" Silicone designed for operation temperatures of -34 deg C to + 177 eg C. Gaskets used in wastewater applications shall be "FlushSeal" style, Grade "T" Nitrile.
- 2.3.8 Bolts shall be type 316 SS with galling reducing coating.
- 2.3.9 Grooved flange coupling adaptors shall meet the same requirements as restrained grooved couplings specified herein.
- 2.3.10 Installation: Comply with manufacturer's field installation handbook. For all couplings 600mm or larger retain the services of a factory trained field technician to inspect and verify that the coupling has been installed in accordance with all manufacturer's requirements. Submit written notice to Engineer for review prior to placing coupling into service.
- 2.3.11 Approved Manufacturers: Victaulic couplings or approved equal.

2.4 PLAIN-END PIPE COUPLINGS

- 2.4.1 Unless otherwise specifically specified, provide restrained couplings for all plain-end pipe couplings.
- 2.4.2 Couplings shall be stainless steel.
- 2.4.3 For sizes greater than 600mm diameter, provide split sleeve body type with at least two segments.
- 2.4.4 Bolts shall be type 316 SS with galling reducing coating.
- 2.4.5 Approved Manufacturers: Victaulic, Straub or Smith-Blair

2.5 COMPRESSION COUPLINGS

- 2.5.1 Victaulic Vic-Press system for Schedule 10S stainless steel pipe from 12 to 50 mm in diameter.

2.6 FLANGE ADAPTOR

- 2.6.1 For mating ANSI Class 125 flanged components to plain end or grooved end pipe and fittings as applicable.
- 2.6.2 For use with grooved end pipe and fittings refer to "Grooved Couplings" specification herein.
- 2.6.3 For use with plain end pipe and fittings refer to "Plain End Pipe Couplings" specification herein.
- 2.6.4 Unless otherwise specified, provide restraints for all flange adaptors.
- 2.6.5 Approved Manufacturers: Victaulic, Robar, Romac or Smith-Blair

2.7 FIRE STOPPING

- 2.7.1 Fire stopping to be ULC listed fire stopping assembly, rating to suit wall and floor penetrations. Acceptable Manufacturers:
 - .1 Fire Stop Systems.
 - .2 Dow Corning.
 - .3 3M.
 - .4 Tremco.
 - .5 A/D Fire Protection System.

2.8 SLAB, FLOOR, WALL, CEILING AND ROOF PENETRATIONS AND CLOSURES

- 2.8.1 Piping penetrations of new cast-in-place concrete slabs, floors, walls, ceilings, and roofs shall be ductile iron wall pipes with thrust collars.
- 2.8.2 Verify the size and location of all building and structure penetrations prior to pouring concrete.
- 2.8.3 Ductile Iron Wall Pipes:
 - .1 All penetrations shall be watertight.
 - .2 Thrust Collars:
 - .1 Ductile iron or cast iron, cast integral with the wall pipe wherever possible.
 - .2 Rated for thrust load developed at 1,725 kPa. Minimum safety factor of 2. Submit pressure rating and safety factor specified.
 - .3 Where wall pipes cannot be cast with integral thrust collars, shop weld a ductile iron thrust collar continuously around the pipe on both sides of the collar. All welds shall be done in the manufacturer's shop by qualified welders and shall be electric arc welds of ductile iron with NI 55 or FC 55 nickel iron carbon weld rod.
 - .4 Support wall pipes by formwork to prevent contact with reinforcing steel.

2.8.4 Sleeves

- .1 Install pipe sleeves at points where pipes pass through masonry, concrete or fire rated assemblies and thrust restraint is not required, and as indicated on drawings.
- .2 Use schedule 40 steel pipe or approved equal for all sleeves.
- .3 Sleeves shall have 50mm puddle flange when they are installed in foundation walls and/or floor slabs on grade.
- .4 Provide a maximum 6mm clearance all around between sleeve and uninsulated pipe or between sleeve and insulation.
- .5 Terminate sleeves flush with surface of concrete and masonry walls and concrete floors on grade and 25mm above all other floors.
- .6 Core drilled holes drilled with a suitable rotary drill are acceptable in lieu of sleeves in existing walls. Permanent sleeves are not required for holes formed by removable PE sleeves.
- .7 Provide a water stop center flange for sleeves in exterior or waterbearing wall. Make the annular space between pipes and sleeves in exterior wall watertight.
- .8 Seal the annular space between pipes and sleeves in exterior wall by caulking with rubber sealant, or using a modular annular mechanical sealing unit. The installed closure shall provide electrical isolation of the pipe from the wall sleeve.
- .9 If selected or specified, modular annular mechanical sealing unit shall be Link-Seal model S-316.
- .10 Coat wall sleeves as specified in Section 09900 - Painting. When placing non insulating type wall sleeves in concrete forms, support them by formwork to prevent contact with reinforcing steel.

2.8.5 Escutcheons

- .1 Install escutcheons on pipes passing through walls, partitions, floors and ceilings.
- .2 Use chrome, plated brass or stainless steel two piece type escutcheons mechanically secured to adjacent surface.
- .3 Outside diameter of escutcheons shall cover the opening of the sleeve.
- .4 The inside diameter of the escutcheon shall fit around the finished pipe.

2.9 PIPING SUPPORT AND RESTRAINING SYSTEMS

- 2.9.1 Support piping, in general, as described hereinafter and as shown on the Drawings.

- 2.9.2 Manufacturer's catalogue figure numbers are typical of the types and quality of standard pipe supports and hangers to be employed. Special support and hanger details are shown to cover typical locations where standard catalogue supports are inapplicable.
- 2.9.3 Pipe supports shown on the Drawings are intended to present the general arrangement of pipe supports in the area, represented as typical of similar arrangements to be used. No attempt has been made to show all required pipe supports and restraints in all locations, either on the Drawings or in the details, standard or custom made. Provide adequate number, size, and type of piping supports required.
- 2.9.4 Pipe support and restraining system components shall withstand the dead loads imposed by the weight of the pipes filled with water and shall have a minimum safety factor of five, and live loads created by pumped fluid thrust and shall be adequately anchored to resist such forces without undue shock, vibration, or damage to the piping system or related equipment.
- 2.9.5 Support horizontal piping with adjustable swivel ring, split ring, or clevis type hangers, welded steel wall bracket, or adjustable pipe saddle support as shown on the Drawings,. Acceptable Manufacturers: Anvil, Figure 104, 108, 260, 199, 264/265; approved B-Line equal.
- 2.9.6 Support stacked horizontal runs of piping along walls by a metal framing system attached to concrete insert channels. Do not support pipe from the pipe above or below itself. Acceptable Manufacturers: Unistrut, Anvil, B-Line.
- 2.9.7 Horizontal piping hanger support rods shall attach to steel beams with I clamps, to concrete with inserts or flanges fastened with flush shells, to wood not less than 65mm thick with lag screws and angle clips.
- 2.9.8 Vertical Piping Hangers and Supports: Channel and pipe clamps as manufactured by Unistrut, Anvil, or approved equal.
- 2.9.9 Hangers, Rods, Clamps, Protective Shields, Metal Framing Support Components, and Hanger Accessories: 3016 stainless steel unless otherwise specified.
- 2.9.10 Expansion Anchors: Type 316 stainless steel.
- 2.9.11 For hangers on copper pipe use copper plated or steel with insulating bushing. Copper pipes must not contact steel pipe or hangers.
- 2.9.12 Submerged Supports: Type 316 stainless steel, electrically isolated from metal piping with a 6mm x 75mm neoprene rubber wrap.

2.9.13 For support of horizontal piping use round steel threaded rods spaced at regular intervals summarized below:

Pipe Size (mm)	Rod Diameter (mm)	Maximum Spacing for Steel, Stainless Steel and Ductile Iron (m)	Maximum Spacing for Copper Piping (m)	Maximum Spacing for PVC Piping (m)
30	10	2.1	1.8	1.2
40	10	2.7	2.4	1.2
50	10	3.0	2.4	1.5
65	12	3.3	3.7	4.5
75	12	3.6	3.0	1.5
100	16	4.2	-	1.8
150	20	5.1	-	2.4
200	22	5.7	-	3.0
250	25	6.6	-	-
300	25	6.9	-	-
350	25	6.9	-	-
400	25	7.0	-	-

- 2.9.14 When supporting cast or ductile iron pipe, locate hanger rods at all non rigid joints and at each change of direction.
- 2.9.15 Hanger rod sizing for copper pipe shall be same as for steel pipe. Space hangers as specified for support spacing.
- 2.9.16 Hanger rod sizing for plastic pipe shall be the same as for steel pipe. Space hangers as recommended by manufacturer for the flow temperature in the pipe.
- 2.9.17 Support piping in a manner that will prevent undue strain on any valve, fitting, or piece of equipment. In addition, provide pipe supports at changes in direction or elevation, adjacent to flexible couplings, and where otherwise shown. Do not install pipe supports and hangers in equipment access areas.
- 2.9.18 Where pipes change direction either horizontally or vertically provide pipe hanger not more than 300mm from elbows. Where pipes drop from branches of tees support main run in both directions not more than 900mm on each side of tee. Where changes in direction are used for expansion, use linked eye hanger rods.
- 2.9.19 Erect structural work required for support of mechanical equipment. Include angle frames, anchor bolts, guy wires, platforms, braces, etc. required to support equipment, ductwork, piping, etc. Supports to have ample strength to carry equipment under testing and operating conditions. In addition, supports must meet normal acceptable engineering practices and be approved by the Engineer.

3 EXECUTION

3.1 EXAMINATION

- 3.1.1 Verify that surfaces and the Site conditions are ready to receive work.

3.2 MECHANICAL DEMOLITION

- 3.2.1 When coring holes through existing walls or floors for conduit or mechanical piping, the Contractor shall undertake x ray or other method approved by the Engineer to confirm the location of rebar prior to coring. The Contractor shall not core through existing rebar without approval by the Engineer.
- 3.2.2 Disconnect, demolish, and remove mechanical systems, equipment, and components indicated to be removed.
 - .1 Piping to be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.

- .2 Piping to be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material.
- .3 Ducts to be Removed: Remove portion of ducts indicated to be removed and plug remaining ducts with same or compatible ductwork material.
- .4 Ducts to be Abandoned in Place: Cap or plug ducts with same or compatible ductwork material.
- .5 Equipment to be Removed: Disconnect and cap services and remove equipment.
- .6 Equipment to be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.
- .7 Equipment to be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.

3.2.3 If pipe, insulation, or equipment to remain is damaged in appearance or is unserviceable, remove damaged or unserviceable portions and replace with new products of equal capacity and quality.

3.3 PIPING INSTALLATION

- 3.3.1 Provide clearances and access for maintenance of equipment, valves, fittings as specified and as per manufacturer's installation instructions.
- 3.3.2 Install so that equipment can be isolated and removed without interrupting the operation of any other equipment or systems.
- 3.3.3 Assemble piping using fittings manufactured to ANSI standards.
- 3.3.4 Group piping wherever possible and as indicated.
- 3.3.5 Ream pipes, remove scale and other foreign material before assembly.
- 3.3.6 Use eccentric reducers at pipe size changes to ensure positive drainage and venting.
- 3.3.7 Support or suspend piping with necessary hangers, structural supports and/or brackets, to prevent sagging, warping and vibration and to allow for movement due to expansion and contraction.
- 3.3.8 Place hangers and supports close to fittings, elbows, valves and/or other heavy parts.

- 3.3.9 Do not allow loads of any nature to be transmitted through the piping connections to equipment not specifically designed for such loads. Where flexible connections are not called for at connections to equipment, support the pipe by stands attached to both pipe and supporting structure so that force in any direction is not transmitted to the equipment.
- 3.3.10 Place suitably dampened spring hangers at the first three supports from the equipment connection on piping subject to excessive movement or shock from any source, thermal expansion and contraction. Where it is evident that no undue loads will be transmitted to the equipment by the system concerned, i.e. small bore connections to comparatively large equipment, cold service piping not subject to shock, etc., then spring hangers may be omitted, and standard hangers used.
- 3.3.11 Use trapeze type hangers where pipes are grouped together, unless specifically indicated otherwise on the Drawings.
- .1 Suspend horizontal member by adjustable rods with locking feature for maintaining level and slope.
 - .2 Space trapeze type hangers based on the closest interval required by any pipe supported thereon.
 - .3 Provide any auxiliary steel required to support trapeze between building steel.
- 3.3.12 Do not hang pipe from another pipe unless specifically shown on the Drawings.
- 3.3.13 Place saddles at roller supports for piping carrying liquids at 43°C (110°F) or higher. Weld saddles to black or galvanized steel piping.
- 3.3.14 Hanger Spacing - General
- .1 Horizontal runs of plumbing and drainage piping: to hanger spacing requirements of the Ontario Building Code.
 - .2 Place additional hangers in locations where there are concentrated loads such as valves, specialties, etc.
- 3.3.15 Vertical Piping Supports
- .1 Vertical plumbing and drainage piping: To the Ontario Building Code, unless more stringent requirements are specified herein.
 - .2 Vertical support spacing: Cast iron soil pipes: at every floor with riser clamps. Other piping: at every other floor with riser clamps, unless otherwise required by expansion conditions or otherwise specified.
 - .3 Support bottom of riser with base fitting set on concrete pier or by hanger located at top of riser pipe as close to riser as possible.
 - .4 Riser clamps:

- .1 Bolted securely to pipes.
- .2 Rest ends of clamp on the pipe sleeve or on the floor.
- .3 Weld shear lugs to pipe to transfer load to riser clamp.
- .5 Stabilize vertical piping laterally by fabricated brackets or malleable iron, extension type split hangers.
- .6 Run vertical piping at columns in the column webs, on either or both sides of the column, unless otherwise directed by the Engineer.

3.3.16 Anchors and Guides

- .1 Use anchors were shown on the Drawings and/or as required to maintain permanent location of pipelines. Construct anchors for steel or galvanized pipe of approved steel straps and/or rods. For anchoring copper lines, use copper plated anchors, or use insulation bands between tubing and clamps if steel straps or rods are used.
- .2 Provide minimum two pipe guides on each side of an expansion joint and expansion compensator. 1200mm between each guide. Not more than 900mm between last guide and start of expansion joint or expansion compensator.
- .3 For special expansion joint/compensator or for special applications, where more than two guides on each side are required, follow manufacturer recommendations for location of guides.

3.4 PIPE RESTRAINT

- 3.4.1 Where indicated on the contract drawings or otherwise required to prevent pull out, unrestrained flange adaptors and coupling shall be restrained using minimum four equally spaced stainless steel restraining rods, of same diameter as flange bolts, anchored from flanged adaptor to adjacent flange or AWWA M11 type restraint ring welded to pipe. Additional restraining rods may be required for larger pipe diameters. Contractor is responsible for ensuring that restraint system is adequate for full range of design pressures for piping system.

3.5 PIPING JOINT CONSTRUCTION

- 3.5.1 Join pipe and fittings according to the following requirements and individual sections specifying piping systems.
- 3.5.2 Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
- 3.5.3 Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.

- 3.5.4 Soldered Joints: Apply ASTM B813, water flushable flux, unless otherwise indicated, to tube end. Construct joints according to ASTM B828 or the CDA Copper Tube Handbook, using lead free solder alloy complying with ASTM B32.
- 3.5.5 Brazed Joints: Construct joints according to the AWS Brazing Handbook, Pipe and Tube chapter, using copper phosphorus brazing filler metal complying with AWS A5.8.
- 3.5.6 Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
- .1 Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
 - .2 Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.
- 3.5.7 Flanged Joints: Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.
- 3.5.8 Grooved Joints: Grooved joint couplings and fittings shall be installed in accordance with the manufacturer's written installation instructions.
- .1 Grooved ends shall be clean and free from indentations, projections, and roll marks in the area from pipe end to groove.
 - .2 Gaskets shall be verified as suitable for the intended service prior to installation. Gaskets shall be molded and produced by the coupling manufacturer.
 - .3 The grooved coupling manufacturer's factory trained representative shall provide on-site training for contractor's field personnel in the use of grooving tools, application of groove, and installation of grooved joint products. The manufacturer's representative shall periodically visit the jobsite and review installation. Contractor shall remove and replace any joints deemed improperly installed.
- 3.5.9 Plastic Piping Solvent Cement Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:
- .1 Comply with ASTM F402 for safe handling practice of cleaners, primers, and solvent cements.
 - .2 ABS Piping: ASTM D2235 and ASTM D2661.
 - .3 CPVC Piping: ASTM D2846.
 - .4 PVC Pressure Piping:

- .4 Schedule Number Piping: ASTM D1785.
 - .5 PVC Pipe and Socket Fittings: ASTM D2672.
 - .6 Other than Schedule Number PVC Pipe and Socket Fittings:
ASTM D2855.
 - .5 PVC Non pressure Piping: ASTM D2855.
 - .6 PVC to ABS Non pressure Transition Fittings: ASTM D3138.
- 3.5.10 Plastic Pressure Piping Gasketed Joints: ASTM D3139.
- 3.5.11 Plastic Non pressure Piping Gasketed Joints: ASTM D3212.
- 3.5.12 PE Piping Heat Fusion Joints: ASTM D2657. Clean and dry joining surfaces by wiping with clean cloth or paper towels.
- .1 Plain End Pipe and Fittings: Butt fusion.
 - .2 Plain End Pipe and Socket Fittings: Socket fusion.
- 3.5.13 Fiberglass Bonded Joints: Prepare pipe ends and fittings, apply adhesive, and join in accordance with pipe manufacturer's written instructions.

3.6 MISCELLANEOUS STEEL

- 3.6.1 Hang or support equipment, piping, etc., with miscellaneous structural supports, platforms, braces as may be required unless Drawings or other Sections of the Specifications state otherwise.
- 3.6.2 Materials and Fabrication shall conform to:
- .1 CAN/CSA-S16.1 M for materials, design of details and execution of the work.
 - .2 CSA-G40.20/G40.21 grade 300W for structural shapes, plates, etc.
 - .3 CSA W47.1 - for qualification of welders.
 - .4 CSA W48.1-M - for electrodes (only coated rods allowed).
 - .5 CSA W59-M - for design of connections and workmanship.
 - .6 CSA W117.2 - for safety.
- 3.6.3 Painting and Cleaning
- .1 Clean steel to Steel Structures Painting Council SSPC-SP6, Commercial Blast Cleaning.
 - .2 Apply one coat of oil alkyd primer conforming to CISC/CPMA 2.75 to all miscellaneous steel.
 - .3 In the field, touch up all bolt heads and nuts, previously unpainted connections and surfaces damaged during erection with primer as hereinbefore specified.
 - .4 Apply two coats of primer to all surfaces which will be inaccessible after erection.

- .5 Thoroughly remove all foreign matter from steelwork on completion of installation.

3.7 CONCRETE INSERTS

- 3.7.1 Install inserts required for attachment of support frames as required.
- 3.7.2 For poured concrete construction use expansion type units. Insert into the concrete after concrete has cured. Do not use anchors or inserts installed by explosive means.

3.8 FIRE STOPPING

- 3.8.1 Seal piping, conduits and miscellaneous support steel penetrating fire separations.
- 3.8.2 Install fire stopping in accordance with manufacturer's instructions and ULC listing requirements.
- 3.8.3 Provide a written report on completion of fire stopping, by area or floor if necessary, indicating the work is completed and ready for inspection. Do not cover over fire stopping, including installation of walls and ceilings, until work is inspected.

3.9 ERECTION OF METAL SUPPORTS AND ANCHORS

- 3.9.1 Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor mechanical materials and equipment in accordance with Section 05500 – Metal Fabrications and as shown on the Drawings.
- 3.9.2 Field Welding: AWS D1.1.

3.10 PERFORMANCE TESTING AND BALANCING

- 3.10.1 Assume responsibility for testing, balancing and placing all air handling and liquid systems in operation, prior to final acceptance in presence and under direction of the Consultant.
- 3.10.2 Furnish all instruments required to test and balance systems.
- 3.10.3 Balance systems in accordance with design requirements indicated on the Drawings.
- 3.10.4 Report to the Consultant immediately, any deficiencies in the systems or equipment performance resulting in design requirements being unobtainable.

- 3.10.5 On completion of testing and balancing of all systems, submit to the Consultant a report (four copies) of findings, including:
- .1 Complete data of equipment performance.
 - .2 Operating pressures.
 - .3 Flow quantities.
 - .4 Equipment RPM.
 - .5 Final readings at all outlets and equipment.
 - .6 Ampere readings of all motors, taken at motor terminals when equipment is operating under full load conditions.

3.11 ACCEPTANCE

- 3.11.1 After all equipment has been installed and adjusted and all systems balanced Conduct performance tests in the presence of the Consultant and the Owner.
- 3.11.2 Arrange the time for these tests at the convenience of the Consultant and Owner.
- 3.11.3 Conduct tests under climatic circumstances to ensure complete and comprehensive tests and of such a manner and duration as the Consultant may deem necessary.

3.12 REFERENCE STANDARDS

- 3.12.1 Perform identification work in accordance with CGSB 24-GP-3A-67 and NFPA 20 except where specified otherwise.
- 3.12.2 Provide Underwriters Laboratories of Canada (ULC) or equivalent registration plates, as required by respective agency.

3.13 REQUIREMENTS

- 3.13.1 Submit proposed wording for all labels and tags to the Consultant for approval before engraving.

4 SUPPLEMENTS – N/A

END OF SECTION

SECTION 15220 – PROCESS PIPING AND FITTINGS

1 GENERAL

1.1 SECTION INTENT

- 1.1.1 This section describes procedures and requirements for piping systems devoted to process gases, water, wastewater or industrial fluids.
- 1.1.2 The Contractor shall furnish all materials, tools, equipment, transportation, labour, supervision and incidentals required to supply, store, install, clean, and test the process piping & fittings as shown on the drawings and as specified herein.

1.2 RELATED SECTIONS

- 1.2.1 Section 01300 - Submittals
- 1.2.2 Section 01815 - Commissioning
- 1.2.3 Section 02675 - Disinfection
- 1.2.4 Section 11240 - Chemical Feed Equipment
- 1.2.5 Section 15050 - Basic Mechanical Piping, Materials and Couplings
- 1.2.6 Section 15075 - Mechanical Piping Identification
- 1.2.7 Section 15955 - Piping Leakage Testing

1.3 REFERENCES

- 1.3.1 ANSI/AWWA
 - .1 C104/A21.4 Cement-mortar Lining for Ductile Iron Pipe and Fittings for Water
 - .2 C105/A21.5 Polyethylene Encasement of Ductile Iron Pipe Systems
 - .3 C110/A21.10 Ductile Iron and Gray Iron Fittings, 3-in. through 48-in. for Water and Other Liquids
 - .4 C111/A21.11 Rubber Gasket Joints for Ductile Iron Pressure Pipe and Fittings
 - .5 C115/A21.15 Flanged Ductile Iron Pipe with Ductile Iron or Gray Iron Threaded Flanges
 - .6 C150/A21.50 Thickness Design of Ductile Iron Pipe
 - .7 C151/A21.51 Ductile Iron Pipe, Centrifugally Cast for Water
 - .8 C153/A21.53 Ductile Iron Compact Fittings, 3"-24" and 54"-64" for Water Service

- .9 C600 Installation of Ductile Iron Water Mains and their Appurtenances
- .10 C606 Grooved and Shouldered Joints

- 1.3.2 NSF/ANSI/CAN 61 Drinking Water System Components – Health Effects and NSF/ANSI/CAN 600: 2018 Health Effects Evaluation and Criteria for Chemicals in Drinking Water
- 1.3.3 ASTM A312/A312M Standard Specification for Seamless, Welded, and Heavily Cold Worked Austenitic Stainless Steel Pipes
- 1.3.4 ANSI/ASME B31.3, Process Piping Code
- 1.3.5 ASME Boiler and Pressure Vessel Code (BPVC)
- 1.3.6 CAN/CSA B51, Boiler, Pressure Vessel, and Pressure Piping Code

1.4 SCOPE OF WORK

- 1.4.1 This section covers the supply, delivery, and supervision of installation and commissioning of process piping.
- 1.4.2 The term "Process Piping" includes water, water service, process air piping, chemical piping with the exception of heating, ventilation, fuel, natural gas and drainage piping.
- 1.4.3 The plans and specifications are intended to set the acceptable minimum and shall not be construed to relieve this Contractor of the responsibility of:
 - .1 Installing a complete, trouble free system.
 - .2 Good workmanship.

1.5 SUBMITTALS

- 1.5.1 Submit Shop Drawings for review in accordance with Section 01300 - Submittals.
- 1.5.2 Shop Drawings for piping 600mm and larger shall be stamped and signed by a licensed Professional Engineering registered in the Province of Ontario.
- 1.5.3 Shop Fabricated Piping:
 - .1 Detailed pipe fabrication or spool drawings showing special fittings and bends, dimensions, coatings, and other pertinent information.
 - .2 Pressure rating of piping.

- .3 Layout drawing showing location of each pipe section and each special length; number or otherwise designate laying sequence on each piece.
 - .4 Wall thickness and pressure rating.
- 1.5.4 Hydraulic Thrust Restraint for Restrained Joints: Details including materials, sizes, assembly ratings, and pipe attachment methods.
- 1.5.5 Dissimilar Buried Pipe Joints: Joint types and assembly drawings.
- 1.5.6 Proposed Welding Procedure: Details including:
- .1 Date and job title.
 - .2 classification of pipe, maximum tensile strength, carbon content and equivalent, diameter, wall thickness.
 - .3 Filler metal, number of passes, time lapse, cleaning, and heating requirements between passes.
 - .4 Internal and external coatings.

1.6 MINIMUM AMBIENT WELD TEMPERATURE. OPERATING CONDITIONS

- 1.6.1 All process piping shall be designed for the following pressures unless otherwise specified on the contract drawings or specifications.
- .1 Working Pressure: 689kPa (100psi)
 - .2 Test Pressure: 1,034kPa (150psi)
 - .3 Surge Pressure (including Working Pressure): 1,380kPa (225psi)

1.7 ALIGNMENT OF EXISTING PIPE ENDS

- 1.7.1 Where new piping is to be installed between existing pipe ends, the Contractor is fully responsible to verify the alignment of the existing pipe ends prior to submission of Shop Drawings for the proposed process piping. The Contractor shall arrange a short duration process shutdown, remove piping to be replaced, undertake multipoint measurement between existing pipe ends to determine alignment, disinfect existing piping and return to service. Any misalignment identified between pipe ends shall be accommodated with the design of the proposed process piping. No additional compensation or extension in schedule will be considered due to misalignment of newly installed process piping caused by misalignment of existing pipe ends.

2 PRODUCTS

2.1 GENERAL

- 2.1.1 All piping products to be installed on a potable water system shall be NSF 61/NSF 600 certified.

2.1.2 Materials in contact with chlorine shall be suitable for this service.

2.2 STAINLESS STEEL PIPE AND FITTINGS

2.2.1 The Work consists of the design, manufacture, delivery and installation of fabricated stainless steel pipes, as specified and as indicated on the drawing, including all couplings, gaskets, nuts, bolts and pipe hangers.

2.2.2 The Contractor shall submit design calculations, stamped by a Professional Engineer licensed in the Province of Ontario, to demonstrate that stainless steel piping systems have been designed to withstand the working and surge pressures specified herein.

2.2.3 Pipes and Fittings, 50mm diameter and smaller use Schedule 40S threaded 304L SS pipe where indicated.

2.2.4 Pipes and Fittings, 75mm diameter up to and including 400mm diameter:

- .1 Pipes shall be manufactured from ASTM-A312 annealed and pickled sheets and plates in accordance with ASTM A778 in Grade TP 316L stainless steel. Unless otherwise indicated on the Contract Drawings, pipe shall be manufactured to nominal pipe sizes as listed in ANSI B36.19 and shall have a minimum nominal wall thickness of schedule 10S.
- .2 When connecting to existing non-flanged pipe ends, stainless steel pipe to be fabricated to match existing pipe outside diameters.
- .3 Fittings shall be butt weld type manufactured in accordance with ASTM A774 of the same grade (alloy) and in the same thickness as the pipe. Long radius elbows (i.e. centerline to end of elbow equals 1.5 times the nominal pipe size) up to 610mm diameter shall be smooth flow type. All short radius, special radius, and reducing elbows; and long radius elbows greater than 610mm diameter shall be of mitered construction with at least five miter sections for ninety (90) degree bends, three mitered sections for forty-five (45) and sixty (60) degree bends, and two (2) mitered sections for thirty (30) degree and smaller bends. Reducers may be straight tapered, cone type. Tees, crosses, laterals and wyes may be shop fabricated from the specified pipe.
- .4 The finish on the raw material, manufactured to ASTM A-312 will be No. 1, HRAP (hot rolled annealed and pickled) or better. The finish on the completed pipe and fittings shall be as specified in ASTM A778 and A774, respectively.
- .5 Heavier wall pipes or fittings may be substituted for a lighter wall thickness specified. ASTM A312 pipe and A403 fittings may be substituted for A778 and A774 products, respectively.
- .6 Provide reinforcing pads and stiffening rings as required to achieve the above pressure and vacuum ratings.

- .7 All welded pipe nipples shall have reinforcing pads.
- .8 Minimum reinforcement requirements for tees.

2.2.5 Flanges, three (3) inch diameter and larger

- .1 Flanged pipe ends shall be AWWA Class SE, welded in accordance with AWWA C228-08. Prior to assembly of flanged by flanged spool pieces, the Contractor shall field verify the orientation and alignment of existing piping flanges to ensure proper positioning with piping or equipment to be installed.

2.2.6 Gaskets

- .1 AWWA Standard C111, EPDM Hardness 80, 3.2mm thick, NSF 61/NSF 600, ASTM D1330
- .2 Flanged, Hot Air and Fuel Gas Service: 3mm thick unless otherwise specified, homogeneous black rubber (EDPM), hardness sixty (60) (Shore A), rated to one hundred and fifty (150) degrees Celsius, conforming to ANSI B16.21 and ASTM D1330 Steam Grade.
- .3 Full face for Class 150 flat-faced flanges.
- .4 Gasket pressure rating to equal or exceed the system hydrostatic test pressure, minimum 150psi.
- .5 Gaskets shall be supplied by American Biltrite or approved equal.

2.2.7 Couplings

- .1 The piping will be shop prepared for pipe couplings where shown on the Contract Drawings.
- .2 For all plain end or grooved coupling applications, ensure that the pipe outside diameter matches the required coupling diameter. Installation of build-up rings may be required to match the coupling required dimensions.
- .3 Coupling shall be of the type shown on the Contract Drawings and as specified in Section 15050 – Basic Mechanical Piping, Materials and Couplings.

2.2.8 Threaded Connections: Threaded pipe, gauge or instrument connections shall be made using stainless steel 3000-pound threaded half couplings conforming to ASTM A182 or ASTM A-276, shop welded to the pipe at the locations shown on the Contract Drawings.

2.2.9 Joints: Flanges shall be provided as a minimum at all flanged valves, meters, couplings, and other equipment. Couplings shall be provided where shown on the Contract Drawings.

2.2.10 Bolting

- .1 The contractor shall supply and install flange bolting as follows: Type 316 stainless steel, hex head bolts and hex head nuts according to ASTM A320.A320M Grade B8M and ASTM A194/A194M Grade 8M.
- .2 Contractor shall use anti seize lubricants on all stainless steel bolts. Lubricants used on fasteners shall certified to NSF/ANSI 61.

2.2.11 Fabrication

- .1 After the manufacture of individual stainless steel fittings and pipe lengths, they shall be pickled by immersion in a tank containing an ambient nitric hydrofluoric acid solution made up from Oakite Deoxidizer SS, or agency approved equivalent, and monitored to generally maintain a twenty-five (25) per cent or higher solution by volume of water. The duration of immersion shall be fifteen (15) to twenty (20) minutes and may be supplemented by manually scrubbing or brushing with non-metallic pads or stainless steel wire brushes. The acid treatment shall be followed by immersion in a rinse water tank, followed if necessary by a spray rinse. The stainless steel products shall then be allowed to air dry to achieve passivation.
- .2 Welding of pipe spools shall be performed using welders and procedures qualified in accordance with ASME Section IX. Piping with wall thicknesses up to and including eleven (11) gauge (0.125”) shall be welded with the TIG (GTAW) process. Heavier walls shall be bevelled according to procedure, root pass welded with the TIG (GTAW), and have subsequent weld passes performed using the TIG (GTAW), MIG (GMAW), or Metallic Arc (SMAW) process. Filler metal of equal or superior ELC grades and equivalent or greater ultimate tensile strength only shall be added to all welds to provide a cross section at the weld equal to or greater than the parent metal. Weld deposit shall be smooth and evenly distributed; weld reinforcement shall be as follows.

Wall Thickness	Weld Reinforcement (Max)	
	I.D.	O.D.
Up to 12 Ga.	1.5mm	2.3mm
11 Ga. to 4.8mm Pl.	2.3mm	3.3mm
6.4mm Plate & Larger	3.3mm	4.8mm

- .3 Concavity, undercut, cracks or crevices shall not be allowed. Butt welds shall have full penetration to the interior surface, and inert argon gas shielding shall be provided to the interior and exterior of the joint. Angle face rings shall be continuously welded on both sides to pipe or fitting. Exterior welds, such as the back side of face rings or flanges and structural attachments, may be welded by the MIG (GMAW) or Metallic Arc (SMAW) process; however care must be taken to avoid melting through to the interior surface on very light walls. Excessive weld deposits, slag, spatter and projections shall be removed by grinding. Welds on gasket surfaces shall be ground smooth.
- .4 Spools shall be fabricated to the "Pipe Fabrication Institute" fabricating tolerances ES-3 (1981).
- .5 After shop fabrication into pipe spools, exterior welds shall be manually scrubbed or brushed with non metallic pads or stainless steel wire brushes to remove weld discoloration, rinsed with clean water and allowed to air dry.
- .6 All fabricated piping shall have openings plugged and flanges secured for storage and/or transport after fabrication. All fabricated piping shall be piece marked with identifying numbers or codes which correspond to the contractors layout and installation drawings. The marks will be located on the spools at opposite ends and 180 degrees apart.
- .7 The piping supplier during manufacturing, fabrication and handling stages, and the contractor during handling and installation stages, shall use extreme care to avoid the contact of any ferrous materials with the stainless steel piping. All saws, drills, files, wire brushes, etc. shall be used for stainless steel piping only. Pipe storage and fabrication racks shall be non ferrous or stainless steel or rubber lined. Nylon slings or straps or alloy chains or cable shall be used for handling stainless steel piping. After installation, the contractor shall wash and rinse all foreign matter from the piping surface. If rusting of embedded iron occurs, the contractor shall pickle the affected surface with Oakite Deoxidizer SS or equal, scrub with stainless steel brushes and rinse clean.
- .8 Prior to installation, the Contractor shall paint all steel or iron flanges, couplings and appurtenances in accordance with two coats of Tnemec Series N69F Hi-Build Epoxoline. Painting of the stainless steel pipe is not required. However, the Contractor shall be responsible for supplying and installing the stainless steel piping with a consistently clean surface. Identifying spool piece marks shall be removed with paint thinner or solvents and the entire stainless steel surface shall be washed with detergent and rinsed clean. Final marking of the pipeline will be in accordance with Section 15075 - Mechanical Piping Identification.

3 EXECUTION

3.1 INSTALLATION AND INSPECTION

- 3.1.1 The piping, valves, fittings and accessories shall be installed as indicated on the Contract Drawings, in accordance with the Manufacturer's recommendations and as approved by the Consultant. Refer to Section 15050 – Basic Mechanical Piping, Materials and Methods.
- 3.1.2 Provide the services of a factory-trained representative to inspect, operate, test, adjust, and troubleshoot the installation.
- 3.1.3 The factory-trained representative, mentioned above, will certify that the equipment is ready for operation before use. In addition, the factory-trained representative shall instruct the Owner's operation personnel in the proper operation and maintenance of the equipment supplied.
- 3.1.4 Provide for additional supervision of installation by Equipment Supplier as required.
- 3.1.5 Arrange with the Consultant a mutually agreeable date when the representative should be on site
- 3.1.6 Submit a report, signed by the Manufacturer's representative, describing in detail the inspection, tests, and adjustments made, quantitative results and suggestions for precautions to be taken to ensure proper maintenance. The report must verify that the equipment conforms to all specifications
- 3.1.7 Inspection to include checking for:
 - .1 Cracks and other damaged or defective parts. The equipment must be undamaged, without cracks and free of defective parts.
 - .2 Completeness of installation as specified and as recommended by the Manufacturer.
 - .3 Correctness of setting, alignment and relative arrangement of various parts of the system.

3.2 HANDLING

- 3.2.1 Provide proper equipment and tools for safe and convenient handling and installation of pipes, fittings, valves and other accessories.
- 3.2.2 Exercise particular care to prevent abrasion of pipe coating.

3.3 SIZING

- 3.3.1 Supply and install pipes, and fittings according to the sizes indicated on drawings. Where sizes are not clearly indicated, obtain sizes from the Consultant before proceeding with the work.

3.4 SUPPORTS

- 3.4.1 Refer to Section 15050 – Basic Mechanical Piping, Materials and Methods for pipe support requirements.
- 3.4.2 Refer to standard details on Contract Drawings.

3.5 MECHANICAL TESTING AND CERTIFICATION

- 3.5.1 After start-up and prior to final acceptance, the Contractor shall conduct Consultant-witnessed performance tests on the equipment.
- 3.5.2 The field service representative will cause the piping, valves and fittings to perform all mechanical functions that they have been designed to perform. Tests will be scheduled with the Consultant at least two weeks prior to the planned test date.
- 3.5.3 The field service representative shall submit to the Consultant a written report stating that the equipment has been checked and is suitable for operation.

