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September 11, 2024
Environment and Protected Areas
111 Twin Atria Building 4999 98 Avenue NW
Edmonton AB T6B 2X3

Electronically to EPA.EPEAapplications@gov.ab.ca
Attention: **Mr. Mohammad M. Rahman, P. Eng.**
**EPEA Team Lead**

Re: Renewal Application for *EPEA* Approval No. 639-03 as amended (Edmonton Wastewater System)

Dear Mr. Rahman,

In accordance with the Environmental Protection and Enhancement Act (EPEA), EPCOR Water Services (EWS) is applying to Environment and Protected Areas (Alberta EPA) for the renewal of an existing approval to operate a wastewater system. The Edmonton Wastewater system consists of the Edmonton Wastewater Collection System (WWC) and the Gold Bar Wastewater Treatment Plant (WWTP), including a grit recovery facility, the Clover Bar Biosolids Resource Recovery facility, a nutrients facility, and associated pipelines between these physical components.

The designated activity for this wastewater system continues to include construction, operation and reclamation of the Edmonton Wastewater System serving the City of Edmonton, City of Leduc, City of Beaumont, Nisku Business Park and the Edmonton International Airport.

If you have any questions, please feel free contact me by phone at 780-969-8445 or by email at gheise@epcor.com.

Sincerely,

Geoff Heise, M.Sc.
Senior Manager, Environment and Process Services

Attachment

cc: Frank Mannarino, SVP Water Services
Susan Ancel, Director One Water Planning
Mark Mathon, Director Wastewater Planning
Cindy Shepel, Director Wastewater Treatment Plant
Trina Manning, Senior Manager WWTP Operations
Angus Grant, Senior Manager WWC Operations
David Slubik, Environment Manager
Wade Teveniuk, Arrow Utilities

# Edmonton Wastewater System EPEA Renewal Application

**Submitted to Alberta Environment and Protected Areas**

**September 11, 2024**

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# 1. Introduction

The primary function of the EPCOR Gold Bar Wastewater Treatment Plant (GBWWTP) and the wastewater collection system is to protect the North Saskatchewan River from wastewater generated within the City of Edmonton service area. However, while the treatment process is aimed at protecting the environment, it also has a minor impact on the environment through generation of odour, air emissions, and energy consumption. EPCOR Water Services (EWS) utilizes an Integrated Resource Planning (IRP – Appendix D) process to consider all impacts to the environment as a result of the treatment process and includes continuous improvement to reduce the impact and improve overall treatment standards.

Since the GBWWTP opened in 1956, EWS has remained at the forefront of wastewater treatment through continued investment in new technology. We're making ongoing investments to ensure our waste treatment plant is safe, reliable and able to meet the needs of the city and the Gold Bar community. EWS is committed to protecting Edmonton river valley parkland for future generations by using technology to safely handle incoming flows without expanding beyond the current footprint and fenceline through to at least 2060.

With input from the local community, we've also developed an updated new plan for the future of the GBWWTP and the Wastewater Collection System (WWC). Collectively, these are known as the “Edmonton Wastewater System”. Our plan protects the natural environment, preserves all of the adjacent parkland, and includes written commitments to the community. We created these commitments with our stakeholders and we've built them into our long-term Integrated Resource Plan plan. These commitments will guide the Edmonton Wastewater System operations and how we will design and build at the plant for decades.

In accordance with the *Environmental Protection and Enhancement Act* (*EPEA*), EWS is applying to Alberta Environment and Protected Areas (AEPA) for the renewal of an existing approval to operate a wastewater system. The Edmonton wastewater system then consists of the Edmonton WWC, the GBWWTP, a grit recovery facility, the Clover Bar Biosolids Resource Recovery Facility (CBBRRF), a nutrients facility, and associated pipelines between these physical components.

## Background – EPCOR Utilities Inc. (EPCOR) and Operating Companies

EPCOR Utilities Inc. (EUI or EPCOR) builds, owns and operates electrical, natural gas and water transmission and distribution networks, water and wastewater treatment facilities, sanitary and stormwater systems, and infrastructure in Canada and the United States.

EPCOR's story began in 1891, as Edmonton's power and water utility — and Canada's first municipally owned electric utility. EUI has been a stand-alone company since 1996. The City of Edmonton is our sole Shareholder, and we operate as a commercial entity, governed by an independent Board of Directors.

EWS is an operating company under EUI and provides water treatment and delivery and wastewater collection and treatment to Edmonton residents and water service to regional customers. The planning, building, operating and maintenance of the plants, reservoirs, pipes, tunnels, pump stations and stormwater management facilities is facilitated by more than 1300 employees working on all aspects of the water cycle.

## EPCOR Water Services Integrated Management Systems

EWS is fully committed to the protection of the environment and the health and safety of its employees, customers and neighbours. In order to continually improve our health, safety and environmental performance, EWS has implemented an Integrated Management System in alignment with other integrated HSE management systems in EPCOR. The system will be developed in accordance with ISO 45001 as well as ISO 14001 standards.

The EWS integrated management system provides the framework for managing risks (hazards and aspects) to our staff and the environment (including public health) related to our products, activities and services. The Integrated Management System will be a closed-loop management system that follows the "Plan-Do-Check-Act" cycle which directly influence an organization's environmental and safety performance. The management system provides the framework for managing the risks and opportunities arising from our activities, products and services. It is intended to meet the requirements of the following standards:

- ISO 14001:2015 Environmental management systems – Requirements with guidance for use
- ISO 45001:2018 Occupational health and safety management systems – Requirements with guidance for use

Our wastewater plant has been ISO certified since 2014, while the wastewater collection system has been certified under EPCOR since 2018. Both of these systems are guided by a Health, Safety, and Environment (HSE) policy that includes the following commitments:

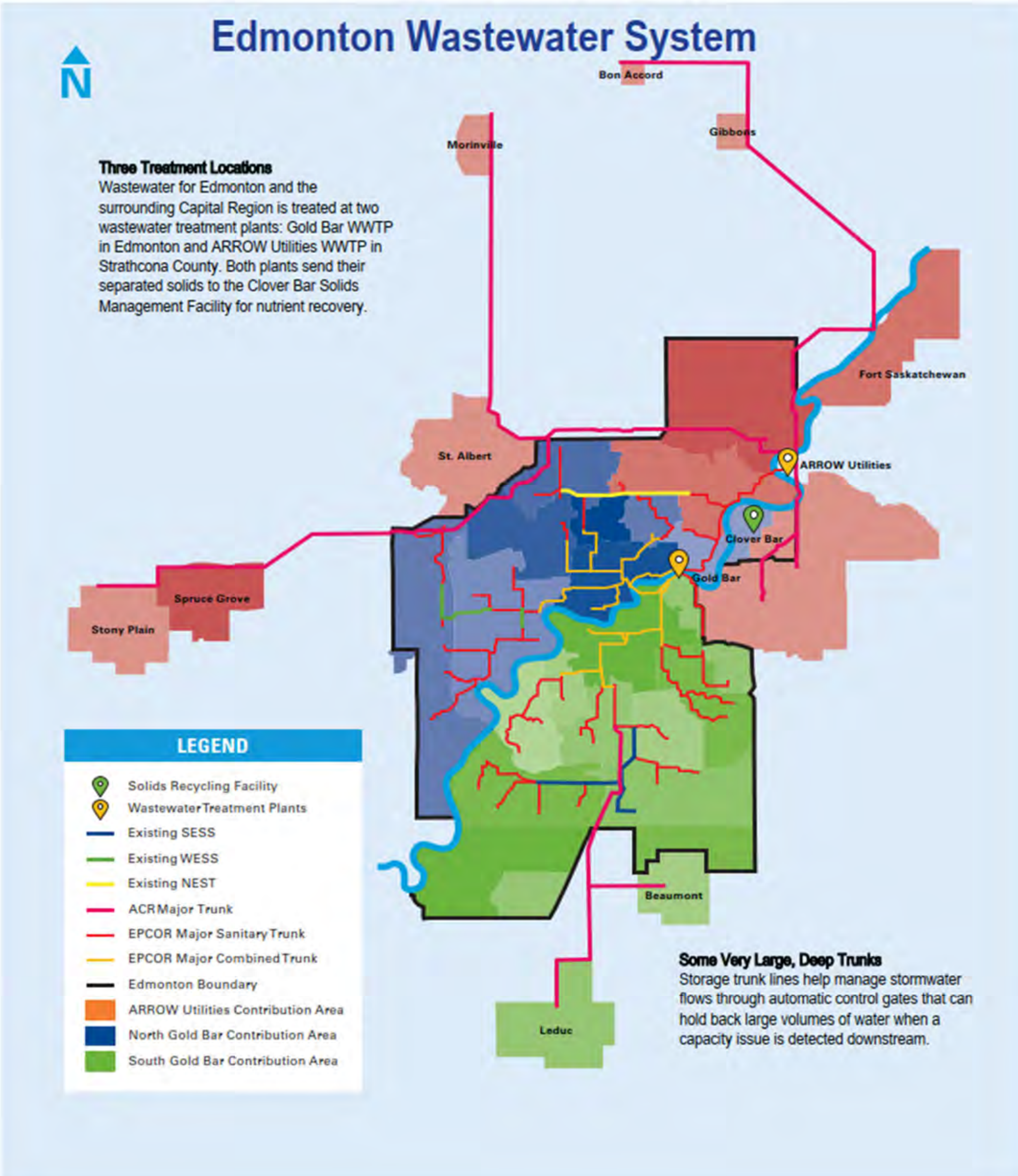
- Maintain an effective HSE management system and continually improve our performance by setting objectives and targets and engaging employees and stakeholders
- Prevent pollution and reduce our environmental impacts affecting the ecosystems in which we operate
- Mitigate our direct climate impact by establishing a pathway to significant reductions and ultimately net zero greenhouse gas emissions
- Implement climate adaptation initiatives that protect the resilience of utility infrastructure and enhance community resiliency
- Meet or exceed all applicable legal requirements, industry standards, and societal expectations


## 2. Description of Current Wastewater System

Wastewater collection and treatment in the Edmonton Capital Region is shared between EWS and ARROW Utilities, formerly the Alberta Capital Regional Wastewater Commission (ACRWC). EWS sends wastewater from nearly 30,000 customers in northeast Edmonton to ARROW Utilities (ARROW) for treatment. In return, wastewater from the City of Leduc and Beaumont is sent to the GBWWTP. Both plants send their separated biosolids to the Clover Bar Biosolids Resource Recovery Facility (CBBRRF) for nutrient recovery. This flow balancing partnership provides more responsible infrastructure investments by avoiding the construction of overly-long and costly sewer pipes.

The regional wastewater systems safely collect, store and convey more than 300 million litres of wastewater per day from nearly 430,000 residential, commercial and industrial service connections. The wastewater flows to the GBWWTP or ARROW WWTP where it is treated and either returned to the North Saskatchewan River (NSR), or is provided to industrial customers as reclaimed water. The scale of the system (Figure 1 Overview of Edmonton Regional wastewater system) is expansive with over 4,200 km of sanitary and combined pipes, 81 wastewater pumping stations and hundreds of active and passive wastewater storage areas across the city with the capacity to store more than 300,000 cubic metres of wastewater.

**FIGURE 1 OVERVIEW OF EDMONTON REGIONAL WASTEWATER SYSTEMS**



## Collection System Overview

The collection system in the city's downtown core and surrounding neighbourhoods stores and conveys both sanitary and storm wastewater through 850 km of combined pipe. The combined sewer system in these areas collects water from both individual properties and catch basins on the street. The City of Edmonton discontinued construction of combined sewer lines in the 1960s, which is why this system is only found in older, more central areas of the city.

*Combined Sewers* are sized to convey both wastewater collected from customers as well as incoming storm flows collected directly from catch basins. While a storm event may be short in duration, they deliver large volumes of water. To prevent backups, a combined sewer pipe to dedicates around 75% of the usable space in the pipe for storm flows.

*Sanitary Sewers* do not collect stormwater directly from catch basins and are meant to only receive wastewater from customers. However the sewers are still sized with storm flows in mind. Through a process called inflow and infiltration, it is common for some stormwater to enter a sanitary sewer. Stormwater can enter through manhole lids, improperly connected household downspouts and through asset deficiencies such as cracks. In practice, nearly half of the capacity of a sanitary pipe is reserved for the additional flows introduced by a storm event.

*Sewer pipes* can also be categorized as local sewers or trunks. Local Sewers (also called collector sewers, mainlines and sometimes even laterals) collect wastewater from customers at the street level. These pipes are smaller in size and make up the majority of the sewer collection network. Trunk Sewers, are larger sewer pipes that collect and then convey the wastewater received from all of the local sewers. Because Edmonton has a relatively flat topography but a deep ravine and river valley system, the sewer trunks serving the city are especially deep. Nearly half of the large trunks (bigger than 1.2 metres in diameter) are more than 20 metres below the ground and the deepest trunk reaches a depth of 45 metres.

The Edmonton WWC system currently consists of:

- 1.2 Million Customers
- 3,350 km of Sanitary Pipe
- 850 km of Combined Pipe
- 81 Pump Stations
- 6 River Crossings

## Storm System Overview

Edmonton's stormwater management system is a complex network of runoff capture, storage and conveyance elements that work to minimize the impacts of both pluvial (rainfall) and fluvial (river) flood risks and protect residents, businesses and the environment. Throughout the city of Edmonton, thousands of kilometres of overland flow routes (roadways, culverts, ditches and swales) and underground infrastructure (storm and combined sewers) and hundreds of distributed storage facilities, including stormwater management facilities (SWMF) and low impact development features (LIDs), work together to manage the volume, the flow and the quality of runoff that enters our urban creeks and the NSR.

In 2017 EWS introduced the Stormwater Integrated Resources Plan (SIRP), a proactive approach to evaluating flood risk from a health and safety, social, environmental and financial perspective, complete with capital and operational programs to drive down risk over 30 years.

The storm system at a glance:

- 3,721 km Storm Sewers
- 850 km of Combined Sewers
- 388 Stormwater Management Facilities
- 418 LIDs
- 276 Stormwater Outfalls

EWS's Stormwater Integrated Resource Plan (SIRP), which was approved by the City of Edmonton Utility Committee and City Council in 2019, is a $1.6 billion system-wide integrated approach. It will be completed over the next 20 to 30 years and will mitigate flood risk across the City.

## Gold Bar Wastewater Treatment Plant Overview

The GBWWTP is located in east Edmonton on the south shore of the NSR. The facility is operated to treat sanitary flows by removing solids, organic contaminants, nutrients and pathogens from wastewater generated within the city as a means to protect public health and the regional ecosystem. The GBWWTP treatment process consistently surpasses regulatory standards for environmental protection and remains in the forefront of technology innovation and process intensification for wastewater treatment.

The wastewater treatment system in Edmonton has the following process stages (Figure 2 Gold Bar WWTP Process Overview and Figure 3 Simplified Process Flow Diagram for the Gold Bar WWTP and Clover Bar BRRF):

*Pre-treatment* removes large materials that can wear or clog plant equipment, while also improving quality of organic solids. Grit and screenings removed in pre-treatment are dumped into portable bins for disposal at a landfill.

*Primary treatment* removes solids and scum from the wastewater with mechanical rakes. Solids collected in this process are sent to the fermenters and anaerobic digesters to be further processed.

*Enhanced Primary Treatment* includes the addition of chemicals and use of primary treatment tanks with plate settlers to increase the removal efficiency of solids and organics for the treatment of wet weather flows.

*Secondary treatment* uses microorganisms to remove nitrogen and phosphorus and 95-97% of organic impurities from the wastewater. Solids collected in this process are sent to the dissolved air flotation (DAF) and anaerobic digesters to be further processed.

*Tertiary treatment* further polishes and disinfects the water before it re-enters the environment. The water passes through a UV system and is disinfected by high intensity ultra-violet (UV) light before discharging to the NSR.

*Solids handling* is where solids are broken- down into stabilized sludge and biogas. The biogas is reused to support plant operations by providing heating and as a process input. Stabilized solids from the GBWWTP are conveyed to the CBBRRF via pipeline for nutrient recovery.

The projected remaining life of the wastewater treatment plant is beyond the year 2059, with a projected serviced population for the wastewater treatment plant of ~1,800,000 in 2059.

**FIGURE 2 GOLD BAR WWTP PROCESS OVERVIEW**

## Clover Bar Biosolids Resource Recovery Facility

The CBBRRF receives digested sludge from the GBWWTP and the ARROW wastewater treatment plant (WWTP) for further processing. Nutrients from the wastewater that are captured in the sludge are recovered for beneficial reuse at this facility. The CBBRRF was first constructed in the 1970s and consists of a solids basin, four settling basins, a supernatant storage cell, and the OSTARA Nutrient Recovery Facility.

*Digested sludge* from the GBWWTP is sent to the CBBRRF via 33 km of pipeline; whereas sludge from the ARROW WWTP is trucked to the site.

*Basin cells* receive the sludge where it then settles and separates into solid and liquid fractions. The liquid fraction, called “supernatant” is decanted and returned to the GBWWTP and ARROW WWTP through the collection system for further treatment. The solid fraction called “biosolids” is used on farmlands as a fertilizer in agricultural applications as part of the Nutri-Gold program. Currently this program helps grow over 4,500 acres of regional crops.

*OSTARA nutrient recovery* process at the CBBRRF site recovers phosphorus from the basin supernatant and converts a portion of the phosphorus and ammonia also into commercially viable fertilizer. This also carries the benefit of reducing the nutrient loading to the wastewater treatment plants.

The CBBRRF at a glance:

- Nutrients from the wastewater are captured in biosolids and recovered for beneficial reuse at the CBBRRF
- Over 20,000 dry tonnes of biosolids is processed each year
- 33 km pipeline transports sludge from the GBWWTP to the CBBRRF. Sludge from ARROW Utilities is trucked to the site.

Further technical details of the entire wastewater system is contained in *Appendix A Application Form and Guide for a New or Renewed Approval of a Municipal Mechanical Wastewater* System *of this document.*

### FIGURE 3 SIMPLIFIED PROCESS FLOW DIAGRAM FOR THE GOLD BAR WWTP AND CLOVER BAR BRRF

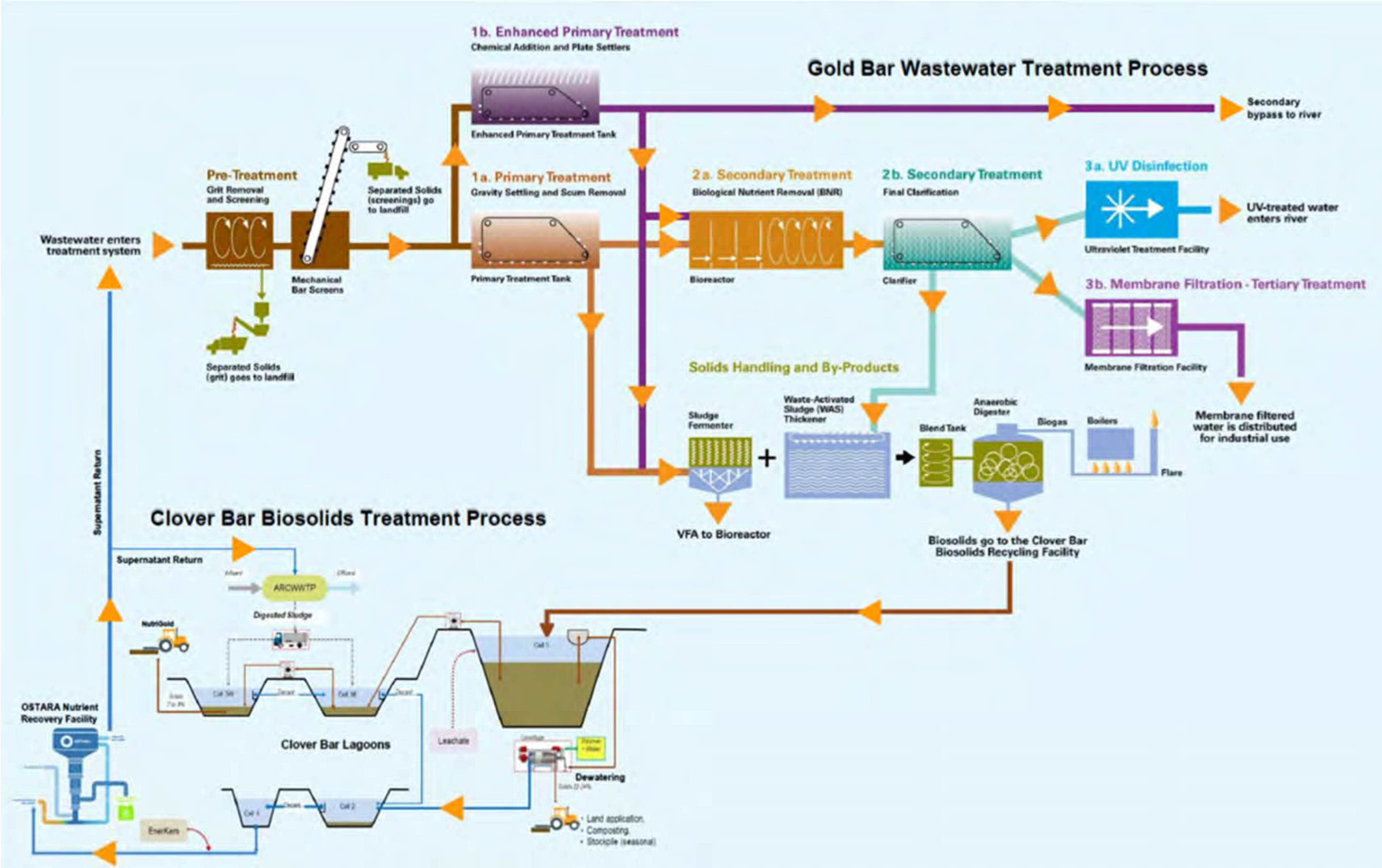
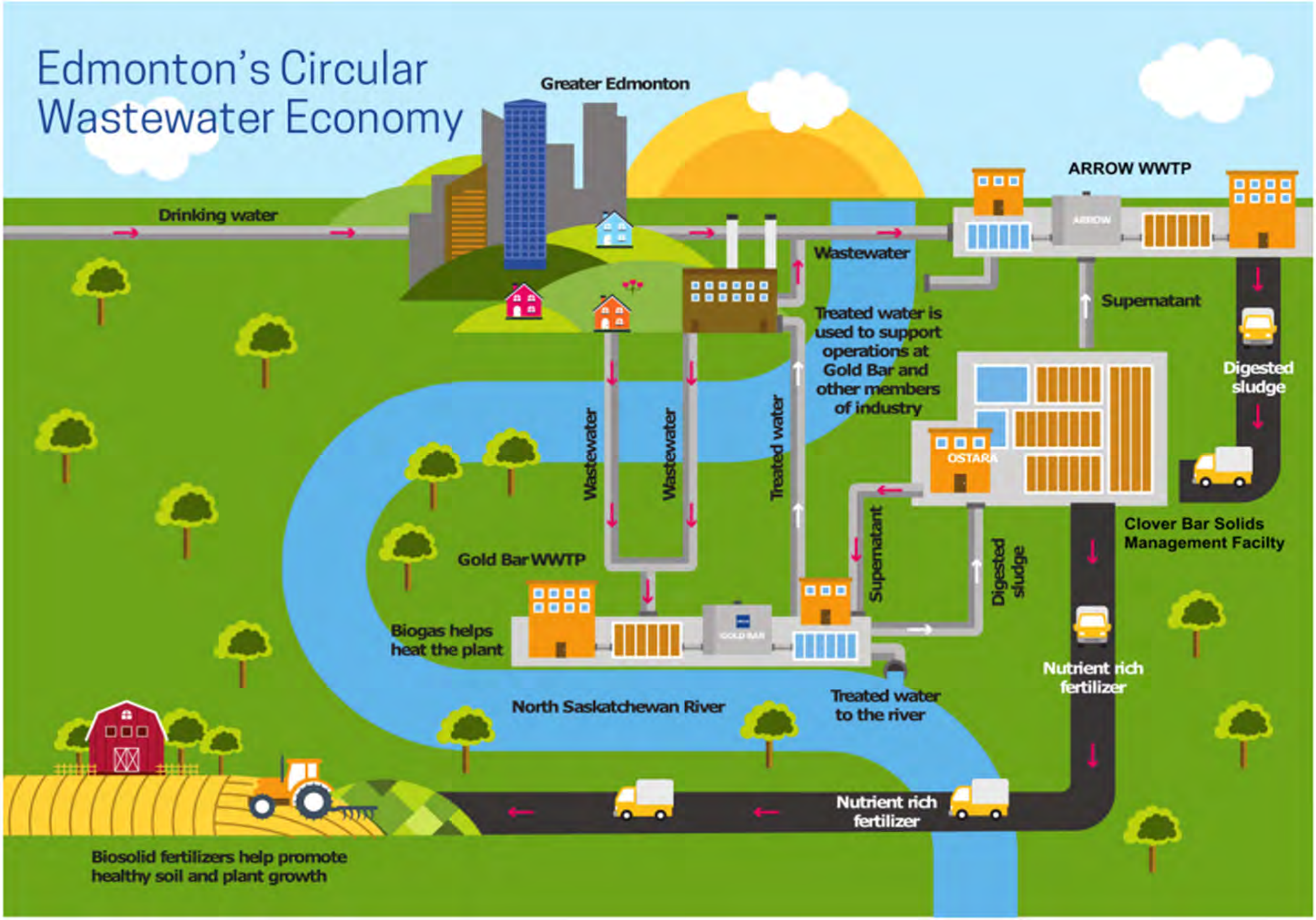


**FIGURE 4 EDMONTON CIRCULAR WASTEWATER ECONOMY**



# 3. Requested Changes to EPEA Approval

EWS is requesting changes in the following areas of the current approval:

1. Additional and Changes to Definitions.
2. Removal of Construction and Upgrading Section.
3. Replace the “Combined Sewer Discharge Strategy” with the ”Combined Sewer Overflow Reduction Progress Report”.
4. Replace 6 protocols with a combined *Total Loading Calculation and Reporting Protocol.*
5. Requested Change to Monitoring and Sampling Requirements for Third Party Releases.
6. New Proposed Enclosed Flare – approval condition to allow for this to be added.
7. Requirement for Manual Stack surveys for redundant scrubbers.
8. Continued waiver on routine 7-Day letters for air quality exceedances for the Ambient Air Quality Monitoring Station located at Gold Bar Park Rd.
9. Removal of Carbon Scrubber

## 3.1. Section 1.1 Definitions

a) EPCOR is requesting the following change to definition:

Replace:

(i) "Clover Bar biosolids dewatering facility" means the facility that is used for withdraw biosolids from the biosolids lagoons, dewater biosolids, temporary storage and transfer of dewatered biosolids, including the air handling system for this facility, and located within Northeast of Section 21, Township 53, Range 23, West of the 4th Meridian;

With:

(ii) Clover Bar biosolids dewatering facility "means the mobile facility, provided by a third party, that is used to withdraw biosolids from the biosolids lagoons, dewater biosolids using a centrifuge system and provide temporary storage prior to being hauled out for beneficial reuse"

b) EPCOR is requesting the following additional definitions:

(xx) “Unauthorized Release” means the release of untreated wastewater from the wastewater collection system to the ground and/or watercourse that is not fully contained (i.e. Within a building or containment structure, tankage, etc.).

(xx) “untreated wastewater” means the water, which is conveyed by the wastewater collection system through normal operation, contributed by customers of the Approval holder.

(xx) “person or owner” means an individual, partnership, association, corporation, organization, business, cooperative, trustee, executor, administrator, legal representative, firm, or body corporate that discharges into the wastewater collection system with or without agreement or permission.

(xx) “person or owner release of concern” means the accidental or intentional release into the wastewater collection system that may;

- cause hazard to any person, animal, property or vegetation;
- cause damage to a watercourse;
- cause damage or a dangerous condition in the wastewater collection system or wastewater treatment facility;
- cause an upset to the wastewater treatment process;
- cause wastewater treatment plant effluent to contravene approval conditions;
- cause sludge from the wastewater treatment process to fail to meet the criteria for spreading the sludge on agricultural land;

## 3.2. Section 3 Part 3: Construction and Upgrading Requirements

EWS is requesting to Delete this Section. Further discussion is given below.

## 3.3. CSO and Equivalency

Approval to operate 638-03-07 clause 3.1.1 refers to the approval holder implementing the “Combined Sewer Overflow Control Strategy” as outlined in the “Combined Sewer Discharge Strategy (June 2013)”. Both strategies referred to in this clause are legacy commitments from the City of Edmonton as the former approval holder of the Wastewater Collection System prior to the transfer of Drainage Services to EUI in 2017. EWS as the current approval holder for the Edmonton Wastewater System, for both collection and treatment, has reviewed the Combined Sewer Overflow Control Strategy and has provided an update on the implementation of its Long Term Control Plan (LTCP) components with associated comments as part of this application (see Table 1 EPCOR Water Services Review of the City of Edmonton's Combined Sewer Overflow Control Strategy, Long Term Control Plan). Additionally, a map highlighting the location and status of current combined sewer overflow (CSO) discharge locations is shown in *Figure 5. Map of Edmonton Showing Combined Sewer Area and Discharge Locations and Status.*

EWS proposes to replace the “Combined Sewer Discharge Strategy” with the “Combined Sewer Overflow Reduction Progress Report” (Appendix D)which will summarize progress toward the long term goal of no net degradation of water quality in the North Saskatchewan River despite growth in the City. EWS’s plan to slow and hold stormwater from entering the combined sewer system during wet weather events will result in the environmental benefits equivalent to sewer separation. EWS proposes to inform AEPA of its ongoing efforts to reduce CSO’s by providing a progress report on the implementation of combined sewer overflow control measures every three years starting on May 1, 2026 (for the period of 2023 through 2025).

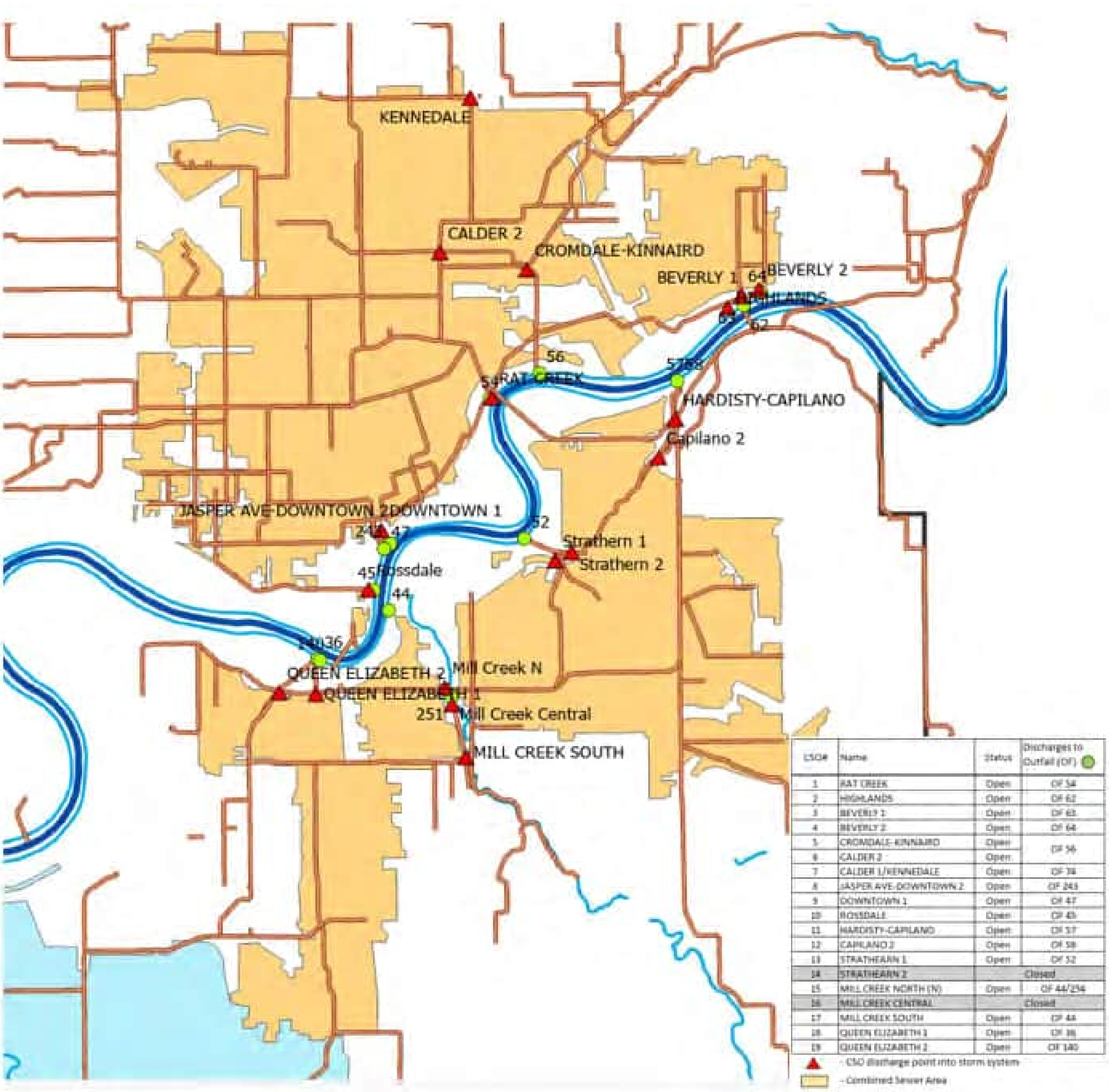
As outlined in the Wastewater IRP (Appendix D), EWS has put its focus on the quantification and reduction of the inflow and infiltration (I&I) of stormwater into the sanitary and combined sewer system in addition to ongoing opportunistic sewer separation. Over the long term, this effort will contribute to the reduction of CSOs by reducing wet weather flow volumes and peaks in the combined sewer system including the reduction of wet weather bypasses at the GBWWTP.

Several capital programs have been developed to reduce the I&I and the CSO Equivalency concept. Key I&I reduction programs are as per below:The **Proactive Pipe Relining Program** focuses on relining sanitary and combined sewer pipes in low lying areas with surface ponding. These sag areas have a higher risk for I&I to occur due to cracks and open joints in sewer pipes and the program intends to reduce the volume of stormwater entering the sanitary and combined pipe networks. Focus of this program is on neighborhoods that are not included in the Wastewater Collection and City's Neighbourhood Renewal List within the next 5 years. The program focuses on pipes with diameter less than or equal to 750 mm, made of non-PVC materials and located in areas with ponding depth greater than 0.3 meter. This program aims to reline a total of 498 km of pipes across the city.

- The **Proactive Maintenance Hole (MH) Sealing Program** aims to reduce I&I into the sanitary and combined sewer system in areas where MH are in street sags. This initiative is to reline and seal the top 1.5m portion of maintenance holes in sag locations. This section of maintenance hole receives the most vibration or ground movement due to traffic on the road. Starting late 2024, such maintenance hole covers will be replaced with covers that have one pick hole only (Open pick hole to be sealed using HDPE plug). The MH sealing program aims to seal a total of 1,000 MH annually, for a total of 10,000 MH in ponding areas by 2030 across the city.
- The **Sanitary Flow Monitoring Program**: The program's focus is on installing sanitary flow monitors throughout the City of Edmonton and is based on prioritized Sanitary Planning Area (SPA) and the local sewer network boundary within each SPA. The contribution areas of the sanitary and combined sewer networks within the City of Edmonton have been divided into 24 SPAs. These SPAs are prioritized based on a number of major I&I contribution indicators found within each SPA. Some of these indicators include results from the CCTV inspection reports, sump pump seasonal discharge, pipe materials, recent basement flooding records, low lying areas with potential surface ponding after heavy rainfall, sewer flow and pump flow monitoring data. Site selection of permanent flow monitoring stations within each SPA is based on the extent of the local sewer network at the neighborhood level. Each SPA may consist of a number of neighborhoods or sewer network groups and each sewer network group may consist of multi-local sewer networks. Depending on the number of the local sewer networks and the size of the contribution area upstream of the selected locations, installation of permanent flow monitoring stations are

prioritized at 3 different levels: High (1), Medium (2) and Low (3). A total of 66 potential permanent monitoring stations sites have been selected for flow monitoring installation within the top 5 SPAs, including 15 High, 35 Medium and 16 Low priority sites. The ultimate flow monitoring network may have up to 250 permanent flow monitoring stations covering all SPAs within the City boundary. However, number of flow monitor stations may still be optimized within each SPA to have a right balance with Operations and Maintenance cost.

**FIGURE 5. MAP OF EDMONTON SHOWING COMBINED SEWER AREA AND DISCHARGE LOCATIONS AND STATUS.**




| CSO# | Name | Status | Discharges to Outfall (OF) |
|---|---|---|---|
| 1 | RAT CREEK | Open | OF 54 |
| 2 | HIGHLANDS | Open | OF 62 |
| 3 | BEVERLY 1 | Open | OF 63 |
| 4 | BEVERLY 2 | Open | OF 64 |
| 5 | CROMDALE-KINNAIRD | Open | OF 56 |
| 6 | CALDER 2 | Open | |
| 7 | CALDER 1/KENNEDALE | Open | OF 74 |
| 8 | JASPER AVE-DOWNTOWN 2 | Open | OF 243 |
| 9 | DOWNTOWN 1 | Open | OF 47 |
| 10 | ROSSDALE | Open | OF 45 |
| 11 | HARDISTY-CAPILANO | Open | OF 57 |
| 12 | CAPILANO 2 | Open | OF 58 |
| 13 | STRATHEARN 1 | Open | OF 52 |
| 14 | STRATHEARN 2 | Closed | |
| 15 | MILL CREEK NORTH (N) | Open | OF 44/254 |
| 16 | MILL CREEK CENTRAL | Closed | |
| 17 | MILL CREEK SOUTH | Open | OF 44 |
| 18 | QUEEN ELIZABETH 1 | Open | OF 36 |
| 19 | QUEEN ELIZABETH 2 | Open | OF 140 |

## Table 1 EPCOR Water Services Review of the City of Edmonton's Combined Sewer Overflow Control Strategy, Long Term Control Plan

| Combined Sewer Overflow (CSO) Control Strategy: Long Term Control Plan (LTCP) | | | | |
|---|---|---|---|---|
| **Components** | | **Implemented** | **Not implemented** | **EPCOR Comments** |
| **In-line system storage** | Real Time Control (RTC) #1 | | ● | The City of Edmonton determined that the minimal CSO reduction and small performance improvement at the Gold Bar WWTP did not justify costs. |
| | RTC #2 | | ● | |
| | RTC #3 | ● | | |
| | RTC #4 | ● | | |
| | RTC #6 | ● | | |
| **Solids and floatable control measures at CSO sites** | | | ● | The City of Edmonton decided not to implement this component given that the CSO Control Strategy approach diverts large quantitites of CSO's to the Gold Bar WWTP for treatment, including solids and floatable screening on the plant bypass. |
| **Modifications to 4 existing fixed weirs at CSO sites:** | CSO#1 - Rat Creek | ● | | |
| | CSO#3 - Beverly 1 | ● | | |
| | CSO#5 - Cromdale/Kinnaird | ● | | |
| | CSO#13 - Strathearn 1 | ● | | |
| **Stop logs on fixed weirs:** | CSO#18 Queen Elizabeth 1 | ● | | |
| **Roof leader disconnection program** | | ● | | EPCOR has a roof leader disconnection program focused on downspouts to combined system |
| **Opportunistic sewer separation projects** | 267 ha of service area separated as part of LTCP | ● | | EPCOR has a Environmental Enhancement program that funds elimination of interconnections or separation (disconnection of catch basins from combined sewers). Focus on LID implementation and storage to reduce inflow of stormwater to combined sewer system. |
| | Kinnaird trunk extension (33 ha) | ● | | |
| | 98 Ave and 79 St storm pond (21 ha) | ● | | Dry pond at Ottewell and Kenilworth Ongoing. Forest Heights Dry Pond at Mike Finland Park initiated in 2024 including opportunistic sewer separation in the vicinity of 98 Ave and 79 St; a number of LIDs implemented as part of City of Edmonton's Building Great Neighborhoods projects, as well as LID at Holyrood with City of Edmonton affordable/social housing project. |
| **Off-line storage at Strathearn CSO site** | | | ● | Same as above - the Forest Heights Dry Pond and Holyrood LIDs (among others) will provide a direct benefit to Strathearn CSO. |
| **Closure of CS Outfalls** | CSO#9 - Downtown 1 | | ● | These locations remain open due to flood risk at Shaw Conference Centre. |
| | CSO#8 - Downtown 2 | | ● | |
| | CSO#14 - Strathearn 2 | ● | | |
| | CSO#15 - Mill Creek North | | ● | Mill Creek North Diversion was constructed to route combined sewer flows into Mill Creek storm trunk that discharges from Outfall (OF)44. There is still potential to have CSO at OF254 into Mill Creek. |
| | CSO#16 - Mill Creek Central | ● | | |
| | CSO#17 - Mill Creek South | | ● | EPCOR has initiated a project that will result in closure of Mill Creek South. |
| **Tunnel crossings** | Highlands Phase IV (Rat Creek) tunnel crossing (WESS-W12) | ● | | |
| | Highlands CSO tunnel crossing | | ● | The City of Edmonton completed additional analysis after the development of the LTCP and concluded that the decrease in CSO volume provided by the addition of the Highlands 3rd pipe was estimated to be much less than the original benefit predicted. |
| **Gold Bar WWTP Upgrades** | Headworks upgrades with screens | ● | | Refer to: Appendix F. *Reviewof CSO Treatment Strategy and Future Upgrade Requirements* . |
| | Plant bypass and outfall improvements | ● | | |
| | Primaries 9, 10, 11 & 12 | ● | | |
| | Digesters 7 & 8 | ● | | |
| | 600 MLD of Enhanced Primary Treatment (EPT) | ● | | |
| | Disinfection EPT discharges | | ● | |

## 3.4. Total Loading Calculation and Reporting Protocol

EWS requests that the following 6 protocols be replaced with a combined document "Total Loading Calculation and Reporting Protocol".

4.4.1 (p) River Load Calculation Protocol.

4.4.6 The approval holder shall update and maintain the Wastewater Collection System Operations Plan as per this approval to include all of the following, at a minimum:

(b) Wastewater Collection System Monitoring Protocol;

(c) Interconnection Identification and Control Strategy;

(d) Wastewater Collection System Chemical Usage Protocol;

(f) River Water Quality Monitoring Protocol; and

(g) River Load Calculation Protocol.

The purpose of this new protocol is to estimate and report on loads from EWS's piped infrastructure (stormwater, combined sewer overflow, and WWTP outfalls) of key parameters to the North Saskatchewan river and tributaries to allow the evaluation of the effect on these receiving waterbodies. This is done through paired flow and water quality monitoring as well as scientifically robust estimation methods where monitoring is not done. The proposed protocol is listed in Appendix H Total Loading Calculation and Reporting Protocol.

## 3.5. Section 4.2: Wastewater Treatment Plant (Proposed Flare Stack)

EWS requests the addition of one Flare to this section, and addition of new Flare stack height to Table 4-1:

"4.9.3 The approval holder shall only release air effluent streams to the atmosphere from the following sources:

(m) the THREE (from two) digester gas flare stacks; "

EWS has identified the need for improvements to the existing biogas flaring system on site to provide adequate redundancy and meet future biogas generation capacity. Currently, untreated digester gas (raw biogas) generated from the GBWWTP digesters is collected and reused on site to provide heat through the plant's boilers and energy through the digester mixing system. Digester gas in excess of what can be reused on site is sent to the flaring system.

EWS is planning to install one new enclosed flare stack (also referred to as ground flare stacks) to meet the immediate need for redundancy and improve capacity of the flaring system to incinerate waste biogas generated from the treatment processes at the

GBWWTP. The current project will install one enclosed flare stack and a new flare building over an abandoned primary clarifier in the GBWWTP. There are no new or increased sources of biogas being introduced at GBWWTP as part of this project.

Air quality dispersion modelling of the enclosed flare is required to amend the *EPEA* Approval 639-07 to include the enclosed flare as an air emission source. The air quality assessment will be completed in compliance with the Alberta Energy Regulator (AER) Directive 060 (AER, 2022), as well as the AEPA Air Quality Model Guideline (AQMG; (AEP, 2021a)), and the Non-Routine Flaring Management: Modelling Guidance (NRMG; (ESRD, 2014)). The air quality assessment for the *EPEA* Approval amendment will focus on the potential effect on ambient air quality from one enclosed flare stack.

The *EPEA* Approval 639-03-07 for the GBWWTP lists the existing two digester gas flare stacks as approved release sources to atmosphere (Part 4, Section 4.9) and lists the flare stack heights (Table 4-1). The GBWWTP Operations Plan includes details on the digester gas system and flares in Section 12 Digester Gas Protocol. We will be submitting a detailed amendment to this application according to the schedule below. The current schedule for the project is as follows:

- Pre-select flare technology: June 2024
- Issued for Construction design: September 2024
- Amendment approval request submittmission: October 2024

Should the amendment to this application coincide with the required Public Notification period, we would propose to notice them together in the fall of 2024.

## Section 6.1 Wastewater System Monitoring

EPCOR requests to replace portion of Table 6-1 CSO Outfalls and Unauthorized Release with the following.  This change coincides with the requested changes to definitions.

| Parameter | Frequency (minimum) | Sample Type | Sampling Location |
|---|---|---|---|
| CSO OUTFALLS | | | |
| Release Volume | Total volume during each discharge event | Continuous during discharge event | Rat Creek CSO outfall;<br>Hardistry-Capilano CSO outfall;<br>Highlands CSO outfall;<br>Cromdale CSO outfall;<br>Strathearn CSO outfall; |
| pH<br>BOD5<br>TSS<br>Total Phosphorus<br>Total Ammonia-nitrogen<br>*E. coli* | Each discharge event | Composite | Rat Creek CSO outfall |

| | | | |
|---|---|---|---|
| UNAUTHORIZED RELEASE | | | |
| Location<br>Duration | Each discharge event | | Unauthorized release point |
| Release Volume | Each event | Estimated volume or mass | |
| pH<br>BOD5<br>TSS<br>Total Phosphorus<br>Total Ammonia-nitrogen<br>*E. coli* | Each discharge event | Grab | Unauthorized release point |
| PERSON OR OWNER - RELEASES OF CONCERN | | | |
| Location<br>Duration | Each event | | |
| Release Volume | Each event | Estimated volume or mass | |

## 3.6. Section 6.2: Air Monitoring – Manual Stack Surveys

Table 6-2 – EWS requests to clarify that the annual manual stack surveys only be required for a minimum of four of the six wet scrubbers that are in operation. As scrubber ducting is interconnected and new foul air sources are added (Diversion Structure and Primary Clarifiers 5-8), the duty/standby configuration of the Scrubbers may change. Currently, it is typical that Scrubbers 2 and 3 act as redundant/backup scrubbers for Scrubbers 5 and 6 and that Scrubbers 1 and 4 are stand-alone. In the previous EWS Application to amend the wastewater system approval to include the new scrubbers, we stated that Scrubbers 2 and 3 would only run when needed as backup during maintenance of the new scrubbers. However, in the issued amendment 639-03-07 it indicates “4.2.2 The approval holder shall operate and maintain the wastewater treatment plant consisting of all of the following treatment units as a minimum:” which includes Scrubbers 2 and 3. This is usually interpreted that all listed units must be in operation, or an approval violation occurs. Furthermore, it would also require an annual stack survey. This would necessitate that we operate Scrubbers 2 and 3 solely to conduct a manual stack survey. . The typical scrubber configuration will be documented in the Operations Plan.

**TERMS AND CONDITIONS ATTACHED TO APPROVAL**

**TABLE 6-2: MONITORING AND REPORTING - AIR POLLUTION CONTROL SYSTEMS AND AMBIENT AIR (continued)**

| Source | Parameter | Frequency | Method of Monitoring | Sample Location | Reporting Frequency |
|---|---|---|---|---|---|
| ambient air | $H_2S$ | before ambient air monitoring station commissioned: daily, when ambient air temperature > 0 °C | portable low range $H_2S$ analyzer, as per the manufacturer's specifications, grab sample | fence line of Gold Bar Wastewater Treatment Plant | as per 6.3.2 and 6.3.4 |
| | $H_2S$, $NO_2$, and $SO_2$ | after ambient air monitoring station commissioned: continuous | *Air Monitoring Directives*, as amended, record 1-hour average and 24-hour average | ambient air monitoring station | as per 6.3.2 and 6.3.4 |
| | temperature | | | | |
| | wind speed | | | | |
| | wind direction | | | | |

## 3.7. Waiver on 7-Day Letters

On December 18, 2023 EWS received a waiver on submission of individual 7-day letters related to air quality exceedances at our air quality monitoring trailer. AEPA had agreed to temporarily waive 7-day written reports upon request of EWSI, for verbal report(s) made to EPA, only for 1-hour and 24-hour exceedances of the Alberta Ambient Air Quality Objective for hydrogen sulphide, at the ambient air monitoring station required in Approval No. 639-03-00 (as amended) (the Approval).

This Letter of Authorization applies only to verbal reports made by EWSI when the air pollution control systems for air effluent streams from the sources described in s.4.9.3 in the Approval are in satisfactory operation. This written report waiver is provided under s.4(2) of the Release Reporting Regulation and will expire on May 1, 2025. Note that all other reporting requirements of the Approval and the Environmental Protection and Enhancement Act remained intact.

EWS is requesting that a similar option be carried forward into the next approval.

## 3.8. Removal of Carbon Scrubber

EWS is requesting to remove reference to “carbon scrubber for Clover Bar biosolids dewatering facility” as this is no longer in operation. Operation of the Clover Bar Biosolids Dewatering Facility has been suspended as per the notification letter sent to AEPA on February 23, 2023 from EWS’s Dave Curran. As of 2024, dewatering operations is being completed by a mobile, seasonal and onsite dewatering facility provided by a third party contractor. We are proposing to continue this season practice every summer until a permanent facility can be designed and constructed. Updates will be provided to AEPA annually in our Operations Plan.

The following sections of the approval contain references to a carbon scrubber to be removed:

- Clause 1.1.2(i) - definitions
- Clause 4.2.2(l)(vi) – Operations: Wastewater Treatment Plant - approval says “including all of the following at a minimum:” and includes Clover Bar biosolids dewatering facility
- Clause 4.2.2(m)(x) – air pollution control systems, including” “a carbon scrubber for the Clover bar biosolids dewatering building,”
- Clause 4.9.3(j) – air effluent streams
- Table 4-1: Stack Heights
- Table 6-2: Monitoring and Reporting – Air Pollution Control Systems and Ambient Air
- Clause 4.6.1 - The approval holder shall manage sludge as per the Biosolids Management Plan, unless otherwise authorized in writing by the Director. – This reference the Operations Plan-Section 5-page 12

# 4. Current *EPEA* Approvals

The following is a list of the existing approvals and authorizations for the Edmonton Wastewater System and the related stormwater management system. The Approvals are included in Appendix B - Current *EPEA* Operating Approvals.

| Document Name | Description | Issue Date |
|---|---|---|
| 00000639-03-06 Edmonton Wastewater System is held by EPCOR Water Services Inc. | Current main approval for Wastewater system. Replaces in its entirety Approval 00000639-03-03. This approval replaced and consolidates all previous versions –03-00 to –03-05. Expires May 1, 2025. | April 1, 2020 |
| 00000639-03-07 Edmonton Wastewater System is held by EWS Water Services Inc. | Amendment to –03-06 mainly for the scrubber upgrades project to add references to new Scrubbers 5 and 6 throughout approval. Expires May 1, 2025. | September 13, 2021 |
| File Number: 0202-639 | Letter of Authorization for a waiver of 7-Day Written reports at EPCOR ambient monitoring trailer. | December 18, 2023 |
| 00267528-00-00 to<br><br>00267528-00-98 | Registrations for the Construction, operation or reclamation of a storm drainage system (including storm outfalls, storm collection, stormwater management) within the City of Edmonton. Held by EPCOR Water Services Inc. Registrations have no expiry date.<br><br>Note: these various registrations not included in Appendix B but are available on the Government of Alberta website at https://avw.alberta.ca/ApprovalViewer.aspx | June 24th, 2010 to June 25, 2024. |

# 5. One Water Planning – Proposed Upgrades and Improvements

One Water is the industry leading planning approach to overcoming water-related challenges. It is an outcome of EWS's recognition that the water cycle is circular and interconnected, therefore our planning should also be interconnected. Rather than focus on fragmented interventions, we need to prevent issues upstream by using integrated water management strategies (Figure 4 Edmonton circular Wastewater Economy). This approach to manage finite water resources for long-term resilience and reliability meeting both community and ecosystem needs.

This One Water approach is informed by several sub-plans. This overall IRP (Appendix D) initiates the capital planning process for Edmonton's wastewater collection and treatment operations. It outlines a path forward for building, operating and maintaining a municipal wastewater collection and treatment system that meets or exceeds all regulatory requirements, and helps ensure the continued provision of safe, reliable utility services to a growing population. The IRP consists of a Stormwater Integrated Resource Plan, a Sanitary integrated resource plan, and the Wastewater integrated resource plan.

This planning document takes into consideration input from the community, is regularly updated, outlines the factors taken into consideration in the planning process and describes the budget allocated for specific areas of future investment of the Edmonton Wastewater System. The IRP focuses on reliability and rehabilitation of current assets while aligning current and future work to help achieve the five shared outcomes between EPCOR and nearby Edmonton communities (quality of life; safety; relationship; environment; reliable, responsible and sustainable.)

EWS's Wastewater IRP (see Appendix D) also takes population growth and water conservation into consideration. Total water usage in Edmonton has essentially stayed the same over the last 40 years as added flows from population growth have been offset by a systematic decline in water consumption.

The Edmonton wastewater system is able to safely handle incoming wastewater flows without expanding beyond the current footprint and fence line through to 2060 and beyond. We'll have to increase nutrient removal capacity in order to keep pace. To do this, we will validate and implement new technologies to facilitate process intensification. Such technologies include Activated Sludge Densification with Selective Wasting and Membrane based technologies like Membrane Bioreactor (MBR), or other novel technologies as considered appropriate.

EWS also uses the integrated resource planning approach to guide the strategic capital and operational plans for Edmonton's wastewater collection (sanitary, combined and stormwater) and GBWWTP and CBBRRF systems. Integrated resource planning is flexible and holistic, anticipates risks, adapts and mitigates against new and emerging threats to ensure greater operational, environmental and financial flexibility. The EWS Wastewater Integrated Resource Plan (Appendix D), provides a summary of the strategies and planning principles for Edmonton's wastewater system.

The result is an evolving path forward for building, operating and maintaining a municipal wastewater collection and treatment system (pipes and plants) that meets or exceeds all regulatory requirements, and helps ensure the continued provision of safe, reliable and resilient utility services to a growing population. Proposed capital projects are summarized in the next section.

## 5.1. 2025-2027 Capital Plan

EWS's capital plan includes a range of capital projects and programs for supporting ongoing operations to ensure reliability, safety, efficiency, customer growth, and regulatory compliance while also aligning with the objectives of the City Plan. The capital plan is developed using input from various sources, assessments, and expert resources. During the execution of the capital plan, agility and flexibility are maintained to ensure the safety and reliability of the wastewater collection and treatment systems. Any capital plans affecting the EPEA Approval, or requiring an amendment have been specifically identified in *Section 3 Requested Changes to EPEA Approval*. While EWS also undertakes other maintenance and upgrade projects, the following projects are ones specifically related to the collection or process of wastewater treatment.

A summary of the projects are listed below, with a full description available at EPCOR.com https://www.epcor.com/products-services/water/water-wastewater-drainage-rate-application/Pages/default.aspx.

### *5.1.1. WASTEWATER TREATEMENT PLANT ODOUR CONTROL IMPROVEMENTS PROJECT*

The GBWWTP is known to generate odours as a natural part of the overall wastewater conveyance and treatment from municipal, commercial, and industrial sources within Edmonton and surrounding areas. EWS has made a commitment to the regulator Alberta Environment and Protected Areas (AEPA) to continuously improve odour control at this facility and maintain quality of life in the surrounding areas by actively managing the odour sources within the GBWWTP.

EWS has committed to implement an odour monitoring and control strategy that aims to minimize the emission of odours from the site, while informing actions and potential improvements using continuous monitoring. EPCOR regularly engages with residents that live near the GBWWTP through an established Community Liaison Group (CLG), by hosting and attending neighbourhood events, and offering tours of the plant. In the past, many of these touchpoints included both formal and informal discussions around EPCOR's odour mitigation efforts.

Efforts to mitigate and reduce odours at the plant have been ongoing since the early 1970's, with a focus in the past 8 years to better understand and monitor the major sources of odour so that they can be prioritized for management. Over $35 million in capital has been spent on odour control improvements including adding new containment covers, installing additional foul air treatment capacity with three new carbon scrubbers and two new chemical scrubbers. Additionally, an ambient air quality monitoring station (AAQMS) has been installed outside of the fence line south of the facility to monitor the overall odour levels leaving the site and to improve the understanding of odour management needs.

Several assessment studies have also been undertaken to identify the top sources of odour as well as to develop improvement plans for containment and treatment. The key contributors to odour exceedance of the AAAQO are the diversion structure, the exhaust fans, and primary clarifiers 5-8 (which are located outdoors). The project scope of work for 2025 to 2027 will address the foul air generated at the Diversion Structure and Primary Clarifiers 5-8, which were identified as the most significant remaining sources of odour generation at the facility. The project will focus on providing odour capture at these two sources using the following means:

- Installation of fabric rollover covers to enclose the air headspace over Primary Clarifiers 5-8.
- Installation of ductwork to capture foul air from the Diversion Structure, which will be conveyed into the centralized duct network, where it will be treated by one or more of the existing scrubbers.

**FIGURE 6 PRIMARY CLARIFIERS 5-8 PROPOSED COVERS**

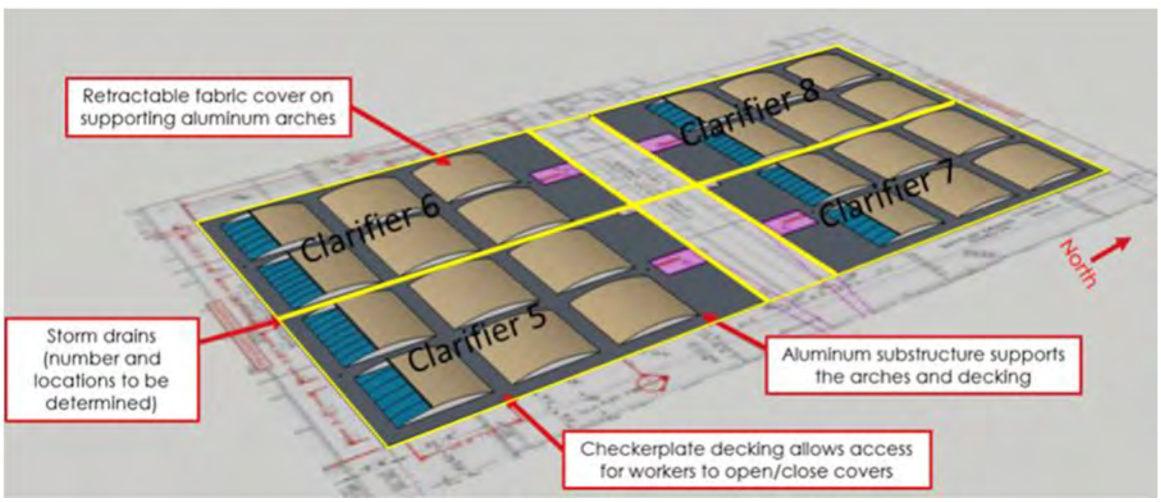
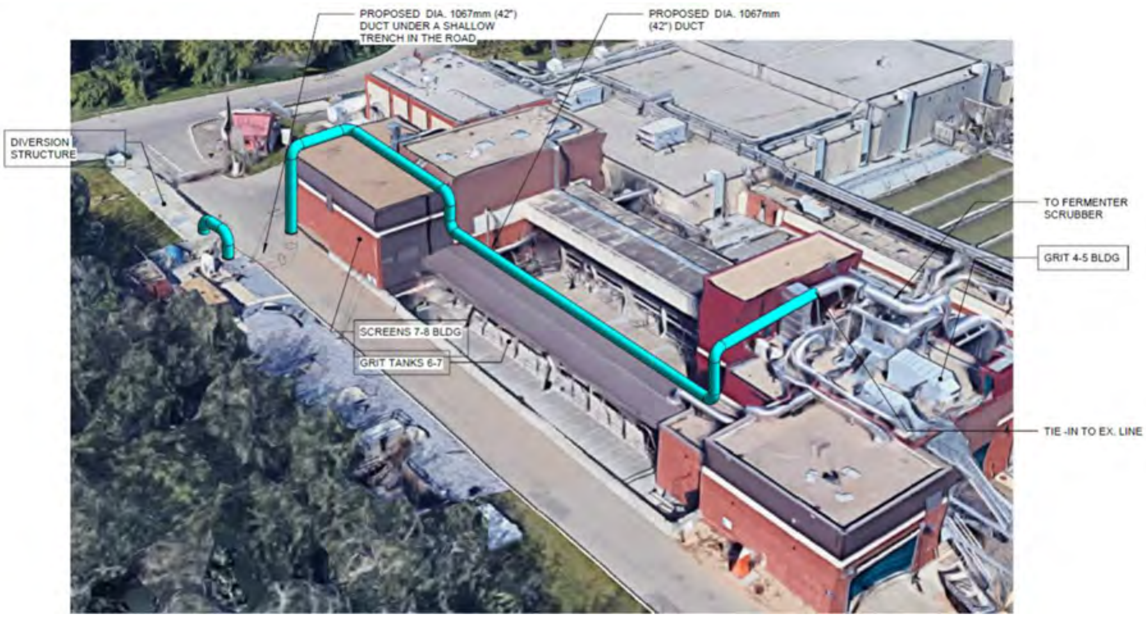


**FIGURE 7 DIVERSION STRUCTURE TENTATIVE DUCT CONNECTIONS**




### *5.1.2. DIGESTER IMPROVEMENTS PROGRAM*

The Digester Improvements are intended to improve the solids digestion process at the GBWWTP, ensuring it can continue to handle wastewater solids loading safely and reliably. The project will initiate major rehabilitation and upgrades to Digester 6 during the 2025-2027 PBR term, along with replacement of systems and components that are end of life or have failed. The upgrades aim to reduce biogas-handling risks, restore digester capacity, improve digester performance, and align with the requirements of the GBWWTP.

It is normal for digesters to gradually foul and lose treatment capacity with continued operation. Regular cleaning, rehabilitation, and upgrades are conducted for each digester to restore their operating capacity. Digesters 1 through 4 have previously been upgraded and Digester 6 is the next asset scheduled for upgrade work to restore its treatment capacity, while also enhancing safety, reliability, and efficiency of operation. Digesters 7 and 8 are currently scheduled for cleaning and rehabilitation following the upgrades to Digester 6.

### *5.1.3. UV DISINFECTION SYSTEM UPGRADES PROJECT*

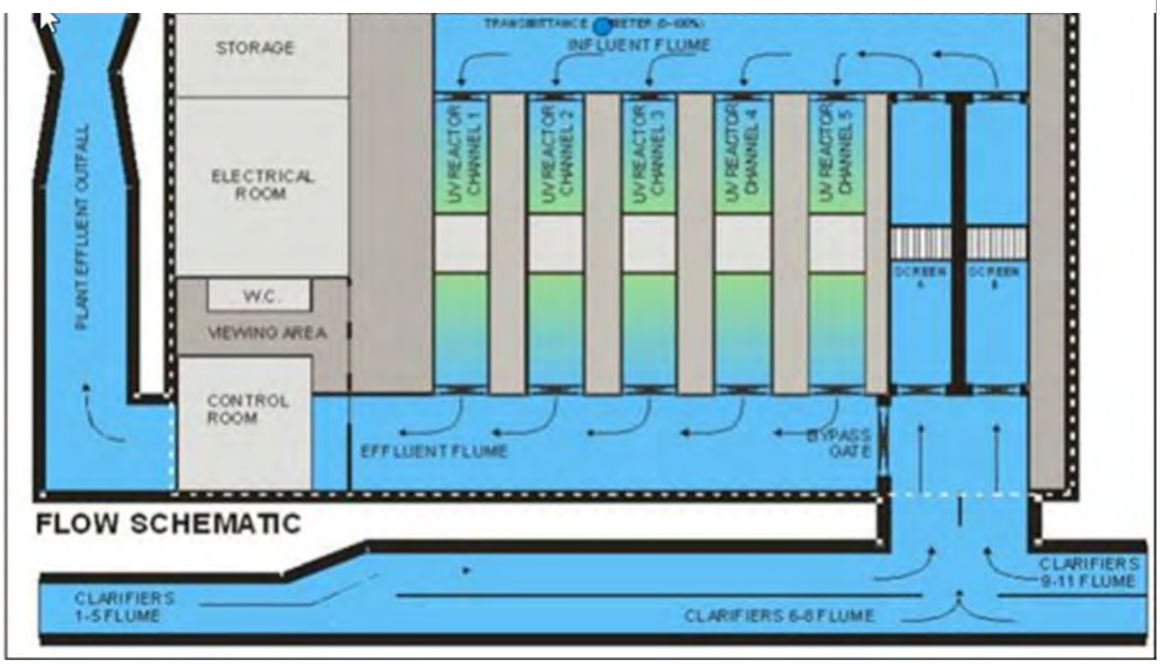
The GBWWTP currently has a UV4000 system in place to provide disinfection to the wastewater effluent, as required by EPCOR's approval to operate enforced by Alberta Environment and Protected Areas (AEPA). This system was originally supplied by Trojan Technologies in 1995 but is no longer manufactured. The Ultraviolet (UV) Disinfection System Upgrades Project is focused on upgrading the UV disinfection system at the Gold Bar Wastewater Treatment Plant (GBWWTP) to a new UV system with low pressure high efficiency lamps. The current UV4000 disinfection system from Trojan

Technologies is no longer manufactured and is extremely energy intensive compared to modern systems.

The existing UV system has five flow channels. The first four channels of the system were installed in 1995, while the fifth channel was installed in 2006 and commissioned in 2011. Each of the initial four UV channels has 180 medium pressure lamps while the fifth channel has 176 lamps. Each channel can convey flows up to 140 million litres per day (MLD). Figure 8 shows the flow schematic of the disinfection facility and the cross section of a channel.

The scope of work will upgrade the existing UV system to a new UV system that is equipped with low pressure high efficiency lamps along with the associated control system. The design UV treatment of 60% and peak flow of 700 MLD for the proposed system were selected based on historical analysis of the existing data and the forecast maximum flow data to the year 2050.

**FIGURE 8 FLOW SCHEMATIC OF THE UV DISINFECTION SYSTEM**




### *5.1.4. PRIMARY EFFLUENT (PE) CHANNEL UPGRADES PROJECT*

The Primary Effluent (PE) Channel Upgrades Project will continue the phased upgrade and rehabilitation work to the PE channel system at the GBWWTP. This work was initiated in 2019, the majority of the work will be completed by 2027, with the remaining beyond this time. GBWWTP consists of channels and chambers that convey wastewater from the entrance of the plant through treatment processes, then to the outfalls back into the NSR. Within the plant, PE channels move effluent from the primary clarifiers where primary treatment occurs to the Bioreactors for secondary treatment.

Detailed early planning work identified the key drivers for this project to be the following:

- Maintain current flow capacity in the PE channel system during any inspection and rehabilitation work.
- Allow safe isolation and entry to the existing PE channels for inspection and rehabilitation work as needed.
- Eliminate single point of failure locations (e.g., Confluence Chamber and Bypass Chamber).

**FIGURE 9 PE CHANNEL PATH**


#### *5.1.5. PLANT PIPE REHABILITATION AND UPGRADE PROGRAM SLUDGE AND SUPERNATANT PIPELINE REHABILITATION PROGRAM*

The Plant Pipe Rehabilitation and Upgrade Program is for replacement and upgrades to critical process and utility pipes at the GBWWTP. The GBWWTP relies on a network of piping to carry out its processes effectively to treat wastewater before it is discharged back into the environment. These piping systems are essential for transporting both process streams and utilities throughout the facility. The potable water piping network is comprised of approximately 3,000 m of piping of various materials including polyvinyl chloride (PVC), cast iron, asbestos-cement, and steel, ranging anywhere in age from less than 5 years to more than 50 years old. The secondary sludge pipes carry biologically active solid material called activated sludge and have been problematic for some time due to the corrosive nature of the process, with multiple leak events occurring over the last 10 years. The focus of the capital program includes the removal of epoxy lined carbon steel piping connecting the secondary process and replacement with stainless steel.

The Sludge and Supernatant Pipeline Rehabilitation Program is for major inspections, cleaning, repairs, rehabilitation, and upgrades for the pipeline assets and supporting infrastructure used to transfer sludge and supernatant between the GBWWTP and the CBBRRF. The first sections of these pipes were built in 1972 and have expanded continually since then. There is 33.6 km of sludge and supernatant piping between GBWWTP and CBBRRF. The sludge and supernatant pipelines require regular cleaning, inspection, rehabilitation, and upgrades to extend the useful asset life and mitigate operational risks.

#### *5.1.6. EXPAND FLARE CAPACITY PROJECT AT GOLD BAR WASTEWATER TREATMENT PLANT*

The Expand Flare Capacity Project is to construct a new building, new flare, and associated equipment. This will provide the GBWWTP with reliable and redundant biogas flaring capacity as the existing flares cannot safely process all potential biogas produced in the wastewater treatment process during needed maintenance activities. The facility will be built within a part of the space currently occupied by the abandoned Primary 1 and 2 clarifier structures.

Biogas is a product of the wastewater treatment process and is a blend of methane, carbon dioxide, hydrogen sulfide, water vapour, and traces of other gases. The biogas is generated in anaerobic digesters and either utilized to provide heat and energy on site through boilers or flared. There is no biogas storage on site and the flares are primarily used to control biogas pressures and volumes within the anaerobic digester's headspace. Methane is a very potent greenhouse gas. One tonne of methane released into the atmosphere is equivalent to 28 tonnes of carbon dioxide, based on the Global Warming Potential (GWP) for 100-year time horizon (IPCC, 2014). Facilities that handle, process, or produce methane greatly reduce their climate change impact by flaring as opposed to venting methane. By flaring the methane, it is burned and converted into carbon dioxide which is a much weaker greenhouse gas.

The existing flares at GBWWTP were installed circa 2004-2008. The system is now approaching its design capacity and, due to its age has increasing operational, and maintenance needs. A study was completed in 2019 to review the capacity of the existing infrastructure as well as evaluate the future biogas projections and capacity requirements up to 2060. This project will require an Approval amendment.

#### *5.1.7. WASTEWATER COLLECTION SYSTEM PROJECTS*

Significant investments planned for the Wastewater Collection operations over the 2025-2027 term include a $406 million investment for various projects and programs in the Reliability/Lifecycle Replacement category to manage risks and improve system reliability by rehabilitating or replacing existing assets that are approaching the end of their useful lives; and a $192 million investment in the Growth/Customer Requirements category. A summary of the projects is listed below, with a full description is available at EPCOR.com https://www.epcor.com/products-services/water/water-wastewater-drainage-rate-application/Pages/default.aspx. As required, EWS will supply extension notices to AEPA according to either the *EPEA* Approval 639-07 or its Stormwater registration, or apply for separate *Water Act* approvals as needed.

- **Access Maintenance Hole Program** - The Access Maintenance Hole Program is a critical component of EWS' Corrosion and Odour Reduction Strategy (CORe). The program includes construction of access maintenance holes on major trunk lines where safe access for inspections and cleaning is required. The Access Maintenance Hole Program targets trunk lines with poor existing access availability, where odour causing sediment accumulations are expected and where there is a risk of moderate to severe deterioration of the sewer structure from hydrogen sulfide (H2S) corrosion.
- **Dry Ponds Program** - Dry ponds are a critical element of EWS's Stormwater Integrated Resource Plan (SIRP) to mitigate flood risks across Edmonton. Using dry ponds, EWS is able to achieve flood mitigation objectives at a lower overall capital investment than seen with traditional engineering approaches. Dry ponds capture large volumes of stormwater within a neighbourhood during storm events and then release the stormwater slowly back into the existing piped storm trunk network after the storm event. As part of developing the SIRP strategy, EWS identified 14 potential locations for future dry ponds and continues to work with City of Edmonton Open Spaces team.
- **Private Development Construction Coordination Program** – The Private Development Construction Coordination Program is an annual program that includes costs to support the planning and development processes and facilitate the construction of new wastewater collection infrastructure by private developers. This is an annual program that supports land planning and development processes. Land development in Edmonton is driven by developers who utilize consultants and contractors to plan, design, and construct drainage infrastructure which is then turned over to EWS.
- **Low Impact Development (LID) Program** - The Low Impact Development (LID) Program will construct and design LID installations throughout Edmonton on both public property and privately-owned commercial, industrial, and institutional properties in alignment with the (SIRP) strategy. Implementation involves significant coordination with both the City of Edmonton and private owners of industrial and commercial property where LID installation will support the overall system. LID is a critical element of EWS's SIRP strategy to mitigate flood risks across the city. LID provides another strategy to achieve climate change adaptation and to maintain and improve the health of the local creeks and the NSR. The SIRP Capital and Operational plan estimated $480 million in LID would be implemented over the next 20 to 30 years.
- **Drill Drop Maintenance Hole Renewal Program** - The Drill Drop Maintenance Hole (DDMH) Renewal Program is an annual program to systematically rehabilitate or replace failing DDMH which are small diameter shafts extending from the ground surface into the deep trunk sewer. These assets were built at time of the trunk line construction using corrugated metal pipes (CMP) or cast iron (CI) pipe that are highly susceptible to corrosion, and many are beyond their expected life. The scope includes inspections, risk assessment, prioritization, design, and construction of the DDMHs. During the 2025-2027 period, this program is forecast to complete 18 DDMHs full replacements with a total capital spend of $29.8 million which contributes to reducing the overall risk of significant failure of these structures. DDMH failures can lead to roadway subsidence or sinkhole formation, resulting in public safety and traffic impacts, flooding, environmental spills, and costly emergency repairs.
- **Flow Control Facilities Rehabilitation Program** - The Flow Control Facilities (FCF) Rehabilitation Program is an annual program that focuses on the renewal of aging lift stations and real time control (RTC) assets on the wastewater collection system across the city. Maintaining an acceptable level of

environmental protection and service requires ongoing rehabilitation efforts. Through this program, EWS can systematically rehabilitate or replace deteriorated flow control facility assets to mitigate the risks of deterioration and failure. Total program capital expenditures for the 2025 – 2027 term is forecasted at $20.3 million. Based on historical projects, the program will support the rehabilitation of approximately 8 sites including lift stations, RTCs, syphon structures or other flow control infrastructure. This annual program allows EWS to rehabilitate or replace deteriorated facilities to mitigate the risks of failure and maintain an acceptable level of environmental protection and service.

- **High Priority Renewal Program -** The High Priority Renewal (HPR) Program focuses on emergency and high priority repairs and replacements within the wastewater collection system of assets such as service pipes, catch basins, mainlines, maintenance holes, outfalls, force mains and other small drainage assets where the total project cost is not expected to exceed $250,000. The HPR program also includes proactive service pipe relining to reduce future HPR needs. EWS has forecast total program capital expenditures during the 2025-2027 term at $72.2 million. Deterioration of drainage infrastructure as it ages increases the risk of unexpected failures that can disrupt sewer service to homeowners and businesses and result in safety issues or environmental impacts. High priorities and emergencies are identified either through regular inspections or through customer calls to the EWS Control Center.
- **Inflow and Infiltration Relining Program -** The Inflow and Infiltration (I/I) Relining Program consists of annual programs focused on reducing inflow and infiltration into the sanitary and combined sewer systems to decrease the risk of flooding due to sewer backups and to create capacity within the existing sewer network to accommodate the City of Edmonton's growth targets. The scope of this program includes the inspection, repair, and relining of manholes and sanitary and combined sewer pipes in areas, with high I/I such as local sags, and low-lying areas. The I/I Relining Program is a critical component of the SIRP Strategy. I/I reduces the capacity of the collection system by allowing stormwater and groundwater flows to enter into the sanitary and combined system through cracks or holes in the infrastructure, or by direct connections of roof or foundation drains. SIRP identified that there is an increased risk of basement flooding in areas where water ponding occurs on the road prior to draining through the piped stormwater network.
- **Large Trunk Rehabilitation Program -** The Large Trunk Rehabilitation Program focuses on the rehabilitation of aging large trunks across the city of Edmonton. Large trunks are gravity fed sanitary, storm, and combined sewers greater than or equal to 1,200 mm in diameter. The scope of work includes inspections and rehabilitation of large trunks at a total spend of $85.8 million over the 2025-2027 term. There are approximately 643 km of sanitary, storm, and combined large trunk sewers constructed over the past 100 years to varying standards and specifications. The average ages for sanitary, storm and combined trunk sewers are 37, 40 and 64 years, respectively. Additionally, premature deterioration has been accelerated by hydrogen sulfide (H2S) induced corrosion in the sanitary and combined trunks, posing further challenges to the integrity of the infrastructure. EPCOR Water Services' (EWS) Corrosion and Odour Reduction Strategy (CORe) was initiated in 2019 to understand, mitigate and prevent sewer odour issues across the city using a combination of capital and operational interventions. The CORe strategy focuses on preventing the formation of H2S gas, reducing community odour impacts, and lengthening the life of sewer network assets.

- **Local System Rehabilitation Program -** The Local System Rehabilitation Program consists of several annual programs focusing on the renewal and replacement of aging local sanitary, storm and combined sewers around the City of Edmonton. The scope of work includes targeted inspections, relining, and open cut repairs of local sewers at a total spend of $60.1 million over the 2025-2027 term. The program expects to rehabilitate 20-25 km of local sewer per year. Local sewers are classified as any mainline sewer smaller than 600 mm. They receive flows from service connections, catch basins, catch basin leads, and other local sewers, and convey the flows to the small and large trunk sewers. Assessing the condition of an aging sewer system and planning for rehabilitation is crucial for maintaining public health, environmental sustainability, and overall infrastructure resilience. As the system ages, it is prone to deterioration, leaks, and structural issues that can lead to contamination of water sources and pose health hazards.
- **Maintenance Hole and Catch Basin Replacement Program -** The Maintenance Hole (MH) and Catch Basin (CB) Replacement Program is to assess and replace the shallow portion of MHs and CBs before end of life. These replacements will be done in coordination with EPCOR Water Services (EWS) rehabilitation programs and City of Edmonton roadway rehabilitation programs. The total estimated cost for this program for the 2025-2027 term is $11.8 million. The wastewater collection system comprises of over 100,000 MHs and 70,000 CBs. To address the challenge of failing or failed MHs and CBs, an ongoing replacement program has been implemented. A failed asset refers to infrastructure that can no longer perform its function as intended or has become a hazard to the public, while a failing asset is deficient in some capacity but is still able to perform its function. Failed MHs and CBs present a public safety risk, and timely replacement of these assets is critical. By implementing this program, the potential for injury resulting from failed drainage infrastructure is significantly reduced, enhancing overall safety for the community.
- **Small Trunk Rehabilitation Program -** The Small Trunk Rehabilitation Program focuses on the rehabilitation of aging small trunks around the city of Edmonton. Small trunks are gravity fed and are used to convey sanitary, storm, and combined flows from local drainage pipes to larger trunks throughout the system. The scope of work includes targeted inspections, relining, and open cut repairs of small trunks at a total spend of $35.8 million over the 2025-2027 PBR term. Small trunks range in diameter from 600 mm to less than 1200 mm, and include pipes on trestles across the city. Small trunks account for the second largest portion of underground pipe in the sewer system at approximately 1,310 km and have been constructed over the past 100 years to varying standards and specifications. As the system ages, it is prone to deterioration, leaks, and structural issues that can lead to contamination of water sources and pose health hazards. Failure of a sanitary or combined small trunk could cause a sewage spill to the local environment or water bodies.
- **Smart Ponds Program -** The Smart Ponds Program is a capital program that converts existing Stormwater Management Facilities into smart ponds for enhanced storm water management. Smart ponds use technology such as automatic gates, water level and flow sensors, and weather radar/precipitation data to create a system wide control system. This approach optimizes the utilization of existing capacity during a rainstorm event to reduce flooding risks in the community. Smart Ponds are a critical element of EPCOR Water Services' (EWS) Stormwater Integrated Resource Plan (SIRP) to mitigate flood risk across Edmonton through the SIRP-Predict component of the plan. During the 2025-2027 PBR term, this program is forecast to initiate 5 areas projects per year. The

total capital spend is $18.9 million. By moving forward with this program, EWS will become more resilient to urban and riverine flood risks. Edmonton and surrounding communities will be better protected and experience minimal disruption to essential services during severe flood events.

# 6. Operations Plans

The Edmonton wastewater system is required to maintain and update several sets of Operations plans under Section 4.4 and elsewhere in the current operating Approval. One is specific for the wastewater treatment plant, one for the collection system, one for protection of the river, and one set specific to emergency response. Collectively, these plans ensure that the plant and collection system are operated safely and maintain the environmental goals of the operating approval.

## 6.1. Wastewater Treatment Plant Operations Plan

The GBWWTP Operations Plan as required by Approval No. 639-03-07 is made up of seventeen components. Each of the components has been developed to address a specific operational or environmental concern. As some of the individual conditions change (due to new regulations, projects or programs), these components are reviewed annually and updated based on any direction from AEPA or operational need.

Related Standard Operational Procedures (SOPs) are also developed for operating the Wastewater Treatment systems to ensure due diligence in system operation. The procedures allow the plant Operators to troubleshoot processes, put systems into service, isolate process equipment and respond to emergency conditions.

This operations plan is updated and submitted annually to AEPA prior to May 1st. Any proposed changes to the operations plan are noted in this annual submission. A summary of this Operations Plan is noted in Table 2 below.

**TABLE 2 EDMONTON GOLD BAR WWTP OPERATIONS PLAN SUMMARY**

| WWTP Protocol | Summary and Purpose of Protocol |
|---|---|
| 1. Communications Protocol | This protocol lists the scenarios for communicating operational issues with AEPA. Any Variances from the target operating capacities are reported as variances from the Operations Plan. The notifications can include:<br>• Loss of UV due to power feed switching, planned loss for maintenance, or other unplanned losses.<br>• Odour scrubber outages for planned maintenance.<br>• Reporting of any other Approval contraventions.<br>The notifications can include phone calls to AEPA's 24 hour environmental response line, an email, or a written 7-day letter. |

| WWTP Protocol | Summary and Purpose of Protocol |
|---|---|
| 2. Preventive and Corrective Maintenance Protocol for Maximizing Treatment Capacity | The protocol focuses on preventive and corrective maintenance. Redundant capacity is constructed in support of preventive maintenance for Biological Nutrient Removal (BNR), Enhanced Primary Treatment (EPT) and Ultraviolet Disinfection (capacity is primarily needed during spring runoff and in the summer wet weather seasons).<br><br>• Seasonal capacity requirements that meet the approval requirements for maximum capacity to protect the NSR during critical seasons and EPCOR's need for reduced capacity during periods of preventive maintenance is developed.<br>• In the event of an unforeseen corrective maintenance situation that would require a reduction below the target operating capacity in any season, EPCOR will notify AEPA immediately of the reduction in target operating capacity and will take all reasonable measures to return unit processes to service as quickly as possible to return the plant to its target operating capacity. In its notification to AEPA, EWS will specify the reduction of the target operating capacity. |
| 3. Standard Operating Procedure (SOP) of the BNR Processes A-D | This SOP contains four protocols to maintain the nitrification capability of the WWTP.<br><br>• 3A – The intent of the protocol is to outline how a sufficient population of nitrifiers is maintained during winter months to respond to impacts on the nitrification process from cold weather, low temperature runoff events, equipment failures or toxic shock.<br>• 3B - In the event of a loss of nitrification and increase in the effluent NH3-N concentration, all efforts necessary to restore nitrification as quickly as possible are made. EWS has recovery strategies from the following potential nitrification threats: Cold weather affecting plant influent temperatures, Equipment failure, and Toxic loads to the plant.<br>• 3C - EPCOR continually strives to maximize the efficiency of nitrogen removal from its final effluent discharge at the Gold Bar WWTP. Currently, the strategy in place to minimize total nitrogen loading to the river from the Gold Bar WWTP is to maximize |

| WWTP Protocol | Summary and Purpose of Protocol |
|---|---|
| | denitrification capacity by operating the BNR bioreactors with reduced aeration zone volume (during summer months).<br>• 3D - The phosphorus removal protocol is a method to ensure that the intent of the Approval is satisfied, meet Reclaimed Water specifications to customers, and reduce the recycle of phosphorus in the wastewater stream by recovering it as a resource. |
| 4. Treatment Facility Hydraulic and Organic Loading Capacity Estimates and Plans for Future Capacity and/or Effluent Quality Improvements | The current capacity estimates for each process unit are outlined in the Seasonal Target Operating Capacity table of this document. Any changes, as a result of future studies, to existing capacities to be reviewed by and agreed upon with AEPA. |
| 5. Biosolids Management Plan | Gold Bar WWTP, in partnership with Arrow Utilities, implements a comprehensive regional Biosolids Management Plan. Wastewater sludge (Primary and Secondary) is produced and collected during wastewater treatment processes at both the Gold Bar WWTP and Arrow Utilities. Wastewater sludge is stabilized at both facilities using mesophilic anaerobic digestion. The protocol describes how Biosolids:<br>• are transferred from the WWTP's to the CBBRRF.<br>• Are stored and then extracted from the lagoons, and hauled offsite.<br>• Applied to agricultural and non-agricultural land and locations chosen.<br>• Reported to AEPA in annual reports. |
| 6. Wastewater Treatment System Chemical Usage Protocol | Chemicals used directly with the wastewater treatment processes are listed in this protocol. Gold Bar WWTP monitors chemical consumption using physical inventory checks and invoice tracking. Chemical usages are monitored daily and summarized monthly. |
| 7. Odour Control and Management Protocol | The main contributor to the odour generation at Gold Bar WWTP is Hydrogen Sulfide (H2S) which is produced by biological activity in wastewater (sewage). The long travel time through the collection |

| WWTP Protocol | Summary and Purpose of Protocol |
|---|---|
| | system, even longer during dry weather, can cause the wastewater to be septic and extremely odourous on arrival. Keeping odours under control is a challenge for staff at Gold Bar WWTP, as millions of litres of wastewater is treated every day.<br><br>• Main sources of odours are identified in this protocol and procedures identified for minimizing them.<br>• Communications with key community stakeholders and AEPA are identified. |
| 8. Ambient Air Monitoring and Reporting | EPCOR continues to be an active member of the Strathcona Industrial Association (SIA), an organization of local major industries dedicated to addressing common concerns like air quality. Membership in the SIA provides EPCOR access to the association's network of air monitoring stations. Two SIA stations are located in close proximity of Gold Bar WWTP. There is also a new EWS station:<br><br>• SIA Gold Bar Monitoring Station: 105 A Avenue and 47 Street<br>• SIA Beverly Monitoring Station: 114 Avenue and 38 Street<br>• EPCOR installed a new ambient air monitoring station located approximately 75 meters south of the Gold Bar WWTP in 2022.<br><br>Any exceedances of Alberta Air Quality guidelines are reported to AEPA. The overall monitoring results also help in maintaining the performance of the WWTP and nearby WWC sources. |
| 9. Effluent Toxicity Testing Protocol | The Gold Bar Wastewater Laboratory arranges for acute and chronic toxicity testing of the final effluent post-UV treatment to ensure that effluent released into the environment does not result in measurable toxic effects to the organisms indigenous to NSR.<br><br>• If the tested samples affect mortality, reproduction or growth of any of the organisms used for acute or chronic toxicity testing, EPCOR will report the result to AEPA as a notification, and resample and repeat testing as soon as possible. |
| 10. Treated Effluent Reuse Protocol | EPCOR operates a reclaimed water facility for supply of high quality, ultra-filtered final effluent to the |

| WWTP Protocol | Summary and Purpose of Protocol |
| --- | --- |
| | Suncor Edmonton Refinery located within Strathcona County. The current membrane ultrafiltration system is sized for a nominal operating capacity of 15 ML/day and a peak capacity of 20 ML/day. The distribution pipeline to Strathcona County has a rated capacity of 40 ML/day for future reclaimed water growth within the County.<br><br>• The quality of the water is subject to the conditions agreed under contract among the various parties, subject to the previous approvals issued by AEPA.<br>• Re-use water minimizes the need to take fresh water from the NSR for industrial purposes. |
| 11. Monitoring Protocol | The Gold Bar WWTP routinely monitors several parameters for efficient and effective operations in meeting the Approval to Operate.<br><br>• An extensive sampling and testing program is developed to ensure all process units are monitored on a frequent basis.<br>• The wastewater plant effluent monitoring data is submitted as part of the Annual Wastewater Report.<br>• Process instrumentation is also used as a “real- time” measurement of process performance and allows operations staff to respond effectively to process control deviations or process upsets due to toxic discharges in the collection system. |
| 12. Digester Gas Protocol | Gold Bar WWTP has eight mesophilic anaerobic digesters that are operated at 37ºC to produce approximately 40 ML/day of digester gas (i.e. biogas) from the digestion process. Depending on ambient air temperatures, a portion of the biogas is used for plant facility and process heating via a boiler fed hot water distribution system, and digester mixing, with the remaining unutilized biogas flared to atmosphere.<br><br>• Two flares are available for service: a high efficiency flare (North) and a full biogas capacity candlestick flare (South) for failsafe operation.<br>• EWS tries to maximize the use of the high efficiency flare during peak flaring activities to |

| WWTP Protocol | Summary and Purpose of Protocol |
|---|---|
| | minimize SOx and NOx emissions from the plant. |
| 13. Laboratory Accreditation Program | The Wastewater Laboratory, currently at the Gold Bar WWTP is accredited to ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation (CALA) for analyses within the laboratory's scope of accreditation. EWS is in the process of consolidating Edmonton lab functions at our Rossdale site within the existing laboratory building. This will occur in late 2024.<br><br>• As part of the accreditation requirements, the Laboratory Quality Management System and the laboratory technical testing capabilities are assessed by CALA every two years to ensure conformance of the lab to the ISO/IEC 17025 standard.<br>• Where a test is required by the Approval to Operate but is not accredited at the Wastewater Laboratory, the samples requiring this parameter are analyzed by an external laboratory that is accredited to ISO/IEC 17025 for that parameter. |
| 14. Wet Weather Operations Protocol | The Enhanced Primary Treatment (EPT) system is built at the Gold Bar WWTP as part of EPCOR WWC's Combined Sewer Discharge Strategy (CSDS) and Total Loadings Plan. The EPT increases the capture and treatment of Combined Sewer Discharge (CSD) that otherwise is discharged untreated or partially treated to the NSR. The increased treatment reduces loading of the following to the NSR:<br><br>• Solids<br>• Bacteria and Viruses<br>• Phosphorus and Nitrogen |
| 15. Capital Construction, Commissioning and Performance Testing Protocol | EPCOR makes all effort to implement capital projects without reducing the treatment capacities of the Gold Bar WWTP. As future capital projects are implemented at the Gold Bar WWTP, EPCOR may require reduction in target operating capacities. The main objectives for any temporary reduction in target operating capacities is to reduce risk of personnel safety incidents through the effective positive isolation of major process units, and ultimately |

| WWTP Protocol | Summary and Purpose of Protocol |
|---|---|
| | protect the Gold Bar facility from flooding during wet weather events.<br><br>• Should future capital projects impact the target operating capacities at Gold Bar WWTP, EWS will notify AEPA on the capacity impacts prior to execution of the construction phase of the project.<br>• Variance from the reduced target operating capacity is reported in accordance with the Reporting and Notification section of the Communications Protocol. |
| 16. River Load Calculation Protocol | A key approach of AEPA for Cumulative Effects Management (CEMS) is to implement a total loadings framework in which pollutant loads from significant points of discharge to a receiving watercourse are monitored for main stem reaches in a river basin.<br><br>• For NSR, AEPA has WWC, Arrow Utilities and Gold Bar WWTP monitor for select pollutant load parameters on a daily basis for discharges to the NSR.<br>• For Gold Bar WWTP, daily loads (kg/d) are calculated based on effluent concentration measurements and measured flow rates. Daily loads are calculated for TSS, CBOD, TP, NH3, TKN, NO2/NO3, and E. coli.<br>• Total Loadings summary report for key stakeholders in metro-Edmonton. This document forms the basis for CEMS by AEPA for EPCOR WWC, Gold Bar WWTP and Arrow Utilities. |
| 17. Wastewater Treatment Certified Operator Requirements | EPCOR maintains a twenty-four (24) hour Operations Shift Crew that operates the Gold Bar WWTP and the associated facilities, including CBBRRF.<br><br>• EPCOR maintains a minimum of two (2) Level IV WWT Operators in either Management or as WWTP Operations Foremen to ensure that this level of WWT Operator provides strategic process direction for the operation at the Gold Bar WWTP<br>• EPCOR maintains a minimum of three (3) Level III WWT Operators on the Shift Crews to ensure that this level of WWT Operator provides direct process monitoring, |

| WWTP Protocol | Summary and Purpose of Protocol |
|---|---|
| | supervision and operation at the Gold Bar WWTP<br>• EPCOR's practice is to schedule, at a minimum, a Level III WWT Operator in charge of each shift. |

## 6.2. Wastewater Collection System Operations Plan

EWS is also required to maintain and update a Wastewater Collection System Operations Plan as per the operating Approval. On or before May 1 of each year EWS submits a copy of the current Wastewater Collection System Operations Plan. A summary of any proposed changes to the Operations Plan is included in this annual submission.

This plan is summarized in Table 3 Wastewater Collection System Operations Plan below.

**TABLE 3 WASTEWATER COLLECTION SYSTEM OPERATIONS PLAN**

| WWC Protocol | Summary and Purpose of Protocol |
|---|---|
| (a) Wastewater Collection Certified Operator Requirements | At all times the operation of the wastewater collection system shall be performed by or under the direction of the following number of persons who hold valid certificates of qualification of the following types at the following minimum levels:<br>• one operator with a Level IV Wastewater Collection (WWC) Certificate, and<br>• two operators each with a Level III or higher WWC Certificate, and<br>• one operator with a Level II or higher WWC Certificate in charge of each shift.<br>This protocol ensures that EWS follows these approval requirements. |
| (b) Wastewater Collection System Monitoring Protocol | The overall purpose of this Wastewater System Monitoring Protocol is to collect flow and/or water quality data from;<br>• Representative Combined Sewer Overflow (CSO) sites and storm outfalls during the spring runoff period<br>• Representative CSOs and storm outfalls for the majority of events (90% CSO events and 90% of wet weather events) through the use |

| WWC Protocol | Summary and Purpose of Protocol |
|---|---|
| | of composite sampling during the summer and fall period (May to December)<br>• Selected creeks and tributaries<br>• Wastewater Treatment Plants final effluent channel; and<br>• Open (active) interconnection sites. |
| (c) Interconnection Identification and Control Strategy | This strategy or procedure describes the methods and processes used to carry out monitoring, data collection, analysis, and reporting for open interconnection sites as required by the operating Approval. An Interconnection is a location within the sewer systems where the flow may pass from one sewer system to another. Interconnections generally provide overflow relief to combined sewers in the event of sewer backup, thus minimizing basement flooding. These interconnections generally discharge excess flows to storm sewers and produce much smaller volumes than CSOs in Edmonton. |
| (d) Wastewater Collection System Chemical Usage Protocol | The overall purpose of the Wastewater Chemical Usage Monitoring Protocol is to collect the procedures and forms to ensure approved chemicals used in the maintenance of the collection system are tracked, provide mechanisms for trial of new products as authorized in writing by the Director and to ensure conformance with the operating Approval.<br><br>EWS will ensure that only the following chemicals are used in the collection system on a regular basis:<br><br>• Reward<br>• Potassium Permanganate<br>• EnvironMelt Ice Melter<br>• Bright Dyes Tracer Dye<br>• Biomaxx Oxyn8<br><br>Other chemicals may be used in the wastewater collection system on a trial basis, as authorized by Alberta EPA. |
| (e) Odour Control and Management Protocol | This protocol is made up of an 11-step process:<br><br>1. EWS will respond to and investigate odour complaints or inquiries involving the sanitary and storm collection.<br>2. Odour complaints regarding the storm and sanitary collection system may be generated from Customers directly reporting odour |

| WWC Protocol | Summary and Purpose of Protocol |
|---|---|
| | complaints to EPCOR or from municipal representatives, or from other regulators.<br>3. The main purpose of odour complaints investigation is to identify possible sewer odour sources and ensure continued operation of the sanitary collection system through the identification of operational issues.<br>4. Residential inside and outside odour complaints involving the sanitary and storm collection system are forwarded to Drainage Services Environmental Inspection group to investigate and respond.<br>5. Odour complaints related to commercial and industrial establishments related to the sanitary and storm collection system will be investigated by EWS pursuant to Drainage By-laws.<br>6. The investigations listed in (4) and (5) and associated records are documented within internal EWS software systems.<br>7. In the event that a sewer odour is identified to have been caused by an obstruction in the collection system operational maintenance will be initiated. Operational maintenance intervals will be investigated for infrastructure and may be adjusted based on reoccurrence of odour or obstruction.<br>8. Where possible EPCOR Water Services will attempt to identify the suspected source of non-collection system related odour<br>9. A notification will be sent to the Gold Bar WWTP for odours that have been identified as having been suspected to have been caused by the plant.<br>10. A sample may be taken in circumstances where there is a suspicion of affluent in the storm collection system to rule out sanitary cross connection generated odours.<br>11. Based on engineering assessments and research, EWS will identify potential capital and operational projects to mitigate sewer odour in alignment with capital planning. |
| (f) River Water Quality Monitoring Protocol | The overall purpose of River Water Quality Monitoring is to evaluate how water quality in the North Saskatchewan River (NSR) is affected by the release of material from EWS stormwater and wastewater systems. |

| WWC Protocol | Summary and Purpose of Protocol |
|---|---|
| | This procedure covers the collection of water quality data from the North Saskatchewan River. The NSR will be routinely monitored at four existing river water intakes: E.L. Smith Water treatment plant (WTP), Rossdale WTP, Suncor and Dow Chemical. There will be ten (10) sampling events per year. Samples will preferentially be collected during the open water period (April – October) with more frequent sampling during spring melt and summer wet weather events. |
| (g) River Load Calculation Protocol | This protocol provides a consistent method for calculation of the volumes and contaminant loadings for discharges to the North Saskatchewan River (NSR) from the EWS stormwater and sewer system, provides a reasonable method for estimating missing flow and concentration data, and provides a tool that will make revisions or analysis easier to accommodate. |

## 6.3. EPCOR and ARROW/ACRWC 2022-2040 Edmonton Total Loading Plan

EPCOR's wastewater collection and treatment systems are set out in the *EPEA* Approval (#639-03-07) issued by Alberta Environment and Protected Areas (AEPA) in 2015. This 10-year approval sets monitoring requirements for both the combined sewer systems and the GBWWTP discharges. The approval specifically requires that EPCOR implement a Total Loadings Management Plan (the "Total Loadings Plan") in coordination with the ARROW Utilities and as authorized in writing by AEPA. Total loadings refers to the annual mass of total suspended solids (TSS) released to the North Saskatchewan River from all sources and includes loads from the GBWWTP effluent and bypasses, combined sewer overflows and the storm sewer system. The guiding principle of the Total Loadings Plan is to have no net increase in TSS loadings to the North Saskatchewan River in order to achieve the long-term goal of no net degradation of the North Saskatchewan River relative to the 2000-2008 time period.