3.6 SUPERVISION OF INSTALLATION AND COMMISSIONING

- 3.6.1 Test and commission the equipment in accordance with Section 01815 - Commissioning.
- 3.6.2 At the completion of satisfactory installation, each valve, gates, and/or section will be tested by the General Contractor under the supervision of the Supplier and with cooperation of the plant operating staff. All controls and alarms shall be checked and tested to ensure proper control and equipment protection.
- 3.6.3 Equipment installation shall only be accepted after receipt of a satisfactory report submitted by the Manufacturer's representatives.
- 3.6.4 Modify or replace equipment or materials failing required tests.
- 3.6.5 Perform additional testing required due to changes of materials and/or failure of materials or construction to meet specifications at no extra cost to the Owner.

3.7 STORAGE

- 3.7.1 Prior to the installation the piping, valves, fittings and accessories shall be protected and stored indoors in a dry area, in accordance with the Manufacturer's recommendations.

3.8 MAINTENANCE

- 3.8.1 Provide maintenance on Supplier's equipment as required by the Supplier from the date of delivery to the initial start-up.

3.9 PIPE SLAB, FLOOR, WALL, AND ROOF PENETRATIONS

- 3.9.1 As specified in Section 15050 - Basic Mechanical Piping, Materials and Couplings.

3.10 WELDING

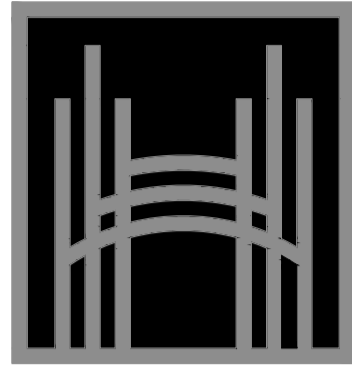
- 3.10.1 Do all work associated with the field welding process, such as procedure qualification, welder qualification, lineup, welding, and weld testing, in accordance with the latest edition of CSA B51, except where the terms of these standards are added to or modified by these specifications.
- 3.10.2 Weld procedure qualification:
- .1 Contractor to submit proposed welding procedure will all necessary information to the Engineer.
 - .2 Contractor to prepare test joints in accordance with the proposed welding specification and submitted Proposed Welding Procedure. Contractor to give the Engineer written notice of when and where the welding of test joints will take place so that the Engineer can be present. Test joints shall be tested at the Owner's expense, and in accordance with CSA B51. Upon qualification, no changes in procedure will be permitted without the Engineer's written approval.
- 3.10.3 Field Welding
- .1 Welding shall not be done when the quality of the completed weld would be impaired by prevailing weather conditions, including, but not limited to: moisture, blowing sands, high winds, or low temperatures. Windshields may make conditions for welding satisfactory.
 - .2 If, in the opinion of the Engineer, protection from prevailing weather conditions is necessary then welding shall cease until this protection has been placed correctly. The Contractor will not be compensated for "downtime" delays of this nature.
 - .3 Metal surfaces adjacent to the welding groove to be dry before welding commences and while welding is in progress.
 - .4 When ambient temperature is below 0 °C, welding operations shall cease unless an appropriate welding procedure has been qualified.

- .5 When the pipe is welded in a trench, bell hole is to be of sufficient size to provide the welder or welders ready access to the joint so that their skill is not impaired. When pipe is welded above ground, the working clearance around the pipe at the weld shall not be less than 400 mm.
 - .6 Coated Pipe Protection:
 - .1 Protect and prepare for field welding all steel water pipe which has been previously coated.
 - .2 After Field welding of steel water pipe, pipe coating of welded joints in the field to be completed in accordance with AWWA C210, Section 3.5. Primer and field coating of bare surfaces to be the same materials as used for shop coating of pipe
- 3.10.4 Internal lineup clamps to be used whenever possible, and when used shall not be removed until the root bead is complete. External lineup clamps may be used only when the use of internal lineup clamps is not practicable. Root bead segments used in connections with external lineup clamps to be uniformly spaced around the circumference of the pipe with an accumulative length of not less than 50% of the pipe circumference before the clamp may be removed. Pipe to remain supported and stationary until the root bead is complete.
- 3.10.5 Weld Inspection
- .1 After completion of the welding operation, the pipe is to be left uncoated for a period sufficient to permit the Engineer to carry out inspection of the welds. Contractor to allow reasonable time for the Engineer to conduct test on tie-in welds.
 - .2 Work performed will be rigidly inspected. Such inspection shall not relieve the Contractor of responsibility for performing work in conformance with the specifications. Contractor to notify the Engineer in advance of performing any welding work in order that an inspection may be arranged. The Engineer may reject any work that does not comply with the specified requirements. Contractor to furnish reasonable facilities and space for inspection, testing, and obtaining any information the Engineer desires with respect to the character of material used, progress, and condition of the work.
 - .3 The Engineer may use any method of inspection deemed necessary to establish quality control and ensure adherence to welding procedure. Based on expert opinion, the Engineer has the right to accept or reject any weld not meeting the approved procedures and/or specified requirements.
 - .4 Field welds to be subject to radiographic inspection, the cost of which will be borne by the Contractor. Radiographic inspection to be carried out by operators certified in conformance with CSA W178.

- .5 Nondestructive testing standards specified in section V of ASME BPVC to be used as criteria for weld acceptability.
- 3.10.6 Repair or removal of weld defects to be in accordance with Section IX of ASME BPVC. Backwelding is not allowed without the qualification of the welding procedure used.
 - .1 Repair shall follow ASME B31.3 Section 328.6, Weld Repair.
 - .2 All costs for repairing defective or rejected welds, including radiographic inspection of the corrected work, to be borne by the Contractor.
- 3.10.7 If damage of the pipe protection coating occurs in the field, repair damaged portions in accordance with AWWA C210 Section 3.4
- 3.10.8 Acceptance criteria for welds shall follow ASME B31.3 Section 341.3.2 Table 341.3.2, in particular Category D Fluid Service.
 - .1 Any reject welds shall be repaired or replaced

4 SUPPLEMENTS – N/A

END OF SECTION



PUBLIC WORKS DEPARTMENT

General Manager, CARLYLE KHAN

Hamilton Contract No. C13-32-24

DUNDAS WASTEWATER TREATMENT PLANT (WWTP) HEALTH AND SAFETY IMMEDIATE NEEDS AND STRUCTURAL REPAIR UPGRADES

ISSUED FOR TENDER

AUGUST 2024

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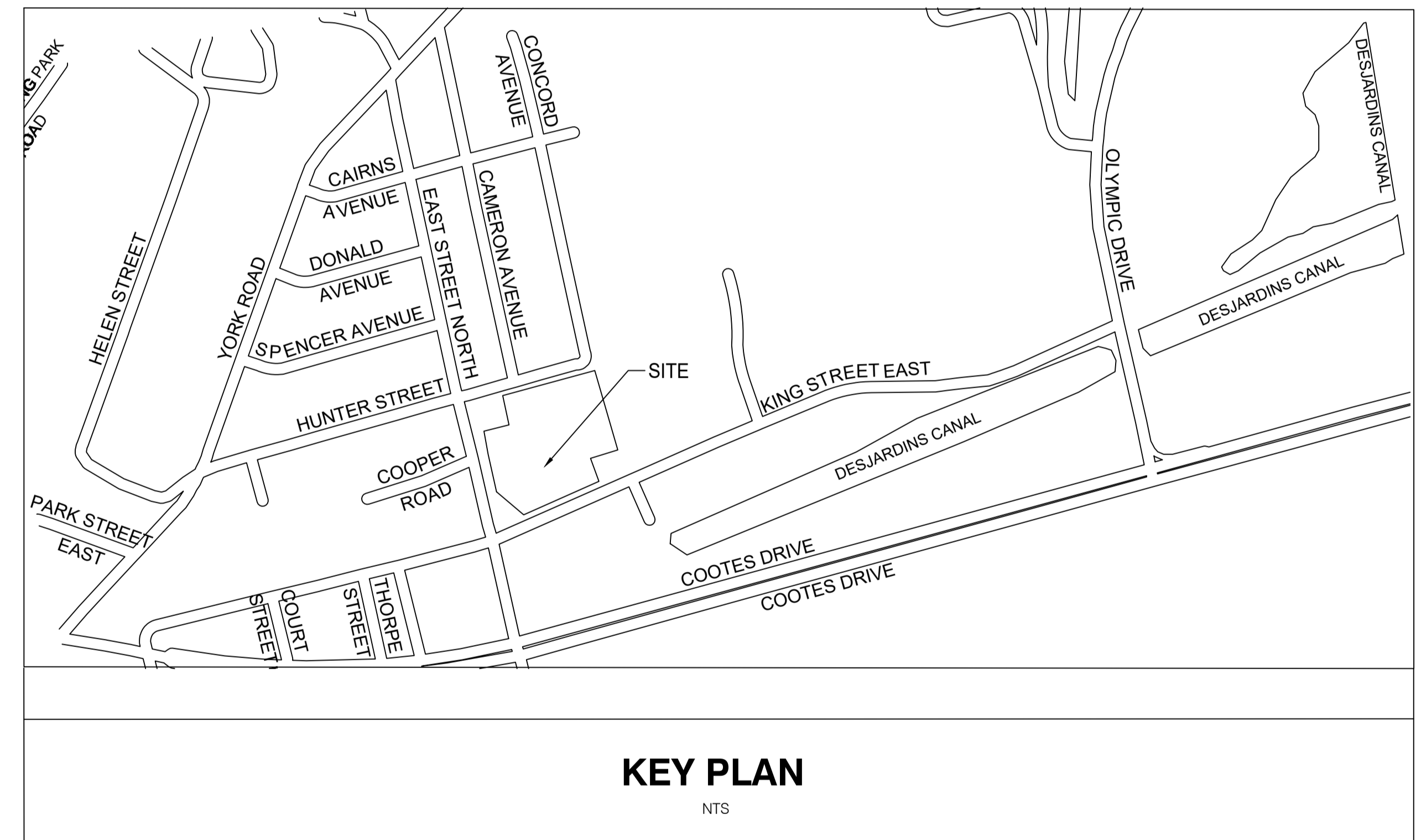
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- 17 P02 PLANT B DIFFUSER UPGRADES



KEY PLAN

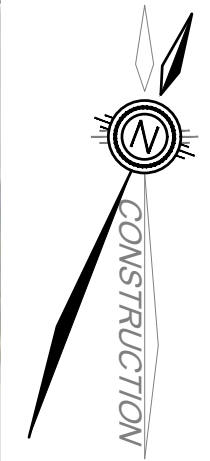
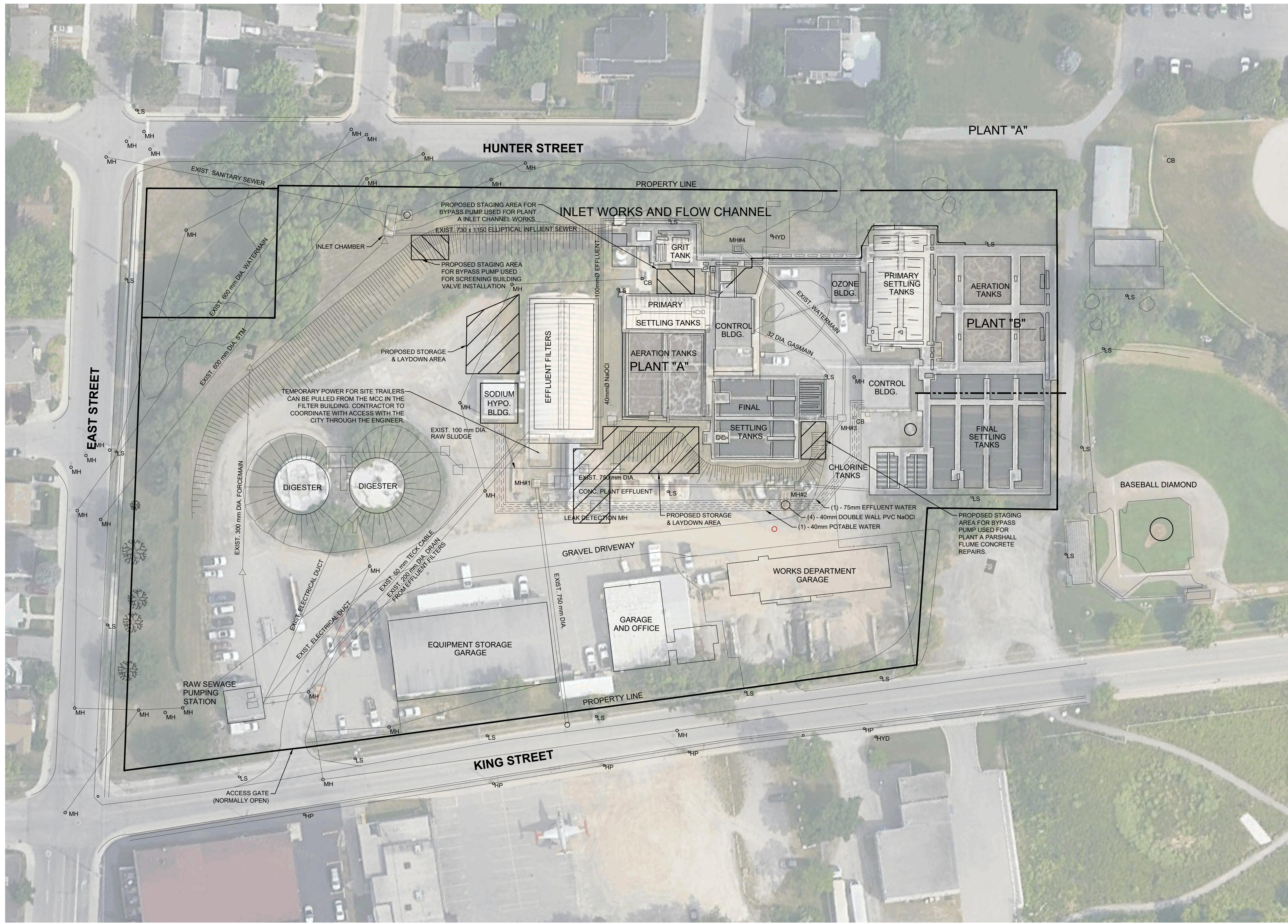
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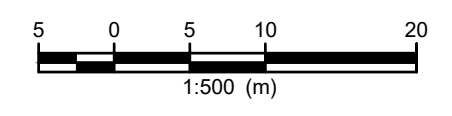
DIMENSIONS SHOWN ON THIS PLAN ARE IN MILLIMETERS UNLESS OTHERWISE NOTED

DRAWING No. G01
FILE No. 422130

SHEET No. 1 OF 17



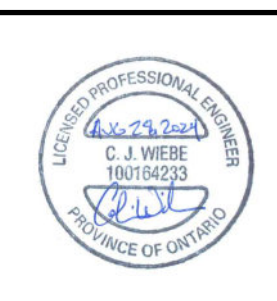
- NOTES:
1. AERIAL IMAGERY SOURCED FROM GOOGLE EARTH COPYRIGHTED 2020.
 2. MAINTAIN ACCESS TO ALL ACTIVE PROCESS EQUIPMENT
 3. THE EXISTING FACILITIES MUST REMAIN IN OPERATION AT ALL TIMES
 4. ENSURE TRUCK ACCESS TO THE CHEMICAL TANKS ARE MAINTAINED (EXPECTED DELIVERY ONCE A WEEK)
 5. SUBMIT A MOBILIZATION AND SITE USE PLAN FOR REVIEW & APPROVAL PRIOR TO MOBILIZATION
 6. WORKING HOURS PROVIDED IN SPECIFICATIONS
 7. ACCESS GATE WILL BE OPEN FROM 7:00AM TO 3:00PM; OTHER HOURS BY REQUEST & MUST BE COORDINATED IN ADVANCE
 8. PROVIDE TEMPORARY CONSTRUCTION FENCING AROUND ACTIVE WORK AREAS & MOBILIZATION AREAS
 9. SUBMIT ISOLATION PLAN FOR REVIEW AND APPROVAL PRIOR TO MOBILIZATION
 10. NO MORE THAN ONE CELL WILL BE PERMITTED TO BE OFFLINE AT ANY GIVEN TIME
 11. AN EXISTING CONDITION INSPECTION IS TO BE COMPLETED WITH THE ENGINEER BEFORE BEGINNING WORK IN AN ISOLATED CELL. THE CONTRACTOR IS RESPONSIBLE FOR DRAINING & CLEANING EACH CELL PRIOR TO THE EXISTING CONDITION INSPECTION. ANY SLUDGE TO BE REMOVED FROM THE FACILITY.
 12. CONTRACTOR TO PROVIDE DELINEATION PLAN TO THE ENGINEER FOR REVIEW AND APPROVAL PRIOR TO MOBILIZATION AS PER SECTION 01510.
 13. CONTRACTOR TO BE RESPONSIBLE FOR SNOW REMOVAL IN LAYDOWN AREAS AS WELL AS PROCESS AREAS ACTIVELY WORKING.



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1.	PRELIMINARY DESIGN	W.H	31/01/23			August 28, 2024
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3.	ISSUED FOR 90% REVIEW	W.H	27/09/23	APPROVED BY:	CW	DATE: August 28, 2024
4.	RE-ISSUED FOR 90% REVIEW	W.H	11/10/23			
5.	ISSUED FOR TENDER	W.H	28/08/24			

Geodetic Bench Mark Index No.
Elevation=

SCALES
1:500



CITY OF HAMILTON
Public Works Department

SITE PLAN

DUNDAS WASTEWATER TREATMENT PLANT (WWTP)
HEALTH AND SAETY IMMEDIATE NEEDS AND
STRUCTURAL REPAIR UPGRADES

G01

DIMENSIONS SHOWN ON THIS PLAN ARE IN MILLIMETERS UNLESS OTHERWISE NOTED

DRAWING No. G02
FILE No. 422130
SHEET No. 2 OF 17



PHOTO No. 1 - FERRIC TANK CONTAINMENT AREA
N.T.S.



PHOTO No. 2 - PROPOSED ALUMINUM STAIRCASE LOCATION
N.T.S.



PHOTO No. 3 - INLET BAR SCREENS
N.T.S.

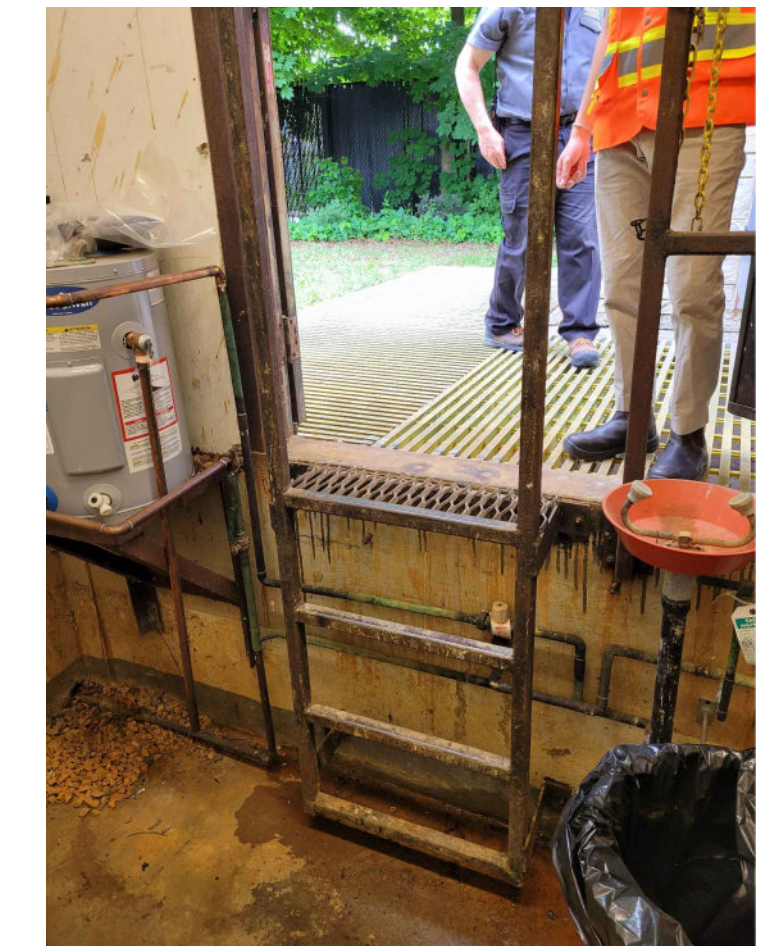
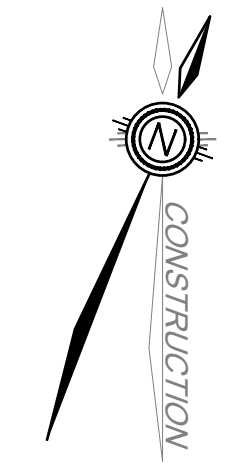
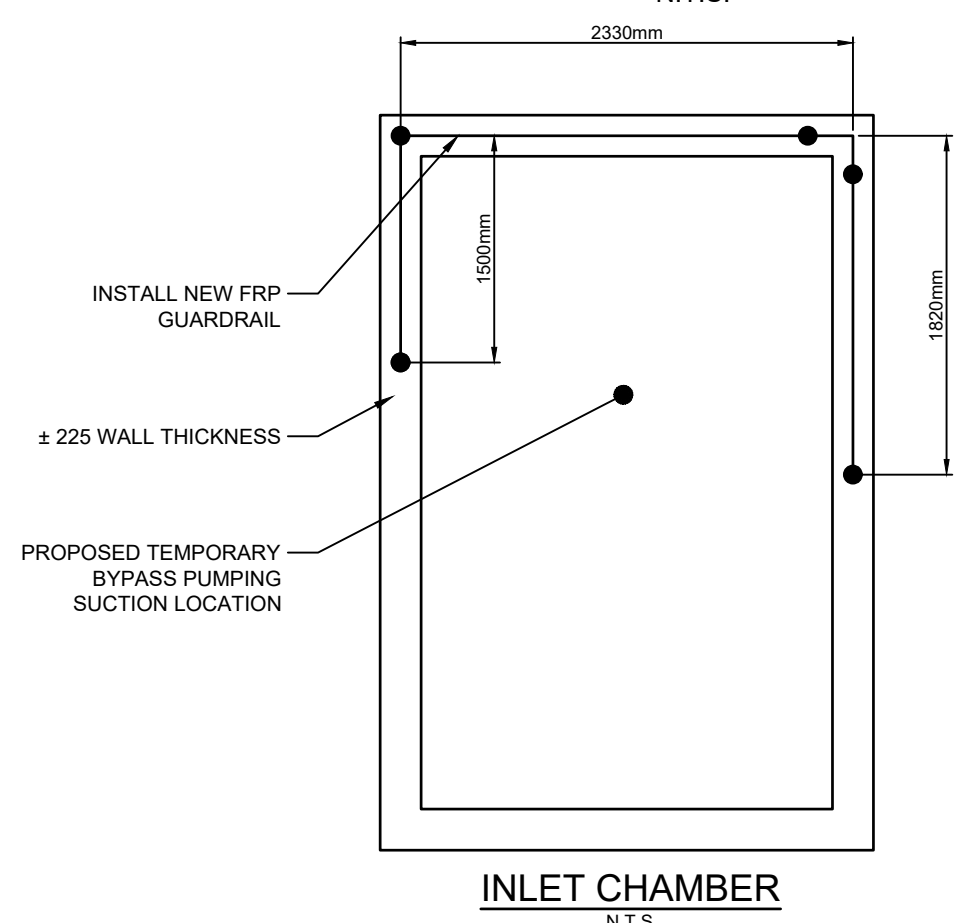


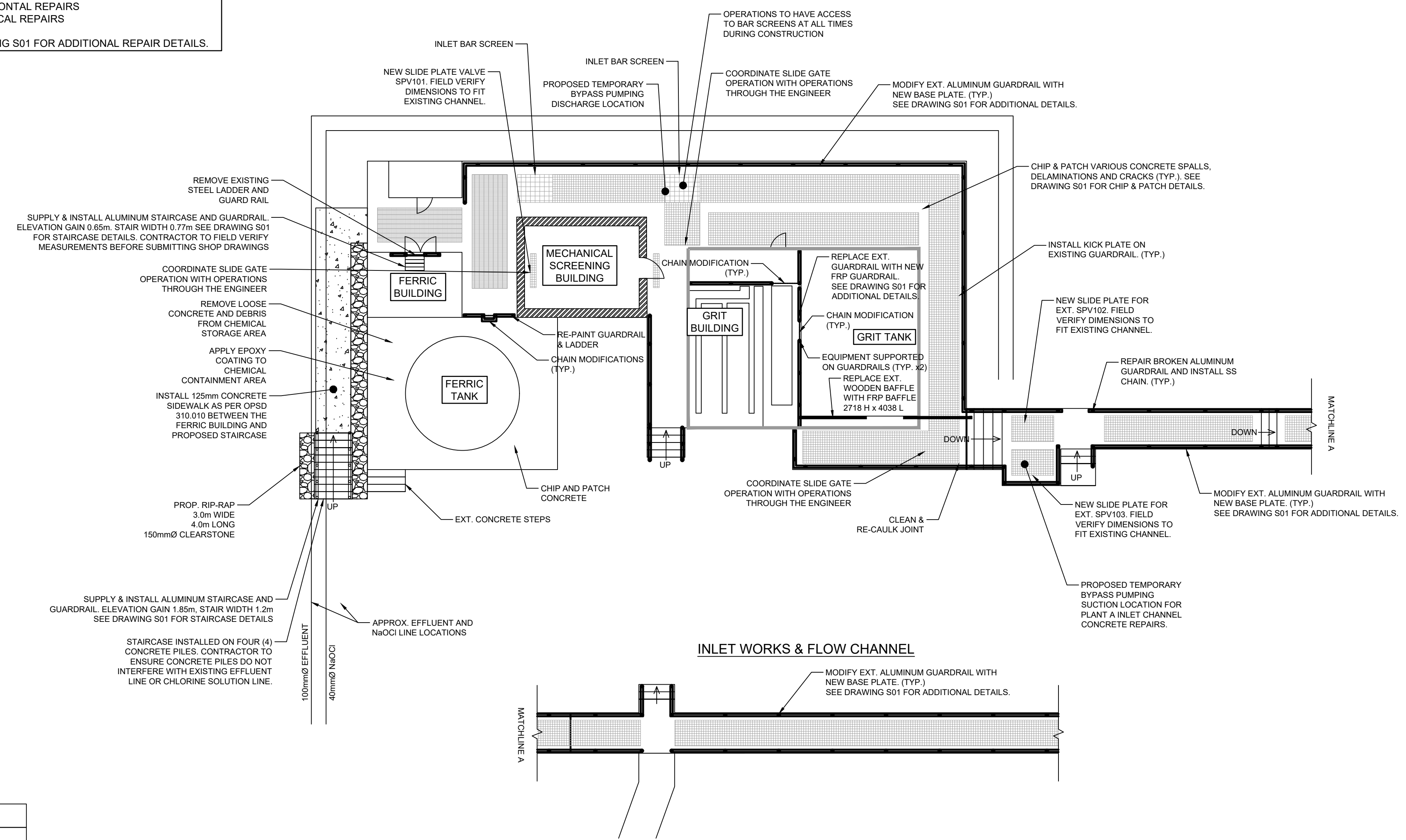
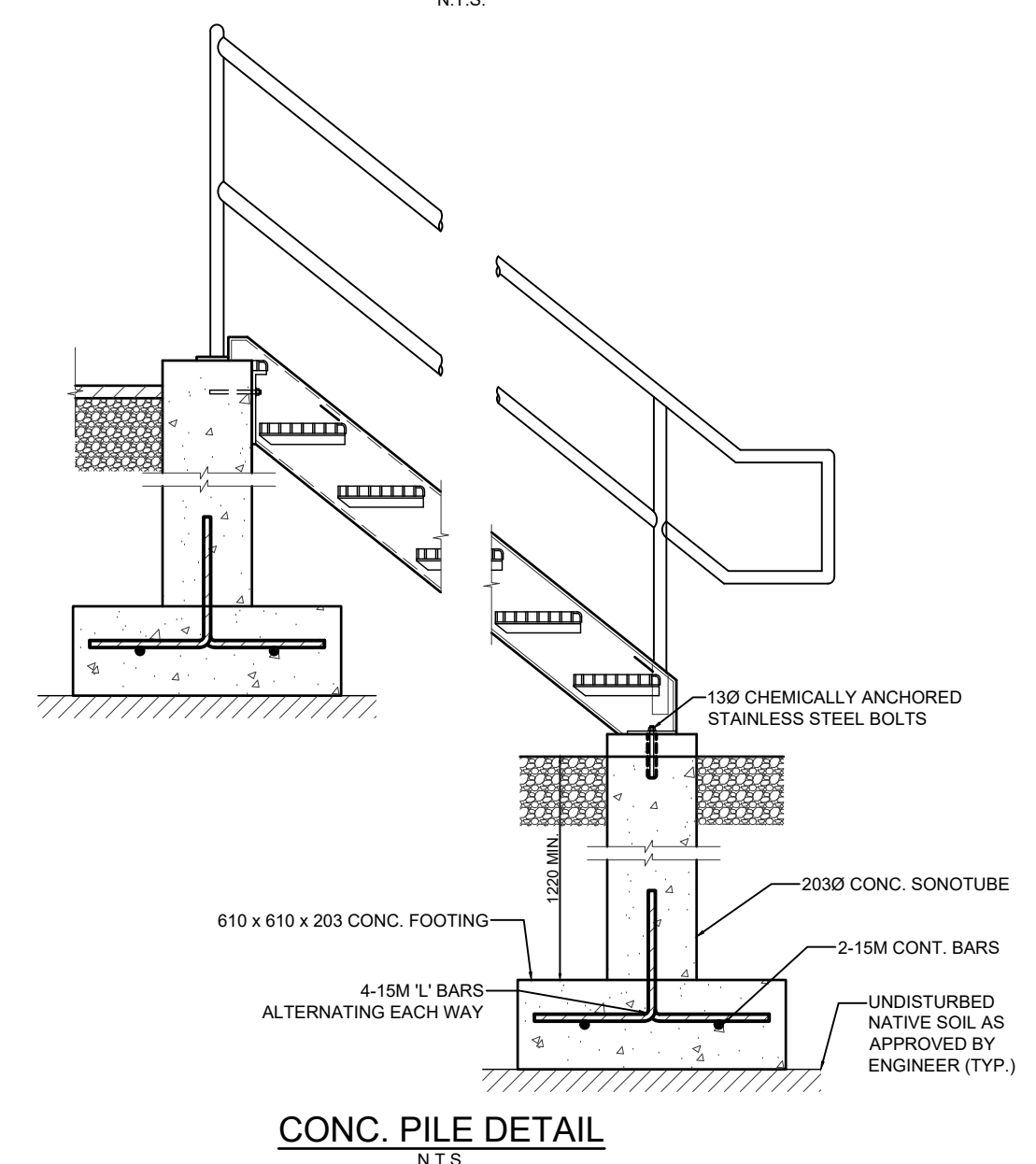
PHOTO No. 4 - FERRIC BUILDING LADDER
N.T.S.



- NOTES:
- PROVIDE TEMPORARY BY PASS PUMPING FROM THE INLET CHAMBER TO MANUAL BAR SCREENS WITH A MINIMUM FLOW RATE OF 210L/s. BYPASS PUMPING SYSTEM TO OPERATE BASED ON FLOAT CONTROL (OR APPROVED EQUAL CONTROL METHOD), HAVE A AUTO DIALER & BACKUP PUMP. BYPASS PUMPING REQUIRED TO SUPPORT THE INSTALLATION OF THE NEW SLIDE GATE AT THE INLET TO THE MECHANICAL SCREENING BUILDING. SUBMIT BYPASS PLAN COMPLETE WITH ALL PROPOSED PUMP INFORMATION AND SKETCH FOR REVIEW ALONG WITH PROPOSED SHUTDOWN PLAN.
 - EXISTING SLIDE GATES DO NOT SEAL COMPLETELY. CONTRACTOR TO SANDBAG INFLUENT CHANNEL OR IMPLEMENT OTHER APPROVED MEAN TO COMPLETE THE SCOPE OF WORK WITHOUT ADDITIONAL COST TO THE CITY.
 - NEW FRP BAFFLE IN THE GRIT TANK TO BE INSTALLED 838mm BELOW TOP OF CONCRETE WALL.
 - GRIT CHAMBER VOLUME APPROX. 60m³
 - INSTALL CONCRETE PILES AS PER THE SPECIFICATIONS TO SUPPORT THE PROPOSED ALUMINUM STAIRS. CONTRACTOR TO REMOVE ALL TOPSOIL & VEGETATION BELOW THE ALUMINUM STAIRS & REPLACE W/ RIP-RAP. COMPLETE LOCATES BEFORE INSTALLING PILES FOR THE PROPOSED STAIRCASE.
 - AN EXISTING CONDITION INSPECTION IS TO BE COMPLETED WITH THE ENGINEER BEFORE BEGINNING WORK IN AN ISOLATED CELL. THE CONTRACTOR IS RESPONSIBLE FOR DRAINING & CLEANING EACH CELL PRIOR TO THE EXISTING CONDITION INSPECTION.
 - COORDINATE WITH OPERATIONS THROUGH THE ENGINEER THE RELOCATION OF DOSING AND SAMPLING EQUIPMENT IN THE INLET CHANNEL DURING BYPASS PUMPING.
 - CLEAN STEEL GUARDRAILS AS PER THE SPECIFICATIONS BEFORE RE-PAINTING.
 - SUPPORT ALL PROCESS EQUIPMENT MOUNTED TO THE GUARDRAIL THROUGHOUT CONSTRUCTION. REATTACH THE EXISTING EQUIPMENT TO THE NEW GUARDRAIL AT THE SAME HEIGHT AND LOCATION AS BEFORE CONSTRUCTION. ATTACH EQUIPMENT TO THE NEW GUARDRAIL WITH GUARDRAIL MANUFACTURE APPROVED FASTENERS AND STAINLESS STEEL STRUT CHANNEL AS REQUIRED.
 - INSTALL STRUT CHANNEL TO SUPPORT CONDUIT WHERE CONDUIT IS SUPPORTED BY THE EXISTING GUARDRAIL
 - ALL GUARDRAIL IS TO BE INSTALLED WITH KICKPLATE EXCEPT WHERE KICKPLATE IMPEDES THE FUNCTION OF A SLIDE GATE
 - CLEAN WITH POWER TOOLS TO MEET SSPC-SP13/INACE 6 SURFACE PREPARATION OF CONCRETE WHERE EPOXY COATING IS TO BE APPLIED. REFER TO CONTRACT DOCUMENTS FOR DETAILS.



TYPICAL CONCRETE REPAIRS EXPECTED IN THIS AREA:
- TOP WALL REPAIRS
- HORIZONTAL REPAIRS
- VERTICAL REPAIRS
SEE DRAWING S01 FOR ADDITIONAL REPAIR DETAILS.



VALVE SCHEDULE				
TAG No.	SIZE (mm)	EQUIPMENT TYPE	ACTUATOR TYPE	FRAME INSTALLATION
DS HDS SG01	1118 W x 1600 H	SLIDE PLATE VALVE	MANUALLY LIFT	SIDES: FACE MOUNTED IN EXISTING CHANNEL BOTTOM: EMBEDDED IN CONCRETE
DS HDS SG02	950 W x 914 H	SLIDE PLATE VALVE	MANUALLY LIFT	N/A. USE EXISTING
DS HDS SG03	660 W x 914 H	SLIDE PLATE VALVE	MANUALLY LIFT	N/A. USE EXISTING

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4.	RE-ISSUED FOR 90% REVIEW	W.H	11/10/23			
5.	ISSUED FOR TENDER	W.H	28/08/24			

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SCALES
1:100

City of Hamilton Public Works Department

City of HAMILTON
Public Works Department

INLET WORKS & FLOW CHANNEL

DUNDAS WASTEWATER TREATMENT PLANT (WWTP)
HEALTH AND SAETY IMMEDIATE NEEDS AND STRUCTURAL REPAIR UPGRADES

G02

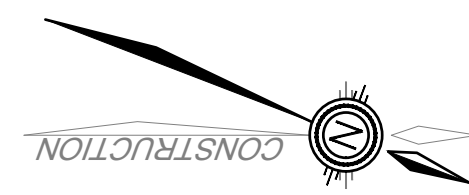
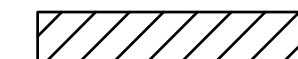


PHOTO No. 1 - TYPICAL HORIZONTAL CONCRETE REPAIR
N.T.S.



PHOTO No. 2 - TYPICAL REPAIR ON TOP OF WALL
N.T.S.

LEGEND:



TO BE REMOVED



PROPOSED TEMPORARY RAS PIPING PATH

DIMENSIONS SHOWN ON THIS PLAN ARE IN MILLIMETERS UNLESS OTHERWISE NOTED

DRAWING No. G03

SHEET No.

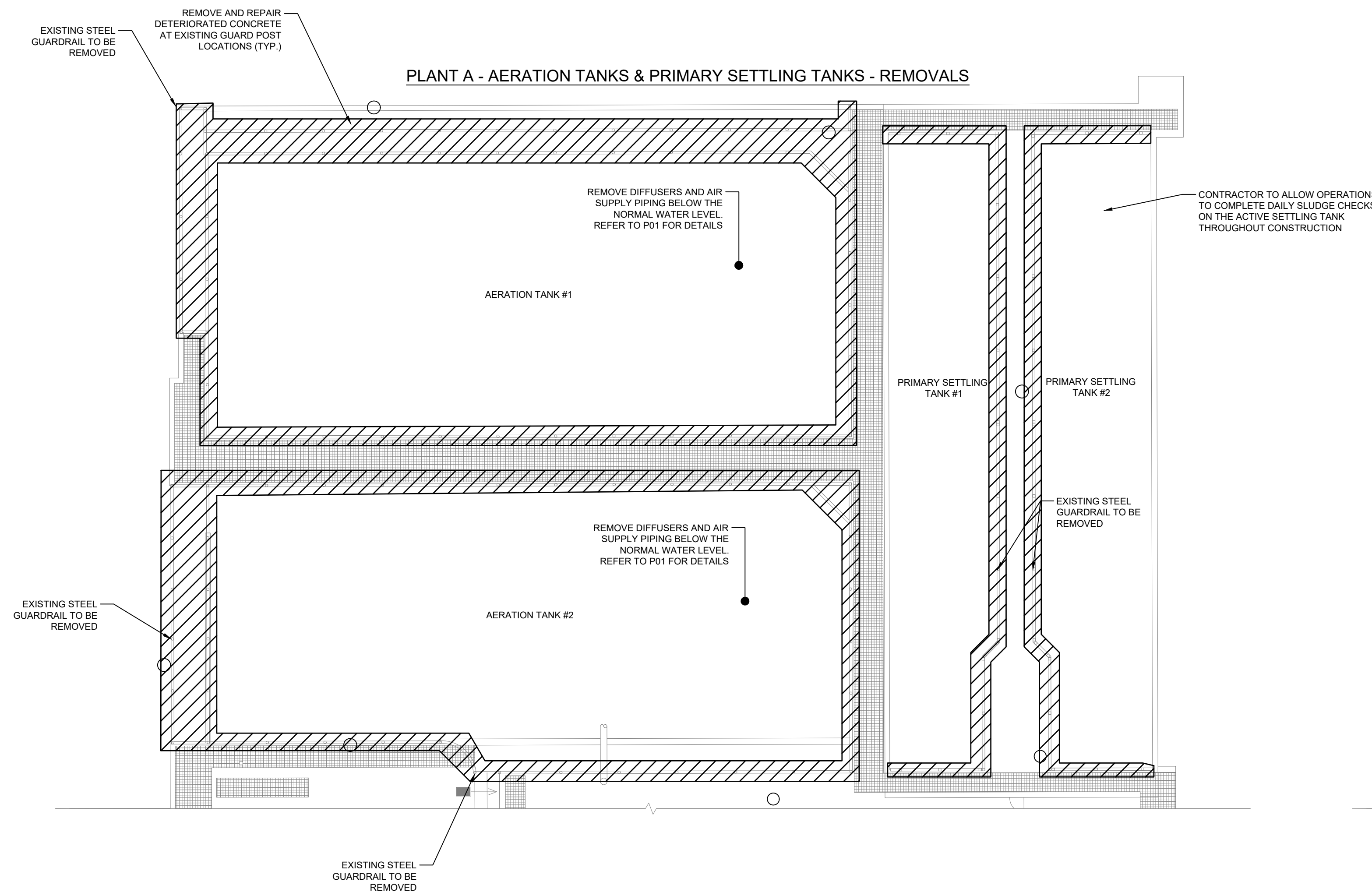
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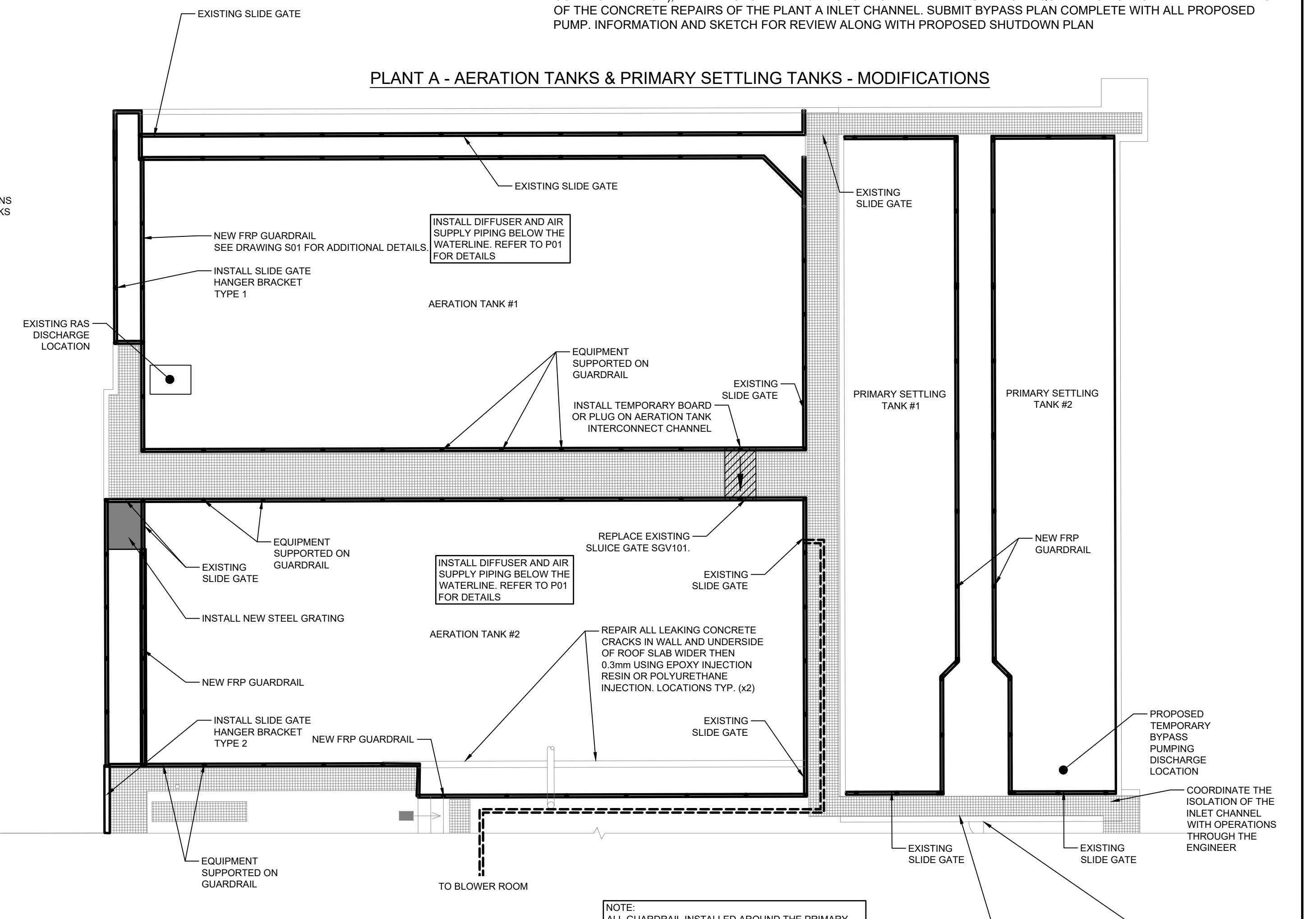
NOTES:

- SUPPORT ALL PROCESS EQUIPMENT MOUNTED TO THE GUARDRAIL THROUGHOUT CONSTRUCTION. REATTACH THE EXISTING EQUIPMENT TO THE NEW GUARDRAIL AT THE SAME HEIGHT AND LOCATION AS BEFORE CONSTRUCTION. ATTACH EQUIPMENT TO THE NEW GUARDRAIL WITH GUARDRAIL MANUFACTURE APPROVED FASTENERS AND STAINLESS STEEL STRUT CHANNEL AS REQUIRED.
- INSTALL TEMPORARY CHANNEL TO SUPPORT CONDUIT WHERE CONDUIT IS SUPPORTED BY THE EXISTING GUARDRAIL
- ALL GUARDRAIL IS TO BE INSTALLED WITH KICKPLATE EXCEPT WHERE KICKPLATE IMPEDES THE FUNCTION OF A SLIDE GATE. EXISTING SLIDE GATE LOCATIONS IDENTIFIED ON DRAWINGS.
- EXISTING SLIDE GATES DO NOT SEAL COMPLETELY. CONTRACTOR TO SANDBAG INFLUENT CHANNEL OR IMPLEMENT OTHER APPROVED MEAN TO COMPLETE THE SCOPE OF WORK WITH ADDITIONAL COST TO THE CITY.
- PROVIDE TEMPORARY PIPING (FOR THE RETURN ACTIVATED SLUDGE) FROM THE BLOWER ROOM TO THE INLET OF AERATION TANK #2 WHEN AERATION TANK #1 IS OFFLINE. SUBMIT WORK PLAN COMPLETE WITH ALL PROPOSED PIPING INFORMATION AND SKETCH FOR REVIEW ALONG WITH PROPOSED SHUTDOWN PLAN.
- PRIMARY SETTLING TANK CELL VOLUME APPROX. 170m³ (x2)
- AERATION TANK CELL VOLUME APPROX. 825m³ (x2)
- INSTALL TEMPORARY BOARD OR PLUG OVER THE AERATION TANK INTERCONNECT CHANNEL TO SUPPORT THE REPLACEMENT OF THE SLUICE GATE. BOARD OR COVER TO BE ABLE TO SUPPORT THE PRESSURE WHEN AERATION TANK #1 IS IN OPERATION. ASSUME 1.5m OF WATER PRESSURE.
- CONTRACTOR TO DRAIN THE ISOLATED CELL BY PUMPING THE WATER TO THE NEIGHBOURING CELL. SLUDGE AT THE BOTTOM OF THE TANKS SHALL BE REMOVED AND DISPOSED OF OFF SITE. SLUDGE MAY BE DELIVERED TO THE WOODWARD WWTP. CONTRACTOR TO COORDINATE THE SLUDGE DELIVERY TO WOODWARD WITH OPERATIONS THROUGH THE ENGINEER.
- PROVIDE TEMPORARY BY PASS PUMPING FROM THE GRIT BUILDING OUTLET TO THE PLANT A PRIMARY CLARIFIERS WITH A MINIMUM FLOW RATE OF 35L/S. BYPASS PUMPING SYSTEM TO OPERATE BASED ON FLOAT CONTROL (OR APPROVED EQUAL CONTROL METHOD), HAVE A AUTO DIALER & BACKUP PUMP. BYPASS PUMPING REQUIRED TO SUPPORT THE INSTALLATION OF THE CONCRETE REPAIRS OF THE PLANT A INLET CHANNEL. SUBMIT BYPASS PLAN COMPLETE WITH ALL PROPOSED PUMP. INFORMATION AND SKETCH FOR REVIEW ALONG WITH PROPOSED SHUTDOWN PLAN

PLANT A - AERATION TANKS & PRIMARY SETTLING TANKS - REMOVALS



PLANT A - AERATION TANKS & PRIMARY SETTLING TANKS - MODIFICATIONS



TYPICAL CONCRETE REPAIRS EXPECTED IN THIS AREA:
- DECK EDGE
- TOP WALL REPAIRS
- HORIZONTAL REPAIRS
- VERTICAL REPAIRS
SEE DRAWING S01 FOR ADDITIONAL REPAIR DETAILS.

NOTE:
ALL GUARDRAIL INSTALLED AROUND THE PRIMARY SETTLING TANKS TO BE SIDE MOUNTED
NOTE:
ALL GUARDRAIL INSTALLED AROUND THE AERATION TANK TO BE MOUNTED TO STEEL BASE
NOTE:
CHIP AND PATCH CONCRETE WITHIN THE INLET CHANNEL IDENTIFIED BY THE ENGINEER DURING THE CHANNEL INSPECTION. WALL APPROXIMATE 200 x 200
PATCH HOLE BETWEEN INLET FLOW CHANNEL AND PLANT A CONTROL BUILDING BASEMENT WALL APPROXIMATE 200 x 200

VALVE SCHEDULE

TAG No.	SIZE (mm)	EQUIPMENT TYPE	ACTUATOR TYPE	FRAME INSTALLATION
DS AER ATK SG01	762 W x 762 H	SLUICE GATE VALVE	EXTENSION STEM WITH HAND WHEEL	SIDE MOUNTED

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3.	ISSUED FOR 90% REVIEW	W.H	27/09/23			
4.	RE-ISSUED FOR 90% REVIEW	W.H	11/10/23	APPROVED BY:	CW	DATE: August 28, 2024
5.	ISSUED FOR TENDER	W.H	28/08/24			

Geodetic Bench Mark Index No. Elevations=

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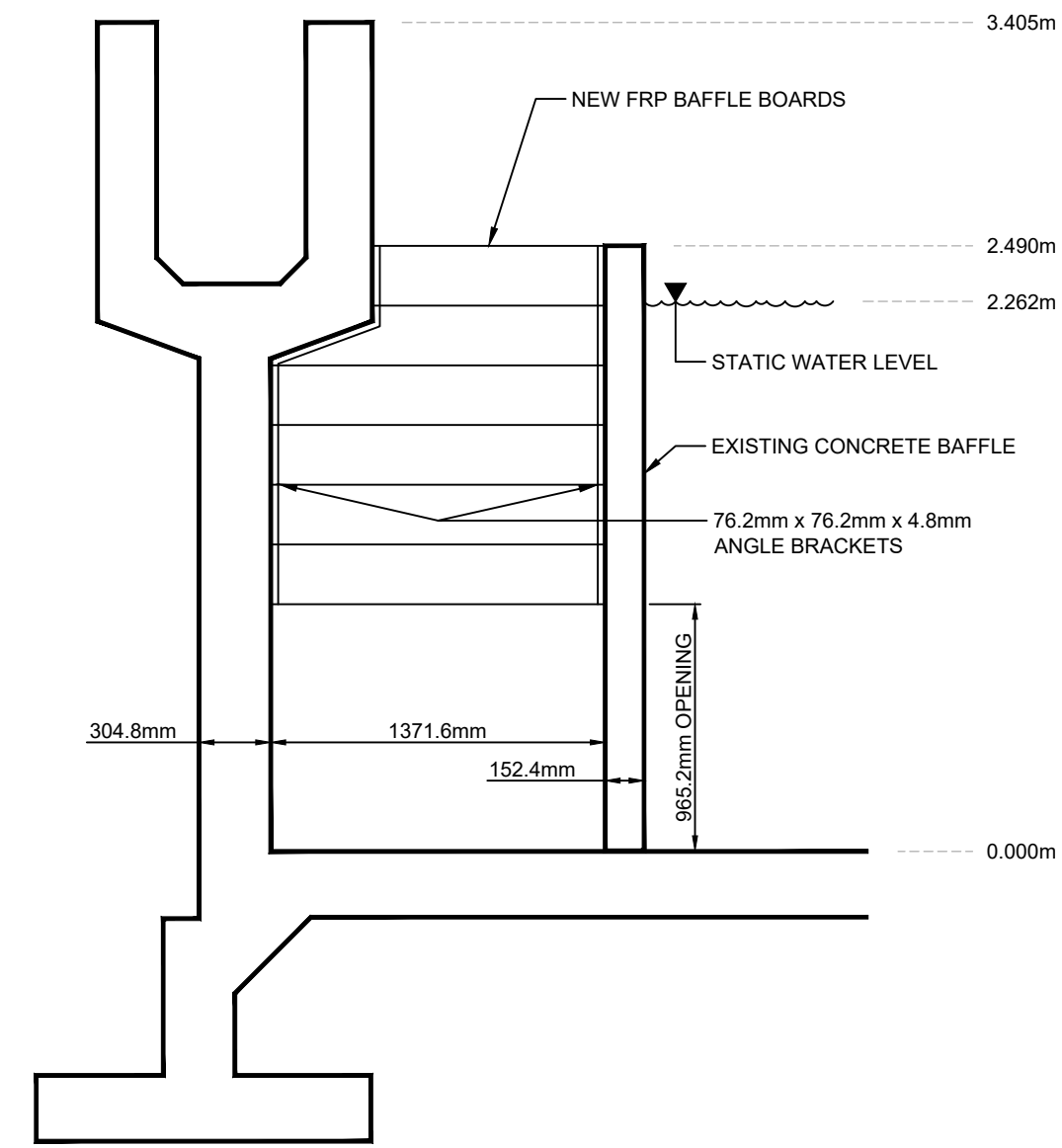
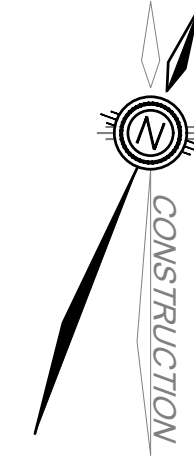


CITY OF HAMILTON
Public Works Department

PLANT A - AERATION TANKS & PRIMARY SETTLING TANKS

DUNDAS WASTEWATER TREATMENT PLANT (WWTP)
HEALTH AND SAETY IMMEDIATE NEEDS AND STRUCTURAL REPAIR UPGRADES

G03



PROPOSED CHLORINE TANK BAFFLE
N.T.S.



PHOTO No. 1 - PLANT A PARSHALL FLUME
N.T.S.

LEGEND:



TO BE REMOVED



PROPOSED TEMPORARY RAS PIPING PATH

DIMENSIONS SHOWN ON THIS PLAN ARE IN MILLIMETERS UNLESS OTHERWISE NOTED

DRAWING No. G04

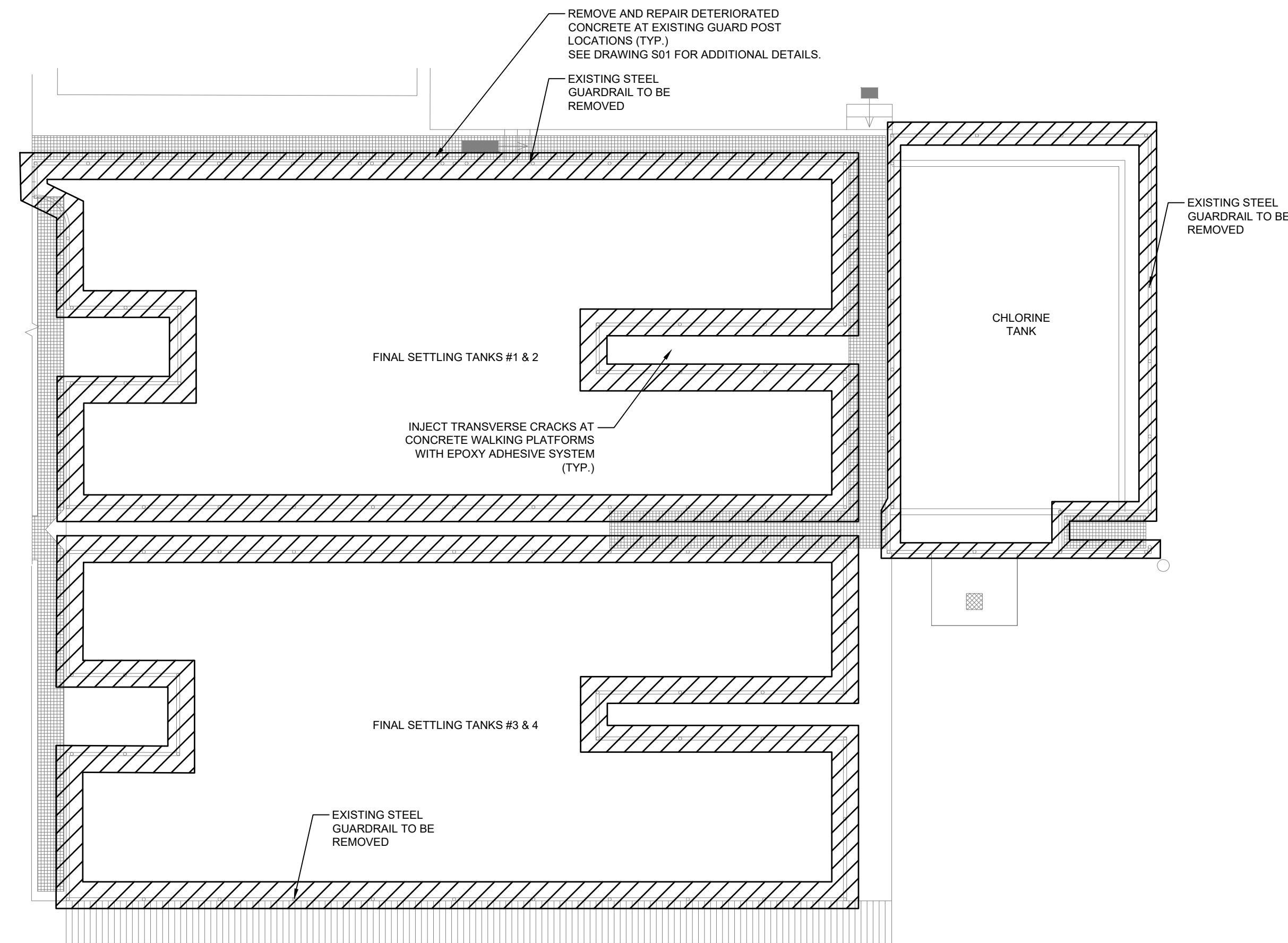
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FILE No. 422130

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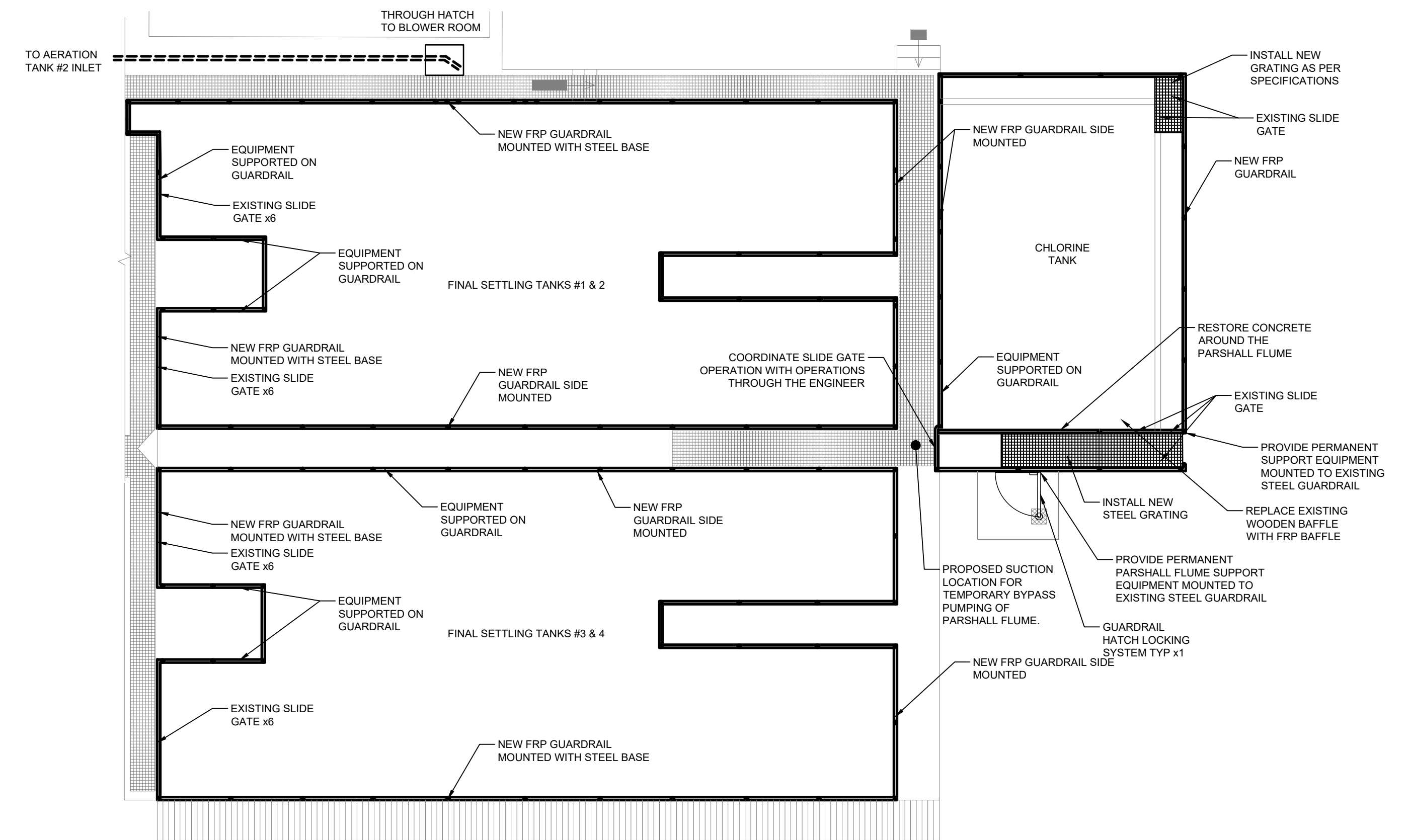
NOTES:

- SUPPORT ALL PROCESS EQUIPMENT MOUNTED TO THE GUARDRAIL THROUGHOUT CONSTRUCTION. REATTACH THE EXISTING EQUIPMENT TO THE NEW GUARDRAIL AT THE SAME HEIGHT AND LOCATION AS BEFORE CONSTRUCTION. ATTACH EQUIPMENT TO THE NEW GUARDRAIL WITH GUARDRAIL MANUFACTURE APPROVED FASTENERS AND STAINLESS STEEL STRUT CHANNEL AS REQUIRED.
- INSTALL TEMPORARY CHANNEL TO SUPPORT CONDUIT WHERE CONDUIT IS SUPPORTED BY THE EXISTING GUARDRAIL.
- ALL GUARDRAIL IS TO BE INSTALLED WITH KICKPLATE EXCEPT WHERE KICKPLATE IMPEDES THE FUNCTION OF A SLIDE GATE. EXISTING SLIDE GATE LOCATIONS IDENTIFIED ON THE DRAWINGS.
- EXISTING SLIDE GATES DO NOT SEAL COMPLETELY. CONTRACTOR TO SANDBAG INFLUENT CHANNEL OR IMPLEMENT OTHER APPROVED MEAN TO COMPLETE THE SCOPE OF WORK WITH ADDITIONAL COST TO THE CITY.
- PROVIDE TEMPORARY PIPING (FOR THE RETURN ACTIVATED SLUDGE) FROM THE BLOWER ROOM TO THE INLET OF AERATION TANK #2 WHEN AERATION TANK #1 IS OFFLINE. SUBMIT WORK PLAN COMPLETE WITH ALL PROPOSED PIPING INFORMATION AND SKETCH FOR REVIEW ALONG WITH PROPOSED SHUTDOWN PLAN.
- PROVIDE TEMPORARY BYPASS PUMPING FROM THE OUTLET CHANNEL OF THE FINAL SETTLING TANKS TO MH#2 WITH A MINIMUM FLOW RATE OF 115L/S. BYPASS PUMPING SYSTEM TO OPERATE BASED ON FLOAT CONTROL (OR APPROVED EQUAL CONTROL METHOD) HAVE A AUTO DIALER, FLOW MONITORING AND BACKUP PUMP. BYPASS PUMPING REQUIRED TO SUPPORT THE CONCRETE REPAIR WORKS AROUND THE PARSHALL FLUME.
- FINAL SETTLING TANK CELL VOLUME APPROX. 130m³ (x4)
- CHLORINATION TANK VOLUME APPROX. 125m³



PLANT A - FINAL SETTLING TANKS & CHLORINE TANK - REMOVALS

TYPICAL CONCRETE REPAIRS EXPECTED IN THIS AREA:
 - DECK EDGE
 - TOP WALL REPAIRS
 - HORIZONTAL REPAIRS
 - VERTICAL REPAIRS
 SEE DRAWING S01 FOR ADDITIONAL REPAIR DETAILS.



PLANT A - FINAL SETTLING TANKS & CHLORINE TANK - MODIFICATIONS

No.	REVISIONS	INITIAL	DATE	DRAWN BY:	AM/CP	DATE:
1.	PRELIMINARY DESIGN	W.H	31/01/23			August 28, 2024
2.	ISSUED FOR 60% REVIEW	W.H	08/08/23	CHECKED BY:	WH	DATE: August 28, 2024
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4.	RE-ISSUED FOR 90% REVIEW	W.H	11/10/23			
5.	ISSUED FOR TENDER	W.H	28/08/24			

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Elevation= _____

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1:100



City of HAMILTON
Public Works Department

PLANT A - FINAL SETTLING TANKS & CHLORINE TANK

DUNDAS WASTEWATER TREATMENT PLANT (WWTP)
HEALTH AND SAETY IMMEDIATE NEEDS AND STRUCTURAL REPAIR UPGRADES

G04

DIMENSIONS SHOWN ON THIS PLAN ARE IN MILLIMETERS UNLESS OTHERWISE NOTED

DRAWING No.	G05	SHEET No.	5 OF 17
FILE No.	422130		



PHOTO No. 1 - FLOOR SUPPORT BEAM CONCRETE REPAIR
N.T.S.

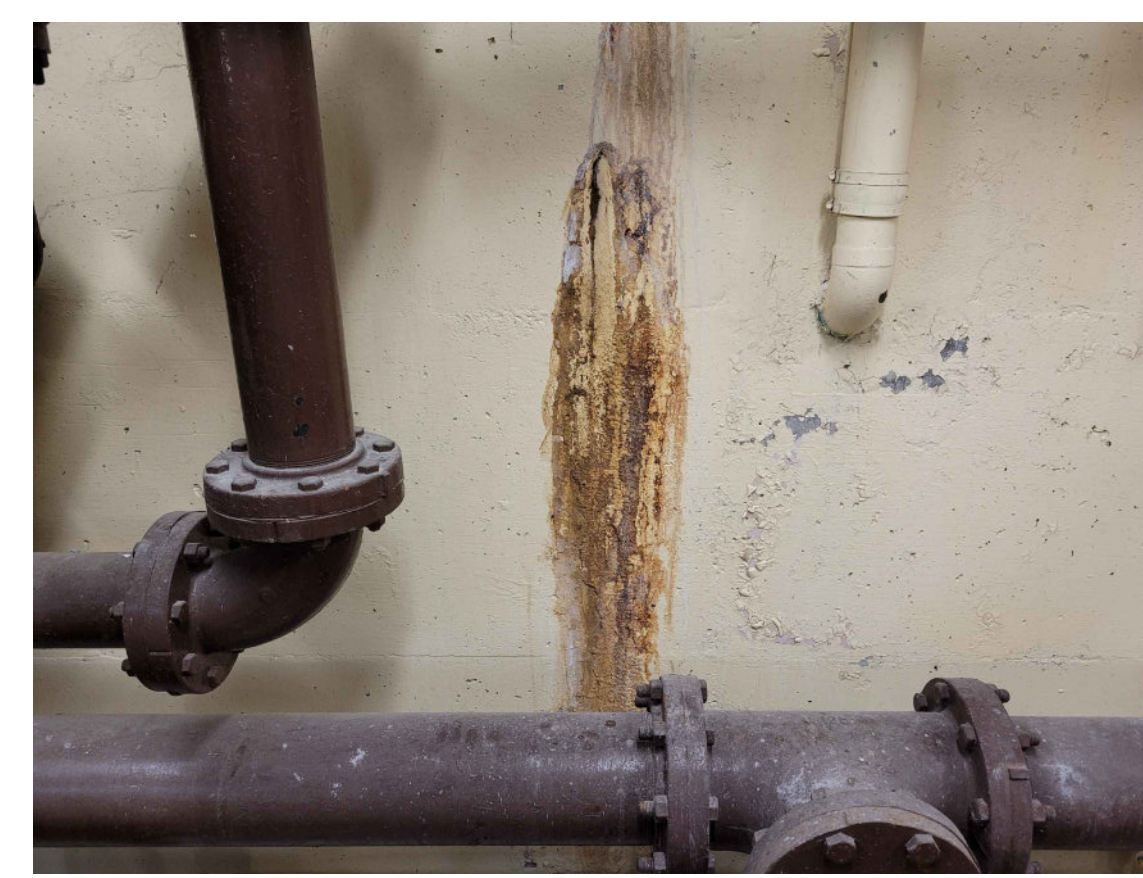


PHOTO No. 2 - TYPICAL CRACK INJECTION REPAIR
N.T.S.