EWS is committed to preventing pollution and reducing our environmental impacts. This 2022-2040 Total Loading Plan (TLP -

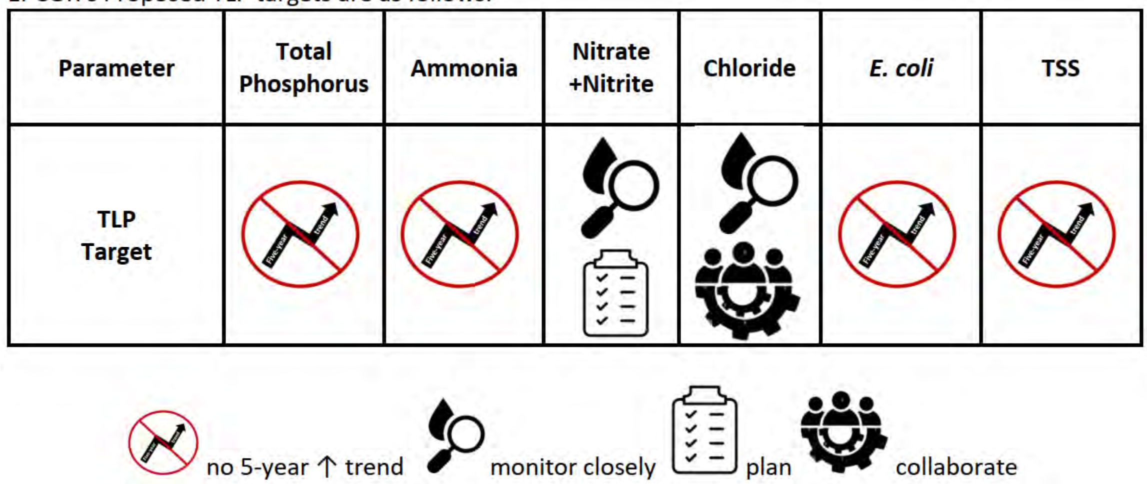
Appendix E EPCOR and ACRWC's 2022-2040 Edmonton Total Loading Plan.) replaces the 2010-2019 TLP and builds on the results and learnings from that plan. The proposed 2022-2040 TLP expands the parameter list from total suspended solids to include nutrients (ammonia, phosphorus, nitrate plus nitrite), chloride, and E. coli. These parameters are ones for which a Surface Water Quality Management Framework (https://open.alberta.ca/publications/north-saskatchewan-region-surface-water-quality-management-framework, Alberta Environment and Protected Areas 2023) has been developed and where triggers are set on current water quality; the intent is no further degradation of water quality in the NSR. These parameters are also ones that EWS has long-term loading data available.

In the EWS and ACRWC approvals, approval holders are directed to collaborate to implement a Total Loadings Plan (TLP). The first TLP was developed for the 2010-2019 period and the final annual TLP report was submitted to Alberta Environment and Protected Areas (AEPA; formerly Alberta Environment and Parks) in 2020. In that update, EWS and ACRWC indicated that they would be submitting an updated TLP. This joint 2022-2040 Total Loading Plan summarizes loads of TSS, nutrients (ammonia, TP, and nitrate plus nitrate), chloride and E. coli from the stormwater collection system, water treatment plant waste streams, and the GBWWTP and ARROW WWTP to the NSR for three periods: historical (2010-2019); recent (2020 and 2021); and future (2022-2040).

To develop the plan, EWS quantified current daily loads of the above parameters from its discharges (drainage collection system, water treatment plant residuals, wastewater treatment plant) and the Alberta Capital Region Wastewater Commission wastewater treatment plant's effluent, and forecasted how loads may change due to implementation of LID. EWS is planning significant investments in LID infrastructure and other stormwater management strategies as part of the Stormwater Integrated Resource Plan. These investments will work to ensure risk of flooding is reduced and as a co-benefit, loads to the river are reduced. As such, LID implementation targets and subsequent load reduction benefits are integral to the TLP. This TLP is also guided by EWS Integrated Watershed Management Strategy, which assess effects on the NSR and its tributaries at both the near-field and regional scale. This TLP is narrower in scope and is focused on achieving regional outcomes as established downstream of Edmonton.

Annual average load reductions are projected for ammonia, E. coli, and total suspended solids by 2040. Total phosphorus loads will stay the same. Chloride (sources which include salt application to roads and human waste) and nitrate plus nitrate (almost all wastewater source) will likely increase by 2040. Strategies to mitigate these increased loads such that triggers are not exceeded downstream will be evaluated as the TLP is implemented.

EPCOR's Proposed TLP targets are as follows:




The entire TLP is presented in Appendix E EPCOR and ACRWC's 2022-2040 Edmonton Total Loading Plan.

## 6.4. Emergency Response Plans

EPCOR reviews and updates each Emergency Response Plan (ERP) for the Gold Bar WWTP and the wastewater collection system on a three-year cycle. Reviews and updates are performed by the Operations or Maintenance groups at each site with assistance from EWS Safety, EWS Emergency Response and Corporate Health and Safety.

Emergency Management is defined as an ongoing process to prevent, mitigate, prepare for, respond to and recover from an incident. EWS has identified risks or situations that could lead to disruptions, loss, an emergency or crisis. In order to prepare for these situations, documentation including the Business Continuity Plan (BCP), Emergency Response Plans (ERPs) and Standard Operating Procedures (SOPs) have been developed to respond to incidents and emergencies, to prevent and mitigate the risks that may be associated with them.

EWS reviews and, where necessary, revises its emergency preparedness and response procedures. This is done on an three-year rotation at a minimum, or as required, and in particular, after the occurrence of major incidents or emergency situations. The identified shortcomings and opportunities for improvement are used for the continual improvement of the iMS. In addition, review of the Hazard Registry by Health and Safety and/or Environmental Aspect Registry may require an update to the emergency response procedures.

Post exercise debrief meeting minutes is prepared that includes action items to address the findings of the exercise where applicable.

The list of ERP’s for the Edmonton Wastewater System are consistent with requirements as set out in Table 1.4 Operations Program Contents of the Standard for Municipal Wastewater (Alberta Environment and Protected Areas, 2021). See Table 4 Gold Bar Wastewater Treatment Plant ERP's and Table 5 Edmonton Wastewater Collection System ERP's below.

### TABLE 4 GOLD BAR WASTEWATER TREATMENT PLANT ERP'S

| Name |
| --- |
| 1 - GB Documentation Distribution List.docx |
| 2 - GB Notification Procedure - Modified.docx |
| 4 - EWTP Fire or Explosion - FacilityEWTP.docx |
| Business Continuity Plan BCP - Gold Bar WWTP.docx |
| EWS Biological Hazards _ ERP.docx |
| EWS-AB-GB-ERP-1-Document Distribution List.docx |
| EWS-AB-GB-ERP-2-Notification Procedure.docx |
| EWS-AB-GB-ERP-4-Biosolids Spill.docx |
| EWS-AB-GB-ERP-4-Clover Bar Emergency Response.docx |
| EWS-AB-GB-ERP-4-Emergency Alarm Response.docx |
| EWS-AB-GB-ERP-4-Environmental Release.docx |
| EWS-AB-GB-ERP-4-Fire or Explosion Facility.docx |
| EWS-AB-GB-ERP-4-Plant Security and Delta V Cyber Security.docx |
| EWS-AB-GB-ERP-4-River Flooding.docx |
| EWS-AB-GB-ERP-4-Serious Injury Illness Fatality.docx |
| EWS-AB-GB-ERP-4-Workplace Violence.docx |
| EWS-AB-GB-ERP-5-Emergency Support.docx |

### TABLE 5 EDMONTON WASTEWATER COLLECTION SYSTEM ERP'S

| Name |
| --- |
| EM -10F Train Derailment Protocol1.doc |
| Form 122 Drainage Operations Annual Schedule for Shift Supervisor.doc |
| Form 123 Schedule (Annual) for Standby Minor Repair Staff.doc |
| EDS-LST-OHS-Site Emergency Information - Customer Construction.docx |
| EDS-LST-OHS-Site Emergency Information - Tunnels.docx |
| EDS-PRO-OHS- Shelter in Place ERP -Customer Construction.docx |
| EDS-PRO-OHS- Tornado ERP -Customer Construction.docx |
| EDS-PRO-OHS-Fire Evacuation ERP -Customer Construction.docx |
| EDS-PRO-OHS-Fire Evacuation ERP -Tunnels.docx |
| EDS-PRO-OHS-Serious Injury and Illness ERP - Tunnels.docx |
| EDS-PRO-OHS-Serious Injury and Illness ERP -Customer Construction.docx |
| EDS-PRO-OHS-Shelter-in-Place Tornado ERP - Tunnels.docx |
| EDS-PRO-OHS-Suspicious Item Bomb Threat ERP - Tunnels.docx |
| EDS-PRO-OHS-Trench Collapse ERP -Customer Construction.docx |
| EDS-PRO-OHS-Tunnel Collapse ERP - Tunnels.docx |
| EDS-PRO-OHS-Tunnel Flood ERP - Tunnels.docx |
| EDS-PRO-OHS-Workplace Violence ERP - Tunnels.docx |
| EDS-PRO-OHS-Workplace Violence ERP -Customer Construction.docx |
| EDS-ERP-Drainage Environmental Flooding ERP.docx |
| EDS-ERP-OPS-Asset-Related Flooding.docx |
| ERP_Trunks_Draft.pdf |

# 7. Public and First Nations Consultation Plans

## 7.1. Ongoing Public Engagement Activities

EWS and the communities around the Gold Bar Wastewater Treatment Plant created a public engagement framework, which outlines the different levels of public engagement and how EWS will get feedback or work with the community, special interest groups and recreational users. There are several ongoing initiatives:

Community Liason Group

- EWS hosts a Community Liaison Group (CLG) specific to the ongoing operations of the Gold Bar Wastewater Treatment Plant for over ten years. The CLG provides an opportunity for members to learn and give feedback on our work to provide reliable and high-quality water and wastewater services. The CLG is a very important link to the communities surrounding the Gold Bar WWTP. Members of the CLG are in the group for two years, and the group is comprised of 10 to 15 volunteers. The current CLG started in 2019 and meets several times a year.

Community Events

- EWS also attends community events, such as Highlandia and the Greater Hardisty Community Day, when possible to share educational information about wastewater treatment, talk with community members about our projects and operations, and answer any questions they may have.

Plant tours

- EWS has a longstanding partnership with RiverWatch to support student learning. Over the past 18 years, more than 50,000 students have toured through our Gold Bar plant. In the summer of 2018, Gold Bar was part of RiverWatch's new River Ambassador Program, which brought community members by our plant as part of an on-water learning experience.

## 7.2. Public Consultation Plan for Approval Renewal

EWS believes in listening to and engaging stakeholders. Community input and involvement is important to our decision making. We believe in working towards solutions together and consulting with stakeholders on initiatives. EWS strives to be a neighbour of choice so that stakeholders welcome and recommend us in their communities.

In accordance with *EPEA*, EWS will undertake a public involvement program (PIP) with those potentially directly affected by, and receiving water from, the Edmonton wastewater system. EWS considers public involvement to be an important part of our operations and is committed to conducting an open and transparent consultation process throughout the duration of the Renewal process. Public involvement activities for the renewal process and will continue until a new approval is received from AEPA.

This operating Approval renewal process has several opportunities for public feedback. These steps in the approval renewal process and our anticipated timelines are as outlined in Table 6 below:

### TABLE 6 EPEA APPROVAL RENEWAL PROCESS

| | Regulatory Process | Anticipated Timing |
|---|---|---|
| 1 | **Application Filed**<br>EWS files an application for approval. | September 11, 2024 |
| 2 | **Notice of Application**<br>A notice advising that the application has been submitted and inviting public feedback is posted:<br>online at epcor.com;<br>on AEPA's website;<br>in Edmonton newspapers; and,<br>direct email to community liaison group. | October to November 2024 once given direction from AEPA |
| 3 | **Public Review**<br>Anyone directly affected by the application can obtain a copy of the application for review and submit written statements of concerns to AEPA for response by EWS. | 30 Day Comment Period<br>October to November 2024 |
| 4 | **Alberta Environment and Protected Areas Review**<br>AEPA reviews the application and any statements of concern that were submitted. | October to December 2024 |
| 5 | **Alberta Environment and Protected Areas Decision**<br>AEPA decides whether to issue the approval and what conditions to attach to the approval. Parties who submitted a statement of concern notified of AEPA's decision and the timelines to appeal that decision. | January 2024 to May 31 2024. |
| 6 | **Appeals**<br>Directly affected members of the public who have submitted a statement of concern can appeal AEPA's decision to the Environmental Appeals Board (EAB). | If needed. |

EWS is committed to establishing open and effective lines of communication with stakeholders throughout the planning and execution stages of the project. As such, the main public engagement objectives for the project include:

- Informing stakeholders about the project and potential impacts through clear, understandable communications.
- Providing stakeholders with opportunities to ask questions about the project and have those questions answered.
- Providing stakeholders with opportunities to express concerns and raise issues with respect to the project and to have those concerns and issues addressed.
- Documenting any concerns or issues raised.

- Share the input received with AEPA for consideration during their review of EWS's application.
- Reporting back to stakeholders as the project progresses on how their feedback was used by the project team.

The stakeholder audiences that have been identified for this project, along with the proposed engagement activities associated with each of these audiences are included in Table 7 Stakeholder audiences for Approval Renewal Application below.

### Table 7 Stakeholder audiences for Approval Renewal Application

| Audience | Activity |
|---|---|
| Government Agencies | • AEPA is the Regulatory Agency receiving and processing application. No federal agency required to be consulted or engaged.<br>• Inform City of Edmonton |
| Elected Officials | Councillor briefs |
| Indigenous Nations and Communities | Pre Consultation Application to be determined if required. See section below on First Nations consultation. |
| Edmonton Customers | Newspaper advertisement, epcor.com content |
| ARROW Utilities | Letter and Notice of Application |
| EPCOR Employees | EWS News articles |
| Media | Reactive to any inquiries |

## 7.3. First Nations Consultation Requirement

EWS is committed to developing and strengthening meaningful and mutually-beneficial relationships with Indigenous Nations, communities, organizations, and businesses. These relationships allow us to do our work in a good way, respecting the rich history of the lands we operate on and incorporating Indigenous perspectives across all lines of business

EWS will initiate a Pre-Consultation assessment request as part of this application if necessary. The Wastewater system activity is located on a combination of privately owned land, public lands owned by the City of Edmonton, and possibly some federal lands via wastewater delivery to and from the ARROW WWTP outside City of Edmonton boundaries. The physical wastewater treatment plant is wholly located within the City of Edmonton on EWS owned land. Plants are currently in operation and will continue indefinitely, as such no activity start and end dates are given in the request.

EWS plans to engage a consultant to lead the ACO Pre-Consultation Assessment Request process in accordance with the Government of Alberta's guidelines and procedures on Consultation with First Nations on Land and Natural Resource Management (GOA Indigenous consultation procedures, December 2019 & GOA Indigenous Consultation Guide, June 2022).

EPCOR's Indigenous Peoples Policy and corporate partners engagement approach includes the following guiding principles:

- Build Relationships: EPCOR commits to fostering and sustaining strong relationships with Indigenous Peoples .
- Engage Meaningfully: EPCOR seeks to engage early, meaningfully and in good-faith on projects that may impact cultural practices or lands.
- Value Indigenous Perspectives about Ecosystems: in alignment with the Health, Safety and Environment (HSE) Policy, EPCOR is committed to preventing pollution and reducing environmental impacts.
- Build Internal Understanding: EPCOR commits to providing employees with skills and knowledge-based training and initiatives in intercultural understanding.
- Support Indigenous Business Development: EPCOR seeks to develop mutually beneficial business relationships with Indigenous Nations, communities, and businesses where it operates.
- Advance Equitable Employment Opportunities: EPCOR seeks to ensure that Indigenous people have equitable access to jobs, and that our workforce reflects the Indigenous population in the regions where we operate.
- Create an Inclusive Workplace: In alignment with the Respectful Workplace Policy, EPCOR seeks to create an inclusive workplace where Indigenous employees feel accepted, supported, respected and heard.
- Develop Community Initiatives and Partnerships: EPCOR commits to working in partnership with Indigenous Peoples to create and realize opportunities with them in training and education, employment and community development.

The ACO Pre-Consultation Assessment Request may include:

- Land title searches and identification of any reserve lands in relation to the Project
- Identification of interested Indigenous communities, organizations, and groups
- Preparation of the Project information mailout packages for ACO purposes
- Preparation of GIS mapping and Shapefiles per ACO requirements
- Preparation of Water Act (RSA 2000, c. W-3) Supplemental Form, as required by ACO
- Preparation of Indigenous Notification Letter templates, as required by ACO ACO
- Pre-Consultation Assessment Request submission to identify the consultative groups, if directed by ACO

The main components of the submission will include a Project Information Package and associated overview maps.

# 8. Environmental Monitoring Summary

The Operating approval requires various environmental monitoring activities to be performed around the Gold Bar WWTP and the wastewater collection system. The next few sections are summaries of: ambient air monitoring from a new air quality monitoring trailer, an assessment of these results, public odour complaints, approval contraventions and reports, and a summary of the biosolids application program.

## 8.1. Summary of Ambient Air Monitoring

In alignment with EWS's long-term plans and commitment to continued investment in odour mitigation and reduction, we measure air quality near the Gold Bar Wastewater Treatment Plant at the Gold Bar Park Ambient Air Quality Monitoring Station (AAQMS). The operating approval requires that the AAQMS be installed between the Gold Bar Wastewater Treatment Plant and surrounding community, i.e. outside the fenceline. As such, proposed locations for the AAQMS near the Gold Bar plant were vetted with the community, and the final location was based on community feedback and the assessments of a third party consultant specializing in odour dispersion modeling.

The AAQMS was commissioned as of June 30, 2022. The AAQMS monitors and collects data for $H_2S$, $NO_2$, $SO_2$, temperature, wind speed, and wind direction. On January 13, 2023, a Letter of Authorization was provided to EWS to temporarily waive the requirement for 7-day letters for $H_2S$ exceedances at the AAQMS for 2023, as long as the air pollution control systems were in operation. An additional letter was provided on December 18, 2023 to extend the waiver until May 1, 2025. EWS hires a 3rd party contractor to operate and maintain the AAQMS, report exceedances, and complete reporting requirements as per the AEPA *Air Monitoring Directive*. The Ambient Air Quality Monitoring Station that EPCOR installed is located adjacent to Gold Bar Park Road and east of 50 Street as shown in Figure 10.

**FIGURE 10 LOCATION OF AAQMS SOUTH OF GOLD BAR WWTP**


Prior to the AAQMS operation, ambient air quality was monitoring using a handheld low-range $H_2S$ meter. Daily readings were taken in eight locations along the fence line of the Gold Bar WWTP. This practice has been discontinued with the operation of the AAQMS.

Air Quality Monitoring reports from this station can be viewed online at https://www.epcor.com/products-services/infrastructure/construction-projects/gold-bar-wastewater-treatment-plant/Pages/air-quality-monitoring.aspx.

EWS is also a member of the Strathcona Industrial Association (SIA) Ambient Air Monitoring Network. The SIA is a multi-stakeholder organization that conducts air, water, and land monitoring in the Strathcona Industrial area. EWS has been a member of the SIA since 1999. There are an additional five regional SIA ambient air quality monitoring stations, with data available at https://sia.ab.ca/.

## 8.2. Assessment of Air Quality Monitoring Results

Table 8 shows the number of 1-hour and 24-hour exceedances of the Alberta Ambient Air Quality Objectives (AAAQO) for $H_2S$ as measured at the Gold Bar AAQMS. The 1-hour objective for $H_2S$ is 10 ppb and the 24-hour objective is 3 ppb. The majority of the exceedances tend to occur in early fall. During extended dry periods in late summer H2S can build up in the collection system, any precipitation tends to flush this into the plant and increase air quality incidents. Many of the incidents occur in overnight periods when a combination of nocturnal inversions, low wind speeds, and the location in the river valley contribute to reduced dilution.

**TABLE 8 AAQMS 1-HOUR AND 24-HOUR H2S AAAQO EXCEEDANCES**

| Month | 2022 | | 2023 | | 2024 | |
|---|---|---|---|---|---|---|
| | 1-hr | 24-hr | 1-hr | 24-hr | 1-hr | 24-hr |
| January | | | 0 | 0 | 2 | 1 |
| February | | | 0 | 0 | 3 | 0 |
| March | | | 0 | 0 | 0 | 0 |
| April | | | 3 | 0 | 3 | 0 |
| May | | | 10 | 2 | 3 | 0 |
| June | | | 1 | 0 | 1 | 0 |
| July | 3 | 0 | 13 | 4 | 21 | 7 |
| August | 41 | 5 | 13 | 1 | N/A | N/A |
| September | 61 | 9 | 47 | 13 | N/A | N/A |
| October | 36 | 8 | 69 | 10 | N/A | N/A |
| November | 17 | 4 | 13 | 3 | N/A | N/A |
| December | 0 | 0 | 9 | 2 | N/A | N/A |
| **Total** | **158** | **26** | **178** | **35** | **32** | **10** |

There have been no exceedances of the AAAQO for $NO_2$ or $SO_2$ since the station has been in operation.

## 8.3. Summary of Public Odour Complaints

Table 9 shows the number of odour complaints received by the GBWWTP, and also the number of odour complaints where the GBWWTP is the confirmed source of odour based on wind direction, scrubber operation, odour modelling software, ambient $H_2S$ monitoring results, and plant operation/maintenance activities. The number of complaints peaked in 2018 during a scrubber outage, but has decreased significantly since that time. The GBWWTP has also installed and commissioned two new redundant scrubbers in 2024 that should maintain odour complaints at this low number.

### TABLE 9 SUMMARY OF PUBLIC ODOUR COMPLAINTS

| Year | Number of Odour Complaints | Number of Odour Complaints where Gold Bar WWTP is the Confirmed Source of Odour |
|---|---|---|
| 2017 | 11 | 8 |
| 2018 | 80 | 34 |
| 2019 | 26 | 14 |
| 2020 | 15 | 8 |
| 2021 | 13 | 4 |
| 2022 | 11 | 4 |
| 2023 | 10 | 3 |

EWS also tracks odour complaints across the wastewater collection system, and their location. In looking at the trend of odour complaints between 2018 when EWS assumed operation of the WWC system and 2023 there has been a significant downward trend in the number. Following in Figure 11 Odour Complaint Density in Wastewater Collection System 2018 and Figure 12 Odour Complaint Density Wastewater Collection System is a graphical trend of the reduction of complaints. The majority of the complaints are near the 1200 mm combined trunk systems, with the highest density near 87$^{th}$ avenue and the Faculte Saint Jean, the Capilano area, and the Yellowhead 110$^{th}$ street area. These areas saw complaints in the 57 to 145 per square km for 2018, but in 2023 have dropped to less than 50 per square km.

### FIGURE 11 ODOUR COMPLAINT DENSITY IN WASTEWATER COLLECTION SYSTEM 2018

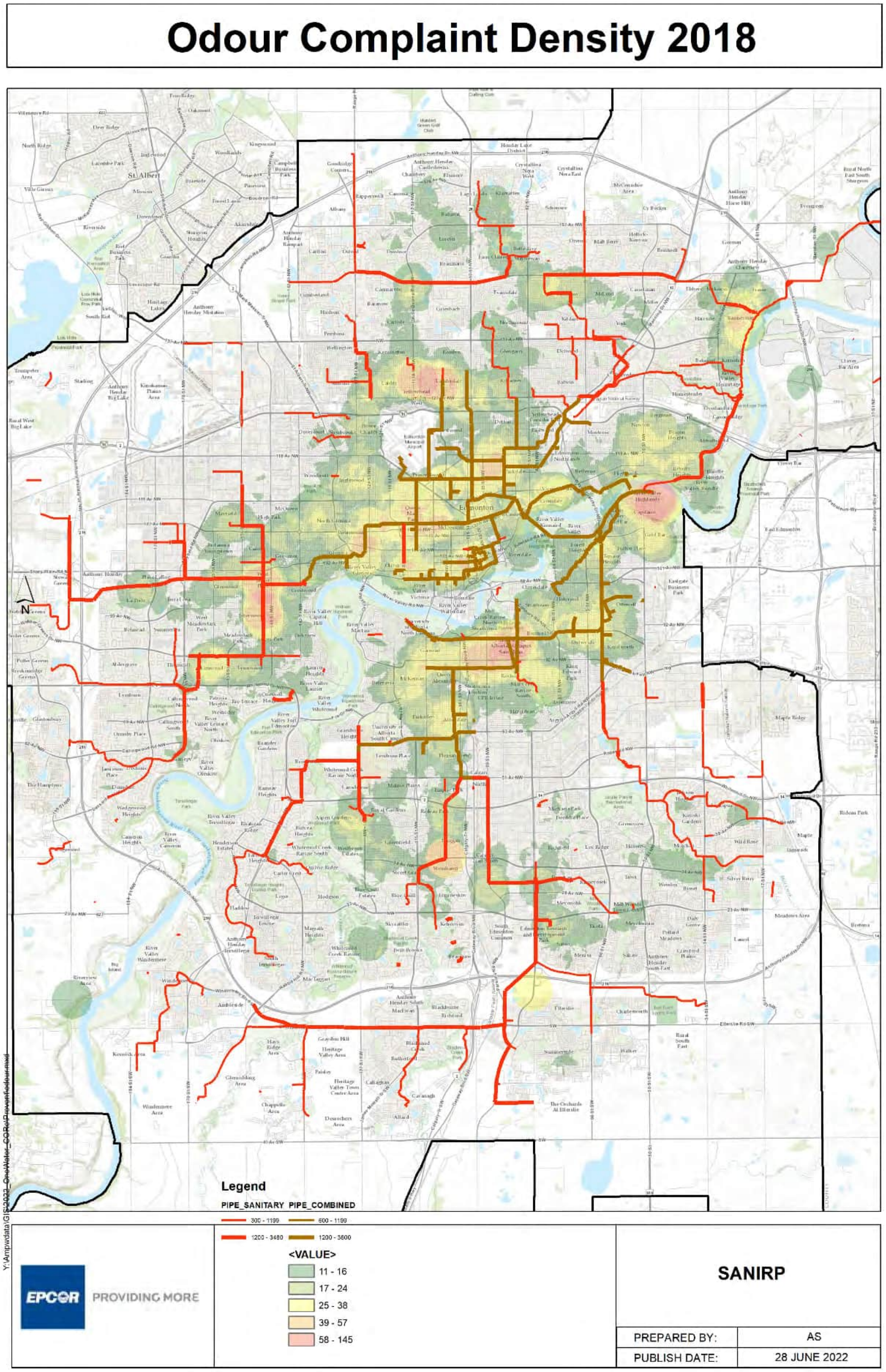
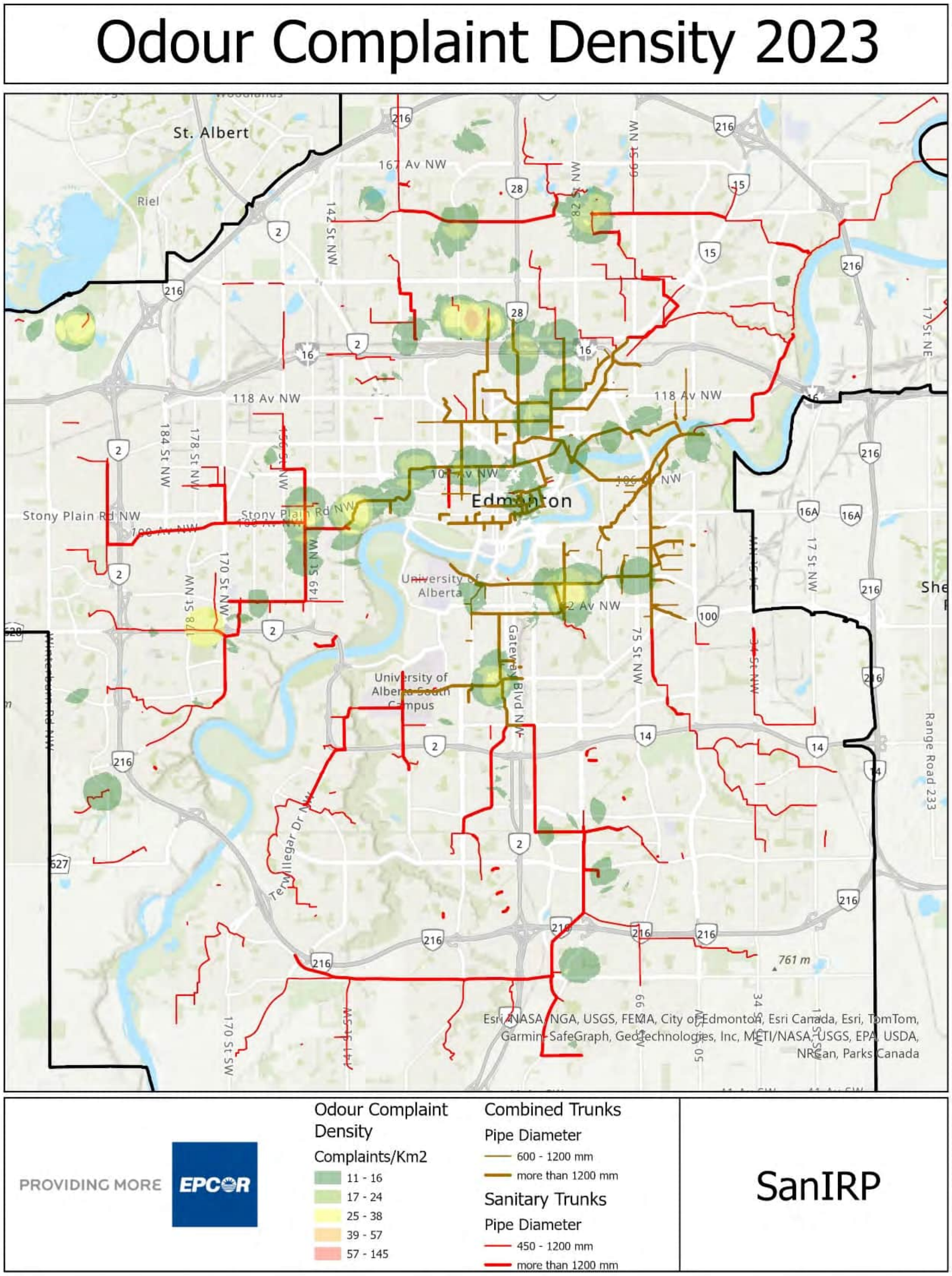


**FIGURE 12 ODOUR COMPLAINT DENSITY WASTEWATER COLLECTION SYSTEM 2023**



## 8.4. Summary of Wastewater Approval Contraventions

The *EPEA* operating approval also requires reporting of approval contraventions other than note above in Table 8 AAQMS 1-hour and 24-hour H2S AAAQO Exceedances . From the time period 2018 (when EWS assumed operations of the WWC system) to 2023, the following is a summary of the type of environmental incidents in the collection system that are considered approval contraventions:

- 5 permit exceedances such as turbidity/sediment flowing into the collection system in excess of allowed limits.
- 4 other reports including discovered soil contamination from existing activites, or erosion from pumping activities.
- 7 releases of cement based products.
- 2 releases of other chemicals into the collection system.
- 1 coolant release from a WWC vehicle .
- 2 small fuel (gasoline and diesel) releases.
- 2 other unknown hydrocarbon releases discovered in the collection system.
- 3 hydraulic fluid releases. These were all less than 20 litres.
- 1 motor oil contamination discovered in soil hydrovaced from a project site.
- 11 other releases, including concrete cuttings in water flowing into the collection system, hydro cracking fluid surfacing, and unknown objects.
- 1 biosolids release/application in excess of guidelines.
- 12 potable (chlorinated) water releases.
- 103 releases of raw or untreated wastewater from combined sewer overflows, pipe breaks, and surcharging from blocked lines.

The above listing only includes incidents for which EWS or one of its contractors was the operator. It does not include any incidents that were a result of the public releasing any substance into the WWC system. As a result of these incidents, EWS also received two Warning Letters during this 2018 to 2023 period:

- On August 9, 2022 EWS received a warning letter from Environment and Climate Change Canada for an unauthorized release of wastewater from Pump Station 103 in Edmonton (located at 15210-58 Avenue). The release from the pump station went into a nearby catch basin that then discharges to the NSR about 650 m along the storm line. About 500 m3 of untreated wastewater was estimated to be released.

- On October 4, 2022 EWS received a warning letter from AEPA for failing to take a grab sample and test for pH, BOD5, TSS, total phosphorus, and total ammonia nitrogen, which is required to be monitored during each discharge event at the unauthorized release point. This relates to an unauthorized release which occurred at a manhole located at the corner of 66 street and 38 avenue NW, Edmonton.

A year over year comparison is also shown in Figure 14 Wastewater Collection System Reportable Events 2018 - 2023. The environment events peaked in 2019, but saw a gradual and significant decline towards 2023. EWS has put forward significant resources and training for its operators and contractors in reducing environmental approval contraventions. The number peaked at 48 in 2019 and decrease to 12 in 2023.

For the WWTP for the time period from 2014 to 2023, the following is a summary of the 31 contraventions (some over lap with those listed in 8.3 Assessment of Air Quality Monitoring Results):

- One missed measurement of influent pH during a bypass event.
- Two SIA air quality stations measuring exceedance of H2S as a result of Gold Bar WWTP operations.
- Two ORP issues as noted below (Section 9)
- Two missed hand held daily measurements for H2S.
- Two Power outages resulting in UV not disinfecting effluent.
- One missed day for NO2 sampling for the air quality monitoring trailer.
- One biogas release during a capital upgrade project.
- Scrubber outage.
- UV system not engaged during a wet weather flow event.
- Glycol leak into ground from a underground piping system.
- 5 releases of partially treated biosolids.
- One release of chlorinated water to the NSR from a malfunctioning hydrant on the Gold Bar WWTP site.
- Two untreated wastewater releases.
- 9 events of missed sampling.

Figure 13 Wastewater Treatment Plant Reportable Events 2014 - 2023 shows the year over year trend in contraventions. The number peaked at 6 in 2014, and has generally been around 3 per year since that time.

A complete listing of the WWC and WWTP wastewater system reportable contraventions is listed in Appendix G Wastewater System Reportable Events.

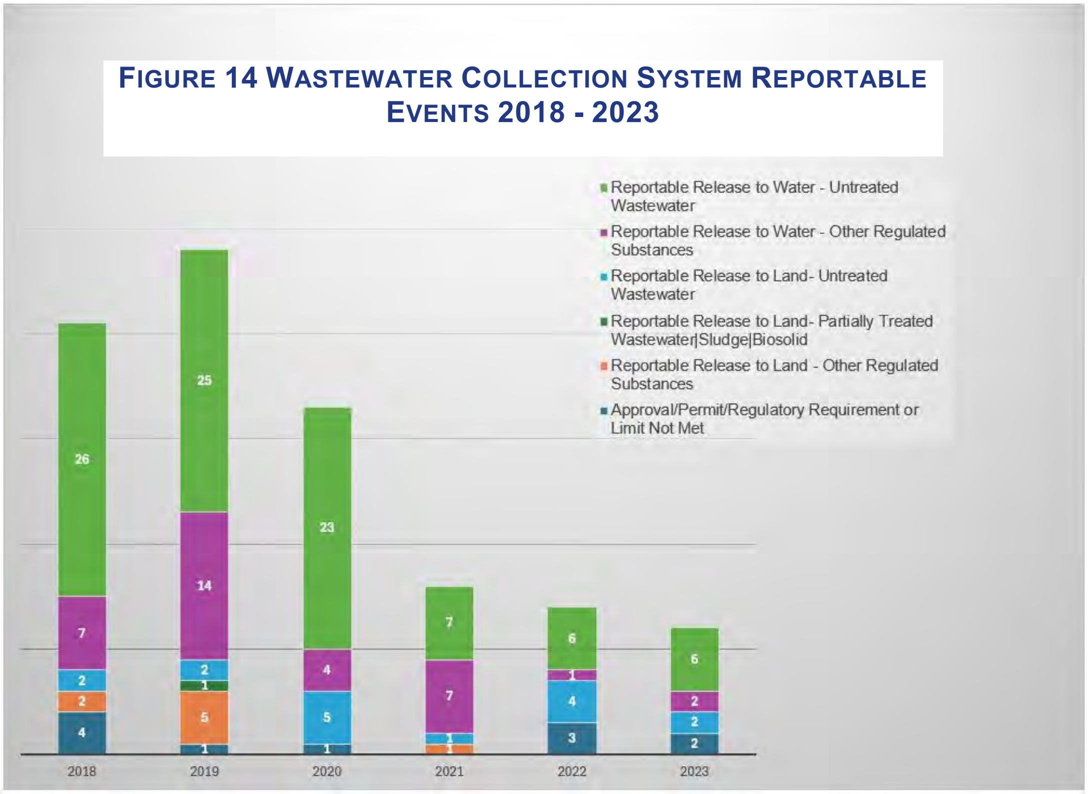


FIGURE 14 WASTEWATER COLLECTION SYSTEM REPORTABLE EVENTS 2018 - 2023
Reportable Release to Water - Untreated Wastewater
Reportable Release to Water - Other Regulated Substances
Reportable Release to Land- Untreated Wastewater
Reportable Release to Land- Partially Treated Wastewater|Sludge|Biosolid
Reportable Release to Land - Other Regulated Substances
Approval/Permit/Regulatory Requirement or Limit Not Met
26
7
2
2
4
25
14
2
1
5
1
23
4
5
1
7
7
1
1
6
1
4
3
6
2
2
2
2018
2019
2020
2021
2022
2023

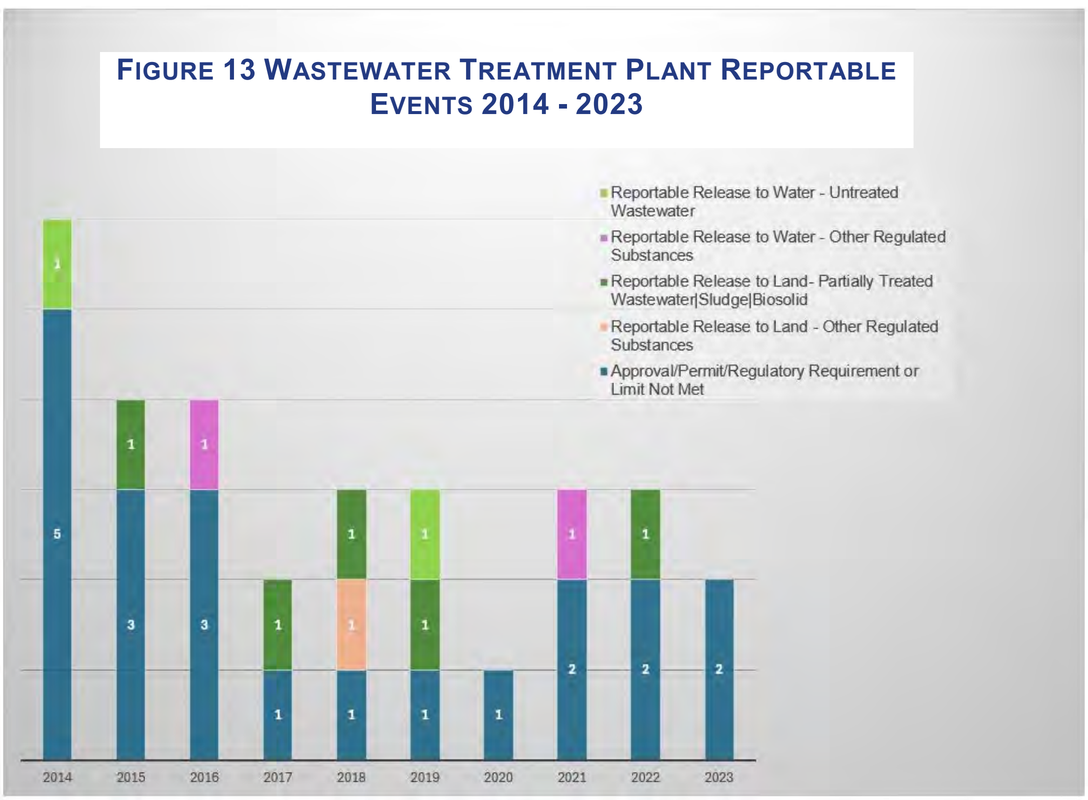


FIGURE 13 WASTEWATER TREATMENT PLANT REPORTABLE EVENTS 2014 - 2023
Reportable Release to Water - Untreated Wastewater
Reportable Release to Water - Other Regulated Substances
Reportable Release to Land- Partially Treated Wastewater|Sludge|Biosolid
Reportable Release to Land - Other Regulated Substances
Approval/Permit/Regulatory Requirement or Limit Not Met
1
5
1
3
1
3
1
1
1
1
1
1
1
1
1
1
2
1
2
2
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023

## 8.5. Summary of Biosolids Program

The GBWWTP, in partnership with ARROW implements a comprehensive regional Biosolids Management Plan. The digested wastewater sludge from the GBWWTP and ARROW WWTP is transported to the CBBRRF. It is stored in a series of large lagoons for further stabilization and thickening via gravity and the Dewatering Facility.

Thickened biosolids from CBBRRF are applied directly to local agricultural land during the growing season through the NutriGold program. The dewatered biosolids are also applied on agricultural and non-agricultural lands for beneficial purposes, such as mine reclamation. The provincial document, Guidelines for the Application of Municipal Wastewater Sludges to Agricultural Lands (2001), is followed to ensure that land application is an environmentally acceptable option for spreading the biosolids to agricultural lands.

Table 10 Biosolids Removed From the Clover Bar BRRF 2019 to 2023 on the next page provides a summary of the quantity of biosolids (both by weight and volume) removed from lagoons as per section 4.6.1 of the Approval to Operate No. 639-03-07 from 2019 to 2023. Over the past five years, a total of 127,202 dry tonnes of biosolids has been removed from the CBBRRF for beneficial reuse.

### TABLE 10 BIOSOLIDS REMOVED FROM THE CLOVER BAR BRRF 2019 TO 2023

| Year | Beneficial Application Use Method | Application Weight (dry tonnes) | Application Volume ($m^3$) |
|---|---|---|---|
| 2023 | Nutri-Gold (dewatered material) | 5,181 | 22,530 |
| | Nutri-Gold (thickened material) | 3,561 | 57,452 |
| | Agricultural Land Application (3rd party) | 6,372 | 106,177 |
| | Non-Agricultural Land Application | 3,945 | 16,959 |
| | **Total** | **19,059** | **266,938** |
| 2022 | Nutri-Gold (dewatered material) | 2,675 | 11,481 |
| | Nutri-Gold (thickened material) | 5,007 | 85,170 |
| | Agricultural Land Application (3rd party) | 7,797 | 131,229 |
| | Non-Agricultural Land Application | 4,305 | 17,500 |
| | **Total** | **19,785** | **245,380** |
| 2021 | Nutri-Gold (dewatered material) | 5,958 | 25,353 |
| | Nutri-Gold (thickened material) | 5,843 | 89,892 |
| | Agricultural Land Application (3rd party) | 12,947 | 199,185 |
| | Non-Agricultural Land Application | 6,015 | 25,596 |
| | **Total** | **30,763** | **340,026** |
| 2020 | Nutri-Gold (dewatered material) | 3,921 | 16,685 |
| | Nutri-Gold (thickened material) | 6,812 | 90,826 |
| | Agricultural Land Application (3rd party) | 10,414 | 138,853 |
| | Non-Agricultural Land Application | 5,997 | 25,519 |
| | Landfill (3E Project) | 2,250 | 4,500 |
| | **Total** | **29,394** | **276,383** |
| 2019 | Composting (City of Edmonton) | 1,537 | 6,148 |
| | Nutri-Gold (dewatered material) | 2857 | 11,428 |
| | Nutri-Gold (thickened material) | 14,944 | 213,486 |
| | Agricultural Land Application (3rd party) | 2,857 | 43,954 |
| | Non-Agricultural Land Application | 6,007 | 24,028 |
| | **Total** | **28,202** | **299,044** |

# 9. Wastewater System Performance Summary

The operating approval requires monitoring and reporting of several operational areas of the wastewater system. The following is a selected summary of major WWTP capital upgrade projects, wastewater effluent quality performance and wet weather events, total wastewater collection and treatment volumes, summary if air pollution control issues, and total chemical consumptions by process area (WWTP only).

Complete discussions of each of these areas are also supplied in Annual Reports to AEPA as required by Sections 6.3 of the Approval.

## 9.1. Summary of Completed Capital Projects Upgrades

Table 11 outlines the major capital projects undertaken over the past decade, focusing on construction/rehabilitation and improvements in odour control, air quality monitoring, solids handling, and secondary treatment capacity. This table also summarizes notable events.

**TABLE 11 GOLD BAR WWTP CAPITAL UPGRADES HIGHLIGHTS 2015-2023**

| Year | Capital Upgrades and Notable Events |
|---|---|
| 2023 | • Construction/rehabilitation: Digester 4, EPT Scrubbers 5 and 6, Secondary 2 inDENSE, Square 1 Gas Biogas System Upgrades, Operations Centre, Maintenance Hygiene Facilities, Lagoon Cell 3W berm repairs and Secondary 6-8 Return Activated Sludge pump replacement.<br>• Acid cleaning a section of the sludge transfer lines.<br>• Design progressed for the flare expansion project and for odour control improvements on Primary Clarifiers 5-8, the Diversion Structure and primary effluent channel structural rehabilitation.<br>• Several exceedances of the Alberta Ambient Air Quality Objectives (AAAQO) for $H_2S$. The majority of the exceedances occurred in September and October when there was less precipitation to flush the collection system, but the temperature remained warm. |
| 2022 | • Construction/rehabilitation: Ambient Air Quality Monitoring Station commissioning, Diversion Structure structural rehabilitation, Secondary 3 structural and mechanical rehabilitation, the Plant Wide Monitoring System, UV transformer, Secondary 2 inDENSE, Scrubber 5 and 6, Maintenance Hygiene Facility, Clover Bar Valve, Chamber & Pipe Rehabilitation, and Operations Centre. |
| 2021 | • Construction/rehabilitation: Secondary 3 structural rehab, Ambient Air Quality Monitoring Station construction, and upgrades to the Diversion Structure.<br>• Cleaning of Digester 5 and tracer testing on digester mixing efficiency. |
| 2020 | • Construction/rehabilitation: Fermenter 1 and Fermenter 4, Clover Bar Lagoon Cell 3E Berm repairs, Secondary Clarifier 7 and Secondary Clarifier 3, Diversion Structure.<br>• Seeding and placing Digester 3 into service and removal of Digester 5 from service due to brick façade damage. |
| 2019 | • Construction/rehabilitation: Secondary 5 and the Distribution Chamber completed. |
| 2018 | • Construction/rehabilitation: EPT clarifier covers, East scrubber stack extension, balancing of foul air collection, addition of redundant chemical pumps for foul air treatment along with improved instrumentation. |
| 2017 | • Construction/rehabilitation: Screens 7 and 8 upgrades, Bioreactor 6 and Secondary 1 structural rehabilitation, Channel 3 structural rehabilitation. |
| 2016 | • Construction/rehabilitation: Digester 1 upgrade, Grit Tanks 6 and 7 upgrades, Bioreactor 8 upgrades, and Channel 2 structural rehabilitation completed. |

| Year | Capital Upgrades and Notable Events |
|---|---|
| | • Enhanced Primary Effluent (EPE) pumps (commissioned in 2015) were used in 2016 to blend the EPE with final effluent from bioreactors and provided UV disinfection to EPE. |
| 2015 | • Construction/rehabilitation: Digester 1 upgrade, Grit Tanks 4 and 5 upgrades, Bioreactors 7 and 8 upgrades, and Channel 2 structural rehabilitation continued.<br>• Enhanced Primary Effluent (EPE) pumps that provide UV disinfection to a portion of EPE commissioned. |

## 9.2. Summary of Wastewater Quality Performance

EWS monitors the quality of raw sewage entering the GBWWTP, as well as partially treated and final effluent before its release to the NSR. Below is a comprehensive summary of this monitoring data from 2015 to 2023.

### Wastewater System Effluent Quality 2015 to 2023

Table 12 Wastewater System Effluent Quality 2015 to 2023 Part A and Part B summarizes the annual minimum, mean (or average), and maximum values for the GBWWTP effluent quality parameters, as required by section 6.3.3 of the Approval to Operate 639-03-07. All analytical data in the table were developed on 24-hour composite samples collected using autosamplers. Discrete samples for *Escherichia coli* (*E. coli*) determinations were collected randomly each day. All parameters in the wastewater system treated effluent remained below the GBWWTP approval discharge limits during the period from 2015 to 2023.

## TABLE 12 WASTEWATER SYSTEM EFFLUENT QUALITY 2015 TO 2023 PART A

| Year | | Flow (ML) | | | | | | | pH | | | | TSS (mg/L) | | | | | | BOD₅ (mg/L) | | | | CBOD₅ (mg/L) | | TP (mg P/L) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Raw | OUTFALL 30 | OUTFALL 20 | MPW | EPEPS | OUTFALL 10 | | RAW | OUTFALL 30 | OUTFALL 20 | OUTFALL 10 | RAW | OUTFALL 30 | OUTFALL 20 | EPEPS | OUTFALL 10 | | RAW | OUTFALL 30 | OUTFALL 20 | EPEPS | OUTFALL 10 | | RAW | OUTFALL 30 | OUTFALL 20 | EPEPS | OUTFALL 10 | |
| | | | | | | | FEC | FE | | | | FEC | | | | | FEC | FE | | | | | FEC | FE | | | | | FEC | FE |
| 2023 | Min | 246 | 0 | 0.0 | 3 | 0 | 235 | 235 | 7.2 | 6.7 | 7.2 | 7.2 | 120 | 28 | 53 | --- | 2 | 2 | 88 | 24 | 24 | --- | <2 | <2 | 1.2 | 1.5 | 1.3 | --- | 0.1 | 0.1 |
| | Avg | 301 | 19 | 0.0 | 11 | 0 | 271 | 271 | 7.5 | 7.6 | 7.4 | 7.5 | 317 | 101 | 247 | --- | 4 | 4 | 296 | 123 | 72 | --- | 3 | 3 | 7.4 | 4.4 | 5.8 | --- | 0.3 | 0.3 |
| | Max | 1123 | 789 | 1.0 | 13 | 0 | 373 | 373 | 7.8 | 8.0 | 7.5 | 7.8 | 1070 | 420 | 652 | --- | 65 | 65 | 424 | 366 | 124 | --- | 14 | 14 | 10.0 | 10.2 | 4.9 | --- | 2.9 | 2.9 |
| 2022 | Min | 241 | 0 | 0.0 | 6 | 0 | 228 | 228 | 7.2 | 7.2 | --- | 7.1 | 76 | 26 | --- | --- | 2 | 2 | 91 | 22 | --- | --- | <2 | <2 | 2.1 | 0.7 | --- | --- | 0.1 | 0.1 |
| | Avg | 288 | 16 | 0.0 | 11 | 0 | 260 | 260 | 7.5 | 7.5 | --- | 7.6 | 345 | 93 | --- | --- | 4 | 4 | 298 | 108 | --- | --- | 3 | 3 | 6.9 | 3.7 | --- | --- | 0.3 | 0.3 |
| | Max | 943 | 607 | 0.3 | 14 | 0 | 348 | 348 | 7.8 | 8.0 | --- | 7.8 | 893 | 262 | --- | --- | 11 | 11 | 561 | 197 | --- | --- | 6 | 6 | 19.3 | 6.5 | --- | --- | 1.0 | 1.0 |
| 2021 | Min | 226 | 0 | 0.0 | 3 | 0 | 215 | 215 | 7.3 | 7.2 | 6.9 | 7.2 | 148 | 22 | 303 | --- | 2 | 2 | 169 | 45 | 102 | --- | <2 | <2 | 0.6 | 0.7 | 2.5 | --- | 0.1 | 0.1 |
| | Avg | 264 | 8 | 0.0 | 11 | 0 | 246 | 246 | 7.5 | 7.5 | 7.0 | 7.6 | 312 | 107 | 965 | --- | 5 | 5 | 299 | 132 | 138 | --- | 3 | 3 | 7.3 | 4.3 | 2.9 | --- | 0.3 | 0.3 |
| | Max | 771 | 453 | 0.3 | 13 | 0 | 342 | 342 | 7.8 | 7.9 | 7.0 | 8.0 | 616 | 436 | 2740 | --- | 27 | 27 | 495 | 282 | 178 | --- | 13 | 13 | 11.6 | 7.6 | 3.5 | --- | 1.2 | 1.2 |
| 2020 | Min | 211 | 0 | 0.0 | 8 | 0 | 201 | 201 | 6.9 | 7.0 | 7.6 | 7.4 | 60 | 23 | 16 | --- | 2 | 2 | 73 | 29 | 5 | --- | <2 | <2 | 2.8 | 1.2 | 0.2 | --- | 0.1 | 0.1 |
| | Avg | 294 | 22 | 0.0 | 11 | 0 | 262 | 262 | 7.6 | 7.6 | 7.9 | 7.6 | 345 | 81 | 276 | --- | 4 | 4 | 290 | 119 | 55 | --- | 3 | 3 | 7.5 | 4.5 | 1.5 | --- | 0.3 | 0.3 |
| | Max | 969 | 628 | 0.4 | 13 | 0 | 350 | 350 | 7.9 | 8.3 | 8.3 | 8.0 | 5900 | 286 | 963 | --- | 25 | 25 | 2750 | 345 | 103 | --- | 6 | 6 | 137.0 | 10.5 | 2.6 | --- | 0.9 | 0.9 |
| 2019 | Min | 224 | 0 | 0.0 | 5 | 0 | 212 | 212 | 7.3 | 7.0 | 7.4 | 7.1 | 132 | 22 | 132 | --- | 2 | 2 | 77 | 25 | 35 | --- | <1 | <1 | 2.9 | 0.6 | 1.3 | --- | 0.2 | 0.2 |
| | Avg | 286 | 13 | 0.0 | 11 | 0 | 261 | 261 | 7.6 | 7.6 | 7.6 | 7.6 | 316 | 97 | 402 | --- | 6 | 6 | 284 | 125 | 100 | --- | 3 | 3 | 7.3 | 4.0 | 3.4 | --- | 0.3 | 0.3 |
| | Max | 653 | 303 | 1.3 | 13 | 0 | 378 | 358 | 7.9 | 8.3 | 7.9 | 7.8 | 728 | 300 | 724 | --- | 120 | 120 | 454 | 271 | 140 | --- | 18 | 18 | 12.4 | 7.5 | 5.5 | --- | 4.0 | 4.0 |
| 2018 | Min | 221 | 0 | 0.0 | 0 | 0 | 209 | 209 | 7.3 | 7.3 | 7.3 | 7.0 | 59 | 17 | 320 | --- | 3 | 3 | 87 | 45 | 127 | --- | <1 | <1 | 2.0 | 0.6 | 2.6 | --- | 0.2 | 0.2 |
| | Avg | 271 | 9 | 0.0 | 10 | 0 | 253 | 253 | 7.6 | 7.5 | 7.3 | 7.5 | 325 | 78 | 320 | --- | 7 | 7 | 299 | 125 | 127 | --- | 4 | 4 | 7.2 | 4.2 | 2.6 | --- | 0.4 | 0.4 |
| | Max | 684 | 337 | 0.1 | 13 | 0 | 337 | 337 | 7.9 | 8.2 | 7.3 | 7.9 | 1180 | 139 | 320 | --- | 72 | 72 | 776 | 330 | 127 | --- | 14 | 14 | 15.6 | 13.8 | 2.6 | --- | 2.4 | 2.4 |
| 2017 | Min | 219 | 0 | 0.0 | 4 | 0 | 208 | 208 | 7.4 | 7.3 | 7.1 | 7.2 | 152 | 19 | 298 | --- | 3 | 3 | 142 | 35 | 33 | --- | <1 | <1 | 3.5 | 0.5 | 2.2 | --- | 0.1 | 0.1 |
| | Avg | 275 | 12 | 0.0 | 10 | 0 | 254 | 254 | 7.6 | 7.7 | 7.5 | 7.5 | 317 | 82 | 405 | --- | 7 | 7 | 294 | 114 | 100 | --- | 4 | 4 | 7.5 | 3.8 | 3.6 | --- | 0.3 | 0.3 |
| | Max | 705 | 398 | 1.7 | 13 | 0 | 340 | 340 | 7.9 | 8.3 | 8.0 | 7.9 | 790 | 400 | 548 | --- | 91 | 91 | 772 | 290 | 167 | --- | 17 | 17 | 12.2 | 7.5 | 6.7 | --- | 2.8 | 2.8 |
| 2016 | Min | 186 | 0 | 0.0 | 4 | 0 | 117 | 117 | 7.2 | 7.2 | 7.3 | 7.2 | 131 | 12 | 438 | 34 | 2 | 2 | 99 | 34 | 24 | 44 | <2 | <2 | 3.3 | 0.3 | 1.5 | 0.57 | 0.1 | 0.1 |
| | Avg | 277 | 11 | 0.0 | 10 | 2 | 256 | 255 | 7.6 | 7.7 | 7.6 | 7.6 | 288 | 96 | 438 | 59 | 4 | 4 | 279 | 119 | 24 | 53 | 3 | 3 | 6.8 | 4.2 | 1.5 | 2.305 | 0.3 | 0.5 |
| | Max | 759 | 439 | 0.2 | 12 | 27 | 378 | 365 | 8.4 | 8.2 | 7.9 | 7.9 | 732 | 266 | 438 | 77 | 14 | 14 | 400 | 342 | 24 | 72 | 8 | 8 | 11.9 | 7.7 | 1.5 | 4.73 | 1.6 | 1.6 |
| 2015 | Min | 218 | 0 | 0 | 4 | 0 | 208 | 208 | 7.2 | 7.3 | --- | 7.1 | 49 | 19 | --- | --- | 2 | 2 | 120 | 39 | --- | --- | <2 | <2 | 3 | 0.8 | --- | --- | 0.1 | 0.1 |
| | Avg | 274 | 10 | 0 | 11 | 0 | 254 | 254 | 7.6 | 7.6 | --- | 7.5 | 357 | 86 | --- | --- | 7.0 | 7.0 | 305 | 106.4 | --- | --- | 4.1 | 4.1 | 6.6 | 3.9 | --- | --- | 0.4 | 0.4 |
| | Max | 648 | 310 | 0 | 13 | 0 | 318 | 318 | 7.8 | 8.1 | --- | 7.9 | 1630 | 208 | --- | --- | 37 | 37 | 500 | 189 | --- | --- | 22 | 22 | 12 | 8.4 | --- | --- | 4.6 | 4.6 |

PBP – Plant Bypass
TBP – Total Bypass Plant (including plant and secondary)
SEC – Secondary Bypass Plant
EPE - Enhanced Primary Effluent
EPT – Enhanced Primary Treatment

FEC – Final Effluent, Combined
FE – Final Effluent
RAW – Influent
BOD5 – 5-day Biological Oxygen Demand
CBOD5 – 5-day Inhibited BOD

TSS – Total Suspended Solids
TP – Total Phosphorus
NH3-N – Ammonia as nitrogen

MPW – Membrane Product Water
ns – No sample
Avg/Geomean –Geomean for E.coli; Avg for others

Outfall 10 - Combined, UV-disinfected (FEC + EPE)
Outfall 20 – Combined Bypass (RAW + PE + EPE)
Outfall 30 - Combined Bypass (RAW + Screened + PE + EPE)

## TABLE 13 WASTEWATER SYSTEM EFFLUENT QUALITY 2015 TO 2023 PART B

| Year | | Flow (ML) | | | | | | | NH3 (mg N/L) | | | | | | TKN (mg N/L) | | | | NO2+NO3 (mg N/L) | | | | Chloride (mg/L) | | | | *E. coli* (Counts/100 mL) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Raw | OUTFALL 30 | OUTFALL 20 | MPW | EPEPS | OUTFALL 10 | | RAW | OUTFALL 30 | OUTFALL 20 | EPEPS | OUTFALL 10 | | RAW | OUTFALL 30 | OUTFALL 20 | OUTFALL 10 | RAW | OUTFALL 30 | OUTFALL 20 | OUTFALL 10 | RAW | OUTFALL 30 | OUTFALL 20 | OUTFALL 10 | RAW X10^6 | OUTFALL 30 X10^6 | OUTFALL 20 X10^6 | OUTFALL 10 |
| | | | | | | | FEC | FE | | | | | FEC | FE | | | | FEC | | | | FEC | | | | FEC | | | | FEC |
| 2023 | Min | 246 | 0 | 0.0 | 3 | 0 | 235 | 235 | 8 | 8.9 | 5.6 | --- | 0.1 | 0.1 | 12 | 12.8 | 6.7 | 1.0 | <0.01 | 0.0 | 0.0 | 3.0 | 31 | 38 | 21 | 47 | 2 | 0 | 0 | 1 |
| | Avg | 301 | 19 | 0.0 | 11 | 0 | 271 | 271 | 34 | 26.7 | 10.0 | --- | 2.0 | 2.0 | 50 | 33.4 | 16.0 | 3.5 | 0.0 | 0.3 | 0.7 | 8.9 | 94 | 144 | 39 | 102 | 3 | 1 | 1 | 6 |
| | Max | 1123 | 789 | 1.0 | 13 | 0 | 373 | 373 | 54 | 43.9 | 13.3 | --- | 8.0 | 8.0 | 82 | 57.1 | 25.5 | 11.1 | 0.4 | 7.6 | 2.2 | 13.5 | 409 | 561 | 60 | 347 | 7 | 8 | 1 | 270 |
| 2022 | Min | 241 | 0 | 0.0 | 6 | 0 | 228 | 228 | 9 | 2.0 | --- | --- | 0.1 | 0.0 | 17 | 6.6 | --- | 1.0 | <0.01 | <0.01 | --- | 3.5 | 34 | 50 | --- | 48 | 1 | 0 | --- | <1 |
| | Avg | 288 | 16 | 0.0 | 11 | 0 | 260 | 260 | 34 | 27.2 | --- | --- | 1.7 | 1.7 | 54 | 37.0 | --- | 3.4 | 0.1 | 0.6 | --- | 9.2 | 105 | 175 | --- | 112 | 2 | 1 | --- | 4 |
| | Max | 943 | 607 | 0.3 | 14 | 0 | 348 | 348 | 50 | 44.9 | --- | --- | 7.8 | 7.8 | 126 | 59.4 | --- | 9.7 | 1.2 | 4.0 | --- | 15.0 | 417 | 705 | --- | 353 | 5 | 4 | --- | 22 |
| 2021 | Min | 226 | 0 | 0.0 | 3 | 0 | 215 | 215 | 8 | 2.1 | 9.9 | --- | 0.1 | 0.1 | 4 | 21.2 | <1 | 0.8 | <0.01 | 0.0 | 0.4 | 3.3 | 42 | 41 | 28 | 52 | 1 | 0 | 1 | 1 |
| | Avg | 264 | 8 | 0.0 | 11 | 0 | 246 | 246 | 35 | 24.2 | 11.0 | --- | 1.7 | 1.7 | 56 | 40.0 | 13.9 | 3.4 | 0.0 | 0.3 | 0.4 | 9.5 | 90 | 226 | 30 | 98 | --- | --- | --- | --- |
| | Max | 771 | 453 | 0.3 | 13 | 0 | 342 | 342 | 70 | 44.2 | 11.9 | --- | 6.3 | 6.3 | 78 | 67.8 | 21.6 | 10.0 | 0.3 | 2.1 | 0.5 | 18.4 | 534 | 980 | 31 | 366 | 6 | 25 | 1 | 690 |
| 2020 | Min | 211 | 0 | 0.0 | 8 | 0 | 201 | 201 | 6 | 8.7 | 0.4 | --- | 0.1 | 0.1 | 16 | 15.0 | --- | --- | 0.1 | 0.0 | 0.4 | --- | 40 | 34 | --- | --- | 1 | 0 | --- | 2 |
| | Avg | 294 | 22 | 0.0 | 11 | 0 | 262 | 262 | 35 | 32.0 | 4.3 | --- | 2.2 | 2.2 | 56 | 42.7 | --- | --- | 0.0 | 0.9 | 7.5 | --- | 101 | 136 | --- | --- | 2 | 2 | --- | 8 |
| | Max | 969 | 628 | 0.4 | 13 | 0 | 350 | 350 | 52 | 49.0 | 7.3 | --- | 8.6 | 8.6 | 390 | 65.8 | --- | --- | 0.2 | 3.9 | 23.0 | --- | 470 | 498 | --- | --- | 3 | 7 | --- | 3800 |
| 2019 | Min | 224 | 0 | 0.0 | 5 | 0 | 212 | 212 | 14 | 13.0 | 6.0 | --- | 0.1 | 0.1 | 22 | 20.8 | 9.7 | 1.2 | <0.01 | 0.0 | 0.1 | 2.8 | 45 | 37 | 25 | 52 | 1 | < 0.1 | 0 | < 1 |
| | Avg | 286 | 13 | 0.0 | 11 | 0 | 261 | 261 | 38 | 32.4 | 11.3 | --- | 3.2 | 3.2 | 57 | 41.3 | 21.3 | 5.0 | 0.0 | 1.0 | 0.7 | 10.4 | 99 | 148 | 79 | 102 | 3 | 2 | 2 | 6 |
| | Max | 653 | 303 | 1.3 | 13 | 0 | 378 | 358 | 51 | 44.8 | 16.8 | --- | 14.6 | 14.6 | 91 | 53.4 | 28.8 | 17.4 | 0.4 | 4.8 | 1.7 | 19.6 | 382 | 521 | 261 | 390 | 24 | 10 | 18 | 60 |
| 2018 | Min | 221 | 0 | 0.0 | 0 | 0 | 209 | 209 | 12 | 9.2 | 11.1 | --- | 0.1 | 0.1 | 21 | 12.4 | 17.1 | 1.5 | 0.0 | 0.0 | 0.3 | 3.0 | 42 | 39 | 36 | 46 | 1 | 0 | 0 | 1 |
| | Avg | 271 | 9 | 0.0 | 10 | 0 | 253 | 253 | 37 | 30.0 | 11.1 | --- | 2.3 | 2.3 | 56 | 38.5 | 17.1 | 4.3 | 0.0 | 0.9 | 0.3 | 10.3 | 102 | 137 | 36 | 108 | 3 | 1 | 0 | 10 |
| | Max | 684 | 337 | 0.1 | 13 | 0 | 337 | 337 | 52 | 46.8 | 11.1 | --- | 9.6 | 9.6 | 105 | 60.2 | 17.1 | 12.8 | 0.2 | 4.2 | 0.3 | 19.7 | 555 | 733 | 36 | 436 | 6 | 4 | 0 | 1500 |
| 2017 | Min | 219 | 0 | 0.0 | 4 | 0 | 208 | 208 | 11 | 11.9 | 9.1 | --- | 0.0 | 0.0 | 28 | 17.3 | 15.9 | 1.2 | 0.0 | 0.0 | 0.3 | 4.5 | 42 | 36 | 18 | 57 | 1 | 0 | 1 | 1 |
| | Avg | 275 | 12 | 0.0 | 10 | 0 | 254 | 254 | 37 | 29.9 | 13.6 | --- | 1.6 | 1.6 | 57 | 38.6 | 15.9 | 3.5 | 0.0 | 0.7 | 0.3 | 9.7 | 93 | 137 | 18 | 98 | 3 | 2 | 1 | 10 |
| | Max | 705 | 398 | 1.7 | 13 | 0 | 340 | 340 | 54 | 44.8 | 25.6 | --- | 6.6 | 6.6 | 80 | 70.6 | 15.9 | 10.1 | 0.3 | 3.7 | 0.3 | 15.0 | 434 | 546 | 18 | 356 | 7 | 4 | 2 | 2800 |
| 2016 | Min | 186 | 0 | 0.0 | 4 | 0 | 117 | 117 | 10 | 8.4 | 3.2 | 10.7 | 0.1 | 0.1 | 23 | 11.5 | 6.2 | 1.3 | 0.0 | 0.0 | 0.5 | 4.5 | 36 | 25 | 9 | 45 | 1 | 0 | 0 | 1 |
| | Avg | 277 | 11 | 0.0 | 10 | 2 | 256 | 255 | 34 | 29.4 | 3.2 | 19.9 | 1.2 | 1.2 | 52 | 39.6 | 6.2 | 2.9 | 0.1 | 0.8 | 0.5 | 10.2 | 80 | 112 | 9 | 85 | 3 | 2 | 0 | 13 |
| | Max | 759 | 439 | 0.2 | 12 | 27 | 378 | 365 | 62 | 51.3 | 3.2 | 34.3 | 4.4 | 4.4 | 78 | 67.1 | 6.2 | 5.9 | 2.6 | 2.9 | 0.5 | 16.0 | 265 | 467 | 9 | 227 | 9 | 5 | 3 | 1200 |
| 2015 | Min | 218 | 0 | 0 | 4 | 0 | 208 | 208 | 11 | 6 | --- | --- | 0.1 | 0.1 | 22 | 11 | --- | 1 | <0.01 | 0 | --- | 3.0 | --- | --- | --- | --- | 1 | 0 | --- | <1 |
| | Avg | 274 | 10 | 0 | 11 | 0 | 254 | 254 | 32 | 27.1 | --- | --- | 1.7 | 1.7 | 51 | 37 | --- | 4 | 0.1 | 0.7 | --- | 9.0 | --- | --- | --- | --- | 3.7 | 1.8 | --- | 4.5 |
| | Max | 648 | 310 | 0 | 13 | 0 | 318 | 318 | 50 | 54 | --- | --- | 11 | 11 | 94 | 69 | --- | 17 | 0 | 4 | --- | 14.8 | --- | --- | --- | --- | 23 | 6 | --- | 1200 |

PBP – Plant Bypass
TBP – Total Bypass Plant (including plant and secondary)
SEC – Secondary Bypass Plant
EPE - Enhanced Primary Effluent
EPT – Enhanced Primary Treatment

FEC – Final Effluent, Combined
FE – Final Effluent
RAW – Influent
BOD5 – 5-day Biological Oxygen Demand
CBOD5 – 5-day Inhibited BOD

TSS – Total Suspended Solids
TP – Total Phosphorus
NH3-N – Ammonia as nitrogen

MPW – Membrane Product Water
ns – No sample
Avg/Geomean –Geomean for E.coli; Avg for others

Outfall 10 - Combined, UV-disinfected (FEC + EPE)
Outfall 20 – Combined Bypass (RAW + PE + EPE)
Outfall 30 - Combined Bypass (RAW + Screened + PE + EPE)

## Treated Effluent Toxicity From 2015 to 2023

Table 14 on the next page presents the results of both chronic and acute toxicity tests conducted on the GBWWTP treated final effluent, as detailed in sections 4.4.1 (i) and 6.1.1 of Approval 639-03-07. Both tests were conducted by contract laboratories in compliance with the Environment and Climate Change Canada Biological Test Methods (Environment Canada 1990 and 1992). The acute testing included 48-hour Rainbow Trout static toxicity, 48-hour static toxicity using *Daphnia magna* and 15-minute Microtox tests using luminescence bacteria. Chronic toxicity was determined using seven-day survival and reproductive impairment tests on *Ceriodaphnia dubia*, Fathead minnows and three-day *P. Subcapitata*. Fathead Minnows mortality was observed on the sample collected on April 6, 2017 (Q2). This led to a notification to AEPA (Reference No. 322851), documenting a quality control failure for *Ceriodaphnia dubia* and mortality issues in Fathead Minnow. No further mortality was observed in the following three months of analyses. From 2015 to 2023, no other toxic or mortality events related to the GBWWTP treated effluent were recorded.

## TABLE 14 GOLD BAR WWTP TREATED EFFLUENT TOXICITY FROM 2015 TO 2023

| Dates | Quarter | Microtox | *Daphnia Magna* | Rainbow Trout | *Ceriodaphnia Dubia* Survival | Fathead Minnows Survival | *Pseudokirchneriella* | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | % of Control | $LC_{50}$ (% vol/vol)[1] | $LC_{50}$ (% vol/vol) | $LC_{50}$ (% vol/vol) | $LC_{50}$ (% vol/vol) | $IC_{25}$ (% vol/vol)[2] | NOEL (%)[3] | LOEL (%)[4] | TOEL (%)[5] | Toxic Units(TU)[6] |
| 2023 | 1 | >91 | >100 | >100 | >100 | >100 | >95.2 | <1.5 | 1.5 | NA | >66.7 |
| | 2 | >91 | >100 | >100 | >100 | >100 | >91 | 2.8 | 5.7 | 3.995 | 35.7 |
| | 3 | >91 | >100 | >100 | >100 | >100 | >91 | 2.8 | 5.7 | 3.995 | 35.7 |
| | 4 | >91 | >100 | >100 | >100* | >100 | >91 | 2.8 | 5.7 | 3.995 | 35.7 |
| 2022 | 1 | >82 | >100 | >100 | >100 | >100 | >90.91 | 1.42 | 2.841 | 2.009 | 70.42 |
| | 2 | >82 | >100 | >100 | >100 | >100 | >90.91 | 1.42 | 2.841 | 2.009 | 70.4 |
| | 3 | >82 | >100 | >100 | >100 | >100 | >90.90 | <1.42 | 1.42 | NA | 70.4 |
| | 4 | >82 | >100 | >100 | >100* | >100 | >90.90 | <1.42 | 1.42 | NA | >70.4 |
| 2021 | 1 | >82 | >100 | >100 | >100 | >100 | >90.91 | <1.42 | 1.42 | NA | >70.42 |
| | 2 | >82 | >100 | >100 | >100 | >100 | >90.91 | 1.42 | 2.841 | 2.009 | 70.42 |
| | 3 | >82 | >100 | >100 | >100 | >100 | >90.91 | 22.728 | 45.455 | 32.14 | 4.4 |
| | 4 | >82 | >100 | >100 | >100 | >100 | >90.91 | 5.682 | 11.364 | 8.036 | 17.6 |
| 2020 | 1 | >81.9 | >100 | >100 | >100 | >100 | >90.91 | 1.42 | 2.841 | 2.009 | 70.42 |
| | 2 | >81.9 | >100 | >100 | >100 | >100 | >90.91 | 2.841 | 5.682 | 4.018 | 35.2 |
| | 3 | >81.9 | >100 | >100 | >100 | >100 | >90.91 | <1.42 | 1.42 | NA | >70.42 |
| | 4 | >81.9 | >100 | >100 | >100 | >100 | >90.91 | 2.841 | 5.682 | 4.018 | 35.2 |
| 2019 | 1 | >81.8 | >100 | >100 | >100 | >100 | >91 | 91 | >91 | NA | 1099 |
| | 2 | >81.8 | >100 | >100 | >100 | >100 | >90.91 | 1.42 | 2.841 | 2.009 | 70.42 |
| | 3 | >81.8 | >100 | >100 | >100 | >100 | >90.91 | 1.42 | 2.841 | 2.009 | 70.42 |
| | 4 | >81.8 | >100 | >100 | >100 | >100 | >90.91 | 1.42 | 2.841 | 2.009 | 70.42 |
| 2018 | 1 | >81.8 | >100 | >100 | >100 | >100 | >90.91 | 1.42 | 2.841 | 2.009 | 70.42 |
| | 2 | >81.8 | >100 | >100 | >100 | >100 | >90.91 | 2.841 | 5.682 | 4.018 | 35.2 |
| | 3 | >81.8 | >100 | >100 | >100 | >100 | >90.91 | 1.42 | 2.841 | 2.009 | 70.42 |
| | 4 | >81.8 | >100 | >100 | >100 | >100 | >90.91 | 1.42 | 2.841 | 2.009 | 70.42 |
| 2017 | 1 | >81.8 | >100 | >100 | NA | NA | >90.91 | <1.42 | 1.42 | NA | >70.42 |
| | 2 | >81.8 | >100 | >100 | >100 | 10.3* | >90.91 | 2.841 | 5.682 | 4.018 | 35.2 |
| | 3 | >81.8 | >100 | >100 | >100 | >100 | >90.91 | <1.42 | 1.42 | NA | >70.42 |
| | 4 | >81.8 | >100 | >100 | >100 | >100 | >90.91 | 11.364 | 22.728 | 10.07 | 8.8 |
| 2016 | 1 | >81.8 | >100 | >100 | >100 | >100 | >90.91 | <1.42 | 2.841 | 2.009 | 70.42 |
| | 2 | >81.8 | >100 | >100 | >100 | >100 | >90.91 | 2.841 | 5.682 | 4.018 | 35.2 |
| | 3 | >81.8 | >100 | >100 | >100 | >100 | >90.91 | <1.42 | 1.42 | NA | >70.42 |
| | 4 | >81.8 | >100 | >100 | >100 | >100 | >90.91 | 1.42 | 2.841 | 2.009 | 70.42 |
| 2015 | 1 | >81.8 | >100 | >100 | >100 | >100 | NA | NA | NA | NA | NA |
| | 2 | >81.8 | >100 | >100 | >100 | >100 | NA | NA | NA | NA | NA |
| | 3 | >81.8 | >100 | >100 | >100 | >100 | >90.91 | <1.42 | 1.42 | NA | >70.42 |
| | 4 | >81.8 | >100 | >100 | >100 | >100 | >90.91 | 1.42 | 2.841 | 2.009 | 70.42 |

[1] $LC_{50}$ - % effluent concentration at which there is a 50% mortality of test organisms; [2] $IC_{25}$ - % effluent concentration at which there is a 25% reduction in growth or reproduction of test organisms; [3] NOEL - the concentration at which there was no observed effect level; [4] LOEL - the concentration at which you start seeing the lowest observable effect; [5] TOEL = NOEL/LOEL; [6] TU - the ratio of the concentration observed divided by the concentration for 50% inhibition.

## Reclaimed Water Quality from 2015 to 2023

Table 15 Gold Bar WWTP Reclaimed Water Quality from 2015 to 2023 on the next page provides the ultrafiltered final effluent (i.e., reclaimed water) quality data as mandated by section 4.2.2 (i) and 4.4.1 (j) of the Approval to Operate No. 639-03-07. All parameters, except *E. coli*, were assessed on daily 24-hour composite samples of the reclaimed water. The *E. coli* testing, on the other hand, was conducted on discrete samples collected daily. All parameters in the reclaimed water consistently met the approval discharge limits from 2015 to 2023.

## TABLE 15 GOLD BAR WWTP RECLAIMED WATER QUALITY FROM 2015 TO 2023

| Annual Summary | | Flow | Total Alkalinity | Ammonia | BOD | COD | Chloride | Conductivity | *E. coli* | pH | TSS | TOC | Total Phosphorus | TDS | Turbidity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | (ML) | (mg CaCO3/L) | (mg N/L) | (mg/L) | (mg/L) | (mg Cl/L) | (mS/cm) | (Counts/100 mL) | | (mg/L) | (mg/L) | (mg P/L) | (mg/L) | (NTU) |
| 2023 | Avg | 11.1 | 148 | 0.71 | 3 | 31 | 107 | 969 | <1 | 7.9 | 1.3 | 9.3 | 0.1 | 595 | 0.34 |
| | Min | 2.6 | 114 | 0.04 | <2 | <20 | 52 | 567 | <1 | 7.5 | <1.0 | 6.4 | 0.03 | 334 | 0.08 |
| | Max | 13 | 184 | 5.79 | 5 | 52 | 366 | 1560 | <1 | 8.2 | 3.3 | 11.4 | 0.47 | 912 | 1.6 |
| 2022 | Avg | 11.2 | 156 | 0.49 | <2 | 28 | 115 | 1005 | <1 | 7.9 | <1 | 9.1 | 0.81 | 610 | 0.22 |
| | Min | 6 | 117 | 0.03 | <2 | 20 | 54 | 679 | <1 | 7.5 | <1 | 6.9 | 0.03 | 407 | 0.11 |
| | Max | 13.9 | 225 | 4.24 | 4 | 47 | 355 | 1660 | <1 | 8.9 | 2 | 13.4 | 9.4 | 915 | 0.63 |
| 2021 | Avg | 10.55 | 151 | 0.42 | <2 | 28 | 111 | 936 | <1 | 8 | <1.0 | 8.6 | 0.1 | 575 | 0.23 |
| | Min | 2.6 | 120 | 0.04 | <2 | 20 | 57.9 | 612 | <1 | 7.6 | <1.0 | 6.8 | 0.03 | 380 | 0.11 |
| | Max | 13.2 | 180 | 4.96 | <2 | 62 | 386 | 1750 | <1 | 8.2 | 2.9 | 10.8 | 0.71 | 985 | 1.32 |
| 2020 | Avg | 10.67 | 171 | 0.4 | <2 | 28 | 107 | 1040 | <1 | 830 | <0.9 | 9.2 | 0.1 | 656 | 0.18 |
| | Min | 8.2 | 130 | 0.04 | <2 | <20 | 48 | 585 | <1 | 7.8 | <0.9 | 6.6 | 0.03 | 407 | 0.11 |
| | Max | 12.9 | 224 | 2.75 | <2 | 48 | 360 | 1730 | <1 | 8.7 | 1.0 | 12.4 | 0.96 | 1060 | 1.35 |
| 2019 | Avg | 11.11 | 160 | 0.65 | <2 | 27 | 105 | 1042 | <1 | 8 | <0.7 | 9.8 | 0.15 | 642 | 0.23 |
| | Min | 5.1 | 115 | 0.04 | <2 | <20 | 56.3 | 711 | <1 | 7.4 | <0.7 | 7.7 | 0.01 | 287 | 0.11 |
| | Max | 13.2 | 239 | 5.55 | <2 | 47 | 376 | 1800 | <1 | 8.2 | 1 | 12.4 | 1.66 | 955 | 1.58 |
| 2018 | Avg | 9.57 | 149 | 0.51 | <2 | 27 | 115 | 1011 | <1 | 8 | <0.7 | 8.8 | 0.14 | 604 | 0.26 |
| | Min | 0 | 104 | 0.04 | <2 | <20 | 48.9 | 559 | <1 | 7.7 | 0.8 | 4.7 | 0.02 | 271 | 0.09 |
| | Max | 13.1 | 185 | 5.03 | 4 | 46 | 447 | 1980 | 2 | 8.2 | 11.2 | 79 | 2.27 | 1070 | 6.25 |
| 2017 | Avg | 10.39 | 156 | 0.34 | <2 | 27 | 102 | 1006 | <1 | 8.1 | 0.7 | 9.4 | 0.1 | 629 | 0.17 |
| | Min | 3.93 | 113 | 0.02 | <2 | <20 | 60 | 738 | <1 | 7.9 | 0.7 | 7.2 | 0.01 | 459 | 0.1 |
| | Max | 13.38 | 193 | 4.85 | 5 | 58 | 341 | 1710 | 1 | 8.3 | 1 | 10.7 | 0.77 | 938 | 0.75 |
| 2016 | Avg | 9.82 | 155 | 0.38 | 2 | 27.7 | 88.7 | 953 | <1 | 8.1 | 0.8 | 9.9 | 0.16 | 598 | 0.27 |
| | Min | 4.26 | 129 | 0.04 | <2 | <20 | 30.5 | 548 | <1 | 7.9 | <0.7 | 9.5 | 0.01 | 349 | 0.08 |
| | Max | 12.33 | 198 | 5.5 | 6 | 51 | 232 | 1390 | <1 | 8.4 | 21.3 | 10.4 | 2.81 | 795 | 13.8 |
| 2015 | Avg | 10.57 | 149 | 0.803 | 2 | 22.7 | 91.8 | 921 | <1 | 8 | <0.7 | 7.8 | 0.149 | 565 | 0.33 |
| | Min | 3.54 | 110 | 0.029 | <2 | <0.5 | 46.5 | 559 | <1 | 7.5 | <0.7 | 5.7 | 0.02 | 360 | 0.18 |
| | Max | 13.35 | 197 | 13.5 | 6 | 38 | 349 | 1480 | 1 | 8.2 | 8.4 | 11 | 4.09 | 835 | 10.5 |

## Summary of Proficiency Testing Results Gold Bar Wastewater Laboratory

Table 16 provides a summary of the proficiency testing results from the Gold Bar Wastewater Laboratory. It includes the Laboratory z-scores achieved from analyzing proficiency testing (PT) samples for constituents required by the *EPEA* Approval 639-03-07. The PT samples were provided by the Canadian Association for Laboratory Accreditation (CALA). PT scores greater than or equal to 70 or z-scores less than or equal to 3.000 are considered acceptable for CALA PT. This testing is an indication of the reliability of the analyses completed at the EWS onsite laboratory. All of the scores have been acceptable for the laboratory.

### Table 16 Gold Bar WWTP Laboratory Proficiency Testing from 2015 to 2023

| Study | Date | pH | | BOD | | C-BOD | | TSS | | $NH_3$-N | | TP | | *E.coli* | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | PT Score | Avg. z-score | PT Score | Avg. z-score | PT Score | Avg. z-score | PT Score | Avg. z-score | PT Score | Avg. z-score | PT Score | Avg. z-score | PT Score | Avg. z-score |
| PTC | 23-Mar-23 | 96 | 0.3 | 97 | -0.33 | 94 | -0.32 | 97 | 0.15 | 96 | -0.27 | 99 | 0.1 | 92 | 0.01 |
| PTC | 23-Oct-23 | 95 | 0 | 93 | -0.45 | 88 | -0.78 | 98 | 0.14 | 91 | 0.09 | 97 | 0.16 | 92 | -0.41 |
| PTC | 22-Mar-22 | 87 | 0.85 | 98 | 0 | 97 | -0.06 | 96 | 0.29 | 98 | 0.14 | 98 | 0.1 | 96 | -0.22 |
| PTC | 22-Oct-22 | 95 | -0.1 | 94 | -0.48 | 93 | -0.41 | 93 | 0.47 | 91 | 0.6 | 96 | 0.01 | 94 | -0.11 |
| PTC | 23-Mar-21 | 99 | 0.05 | 85 | 0.08 | 94 | 0.43 | 96 | 0.25 | 97 | 0.23 | 90 | 0.04 | 90 | 0.66 |
| PTC | 23-Oct-21 | 97 | 0.15 | 95 | 0.34 | 91 | -0.62 | 96 | -0.08 | 98 | -0.11 | 90 | 0.7 | 97 | -0.03 |
| CALA | 20-Mar-20 | 95 | 0.15 | 87 | 0.86 | 99 | -0.03 | 95 | -0.08 | 97 | -0.15 | 90 | 0.66 | 94 | 0.43 |
| CALA | 20-Oct-20 | 93 | -0.45 | 92 | -0.63 | 84 | -1.06 | 97 | 0.18 | 95 | -0.3 | 96 | 0.29 | 90 | -0.68 |
| CALA | 19-May-19 | 92 | 0.48 | 90 | 0.69 | 93 | -0.41 | 96 | 0.25 | 94 | 0.38 | 95 | -0.36 | 90 | -0.66 |
| CALA | 19-Oct-19 | 98 | 0.15 | 98 | 0.157 | 89 | -0.74 | 91 | -0.48 | 89 | 0.76 | 99 | 0.07 | 94 | -0.32 |
| CALA | 18-Mar-18 | 97 | -0.05 | 88 | 0.78 | 94 | 0.4 | 97 | -0.13 | 98 | 0.071 | 99 | -0.17 | 93 | 0 |
| CALA | 17-Oct-18 | 92 | -0.5 | 93 | -0.44 | 99 | -0.05 | 93 | 0.5 | 94 | 0.39 | 98 | 0 | 90 | -0.65 |
| CALA | 17-Mar-17 | 96 | -0.08 | 86 | 0.92 | 86 | 0.95 | 98 | 0.04 | 98 | -0.09 | 98 | -0.25 | 83[L] | -1.13 |
| CALA | 17-Oct-17 | 97 | 0.23 | 95 | -0.32 | 85 | -0.98 | 95 | -0.31 | 94 | -0.37 | 95 | 0.02 | 94 | -0.35 |
| CALA | 16-Mar-16 | 94 | -0.2 | 94 | 0.358 | 95 | -0.35 | 90 | 0.58 | 97 | 0.171 | 84[L] | -1.087 | 88 | -0.775 |
| CALA | 16-Oct-16 | 98 | 0.225 | 88 | 0.829 | 90 | 0.648 | 95 | 0.313 | 97 | -0.129 | 95 | 0.354 | 88 | 0.833 |
| CALA | 15-Mar-15 | 95 | 0.15 | 90 | 0.6518 | 88 | 0.806 | 92 | 0.504 | 99 | -0.043 | 98 | -0.08 | 67[VL,U] | -2.183 |
| CALA | 15-Oct-15 | 95 | 0.325 | 95 | 0.3358 | 97 | 0.17 | 87 | 0.883 | 97 | 0.319 | 98 | 0.178 | 64[VL,U] | -2.405 |

Notes:
PT Score > 70 acceptable.
VH - Very high bias, H - High bias, L - Low bias, A - Acceptable, Q - Questionable, U – Unsatisfactory
pH - pH manual, BOD - 5-day Biochemical Oxygen Demand, C-BOD - 5-day Carbonaceous Biochemical Oxygen Demand, TSS - Total Suspended Solids, NH3-N - Ammonia as Nitrogen, TP - Total Phosphorus.
*E.coli* - Sample analyzed using membrane filtration (mENDO) method.

## 9.3. Wet Weather Events

Total wet weather events (i.e., with inflows to the plant greater than 1,200 MLD) and the associated number of days with secondary and primary bypasses from 2015 to 2023 are reported in Table 17. A maximum peak flow rate of approximately 2,298 MLD was recorded on June 28, 2022 during a wet weather event.

### Table 17 Gold Bar WWTP Bypass and Peak Flow During Wet Weather Events

| Year | Wet Weather Event | Plant Bypass Days | Peak Flow (MLD) |
|---|---|---|---|
| 2015 | 1 | 57 | 1220 |
| 2016 | 9 | 62 | 1476 |
| 2017 | 1 | 64 | 1551 |
| 2018 | 1 | 70 | 1457 |
| 2019 | 14 | 92 | 1893 |
| 2020 | 21 | 92 | 1929 |
| 2021 | 6 | 43 | 1877 |
| 2022 | 14 | 78 | 2298 |
| 2023 | 18 | 65 | 1933 |

## 9.4. Annual Wastewater Collection and Treatment Volumes

From 2015 to 2023, the GBWWTP received a total of 96,374 to 110,088 ML annually of wastewater from the sewer collection system. Secondary treatment and UV disinfection were applied to 87,976 to 99,016 ML of the total influent raw flow with 3,514 to 4,103 ML of reclaimed water provided to industrial customers. The amount of sludge that was digested annually was between 737 and 840 ML, this was conveyed to the CBBRRF (Table 18 below).

### Table 18 Gold Bar WWTP Annual Total Wastewater Volume

| Year | Annual Total Volume (ML) | | | | | | | Total Digested Sludge (ML) |
|---|---|---|---|---|---|---|---|---|
| | Raw | OUTFALL 30 | OUTFALL 20 | MPW | EPEPS | OUTFALL 10 | | |
| | | | | | | FEC | FE | |
| 2023 | 110,088 | 7,009 | 2.0 | 4,064 | 0 | 99,016 | 99,016 | 830 |
| 2022 | 105,096 | 5,913 | 0.0 | 4,103 | 0 | 95,077 | 95,077 | 819 |
| 2021 | 96,374 | 3,364 | 0.7 | 3,848 | 0 | 89,763 | 89,762 | 812 |
| 2020 | 108,289 | 8,358 | 1.0 | 3,903 | 0 | 96,029 | 96,029 | 840 |
| 2019 | 96,418 | 4,725 | 10.0 | 3,707 | 0 | 87,976 | 87,976 | 812 |
| 2018 | 98,884 | 3,217 | 0.2 | 3,514 | 0 | 92,152 | 92,152 | 800 |
| 2017 | 101,057 | 4,235 | 2.6 | 3,795 | 0 | 93,027 | 93,027 | 745 |
| 2016 | 101,311 | 4,009 | 0.4 | 3,594 | 183 | 93,723 | 93,480 | 774 |
| 2015 | 100,058 | 3,562 | 0 | 3,858 | 0 | 92,638 | 92,638 | 737 |

## 9.5. Summary of Air Pollution Control System Monitoring

Table 19 through Table 21 shows the average values of the Air Pollution Control System monitoring parameters. The daily average values were recorded effective July 1, 2019 with the exception of $H_2S$ which were recorded effective July 1, 2020.

**TABLE 19 SUMMARY OF AIR POLLUTION CONTROL SYSTEM MONITORING – PART A**

| Year | Scrubber 1 – East | | | | Scrubber 2 – West | | | |
|---|---|---|---|---|---|---|---|---|
| | pH | ORP (mV) | $H_2S$ In (ppm) | $H_2S$ Out (ppm) | pH | ORP (mV) | $H_2S$ In (ppm) | $H_2S$ Out (ppm) |
| 2019 | 9.5 | 649.8 | N/A | N/A | 9.5 | 648.2 | N/A | N/A |
| 2020 | 9.5 | 670.4 | 0.3 | 0.0154 | 9.5 | 667.1 | 2.9 | 0.0515 |
| 2021 | 9.6 | 665.0 | 0.3 | 0.0014 | 9.7 | 672.8 | 5.7 | 0.0122 |
| 2022 | 9.8 | 670.1 | 0.1 | 0.00229 | 9.8 | 666.7 | 5.6 | 0.0094 |
| 2023 | 9.5 | 670.3 | 0.1 | 0.0019 | 9.8 | 664.6 | 5.1 | 0.0034 |

**TABLE 20 SUMMARY OF AIR POLLUTION CONTROL SYSTEM MONITORING – PART B**

| Year | Scrubber 3 – EPT | | | | Scrubber 4 – Fermenter | | | |
|---|---|---|---|---|---|---|---|---|
| | pH | ORP (mV) | $H_2S$ In (ppm) | $H_2S$ Out (ppm) | pH | ORP (mV) | $H_2S$ In (ppm) | $H_2S$ Out (ppm) |
| 2019 | 9.6 | 693.9 | N/A | N/A | 9.5 | 693.0 | N/A | N/A |
| 2020 | 9.5 | 685.6 | 2.5 | 0.542 | 9.5 | 699.3 | 4.5 | 0.615 |
| 2021 | 9.7 | 681.6 | 5.1 | 0.408 | 9.7 | 680.7 | 5.4 | 0.446 |
| 2022 | 9.8 | 680.5 | 3.5 | 1.0318 | 9.8 | 668.7 | 18.6 | 1.022 |
| 2023 | 9.8 | 671.4 | 3.5 | 1.587 | 9.8 | 669.6 | 14.6 | 3.319 |

### TABLE 21 SUMMARY OF AIR POLLUTION CONTROL SYSTEM MONITORING – PART C

| Year | GRF Scrubber | | | | Grit 6/7 Building Scrubber | Screen 4-8 Building Scrubber | Dewatering Facility Scrubber |
|---|---|---|---|---|---|---|---|
| | Temperature In (°C) | Pressure In (kPa) | Pressure Out (kPa) | $H_2S$ Out (ppb) | $H_2S$ Out (ppb) | $H_2S$ Out (ppb) | $H_2S$ Out (ppb) |
| 2019 | 18.7 | -0.3 | N/A | N/A | N/A | N/A | N/A |
| 2020 | 19.1 | -0.2 | 0.1 | 0.1 | 1.0 | 330.6 | 0.0 |
| 2021 | 20.8 | -0.3 | 0.6 | 0.1 | 0.4 | 262.5 | 11.1 |
| 2022 | 18.4 | -0.3 | 0.7 | 0.0 | 4.1 | 147.7 | 26.5 |
| 2023 | 21.2 | -0.2 | 0.8 | 0.1 | 0.8 | 534.4 | N/A* |

*Dewatering Facility Scrubber decommissioned in 2023

## 9.6. Air Pollution Control System Operational Issues

The main contributor to the odour generation at the GBWWTP is Hydrogen Sulfide (H2S) which is produced by biological activity in wastewater (sewage). The long travel time through the collection system can cause the wastewater to be septic and extremely odourous on arrival. As per the Odour Control and Management Protocol, keeping odours under control is the goal for operations at the GBWWTP, as millions of litres of wastewater is treated every day.

Table 22 shows a summary of the Air Pollution Control System operational issues since 2020. During this time there was only one shutdown that exceeded 48 hours. In 2022, Scrubber 4 – Fermenter Scrubber was offline for 100.4 hours for an acid clean and media replacement.

**TABLE 22 SUMMARY OF AIR POLLUTION CONTROL SYSTEM OPERATIONAL ISSUES**

| Year | Total Number of Items | Number of Shutdowns > 2 hours | Descriptions of Operational Issues |
|---|---|---|---|
| 2020 | 30 | 16 | Foaming in scrubber tower.<br>Chemical pump failures.<br>$H_2S$ sensor installation.<br>Rerouting bleach piping to resolve air locking issue. |
| 2021 | 29 | 14 | Bleach pump tube failure.<br>Chemical line leaks.<br>Recirculation pump replacements. |
| 2022 | 26 | 11 | Acid clean and media replacement in Scrubber 1 – East Scrubber and Scrubber 4 – Fermenter Scrubber.<br>Bleach pump tube failures. |
| 2023 | 42 | 19 | Cleaning nozzles and replacing recirculation pump to sustain recirculation flows.<br>Planned shutdowns for capital work for Scrubbers 5/6. |

In 2020, the Approval was amended and the requirement to maintain a daily average ORP above 300 mV and a daily average pH above 8 for the wet scrubber air pollution control systems was added. Since this requirement was added, there have been only 2 instances where the limits were not met and are summarized below.

- On April 27, 2020 the daily average ORP for Scrubber 3 – EPT Scrubber was below 300 mV (AEPA Ref #365988).
- On August 23, 2023 the daily average ORP for Scrubber 3 – EPT Scrubber was below 300 mV (AEPA Ref #418703).

## 9.7. Chemicals Consumed by Wet Scrubbers

Sodium hypochlorite (bleach) and caustic soda are used in the scrubbers for oxidization of $H_2S$ and pH control, respectively. Annual consumption of these chemicals is summarized in Table 23 Summary of Scrubber Chemical Usage.

**TABLE 23 SUMMARY OF SCRUBBER CHEMICAL USAGE**

| Year | Sodium Hypochlorite (L of 16% solution) | Caustic Soda (kg as 100% solution) |
|---|---|---|
| 2015 | 69,726 | 21,515 (L as 50% solution) |
| 2016 | 303,750 | 42,005 |
| 2017 | 382,689 | 26,476 |
| 2018 | 332,093 | 16,005 |
| 2019 | 359,703 | 25,541 |
| 2020 | 375,583 | 35,208 |
| 2021 | 433,261 | 39,542 |
| 2022 | 410,598 | 46,964 |
| 2023 | 316,770 | 37,510 |

## 9.8. Overall Chemical Usage Gold Bar Wastewater Treatment

As per sections 4.7.1 (a) and 6.3.1 (b) of the Approval to Operate No. 639-03-07, Table 24 Chemical Usage at Gold Bar WWTP and Clover Bar (CBBRRF) From 2015 to 2023 reports the annual chemical consumption related to wastewater and foul air treatment processes. The GBWWTP monitors its chemical consumption using physical inventory checks and invoice tracking.

### Table 24 Chemical Usage at Gold Bar WWTP and Clover Bar (CBBRRF) From 2015 to 2023

| Year | Alum (kg) | | Polymer (kg) | | 16% Sodium Hypochlorite (kg) | Caustic (kg) | | 30% Magnesium Chloride (kg) | 50% Citric Acid (kg) |
|---|---|---|---|---|---|---|---|---|---|
| | Secondary | EPT | DAF | EPT | Membrane | Membrane | Ostara | Ostara | Membrane |
| 2023 | 4,826 | 310,551 | 12,521 | 1,113 | 180,517 | NA | 109,155 | 765,353 | 876 |
| 2022 | 0 | 465,310 | 11,627 | 1,227 | 170,435 | NA | 78,867 | 725,330 | 892 |
| 2021 | 100,313 | 188,923 | 11,024 | 1,025 | 174,964 | NA | 69,683 | 713,377 | 925 |
| 2020 | 9,377 | 560,637 | 11,373 | 1,478 | 163,905 | NA | 126,915 | 1,005,427 | 629 |
| 2019 | 136,559 | 509,841 | 10,834 | 1,385 | 149,029 | NA | 133,231 | 1,126,583 | 749 |
| 2018 | 4,503 | 278,178 | 11,097 | 25 | 139,037 | NA | 146,670 | 1,374,523 | 1,117 |
| 2017 | 58,549 | 323,844 | 10,604 | 635 | 156,032 | NA | 90,670 | 1,004,486 | 1,846 |
| 2016 | 60,952 | 370,154 | 16,472 | 1,281 | 141,478 | 1,321 | 67,778 | 1,078,623 | 1,059 |
| 2015 | 528,337 | 616,490 | 19,296 | 5,656 | 125,931 | 9622* | NA | NA | 5,010 |
| Total | 903,416 | 3,623,928 | 114,849 | 13,824 | 1,401,327 | 7,610 | 822,969 | 7,793,703 | 13,103 |

*2015 Caustic recorded in litres (50% caustic at 1530 kg/m$^3$) 6289 L = 9622 kg

# 10. Conservation and Reclamation Plan

The life cycle of a facility typically consists of planning, construction, operation, and reclamation. Reclamation consists of decommissioning followed by land reclamation. In the case of the GBWWTP and the CBBRRF, there are no plans within the next 3 years to shutdown any operations or decommission any major process unit. The GBWWTP plant was built in 1954 on a green field site and was not known to have any historical contamination. In general, WWC infrastructure will also extent beyond the next approval period. For any rehabilitation project sites within the City of Edmonton, any required reclamation typically occurs immediately at the conclusion of the project to original site conditions. However, right of ways for WWC infrastructure tends to see continued use and complete abandonment is rare.

## Groundwater and Soil Contamination Procedures

EWS typically deals with any existing or encountered groundwater or soil contamination on a project basis. We have a series of procedures contained within our *Environmental Planning and Assessment Guide* (EPIC) to deal with contamination and to restore sites to original or suitable conditions.

When a WWTP or WWC project is initiated, a records review of existing and historical land use, and neighbouring facilities can provide an indication if contamination is likely to be found, and what type of contamination is likely. Phase I Environmental Site Assessment (non-intrusive investigation) prior to work being conducted on-site can provide information about potential areas of contamination and contaminant. The following databases contain information regarding contaminated sites in Alberta:

- AEPA's Environmental Site Assessment Repository (ESAR)
- The City of Edmonton's Environmental Site Information Database
- EWS's GeoFIT Tool outlines internal discoveries of contaminated soils.

When needed, the EWS Environment group is engaged if contaminated soil or water is found or suspected, they will provide additional steps regarding reporting to the province, federal government or other regulatory agency. Phase II Environmental Site Assessment (intrusive investigation) are conducted after contamination is suspected, followed by Phase III Environmental Site Assessment (remediation) monitoring and if necessary ensuring contamination is removed or managed. Any material excavated from a work or project site not required or suitable for fill or other purposes is appropriately disposed of off-site, typically at a Class I landfill. During any active worksites, EWS has procedures in place to avoid erosion and sedimentation, hydrocarbon spills, prevent turf damage, protect trees, and reduce noise and odours.

Table 25 lists common effects/issues and potential mitigations related to contamination at a site.

### TABLE 25 EPIC PROCEDURES FOR DEALING WITH SITE CONTAMINATION

| Common Effect/ Issue | Potential Mitigation(s) |
|---|---|
| Contaminated soils may be discolored or have an odor. If the area is wet or if there is water in an excavation, the water may have a sheen on it. Other indicators include dead or stressed vegetation. | • Phase I Environmental Site Assessment (non-intrusive investigation) prior to work being conducted on-site can provide information about potential areas of contamination and contaminants<br>• Phase II Environmental Site Assessment (intrusive investigation) after contamination is suspected.<br>• Phase III Environmental Site Assessment (remediation) monitoring and if necessary ensuring contamination is removed or managed. Ensuring contaminated material is handled and disposed of properly. |
| Disposal of waste – waste management | If contaminated soils or other contaminated materials need to be disposed the material should be sent for testing at an analytical laboratory and compared against the properties listed in Schedule 1 of the *Waste Control Regulation*. If waste is deemed to be hazardous or has disposal restrictions contact the Drainage Services EMS Team to help assess suitable disposal locations. Costs for disposing of hazardous wastes can be significant. |
| Off-site disposal of excavated soil or material | Any material excavated from a site not required or suitable for fill or other purposes must be appropriately disposed of off-site. The EPCOR Project Manager is responsible for proper disposal of the material in accordance with the law. Contractors must provide proof that the material was taken to an approved facility and disposed of properly. |
| Recycled and imported fill material | When imported fill material is used at a construction site, contractors are responsible for reporting the source location of the material to the EPCOR Project Manager. The source location of any imported or recycled fill material must be reported to the Project Manager prior to material being brought on-site**.** The contractor may be asked to verify the suitability of the material for its use (i.e. provide copies of laboratory analytical testing to verify the material meets the most current version of the Alberta Tier 1 Soil and Groundwater Remediation Guidelines). |

| Common Effect/ Issue | Potential Mitigation(s) |
| --- | --- |
| Site management | Inadequate setup and management of a construction site can have potential adverse impacts on the environment. Some of the considerations that need to be taken into account include, but are not limited to:<br><br>• Suitably locating and protecting chemical, fuel and lubricant storage areas to prevent and minimize any releases or contamination on or around the worksite.<br>• Ensuring hazardous materials are managed properly.<br>• Controlling tracking of dirt, mud and generation of dust.<br>• Keeping the worksite free from accumulations of debris or waste.<br>• Ensuring spill kits and fire extinguishers are present and their location is communicated at the worksite.<br>• Ensure perimeter fencing or hoarding is secured to provide security against public access and that public ways are physically separated from all active construction sites with an adequate safety barrier.<br><br>Signage with emergency contact information, as required by the jurisdiction having authority, must be prominently posted. |

# 11. Concordance Table with Alberta Regulation 113-93, Approvals and Registrations Procedure Regulation

The following table outlines the contents of this application in accordance with the Environmental Protection and Enhancement Act requirements as per Alberta Regulation 113-93, Approvals and Registrations Procedure Regulation.

| | **SECTION 3.1 of AR 113/93**<br><br>**Requirements of Application** | **Response to Requirements** |
|---|---|---|
| **3(1)** | An application must be made to the Director and must be accompanied by the following information relative to the activity, the change to the activity or the proposed amendment, addition or deletion of the term or condition: | This application document and<br><br>Appendix A Application Form and Guide for a New or Renewed Approval of a Municipal Mechanical Wastewater System |
| **(a)** | the name and address of the applicant; | Appendix A |
| **(b)** | the location, capacity and size of the activity to which the application relates; | Appendix A |
| **(c)** | the nature of the activity, the change to the activity or the amendment, addition or deletion, as the case may be; | Appendix A |
| **(d)** | where the applicant requires an approval from the Energy Resources Conservation Board or the Natural Resources Conservation Board in relation to the activity, the date of the written decision in respect of the application; | Not Applicable |
| **(e)** | an indication of whether an environmental impact assessment report has been required; | Not Applicable |
| **(f)** | copies of existing approvals or registrations that were issued to the applicant in respect of the activity under this Act or a predecessor of this Act; | Appendix B Current Operating Approvals |
| (g) | the proposed or actual dates for construction commencement, construction completion and commencement of operation; | 3. Requested Changes to EPEA Approval<br><br>5.2 2025-2027 Capital Plan |

| | SECTION 3.1 of AR 113/93<br><br>Requirements of Application | Response to Requirements |
|---|---|---|
| (h) | a list of substances, the sources of the substances and the amount of each substance that will be released into the environment as a result of the activity, the change to the activity or the amendment, addition or deletion, as the case may be, the method by which the substances will be released and the steps taken to reduce the amount of the substances released; | 9.2 Summary of Wastewater Quality Performance<br><br>9.4 Annual Wastewater Collection and Treatment Volumes<br><br>8.5 Summary of Biosolids Program<br><br>Appendix E EPCOR and ACRWC's 2022-2040 Edmonton Total Loading Plan. |
| (i) | a summary of the environmental monitoring information gathered during the previous approval or registration period; | 8 Environmental Monitoring Summary |
| (j) | a summary of the performance of substance release control systems used for the activity during the previous approval or registration period; | 9 Wastewater System Performance Summary |
| (k) | the justification for the release of substances into the environment as a result of the activity, the change to the activity or the amendment, addition or deletion, as the case may be; | 2 Description of Current Wastewater System |
| (l) | the measures that will be implemented to minimize the amount of waste produced, including a list of the wastes that will or may be produced, the quantities and the method of final disposition of them; | 9 Annual Wastewater Collection and Treatment Volumes |
| (m) | any impact, including surface disturbance, that may or will result from the activity, the change to the activity or the amendment, addition or deletion, as the case may be; | 5.1 2025-2027 Capital Plan |

| | SECTION 3.1 of AR 113/93<br><br>Requirements of Application | Response to Requirements |
|---|---|---|
| (n) | confirmation that any emergency response plans that are required to be filed with the local authority of the municipality in which the activity is or is to be carried on or with Alberta Public Safety Services have been so filed; | 6.4 Emergency Response Plans |
| (o) | confirmation that there are contingency plans in place to deal with any unforeseen sudden or gradual releases of substances to the environment; | 6.4 Emergency Response Plans |
| (p) | the conservation and reclamation plan for the activity | Conservation and Reclamation Plan |
| (q) | a description of the public consultation undertaken or proposed by the applicant | Public and First Nations Consultation Plans |
| (r) | information required under any other regulation under the Act to be submitted as part of or in support of the application; | Not applicable |
| (s) | any other information required by the Director, including information that is addressed in a standard, code of practice or guideline in respect of the activity that is published or adopted by the Department; | Not applicable |

# Appendix A Application Form and Guide for a New or Renewed Approval of a Municipal Mechanical Wastewater System

Alberta Government

# Application Form and Guide for a New or Renewed Approval of a Municipal Mechanical Wastewater System

## Introduction

The attached form and guidelines outline the information required for an application for an approval or approval renewal of a mechanical wastewater system. The application has been prepared in accordance with the *Environmental Protection and Enhancement Act* (EPEA) and Approval and Registrations Procedure Regulation 113/93. Please ensure that each section of the application is completed in a concise and clear manner.

A wastewater system includes wastewater collection mains, lift stations, wastewater treatment plant, treated effluent storage, treated effluent wetlands, pumping, any treated effluent outfall(s), the treated effluent discharge route, and if applicable, wastewater irrigation systems and lands used for irrigation.

For your information, the general steps and procedures that are followed when reviewing and issuing an Approval for a municipal wastewater system is illustrated by the attached flow chart (Figure 1). Of particular note is the fact that the application for this Approval must be advertised by the applicant and that the applicant, upon request, must provide copies of the application to the public. It is therefore important that the application for this Approval contain all the information required and be formatted to facilitate public review.

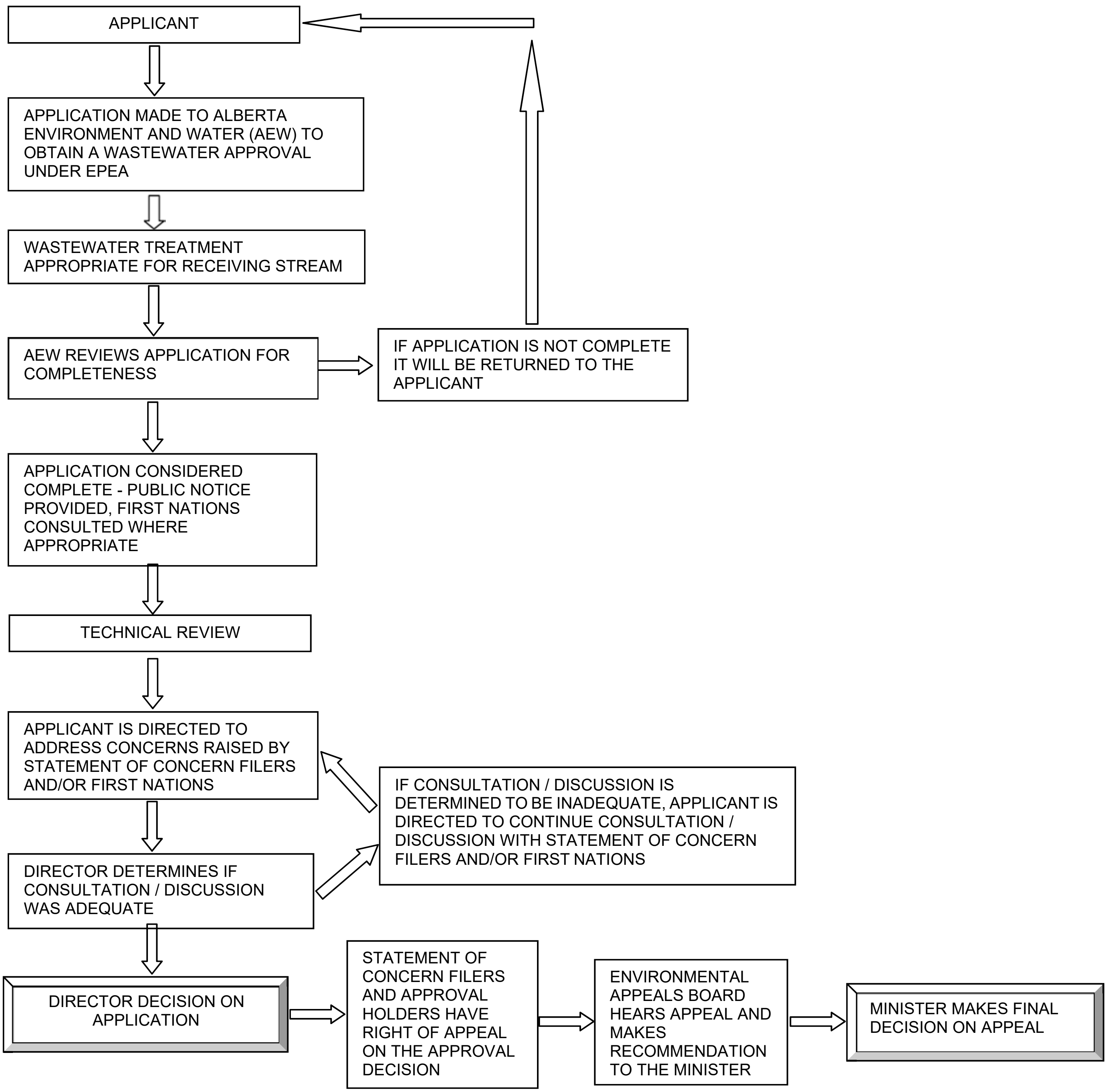
Application for new approvals must contain written confirmation, by a professional registered with APEGGA that all aspects of the wastewater design conform to the requirements of the Regulations under the Act, or a statement identifying and justifying any deviation. The plans and specifications submitted in support of the new approval must also be signed and stamped by a professional registered with APEGGA.

All information spaces in this application must be filled in or marked not applicable (N/A). Failure to provide all necessary information may cause the application to be rejected and returned to the applicant.

For an EPEA approval renewal, this application must be completed and forwarded to the Alberta Environment and Water, at least six months prior to the expiry date of the existing Approval for the wastewater system. All applications must be forwarded to:

Alberta Environment and Parks
Regulatory Approvals Center
5th Floor, South Petroleum Plaza
9915 108 Street
Edmonton, AB T5K 2G8
Phone: 780-427-6311
Fax: 780-422-0154
E-mail: aep.epeaapplications@gov.ab.ca

## FIGURE 1 - THE APPROVAL PROCEDURE FOR MUNICIPAL WASTEWATER SYSTEM



Alberta Government

# Application Form and Guide for a New or Renewed Approval of a Municipal Mechanical Wastewater System

## 1.0 Administrative Information

**1.1** Name of the Wastewater System: *Edmonton Wastewater System* Existing EPEA Approval No. (if applicable) *639-03-07* Expiry Date: *May 1, 2025*

**1.2** Copies of the latest existing wastewater approval (if applicable) that were issued to the applicant in respect of the activity under this Act or a predecessor of this Act must be submitted in support of this application. *(Please refer to Appendix B Current EPEA Operating Approvals)*

**1.3** Legal land description of the wastewater treatment facility:

Land Location *Lot 34, Block 1, Plan 094 1211* SEC *12* TWP *53* RG *24* M *W4M*

or other (i.e.: street address) *10977-50 Street NW, Edmonton, AB T6A 2E9*

GPS Co-ordinates: Latitude: *53°33'41.0"N* Longitude: *113°24'54.6"W*

**1.4** Submission of a map / plan of the area showing the location of the following landmarks must be submitted in support of the application. The map should show: (*Please refer to Appendix C Wastewater System Map and Figures*)

(a) All lift stations;

(b) The wastewater treatment plant (including a process schematic of the plant);

(c) Any treated effluent storage (if applicable);

(d) The location of the disinfection facility if separate from the treatment plant (if applicable);

(e) Any and all treated effluent pump stations (if applicable);

(f) Any and all wastewater irrigation fields (if applicable);

(g) The treated effluent outfall (if applicable).

**1.5** Corporate Name/Address/Phone of wastewater system owner (Municipality / Commission / Utility / Water Co-op / Company):

| | | | |
|---|---|---|---|
| *Name:* | *EPCOR Water Services Inc. (EWS)* | | |
| *Address:* | *2000 – 10423 101 Street NW, Edmonton, AB T5H 0E8* | | |
| *Contact Person:* | *Geoff Heise* | *Position:* | *Senior Manager Environment* |
| *Telephone:* | *780-969-8445* | *Fax:* | *N/A* |
| *Email Address:* | *gheise@epcor.com* | | |

Is your organization registered with Corporate Registry?

Yes ☑ No ☐

**1.6** Operating staff (proposed or current) and person(s) responsible for the day to day operation of the wastewater system:

| **TABLE 9: 2024 List of Certified Wastewater Treatment Operators** (August 2024) | | |
|---|---|---|
| **Name** | **Title** | **WWT Certification Level** |
| Grossell, Ken M | Sr Advisor, WWTP Operations | IV |
| Jones, Kira I | WWTP HEI Coordinator | IV |
| Lekamwasam, Janaka | WWTP Operator Foreman | IV |
| Nunes, Michael | WWTP Operator Foreman | IV |
| Penner, Jody | WWTP Lead Operator | IV |
| Sanche, Dagny | WWTP Training Coordinator | IV |
| Sandouga, Sam | WWTP Operator Foreman | IV |
| Baker, Cole | WWTP Operator Foreman | IV |
| Nieuwenhuis, Andrew | WWTP Operator Foreman | IV |
| Kelly, Adam | WWTP Operator | IV |
| Jama, Yusuf | WWTP Operator | IV |
| Omeragic, Armen | WWTP Lead Operator | IV |
| Holden, Derek | WWTP Operator | IV |
| Vogelgesang, Ryan | WWTP Operator | IV |
| Rees, Emma | WWTP Lead Operator | IV |
| Paglicauan, Jermine | Engineer, Operations | IV |
| Barrett, Jeremy L | Manager, Process Risk & Integration | III |
| Li, Bing (Frank) | WWTP Operator | III |
| Budden, Curt | WWTP Operator Foreman | III |
| Rindero, Billy | WWTP Operator Foreman | III |
| Hahn, Kevin | WWTP Operator Foreman | III |
| Jordan, Bradley | WWTP Operator Foreman | III |
| Diletzoy, Kyle | WWTP Lead Operator | III |
| Downey, Anthony | WWTP Lead Operator | III |
| Lorenz, Tory | WWTP Operator | III |
| Ozimko, Michael | WWTP Operator | II |
| Price, Jeremy | WWTP Operator | II |
| Cousins, Kenzie | Manager, Operations Support & Training | II |
| Gordon, Allan | Manager, Operations | II |
| Gilker, Michael | WWTP Operator | II |

| | | |
|---|---|---|
| Furber, Brandyn | WWTP Operator | I |
| Marling, Connor | WWTP Operator | I |

**1.7** Have setbacks under the *Municipal Government Act* and / or the *Environmental Protection and Enhancement Act* been applied for and issued by the local Subdivision Approving Authority relative to this existing or proposed wastewater system?
Yes ☐ No ☑

If yes to Section 1.7, then please provide copies of all setbacks variances that have been issued for this wastewater system:

Setback Waiver #1: Issued *Not Applicable*

Setback Waiver #2: Issued *Not Applicable*

Setback Waiver #3: Issued *Not Applicable*

If yes to Section 1.7, then please provide a map detailing the location of all properties and corresponding legal land locations relating to the setback variances that have been issued relative to this wastewater system.

**1.8** As a requirement of the *Environmental Protection and Enhancement Act* (section 72), this activity / application must be advertised. Therefore, please provide the name of the newspaper(s) most widely distributed in the area where the facility is located. Also, you may suggest other methods of public notification.

(a) Newspaper(s): *Edmonton Journal, Edmonton Sun*

(b) Other methods: *EPCOR website (EPCOR.com), direct to community groups*

## 2.0 First Nations Engagement (if applicable)

**2.1** There is a duty to consult with First Nations where land management and resource development on Provincial Crown land may adversely impact First Nations Rights and Traditional Uses. Please contact the Approvals Coordinator and/or Aboriginal Relations Advisor for the Region to discuss this requirement. [See Section 8.0 Public and First Nations Consultations of Main Application for more information].

## 3.0 Wastewater System (Technical Data)

**3.1** Present population served by the wastewater system: *approximately 1,000,000 (in 2024)*

**3.2** Projected remaining life of the wastewater treatment plant: *beyond 2059*

**3.3** Projected population at end of life for the wastewater treatment plant: *~1,800,000 (in 2059)*

| FLOWS) | AVERAGE DAILY FLOW ($M^3$ / DAY) | MAXIMUM DAILY FLOW ($M^3$ / DAY) | PEAK HOURLY FLOW (LITRES / HOUR) |
|---|---|---|---|
| Current | *273,000 (in 2020)* | *360,000 (in 2020)* | *78,000,000* (in 2020)* |
| Design | *310,000* | *420,000* | *91,700,000*** |

*Partially treated flow during wet-weather events; **Influent screening maximum design capacity.

**3.4** Are there any other Municipality(ies), Development(s) Commissions / Co-ops / or Companies outside the municipal boundaries that discharge raw or partially treated wastewater into the wastewater collection system (other than septic truck haul)?
Yes ☑ No ☐

If yes, please provide a list of the systems, the name and phone number of the contact person(s) and approximate annual flows or population.

| NAME OF SYSTEM | CONTACT PERSON | PHONE NUMBER | ANNUAL FLOW ($M^3$) OR POPULATION |
|---|---|---|---|
| *Alberta Capital Region Wastewater Commission (aka Arrow Utilities)* | *Kate Polkovsky* | *(780) 467-8655* | *217,590* $m^3$ (in 2020)* |
| | | | |

*Digested sludge discharged to lagoons of the Clover Bar Biosolids Recovery Facility.

**3.5** Does your wastewater system receive septic tank waste? Yes ☑ No ☐

If Yes, please detail the septage management plan: (including septage hauler agreements yearly volume of septage, conditions of wastewater facility use, limitation of access, surveillance, sampling):

*Poundmaker Wastewater Transfer Station is used to receive wastewater in Edmonton areas from some homes, businesses and temporary commercial operations like construction site that are not connected to a Sanitary sewer. Users of the transfer station must be registered and abide by the conditions of use (Code of Practice – Hauled Wastewater Discharge Requirements, EPCOR Drainage Services Bylaw 19627). The transfer station is a gated facility with an access control card system and monitored with 24/7 CCTV. The facility is fully automated and open 24 hours per day, 7 days a week. A 24-hour composite sample is taken monthly for TSS, BOD, COD, OG, TKN and TP analysis; also, 24 discrete samples are taken every month for pH test on site with a calibrated pH meter and a visual test. A load violating the EPCOR Drainage Bylaw 19627 may be denied permission to release. There are currently about 63 customers discharging wastewater to the facility approximately 130,000$m^3$ annually.*

If No, please detail the concerns or circumstances that preclude septage from being received:

____________________________________________________________

____________________________________________________________

Is the septic waste metered? Yes ✓ No ☐ Average monthly flows ($m^3$) *~10,833*

☐

*(estimated based on the loads)*

## 4.0 Raw Wastewater Collection System

**4.1** Are there sanitary sewer use bylaw(s) in place to ensure the integrity of the wastewater treatment process? Yes ☑ No ☐

**4.2** Do the sanitary sewer use bylaw(s) either preclude discharge of some waste(s) or require pre-treatment for industrial or non-compatible waste? Yes ☑ No ☐

City of Edmonton Bylaw 19627 - EPCOR Drainage Services and Wastewater Treatment Bylaw. Codes of practice outline specific information related to aspects of the Wastewater collection system. The information includes content that is binding on every customer:

- Flow Monitoring Point Installation and Maintenance Requirements
- Dental Amalgam Separator Installation and Maintenance Requirements
- Hauled Wastewater Discharge Requirements
- Large Volume Releases
- Oil and Grease Interceptor Installation and Maintenance Requirements
- Oil, Grease and Sand Interceptor Installation and Maintenance Requirements
- Operations and Regulatory Requirements for De-Chlorinated Water Releases and Commercial/Industrial Line Flushing

**4.3** Raw Water Pumping Stations (lift stations):

| LIFT STATION NUMBER AND LOCATION | EMERGENCY OVERFLOW / DISCHARGE ROUTE | POWER RATING (KW) | CAPACITY (L/S) |
|---|---|---|---|
| The Edmonton Wastewater system sanitary/combined sewer system and stormwater system has 91 pump stations with about 170 pumps of various power ratings, including spares. EWS owns and maintains these 91 lift stations, 4 real time controls (RTCs), 9 sewer control gate stations, 3 syphon tunnels and over 70 other Flow Control Facilities such as manual gates and weirs. If needed, a complete dataset with the details above can be provided. (See Appendix G of Edmonton PBR Wastewater Collection Business Cases - https://www.epcor.com/products-services/water/water-wastewater-drainage-rate-application/Pages/default.aspx - document not included in renewal application but available on internet) | | | |

**4.4** Raw Wastewater Equalization / surge tank Storage (if applicable):

| LOCATION | APPROXIMATE EQUALIZATION CAPACITY ($M^3$) |
|---|---|
| There are approximately 165 km of sanitary and combined large trunk sewers (1,200 mm diameter and larger) that provide some temporary storage in the WWC system. The WWC system also employs several Real Time Control (RTC) assets for storage to minimize overflows, bypasses at the Gold Bar WWTP, and to maximize flows receiving full treatment. These are RTC#3, #4 and #6. | |

| |
|---|
| The Gold Bar WWTP does not have any onsite equalization tanks. |

| | |
|---|---|
| Total Capacity: | |

**4.5** Wastewater Treatment Plant Pumping:

| UNIT | POWER RATING (KW) | CAPACITY (L/S) |
|---|---|---|
| *BNR influent pump (one for each bioreactor and 11 in total)* | *17 kW (each)* | *556 L/s (each)* |
| | | |
| | | |

Total capacity of Treatment Plant pumps *6,116* (L/s).

Description and location of fuel source for Treatment Plant pumping:

*600 V Electrical power from MCCs located in Tunnels "K" and "L" is used for the PE pumps; overall, the power supply at Gold Bar WWTP is from Hardisty circuit H14 (primary feeder) and Kennedale circuit K32 (secondary feeder).*

**4.6** Wastewater Metering:

(a) Please list all flow monitoring locations:

i) Monitoring in the Treatment Process:

A) Raw wastewater monitoring location: *Channel 1, 2 and 3; Strathcona forcemain*

B) Treated wastewater monitoring location: *Outfall 10 and the Membrane Product Water supply header*

C) Other monitoring location: *Outfall 30 and Outfall 20 for partially treatment bypass flows*

ii) In the wastewater collection system (i.e. residential, commercial, industrial, public/government, or any combination of):
*Flow monitoring in the Edmonton wastewater system occurs at 86 permanent sites, 44 temporary sites, 115 interconnect (IC) sites, and 23 sites currently under construction. The long term plan also calls for the installation of approximately 30+ locations a year for the next 3 years at least as we push to build out our flow monitoring capabilities and our situational awareness of the system as a whole.*

*Temporary sites are put in either seasonally (install in spring, remove in fall) to protect them from winter conditions, or on a trial basis to determine if that is a good location for a permanent monitoring site.*

*The IC sites are Interconnect sensors that monitor when an overflow occurs on a combined sanitary/storm line, which can happen during wet weather events. These sensors record when an event occurs, but does not provide a flow rate or total amount of overflow.*

## 5.0 Wastewater Treatment System

**5.1** Wastewater treatment for existing or proposed wastewater system is based on:

(a) Best Practicable Technology ☑

(b) Receiving Water Quality Based Effluent Limits ☐

### Receiving Water Quality Based Effluent Limits

**5.2** Submission of findings / report to support the existing or proposed treated effluent discharge using Alberta Environment and Water's *Water Quality Based Effluent Limits Procedures Manual* must be submitted in support the treatment process and discharge in support of the wastewater application and / or renewal (where applicable).

Date of *Water Quality Based Effluent Limits procedure* completion: *Not Applicable*

**5.3** Wastewater Treatment Processes (indicate applicable equipment and mechanical treatment processes):

### Preliminary Treatment:

(a) Wastewater Screening / Grit removal (pump protection):

i) Coarse Screens:
- A) Trash Racks ☐
- B) Coarse Bar Racks ☐
- C) Course Screens ☑

ii) Fine Screens, ☑

iii) Grit Removal Facilities:
- A) Grit Channels ☐
- B) Aerated Grit Chambers ☑

### Primary Treatment:

(a) Wastewater equalization ☐

(b) Sedimentation / clarification ☑

(c) Scum removal ☑

(d) Sedimentation sludge removal ☑

### Secondary Treatment: (Best Practicable Technology):

(a) Aerated Lagoons (completely mixed type) ☐

i) Maximum monthly average daily design flow:________________________

| CELL TYPE | NUMBER OF CELLS | DESIGN CAPACITY | HYDRAULIC RETENTION TIME (days) |
|---|---|---|---|
| Completely Mixed | | | |
| Partially Mixed (indicate series or parallel) | | | |
| Polishing | | | |

(b) Suspended Growth Wastewater Systems:

i) Continuous Flow Activated Sludge:
A) Conventional Plug flow ☐☑
B) Complete mix ☐☐
C) Step Aeration ☐☐
D) Contact stabilization ☐☐
E) Extended aeration ☐☐
F) High Rate ☐☐
G) High Purity oxygen ☐☐

| Process Modification | Flow Regime | Sludge Age | Detention Time (hours) | Activated sludge Return Ratio |
|---|---|---|---|---|
| Conventional | Plug | *6 to 12 days* | *5 to 10 hours* | *RAS to PE ratio 85 to 95%* |
| Complete mix | Complete mix | | | |
| Step Aeration | Plug | | | |
| Contact stabilization | Plug or complete mix | | | |
| Extended aeration | Plug or complete mix | | | |
| High Rate | Complete mix | | | |
| High Purity oxygen | Complete mix reactors in series | | | |

(c) Sequencing Batch Reactors (SBR):

i) Intermittent feed and intermittent discharge (IFID) ☐

ii) Continuous feed and intermittent discharge (CFID) ☐

| BASIN TYPE | NUMBER OF TANKS | DESIGN CAPACITY | BYPASS ON EACH TANK (Y or N) | DRAIN ON EACH TANK (Y or N) |
|---|---|---|---|---|
| SBR tankage for continuous inflow | | | | |
| SBR tankage | | | | |

(d) SBR – Decanters:

i) Floating decanter ☐

ii) Fixed decanter ☐

iii) Mechanically actuated surface skimmer ☐

(e) Fixed Film Wastewater Systems:

i) Rotating Biological Contactor (RBC) ☐

A) Media type:

1) standard density________________________________

2) medium density________________________________

3) high density________________________________

B) Number of stages:________________________________

(f) Membrane System:

i) Membrane Bioreactor ☐

| BASIN TYPE | NUMBER OF BASINS | DESIGN CAPACITY | Sludge Age | Detention Time (hours) | Activated sludge Return Ratio |
|---|---|---|---|---|---|
| Anoxic | | | | | |
| Anaerobic | | | | | |
| Aerobic | | | | | |

A) Number and Type of membrane modules/cassettes:_____________

B) Air scour for bioreactor membranes: (Y or N):_________________

C) Air scour orientation / location: (Bottom or across membrane):_____

## Tertiary Treatment: (Best Practicable Technology)

(a) Phosphorus Control:

i) Biological Phosphorus Removal ☑

ii) Chemical Phosphorus Removal ☑

A) Chemicals used:
1) *Alum as a chemical trim when required*
2) ______
3) ______

(b) Nitrogen Removal:

i) Biological Nitrogen Removal ☑

ii) Others, please specify: *Not Applicable*

A) Chemicals used:
1) *Not Applicable*
2) ______
3) ______

(c) Treated Effluent Disinfection ☑

## Sludge Treatment:

(a) Dewatering ☑

(b) Thickening ☑

(c) Digestion ☑

Design information on sludge treatment / digesters:

*Four fermenters/thickeners with a design sludge thickening loading rate of 120 kg/(m$^2$day) are used to process Primary Sludge (PS); VFA generated from this process is supplied to bioreactors for phosphorus removal and thickened PS is blended with thickened Waste Activated Sludge (WAS) prior to being fed to digesters.*
*Six Dissolved Air Flotation (DAF) units with a design peak WAS flow of 20 ML/d in total are used for thickening of WAS from bioreactors. The thickened WAS is blended with thickened PS in two blend tanks prior to being fed to digesters.*
*Eight mesophilic anaerobic digesters with a design minimum SRT of 13 to 15 days are used to process the blended sludge. Biogas generated in this process is used as a fuel for boilers at Gold Bar WWTP and excess biogas is flared; digested sludge is pumped to the Clover Bar Biosolids Recycling Facility.*

(d) Method of sludge disposal:

Landfill: SEC______TWP_______RG________M_______

GPS Co-ordinates: Latitude:______________ Longitude:_____________________

Sludge storage/drying cell: SEC NE1/4 21 TWP 53 RG 24 M W4

GPS Co-ordinates: Latitude:______________ Longitude:_____________________

Sludge applied to land: SEC_________TWP______RG______M______

GPS Co-ordinates: Latitude:______________ Longitude:_____________________

Other - please specify: *Thickened/Dewatered biosolids are removed from the Clover Bar Biosolids Recycle Facility and used for land application. Refer to "Summary of Biosolids Program" in the main application report.*

> ***A Letter of Authorization must be obtained from the Regional Director of Alberta Environment and Water prior to sludge disposal to lands other than a landfill site or an approved sludge drying cell or as allowed in the EPEA approval.*

**Disinfection:**

> *(indicate disinfection practiced where applicable)*

(a) Type of Primary Disinfection:

| | | | |
|---|---|---|---|
| Chlorine Gas | ☐ | Sodium Hypochlorite | ☐ |
| Calcium Hypochlorite | ☐ | Ozonation | ☐ |
| Chlorine Dioxide | ☐ | Ultra Violet | ☑ |

Location of introduction of primary or main disinfection process: *post secondary clarification*

(b) Chlorine Gas Disinfection:

Size / weight / volume of chlorine gas containers being used: *Not Applicable*

Dechlorination of treated effluent: Yes ☐ No ☐

If No, please detail the timeline for installation of the dechlorination equipment / process:

(c) Ozonation Disinfection:

i) Ozone Disinfection Type:

A) Low frequency ☐ ☐

B) Medium frequency ☐ ☐

☐

C) High frequency ☐

ii) Ozone Contacting Type:
A) Diffused bubble ☐ ☐
B) Positive pressure injection ☐ ☐
C) Negative pressure ☐ ☐
D) Mechanically agitated ☐ ☐
E) Packed tower ☐ ☐

(d) Ozonation disinfection design considerations relating to:

i) Corrosion protection: Yes ☐ No ☐

ii) Ozone monitoring and / or leak detection system: Yes ☐ No ☐

iii) Continuous ventilation system: Yes ☐ No ☐

(e) Ultra Violet Disinfection:

i) Ultra Violet Disinfection equipment manufacturer: *Trojan Technologies*

ii) Type of Ultra Violet system:
A) Low-pressure, low-intensity ☐
B) Low-pressure, high intensity ☐
C) Medium-pressure, high-intensity ☑
D) Other:____________________ ☐

iii) Orientation of Ultra Violet bulbs in UV disinfection reactors / system:
A) In-line with effluent flow ☑
B) Perpendicular to effluent flow ☐

iv) Screens immediately upstream of Ultra Violet disinfection process:
Yes ☑ No ☐

v) Number of Ultra Violet disinfection channels: *five (four plus one)*

vi) Capacity of Ultra Violet disinfection system: *140 ML/day for each channel*

vii) Ultra Violet lamp cleaning process: *clean-in-place pneumatic wiper*

viii) Ultra Violet Disinfection design considerations relevant to SBR (if SBR used): Yes ☐ No ☑

**5.4** Inventory of all wastewater treatment chemicals used. (Please identify all the chemicals used seasonally or continuously, including enzymes, pH adjusters, and chlorine).

| Chemical Name | NSF Approved Y/N | Chemical Type | Purpose / Point of Injection | Seasonal/ Continuous |
|---|---|---|---|---|
| Alum | N | 48.5% liquid solution | Phosphorus trimming in secondary effluent / mixed liquor channel to secondary clarifier | Seasonal |
| | | | Coagulation agent for EPT / at flash mixers in west primary influent channel feeding EPT clarifiers | Seasonal |
| Polymer, Zetag 8185 | N | Dry powder | Cationic polymer used as flocculation agent for Waste Activated Sludge (WAS) thickening / Dissolved Air Flotation Facility | Continuous |
| Polymer, Alcomer 120L | N | Emulsion | High density, molecular weight, anionic polymer used as flocculation agent for EPT / west primary influent channel to EPT | Seasonal |
| Sodium Hypochlorite | N | 16% liquid | Oxidization of H2S for odour control / the recirculation pump discharge header of each odour control wet scrubber unit | Continuous |
| | | | Chemical cleaning of ultrafiltration membranes / CIP pump discharge header to each membrane train | As required |
| | | | Maintain chlorine residual in the membrane product water / the common header of membrane permeate pumps to the chlorine contact tank | Continuous |
| Caustic Soda | N | 20% liquid | pH adjustment for odour control / recirculation pump discharge header of each odour control wet scrubber unit | Continuous |
| | Y | 50% liquid | pH adjustment for recovering phosphorus at the Nutrient Recovery Facility / influent header of the Ostara reactor | Continuous when Ostara is in operation. |
| Magnesium Chloride | N | 30% liquid | Provide magnesium for recovering phosphorus / influent header of the Ostara reactor | Continuous when Ostara is in operation. |
| Citric Acid | N | 50% liquid | Chemical cleaning of ultrafiltration membranes / CIP pump discharge header to each membrane train | As required |
| | | | Scaling removal / digested sludge transfer forcemains or Ostara reactor and associated piping in the Nutrient Recovery Facility | As required |
| Nitrogen Gas | N | Liquefied nitrogen gas | Digester system "out of service" and "return to service" purging / biogas/natural gas piping systems and digester headspaces | As required |

**5.5** Disposal and handling of wastes from wastewater from plant:

| TYPE OF WASTE STREAM | WASTE STORAGE LOCATION | METHOD OF WASTE DISPOSAL |
|---|---|---|
| Screenings or grit | *On site* | *Landfill* |
| Scum and / or foam | *On site* | *Anaerobic digestion* |
| Sludge from clarification / sedimentation | *On site* | *Anaerobic digestion* |
| Dewatering / drain / bypass waste | *On site* | *Return to headworks for full treatment* |
| Sludge from phosphorus removal process | *On site* | *Anaerobic digestion after being thickened by DAF units* |
| Wastewater from lab sink, floor drain(s), toilets and / or showers | *On site* | *Return to headworks for full treatment* |
| Other (Specify) – *Subnatant from the Dissolved Air Flotation units* | *On site* | *Return to headworks for full treatment* |
| Other (Specify) – *Supernatant from the Clover Bar Biosolids Resource Recovery Facility (CBBRRF)* | *Lagoons at Clover Bar* | *Return to the Gold Bar WWTP though Collection Systems for full treatment* |

## 6.0 Treated Effluent Discharge

**6.1** Treated effluent discharge method:

(a) Continuous direct discharge to watercourse or water body. ☑

Description and location of the treated effluent outfall:

*Concrete outfall infrastructure located on the south bank of North Saskatchewan River downstream of the UV disinfection facility. Consists of 3 outfalls: Final effluent Outfall 10 and the Membrane Product Water supply header. Outfall 30 and Outfall 20 for partially treatment bypass flows.*

Land Location________SEC_______TWP_______RG______M______

or other (i.e.: street address)________________________________________

GPS Co-ordinates: Latitude: *N5936690.98** Longitude: *E39082.28**

**NAD 83*

Dilution ratio for continuous discharge (stream flow:discharge) during lowest stream flow:

*31:1 (in 2020)*

(b) Continuous discharge to storage, then continuous/batch discharge to watercourse or water body. ☐

Description, volume and location of the treated effluent storage:

Land Location________SEC_______TWP_______RG______M______

or other (i.e.: street address)________________________________________

GPS Co-ordinates: Latitude:______________ Longitude:____________________

Description and location of the treated effluent outfall:

Land Location________SEC_______TWP_______RG______M______

or other (i.e.: street address)________________________________________

GPS Co-ordinates: Latitude:______________ Longitude:____________________

Description of the existing or proposed discharge times and durations from the treated effluent storage:

______________________________________________
______________________________________________
______________________________________________
______________________________________________

Description of the discharge route:
Immediate:
______________________________________________
Ultimately to:
______________________________________________

Have easement(s) been obtained for the discharge route? Yes ☐ No ☐
If No please explain:

______________________________________________
______________________________________________
______________________________________________
______________________________________________

Dilution ratio for continuous discharge (stream flow:discharge) during lowest stream flow: (if applicable):

______________________________________________
______________________________________________
______________________________________________
______________________________________________

(c) Continuous discharge to storage, then wastewater irrigation. ☐

Description, volume and location of the treated effluent storage:

______________________________________________
______________________________________________
______________________________________________
______________________________________________

Land Location________SEC________TWP_______RG______M______
or other (i.e.: street address)_____________________________________
GPS Co-ordinates: Latitude:_____________ Longitude:____________________

Type of the irrigation system:
Permanent in-ground ☐
Hand move ☐
Wheel move ☐
Pivot ☐
Other:____________________ ☐

Topographical description of the irrigated land(s):

______________________________________________________________________

______________________________________________________________________

______________________________________________________________________

______________________________________________________________________

Total land area irrigated:______________hectares____________
Land Locations of the irrigated land(s):
Land Location________SEC________TWP_______RG______M______
Land Location________SEC________TWP_______RG______M______
Land Location________SEC________TWP_______RG______M______
GPS Co-ordinates: Latitude:______________Longitude:______________________
GPS Co-ordinates: Latitude:______________Longitude:______________________
GPS Co-ordinates: Latitude:______________Longitude:______________________

Land irrigability study (as per EPEA Guidelines for Municipal Wastewater Irrigation) must be submitted for irrigated lands in support of this application:
Date of study completion:_________________________________________________

Existing or Projected wastewater irrigation application volume (annual total):
_____________mm (total).

Existing or Projected wastewater irrigation application rate:
_____________mm/hr or mm/irrig. event

(d) Continuous or batch discharge to landlocked wetland. ☐

Description, approximately area (hectares2) and location of the wetland:

______________________________________________________________________

______________________________________________________________________

______________________________________________________________________

______________________________________________________________________

Land Location________SEC________TWP_______RG______M______
Land Location________SEC________TWP_______RG______M______
Land Location________SEC________TWP_______RG______M______
GPS Co-ordinates: Latitude:______________Longitude:______________________
GPS Co-ordinates: Latitude:______________Longitude:______________________
GPS Co-ordinates: Latitude:______________Longitude:______________________

(e) Continuous or batch discharge to a wetland with subsequent discharge to a watercourse or water body. ☐

Type of wetland: Natural ☐ Man Made/designed ☐ Hybrid ☐

Purpose of wetland:
Wastewater treatment (recognized part of treatment train) ☐
Wastewater Polishing ☐
Additional Wastewater storage ☐
Other:______________________________________________ ☐

Wetland Management Plans in place: Yes ☐ No ☐
Volume and water level management ☐
Aquatic plant management ☐
Phosphorus management ☐

Description, volume and location of the treated effluent storage:
(pre-wetland - if applicable)

______________________________________________________________
______________________________________________________________
______________________________________________________________
______________________________________________________________

Land Location________SEC_______TWP_______RG______M______
Land Location________SEC_______TWP_______RG______M______
Land Location________SEC_______TWP_______RG______M______
GPS Co-ordinates: Latitude:_____________Longitude:_____________________
GPS Co-ordinates: Latitude:_____________Longitude:_____________________
GPS Co-ordinates: Latitude:_____________Longitude:_____________________

Description, approximately area (hectares2) and location of the wetland:

______________________________________________________________
______________________________________________________________
______________________________________________________________
______________________________________________________________

Land Location________SEC_______TWP_______RG______M______
Land Location________SEC_______TWP_______RG______M______
Land Location________SEC_______TWP_______RG______M______
GPS Co-ordinates: Latitude:_____________Longitude:_____________________
GPS Co-ordinates: Latitude:_____________Longitude:_____________________
GPS Co-ordinates: Latitude:_____________Longitude:_____________________

Description and location of the treated effluent outfall to watercourse:

________________________________________
________________________________________
________________________________________
________________________________________

Land Location________SEC_______TWP_______RG______M______
GPS Co-ordinates: Latitude:_____________ Longitude:____________________

(f) Discharge to a subsurface soil disposal system ☐

Diagram of the layout of disposal laterals must be included in support of this existing or proposed wastewater system.

Description, type, and location of the soil disposal field:

________________________________________
________________________________________
________________________________________
________________________________________

Land Location________SEC_______TWP_______RG______M______
Land Location________SEC_______TWP_______RG______M______
GPS Co-ordinates: Latitude:_____________Longitude:______________________
GPS Co-ordinates: Latitude:_____________Longitude:______________________
or other (i.e.: street address)_____________________________________

Disposal laterals:
Diameter:___________________mm
Number of laterals:____________
Length______________________per lateral (meters)
Length______________________total lateral (meters)
Depth of topsoil cover__________cms

Soil Monitoring Plan: Yes ☐ No ☐
A Soil Monitoring Plan must be included in support of this existing or proposed subsurface wastewater disposal system.

Groundwater Monitoring Plan: Yes ☐ No ☐
A Groundwater Monitoring Plan must be included in support of this existing or proposed subsurface wastewater disposal system.

## 7.0 Laboratory and Monitoring (for existing EPEA Approved systems)

**7.1** Extent of existing monitoring carried out by the Municipality / Commission / Company, noted in Table below and as required by the current operating Approval. The Wastewater Laboratory at Gold Bar is accredited to ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation (CALA) for analyses within the laboratory's scope of accreditation. As part of the accreditation requirements, the Laboratory Quality Management System and the laboratory technical testing capabilities are assessed by CALA every two years to ensure conformance of the lab to the ISO/IEC 17025 standard. Proficiency assessments are based on proficiency testing (PT) samples supplied by CALA-approved PT providers. The PT samples are analyzed with regular analytical sets at a frequency of two PT rounds per test per year. Where a test is required by the Approval to Operate but is not accredited at the Wastewater Laboratory, the samples requiring this parameter are analyzed by an external laboratory that is accredited to ISO/IEC 17025 for that parameter.

**Monitoring on the Influent and Effluent Parameters**

| Parameter | Influent | | Effluent, Outfall 10 | | Effluent, Outfall 20 | | Effluent, Outfall 30 | |
|---|---|---|---|---|---|---|---|---|
| | Grab | Composite | Grab | Composite | Grab | Composite | Grab | Composite |
| pH | | 7/week | | 7/week | | 1/event | | 1/event |
| $CBOD_5$ | | 7/week | | 7/week | | | | |
| $BOD_5$ | | | | | | 1/event | | 1/event |
| TSS | | 7/week | | 7/week | | 1/event | | 1/event |
| Total Phosphorus | | 7/week | | 7/week | | 1/event | | 1/event |
| Ammonia | | 7/week | | 7/week | | 1/event | | 1/event |
| E. Coli | | | 7/week | | 1/event | | 1/event | |
| Acute Toxicity | | | 1/month | | | | | |
| Chronic Toxicity | | | 4/year | | | | | |

**7.2** Monitoring and control proposed or carried out by the Municipality / Commission / Company system for the wastewater system:

SCADA system: Yes ☑ No ☐

On-site ☑ Remote Process Monitoring ☐ Remote Process Control ☐

Description of the monitoring and control system (On-site):

*The process required control and monitoring is provided by a Delta V distributed control system (DCS) that is interfaced with programmable logic controllers (PLCs) which provide some local control on skids or in specialized process areas.*

Description of the monitoring and control system (Remote):

*Not Applicable.*

## 8.0 Operations Plan

**8.1** An operations plan must be submitted in support of this application. The operations plan shall contain the following: *(Please refer to main application report Section 7 Edmonton Gold Bar Operations Plan and the Edmonton Wastewater Collection Operations Plan. Also note that the current Approval 639-03-06 contains a more detailed version of the requirements below. In addition, annual updates and complete Plans are submitted annually to AEPA)*

(a) Routine Operational Procedures, which shall, at a minimum, include:

i) contact name and telephone numbers for the wastewater system owner, system operator, engineering consultants and equipment suppliers,

ii) roles and responsibilities of the organization (owner/management, operator(s), contractors, visitors),

iii) operating instructions:
A) general description of the wastewater treatment process and operating procedures,
B) performance requirements, and
C) location of equipment major controls;

iv) general maintenance schedule, and

v) general maintenance instructions for:
A) lift stations,
B) wastewater treatment / process equipment,
C) aeration compressors,
D) monitoring equipment, and
E) treatment plant pumping equipment;

(b) Routine Operational Procedures for Monitoring and Analysis, which shall, at a minimum, include:

i) operational and compliance tests to be performed,

ii) methods used for monitoring and analysis,

iii) locations of monitoring points,

iv) alternate laboratory sample analyses, and

v) laboratory data quality assurance information.

## 9.0 Emergency Response Plan

**9.1** Confirmation that any emergency response plans that are required to be filed with the local authority or the municipality in which the activity is or is to be carried on or with Alberta Public Safety Services have been so filed must be submitted in support of this application.
Yes ☑ No ☐

If no, please identify the reason and provide a timeline for submission to the specific party:

______________________________________________________________________

______________________________________________________________________

______________________________________________________________________

______________________________________________________________________

______________________________________________________________________

**9.2** A copy of any formal Emergency Response Plan must be submitted along with the Operations Plan. The Emergency Response Plan must outline the procedure that would be followed in the event of major problems with the wastewater system such as: (*Please refer to section in Main Application report – Section 7 Emergency Response Plans*)

(a) bacteriological results exceeding the prescribed discharge limits;

(b) BOD / CBOD /TSS / TP / NH4 exceeding discharge limits;

(c) CBOD / COD / TSS / EC / SAR / pH / Faecal and Total Coliforms exceeding wastewater irrigation limits;

(d) Chlorine residual in treated effluent exceeding discharge limits;

(e) disinfection system failure;

(f) chemical overfeed;

(g) no chemical feed;

(h) raw wastewater influent quality problems;

(i) wastewater treatment plant failures;

(j) power failure;

(k) any unforeseen sudden or gradual releases of substances to the environment from lift stations and / or treatment plant;

(l) wastewater collection system / pipeline break, repair and clean-up;

(m) flood conditions;

(n) list of contacts; Alberta Environment and Water, Alberta Health, Regional Health Authorities, Fire Department, Disaster Coordinator, and other agencies.

## 10.0 Wastewater Application Signature

**10.1** The *Environmental Protection and Enhancement Act* and Regulations, provide a specific definition for the "owner" and "person responsible for a wastewater system". Therefore, the person(s) responsible/person signing this document should be familiar with the applicable sections of the *Environmental Protection and Enhancement Act* and the Regulations. The sections of the *Environmental Protection and Enhancement Act* and Regulations that are of particular relevance to waterworks system are:

(a) *Environmental Protection and Enhancement Act* Part 2, Division 2 (Approvals and Certificates); Part 4 (Release of Substances); Part 10 (Enforcement);

(b) Activities Designation Regulation 276/2003;

(c) Approvals and Registrations Procedure Regulation 113/1993;

(d) Wastewater and Storm Drainage Regulation 119/1993;

(e) Wastewater and Storm Drainage (Ministerial) Regulation 120/1993.

I certify that I am familiar with the information contained in this application, and that to the best of my knowledge and belief, such information is true, complete and accurate.

| | |
|---|---|
| *Trina Manning*<br>*Printed Name of Person Signing* | *Senior Manager, Operations, GBWWTP*<br>*Title* |
| *2000, 10423 – 101 Street NW, Edmonton AB*<br>*Corporate Address* | *T5H 0E8*<br>*Corporate Postal Code* |
| *780-412-3616*<br>*Corporate Telephone Number* | *780-412-7619*<br>*Corporate Fax Number* |
| *September 10, 2024*<br>*Date of Application* | TManning<br>*Signature* |

| | |
|---|---|
| *Angus Grant*<br>*Printed Name of Person Signing* | *Senior Manager, WWC Operations*<br>*Title* |
| *2000, 10423 – 101 Street NW, Edmonton AB*<br>*Corporate Address* | *T5H 0E8*<br>*Corporate Postal Code* |
| *780-412-3616*<br>*Corporate Telephone Number* | *780-412-7619*<br>*Corporate Fax Number* |
| *September 10, 2024*<br>*Date of Application* | *Signature* |

# Appendix B Current EPEA Operating Approvals

Alberta Environment and Parks

# AMENDING APPROVAL

## PROVINCE OF ALBERTA

## ENVIRONMENTAL PROTECTION AND ENHANCEMENT ACT
## R.S.A. 2000, c.E-12, as amended.

APPROVAL NO.: 639-03-06

APPLICATION NO.: 101-639

EFFECTIVE DATE: April 1, 2020

EXPIRY DATE: MAY 1, 2025

APPROVAL HOLDER: EPCOR WATER SERVICES INC.

ACTIVITY: Construction, operation and reclamation of the Edmonton Wastewater System serving the City of Edmonton, City of Leduc, City of Beaumont, Nisku Business Park and Edmonton International Airport

is amended as per the attached terms and conditions.

Designated Director under the Act
MOHAMMAD HABIB, P.ENG.

Date Signed March 31, 2020

# TERMS AND CONDITIONS ATTACHED TO APPROVAL

*Environmental Protection and Enhancement Act* Approval No .639-03-00 is hereby amended by deleting all the terms and conditions and replacing with the following:

## PART 1: DEFINITIONS

### SECTION 1.1: DEFINITIONS

1.1.1 All definitions from the Act and the regulations apply except where expressly defined in this approval.

1.1.2 In all PARTS of this approval:

(a) "Act" means the *Environmental Protection and Enhancement Act*, R.S.A. 2000, c.E-12, as amended;

(b) "Alberta Capital Region Wastewater Treatment Plant" means the tertiary wastewater treatment plant owned by the Alberta Capital Wastewater Commission, and located at Southwest of Section 3, Township 54, Range 23, West of the 4$^{th}$ Meridian;

(c) "application" means the written submissions to the Director in respect of application number 095-639 and 001-361975 and any subsequent applications for amendments of approval number 639-03-00 and 361975-00-00;

(d) "arithmetic mean" means the sum of all the sample analysis results divided by the total number of samples per reporting period;

(e) "$BOD_5$" means the Biochemical Oxygen Demand in milligrams per litre measured at 20°C over a 5 day period;

(f) "$CBOD_5$" means the carbonaceous $BOD_5$ in milligrams per litre which is measured after the nitrogenous demand has been inhibited with an inhibitory chemical;

(g) "chemical" means any substance that is added or used as part of the treatment process;

(h) "Clover Bar biosolids lagoons" means the lagoons that are used for biosolids storage, dewatering and transfer, and located within Northeast of Section 21, Township 53, Range 23, West of the 4$^{th}$ Meridian;

(i) "Clover Bar biosolids dewatering facility" means the facility that is used for withdraw biosolids from the biosolids lagoons, dewater biosolids, temporary storage and transfer of dewatered biosolids, including the air handling system

## TERMS AND CONDITIONS ATTACHED TO APPROVAL

for this facility, and located within Northeast of Section 21, Township 53, Range 23, West of the $4^{th}$ Meridian;

(j) "Clover Bar nutrients recovery facility" means the plant that produces fertilizer with dissolved phosphorus and ammonia in the supernatant of the Clover Bar biosolids lagoons, and located at Northeast of Section 21, Township 53, Range 23, West of the $4^{th}$ Meridian;

(k) "combined sewer overflows (CSO)" means when the capacity of the combined sewer system is exceeded from heavy rainfall or snow melt, the excess is discharged to the environment through the overflow structures;

(l) "combined sewer system" means the older sewer system designed to convey both sewage and storm water in one pipe to a wastewater treatment plant, and the combined sewer system will overflow to the environment when the sewage/storm flow exceeds the combined sewer system's capacity during wet weather conditions;

(m) "composite sample" for Gold Bar Wastewater Treatment Plant means a refrigerated (approximately 4°C) sample consisting of not less than twelve portions of equal volume which are representative of the stream sampled, collected over a 24 hour period, at a rate proportional to the flow rate of the stream sampled,

(n) "composite sample" for City of Edmonton wastewater collection system CSO event means a sample of the stream collected every 30 minutes in a refrigerated bottle sampler and then mixed in a quantity proportional to the flow rate of the stream over the CSO event after CSO event is concluded;

(o) "continuous monitoring" means sampling or flow measurement through equipment that creates an uninterrupted output of the analysis or flow measurement;

(p) "day" means calendar day;

(q) "Director" means an employee of the Government of Alberta designated as a Director under the Act;

(r) "dry weather condition" means a condition where wastewater flow is not impacted by the run off from snow melt or rainfall;

(s) "*E. Coli* " means *Escherichia coli* bacteria;

(t) "enhanced primary treatment (EPT)" means coagulant aided primary treatment for a better removal of contaminants by settlement;

## TERMS AND CONDITIONS ATTACHED TO APPROVAL

(u) "fugitive emissions" means emissions of substances to the atmosphere other than ozone depleting substances, originating from a source of the wastewater system other than a flue, vent, or stack but does not include sources which may occur due to breaks or ruptures in process equipment;

(v) "geometric mean" means the calculated $n^{th}$ root of the product of all the sample analyses within the reporting period, where $n$ equals the total number of samples within the reporting period, as follows:

Geometric Mean = $\sqrt[n]{S_1 \times S_2 \times S_3 \times \ldots \times S_n)}$

where,
$n$ = the total number of samples within the reporting period,
$S_1$ = the 1st sample analysis value,
$S_n$ = the nth sample analysis value;

(w) "Gold Bar Wastewater Treatment Plant" means the tertiary wastewater treatment plant located within Southwest of Section 12, Township 53, Range 24, West of the 4th Meridian;

(x) "grab sample" means an individual sample collected in less than 30 minutes and which is representative of the substance sampled;

(y) "grit recovery facility" means a facility inside of an enclosed building within the Gold Bar Wastewater Treatment Plant, and that is for washing and separating sanitary grit materials removed by hydrovac trucks during sanitary lift station and combined sewer sand trap cleaning activities, and discharges the wash water to the headworks of the Gold Bar Wastewater Treatment Plant;

(z) "interconnection" means a location within the drainage system downstream of the lot service connections of wastewater and stormwater where flows may pass between systems;

(aa) "ISO 17025" means the international standard, developed and published by International Organization for Standardization (ISO), specifying management and technical requirements for laboratories;

(bb) "manual stack survey" means a survey conducted in accordance with the *Alberta Stack Sampling Code,* Alberta Environment, 1995, as amended;

(cc) "nutrient removal" means the chemical, physical or biological treatment of the wastewater to reduce the amounts of total phosphorus and total nitrogen in the treated effluent;

(dd) "NSR" means North Saskatchewan River;

## TERMS AND CONDITIONS ATTACHED TO APPROVAL

(ee) "ORP" means Oxidation-Reduction Potential in millivolts;

(ff) "primary treatment" means treatment where the untreated wastewater is passed through clarifiers to settle the solids;

(gg) "regulations" means the regulations issued pursuant to the Act and as amended;

(hh) "secondary treatment" means treatment where aeration takes place and the dissolve organics are removed from the wastewater;

(ii) "sludge" means the settled solids collected from the primary and secondary clarifiers;

(jj) "total ammonia-nitrogen" means the total of ionized ammonia-nitrogen ($NH_4^+$-N) and un-ionized ammonia-nitrogen ($NH_3$-N), measured in milligram per litre;

(kk) "TKN" means total Kjeldhal nitrogen which includes organic nitrogen and total ammonia-nitrogen, measured in milligram per litre;

(ll) "total loading" means the annual mass of a substance released to flowing water bodies from all sources under the control of the approval holder;

(mm) "total nitrogen" means the calculated total of TKN, nitrate-nitrogen and nitrite-nitrogen;

(nn) "TP" means total phosphorus measured in milligram per litre;

(oo) "TSS" means the total suspended solids or non-filterable residue (NFR) measured in milligrams per litre;

(pp) "tertiary treatment" means treatment beyond secondary treatment and includes but not limited to disinfection and nutrient removal;

(qq) "uncommitted hydraulic reserve capacity" means the design capacity of the wastewater treatment plant minus the sum of the peak daily flow and the peak daily flow that would be used by development that is approved but not yet built;

(rr) "UV" means ultraviolet light;

(ss) "wastewater collection system" means the sanitary sewage collection system including all sanitary and combined sewers, lift stations, storage facilities, flow monitoring sites, wastewater quality monitoring sites, and combined sewer overflow structures located within the City of Edmonton;

# TERMS AND CONDITIONS ATTACHED TO APPROVAL

(tt) "wastewater system" means wastewater collection system and wastewater treatment plant;

(uu) "wastewater treatment plant" means the physical components of the wastewater system that are used to treat and dispose of wastewater including components associated with the management of any wastes generated during treatment and includes:

(i) Gold Bar Wastewater Treatment Plant,

(ii) grit recovery facility,

(iii) Clover Bar biosolids lagoons,

(iv) Clover Bar biosolids dewatering facility,

(v) Clover Bar nutrients recovery facility,

(vi) pipelines between Gold Bar Wastewater Treatment Plant and Clover Bar biosolids lagoons, and

(vii) lands that are being or has been used or held for or in connection with the wastewater treatment plant;

(vv) "week" means calendar week;

(ww) "wet scrubbers" means odour scrubbers that use both caustic and oxidizing chemical solutions to remove reduced sulphur odorants, including east scrubber, west scrubber, EPT scrubber, fermenter scrubber, and any other scrubber that uses the similar odour scrubbing technology;

(xx) "wet weather condition" means a condition where wastewater flow is impacted by the run off from snow melt or rainfall; and

(yy) "year" means calendar year.

## PART 2: GENERAL

### SECTION 2.1: GENERAL

2.1.1 The approval holder shall immediately report by telephone any contravention of the terms and conditions of this approval to the Director at 1-780-422-4505.

2.1.2 In addition to reporting pursuant to 2.1.1, the approval holder shall submit, within 7 days from any contravention of the terms and conditions of this approval, a written report to the Director.

# TERMS AND CONDITIONS ATTACHED TO APPROVAL

2.1.3 The approval holder shall immediately notify the Director in writing if any of the following events occurs:

(a) the approval holder is served with a petition into bankruptcy;

(b) the approval holder files an assignment in bankruptcy or Notice of Intent to make a proposal;

(c) a receiver or receiver-manager is appointed;

(d) an application for protection from creditors is filed for the benefit of the approval holder under any creditor protection legislation; or

(e) any of the assets which are the subject matter of this approval are seized for any reason.

2.1.4 The terms and conditions of this approval are severable. If any term or condition of this approval or the application of any term or condition is held invalid, the application of such term or condition to other circumstances and the remainder of this approval shall not be affected thereby.

**SECTION 2.2: ANALYTICAL RECORDS**

2.2.1 The approval holder shall record and retain all the following information in respect of any sampling conducted or analyses performed for a minimum of three years:

(a) the place, date and time of sampling;

(b) the dates the analyses were performed;

(c) the analytical techniques, methods or procedures used in the analyses;

(d) the names of the persons who collected and analyzed each sample; and

(e) the results of the analyses.

**SECTION 2.3: ANALYTICAL REQUIREMENTS**

2.3.1 Collection, preservation, storage, handling and analysis of samples, and reporting shall be conducted in accordance with the following unless otherwise specified in writing by the Director:

(a) for wastewater:

(i) the *Standard Methods for the Examination of Water and Wastewater* published jointly by the American Public Health Association, American

## TERMS AND CONDITIONS ATTACHED TO APPROVAL

Water Works Association, and the Water Environment Federation, as amended; and/or

(ii) the *United States Environmental Protection Agency (USEPA) Water and Wastewater Methods* approved by USEPA from time to time *in the Code of Federal Regulations Title 40 Part 136*; and/or

(iii) the *American Society for Testing and Materials (ASTM) water and wastewater methods* approved by the USEPA from time to time in the *Code of Federal Regulations Title 40 Part 136;*

(b) for wastewater toxicity tests:

(i) the *Biological Test Method: Reference Method for Determining Acute Lethality of Effluents to Rainbow Trout*, Environment Canada, Environmental Protection Series 1/RM/13, December 2000, as amended;

(ii) the *Biological Test Method: Reference Method for Determining Acute Lethality of Effluents to Daphnia Magna*, Environment Canada, Environmental Protection Series 1/RM/14, December 2000, as amended;

(iii) the *Biological Test Method: Growth Inhibition Test Using the Freshwater Alga Selenastrum capricornutum*, Environment Canada, Environmental Protection Series 1/RM/25, March 2007, as amended;

(iv) the *Biological Test Method: Test of Reproduction and Survival Using the Cladoceran Ceriodaphnia dubia*, Environment Canada, Environmental Protection Series 1/RM/21, February 2007, as amended;

(v) the *Biological Test Method: Test of Larval Growth and Survival Using Fathead Minnows*, Environment Canada, Environmental Protection Series 1/RM/22, February 2011, as amended; and

(vi) the *Biological Test Method: Toxicity Test Using Luminescent Bacteria (Photobacterium phosphoreum)*, Environment Canada, Environmental Protection Series, 1/RM/24, November 1992, as amended.

(c) for air:

(i) the *Alberta Stack Sampling Code*, Alberta Environment, 1995, as amended, and

# TERMS AND CONDITIONS ATTACHED TO APPROVAL

(ii) the *Air Monitoring Directive*, Alberta Environment and Parks, 2016, as amended.

2.3.2 The approval holder shall analyse all samples that are required to be obtained by this approval in a laboratory accredited pursuant to ISO 17025, as amended, and accredited for the specific parameter(s) to be analysed, unless otherwise authorized in writing by the Director.

2.3.3 The term sample as used in clause 2.3.2 does not include samples directed to continuous monitoring equipment, until specifically required in writing by the Director.

2.3.4 The approval holder shall comply with the terms and conditions of any written authorization issued by the Director under 2.3.2.

## PART 3: CONSTRUCTION AND UPGRADING REQUIREMENTS

3.1.1 The approval holder shall:

(a) implement the *Combined Sewer Overflow Control Strategy* as outlined in the *Combined Sewer Discharge Strategy* (June 2013), unless otherwise authorized in writing by the Director; and

(b) maximize wastewater treatment during wet weather conditions.

## PART 4: OPERATIONS

### SECTION 4.1: GENERAL

4.1.1 The approvals holder shall coordinate with the Alberta Capital Region Wastewater Commission to implement the *Total Loading Management Plan* as authorized in writing by the Director.

4.1.2 The approval holder shall conduct Effluent Characterization as requested in writing by the Director for the following:

(a) treated wastewater effluent at outfall 10;

(b) wastewater treatment plant bypass flows at outfall 20 and outfall 30; and

(c) Combined sewer overflow at Rat Creek CSO outfall.

4.1.3 The approval holder shall conduct a Pollution Minimization Study as requested in writing by the Director.

# TERMS AND CONDITIONS ATTACHED TO APPROVAL

**SECTION 4.2: WASTEWATER TREATMENT PLANT**

4.2.1 The approval holder shall not release any substances from the wastewater treatment plant to the surrounding watershed except as authorized under this approval.

4.2.2 The approval holder shall operate and maintain the wastewater treatment plant consisting of all of the following treatment units as a minimum:

(a) bar screening;

(b) aerated grit removal;

(c) primary treatment;

(d) enhanced primary treatment;

(e) biological activated sludge process with capability for nutrients removal;

(f) chemical phosphorus trimming;

(g) secondary clarification;

(h) UV disinfection;

(i) membrane filtration for effluent reuse;

(j) grit recovery facility;

(k) Clover Bar nutrients recovery facility;

(l) sludge treatment, including all of the following at a minimum:

(i) primary sludge fermentation,

(ii) sludge thickening by dissolved air floatation (DAF),

(iii) anaerobic sludge digestion,

(iv) digested sludge transmission pipeline from the Gold Bar Wastewater Treatment Plant to the Clover Bar biosolids lagoons,

(v) Clover Bar biosolids lagoons for biosolids storage and transfer,

(vi) Clover Bar biosolids dewatering facility, and

(vii) supernatant of Clover Bar biosolids lagoons returning to:

# TERMS AND CONDITIONS ATTACHED TO APPROVAL

(A) Gold Bar Wastewater Treatment Plant, or

(B) Alberta Capital Region Wastewater Treatment Plant.

(m) air pollution control systems, including:

(i) east scrubber,

(ii) west scrubber,

(iii) EPT scrubber,

(iv) fermenter scrubber,

(v) a carbon scrubber of the grit recovery facility,

(vi) a carbon scrubber for the screening building 2/3,

(vii) a carbon scrubber for the grit building 2,

(viii) a carbon scrubber for the Clover Bar biosolids dewatering building, and

(ix) a cyclone dust control system at the Clover Bar nutrients recovery facility.

**SECTION 4.3: WASTEWATER COLLECTION SYSTEM**

4.3.1 The approval holder shall not release any substances from the wastewater collection system to the surrounding watershed except as authorized under this approval.

4.3.2 The approval holder shall not release any water from the CSO outfalls to the North Saskatchewan River or its tributaries during the dry weather conditions.

4.3.3 The approval holder shall operate and maintain the wastewater collection system within the City of Edmonton, and deliver the collected wastewater to:

(a) Gold Bar Wastewater Treatment Plant;

(b) Alberta Capital Region Wastewater Treatment Plant; and

(c) North Saskatchewan River or its tributaries through the CSO outfalls during wet weather conditions only.

# TERMS AND CONDITIONS ATTACHED TO APPROVAL

## SECTION 4.4: OPERATIONS PLANS

### WASTEWATER TREATMENT PLANT

4.4.1 The approval holder shall maintain and update the *Wastewater Treatment Operations Plan* as per this approval to include all of the following at a minimum:

(a) Wastewater Treatment Certified Operator Requirements;

(b) *Communications Protocol*;

(c) *Preventive and Corrective Maintenance Protocol for Maximizing Treatment Capacity*;

(d) *Standard Operating Procedure of the biological nutrients removal (BNR) process*, including:

(i) *Nitrification Maintenance Protocol*,

(ii) *Nitrification Recovery Strategy Protocol*,

(iii) *Improved Nitrogen Removal Protocol*, and

(iv) *Phosphorus Removal Protocol*;

(e) Treatment Facility Hydraulic and Organic Loading Capacity Estimates and Plans for Future Capacity and/or Effluent Quality Improvements;

(f) *Biosolids Management Plan*;

(g) *Wastewater Treatment System Chemical Usage Protocol*;

(h) *Odour Control and Management Protocol*;

(i) *Effluent Toxicity Testing Protocol*;

(j) *Treated Effluent Reuse Protocol*;

(k) *Monitoring Protocol*;

(l) *Digester Gas Protocol*;

(m) *Laboratory Accreditation Program*;

(n) *Wet Weather Operations Protocol* including:

(i) *Wet Weather Reporting Protocol*,

# TERMS AND CONDITIONS ATTACHED TO APPROVAL

(ii) *Enhanced Primary Treatment-Secondary Treatment Bypass Protocol*,

(iii) *Enhanced Primary Treatment Protocol*,

(iv) *Wet Weather Solids Handling Protocol*;

(o) *Capital Construction, Commission and Performance Testing Protocol*; and

(p) *River Load Calculation Protocol*.

4.4.2 On or before May 1, 2020, the approval holder shall submit a copy of the up-to-date *Wastewater Treatment Operations Plan* to the Director.

4.4.3 The approval holder shall submit a summary of the proposed changes to the *Wastewater Treatment Operations Plan* to the Director by May 1 of each year after 2020.

4.4.4 If *the Wastewater Treatment Operations Plan*, or any part of it, is found to be deficient by the Director, the approval holder shall correct all deficiencies as outlined in writing by the Director within 120 days of the deficiency letter.

4.4.5 The approval holder shall implement the *Wastewater Treatment Operations Plan*.

**WASTEWATER COLLECTION SYSTEM**

4.4.6 The approval holder shall update and maintain the *Wastewater Collection System Operations Plan* as per this approval to include all of the following, at a minimum:

(a) Wastewater Collection Certified Operator Requirements;

(b) *Wastewater Collection System Monitoring Protocol*;

(c) *Interconnection Identification and Control Strategy*;

(d) *Wastewater Collection System Chemical Usage Protocol*;

(e) *Odour Control and Management Protocol*;

(f) *River Water Quality Monitoring Protocol*; and

(g) *River Load Calculation Protocol*.

4.4.7 On or before May 1, 2020, the approval holder shall submit a copy of the up-to-date *Wastewater Collection System Operations Plan* as per this approval to the Director.

# TERMS AND CONDITIONS ATTACHED TO APPROVAL

4.4.8 The approval holder shall submit a summary of the proposed changes to the *Wastewater Collection System Operations Plan* to the Director by May 1 of each year after 2020.

4.4.9 If the *Wastewater Collection System Operations Plan*, or any part of it, is found to be deficient by the Director, the approval holder shall correct all deficiencies as outlined in writing by the Director within 120 days of the deficiency letter.

4.4.10 The approval holder shall implement the *Wastewater Collection System Operations Plan*.

**SECTION 4.5: CERTIFIED OPERATOR REQUIREMENTS**

4.5.1 At all times the operation of the wastewater treatment plant shall be performed by, or under the direction of the following number of persons who hold valid certificates of qualification of the following types at the following minimum levels:

(a) two operators each with a Level IV Wastewater Treatment (WWT) Certificate, and

(b) three operators each with a Level III or higher WWT Certificate, and

(c) one operator with a Level II or higher WWT certificate in charge of each shift.

4.5.2 At all times the operation of the wastewater collection system shall be performed by, or under the direction of the following number of persons who hold valid certificates of qualification of the following types at the following minimum levels:

(a) one operator with a Level IV Wastewater Collection (WWC) Certificate, and

(b) two operators each with a Level III or higher WWC Certificate, and

(c) one operator with a Level II or higher WWC Certificate in charge of each shift.

**SECTION 4.6: SLUDGE DISPOSAL**

4.6.1 The approval holder shall manage sludge as per the *Biosolids Management Plan*, unless otherwise authorized in writing by the Director.

4.6.2 The approval holder shall provide the Director a minimum of 14 days written notice of the intention to apply sludge to agricultural lands.

4.6.3 The approval holder shall apply biosolids to agricultural lands in accordance with the *Guidelines for the Application of Municipal Wastewater Sludges to Agricultural Lands,* Alberta Environment and Parks, as amended.

# TERMS AND CONDITIONS ATTACHED TO APPROVAL

**SECTION 4.7: CHEMICALS USED**

4.7.1 The approval holder shall only use chemicals in the wastewater system as described in the following:

(a) *Wastewater Treatment System Chemical Use Protocol*, and

(b) *Wastewater Collection System Chemical Use Protocol,* or

(c) as authorized in writing by the Director.

**SECTION 4.8: DIGESTER GAS**

4.8.1 The approval holder shall dispose of the digester gas by using the gas for one or both of the following:

(a) as a fuel source for:

(i) on-site heat, and/or

(ii) power generation; and/or

(b) alternative uses.

4.8.2 For alternative uses of digester gas pursuant to 4.8.1(b), the approval holder shall apply for an amendment to the approval unless otherwise authorized in writing by the Director.

4.8.3 In the event the excess digester gas cannot be used on-site as per 4.8.1, the digester gas may be flared.

4.8.4 The approval holder shall continuously operate the digester gas flare stacks with the following minimum systems:

(a) wind guard;

(b) continuously burning pilot light; and

(c) electric lighter

unless an equivalent system is authorized in writing by the Director.

**SECTION 4.9: AIR POLLUTION MANAGEMENT**

**AMBIENT AIR MONITORING STATION**

# TERMS AND CONDITIONS ATTACHED TO APPROVAL

4.9.1 On or before December 31, 2019, the approval holder shall submit a proposal for an ambient air monitoring station to be installed between the Gold Bar Wastewater Treatment Plant and the Gold Bar Community, unless otherwise authorized in writing by the Director.

4.9.2 The approval holder shall install the ambient air monitoring station required in 4.9.1 by December 31, 2021, unless another date authorized in writing by the Director.

**AIR POLLUTION CONTROL SYSTEMS**

4.9.3 The approval holder shall only release air effluent streams to the atmosphere from the following sources:

(a) east scrubber stack;

(b) west scrubber stack;

(c) fermenter scrubber stack;

(d) EPT scrubber stack;

(e) carbon scrubber stack of the grit recovery facility;

(f) a carbon scrubber stack for the screening building 2/3;

(g) a carbon scrubber stack for the grit building 2;

(h) a carbon scrubber stack for the Clover Bar biosolids dewatering building;

(i) cyclone dust control system stack of the Clover Bar nutrients recovery facility;

(j) the ten boilers' stacks;

(k) the two digester gas flare stacks;

(l) the space ventilation exhaust stacks;

(m) the space heater exhaust vents; and

(n) any other source authorized in writing by the Director.

4.9.4 The approval holder shall maintain the following stacks according to the minimum height requirements specified in TABLE 4-1.

# TERMS AND CONDITIONS ATTACHED TO APPROVAL

## TABLE 4-1: STACK HEIGHTS

| STACK | MINIMUM HEIGHT ABOVE GRADE (metres) |
|---|---|
| east scrubber stack | 11.26 |
| west Scrubber stack | 12.53 |
| EPT scrubber stack | 12.76 |
| fermenter scrubber stack | 11.29 |
| grit recovery facility carbon scrubber stack | 9.14 |
| screen building 2/3 carbon scrubber stack | 2.40 |
| grit Building 2 carbon scrubber stack | 13.00 |
| Clover Bar biosolids dewatering facility carbon scrubber stack | 12.80 |
| Clover Bar nutrients recovery facility cyclone dust control system stack | 4.79 |
| Boiler House #1 stacks No. 1-5 | 10.11 |
| Boiler House #2 stacks No. 6-10 | 17.99 |
| North Flare stack | 11.07 |
| South Flare stack | 16.94 |

4.9.5 Whenever and wherever feasible, the approval holder shall use a backup scrubber during maintenance of the wet scrubber.

4.9.6 The approval holder shall consider the redundancy of the wet scrubbers when replace or upgrade of the wet scrubbers.

**FUGITIVE EMISSION MANAGEMENT**

4.9.7 The approval holder shall control fugitive emissions and any source not specified in 4.9.3 in accordance with 4.9.8 of this approval unless otherwise authorized in writing by the Director.

4.9.8 With respect to fugitive emissions and any source not specified in 4.9.3, the approval holder shall not release a substance or cause to be released a substance that causes or may cause any of the following:

(a) impairment, degradation or alteration of the quality of natural resources;

(b) material discomfort, harm or adverse effect to the well-being or health of a person; or

# TERMS AND CONDITIONS ATTACHED TO APPROVAL

(c) harm to property or to vegetative or animal life.

4.9.9 The approval holder shall operate or cause to be operated the *Strathcona Industrial Association Network* or an air monitoring network of a similar nature in a manner satisfactory to the Director.

4.9.10 The approval holder shall participate in implementing the *Capital Region Air Quality Management Framework* (CRAQMF) including programs developed under the CRAQMF when required in writing by the Director.

## PART 5: LIMITS

### SECTION 5.1: WASTEWATER LIMITS

5.1.1 The approval holder shall release treated wastewater from the Gold Bar Wastewater Treatment Plant only as follows:

(a) continuously

(i) to the North Saskatchewan River; and/or

(ii) for effluent reuse water; or

(b) as otherwise authorized in writing by the Director.

5.1.2 The approval holder shall ensure the treated wastewater discharge complies with the limits specified in TABLE 5-1.

**TABLE 5-1: LIMITS FOR TREATED WASTEWATER**

| Parameter | Limit |
|---|---|
| $CBOD_5$ | $\leq$ 20 mg/L monthly arithmetic mean of daily composite samples |
| TSS | $\leq$ 20 mg/L monthly arithmetic mean of daily composite samples |
| Total Phosphorus | $\leq$ 1.0 mg/L monthly arithmetic mean of daily composite samples |
| Total Ammonia-nitrogen (December 1 to May 31) | $\leq$ 10 mg/L monthly arithmetic mean of daily composite samples |
| Total Ammonia-nitrogen (June 1 to November 30) | $\leq$ 5.0 mg/L monthly arithmetic mean of daily composite samples |
| *E. Coli* | $\leq$ 126 per 100 mL/monthly geometric mean |
| pH | 6.5-8.5 |

# TERMS AND CONDITIONS ATTACHED TO APPROVAL

5.1.3 The approval holder shall not bypass the untreated or partially treated wastewater into the North Saskatchewan River during dry weather conditions.

5.1.4 The approval holder shall not bypass the untreated or partially treated wastewater to the North Saskatchewan River during periods of wet weather conditions unless the wastewater flows exceed the seasonal target operating capacities specified in the *Wastewater Treatment Operations Plan*.

5.1.5 The approval holder shall carry out preventive maintenance of the wastewater treatment plant in accordance with the *Wastewater Treatment Operations Plan* to maximize the treatment of all plant inflows.

## SECTION 5.2: AIR LIMITS

5.2.1 The approval holder shall operate and maintain the air pollution control systems in compliance with the limits specified in TABLE 5-2.

5.2.2 The approval holder shall maintain and calibrate the online monitoring equipment for the scrubbers in accordance with the manufacturers' specifications and the industry best practice.

### TABLE 5-2: AIR POLLUTION CONTROL SYSTEM OPERATING LIMITS

| Air pollution control system | Monitoring location | Parameter | Limit |
|---|---|---|---|
| East scrubber;<br>West scrubber;<br>EPT scrubber; and<br>Fermenter scrubber | blowdown recirculation line before chemical makeup of each wet scrubber | pH | $\geq$ 8.0 |
| | | ORP | $\geq$ 300 mV |
| NA | ambient air monitoring station | $H_2S$, $NO_2$, and $SO_2$ | after ambient air monitoring station commissioned:<br>Meet the latest *Alberta Ambient Air Quality Objectives* |

## PART 6: MONITORING, REPORTING AND RECORD KEEPING

## SECTION 6.1: WASTEWATER SYSTEM MONITORING

6.1.1 The approval holder shall monitor the wastewater system as required in TABLE 6-1.

# TERMS AND CONDITIONS ATTACHED TO APPROVAL

## TABLE 6-1: MONITORING – WASTEWATER SYSTEM

<table>
<tr><th>Parameter</th><th>Frequency (Minimum)</th><th>Sample Type</th><th>Sampling Location</th></tr>
<tr><td colspan="4">UNTREATED WASTEWATER</td></tr>
<tr><td>pH<br>$BOD_5$<br>TSS<br>Total Phosphorus<br>Total Ammonia-nitrogen</td><td>once per day</td><td>composite</td><td>untreated Wastewater entering the wastewater treatment plant</td></tr>
<tr><td>Volume of Flow</td><td>continuous, recorded daily</td><td>calculated</td><td>untreated wastewater entering the wastewater treatment plant</td></tr>
<tr><td colspan="4">TREATED WASTEWATER</td></tr>
<tr><td>pH<br>$CBOD_5$<br>TSS<br>Total Phosphorus<br>Total Ammonia-nitrogen</td><td>once per day</td><td>composite</td><td>wastewater treated plant effluent prior to release to the North Saskatchewan River</td></tr>
<tr><td>E. Coli</td><td>once per day</td><td>grab</td><td>after ultraviolet (UV) disinfection</td></tr>
<tr><td>Acute Toxicity</td><td>monthly</td><td>grab</td><td>wastewater treatment plant effluent prior to release to the North Saskatchewan River</td></tr>
<tr><td>Chronic Toxicity</td><td>quarterly</td><td>grab</td><td>wastewater treatment plant effluent prior to release to the North Saskatchewan River</td></tr>
<tr><td>Volume</td><td>continuous, recorded daily</td><td>calculated</td><td>wastewater treatment plant effluent prior to release to the North Saskatchewan River</td></tr>
<tr><td>Volume</td><td>continuous, recorded daily</td><td>calculated</td><td>reuse water transmission main</td></tr>
<tr><td colspan="4">WASTEWATER TREATMENT PLANT BYPASS</td></tr>
<tr><td>Release Volume</td><td>continuous during bypass event, recorded daily</td><td>calculated</td><td rowspan="3">primary and secondary treatment bypass of wastewater at the wastewater treatment plant</td></tr>
<tr><td>pH<br>$BOD_5$<br>TSS<br>Total Phosphorus<br>Total Ammonia-nitrogen</td><td>any bypass event lasting > 2 hours</td><td>composite</td></tr>
<tr><td>E. Coli</td><td>Any bypass event lasting > 2 hours</td><td>grab</td></tr>
</table>

# TERMS AND CONDITIONS ATTACHED TO APPROVAL

| Parameter | Frequency (Minimum) | Sample Type | Sampling Location |
|---|---|---|---|
| SLUDGE DISPOSAL | | | |
| Sludge Volume | total volume | estimated | prior to leaving the wastewater treatment plant |
| Sludge Mass | total mass | estimated | amount of sludge being disposed of as per the *Biosolids Management Plan* |
| CSO OUTFALLS AND UNAUTHORIZED RELEASE | | | |
| Release volume | total volume during each discharge event | continuous during discharge event | Rat Creek CSO outfall;<br>Hardisty-Capilano CSO outfall;<br>Highlands CSO outfall;<br>Cromdale CSO outfall;<br>Strathearn CSO outfall; and<br>unauthorized release point |
| pH<br>$BOD_5$<br>TSS<br>Total Phosphorus<br>Total Ammonia-nitrogen<br>*E. Coli* | each discharge event | composite | Rat Creek CSO outfall |
| | | grab | unauthorized release point |
| The amount of any substance other than wastewater or storm water that is spilled or discharged accidentally or intentionally into the wastewater collection system | each event | estimated volume or mass | unauthorized release point |

## SECTION 6.2: AIR MONITORING

6.2.1 The approval holder shall monitor and report the air pollution control systems and the ambient air as per TABLE 6-2, unless otherwise as the authorization in writing from the Director.

6.2.2 The monitoring and reporting required in 6.2.1 shall comply with the following at a minimum:

(a) *Alberta Stack Sampling Code*, Alberta Environment, 1995 as amended; and

(b) *Air Monitoring Directive,* Alberta Environment and Parks, 2016, as amended;

unless otherwise specified in TABLE 6-2 or authorized in writing by the Director.

6.2.3 The approval holder shall notify the Director in writing a minimum of two weeks prior to any manual stack survey that is required to be conducted by this approval.

# TERMS AND CONDITIONS ATTACHED TO APPROVAL

## TABLE 6-2: MONITORING AND REPORTING - AIR POLLUTION CONTROL SYSTEMS AND AMBIENT AIR

| Source | Parameter | Frequency | Method of Monitoring | Sample Location | Reporting Frequency |
|---|---|---|---|---|---|
| carbon scrubber for grit recovery facility, during operation seasons | temperature | continuous | online temperature transmitter, record daily average | influent air stream | as per 6.3.2 and 6.3.4 |
| | differential air pressure | continuous | online differential air pressure gauge, record daily average | influent and effluent air stream | |
| carbon scrubber for grit recovery facility, during operation seasons;<br>carbon scrubber for screening building 2/3;<br>carbon scrubber for grit building 2 | $H_2S$ | continuous, effective July 1, 2020 | online $H_2S$ sensor, record daily average | effluent air stream of each carbon scrubber | as per 6.3.2 and 6.3.4 |
| | $H_2S$ | annually | manual stack survey, as per the latest *Alberta Stack Sampling Code* | effluent air stream of each carbon scrubber | |
| carbon scrubber for Clover Bar biosolids dewatering building | $H_2S$ | weekly | portable low range $H_2S$ analyzer, as per the manufacturer's specifications, grab sample | effluent air stream of the carbon scrubber | as per 6.3.2 and 6.3.4 |
| | $H_2S$ | annually | manual stack survey, as per the latest *Alberta Stack Sampling Code* | effluent air stream of the carbon scrubber | |
| east scrubber;<br>west scrubber;<br>EPT scrubber; and<br>fermenter scrubber | pH | continuous | online pH sensor, record daily average | recirculation blowdown line, before addition of chemical makeup of each wet scrubber | as per 6.3.2 and 6.3.4 |
| | ORP | continuous | online ORP sensor, record daily average | | |
| east scrubber;<br>west scrubber;<br>EPT scrubber;<br>fermenter scrubber | $H_2S$ | continuous, effective July 1, 2020 | online $H_2S$ sensor, record daily average | influent air stream of each wet scrubber | as per 6.3.2 and 6.3.4 |
| | $H_2S$ | continuous, effective July 1, 2020 | online $H_2S$ sensor, record daily average | effluent air stream of each wet scrubber | |
| | $H_2S$ | annually | manual stack survey, as per the latest *Alberta Stack Sampling Code* | effluent air stream of each wet scrubber | |

# TERMS AND CONDITIONS ATTACHED TO APPROVAL

| Source | Parameter | Frequency | Method of Monitoring | Sample Location | Reporting Frequency |
|---|---|---|---|---|---|
| ambient air | $H_2S$ | before ambient air monitoring station commissioned: daily, when ambient air temperature > 0 ºC | portable low range $H_2S$ analyzer, as per the manufacturer's specifications, grab sample | fence line of Gold Bar Wastewater Treatment Plant | as per 6.3.2 and 6.3.4 |
| | $H_2S$, $NO_2$, and $SO_2$ | after ambient air monitoring station commissioned: continuous | *Air Monitoring Directives*, as amended, record 1-hour average and 24-hour average | ambient air monitoring station | as per 6.3.2 and 6.3.4 |
| | temperature | | | | |
| | wind speed | | | | |
| | wind direction | | | | |
| public odour complaints | N/A | when occurring | document when Gold Bar Wastewater Treatment Plant is alleged and confirmed to be odour source | N/A | as per 6.3.2 and 6.3.4 |

**SECTION 6.3: MONTHLY AND ANNUAL REPORTS**

6.3.1 The approval holder shall compile a Monthly Wastewater System Report which includes, at a minimum, the following information:

(a) a Monthly Wastewater Treatment Plant Report

(i) a Monthly Wastewater Treatment Report, including:

(A) a monthly summary of the results of the monitoring requirements of TABLE 6-1,

(B) an assessment of the monthly results of the monitoring relative to the limits in TABLE 5-1,

(C) the name and daily quantity of any chemical added to the wastewater treatment process,

(D) the name of the supervising operator responsible for the operation of the wastewater treatment plant,

(E) the number of days on which primary or secondary treatment was bypassed, and the total volumes of bypass that occurred

## TERMS AND CONDITIONS ATTACHED TO APPROVAL

for each of the primary and secondary treatment for the month, and

(F) a monthly summary of any operational issues encountered during wastewater treatment, and the remedial actions taken to resolve the issues,

(ii) a Monthly Air Pollution Control System Report, including:

(A) a monthly summary of the monitoring results of the air pollution systems required in TABLE 6-2,

(B) an assessment of the monthly results of the air pollution control system monitoring in terms of the performance of each air pollution control system relative to the limits in TABLE 5-2,

(C) the name and daily and monthly quantities of any chemical consumed by the wet scrubbers, and

(D) a monthly summary of any operational issues encountered by each air pollution control system, and the remedial actions taken to resolve the issues,

(iii) a Monthly Ambient Air Report, including:

(A) a monthly summary of the results of the ambient air monitoring required in TABLE 6-2,

(B) an assessment of the monthly results of the ambient air monitoring relative to the limits in TABLE 5-2, and

(C) a monthly summary of the public odour complaints, follow-up steps taken to identify the source(s) of odour, and remedial actions taken to resolve the odour issues, and

(iv) a monthly summary of contraventions reported pursuant to 2.1.1;

(b) a Monthly Wastewater Collection System Report, including:

(i) the results of the monitoring requirements of Table 6-1,

(ii) the name and the monthly quantity of any chemicals added to the wastewater collection system,

## TERMS AND CONDITIONS ATTACHED TO APPROVAL

(iii) the name of the supervising operator responsible for the operation of the wastewater collection system,

(iv) the number of CSO events, and total volume of the CSO at each CSO site for the month,

(v) a monthly summary of any operational issues encountered within the wastewater collection system, and the remedial actions taken to resolve the issues, and

(vi) a monthly summary of contraventions reported pursuant to 2.1.1; and

(c) any other information as required in writing by the Director.

6.3.2 On or before the end of the month following the month in which the information on which the Monthly Wastewater System Report is based was collected, the approval holder shall:

(a) submit an electronic copy of the Monthly Wastewater System Report prepared pursuant to 6.3.1 to the Director when requested in writing by the Director; and

(b) retain a copy of Monthly Wastewater System Report, including:

(i) the Monthly Wastewater Treatment Plant Report; and

(ii) the Monthly Wastewater Collection System Report.

6.3.3 The approval holder shall compile an Annual Wastewater System Report which shall include, at a minimum, all of the following:

(a) an Annual Wastewater Treatment Plant Report, including:

(i) an Annual Wastewater Treatment Report, including:

(A) an annual summary of the monthly arithmetic mean, including maximum and minimum values, of each parameter monitored, excluding *E. Coli* counts, as outlined in TABLE 6-1,

(B) an annual summary of the monthly geometric mean of *E. Coli* counts,

(C) an assessment of the annual results of the monitoring relative to the limits in TABLE 5-1,

## TERMS AND CONDITIONS ATTACHED TO APPROVAL

(D) an annual summary of the name and the daily and monthly quantities of any chemical added to the wastewater treatment processes,

(E) the name of the supervising operator responsible for the operation of the wastewater treatment plant,

(F) an annual summary of the calculation of the uncommitted hydraulic reserve capacity for each of the secondary/tertiary treatment during dry weather conditions for the year,

(G) an annual summary of the total number of days on which primary or secondary treatment was bypassed, and the total volumes of bypass that occurred for each of the primary and secondary treatment for the year, and

(H) a annual summary of all operational issues encountered related to wastewater treatment, and the remedial actions taken to resolve the issues,

(ii) an Annual Air Pollution Control System Report ,including:

(A) an annual summary of the results of the monitoring required in TABLE 6-2,

(B) an assessment of the annual results of the air pollution control system monitoring in terms of the performance of each air pollution control system relative to TABLE 5-2,

(C) an annual summary of the name and daily and monthly quantities of any chemicals consumed by the wet scrubbers, and

(D) an annual summary of all operational issues encountered by each air pollution control system, and the remedial actions taken to resolve the issues,

(iii) an Annual Ambient Air Report, including:

(A) an annual summary of the results of the ambient air monitoring required in TABLE 6-2,

(B) an assessment of the annual results of the ambient air monitoring relative to TABLE 5-2, and

# TERMS AND CONDITIONS ATTACHED TO APPROVAL

(C) an annual summary of the public odour complaints, follow-up steps taken to identify the source(s) of odour, and remedial actions taken to resolve the odour issues, and

(iv) an annual summary of all contraventions reported pursuant to 2.1.1;

(b) an Annual Wastewater Collection System Report, including:

(i) the monthly arithmetic mean, including maximum and minimum values, of each parameter monitored, excluding *E.Coli* counts, as outlined in the TABLE 6-1,

(ii) the monthly geometric mean of *E.Coli* counts,

(iii) an annual summary of the name and the monthly quantity of any chemical added to the wastewater collection system,

(iv) the name of the supervising operator responsible for the operation of the wastewater collection system,

(v) an annual summary of the total number of CSO events, and total volume of the CSO at each CSO site for the year,

(vi) the name of the supervising operator responsible for the operation of the wastewater collection system,

(vii) an annual summary of any operational issues encountered within the wastewater collection system, and the remedial actions taken to resolve the issues, and

(viii) an annual summary of all contraventions reported pursuant to 2.1.1; and

(c) any other information as required in writing by the Director.

6.3.4 The approval holder shall submit one electronic copy of the Annual Wastewater System Report, which including the following:

(a) the Annual Wastewater Treatment Plant Report; and

(b) the Annual Wastewater Collection System Report

to the Director on or before February 28 of the year following the year in which the information on which the report is based was collected.

# TERMS AND CONDITIONS ATTACHED TO APPROVAL

6.3.5 If the approval holder monitors for any substances or parameters which are the subject of operational limits as set out in this approval more frequently than is required and using procedures authorized in this approval, then the approval holder shall provide the results of such monitoring as an addendum to the Annual Wastewater System Report required by this approval.

**SECTION 6.4: RECORD KEEPING**

6.4.1 The approval holder shall retain an operating record for the wastewater system, which contains all of the following information at a minimum:

(a) a copy of this approval;

(b) a copy of all monitoring results as required in SECTION 6.1 and SECTION 6.2;

(c) a copy of inspection reports prepared by Alberta Environment and Parks;

(d) a copy of all Monthly Wastewater System Reports;

(e) a copy of all Annual Wastewater System Reports;

(f) a copy of the Operations Plan, including:

(i) *Wastewater Treatment Operations Plan*;

(ii) *Wastewater Collection System Operations Plan*;

(g) copies of all:

(i) applications submitted to the Department for an approval regarding the wastewater system which includes, but are not limited to:

(A) correspondence, and

(B) drawings;

(ii) project reports,

(iii) engineering drawings and specifications issued for approved construction,

(iv) as-built engineering drawings, and

(v) correspondence and written notifications sent to the Department regarding a proposed extension of the wastewater collection system, replacement or modification of a portion of the wastewater collection system.