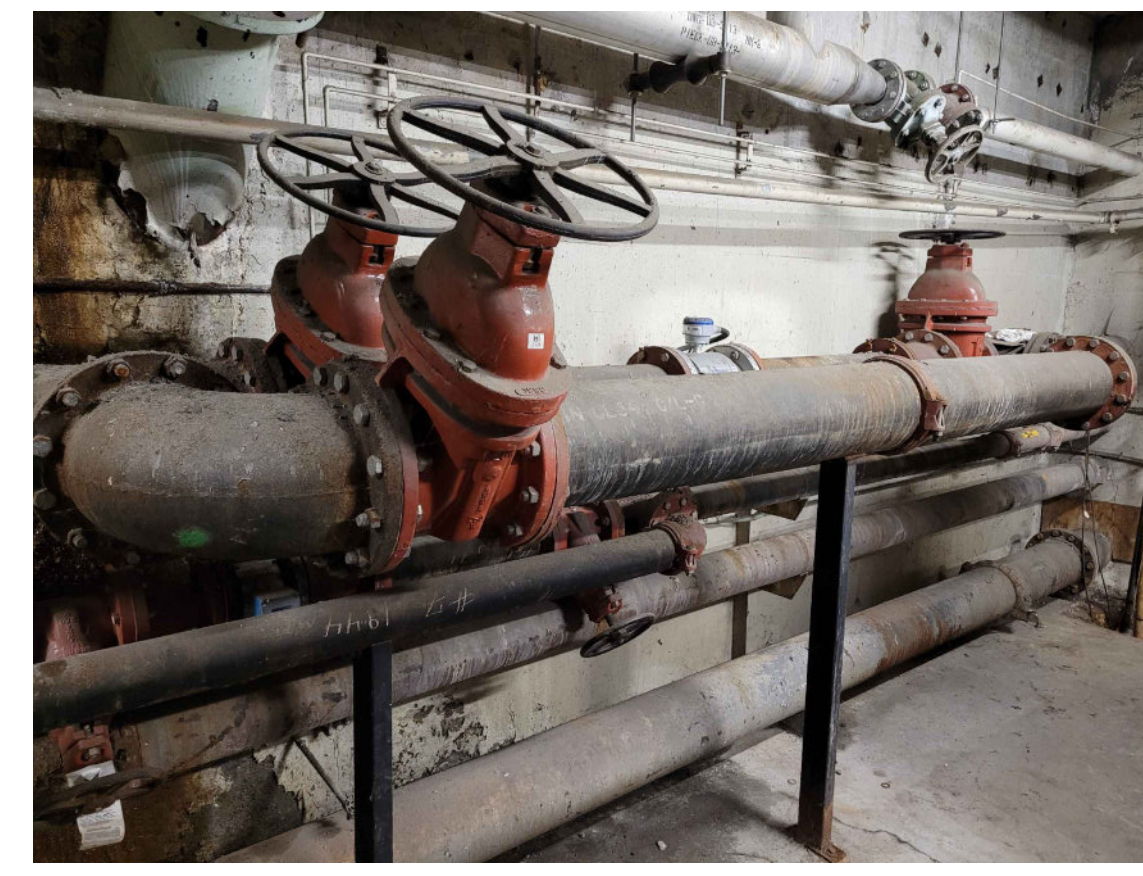
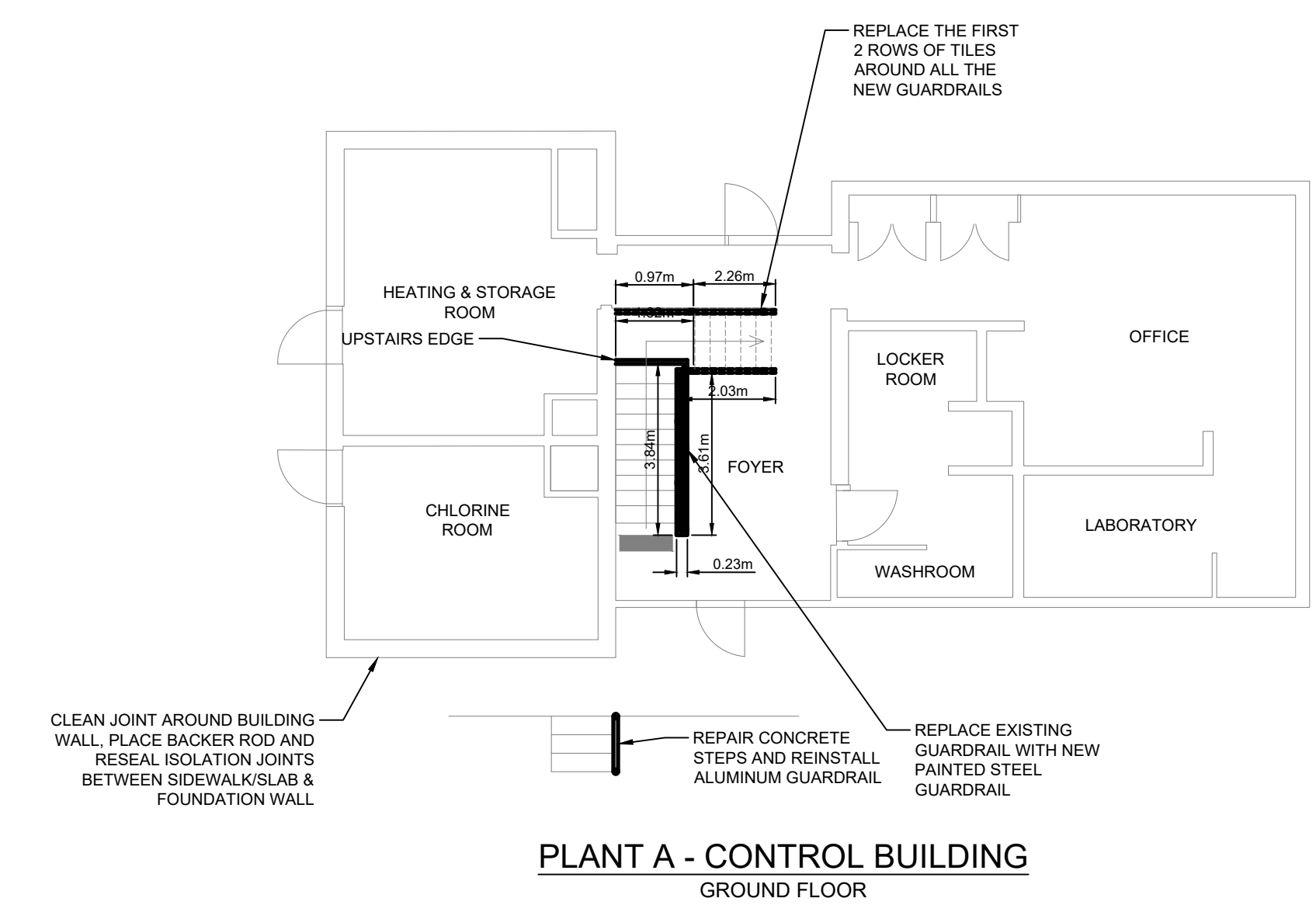
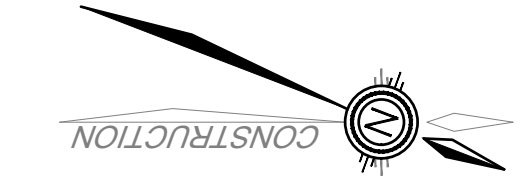
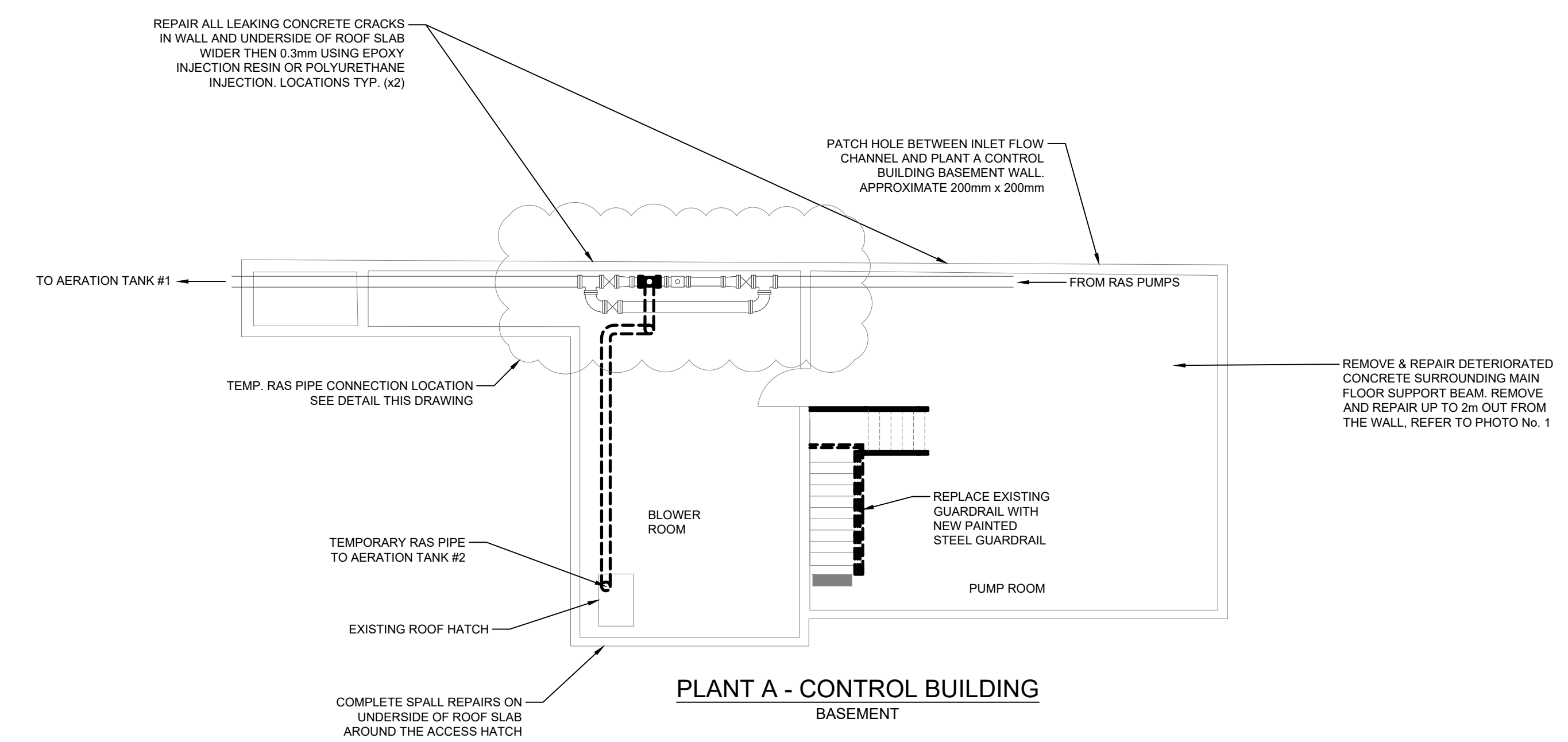
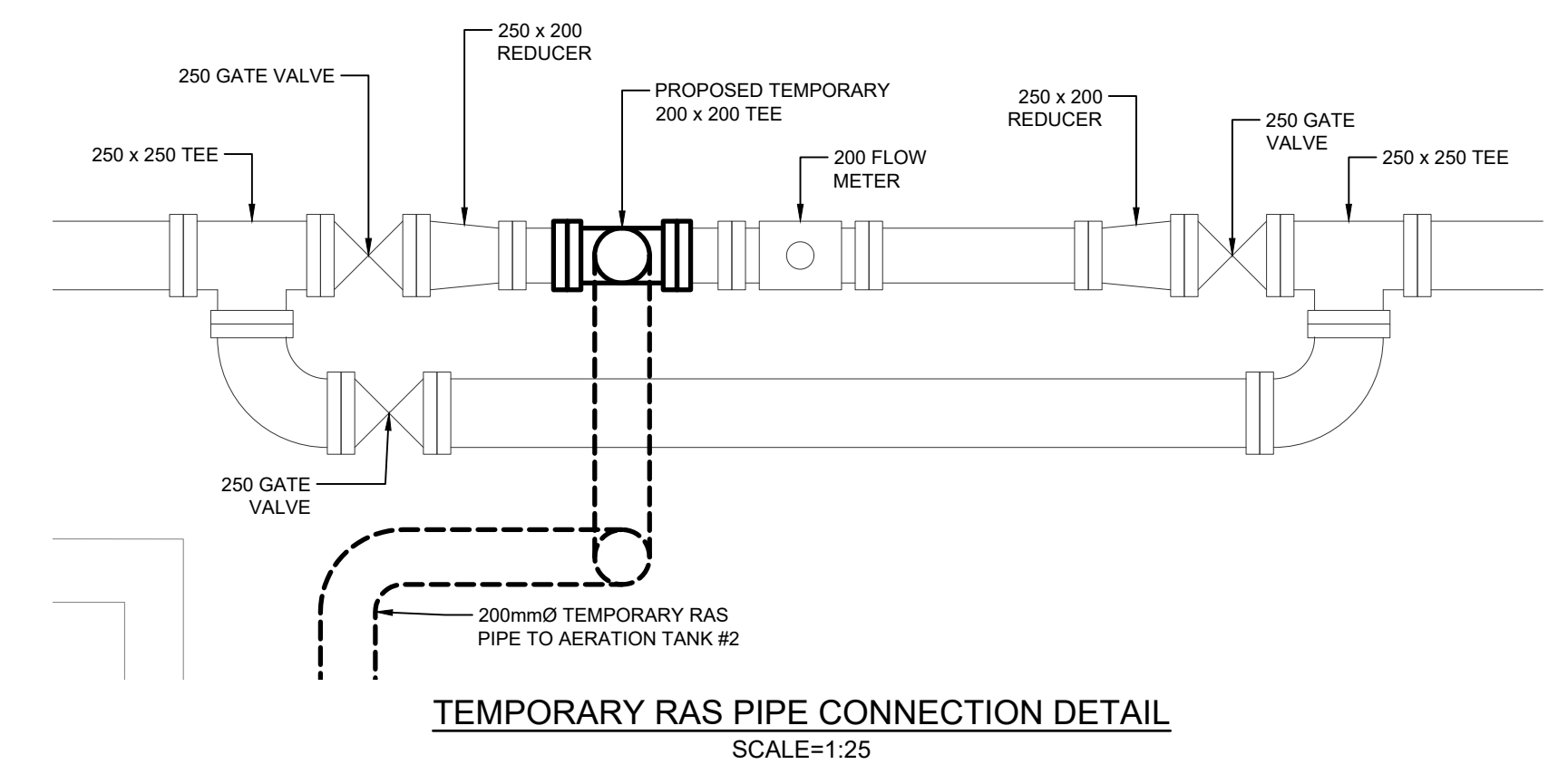


PHOTO No. 3 - RAS PIPING IN BLOWER ROOM
N.T.S.



- NOTES:
1. PROVIDE TEMPORARY PIPING (FOR THE RETURN ACTIVATED SLUDGE) FROM THE BLOWER ROOM TO THE INLET OF AERATION TANK #2 WHEN AERATION TANK #1 IS OFFLINE. SUBMIT WORK PLAN COMPLETE WITH ALL PROPOSED PIPING INFORMATION AND SKETCH FOR REVIEW ALONG WITH PROPOSED SHUTDOWN PLAN.
 2. VERIFY DIMENSIONS ON SITE BEFORE SUBMITTING GUARDRAIL SHOP DRAWINGS
 3. ALL DIMENSIONS WITHIN THIS DRAWING ARE ASSUMED TO BE IN mm UNLESS OTHERWISE STATED.

LEGEND
 PROPOSED TEMPORARY RAS PIPING



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5.	ISSUED FOR TENDER	W.H	28/08/24			

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SCALES
N.T.S



CITY OF HAMILTON
Public Works Department

PLANT A - CONTROL BUILDING & CHEMICAL BUILDING
DUNDAS WASTEWATER TREATMENT PLANT (WWTP)
HEALTH AND SAETY IMMEDIATE NEEDS AND STRUCTURAL REPAIR UPGRADES

G05

DIMENSIONS SHOWN ON THIS PLAN ARE IN MILLIMETERS UNLESS OTHERWISE NOTED

DRAWING No. G06
FILE No. 422130

SHEET No. 6 OF 17

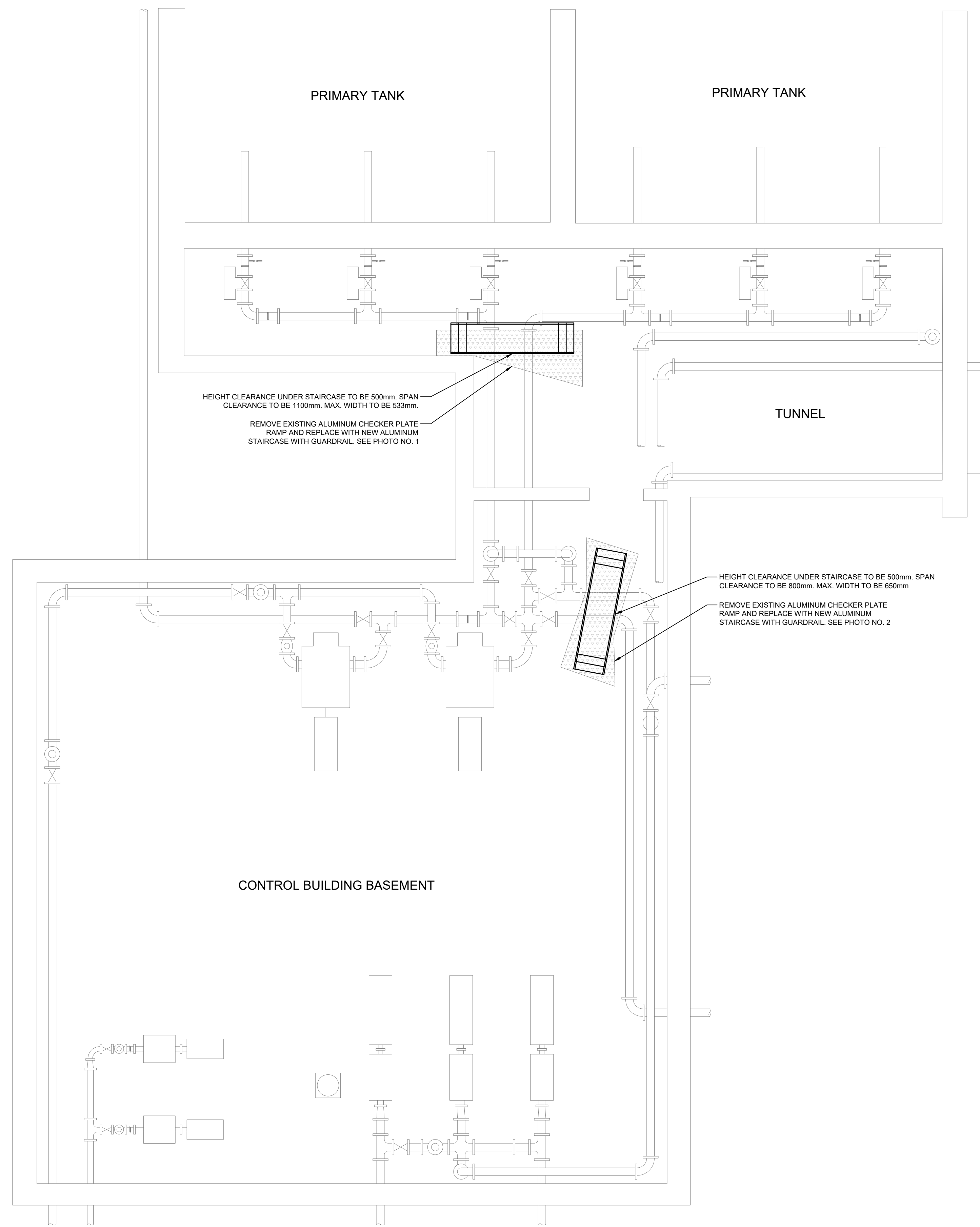


PHOTO No. 1 - ALUMINUM CHECKER PLATE RAMP (TUNNEL)
N.T.S.



PHOTO No. 2 - ALUMINUM CHECKER PLATE RAMP (CONTROL BUILDING BASEMENT)
N.T.S.

NOTES:

- EXISTING SLIDE GATES DO NOT SEAL COMPLETELY. CONTRACTOR TO SANDBAG INFLUENT CHANNEL OR IMPLEMENT OTHER APPROVED MEAN TO COMPLETE THE SCOPE OF WORK WITH ADDITIONAL COST TO THE CITY.
- INSTALL KICK PLATE AROUND ALL GUARD RAIL EXCEPT WHERE KICK PLATE IMPEDES SLIDE GATE OPERATION. EXISTING SLIDE GATE LOCATIONS IDENTIFIED ON DRAWINGS
- ONLY ONE CLARIFIER WILL BE PERMITTED TO BE OFFLINE AT ANY GIVEN TIME.
- NEW FRP BAFFLES IN THE PRIMARY SETTLING TANKS TO BE INSTALLED 533mm BELOW TOP OF CONCRETE WALKWAY.
- PRIMARY SETTLING TANK CELL VOLUME APPROX. 639m³ (x2).

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SCALES
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CITY OF HAMILTON
Public Works Department

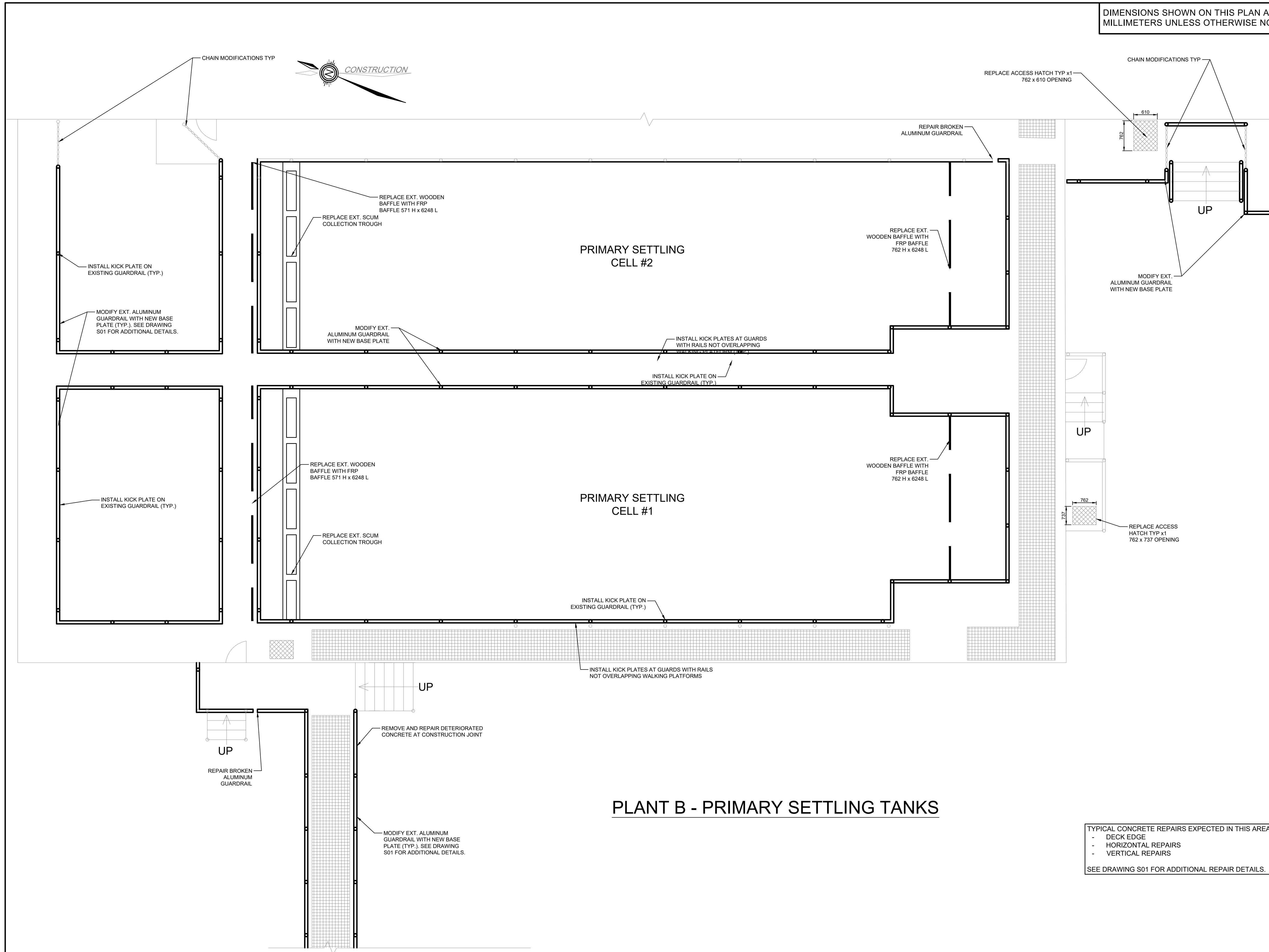
PLANT A - CONTROL BUILDING BASEMENT

DUNDAS WASTEWATER TREATMENT PLANT (WWTP)
HEALTH AND SAETY IMMEDIATE NEEDS AND
STRUCTURAL REPAIR UPGRADES

DIMENSIONS SHOWN ON THIS PLAN ARE IN MILLIMETERS UNLESS OTHERWISE NOTED

DRAWING No. G07
 FILE No. 422130
 SHEET No. 7 OF 17

- NOTES:
- EXISTING SLIDE GATES DO NOT SEAL COMPLETELY. CONTRACTOR TO SANDBAG INFLUENT CHANNEL OR IMPLEMENT OTHER APPROVED MEAN TO COMPLETE THE SCOPE OF WORK WITH ADDITIONAL COST TO THE CITY.
 - INSTALL KICK PLATE AROUND ALL GUARD RAIL EXCEPT WHERE KICK PLATE IMPEDES SLIDE GATE OPERATION. EXISTING SLIDE GATE LOCATIONS IDENTIFIED ON DRAWINGS
 - ONLY ONE CLARIFIER WILL BE PERMITTED TO BE OFFLINE AT ANY GIVEN TIME.
 - NEW FRP BAFFLES IN THE PRIMARY SETTLING TANKS TO BE INSTALLED 533mm BELOW TOP OF CONCRETE WALKWAY.
 - PRIMARY SETTLING TANK CELL VOLUME APPROX. 639m³ (x2).



PLANT B - PRIMARY SETTLING TANKS

No.	REVISIONS	INITIAL	DATE	DRAWN BY:	AM/CP	DATE:
1.	PRELIMINARY DESIGN	W.H	31/01/23			August 28, 2024
2.	ISSUED FOR 60% REVIEW	W.H	08/06/23	CHECKED BY:	WH	DATE: August 28, 2024
3.	ISSUED FOR 90% REVIEW	W.H	27/09/23	APPROVED BY:	CW	DATE: August 28, 2024
4.	RE-ISSUED FOR 90% REVIEW	W.H	11/10/23			
5.	ISSUED FOR TENDER	W.H	28/08/24			

Geodetic Bench Mark Index No. Elevations=

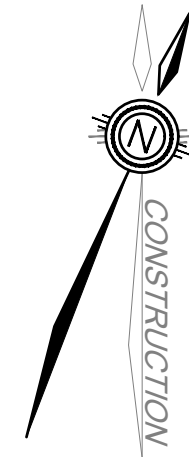
SCALES
 1:50



CITY OF HAMILTON
 Public Works Department

PLANT B - PRIMARY SETTLING TANKS
 DUNDAS WASTEWATER TREATMENT PLANT (WWTP)
 HEALTH AND SAETY IMMEDIATE NEEDS AND
 STRUCTURAL REPAIR UPGRADES

G07



DIMENSIONS SHOWN ON THIS PLAN ARE IN MILLIMETERS UNLESS OTHERWISE NOTED

DRAWING No. G08

SHEET No. 8 OF 17

FILE No. 422130

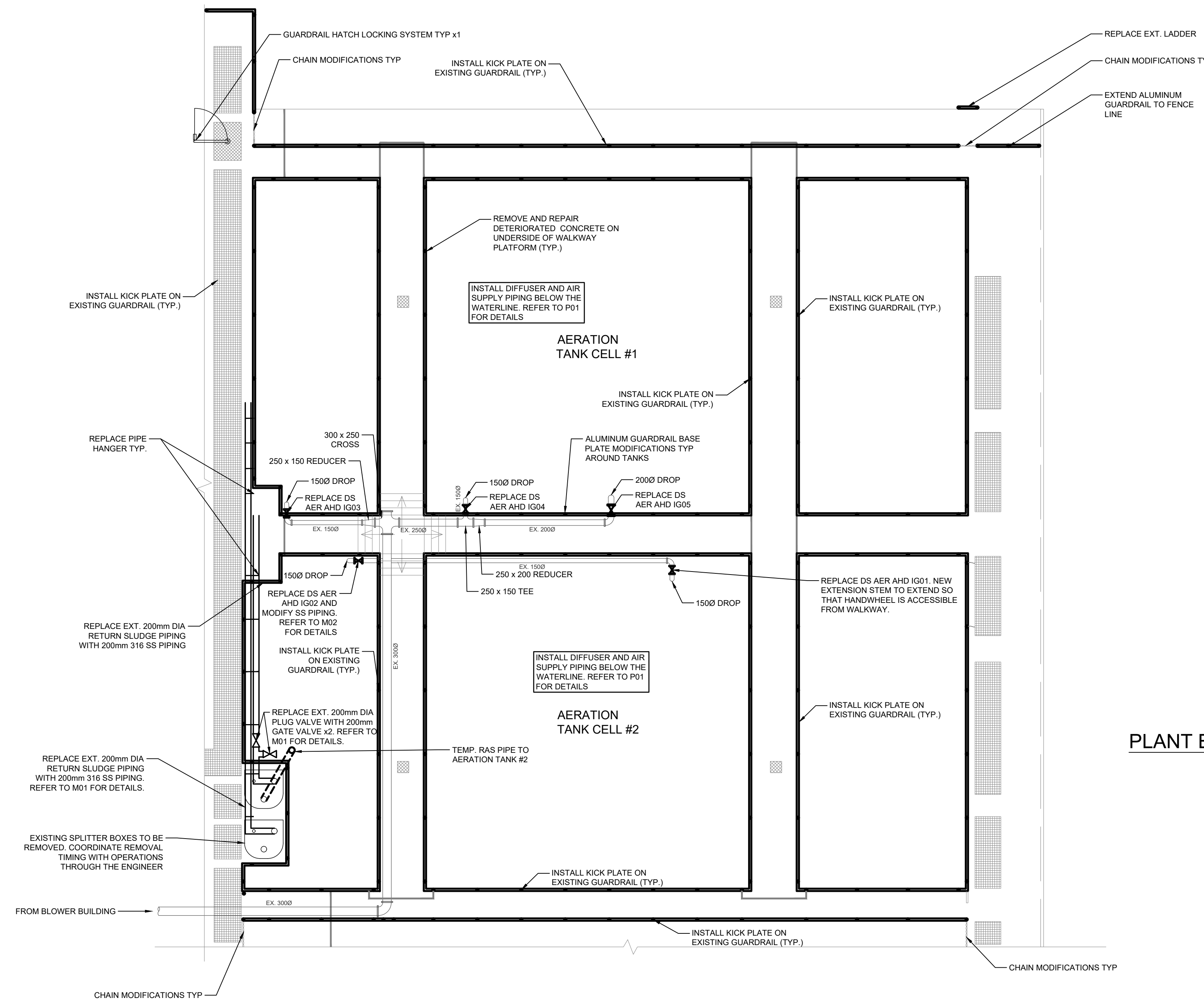
TYPICAL CONCRETE REPAIRS EXPECTED IN THIS AREA.
 - DECK EDGE
 - HORIZONTAL REPAIRS
 - VERTICAL REPAIRS
 SEE DRAWING S01 FOR ADDITIONAL REPAIR DETAILS.

NOTES:

- SLIDE GATES DO NOT SEAL COMPLETELY. CONTRACTOR TO SANDBAG INFLUENT CHANNEL OR IMPLEMENT OTHER APPROVED MEAN TO COMPLETE THE SCOPE OF WORK WITH ADDITIONAL COST TO THE CITY.
- INSTALL KICKPLATE AROUND ALL GUARDRAIL EXCEPT WHERE KICK PLATE IMPEDES SLIDE GATE OPERATION.
- ONLY ONE AERATION TANK WILL BE PERMITTED TO BE OFFLINE AT ANY GIVEN TIME.
- PROVIDE TEMPORARY PIPING (FOR THE RETURN ACTIVATED SLUDGE) FROM THE SPLITTER BOXES TO THE INLET OF AERATION TANK #2 WHEN AERATION TANK #1 IS OFFLINE.
- COORDINATE THE OPERATION OF RAS PUMPING WITH OPERATIONS THROUGH THE ENGINEER.
- CELL #1 IS TO BE TAKEN OFFLINE AND UPGRADES COMPLETED BEFORE CELL #2.
- AERATION TANK CELL VOLUME APPROX. 1405m³ (x2)

LEGEND:

===== PROPOSED TEMPORARY RAS PIPING PATH



NOTE:
 MODIFY EXT. ALUMINUM GUARDRAIL AROUND THE AERATION TANKS WITH NEW BASE PLATE CONNECTIONS. SEE DRAWING S01 FOR ADDITIONAL DETAILS.



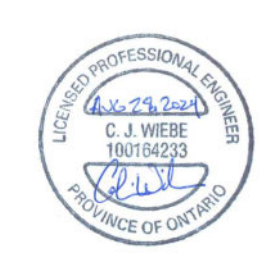
PHOTO No. 1 - TYPICAL VERTICAL CONCRETE REPAIR
 N.T.S.

PLANT B - AERATION TANKS

VALVE SCHEDULE				
TAG No.	SIZE (mm)	EQUIPMENT TYPE	ACTUATOR TYPE	FRAME INSTALLATION
DS AER AHD IG01	150 Ø	ISOLATION VALVE PLANT B AERATION TANK AIR SUPPLY PIPING #1	EXTENSION STEM & HAND WHEEL	N/A. USE EXISTING
DS AER AHD IG02	150 Ø	ISOLATION VALVE PLANT B AERATION TANK AIR SUPPLY PIPING #2	EXTENSION STEM & HAND WHEEL	N/A. USE EXISTING
DS AER AHD IG03	150 Ø	ISOLATION VALVE PLANT B AERATION TANK AIR SUPPLY PIPING #3	EXTENSION STEM & HAND WHEEL	N/A. USE EXISTING
DS AER AHD IG04	150 Ø	ISOLATION VALVE PLANT B AERATION TANK AIR SUPPLY PIPING #4	EXTENSION STEM & HAND WHEEL	N/A. USE EXISTING
DS AER AHD IG05	200 Ø	ISOLATION VALVE PLANT B AERATION TANK AIR SUPPLY PIPING #5	EXTENSION STEM & HAND WHEEL	N/A. USE EXISTING
DS AER RAP IG01	200 Ø	ISOLATION VALVE PLANT B AERATION TANK RAS PIPING #1	EXTENSION STEM & HAND WHEEL	N/A. USE EXISTING
DS AER RAP IG02	200 Ø	ISOLATION VALVE PLANT B AERATION TANK RAS PIPING #2	EXTENSION STEM & HAND WHEEL	N/A. USE EXISTING

No.	REVISIONS	INITIAL	DATE	DRAWN BY:	AM/CP	DATE:
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5.	ISSUED FOR TENDER	W.H	28/08/24			

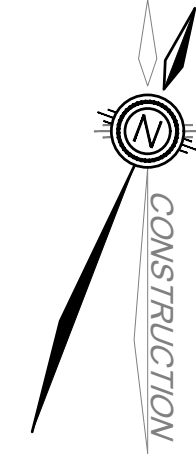
SCALES
 1:100



CITY OF HAMILTON
 Public Works Department

PLANT B - AERATION TANKS
 DUNDAS WASTEWATER TREATMENT PLANT (WWTP)
 HEALTH AND SAETY IMMEDIATE NEEDS AND STRUCTURAL REPAIR UPGRADES

G08



DIMENSIONS SHOWN ON THIS PLAN ARE IN MILLIMETERS UNLESS OTHERWISE NOTED

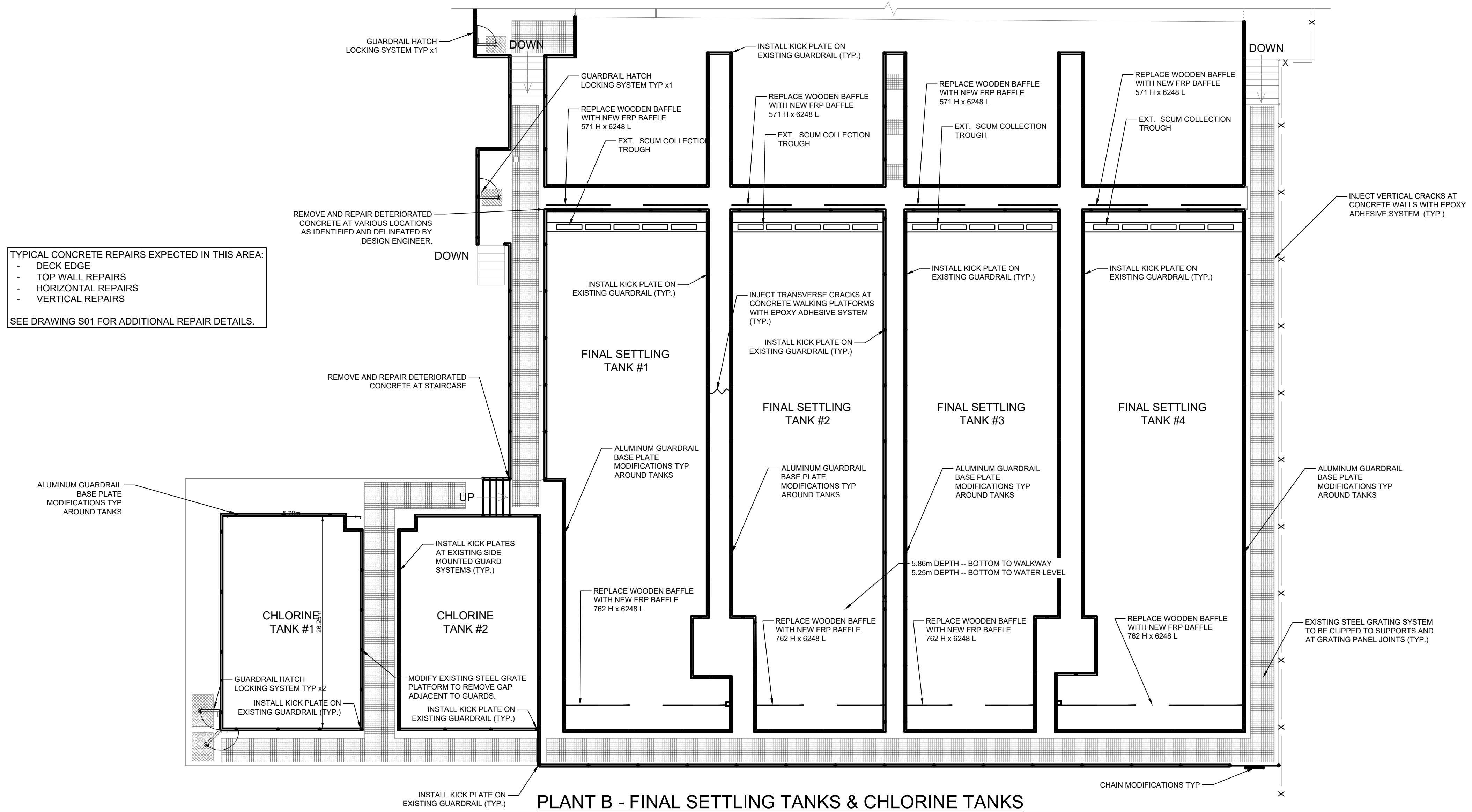
DRAWING No. G09
SHEET No. 9 OF 17

FILE No. 422130

- NOTES:
- SLIDE GATES DO NOT SEAL COMPLETELY. CONTRACTOR TO SANDBAG INFLUENT CHANNEL OR IMPLEMENT OTHER APPROVED MEAN TO COMPLETE THE SCOPE OF WORK WITH ADDITIONAL COST TO THE CITY.
 - INSTALL KICKPLATE AROUND ALL GUARDRAIL EXCEPT WHERE KICK PLATE IMPEDES SLIDE GATE OPERATION.
 - ONLY ONE CLARIFIER WILL BE PERMITTED TO BE OFFLINE AT ANY GIVEN TIME.
 - NEW FRP BAFFLES IN THE FINAL SETTLING TANKS TO BE INSTALLED 533mm BELOW TOP OF CONCRETE WALKWAY.
 - SECONDARY SETTLING TANK CELL VOLUME APPROX. 920m³ (x2).
 - CHLORINE CONTACT TANK VOLUME APPROX. 90m³ (x2).

TYPICAL CONCRETE REPAIRS EXPECTED IN THIS AREA:
- DECK EDGE
- TOP WALL REPAIRS
- HORIZONTAL REPAIRS
- VERTICAL REPAIRS
SEE DRAWING S01 FOR ADDITIONAL REPAIR DETAILS.

NOTE: MODIFY EXT. ALUMINUM GUARDRAIL AROUND THE FINAL SETTLING TANKS WITH BASE PLATE CONNECTIONS. SEE DRAWING S01 FOR ADDITIONAL DETAILS.