**PART 7: RECLAMATION AND DECOMMISSIONING**

**SECTION 7.1: GENERAL**

7.1.1 Within six months of the wastewater system or a portion of the wastewater system permanently ceasing operation, the approval holder shall:

(a) submit a decommissioning and land reclamation plan to the Director, and

(b) not commence reclamation or decommissioning until the approval holder has received written authorization from the Director.

DATED March 31, 2020

DESIGNATED DIRECTOR UNDER THE ACT

Alberta Environment and Parks

# AMENDING APPROVAL

## PROVINCE OF ALBERTA

## ENVIRONMENTAL PROTECTION AND ENHANCEMENT ACT
## R.S.A. 2000, c.E-12, as amended.

APPROVAL NO.: 639-03-07

APPLICATION NO.: 102-639

EFFECTIVE DATE: September 13, 2021

EXPIRY DATE: MAY 1, 2025

APPROVAL HOLDER: EPCOR WATER SERVICES INC.

ACTIVITY:

Construction, operation and reclamation of the Edmonton Wastewater System serving the City of Edmonton, City of Leduc, City of Beaumont, Nisku Business Park and Edmonton International Airport

is amended as per the attached terms and conditions.

Designated Director under the Act ........................
MOHAMMAD HABIB, P. ENG.

Date Signed September 13, 2021

# TERMS AND CONDITIONS ATTACHED TO APPROVAL

Environmental Protection and Enhancement Act Approval No. 639-03-00 is hereby further amended as following:

1. **PART 1: DEFINITIONS, SECTION 1.1: DEFINITIONS,** the following clause is added:

1.1.2(cc1) "North Scrubber Building" means the new scrubber building that houses scrubber 5 and scrubber 6, and located at north of the digester #8 and east of the existing Odour Control Building;

2. **PART 1: DEFINITIONS, SECTION 1.1: DEFINITIONS,** Clause 1.1.2 (ww) is deleted and replaced with the following:

1.1.2(ww) "wet scrubbers" means odour scrubbers that use both caustic and oxidizing chemical solutions to remove reduced sulphur odorants, including:

(i) east scrubber- scrubber 1,

(ii) west scrubber-scrubber 2,

(iii) EPT scrubber-scrubber 3,

(iv) fermenter scrubber-scrubber 4,

(v) scrubber 5,

(vi) scrubber 6, and

any other scrubber that uses the similar odour scrubbing technology;

3. **PART 3: CONSTRUCTION AND UPGRADING REQUIREMENTS,** Clause 3.1.1 is deleted and replaced with the following:

**SECTION 3.1: GENERAL**

3.1.1 The approval holder shall:

(a) implement the *Combined Sewer Overflow Control Strategy* as outlined in the *Combined Sewer Discharge Strategy* (June 2013), unless otherwise authorized in writing by the Director; and

(b) maximize wastewater treatment during wet weather conditions.

3.1.2 If construction of the North Scrubber Building has not commenced by March 31, 2022, the approval holder shall apply for an amendment to this approval unless otherwise authorized in writing by the Director.

# TERMS AND CONDITIONS ATTACHED TO APPROVAL

3.1.3 The North Scrubber Building referred in 3.1.2 shall include, at a minimum, all of the following:

(a) scrubber 5; and

(b) scrubber 6.

3.1.4 The approval holder shall notify the Director in writing at least 14 days before commencing operations of scrubber 5 and scrubber 6 unless otherwise authorized in writing by the Director.

**SECTION 3.2: NORTH SCRUBBER BUILDING**

3.2.1 The approval holder shall submit final design documents of scrubber 5 and scrubber 6 referred in 3.1.3 to the Director a minimum of 30 days prior to installation of these scrubbers, unless otherwise authorized in writing by the Director.

3.2.2 The final design documents of scrubber 5 and scrubber 6 referred to in 3.2.1 shall include, at a minimum, all of the following information:

(a) process and instrumentation diagram of the system;

(b) technical specifications of the major system components;

(c) air contaminant emission reduction measures of the system; and

(d) air contaminant emission reduction performance specifications of the system, including but not limited to $H_2S$ concentration of the exhaust stacks of scrubber 5 and scrubber 6.

3.2.3 If the final design of scrubber 5 and the scrubber 6 as specified in the documents submitted in 3.2.1 is found deficient by the Director, the approval holder shall correct all deficiencies identified in writing by the Director by the date specified in writing by the Director.

3.2.4 The approval holder shall construct scrubber 5 and scrubber 6 as authorized in writing by the Director.

4. **PART 4: OPERATIONS, SECTION 4.2: WASTEWATER TREATMENT PLANT,** Clause 4.2.2(m) is deleted and replaced with the following:

4.2.2(m) air pollution control systems, including:

(i) east scrubber-scrubber 1,

(ii) west scrubber-scrubber 2,

(iii) EPT scrubber-scrubber 3,

# TERMS AND CONDITIONS ATTACHED TO APPROVAL

(iv) fermenter scrubber-scrubber 4,

(v) scrubber 5,

(vi) scrubber 6,

(vii) a carbon scrubber of the grit recovery facility,

(viii) a carbon scrubber for the screening building 2/3,

(ix) a carbon scrubber for the grit building 2,

(x) a carbon scrubber for the Clover Bar biosolids dewatering building, and

(xi) a cyclone dust control system at the Clover Bar nutrients recovery facility.

5. **PART 4: OPERATIONS, SECTION 4.9: AIR POLLUTION MANAGEMENT,** Clause 4.9.3 is deleted and replaced with the following:

4.9.3 The approval holder shall only release air effluent streams to the atmosphere from the following sources:

(a) east scrubber-scrubber 1 stack;

(b) west scrubber-scrubber 2 stack;

(c) EPT scrubber-scrubber 3 stack;

(d) fermenter scrubber-scrubber 4 stack;

(e) scrubber 5 stack;

(f) scrubber 6 stack;

(g) carbon scrubber stack of the grit recovery facility;

(h) a carbon scrubber stack for the screening building 2/3;

(i) a carbon scrubber stack for the grit building 2;

(j) a carbon scrubber stack for the Clover Bar biosolids dewatering building;

(k) cyclone dust control system stack of the Clover Bar nutrients recovery facility;

(l) the ten boilers' stacks;

(m) the two digester gas flare stacks;

(n) the space ventilation exhaust stacks;

# TERMS AND CONDITIONS ATTACHED TO APPROVAL

(o) the space heater exhaust vents; and

(p) any other source authorized in writing by the Director.

6. **PART 4: OPERATIONS, SECTION 4.9: AIR POLLUTION MANAGEMENT, TABLE 4-1** is deleted and replaced with the following:

**TABLE 4-1: STACK HEIGHTS**

| STACK | MINIMUM HEIGHT ABOVE GRADE (metres) |
|---|---|
| east scrubber-scrubber 1 stack | 11.26 |
| west Scrubber-scrubber 2 stack | 12.53 |
| EPT scrubber-scrubber 3 stack | 12.76 |
| fermenter scrubber-scrubber 4 stack | 11.29 |
| scrubber 5 stack | 17.89 |
| scrubber 6 stack | 17.89 |
| grit recovery facility carbon scrubber stack | 9.14 |
| screen building 2/3 carbon scrubber stack | 13.00 |
| grit Building 2 carbon scrubber stack | 2.40 |
| Clover Bar biosolids dewatering facility carbon scrubber stack | 12.80 |
| Clover Bar nutrients recovery facility cyclone dust control system stack | 4.79 |
| Boiler House #1 stacks No. 1-5 | 10.11 |
| Boiler House #2 stacks No. 6-10 | 17.99 |
| North Flare stack | 11.07 |
| South Flare stack | 16.94 |

# TERMS AND CONDITIONS ATTACHED TO APPROVAL

7. **PART 5: LIMITS, SECTION 5.2: AIR LIMITS, TABLE 5-2** is deleted and replaced with the following:

**TABLE 5-2: AIR POLLUTION CONTROL SYSTEM OPERATING LIMITS**

| Air pollution control system | Monitoring location | Parameter | Limit |
|---|---|---|---|
| east scrubber-scrubber 1;<br>west scrubber-scrubber 2;<br>EPT scrubber-scrubber 3;<br>fermenter scrubber-scrubber 4;<br>scrubber 5;<br>scrubber 6 | blowdown recirculation line before chemical makeup of each wet scrubber | pH | ≥ 8.0 |
| | | ORP | ≥ 300 mV |
| NA | ambient air monitoring station | $H_2S$, $NO_2$, and $SO_2$ | after ambient air monitoring station commissioned:<br>Meet the latest *Alberta Ambient Air Quality Objectives* |

8. **PART 6: MONITORING AND REPORTING AND RECORD KEEPING, SECTION 6.2: AIR MOINTORING, TABLE 6-2** is deleted and replaced with the following:

**TABLE 6-2: MONITORING AND REPORTING - AIR POLLUTION CONTROL SYSTEMS AND AMBIENT AIR**

| Source | Parameter | Frequency | Method of Monitoring | Sample Location | Reporting Frequency |
|---|---|---|---|---|---|
| carbon scrubber for grit recovery facility, during operation seasons | temperature | continuous | online temperature transmitter, record daily average | influent air stream | as per 6.3.2 and 6.3.4 |
| | differential air pressure | continuous | online differential air pressure gauge, record daily average | influent and effluent air stream | |
| carbon scrubber for grit recovery facility, during operation seasons;<br>carbon scrubber for screening building 2/3;<br>carbon scrubber for grit building 2 | $H_2S$ | continuous | online $H_2S$ sensor, record daily average | effluent air stream of each carbon scrubber | as per 6.3.2 and 6.3.4 |
| | $H_2S$ | annually | manual stack survey, as per the latest *Alberta Stack Sampling Code* | effluent air stream of each carbon scrubber | |

# TERMS AND CONDITIONS ATTACHED TO APPROVAL

## TABLE 6-2: MONITORING AND REPORTING - AIR POLLUTION CONTROL SYSTEMS AND AMBIENT AIR (continued)

| Source | Parameter | Frequency | Method of Monitoring | Sample Location | Reporting Frequency |
|---|---|---|---|---|---|
| carbon scrubber for Clover Bar biosolids dewatering building | $H_2S$ | weekly | portable low range $H_2S$ analyzer, as per the manufacturer's specifications, grab sample | effluent air stream of the carbon scrubber | as per 6.3.2 and 6.3.4 |
| | $H_2S$ | annually | manual stack survey, as per the latest *Alberta Stack Sampling Code* | effluent air stream of the carbon scrubber | |
| east scrubber-scrubber 1; west scrubber-scrubber 2; EPT scrubber-scrubber 3; fermenter scrubber-scrubber 4; scrubber 5; scrubber 6 | pH | continuous | online pH sensor, record daily average | recirculation blowdown line, before addition of chemical makeup of each wet scrubber | as per 6.3.2 and 6.3.4 |
| | ORP | continuous | online ORP sensor, record daily average | | |
| east scrubber-scrubber 1; west scrubber-scrubber 2; EPT scrubber-scrubber 3; fermenter scrubber-scrubber 4; scrubber 5; scrubber 6 | $H_2S$ | continuous | online $H_2S$ sensor, record daily average | influent air stream of each wet scrubber | as per 6.3.2 and 6.3.4 |
| | $H_2S$ | continuous | online $H_2S$ sensor, record daily average | effluent air stream of each wet scrubber | |
| | $H_2S$ | annually | manual stack survey, as per the latest *Alberta Stack Sampling Code* | effluent air stream of each wet scrubber | |

# TERMS AND CONDITIONS ATTACHED TO APPROVAL

## TABLE 6-2: MONITORING AND REPORTING - AIR POLLUTION CONTROL SYSTEMS AND AMBIENT AIR (continued)

| Source | Parameter | Frequency | Method of Monitoring | Sample Location | Reporting Frequency |
|---|---|---|---|---|---|
| ambient air | $H_2S$ | before ambient air monitoring station commissioned:<br>daily, when ambient air temperature > 0 ºC | portable low range $H_2S$ analyzer, as per the manufacturer's specifications, grab sample | fence line of Gold Bar Wastewater Treatment Plant | as per 6.3.2 and 6.3.4 |
| | $H_2S$, $NO_2$, and $SO_2$ | after ambient air monitoring station commissioned:<br>continuous | *Air Monitoring Directives*, as amended, record 1-hour average and 24-hour average | ambient air monitoring station | as per 6.3.2 and 6.3.4 |
| | temperature | | | | |
| | wind speed | | | | |
| | wind direction | | | | |
| public odour complaints | N/A | when occurring | document when Gold Bar Wastewater Treatment Plant is alleged and confirmed to be odour source | N/A | as per 6.3.2 and 6.3.4 |

DATED September 13, 2021

DESIGNATED DIRECTOR UNDER THE ACT

Alberta Environment and Protected Areas

**Regulatory Assurance Division**
**North Region – Capital District**
111 Twin Atria Building
4999 98 Avenue
Edmonton AB T6B 2X3
Telephone: 780-427-7617
https://www.alberta.ca/environment-and-protected-areas.aspx

December 18, 2023

File No.: 0202-639

Cindy Shepel
Director, Gold Bar Wastewater Treatment Plant
EPCOR Water Services Inc.
10977 50 St. NW
Edmonton, Alberta T6A 2E9

**Delivered via Email to:** cshepel@epcor.com

Dear Ms. Shepel:

**Re: Reporting – Alberta Ambient Air Quality Monitoring**
**EPCOR Water Services Inc. – Edmonton Wastewater System,**
***Environmental Protection and Enhancement Act (EPEA)* Approval No. 639-03-00**

---

This Letter of Authorization is provided to EPCOR Water Services Inc. (EWSI) in response to a meeting on November 03, 2023, and the submission by EWSI to Environment and Protected Areas (EPA) on November 27, 2023, requesting the relaxation of the 7-day written reporting requirement for certain verbal reports made to EPA.

EPA has agreed to temporarily waive 7-day written reports upon request of EWSI, for verbal report(s) made to EPA, only for 1-hour and 24-hour exceedances of the Alberta Ambient Air Quality Objective for hydrogen sulphide, at the ambient air monitoring station required in Approval No. 639-03-00 (as amended) (the Approval).

This Letter of Authorization applies only to verbal reports made by EWSI when the air pollution control systems for air effluent streams from the sources described in s.4.9.3 in the Approval are in satisfactory operation.

This written report waiver is provided under s.4(2) of the Release Reporting Regulation and will expire on May 1, 2025. Note that all other reporting requirements of the Approval and the *Environmental Protection and Enhancement Act* remain intact.

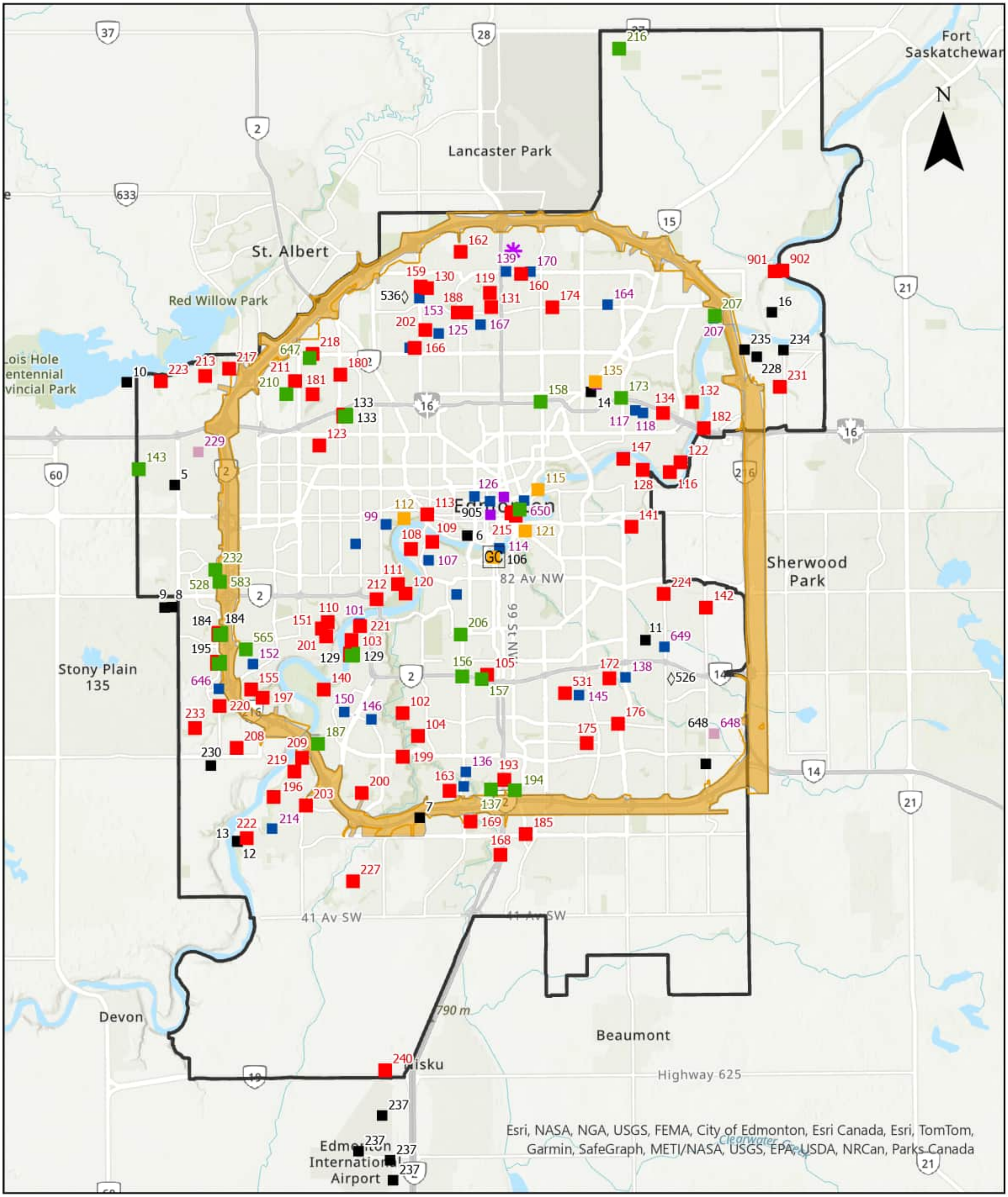
If you have any questions regarding this letter, please contact Mohammad M. Rahman at 780-422-1721 or via email to Mohammad.M.Rahman@gov.ab.ca.

Sincerely,

Gerald Feschuk, P. Eng.
Designated Director under the Act

cc: David Slubik, EWSI, DSlubik@epcor.com
Trina Manning, EWSI, TManning@epcor.com
Breeann Barry, EPA
Maxwell Harrison, EPA
Mohammad M. Rahman, EPA

# Appendix C Wastewater Systems Maps and Figures




EPCOR

# PUMPWELLS

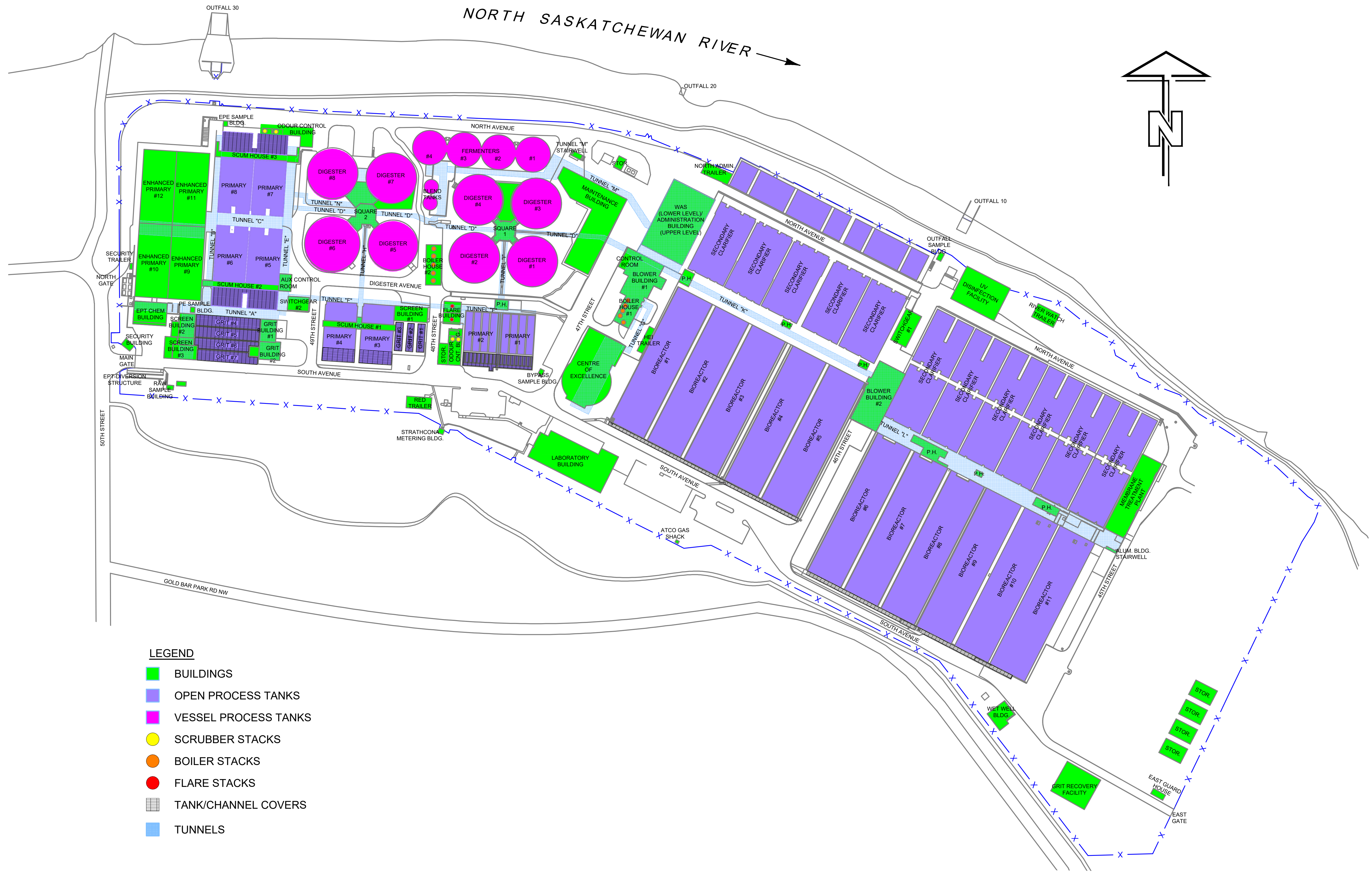
2024 EDITION

**PUMP STATIONS**

- STORM
- SANITARY
- SANITARY STN. & STORM STN.
- COMBINED
- CITY OWNED
- TEMPORARY
- ABANDONED/REMOVED
- PRIVATE

**DEVICES**

- GC GRIT SEPARATOR-COE
- Odour_filter_2024_pt
- FOUNTAIN PUMP
- GATE - COMBINED
- GATE - SANITARY
- GATE - STORM
- FLOW MONITOR - COMBINED
- FLOW MONITOR - SANITARY
- FLOW MONITOR - STORM
- TUC




## LEGEND

- BUILDINGS
- OPEN PROCESS TANKS
- VESSEL PROCESS TANKS
- SCRUBBER STACKS
- BOILER STACKS
- FLARE STACKS
- TANK/CHANNEL COVERS
- TUNNELS

| REFERENCE DRAWING | |
|---|---|
| DRAWING No. | DRAWING TITLE |
| N/A | N/A |

| REVISION | | | |
|---|---|---|---|
| Rev. | DATE | DESCRIPTION | BY |
| 1 | 28-MAR-2012 | UPDATED TAGS & FENCELINE | P.DAM |
| 2 | 18-APR-2016 | ADDED STACKS, TANK/CHANNEL COVERS AND TUNNELS | S.MOLLA/P.DAM |
| 3 | 07-SEP-2016 | UPDATED BUILDINGS NAME | S.MOLLA/P.DAM |
| 4 | 08-NOV-2017 | ADDED GRIT RECOVERY FACILITY, UPDATE TITLE BORDER | P.DAM |
| 5 | 04-JUL-2018 | UPDATED: RED TRAILER, NORTH ADMIN. TRAILER, RIVER WATCH TRAILER, HEI TRAILER. | P.DAM |

ENGINEERING STAMP

APEGA PERMIT NUMBER 6368

**CONTROLLED DOCUMENT**

ALL CHANGES MUST BE RED-LINED AND FORWARDED TO PLANT ENGINEERING AT THE TIME OF INSTALLATION

LAST UPDATED: 04 Jul 2018



EPCOR

# PLANT BASE DRAWING

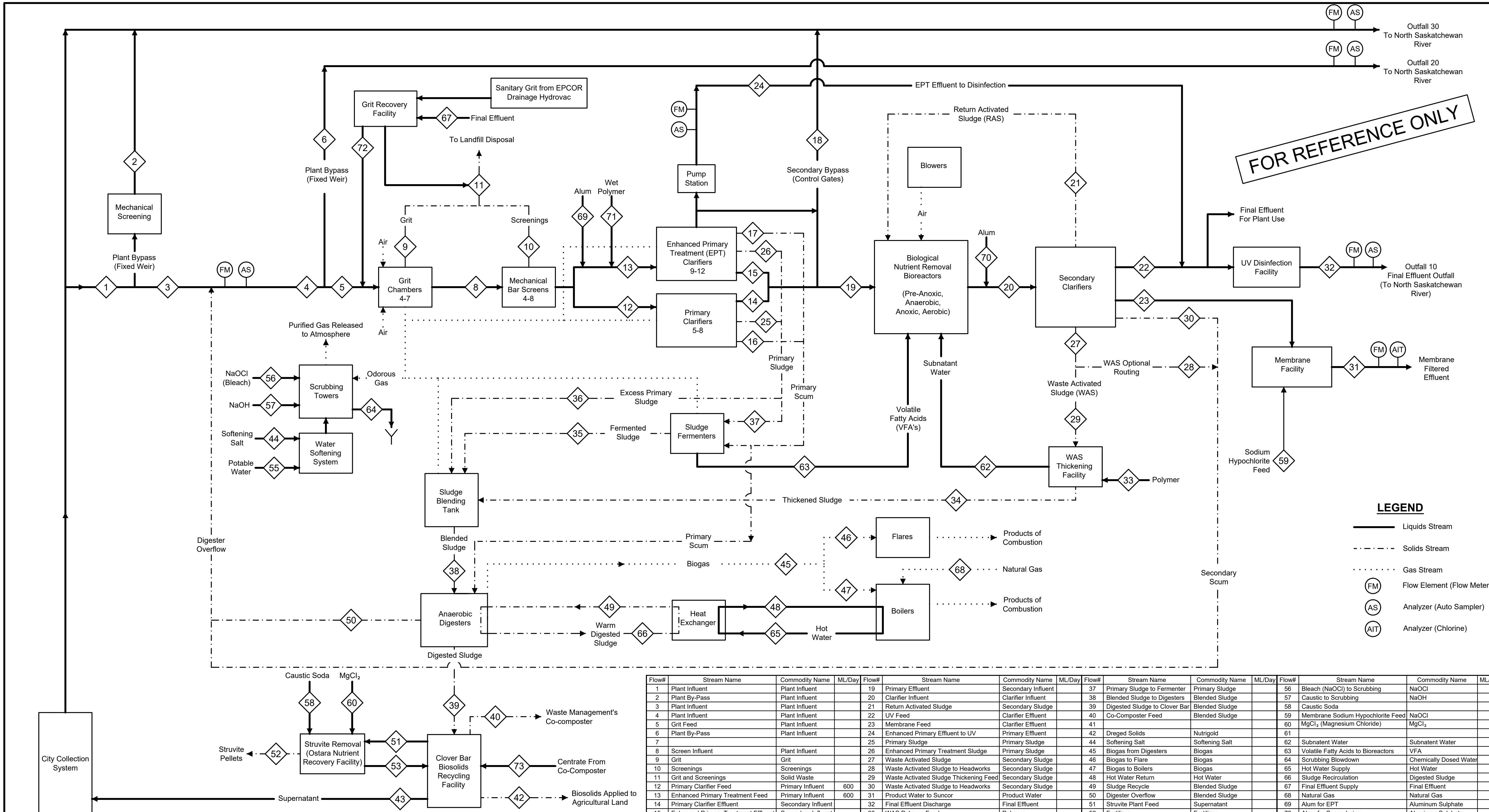
PLANT SITE: GOLD BAR WWTP

DRAWING TYPE: STD

DRAWING TITLE:

GOLD BAR WWTP
BUILDINGS, TANKS AND TUNNELS

| SCALE | SHEET | CODE | DRAWING NUMBER |
|---|---|---|---|
| NOT TO SCALE | 1 OF 1 | STD-GEN | 006 |




| Flow# | Stream Name | Commodity Name | ML/Day | Flow# | Stream Name | Commodity Name | ML/Day | Flow# | Stream Name | Commodity Name | ML/Day | Flow# | Stream Name | Commodity Name | ML/Day |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Plant Influent | Plant Influent | | 19 | Primary Effluent | Secondary Influent | | 37 | Primary Sludge to Fermenter | Primary Sludge | | 56 | Bleach (NaOCl) to Scrubbing | NaOCl | |
| 2 | Plant By-Pass | Plant Influent | | 20 | Clarifier Influent | Clarifier Influent | | 38 | Blended Sludge to Digesters | Blended Sludge | | 57 | Caustic to Scrubbing | NaOH | |
| 3 | Plant Influent | Plant Influent | | 21 | Return Activated Sludge | Secondary Sludge | | 39 | Digested Sludge to Clover Bar | Blended Sludge | | 58 | Caustic Soda | | |
| 4 | Plant Influent | Plant Influent | | 22 | UV Feed | Clarifier Effluent | | 40 | Co-Composter Feed | Blended Sludge | | 59 | Membrane Sodium Hypochlorite Feed | NaOCl | |
| 5 | Grit Feed | Plant Influent | | 23 | Membrane Feed | Clarifier Effluent | | 41 | | | | 60 | $MgCl_2$ (Magnesium Chloride) | $MgCl_2$ | |
| 6 | Plant By-Pass | Plant Influent | | 24 | Enhanced Primary Effluent to UV | Primary Effluent | | 42 | Dreged Solids | Nutrigold | | 61 | | | |
| 7 | | | | 25 | Primary Sludge | Primary Sludge | | 44 | Softening Salt | Softening Salt | | 62 | Subnatent Water | Subnatent Water | |
| 8 | Screen Influent | Plant Influent | | 26 | Enhanced Primary Treatment Sludge | Primary Sludge | | 45 | Biogas from Digesters | Biogas | | 63 | Volatile Fatty Acids to Bioreactors | VFA | |
| 9 | Grit | Grit | | 27 | Waste Activated Sludge | Secondary Sludge | | 46 | Biogas to Flare | Biogas | | 64 | Scrubbing Blowdown | Chemically Dosed Water | |
| 10 | Screenings | Screenings | | 28 | Waste Activated Sludge to Headworks | Secondary Sludge | | 47 | Biogas to Boilers | Biogas | | 65 | Hot Water Supply | Hot Water | |
| 11 | Grit and Screenings | Solid Waste | | 29 | Waste Activated Sludge Thickening Feed | Secondary Sludge | | 48 | Hot Water Return | Hot Water | | 66 | Sludge Recirculation | Digested Sludge | |
| 12 | Primary Clarifier Feed | Primary Influent | 600 | 30 | Waste Activated Sludge to Headworks | Secondary Sludge | | 49 | Sludge Recycle | Blended Sludge | | 67 | Final Effluent Supply | Final Effluent | |
| 13 | Enhanced Primary Treatment Feed | Primary Influent | 600 | 31 | Product Water to Suncor | Product Water | | 50 | Digester Overflow | Blended Sludge | | 68 | Natural Gas | Natural Gas | |
| 14 | Primary Clarifier Effluent | Secondary Influent | | 32 | Final Effluent Discharge | Final Effluent | | 51 | Struvite Plant Feed | Supernatant | | 69 | Alum for EPT | Aluminum Sulphate | |
| 15 | Enhanced Primary Treatment Effluent | Secondary Influent | | 33 | WAS Polymer Feed | Polymer | | 52 | Fertilizer | Fertilizer | | 70 | Alum for Secondaries | Aluminum Sulphate | |
| 16 | Primary Scum | Scum | | 34 | WAS Thickened Sludge | Thickened Sludge | | 53 | Struvite Plant Effluent | Supernatant | | 71 | Wet Polymer | - | |
| 17 | Secondary Scum | Scum | | 35 | Fermented Sludge to Blending | Fermented Sludge | | 54 | | | | 72 | Waste to Headworks | | |
| 18 | Secondary By-Pass | Secondary Influent | | 36 | Primary Sludge Fermenter By-Pass | Primary Sludge | | 55 | Potable Water to Softening | Water | | 73 | Co-Composter Centrate | Supernatant | |

| REFERENCE DRAWING | |
|---|---|
| DRAWING No. | DRAWING TITLE |
| N/A | N/A |

| REVISION | | | |
|---|---|---|---|
| Rev. | DATE | DESCRIPTION | BY |
| 3 | 20-MAY-2015 | ADDED TO PLANT BASE | P.DAM |
| 4 | 24-APR-2019 | AS FOUND | A.SUAREZ/P.DAM |

ENGINEERING STAMP

APEGA PERMIT NUMBER 6368

**CONTROLLED DOCUMENT**
ALL CHANGES MUST BE RED-LINED AND FORWARDED TO PLANT ENGINEERING AT THE TIME OF INSTALLATION

LAST UPDATED: 24 Apr 2019



EPCOR

# PLANT BASE DRAWING

PLANT SITE: GOLD BAR WWTP
DRAWING TYPE: PFD

DRAWING TITLE:
## GOLD BAR WASTEWATER TREATMENT PLANT PROCESS BLOCK DIAGRAM

| SCALE | SHEET | CODE | DRAWING NUMBER |
|---|---|---|---|
| NOT TO SCALE | 1 OF 1 | PFD-WW | 100 |


Outfall 30
Latitude: N5936785.013
Longitude: E38608.83
Outfall 20
Latitude: N5936760.60
Longitude: E38901.553
Outfall 10
Latitude: N5936690.98
Longitude: E39082.28
North Saskatc

# Appendix D EPCOR Wastewater Integrated Resource Plan

# EPCOR WATER SERVICES

## WASTEWATER INTEGRATED RESOURCE PLAN: A NEW WAY OF PLANNING

2023 Summary Report

Published: January 8, 2024


*A four-panel art piece depicting the symbiotic relationship between the magpie and the buffalo and the deep roots these creatures have with Edmonton's river valley adorns the air quality monitoring station near the Gold Bar Wastewater Treatment Plant. The installation was created by local artist Matthew James Weigel in September 2022.*

# LAND ACKNOWLEDGEMENT

As a company that operates across Turtle Island, also known as North America, EPCOR recognizes that its work takes place on the traditional territories of Indigenous Peoples. We respectfully acknowledge the significance of the lands and waters our utilities are situated on and by, including the diverse histories, languages, and cultures of the many First Nations, Métis, and Inuit Peoples, whose presence reaches back to time immemorial.

Several of our Canadian operations reside on territory that is covered under Treaties, which were entered into by First Nations peoples and the Crown. In particular, our headquarters in Edmonton, and both of the city's water treatment plants, are located on the banks of the North Saskatchewan River, found in the heart of Treaty 6 territory – the traditional lands of the Blackfoot, the Cree, the Dene, the Nakota Sioux, the Saulteaux, and later the Métis.

# EXECUTIVE SUMMARY

## WHAT IS THE WASTEWATER INTEGRATED RESOURCE PLAN?

Integrated Resource Planning (IRP) is the iterative long-range planning approach used by EPCOR for regulated water and wastewater operations in Edmonton. The Wastewater IRP (WWIRP) provides a summary of strategies and planning principles for Edmonton's sanitary and storm systems, including our Gold Bar Wastewater Treatment Plant (WWTP) and Clover Bar Solids Management Facility.

The result is an evolving path forward for building, operating and maintaining a municipal wastewater collection and treatment system (pipes and plants) that meets or exceeds all regulatory requirements, and helps ensure the continued provision of safe, reliable utility services to a growing population.

### An Evolution in Planning

Edmonton is a thriving city, to which more than one million people call home. The safe distribution, collection and treatment of its water and wastewater are vital to its continued growth and development.

Yet city growth also impacts how water moves across and through our landscape. Development (both at the city's edges and due to in ll intensi cation) leads to an increase in hard surfaces and an increase in stormwater runo . Population growth also results in increased wastewater generation. More people means more water entering the sewer system that must be safely treated before it can be returned to the North Saskatchewan River. Minimizing adverse impacts to the water cycle from the growth of our city is critical to protecting the integrity of our source water and the surrounding river valley.

Sewer systems of the past were designed to move water away from developments as quick as possible using traditional grey infrastructure investments based on historical water use and rainfall patterns. Wastewater treatment facilities were built to remove "waste," and treatment was considered the end point in the planning cycle.

Yet we cannot simply blame old design. Given changing customer expectations and water use trends, the city's new growth strategy, and the impacts of climate change, it's no longer prudent to focus solely on long-term plans wit xed infrastructure investments. We need to be innovative in our approach to planning and consider adaptive an exible solutions that address current social, environmental and economic conditions. Traditional and siloed water management approaches do not address the realities of the 21st century. Through the integration of its sanitary, stormwater and treatment utilities into a single entity, EPCOR is well-positioned to manage the Capital Region's water system in a sustainable, holistic and cost-conscious manner that considers the entire water cycle.

## Historical Planning Approach

Traditional master planning approaches narrowly focused on addressing growth through capacity-driven infrastructure upgrades. Our master plans had a multi-decade outlook and focused on the trunk network. Little consideration was given to changing how our customers interact with the wastewater system, shiftin ows regionally or focusing on alternative one water management strategies in local catchment areas. This has resulted in a network of very deep and large sewer trunks servicing Edmonton that are difficult to inspect, clean and maintain. Corrosion and odour issues have resulted in failures of the trunk system that require costly repairs.

Wastewater treatment was also driven by growth objectives and increased regulatory requirements focused on removing nutrients from water before being discharged back to the North Saskatchewan River.

Further, planning for our water cycle components was disparate. The water system was planned by the water business unit, while the wastewater system was planned by the wastewater business unit. This siloed organizational structure sti ed projects with multiple bene ts and rather than prevent issues upstream, it proposed fragmented interventions

## How Are We Thinking Differently?

The One Water planning model is the industry leading approach to overcoming water related challenges. One Water is both a holistic way to approach water management and a practical, systems-based approach to meet complex issues.

EPCOR's goals are to maximize the use of our existing infrastructure by optimizing and enhancing the system. We are also reframing the concept of wastewater treatment into the paradigm of resource recovery.

Key focuses of the new strategy include:

- Modular, right-sized solutions that can be scaled up with time according to new information like growth projections and the impacts of climate change.
- Slowing the entry of stormwater into the combined system and attenuating the peaks, by replicating and recreating natural systems hydrologic and ecologic function through the installation of green infrastructure.
- Increasing the focus on inflow and infiltration reduction to increase capacity of the system and improve operational reliability at the wastewater treatment plants.
- Concentrating on customer-focused solutions including conservation and efficiency and down spout disconnects.
- Investments to increase our situational awareness of the system.
- Situational awareness investment to increase our visibility of the system.
- Increasing regional collaboration between EPCOR and ARROW Utilities to balance sanitary flows in the region.
- Recognizing the value of all water. Future strategies for the Gold Bar and Clover Bar facilities focus on resource recovery - extracting valuable nutrients and energy from wastewater, promoting sustainability.
- Shifting our focus to Sanitary Planning Areas (SPAs) and implementing improvements to local sanitary systems and parcel based solutions versus solutions focused primarily on the trunk system.

## Sanitary Planning Areas (SPA): How We Prioritize Collection System Upgrades

While wastewate ow is indi erent to local boundaries, there are catchment areas that can be used to break the system into more manageable areas for investigation and project prioritization.

The city has been delineated into 23 SPAs to focus planning more locally, an ve SPA locations have been prioritized for capital and operational investment activities including:

- Situational awareness improvements
- Improved wet weather flow management
- Odour and corrosion management
- Asset risk reduction
- Capacity enhancements

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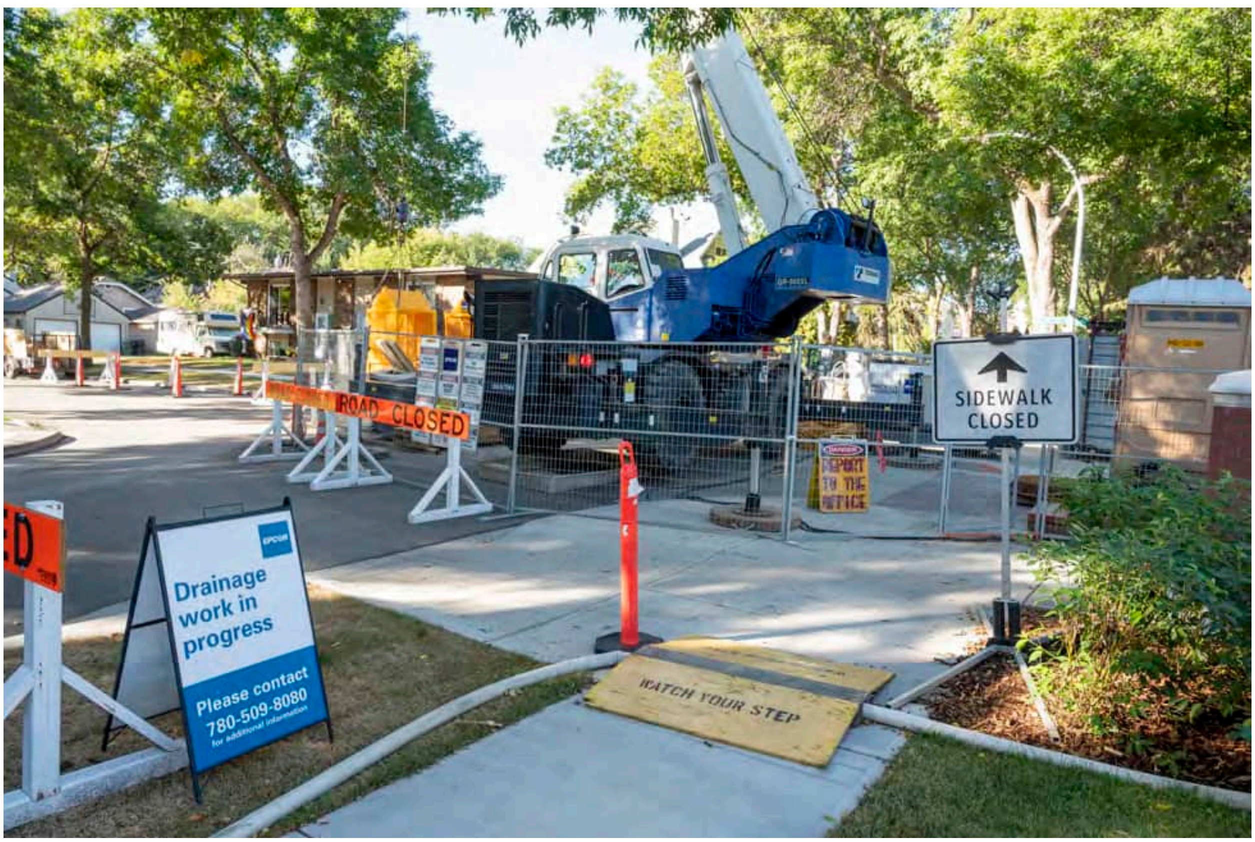


# EDMONTON IS A ONE WATER CITY

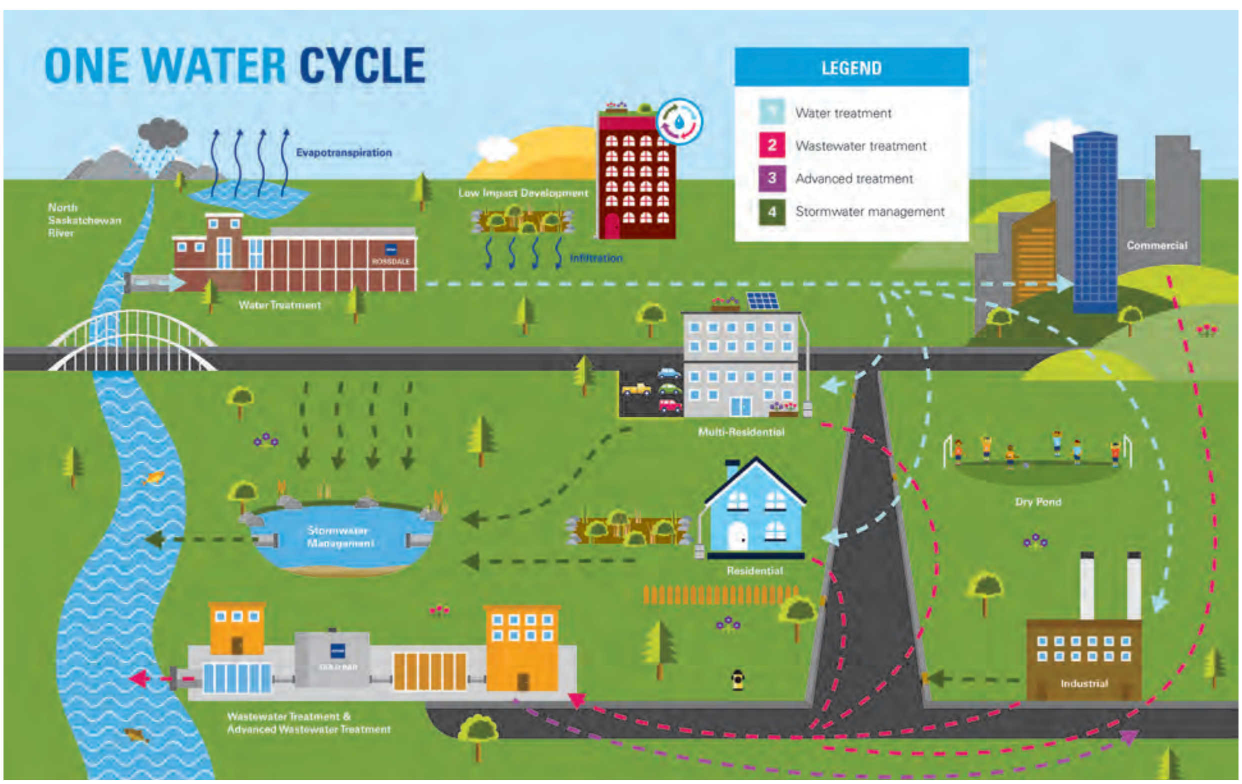
This report summarizes EPCOR's integrated approach to strategic planning as a One Water Utility for Edmonton's sanitary and storm systems, including our Gold Bar WWTP and Clover Bar Solids Management Facility.

Edmonton is a thriving city of more than one million people that require clean, safe, and reliable water, wastewater and storm services. Water is vital to the environmental, social and economic sustainability of the city and its safe distribution, collection and treatment are key components of the overall municipal water cycle.

Edmonton is also fast growing and has ambitious targets to transition future growth to increase in  ll development in strategic nodes and corridors balanced with historical outward-focused growth.

City growth impacts how water moves across and through our landscape. Development (both at the city's edges and due to in  ll intensi  cation) leads to an increase in hard surfaces and an increase in runo  . Population growth also results in increased wastewater generation. More people contribute more water into the sewer system to be safely treated before it is reintroduced back into the North Saskatchewan River.

Minimizing negative impacts to the water cycle from the growth of our city is critical to ensuring quality and quantity of the North Saskatchewan River. With the integration of sanitary, stormwater and treatment utilities as a single entity, EPCOR is well-positioned to manage Edmonton's municipal water system in a way that considers the entire water cycle and develops a more holistic, sustainable and a  ordable utility.



# OUR COMMITMENT TO ONE WATER

***"We cannot solve our problems with the same thinking we used when we created them."***

***- Albert Einstein***

The water industry has unavoidable needs. Climate change, a ordability, aging assets, increasing regulatory/customer requirements, changing water use patterns and growing urbanization, are complex water management issues that require innovative solutions. To overcome these challenges, we needed to change our perspective and approach.

In 2020, the strategic planning areas of the Drainage and Water Business Units merged to form the One Water Planning group. In 2023, the entire organization transitioned to a One Water model.

One Water is the industry leading planning approach to overcoming water-related challenges. It is an outcome of EPCOR's recognition that the water cycle is circular and interconnected, therefore our planning should also be interconnected. Rather than focus on fragmented interventions, we need to prevent issues upstream by using integrated water management strategies.

The underlying characteristics of One Water include:

**The mindset that all water has value**: from the water resources in our ecosystem, to our drinking water, wastewater and stormwater.

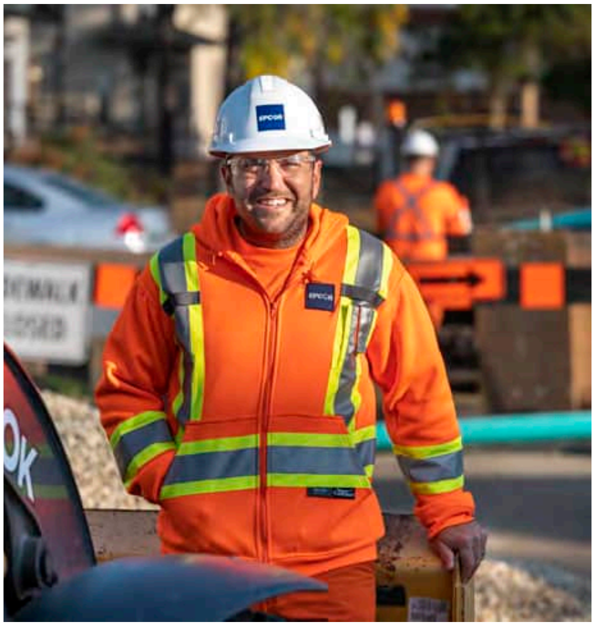
Edmonton has a **circular wastewater economy** and we need to approach planning decisions with a **systems-based mindset** that encompasses the full water cycle.

**Non-traditional, right-sized solutions** such as green infrastructure.

**Focusing on achieving multiple bene ts**; water related investments should provide economic, environmental and societal returns.

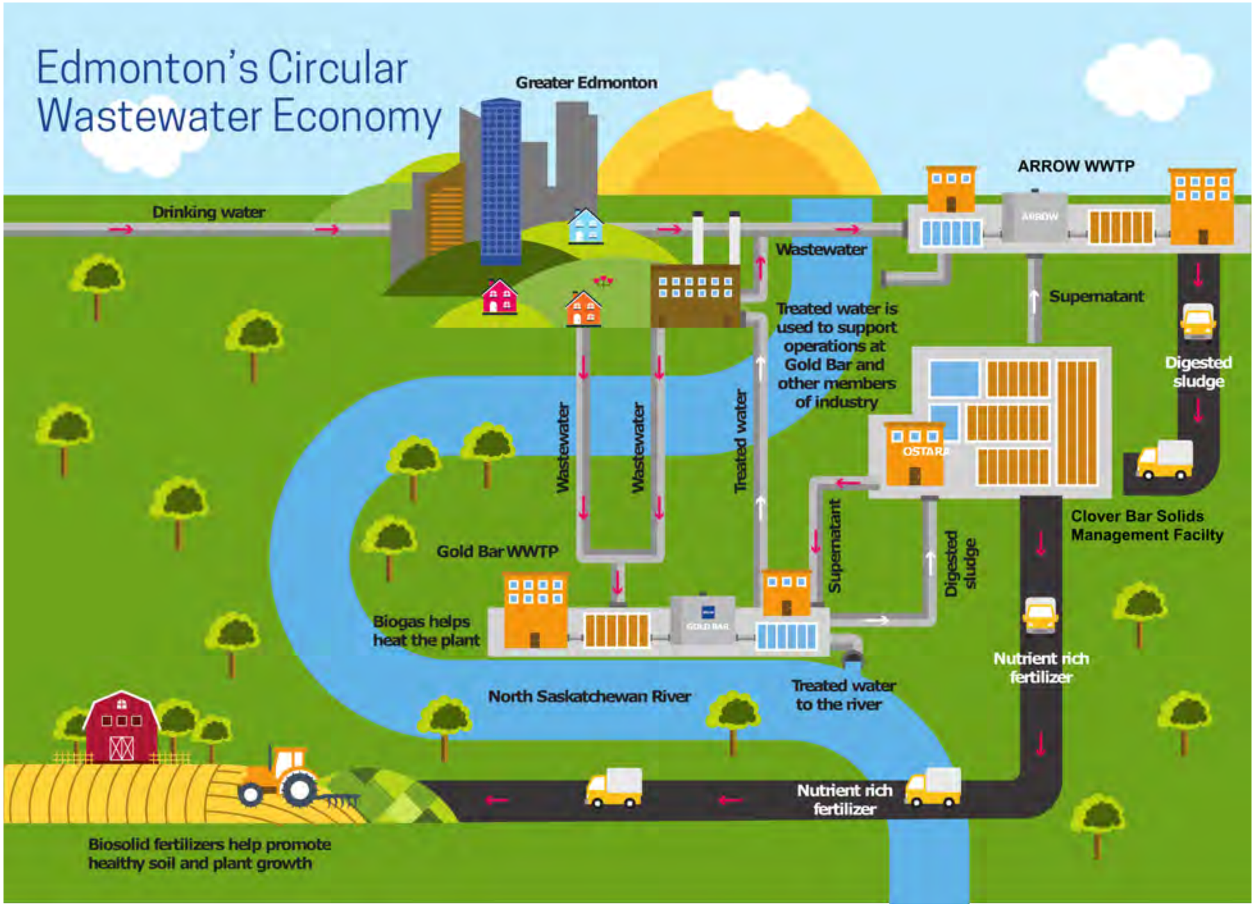
**Relying on partnerships and stakeholder inclusion**.

By employing systems-based thinking to plan the entire municipal water cycle, we are able to break down traditional planning silos, seek water management strategies with co-bene ts and implement innovative solutions for the future.



**What is One Water?**

An integrated planning and implementation approach to manag nite water resources for long-term resilience and reliability meeting both community and ecosystem needs.




## One Water Management Approaches with Systems-Based Co-Benefits

| Strategic focus | Wastewater | Biosolids | Stormwater |
|---|---|---|---|
| Rain & Stormwater Reuse | ✓ | | ✓ |
| Nature-Based Solutions | ✓ | | ✓ |
| Water Conservation & Efficiency | ✓ | | ✓ |
| Inflow & Infiltration Reduction | ✓ | | ✓ |
| Decentralization & On-Site Treatment | ✓ | ✓ | ✓ |
| Risk-Based Asset Management | ✓ | ✓ | ✓ |
| Watershed Management & Source Water Protection | ✓ | ✓ | ✓ |
| Monitoring & Data Collection | ✓ | ✓ | ✓ |
| Nutrient Removal and Recovery | ✓ | ✓ | |
| OSS & FOG Management | ✓ | ✓ | ✓ |

# HOW WE PLAN: INTEGRATED RESOURCE PLANNING

## Our Strategic Objectives

**Support future growth and redevelopment of the city as it grows to 2 million people**

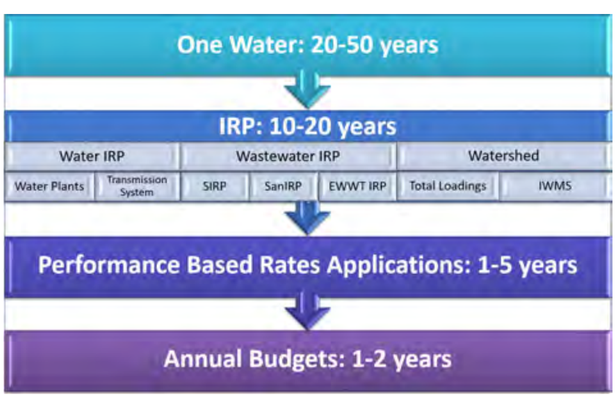
**Build a financially and environmentally sustainable wastewater system**

**Provide resilient wastewater services**

EPCOR's 2024 WWIRP initiates the capital planning process for Edmonton's wastewater collection and treatment operations. It outlines a path forward for building, operating and maintaining a municipal wastewater collection and treatment system that meets or exceeds all regulatory requirements, and helps ensure the continued provision of safe, reliable utility services to a growing population.

EPCOR has successfully utilized the Integrated Resource Plan (IRP) long-range planning approach for the drinking water system since the 1990's and the Gold Bar Wastewater Treatment Plant since 2015.

The Stormwater Integrated Resource Plan (SIRP) was published in 2019, and work is currently occurring t nalize a Sanitary Integrated Resource Plan (SanIRP).




EPCOR's IRPs emplo exible and holistic approach to long-term planning that anticipates risks, as well as adapts and mitigates against new and emerging threats, helping ensure greater operational, environmental an nancial stability.

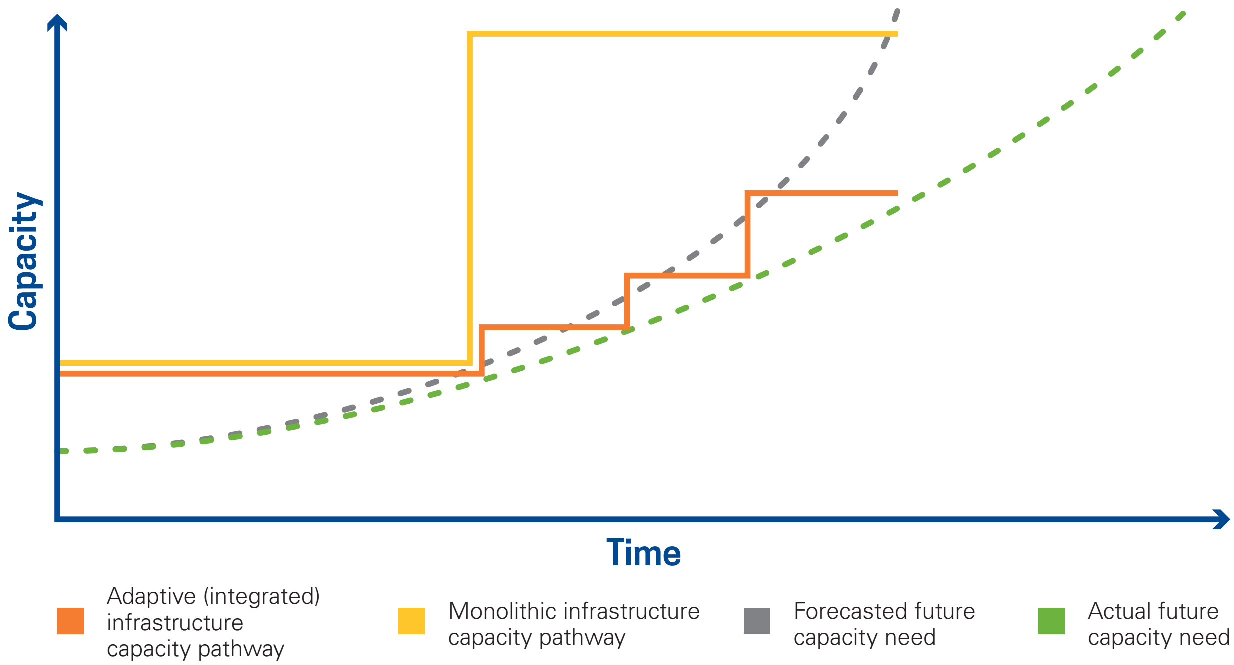
EPCOR's IRPs focus on strategies over a 10-20 year planning horizon. These strategies inform the identi cation of projects for our performance-based rates applications with the City of Edmonton (3-5 years). One Water bridges, synchronizes and looks for intersectional opportunities of the various IRPs and has a 20-50 year outlook.

Through the IRP process, the identi cation of capital projects are balanced to:

- Manage future growth needs
- Minimize risk throughout the system (and increase reliability, resilience and sustainability)
- Meet or exceed regulatory/health, safety and environment (HSE) requirements
- Achieve efficiency/performance improvements

## Supporting Growth Through Incremental Enhancements

In an uncertain environment, unnecessary infrastructure or infrastructure that is no t for purpose is more likely to be avoided through planning that focuses on building for actual needs instead of anticipated needs. Integrated Resource Planning creates pathways to deliver smaller incremental enhancements along shorter planning horizons and encourages leveraging approaches from across the water cycle. This allows EPCOR to make prudent and timely infrastructure investment decisions, while remaining exible and adaptable to changing environmental, economical and social conditions.




Traditional master planning narrowly focuses on addressing growth through capacity-driven infrastructure upgrades. Alternatively, Integrated Resource Planning aims to ***maximize the use of our existing infrastructure*** through:

- Influencing our customers' water use and wastewater generation behaviours through initiatives such as, conservation and efficiency.
- Promoting the concept of stormwater storage on private property through green infrastructure.
- More effectively managing storm flows entering the wastewater system.

Due to increased water use efficiency by customers, and our new approach of in uencing stor ow management, growth is not projected to be the primary driver of capital expenditures in the near-term.

## Resilience is a Requirement

Resilience has always been a priority for EPCOR due to the signi cant public health impacts that can result from the interruption of sanitary or water service. Recent record-breaking heatwaves  ooding and wild res have highlighted the importance of building resilient infrastructure in the face of a changing climate. Adaptation to climate change impacts is essential for any long-range plan.

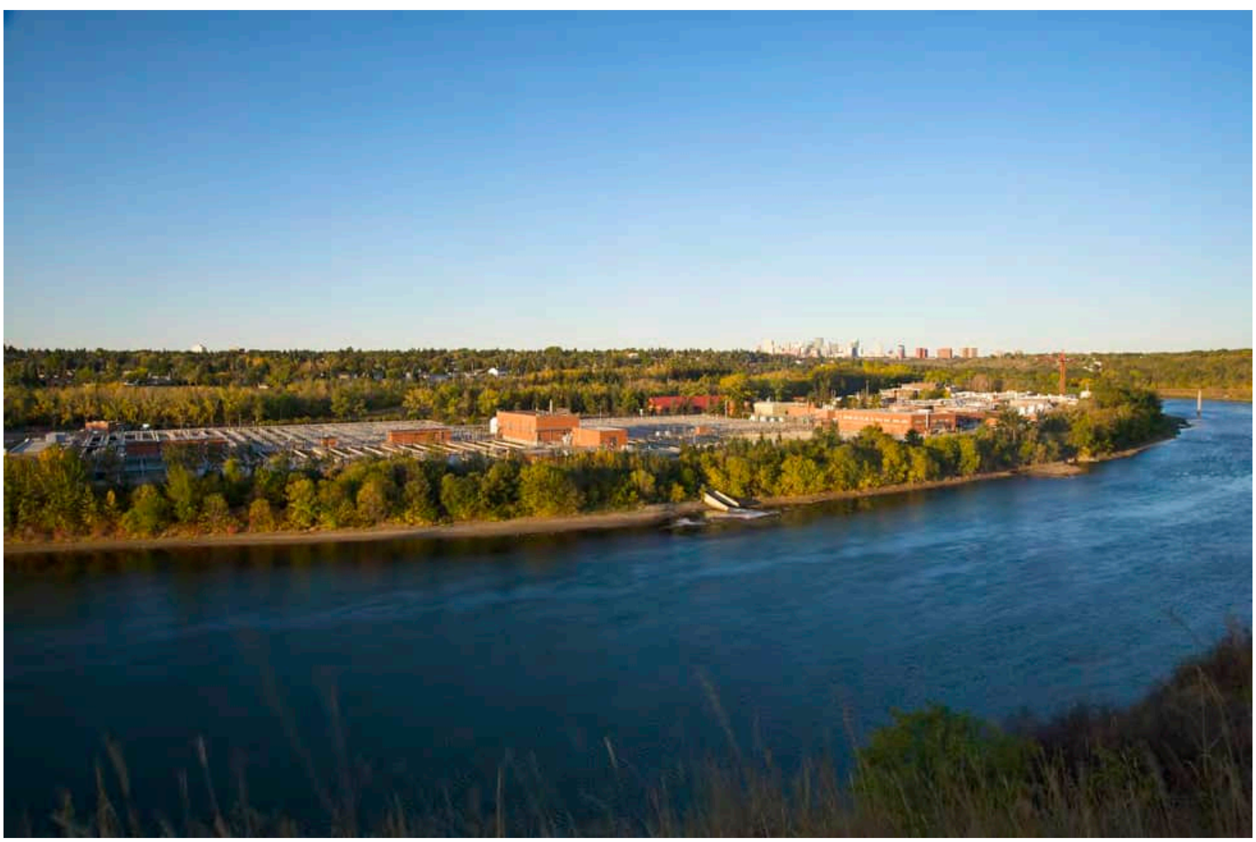
The ability to predict future conditions decreases as the planning horizon increases. With climate change, city growth changes, digital transformation, regulatory updates and changes to customer behaviours on going; designing infrastructure to encompass the full range of potential operational needs 75 years from now is not viable. The uncertainty of a changing future requires us to be adaptive and agile in managing internal and external risks.

The transition to Integrated Resource Planning to ensure future resiliency requires several major shifts in planning, construction and long-term operational strategies including:

- A focus on infrastructure accessibility to ensure regular inspection, maintenance and refurbishment.
- Shorter planning timeframes and the avoidance of multi-generational project timelines.
- High situational awareness capacity through system monitoring and data analysis support.

**What does resilience mean for wastewater infrastructure?**

For the wastewater conveyance and treatment system, resilience is considered to be the ability to handle uncertainty and adapt to future change.



*The Gold Bar Wastewater Treatment Plant*

# EPCOR'S ROLE AS A WATER UTILITY

## WHO WE ARE

EPCOR provides safe and reliable water treatment and delivery, as well as wastewater collection and treatment to Edmonton residents. We also provide water service to a number of regional customers. The planning, building, operating and maintaining of our plants, reservoirs, pipes, tunnels, pump stations and stormwater management facilities is facilitated by more than 1,300 employees working on all aspects of the water cycle.

## OUR PARTNER: ARROW UTILITIES

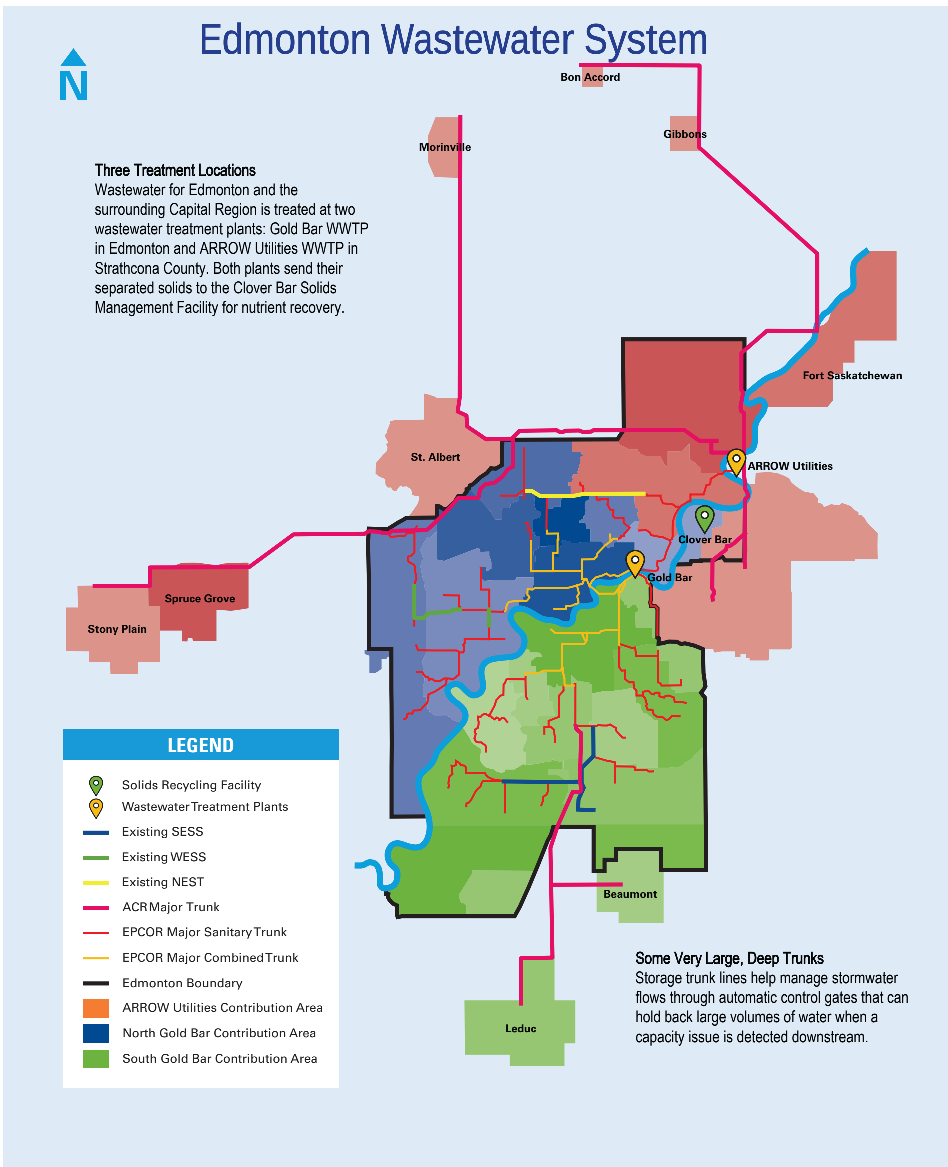
We work with our partner ARROW Utilities (formally the Alberta Capital Region Wastewater Commission) to provide resilient wastewater services to the Edmonton region.

# THE WASTEWATER UTILITY AT A GLANCE

## A Shared Effort

Wastewater collection and treatment in the Capital Region is shared between EPCOR and ARROW Utilities. EPCOR sends wastewater from nearly 30,000 customers in northeast Edmonton to ARROW Utilities for treatment. In return, wastewater from the City of Leduc and Beaumont is sent to the Gold Bar WWTP.

Th ow "balancing" partnership provides for more responsible infrastructure investments by avoiding the construction of overly-long and costly sewer lines - helping ensure operating costs per customer remain reasonable.



# WASTEWATER IRP: THINKING DIFFERENTLY

One Water identi es and takes advantage of the interconnections in the water cycle to develop more holistic solutions for the water utility and provide water and wastewater services that are more a ordable, resilient and sustainable. The 2024 Wastewater Integrated Resource Plan (WWIRP) prioritizes four key measures for improving system planning across the entire wastewater collection and treatment system.

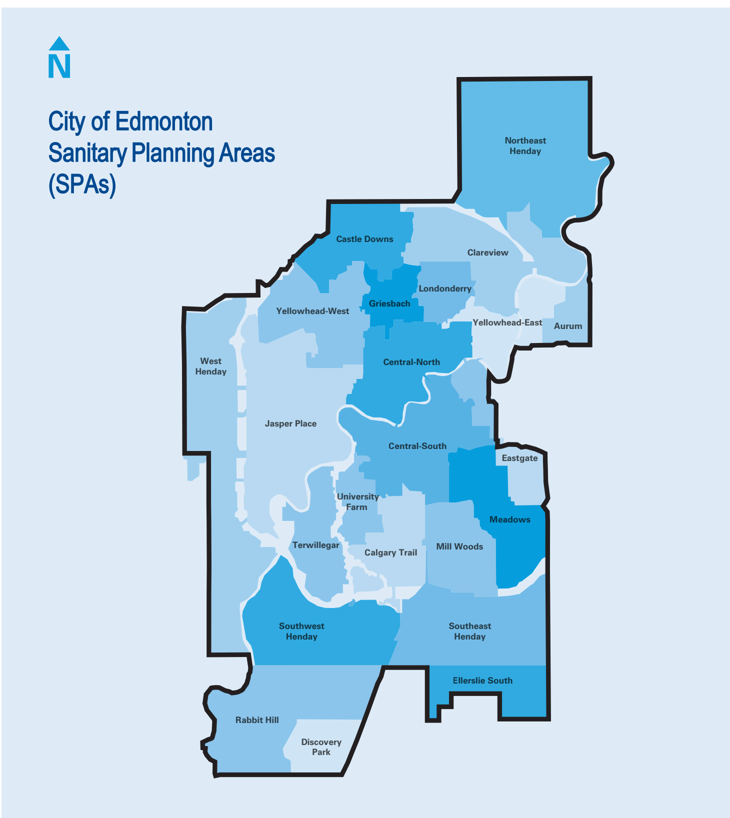
| | | |
|---|---|---|
| Large trunk investments to primarily support greenfield growth | to | Local investment to support node and corridor growth with Sanitary Planning Areas |
| Building large underground storage and capacity assets | to | Maximizing the use of existing infrastructure with customer-focused solutions and situational awareness |
| Limited regional focused planning | to | Enhancing regional cooperation with our partners to balance system loads and leverage system strengths |
| Project-specific actions to increase sustainability | to | Enhancing sustainability by implementing solutions that consider the entire water cycle |

# LOCAL INVESTMENT TO SUPPORT GROWTH USING SANITARY PLANNING AREAS

Previous long-term planning for the growth of the wastewater system assumed outward growth with static development in mature areas. Planning priorities focused largely on building big, deep trunks to connect the “new” areas at the city’s peripheries to the “already built” infrastructure servicing the city’s core.

Edmonton’s City Plan has ambitious targets to transition future growth to increase in  ll development within de  ned nodes and corridors, balanced with historical outward-focused growth.

Planning for this shift in growth requires EPCOR to look inwards towards areas where the wastewater infrastructure is already in place.




To accommodate this changing growth paradigm, EPCOR has shifted away from a master plan process that dictated growth requirements primarily through large trunk projects. In its place, are the SPAs which divides the city into 23 planning regions. The SPAs identify initiatives above the trunk sewer system and serves to track issues critical for the safe operation of the wastewater system, while also ensuring future needs are met.

The SPAs detail and quantify issues that a  ect both the capacity and reliability of the wastewater system including:

- Identified capacity limitations in the sewer trunk and local system.
- Sources of uncontrolled or unwanted stormwater entry.
- Odour and corrosion issues.
- Asset risk issues.

The SPAs support recommendations for capital and operational investment opportunities for:

- Situational awareness improvements.
- Improved wet weathe   ow management.
- Odour and corrosion management.
- Asset risk reduction.
- Capacity enhancements.

The SPAs identify the trigger points and conditions that controls when asset investment decisions must be made in a region and backs it up with investment in monitoring. This represents a shift from strict forecast driven decision making to hybrid process that includes situational awareness as one of the key drivers.

# MAXIMIZING THE USE OF EXISTING INFRASTRUCTURE AND CUSTOMER FOCUSED SOLUTIONS

The way customers interact with their water and wastewater system, has always had an impact on operational e ectiveness and the cost of service. Shared bene ts across the entire water utility can be gained from changing customer interactions.

## Customer Driven Capacity Enhancements: Water Efficiency

EPCOR recognizes that the capacity needs of its wastewater collection system and treatment plants are being met because of the major advancements in water use efficiency made by its customers. Customer behaviours in this area have enabled the utility to reduce project scopes, or deferring project starts, and even eliminating some infrastructure projects entirely.

Since 2020, the following bene ts can either be partially or fully attributed to customers being more efficient with their water use:

- A reduction of between $90M to $100M in capital costs for trunk line capacity enhancements in south west Edmonton (West Henday and Southwest Henday SPAs).
- Cost reductions of between $0.25M to $2.0M each for new sewer pump stations in commercial or industrial areas.
- Contributing to enabling the Gold Bar WWTP to maintain its existing site foot print and fence line.
- Sewer overflow events not increasing in line with population growth.

Water use efficiencies have enabled cost and non-quanti able bene ts for most capacity driven projects and processes across the water utility. The scope of total future realized bene ts is hard to fully conceptualize. EPCOR is currently reviewing future projects with potential capital costs totaling more than $300M where it is expected a signi cant portion of the cost can be o set due to water efficiency.

## Reducing the Cost of Handling Wastewater

Oils, grease, rags and wipes all negatively impact the operability of the collection and wastewater treatment system. The improper disposal of these items is resulting in a need for increased cleaning frequency, is causing damage to equipment and pumps, can e ect treatment efficacy and is leading to higher waste disposal costs.

## Inflow and Infiltration (I&I) Reduction

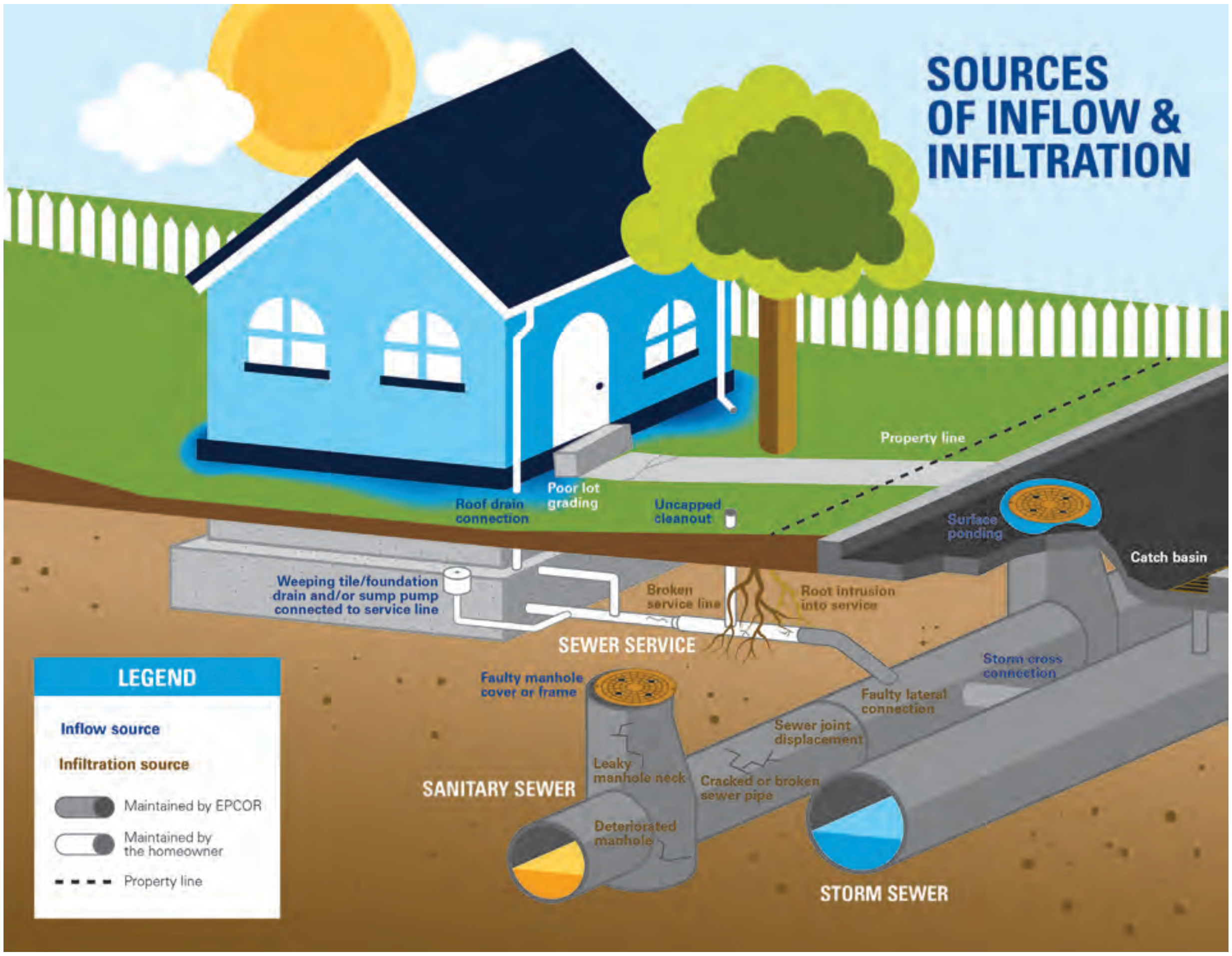
As part of Stormwater Integrated Resource Plan (SIRP), EPCOR has invested in reducing public in ow and in ltration.

EPCOR will now engage with customers to achieve similar progress in reducing stormwater contributions from private properties.

By some estimates, over 40% of the wet weather ows received by the sanitary sewer system come from private property. The implementation of stormwater management principles that store and slow wate ows will help manage system capacity in these more constrained areas.

EPCOR is already working with its commercial and industrial customers to integrate modern stormwater management practices at their sites. Moving forward EPCOR will develop programs for engaging with residential customers to reduce wet weather contributions from sources such as downspout connections and repairing damaged service pipes. These actions will be used to help defer, reduce or eliminate large capacity investments across the water cycle.

Priority areas for 2025-2027 include Calgary Trail, Castle Downs, Jasper Place, Millwoods and Yellowhead-West SPAs. These areas are being prioritized based on their known high contributions to system wet weathe ows.




In ow and in ltration, often abbreviated as I&I, is any water that enters the sanitary sewer system from any source other than customer use. I&I is often classi ed as “wet weathe ow” when sizing sewer pipes.

**In ows** ar ows from stormwater entering the sanitary system during storms or snow melt events. On private lots, in ows often enter through sagging manholes in parking lots, improperly connected downspouts, drains or catch basins.

**In ltration** ar ows from ground water entering the sanitary system through cracks, breaks or joint failures in the sewers servicing the lot.

# INCREASE SITUATIONAL AWARENESS

EPCOR is prioritizing enhancing situational awareness to improve operational ctiveness, strategic planning, project planning and provide critical emergency support.

Situational awareness is being advanced across the entire wastewater collection and treatment system by installing real-tim ow, air quality and operational monitoring instrumentation. Data dashboards and real-time analytics platforms are then used to provide accessible and actionable decision support for the entire water utility.

**City-wide permanent monitoring will support future growth in multiple ways:**

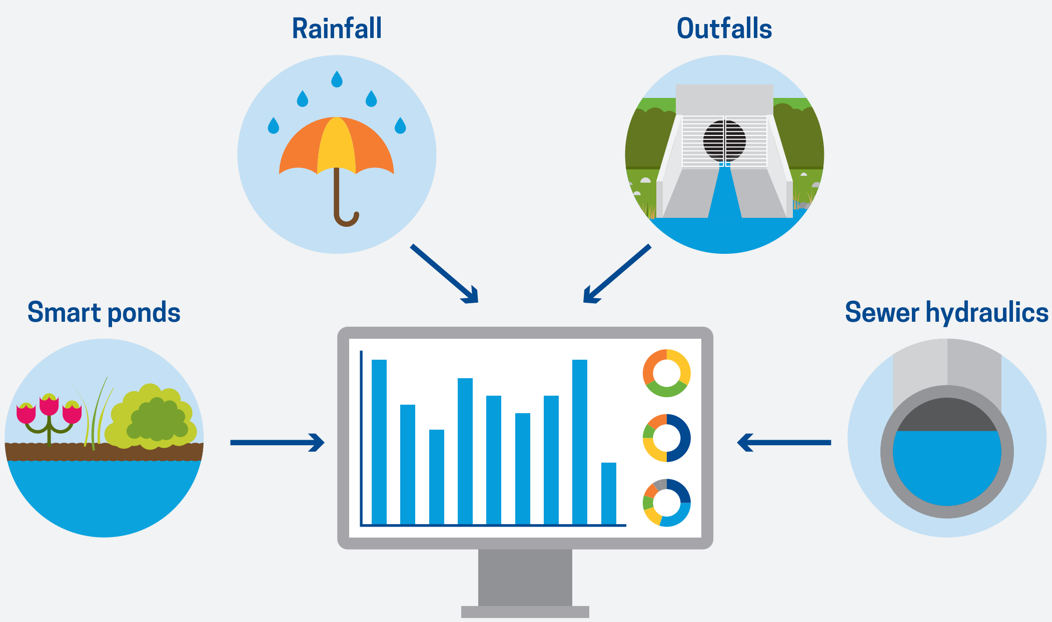
1. Provide direct and timely data on trunk capacity utilization.

2. Support I&I reduction e orts to gain back trunk capacity by identifying areas with high stormwater in ows.

3. Provide opportunities to e ectively implement real time storage an ow diversion actions across the entire system to the bene t of the Gold Bar and ARROW WWTP and collection system during storm events.

4. Reducing the risk of basemen ooding and sewer over ows by implementing enhanced monitoring and smart systems at stormwater management facilities and outfalls.

## Situational Awareness: Data Inputs



# WORKING WITH OUR PARTNER

EPCOR works collaboratively with ARROW Utilities to deliver reliable and resilient wastewater services to Edmonton and the capital region.

Rather then build out extensive lengths of trunk infrastructure, ARROW Utilities sends wastewater from the cities of Leduc and Beaumont to EPCOR to be treated at the Gold Bar WWTP. Likewise, EPCOR sends wastewater from many communities in northeast Edmonton to ARROW Utilities for treatment at their wastewater treatment plant.

Multiple additional opportunities to manag ows between the Utilities have been identi ed and are actively being investigated to maximize the operational resiliency of the wastewater collection and treatment operations. The full scope of opportunities have been broken into three categories:

**1) Operational diversions at existin ow control facilities**
Using existing gates and pump station assets, ows are transferred between utilities with no additional capital investment.

**2) Capital improvements of less than $5M**
For some assets tha ow above or directly adjacent to trunks delivering wastewater to ARROW Utilities, small investments to construct drop structures or junctions can allow for transfers o ow.

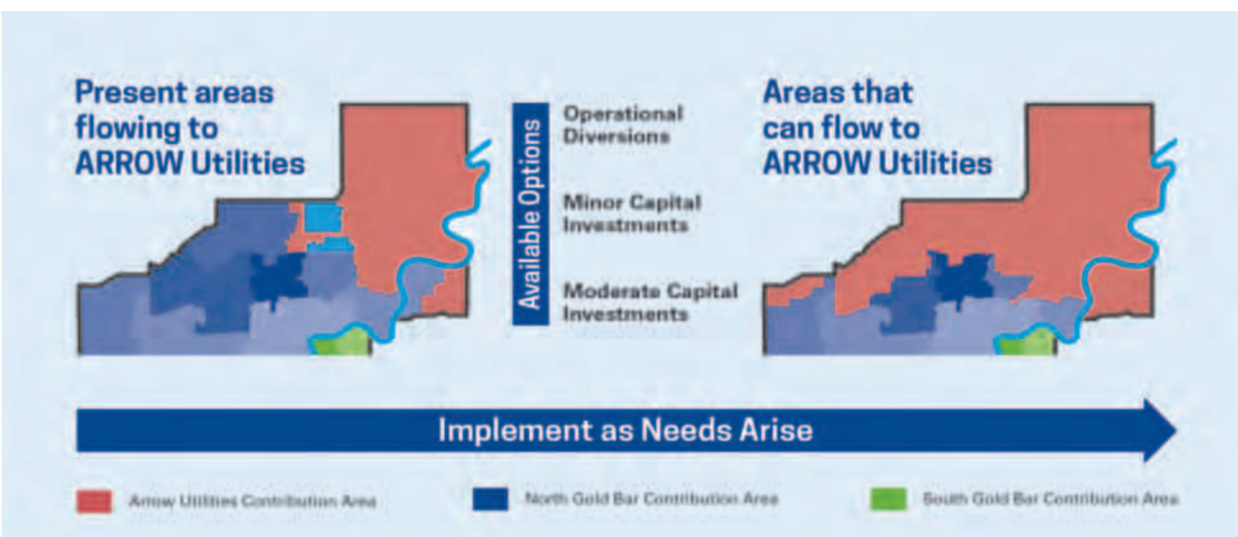
**3) Capital diversions of more than $5M but less than $20M)**
In some areas it is technically feasible to transfer ow by extending existing force mains or building new gravity mains over distances of less than 350 metres.

It is currently estimated that an additional 25,000 m3/day of wastewater could be managed between the utilities depending on the need.

There are multiple bene ts to balancin ows between utilities including:

- Optimizing trunk capacity investments
- Reducing loading at the Gold Bar WWTP
- Providing a means to redirect flow to support maintenance and rehabilitation
- Capacity for expanding smart flow management routines in the future

Increased regional collaboration follows the principals of integrated planning to provide system exibility in order to quickly and e ectively adapt if future conditions deviate from what was rst predicted.



# ENHANCING SUSTAINABILITY

## Total Loadings

Total loadings to our rivers and waterways includes discharges from the Gold Bar WWTP, our combined and storm systems. EPCOR and its partners have a commitment to not increase the loads of priority contaminants to the North Saskatchewan River as the city grows. Through investments in green and grey infrastructure through SIRP as well as targeted reduction in in ow and in ltration, the targets of the total loadings plan can be fully realized.

## Resource Recovery

Resource recovery plays a pivotal role, particularly in the context of wastewater management that encompasses sanitary and stormwate ow, along with the collection systems and treatment facilities. The traditional approach of treating wastewater in isolation is evolving towards a more integrated and collaborative framework.

Wastewater treatment plants function as facilities for environmental protection, but also are now seen as hubs for resource extraction. Future resource recovery initiatives within our network will look at opportunities within the broader water cycle and not be limited by systematic or plant boundaries.

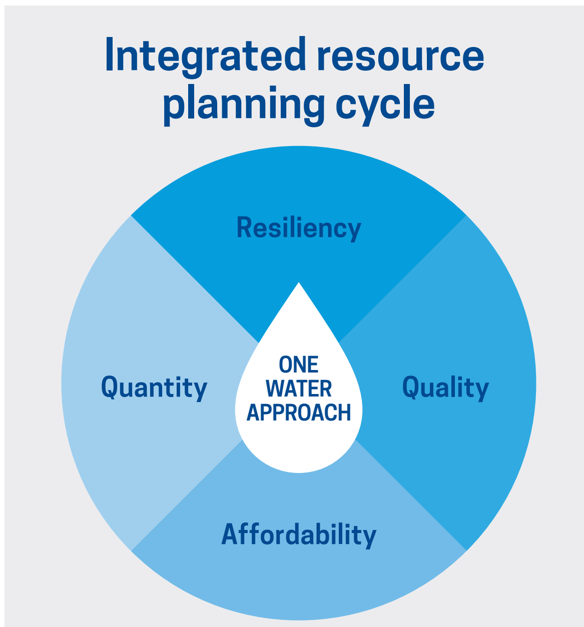
With this approach the Clover Bar Solids Management Facility is longer thought of as an endpoint in treatment, but an essential part of the overall one water cycle. By working in close collaboration with ARROW Utilities, the emphasis moving forward is on unlocking the potential of biosolids as valuable resources.

This shift aims to recover essential elements from wastewater and to foster sustainability by reducing waste and maximizing the utility of resources across the one water system.

*Kennedale Outfall*

# KEY PLANNING DRIVERS

EPCOR’s planning is informed by a thorough analysis of various drivers in the areas of resiliency, quantity, quality and a ordability. The IRP process examines the status of these drivers in the Edmonton service area and presents strategies for the safe and reliable provision of services to accommodate growth while explicitly addressing the need for greater resilience. Notable drivers discussed below include climate adaptation, sustainability, asset management, corrosion and odour, city plan, water use trends, regulations and a ordability.




## CLIMATE ADAPTION: WILDER, WETTER, DRIER WEATHER

The e ects of climate change are already being observed in the Edmonton region, through increasing temperatures and more frequent, and intense storms. The projected climatic changes for the city pose multiple risks for the wastewater collection and treatment system. Larger storms, prolonged heat waves, freezing rain, high wind events and increased urban-wildlan res can lead to service disruptions and failures.

Overlan ooding is the highest climate risk for the Edmonton sanitary system, and a variety of initiatives have been initiated including increasing green hectares city-wide, widespread construction of Low Impact Developments (LID) especially in areas of intensifying development, and increasing adoption of water retention features such as rain gardens on residential properties.

Rive ooding is also a recognized risk and the Gold Bar WWTP is investing i ood protection to ensure it can continue to provide reliable service into the future.


# SUSTAINABILITY

As part of EPCOR's commitment to becoming a leader in sustainability, the company produces an annual Environment, Social and Governance (ESG) performance update. EPCOR's environmental measures and targets includes progress on key initiatives to transform operations to protect the North Saskatchewan watershed and address challenges brought on by climate change.

EPCOR's ESG scorecard has two reportable environmental targets of major relevance to the Wastewater IRP, **Target E1: Net Greenhouse Gas Emissions: Towards Net Zero and Target E2: Protect River Quality.**

## Net Greenhouse Gas Emissions: Towards Net Zero

EPCOR is implementing projects that move the utility closer to its goal of reducing net Scope 1 and 2 greenhouse gas emissions by 50% in 2025, and 85% by 2035, compared to 2020 emissions.

In the wastewater utility, Scope 1 sources of emissions include nitrous oxide emitted during the waste treatment process, natural gas used in building heating, and vehicle fuels. Scope 2 emissions include grid-purchased electricity, which is used primarily for wastewater pumping and treatment.

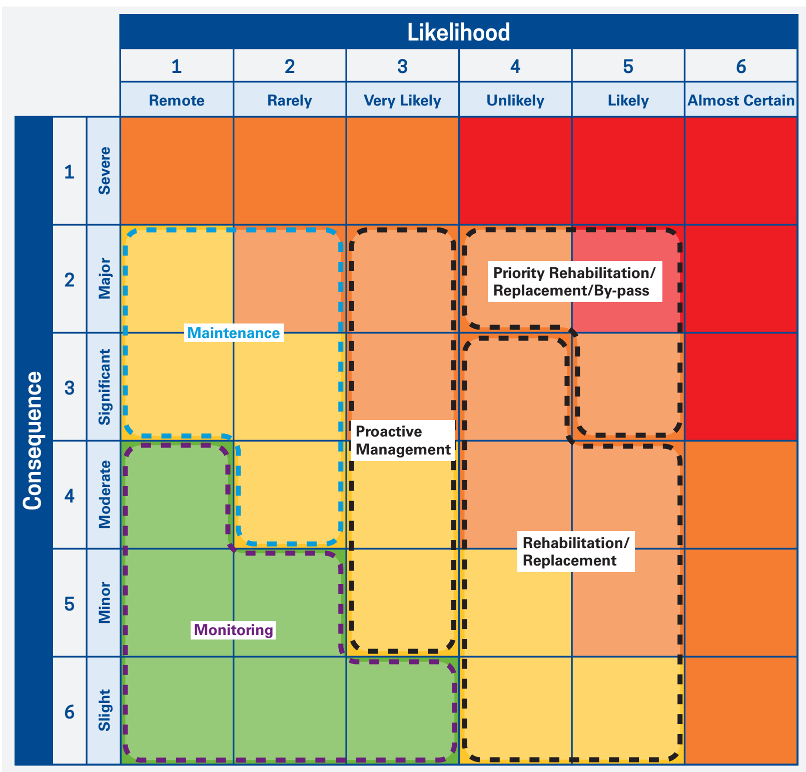
## Protect River Water Quality

EPCOR is committed to protecting the water quality of the North Saskatchewan River. Driven by the Integrated Watershed Management Strategy (IWMS) and Total Loading Plan, a major goal for EPCOR is to have no increasing trend for Total Suspended Solids (TSS) into the river from drainage, water and wastewater treatment operations. However, TSS is just one indicator of river water quality. To provide a more complete assessment of water quality and river health, EPCOR is expanding its measures for discharge characterization. Driven by the targets laid out in the Total Loading Plan, we will also report to Alberta Environment and Protected Areas discharge levels of phosphorus, ammonia, nitrate, chloride and E. coli, with the overall objective being no degradation of water quality in the North Saskatchewan River.

# ASSET MANAGEMENT

EPCOR employs a Risk Management Framework to prioritize expenditures and the allocation of resources to minimize adverse impacts to public health and safety, environment, reputation and finances. Assets are assigned risk rankings that reflect their potential for adverse impacts by considering the assets likelihood of failure and its corresponding impact or consequence. Along with other considerations, such as community needs, growth requirements, equity, environmental sustainability and business needs, the risk rankings help to define the maintenance, rehabilitation and replacement priorities across the city.

There will be a continued focus on reliability / life cycle requirement driven projects in the future, reflecting an increasing number of assets projected to reach end of service life. A continued focus on inspections of critical assets is also included to assess current condition and likelihood of failure.




The risk of failure for an asset is based on its highest **likelihood of failure (LOF)** and **consequence of failure (COF)**.

Actions which can reduce risk include:

- Inspections
- Cleaning
- Preventative and Predictive Maintenance
- Rehabilitation and Repairs
- Enabling Asset Bypassing
- Emergency Response Plan
- Action selection are driven by the nature of the risk for the asset.

# CORROSION AND ODOUR

Hydrogen sulfide gas is a problematic chemical created in sewer systems when wastewater is allowed to stagnate. The chemical causes corrosion and odour issues which have increased in severity as water use has decreased city-wide. The odour nuisance from hydrogen sulfide gas and corrosion it causes to our assets are both serious issues that affect the overall resiliency of the utility. EPCOR introduced the Corrosion and Odour Reduction (CORe) strategy in 2019 to mitigate odour nuisance and protect assets from corrosion. The strategy employs four programs, **Prevent** (inspections, cleaning and rehabilitation), **Optimize** (pump station and syphon improvements), **Control** (sewer ventilation) and **Monitor** to implement capital and operational improvements across the city.

# GROWTH

## City Plan


The Edmonton City Plan, approved by city council in December 2020, is the long-range growth strategy planning document that emphasizes in ll densi cation as Edmonton grows to a population of two million people.

The City Plan aims to add 600,000 new residents into Edmonton's redeveloping areas and add 50% of new units through in ll with signi cant portions of the future growth being achieved by developing a network of growth nodes and corridors within Edmonton's current boundaries.

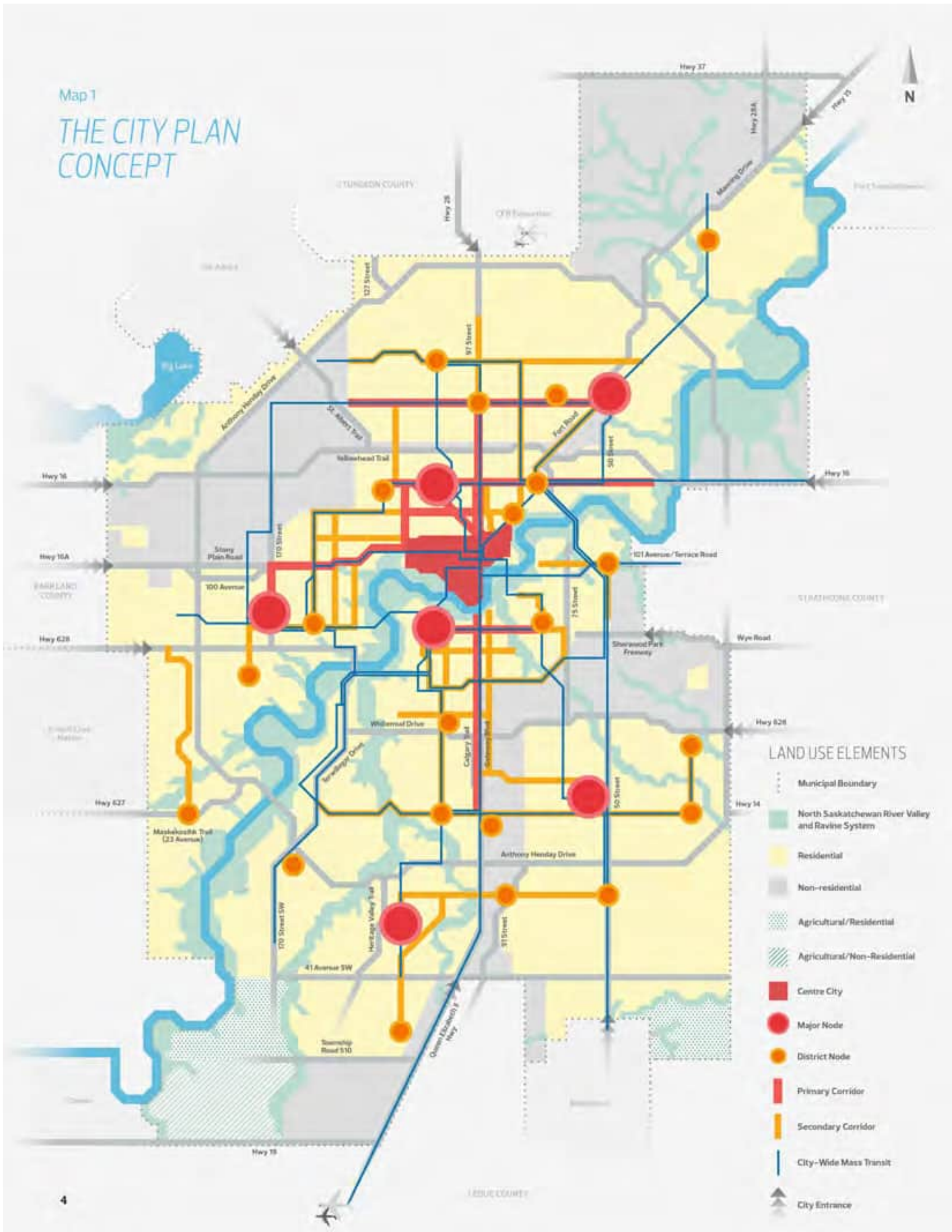
EPCOR is committed to delivering wastewater services in alignment with the City Planning goals.

| BIG CITY MOVES STRATEGIES | |
|---|---|
| Strategy Targets | How the Wastewater IRP Aligns |
| Greener as We Grow<br><br>Continue to develop a healthy city while protecting and enhancing our land, air, water and biodiversity. | • Manage the impacts of climate change on assets.<br>• Improving energy and water efficiency across our operations.<br>• Building green infrastructure to enhance biodiversity, provide critical habitat for pollinators and expand the tree canopy.<br>• Introducing distributed stormwater storage throughout the city to slow runoff to the North Saskatchewan River and its tributaries, restoring a more natural hydrology.<br>• Examine stormwater use as an alternate supply.<br>• Investigate the viability of increased on-site and external industrial reuse applications for reclaimed water.<br>• Wastewater treatment as facilities for environmental protection as well as hubs for resource extraction.<br>• Upgraded biogas utilization as fuel for on site heating and/or power generation and minimize waste through flaring.<br>• Reduce odour nuisance from facilities handling wastewater. |
| A Rebuildable City<br><br>Continuously reimagine and rebuild what our city will be to adapt to a changing future. | • Maximize the use of existing infrastructure.<br>• Manage wet weather inflows to increase capacity and support infill goals.<br>• Modernizing design metrics to minimize oversizing sewer assets.<br>• Expand infrastructure capacity in priority nodes and corridors. |
| Inclusive and Compassionate<br><br>Improve equity, end poverty, eliminate racism and make progress towards Truth and Reconciliation. | • Developing equity and affordability initiatives.<br>• Indigenous partnerships and programs are embraced.<br>• Continued improvements to efficiency in operation to monitor and respond more rapidly to customer impacts that affect quality of life. |
| Catalyze and Converge<br><br>Become a creative and entrepreneurial hub. Support culture and create beautiful and smartly designed urban spaces. | • Review infrastructure investment goals along nodes and corridors.<br>• Investment check-ins to facilitate infill and intensification.<br>• Working closely with the City of Edmonton through stormwater investments (dry ponds, LID) to enhance public spaces. |
| A Community of Communities<br><br>Housing, recreation, schools and employment that are accessible to all forms of transportation. | • Projects and objectives incorporate equity/affordabilty values.<br>• Build infrastructure to support a wider diversity of local services. |

## Nodes and Corridors

Nodes and corridors is a concept within the City of Edmonton City Plan that focuses redevelopment. The goal is to provide densi  cation and support more diverse employment opportunities within key areas of the city.

Nodes and corridors are areas within the already developed city where EPCOR is planning for growth and increased service needs. Considerations that are being taken into account include changes to surface permeability, increased wastewater generation in smaller areas and the reliability of pre-existing assets serving the nodes or corridors.



## Water Use Trends

In 2021 EPCOR released the Water Use Trends and Design Guidelines discussion paper which provided updated design guidance for water use city wide. The report compiled water use trends by customer type by aggregating and analyzing water use records for every customer.

City-wide, water meter records show sustained reductions per customer in water use across all sectors over the past 20 years. In 2023 EPCOR, in partnership with the development community and the City of Edmonton, updated the design standards to re ect current usage patterns.

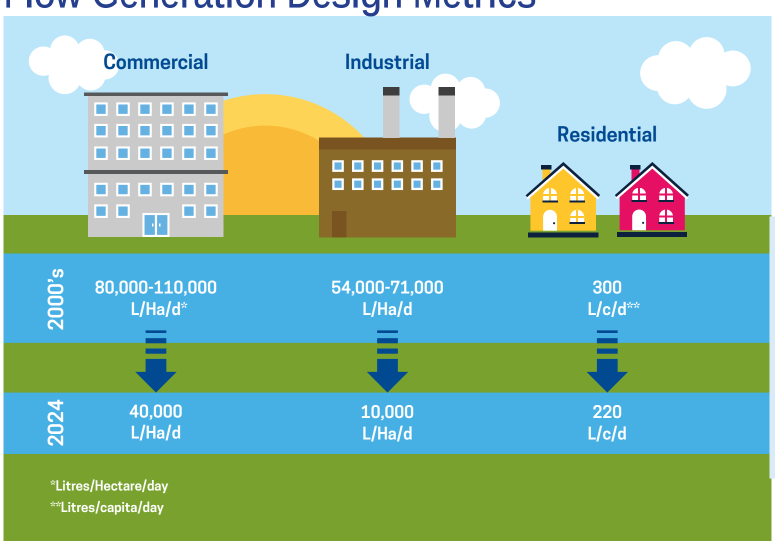
Understanding water use across the city is critical for ensuring that water and wastewater assets are appropriately sized and are not built pre-maturely. In addition to reducing unnecessary capital expenditures, right-sizing assets also improves their reliability. Properly sized pump stations have lower operational and energy costs and properly sized sewers limits wastewater stagnation reducing the prevalence of sewer odours and reducing damage from corrosion

Historically, plant and trunk upgrades have been primarily driven by the notion of inadequate capacity to support growth. Due to the increased water use efficiency of EPCOR's customer base, and the more widespread implementation of stor ow management in the system, growth is not projected to be the primary driver of capital expenditures in the near term.

**Water Efficiency at Home**
Residential water consumption per customer is decreasing city-wide as existing residences retro t and refurbish aging appliances and as new more water efficient residential homes are built in our developing and mature neighborhoods. On average, residential water use is at 176 L/capita/day (L/c/d) across the city, however in new homes average water use is 160 L/c/d thanks to modern water efficient appliances.

**Water Efficiency Everywhere**
Improvements in water efficiency are not limited to residential customers. Water consumption is declining across commercial and industrial sectors as new technologies and practices enable more efficient water use. Design metrics formulated 20 years ago no longer apply for commercial and industrial developments. These areas now use between four to eight times less water depending on industry type.

## Flow Generation Design Metrics




Th ow generation metrics used to inform design and construction planning were published in January 2024 to re ect the decrease in water use by commercial, industrial, and residential customers.

# REGULATORY

A key driver of the WWIRP is the need to meet current and emerging regulatory requirements. A variety of federal and provincial acts, regulations, guidelines and policies govern the delivery of wastewater services in Edmonton.

## City of Edmonton

The City of Edmonton regulates and enforces provisions relating to sanitary combined and surface drainage in Bylaws 19627 and 18100. The city also approves rates, fees charges and conditions for water, wastewater and collection services provided by EPCOR through Bylaw 19627 through performance based regulation.

## Government of Alberta

The environmental regulatory requirements for EPCOR's wastewater collection and treatment systems are set out in the *Environmental Protection and Enhancement Act* Approval (#639-03-07) issued by Alberta Environment and Protected Areas (AEPA) in 2015. This 10-year approval sets monitoring requirements for both the combined sewer systems and the Gold Bar WWTP discharges. The approval speci cally requires that EPCOR implement a Total Loadings Management Plan (the "Total Loadings Plan") in coordination with the ARROW Utilities and as authorized in writing by AEPA. Total loadings refers to the annual mass of total suspended solids (TSS) released to the North Saskatchewan River from all sources and includes loads from the Gold Bar WWTP effluent and bypasses, combined sewer over ows and the storm sewer system. The guiding principle of the Total Loadings Plan is to have no net increase in TSS loadings to the North Saskatchewan River in order to achieve the long-term goal of no net degradation of the North Saskatchewan River relative to the 2000-2008 time period.

## Government of Canada

Federal regulatory involvement is achieved primarily through the *Canadian Environmental Protection Act* (CEPA 1999) and the *Canadian Navigable Water Act.* CEPA is environmental legislation aimed at preventing pollution and protecting the environment and human health. Any development with potential impacts to either must follow processes set out by CEPA. The *Canadian Navigable Waters Act* concerns any work that interacts with the North Saskatchewan River.

## Future Regulatory Considerations

AEPA will continue to be the main regulatory agency overseeing standards and approvals for the foreseeable future. A near term regulatory requirement from AEPA is the objective to capture and treat wastewater and run-o rom any controllable sources. Planning is already underway to initiate programs to assess and mitigate impacts on the receiving streams and river from any controllable source through the Integrated Watershed Management Strategy (IWMS).

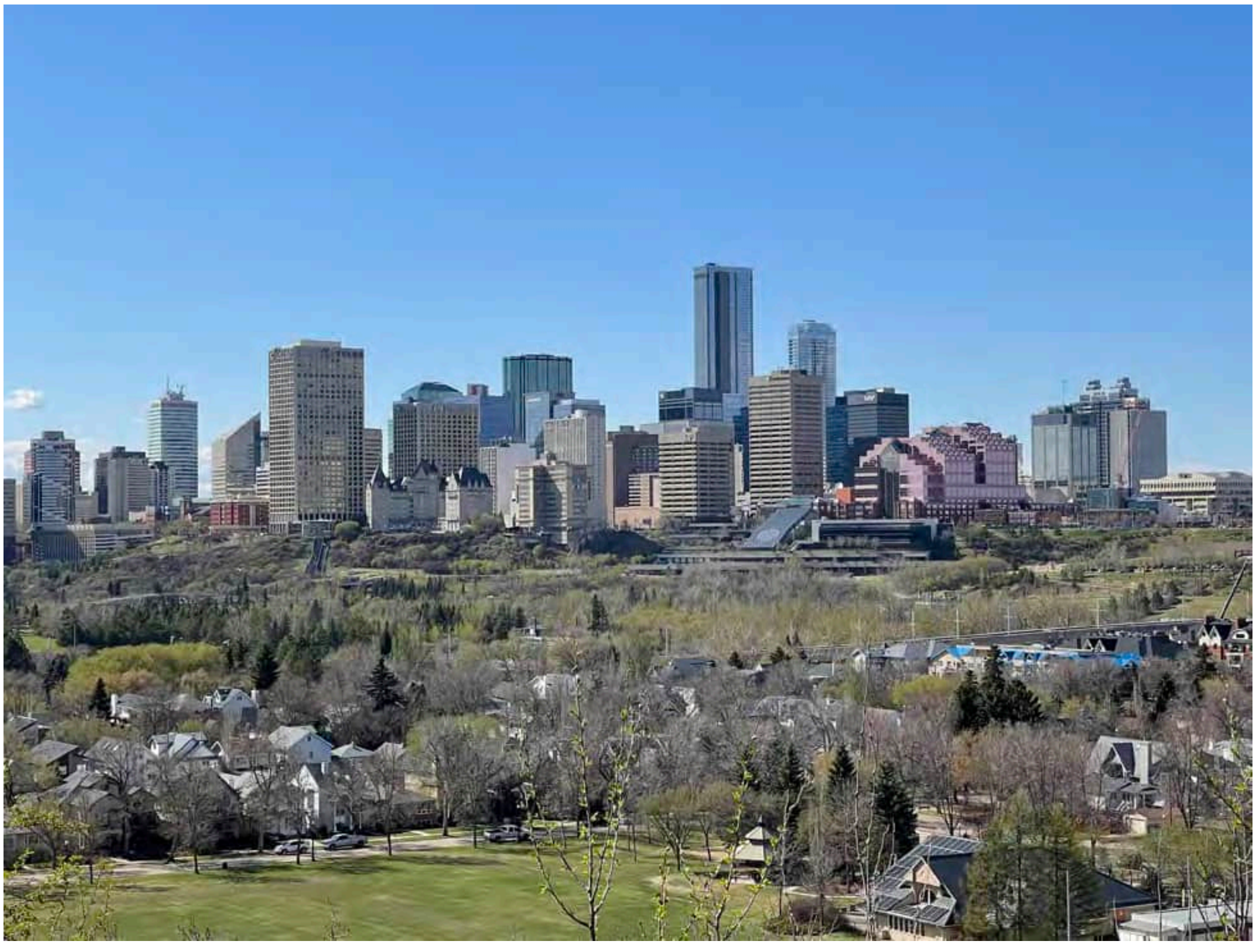
The IWMS expands upon the source water protection plan to meet EPCOR's committed to prevent pollution and reduce environmental impacts that a ect aquatic ecosystems in which it operates. The guiding principal is to improve or maintain water quality in the North Saskatchewan River and its tributaries both upstream and downstream of EPCOR's operations.

Load management practices and targets are being updated under the IWMS to align with updated growth scenarios. The goal remains to maintain a "no further degradation" policy for any updated total loadings targets.

# AFFORDABILITY

Water and wastewater services are essential, but the cost of these services is growing.

By considering one water principles, including investing in conveyance and treatment enhancements, maximizing the use of our existing infrastructure by reducing I&I and prudently investing in asset rehabilitation, alternative nature-based water management solutions and encouraging responsible water use, wastewater management becomes more economical.



# A DEEPER VIEW: PIPES AND PLANTS

## SEWER SYSTEM OVERVIEW

Edmonton's sanitary system safely collects, stores and conveys more than 300 million litres of wastewater per day from nearly 430,000 residential, commercial and industrial service connections. The wastewate ows to the Gold Bar WWTP or ARROW Utilities where it is cleaned and either returned to the North Saskatchewan River, or provided to industrial customers to support operations.

The scale of the system is expansive with over 4,200 km of sanitary and combined pipes, 81 wastewater pumping stations and hundreds of active and passive wastewater storage areas across the city with the capacity to store more than 300,000 cubic metres of wastewater.

The collection system in the city's downtown core and surrounding neighbourhoods stores and conveys both sanitary and storm wastewater through 850 km of combined pipe. The combined sewer system in these areas collects water from both individual properties and catch basins on the street. The city discontinued construction of combined sewer lines in the 1960s, which is why this system is typically only found in older, more central areas of the city.


**The Wastewater Collection System**

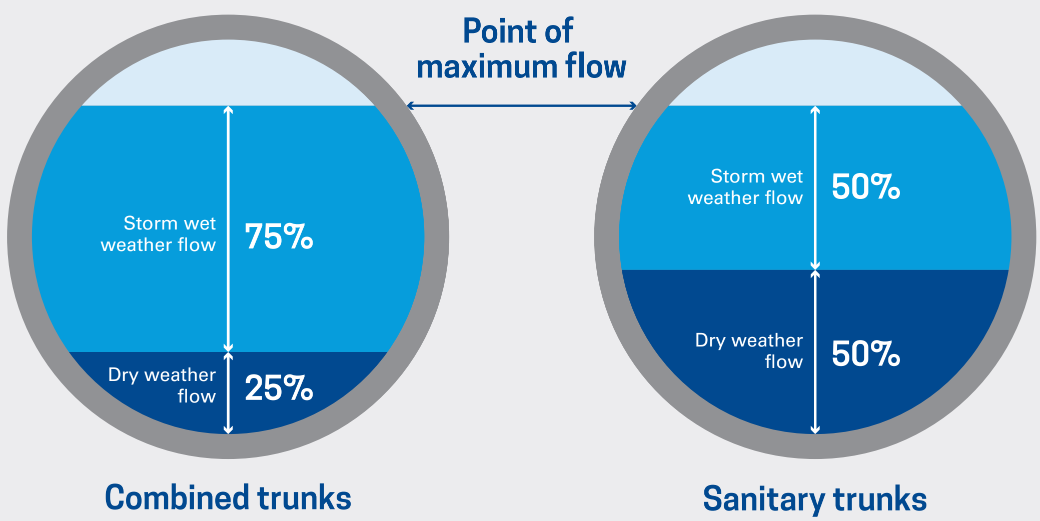
- 1.2 Million Customers
- 3,350 km of Sanitary Pipe
- 850 km of Combined Pipe
- 81 Pump Stations
- 6 River Crossings

## Combined and Sanitary Sewers: Both Sized for Storms

**Combined Sewers** are sized to convey both wastewater collected from customers as well as incoming stor ows collected directly from catch basins. While a storm event may be short in duration, they deliver large volumes of water. To prevent backups, a combined sewer pipe usually needs to dedicate around 75% of the usable space in the pipe for stor ows.

**Sanitary Sewers** do not collect stormwater directly from catch basins and are meant to only receive wastewater from customers. However the sewers are still sized with stor ows in mind. Through a process called in ow and in ltration, it is common for some stormwater to enter a sanitary sewer. Stormwater can enter through manhole lids, improperly connected household downspouts and through asset de ciencies such as cracks. In practice, nearly half of the capacity of a sanitary pipe is reserved for the additiona ows introduced by a storm event.

### Design Capacity of Gravity Pipes

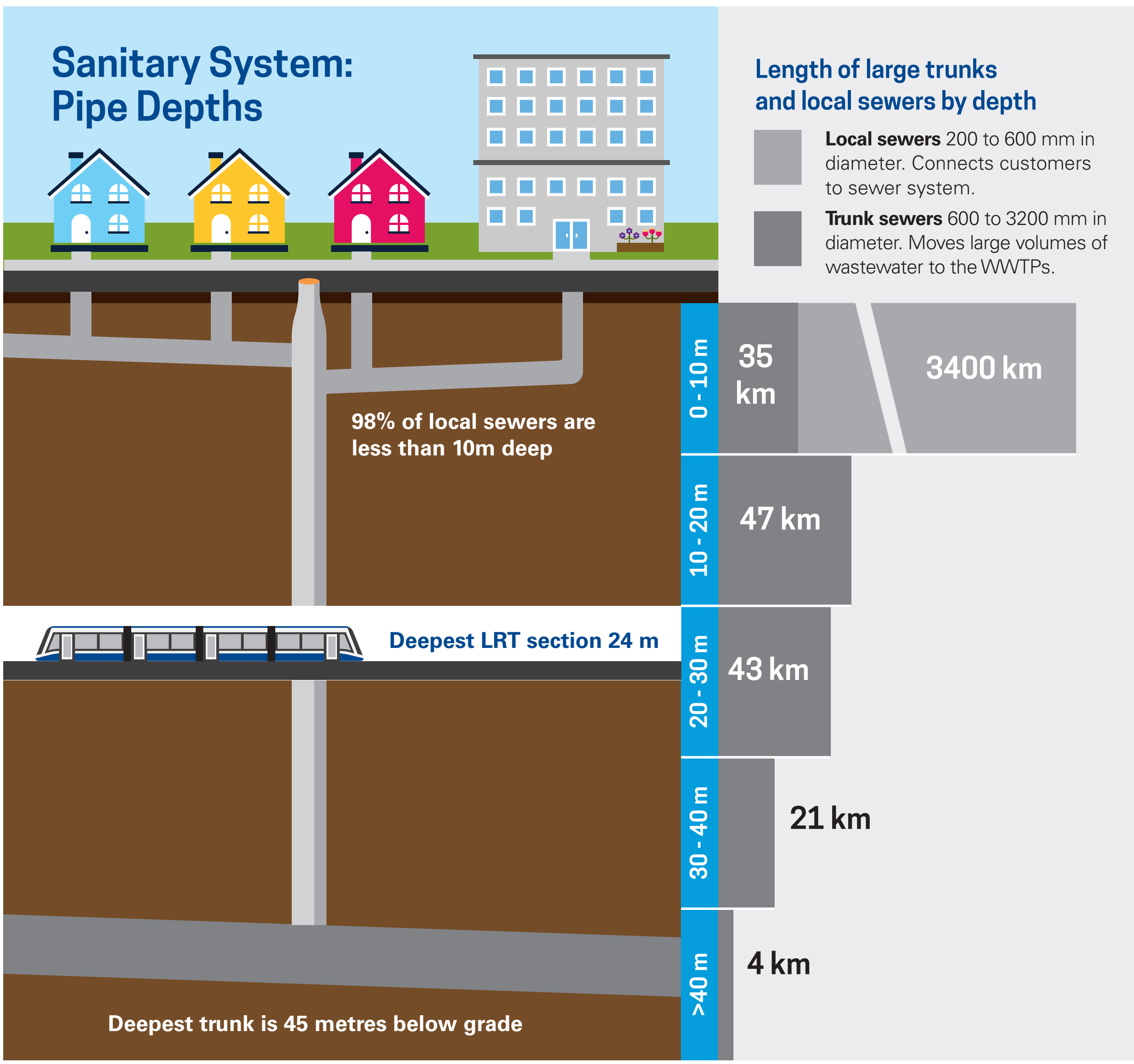


## A System of Shallow Collectors and Deep Trunks

Sewer pipes can also be categorized as local sewers or trunks.

**Local Sewers** (also called collector sewers, mainlines and sometimes even laterals) collect wastewater from customers at the street level. These pipes are smaller in size and make up the majority of the sewer collection network. They are also comparatively shallow with most collector pipes being less than six metres below the surface. Because they are shallow and built with regularly spaced access points, collector pipes are relatively easy to inspect clean and rehabilitate.

**Trunk Sewers**, are larger sewer pipes that collect and then convey the wastewater received from all of the local sewers. Because Edmonton has a relative at topography but a deep ravine and river valley system, the sewer trunks serving the city are especially deep. Nearly half of the large trunks (bigger than 1.2 metres in diameter) are more than 20 metres below the ground and the deepest trunk reaches a depth of 45 metres. Because of the depth and large volumes of water carried by trunks, they are challenging to access, inspect, clean and rehabilitate.



# SANITARY INTEGRATED RESOURCE PLAN

EPCOR is currently working t nalize a Sanitary Integrated Resource Plan (SanIRP). The SanIRP is th rst IRP for the sanitary and combined sewer collection system. This plan will use the SPA concept to provide a path forward for building and operating a municipal wastewater collection system that provides reliable long-term service in a city transitioning to growth through in ll development while exceeding operational, environmental an nancial performance expectations.

SanIRP will feature four main areas of focus within each SPA:

**Integrated Trunk Planning:**

Transitioning trunk capital investment plans into an integrated planning framework using Sanitary Planning Areas (SPAs) to identify growth drivers and capacity trigger points. Capital and operational investment is driven by the planning areas targeted level of service, identi ed capacity constraints and their measured wet weather performance.

**Capacity Recovery Locally:**

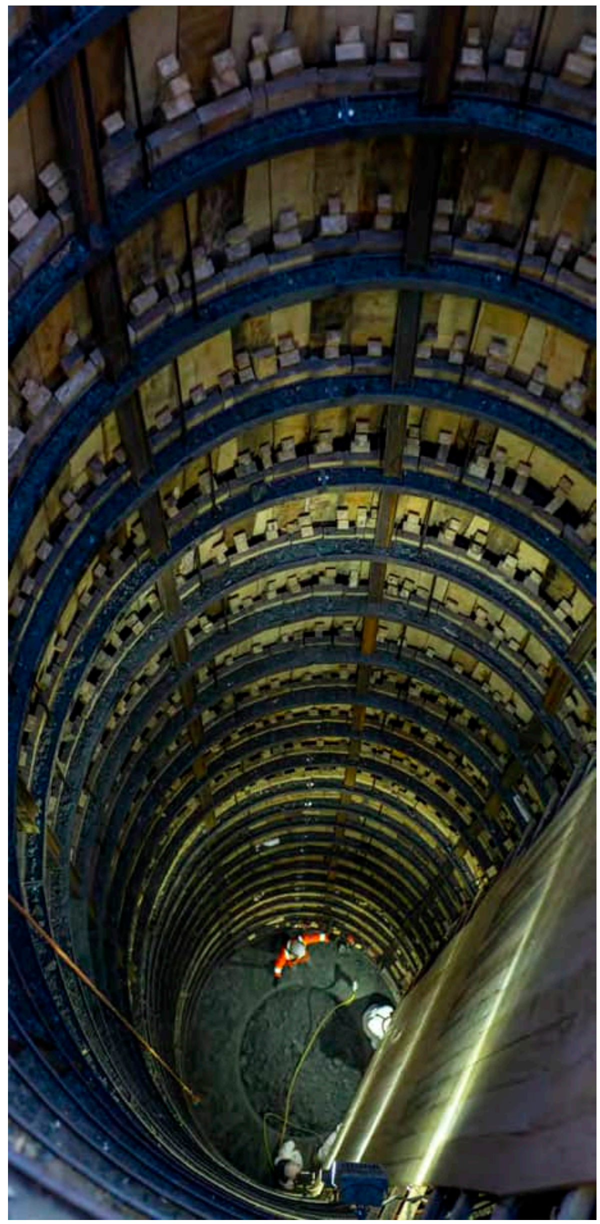
Gaining capacity in the collection system by engaging customers, leveraging the Stormwater Integrated Resources Plan (SIRP), and making focused investments on in ow and in ltration prevention to reduce wet weather ows.

**Asset Management Synergies:**

Aligning corrosion, odour and by-pass investments with the asset management program and practices.

**Situational Awareness:**

SanIRP and SIRP share a city-wide situational awareness plan that installs enhance ow, air quality and operational monitoring across the combined, sanitary and storm collection systems enabling more responsive planning practices across the entire water cycle.



*Access Manhole Shaft*

# STRATEGIC FOCUS

## Integrated Trunk Planning

Traditional water planning approaches have been historically used for sewer trunk design. This approach ensures the delivery of adequate service under the widest foreseeable envelope of future operational conditions. This has often resulted over-sized, underutilized infrastructure that is prone to operational failures.

Continuing traditional approaches in trunk design have become unsustainable as the number of future unknowns has multiplied. A further challenge is that traditional trunk design has left a legacy of large, deep assets with poor accessibility. These deeply buried assets can not be easily modi ed, upgraded or retro tted. EPCOR has approached this challenge by creating Sanitary Planning Areas (SPAs) which uses integrated planning concepts to holistically evaluate the service needs of an area and develop solutions that are more resilient to future change. The SPAs detail the conditions and necessary actions to achieve both growth and resiliency through an integrated planning approach.

Actions of particular importance for integrated trunk planning includes:

- **Shorter project timeframes with a shift to incremental enhancements**
  Rather than building assets today for the capacity needs of the city 75 – 100 years from now, actions are promoted that add incremental capacity, as-needed, to the sewer collection system.
- **Focusing local**
  SPAs focus on gaining back trunk capacity by focusing on more accessible assets and solutions. These include improvements to the local sewer system, and reducing stormwater in ows by leveraging storm management facilities and working with customers. Many of the solutions are on or near the surface and are easier to upgrade or retro t in the future if new needs arise.
- **Resiliency with trunk bypass capacity**
  SPAs identify 55 critical trunk crossings across the city that pass under environmentally sensitive ecosystems or critical infrastructure. At these locations the SPAs recommend and prioritize future actions that will provide bypass capacity in order to minimize adverse e ects in the event of a trunk failure.
- **Monitoring Drives Planning**
  SPAs are used to identify the locations that are the key indicators of system health an ow capacity to support investment in monitoring at those locations. This will allow for the identi cation of capacity trigger points that necessitate action. Shifting from modeling to monitoring driven decision making allows for more responsive and adaptive planning decisions.

## Capacity Recovery at the Local Level

*"Buying Back Capacity"*

Future trunk capacity assessments are underway for each SPA based on current population growth estimates and the growth priorities identi ed in the City Plan. It was determined that most of the sewer trunk infrastructure in place has sufficient capacity to support future population growth of up to two million people. For the areas where future capacity issues were found, trunk construction could often be avoided by more aggressively acting to control and slow down wet weather in ows into the upstream sewer system. The ve priority SPA areas focus these wet weather management approaches.

From both a performance and cost e ectiveness perspective, focusing on investments that slow or prevent wet weather in ows is more sustainable in the long-term. Because trunks are sized to accommodate large storm surges, any action that prevents or especially slows down stor ows entering these trunks will free up capacity for normal baselin ows from customers.

**Actions to gain system capacity include:**

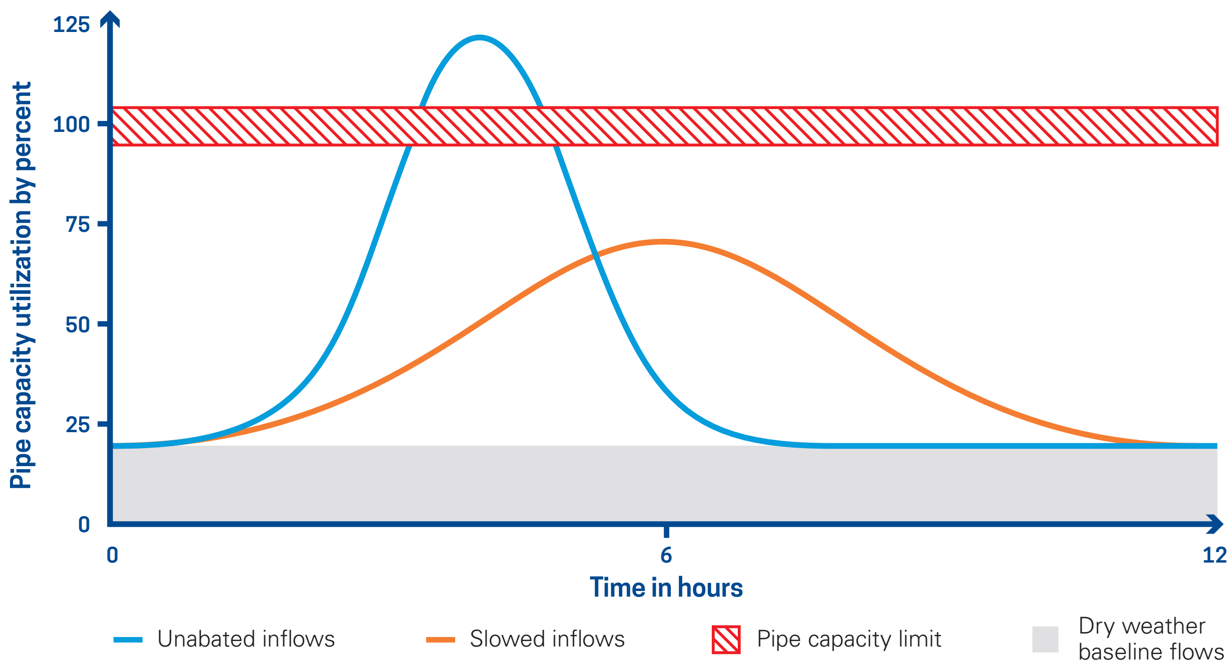
***EPCOR**:*

- Manhole sealing, especially at road and surface sags to prevent stormwater inflow from the surface.
- More aggressive sewer relining in high infiltration, low capacity areas.
- Leveraging SIRP investments to manage wet weather, reduce and slow storm inflows in the sanitary and combined sewers.

***Customers:***

- Engaging with our commercial, industrial and institutional customers to further enable increasing the uptake of green hectares and LID storm features.
- Engaging with our residential customers to decrease the number of improperly connected downspouts and initiating a program that enables customers to build on-property improvements, such as rain gardens, to retain runoff.

## Collection Systems Capacity




### Lowering Trunk Utilization by Slowing In ows

Large, intense rainfall events, such as thunderstorms, tend to cause very large, but short duration "pulses" of ow through the storm, sanitary and combined sewer trunks. It is these pulses of wet weather ow which test the limits of a collection system's capacity.

Trunk capacity can be regained by slowin ows down. Stretching a pulse of stormwater so that it takes two hours to get through a trunk instead of one hour will cause it to take up half the volume of the unabated one hour pulse.

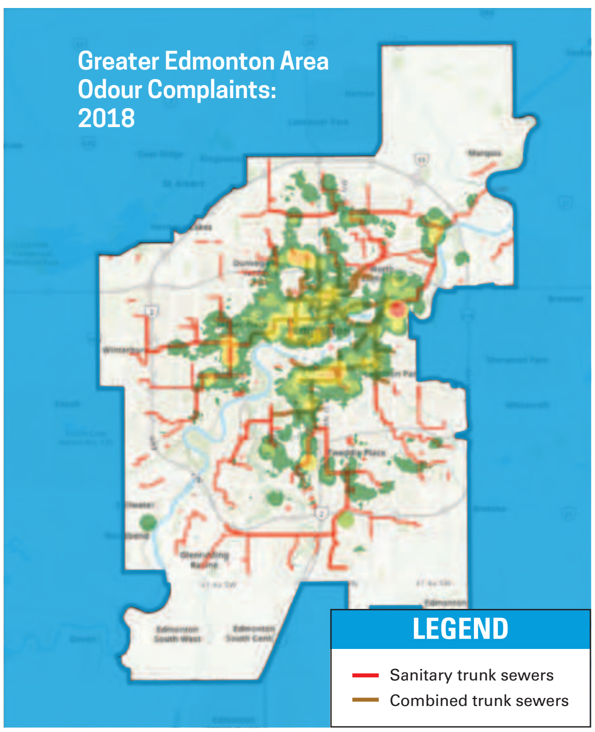
SIRP actions such as LIDs, smart ponds and surface/lot improvements can all be used to retain stormwater locally, and slow down wet weather pulses.

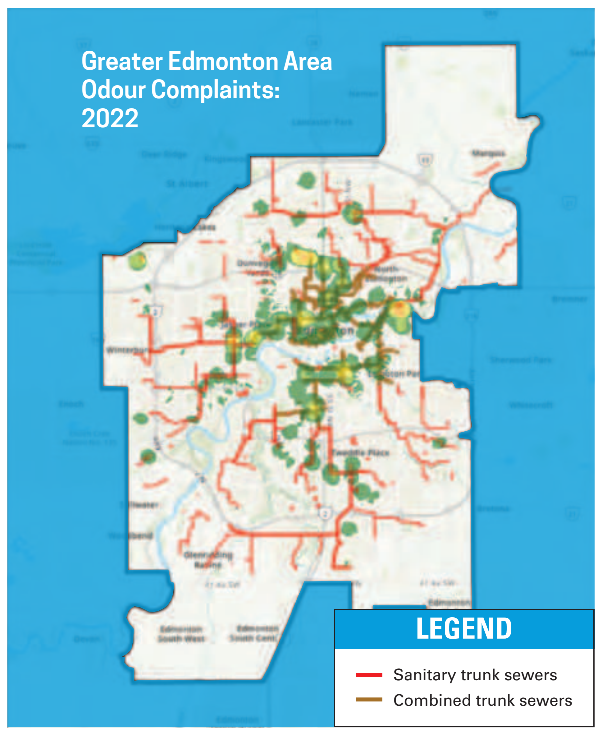
## Asset Management Synergies

EPCOR’s Asset Management Program employs a risk management framework to prioritize expenditures and allocate resources e ectively to minimize adverse impacts to public health and safety, environment, reputation an nances. Taken with other considerations, such as community needs, growth requirements, equity, environmental sustainability and business needs, the risk rankings help to de ne the maintenance, rehabilitation and replacement priorities for sewer assets across the city.

### Corrosion and Odour

To continue to address the impact of sewer corrosion, the Corrosion and Odour Reduction (CORe) strategy objectives are being aligned with the asset management program to ensure it is better captured in the rehabilitation prioritization process. Likewise, for the existing CORe programs that reduce hydrogen sul de in the sewer system, their identi cation and prioritization is now being aligned with asset management priorities through the risk management system. This ensures that the bene ts incurred by reducing the risk of downstream asset failure factors into CORe priorities. Together, these alignments are maximizing asset risk reduction city-wide while also reducing odour nuisance at the surface.



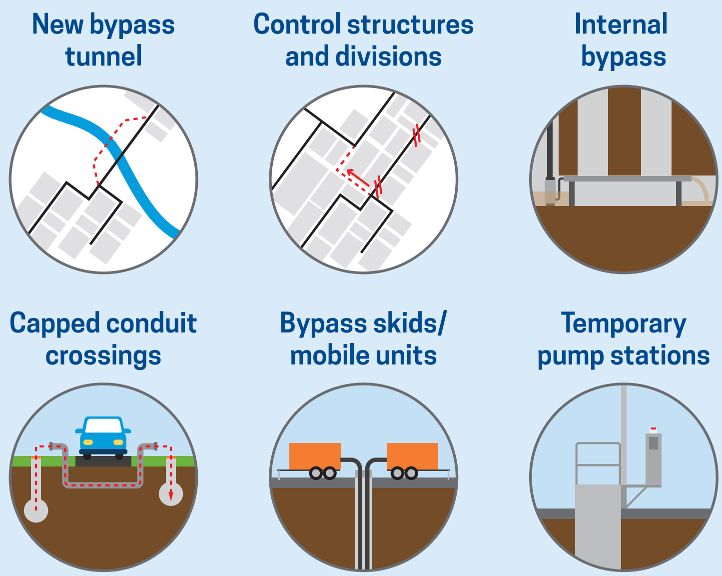




Since 2018, reports of outdoor odour nuisance have decreased by 52% across the city, corresponding with CORe investments. Aligning CORe with the Asset Management Program will ensure odour nuisance decreases while further reducing impacts to asset condition from corrosion.

## Introducing Sewer Bypass Capacity

EPCOR has developed a bypass plan for the large trunk system which recommends investments to provide trunk by-pass capabilities for high risk trunks. EPCOR has identified that service disruption caused by trunk failure can be reduced by expanding the capacity to quickly and effectively respond to and perform emergency repairs. In particular, sections of trunk that cross under sensitive areas such as the North Saskatchewan River, creeks, lakes, freeways, railways, pipeline corridors and buildings have been identified as assets where having by-pass capacity is extremely advantageous in the long run.

### Bypass Approaches




The type of bypass approach used depends on pipe characteristics such as depth, size and flow as well as network factors such as the availability of pre-existing discharge locations.

A successful bypass provides appropriate and safe access points for both the inlet and discharge point.

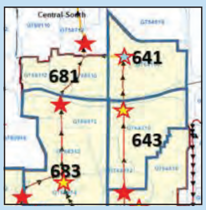
## Sanitary Planning Areas: Planning at the Local Level - An Example

The Calgary Trail SPA is has been identi ed as one of the to ve priority action areas due in large part to its capacity needs and high I&I rates. The SPA is used to detail the primary operational and planning conditions that drive investments in situational awareness, operational improvements and capital enhancements to ensure both local and downstream service requirements are met. A summary of the key focus areas of the SPA are detailed below as an example of form and function provided in all 23 SPA areas.

### GROWTH

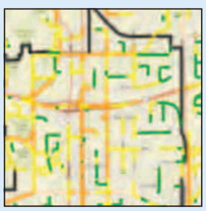
The SPAs use the nodes and corridors prioritization to relate expected growth and intensification with existing sewer infrastructure.

The Calgary Trail SPA has three district nodes, one primary corridor and seven secondary corridors within its boundary which overlap and align with several major trunks whose long term capacity needs will need to be closely monitored.




### INFLOW AND INFILTRATION

Investment in situational awareness in the Calgary Trail SPA is being driven by high I&I rates for the area. The SPAs recommends installing eight monitoring stations across the areas eight sewer sub-catchments in order to identify and quantify the main source of wet weather flows so that planning actions can be created and prioritized.



### ASSET RISK

Many of the large trunks within the Calgary Trail SPA are over 50 years old. The SPAs highlights which specific trunks need to be prioritized for more in-depth inspections and has identified one specific location within the SPA where risk is best mitigated by invest-ing in by-pass improvements.

### ODOUR AND CORROSION

The SPAs details both the corrosion and odour risks for the area. The report highlights two areas that are known odour nuisance hotspots as well as identifying two major trunks where accelerated asset loss due to corrosion is more likely.

# STORM SYSTEM OVERVIEW

Edmonton's stormwater management system is a complex network of runo apture, storage and conveyance elements that work to minimize the impacts of both pluvial (rainfall) and uvial (river ood risks and protect residents, businesses and the environment. Throughout the city of Edmonton, thousands of kilometres of overlan ow routes (roadways, culverts, ditches and swales) and underground infrastructure (storm and combined sewers) and hundreds of distributed storage facilities (stormwater management facilities and LIDs) work together to manage the volume, th ow and the quality of runo hat enters our urban creeks and the North Saskatchewan River.

In 2017 EPCOR introduced the Stormwater Integrated Resources Plan (SIRP), a proactive approach to evaluatin ood risk from a health and safety, social, environmental an nancial perspectives, complete with capital and operational program to drive down risk over 30 years.

Edmonton's stormwater management system collects, stores and moves runo f the landscape through the storm and combined sewer network to the natural environment. The capacity of the system is largely determined by the era in which it was developed and any subsequent infrastructure upgrades. Mature neighbourhoods and those areas developed prior to 1989 generally have a highe ood risk due to the design philosophy that was used at the time of development, which did not include stormwater management facilities and considerations for the roadway to convey stormwater during extreme rainfall events.

**Storm system at a glance:**

- 3,721 km Storm Sewers
- 850 km of Combined Sewers
- 388 Stormwater Management Facilities
- 418 LIDs
- 276 Stormwater Outfalls

## Dual Drainage System:

Modern stormwater management systems are designed with a “dual drainage” focus with both the overland and underground system working hand-in-hand to collect, store, and move runo or all sizes of storm events. In these systems, stormwater infrastructure are broadly categorized into the “major” system, which includes stormwater management facilities, roadways, ditches, and swales, and the “minor” systems which includes LIDs, catch basins and storm sewers.

## Major System

**Stormwater Management Facilities** EPCOR has three types of stormwater management facilities in the City of Edmonton: Wet and Dry Ponds as well as Constructed Wetlands. Stormwater Management Facilities and the areas around them serve the dual purpose and open spaces which may include walking trails and picnic areas, or event programmable sports elds.

**Overland Flow Routes** The major system includes conveyance infrastructures that are seen at the surface. This includes things like ditches and culverts, as well as the gutters of the roadway system. The design of newer neighbourhoods takes into account where water will over ow in the event of an extreme event that exceeds the capacity of the sewer system.

*Parkallen Dry Pond*

## Minor System

*An example of LID installation along Whyte Avenue*

**Low Impact Developments (LIDs)** are designed to capture runo cross all rainfall events and hold it as close to its point of generation as possible, slowly releasing into the storm and combined sewer systems. These can include a variety of infrastructures including traditional rain gardens, bioretentions, and soil cells as well as small storage infrastructure which hold water during both smaller events and bigger events. By holding water back from the sewer system, LIDs create additional capacity in the sewer network. They also function to reduce I&I into the sanitary network. Additionally, LIDs have many co-bene ts including improving water quality, reducing the urban heat island e ect and providing critical habitat for pollinators.

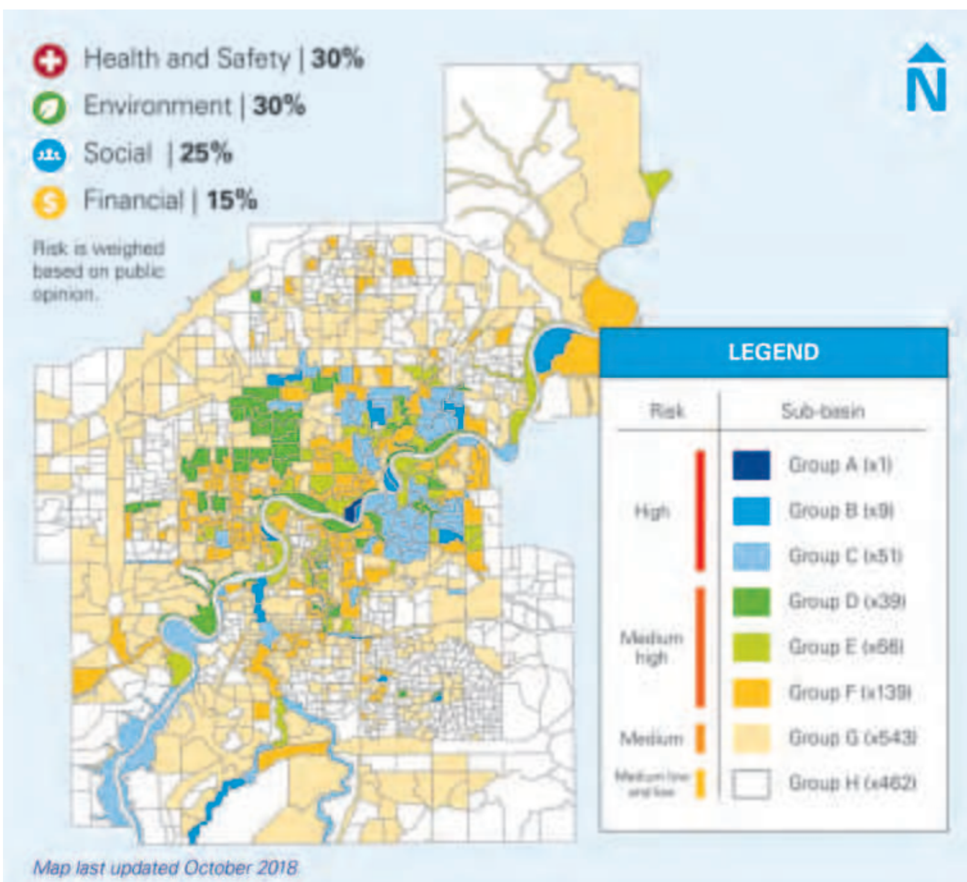
**Storm and Combined Sewers** are designed to move runo rom the point it lands on the ground out towards a safe discharge location (typically one of Edmonton’s seven urban creeks, or directly to the North Saskatchewan River via one of 276 stormwater outfalls, or towards the Gold Bar WWTP for combined sewers). Storm sewers are typically designed for more regular rainfall events, and are supplemented by the overland system during periods of extreme rainfall. The combined system is designed to accommodate both stormwater and wastewater, and during heavy rainfall events, some diluted combined sewerage may over ow to the natural environment through a combined sewer over ow.

# STORMWATER IRP

EPCOR's Stormwater Integrated Resource Plan (SIRP), which was approved by the City of Edmonton Utility Committee and City Council in 2019, is a $1.6 billion system-wide integrated approach. It will be completed over the next 20 to 30 years and will mitigat ood risk by reducing the health, safety nancial and social risks o ooding. The existing capacity constraints in the sanitary system is driven by the design of the systems accommodating a substantial amount of extraneo ows into the systems during wet weather. The investments in the stormwater system through SIRP have the dual bene t of reducing the impacts of wet weather on the sanitary and combined systems. This creates capacity for growth and improves operation and maintenance of the collections systems and associated infrastructure across the water cycle.

The SIRP program is classi ed into the followin ve themes of investment:

- **Slow**: The entry of stormwater into the drainage network is slowed by absorbing it in green infrastructure
- **Move**: Excess water is moved away from areas at risk, quickly and efficiently
- **Secure**: Individual properties in higher risk areas are secured against sewer backups, and ooding
- **Predict**: Predict and manage the movement of stormwater through smart intelligent monitoring.
- **Respond**: Respond through fast rollout o ood barriers, traffic diversions, and public communications to protect life, safety and property



# STRATEGIC FOCUS

## Supporting Growth

The implementation of SIRP continuously re-evaluate ood risk, priorities and adapts to the needs of the growing city. The SIRP exible programming makes it nimble and ready to adapt to changing city-building policies and practices in addition to a changing climate. In particular, the roll out of the slow theme of SIRP investment, developing distributed stormwater storage throughout the city, has multiple bene ts across the water cycle:

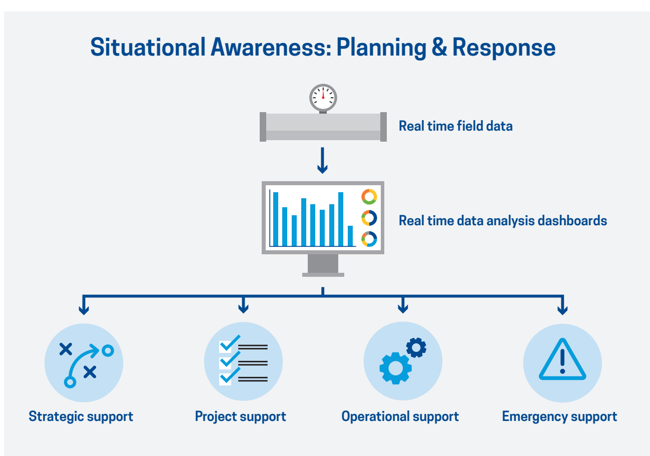
- Reducing localized flooding
- Creating additional capacity in the sewer system for areas impacted with more intense rainfall
- Freeing up capacity in the combined system to accommodate growth
- Creates a land cover that is hydrologically more reflective of a natural watershed
- Full alignment with the City aspirations to enhance the green network and urban tree canopy, and
- Many other environmental co-benefits, including opportunities for native plant species and enhanced habitat for pollinators and other fauna.

Working closely with the City of Edmonton and the development industry, EPCOR endeavours to rede ne how the city's stormwater management system is built across both the public and private spaces. We have been developing policy, designing guidance, monitoring and funding mechanisms to enable widespread I&I reduction and development of green stormwater infrastructure throughout the city.

## Enhanced Operations

At its core, the **predict** theme of SIRP investment focuses on enhancing the monitoring, and in turn our understanding of how runo oves across the landscape and through the drainage system. Through building this enhanced monitoring network, EPCOR is better able to predict and develop programming so actively respond to majo ooding events. Examples of this programming includes:

- Working with the City of Edmonton and communities to develop an enact Emergency Response Plans
- Customer focused flood resilience planning including lot-level inspections and subsidized flood protection
- Developing a smart system controls operational philosophy. Enabling the automatic operation of outfall gates to protect communities from riverine flood threats. Converting existing stormwater management facilities to "smart ponds", allowing them to actively store water during regular rainfall events.



# TREATMENT PLANT OVERVIEW

The Gold Bar WWTP is located in east Edmonton on the south shore of the North Saskatchewan River. The facility is operated to treat sanitary ows by removing solids, organic contaminants, nutrients and pathogens from wastewater generated within the city as a means to protect public health and the regional ecosystem.

Gold Bar's treatment process consistently surpasses regulatory standards for environmental protection and remains in the forefront of technology innovation and process intensi cation for wastewater treatment.

**WWTP at a glance:**

- Gold Bar WWTP has been protecting public health and the North Saskatchewan River since 1956 and ARROW Utilities WWTP since 1985.
- Each day an average of 300 million litres of wastewater is treated and 80 million litres at the ARROW Utilities WWTP.

## Treatment Stages

The wastewater treatment system in Edmonton has the following process stages:

**Pre-treatment** removes large materials that can wear or clog plant equipment, while also improving quality of organic solids.

Grit and screenings removed in pre-treatment are dumped into portable bins for disposal at a land  ll.

**Primary treatment** removes solids and scum from the wastewater with mechanical rakes.

**Secondary treatment** uses microorganisms to remove nitrogen and phosphorus and 95-97% of organic impurities from the wastewater.

Solids collected in this process are sent to the fermenters and anaerobic digesters to be further processed.

A small portion of the secondary treated water enters a membran  ltration process for the purpose of water re-use by industrial partners.

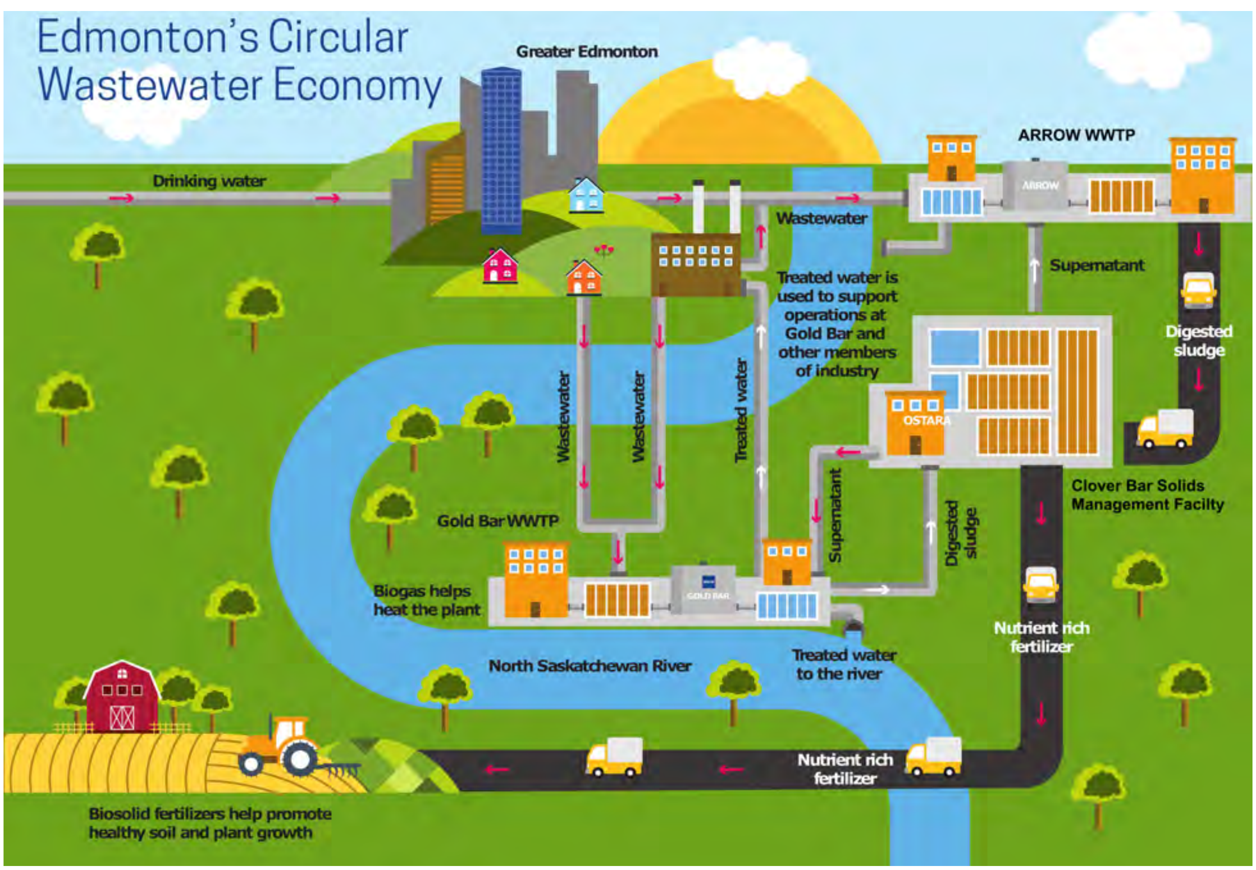
**Tertiary treatment** further polishes and disinfects the water before it re-enters the environment. The water passes through a UV system and is disinfected by high intensity ultra-violet (UV) light before discharging to the North Saskatchewan River.

**Solids handling** is where solids are broken-down into stabilized sludge and biogas. The biogas is reused to support plant operations by providing heating and as a process input.

Stabilized solids from the Gold Bar WWTP are conveyed to the Clover Bar Solids Management Facility via pipeline for nutrient recovery.

> Nutrients in sanitary wastewater consists of primarily ammonia and phosphorus. Ammonia comes mostly from urine and phosphorus is present in feces and household cleaning products. These nutrients can be very harmful to the aquatic habitat if discharged to surface waters, but can be very helpful for farming and agriculture when applied to the land.

In wastewater treatment solids, liquids and nutrients can be looked at separately to assess the systems' capacity to handle and process these components.



# EDMONTON WASTEWATER TREATMENT IRP SUMMARY

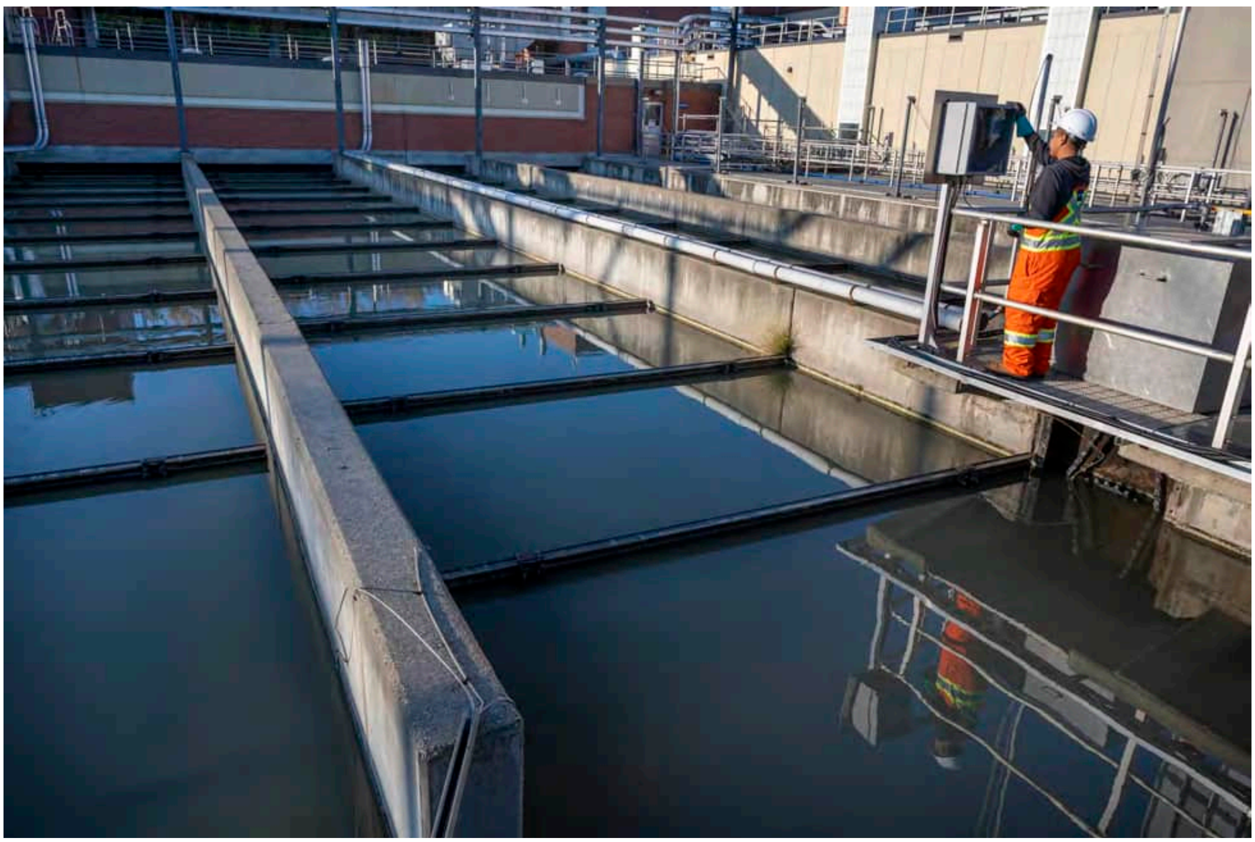
The Edmonton Wastewater Treatment IRP (EWWT IRP) was approved by the City's Utility Committee and Edmonton City Council in 2019.

The EWWT IRP is the long-range plan for the Gold Bar WWTP and Clover Bar Solids Management Facility.

Recovering and reusing useful resources like treated water, biogas, and biosolids is also a fundamental goal of the treatment process.

The EWWT IRP outlines the long-term planning assumptions and summarizes pertinent information on the following key areas:

- Analysis of each of the key drivers impacting the IRP including future growth, reliability of process and assets, regulatory impacts, sustainability goals, health, safety & environmental impacts, social impacts, new and emerging technologies.
- Most likely future development scenarios.
- Forecasted long-term capital spending.



*The primary treatment basins at Gold Bar.*

# STRATEGIC FOCUS

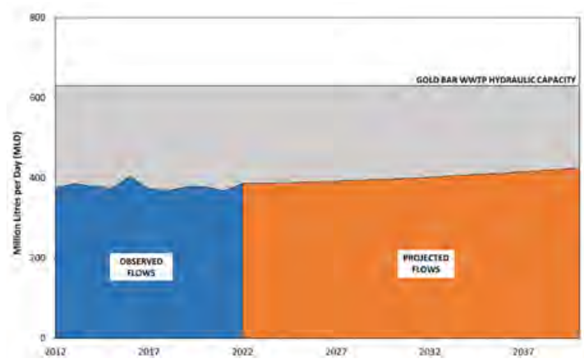
## Innovate to Achieve Growth

Providing essential wastewater treatment service to meet Edmonton's growth plans is an important objective for the future. The strategy for achieving growth is to enhance the operation of existing assets with input from stakeholders and employ innovative technologies to intensify existing treatment processes, thereby limiting physical expansions.

### Liquid

There is sufficient capacity within existing plant infrastructure to continue to provide conveyance for the sanitar ows from the city of Edmonton in the future. Original designs that under predicted the impact water efficiency has left a bu er for futur ows.

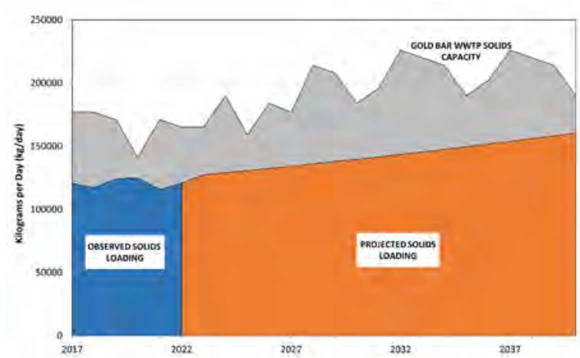
Liquid Capacity Trends: Gold Bar WWTP




### Solids

The capacity of the solids handling processes, speci cally in the existing digesters as shown, will be maintained through regular cleaning, maintenance and periodic upgrades to accommodate future treatment demands.

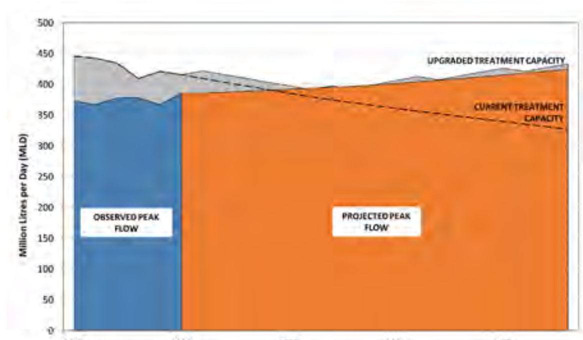
Solids Capacity Trends: Gold Bar WWTP




### Nutrients

Nutrient concentration in wastewater increases with population and this reduces capacity for removal. Intensi cation of the existing process with new technologies, within the plant's existing footprint, will allow continued cost-e ective treatment of the city's wastewater in the future.

Nutrients Capacity Trends: Gold Bar WWTP



## Gaining Capacity Upstream

Climate change models for the Edmonton region are predicting that high-intensity storms will become more frequent in the future. The high flows that are associated with high intensity storms can impact the treatment process at the Gold Bar WWTP and negatively impact the quality of the water entering the North Saskatchewan River.

Gold Bar and ARROW WWTPs will benefit from EPCOR's One Water approach that reduces and slows wet weather inflows upstream of the treatment plants.

## Maximizing Use of Existing Infrastructure

The influx of solids and nutrients to the wastewater treatment process is expected to keep pace with growth in the Edmonton region.

The Gold Bar WWTP is undertaking secondary treatment technology upgrades that increases the concentration of microorganisms in the treatment train. This densification process enhances the biological treatment stage with higher biomass concentrations and improves the nutrient removal rate without increasing the plant's footprint. The implementation of this technology is still in its early stages, but the deliberate effort to concentrate the process in the existing tankage results in a smaller overall footprint with gained efficiencies in nutrient removal.

## Asset Management to Build Reliability

EPCOR implements proven asset management strategies to prevent damage to equipment and reduce operational and capital costs. Asset management includes rehabilitation programs that focus on life-cycle and replacement in-kind projects for ensuring assets continue to function as intended.

Gold Bar's electrical infrastructure is aging and poses challenges as outdated components can compromise the plant's efficiency and reliability. Upgrading the electrical system is essential to maintain the plant's overall operational integrity and will allow the plant to adopt more efficient process technologies.

In addition to the electrical system, several concrete channels at the plant have been identified for capital improvement. These channels exhibit signs of deterioration due to corrosion and wear. Implementing a proactive plan to rehabilitate and potentially replace where necessary, ensures the structural integrity of the channels and ultimately extends the lifespan of the infrastructure.

A comprehensive asset management approach that follows plant equipment and structures through their life-cycle is vital for the continued effectiveness and resilience of the Gold Bar WWTP.


*PVC Sewer Pipes*

# CLOVER BAR SOLIDS MANAGEMENT FACILITY

The Clover Bar Solids Management Facility receives digested sludge from the Gold Bar WWTP and ARROW Utilities for further processing. Nutrients from the wastewater that are captured in the sludge are recovered for bene cial reuse at this facility.

Clover Bar w rst constructed in the 1970s and consists of a solids basin, three settling basins, a supernatant aeration cell, and the OSTARA Nutrient Recovery Facility.

**Clover Bar Solids Management Facility at a glance:**

- Nutrients from the wastewater is captured in biosolids and recovered for bene cial reuse at Clover Bar
- Over 20,000 dry tonnes of biosolids is processed each year
- 33 km pipeline transports sludge from Gold Bar to Clover Bar. Sludge from ARROW is trucked to the site.


**Digested sludge** from Gold Bar WWTP is sent to the Clover Bar facility via 33 km of pipeline; whereas sludge from the ARROW WWTP is trucked to the site.

**Basin cells** receive the sludge where it then settles and separates into solid and liquid fractions.

The liquid fraction, called “supernatant” is decanted returned to the Gold Bar WWTP and ARROW WWTP through the collection system for further treatment.

The solid fraction called “biosolids” is used on farmlands as a fertilizer in agricultural applications as part of the Nutri-Gold program. Currently this program helps grow over 4,500 acres of regional crops.

**OSTARA nutrient recovery** process at the Clover Bar site recovers phosphorus from the basin supernatant and converts a portion of the phosphorus and ammonia also into commercially viable fertilizer. This also carries the bene t of reducing the nutrient loading to the wastewater treatment plants.

Other sidestreams collected at Clover Bar include wastewater from Edmonton Waste Management Centre and Enerkem, and treated effluent from the Ostara Nutrient Recovery Facility. Currently these sidestreams are returned to the collection system with the basin supernatant and directed to the wastewater treatment plants.

# STRATEGIC FOCUS

## Municipal and Regional Partnerships

The Clover Bar Solids Management Facility handles the biosolids from all sanitary waste generated in the greater Edmonton region. Both Gold Bar WWTP and ARROW Utilities transfer the biosolids to Clover Bar.

Supernatant from the basins is returned to both plants for continued treatment. Enhancing the regional partnership is key in managing the nutrients loading for the population of the entire region.

## Operational Excellence

There are challenges in operating Clover Bar including but not limited to the lack of permanent dewatering facilities, effective solids recovery and dredging of basins, seasonal limitations to land application and transfer of biosolids, integrity and reliability of lagoon assets, continued accumulation of nutrient inventory, and struvite deposition in piping.

Improving reliability and efficacy of existing treatment is a primary focus for Clover Bar. Necessary capital and operating initiatives are being taken to address these challenges.

## Innovations in Technology

The supernatant from the basins carry a significant concentration of nutrients which is returned to the two WWTPs for treatment. The ammonia concentrations in this return contribute about 20-25% of the plants' incoming nitrogen loads. Localized treatment of this side stream at Clover Bar can immensely benefit the wastewater treatment process by reducing the overall nutrient loading. In addition finding better and more efficient ways to convert biosolids to fertilizer or other useful product will help maximize resource recovery. Thus, new and innovative technology alternatives are being considered and evaluated to define future strategic direction of biosolids management in Edmonton.

City growth will also facilitate an increase in the production of biosolids. With this in mind, the operations at Clover Bar will remain central to the future prosperity of the region – necessitating investments in achieving efficiencies in existing infrastructure and processes.

## Asset Management

The aging infrastructure at Clover Bar poses challenges to the basins' long-term integrity and functionality. Equipment used to harvest biosolids from the basins as well as mechanical equipment used to convey material between cells requires maintenance and capital investments.

To maintain the facility's effectiveness, strategic asset management and rehabilitation or replacement efforts are a key aspect of planning. Proactive measures to enhance the resiliency of the components of the lagoon site and prevent potential leaks or breaches in the infrastructure is a crucial area of ongoing focus.

In addition to maintaining structural integrity, the rehabilitation or replacement of assets at Clover Bar presents an opportunity to reduce the facility's environmental footprint. Overall, this approach will enhance the sustainability and effectiveness of the wastewater basins and biosolids production for the region.

## Reducing our Environmental Footprint

Future goals for Edmonton Wastewater Treatment and the Clover Bar Facility include improving sustainability and resource recovery by increasing the amount of biogas, nutrients, and reclaimed water that can be re-used, while reducing greenhouse gas emissions.

Three major investment paths are targeted:

- Upgrading and the biogas utilization process to allow the maximum use of biogas as fuel for on site heating and/or power generation and minimize waste through flaring.
- Installation of drying and dewatering infrastructure to improve solids handling will be essential to promote the beneficial use of this resource in agricultural application.
- Investigate the increase of on-site and external industrial reuse applications for reclaimed water.

In order to reduce greenhouse gas emissions, a number of capital projects will focus on minimizing power consumption of existing treatment processes. Planning e  orts will also continue to obtain better understanding of process emissions and to devise future strategies for emission reductions from wastewater treatment.

*Bob Starko, owner of Starko Century Farms and Deidre Bartlett, EPCOR Biosolids Technologist, go over Starko's Nutri-Gold delivery details. Bob has been using this circular economy product to help fertilize his 1,600-acre farming operation since 2014.*

# COMMUNITY ALIGNMENT

Stakeholders play an important role by providing meaningful input on EPCOR's operations and plans. Input from stakeholders helps ensure optimization of proposed project design initiatives and helps build sustainable relationships.

Development projects have the potential to create impacts, and require regulatory approval from varying levels of government. Stakeholder understanding and support is critical. EPCOR engages in collaborative, transparent and respectful planning that results in permitting, building and operating critical infrastructure in a way that is aligned with the interests and priorities of the communities EPCOR operates in. Stakeholder input is gathered through informal customer feedback associated with day-to-day operations as well as through formalized consultation programs on development projects.

Engagement for EPCOR involves:

- Designing engagement processes that considers: community preferences for how they wish to be engaged, the extent of potential impact on the community, and the extent of adaptation possible within the known technical and regulatory requirements.
- Meeting or exceeding all regulatory requirements for stakeholder engagement.
- Understanding the values and interests of the affected stakeholders.
- Incorporating public input into the design of the project and consideration of alternatives.
- Clearly communicating how final design decisions and public input were incorporated.
- Being aware of potential cumulative impacts from multiple developments and engagement processes.
- Working to be good partner to the community throughout construction and the life of the facility or infrastructure.

Stakeholder engagement work is focused o ve shared outcomes with community:

- **Quality of life**: The plants are operated, maintained and updated in a way that reduces impacts to stakeholders and improves quality of life including noise and enjoyment of parks and recreation.
- **Safety**: Community, public and worker safety and health are protected.
- **Relationship**: An honest, transparent, trusting, responsive, supportive and respectful long-term relationship is developed between EPCOR and stakeholders.
- **Environment**: Pollution is prevented and community beauti cation is considered.
- **Reliable, Responsible & Sustainable**: Plants are designed, maintained and operated in a prudent and responsible manner.

# PROJECT SPECIFIC ENGAGEMENT

Stakeholder participation is considered at various phases of a project. Project teams work with stakeholder engagement specialists on each project to consider how stakeholders might play a role in the:

- **Planning stage**: Assist in identifying impacts, mitigation and help with strategy.
- **Development stage**: Check in with stakeholders on progress and the level of impact of the initiative.
- **Evaluation stage**: At project completion, EPCOR checks in with stakeholders to evaluate performance and suggest improvements in the future.

Public engagement varies based on the initiative. Levels of community engagement are modeled after the City of Edmonton's Public Engagement Spectrum (C593) by specifying the level of public in uence and commitment from EPCOR for various scenarios. Communication is an important factor and is integrated into all levels of EPCOR's Community Engagement Framework.


*Decorative Art Hoarding installed at 142 Street and Summit Drive as part of the 99 Avenue Trunk Rehabilitation Project*

# GOLD BAR COMMUNITY COMMITMENTS

Gold Bar WWTP is situated in close proximity of a residential area, adjacent to Gold Bar Park and nature trails that are regularly used for recreational activities by Edmontonians.

To connect with community stakeholders, EPCOR facilitates consultation through a Gold Bar Community Liaison Group to discuss operational and planning updates. EPCOR seeks to implement high quality public engagement that results in critical infrastructure being built and operated in a way that aligns with the interests and priorities of the community and ensures our decisions and actions are guided by the values we share.

Odour management at Gold Bar has improved signi cantly over the life of the plant thanks to our investments in odour control systems, process improvements and an odour monitoring program. In order to further lessen nuisance impacts in our neighbouring communities, future actions will now also consider and act on reducing odour nuisance sources from incoming wastewater sewer trunks. Th rst set of investments to support future odour management within the sewer trunk lines is underway in both the Capilano and Beverly communities. These include the deployment of in-sewer hydrogen sul de monitoring systems, construction of access manholes and sewer trunk inspections. This work is enabling EPCOR to plan future in-sewer odour mitigation actions. By committing to addressing issues outside the fence line of the Gold Bar WWTP, EPCOR will provide more comprehensive reduction in odour nuisance in our neighbouring communities.

Wastewater treatment enhancements and upgrades to maintain acceptable treatment levels will require strategic approaches to retro tting existing structures, accepting new and innovative treatment technologies that wil t into the current plant footprint, and maintaining relationships with our regional partners for balancing and directing sanitary ows as the city and the region grows.

EPCOR recognizes the importance of building strong and mutually bene cial relationships with Indigenous Peoples in the areas where we operate, including around EPCOR's facilities in the North Saskatchewan River Valley such as the Gold Bar WWTP. Guided by EPCOR's Indigenous Peoples Policy, we are committed to fostering and sustaining strong relationships with Indigenous Peoples based on mutual respect, trust, a willingness to listen and learn, and achieving common interests. We recognize that EPCOR must demonstrate integrity in its conduct and actions in order to earn the respect and trust of Indigenous Peoples.

EPCOR seeks to engage early, meaningfully and in good-faith on projects that may impact cultural practices or lands traditionally used by Indigenous Peoples. We strive to be responsive to the input received from Indigenous Nations and communities regarding our projects, especially as opportunities for Indigenous inclusion, cultural protection and cultural revitalization are concerned.

In alignment with our Health, Safety and Environment Policy, we are committed to preventing pollution and reducing environmental impacts, including those contributing to climate change and a ecting the ecosystems in which EPCOR operates. This includes learning from Indigenous Peoples about their experiences with and knowledge of the lands, air and water and responding to opportunities and concerns of Indigenous Peoples related to the environment.

EPCOR will continue to collaborate with industry peers, closely monitoring economic and public initiatives. Our commitment is to maintain agility in our operations and project selection, introducing innovation that aligns with the regulatory landscape while continuously meeting public needs.

EPCOR is committed to minimizing impact to the community surrounding Gold Bar WWTP from reliability upgrades or growth in service. In 2019 EPCOR made a public commitment that **the Gold Bar site and associated facilities will not expand outside of the current fenceline** through at least 2060. This commitment remains in place.

# CONCLUSION

EPCOR is committed to providing safe, reliable and sustainable water services to the city of Edmonton and its surrounding communities.

The transition to a One Water Utility has allowed EPCOR to identify solutions for wastewater services that capture the system wide co-bene ts of an integrated system. Guided by IRP principals EPCOR is shifting from strict capital driven solution development towards approaches that maximize the use of our existing in-place infrastructure and which engages with our customers and regional partners to continue to grow as a utility that is a ordable, climate resilient and sustainable.

Speci c capital and operational programs and projects will be submitted with the PB lling and further articulated in their respective business cases. The consultation process for each program will be followed as they move forward to completion.

# Appendix E EPCOR and ACRWC’s 2022-2040 Edmonton Total Loading Plan.

# EPCOR **and ACRWC's 2022**-2040 Edmonton Total Loading Plan

**Submitted: December 2022**

TABLE OF CONTENTS

## ACRONYMS AND ABBREVIATIONS

| Acronym/Abbreviation | Definition |
|---|---|
| ACRWC | Alberta Capital Region Wastewater Commission |
| AEPA | Alberta Environment and Protected Areas |
| AWC | Alberta Water Council |
| BOD | Biological Oxygen Demand |
| cBOD | Carbonaceous Biological Oxygen Demand |
| COD | Chemical Oxygen Demand |
| CoE | City of Edmonton |
| CSO | Combined Sewer Overflow |
| ECCC | Environment and Climate Change Canada |
| *E. coli* | *Escherichia coli* |
| EIA | Edmonton International Airport |
| EMP | Environmental Monitoring Program |
| EPT | Enhanced Primary Treatment |
| EWSI | EPCOR Water Services Inc. |
| FE | Final Effluent |
| IRP | Integrated Resource Plan |
| IWMS | Integrated Watershed Management Strategy |
| kg/d | Kilograms per day |
| km | kilometer |
| LID | Low Impact Development |
| LTRN | Long-term river network |
| $m^3/s$ | Meters cubed per second |
| mg/L | Milligrams per liter |
| MOE | Ministry of Environment |
| ML | Megalitre |
| MPN | Most Probable Number |
| NSR | North Saskatchewan River |
| NSRSWQMF | North Saskatchewan Region Surface Water Quality Management Framework |
| NSRP | North Saskatchewan Regional Plan |
| NSWA | North Saskatchewan Watershed Alliance |
| $NH_3$ | Ammonia as N |
| $NO_3+NO_2$ | Nitrate plus nitrite |
| SanIRP | Sanitary Integrated Resource Plan |
| SIRP | Stormwater Integrated Resource Plan |
| TDP | Total Dissolved Phosphorus |
| TKN | Total Kjeldahl Nitrogen |
| TLP | Total Loading Plan |
| TP | Total Phosphorus |
| TSS | Total Suspended Solids |
| UDI | Urban Development Institute |
| US EPA | United States Environmental Protection Agency |
| VSS | Volatile Suspended Solids |
| WTP | Water Treatment Plant |
| WWTP | Waste Water Treatment Plant |

# 1. EXECUTIVE SUMMARY

EPCOR is committed to preventing pollution and reducing our environmental impacts. This 2022-2040 Total Loading Plan (TLP) replaces the 2010-2019 TLP and builds on the results and learnings from that plan. The proposed 2022-2040 TLP expands the parameter list from total suspended solids to include nutrients (ammonia, phosphorus, nitrate plus nitrite), chloride, and *E. coli*. These parameters are ones for which a draft Surface Water Quality Management Framework has been developed and where triggers are set on current water quality; the intent is no further degradation of water quality in the NSR. These parameters are also ones that EPCOR has long-term loading data available.

To develop the plan, EPCOR quantified current daily loads of the above parameters from its discharges (drainage collection system, water treatment plant residuals, wastewater treatment plant) and the Alberta Capital Region Wastewater Commission wastewater treatment plant's effluent, and forecasted how loads may change due to implementation of low impact development (LID) infrastructure. EPCOR is planning significant investments in LID infrastructure and other stormwater management strategies as part of the Stormwater Integrated Resource Plan. These investments will work to ensure risk of flooding is reduced and as a co-benefit, loads to the river are reduced. As such, LID implementation targets and subsequent load reduction benefits are integral to the TLP. This TLP is also guided by EPCOR's Integrated Watershed Management Strategy, which assess effects on the NSR and its tributaries at both the near-field and regional scale. This TLP is narrower in scope and is focused on achieving regional outcomes as established downstream of Edmonton.

EPCOR's Proposed TLP targets are as follows:

| **Parameter** | **Total Phosphorus** | **Ammonia** | **Nitrate +Nitrite** | **Chloride** | ***E. coli*** | **TSS** |
|---|---|---|---|---|---|---|
| **TLP Target** |  |  |  |  |  |  |

 no 5-year ↑ trend  monitor closely  plan  collaborate

Annual average load reductions are projected for ammonia, *E. coli*, and total suspended solids by 2040. Total phosphorus loads will stay the same. Chloride (sources which include salt application to roads and human waste) and nitrate plus nitrate (almost all wastewater source) will likely increase by 2040. Strategies to mitigate these increased loads such that triggers are not exceeded downstream will be evaluated as the TLP is implemented.

# 2. INTRODUCTION

In the EPCOR and ACRWC approvals, approval holders are directed to collaborate to implement a Total Loadings Plan (TLP). The first TLP was developed for the 2010-2019 period and the final annual TLP report was submitted to Alberta Environment and Protected Areas (AEPA; formerly Alberta Environment and Parks) in 2020. In that update, EPCOR and ACRWC indicated that they would be submitting an updated TLP. This joint 2022-2040 Total Loading Plan summarizes loads of TSS, nutrients (ammonia, TP, and nitrate plus nitrate), chloride and *E. coli* from the stormwater collection system, water treatment plant (WTP) wastestreams, Gold Bar wastewater treatment plant (WWTP), and Alberta Capital Region Wastewater Comission (ACRWC) WWTP to the North Saskatchewan River (NSR)  for three periods: historical (2010-2019); recent (2020 and 2021); and future (2022-2040).

The Drainage Services utilities that service Edmonton were transferred from The City of Edmonton (the City) to EPCOR Water Services Inc. (EWSI) on September 1, 2017. The City developed a TLP for total suspended solids (TSS) in 2009 to meet an Approval (639-02-07) requirement under the *Environmental Protection and Enhancement Act*. Also in 2009, the City transferred ownership and operations of the Gold Bar Wastewater Treatment Plant to EWSI. In 2015, approvals were renewed for the City of Edmonton (639-03-00), EWSI's Gold Bar WWTP (361975-00-00), and the ACRWC WWTP (486-03-00).

EPCOR now operates the wastewater and stormwater collection systems in Edmonton. In 2019, approvals 639 and 361975 were merged to amending Approval 639-03-03; Approval 639-03-03 has since been updated to 639-03-06 and subsequently amended as 639-03-07. In this Approval, Section 4.1.1 states: 'The approval holder shall coordinate with the Alberta Capital Region Wastewater Commission to implement the Total Loading Management Plan as authorized in writing by the Director.' The approval for the Edmonton waterworks system, which includes EPCOR's two water treatment plants (WTP) is 638-04-00.

The guiding principle of the 2010 TLP was to have no net increase in TSS loading to the NSR in order to achieve the long-term goal of no net degradation of water quality in the NSR despite growth in the City of Edmonton. This principle was realized through an attempt to maintain average loads relative to the 2000-2008 period through the establishment of a benchmark of 28,868 kg/d of TSS.  Implementation occurred through the Combined Discharge Control Strategy, which includes sewer separation, Combined Sewer Overflow (CSO) weir modifications, the RTC3/W12 project and upgrades at EWSI's Gold Bar WWTP. Stormwater TSS reductions have been achieved through end-of-pipe projects such as the Kennedale Constructed Wetland and the Groat Basin Filter Facility. Following the initial development of the TLP, EPCOR has continuously worked to refine the estimation of TSS and other parameter loading to the NSR; it became clear the benchmark number and overall TLP needed updating. As well, EPCOR has begun to increase LID practices on the landscape which were not quantified as part of the previous TLP. The guiding principle of the 2010-2019 of maintaining or improving water quality in the NSR remains, but the 2022-2040 TLP it is now linked to the AEPA draft North Saskatchewan Region Surface Water Quality Management Framework (NSRSWQMF); is based on an improved estimation methods of daily loads; and now includes six water quality parameters.

At the regional level, the draft NSRSWQMF will be issued pursuant to Section 14 of the *Environmental Protection and Enhancement Act* until subsequent incorporation under a regional plan and the *Alberta Land Stewardship Act*; it is the leading directive for managing water quality for the NSR mainstem. This framework outlines triggers and limits in the mainstem NSR at Rocky Mountain House, Devon, and Pakan and are based on median and 90th percentiles of historical water quality for 21 parameters. There are also limits provided but those are not considered 'pollute-up-to" numbers and an AEPA management response will be initiated when a trigger is exceeded. Again, this TLP intends to align with the principles and goals of the NSRSWQMF. Specifically, the primary objective of the TLP is to manage the total loading from EPCOR's storm water and wastewater treatment systems, water treatment plant wastestreams, and ACRWC wastewater in one unified approach to ensure the continued health of the NSR and its tributaries. As such, this TLP was done collaboratively with the ACRWC.

# 3. TOTAL LOADING PLAN OBJECTIVES

The following objectives and accompanying strategies and actions will guide EPCOR's work to ensure a healthy river and sustainable environment for the long term.

**Objective 1: Align with Regional Water Quality Outcomes**

To achieve North Saskatchewan Region Surface Water Quality Management Framework regional objectives, EPCOR's Total Loading Plan is committed to managing loads from EPCOR and ACRWC sources (storm, WTPs, CSOs, WWTPs) to ensure downstream triggers are not exceeded. This will be done through setting parameter specific targets for 5-year trends, monitoring, collaboration, and planning.

**Objective 2: Improve Load Estimation and Load Forecasting Methods**

EPCOR will continue to improve load estimations and forecasting by: expanding and optimizing the paired outfall flow and water quality monitoring program; increasing flow monitoring across the stormwater system and in urban creeks; refining landuse runoff coefficients; implementing an LID performance monitoring program; and developing a stormwater water quality model to replace the current Excel-based load estimation method (LoadCalc). Where load estimation is improved, historical load estimations will be adjusted to ensure that we are benchmarking appropriately.

**Objective 3: Focus on Flow Attenuation and Volume Reduction**

EPCOR will continue to implement policies, programs, initiatives, and capital projects around stormwater management and align the TLP with other major programs that directly benefit from flow attenuation and flow reduction like the Sanitary Integrated Resource Plant (SanIRP) and the Stormwater Integrated Resource Plan (SIRP).

# 4. LOAD ESTIMATION METHODS

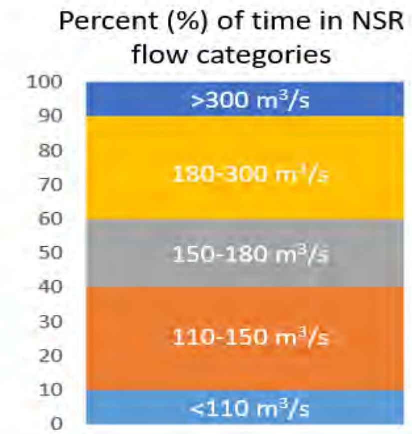
The TLP considers the cumulative loads (water quality and quantity) to the NSR from several major sources within and near the City of Edmonton, including EPCOR's stormwater and combined sewer system, Gold Bar WWTP, two WTPs (Rossdale and E.L. Smith), and the ACRWC WWTP. By quantifying and managing the loads of these point and non-point sources of loading, the long-term goal of no net degradation of water quality in the NSR may be achieved. Appendix A summarizes how loads are calculated from each of these sources, and describes the methods used to project future loads.

For this TLP, six parameters were selected for inclusion because; 1) they aligned with the NSRSWQMF water quality parameters; 2) sufficient data was available to establish historical and projected loads; and 3) EPCOR's assets were a significant enough contributor to be able to affect downstream concentrations in the NSR. These parameters include nutrients (total phosphorus, total ammonia, nitrate plus nitrite), chloride, total suspended solids, and *E. coli*. It is important to note that as load estimation methods improve (e.g. using for impervious categories rather than zoning) historical load estimations may be adjusted.

The NSRSWQMF triggers at Pakan were developed using mostly data from 2006-2014 and therefore for the TLP we used a ten year period from 2010-2019 to establish historical loads from which a significant increase could cause triggers to be exceeded. Some NSRSWQMF parameters have limits as well as triggers. It is important to note that limits are not “pollute-up-to” numbers and a management reponse will be initiated when a trigger is exceeded; as such the TLP aims to ensure that triggers are not exceeded in the long-term.

# 5. LOAD ASSESSMENT AND FORECAST

This Total Loading Plan focuses on the mean daily load of a substance that enters the NSR and its tributaries. This assessment is also done in terms of NSR flow categories to account for differences in dilution capacity of the NSR. The load forecasts make some broad assumptions about the rate of LID implementation and expected water quality treatment from LIDs. As such, load projections are for illustrative purposes and are not intended to be used as numeric load targets.




For each water quality parameter discussed below, the header at the top of page represents the relative loading contribution from all EPCOR and ACRWC sources for the historical period (2010-2019).

For example the loading sources of total suspended solids is represented below:


For each water quality parmeter, the TLP:

1. Describes regional targets at Pakan (110 km downstream) as set in the North Saskatchewan Region Surface Water Quality Management Framework;
2. Summarizes average daily loads during the historical assessment period (2010-2019) and recent loads (2020 and 2021);
3. Provides a forecasted estimate of future loads to 2040.
4. Sets EPCOR Total Loading Plan Targets in four categories:

| Trend Assessment | Monitoring | Collaboration | Planning |
|---|---|---|---|
|   |  |  |  |


## Total Phosphorus

Phosphorus is an essential plant nutrient, and is readily found in soil and organic material. While phosphorus is naturally present in the NSR, increased concentrations are the result of increased loads from agriculture, urban storm water, and wastewater. There is no numerical water quality guideline for phosphorus in Alberta, but there is a narrative guideline that concentrations should be maintained as to prevent detrimental changes to algae and aquatic plant communities, aquatic biodiversity, oxygen levels and recreational quality.

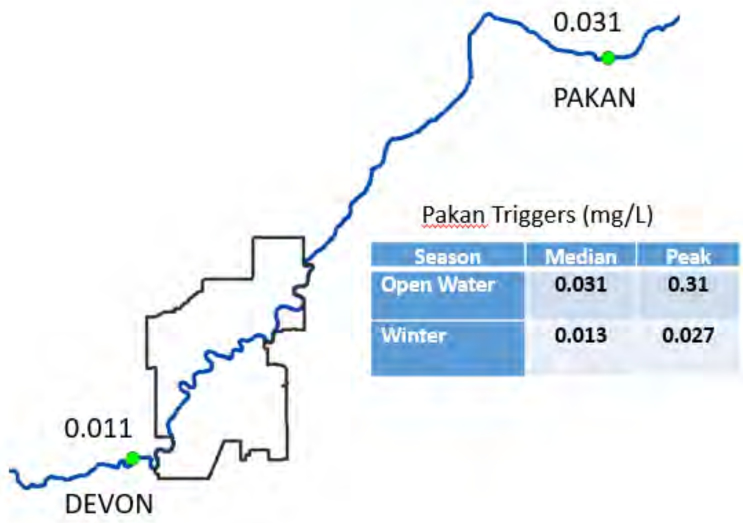
Lakes and rivers are categorized by their trophic status, which is a representation of how much algal or plant growth occurs. There are a number of different methods used to classify the trophic status of a waterbody, however, the concentration of total phosphorus is frequently used due to the strong relationship between phosphorus concentrations and algae and plant growth. The Canadian Council of Ministers of the Environment provides trigger ranges for the trophic status of Canadian lakes and rivers in Table 1.

At the Devon and Pakan Long-Term River Network (LTRN) sites, the median phosphorus concentrations are 0.011 and 0.031 mg/L in the open water season respectively, suggesting that the NSR is near oligotrophic upstream of Edmonton and meso-eutrophic downstream of Edmonton. A number of studies suggest that streams transition from mesotrophic to eutrophic conditions at TP concentrations of 0.02 to 0.06 mg/L and that 0.03 mg/L may be an appropriate trigger for the NSR. TP loads should not increase in order to maintain the NSR's status as a mesotrophic river and to ensure triggers are not exceeded. As such NSRSWQMF trigger limits are set at historical medians and 90$^{th}$ percentiles (peak).

**Table 1. Trophic status in relation to total phosphorus concentrations, and concentration in the NSR at Devon and Pakan**

| Trophic Status | Total Phosphorus (mg/L) | Devon (median) | Pakan (median) |
|---|---|---|---|
| Ultra-oligotrophic | < 0.004 | | |
| Oligotrophic | 0.004 - 0.010 | | |
| Mesotrophic | 0.010 - 0.020 | 0.011 mg/L | |
| Meso-eutrophic | 0.020 - 0.035 | | 0.031 mg/L |
| Eutrophic | 0.035 - 0.100 | | |
| Hyper-eutrophic | > 0.100 | | |

# TOTAL PHOSPHORUS




| Season | Median | Peak |
|---|---|---|
| Open Water | 0.031 | 0.31 |
| Winter | 0.013 | 0.027 |

**TP Target**


**TP loads should not increase over time in order to maintain the NSR's status as a mesotrophic river, as measured at Pakan. There should be no significant increase in total annual average loads as measured by a 5-year trend assessment. There should also be no significant increase in loads over time when river flows are between 110-300 $m^3/s$.**

Based on historical data (2010-2019), median annual loads from all EPCOR and ACRWC are 315 kg/day with 47% of that from stormwater; 31% from Gold Bar WWTP final effluent; 11% from Gold Bar Bypass; 8% from ACRWC final effluent; and less than 3% from CSO effluent (Figure 1). Average annual 5-year total phosphorus loads in 2040 are estimated to be 317 kg/day, which is an increase of less than 1%, effectively remaining unchanged from historical loads. The gains from CSO management have largely been achieved and additional reductions are estimated to come from stormwater management strategies (LID implementation). Without LID practice implementation it is estimated that average 5-year TP loads in 2040 would be 377 kg/day. These forecasts also account for estimated loading increases from orthophosphate addition to the drinking water distribution system for lead management. A review paper completed by EPCOR in 2018 suggested that total phosphorus loads could be increased 8-30 kg/day depending on how orthophosphate enters into stormwater and groundwater. Taking the average runoff value, we would expect future TP loads to remain within historical averages but will continue to monitor closely.

# TOTAL PHOSPHORUS

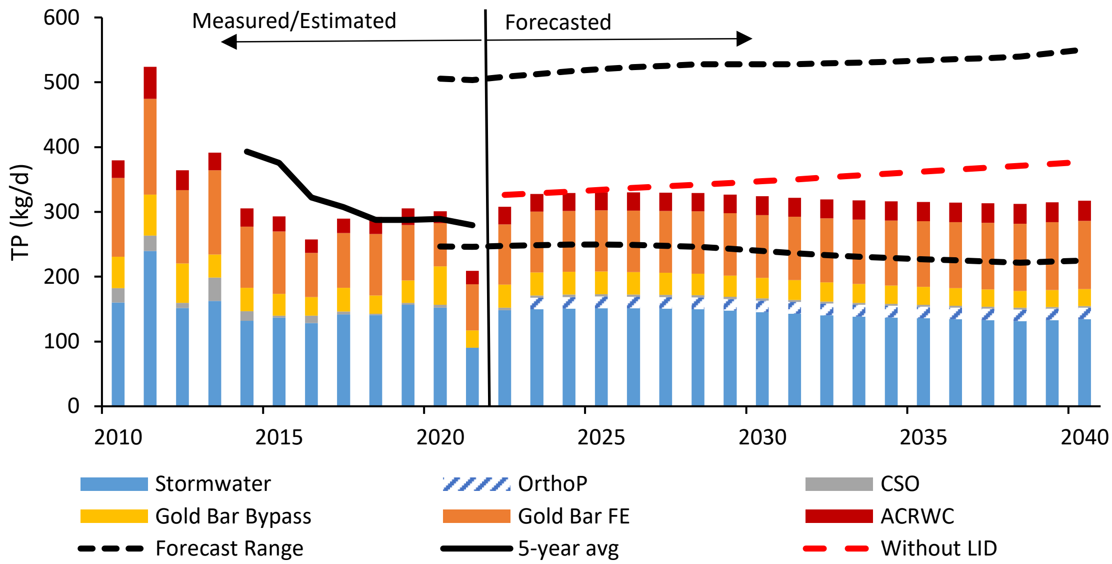


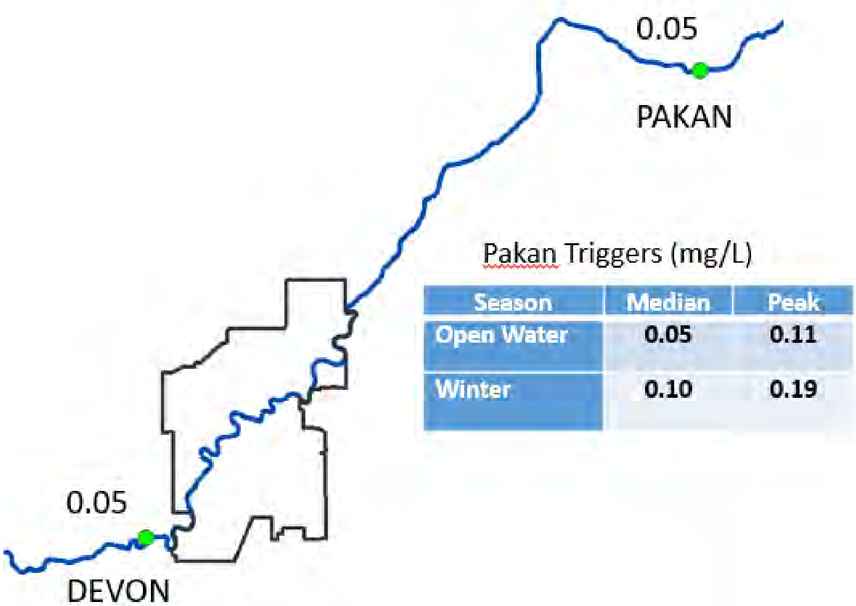

**Figure 1. Historical Loads (2010-2019), Current Loads (2020 and 2021), and Future Load Projections (2022 – 2040) of Total Phosphorus**

**Table 2. Percent Contribution of Sources of TP Loading, and Percent Change of Annual Load by 2040.**

| Source | Historical (2010 - 2019) % of Annual Load | % Change of Annual Load from Historical to 5-year average in 2040 |
|---|---|---|
| SSO | 47 | <1 |
| CSO | 3 | -62 |
| GB Bypass | 11 | -13 |
| GB Final Effluent | 31 | 10 |
| ACRWC | 8 | 17 |
| **Total** | | **1** |


## Total Ammonia

Nitrogen is an essential plant nutrient, and in the form of ammonia, can be readily taken up by aquatic plants and algae and contribute to eutrophication. Ammonia can also be toxic to aquatic life, and has a chronic water quality guideline for the protection of aquatic life that is dependent upon temperature and pH. Ammonia is produced by the decomposition of organic matter and loads within the City largely originate from wastewater treatment plants, and to a lesser extent, stormwater. Draft NSRSWQMF triggers are set at historical medians and 90th percentiles:




Pakan Triggers (mg/L)

| Season | Median | Peak |
|---|---|---|
| Open Water | 0.05 | 0.11 |
| Winter | 0.10 | 0.19 |

**Ammonia Target**


**Total ammonia loads should not have an increasing trend as measured by 5-year trend assessment. There should also be no significant increase in loads over time when river flows are < 300 m$^3$/s to reduce environmental effects when dilution is reduced.**

Based on historical data (2010-2019), annual loads of ammonia are largely (59%) from WWTP effluent (Goldbar WWTP - 36% and ACRWC - 23%) with stormwater comprising 19%, Gold Bar bypass comprising 20%, and CSOs comprising the remaining 2%. Loads are largely evenly distributed through the year for WWTP effluent whereas storm runoff and bypass events typically happen between 60-90 times over a year. It is expected that annual average total ammonia loads will reduce by approximately 6% from historical values by 2040 with most of the gains coming from the implementation of LID practices. Although CSOs show the greatest reduction from historical averages, most of those reductions have occurred through implementation of the previous TLP (2010-2019); in 2021 and 2022 CSO ammonia loads are < 0.5% of the annual ammonia load. In 2040, the average 5-year annual average load is estimated at 1,134 kg/day whereas the average 5–year annual average load without LID implementation is estimated at 1,339 kg/day.