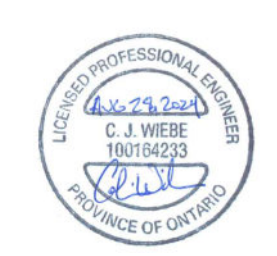


PLANT B - FINAL SETTLING TANKS & CHLORINE TANKS

VALVE SCHEDULE				
TAG No.	SIZE (mm)	EQUIPMENT TYPE	ACTUATOR TYPE	FRAME INSTALLATION
DS PRI SCL STG01	CHANNEL WIDTH	SCUM COLLECTION TROUGH PLANT B PRIMARY SETTLING TANK 1	EXTENSION STEM & HAND WHEEL	N/A USE EXISTING
DS PRI SCL STG02	CHANNEL WIDTH	SCUM COLLECTION TROUGH PLANT B PRIMARY SETTLING TANK 2	EXTENSION STEM & HAND WHEEL	N/A USE EXISTING

No.	REVISIONS	INITIAL	DATE	DRAWN BY:	AM/CP	DATE:
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4.	RE-ISSUED FOR 90% REVIEW	W.H	11/10/23			
5.	ISSUED FOR TENDER	W.H	28/08/24			

SCALES
1:100



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Public Works Department

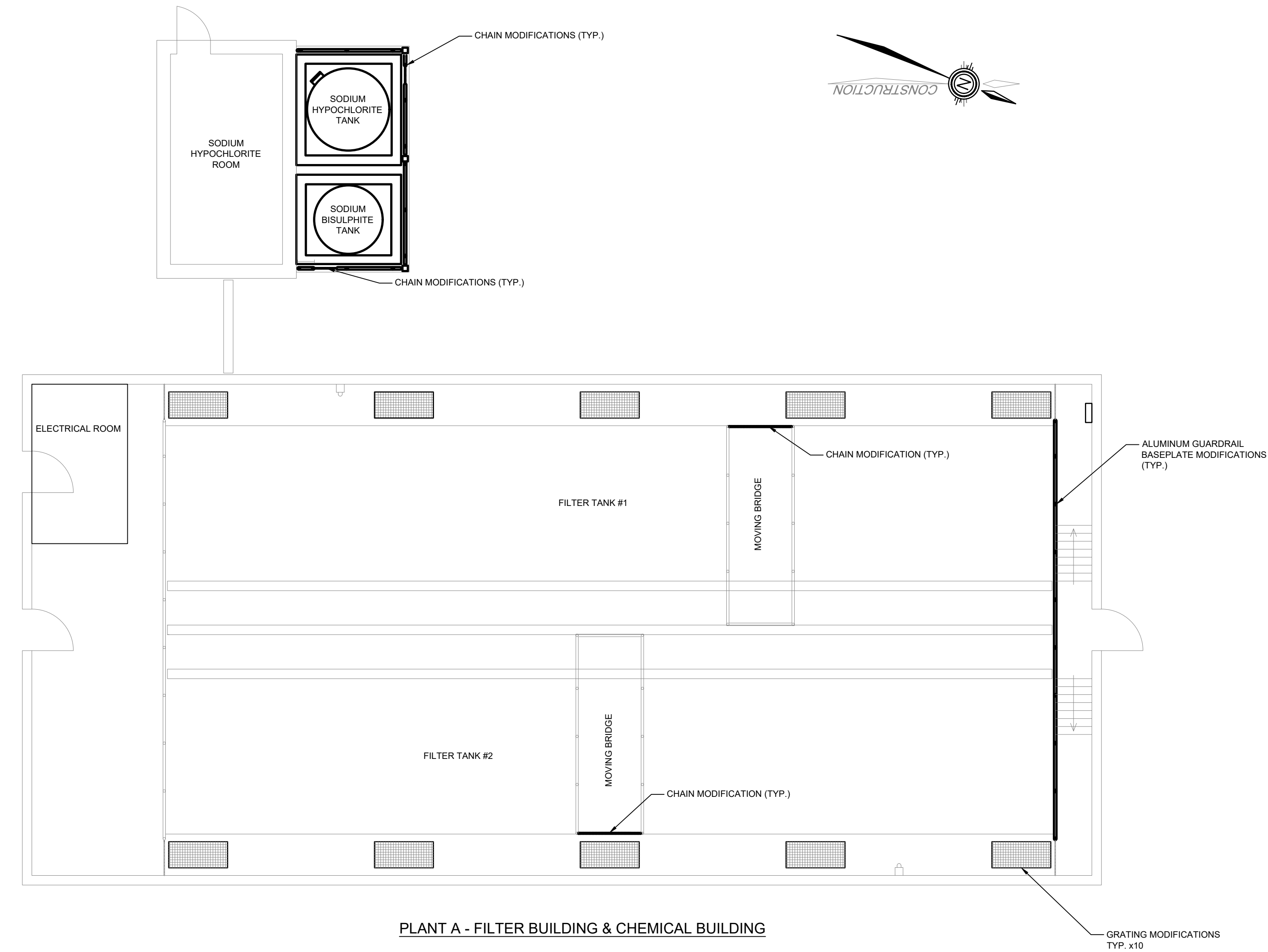
PLANT B - FINAL SETTLING TANKS & CHLORINE TANKS
DUNDAS WASTEWATER TREATMENT PLANT (WWTP)
HEALTH AND SAETY IMMEDIATE NEEDS AND STRUCTURAL REPAIR UPGRADES

G09

DIMENSIONS SHOWN ON THIS PLAN ARE IN MILLIMETERS UNLESS OTHERWISE NOTED

DRAWING No. G10
FILE No. 422130

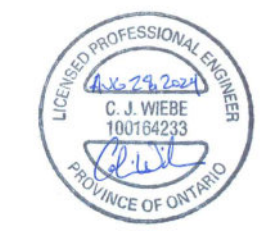
SHEET No. 10 OF 17



PLANT A - FILTER BUILDING & CHEMICAL BUILDING

No.	REVISIONS	INITIAL	DATE	DRAWN BY:	AM/CP	DATE:
1.	PRELIMINARY DESIGN	W.H	31/01/23			August 28, 2024
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4.	RE-ISSUED FOR 90% REVIEW	W.H	11/10/23	APPROVED BY:	CW	DATE: August 28, 2024
5.	ISSUED FOR TENDER	W.H	28/08/24			

SCALES
1:100



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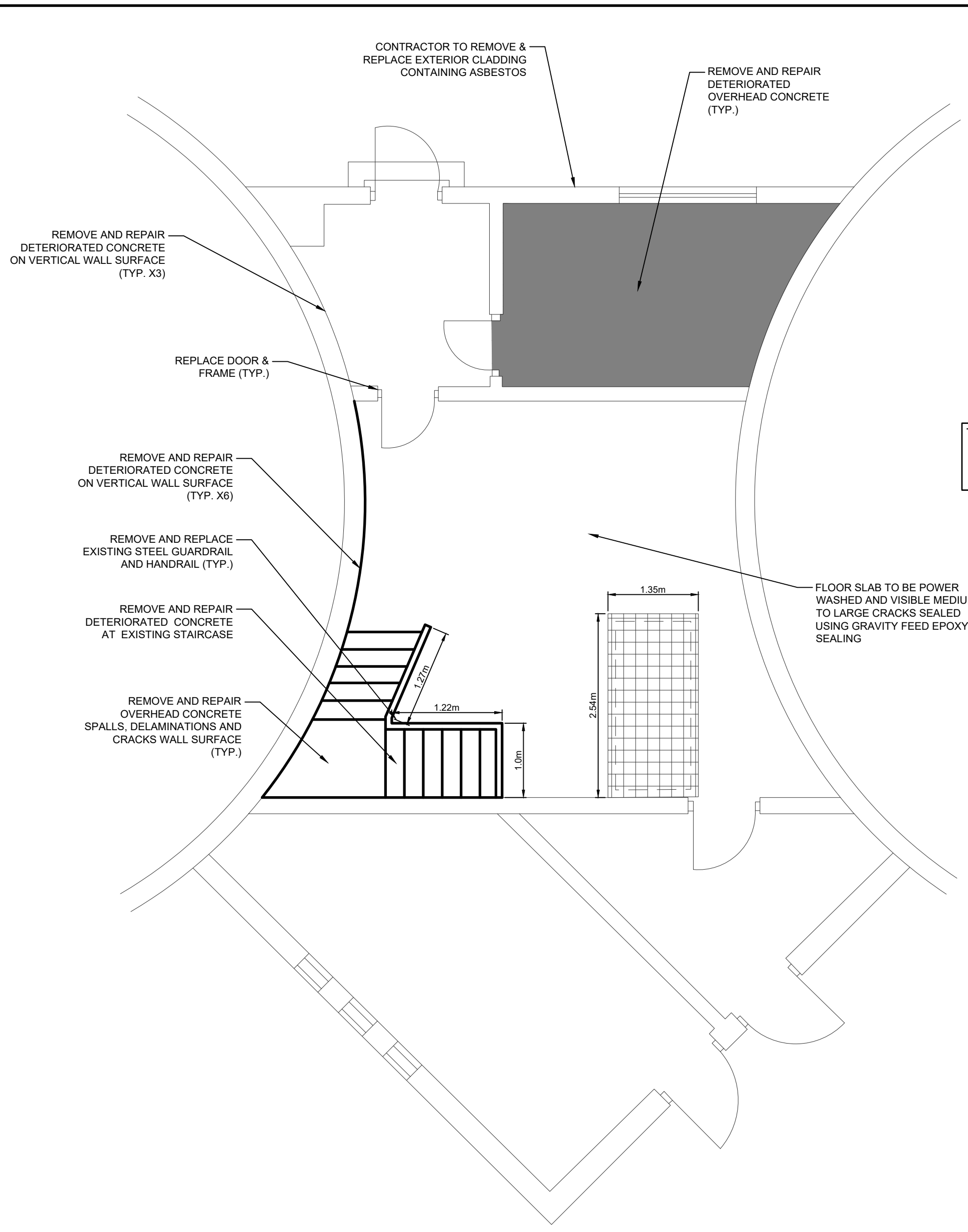
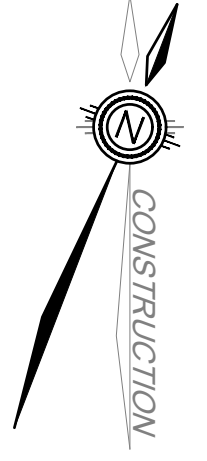
PLANT A - FILTER BUILDING
DUNDAS WASTEWATER TREATMENT PLANT (WWTP)
HEALTH AND SAETY IMMEDIATE NEEDS AND
STRUCTURAL REPAIR UPGRADES

G10

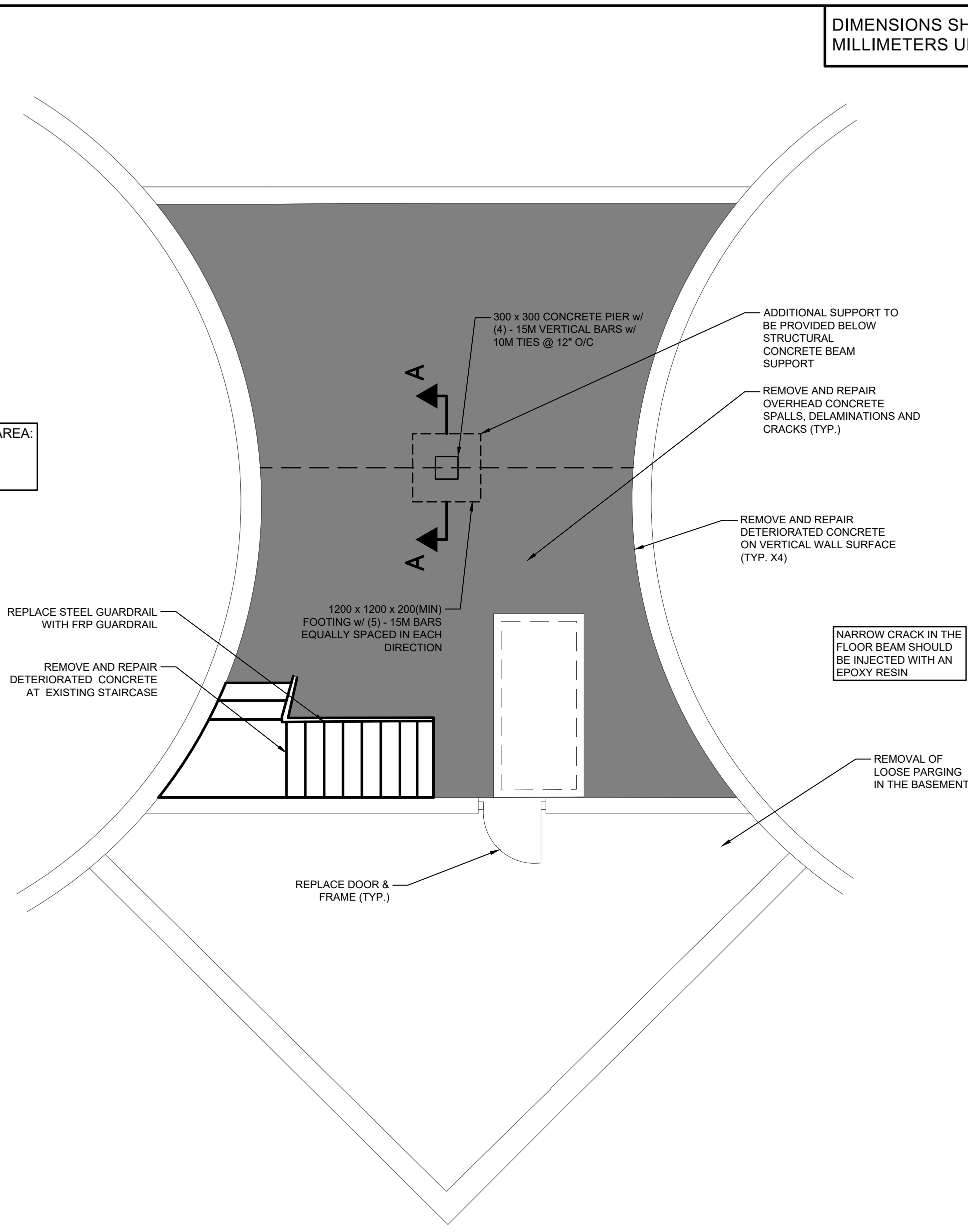
DIMENSIONS SHOWN ON THIS PLAN ARE IN MILLIMETERS UNLESS OTHERWISE NOTED

DRAWING No.	G11	SHEET No.	11 OF 17
FILE No.	422130		

- NOTES:
- SUBMIT A SAFE WORK PLAN FOR REVIEW AND APPROVAL BEFORE COMPLETING WORK IN THE DIGESTER BUILDING.
 - REFER TO DESIGNATED SUBSTANCE SURVEY COMPLETED FOR THE DIGESTER BUILDING IN THE CONTRACT DOCUMENTS.
 - REMOVE, DISPOSE AND REPLACE ALL LIGHT FIXTURES IN THE DIGESTER VALVE BUILDING THAT ARE PRESUMED TO CONTAIN PCB'S AS OUTLINED IN THE DESIGNATED SUBSTANCE SURVEYS INCLUDED WITHIN THE CONTRACT DOCUMENTS. NEW LIGHT FIXTURES TO BE RATED FOR CLASS 1 DIVISION 2 INSTALLATION.



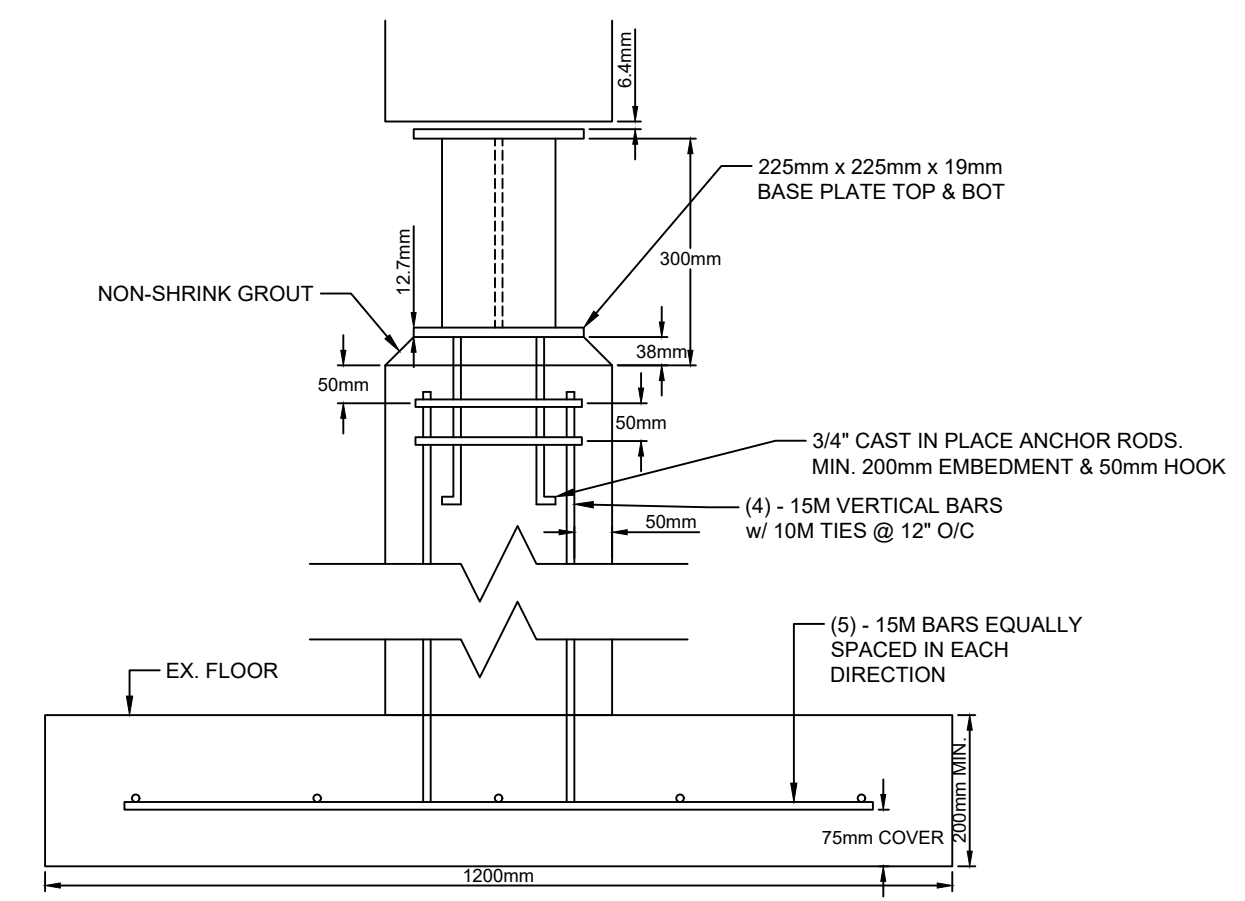
GROUND FLOOR
SCALE= 1:50



BASEMENT FLOOR
SCALE= 1:50



PHOTO No. 1 - EXTERIOR CLADDING ON DIGESTER BUILDING
N.T.S.



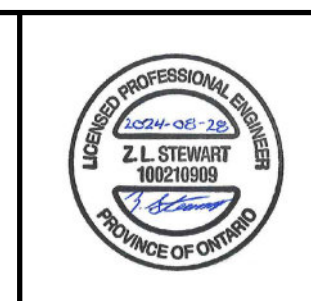
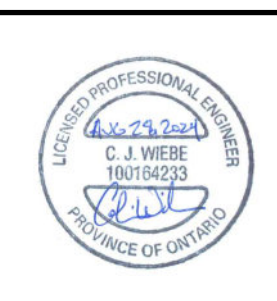
SECTION A-A
SCALE= 1:10

No.	REVISIONS	INITIAL	DATE	DRAWN BY:	AM/CP	DATE:
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4.	RE-ISSUED FOR 90% REVIEW	W.H	11/10/23			
5.	ISSUED FOR TENDER	W.H	28/08/24			

Geodetic Bench Mark Index No. _____
Elevation= _____

SCALES

AS NOTED



CITY OF HAMILTON
Public Works Department

DIGESTER BUILDING FLOOR PLANS
DUNDAS WASTEWATER TREATMENT PLANT (WWTP)
HEALTH AND SAETY IMMEDIATE NEEDS AND
STRUCTURAL REPAIR UPGRADES

G11

DIMENSIONS SHOWN ON THIS PLAN ARE IN MILLIMETERS UNLESS OTHERWISE NOTED

DRAWING No.	M01	SHEET No.	12 OF 17
FILE No.	422130		



PHOTO No. 1 - EXISTING SPLITTER BOXES
N.T.S.



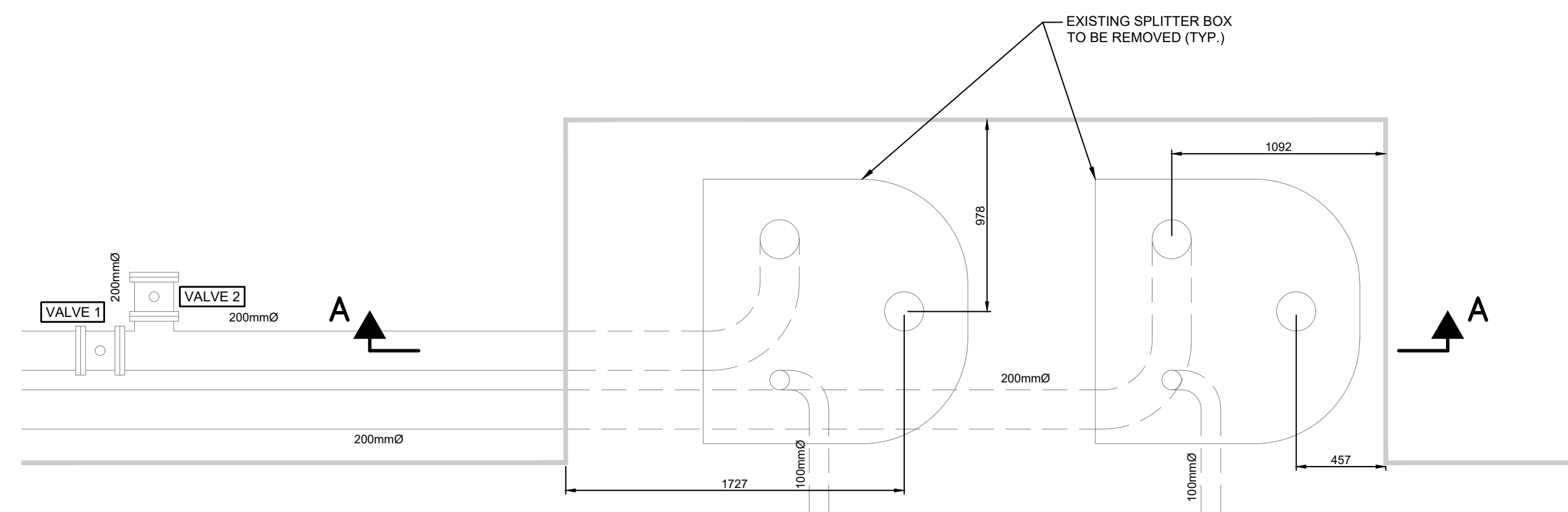
PHOTO No. 2 - EXISTING DI RAS PIPING BELOW SPLITTER BOXES
N.T.S.



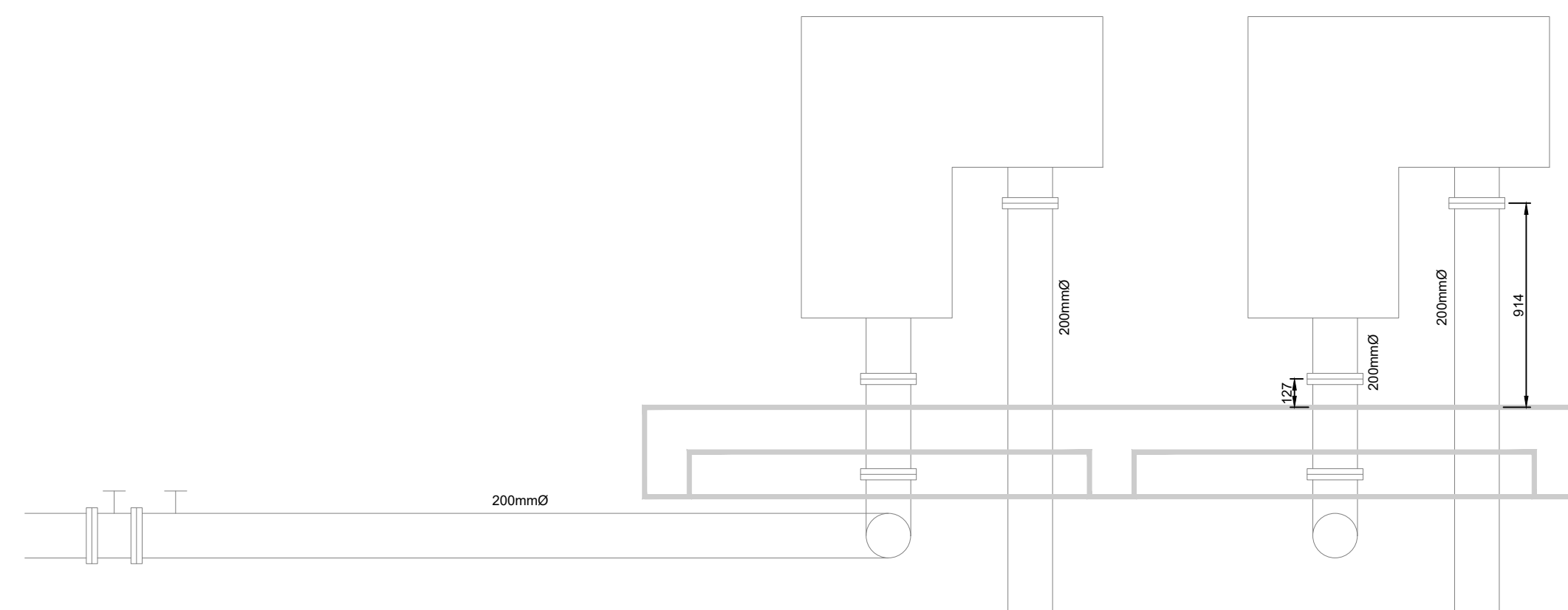
PHOTO No. 3 - EXISTING DI RAS PIPING DISCHARGE TO PLANT A AERATION TANK CELL #1
N.T.S.

NOTES:

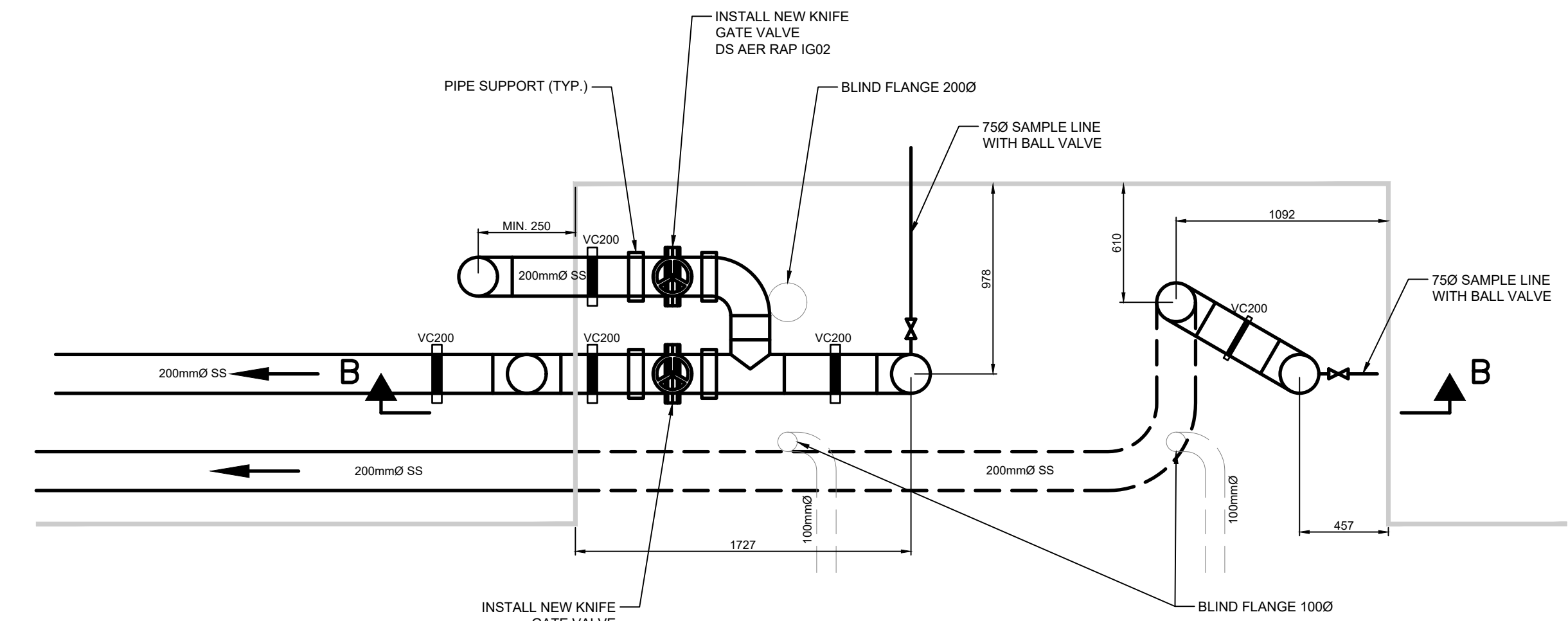
1. VERIFY DIMENSIONS ON SITE BEFORE SUBMITTING PIPE SHOP DRAWINGS.
2. ALL NEW RAS PIPING TO BE 316 SS.
3. PROVIDE PIPE SUPPORTS AS REQUIRED PER THE CONTRACT SPECIFICATIONS.
4. ALL EXISTING DUCTILE IRON PIPE REMAINING IN SERVICE SHALL BE MECHANICALLY CLEANED AND COATED AS PER CONTRACT SPECIFICATIONS.
5. FLANGED CONNECTIONS BETWEEN SS & DI PIPE TO HAVE DIELECTRIC ISOLATION
6. ALL PROCESS PIPING & FASTENERS SHALL BE 316 SS



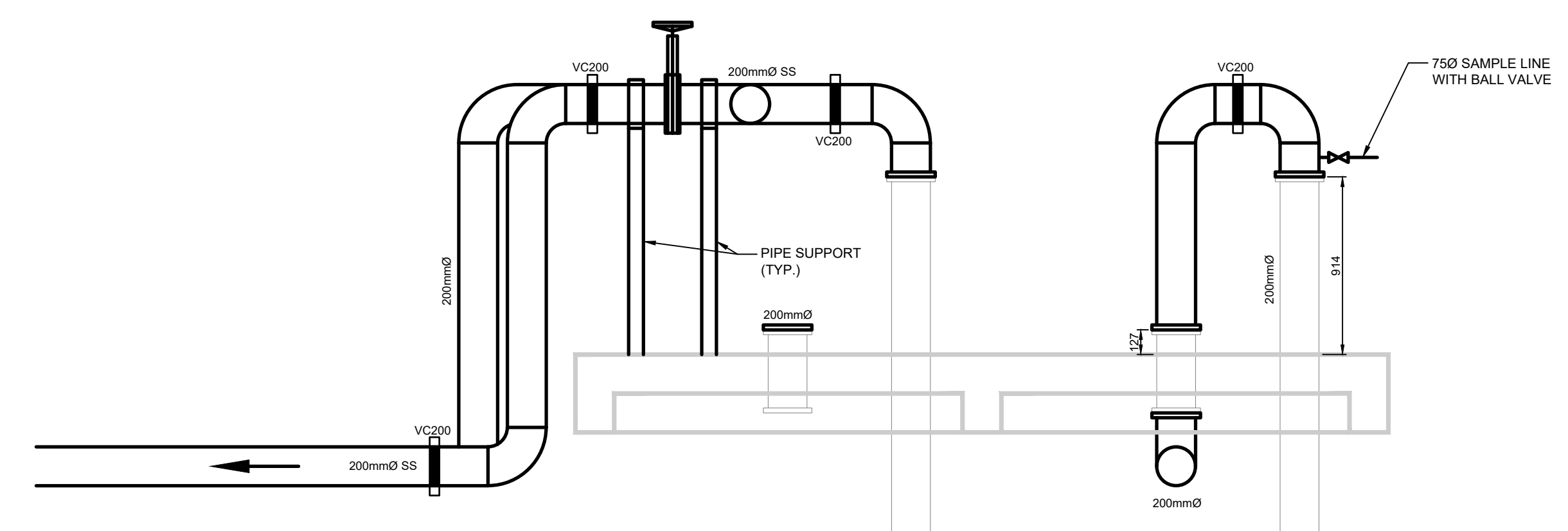
EXISTING PIPING LAYOUT



SECTION A-A



PROPOSED PIPING LAYOUT



SECTION B-B

No.	REVISIONS	INITIAL	DATE	DRAWN BY:	AM/CP	DATE:
1.	PRELIMINARY DESIGN	W.H	31/01/23			August 28, 2024
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4.	RE-ISSUED FOR 90% REVIEW	W.H	11/10/23			
5.	ISSUED FOR TENDER	W.H	28/08/24			

SCALES

1:25



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Public Works Department

PLANT B - RETURN ACTIVATED SLUDGE PIPING DETAILS

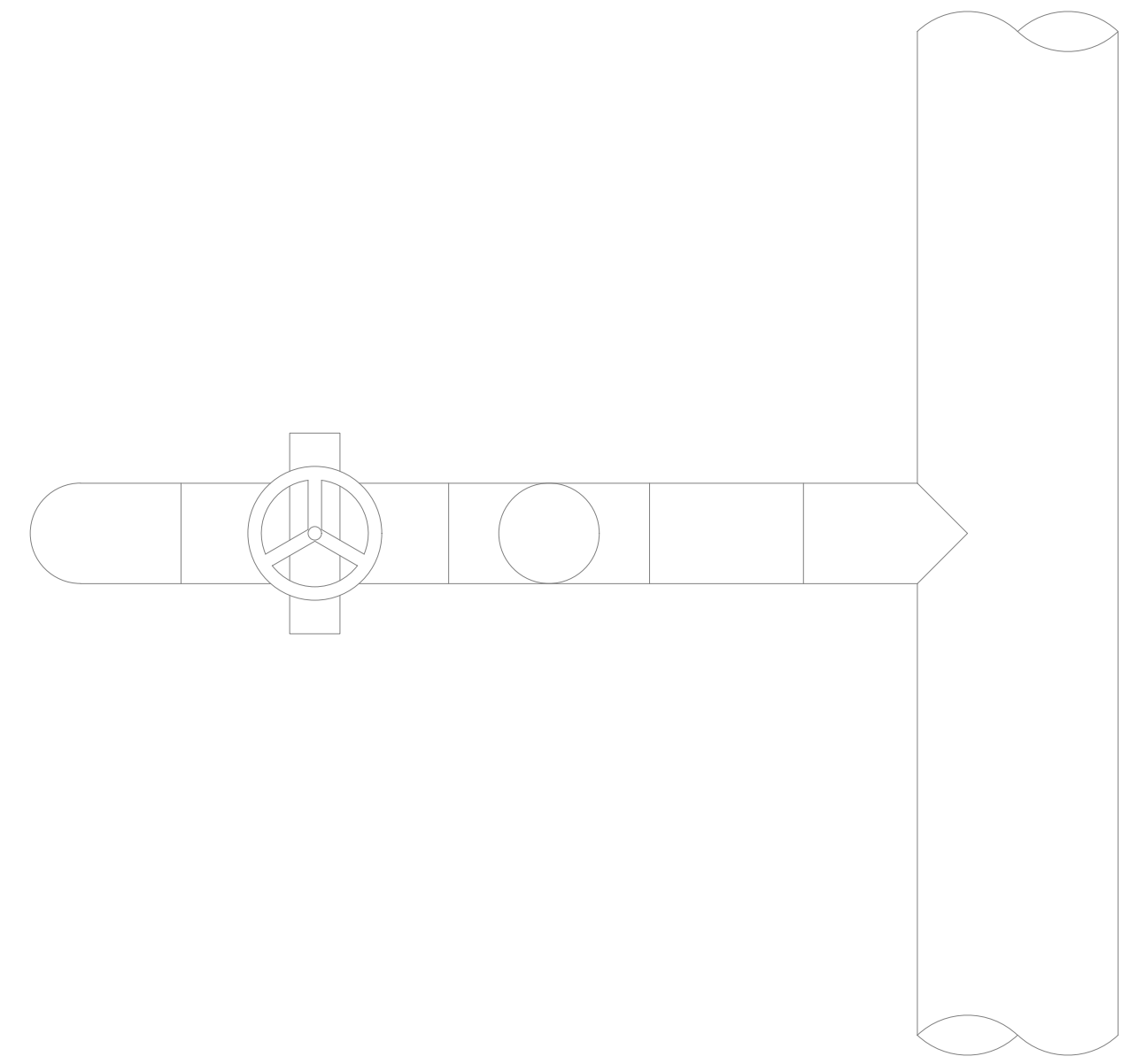
DUNDAS WASTEWATER TREATMENT PLANT (WWTP)
HEALTH AND SAETY IMMEDIATE NEEDS AND
STRUCTURAL REPAIR UPGRADES