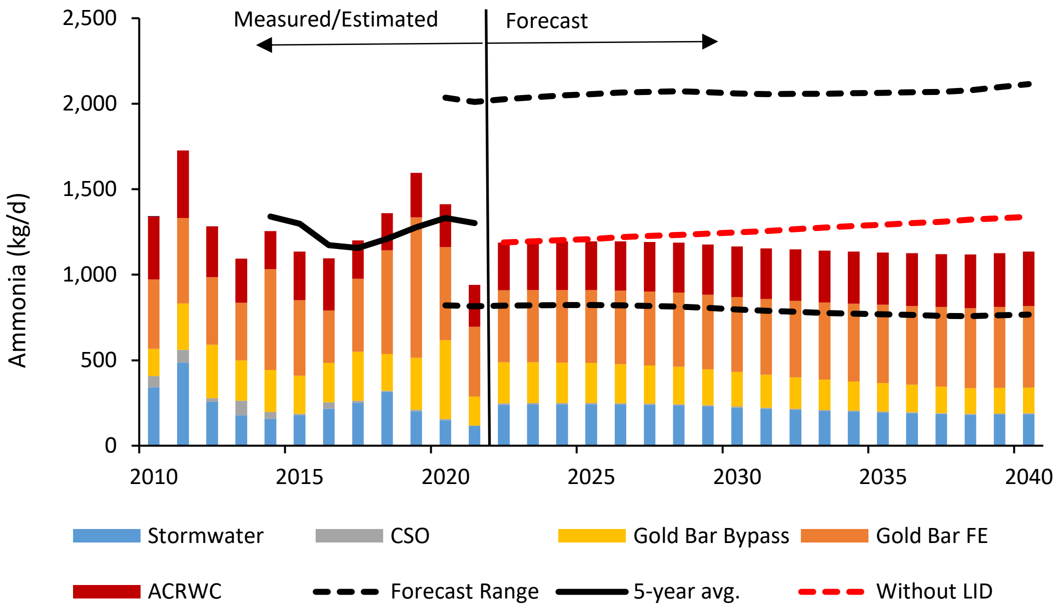


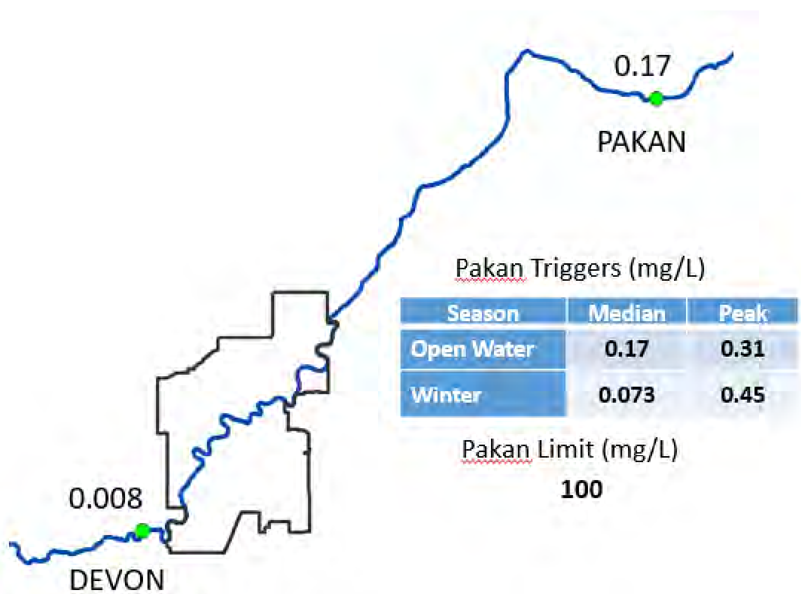

**Figure 2. Historical Loads (2010-2019), Current Loads (2020 and 2021), and Future Load Projections (2022 – 2040) of Ammonia**

**Table 3. Percent Contribution of Sources of Ammonia Loading, and Percent Change of Annual Load by 2040.**

| Source | Historical (2010 – 2019) % of Annual Load | % Change of Annual Load from Historical to 5-year average in 2040 |
|---|---|---|
| SSO | 19 | -21 |
| CSO | 2 | -82 |
| GB Bypass | 20 | -38 |
| GB Final Effluent | 36 | 10 |
| ACRWC | 23 | 17 |
| **Total** | | **-6** |


## Nitrate plus Nitrite

Nitrogen is an essential plant nutrient, and in the form of nitrate it readily absorbed by aquatic plants and algae and contributes to nutrient enrichment. Monitoring and NSRSWQMF triggers are based on the measurement of nitrate plus nitrite; however, in most well oxygenated surface waters, nitrite is rare. Nitrate is also toxic to aquatic life in sufficiently high concentrations, with a chronic guideline of 3 mg/L and an acute guideline of 124 mg/L. Draft NSRSWQMF triggers are set at historical medians and 90$^{th}$ percentiles and limits are based on aquatic life guidelines. Limits are not "pollute-up-to" numbers and a management reponse will be initiated when a trigger is exceeded.




| Season | Median | Peak |
|---|---|---|
| Open Water | 0.17 | 0.31 |
| Winter | 0.073 | 0.45 |

Based on historical data (2010-2019), nitrate plus nitrite loads are largely (91%) from WWTP effluent. There are currently no plans to upgrade Gold Bar WWTP or the ACRWC WWTP that would significantly change effluent concentrations. For that reason, EPCOR did not set a total loading target for nitrate plus nitrate, but will continue to closely monitor loads and will scope possible plant upgrades to address loads if triggers are exceeded.

**Nitrate + Nitrite Target**

- **Continue to monitor annual loads to predict when triggers may be exceeded from increased loads.**
- **Scope upgrade options to address $NO_3 + NO_2$ in the long-term and provide options during the 2028 TLP annual update.**

# NITRATE PLUS NITRITE

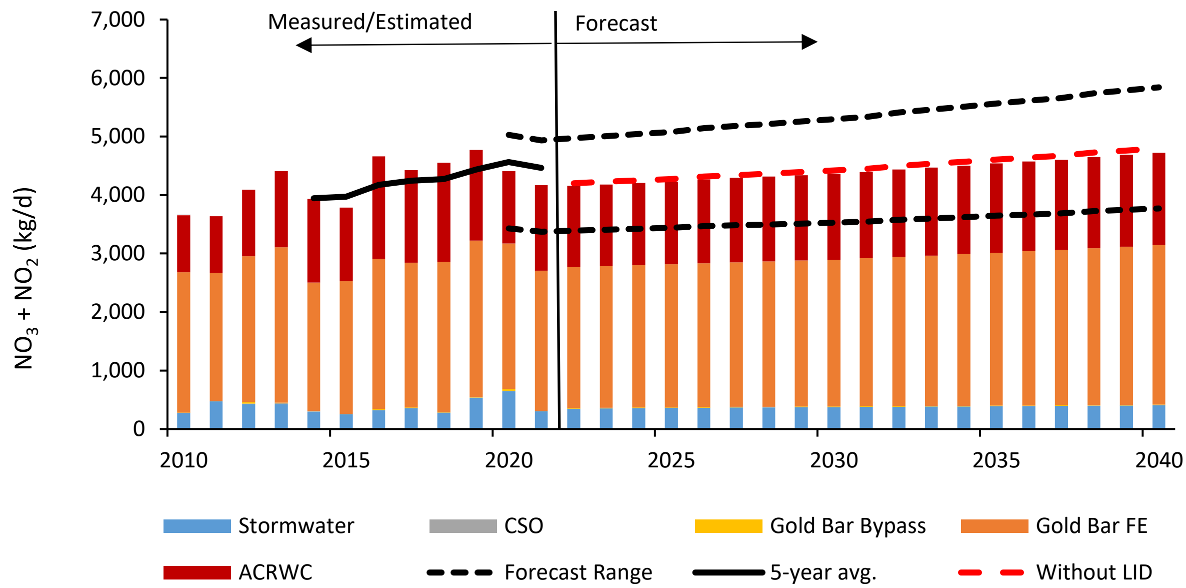



**Figure 3. Historical Loads (2010-2019), Current Loads (2020 and 2021), and Future Load Projections (2022 – 2040) of Nitrate plus Nitrite**

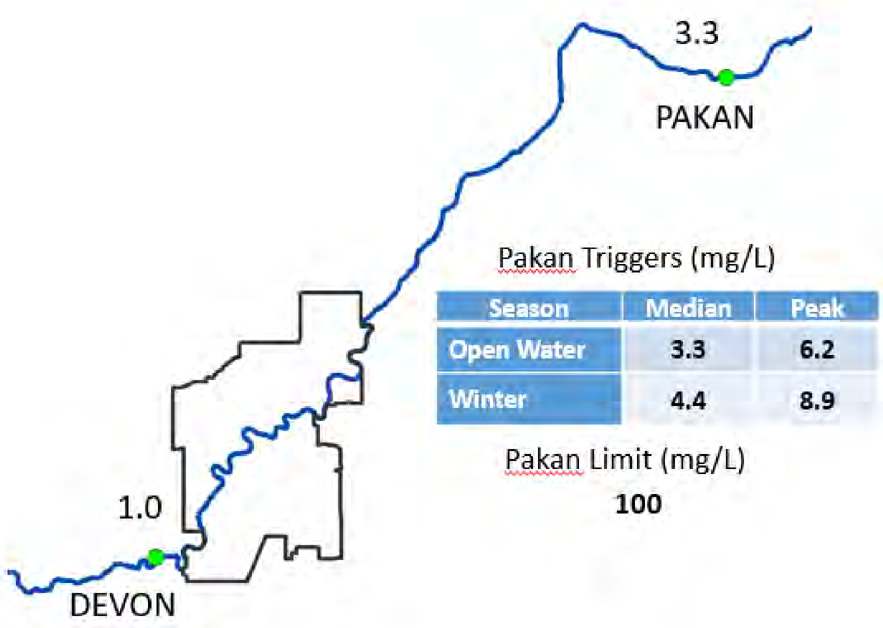
It is expected that annual nitrate plus nitrite will increase by approximately 13% by 2040. In 2040 average annual 5-year loads are estimated at 4,723 kg/day whereas the average load without implementation of LID is estimated at 4,797 kg/day. The increased load over time is due to anticipated increase of WWTP loads due to population growth.

**Table 4. Percent Contribution of Sources of Nitrate plus Nitrite Loading, and Percent Change of Annual Load by 2040.**

| Source | Historical (2010 – 2019) % of Total Annual Load | % Change of Annual Load from Historical to 5-year average in 2040 |
|---|---|---|
| SSO | 8 | 20 |
| CSO | <1 | -70 |
| GB Bypass | <1 | -5 |
| GB Final Effluent | 59 | 10 |
| ACRWC | 32 | 17 |
| **Total** | | **13** |


## Chloride

Chloride is naturally present in rivers due to weathering of rocks and soils; however, the application of road salt is the largest source of salt into the environment. Chloride is chronically and acutely toxic to aquatic life; protection of aquatic life guidelines are 120 mg/L for chronic exposure and 640 mg/L for acute. Chloride in the NSR is generally low with median values at Devon of 1 mg/L and 4 mg/L at Pakan (110 km downstream of Edmonton). Despite Pakan values being below chronic aquatic life limits, because values at Pakan are 3 to 9 times higher than at Devon, chloride was selected as a contaminant of concern. Draft NSRSWQMF triggers are set at historical medians and 90$^{th}$ percentiles and limits are based on protection of aquatic life guidelines:




Pakan Triggers (mg/L)

| Season | Median | Peak |
|---|---|---|
| Open Water | 3.3 | 6.2 |
| Winter | 4.4 | 8.9 |

Pakan Limit (mg/L)

**100**

Total chloride loads are linked closely with salt application, which is not controlled by EPCOR. As well, median chloride values at Pakan remain well below chronic guidelines for the Protection of Aquatic Life. Due to the complexity and required collaboration on this issue a numeric or trend based total loading target has not been set.

**Chloride Target**

- **Continue to monitor annual loads to predict when triggers may be exceeded from increased loads.**
- **Work with the City of Edmonton to align salt application with maintaining no increase in chloride loads over time.**

# CHLORIDE

Chloride is typically elevated in storm water during spring freshet and winter melt events, but is typically low throughout the rest of the year. Based on historical data (2010-2019), 62% of chloride is from stormwater. Wastewater from the Gold Bar WWTP (26%) and ACRWC (10%) are also a notable sources of chloride and also represent a continuous source of chloride to the NSR.

Because LID infrastructure is limited in its ability to remove chloride, as the City grows the chloride load is expected to increase ~20% by 2040. Specifically, the 2040 average load is estimated at 101,866 kg/day. Without LID practice implementation the number would be slightly higher at 103,703 kg/day.

An increase in annual chloride loads does not equate to limits being exceeded downstream but may trigger action if median values or peak increase over time as measured at the Pakan monitoring site. Actions to reduce chloride would be developed collaboratively with the City of Edmonton.

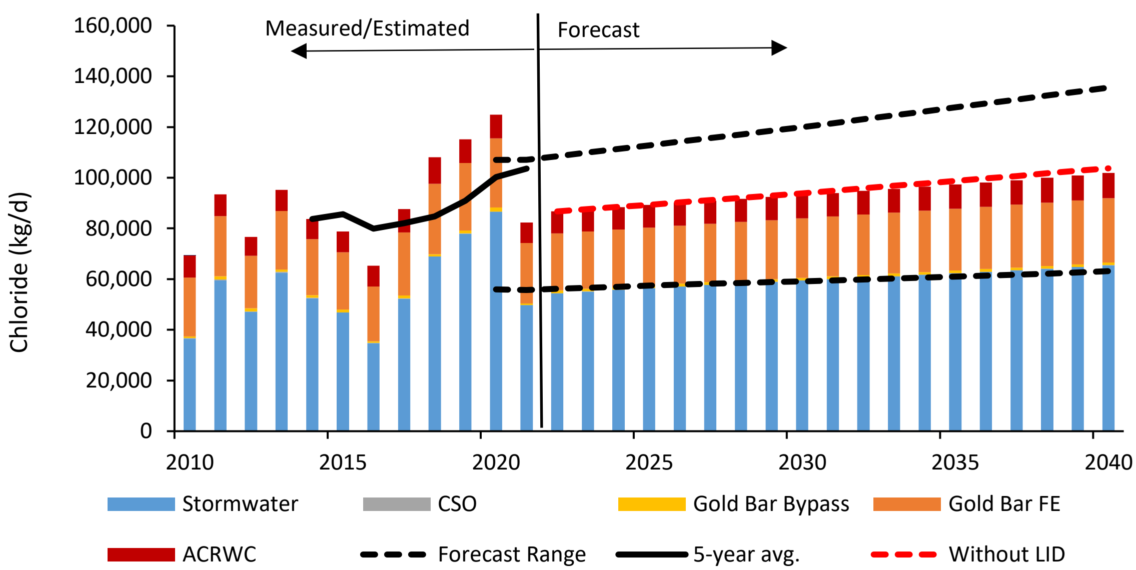
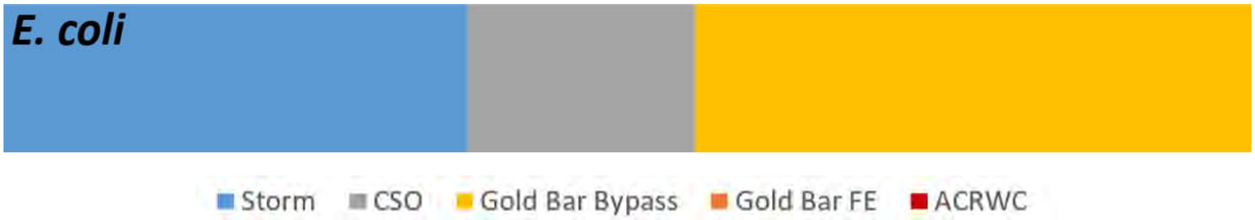



**Figure 4. Historical Loads (2010-2019), Current Loads (2020 and 2021), and Future Load Projections (2022 – 2040) of Chloride.**

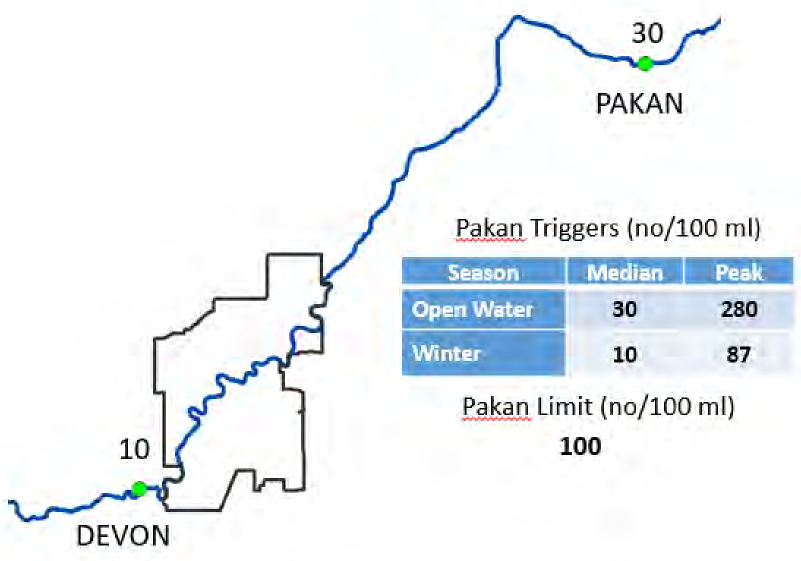
**Table 5. Percent Contribution of Sources of Chloride Loading, and Percent Change of Annual Load by 2040.**

| **Source** | **Historical (2010 – 2019) % of Annual Load** | **% Change of Annual Load from Historical to 5-year average in 2040** |
|---|---|---|
| SSO | 62 | 25 |
| CSO | <1 | -60 |
| GB Bypass | 1 | -3 |
| GB Final Effluent | 27 | 10 |
| ACRWC | 10 | 17 |
| **Total** | | **20** |




*E. coli*

*Escherichia coli (E. coli)* is a bacteria found in the gastrointestinal tract and feces of warm-blooded animals and is used as an indicator of fecal contamination in water. *E. coli* is a parameter of concern in drinking water; however, at current levels is considered a low risk by Edmonton's WTPs due to the UV and chlorine disinfection processes used and the fact that source water concentrations remain low. *E. coli* in the NSR is primarily a risk for recreational water users (i.e., boaters, swimmers, fish, etc.) and is an important indicator parameter as the City of Edmonton promotes recreation on the river. Draft NSRSWQMF triggers are set at historical medians and 90$^{th}$ percentiles limits are based on protection of aquatic life guidelines.




| | |
|---|---|
| ***E. coli* Target**   | ***E. coli*** should not have an increasing trend in total annual average loads as measured by 5-year trend assessment. There should also be no significant increase in loads over time when river flows are < 300 $m^3/s$ to reduce risk to recreational river users. |

Based on historical data (2010-2019), most of the *E. coli* load to the NSR from EPCOR and ACRWC sources comes from Gold Bar bypasses (45%), stormwater (36%) and CSOs (20%). Final WWTP effluent is less than 1% of all loads. There have been significant reductions in CSO loading through time and in 2020 CSOs contributed only 6% to the annual load and in 2021 contributions were less than 2%.

*E. coli* loads are expected to decrease by over 41% by 2040 where the average daily load is estimated to be 269 MPN x $10^{12}$/day. Without LID practice implementation, *E. coli* loads in 2040 would be 431 x $10^{12}$/day.

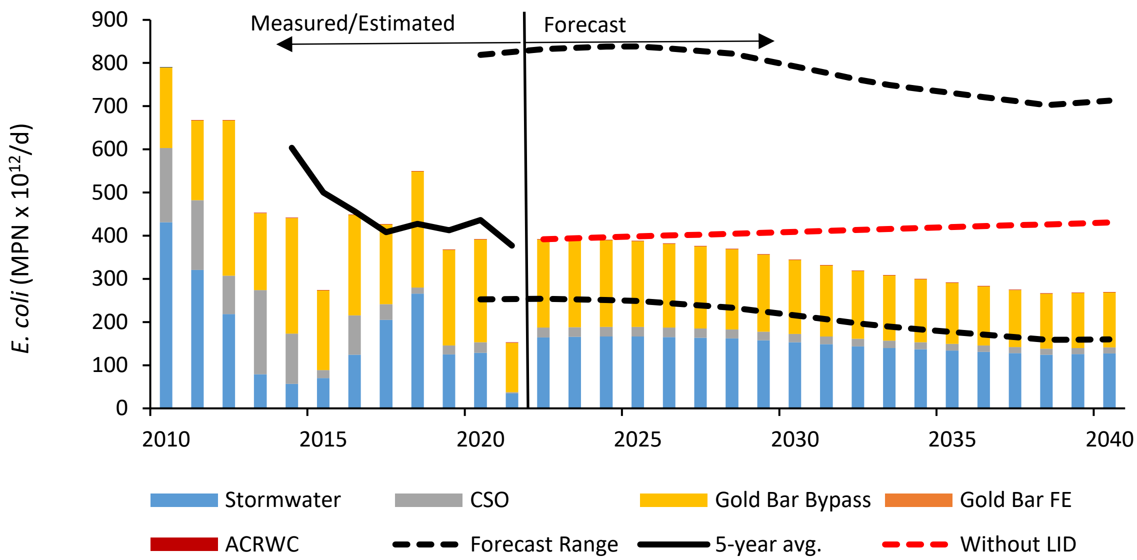
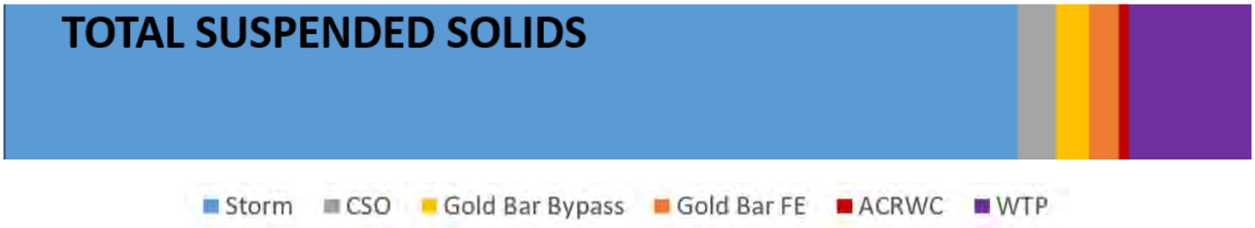



**Figure 5. Historical Loads (2010-2019), Current Loads (2020 and 2021), and Future Load Projections (2022 – 2040) of *E.coli*.**

**Table 1. Percent Contribution of Sources of *E. coli* Loading, and Percent Change of Annual Load by 2040.**

| **Source** | **Historical (2010 – 2019) % of Annual Load** | **% Change of Annual Load from Historical to 5-year average in 2040** |
|---|---|---|
| SSO | 36 | -23 |
| CSO | 20 | -84 |
| GB Bypass | 45 | -38 |
| GB Final Effluent | <1 | 9.8 |
| ACRWC | <1 | 17 |
| **Total** | | **-41** |




## Total Suspended Solids

Total Suspended Solids (TSS) is a measurement of the particulate material in water that typically comes from eroded sediments. High concentrations of TSS can negatively impact fish, benthic invertebrates and algae, particularly if the values are out of the range and frequency of natural variability. The NSR is naturally very high in TSS during higher flow/runoff events due to the abundance of clay soils within the watershed. While runoff from naturalized areas does carry sediment, land uses such as agriculture, roads, forestry and urban environments alter hydrology and increase erosion as well as export sediment directly to streams. Water quality guidelines for the protection of aquatic life are based on the increase of solids over the short-term and long-term relative to background concentrations. Draft NSRSWQMF triggers are set at historical medians and 90$^{th}$ percentiles:


Pakan Triggers (mg/L)

| Season | Median | Peak |
|---|---|---|
| Open Water | 23 | 220 |
| Winter | 4.4 | 22 |

| TSS Target | ***TSS*** should not have an increasing trend in total annual average loads as measured by 5-year trend assessment. There should also be no significant increase in loads over time when river flows are < 300 $m^3/s$ to reduce risk to aquatic life. |
|---|---|


Based on historical data (2010-2019), storm water contributes 82% of EPCOR's and ACRWC total annual TSS load. The next largest contributor is the WTPs wastestreams at 10%; the remaining 8% is divided relatively equally among the remaining sources. Through implementation of LID practices and other stormwater management initiatives it is estimated that 5-year average TSS loads will be reduced by 32% from 2010-2019 loads, by 2040. Specifically, it is estimated that in 2040 the 5-year average annual load will be 39,091 kg/day whereas the 5-year 2040 average daily load without LID practice implementation is estimated at 67,968 kg/day. Additional load reductions may also occur due to other operational practices that are not part of the loading assessment but those are yet to be determined.

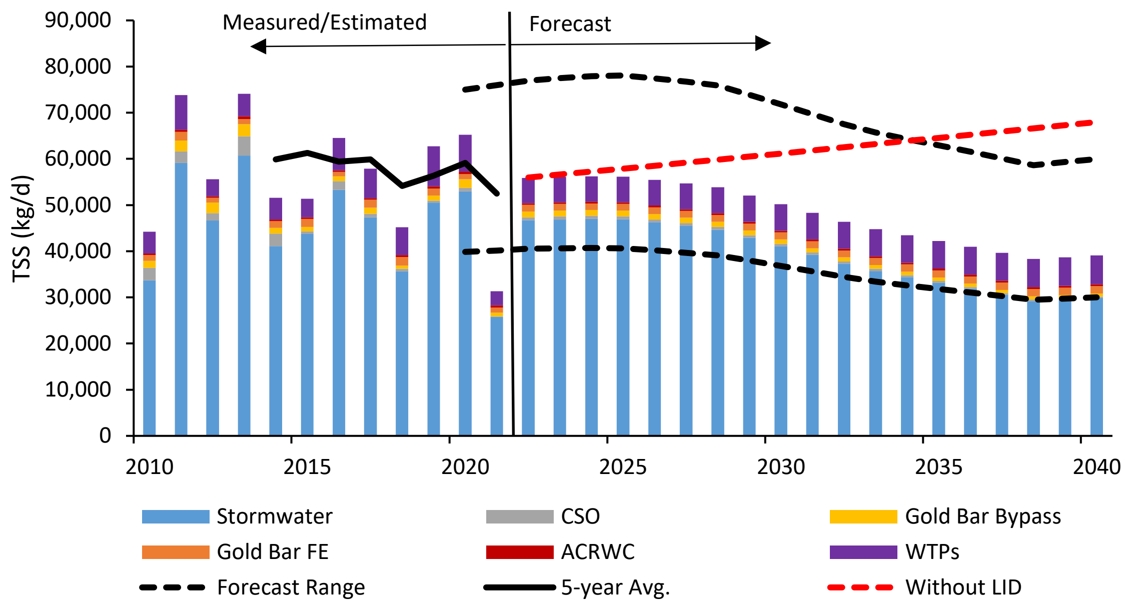



**Figure 7. Historical Loads (2010-2019), Current Loads (2020 and 2021), and Future Load Projections (2022 – 2040) of Total Suspended Solids.**

**Table 2. Percent Contribution of Sources of TSS Loading, and Percent Change of Annual Load by 2040.**

| Source | Historical (2010 – 2019) % of Annual Load | % Change of Annual Load from Historical to 5-year average in 2040 |
|---|---|---|
| SSO | 82 | -37 |
| CSO | 3 | -80 |
| GB Bypass | 2 | -48 |
| GB Final Effluent | 3 | 9.8 |
| ACRWC | 1 | 17 |
| WTP | 10 | 14 |
| **Total** | | **-32** |

## Other parameters

### *Total Dissolved Phosphorus*

Total dissolved phosphorus (TDP) is listed in the NSRSWQMF and loads need to be managed through time to ensure triggers are not exceeded at Pakan. Insufficient historical data is available for TDP or orthophosphate from urban sources to calculate loads. EPCOR will be adding orthophosphate to drinking water beginning in 2023 to limit lead exposure in lead service lines and plumbing fixtures. The addition of orthophosphate to drinking water is anticipated to increase phosphorus loading to the NSR through outdoor water use, leaks and breaks, and other sources. While total phosphorus is expected to increase by a moderate amount, it must be considered that the additional phosphorus loading from drinking water is in the form of orthophosphate and therefore may impact algal growth. As such TDP has been added as a monitoring parameter to the Environmental Monitoring Program (EMP) effective in 2021 and this will allow annual daily load estimations.

### *Metals*

While metals naturally occur in the NSR due to weathering of rocks and soils, increased concentrations of metals frequently occur as a result of increased erosion, atmospheric deposition, storm water and waste water. Many metals are strongly associated with increased sediments and flows. In sufficiently high concentrations, many metals are toxic to fish and other aquatic life. AEPA has developed triggers and limits for nine metals: dissolved aluminum, arsenic, cadmium, cobalt, copper, lead, mercury, selenium, and zinc. Metals (total and dissolved) were added in 2021 to the stormwater monitoring program and in 2022 loads estimation methods were developed. It is too soon to include metals that are listed in the NSRSWQMF to this TLP.

### *Pesticides*

Pesticides are monitored several times per year from storm water, wastewater and the NSR. This level of monitoring is insufficient to calculate loads. Many pesticides have water quality guidelines for the protection of aquatic life, but only 2, 4-D is included in AEPA's NSRSWQMF. Pesticides are frequently detected in storm water, wastewater and the NSR; but only guthion has ever measured above protection of aquatic life guidelines. Diacamba and MCPA are two pesticides that are regularly found to exceed irrigation guidelines in stormwater.

# 6. TOTAL LOADING PLAN STRATEGIC DIRECTIONS AND ACTIONS

In order to achieve the TLP objectives implementation of the following strategic directions is required.

## Strategic Direction 1: Align TLP within EPCOR and ACRWC

### *Review other relevant planning documents across EPCOR and ACRWC to encourage alignment with TLP targets and other regulatory commitments*

There are many high-level planning documents within EPCOR that guide decisions on infrastructure investments across the one water cycle (WTPs, stormwater, CSO, and WWTP). It is important that these plans consider the TLP's primary objective: maintain current water quality in the NSR by maintaining loads of key contaminants within historical (2010-2019) averages.

**Planning Actions Include:**

- Establish an EPCOR Total Loading Plan Implementation Committee with representation across EPCOR business units whose goals are to:
  - Ensure that EPCOR's relevant internal planning documents where actions can positively or negatively affect loading to the NSR or its tributaries (examples in Appendix C) are aligned with the TLP.
  - Liaise with different groups within EPCOR to help align the TLP with operational initiatives.
  - Include other EPCOR initiatives that could result in load reductions in subsequent TLPs.
- Continue engagement with ACRWC through the Edmonton Regional Wastewater Regulatory Working Group and Edmonton Regional Wastewater Steering Committee.

**Stormwater Management Actions Include:**

To achieve load reduction targets, implementation of LID practices is critical. The LID implementation and other stormwater storage targets set out in SIRP will be achieved through the following ongoing actions:

- Supporting SIRP capital project ($500M over 20 years) development and target attenuation and storage of stormwater:
  - Strategically targeting high impervious areas such as road widening projects and direct discharges in mature neighborhoods.
  - Identifying EPCOR-owned sites suitable for, and install volume control facilities.
  - Identifying large industrial and commercial sites within the Mill Creek basin and develop a plan for LID implementation.
- Constructing additional stormwater storage capacity in mature neighborhoods.
- Collaborating with Drainage Capital (up to $2M per year) programs to identify opportunities for twinning pipes, pipe upsizing/invert adjustment, storage provision, sewer separation, interconnection site control and roof leader downspout disconnection.
- Building capacity and expertise in LID design and construction; and working closely with Urban Development Institute (UDI) and other stakeholders.

- Continue to develop a citywide urban stormwater model (with urban creek submodels) that can be used to investigate opportunities for LID implementation, optimize smart pond operation to restore urban hydrology, and prioritize areas for implementation (CSO areas).

### CSO Management Actions include:

Focused work and actions around combined sewers is ongoing and actions include:

- Installation of dry ponds to increase storage in CSO areas.
- Implementation and use of smart pond technology to increase downstream pipe capacity during high flow events and reduce CSO discharge occurrences.
- Continued implementation of LID practices with a focus on CSO areas.
- Continued optimization of real time control gate site 3.
- Future closure Downtown CSO’s 1 and 2.

## Strategic Direction 2: Work with the City of Edmonton to Align with TLP

### *Ensure TLP outcomes are aligned with planning initiatives/departments across the City of Edmonton*

The now retired River for Life Strategic Framework (2012) outlined the complexities of citywide implementation of policies to reduce loads to the NSR and its tributaries. Specifically it was noted that the institutional complexity of the City's administration means that there are many policies, strategies and programs located within different branches/departments that may either support or be in conflict with the TLP. There is opportunity to increase the alignment of City of Edmonton initiatives with the TLP.

**Planning Actions include:**

- EPCOR continues to work with the City of Edmonton to review cross-departmental policies, strategies and programs and encourage alignment with TLP targets (e.g. revised street sweeping schedule to reduce sediment wash-off, improved sanding mixes to reduce salt in runoff, bylaw revisions).
- EPCOR continues to work with the City of Edmonton to review high level planning documents (e.g. Municipal Development Plan, Downtown Redevelopment Plan, City Plan, District Plans) to encourage LID implementation and alignment to TLP targets.
- EPCOR One Water Planning and City of Edmonton Drainage Planning continue to have bi-monthly meetings to discuss and revise the stormwater management requirements at various levels of community and neighborhood planning (i.e., Area Structure Plans, Area Redevelopment Plans, etc.) to ensure early consideration of treatment LIDs, best management practices, and water conservation strategies.
- EPCOR works with the City of Edmonton to determine how loads from snow storage facilities can be included in future TLPs.

## Strategic Direction 3: Participate in Collaborative Watershed Planning

Watershed planning occurs at the local, NSR watershed, and regional scale. Planning is led by different groups, including Alberta Environment and Protected Areas (AEPA) and the North Saskatchewan Watershed Alliance (NSWA), which is the Watershed Planning and Advisory Council for the basin. Local municipal planning is done through different groups at the City of Edmonton and EPCOR; they are also represented on the NSWA board. Coordinated municipal planning is also done through the Edmonton Metropolitan Region Board. EPCOR's role is to integrate into each watershed and municipal planning initiatives to ensure that TLP outcomes are considered in context of all dischargers in the NSR watershed.

**Key Actions:**

- Continue to participate in regional level watershed planning through the implementation of the North Saskatchewan Regional Plan (NSRP) and associated water quality monitoring frameworks. This includes participation on the Water Management Framework for the Industrial Heartland and Capital Region.
- Continue to lead the NSR Science and Knowledge Mobilization Steering Committee that aims to align research, modelling, monitoring, and education at the watershed scale.
- Continue to inform water policy at the Provincial level through representation on the Alberta Water Council (AWC) and relevant project teams such as the Water for Life Action Team.
- Continue to be actively engaged in the North Saskatchewan Watershed Alliance (NSWA) through representation on their Board of Directors and Headwaters Technical Advisory Committee. Continue to fund the NSWA with the City of Edmonton at 50 cents per capita, which includes in-kind support.
- Continue to develop a geospatial watershed science dashboard for the NSR Basin - The Healthy River Ecosystem Assessment System (THREATS).
- Continue to improve urban creek knowledge through partnership with the NSWA and other regional stakeholders.
- Continue to sit on the Edmonton Metropolitan Regional Board Stormwater Collaborative.

## Strategic Direction 4: Improve Load Estimation Methods

There are opportunities to improve load estimation and forecast methods as the TLP is implemented to ensure that the most accurate data is being used and that there is continuous improvement in accuracy of data estimations.

**Key Actions:**

- Improve estimation of low impact development (LID) feature effectiveness through a water balance based monitoring approach that evaluates inflow loads and outflow loads to understand removal efficiencies across LID types.

- Improve 'LoadCalc' Load Calculation and Estimation Tool:
  - Update LoadCalc to have unmonitored basin runoff volume estimations based on impervious surface classifications and lot-level stormwater management initiatives. The City of Edmonton zoning categories are not always representative of what is on the land. They also do not account for any stormwater management activities that may have been implemented.
  - Updating LoadCalc into the seven main creek watersheds which have been recently delineated, four main SSO catchment areas, and new catchments where flow stations have been installed.
  - Other improvements that are being considered are further mapping and delineation of all outfall sewersheds; installing flow monitors at the mouths of Wedgewood, Horsehills, and Gold Bar Creeks; and incorporating existing flow gauges on Whitemud/Blackmud creek into LoadCalc.

- Continue to develop an integrated stormwater model for the City of Edmonton including the 7 major urban creek watersheds, 4 main SSO basins, and the other unmonitored outfalls in the 783 $km^2$ watershed boundary that includes implementation of LID, water reuse, and stormwater management facility flow management.

- Improve understanding of total loading from the seven urban creeks that includes estimations of stormwater loads to creeks as well as instream sediment movement from changes in hydrology. This may include 1) hindcasting pre-disturbance hydrology 2) suggesting hydrologically based restoration targets and 3) exploring stormwater management options to restore urban creek hydrology and subsequently improve aquatic habitat.

## Strategic Objective 5: Report on TLP Targets Annually

- Reporting will occur through an annual Total Loading Report submitted by March 31st, each year.
- Reporting on total loads will also occur through EPCOR's Environment, Social and Governance Report.

# 7. DOCUMENT CONTROL

The document control section indicates the revisions and track changes to the TLP.

| Action | Responsibility | SIGNATURE | DATE |
|---|---|---|---|
| Developed by: | S. Neufeld, M.Sc., P. Biol.<br>Watershed Manager | | December 30, 2022 |

# APPENDIX A: DETAILED METHODS FOR LOAD ESTIMATION AND FORECASTING

## Stormwater and CSOs

The total area of the City of Edmonton after recent annexation is 783 $km^2$, and runoff from this area drains largely through EPCOR's stormwater system of 300 outfalls to the NSR or urban tributaries. Not all areas of City (i.e., undeveloped areas) are connected to the drainage system, but still generate runoff and loading to receiving water bodies. A portion (65 $km^2$) of the City of Edmonton is drained by a combined sewer system, where stormwater runoff combined with sanitary flow enters the NSR and Mill Creek during runoff events of sufficient magnitude; this rarely occurs.

EPCOR monitors the flows of five major storm outfalls (30$^{th}$ Ave, Quesnell, Groat Road, Kennedale and Belgravia), as well as Mill Creek, and the major CSO outfalls (Rat Creek, Capilano, Highlands, Cromdale and Strathern) (Figure A1). As it is not feasible to monitor flows in all 300 outfalls as many of the catchments are small, daily flows from the unmonitored sections of the City are estimated using precipitation data from EPCOR's network of rain gauges and land use data.

Water quality monitoring of stormwater in Edmonton began in the early 1990s as part of the Environmental Monitoring Program (EMP), and continues today. Water quality samples are collected from four major outfalls (30$^{th}$ Ave, Quesnell, Groat Road, Kennedale) and Rat Creek (Table A3). Water quality samples are collected when flows exceed a preset trigger level, which generally corresponds with any notable runoff event. There are generally between 60 and 100 storm event samples collected a year and samples are also collected semi-monthly during baseflow conditions. Since the early 2000's all stormwater samples have been sampled for eight main parameters (Biological oxygen demand [BOD], TSS, chloride, TKN, $NH_3$, $NO_3$+$NO_2$, TP, *E. coli*). Again, for this TLP, daily loads have been calculated for six parameters: TSS, chloride, $NH_3$, $NO_3$+$NO_2$, TP, *E. coli*. In 2021, all NSRSWQMF indicators were added to the program, along with a full suite of total and dissolved metals. These parameters are now sampled in the same frequency as the eight original parameters.

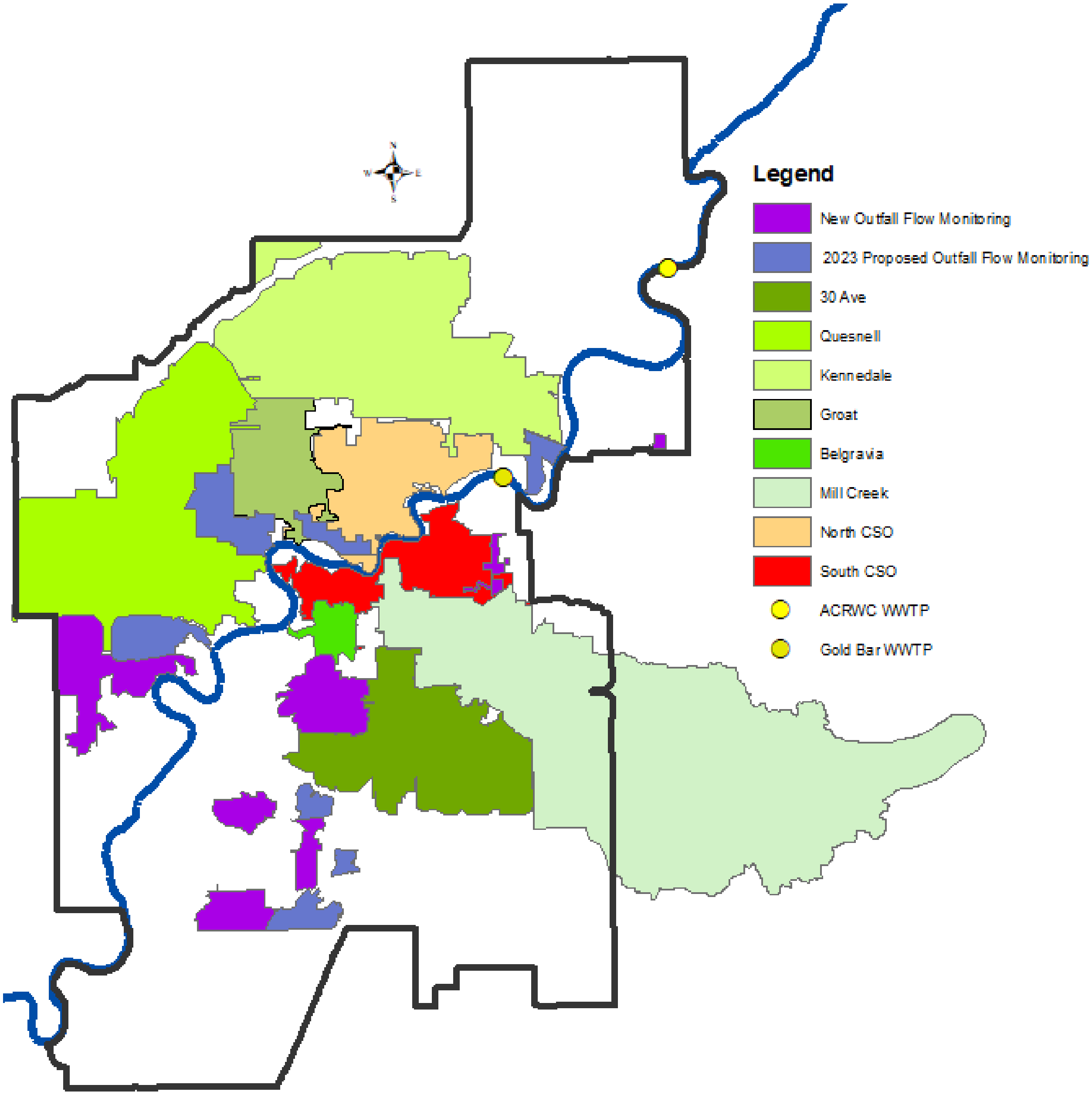



**Figure A1. Map of combined sewer and storm water outfalls and areas that are routinely monitored for flow and/or water quality (Groat, Kennedale, Quesnell, and 30 Avenue) and included in load calculations. The other flow monitoring (purple) will be added to LoadCalc as monitors are installed and data is validated. The white area is considered unmonitored and flow and loads are estimated.**

**Table A3. Summary of EPCOR's Stormwater Quantity and Quality Monitoring Program**

| Flow Monitoring Locations | Water Quality Monitoring Locations | Water Quality Parameters and Frequency |
|---|---|---|
| Continuous flow Monitoring on:<br><br>Storm Outfalls<br>• 30th Avenue<br>• Groat Road<br>• Kennedale<br>• Quesnell<br>• Belgravia<br>• Outfalls: 2, 10, 217, 313, 76, 206, and 276<br><br>CSO outfalls:<br>• Rat Creek<br>• Capilano<br>• Highlands<br>• Cromdale<br>• Strathern | Storm Outfalls<br>• 30th Avenue<br>• Groat Road<br>• Kennedale<br>• Quesnell<br><br>CSO outfalls:<br>• Rat Creek | Every runoff event and baseflow biweekly:<br>• BOD<br>• TSS<br>• chloride<br>• TKN<br>• $NH_3$<br>• $NO_3$+$NO_2$<br>• TP<br>• *E. coli*<br>• temperature<br>• pH<br>• conductivity<br>• dissolved oxygen<br>• turbidity<br><br>Twice per year: Pesticides<br><br>Beginning in 2021 – all SWQMF parameters, including total and dissolved metals<br><br>Other parameters have been measured infrequently over the program |

Loads from the EPCOR's stormwater system are calculated using LoadCalc, an Excel-based tool that calculates daily loads from monitored locations, and estimates the daily flows, concentrations and loads of parameters from unmonitored locations. LoadCalc has been used since the early 2000s; however, the current assumptions used behind LoadCalc have only been extended back to 2010, and thus, previous years are not directly comparable. LoadCalc consists for four distinct, but interconnected components: monitored outfalls, unmonitored outfalls, creeks, and the Gold Bar WWTP.

For the monitored outfalls, daily loads are calculated by using the daily flow data and the daily concentration. Days with no water quality data are interpolated from adjacent days with data.

For unmonitored outfalls, flows are estimated using precipitation metrics such as daily rainfall, rainfall intensity and antecedent precipitation index along with land use and runoff coefficients derived from the literature. This estimation approach generates flow values similar to measured flows in monitored basins, which provides confidence that this method is a suitable approach. The daily concentrations from the unmonitored storm sewer outfalls are based on the flow-weighted daily concentrations of the four monitored outfalls. Likewise, unmonitored CSOs are assumed to have the same concentration as the Rat Creek CSO outfall.

Among the urban creeks, Mill Creek is monitored with a flow gauge, and thus represents flows from both upstream and within the City of Edmonton, which is 36% of Mill Creek's total watershed. Daily water quality concentrations in Mill Creek are generated the same way as unmonitored outfalls. For the six remaining urban creeks (Wedgewood, Whitemud, Blackmud, Fulton, Gold Bar, and Horsehills creeks), flows and concentrations are estimated the same was as unmonitored outfalls. LoadCalc only accounts for the direct stormwater loads into these creeks from within the City of Edmonton, and does not consider loads from outside the City of Edmonton, or from instream erosion. LoadCalc currently only summarizes loads from Whitemud (includes Blackmud), Horsehills, and Wedgewood creeks, whereas Gold Bar and Fulton are included in unmonitored outfalls.

To provide further context, 61% (476 $km^2$) of the area within the City of Edmonton boundary is currently considered unmonitored in the load calculation. Specifically, unmonitored storm sewer outfalls have a combined catchment area of 215 $km^2$; the unmonitored creek watershed area is 240 $km^2$; and unmonitored CSO area is 21 $km^2$. The current total monitored area that is used for load calculation is 307 $km^2$. This includes 211 $km^2$ of monitored stormwater outfalls, 44 $km^2$ of monitored CSO area, and 52 $km^2$ of monitored Mill Creek flow. As part of a commitment to increase flow monitoring, new flow monitors are being added to outfalls annually and will be included in future load estimations as flows are validated. An additional 52 $km^2$ of stormwater catchbasin area will have been added by then end of 2023 (Figure A1). By the end of 2028, a cumulative total of 390 $km^2$ is expected to be monitored for flow bring the total outfall area monitored to ~50%. The additional flow monitoring on the 37 outfalls from 2024 to 2028 adds an additional area of 30 $km^2$; most of the remaining outfalls in the City will have areas less than 1 $km^2$.

## Gold Bar and Capital Region WWTPs

Concentrations in the final effluent from both WWTPs are measured through the collection of daily composite samples. Effluent flows are also measured directly. Daily loads from the final effluent are calculated by using daily flow totals and the daily effluent concentration. Chloride is not measured at the ACRWC WWTP, nor was it measured at the Gold Bar WWTP in 2010 – 2011. At the ACRWC WWTP, only nitrate is measured, whereas nitrate plus nitrite is measured at the Gold Bar WWTP, stormwater and CSOs. It is assumed that a nitrite in the ACRWC WWTP is small compared to nitrate, and therefore the measured concentrations of nitrate were assumed to be equal to nitrate plus nitrite.

During wet weather periods, stormwater entering Edmonton’s sanitary system results in greater influent to the Gold Bar WWTP than the plant can handle through its normal treatment process. Additional wastewater overflow receives enhanced primary treatment before it is released to the river. Water quality and quantity is measured from the effluent stream, and loads are directly calculated.

**Table A4. Summary of WWTP Water Quantity and Quality Monitoring**

| Program | Locations | Water Quality Parameters and Frequency | Flow Monitoring |
|---|---|---|---|
| **Gold Bar WWTP** | Treated effluent and plant bypass | TSS, chloride, TP, orthophosphate, $NH_3$, TKN, $NO_3$+$NO_2$, *E. coli*, fecal coliforms, pH, BOD, cBOD, COD and VSS (daily), metals, acute toxicity (monthly), acute and chronic toxicity (quarterly). Daily parameters also measured in plant bypass | Continuous flow monitoring on all outfalls |
| **Alberta Capital Region WWTP** | Treated effluent | pH, TSS, TP, $NH_3$, $NO_3$, *E. coli* (daily), cBOD (3x /wk), COD (daily), TKN (monthly), metals (monthly), acute toxicity (quarterly), acute and chronic toxicity (annually). | Continuous flow monitoring |

### WTP Residuals

EPCOR's two WTPs have wastestreams that discharge residuals back to the NSR. These wastestreams contain concentrated solids originally from the NSR, as well as alum, polymer, and at times powdered activated carbon. Loads from residual wastestreams are not measured directly, but are inferred by measuring the daily masses of alum, polymer and powdered activated carbon used by the WTPs. EPCOR has submitted a proposed residuals wastestream monitoring program to AEPA, where flows and concentrations will be monitored at WTP wastestreams for TSS, and total and dissolved metals, which will allow for a more accurate calculation of residual loads in the future.

## Load Forecasting Methods

*Estimating Future Stormwater Loads*: Future stormwater loads will be determined by two main factors: hydroclimatic variability and land use changes as the City continues to grow. Changes due to LID are also considered and summarized in the next subsection. Load forecasts do not include other management strategies which could reduce loads over time because of the uncertainty around reduction estimates. These include implementation of smart ponds; changes to the street sweeping program; wetland enhancement; mangement of snow storage sites; and stormwater reuse.

It is recognized that climate change will result in increased hydroclimatic variability with periods of the year receiving more precipitation, and more intense precipitation events, but will also experience periods of reduced precipitation and increased evapotranspiration. Loads from stormwater are not closely related to amounts of annual precipitation, but rather the timing and intensity of precipitation events, along with activities occurring on the landscape. Sufficient information and data is not yet available to assess how loads may change under changing climate.

EPCOR has been estimating the volume of runoff from unmonitored basins by using urban land use data and assumed runoff coefficients from each type of land use. For example, undeveloped land is assumed to have a runoff coefficient of 0.10, whereas residential areas and roadways have a coefficient of 0.36 and 0.85 respectively. As the amount of land with higher impervious surface continues to increase in Edmonton, so does the anticipated runoff and load; though stormwater management initiatives can augment this relationship. Over the past two decades, the City of Edmonton's runoff coefficient has increased at fairly linear rate with a slight shift occurring between 2014 and 2015 (Figure A2). The explanation for this shift is unclear, but it is assumed that there was a shift in how land use was categorized by the City of Edmonton. As Edmonton's growth over the next two decades is projected to continue at similar rates, it was assumed the runoff coefficient would likewise continue to increase at the same linear rate. This is a simplistic assumption that may not hold true, as future growth may occur faster or slower than expected. Improvement in forecasting will occur LoadCalc landuse categories are moved into impervious/pervious calculation using LIDAR data versus zoning data (Section 6). As well the way the City grows may change (densification versus expansion) and changes to implementation of stormwater management may occur at the lot level.  To account for differences in the anticipated range of growth, low (20% lower) and high (20% higher) estimates were also included.

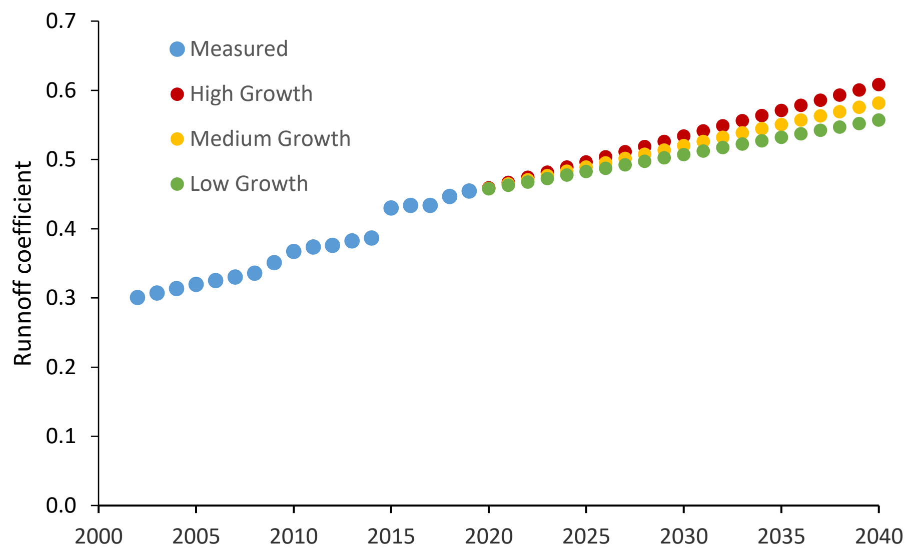



**Figure A2. City of Edmonton's Measured and Estimated Runoff Coefficient, 2002 – 2040.**

*Estimating Future LID implementation:* EPCOR and the City of Edmonton are beginning to actively implement LID to management stormwater volumes and loads. EPCOR has a 20 year implementation plan as part of SIRP to implement LID. As well there is an overall total loading target across the City of Edmonton to manage loads through LID and small storage implementation. Previous work showed that there are opportunities to increase storage in mature neighborhoods, to implement LID along road right-of-ways and to implement other distributed storage options. Additionally, the City of Edmonton will be implementing policy and bylaws for redevelopment of residential, industrial, commercial and institutional areas. Although the distribution of stormwater storage across the categories presented in Figure A3 is not certain, there are specific targets for storage (as greened hectares) across the City of Edmonton from multiple implementation pathways.

LID implementation targets are based on a greened hectare, which is the amount of water generated by 15 mm of precipitation that falls on one hectare. By 2038, EPCOR's total loading target is to have nearly

25,000 greened hectares (Figure A3) through multiple implementation pathways. EPCOR estimates that by 2038, these LIDs will be able store over 3.5 million m$^3$ of stormwater. For more intense storms (often greater than 15 mm), it was conservatively assumed that LIDs have no additional benefit to reduce volumes or loads. Likewise, it is assumed that during the winter and spring runoff that LIDs have limited ability to reduce loads due to the ground being frozen and typically high runoff rates during spring freshet. This may not be true of all LIDs and newer LIDs are being designed to capture water during frozen conditions. To detail how much stormwater would be retained by LIDs, a detailed analysis on rainfall data is discussed in the following subsection. In addition to storing this rainwater, load reductions are also anticipated. For example, up to 90% of total suspended solids are estimated to be captured by LIDs.

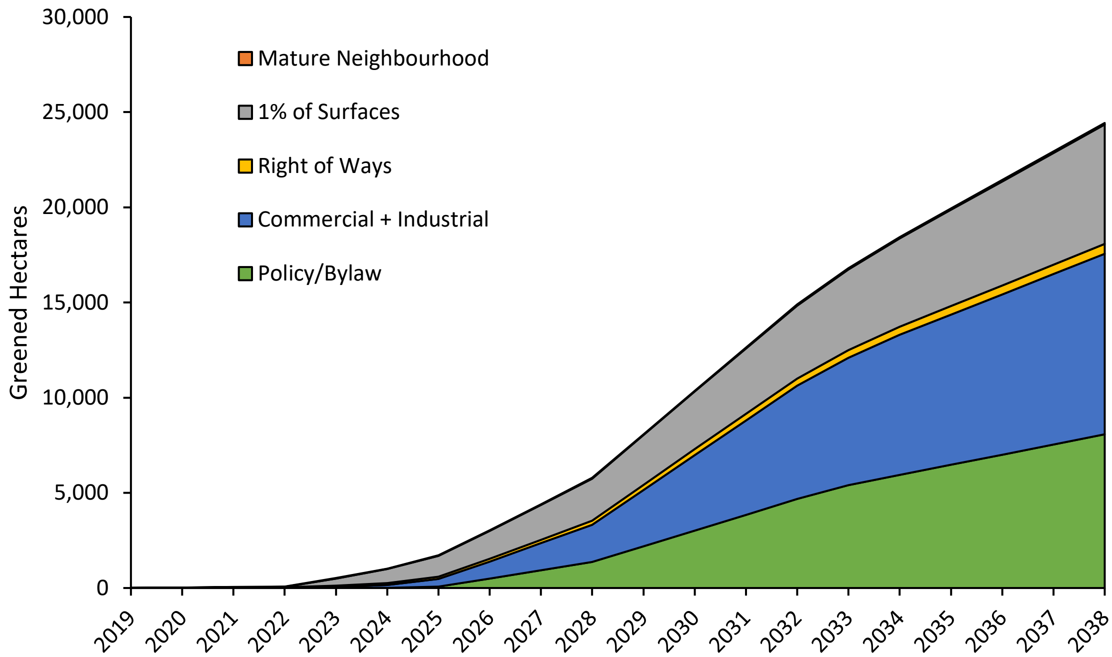



**Figure A3. Total Loading Target for Greened Hectares within City of Edmonton (2019 – 2038) which could be implemented through various programs, including EPCOR's SIRP.**

**Rainfall data and LIDs** – Environment and Climate Change Canada (ECCC) maintains two permanent weather stations that measure precipitation in/near Edmonton: Edmonton International Airport (EIA) and Blatchford. Other weather stations located in/near Edmonton are operated by the Government of Alberta, Department of National Defense or NAV Canada; however, these stations are either too far outside of Edmonton, and/or have been operational for less than ten years. EPCOR Drainage operates a network of ~ 30 rain gauges (number of gauges changes slightly over time) that are operational from May – October.

Because precipitation can be highly localized, it was assumed that EPCOR's network of rain gauges can generate better estimates of precipitation than the EIA or Blatchford stations alone. Rainfall estimates for May – October for Edmonton were calculated by taking the average of all reporting EPCOR rain gauges from 2010 – 2020. This data was graphically compared to precipitation data from the ECCC stations at EIA and Blatchford. While variability among the stations was evident, each produced relatively similar estimates of seasonal precipitation (data not shown). To construct the entire year of precipitation data within Edmonton, the precipitation data from November – April from the EIA station was added to the

May – October EPCOR Drainage network (Figure A4). November – April data from Blatchford were not used as this gauge did not have a complete record of data.

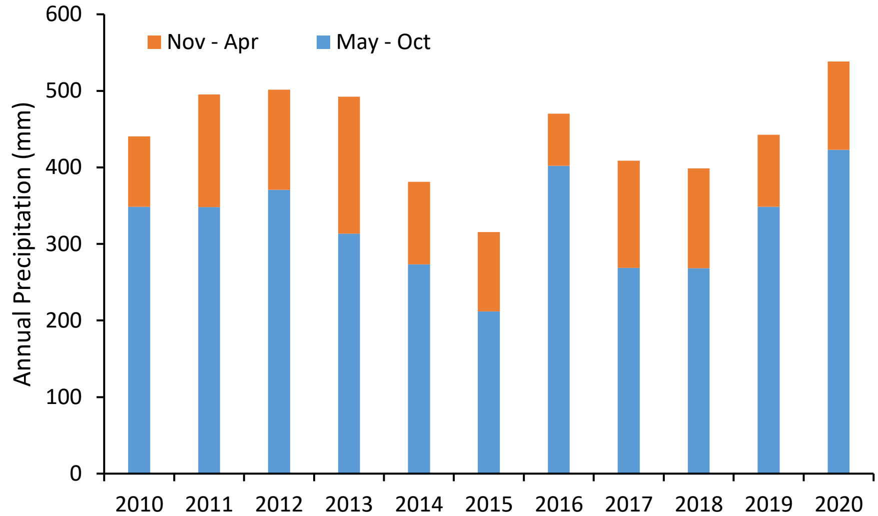



**Figure A4. Calculated Annual Precipitation for Edmonton, 2010 – 2020.**

As described above, LID facilities in Edmonton are assumed to provide storage for the majority of storm events. To determine the amount of rain that would be stored by LIDs, the following procedures were used. First, it was assumed that only precipitation falling from May – October would be captured by LIDs. Precipitation falling from November – April was assumed to be predominantly snow, and that spring runoff flows would generally not be captured by LID facilities due to the ground being frozen and that flows during spring runoff are typically high. Secondly, it was recognized that daily precipitation totals can overlook the fact that rain events can span two different dates. In addition to determining which days had rainfall totals > 15 mm, events where the two-day rain total exceeded 15 mm were also identified. It is noted that this approach is simplistic and does not capture the complexity of how LIDs function or how rainfall is distributed across the City of Edmonton. The amount of precipitation that can be captured by LIDs is a function of soil moisture, rainfall from the preceding days/weeks/months, evaporation, etc. A detailed analysis of the function of LIDs is beyond the scope of this assessment, and will presumably require an urban watershed model.

The amount of rain that exceeds 15 mm (both daily and two-day totals) is a small portion of the May – October precipitation (Figure A5). In other words, LID facilities in Edmonton are anticipated to store a majority of the May – October rainfall, and a fairly large portion of the annual precipitation that falls in their catchments. Based on the criteria described, the amount of precipitation that could be captured by LIDs ranged from 188 to 355 mm with an median of 285 mm. Utilizing projected growth of LID in Edmonton, the low, median and high precipitation values, the total amount of annual runoff captured by LID was estimated.

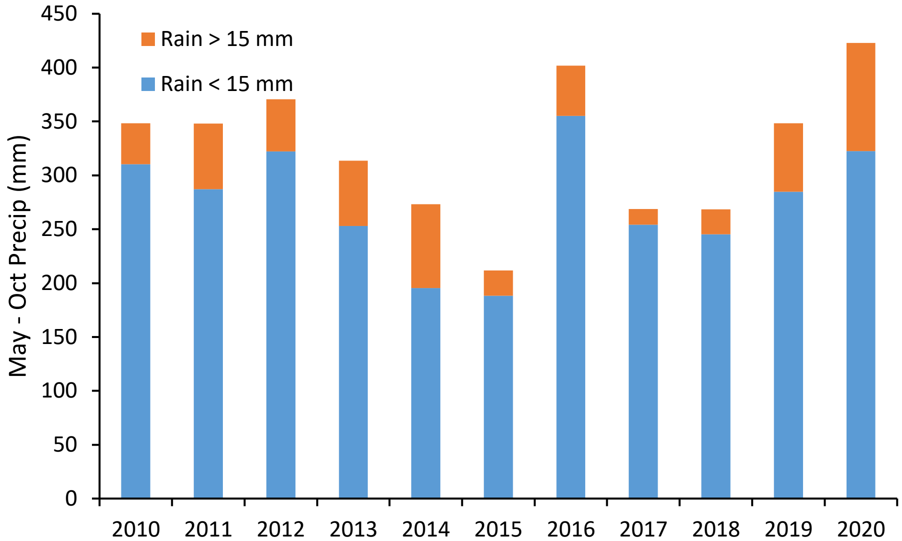



**Figure A5. Single day and two-day rainfall totals that above/below 15 mm, May – October, 2010 – 2020.**

*Removal efficiency of LIDs* – To generate estimates of the removal efficiencies of LIDs, a literature review was conducted as sufficient monitoring data is not available from local LIDs (Table A5). Removal efficiency data of LIDs was not abundantly available, and frequently came from jurisdictions with different climates and soils. Improving the estimates of LID removal efficiency is a future area focus. Several parameters are known to have high removal efficiencies like TSS. However, other parameters such as chloride are known to have low removal efficiencies, and other parameters have wide ranges in the literature. The removal efficiencies used in these calculations reflect the magnitude, but also the range observed in the literature.

**Table A5. Estimates removal efficiencies of LID facilities**

| | Removal Efficiency (%) | | | |
|---|---|---|---|---|
| **Parameter** | **Low** | **Medium** | **High** | **References** |
| TSS | 85 | 90 | 95 | CoE (2014), Ontario MOE (2017) |
| Chloride | 0 | 5 | 10 | Cockerill et al. (2018), Ontario MOE (2017) |
| Ammonia | 50 | 70 | 90 | US EPA (2000) |
| TKN | 10 | 30 | 50 | Walsh (2015), US EPA (2000) |
| $NO_3 + NO_2$ | 0 | 10 | 20 | Kim et al. (2003), Ontario MOE (2017) |
| TP | 30 | 50 | 70 | CoE (2014), Ontario MOE(2017), US EPA (2013) |
| *E. coli* | 50 | 70 | 90 | Hunt et al. (2008), Zhang et. al (2011) |

Future Loads from CSOs – The City of Edmonton and now EPCOR have been reducing the volume and loads from CSOs discharging into the NSR through the 1999 CSO Long Term Control Plan and 2012 Combined Sewer Discharge Strategy (CSDS: 2013). The long-term vision is to eliminate CSOs or provide environmental benefits equivalent or better than those provided by sewer separation. The effectiveness of this strategy in reducing discharges and loads is demonstrated in subsequent sections; loads since 2017 have been significantly lower compared to previous years. Continual reduction of CSO loads will be achieved through LID practice implementation and that is included in this load projection. Other CSO reduction strategies are underway (e.g. dry ponds) but at present load reductions are difficult to quantify and are not included in this assessment. High, median and low loads were based on historical annual loading since 2017. Loads from the CSOs could increase due to climate change and more frequent and intense storms; however, this cannot be accurately estimated, and is not included in this assessment. Reductions of stormwater volumes are anticipated to occur due to the implementation of LID as described above. EPCOR is working on a Sanitary Integrated Resource Plan (SanIRP) which is anticipated to include future projections of CSO discharges.

*Future Loads from Gold Bar WWTP* – As part of the Gold Bar Integrated Resource Plan (IRP), future increases in effluent volumes are based on population growth, residential water use efficiency, and increases/decreases from commercial customers. No significant upgrades are planned by 2040 that would significantly change effluent concentrations. Therefore future increases in loads were based on projected increases in effluent volumes due to population growth. High and low growth projections were based on a ± 20% difference from the projected (medium) increase. Loads from the Gold Bar's bypass are based on stormwater infiltration into the sanitary system, similar to CSO discharges. Like CSO discharges, it was assumed the bypass loads were remain similar to load observed since 2017.

*Future Loads from Capital Region WWTP* – Similar to the Gold Bar WWTP, the Capital Region projects future increases in effluent volumes based on population growth, water use efficiency and increases/decreases from commercial customers. Based on conversations with Capital Region WWTP staff, no significant upgrades are planned by 2040 that would significantly change effluent concentrations. Therefore future increases in loads were based on projected increases in effluent volumes. High and low growth projections were based on a ± 20% difference from the projected (medium) increase.

Future Loads from EL Smith and Rossdale Water Treatment Plants – The production of residuals from the WTPs are a function of water quality in the NSR and water demand from EPCOR's customers (i.e., how much water the WTPs treat). For the sake of this exercise, it was assumed that water quality in the NSR in the future would remain similar to current conditions, and that future climate change will not have a significant impact on residuals production. Water demand is projected based on population increases, water demand and trends in commercial and regional customers. High and low growth projections were based on a ± 20% difference from the projected (medium) increase.

This TLP is an attempt to quantify future loads under current management and implementation plans. Strategic Direction 4 will discuss plans for improving current load estimation methods and projections. Strategic Direction 2 and 3 will discuss management actions that will be undertaken or investigated to further reduce overall loads to the NSR and its tributaries within the City of Edmonton boundary.

# APPENDIX B: HISTORICAL FLOWS AND LOADS: (2010-2021)

## Flow volumes

There are three major discharge pathways to the NSR and its tributaries within from the City of Edmonton that EPCOR manages: stormwater, wastewater, and water treatment plant residuals. These pathways combine to discharge 270,400 ML per year of water to the NSR and its tributaries. Because of combined pipes in some areas of the City, there are times where wastewater and stormwater mix and enter the NSR or its tributaries.

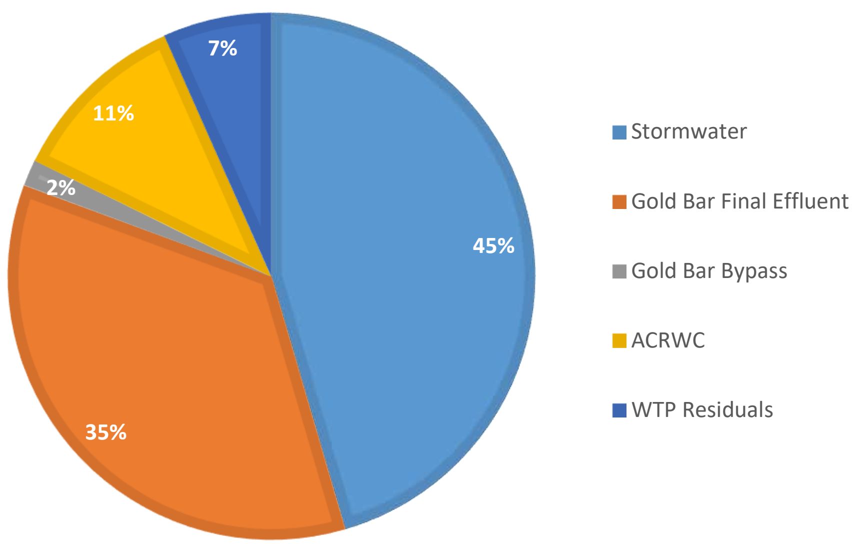



**Figure B1. Total annual average volume (2010-2019) distribution to the NSR from each source. CSO discharges make up less than 0.5% of the flow and are not included in the graph.**

Storm water flows contribute on average 123,000 ML per year to the NSR and its tributaries (Figure B2). Flows from the storm sewer system are continuous due to baseflow infiltration; however, most of the storm water volume (and loads) originates during the 75 – 115 runoff events that occur each year, most of which occur during spring runoff through early summer. To put that in context an average of 304,216 ML of precipitation falls on the City annually.

Treated wastewater from the Gold Bar and ACRWC WWTPs are continuous discharges that contribute on average 95,000 ML and 30,000 ML per year, respectively.

The Gold Bar WWTP also has a bypass that discharges on average 4,400 ML per year over a period of 69 to 92 days a year, corresponding to runoff events. Over half of the bypass events last less than 8 hours, 90% of the events last less than 18 hours, and only 5% of events last greater than 24 hours.

Prior to 2015, CSOs contributed on average over 2,000 ML per year over 40 days a year; however, since improvements to the collection system, CSOs now discharge on average 600 ML per year over 18 days a year (Figure B3). Components of the CSO Control Strategy that have been implemented include:

- Modifications to existing fixed weirs and stop logs at CSO#18

- Opportunistic sewer separation (267 ha separated)
- Closure of Strathearn and Milll Creek Central CSOs
- Completion of Highlands Phase IV tunnel crossing
- Gold Bar WWTP upgrades including: headworks, plant bypass and outfall improvements, 600 MLD of enhanced primary treatment (EPT) of bypass flows

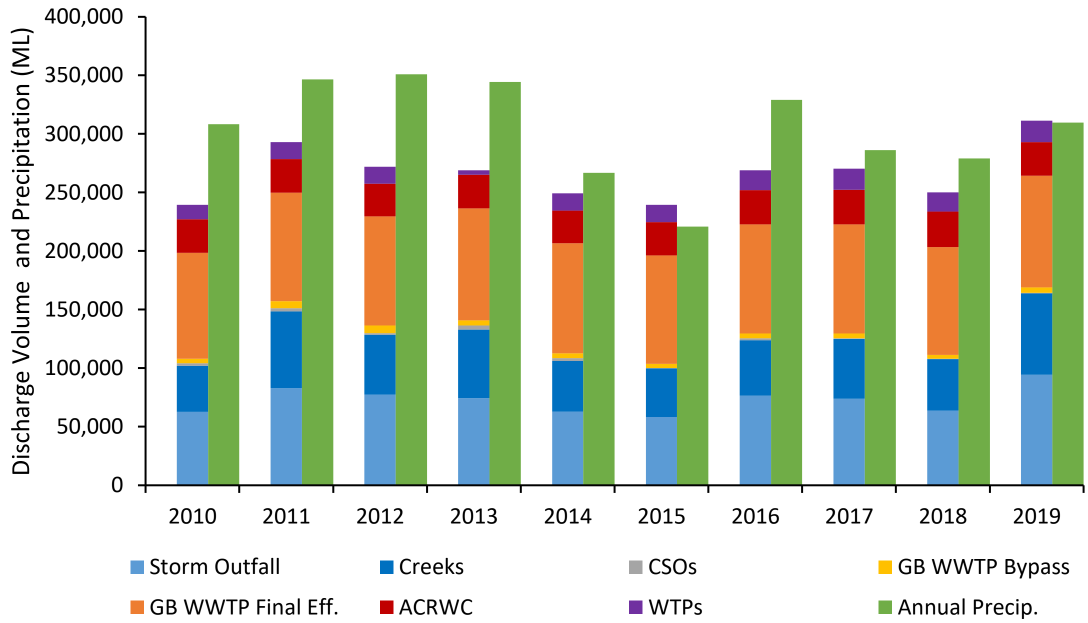



**Figure B2. Annual Precipitation and Discharge Pathway Total Volumes, 2010 – 2019.**

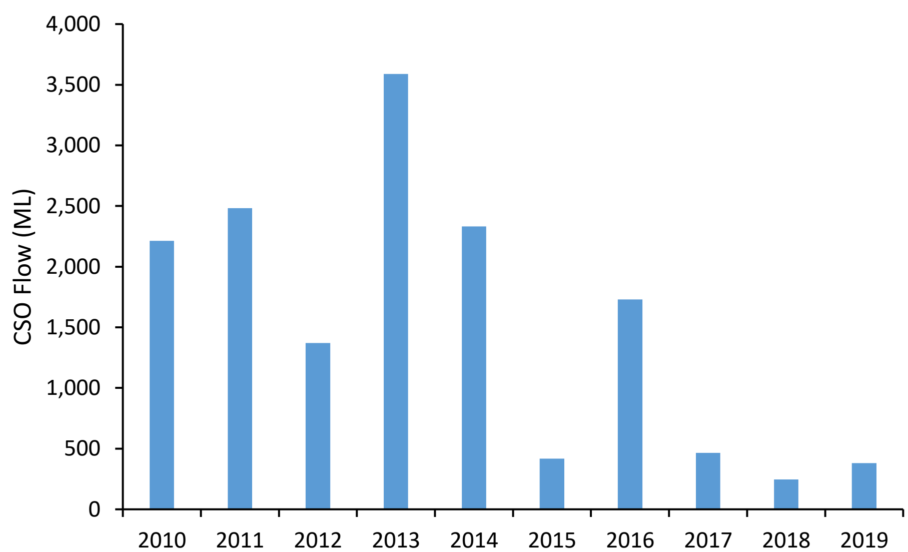



**Figure B3. CSO flows per year, 2010 – 2019.**

WTPs discharge residuals every day, sometimes as 4-6 pulses, and sometimes as a continuous discharge, dependent upon river conditions. The annual volume of residuals discharged to the NSR is 18,000 ML but the timing of those discharges is difficult to estimate because there are not currently flow meters on the six wastestream outfalls.

Periods of low flow in the NSR typically occur during winter months, and not surprisingly, flows from storm outfalls, creeks, CSOs and the Gold Bar WWTP bypass are also low during this period (Table B1). As flows in the NSR increase, generally so do flows from each of these locations, unless there are localized precipitation/melt events. For example, during the winter months, early spring runoff from the urban environment can result in elevated stormwater flows, and yet have little impact on flows in the NSR. During low flow conditions, the median stormwater flow is 0.5 $m^3/s$, but can as high as 13.3 $m^3/s$ (**Error! Reference source not found.**1), which is more than 10% of the flow in the NSR. Flows from the Gold Bar WWP final effluent are relatively steady, and show a smaller range of variation compared to stormwater.

**Table B1. Flow ($m^3/s$) statistics of storm outfalls, creeks, CSOs, and Gold Bar WWTP under each flow category (2010 – 2019).**

| NSR Flow Category | Statistic | Total Storm Outfall | Total Creek | Total CSO | Gold Bar Final Effluent | Gold Bar Bypass |
|---|---|---|---|---|---|---|
| **Low Flow** (< 110 $m^3/s$) | Min | 0.1 | 0.0 | 0.0 | 1.2 | 0.0 |
| | Median | 0.4 | 0.1 | 0.0 | 2.7 | 0.0 |
| | Max | 7.9 | 4.1 | 0.4 | 3.5 | 0.9 |
| **Dry** (110 - 150 $m^3/s$) | Min | 0.1 | 0.1 | 0.0 | 1.4 | 0.0 |
| | Median | 0.7 | 0.3 | 0.0 | 2.8 | 0.0 |
| | Max | 19.0 | 14.2 | 1.0 | 3.9 | 1.9 |
| **Midrange** (150 - 180 $m^3/s$) | Min | 0.2 | 0.1 | 0.0 | 2.4 | 0.0 |
| | Median | 1.1 | 0.7 | 0.0 | 2.9 | 0.0 |
| | Max | 24.3 | 13.3 | 2.0 | 3.9 | 2.9 |
| **Moist** (180 - 300 $m^3/s$) | Min | 0.2 | 0.1 | 0.0 | 2.1 | 0.0 |
| | Median | 1.6 | 1.3 | 0.0 | 3.0 | 0.0 |
| | Max | 38.6 | 26.3 | 5.5 | 4.0 | 6.4 |
| **Wet Flow** (> 300 $m^3/s$) | Min | 0.3 | 0.1 | 0.0 | 2.1 | 0.0 |
| | Median | 2.7 | 2.6 | 0.0 | 3.2 | 0.0 |
| | Max | 54.9 | 35.8 | 11.7 | 4.3 | 10.2 |

## Total Phosphorus

Historical total phosphorus loads from all EPCOR and ACRWC sources average 340 kg/day with 46% of that from stormwater and 30% originating from Gold Bar WWTP final effluent. During periods of moderate flow (110-300 $m^3/s$) the average load is 236-400 kg/day. On an annual basis, only 16% of TP in the NSR at Edmonton is from EPCOR and ACRWC discharges, as a majority originates from upstream sources. However that is because the greatest TP flux tends to occur during high flow and it is often adsorbed to sediment. During lower flow periods (< 180 $m^3/s$) about 60% of TP is from EPCOR and ACRWC discharges.

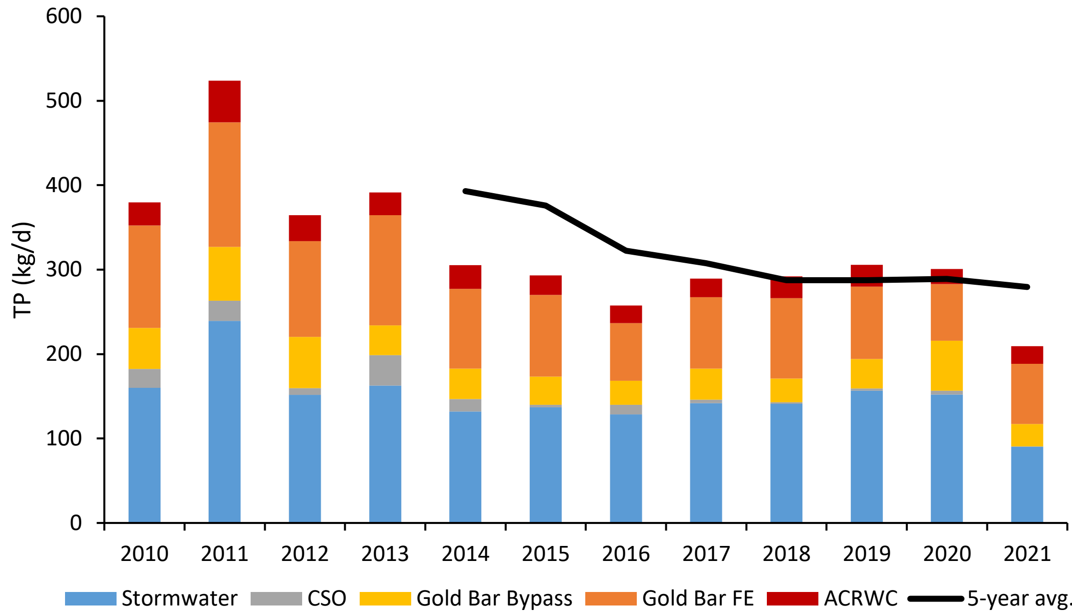



**Figure 6. Average Daily Loads (kg/d) for TP from 2010 to 2021.**

**Table 6. Average Daily Loads (kg/d) for Total Phosphorus**

| Flow Category [1] | 50th Percentile Loads at Pakan | Historical (2010-2019) | | | | | | | 2020 | 2021 |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Upstream Load | Storm Load | CSO Load | Gold Bar Final Effluent Load | Gold Bar Bypass Load | ACRWC Load | Total City Load | Total City Load | |
| All | - | 2,156 | 155 | 13 | 104 | 41 | 28 | 340 | 301 | 209 |
| Low Flow | 101 | 97 | 48 | 0 | 91 | 8 | 18 | 165 | 140 | 144 |
| Dry | 167 | 140 | 99 | 2 | 91 | 23 | 22 | 236 | 163 | 112 |
| Midrange | 168 | 214 | 131 | 5 | 91 | 33 | 23 | 284 | 143 | 194 |
| Moist | 591 | 636 | 189 | 17 | 110 | 51 | 32 | 399 | 225 | 286 |
| High Flow | 4,106 | 11,587 | 298 | 42 | 138 | 86 | 46 | 610 | 346 | 578 |

[1] Low flows: < 110 $m^3/s$ (10% of time), Dry: 110 – 150 $m^3/s$ (30% of time), Midrange: 150 – 180 $m^3/s$ (20% of time), Moist: 180 – 300 $m^3/s$ (30 % of time), High flow: > 300 $m^3/s$ (10% of time)

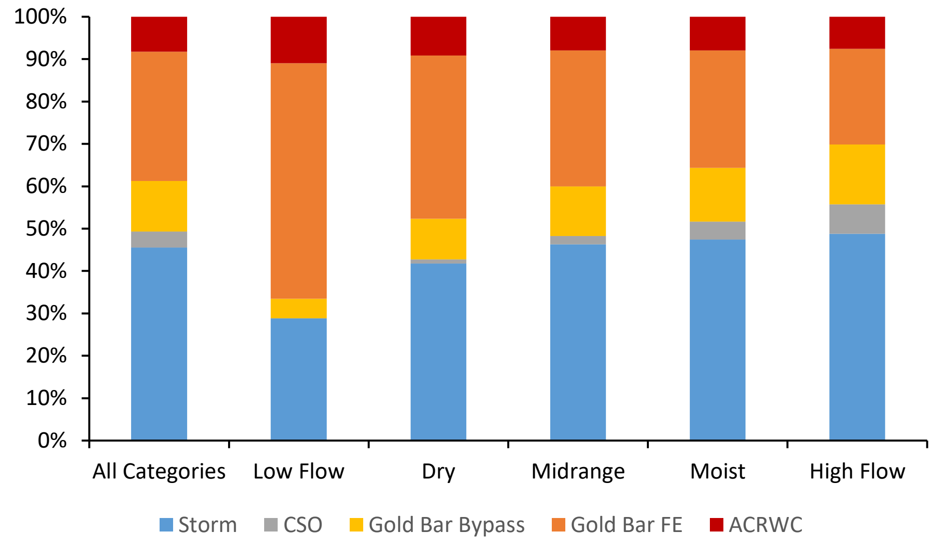



**Figure B5. Historical load distribution of total phosphorus under various flow categories (2010 – 2019)**

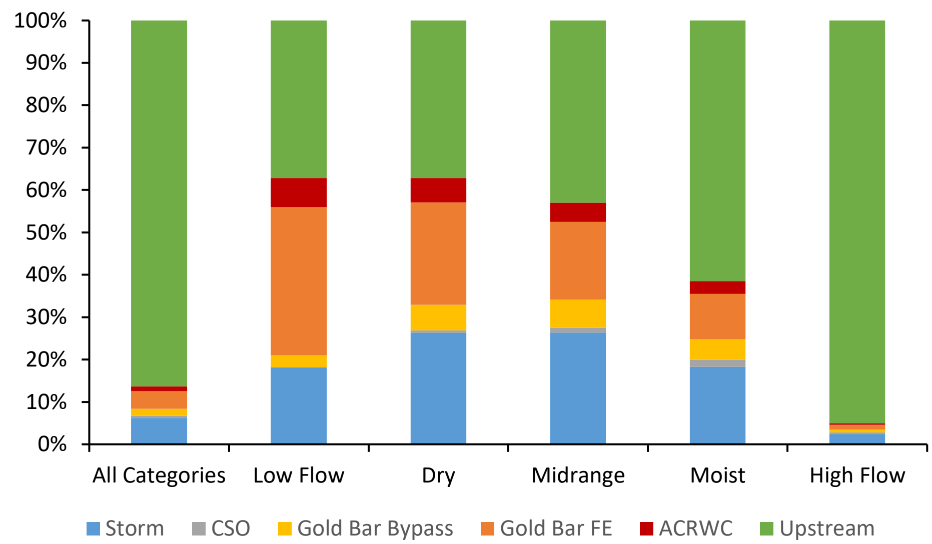



**Figure B6. Historical load distribution of total phosphorus under various flow categories, including upstream sources (2010 – 2019)**

The flows and loads from the stormwater, CSOs and Gold Bar WWTP bypass are highly intermittent and are the result of large precipitation/runoff events that add significant loads during a short period of time. During days with no runoff, loads from these sources are generally negligible. In contrast, the Gold Bar WWTP final effluent represents a low, but continuous load of total phosphorus.

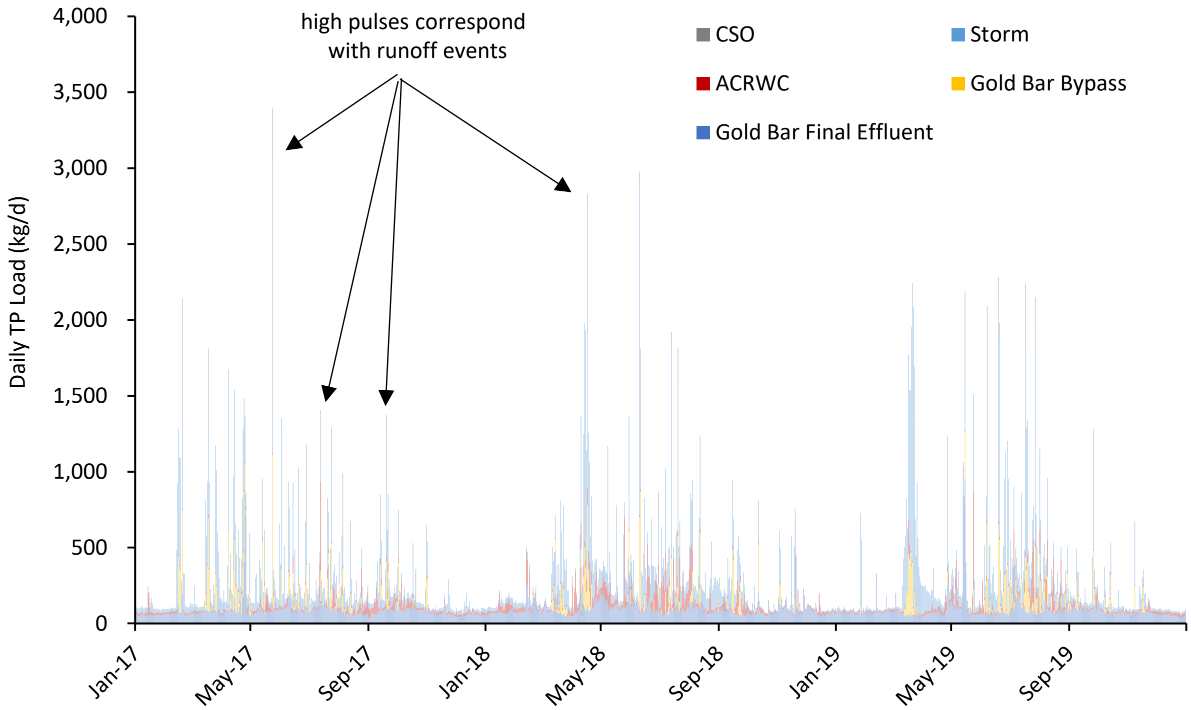



**Figure B7. Daily load of total phosphorus by source (excluding upstream sources), 2017 – 2019**

Historical TP loads from the Gold Bar WWTP are variable year to year, from both the final effluent and the bypass, but loads have reduced in recent years. Volumes from the final effluent have had little variation of the past 10 years, so any reductions in final effluent loads would be the result of improved removal by the WWTP. Reduced TP loads from the bypass are roughly correlated with reduced volumes which were achieved by improvements to the City's collection system, which have attenuated peak flows to the WWTP.

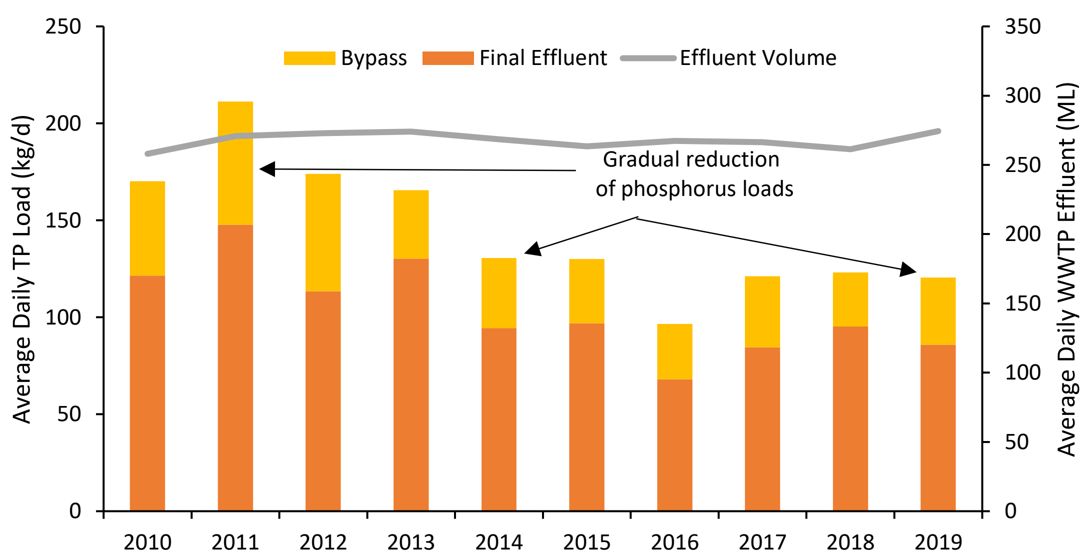



**Figure B8. Historical daily average loads of total phosphorus from the Gold Bar WWTP, 2010 – 2019**

Historical TP loads from stormwater have been quite consistent year-to-year and do not appear to be linked with trends in precipitation (not shown) or annual runoff. This trend is initially surprising, as runoff events result in increased phosphorus loading; however, high loads of particulate material are often accompanied with the 'first-flush' of a runoff event, and the tail end of prolonged rain events typically has much lower particulate material. In other words, a prolonged rain event of 30 mm, may not result in more phosphorus loading than a short but intense 5 mm rain event.

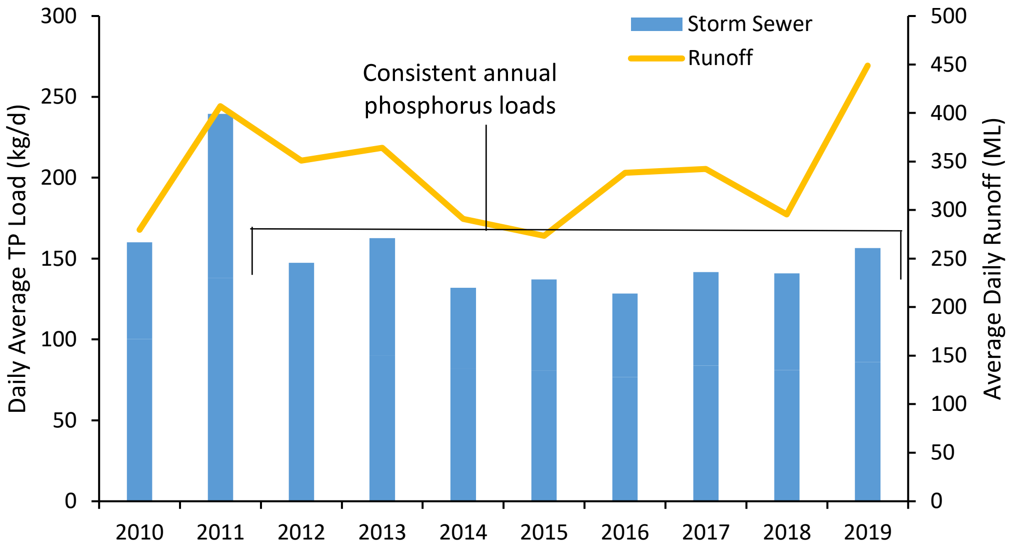



**Figure B9. Daily average loads of total phosphorus from storm water, 2010 – 2019**

## Ammonia

Historical total ammonia loads from all EPCOR and ACRWC sources average 1,309 kg/day with 56% of that originating from the Gold Bar WWTP and 20% from stormwater. During period of moderate flow (110-300 $m^3/s$), the average load is 1,073-1,416 kg/day. Insufficient data is available to estimate daily background concentrations of ammonia in the NSR; however, ammonia is frequently below detection limits upstream of Edmonton, except during spring runoff; therefore loads from upstream are anticipated to be small.

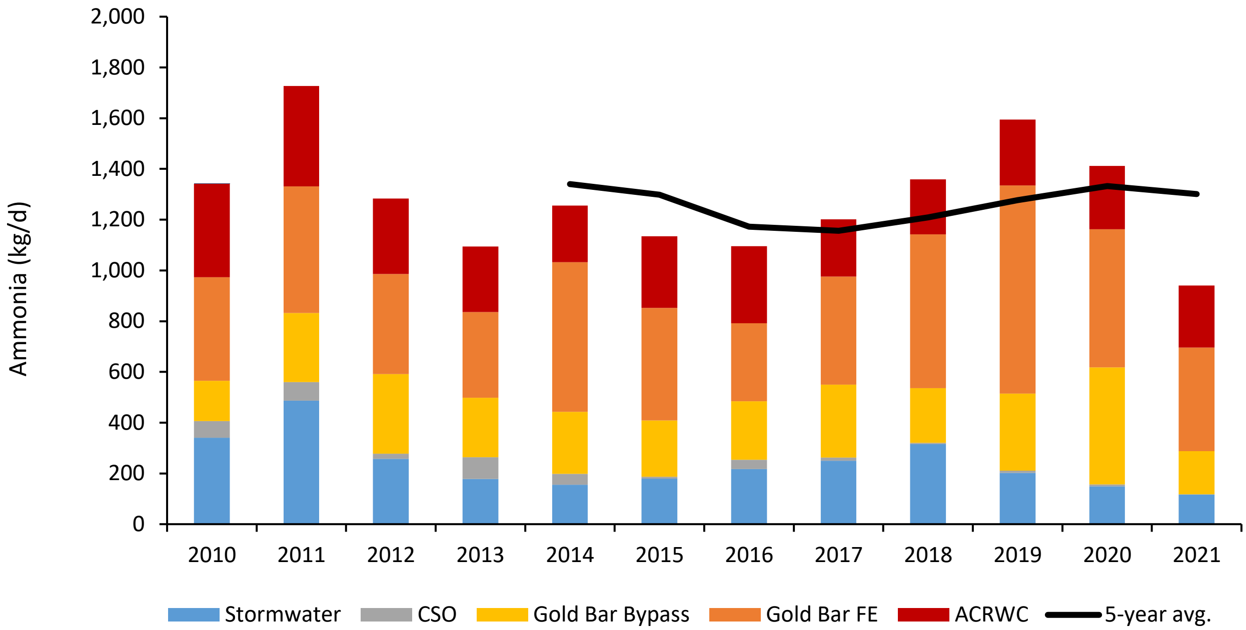



**Figure 7. Average Daily Loads (kg/d) for ammonia from 2010 to 2021.**

**Table B3. Average Daily Loads (kg/d) for Ammonia**

| **Flow Category** [1] | **50th Percentile Loads at Pakan** | **Historical (2010-2019)** | | | | | | | **2020** | **2021** |
|---|---|---|---|---|---|---|---|---|---|---|
| | | **Storm Load** | **CSO Load** | **Gold Bar Final Effluent Load** | **Gold Bar Bypass Load** | **Gold Bar Approval Load** | **ACRWC Load** | **Total City Load** | **Total City Load** | |
| All | - | 259 | 36 | 248 | 483 | 1,877 | 283 | 1,309 | 1,412 | 940 |
| Low Flow | 1,257 | 170 | 0 | 25 | 680 | 2,080 | 299 | 1,174 | 1,271 | 1,123 |
| Dry | 1,045 | 214 | 7 | 129 | 522 | 1,978 | 267 | 1,138 | 1,181 | 671 |
| Midrange | 389 | 233 | 17 | 218 | 382 | 1,689 | 223 | 1,073 | 878 | 1,024 |
| Moist | 581 | 299 | 46 | 294 | 476 | 1,802 | 302 | 1,416 | 924 | 1,081 |
| High Flow | 1,594 | 359 | 114 | 573 | 399 | 1,845 | 334 | 1,779 | 2,182 | 1,065 |

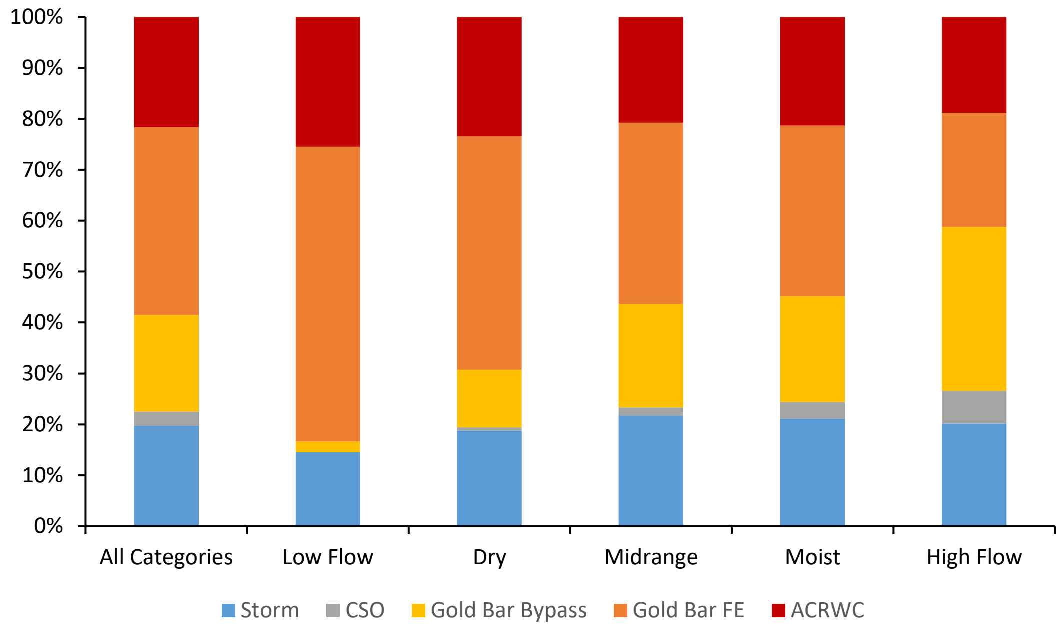



**Figure B11. Load apportionment of total ammonia under various flow categories.**

Loads from the WWTPs are seasonal, with increased loads during the winter and spring months due to the cold temperatures limiting the conversion of ammonia to nitrate. During periods of low flow (i.e., typically winter months) the final effluent from the WWTPs provide a continuous high source of ammonia loading. Highly intermittent loading also originates from the Gold Bar bypass during precipitation/runoff events, and becomes the dominant source of loading during periods of higher flow, which coincide with warmer months when loading from the final effluent is typically lower. Thus during the winter months, ammonia loading is dominated by continuous sources of loading, but the summer months are largely intermittent loading.