M01

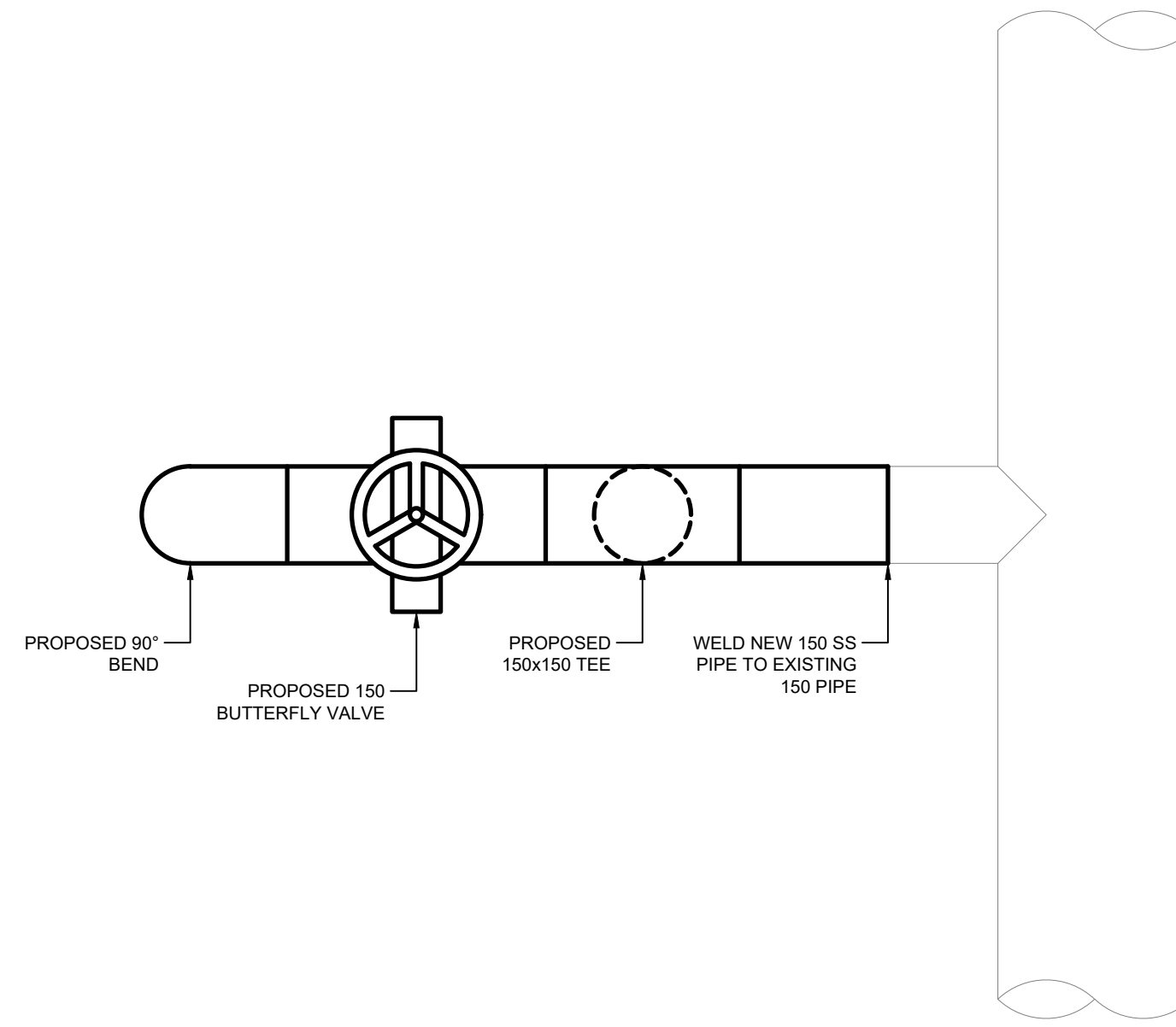
DIMENSIONS SHOWN ON THIS PLAN ARE IN MILLIMETERS UNLESS OTHERWISE NOTED

DRAWING No. M02	SHEET No. 13 OF 17
FILE No. 422130	

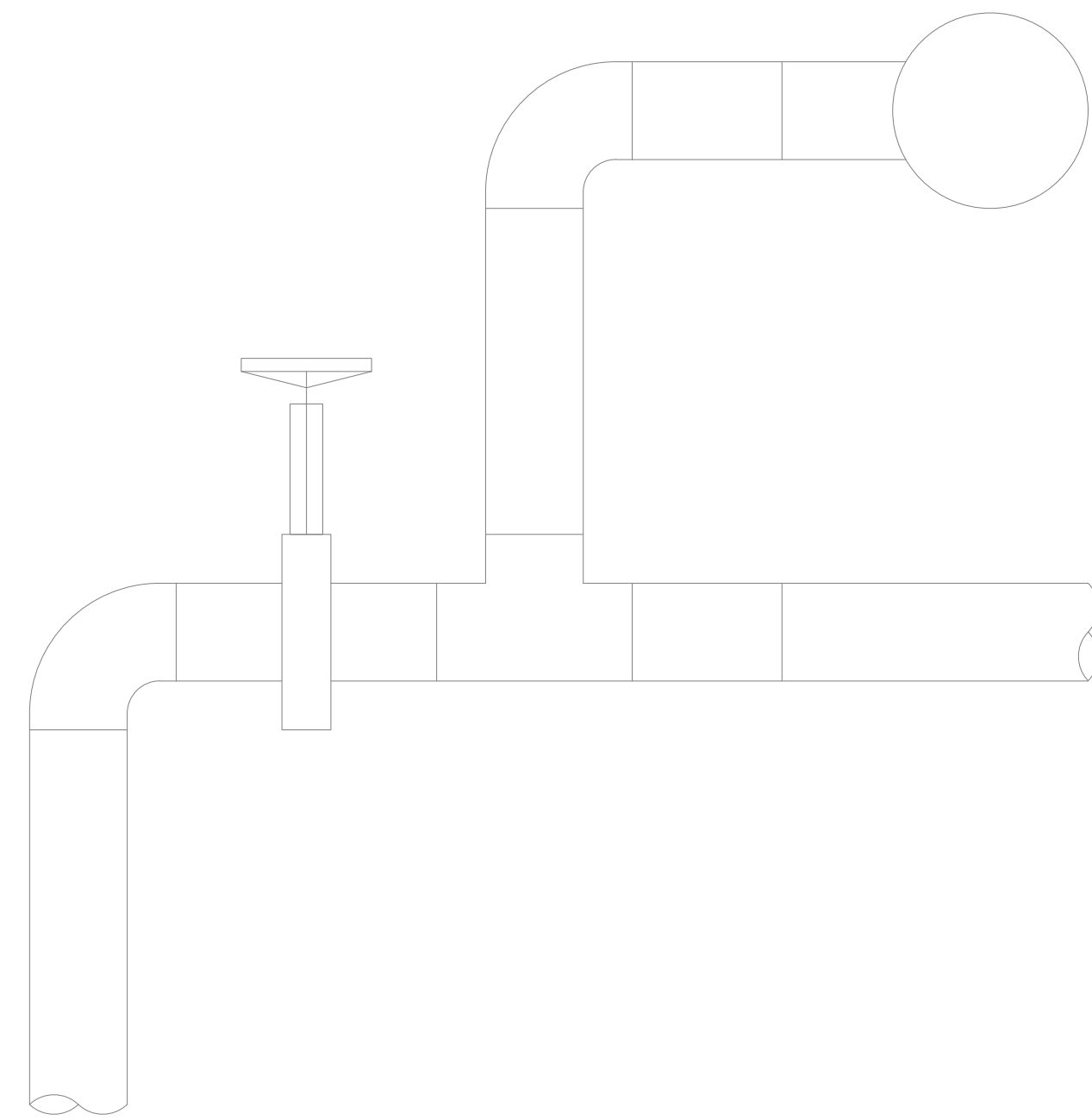
- NOTES:
1. VERIFY DIMENSIONS ON SITE BEFORE SUBMITTING PIPE SHOP DRAWINGS.
 2. ALL NEW AIR SUPPLY PIPING TO BE SCH. 10 - 316 SS.
 3. PROVIDE PIPE SUPPORTS AS REQUIRED PER THE CONTRACT SPECIFICATIONS.
 4. ALL PROCESS PIPING & FASTENERS SHALL BE 316 SS



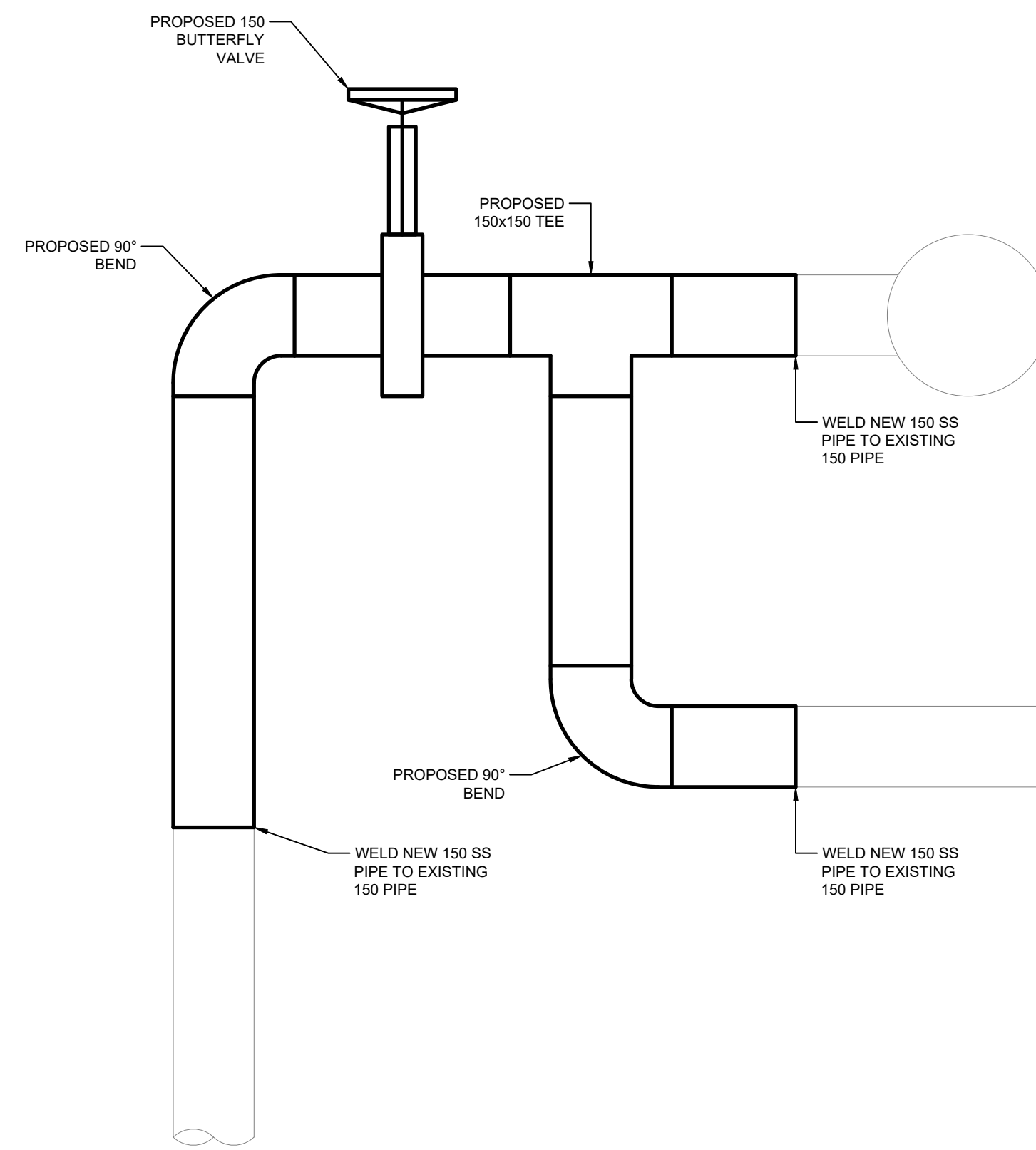
EXISTING PIPING DETAIL 1
N.T.S.



PROPOSED PIPING DETAIL 1
N.T.S.



EXISTING PIPING DETAIL 2
N.T.S.



EXISTING PIPING DETAIL 2
N.T.S.

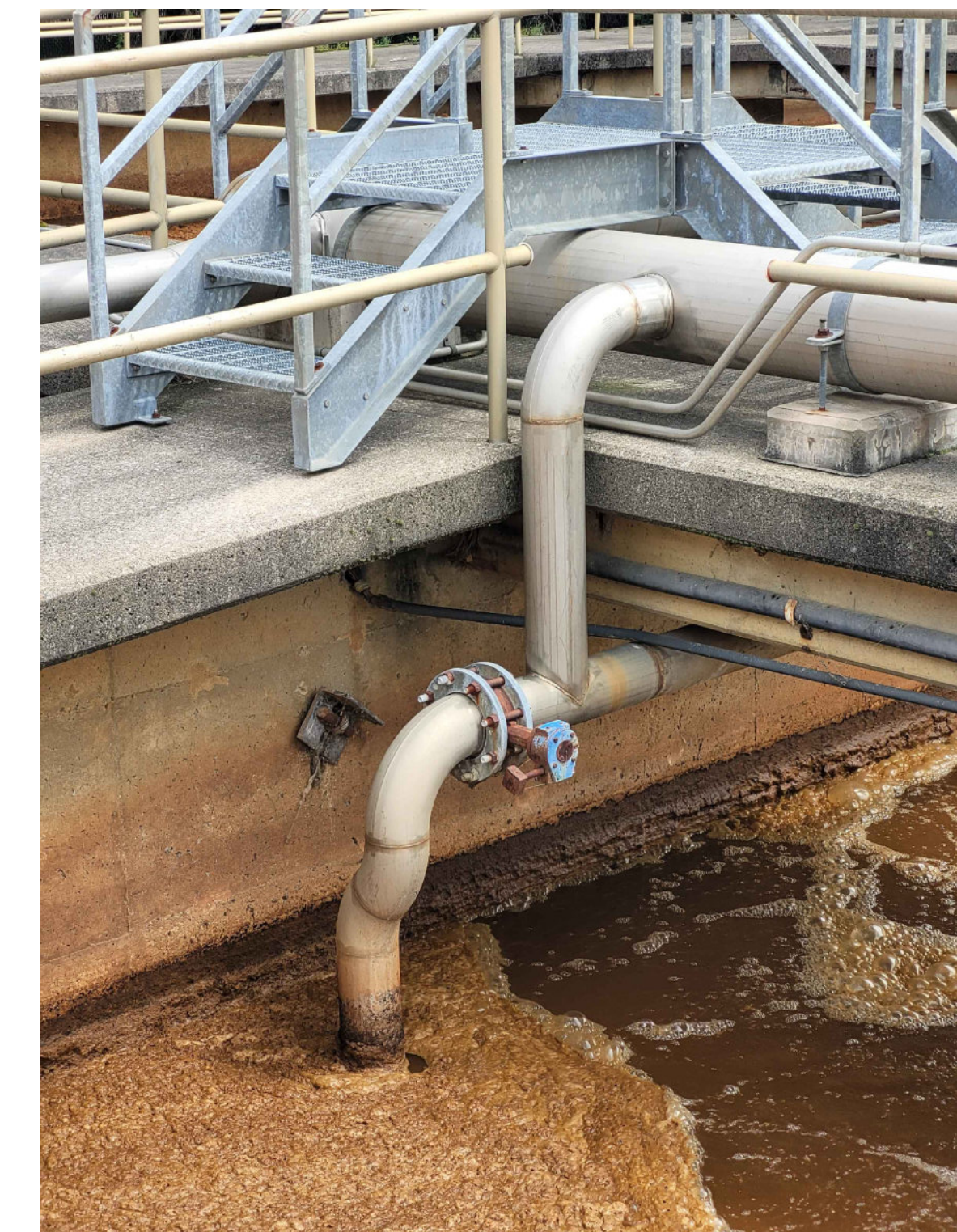


PHOTO No. 1 - EXISTING AIR SUPPLY PIPING AND VALVE
N.T.S.

No.	REVISIONS	INITIAL	DATE	DRAWN BY:	AM/CP	DATE:
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3.	ISSUED FOR 90% REVIEW	W.H	27/09/23			
4.	RE-ISSUED FOR 90% REVIEW	W.H	11/10/23	APPROVED BY:	CW	DATE: August 28, 2024
5.	ISSUED FOR TENDER	W.H	28/08/24			

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Elevation=

SCALES
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Public Works Department

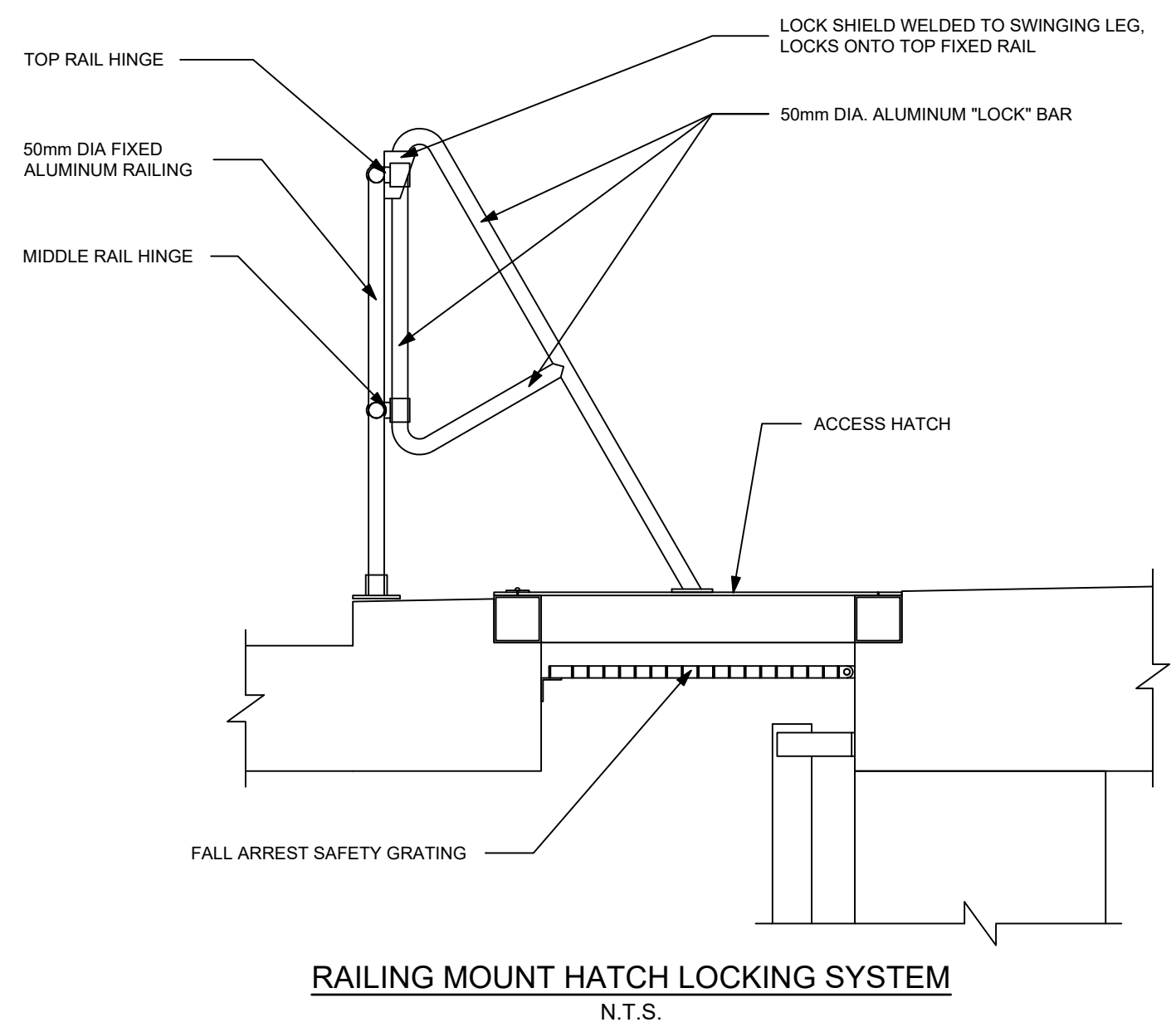
PLANT B - AIR SUPPLY PIPING REPLACEMENT DETAIL

DUNDAS WASTEWATER TREATMENT PLANT (WWTP)
HEALTH AND SAFETY IMMEDIATE NEEDS AND STRUCTURAL REPAIR UPGRADES

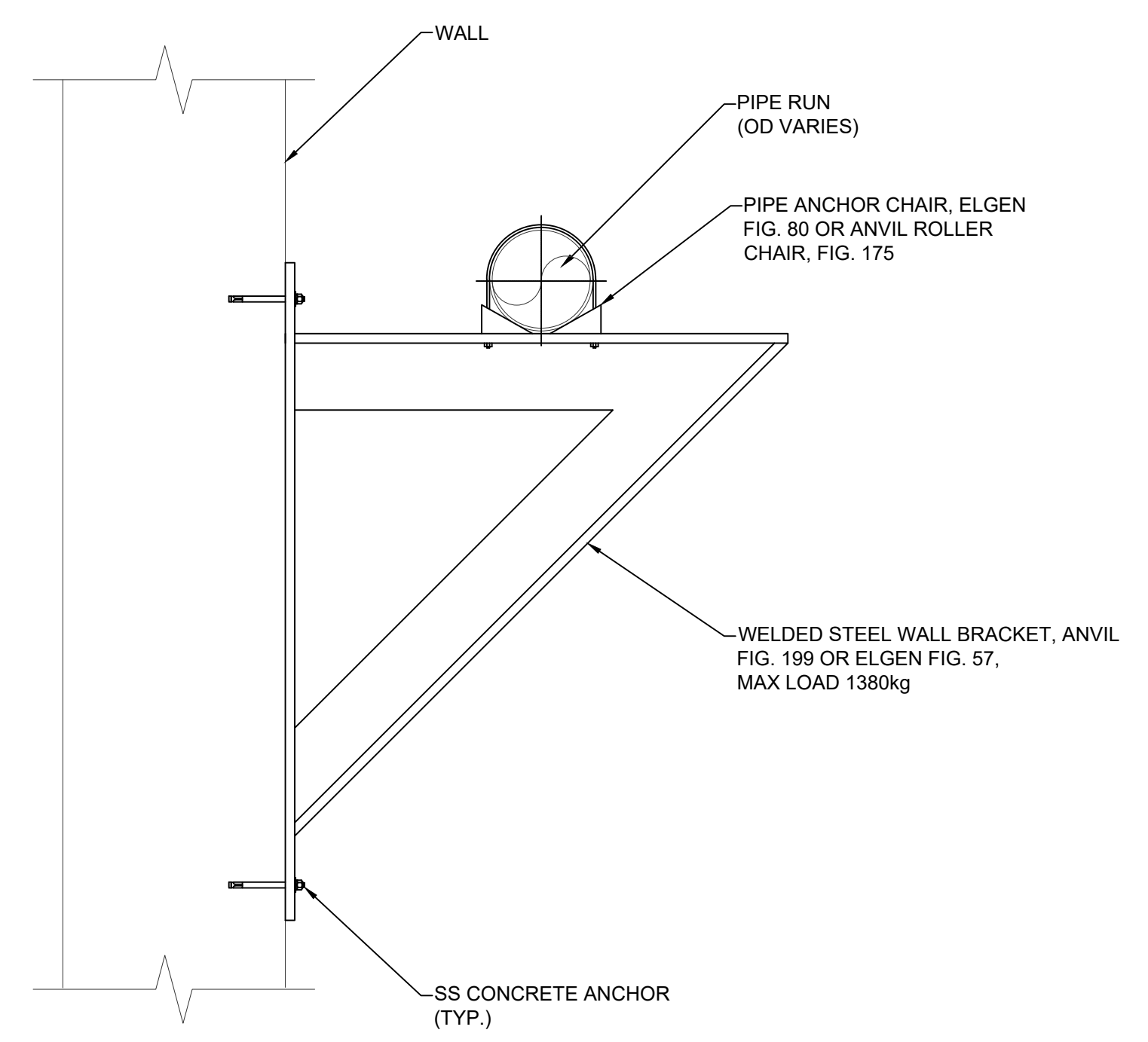
M02

DIMENSIONS SHOWN ON THIS PLAN ARE IN MILLIMETERS UNLESS OTHERWISE NOTED

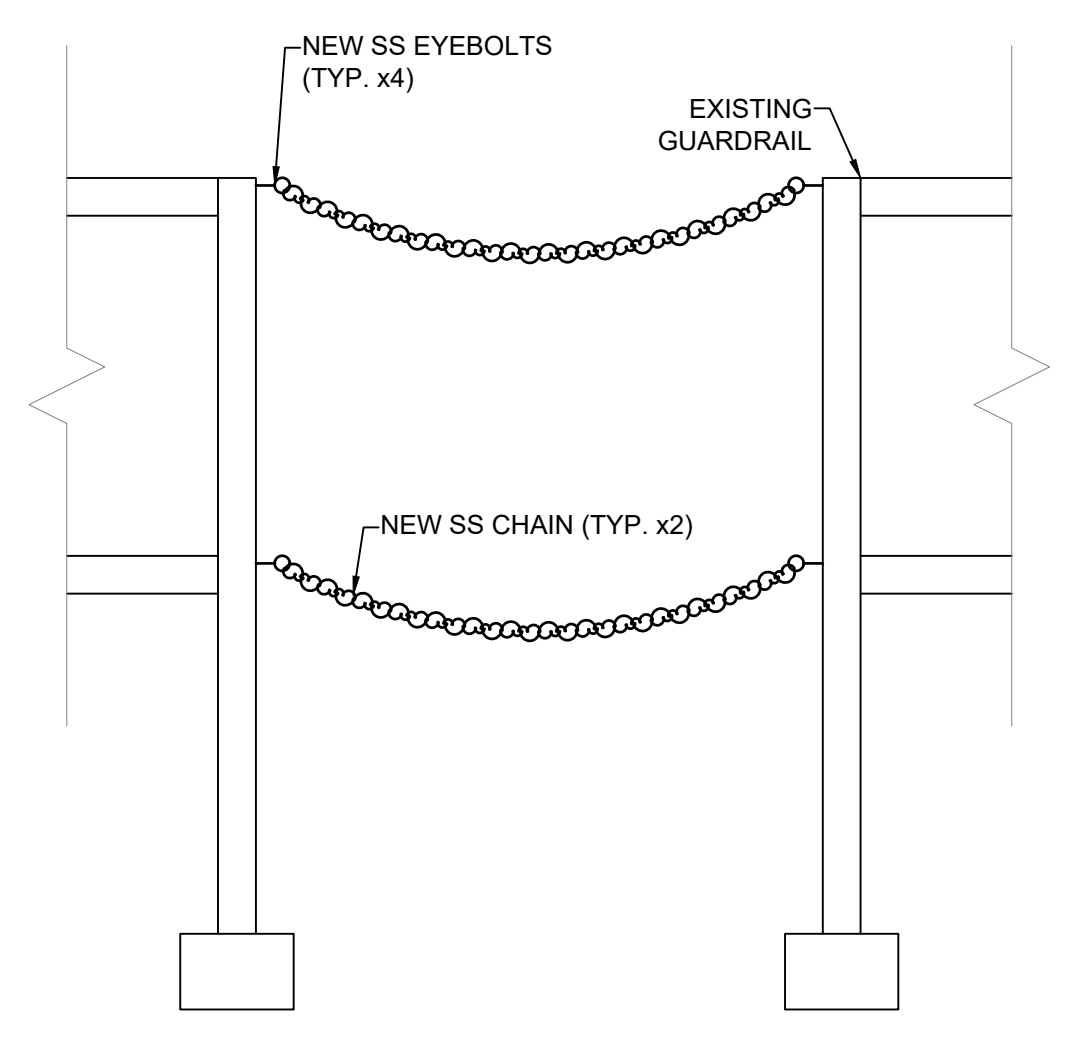
DRAWING No. M03
FILE No. 422130
SHEET No. 14 OF 17



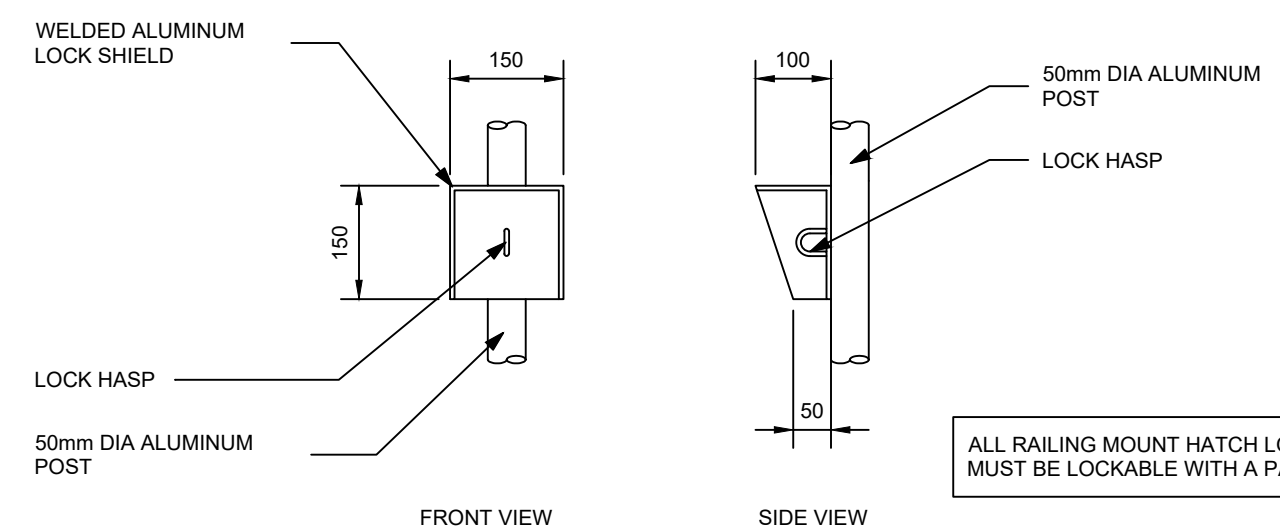
RAILING MOUNT HATCH LOCKING SYSTEM
N.T.S.



WALL BRACKET PIPE SUPPORT DETAIL (1 PIPE)
N.T.S.

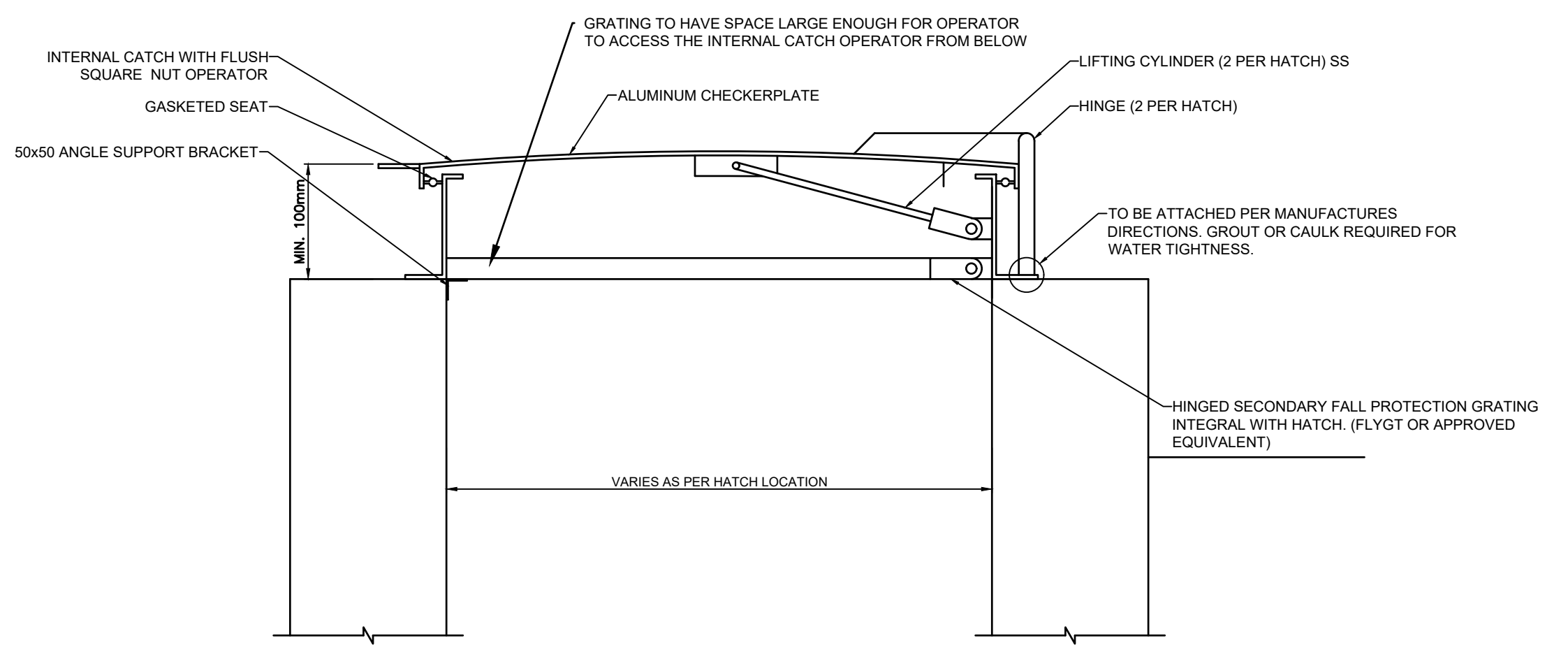


CHAIN MODIFICATION
N.T.S.

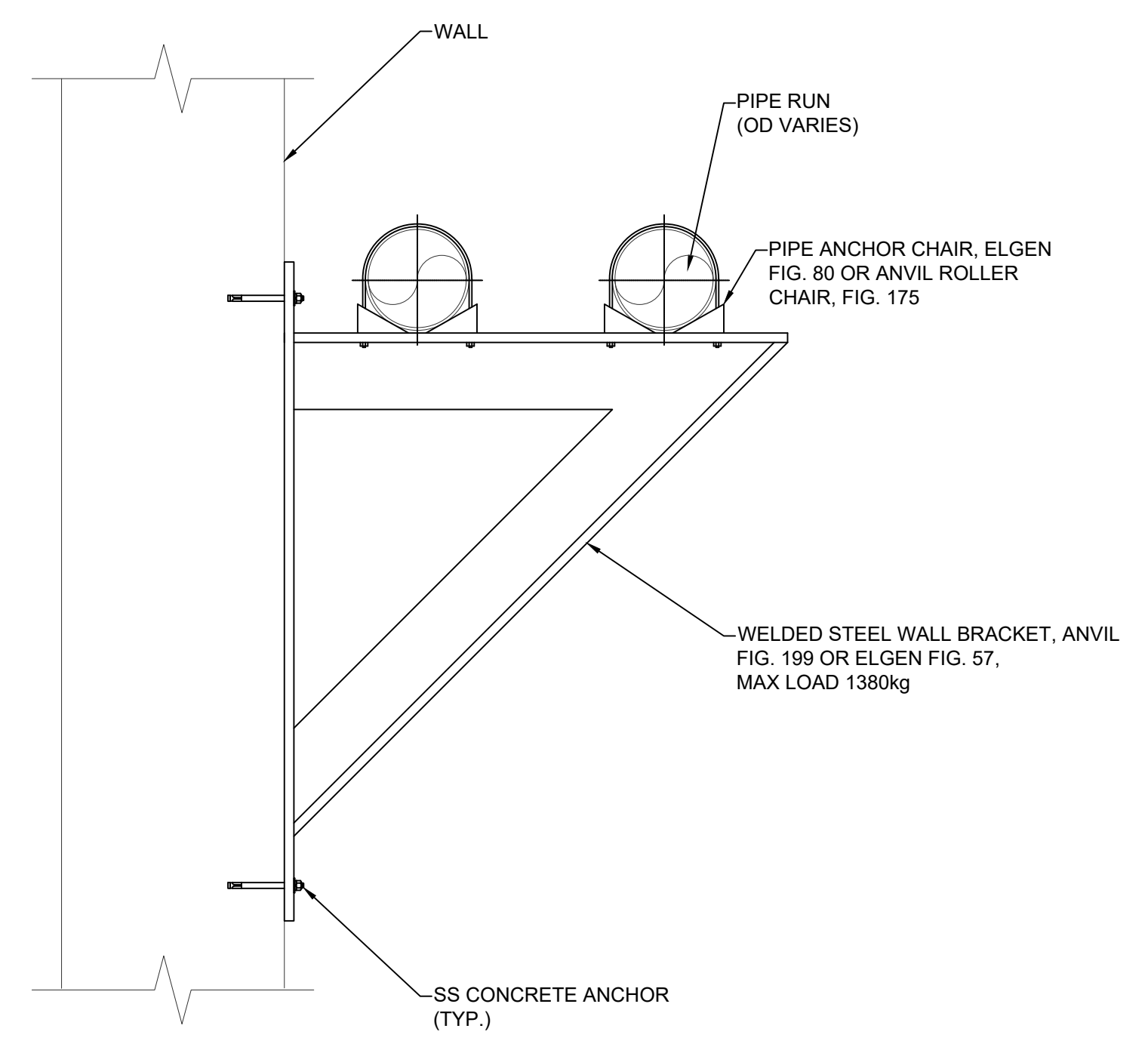


LOCK SHIELD DETAIL
N.T.S.

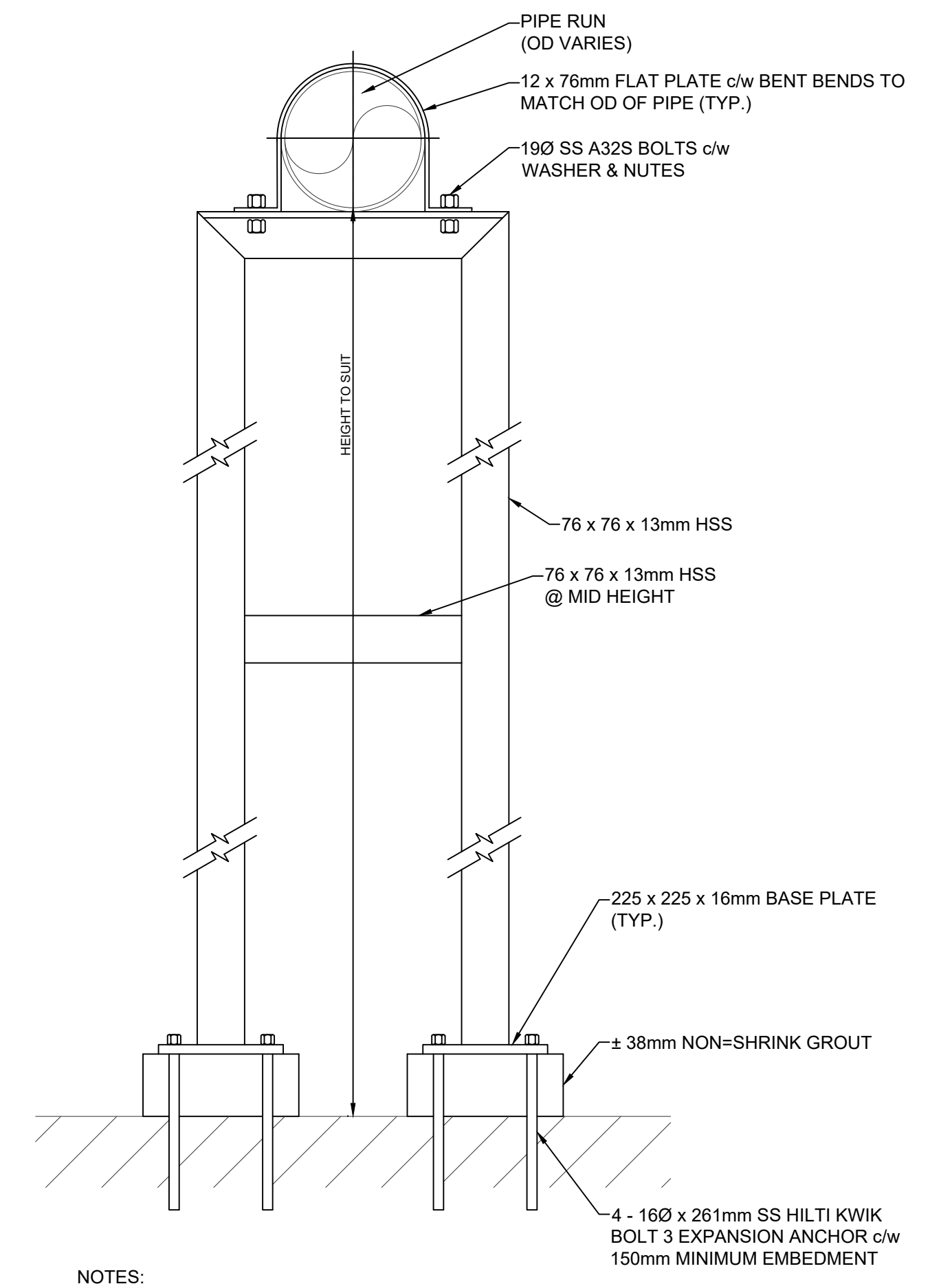
ALL RAILING MOUNT HATCH LOCKING SYSTEMS MUST BE LOCKABLE WITH A PADLOCK



ACCESS HATCH DETAIL
N.T.S.



WALL BRACKET PIPE SUPPORT DETAIL (2 PIPES)
N.T.S.



FLOOR BRACKET PIPE SUPPORT DETAIL
N.T.S.

- NOTES:**
- HOT DIP GALVANIZE AFTER FABRICATION.
 - USE ROLLER FOR ALL PIPE LINES WHERE LONGITUDINAL MOVEMENT DUE TO EXPANSION AND CONTRACTION WILL OCCUR. REVIEW PIPE ANCHOR LOCATIONS WITH ENGINEER.
 - DIMENSIONS OF BRACKET WILL DEPEND ON PIPE SIZE AND OFFSET FROM SUPPORTING STRUCTURE.

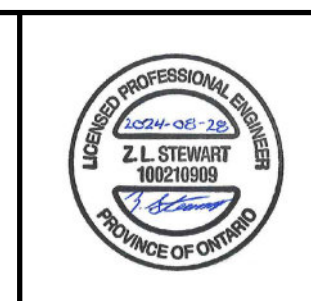
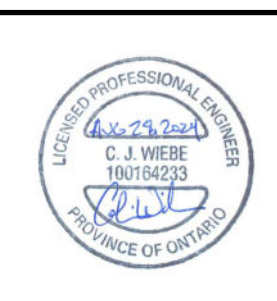
- NOTES:**
- HOT DIP GALVANIZE AFTER FABRICATION.
 - USE ROLLER FOR ALL PIPE LINES WHERE LONGITUDINAL MOVEMENT DUE TO EXPANSION AND CONTRACTION WILL OCCUR. REVIEW PIPE ANCHOR LOCATIONS WITH ENGINEER.
 - DIMENSIONS OF BRACKET WILL DEPEND ON PIPE SIZE AND OFFSET FROM SUPPORTING STRUCTURE.

- NOTES:**
- ALL COMPONENTS SHALL BE STAINLESS STEEL.
 - MIN. 25mm EDGE DISTANCE FOR ALL BOLT HOLES.

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Geodetic Bench Mark Index No. Elevation=

SCALES
AS NOTED



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MECHANICAL DETAILS 1

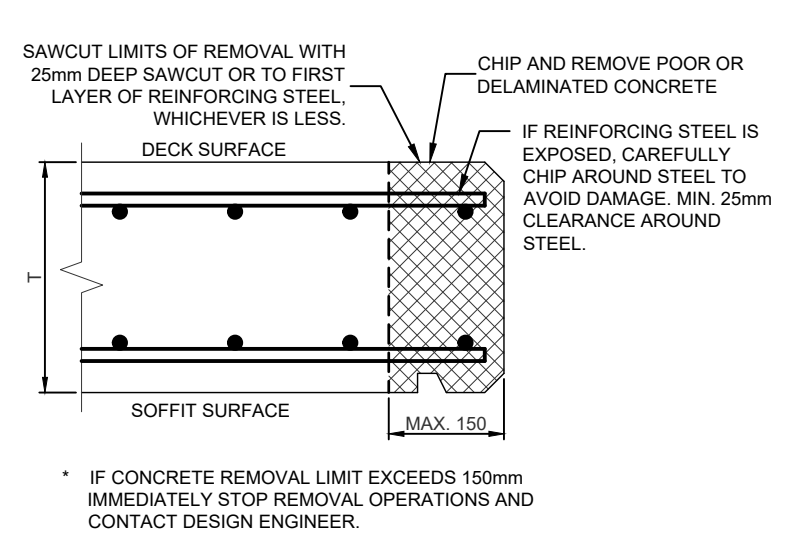
DUNDAS WASTEWATER TREATMENT PLANT (WWTP)
HEALTH AND SAETY IMMEDIATE NEEDS AND
STRUCTURAL REPAIR UPGRADES

M03

DIMENSIONS SHOWN ON THIS PLAN ARE IN MILLIMETERS UNLESS OTHERWISE NOTED

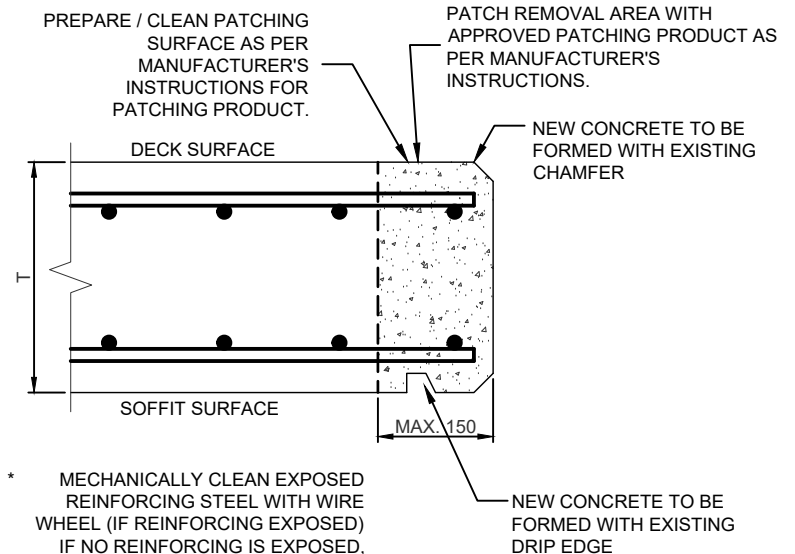
DRAWING No. S01
FILE No. 422130

SHEET No. 15 OF 17

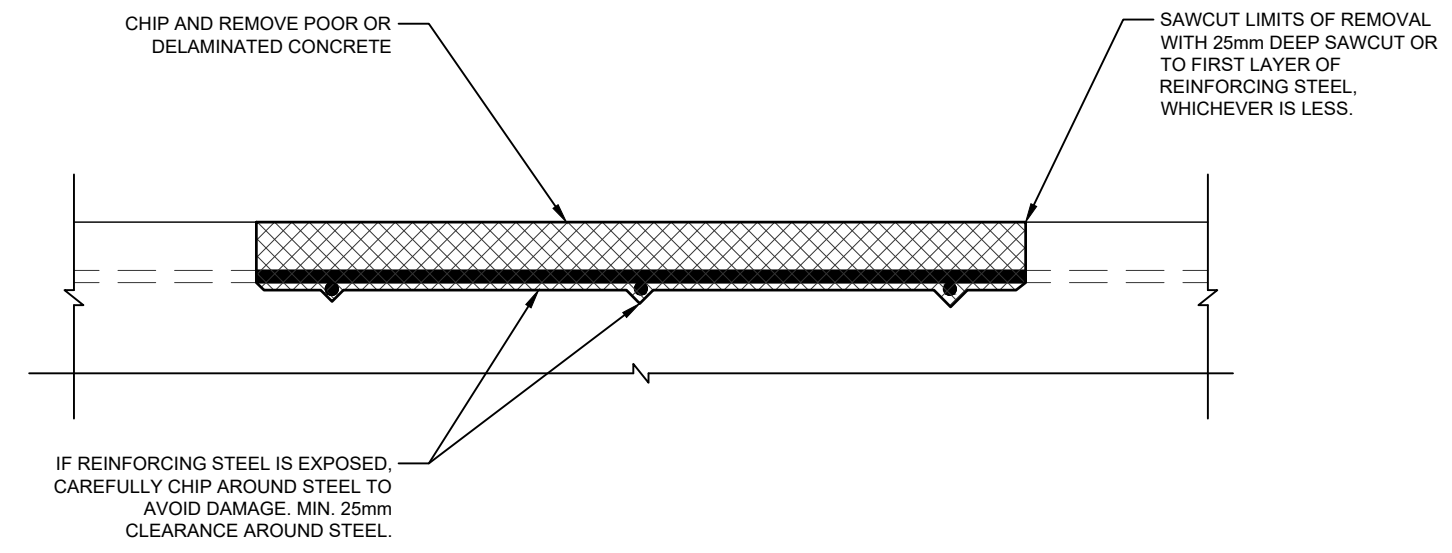


DECK EDGE - REMOVALS
SCALE= 1:10

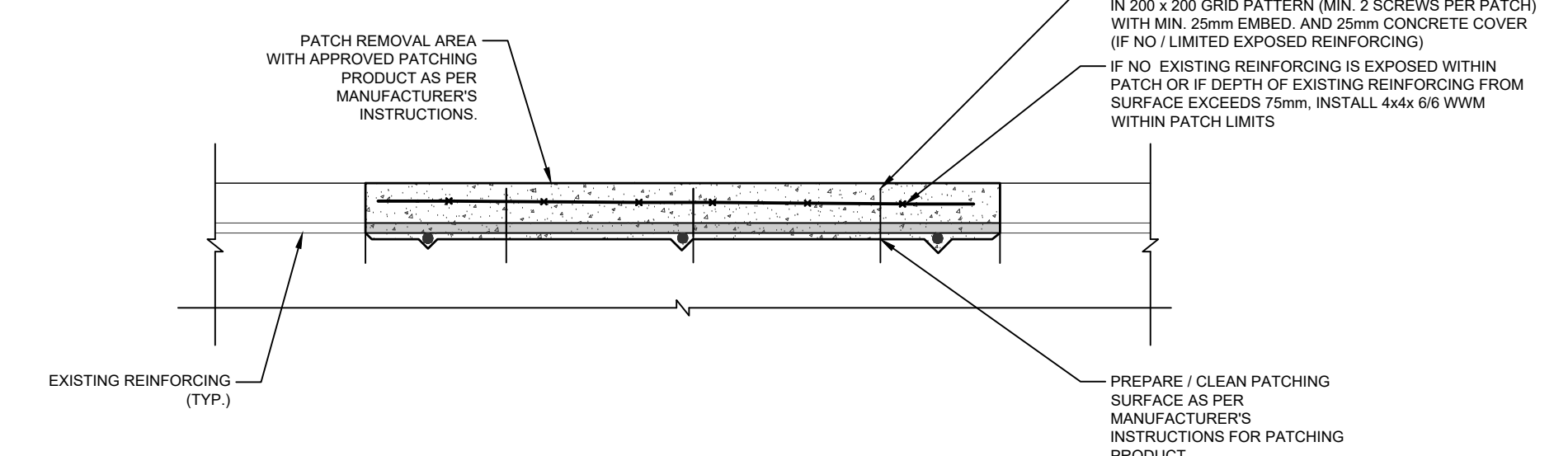
* IF CONCRETE REMOVAL LIMIT EXCEEDS 150mm IMMEDIATELY STOP REMOVAL OPERATIONS AND CONTACT DESIGN ENGINEER.



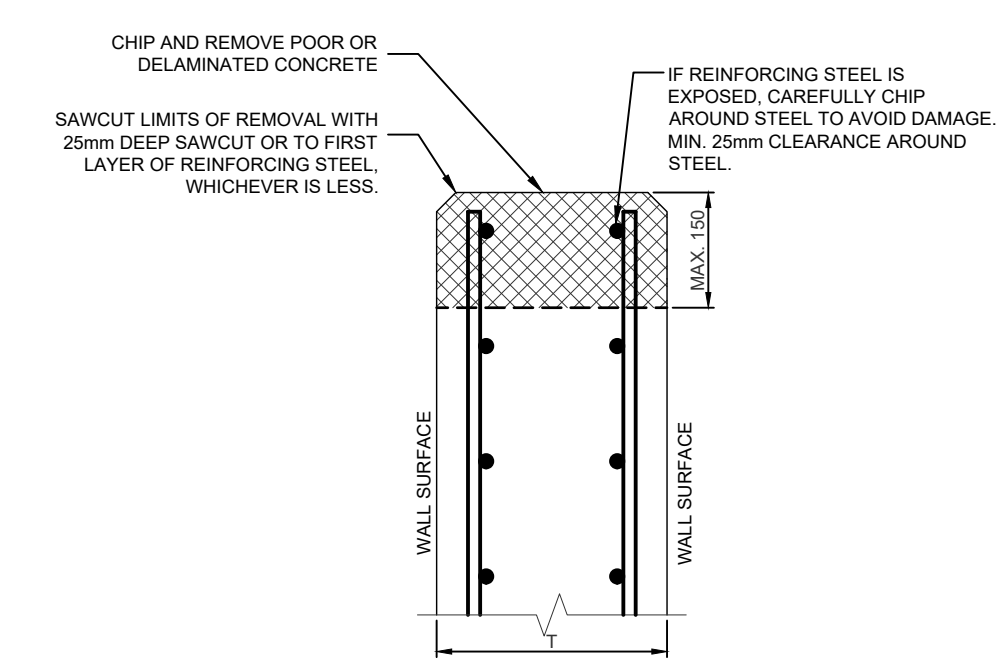
DECK EDGE - REPAIRS
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TYPICAL PARTIAL DEPTH CONCRETE REMOVAL
SCALE= 1:10

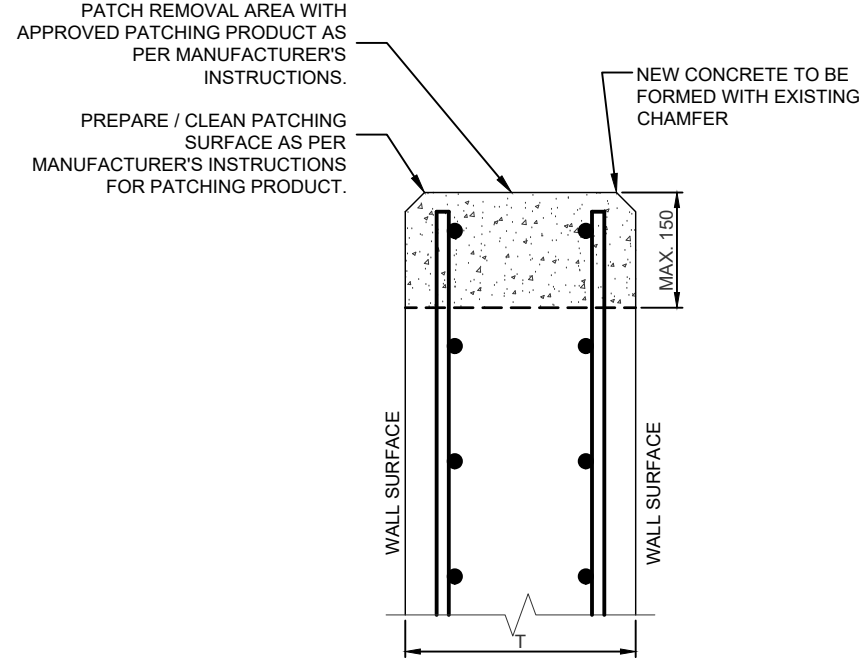


TYPICAL UNFORMED CONCRETE REPAIR HORIZONTAL SURFACE
SCALE= 1:10

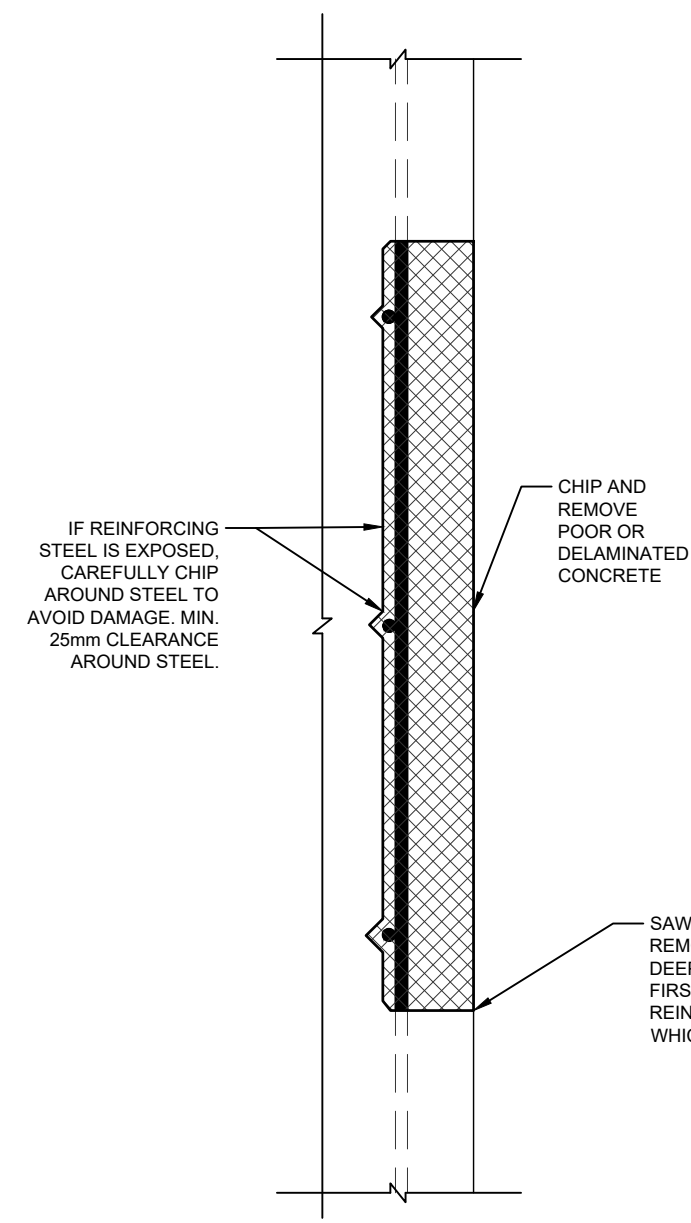


TOP OF WALL - REMOVALS
SCALE= 1:10

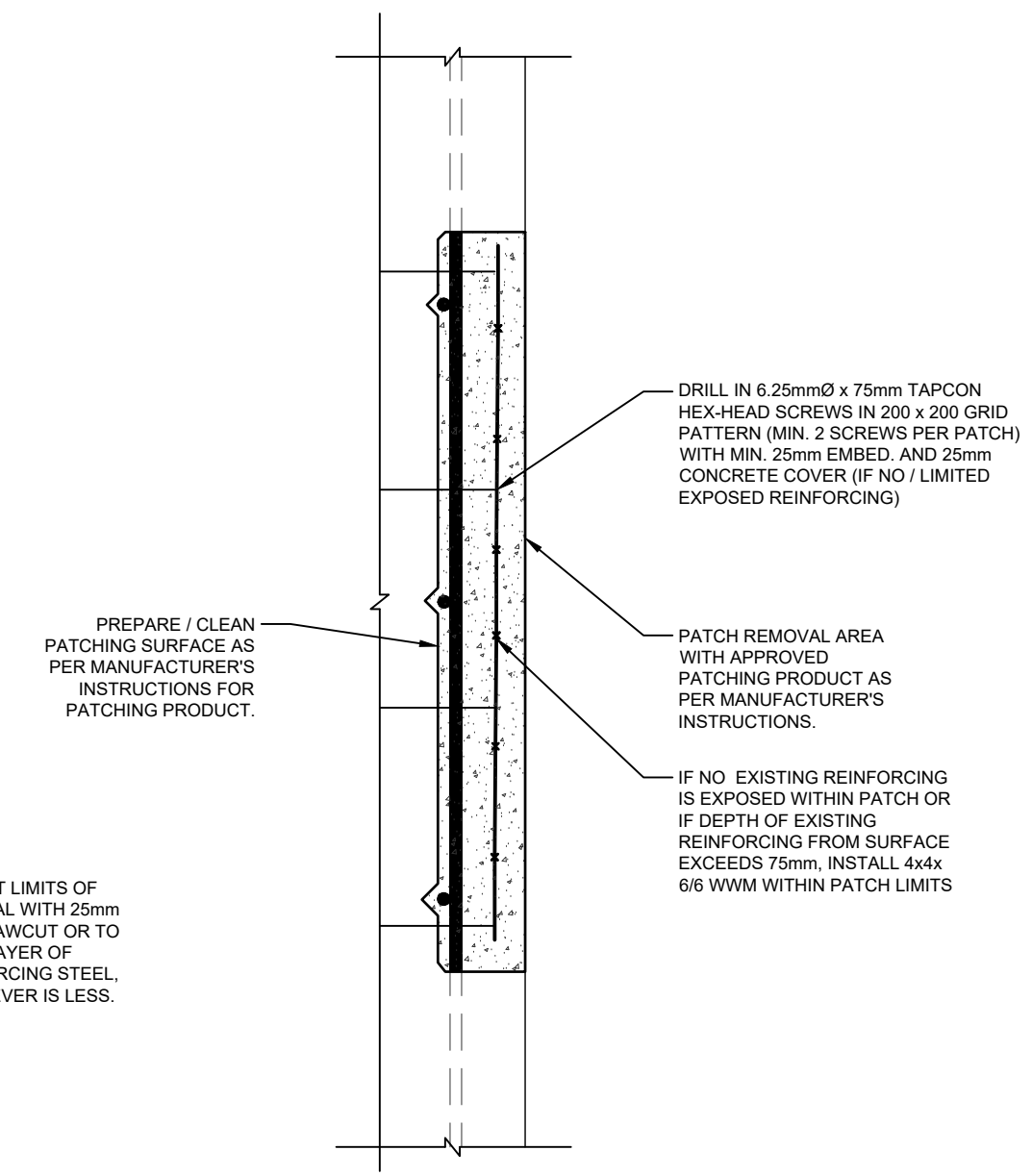
* IF CONCRETE REMOVAL LIMIT EXCEEDS 150mm IMMEDIATELY STOP REMOVAL OPERATIONS AND CONTACT DESIGN ENGINEER.



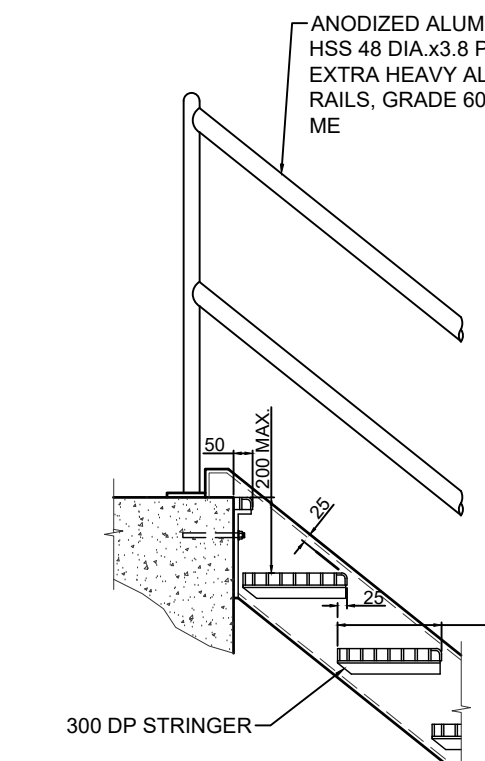
TOP OF WALL - REPAIRS
SCALE= 1:10



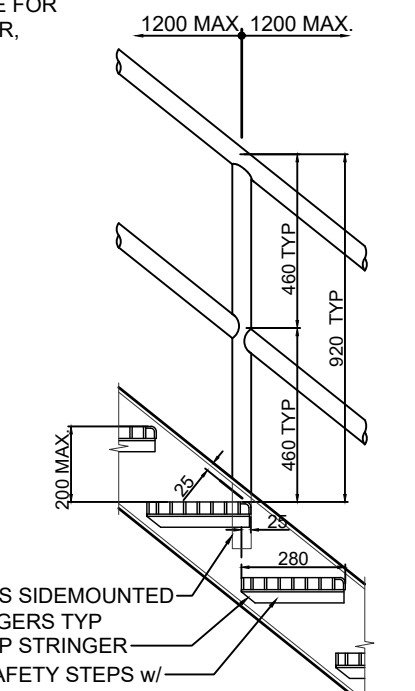
TYPICAL CONCRETE REMOVAL VERTICAL FACE
SCALE= 1:10



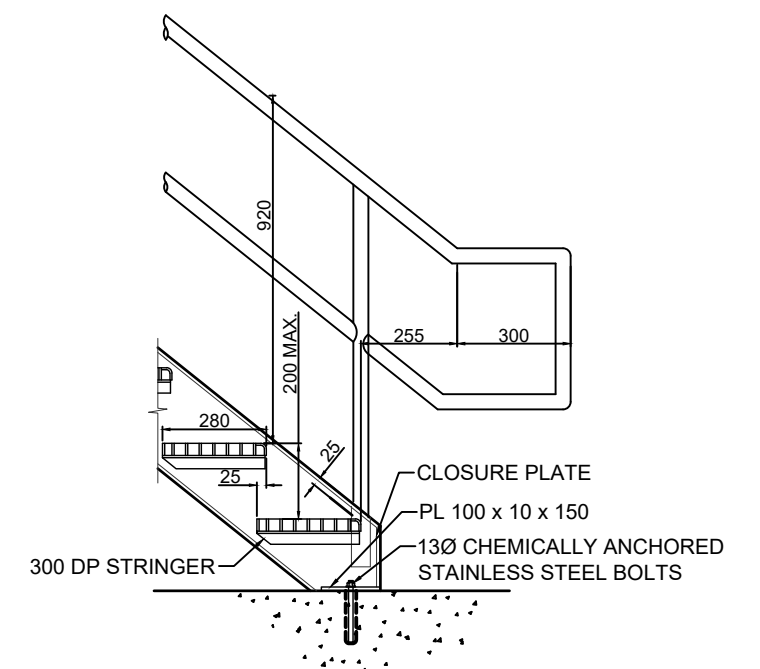
TYPICAL FORMED CONCRETE REPAIR VERTICAL SURFACE
SCALE= 1:10



STAIRCASE DETAIL 1

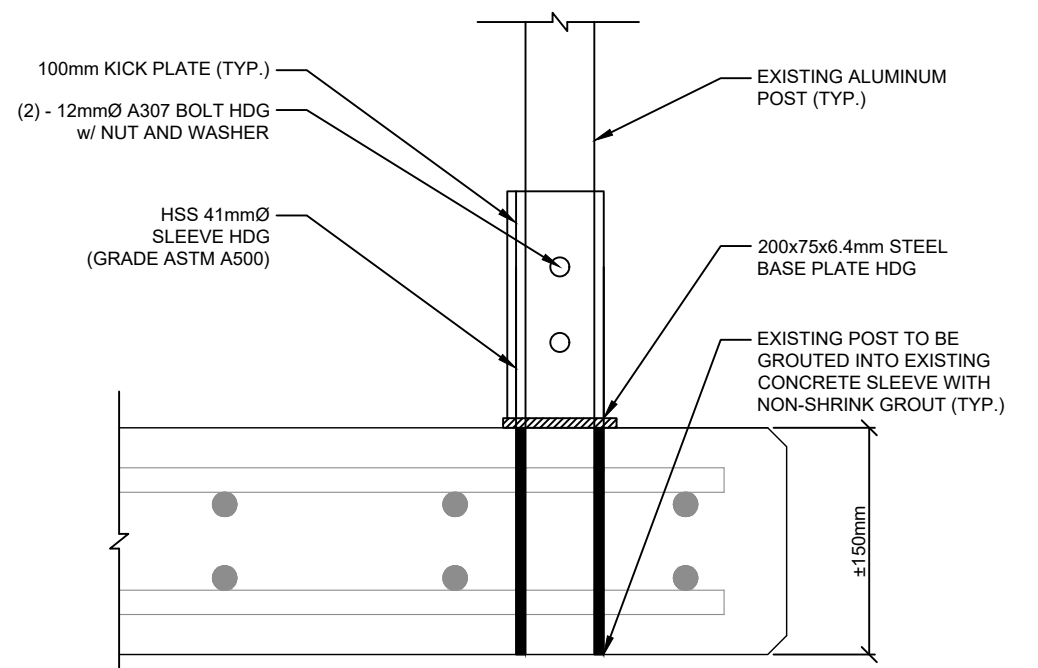


STAIRCASE DETAIL 2

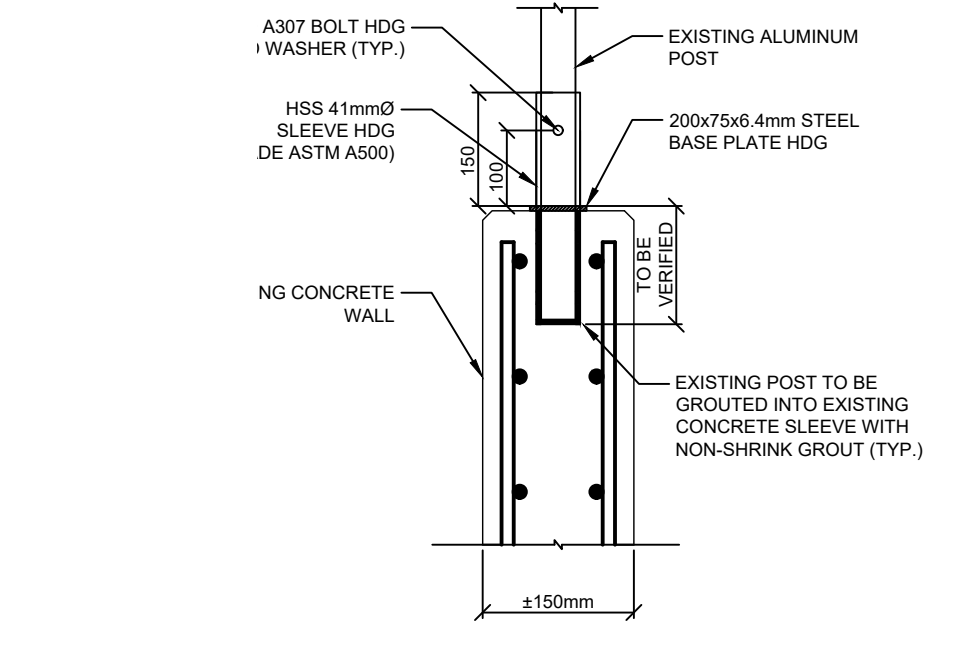


STAIRCASE DETAIL 3

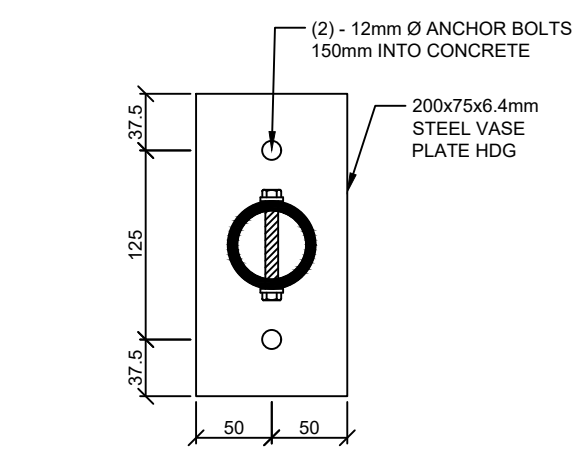
STAIRCASE DETAILS
SCALE=N.T.S



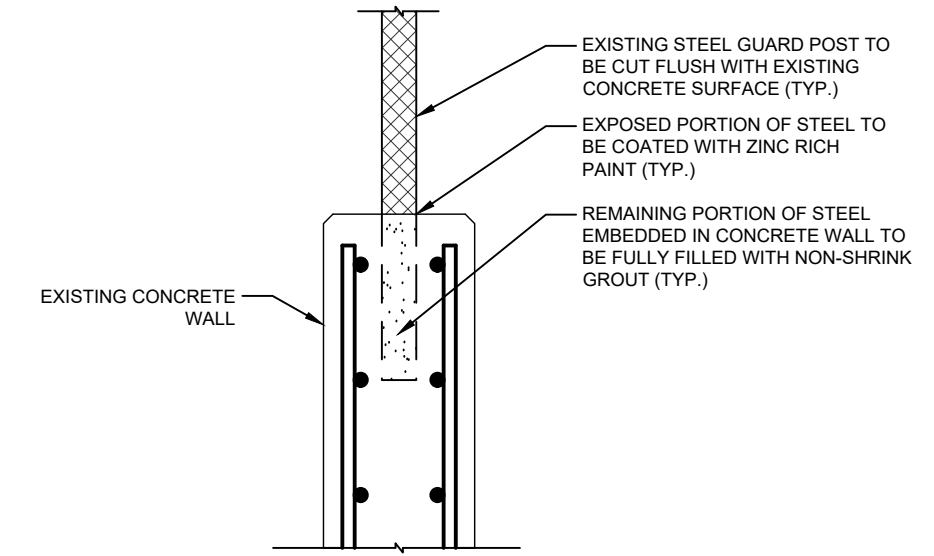
TYPICAL ALUMINUM GUARD STABILIZING PLATE - WALL
SCALE= 1:5



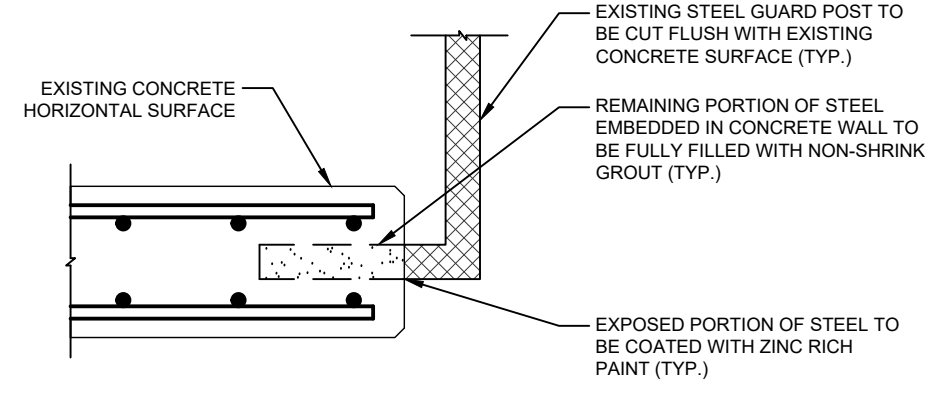
TYPICAL ALUMINUM GUARD STABILIZING PLATE - WALL
SCALE= 1:10



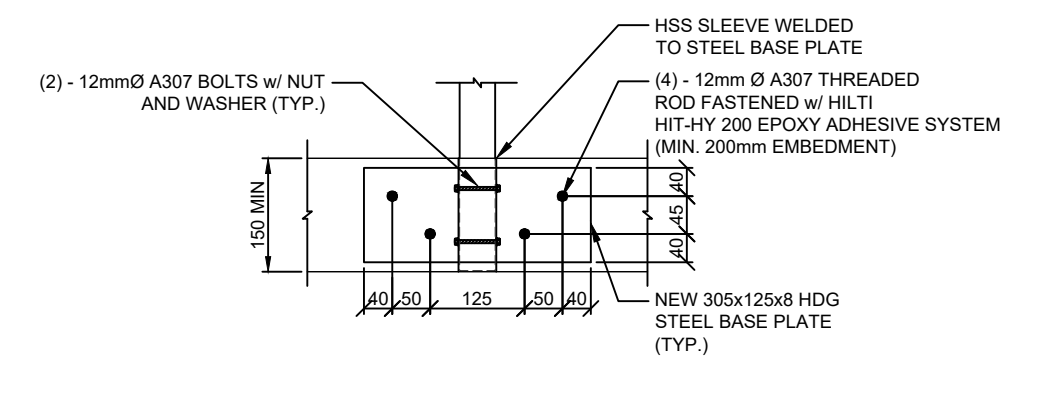
BASE PLATE DETAIL
SCALE= 1:5



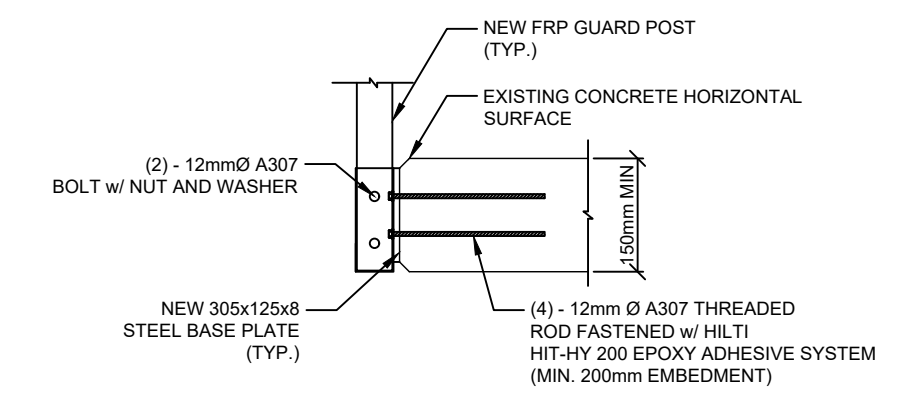
STEEL GUARDRAIL REMOVAL - WALL
SCALE= 1:10



STEEL GUARDRAIL REMOVAL - DECK
SCALE= 1:10



TYPICAL NEW FRP GUARD SYSTEM SIDE MOUNT CONNECTION
SCALE= 1:10

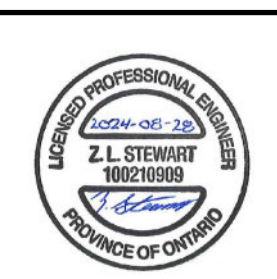


TYPICAL FRP TOP MOUNT BASE PLATE DETAIL
N.T.S

No.	REVISIONS	INITIAL	DATE	DRAWN BY:	AM/CP	DATE:
1.	PRELIMINARY DESIGN	W.H	31/01/23			August 28, 2024
2.	ISSUED FOR 60% REVIEW	W.H	08/08/23	CHECKED BY:	WH	DATE: August 28, 2024
3.	ISSUED FOR 90% REVIEW	W.H	27/09/23	APPROVED BY:	CW/ZS	DATE: August 28, 2024
4.	RE-ISSUED FOR 90% REVIEW	W.H	11/10/23			
5.	ISSUED FOR TENDER	W.H	28/08/24			