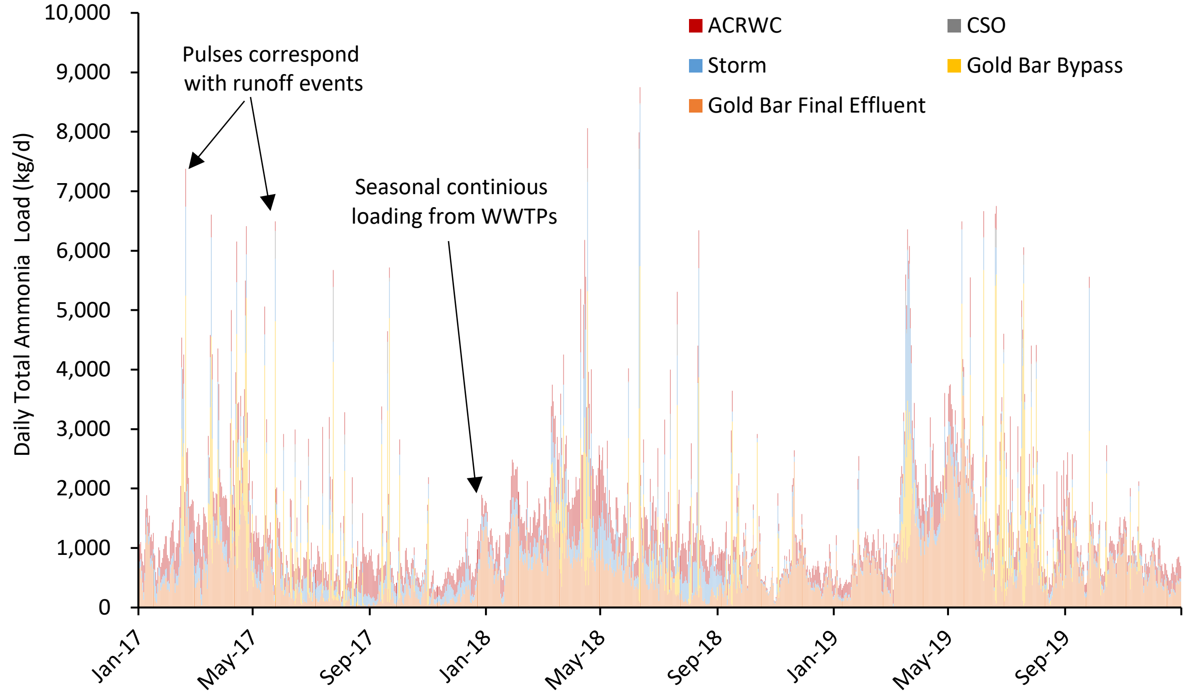



**Figure B12. Daily load of ammonia by source, 2017 – 2019**

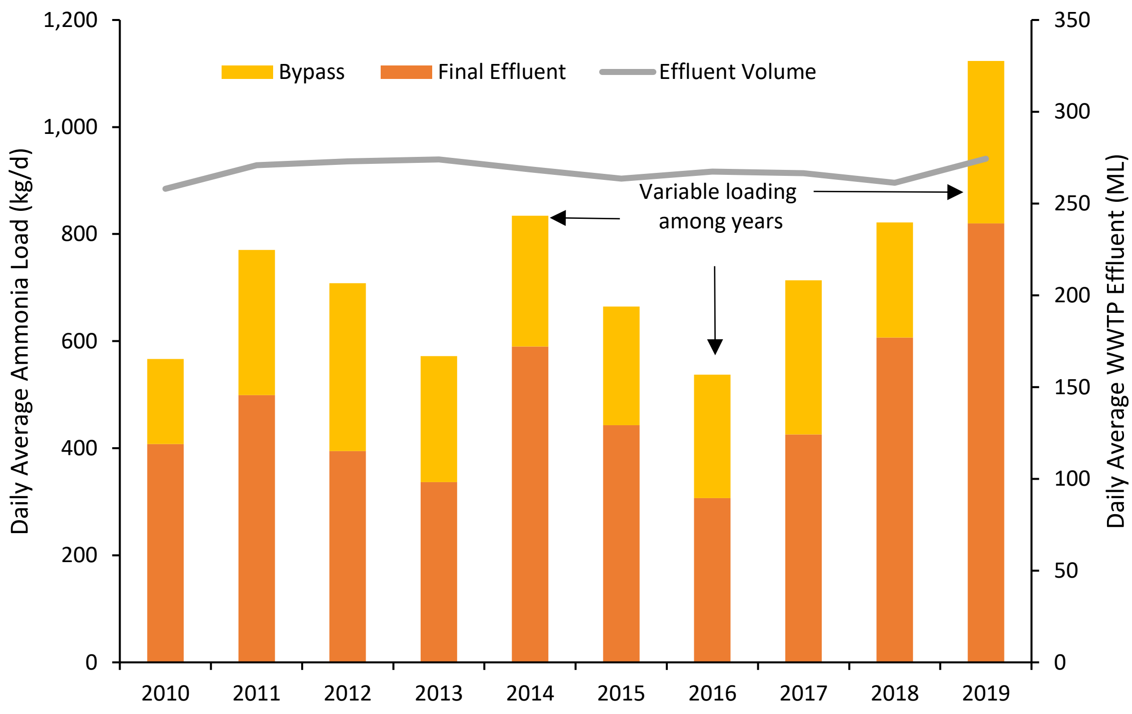



**Figure B13. Daily average loads of ammonia from the Gold Bar WWTP, 2010 - 2019**

## Nitrate plus Nitrite

Historical total nitrate plus nitrate loads from all EPCOR and ACRWC sources average 4,192 kg/day with 58% of that originating from the Gold Bar WWTP and 33% from the ACRWC WWTP. During period of moderate flow (110-300 $m^3/s$), the average load is 3,769-4,483 kg/day. Insufficient data is available to estimate daily background concentrations of nitrate in the NSR; however, nitrate concentrations in the NSR upstream of Edmonton is typically below 0.1 mg/L. therefore loads from upstream are anticipated to be small.

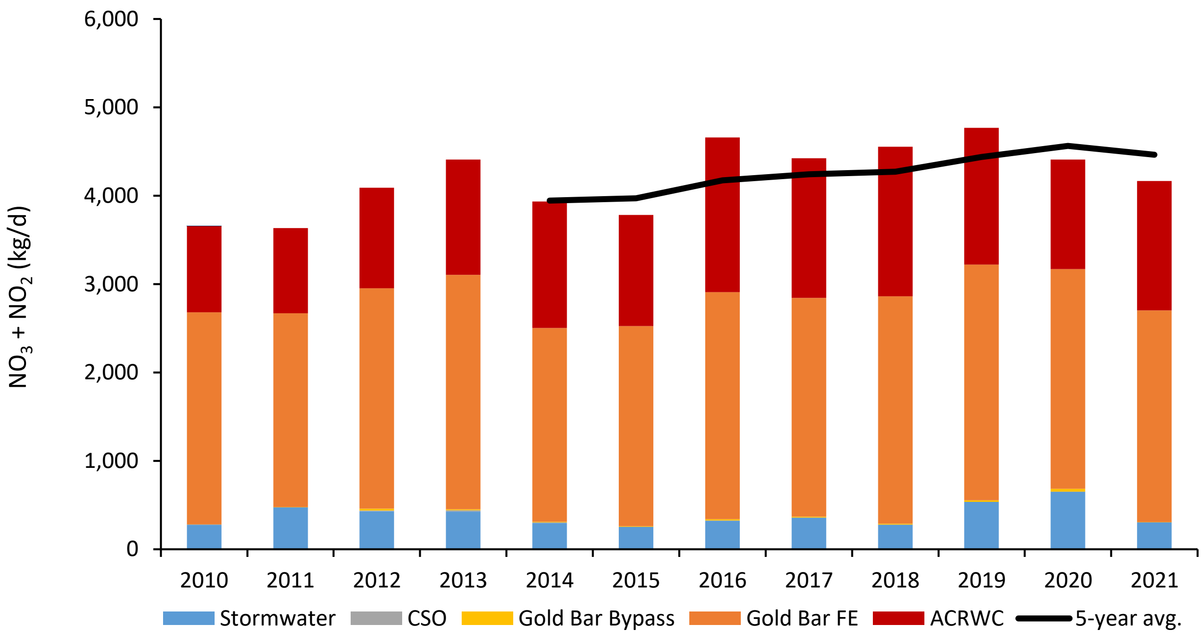



**Figure B14. Average Daily Loads (kg/d) for nitrate plus nitrite from 2010 to 2021.**

**Table B4. Average Daily Loads (kg/d) for nitrate plus nitrate**

| Flow Category [1] | 50th Percentile Loads at Pakan | Historical (2010-2019) | | | | | | 2020 | 2021 |
|---|---|---|---|---|---|---|---|---|---|
| | | Storm Load | CSO Load | Gold Bar Final Effluent Load | Gold Bar Bypass Load | ACRWC Load | Total City Load | Total City Load | |
| All | - | 365 | 4 | 2,448 | 11 | 1,364 | 4,192 | 4,240 | 4,108 |
| Low Flow | 3,101 | 69 | 0 | 2,243 | < 1 | 1,102 | 3,415 | 2,004 | 4,227 |
| Dry | 3,377 | 166 | 0 | 2,282 | 4 | 1,317 | 3,769 | 3,382 | 3,580 |
| Midrange | 2,203 | 296 | 1 | 2,432 | 5 | 1,446 | 4,180 | 3,844 | 3,891 |
| Moist | 3,034 | 488 | 4 | 2,555 | 10 | 1,427 | 4,483 | 4,159 | 4,474 |
| High Flow | 6,375 | 806 | 15 | 2,744 | 36 | 1,434 | 5,035 | 5,463 | 5,123 |

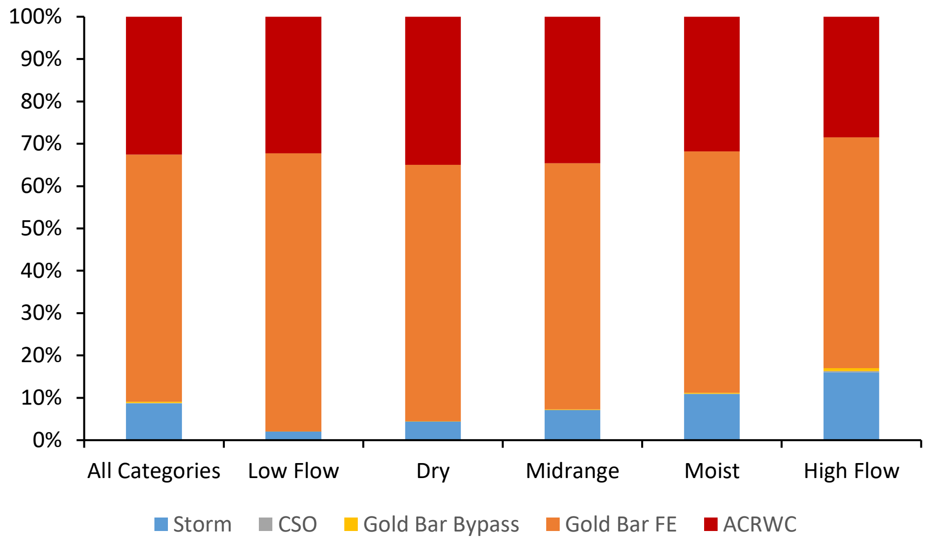



**Figure B15. Load apportionment of nitrate plus nitrite under various flow categories.**

Loads from the WWTPs are seasonal, with reduced loads during the winter and spring months due to the cold temperatures limiting the conversion of ammonia to nitrate; however, the WWTPs a continuous source of nitrate plus nitrite loading. Additional intermittent loading also originates from stormwater during precipitation/runoff events. Increases of nitrate concentrations and loading represent a continious steady source of nutrients for algae and aquatic plant growth.

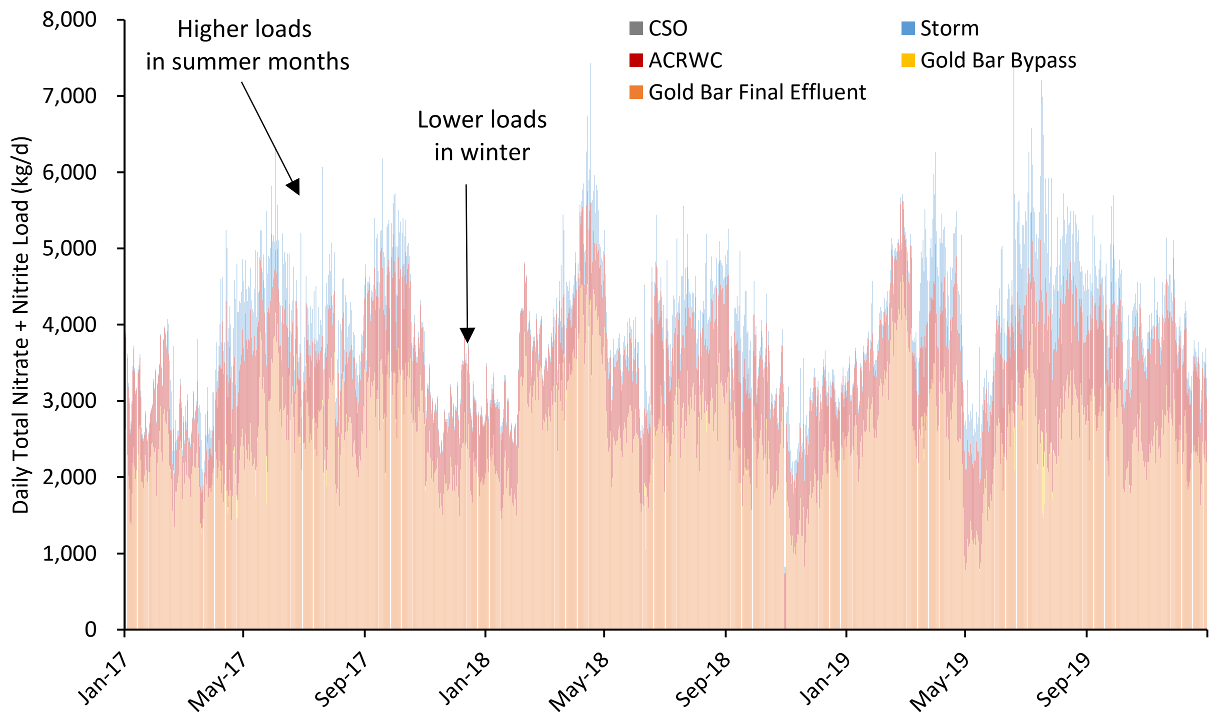



**Figure B16. Daily load of nitrate plus nitrite by source, 2017 – 2019**

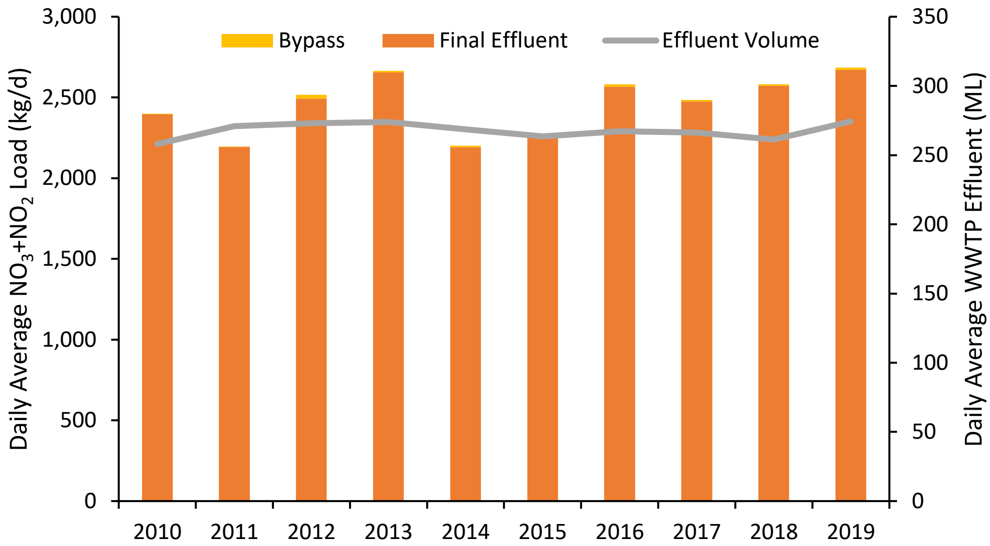



**Figure B17. Annual loads of nitrate plus nitrite from the Gold Bar WWTP, 2010 - 2019**

## Chloride

Chloride loads from all EPCOR and ACRWC sources are an average of 73,973 kg/day and show an increasing trend over the last 5 years. Approximately 62% of the chloride load is from the stormwater system, and the remaining 38% is from the Gold Bar WWTP. The relative proportion of loading does not change significantly with increasing flow in the NSR, the overall contribution of storm water does not change substantially.

Chloride is not monitored at the ACRWC WWTP and was not monitored at the Gold Bar WWTP in 2010 and 2011. Chloride concentrations at Gold Bar for 2010 – 2011 were estimated using chloride data from 2012 – 2019. Chloride concentrations were monitored biweekly at both the Gold Bar and ACRWC WWTP between 2020 - 2021 as part of the Effluent Characterization Program, and there was a strong relationship between the concentrations at the two WWTPs; therefore daily concentrations of chloride from the ACRWC WWTP were estimated based daily measured concentration from the Gold Bar WWTP. There is insufficient data available to estimate loads from the upstream watershed. Loads from the upstream watershed are anticipated to be relatively small.

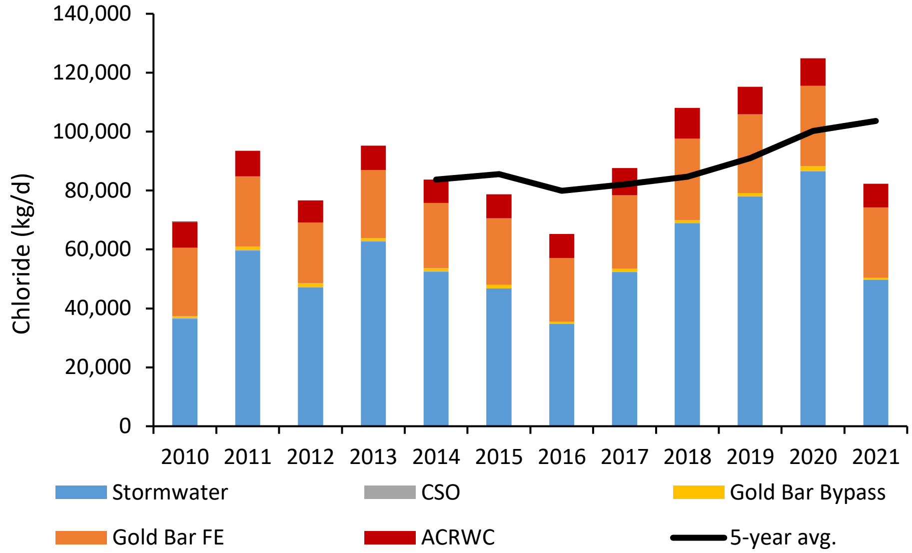



**Figure 8. Average Daily Loads (kg/d) for chloride from 2010 to 2021.**

**Table 7. Daily Average Loads (kg/d) of chloride**

| Flow Category [1] | 50th Percentile Loads at Pakan | Historical (2010-2019) | | | | | | 2020 | 2021 |
|---|---|---|---|---|---|---|---|---|---|
| | | Storm Load | CSO Load | Gold Bar Final Effluent Load | Gold Bar Bypass Load | ACRWC Load | Total City Load | Total City Load | |
| All | - | 53,876 | 175 | 23,617 | 1,000 | 8,647 | 87,315 | 124,864 | 82,318 |
| Low Flow | 37,895 | 27,122 | 1 | 25,002 | 222 | 8,956 | 61,302 | 120,228 | 82,018 |
| Dry | 39,398 | 50,510 | 67 | 25,666 | 921 | 9,082 | 86,245 | 99,848 | 72,546 |
| Midrange | 47,313 | 43,349 | 89 | 22,506 | 800 | 8,299 | 75,042 | 78,066 | 92,054 |
| Moist | 60,204 | 60,220 | 202 | 22,011 | 1,009 | 8,217 | 91,659 | 74,378 | 85,627 |
| High Flow | 133,307 | 75,900 | 529 | 22,295 | 1,782 | 8,606 | 109,112 | 198,000 | 100,740 |

[1] Low flows: < 110 $m^3/s$ (10% of time), Dry: 110 – 150 $m^3/s$ (30% of time), Midrange: 150 – 180 $m^3/s$ (20% of time), Moist: 180 – 300 $m^3/s$ (30 % of time), High flow: > 300 $m^3/s$ (10% of time).

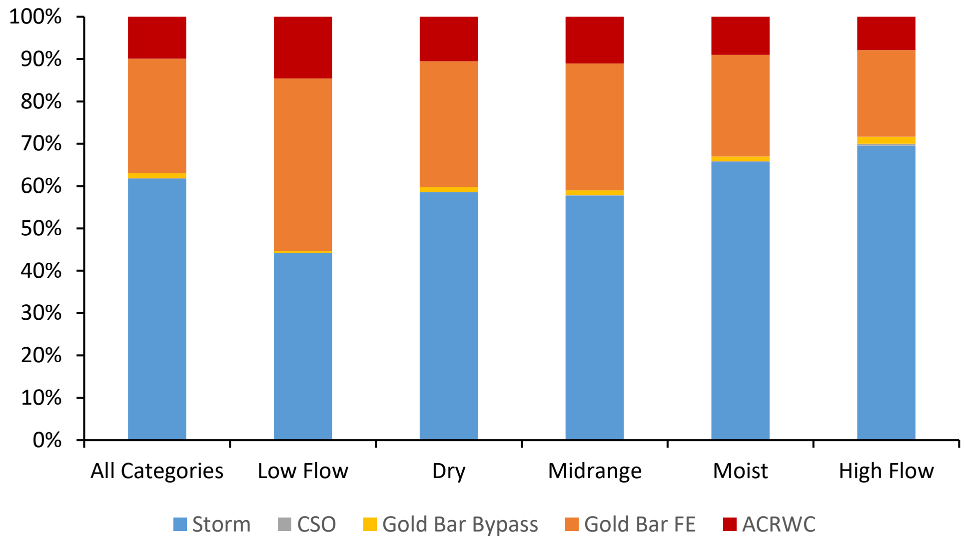



**Figure B19. Load apportionment of chloride under various flow categories.**

There is a continuous source of chloride loading from the Gold Bar WWTP, and that large amounts of loading from stormwater occur during very brief events in the spring and occasionally during the late fall, corresponding to runoff carrying loads of road salt. Summer storm events contribute very little additional loading.

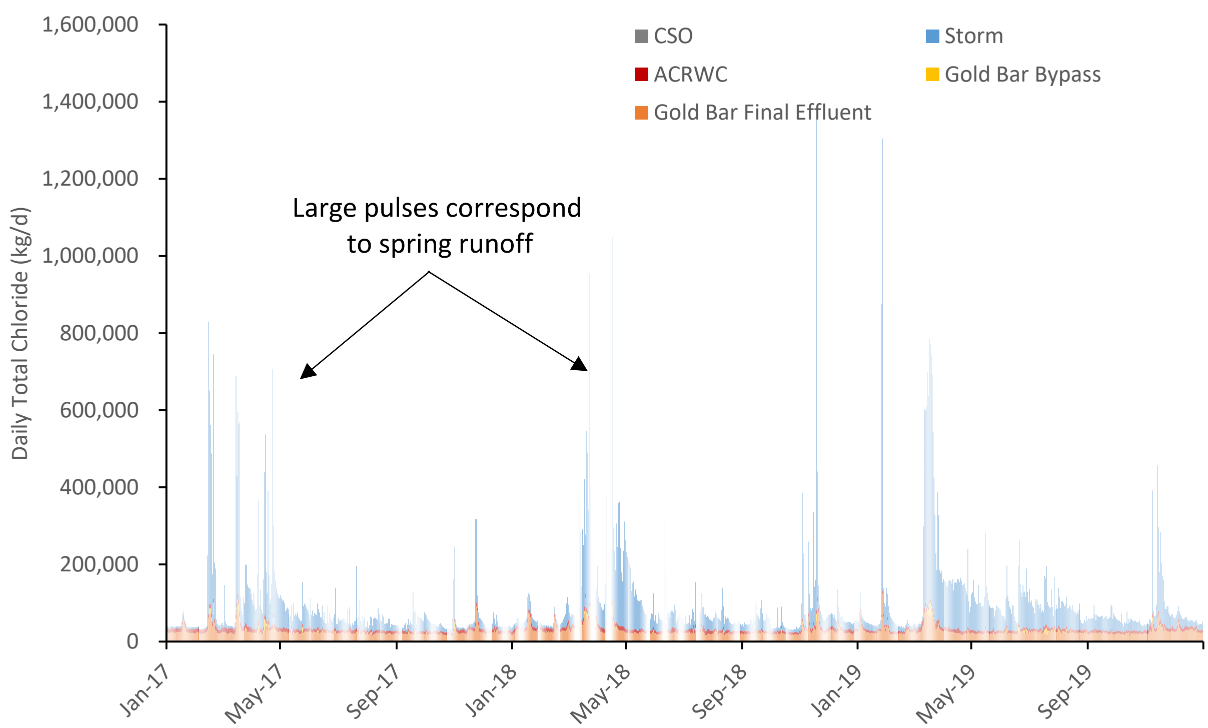



**Figure B20. Daily load of chloride by source, 2017 – 2019.**

Trends of chloride loading over the past decade have been relatively steady over time with increases over the last few years; increased loads tend to follow total chloride application values and total runoff volumes. The City of Edmonton applies an average of over 24,000 tonnes of road salt each year (over

41,000 kg/d of chloride). The City of Edmonton's loads of applied chloride is equal to approximately 70% of the stormwater loads to the NSR. Additional sources of chloride loads include residential and commercial applications of salt, previous salt build up on the landscape, and that applied by Alberta Transportation to the Anthony Henday.

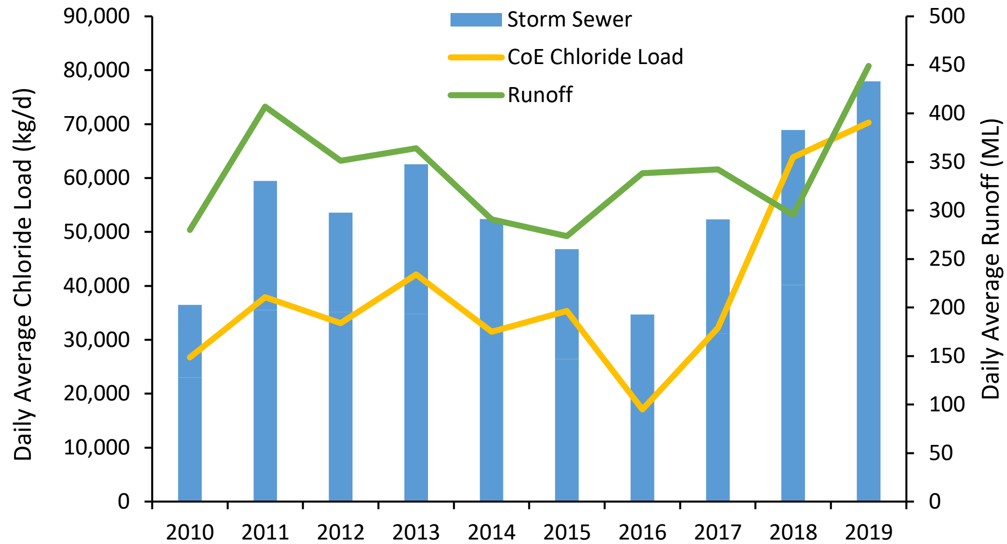



**Figure B21. Annual loads of chloride from the stormwater, 2010 – 2019.**

## *E. coli*

Historical *E. coli* loads from all EPCOR and ACRWC sources average 508 MPN x 10 $^{12}$ per day with 45% of that from the Gold Bar WWTP bypass and 37% originating from stormwater. During periods of moderate flow (110-300 $m^3/s$) the average load is 206-689 MPN x 10 $^{12}$ per day. On an annual basis, only 5% of the *E. coli* load originates from upstream sources.

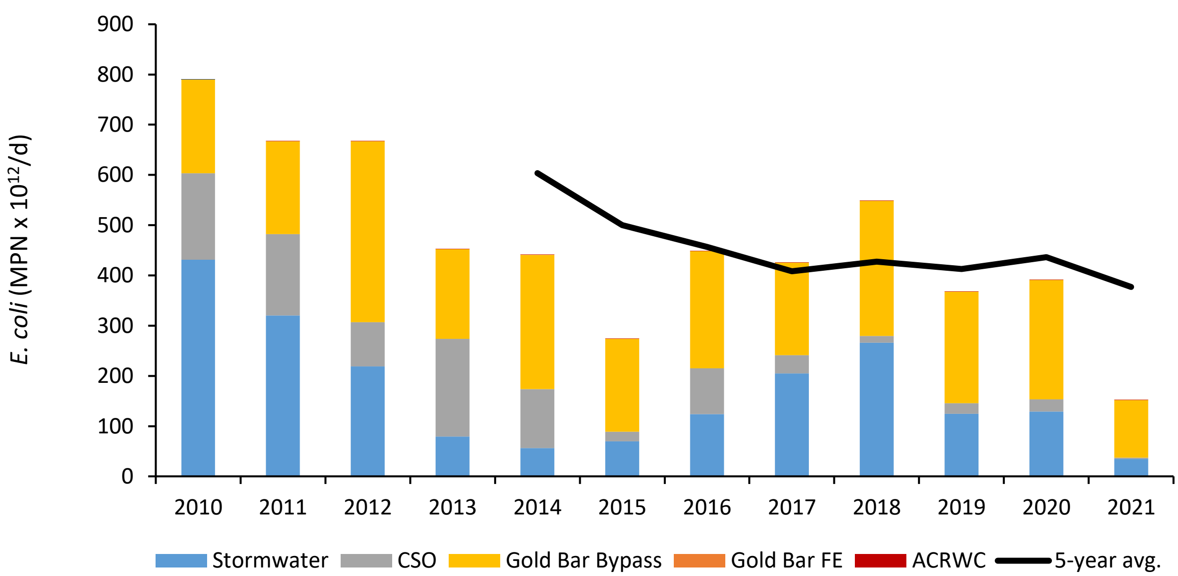



**Figure B22. Average Daily Loads (MPN x $10^{12}$/d) of *E. coli* from 2010 to 2021.**

**Table B6. Daily Average Loads (MPN x 10 $^{12}$/d) of *E. coli***

| Flow Category [1] | 50th Percentile Loads at Pakan | Historical (2010 – 2019) | | | | | | | 2020 | 2021 |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Upstream Load | Storm Load | CSO Load | Gold Bar Final Effluent Load | Gold Bar Bypass Load | ACRWC Load | Total City Load | Total City Load | |
| All | - | 26 | 189 | 92 | < 1 | 227 | < 1 | 508 | 391 | 152 |
| Low Flow | 1.5 | 2 | 94 | 0 | < 1 | 45 | < 1 | 139 | 32 | 12 |
| Dry | 0.8 | 7 | 99 | 14 | < 1 | 93 | < 1 | 206 | 126 | 45 |
| Midrange | 0.6 | 11 | 121 | 37 | < 1 | 165 | < 1 | 324 | 70 | 235 |
| Moist | 3.5 | 13 | 283 | 111 | < 1 | 295 | < 1 | 689 | 210 | 204 |
| High Flow | 42.9 | 109 | 342 | 321 | < 1 | 551 | < 1 | 1,214 | 961 | 513 |

[1] Low flows: < 110 m$^3$/s (10% of time), Dry: 110 – 150 m$^3$/s (30% of time), Midrange: 150 – 180 m$^3$/s (20% of time), Moist: 180 – 300 m$^3$/s (30 % of time), High flow: > 300 m$^3$/s (10% of time)

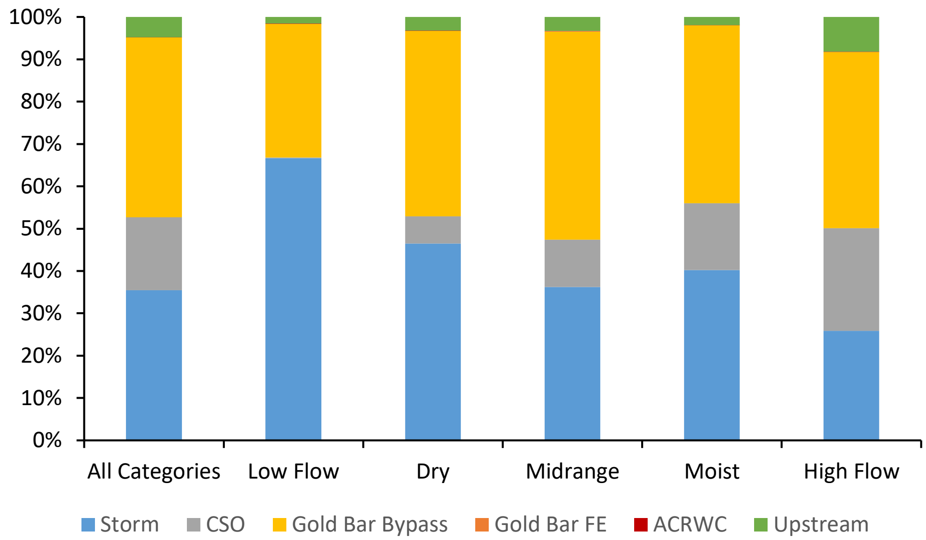



**Figure 9. Load apportionment of *E. coli* under various flow categories.**

*E. coli* loading is highly intermittent and dominated by the loading that occurs during wet events when flows bypass the Gold Bar WWTP. Prior to 2015, when improvements in the collection system were implemented, CSO loads of *E. coli* were comparable to those of the Gold Bar bypass. While difficult to discern from the figure below, stormwater provides a continual source of small amounts of loading which also significantly increased during runoff events.

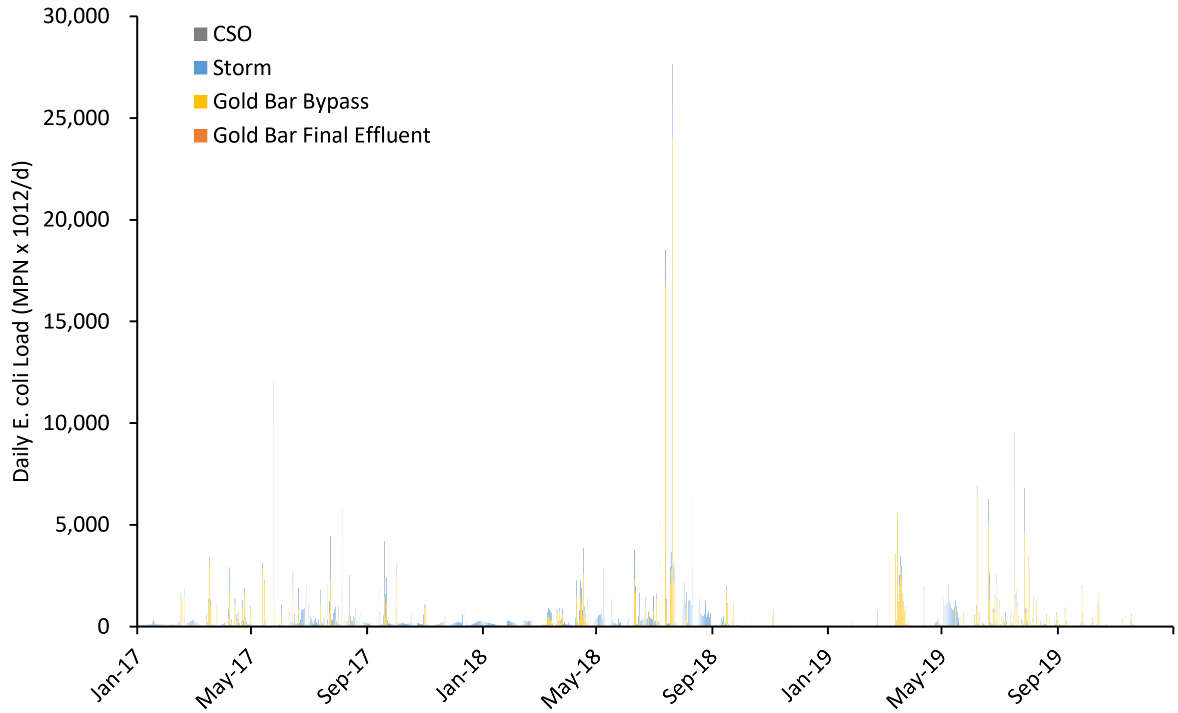



**Figure B24. Daily load of *E. coli* by source, 2017 – 2019**

*E. coli* loads from storm sewers are highly variable over time. *E. coli* loads were high in 2010 from the Quesnell outfall due to a leak of sanitary flows into the storm sewer; however, this was repaired, and by 2013 the loads from Quesnell were negligible. Beginning in 2015, *E. coli* loads steadily increased from the 30$^{th}$ Ave outfall due to sanitary flows entering the storm system, before rapidly declining in 2019. This was due to a cross connection of sanitary which was fixed in 2019. Typically sources of *E. coli* in storm water are related to illicit releases, cross connections, or double barrel infrastructure. Higher E. coli detections trigger investigation and rectification of issues. The loads from the remaining outfalls closely tracks the trends from Quesnell and 30$^{th}$ Ave. This is because loads from unmonitored outfalls, are based on average concentrations from the monitored outfalls. Therefore, when concentrations were elevated in either the Quesnell or 30$^{th}$ Ave outfall, the average applied to the unmonitored outfalls also increased. This effect is highly pronounced for *E. coli*, as this parameter can range multiple orders of magnitude, whereas other parameters much as phosphorus or ammonia typically increase by less than one order of magnitude when sanitary flows enter storm water. The consequence of using average concentrations to estimate unmonitored flows likely significantly over estimates the contribution of *E. coli* loading from unmonitored outfalls.

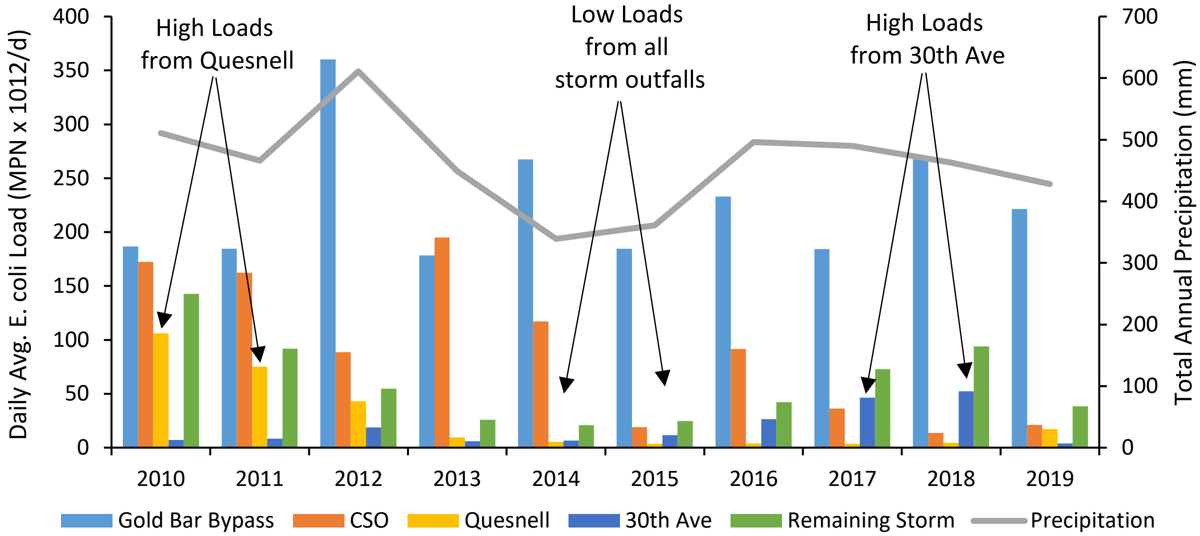



**Figure B25. Annual loads of *E. coli* from the Gold Bar WWTP Bypass and CSOs, 2010 – 2019**

Loads of *E. coli* from all EPCOR and ACRWC sources exceed the loads observed at Pakan by one or two orders of magnitude. Loads from storm water alone, also exceeded the loads at Pakan. This can only be explained by a significant amount of die-off of *E. coli* in the NSR. In other words, a significant portion of the *E. coli* that enters the NSR within the City of Edmonton dies before it reaches Pakan. Temperature is a significant variable that determines *E. coli* die-off, but a wide range of biological and environmental factors contribute to mortality. This is a critical aspect that needs to be considered when evaluating loads and models.

## Total Suspended Solids Loads

The total amount of TSS (Historical average of 58,120 kg/day) in the NSR from all EPCOR and ACRWC sources is less than 1.5% of the load of the NSR. The highest proportion of the load occurs during flow conditions under 180 $m^3/s$ where an average of 22% of the load comes from EPCOR and ACRWC discharges. Of the EPCOR and ACRWC loads, approx. 81% of TSS load is from storm water. With the implementation of LID practices, loads of TSS from all EPCOR sources will decrease by 2040.

Of note, for a number of the flow categories, the calculated loads upstream of the City are significantly greater than AEPA's estimated loads downstream at Pakan. The upstream loads were estimated based on daily average turbidity data collected from the E.L. Smith WTP and converted to daily TSS loads. In comparison, AEPA's loads were based on 139 samples collected at Pakan over a 12 year period. As TSS in the NSR is flashy and variable, it is likely that the estimation of TSS loads utilizing daily turbidity values generate a more accurate estimate of loading.

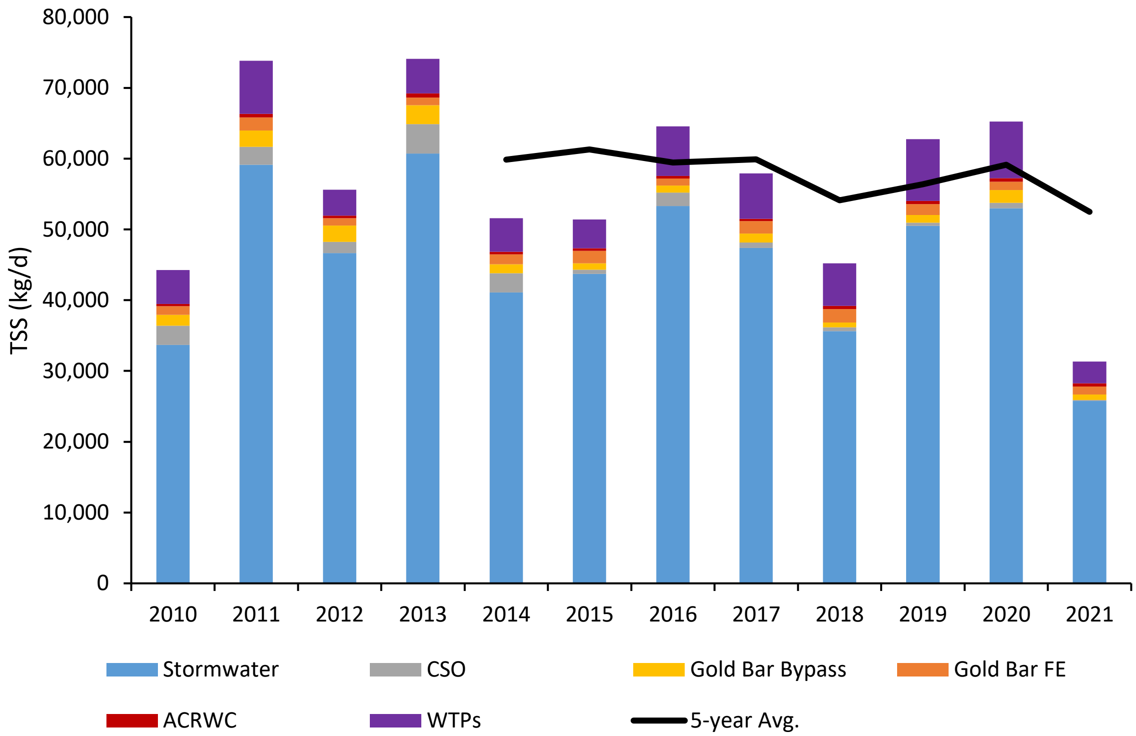



**Figure B26. Average Daily Loads (kg/d) for TSS from 2010 to 2021.**

**Table B7. Average Daily Loads (kg/d) for TSS**

| Flow Category [1] | 50th Perc. Loads at Pakan | Historical (2010 – 2019) | | | | | | | | Total City | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Upstream Load | Storm Load | CSO Load | Gold Bar Final Effluent Load | Gold Bar Bypass Load | ACRWC Load | WTP Load | Total City Load | 2020 | 2021 |
| All | - | 3,768,595 | 47,186 | 1,787 | 1,447 | 2,956 | 417 | 5,774 | 58,120 | 65,245 | 31,312 |
| Low Flow | 26,006 | 45,226 | 8,303 | 4 | 1,528 | 1,786 | 322 | 1,076 | 11,491 | 12,956 | 5,459 |
| Dry | 39,398 | 73,100 | 22,887 | 389 | 1,356 | 1,992 | 367 | 2,003 | 27,638 | 13,080 | 8,633 |
| Midrange | 95,904 | 169,723 | 31,325 | 868 | 1,331 | 2,148 | 365 | 3,610 | 38,317 | 9,489 | 21,282 |
| Moist | 413,338 | 882,249 | 57,999 | 2,022 | 1,486 | 3,222 | 460 | 7,650 | 71,353 | 24,009 | 50,520 |
| High Flow | 6,521,213 | 21,218,486 | 115,998 | 6,100 | 1,632 | 5,896 | 551 | 15,092 | 143,636 | 171,304 | 94,511 |

[1] Low flows: < 110 $m^3/s$ (10% of time), Dry: 110 – 150 $m^3/s$ (30% of time), Midrange: 150 – 180 $m^3/s$ (20% of time), Moist: 180 – 300 $m^3/s$ (30 % of time), High flow: > 300 $m^3/s$ (10% of time)

During all flow conditions, loads from the upstream watershed were by far the most significant contributor to TSS loads. As flows increase, so does the proportion that the upstream watershed contributes, where it contributes over 99% of the load during high flow conditions. Of the remaining sources of loading, stormwater is the next largest sources of loading. The WTPs contribute very little TSS loading, even under low flow conditions.

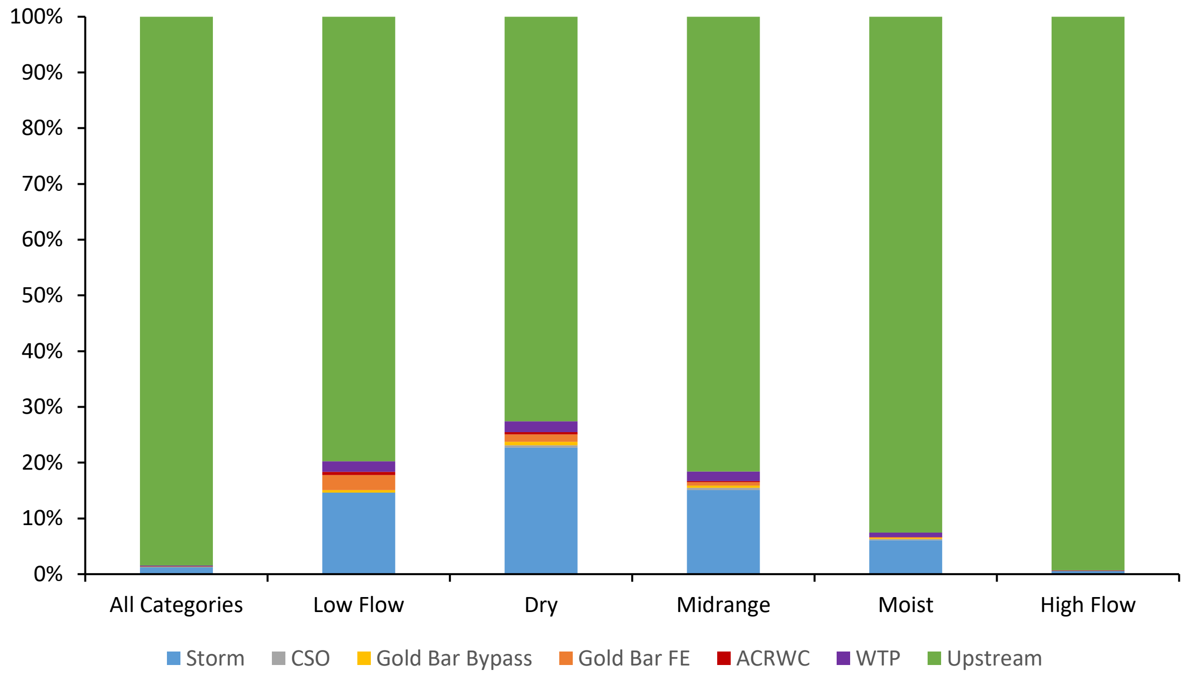



**Figure B27. Load apportionment of TSS under various flow categories.**

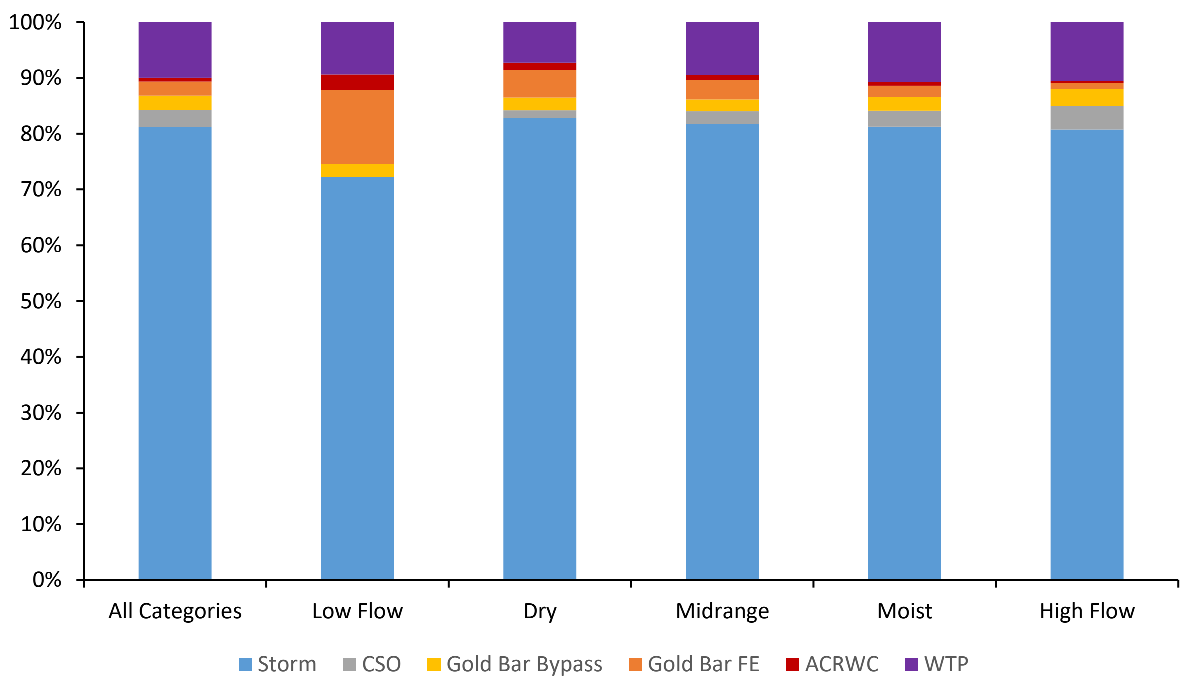



**Figure B28. Load apportionment of chloride under various flow categories with background included.**

The total City Load of TSS is highly variable year-to-year, and the loads enter the NSR primarily during moist and high flow conditions. This is the result of large and increased loading during the summer months when flows in the NSR are typically highest. During low flow conditions, where typically occur during the winter, there is frequently very little TSS loading. However, in some years, spring runoff generates large loads of TSS, which enter the NSR when it is still in low flow conditions.

Elevated loads of TSS from sources within the City are highly intermittent and correspond with runoff events in the spring and summer. Loads from the upstream watershed were omitted from the figure below as they would overwhelm the graph and hide the intermittent nature of TSS loading.

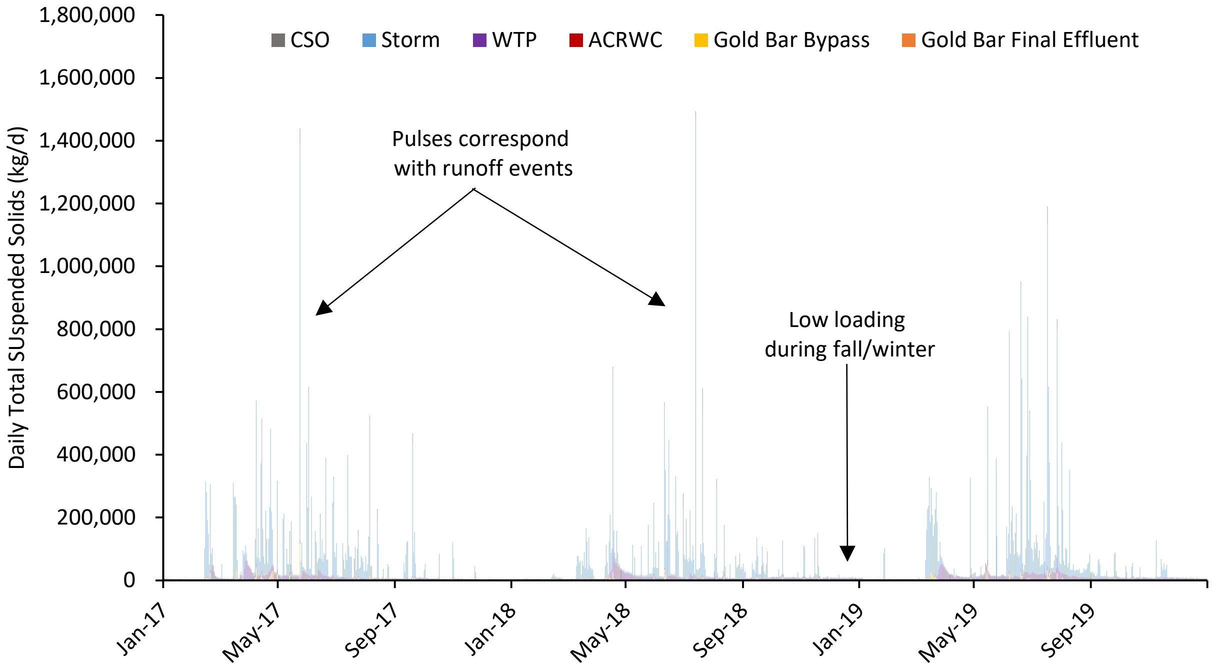



**Figure B29. Daily load of TSS by source (excluding upstream sources), 2017 – 2019**

TSS loading from the stormwater were variable among years and showed no consistent increase or decreasing trend. Loads were loosely correlated with total annual runoff; however, the loads likely correspond closer with the timing and intensity of runoff rather than simply the total volume.

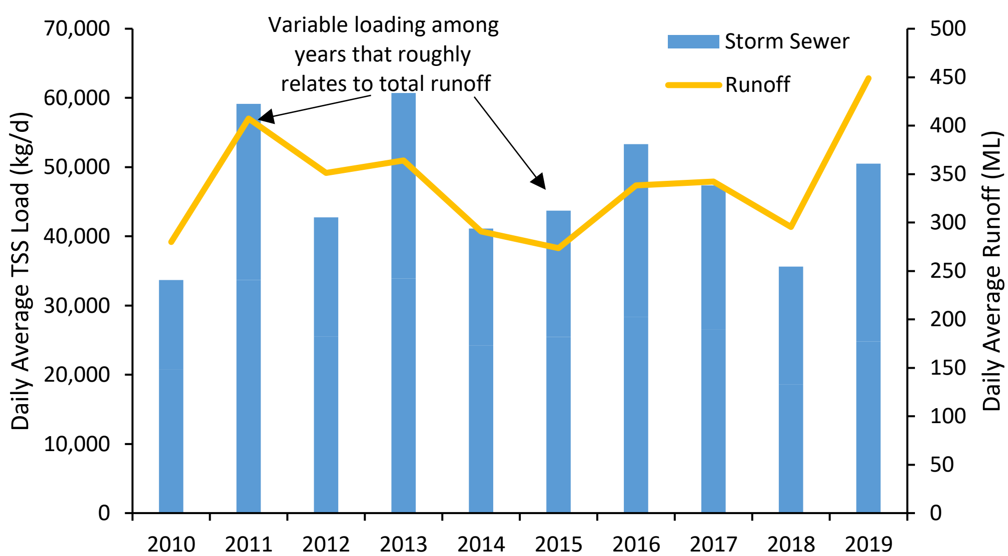



**Figure B30. Annual loads of TSS from stormwater, 2010 – 2019**

Loads from the upstream watershed were highly variable among years, and did not show a significant relationship with average flows in the NSR (Figure ). Total loads are driven by large, but brief high flow events, such as the flood event that occurred in 2013.

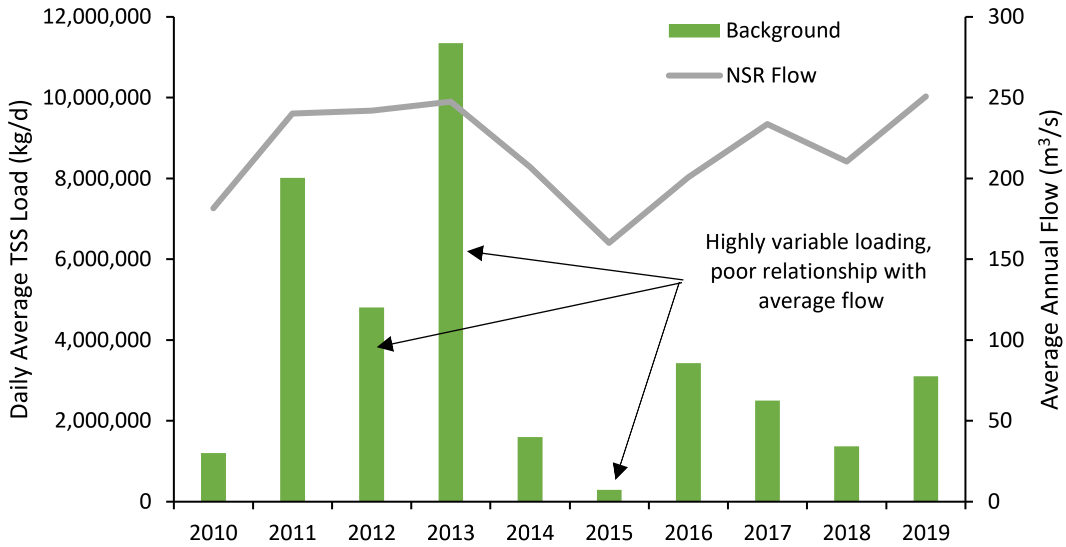



**Figure B31. Annual loads of TSS from the upstream watershed, 2010 – 2019**

## APPENDIX C: EPCOR'S PLANNING DOCUMENTS

**Table C1. Current EPCOR Watershed/Resource Management Plans that have the potential to affect discharges to the NSR**

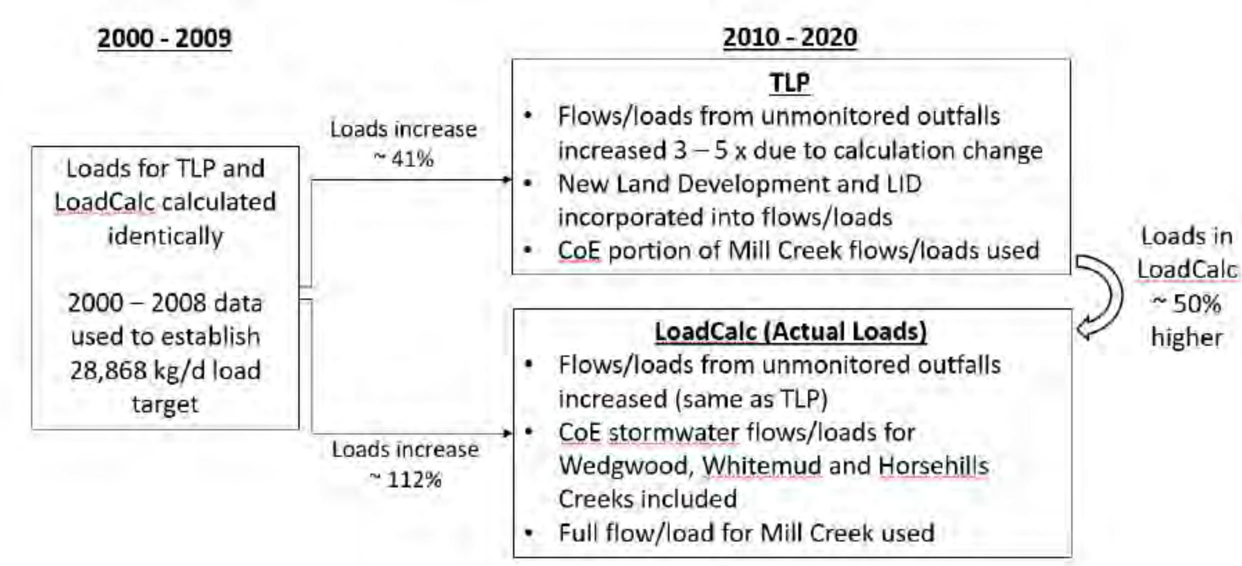
| Plan Title | Plan Objectives |
|---|---|
| Integrated Watershed Management Strategy<br>**(IWMS)** | To evaluate EPCOR's impact to the NSR from WTP residuals, Storm runoff, CSOs, Urban Creeks (storm component) and WWTPs (includes ACRWC) and ensure that planning is integrated to most effectively manage inputs. As well to ensure that basin planning protects the drinking water source. |
| Drinking Water Safety Plan<br>**(DWSP)** | To assess risk to drinking water quality, which better protects public health. The plan is based on an assessment of risk factors that could potentially adversely affect drinking water quality. They include source of the water, water treatment, distribution systems and customer facilities (source to tap). |
| EPCOR WTPs Long Term Plan<br>**(WTPLTP)** | The LTP is an outline our WTP future operational and treatment objectives and laying out a plan for new and retrofit to the WTPs to incorporate treatment upgrades for resiliency and growth. This includes meeting residual monitoring and evaluation commitments. |
| Water Treatment Plant Operations Plan | The WTP Operations Plan is a comprehensive compilation of the plans, philosophies, and procedures used by WTP staff to ensure the consistent production and delivery of high quality drinking water while reducing environmental impacts according to the Approval-to-Operate (638-03-00). |
| Residuals/Wastestream Management and Monitoring Plan<br>**(RMMP)** | The former EnviroVista Stewardship Agreement included a commitment to manage and reduce impacts of waste streams on the NSR. Through the Residuals Management and Monitoring Plan (2021) this commitment is continued through science-based decision making where the impacts on the NSR are evaluated against river outcomes and managed as part of a total loading initiative in the IWMS. The residuals monitoring program was sent to AEPA in 2021, revised and sent again in December 2022. |
| WTP Integrated Resource Plan<br>**(WTP IRP)** | Integrated Resource Planning (IRP) is the iterative long-range planning process used by EPCOR Water Services Inc. (EWSI) for regulated water operations in the City of Edmonton (CoE). Along with analyzing supply (river, plant production, transmission capacity, and reservoir capacity), demands are considered a mitigating factor to alleviate production vs. demand discrepancies. The IRP process also examines external factors and their influence on future plans. For example, EPCOR has developed lead mitigation and residuals management strategies in response to new regulation or regulatory pressures. |

| | |
|---|---|
| Stormwater Integrated Resource Plan<br><br>**(SIRP)** | SIRP is intended to reduce the flooding risks within the City of Edmonton for urban and riverine flooding events through capital and operational changes using a risk ranking assessment. EPCOR developed the investment recommendations considering a mix of grey and green infrastructure components installed across the City of Edmonton. The $1.6 Billion capital program proposed through the SIRP can be classified into five themes of investment: slow, move, secure, predict and respond. Although flooding risk a major driver (achieved through SIRP's main objectives of volume reduction and peak flow reduction) it is expected that water quality improvements will be made through the implementation of green infrastructure.<br><br>The SIRP approach is to capture the stormwater volumes in dry ponds *prior* to reaching the storm trunk network to provide additional capacity in the pipes in the immediate path of the storm. The addition of Low Impact Development throughout the catchment area will further retain these volumes and reduce the impact on the entire pipe network as storms travel across the community. The plan includes tunnels, trunks and sewer separation in locations where due to configuration of the community there is limited space to install additional ponds or LID components to fully capture the expected water volumes during a major storm event. |
| Total Loading Plan<br><br>**(TLP)** | Drainage Service's Total Loading Plan was a 10 year old, continuous commitment to protect regional watershed, comply with regulatory requirements and sustain the surface water quality by managing and limiting loading from collection system. 2019 marked the end of original 10 year Total Loading Plan and there was a need to re-evaluate established benchmark and align the Total Loading Strategy with EPCOR corporate strategic goals of preserving and sustaining Edmonton's environment and above all healthy river. The IWMP will guided and will continue to guide the 2022 TLP as well as manage near-field effects of discharged. |
| Combined Sewer Discharge Strategy | A combined Sewer Discharge Strategy (CSDS) was submitted to AEPA in 2013 and outlines commitments to reduce CSOs volumes. The long-term vision was, and continues to be, to eliminate CSOs or provide benefits equivalent or better than those provided by sewer separation. The recommended control plan included several components including implementation of Early Action Control Plan, addition of EPT at Gold Bar WWTP, upgrades to Rat Creek and Highlands crossings, and raising existing weirs at four CSO sites. The recommended strategy from the CSDS was to take a "green approach" based on continuous improvement including taking a broader watershed view of water quality management, alignment of common goals for existing programs, optimization of the LTCP, coordinating efforts involving various initiatives into one system, and enhancing stakeholder involvement. A "grey approach" involving construction of new infrastructure and adding more capacity at Gold Bar |

| | |
|---|---|
| | WWTP was not selected due to the high cost and diminishing rate of return. In 2019, ILS completed a Review of the Combined Overflow Strategy Implementation Report and suggested some new approaches to CSO management, which are now being implemented.<br><br>The CSDS will be now be incorporated into an internal EPCOR strategy called SanIRP to better align management across business units. |
| Edmonton Wastewater Treatment Integrated Resource Plan<br><br>**(Gold Bar IRP)** | Covering 2017-2061 the IRP sets the framework for plant changes as the City grows over the short, medium, and long-term. The plan is grounded in shared outcomes one of which is ensuring pollution is prevented and the impact of the Gold Bar WWTP on water, climate, and ecosystems is reduced. To do this the Gold Bar IRP focuses on end-of-pipe approval limits as set by the regulator but with stricter performance standards. Although the IRP methodology takes a holistic approach that integrates environmental and social externalities; operational, planning and infrastructure responses; risk assessment and management; financial analysis; and an open participatory process, because river outcomes are fluid and evolving the process can miss including external outcomes. |
| Gold Bar Operations Plan | The operation plan outlines how the WWTP will operate and discharge effluent. It also sets commitments for monitoring and reporting. |
| ACRWC Wastewater Treatment Operations Plan | ACRWC's operation plan outlines how the WWTP will operate and discharge effluent. It also includes current design hydraulic and loading capacities and future expansion plans and projected capacities. |

# APPENDIX D: TOTAL LOADING PLAN METHOD CHANGE

In June 2009, the City of Edmonton submitted a Total Loading Plan (TLP) to Alberta Environment that utilized a method to calculate loads of total suspended solids discharged to the NSR. In September 2009, the City of Edmonton completed a study that re-examined how flows and loads from unmonitored outfalls, including those discharged to urban creeks, should be estimated. The main outcome of this study was that unmonitored flows and loads were significantly larger than previously calculated, and these changes were incorporated into loading estimates from 2010 to present. However, to keep consistency with the TLP, the City of Edmonton did not report the total loads discharged to the NSR, but rather, continued to report only a portion of the unmonitored loads to the NSR. The differences between the loading methods used for the TLP, and the "actual loads" are summarized in the figure below.




The original TLP came into effect in 2009, and concluded at the end of 2019. The new TLP will utilize the flow and load estimation methods for unmonitored outfalls established in 2010 (i.e., the "actual loads").

Additionally, loads in the TLP will include two new sources that were not included in the previous TLP.

1) Total Suspended Solids loading from the water treatment plants (WTPs). The original TLP was focused on loading from the drainage system and the WWTPs, and did not consider any loading from the WTPs. This likely originated because the TLP was originally completed by the City of Edmonton's Drainage Services, while EPCOR managed the WTP. Now that EPCOR manages both utilities, loads from the WTP has been included in the TLP.

2) Alberta Capital Region Wastewater Commission loads. While the original TLP did discuss loads from the ACRWC WWTP, the loading values were not included in the benchmarks and reported values. The TLP now include loads from the ACRWC WWTP.

# Appendix F Review of CSO Treatment Strategy and Future Upgrade Requirements

# GOLD BAR WASTEWATER TREATMENT PLANT

## REVIEW OF CSO TREATMENT STRATEGY AND FUTURE UPGRADE REQUIREMENTS

## – REPORT –

# DOCUMENT HISTORY AND AUTHENTICATION

## DOCUMENT HISTORY

| REVISION | ISSUE DATE | PREPARED BY | REVIEWED BY |
|---|---|---|---|
| Draft | 21-Apr-2020 | Saif Molla<br>Rick Feng<br>Kenzie Harmsworth | Craig Bonneville<br>Alfredo Suarez<br>Nicola Lewin<br>Geoffry Heise |
| Final | 20-May-2020 | | |

## AUTHENTICATION

| AREA | NAME | STAMP | PERMIT TO PRACTICE |
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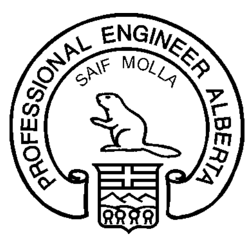
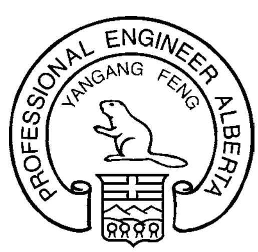
| PROCESS | SAIF MOLLA |  | **PERMIT TO PRACTICE**<br>**EPCOR Water Services Inc.**<br>Signature ________<br>Date ________<br>**APEGA PERMIT NUMBER P6368**<br>The Association of Professional Engineers and Geoscientists of Alberta |
| PROCESS | RICK FENG |  | |

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# ACRONYMS

| | |
|---|---|
| AEP | Alberta Environment and Parks |
| BNR | Biological Nutrient Removal |
| cBOD | Carbonaceous Biological Oxygen Demand |
| CSDS | Combined Sewer Discharge Strategy |
| CSO | Combined Sewer Overflow |
| EACP | Early Action Control Plan |
| EPEA | Environmental Protection and Enhancement Act |
| EPT | Enhanced Primary Treatment |
| GBWWTP | Gold Bar Wastewater Treatment Plant |
| LID | Low Impact Development |
| LTCP | Long Term Control Plan |
| MBR | Membrane Bioreactor |
| MLD | Million Litres per Day |
| $NH_3$ | Ammonia |
| NSR | North Saskatchewan River |
| PE | Primary Effluent |
| RNG | Renewable Natural Gas |
| RTC | Real-time Control |
| SIRP | Stormwater Integrated Resource Plan |
| TLP | Total Loading Plan |
| TP | Total Phosphorus |
| TSS | Total Suspended Solids |
| UV | Ultraviolet |

# 1. INTRODUCTION / BACKGROUND

On July 9, 2019, a request was submitted by Gold Bar Wastewater Treatment Plant (GBWWTP) to Alberta Environment and Parks (AEP) to authorize the decommissioning of Primary Clarifiers 1 and 2 that are currently sited in the proposed location for the Renewable Natural Gas (RNG) Facility (EPCOR, 2019). On August 6, 2019, AEP issued an authorization letter for the decommissioning of those clarifiers under EPEA Approval No. 639-03-03 (AEP, 2019), subject to the following four conditions:

1. Decommission of Primary Clarifiers 1 and 2 does not affect the implementation of the Combined Sewer Overflow (CSO) Control Strategy-Phase IV: Long Term Control Plan and Phase V: Implementation Plan (June 1999);
2. The footprint occupied by Grit Tanks 1-3/Screens and Primary Clarifiers 3 and 4 is sufficient to accommodate an additional 400 MLD Enhanced Primary Treatment (EPT) capacity as described in the submission from the City of Edmonton on June 25, 2003;
3. EPCOR Water Services Inc. (EPCOR) will complete the conceptual design study by March 31, 2020 which will compare all the alternatives to achieve the maximum environmental performance at a cost effective manner as described in the submission from EPCOR on July 9, 2019; and
4. EPCOR will submit the study report to Alberta Environment and Parks by May 31, 2020.

A conceptual design study for the upgrades to Channel 1 and its associated treatment units was completed and submitted to AEP on February 19, 2020. The study produced conceptual options that would allow a minimum 400 MLD EPT capacity by installing new treatment processes at the location currently occupied by Grit Tanks 1-3, Screens 1-3 and Primary Clarifiers 3 and 4 (EPCOR, 2020). The study report therefore satisfies the first two conditions and the first part of the third condition above. The purpose of this report is to satisfy the third and fourth condition of the authorization letter. The report focuses on the following:

- Summary of historical CSO treatment plans and current strategy at GBWWTP
- Comparative analysis of the environmental performance and cost of future upgrade options at GBWWTP;
- The future upgrade options considered for this analysis include:
    - Upgrade primary treatment process to accommodate an additional 400 MLD EPT capacity giving a total of 1,600 MLD primary capacity.
    - Upgrade secondary treatment process by converting one Biological Nutrient Removal (BNR) train to Membrane Bioreactor (MBR) with an average capacity of 60 MLD.

The analysis in this report compares environmental performance of the alternatives, only in terms of solids removal, as this is the fundamental purpose of primary treatment. Disinfection of the additional capacity is not included in the comparison. The cost and benefit of CSO disinfection is being investigated separately for application at GBWWTP. Furthermore, the analysis considers GBWWTP outfalls only, as the alternative upgrade options analyzed in the report are also within the plant and does not include the drainage collection system.

# 2. OVERVIEW OF CSO TREATMENT STRATEGY

This section is a summary of the literature review of historically published documents on CSO treatment strategy. The following documents were reviewed:

- 1999 CSO Long Term Control Plan (LTCP) (UMA, 1999)
- 2000 CSO Control Strategy Implementation Plan (City of Edmonton, 2000)
- 2002 CSO EPT Technology Selection Value Engineering Workshop Report (City of Edmonton, 2002)
- 2003 City of Edmonton GBWWTP Master Plan – Volume I and Volume II (UMA, 2003)
- 2004 Environmental Impact Assessment for EPT Facility (Spencer Environmental, 2004)
- 2004 EPT Preliminary Design Report (Stantec, 2004)
- 2010 Review of the CSO Control Strategy (AECOM, 2010)
- 2012 EPT Design Intent (Stantec, 2012)
- 2013 Combined Sewer Discharge Strategy (CSDS) (CH2MHill, 2013)
- 2020 Approval to Operate (AEP, 2020)

It was assumed that any relevant information from reports written prior to 1999 was captured in the 1999 LTCP. The 1999 LTCP, 2000 Implementation Plan and 2013 CSDS were submitted to and accepted by AEP, representing major updates to the overall CSO strategy. The other reports were also submitted to AEP and contain progress information related to the implementation of LTCP at GBWWTP. Accordingly, the CSDS is representative of the current CSO control strategy and is included in section 3.1.1 of the current Approval to Operate (AEP, 2020).

In addition to the reports listed above, the following communications were reviewed:

- Letter from City of Edmonton to AEP dated June 25, 2003 in reference to proposed EPT Water Quality (City of Edmonton, 2003)
- Letter of Authorization from AEP to City of Edmonton dated June 24, 2004 authorizing the construction of EPT facility (AEP, 2004)
- Letter from City of Edmonton to AEP dated June 1, 2013 in reference to submission of the CSDS (City of Edmonton, 2013)
- Letter of Acceptance from AEP to City of Edmonton dated July 17, 2013 for the 2013 CSDS Submission (AEP, 2013)
- Letter from EPCOR to AEP dated July 9, 2019 requesting authorization for the decommissioning of Primary Clarifiers 1 and 2 (EPCOR, 2019)
- Letter of Authorization from AEP to EPCOR dated August 6, 2019 conditionally authorizing the decommissioning of Primary Clarifiers 1 and 2 (AEP, 2019)
- Letter from EPCOR to AEP dated February 19, 2020 in reference to submission of the Conceptual Design Study of Channel 1 Facilities Upgrades (EPCOR, 2020)

## 2.1. Historical Overview of CSO Treatment Strategies

The CSO LTCP and the corresponding Implementation Plan were finalized in 1999 and 2000, respectively, with the purpose of providing a cost-effective strategy to mitigate environmental impacts of CSOs in the City of Edmonton. The long-term vision was to eliminate CSOs or provide benefits equivalent or better than those provided by sewer separation (UMA, 1999). The recommended control plan included several components including implementation of Early Action Control Plan (EACP), addition of EPT at GBWWTP, upgrades to Rat Creek and Highlands crossings, raising existing weirs at four CSO sites, addition of underground CSO storage and opportunistic sewer separation. Completion of the LTCP recommendations would reduce the number of CSO occurrences from 89 to 46 and increase the amount of CSO captured from 56% to 86% by volume (based on 1991 baseline) (City of Edmonton, 2000).

In reference to GBWWTP, the report discussed providing tertiary treatment for all dry weather flows and possibly for a small component of wet weather flows, as well as increasing the UV capacity by adding a 5$^{th}$ channel. The LTCP originally intended to convert Primary Clarifiers 1 through 4 to EPT with chlorine disinfection facilities, and would add 650 MLD of EPT capacity in Primary Clarifiers 9 through 12. The intent was to disinfect both the EPT effluent and CSO by chlorination/dechlorination (UMA, 1999). The final report recommendation was to provide 1,600 MLD of EPT with secondary bypass disinfection. The original LTCP for GBWWTP is shown in Figure 1.


**Figure 1: LTCP for GBWWTP**

The Implementation Plan published in 2000 was slightly different than the 1999 LTCP and stated that an additional 650 MLD of primary treatment would be added to the existing 950 MLD and would be upgraded to EPT at a later date. Two more components were added to the treatment plant upgrades including additional improvements to the headworks/screens facilities and a new digester to process EPT sludge. The overall sequence of activities involved construction of additional primary treatment capacity at the plant, followed by system conveyance capacity increases, followed by upgrading primaries to EPT along with disinfection of the CSO flow (City of Edmonton, 2000).

After the implementation plan was published, the City of Edmonton examined alternative disinfection technologies for the EPT process and due to concerns regarding chlorinated organics, the preferred disinfection method was changed from chlorination to UV disinfection for CSO Control. This change made it impractical to achieve same disinfection performance target for CSO flows as with dry weather flows (City of Edmonton, 2003). Consequently, a number of options were evaluated regarding the capacity of future EPT facilities (City of Edmonton, 2002), and a new approach was selected by the City that would increase the combined primary treatment capacity (both conventional and enhanced) at the GBWWTP to 1,200 MLD. This approach involved abandonment of the original primary clarifiers 1 to 4. The footprint occupied by these clarifiers would be reserved for future enhanced primary treatment, if determined necessary (City of Edmonton, 2003). This CSO control concept (Figure 2) was subsequently used for the design of the EPT facility (Spencer Environmental, 2004).

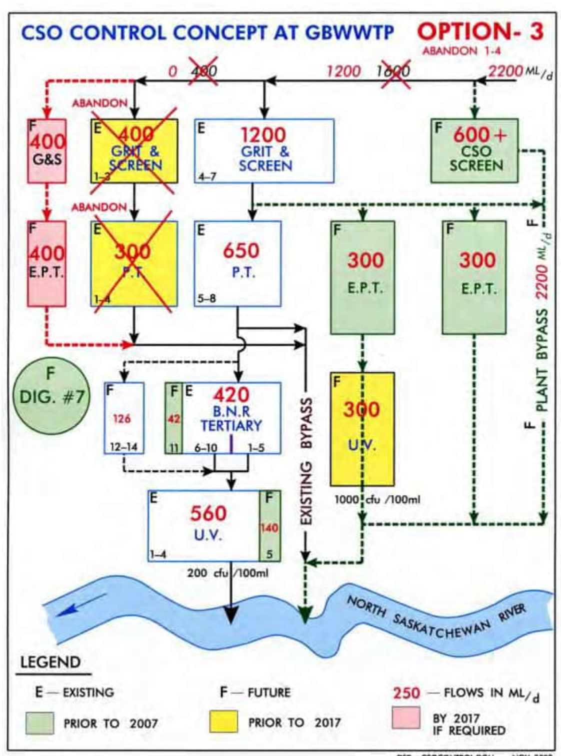


**Figure 2: CSO Control Concept used for the design of EPT facility at GBWWTP**

**(The design capacity of primary clarifiers 5-8 is 600 MLD, not 650 MLD as shown in this schematic)**

Volume I of the City of Edmonton Master Plan issued in 2003 discussed the future plans for CSO and EPT. Future projects related to CSO included new screens and screen building, treatment facilities for CSO flows (Acti-Flo), EPT plate settlers, upgrade of Grit Tank 1-3 removal system, upgrading of Primary 1-2 (or 3-4) or demolishing of the tanks (UMA, 2003). The Volume II draft was also prepared in 2003 and discussed future facilities for treating wet weather flows which included Primary Clarifiers 9-12 with EPT capabilities, screens for CSO flows, a plant bypass, Digester 7, and EPT retrofit for Primary Clarifiers 5-8 (UMA, 2003).

The preliminary design report for EPT was issued in 2004 and noted the treatment capacities as shown in Table 1. Primary Clarifiers 1-4 were not required to meet these capacities, but the report noted the potential of converting these clarifiers to EPT in the future as part of the LTCP. The report estimates that with Primary Clarifiers 1-4 in service at a capacity of 310 MLD (this is lower than the design value of 400 MLD), the total installed primary treatment capacity would be 1,510 MLD (Stantec, 2004).

**Table 1: GBWWTP Capacities as per EPT Preliminary Design Report (Stantec, 2004)**

| Process | Capacity (MLD) | |
|---|---|---|
| Removal of Floatables (Screening) | 1,000 | |
| Pre-Treatment including Grit Removal and Screening | 1,200 Summer | 900 Winter |
| Conventional Primary Treatment | 600 Summer | 450 Winter |
| Enhanced Primary Treatment | 600 Summer | 450 Winter |
| Tertiary Treatment (Bioreactors and Secondary Clarifiers) | 310 Average Day | 420 Peak |
| Total UV Disinfection | 420 | |
| EPT UV Disinfection | Up to 200 | |

Between the issuance of the 1999 LTCP and the 2013 CSDS, the 2010 Review of CSO Control Strategy was completed (AECOM, 2010). The purpose of this report was to review the implementation of the LTCP and identify potential improvements. Twelve scenarios were analyzed, but no changes to the LTCP were recommended for GBWWTP. General recommendations from this report included defining the commitment to operate EPT at full capacity to reduce frequency and volume of CSO (later determined to be 80% uptime (City of Edmonton, 2016)). As per the report, the main difference between the LTCP and the current strategy was that the required combined primary capacity at GBWWTP was reduced from 1,600 MLD to 1,200 MLD as the extra 400 MLD would have been used very infrequently. The design flow to the plant remained at 2,200 MLD with a 1,000 MLD CSO screening capacity (AECOM, 2010).

The EPT facility construction was completed in 2010 and operation began in 2011, allowing combined primary treatment capacity of up to 1,200 MLD. Instead of abandoning, Primary Clarifiers 1-4 were kept in operation in order to maximize available capacity during maintenance activities. A new bypass outfall and additional digestion capacity was also added, as well as upgrades to the headwork and screening system. Ongoing efforts were to focus on plant reliability and changes to plant operations to achieve LTCP targets by 2016 (Stantec, 2012). Figure 3 and

Figure **4** show the intended flow path through the GBWWTP during wet weather flows up to 1,200 MLD and greater than 1,200 MLD, as per the EPT design (Stantec, 2012).

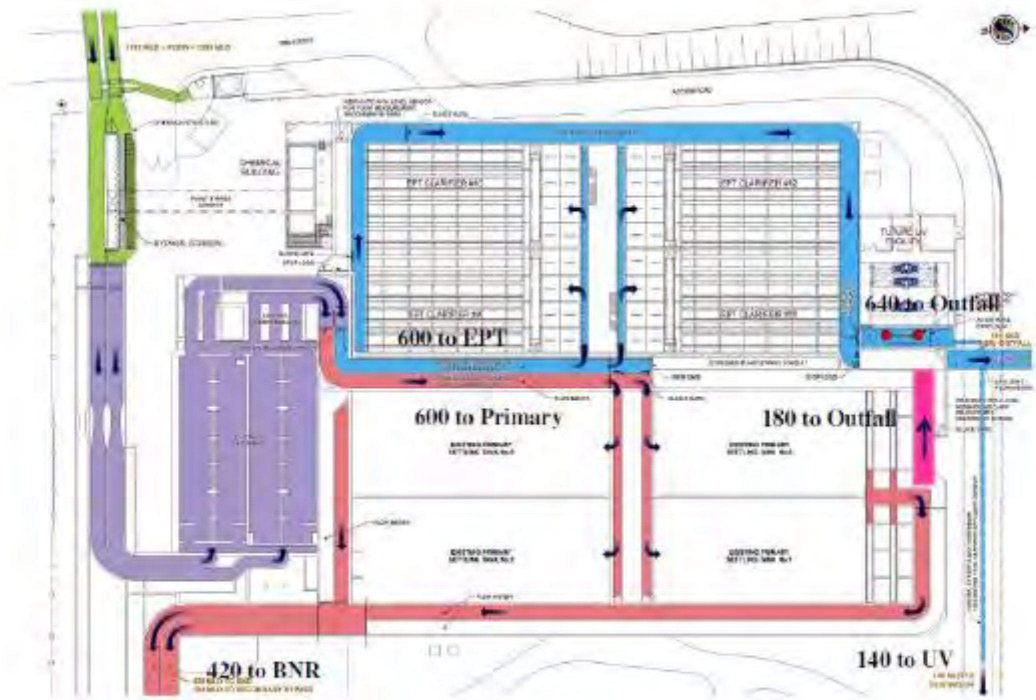


**Figure 3: Flow through GBWWTP during Wet Weather, Flow < 1200 MLD**

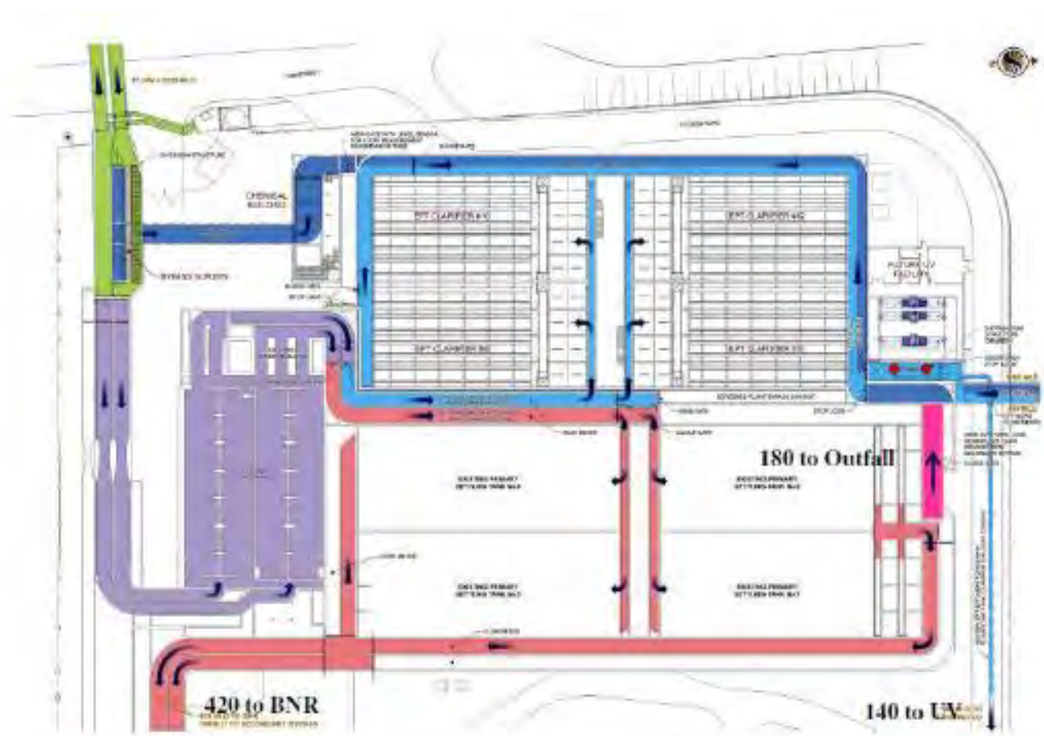


**Figure 4: Flow through GBWWTP during Wet Weather, Flow > 1200 ML**

The treatment plant capacities as per the EPT design intent are shown in . The design included provisions of up to 140 MLD of combined primary effluent to be pumped to the existing UV disinfection facility. This process was not commissioned at the time due to significant challenges related to the reliability of the pumping station and resulting impact on the overall quality of the final effluent.

**Table 2: GBWWTP Capacities as per EPT Design Intent (Stantec, 2012)**

| Process | Flow Rate Treated (MLD) |
|---|---|
| Secondary Treatment and Disinfection | 0-420 |
| Combined Primary Treatment and Disinfection | 420-560 |
| Combined Primary Treatment Only | 560-1,200 |
| CSO Screening Only | 1,200-2,200 |
| Plant Bypass | >2,200 |

## 2.2. Current CSO Treatment Strategy at GBWWTP

The current Approval to Operate (639-03-06) states that the approval holder shall implement the *Combined Sewer Overflow Control Strategy* as outlined in the 2013 *Combined Sewer Discharge Strategy*, unless otherwise authorized in writing by the director and maximize the wastewater treatment during wet weather conditions (AEP, 2020). The reference to the 1999 LTCP (referred to as the 2000 City of Edmonton CSO Plan) was removed from the approval in 2015 and reference to the CSDS was added.

The CSDS was submitted to AEP by the City of Edmonton on June 1, 2013 as a requirement of Approval to Operate No. 639-02-07 (City of Edmonton, 2013). The purpose of the CSDS was to further reduce CSO and work towards the "environmental equivalent" of sewer separation in regards to total suspended solids (TSS), carbonaceous biological oxygen demand (cBOD), total phosphorus (TP), ammonia ($NH_3$), and fecal coliform bacteria. The recommended strategy from the CSDS was to take a "green approach" based on continuous improvement including taking a broader watershed view of water quality management, alignment of common goals for existing programs, optimization of the LTCP, coordinating efforts involving various initiatives into one system, and enhancing stakeholder involvement. A "grey approach" involving construction of new infrastructure and adding more capacity at GBWWTP was not selected due to the high cost and diminishing rate of return. The report acknowledged the two major deviations from LTCP at GBWWTP including the reduction of required combined primary treatment capacity from 1,600 MLD to 1,200 MLD and replacement of chlorine disinfection with UV disinfection (CH2MHill, 2013). The report concluded that Edmonton is a leader among North American cities in terms of CSO programs and that while it is subject to interpretation, the CSO program exceeds sewer separation in most aspects. The report also concluded that additional disinfection at GBWWTP is not recommended due to technical challenges and limited improvement to receiving water quality. The final recommendation for GBWWTP was to continue monitoring and evaluating the performance of the LTCP to identify optimization opportunities and identify future plant upgrade options if necessary (CH2MHill, 2013).

At the time the CSDS was submitted to AEP, GBWWTP had a total installed capacity of 1,600 MLD and a minimum available capacity of 1,200 MLD for combined primary treatment. This combined capacity included 400 MLD of conventional primary treatment capacity through Primary Clarifiers 1-4, 600 MLD of conventional primary treatment capacity through Primary Clarifiers 5-8 and 600 MLD of EPT capacity through Primary Clarifiers 9-12 (EPCOR, 2019). After decommissioning of Primary Clarifiers 1 and 2, the total installed capacity has been reduced to 1,400 MLD but the minimum available capacity for combined primary treatment still remains at 1,200 MLD. With incoming flows below 420 MLD, all wastewater receives full BNR treatment and UV disinfection, before being discharged to the North Saskatchewan River (NSR) via Outfall 10. When incoming flows exceed 420 MLD, a secondary bypass process is activated and combined primary effluent is discharged via Outfall 30, bypassing secondary treatment and disinfection. Incoming flows exceeding 1,200 MLD goes through mechanical CSO screens at the headworks diversion structure and is discharged via Outfall 30, bypassing primary treatment. The design capacity of the CSO screening is 1,000 MLD (unverified), which means incoming flows exceeding 2,200 MLD should bypass all treatment and be discharged directly to NSR via Outfall 30. Figure 5 shows the frequency and volume of raw influent flow entering GBWWTP, based on 15-minute average data from 2011 to 2019. Using the current CSO treatment and flow bypass strategy, GBWWTP can provide secondary BNR treatment to approximately 96.8% of the total raw influent flow by volume and primary treatment to approximately 99.9% flow by volume. Any additional primary treatment capacity, if installed, will only be used 0.15% of the time or to treat 0.10% of the total influent flow by volume. This represents a volume of 926 ML above the flowrate of 1,200 MLD out of 917,566 ML of total influent flow from 2011 to 2019. It should be noted that in 2018, Real-time Control (RTC) site 3 was brought in operation resulting in significant additional volume of CSO being diverted to GBWWTP. This has resulted in a slight increase in the portion of influent above the flowrate of 1,200 MLD (0.2% by volume in 2019).

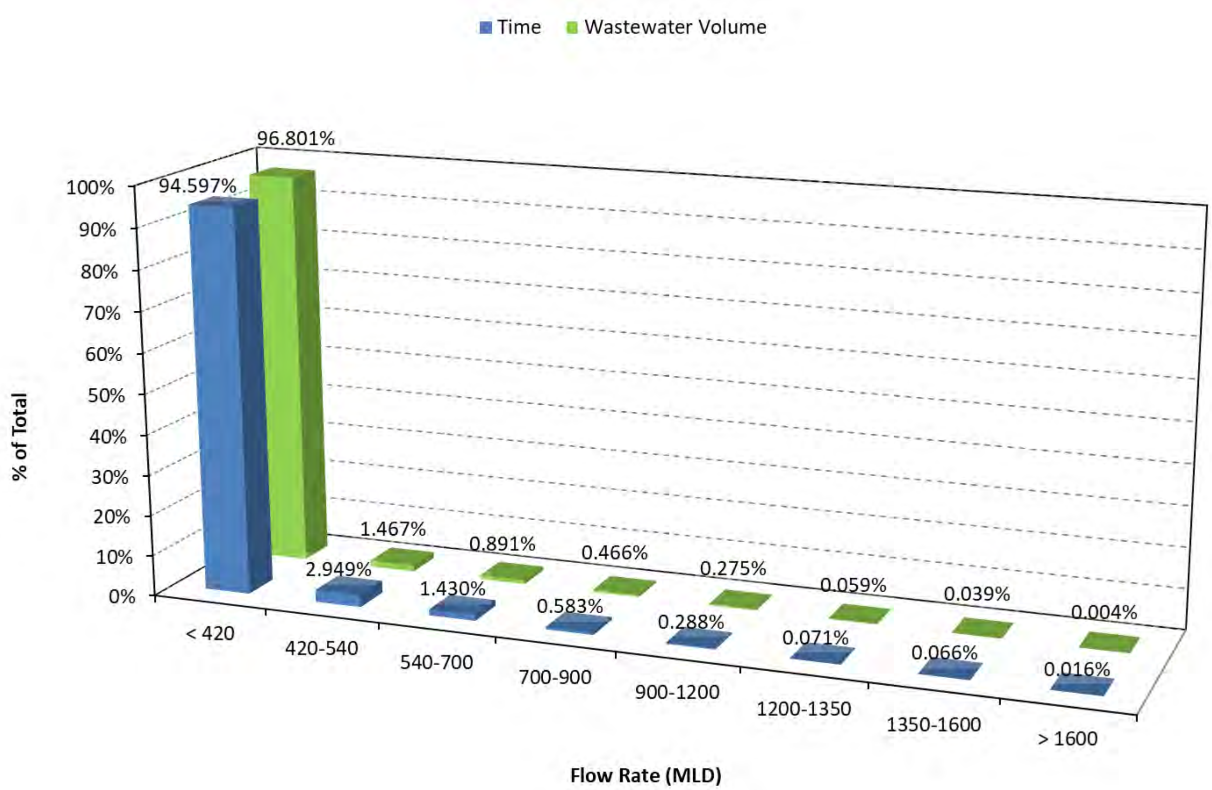


**Figure 5: 2011-2019 Raw Flow Rate Frequencies and Volume**

# 3. ENVIRONMENTAL PERFORMANCE OF FUTURE UPGRADE OPTIONS

This section provides a summary of the analysis done to evaluate the environmental performance of future upgrade options at GBWWTP. Environmental performance was evaluated based on improvement of total solids removal achieved through the GBWWTP outfalls by implementing the upgrades as outlined in each scenario.