Geodetic Bench Mark Index No. Elevations=

SCALES
AS NOTED



STRUCTURAL DETAILS

DUNDAS WASTEWATER TREATMENT PLANT (WWTP) HEALTH AND SAETY IMMEDIATE NEEDS AND STRUCTURAL REPAIR UPGRADES

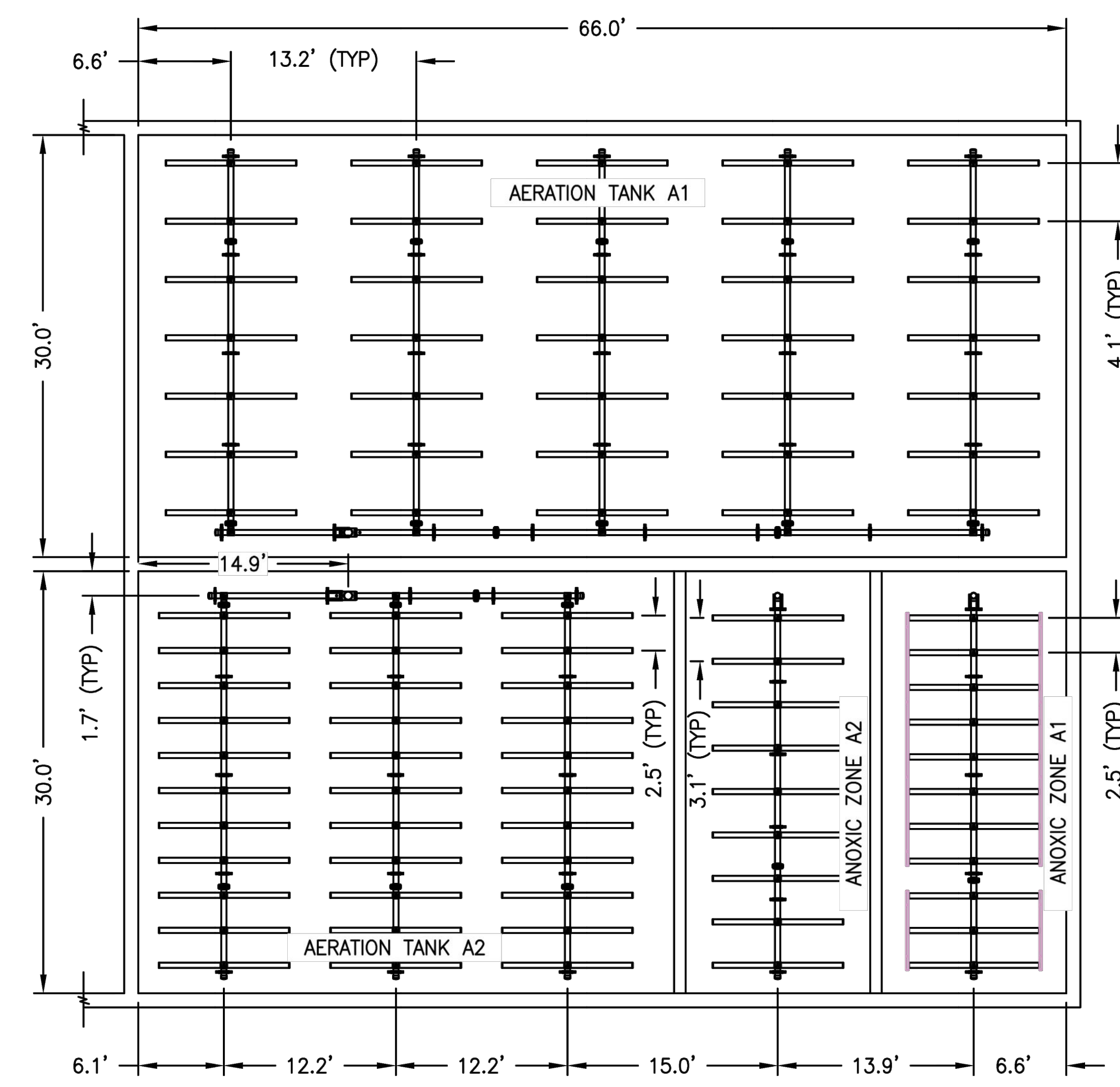
S01

- AERATION TANK A1**
- 6" 304 SS SCH5 DROP
 - 6" X 4" PVC SCH40 SUBHEADER
 - 4" PVC SCH40 LATERALS
 - 304 SS PIPE SUPPORTS
 - 35 FLEXAIR MP3 MINIPANEL DIFFUSER ASSEMBLIES
 - PURGE SYSTEM

- AERATION TANK A2**
- 6" 304 SS SCH5 DROP
 - 6" X 4" PVC SCH40 SUBHEADER
 - 4" PVC SCH40 LATERALS
 - 304 SS PIPE SUPPORTS
 - 33 FLEXAIR MP3 MINIPANEL DIFFUSER ASSEMBLIES
 - PURGE SYSTEM

- ANOXIC ZONE A1**
- 4" 304 SS SCH10 DROP
 - 4" PVC SCH40 LATERALS
 - FRP DIFFUSER SUPPORTS
 - 304 SS PIPE SUPPORTS
 - 11 FLEXAIR MP3 MINIPANEL DIFFUSER ASSEMBLIES
 - PURGE SYSTEM

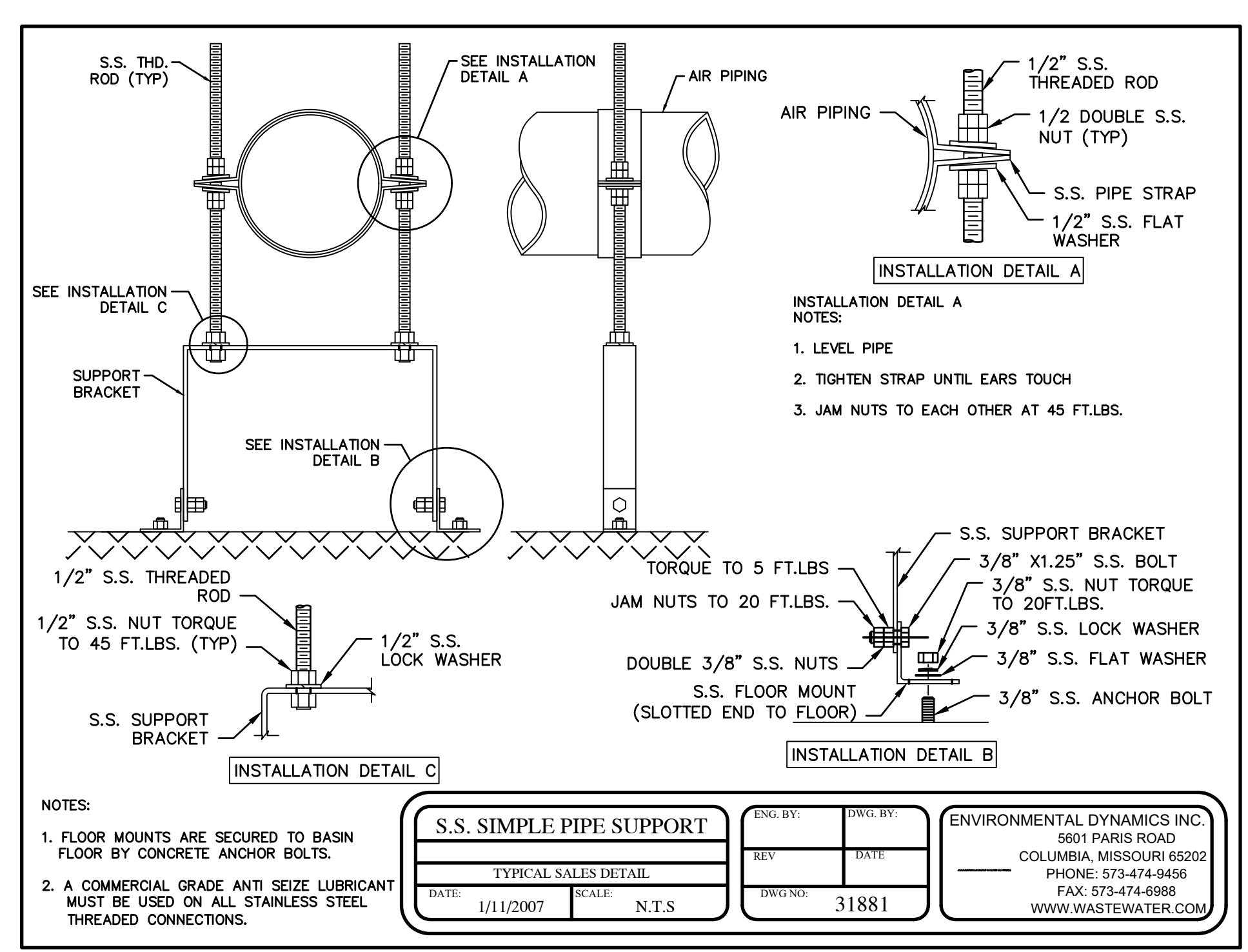
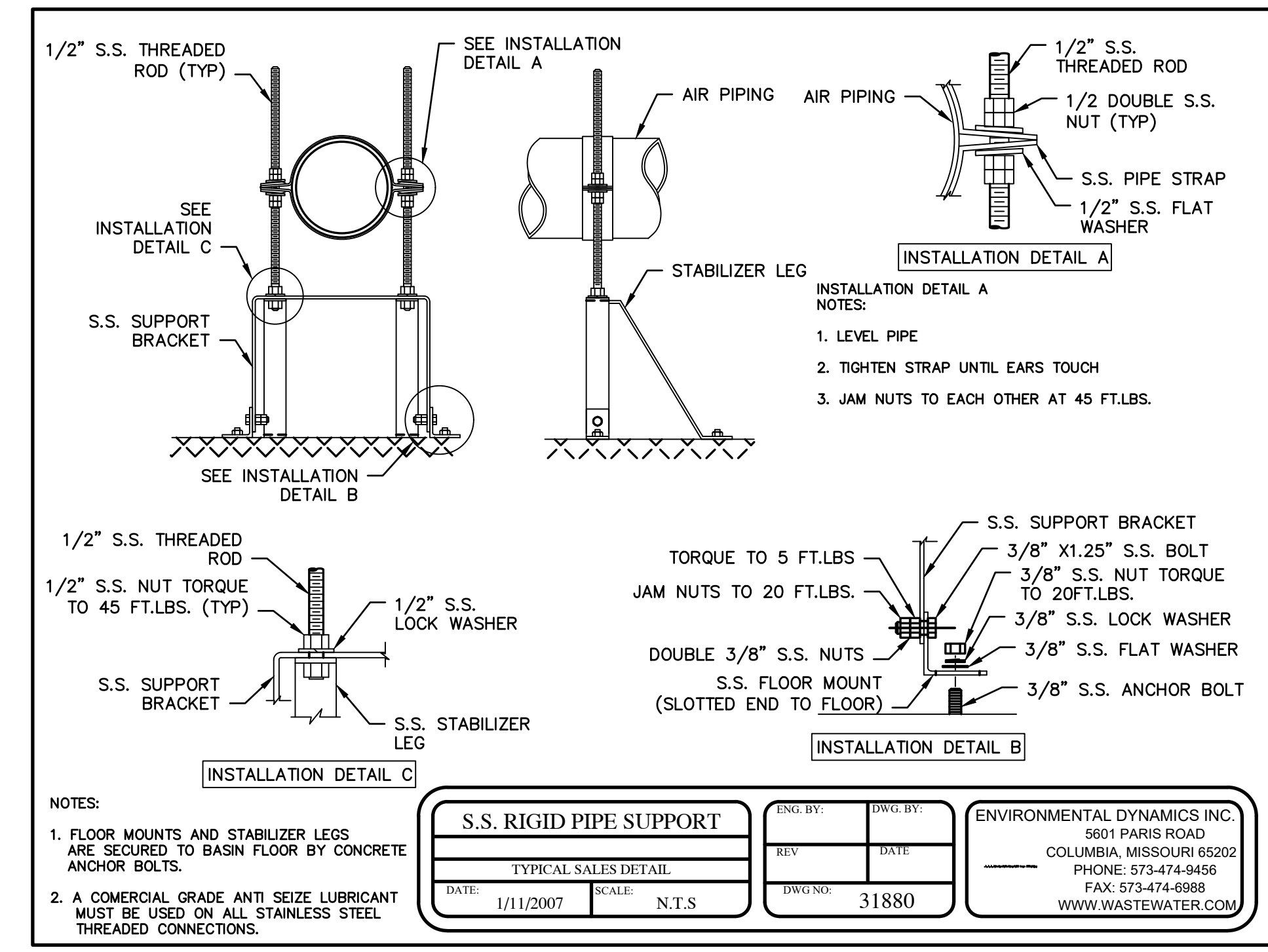
- ANOXIC ZONE A2**
- 4" 304 SS SCH10 DROP
 - 4" PVC SCH40 LATERALS
 - 304 SS PIPE SUPPORTS
 - 9 FLEXAIR MP3 MINIPANEL DIFFUSER ASSEMBLIES
 - PURGE SYSTEM



- NOTES:**
- SIDE WATER DEPTH IS 15.10 FT. DIFFUSER DEPTH IS 13.75 FT.
 - TOTAL= 88 FLEXAIR MP3 MINIPANEL DIFFUSER ASSEMBLIES.
 - 1 OF 1 BASINS SHOWN.

TITLE HAMILTON, ON		FOR: DF	<p>ENVIRONMENTAL DYNAMICS INT'L 5601 PARIS ROAD COLUMBIA, MISSOURI 65202 PHONE: 573-474-9456 FAX: 573-474-6988 WWW.WASTEWATER.COM</p>	REV.	DATE
DESCRIPTION: DUNDAS, WWTP		BY: KPR			
EDI FLEXAIR® AERATION-MIXING SYSTEM		DATE: 5/19/2023			
PROJECT ID: CD13758	SHEET NO: 1 OF 2	DWG NO: 169270		SCALE: N.T.S.	

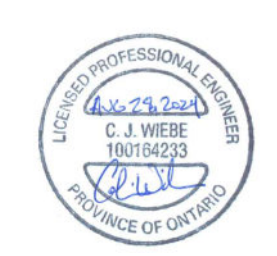
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No.	REVISIONS	INITIAL	DATE	DRAWN BY:	AM/CP	DATE:
1.	PRELIMINARY DESIGN	W.H	31/01/23			August 28, 2024
2.	ISSUED FOR 80% REVIEW	W.H	08/08/23	CHECKED BY:	WH	DATE: August 28, 2024
3.	ISSUED FOR 90% REVIEW	W.H	27/09/23	APPROVED BY:	CW	DATE: August 28, 2024
4.	RE-ISSUED FOR 90% REVIEW	W.H	11/10/23			
5.	ISSUED FOR TENDER	W.H	28/08/24			

Geodetic Bench Mark Index No. Elevations=

SCALES
AS NOTED

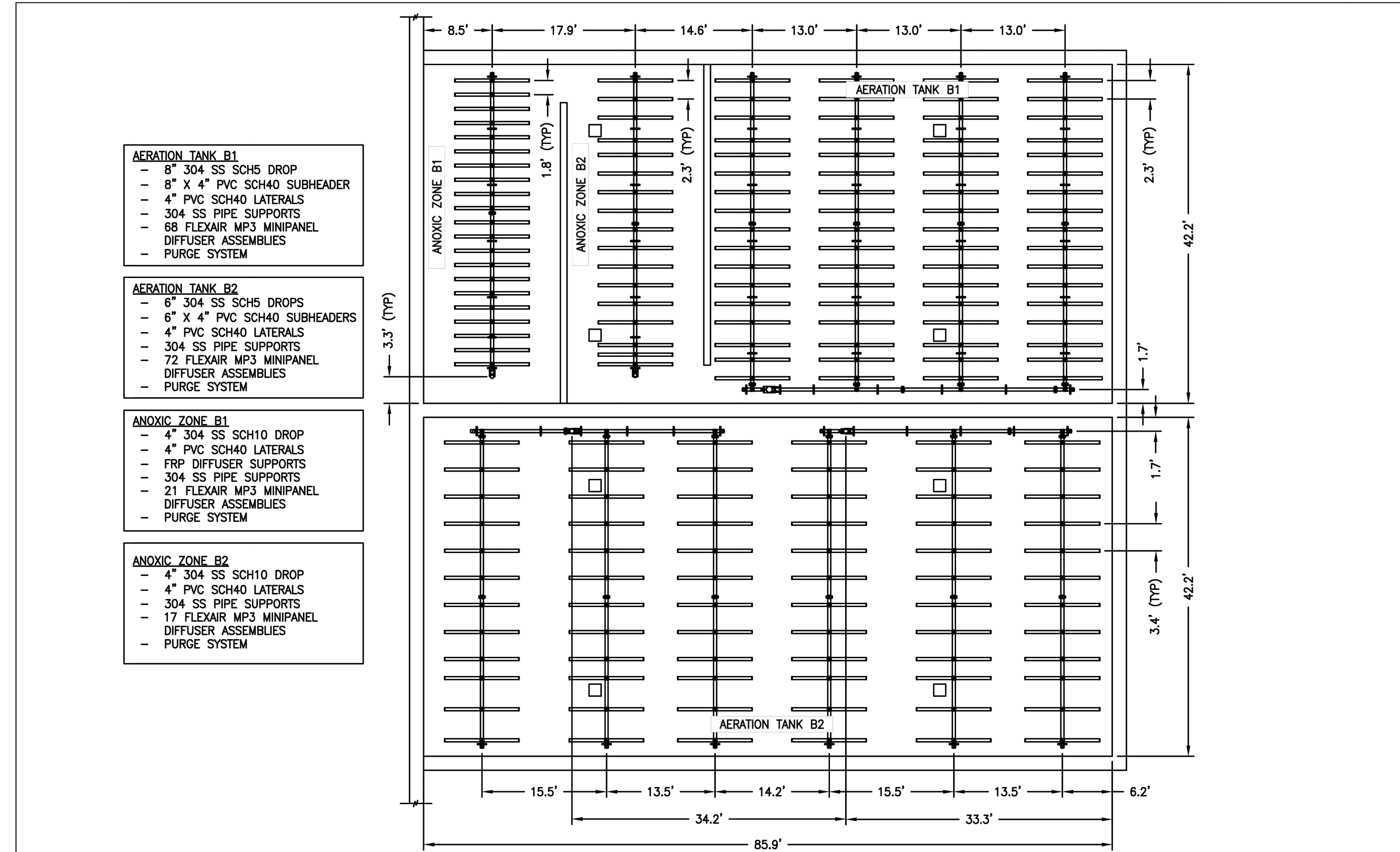


PLANT A DIFFUSER UPGRADES
DUNDAS WASTEWATER TREATMENT PLANT (WWTP)
HEALTH AND SAETY IMMEDIATE NEEDS AND STRUCTURAL REPAIR UPGRADES

DIMENSIONS SHOWN ON THIS PLAN ARE IN MILLIMETERS UNLESS OTHERWISE NOTED

DRAWING No. P02
FILE No. 422130

SHEET No. 17 OF 17



- AERATION TANK B1**
- 8" 304 SS SCH5 DROP
 - 8" X 4" PVC SCH40 SUBHEADER
 - 4" PVC SCH40 LATERALS
 - 304 SS PIPE SUPPORTS
 - 68 FLEXAIR MP3 MINIPANEL DIFFUSER ASSEMBLIES
 - PURGE SYSTEM

- AERATION TANK B2**
- 6" 304 SS SCH5 DROPS
 - 6" X 4" PVC SCH40 SUBHEADERS
 - 4" PVC SCH40 LATERALS
 - 304 SS PIPE SUPPORTS
 - 72 FLEXAIR MP3 MINIPANEL DIFFUSER ASSEMBLIES
 - PURGE SYSTEM

- ANOXIC_ZONE B1**
- 4" 304 SS SCH10 DROP
 - 4" PVC SCH40 LATERALS
 - FRP DIFFUSER SUPPORTS
 - 304 SS PIPE SUPPORTS
 - 21 FLEXAIR MP3 MINIPANEL DIFFUSER ASSEMBLIES
 - PURGE SYSTEM

- ANOXIC_ZONE B2**
- 4" 304 SS SCH10 DROP
 - 4" PVC SCH40 LATERALS
 - 304 SS PIPE SUPPORTS
 - 17 FLEXAIR MP3 MINIPANEL DIFFUSER ASSEMBLIES
 - PURGE SYSTEM

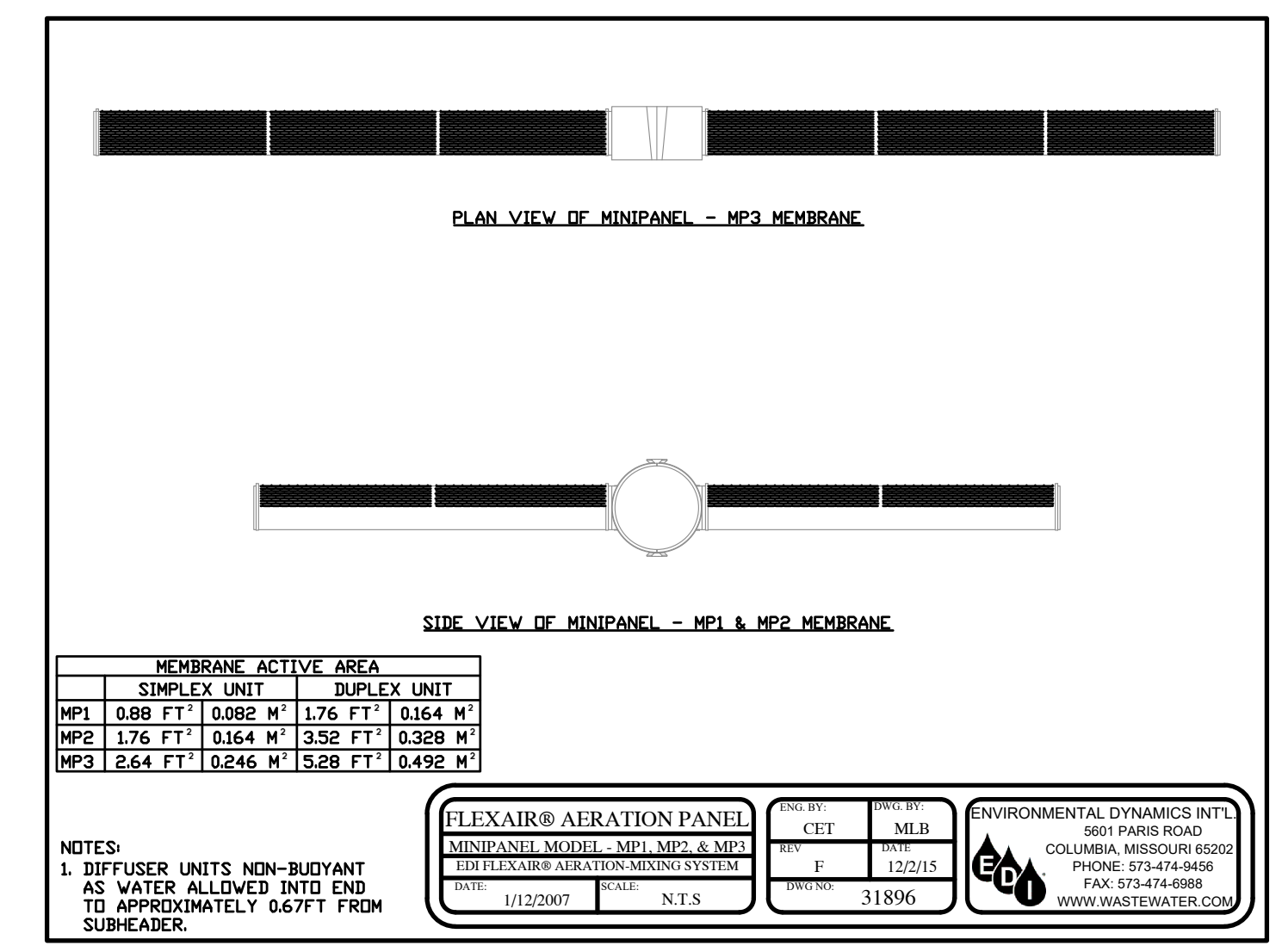
- NOTES:
- SIDE WATER DEPTH IS 15.10 FT. DIFFUSER DEPTH IS 13.75 FT.
 - TOTAL= 178 FLEXAIR MP3 MINIPANEL DIFFUSER ASSEMBLIES.
 - 1 OF 1 BASINS SHOWN.

TITLE HAMILTON, ON		
DESCRIPTION: DUNDAS, WWTP		
EDI FLEXAIR® AERATION-MIXING SYSTEM		
PROJECT ID: CD13758	SHEET NO: 2 OF 2	DWG NO: 169270

FOR: DF
BY: KPR
DATE: 5/19/2023
SCALE: N.T.S.

ENVIRONMENTAL DYNAMICS INT'L
5601 PARIS ROAD
COLUMBIA, MISSOURI 65202
PHONE: 573-474-9456
FAX: 573-474-6988
WWW.WASTEWATER.COM

REV.	DATE



FLEXAIR® AERATION PANEL
MINIPANEL MODEL - MP1, MP2 & MP3
FOR FLEXAIR® AERATION-MIXING SYSTEM

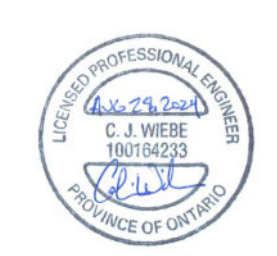
DATE: 11/2/2007 SCALE: N.T.S. REVISED: 3/18/06

ENVIRONMENTAL DYNAMICS INT'L
5601 PARIS ROAD
COLUMBIA, MISSOURI 65202
PHONE: 573-474-9456
FAX: 573-474-6988
WWW.WASTEWATER.COM

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3.	ISSUED FOR 90% REVIEW	W.H	27/09/23	APPROVED BY:	CW	DATE: August 28, 2024
4.	RE-ISSUED FOR 90% REVIEW	W.H	11/10/23			
5.	ISSUED FOR TENDER	W.H	28/08/24			

SCALES
AS NOTED



CITY OF HAMILTON
Public Works Department

PLANT B DIFFUSER UPGRADES
DUNDAS WASTEWATER TREATMENT PLANT (WWTP)
HEALTH AND SAETY IMMEDIATE NEEDS AND
STRUCTURAL REPAIR UPGRADES

C13-32-24 - Prequalified Contractor Required for the Dundas Wastewater Treatment Plant (WWTP) Health and Safety Immediate Needs and Structural Repair Upgrades

Opening Date: December 4, 2024 4:00 PM

Closing Date: January 24, 2025 3:00 PM

***** IMPORTANT *****

Bidders are advised to review and confirm their bids&tenders™ vendor account is set up in the bidder's correct LEGAL name.

This name must exactly match the name on all documentation required of the Successful Bidder, eg; insurance certificate, WSIB certificate.

Schedule of Prices

* Denotes a "MANDATORY" field

Do not enter \$0.00 dollars unless you are providing the line item at zero dollars to the City of Hamilton (unless otherwise specified).

If the line item and/or table is "NON-MANDATORY" and you are not bidding on it, leave the table and/or line item blank. Do not enter a \$0.00 dollar value.

Cost of Work

Line Item No.	Description	Lump Sum Price *
1	Cost of Work excluding Provisional Items and Contingency Allowance	
Subtotal:		

Provisional Items

Line Item No.	Description	Unit of Measure	Est'd Qty	Unit Price *
4.1	Removal, safe disposal and replacement of existing expansion joint per the inlet channel west of the Plant B Primary Clarifier building. As indicated in the Specifications Section 01100 Summary of Work	Lump Sum	1	
4.2	Additional Vacuum Truck Services including haulage and disposal. As directed by the Engineer. Over and above what is specified in the Specifications Section 01100 Summary of Work.	Hours	200	
Subtotal:				

Contingency Allowance

Line Item No.	Description	Lump Sum Price
1	Contingency Allowance	\$485,000.0000
Subtotal:		

Summary Table

Bid Form	Amount
Cost of Work	
Provisional Items	
Contingency Allowance	\$ 485,000.00
Total Contract Price:	

Specifications

Bidder's Business Structure

The City of Hamilton reserves the right to verify the business name and structure of the bidder, whether or not this section is completed, to ensure that the bidder is an existing legal entity. If the bidder is not an existing legal entity, the Bid will be rejected.

Business Structure of Bidder *	If 'Corporation' Selected, Specify Where Incorporated:	If 'Other' Selected, Specify Business Structure:	Registered Business Name of Bidder (if applicable):
Select A Value ▾			

Documents

It is your responsibility to ensure the uploaded file(s) is/are not defective or corrupted and are able to be opened and viewed by the City. If the attached file(s) cannot be opened or viewed, your Bid shall be rejected.

BONDING UPLOAD SECTION

Each Bid submission must be accompanied by a **digital** bid bond.

The City will only accept submissions that include the bid bond in an electronically verifiable and enforceable (e-Bond) format.

A scanned PDF copy of the bond is not acceptable.

Instruction: After uploading the bid bond, ensure the uploaded bid bond is electronically verifiable and enforceable prior to submission of this Bid.

For additional information on Bid Security refer to the Request for Tenders document.

- Bid Bond * (mandatory)

Form of Tender

The bidder hereby acknowledges and agrees:

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 Tenders documents, hereby tenders and offers to furnish all material, labour, service, equipment, scaffolding and all incidentals, and to render all services and pay all applicable customs duties and 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 Tenders documents provided to the bidder by the City (receipt of which is hereby acknowledged) for the Base Bid Price (which is included in the "Contract Price" in the CCDC 2 – 2020 Stipulated Price Contract).

2. Base Bid Price

I/We confirm all prices provided in this Bid:

- are in Canadian funds
- include Provisional Items, if applicable
- include contingency allowances, if applicable
- include cash allowances, if applicable
- do not include Value Added Taxes

Any Value Added Taxes payable are for the account of the City and are in addition to the Base Bid Price stated in the Schedule of Prices.

I/We understand that if this Request for Tenders contains a contingency allowance, Provisional Item(s) or cash allowances, I/we are not entitled to payment thereof except for the extra or additional work carried out by me/us, as directed by the City and in accordance with the Contract and only to the extent of such extra or additional work and payment approved by the City.

3. Addenda

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

4. Commencement and Completion

If awarded the Request for Tenders, I/we agree and undertake that:

- I/We will provide all necessary documents required as set forth prior to the commencement of the Work.
- I/We will commence the Work following receipt of a notice to proceed and otherwise in accordance with the Contract. I/We agree to have the Works "substantially performed" as described in the Construction Act (Ontario) and in accordance with the requirements set out in the Contract.
- in the event that I/we fail to perform the Contract as provided, I/we understand and agree that I/we shall be liable to liquidated damages and other remedies as specified in the contract documents.

5. Contract

I/We understand and agree that a binding contract shall come into being upon acceptance of this Bid by the City and the award of the Request for Tenders to me/us. The subsequent execution of the Contract for the Work is a formality and not a condition precedent to the existence of a binding contract.

6. Occupational Health and Safety

I/We understand and agree 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 of Hamilton 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 shall be appropriately trained, licensed and certified, as required to perform the Work.

7. Fair Wage Policy and Schedule

I/We agree to comply in all respects with the City of Hamilton's Fair Wage Policy and to be fully responsible for ensuring that all of my/our subcontractors also comply in all respects with said Fair Wage Policy.

8. Execution

If this Bid is accepted by the City and the Request for Tenders is awarded to me/us, I/we agree to provide and pay for the proof of insurance, WSIB clearance certificate, performance of contract security and a labour and material payment bond as required by the contract documents, my/our health & safety manual and any other document identified in the award letter as being required by the City prior to it being able to issue a purchase order, and to execute the Contract, in quadruplicate, all within 10 Business Days after the City has issued its award letter or within such longer time period as the City may specify.

9. Bid Security

I/We have submitted the Bid Security as specified in the Request for Tenders. The Bid Security shall be irrevocable for **90 CALENDAR DAYS** after the closing date and time of the Request for Tenders.

In the event of default or failure on my/our part to execute the Contract as required above and to provide the specified security required under the Request for Tenders and the Contract, I/we agree that the City may at its discretion do one or more of the following: declare the Bid Security forfeited, annul the award or terminate the Contract, accept the next lowest compliant Bid, advertise for new tenders, or carry out the Work in any manner deemed in the best interests of the City. In such a case, if required by the City, I/we shall pay the City the difference between the Base Bid Price and any greater sum that the City may be obligated to pay by reason of that default or failure, including the cost of any advertisement for new tenders.

10. Time Open for Acceptance

I/We agree and confirm that this Bid is irrevocable and is to continue open to acceptance by the City for a period of **90 CALENDAR DAYS** after the closing date and time of the Request for Tenders. The City may at any time within the above **90 CALENDAR DAY** period accept this Bid whether or not any other Bid has previously been accepted, upon notice of acceptance and award in writing to me/us, personally delivered or mailed to me/us by ordinary prepaid mail, to the address provided in the Bid submission, or delivered by fax to the fax number set forth in the Bid submission. Any notice mailed or faxed shall be deemed to have been received on the date mailed or faxed. Any notice personally delivered shall be deemed to have been received on the date the notice is personally delivered.

11. 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 for which this Bid is made. I/We further declare that this Bid is made without any connection, comparison of figures or arrangements with, or knowledge of, any other person making a Bid for the same work and is in all respects fair and without collusion or fraud.

I/We confirm that we comply with Article 12 - Conflict of Interest, Lobbying and Collusion of the Instructions to Bidders and Article 4 – Joint Ventures of the Supplementary Instructions to Bidders.

I/We understand that, without limiting or restricting any other right or privilege of the City, the City may terminate the Contract where the bidder is in contravention with the City's Procurement Policy with respect to conflict of interest or vendor eligibility.

12. Interpretation

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

I/We acknowledge and agree that we have not assumed that any information concerning our operations, business or personnel or any other information required to be provided by 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, we acknowledge and agree that all information to be provided by us is to be complete and full and in such detail as required.

13. Procurement Policy

In submitting a Bid in response to the Request for Tenders, 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>

14. Ontarians with Disabilities Act, 2001 and Accessibility for Ontarians with Disabilities Act, 2005

I/We confirm that I/we and all Subcontractors used on the Work for the City of Hamilton 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>

15. 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 Tenders. 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.

16. Lump Sum Breakdown

I/We understand and agree that after the opening of the Bids, if I/we are one of the two apparent low bidders, if requested by the City we are required to submit to the Tender Coordinator, within two Business Days of the closing date of the Request for Tenders, the document entitled Lump Sum Breakdown of Base Bid Price. The breakdown shall be given on the breakdown pages provided in the Request for Tenders. I/We acknowledge and agree that the City may refuse to accept any breakdown which contains prices considered to be unbalanced and may request me/us to adjust the breakdown to correct such unbalancing, and I/we agree to do so upon such request of the City.

17. Provisional Items

I/We understand and agree that, after the award of the Request for Tenders, the City reserves the right to delete from the Base Bid Price one or more of the items identified in the Schedule of Prices as Provisional Items, without penalty or compensation to the Successful Bidder, for credit at the price shown in the table. All prices are inclusive of all duties and taxes applicable, except for Value Added Taxes.

I/We understand that I/we are required to complete the table in the Schedule of Prices for each Provisional Item listed. I/We understand that failure to do so will result in the rejection of this Bid by the City.

I/We agree that the Unit Prices provided for each Provisional Item include all costs required for complete execution of the item of work, including the bidder's office staff, site supervisory staff, project management costs, clerical and other costs for documentation, materials, labour, equipment, delivery, handling, statutory charges, overhead and profit, other related charges, inclusive of all other duties and taxes applicable, and similar charges on account of such item of work. Unit Prices entered shall exclude all Value Added Taxes.

I/We agree that if the quantity actually required for each item of work is more or less than estimated, the extended price for such item of work will be increased or decreased respectively using the same Unit Price or Lump Sum Price specified in the Schedule of Prices.

I/We agree that these Provisional Items are in addition to the requirements outlined in the Specifications. I/We understand that

if I/we are awarded the Request for Tenders, I/we are not entitled to payment for any Provisional Item except for the extra or additional work carried out by me/us, as directed by the City and in accordance with the Contract and where payment was previously approved by the City.

18. Alternatives

I/We understand and agree that alternatives to specified equipment suppliers and/or equipment in the Request for Tenders will not be considered by the City prior to the award of the Request for Tenders.

19. Electronic Funds Transfer

I/We acknowledge and agree to provide the City with the information required for the City to make payment by EFT.

I/WE agree to be bound by the terms and conditions and have authority to bind the Bidder and submit this Bid on behalf of the Bidder.

Conflict of Interest

Except with the prior express written consent of the City, **prior to submitting this Bid**, vendors are required to notify the City in writing, of any potential conflict of interest that may arise prior to the award of any contract and fully disclose any details thereof. Failure on the part of a vendor to declare a conflict of interest to the City and to obtain the City's prior express written consent to waive the conflict of interest shall result in the vendor being ineligible to Bid and shall form a basis for rejection of a Bid submitted to the City.

Do you have a potential conflict of interest? **Yes** **No**

Acknowledgement of Addenda

The Bidder acknowledges and agrees that any Addenda below form part of the bid document.

Please check the box in the column "**I have reviewed this addendum**" below to acknowledge each of the Addenda.

File Name	I have reviewed the below addendum and attachments (if applicable)	Pages
There have not been any addenda issued for this bid.		