## 3.1. Analysis Methodology

Figure 6 shows a simple flow diagram with relevant influent and effluent streams and associated solids concentrations. The equations used to calculate solids removal are outlined below. Detailed calculation steps for the upgrade scenarios are included in Appendix A.

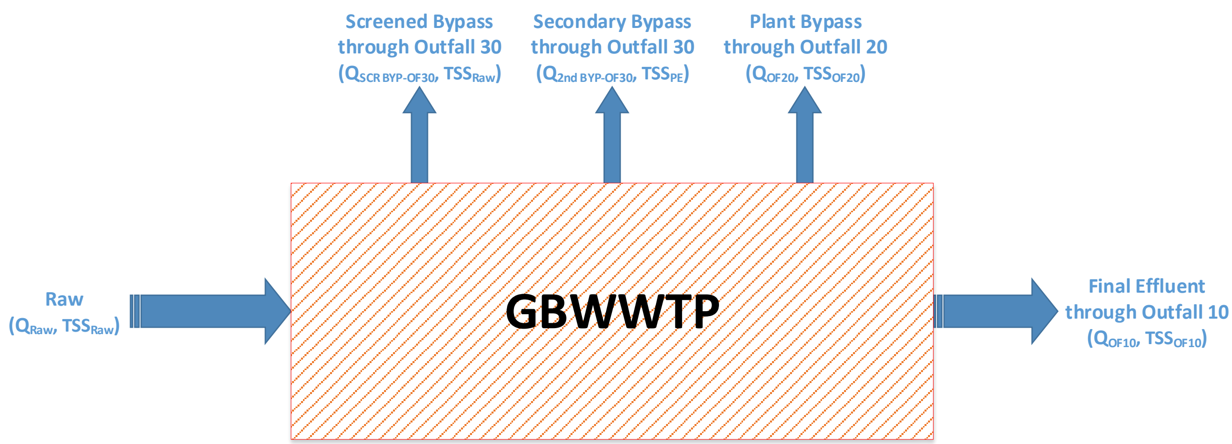


**Figure 6: Simple flow diagram showing GBWWTP influent and outfalls**

$$\text{Solids Captured / Removed (kg/day)} = \text{Solids-IN}_{Raw} - \text{Solids-OUT}_{SCR\ BYP\text{-}OF30} - \text{Solids-OUT}_{2nd\ BYP\text{-}OF30} - \text{Solids-OUT}_{OF20} - \text{Solids-OUT}_{OF10}$$

Where,

$\text{Solids-IN}_{Raw} = TSS_{Raw} \times Q_{Raw}$

$\text{Solids-OUT}_{SCR\ BYP\text{-}OF30} = TSS_{Raw} \times Q_{SCR\ BYP\text{-}OF30}$

$\text{Solids-OUT}_{2nd\ BYP\text{-}OF30} = TSS_{PE} \times Q_{2nd\ BYP\text{-}OF30}$

$\text{Solids-OUT}_{OF20} = TSS_{OF20} \times Q_{OF20}$

$\text{Solids-OUT}_{OF10} = TSS_{OF10} \times Q_{OF10}$

Flow rate (Q in MLD) and solids concentration (TSS in mg/L) data were collected from historical records for the past five years from 2015 to 2019.

## 3.2. Analysis Scenarios and Assumptions

The following scenarios were analyzed as part of this exercise:

**Scenario 1: Baseline**

The baseline solids removal is calculated based on the observed TSS and Flow data. It reflects the amount of solids that have been removed with the current plant status and operating practices. The influent flows treated in this scenario is not limited to 1,200 MLD as the plant would have provided primary treatment to flows above 1,200 MLD, depending on the availability of redundant treatment units.

Assumptions:

- All observed data are reasonable and accurate
- TSS of the screen bypass stream (through outfall 30) is same as the raw influent TSS;
- TSS of the secondary bypass stream (through outfall 30) is same as the PE TSS; and
- 15-min average flow data retracted from historical database are used for solids mass balance calculation

**Scenario 2: Upgrade primary treatment**

This scenario involves upgrading primary treatment process by increasing capacity from 1,200 to 1,600 MLD.

Assumptions:

- The maximum primary treatment capacity is increased to 1,600 MLD;
- The treatment efficiency of the 400 MLD increased capacity will be same as the currently observed EPT efficiency (15% improvement compared with the conventional primary clarifiers);
- Screened bypass occurs only when the raw influent flowrate is >1,600 MLD;
- During secondary bypass, the additional flow treated by primary will be discharge to NSR through Outfall 30; and
- No change in secondary treatment capacity;
- Other operating practices will stay same.

**Scenario 3: Upgrade secondary treatment**

This scenario involves upgrading secondary treatment process by converting one BNR train to MBR.

Assumptions:

- Screened bypass occurs when the raw influent flow rate is >1,200 MLD;
- The train with MBR will be consistently operated at 60 MLD under normal conditions;
- The secondary effluent TSS removal improves by 8%
  - i.e., 8% more TSS is captured from the Outfall 10 discharge, compared to the baseline scenario with one train converted to MBR (Stantec, 2019);
- The Outfall 30 bypass flow is adjusted accordingly based on the increase of secondary treatment capacity;
- No change in primary treatment capacity;
- Other operating practices will stay same.

## 3.3. Comparative Environmental Performance in terms of Solids Removal

The environmental performance of the upgrade scenarios presented in the previous section was compared against the baseline scenario. Analysis was conducted for each year over the past five years, from 2015 to 2019. Figure 7 shows the results of the analysis. Detailed results are included in Appendix B. Results demonstrate very minor improvement over baseline conditions for both scenarios and no significant difference in performance between the two scenarios. The improvement in solids removal is less than 0.5% for both scenarios and the variability between scenarios or years is negligible, with the secondary upgrade scenario generating slightly higher solids removal. The treatment volume is much greater in the primary upgrade scenario while the treatment frequency is much greater in the secondary upgrade scenario resulting in similar solids removal performance.

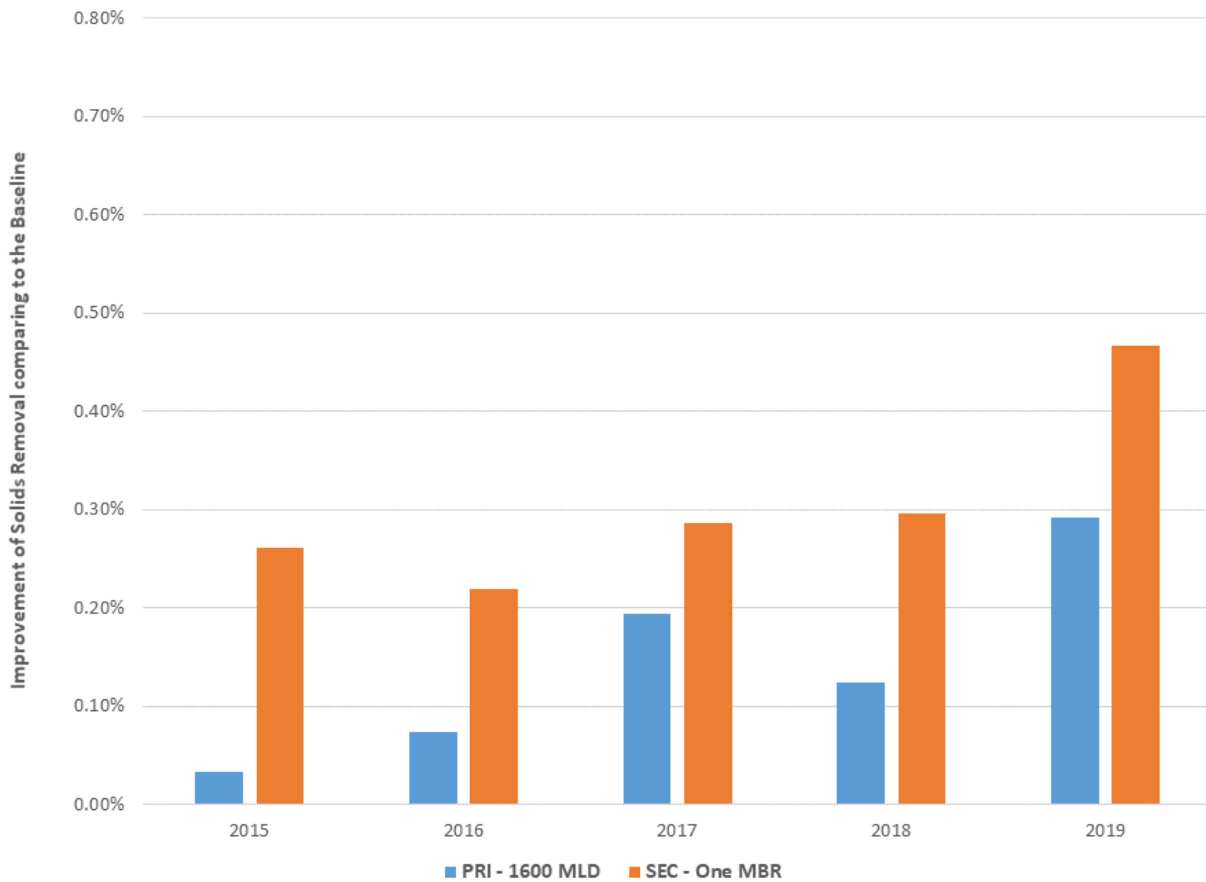


**Figure 7: Comparative environmental performance of future upgrade options at GBWWTP**

## 3.4. Other Considerations

The secondary treatment upgrade outlined in scenario 3 involves maintaining 60 MLD of average flow through the converted MBR train while adjusting flows through the remaining BNR trains as required. The enhanced treatment received through the MBR train contributes to not only higher solids removal but also additional removal of other parameters like $NH_3$, cBOD and TP. This additional environmental benefit, i.e. removal of $NH_3$, cBOD and TP achieved by the secondary upgrade scenario was compared against the baseline scenario for assumed raw flow rates between 250-420 MLD. Figure 8 shows the results of the analysis. Detailed results are included in Appendix B. Results demonstrate significant improvement with maximum benefit achieved for $NH_3$ removal followed by cBOD and TP respectively. At lower flowrates, a larger portion of the flow is treated through the MBR train providing enhanced removal. Thus, the environmental benefits are higher at lower flowrates which is more representative of dry weather conditions. Furthermore, the additional secondary treatment capacity will also receive UV disinfection before being discharged to NSR via Outfall 10.

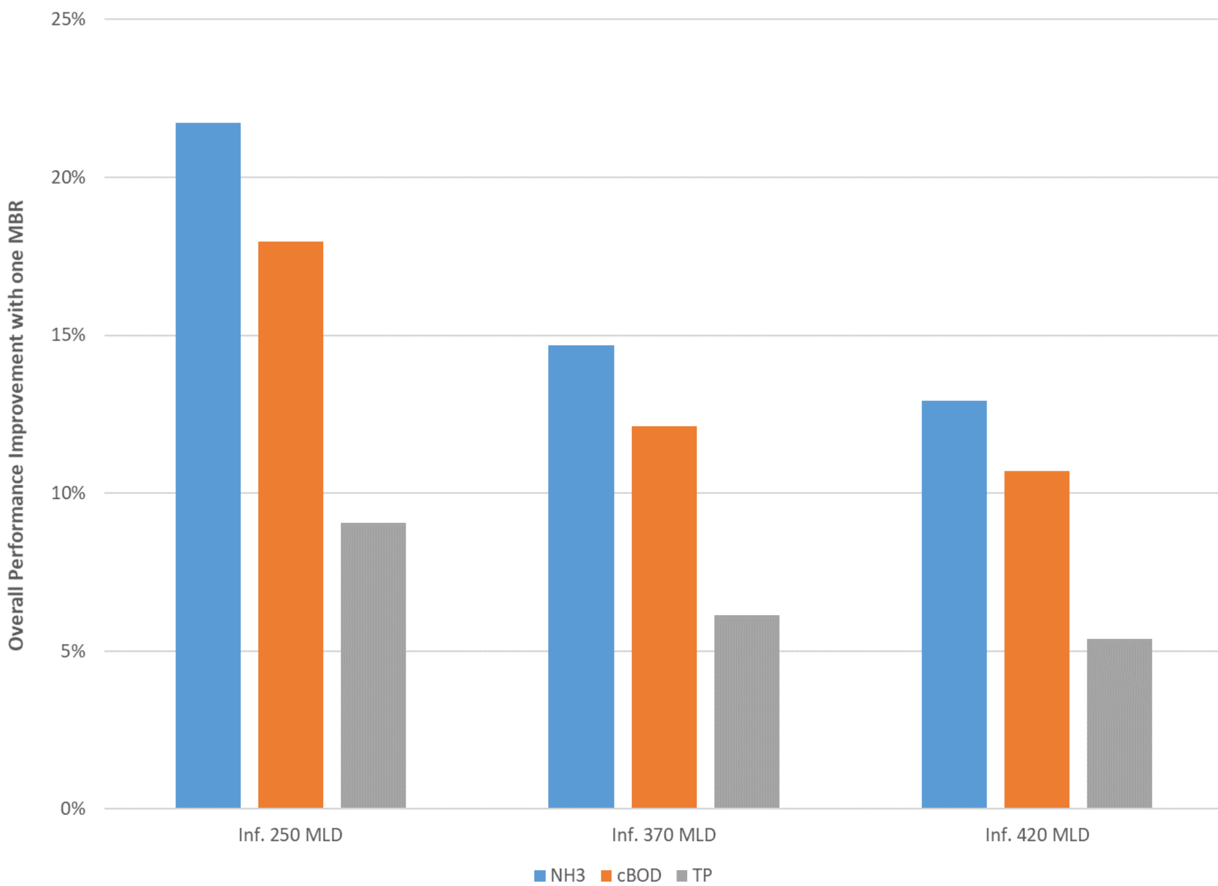


**Figure 8: Additional environmental benefit of secondary treatment upgrade (one MBR conversion)**

## 4. COST OF FUTURE UPGRADE OPTIONS

The Channel 1 Facilities Conceptual Design (Associated Engineering, 2019) identified that in order to upgrade primary treatment process with an additional 400 MLD EPT capacity, two ActiFlo® treatment trains would be installed in the location where Primary Clarifiers 3-4 are sited. Upgrades would also be required to the diversion structure, channel 1, grit removal system and fine screens. The cost estimate for this scenario is $49.8 million in 2019 Canadian dollars with an expected accuracy range between -30% to +50%.

The MBR Upgrades Conceptual Design (Stantec, 2019) identified that the conversion of a single BNR train to MBR could provide 60 MLD of average treatment capacity and 120 MLD of peak capacity. In addition to the upgrades to treatment process and support systems like electrical and aeration system, significant modifications would be required to the BNR train including the primary effluent channel, bioreactor, mixed liquor channel and secondary clarifier. The cost estimate for this scenario is $60.2 million in 2019 Canadian dollars with an expected accuracy range between -20% to +30%.

Both cost estimates include engineering design and construction services component and an overall contingency amount. Both estimates are capital cost estimates only and do not include operation or maintenance costs.

## 5. CONCLUSION AND RECOMMENDATION

EPCOR Drainage and GBWWTP have implemented the CSDS to minimize storm water discharge impacts to the watershed and reduce pollutant loadings to the NSR. The purpose of the CSDS is to work towards the “environmental equivalent” of sewer separation in regards to TSS, cBOD, TP, $NH_3$ and fecal coliform bacteria. The current CSO treatment provided at GBWWTP meets this intent and further addition of primary treatment capacity can provide only minor improvement in terms of solids removal and has negligible impact on other pollutant loadings to NSR. It should be noted that TSS loading to NSR is significantly reduced by using the current CSO controls strategy when compared to sewer separation because the diverted storm water is being treated at GBWWTP (CH2MHill, 2013).

The analysis in this report shows that further addition of primary treatment capacity has negligible environmental benefit at significant capital expense. Improvement of secondary treatment capacity, although for a much smaller flowrate, can provide similar or greater solids removal performance at similar cost. Furthermore, the secondary treatment process has the benefit of reducing other pollutant loads to the NSR including $NH_3$, cBOD and TP. Any additional secondary flow will also receive UV disinfection, thereby reducing the fecal coliform loading to NSR.

It is therefore recommended to maintain the currently available 1,200 MLD of combined primary treatment capacity at all times and consider upgrades to BNR capacity, when there is sufficient demand at GBWWTP, as a preferable approach to provide maximum environmental performance in a cost effective manner. Rehabilitation or upgrades to Channel 1, Grit Tanks 1-3, Screens 1-3 and Primary Clarifiers 3 and 4 may be considered, if they provide reasonable improvement to the reliability and redundancy of the overall treatment process at GBWWTP.

The upgrade scenarios chosen for this analysis are of similar scale in terms of cost and scope in order to establish comparative environmental performance. Based on current treatment demand, there is no immediate need to increase capacity of either the primary or the secondary treatment process. These scenarios are only being considered as part of the long term plans for the GBWWTP. No final decisions have been made to implement either scenario. Cost and benefit of other alternative approaches and technologies (e.g. activated sludge densification, baffling in secondary clarifiers, ammonia based aeration control etc.) are also being explored for improving secondary treatment capacity in the future. Also, the cost and environmental benefits of implementing disinfection for a portion of the EPT effluent, as intended in the initial design, is currently being explored.

This report focuses on the CSO treatment strategy and upgrade scenarios at GBWWTP only. It does not provide detailed updates on the overall progress of implementing the LTCP or CSDS recommendations. Since the LTCP was published, significant CSO control improvements have been made within drainage collection system with the application of the EACP measures, upgrades to conveyance capacity, addition of underground storage and implementing opportunistic sewer separation. In addition, the City developed a Total Loading Plan (TLP) for TSS in 2009, in order to achieve the long-term goal of no net degradation of the NSR relative to the 2000-2008 period. After the end of the original 10-year TLP, the Total Loading Management Plan is currently being re-evaluated to establish benchmarks and align the plan with EPCOR's corporate strategic goals of preserving and sustaining Edmonton's environment and a healthy watershed. EPCOR has also developed the 20-year Stormwater Integrated Resource Plan (SIRP) which focuses on a risk based implementation of Low Impact Development (LID) throughout the entire City to reduce the peak storm water flows that are entering the drainage collection system.

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## APPENDIX A: CALCULATION STEPS

**Scenario 2: Upgrade primary treatment**

Calculation changes compared to Baseline scenario:

$$Q_{\text{SCR BYP}-\text{OF30}} = \begin{cases} 0, \text{if } Q_{\text{Raw}} \leq 1600 \text{ MLD} \\ Q_{\text{Raw}} - 1600, \text{if } Q_{\text{Raw}} > 1600 \text{ MLD} \end{cases}$$

$Q_{2nd\ BYP\text{-}OF30}$ = BBASELINE $Q_{2nd\ BYP\text{-}OF30}$ + (BASELINE $Q_{SCR\ BYP\text{-}OF30}$ – Scenario2 $Q_{SCR\ BYP\text{-}OF30}$)

**Scenario 3: Upgrade secondary treatment**

Calculation changes compared to Baseline scenario:

$$Q_{\text{SCR BYP}-\text{OF30}} = \begin{cases} 0, \text{if } Q_{\text{Raw}} \leq 1200 \text{ MLD in summer or 900 MLD in winter} \\ \text{BASELINE } Q_{\text{SCR BYP}-\text{OF30}}, \text{if } Q_{\text{Raw}} > 1200 \text{ MLD in summer or 900 MLD in winter} \end{cases}$$

$$Q_{\text{2nd BYP}-\text{OF30}} =$$

$$\begin{cases} 0, \text{if } (\text{BASELINE } Q_{\text{2nd BYP}-\text{OF30}} + \text{BASELINE } Q_{\text{SCR BYP}-\text{OF30}} - \text{Scenario3 } Q_{\text{SCR BYP}-\text{OF30}}) \leq 30 \text{ MLD} \\ (\text{BASELINE } Q_{\text{2nd BYP}-\text{OF30}} + \text{BASELINE } Q_{\text{SCR BYP}-\text{OF30}} - \text{Scenario3 } Q_{\text{SCR BYP}-\text{OF30}} - 30), \text{ OTHERWISE} \end{cases}$$

$Q_{OF10}$ = BASELINE $Q_{OF10}$ + (BASELINE $Q_{SCR\ BYP\text{-}OF30}$ + BASELINE $Q_{2ND\ BYP\text{-}OF30}$ + BASELINE $Q_{OF20}$ – Scenario3 $Q_{SCR\ BYP\text{-}OF30}$ – Scenario3 $Q_{2ND\ BYP\text{-}OF30}$ – Scenario3 $Q_{OF20}$)

## APPENDIX B: RESULTS OF THE ANALYSIS

**Table 3: Calculated Solids Removal for Future Upgrade Scenarios**

| Scenario | Description | Process Stream | Mass of Solids, Ton/year | | | | |
|---|---|---|---|---|---|---|---|
| | | | 2015 | 2016 | 2017 | 2018 | 2019 |
| BASELINE | Performance under the current operating conditions | Solids in influent* | 38113 | 32717 | 35498 | 35307 | 34524 |
| | | Screened bypass via Outfall 30 | 1.1 | 9.7 | 69.6 | 48.4 | 116.2 |
| | | Secondary bypass via Outfall 30 | 301 | 297 | 298 | 246 | 267 |
| | | Outfall 20 | 0.0 | 0.2 | 1.0 | 6.0 | 4.5 |
| | | Outfall 10 | 620 | 312 | 657 | 694 | 592 |
| | | Captured in plant | 37191 | 32098 | 34472 | 34313 | 33544 |
| PRI - 1600 MLD | Performance by upgrading the primary treatment capacity to 1600 MLD | Solids in influent | 38113 | 32717 | 35498 | 35307 | 34524 |
| | | Screened bypass via Outfall 30 | 0.0 | 0.0 | 0.4 | 5.4 | 3.5 |
| | | Secondary bypass via Outfall 30 | 290 | 283 | 301 | 246 | 282 |
| | | Outfall 20 | 0.0 | 0.2 | 1.0 | 6.0 | 4.5 |
| | | Outfall 10 | 620 | 312 | 657 | 694 | 592 |
| | | Captured in plant | 37203 | 32122 | 34539 | 34355 | 33642 |
| | Improvement comparing to BASELINE | Improvement, ton | 12 | 24 | 67 | 43 | 98 |
| | | Improvement, % | 0.03% | 0.07% | 0.19% | 0.12% | 0.29% |
| SEC - One MBR | Performance by upgrading the secondary treatment (1 train to MBR) | Solids in influent | 38113 | 32717 | 35498 | 35307 | 34524 |
| | | Screened bypass via Outfall 30 | 0.0 | 6.5 | 67.9 | 45.6 | 38.4 |
| | | Secondary bypass via Outfall 30 | 251 | 252 | 247 | 204 | 235 |
| | | Outfall 20 | 0.0 | 0.0 | 0.0 | 0.0 | 0.4 |
| | | Outfall 10 | 574 | 290 | 612 | 643 | 549 |
| | | Captured in plant | 37288 | 32169 | 34571 | 34414 | 33701 |
| | Improvement comparing to BASELINE | Improvement, ton | 97 | 70 | 99 | 101 | 157 |
| | | Improvement, % | 0.26% | 0.22% | 0.29% | 0.30% | 0.47% |

*The influent solids flows presented here are slightly higher than reported values in corresponding annual reports, because of a smaller averaging period used in this analysis. The results listed here are intended to be used for this comparative analysis only and should not be referenced independently.

**Table 4: Calculated $NH_3$, cBOD and TP Removal for one MBR Conversion**

| | $NH_3$ | TP | cBOD | Comment |
|---|---|---|---|---|
| BNR Effluent Quality, mg/L | 2.38 | 0.35 | 3.58 | Average from 2017 to 2019 |
| MBR Effluent Quality, mg/L | 0.23 | 0.22 | 0.90 | Table 4.10, page 4.13 (Stantec, 2019) |
| **Influent flow 250 MLD** | | | | |
| Combined Effluent Quality, mg/L | 1.86 | 0.32 | 2.93 | Always keep MBR at 60 MLD under normal conditions |
| Improvement, % | 22% | 9% | 18% | Adjust flow to other BNR trains accordingly based on the influent flow |
| **Influent flow 370 MLD** | | | | |
| Combined Effluent Quality, mg/L | 2.03 | 0.33 | 3.14 | Always keep MBR at 60 MLD under normal conditions |
| Improvement, % | 15% | 6% | 12% | Adjust flow to other BNR trains accordingly based on the influent flow |
| **Influent flow 420 MLD** | | | | |
| Combined Effluent Quality, mg/L | 2.07 | 0.33 | 3.19 | Always keep MBR at 60 MLD under normal conditions |
| Improvement, % | 13% | 5% | 11% | Adjust flow to other BNR trains accordingly based on the influent flow |

# Appendix G Wastewater System Reportable Events

| Year | AEPA Reference# | Description WWC Event | Reason for Reporting |
|---|---|---|---|
| 2014 | 285046 | OUTFAL-30 autosampler failed to collect composite sample for bypass event on June 6, 2014. Results to be estimated based on frozen grab samples collected by Operations at 0015 hrs and 0215 hrs. Reported to Alberta Environment and Sustainable Resource Development on June 9, 2014 at 15:02 hrs; reference no. 285046. 7-day letter required. Work request submitted by lab.<br><br>For corrective actions, refer to ENV-00758. | Approval/Permit/Regulatory Requirement or Limit Not Met |
| 2014 | 285097 | OUTFAL-30 autosampler failed to collect samples for May 27th (0000 to 0403 hrs) wet weather events. Results to be estimated based on frozen grab samples collected by Operations. Reported to Alberta Environment and Sustainable Resource Development on June 10, 2014 at 1327 hrs; reference no. 285097. 7-day letter required. | Approval/Permit/Regulatory Requirement or Limit Not Met |
| 2014 | 285097 | OUTFAL-30 autosampler failed to collect samples for May 30th (0000 hrs to 0427 hrs) wet weather event. Reported to Alberta Environment and Sustainable Resource Development on June 10, 2014 at 1327 hrs; reference no. 285097. 7-day letter required.<br><br>Refer to Corrective Actions from ENV-00758. | Approval/Permit/Regulatory Requirement or Limit Not Met |
| 2014 | 285263 | There was no sample collected by the Outfall 30 Autosampler on June 11, 2014. The two grab samples collected by operations at midnight and 2:00 a.m will be tested, but no composite sample exists. Reported to Alberta Environment June 14 at 9:24AM, Reference # 285263.<br><br>From 7 day letter:<br><br>For portions of the wet weather event on the above stated date, flow weighted composite samples were not collected from Outfall No. 30 from both the long term and short term auto samplers. Preliminary investigation indicates that the auto sampler timer was not synchronized to real-time for the wet weather event. As a contingency plan, two (2) grab samples are collected by the Operations dept. at 0000 Hrs. and 0200 Hrs. to provide an estimate of water quality discharged to the North Saskatchewan River during this wet weather event in case of issues with the auto samplers. The estimated water quality data will be reported on the monthly plant performance reports and attached the Wastewater Annual Report for 2014.<br><br>For corrective actions refer to ENV-00758. | Approval/Permit/Regulatory Requirement or Limit Not Met |
| 2014 | 286593 | Untreated wastewater was observed leaking from the underside of a portion of the garage door on the north side of the Centre of Excellence Pilot Plant building. The material continued along the roadway for about 15 metres into a storm sewer on the right side of Division Street facing north. It is estimated that about a maximum of 100 litres of untreated waste water was released to the storm sewer which is based on greater than 10% of the approximately 1000 litres released over a maximum 45 min release duration at a rate of 6.2 US gallons per minute. The release was reported to ESRD at 4:36 PM and a reference number 286593 was issued. The other 90% or more of the release was contained in the Centre of Excellence facility and drained into the floor drain back to the headworks of Gold Bar Plant. | Reportable Release to Water - Untreated Wastewater |

| Year | AEPA Reference# | Description WWC Event | Reason for Reporting |
|---|---|---|---|
| 2014 | 281190 | From 7 day letter: uncontrolled release of biogas from the digester 7 & 8 biogas system that occurred from 9:11 AM to 10:35 AM on March 6, 2014.<br><br>At approximately 6 AM an isolation of the sludge pumping system for the Gold Bar Wastewater Treatment Plant was started in order to do some capital upgrades on the sludge pumping systems. During the isolation, levels in Digesters 7 and 8 (and their shared overflow stand-pipe) reached and then exceeded the maximum operating level/capacity, most certainly due to excessive foaming. As a result, sludge was then redirected through the emergency overflow lines. This condition was controlled by turning on pumps to spray down the foam that had been shut off as part of the shutdown. The Operations Department began to flush the emergency overflow piping with final effluent to prevent sludge from solidifying in the lines. The emergency overflow lines have a built in P-trap that prevents biogas from escaping from the digester; the P-trap was the location being flushed.<br><br>While flushing the P-trap, the operator decided to open the drain valves to the P-trap which caused the liquid seal to be lost and allowed Digester 7 to release biogas out the air vent on the emergency overflow line. The location of the biogas release was discovered at approximately 09:56 AM and emergency response measures were initiated. Digester 7 stopped venting at approximately 10:35 AM. | Approval/Permit/Regulatory Requirement or Limit Not Met |
| 2014 | 286571 | Violation of Edmonton Waterworks Approval. Cannot meet HAA reporting requirement for June. Lab testing failed quality control requirements. Data is not reliable or defensible and cannot be used for reporting purposes. Failure of testing was not actioned in time for resampling and re-analysis. Seven distribution samples and two plant samples. | Approval/Permit/Regulatory Requirement or Limit Not Met |
| 2015 | 303515 | EPCOR's Approval to Operate #638-03-00 requires for 4 samples to be collected within 24 hours for HAAs testing. In August these samples were collected in a space of 48 hours. | Approval/Permit/Regulatory Requirement or Limit Not Met |
| 2015 | 303514 | EPCOR's Approval to Operate #638-03-00 stipulates that a random sample should be tested for the Schedule 4 of such approval between the months of Jun and August. The actual testing was done one at the end of May and the other one at the beginning of September missing the required time window. | Approval/Permit/Regulatory Requirement or Limit Not Met |
| 2015 | 301709 | On July 24 two samples from Outfall 30 (collected July 23) were prepared for E. coli determination and placed in an incubator. The samples should have been read back on July 25. They were not read back until July 27. The samples were over-aged and the results may include false positives and are, therefore, unreliable and cannot be reported. The incident was phoned into Alberta Environment & Parks at 16:30 on July 31 under Reference #301709. | Approval/Permit/Regulatory Requirement or Limit Not Met |
| 2015 | 302153 | pH testing was not performed on the composite sample collected from Outfall 30 on July 23. The incident was reported to Alberta Environment & Parks on August 13 under AEP Reference #302153. | Approval/Permit/Regulatory Requirement or Limit Not Met |

| Year | AEPA Reference# | Description WWC Event | Reason for Reporting |
|---|---|---|---|
| 2015 | 302492 | Related to PH-00408. Offensive odour complaint at 7507 125 Ave triggered flushing and resamples on August 9 from 4 locations (upstream, downstream, and 2 sites at the original location). Dispatch was notified on August 9th that the resamples failed due to offensive odour. However, the information was faxed without the bacteriological results. Additional resamples (2nd set) were collected (upstream, downstream and 2 sites at 7507 125 Ave.<br><br>One sample from the "first set" of resamples was Total Coliform positive. The "second set" of resamples collected on August 10 were negative for Total Coliforms. However, initial investigation suggests that lab procedures were not followed with respect to notifying Dispatch. Dispatch was not notified of the initial Total Coliform positive, therefore, AEP was not notified of a failed bacteriological result. Investigation into the details of the incident and whether AHS was notified is underway.<br><br>Records show that a Foreman in Distribution Maintenance and Scheduling was called. Records that Dispatch was notified have not been found. | Approval/Permit/Regulatory Requirement or Limit Not Met |
| 2015 | 299043 | What: biosolids spill<br>Where: intersection of 137 Ave and Meridian St<br>When: Jun 1st 12:00PM - 4:30PM<br>How: At 2:30PM Jun 1st, Gold Bar received a notification from City of Edmonton in regards to a spill at the intersection of 137 Ave and Meridiam St by Waste Management Center of Excellence at Clover Bar. Leak confirmed on a 10'' sludge transfer line from Gold Bar to Clover Bar Lagoons. Isolated the line and stopped the leak at 4:30PM Jun 1st. Estimated leak quantity is 0.5-1 ML. Canessco onsite on Jun 2nd morning to cleanup the spill with assistance of EWMC. Reported the spill to Alberta Environment (Ref #299043) and City. | Reportable Release to Land- Partially Treated Wastewater\|Sludge\|Biosolid |
| 2015 | 300026 | Lab Sampler collected Random Distribution Sample from 10711 76 Ave 26-Jun at 10:00 AM. 1.90 mg/l and 0.156 NTU. Result TC positive and EC negative. Resamples to be collected by WSS.<br>Requirements under the Communication and Action Protocol for Failed Bacteriological Results in Drinking Water were not met. Resamples were not collected within 24 hours of detecting the initial Total Coliform positive. The initial Total Coliform positive was detected on July 27th. Resamples were not collected until June 29th. All reasamples had chlorine and turbidity within normal operating ranges and all bacteriological results were negative for Total Coliform and E. coli. | Approval/Permit/Regulatory Requirement or Limit Not Met |
| 2015 | 300823 | A mainbreak depressurization event took place on Friday, July 10 at 8555 - Roper Road (sampling point - hose); that had a positive hit for total coliforms. The notification protocol was activated by Lab personnel but was not followed correctly as the wrong notification cover sheet was used (standard cover sheet instead of the Notification coversheet) and the Water Sample Form did not have "Call ESRD CIC" circled. | Approval/Permit/Regulatory Requirement or Limit Not Met |

| Year | AEPA Reference# | Description WWC Event | Reason for Reporting |
|---|---|---|---|
| 2015 | 300064 | Approval 361975-00-00 requirements were not met. Raw influent pH was not measured from May 29 to Jun 27. Bypass (Outfall 30) pH was not measured on May 31, Jun 15, 19, 20. Online pH values are available for the raw influent.<br><br>New approval requirements were not effectively communicated to lab staff. | Approval/Permit/Regulatory Requirement or Limit Not Met |
| 2016 | 314942 | A representative composite sample is not available for the July 30, 2016 Bypass event (Outfall 30).<br><br>Outfall 30 composite sampler is designed to collect two samples at different frequencies - short-term and long-term. The long-term composite sample frequency is at 1/10 the frequency of the short-term sample. Therefore, large volume bypass events will overflow the short-term sample bottle and provide a useable volume (sufficient for required analyses) in the long-term sample bottle. On July 30, 2016, the estimated bypass was 163 ML. The short-term sampler overflowed but the long-term sample was not collected. Since the short-term sample bottle overflowed, the sample collected is not representative of the entire bypass event. Reason(s) for the composite long-term sampler failure are under investigation.<br><br>This contravention was not discovered until preparation for the July monthly report was underway and the sample collector's notes regarding the short-term sample overflow were noticed by the lab Team Lead.<br><br>Incident was reported into Alberta Environment and Parks. AEP Ref #314942. | Approval/Permit/Regulatory Requirement or Limit Not Met |
| 2016 | 307252 | Three (3) out of the four (4) scrubbers have been out of service since October 2015. This incident was reported to the AEP Call in Centre on January 12, 2016. Further details to follow once 7 day letter is finalized and sent to AEP. | Approval/Permit/Regulatory Requirement or Limit Not Met |
| 2016 | 315409 | U.V. Channel #5 went into service based on wet weather flow. The channel filled up and the discharge gate opened but no U.V. bulbs came on. This happened 3 different time on August 22nd. | Reportable Release to Water - Other Regulated Substances |
| 2016 | 309149 | During the acid cleaning of the sludge distribution lines that was happening at Gold Bar an unknown quantity and concentration of $H_2S$ was released for a short duration from the contractors tank. This occurred at approximately 17:00. Operations confirmed at 17:10 the presence of $H_2S$ and the area was evacuated. The acid clean operation was shutdown and operations confirmed shortly after that no $H_2S$ was present in the area. The tank was capped.<br><br>Elevated $H_2S$ reading were recorded at the SIA Gold Bar Air Quality Monitoring (AQM) station for a 10 - 15 minute time duration. Concentration reached a peak of 40 ppb or more, however the one hour air ambient air quality guideline was not exceeded (max 10 ppb). | Approval/Permit/Regulatory Requirement or Limit Not Met |

| Year | AEPA Reference# | Description WWC Event | Reason for Reporting |
|---|---|---|---|
| 2017 | 322851 | AEP was contacted at 780-422-4505 around 14:48 and the reporting employee spoke with Taryn while their Senior Manager was present. The employee stressed to AEP Reporting Hotline representative that this was a notification.<br><br>The employee told AEP Reporting Hotline that we had submitted an effluent sample to a sub-contract lab in March for toxicity testing and the lab had a problem with the Ceriodaphnia test. Consequently, there would be no result for Q1 and we would be submitting another sample today. Taryn insisted that the re-test would therefore be late, that this would be a contravention and require a seven-day letter.<br><br>The employee also informed AEP Reporting Hotline of the mortality results for Fathead Minnow and that we would be submitting another sample today for that test as well.<br><br>AEP Reporting Hotline cited Reference #322851.HP | Approval/Permit/Regulatory Requirement or Limit Not Met |
| 2017 | 324035 | At 3:00PM operations received a call from City of Edmonton Drainage that there was a leak in Hermitage Park which was probably coming from our supernatant return lines from Cloverbar. Operators went out to investigate and confirmed that it was supernatant coming from Line 2 which runs between the Distribution Chamber and D2 Chamber. Supernatant pumping was shutdown at 3:30PM. A vac truck was brought to site to clean up the supernatant and rescue crew arrived to assist operators going into chambers to isolate the line. Alberta Environment was called at 4:30PM (REF: 324035). The area is an off leash dog park so EPCOR staff helped manage the public passing right beside the spill to ensure public safety. Area was cleaned up of all surface supernatant by 8PM and snow fence was placed around the area where the leak had originated from. A total of 10.5 cubic meters of supernatant was removed from the area. | Reportable Release to Land- Partially Treated Wastewater\|Sludge\|Biosolid |
| 2018 | 347514 | MH#246493 shows on DRAINs as a storm, but has a combined line running through it on a bench. The combined has a monitor that alarmed to let us know that a possible over flow was happening. This combined line did plug up and overflowed into the storm through a known interconnection site #151. A vactor came out and released the blockage which contained toilet paper and bit of clay. I don't think the line collapsed because we did not notice any more debris flowing down the line and it was flowing normally. This was phoned into to Epcor control, who in turn contacted Alberta Environment. Ivara WO# 176666. AEP reference #347514. I will add before and after photos.<br>AEP Requested 7 day letter. | Reportable Release to Water - Untreated Wastewater |
| 2018 | 347555 | CHECKED IC 106 ROUTE DISCOVERED MH 24867 SURCHARGING DRAINING INTO STORM MH 224867 CALLED FOR EQUIPEMENT TO RELEASE PLUGGED MAIN STAYED ON SITE UNTIL TASK WAS COMPLETED.<br><br>Release was reported to AEP 347555 . AEP Required a 7 day letter. | Reportable Release to Water - Untreated Wastewater |

| Year | AEPA Reference# | Description WWC Event | Reason for Reporting |
|---|---|---|---|
| 2018 | AEP # 334581 | A public complaint was received regarding water bubbling out of the ground at this location. Various crews were called out to location and determined that the water came from a water main break west of 122 street & 51 ave. The water entered the storm system at this location and ran downstream to the outfall # 4 . At this point it surcharged through manhole 303879 and between the outfall structure and the first upstream pipe. This surcharge was due to the outfall pipe being frozen and blocked with ice. The water ran onto the bank and into the frozen creek bed and turned into ice and never penetrated through the frozen over creek.<br>This incident was reported to RMCO by the Drainage control staff AEP # 334281 & ENVISO # 1632. It was also reported to AEP by EPCOR WATER. I am still waiting to talk to a representative from that group to obtain their information and AEP # to determine the estimated amount of the water release. | Reportable Release to Water - Other Regulated Substances |
| 2018 | AEP # 336025 | A interconnection monitoring contractor was going to install new equipment into Interconnection # 191 (Manhole 246377), when they noticed the manhole was backed up. The contractor contacted an Drainage Services - Environmental Technologist (Monitoring & Compliance), who then contacted the Drainage Services - Labour Foreman 3 (Environmental Services). A Drainage Operations work crew was dispatched and found combined mainline 85927 plugged. This caused an untreated sewage release at the interconnection manhole. This release flowed to the North Saskatchewan River through Outfall #188 ( 246868 ) The release was stopped at 16:30-Mar-23-2018 by High Pressure Flushing the plugged line. This release was reported to RMCO. AEP # 336025 & ENVISO # 1695. AEP has requested a 7 day written report. Unknown amount of sewage reported. Estimated the release occurred sometime between Dec-20-2017 ( Last Inspection ) to present Mar-23-2018. | Reportable Release to Water - Untreated Wastewater |
| 2018 | AEP#336852 | A combined sewer overflow event occurred at the Rat Creek CSO location. 14,050 cm of combined sewage was discharged between 12:30 and 3:40 on April 17, 2018. Real time control (RTC) gates may not have been functioning as planned. Near the time when the release was discovered, the RTC gates were storing flow and releasing it at a rate that did not cause CSO flow to occur. All storage level and gate position data will need to be reviewed to see what was the cause of the CSO. The release may not have been reportable, but with the uncertainty of the situation, the release was reported.<br>Reported to AEP 19:45 April 17, 2018<br>AEP Reference No: 336852<br>AEP Contact: Darren<br>7-day Letter requested? YES<br>911, Fire prevention not required.<br>Rossdale and Gold Bar not required to be notified. | Reportable Release to Water - Untreated Wastewater |

| Year | AEPA Reference# | Description WWC Event | Reason for Reporting |
|---|---|---|---|
| 2018 | AEP # 337785 | Upon arrival, EPCOR Drainage Inspectors observed that there was evidence of overflow from sanitary MH 401871. However, no overflow was occurring on site at the time of inspection. Sanitary MH 400985 was plugged at the bottom from what appeared to be grease. An EPCOR vactor unit performed high pressure flushing of sanitary lines 400987 & 401872 to release the blockage.<br><br>Vactor pumped pooling water at plugged CB 401899 then proceeded to wash down road and re-pump pooling water at plugged CB 401899 (there was possible issue with CB lead). Unknown amount entered STM system and ran to SWMF 400976. Unlikely any amount of untreated wastewater entered the North Sask river because the SWMF empties to a ditch then back into a pipe then to another SWMF. There was no evidence of untreated wastewater in any of those locations or the SWMF.<br><br>Reported to AEP REF# 337785, 7 day letter required. | Reportable Release to Water - Untreated Wastewater |
| 2018 | AEP# 338465 | An EPCOR Drainage Services inspector responded to an alarm at combined / storm sewer interconnection # 151. The combined sewer line #85366 was plugged, resulting in untreated sewage overflowing thru the interconnection and into the storm sewer line.<br>An EPCOR Drainage Services vactor unit was called in to flush and release the main line stoppage.<br>The blockage has now been released and the combined sewer line is flowing normally. | Reportable Release to Water - Untreated Wastewater |
| 2018 | AEP# 338927 | 1363 cubic meters of untreated wastewater was released between 9:55AM and 10:30AM at the rat creek outfall. The utility power shut was off for emergency generator testing. The gate at RTC#3 opened and did not resume its position while the emergency generator was running. This event was reported to AEP on May 30, 2018 @ 16:20 hrs. (AEP # 338927). AEP has requested a 7-day letter for this release. This 7-day letter will need to be issued to AEP by June 6, 2018. | Reportable Release to Water - Untreated Wastewater |
| 2018 | AEP # 339018 | The sanitary service of this house is connected to the storm system causing a sewage release.<br>There was a cross connection investigation being performed in this neighborhood due to a sewer odour complaint. Through various forms of testing such as sampling, smoke testing, dye testing, service line televising, it was confirmed that this property was in-correctly tied into the storm sewer system.<br>WO # 162645.3<br>AEP REFERENCE # 339018<br>7 DAY LETTER IS REQUIRED | Reportable Release to Water - Untreated Wastewater |
| 2018 | AEP # 339076 | EPCOR Drainage Inspectors responded to a complaint of water surcharging from a sanitary manhole. Inspectors found Sanitary MH 293787 overflowing from community hall and spray park use. The Drainage Control Center was contacted to request a vactor unit to release sanitary pipe 503842. Untreated sewage entered storm CB 292241, checked STM MH 292240, MH wall wet but unsure as to quantity of sewage that entered STM main. The vactor unit pumped out sump of CB 292241.<br>This release has been reported to AEP (#339076). AEP has requested a 7-day letter. | Reportable Release to Water - Untreated Wastewater |

| Year | AEPA Reference# | Description WWC Event | Reason for Reporting |
|---|---|---|---|
| 2018 | 339391 | The City of Edmonton experienced heavy rain on June 10th and 11th. Heavy rainfall in combined sewer areas can overwhelm associated pump stations due to the inflow of storm water. Pumpwell staff were alerted to overflow alarms occurring at Walterdale pump station. The SCADA monitoring system showed that the pump stations were operating at full capacity and that all equipment was on line.<br><br>The Walterdale station has a 3100 cubic meter storage tunnel which reduces the amount of combined sewage discharging to the North Saskatchewan River. Once the storage tunnel has reached capacity the combined sewage enters a storm sewer that discharges to the North Saskatchewan River.<br><br>Event was reported to AEP - 339391. 7 day letter due on June 18th, 2018. | Reportable Release to Water - Untreated Wastewater |
| 2018 | 340349 | I was called for combined sewage over flow to river alarm for 537. I checked SCADA and noticed that the operating modes of the three gates were Auto: high high. After referring to the Interim Checklist for Rat Creek Overflow Alarm I took action B which is to notify the standby manager about a release and also informed the control centre to notify AEP about the event. After about one hour I saw on SCADA that the gates 401, 402 and 403 had moved from 100% open to around 10% open. This is normal operation so It would appear the release of combined sewage was over. The operation of station 584 gates functioned as they should have due to the heavy rain event.<br>Event was reported to AEP# 340349. 7-Day letter is due on July 6th, 2018. | Reportable Release to Water - Untreated Wastewater |
| 2018 | AEP# 340715 | This is a child event of ERS event VEH-20180710-269076.<br><br>As indicated within the above event. The contractor had a truck and trailer roll over and spill biosolids into the ditch. Approximately 2m3 was spilled from the truck. At 9:30am a vacuum truck arrived on site and cleaned up the easily accessible spill amount in addition to emptying the trailer. The biosolids we taken to the nearby application site and applied. The vacuum truck is remaining on site until the tow truck arrives in case there is more spillage during that operation or hidden underneath the trailer.<br>While awaiting the tow vehicle workers on site pumped fuel out of the truck to mitigate the risk of fuel spillage.<br>The contractor reported the spill to AEP on July 10, 2018 (1:40 PM). AEP# 340715. AEP has requested a 7-day letter. | Reportable Release to Land- Untreated Wastewater |
| 2018 | AEP# 225663 | Notified by call centre for Combined sewage water overflow to river alarm .This alarm was for about 10 minutes. Checked alarm on SCADA as interim checklist for Rat Creek overflow . Operation of station was normal. Call centre report spill to river.<br>This release has been reported to AEP (AEP# 225663). AEP has asked for a 7-day letter. | Reportable Release to Water - Untreated Wastewater |

| Year | AEPA Reference# | Description WWC Event | Reason for Reporting |
|---|---|---|---|
| 2018 | AEP# 340888 | A citizen called 311 to report that water was surcharging out of a manhole at the intersection of 94-Street & Cameron Avenue NW, Edmonton, AB. Upon arrival at this location, Drainage inspectors observed that a combined MH (#262034) was surcharging due to a plugged main. Untreated wastewater from the manhole was running down the road (less than a block) and ended up in the sump of a storm catch basin (#400193). The CB lead at this location enters the storm collection system, which drains into a nearby outfall (#147).<br><br>An EPCOR Hydrovac was dispatched and released the blockage in the plugged main. The untreated wastewater on the road surface was cleaned up and the roadway washed with water. The untreated wastewater was also cleaned out of the storm catch basin.<br><br>Prior to the on-call manager being notified, this release was reported to AEP (AEP# 340888). AEP has requested a 7-day letter. | Reportable Release to Water - Untreated Wastewater |
| 2018 | AEP# 341207 | COMBINED SEWAGE RELEASE AT OUTFALL 537 DUE TO HEAVY RAINFALL,<br>This release has been reported to AEP (#341207). AEP has requested a 7-day letter. | Reportable Release to Water - Untreated Wastewater |
| 2018 | 341554 | A manhole was present at this location that was made of CSP (corrugated steel pipe), which degrades over time. A rehabilitation of the manhole was planned for August 2018, which prompted a video inspection of the manhole. From 16m below ground to 23m below ground, the manhole barrel / pipe was missing and a large underground cavity was discovered. This manholes function was to take combined flow (both stormwater and untreated sanitary sewage) from a 900mm sewer line approximately 5m below ground and drop it to the trunk sewer 23m below ground. With the bottom of the manhole barrel / pipe missing, the flow from the 900mm would have entered the underground cavity from the time of pipe degradation until July 26, 2018 when flow was diverted from this drop structure.<br>On July 26, sand bags were placed in the 900mm line leading into this manhole to force the flow of untreated wastewater to divert to another sanitary sewer line upstream to further assess the impacted infrastructure. The untreated wastewater would then re-enter the trunk sewer and flow for treatment at the Gold Bar Waste Water Treatment Plant. When it was determined that there had been a release of untreated wastewater due to the degradation of the CSP it was reported to the regulator.<br>AEP Reference #: 341554<br>7-Day letter was issued to AEP on August 8th. | Reportable Release to Land- Untreated Wastewater |
| 2018 | AEP# 342415 | Force main break at the Elsinore Pump Station resulted in the release of wastewater to the environment<br>This event has been reported to AEP (#342415). AEP has requested a 7-day letter. | Reportable Release to Water - Untreated Wastewater |

| Year | AEPA Reference# | Description WWC Event | Reason for Reporting |
|---|---|---|---|
| 2018 | AEP# 342415 | Bypass pumping equipment Bauer fitting opened up, separating the two pipes, resulting in a release of wastewater on to the ground nearby. Release was contained and Vactor truck was called to suck up wastewater. Approximately 1 liter of wastewater entered the near by catch basin, was sucked up by Vactor Truck. This release has been reported to AEP (#342415). AEP has requested a 7-day letter. AEP has requested that this release and the August 14, 2018 release (ENV-20180814-592044) be included in the same 7-day letter. | Reportable Release to Water - Untreated Wastewater |
| 2018 | AEP# 342415 | Bypass pumping equipment being used to redirect flow at the Elsinore Pump Station leaked, resulting in a spill. The fitting on the pipe failed. The spill resulted in wastewater being released to the catch basin and on the grass boulevard. The spill was contained and the wastewater was removed from the catch basin using a Vactor Truck. This release was reported to AEP (AEP# 342415). AEP has requested a 7-day letter. | Reportable Release to Water - Untreated Wastewater |
| 2018 | AEP# 343158 | Drainage Services staff responded to a report a subsidence around storm manhole 211864. While investigation this subsidence, it was discovered that untreated sewage was entering storm manhole 211864 through a 450mm corrugated metal pipe connected to sanitary manhole 211851. There was a steel gate over the 450mm pipe that should have stopped the untreated sewage from entering into the storm line. However, this steel gate was found to be missing, possibly due to deterioration (rusted away).<br>This event has been reported to AEP (AEP# 343158). AEP has requested a 7-day letter. | Reportable Release to Water - Untreated Wastewater |
| 2018 | AEP# 343139 | Due to pressure and vibration the clamps on a flex hose came loose resulting in the separation of the hose and a Bauer fitting. Consequentially the separation resulted in the release of untreated wastewater on to the ground and road immediately surrounding the hose.<br>A hydrovac truck was dispatched to the site to contain the untreated wastewater entering a nearby storm manhole. The hydrovac also removed untreated wastewater on the ground and in the catch basin sump.<br>This event has been reported to AEP (AEP# 343139). AEP has requested a 7-day letter. | Reportable Release to Water - Untreated Wastewater |
| 2018 | AEP# 343698 | EPCOR Drainage Operations Environmental Inspection group were investigating High E-coli sources (recorded in outfall #71 ) in the area of Rundle Heights neighborhood. The inspector completed a dye test at 3315 104 Avenue NW which failed on February 20, 2018. A televising of the sanitary service, to verify the cross connection was completed on September 6, 2018.<br>This cross-connection has been reported to AEP (#343698). AEP has requested a 7-day letter. | Reportable Release to Water - Untreated Wastewater |
| 2018 | 343747 | Force main break at the Elsinore Pump Station resulted in the release of wastewater to the environment. Booms placed in manholes. Catch basin pumped out. By-pass pumping setup. IVARA work order #171970. This event has been reported to AEP (#343747). AEP has requested a 7-day letter. | Reportable Release to Water - Untreated Wastewater |

| Year | AEPA Reference# | Description WWC Event | Reason for Reporting |
|---|---|---|---|
| 2018 | 344002 | Manhole DR244323 from a 300mm combined line overflowed during rain/sleet weather conditions, the overflow ran down 98ave and entered CB DR243673 which is connected to the same combined mainline that it originally came from. A vactor unit was dispatched and released the blockage in the 300mm line. The release was reported to AEP #344002. | Reportable Release to Water - Untreated Wastewater |
| 2018 | 344734 | Service truck called in Environmental Standby. Got to the location. Sewage was surging out of MH#311786 and flowing down the curb line into CB# 311805. It's unknown how much sewage ran into CB#311805 as there was a rain event happening at the time of this call. Epcor Control phoned in a Vactor truck when they phoned me in as well. The Vactor arrived on site 5 min. after I did and released the sanitary plugged line. We then pumped CB#311805 while washing down the street. Due to the rain event the sewage was already cleaned out. It's unknown how long the MH surcharged into the storm and it's also unknown how much sewage made it into STM line#311845. Release was reported to AEP(#344734). AEP requested 7-day Letter. | Reportable Release to Water - Untreated Wastewater |
| 2018 | 346028 | As part of the regular monitoring and sampling of the storm collection system EPCOR Drainage Services identified the existence of a cross-connection in Michaels Park neighborhood at 4303 68 Street NW. Release was reported to AEP (#346028). AEP has requested a 7-day letter. | Reportable Release to Water - Untreated Wastewater |
| 2018 | AEP# 347022 | On November 26th, at 12:45 PM Drainage Operations received a high level wet well alarm from the SCADA monitoring system from Saskatchewan Drive Pump Station (#109). EPCOR Water Distribution and Transmission (D&T) crew was flushing an upstream watermain into the sanitary sewer directly connected to the storage tank of Station #109. The wet well was not overflowing to the storm water system when the Drainage Operations Crew arrived. Based on alarm indications and observations of wet floor, and debris, the operator determined there was a potential release of dechlorinated water and untreated wastewater. | Reportable Release to Water - Untreated Wastewater |
| 2018 | AEP# 347062 | The EPCOR Project Management group initiated a smoke testing with Drainage Operations - Environmental Services group to investigate and or identify possible sanitary mainline and service deficiencies in the neighbourhoods of Aldergrove and Belmead as part of Aldergrove Sanitary Sewer Upgrades Capital Project. The location 18504-94 Avenue NW was initiated for follow up testing with dye and service televising of the residential sanitary service and confirmed the cross-connection of the residential sanitary service to the EPCOR Drainage Services storm mainline. This cross-connection was reported to AEP on November 27, 2018 (AEP# 347062). AEP has asked for a written report. | Reportable Release to Water - Untreated Wastewater |

| Year | AEPA Reference# | Description WWC Event | Reason for Reporting |
|---|---|---|---|
| 2018 | AEP # 335127 | Station# 159: My crew and I discovered the break to a 3/4 inch water line we shut the supply valve off and stopped the water discharge. We then phoned the Corporate Release Reporting Center: 780-496-6666. A large amount of treated water was released into the environment. It is unknown when the pipe burst.<br><br>The water line break was inside the station and included the water meter and backflow preventer. EPCOR water is coming to fix the water meter. We called a Vactor to clean up remaining water on the ground. The Vactor arrived and started sucking up water that was on the ground.<br>We chipped ice off of the sidewalk removing a slip hazard to the public.<br><br>Alberta Environment does want a report<br>Enviso # 1648<br>AE#335127 | Reportable Release to Water - Other Regulated Substances |
| 2018 | AEP# 343673 | EPCOR Drainage Services employee was using a hose from inside the building at Kennedale yard located at 12810-58 Street NW to remove build up leaves from a parking lot area. Another employee identified that the run-off water was entering a private storm manhole and immediately shut down washing activity. Drainage Services industrial investigators had inspected the manhole and determined that approximately 50L of chlorinated water had entered the storm collection system. Water tested at 0.33mg/L total chlorine.<br><br>This release has been reported to AEP (#343673). AEP has requested a 7-day letter which was issued on September 7th. | Reportable Release to Water - Other Regulated Substances |
| 2018 | 335978 | At 12:50PM digested sludge was observed coming out of the ground west of the EPT building spilling onto the road. Control room was notified and shutdown sludge pumping out of the plant which slowed the leak significantly. Maintenance and operations contained the spill to prevent it from spreading too far, and Line 1 which was running at the time was isolated. Reported to AEP (ref #335978). | Reportable Release to Land- Partially Treated Wastewater\|Sludge\|Biosolid |
| 2018 | 334025 | Employee was refueling the crane using the fuel cube. The employee set the fuel nozzle to the automatic hold position and then began fueling. The employee walked away from the nozzle during fueling operations leaving the nozzle unattended to perform other tasks. The employee noticed that the tank was overflowing and immediately shut off supply from the fuel cube. Approximately 20 litres of fuel was released onto the ground within the confined worksite area. No fuel entered the waterway or drainage system.<br><br>Employee and Foreman contained spill and cleaned contaminated area using spill kit, absorb-all and spill pads. The Construction Supervisor immediately notified the City of Edmonton environmental spill release contact, General Supervisor, Drainage HSE and the Drainage Monitoring and Compliance rep. Arrangements to remove the hazardous contaminated material from site were immediately made. Material Was removed on Thursday January 25th.<br><br>This event was reported to AEP (AEP# 334025) | Reportable Release to Land - Other Regulated Substances |

| Year | AEPA Reference# | Description WWC Event | Reason for Reporting |
|---|---|---|---|
| 2018 | AEP# 338453 | A Drainage Services Open Cut construction crew was working on the replacement of a sanitary service line at 9621-75 avenue. During the work to replace the service there was a utility strike on a water line at this location which caused the trench to begin filling up with water. To prevent flooding of the home and prevent flooding on the road a pump was placed in the trench to evacuate the chlorinated water. The crew placed the outlet hose into CB 86834. There was no untreated wastewater in the trench as the sanitary service was still intact.<br><br>The pump ran for 2 hours and discharged approximately 4000L of chlorinated water to the storm collection system. The pump was stopped when the water was shut off to the broken water line. This stopped the release of chlorinated water.<br><br>The release of chlorinated water to the storm system was reported to Alberta Environment (Reference #338453). AEP is requesting a 7-Day letter. | Reportable Release to Water - Other Regulated Substances |
| 2018 | AEP# 339242 | Citizen sent in photo(see attached) of Mill Creek separator (facility 385992) from the weekend which showed the creek seemed to have more foam/bubbles than usual. Investigators went to separator and found that there did appear to be more than normal but took a sample of the water to be certain. The sample results came in June 6, 2018 showing that Total Phosphorus was higher than Drainage Bylaw 18100 limits. Total Phosphorus limits for storm are 1.0 mg/L in the Drainage Bylaw, the sample results were 13.6 mg P/L. The foam did dissipate off after a couple days and some rain but investigators will continue to spot check on the creek. Investigators drove around the area to see if there were any signs of anyone washing vehicles/equipment or dumping materials and found nothing. There will be a follow up sample to determine if this was an isolated incident and that the release is no longer occurring. Grab samples taken through the Environmental Monitoring Program at Outfall 44, where the creek discharges to the NSR had TP levels of 0.25 on May 7 and 0.1 on May 24 showing this to be an anomaly.<br>This release has been reported to AEP (#339242). AEP has requested a 7-day letter. | Reportable Release to Water - Other Regulated Substances |

| Year | AEPA Reference# | Description WWC Event | Reason for Reporting |
|---|---|---|---|
| 2018 | 340222 | Alberta Environment was called today to report a potential glycol leak of unknown quantity and unknown location somewhere on the 340m of underground 200mm inhibited ethylene glycol pipe buried under North avenue at the Gold Bar WWTP. The pipe is approximately 40m South of the North Saskatchewan River (NSR).<br><br>The potential leak was discovered when a contractor performed a pressure test on June 22nd of the underground pipe and was unable to hold pressure during the testing. The pressure test report was received today (June 27th) and AEP (Ref#: 340222) was called after a brief review of the report showed that the pressure test had failed.<br><br>Update Sept 7/18- Further pressure testing with water was performed on the glycol line in question and that revealed the suspected leak location of the pipe. The location was excavated and samples were taken that confirmed several high ethylene glycol concentrations (higher than the Alberta Tier 1 soil standard) within the excavated area. Further auger samples will be performed within below the excavation surface location and based on the results more soil/ground water sampling may be performed to the west and north of the excavation area. | Reportable Release to Land - Other Regulated Substances |
| 2018 | AEP# 340527 | Location intersection: 156 street and 113 Avneue<br>Services: DR255373 & DR255374<br><br>Drainage Operations employees witnessed an EPCOR Drainage crew preforming concrete cutting along the west-side roadway of 156 street and 113 avenue, near EPCOR catch basin's (DR255373 & DR255374) and reported to monitoring and compliance.<br>We arrived around 14:45 pm, no workers were onsite and this time. We observed Drainage Operation delineation equipment around both catch basins in question, with concrete work recently preformed around them. A grab sample from the wastewater within DR255373 was obtained for a field test and resulted in a pH of 11 (storm limits 6.0 - 9.0). No sample was obtained for further analysis. (see attached photos).<br><br>Drainage control was contacted at 15:30 pm (see attached report).<br>The original release (July 3, 2018) was not reported to AEP.<br>Incorrect CB was cleaned out on July 3rd andOn July 5, 2018 it was determined by Drainage Investigators that there was a actual release of contaminated wastewater into the storm collection system. This information was reported to AEP on July 5, 2018 (AEP# 340527). AEP has requested a 7-day letter.<br><br>The Drainage Operations - Labour Foreman 1 (780-719-8377) was contacted at 15:45 pm to request a vac truck to clean out the catch basin - pending.<br><br>Incorrect CB was cleaned out originally. | Reportable Release to Water - Other Regulated Substances |

| Year | AEPA Reference# | Description WWC Event | Reason for Reporting |
|---|---|---|---|
| 2018 | 340833 | Gold Bar operations contacted drainage Monitoring and Compliance about oil or bitumen of some kind that had entered the plant through the 34th street trunk. Monitoring and Compliance staff investigated key locations in the system for evidence of the release. Strathcona County was also contacted through the ACRWC Control room to investigate contributing sewers in their part of the drainage basin. After investigating the key locations no evidence was found. Strathcona County was notified of our results.<br><br>At Gold Bar, the material was contained in the primaries and skimmed off to the digesters. Air demand did temporarily go up in the biological process but went back to normal levels, the treatment processes were protected.<br><br>The release was reported to AEP, Ref# 340833. No 7-day letter was required unless circumstances change and the product is released into the river.<br><br>Investigation was not able to determine the source of the release. Monitoring and compliance investigators will continue to inspect the infrastructure upstream of the plant (July 13, 2018). | Reportable Release to Water - Other Regulated Substances |
| 2018 | 345370 | SCGCC contractor's sub contractor Patrick's Water hauling Ltd( Hydrovac Company) was doing the hydrovac work at Downtown Intensification Project site at south of Jasper Ave on 105 St. There were two spots of hydraulic fluid (About 250ml each) spilled to the asphalt. Contractor immediately use the spill kit to absorb the spilled chemical and started using the spill kit tray to contain remaining fluid. Contractor asked their sub contractor to remove the hydrovac truck from the site after completing the task that was being in progress.<br>Release was reported to AEP (#345370) by contractor. AEP did not request 7 day letter. | Reportable Release to Land - Other Regulated Substances |
| 2018 | AEP # 335681 | There was a complete road closure on 92 Avenue between 34 street and 39 street due to overland flooding caused by frozen culverts that cross 92 Avenue. The crews originally could not locate the culvert due to the large amount of built up frozen ice. Drainage Services crews were on site pumping water from that side of the road downstream on the other side of Imperial Oil. There is ongoing activity by Drainage Services at this location.<br><br>Canadian Dewatering is pumping water out of the Imperial Oil parking lot (it is reported to be 6 under water) and they are reporting that they have two pumps pumping at 3000 gal/minute.<br><br>Other water in the area has started to freeze however this water is still moving and flowing. Can we EPCOR Water D&T have checked CV20552 and H6502 (no issue). Drainage Compliance Investigators have surveyed surrounding businesses for contributing private flows but have been unable to locate additional sources of water. At this time the large volume of water appears to be coming from melt in the large basin congesting at this location.<br><br>As part of the ongoing activity AEP (Ref# 335681) was contacted to ensure that the regulator was aware of the ongoing activities at this location and for the transfer of | Approval/Permit/Regulatory Requirement or Limit Not Met |

| Year | AEPA Reference# | Description WWC Event | Reason for Reporting |
|---|---|---|---|
| | | water. At this time it does not represent a contravention of the Approval or other environmental legislation. No additional regulatory reporting was requested. | |
| 2018 | AEP #337675 | An EPCOR contractor was excavating a Rescue shaft on 105 St and south of Jasper Avenue to complete the drainage work of Downtown Intensification project. While excavating the shaft, contract workers encountered contaminated soil at 5.8m depth from the ground surface. The site was immediately vacated and closed for a soil contamination investigation. The initial soil test result confirmed Benzene contamination in soil. Further soil testing and a investigation will be performed to determine the cause of the contaminated soil and the level of soil contamination. After the analytical results have been reviewed, the contaminated soil will then be taken away for proper disposal.<br>AEP has been notified of this event (AEP# 337675). AEP did not request a 7-day letter. | Approval/Permit/Regulatory Requirement or Limit Not Met |
| 2018 | 340565 | Open cut construction crew was day lighting utilities with a hydro vacuum truck. when they began to smell a strong hydrocarbon smell coming from the hydro-excavated location.<br><br>Job was shut down until substance in the ground can be determined.<br><br>EPCOR Distribution Inspector noticed the protective coating on the newly daylight 72Kv power line was partially dissolved.<br><br>Called EPCOR Drainage Environmental Engineering Technologist. Soil samples are being taken to determine what the contaminate is and what controls need to be applied to allow safe work to proceed.<br><br>Reference ERS by EPCOR Distribution Inspector ENV20180704-009273 | Approval/Permit/Regulatory Requirement or Limit Not Met |

| Year | AEPA Reference# | Description WWC Event | Reason for Reporting |
|---|---|---|---|
| | | Event has been reported to AEP: 340565. 7 day letter has been requested by AEP. | |
| 2018 | 336093 | At 1:04PM UV Channel 3 was called to start to accommodate the rise in flow coming to the plant, lights and power came on normally.<br><br>Shortly after UV Channel 2 also opened the effluent gate but no power turned on and no lights were on. An operator noticed the abnormal state at 3:29PM and immediately put UV Channel 2 into hand and closed the gate.<br><br>A critical alarm was generated by the UV program at 1:19PM that stated UV Channel 2 outlet gate open but no bulbs on, but this alarm did not get to the Control room. PCA is currently investigating why this alarm did not come to the control room.<br><br>Trojan (UV Manufacturer) is on the plant site tomorrow for the UV capital hardware upgrade, PCA is going to see if they can help trouble shoot why this happened.<br><br>AEP was called to report the incident at 4:30PM (Ref#: 336093), a 7 day letter is required.<br><br>Approximately 12ML of non-UV disinfected water went to the river during the 2 hours (approximated 140MLD flowrate). | Approval/Permit/Regulatory Requirement or Limit Not Met |

| Year | AEPA Reference# | Description WWC Event | Reason for Reporting |
|---|---|---|---|
| 2018 | AEP Ref# 335742 | EPCOR Open cut called and reported a small amount of sewage is in a storm pipe that was in the same ditch as the emergency dig up. They had already Hydrovaced it out, and a very small amount is still visable in open ditch. I called F3 on standby, after I spoke at length with the F3 Neil Lepps, we left it until the morning as it is no longer running, and had no ability to move down storm line due to it being plugged. (infiltration occurring due to crack between pipes was the explanation. We then visited the site at 9:30 am, ditch had filled again, EPCOR Hydro Vac approaching site as I arrived. We checked (STM) 268651, nothing running in from lead, possibly some mud/grey water in the storm bottom. We asked for a flusher to flush and suck line 52414.<br>We chose Neil Lepps for Employee because EPCOR Drainage is not a option in drop down list...<br><br>When crew dug sump to release san service no defect with storm service was noted. typical sump will not allow flow to storm system - ensure no xfiltration to storm possible with future temporary sumps.<br><br>Reported to AEP (Ref# 335742). No further regulatory reporting required. | Approval/Permit/Regulatory Requirement or Limit Not Met |
| 2019 | 358927 | Employee missed contacting Dispatch regarding a failed TC result (ERS Event ENV-20190916-427379; AEP Ref # 358927). This resulted in a late (>24 h) reporting to AEP. This is a contravention of the Communication and Action Protocol for Failed Bacteriological Results in Drinking Water. | Approval/Permit/Regulatory Requirement or Limit Not Met |
| 2019 | AEP# 348313 | We were inspecting a routinely scheduled double barrel trunkline when we came across some sanitary leaking into the storm line. We found 2 leaks in Pipe segment DR#319944, and 1 leak in pipe segment DR#66453. We then had to go back to the yard to retrieve concrete to be able to patch the leaks with grout to seal the leakage. No longer any more leaks within double barrel trunkline.<br>The release has been reported to AEP (#348313). AEP has requested a 7-day letter. | Reportable Release to Water - Untreated Wastewater |
| 2019 | AEP# 349186 | The EPCOR Project Management group initiated a smoke testing with Drainage Operations - Environmental Services group to investigate and or identify possible sanitary mainline and service deficiencies in the neighbourhoods of Aldergrove and Belmead as part of Aldergrove Sanitary Sewer Upgrades Capital Project. The location 18248 - 80A AVENUE NW was initiated for follow up testing with dye and service televising of the residential sanitary service and confirmed the cross-connection of the residential sanitary service to the EPCOR Drainage Services storm mainline.<br>This cross-connection has been reported to AEP (# 349186). AEP has requested a 7-day letter. | Reportable Release to Water - Untreated Wastewater |

| Year | AEPA Reference# | Description WWC Event | Reason for Reporting |
|---|---|---|---|
| 2019 | AEP# 349312 | The EPCOR Project Management group initiated a smoke testing with Drainage Operations - Environmental Services group to investigate and or identify possible sanitary mainline and service deficiencies in the neighbourhoods of Aldergrove and Belmead as part of Aldergrove Sanitary Sewer Upgrades Capital Project. The location 18412 - 91 AVENUE NW was initiated for follow up testing with dye and service televising of the residential sanitary service and confirmed the cross-connection of the residential sanitary service to the EPCOR Drainage Services storm mainline. This cross-connection is on the EPCOR side of the sanitary service.<br>This cross-connection has been reported to AEP (#349312). A 7-day letter was not requested by AEP. | Reportable Release to Water - Untreated Wastewater |
| 2019 | 349540 | Drainage Operations  Environmental Services group completed a regular review of the records related to ongoing and closed cross-connection investigations and has identified a cross-connection at 552 Butterworth Way NW. The cross-connection of the residential sanitary service to the EPCOR storm mainline on the EPCOR portion at 552 Butterworth Way NW was identified through regular MTV inspection of the storm mainline at this location. The cross-connection was confirmed by dye testing and televising of the private and storm mainline (Work Orders 164028, 169280 and 171108) in August of 2018.<br><br>The cross-connection was reported to the Drainage Call Center (AEP notification number 349540) and a 7-day letter has been requested. The cross-connection has been forwarded to Drainage Services Open Cut group for repair. The transition between the identification and reporting of the cross-connection is under review. | Reportable Release to Water - Untreated Wastewater |
| 2019 | 350661 | Epcor water phoned in an overflowing manhole in Capilano park west of the Goldbar wastewater treatment facility. We arrived on site at to find the force main overflowing out of the concrete slabs that cover the manholes. (DR268723) The duration of the release is not known, but I would estimate that it started after the treatment plant reached capacity and the lines started backing up (Unknown). The surcharge ended just before 10pm. Due to the location, It was originally estimated that some sewage managed to make it to the river. However, a follow-up investigation confirmed that there was no release of untreated sewage to the river. It also saturated the soil around the manholes. This will be further investigated Monday morning.<br>This release has been reported to AEP (#350661). AEP has requested a 7-day letter. | Reportable Release to Water - Untreated Wastewater |

| Year | AEPA Reference# | Description WWC Event | Reason for Reporting |
|---|---|---|---|
| 2019 | AEP# 351044 | On March 23, 2019 Crew#514 (FCF standby electrician) responded to a communication fail alarm at Pump Station 112. The standby electrician attempted to restore communication to the system from his home, but was not successful.<br>The FCF standby electrician arrived at the pump station and restored power to the system. When power was restored to the system, an overflow of untreated wastewater at the pumpstation was detected. It is not known how long untreated wastewater was being released from the pumpstation. Further information on this event will be provided in the AEP 7-day letter.<br>This release has been reported to the City of Edmonton (780-496-6666). The City of Edmonton report number is 2434<br>This event has been reported to AEP (# 351044). AEP has requested a 7-day letter. | Reportable Release to Water - Untreated Wastewater |
| 2019 | AEP# 355870 | EPCOR crews sent to televise MH# 277328 to confirm combined was not crossing into the Storm, Storm MH was found full of water, smells like sewage. Investigation determined that untreated wastewater was flowing through unmarked interconnection in to storm collection system which then traveled downstream to combined system and then treated at GBWWTP. Investigating engineering solutions to this alignment and GIS has been updated to identify infrastructure. No release of untreated wastewater to downstream tributaries.<br>This release has been reported to AEP (#355870). AEP has requested a 7-day letter. Please see 7-day letter for additional details of event. | Reportable Release to Water - Untreated Wastewater |
| 2019 | AEP# 356241 | SCADA showed Station 112 (St Georges Cres) overflowed to McKinnon Ravine during July 17 storm event at approximately 8:10pm. Pumping system appears to have functioned as designed. Overflow stopped shortly after when pumps caught up.<br><br>This release has been reported to AEP (#356241). AEP has requested a 7-day letter. Please see 7-day letter for additional event details. | Reportable Release to Water - Untreated Wastewater |
| 2019 | AEP# 356261 | Came to station 160 , Lago Lindo as there was abnormal sound coming from one of the surge relief. Fixed the issue & put all pumps back on Auto. While leaving the station, noticed that manhole at the entrance of driveway has sewage spilling out from the holes. Came back to station & saw that there are two pumps running simultaneously & overwhelming the discharge manhole. Shut one of the pumps off & release stopped. Release only happened less then 5 minutes & we called vactor to contain it & suck the area & catch basin. Filed report with dispatch.<br>This release has been reported to AEP (#356261). AEP has requested a 7-day letter. Please see 7-day letter for additional details of event. | Reportable Release to Water - Untreated Wastewater |

| Year | AEPA Reference# | Description WWC Event | Reason for Reporting |
|---|---|---|---|
| 2019 | 356338 | During site visit at station 119, Castledowns we noticed debris under the manhole lid, so we identified a potential release of untreated wastewater.<br><br>Asked SCADA techs to confirm levels after we returned to the office and they identified 13 instances over the last three days where the level was higher than ground elevation for 10 seconds at a time.<br><br>Release report to AEP underway. Pictures available if needed.<br><br>This release has been reported to AEP (#356338). AEP has requested a 7-day letter. Please see 7-day letter for additional details of event. | Reportable Release to Land- Untreated Wastewater |
| 2019 | AEP# 357818 | Trunkline crew was performing a routine double barrel inspection. We found 2 small holes, in the membrane from sanitary to storm, that was leaking sanitary wastewater into the storm collection system. One hole was approx. 2.5cm square, and the other was 5cm x 2.5cm. Holes were approximately 8m apart, located on the joints of membrane separating sanitary from storm.<br>Pipe segment ID# 66449, upstream of MH# 254218.<br>Holes were found at 12pm, and repaired at 330pm.<br>Foreman III was immediately notified of the situation, crew prepared to make re-entry to repair the holes.<br>This event has been reported to AEP (#357818). AEP has requested a 7-day letter.<br>See attached 7-day letter for further information. | Reportable Release to Water - Untreated Wastewater |
| 2019 | AEP# 359483 | Responded to alarming interconnection , Upon arrival M.H.# 229993 was surcharging into M.H.#246519.<br>Requested a flusher to release blockage , crew 119 released blockage. Contacted Call Centre. See attached 7-Day Letter for further information.<br>Release was reported to Alberta Environment (AEP# 359483). A 7-day letter is required. | Reportable Release to Water - Untreated Wastewater |
| 2019 | AEP# 361052 | Sanitary leaked into the storm trunkline through the membrane in the double barrel (Pipe ID# 350241). Two separate leaks in the double barrel pipe were identified. Both leaks were approximately 50mm x 100mm. The pipe was last inspected by Drainage Operations staff on August 7, 2019. Both leaks were repaired on November 14, 2019.<br>AEP has been notified of this release (#361052). AEP has requested a written report.<br>Please see attached AEP 7-day letter for further information. | Reportable Release to Water - Untreated Wastewater |
| 2019 | AEP# 351869 | Alarming IC #78 lead to discovery of MLS (pipe 31892) caused SAN Trough to overflow in STM MH 263708, untreated flow entered into STM pipe 31892, Flow would have ended up entering North Sask via OF # 56 ( DR 261549 ) 50 minutes on site waiting for vactor unit leads me to believe flow would have made it to the river.<br>This release has been reported to AEP (#351869). AEP has requested a 7-day letter. | Reportable Release to Water - Untreated Wastewater |

| Year | AEPA Reference# | Description WWC Event | Reason for Reporting |
|---|---|---|---|
| 2019 | 352008 | RUNNING FROM PUMPSTATION 217 THE FORCE MAIN SANITARY CLEAN OUT CAP DR494460 (WHICH IS IN A MH NOT ON DRAINS )BROKE OFF AND UNTREATED SEWAGE WAS RELEASED EVERYTIME THE PUMP TURNED ON ( SEE PHOTO ) IT PUMPED A LARGE AMOUNT OF SEWAGE OUT WHICH THEN RAN DOWN THE PATH AND INTO STARLING 1 SWMF DR518095, THERE WAS NO FLOW EXITING THE SWMF . THE PUMP WAS SHUT OFF AND THE RELEASE STOPPED, THE STAND BY MANAGER ARRIVED ON SCENE AND BEGAN COORDINATING MULTIPLE HYDO-VAC UNITS TO CONTINUALLY PUMP FROM STATION 217. ONCE THE RELEASE WAS UNDER CONTROL THE POOLED WASTEWATER AND SOLIDS LEFT BEHIND WERE CLEANED UP. AEP WAS NOTIFIED #352008. 7-day letter has been requested by AEP.<br>7-Day Letter was issued to AEP on April 18, 2019. | Reportable Release to Water - Untreated Wastewater |
| 2019 | 352042 | On April 14, 2019 at approximately 12:05 PM, flushing activity dislodged an non catalogued diversionary structure at Manhole 227502. MTV confirmed a hole in the structure and escalated. Review on April 15, 2019 confirmed that there is now the possibility of sanitary flow entering the storm system at this location. Review is underway to determine repair options. Event has been reported to AEP #352042. A 7-day letter was issued to AEP on April 17, 2019.. | Reportable Release to Water - Untreated Wastewater |
| 2019 | 354970 | Due to heavy rain conditions, Walterdale Pump Station was overwhelmed by storm water that entered the storage tunnel, resulting in an overflow of untreated wastewater to watercourse at outfall #145. Between 1:40pm and 3:35 pm. Quantity unknown.<br>The performance of the station was checked and it was running as per designed.<br><br>*(EA)Release was reported to AEP #354970. AEP has requested 7-day letter. | Reportable Release to Water - Untreated Wastewater |
| 2019 | 355018 | Due to heavy rain conditions, Walterdale Pump Station was overwhelmed by storm water that entered the storage tunnel from the Rossdale Neighborhood. This resulting in an overflow of untreated wastewater to watercourse at outfall #145. Between 7:22 AM and 11:41 AM. Quantity unknown. The performance of the station was checked and it was running as per designed.<br><br>(EA)Release was reported to AEP. #355018. AEP Has requested a 7-day Letter. | Reportable Release to Water - Untreated Wastewater |
| 2019 | 355018 | 250mm suspected pipe collapse along 75th street, between MH 232620 to MH232614. Flow is currently entering the catch basin. FCF has started to assemble a bypass to divert flow. Please see copy of 7-day letter for further event details.<br><br>Release was reported to AEP. #355019. AEP Has requested a 7-day letter. | Reportable Release to Water - Untreated Wastewater |

| Year | AEPA Reference# | Description WWC Event | Reason for Reporting |
|---|---|---|---|
| 2019 | AEP# 355278 | Untreated waste water found leaking into the storm side of the double barrel membrane (DR465713).<br>There was a 3/4 inch diameter opening in the membrane in the double barrel pipe releasing untreated waste water into the storm system. Location was immediately patched same day.<br>This release has been reported to AEP (# 355278). AEP has requested a 7-day letter. | Reportable Release to Water - Untreated Wastewater |
| 2019 | AEP# 355381 | Rat Creek gate overflowed due to rain conditions. Designed CSO overflow station number 537.<br><br>This event does not require a "5-Why Root Cause Analysis". During this event the Rat Creek pump station was operating as per design and at full capacity. - See 7-day letter for further details.<br><br>Please see attached 7-day letter for further event description. | Reportable Release to Water - Untreated Wastewater |
| 2019 | 356359 | The sanitary lines in Griesbach are filled to capacity. This has caused multiple back ups in basements. The people who live at 7063 though are having a back up that is also flowing out the walk out basement and into the lake behind the house. Griesbach Fac. #4 This is ongoing as of yet, the lines are still backed up. Please see attached 7-day letter for further event description.<br>Release was reported to AEP (#356359). Written report issued to AEP on July 26, 2019. | Reportable Release to Water - Untreated Wastewater |
| 2019 | 356708 | Spill to river at C.S.O 537 due to heavy rainfall event. Please see attached 7-day letter for further event description.<br>The release was reported to AEP (Ref# 356708). AEP has requested a 7-day letter. | Reportable Release to Water - Untreated Wastewater |
| 2019 | 356718 | Release to north Saskatchewan river due to a heavy rainfall event. Please see attached 7-day letter for further event description.<br>The release was reported to AEP (Ref# 356718). AEP has requested a 7-day letter. | Reportable Release to Water - Untreated Wastewater |
| 2019 | 357146 | Subsidence - 6.0m deep - due to collapse of 900mm combined sewer pipe over live traffic lane. Occurred due to pipe degradation resulting in wash-out of earth above and around the area. Sink hole has been barricaded for safety and flow bypass will be in effect soon, to facilitate an emergency condition assessment as next steps. 24x7 security has been commissioned to monitor the location. Sand bags has been placed around to prevent further water infiltration into the sink hole.<br>This release was reported to AEP(357146). AEP has requested a 7-day letter. | Reportable Release to Water - Untreated Wastewater |

| Year | AEPA Reference# | Description WWC Event | Reason for Reporting |
|---|---|---|---|
| 2019 | 357318 | Contractor notified project manager on August 8, 2019 at the end of day that there was a hole in 900mm steel pipe at the trestle location. The contractor was doing their due diligence work to bid on the Clareview Santiary Trunk Rehab project. The information was passed to Sr.Manager at Drainage Operations. A site inspection was conducted in the morning of August 9th with Drainage Construction and found that there are two holes. First hole appears to be the way up the pipe and the Second hole appears to be way up the pipe. The flow in the pipe was around of the pipe.<br><br>The pipe looks like it had been vandalized. Construction is looking at option to patch the holes to prevent further spill of sewage into the ravine. It looks like during high flow period some flow are spilling out of the pipe.<br><br>Incident was reported to Drainage Control who has notified AEP (Ref#357318). AEP has requested at 7-day Letter. | Reportable Release to Land- Untreated Wastewater |
| 2019 | 361772 | Crew responded to odour complaint in sweet grass area. Found plugged main. while san main was full, noticed increased flow in STM MH coming from pipe 500487. once san main was released. flow in STM pipe 500487 ceased. leads me to believe infiltration took place from sanitary into storm.<br><br>This release was reported to AEP (361772). AEP has requested a 7 day letter. | Reportable Release to Water - Untreated Wastewater |
| 2019 | 361935 | Opened (MH) leading directly to outfall 126 to retrieve a bag that we dropped down the (MH) the previous day. Noted increased flow, odor, paper and sewage remnants. Traced back to (MH) 255954 and noticed that it was an (IC) combination line, with half of its flow running to the storm (MH) to outfall, and the remaining half running down its normal combo channel.<br><br>There was a probe in the (MH), however, it was dry as the sewage was actually running around the probe and not registering an overflowing IC.<br><br>UNK the cause of the overflow. (possibly paper build up).<br><br>This release was reported to AEP (361935). AEP has requested a 7 day letter. | Reportable Release to Water - Untreated Wastewater |
| 2019 | 349881 | Sanitary flow was planned to be bypassed through a HDD pipe, Sanitary flow for the 675mm was plugged at MH 221298. E.Coli tests at downstream outfall confirmed sanitary flow as entered in storm trunk line. AEP #349881, 7 day written report was submitted.<br>A new plan for bypass pumping was developed which resulted in using a submersible pump which did not require the manhole to be surcharged. There was no future contamination recorded after the initial event.<br><br>Background information and additional description of the event can be found in attached evidence (AEP-7 day letter, cross connection inspection report, pictures, e-mail communication)<br><br>Any other additional information is available with project management group. | Reportable Release to Water - Other Regulated Substances |

| Year | AEPA Reference# | Description WWC Event | Reason for Reporting |
|---|---|---|---|
| 2019 | AEP# 351918 | A EPCOR Drainage Inspector was working in area on a ICVI route, when he was approached by a rate payer and asked if I was there for his complaint, clarified the complaint with him, he had noticed for the past 5 days there has been a constant stream of water coming from outfall 124 and in his decades of living in the area never remembers it running for that long that steady. Advised me he had put in a complaint the day prior for the issue and asked if I knew what was possibly going on and that the problem in question was just around the corner.<br><br>Inspected STM MH255881 as we could hear a very heavy flow via CB345308 and noticed a very constant flow of clean potable water. Phoned F3 with findings asking the F3 to report the issue to EPCOR water. Left site and was called at 1108 by F3 to return and gather as much info from water employees as possible.<br><br>First responded on site from water that shut the main off was an EPCOR Water - Labourer 2, who informed me no lab sample was taken, they shut the main off and performed a post residual Chlorine test (0.29 PPM). They advised any further info needed could be provide from their S2 Manager.<br><br>This release was reported to AEP (#351918). A written report was issued to AEP on April 17, 2019. | Reportable Release to Water - Other Regulated Substances |
| 2019 | 352688 | Crew was excavating to repair a residential sewer service. water main was exposed and there were not any copper water services in the excavation. Crew began to excavate further and hit the copper water service coming from the residence on the opposite side of road.<br>Event was reported to AEP (352688) on May 1st, 2019. AEP Has requested a 7 day letter.<br><br>Water was running for approximately 10 min before crew was able to shut off the main stop.<br><br>Water from water main was released into the sanitary and storm mains via the house services that the crew was working on. | Reportable Release to Water - Other Regulated Substances |
| 2019 | 353075 | EPCOR Power setting up transformer for demonstration purpose at Get Ready In the Park. It caught fire, fire department put small fire out. Chlorinated water entered the CB manhole about 20 ft away. Boom was around CBMH. Only water entered CBMH approximately 8 -10 gallons. Hasmat team cleaned up debris. I was informed that the City of Edmonton - Fire Services Hazmat unit would let the area dry and then sweep up the remainder to dispose of. I contacted Control to inform them of the release.<br>Release was reported to AEP (#353075). AEP has requested 7-day letter.<br>A 7-day letter was issued to AEP on May 16, 2019. | Reportable Release to Water - Other Regulated Substances |

| Year | AEPA Reference# | Description WWC Event | Reason for Reporting |
|---|---|---|---|
| 2019 | 361558 | Contractor had did some hydrovac and daylighting for a drainage service replacement. When they crews left the site for the day, everything looked to be in order. At some point through the night, the main stop for the water service had come off the water main causing flooding down the alley. EPCOR water crews were called out to site to assess the situation.<br><br>This release was reported to AEP (361558) on November 29, 2019. AEP has requested a 7 day letter from the contractor. | Reportable Release to Water - Other Regulated Substances |
| 2019 | 361676 | At approximately 3:30 PM on Monday, December 2nd, while excavating to replace a sanitary service at 11217 95A Street, GS Construction crew contacted a live water service with the excavator, resulting in a break to the water main. The crew immediately notified EPCOR Water trouble and shutdown the water valves to isolate the line. EPCOR Water repaired the damaged water main and nobody was injured. AEP will be notified of the release. | Reportable Release to Water - Other Regulated Substances |
| 2019 | AEP# 348611 | Background: EPCOR Drainage contracted Lambourne Environmental to apply biosolids to agricultural fields as part of the biosolids management program. Biosolids are to applied at AEP guideline rates in order to limit nutrient and metals addition to the receiving soils.<br><br>Upon reviewing Lambourne's year end Final Report it became apparent that guideline application rates were exceeded on five application sites. The application sites and exceeded parameters are included in the attachment.<br><br>This release was reported to AEP (#348611). A 7 day letter will be sent to AEP. | Reportable Release to Land- Partially Treated Wastewater\|Sludge\|Biosolid |
| 2019 | 361750 | A contractor truck left the highway trying to avoid another vehicle and rolled over spilling an estimated 8 dt of dewatered biosolids. | Reportable Release to Land- Partially Treated Wastewater\|Sludge\|Biosolid |
| 2019 | 361394 | Driving South on Anthony Henday Drive Truck Engine lights came on warning of low coolant. Pulled over to the side of highway put out cones. Coolant was leaking out of Twister unit. Quick connect fitting had become loose and the coolant was coming out of the overflow tank on the Twister Unit. Called MES to repair the vehicle (# Y3413) they put 3 litres of coolant in to replace the amount spilled. The vehicle was repaired on site. Cleaned Site with One advanced absorbent. Swept up MES took to dispose of. There was no release of coolant into the storm / sanitary collection system.<br><br>This incident was reported to Drainage Control / AEP (AEP Ref#<br>361394 ). AEP did not request a 7-day letter. | Reportable Release to Land - Other Regulated Substances |

| Year | AEPA Reference# | Description WWC Event | Reason for Reporting |
|---|---|---|---|
| 2019 | 358693 | While disposing hydrovac excavated loads, material was rejected at dumpsite. Another load from EPCOR water from same location was also rejected. Third load by EPCOR Water and fourth load from Norellco had no contamination. Contractor will report this incident to AEP today (Sept 10), they were told that all future incidents must be reported as soon as it discovered.<br><br>Monitoring and compliance group was dispatched to collect water samples. Samples came back positive for presence of oils and grease. No hydrocarbon testing was done. See attached results.<br>AEP Has requested 7-day letter. 7-day letter was sent to AEP on September 10, 2019 | Reportable Release to Land - Other Regulated Substances |
| 2019 | 349813 | An unknown fluid was discovered by workers in the storm trunk sewer at this location upstream to the west on 118 Ave from MH 274664. The liquid appeared to be an oil-like fluid. The contractor put in filter socks and sand bags just downstream of the liquid to prevent it from going further downstream. EPCOR Monitoring and Compliance and Drainage Control were notified. Bylaw inspectors were contacted and on site to collect samples. Drainage Operations has dispatched a crew for clean up. | Reportable Release to Water - Other Regulated Substances |
| 2019 | 356622 | While replacing a Catchbasin, the Contractor found the contaminated soil in the pit. Contracor has ordered testing of the material. Is instructed to transport all material to Riley disposal site for proper disposal. Contractor will report the incident to Alberta Environment within 24 hours. This release was reported to AEP (#356622). AEP Has requested a 7 day letter.<br>Please see attached 7-day letter for more details. | Reportable Release to Land - Other Regulated Substances |
| 2019 | 360530 | At about 1:00 pm today a sub-contractor (Entrac) had a hydraulic line on their mobile crane fail causing approximately 15-20 litres of hydraulic oil to leak on the roadway on the way to the site exit gate.<br><br>No oil entered any water way and the oil was immediately contained and cleanup was initiated.<br>The Prime Contractor HSE representative has contacted AEP and reported the spill as required.<br>Reference number is 360530. AEP did not request 7 day letter.<br><br>Incident report has been requested to be forwarded to EPCOR within 7 days.<br>Some pictures are attached. | Reportable Release to Land - Other Regulated Substances |
| 2019 | 350172 | Employee was fueling up frost fighter from fuel cube and walked away to do other work. Employee forgot he was fueling up frost fighter. Crane operator reported it to employee that the diesel was running down the shaft walls before he could shut it off. We are estimating about 100L that was spilt.<br>This release was reported to AEP (#350172). AEP does not require a written report. | Reportable Release to Land - Other Regulated Substances |

| Year | AEPA Reference# | Description WWC Event | Reason for Reporting |
|---|---|---|---|
| 2019 | 359480 | The contractor was drilling holes on the northwest side, outside of the caisson, to fill with fillcrete to stabilze the ground before they continue with excavation and sinking of the caisson. After drilling one of the last holes, the auger came out, and the contractor could smell diesel. Monitoring and Compliance industrial investigators went to location to collect water samples for testing. Contractor reported event to AEP (359480) on September 30th, 2019. AEP did not request a 7-day letter. Follow up water testing will be done on October 22-23,2019 by M&C to confirm if water can be released to storm. | Reportable Release to Water - Other Regulated Substances |
| 2019 | AEP# 360564 | Upon reviewing flow data from Outfall #31 (Basin approximately between 121 and 149 Street from NSR north to 132 Avenue), irregular flow patterns were observed on May 17th, 2019. As a result, Monitoring and Compliance Investigators were sent out on June 04, 2019 to perform routine field tests on Outfall #31's effluent. Field chlorine test indicated elevated levels of chlorine (field test result = 0.45 mg/L, schedule C limit = 0.020 mg/L); therefore, a grab sample was obtained for analysis. Sample results concluded a total chlorine schedule C violation with a result of 0.21 mg/L. All other parameters analyzed were within limits. This release was reported to AEP (#360564) on October 30, 2019. AEP has asked for a 7-day letter. | Reportable Release to Water - Other Regulated Substances |
| 2019 | 348081 | During the Secant pile drilling construction at the Downtown Intensification project, fill crete leaked in to the abandoned sewer line through the adjacent manhole. Contractor immediately reported to Alberta Environment (AEP #348081, 7-day letter requested) and started cleaning the leaked fill Crete. The sewer line has been plugged and contractor is working on detail incident report. The attached photo shows the sewer line has been cleaned already. | Reportable Release to Water - Other Regulated Substances |
| 2019 | 350250 | While constructing Shaft 4 March 5, 2019 grout was being used used to seal the cribbing. Due to flushing operations at Shaft 2 and 3 workers did not enter the CMP until March 6, 2019 after flushing had been completed. When workers entered the CMP they discovered grout had been released into the CMP. It had already hardened when it was discovered so there is no immediate safety or environmental concern and doesnt appear to have traveled more than 2 meters. SCGCC will work with CKB management and HSE to complete an investigation, clean up, and implement appropriate corrective actions starting 08:00, March 7, 2019. Incident was reported by CKB to AEP at 06:49 March 7, 2019 AEP #350250. AEP advised they would contact CKB if any further action was required. Clean up was done on March 7, 2019. | Reportable Release to Water - Other Regulated Substances |

| Year | AEPA Reference# | Description WWC Event | Reason for Reporting |
|---|---|---|---|
| 2019 | 351362 | Crew were abandoning a drill drop manhole on Wednesday March 27, 2019 at about 2:00pm. It is located at 123ave-86st, MH#264055. This is a drill drop abandonment with a 10 inch vertical line to abandon. The crew installed a 6 inch-12 inch balloon at the base of the 10 inch line & inflated to manufacturer spec. They poured 8 bags of mixed concrete into the line on top of the balloon, this works out to approx. 0.1 cubed meters of concrete. The area was monitored for 30-45minutes. The balloon was tied off to the step inside the manhole. When the open cut crew went to start work on that manhole the next day they opened up the manhole at about 10am & saw that the balloon along with all the concrete had let go & went into the sanitary 1200mm line sometime during the afternoon or evening the previous day. The 1200mm line is flowing very aggressively & there is no sign of the balloon or concrete. Drainage control has been contacted about the spill.<br><br>Release was reported to AEP (# 351362) on March 29, 2019. AEP does not require 7 day letter. | Reportable Release to Water - Other Regulated Substances |
| 2019 | AEP# 359849 | Contractor on site has been rinsing their shotcrete equipment into CB #234864. An unknown amount of shotcrete and chlorinated water had been rinsed into that CB. During previous meeting with contractor's PM on site, contractor was advised that washing of cement mixing equipment is not allowed on site.<br><br>Monitoring and Compliance section has been notified to inspect CB. This release has not been reported to AEP at this moment pending investigation from M&C group.<br><br>This release has been reported to AEP (# 359849) by the EPCOR Contractor. The 7-day letter was issued by the EPCOR contractor on October 9, 2019..<br>See attached email / 7-day letter for further information. | Reportable Release to Water - Other Regulated Substances |
| 2019 | AEP# 360382 | Shanghai Construction Group (SCG) informed to EPCOR regarding about 0.2 cubic meters Grout Spilled while filing the grout at Shaft #4 location of the Groat Road Storm Trunk Rehabilitation Project Part A. Spilled grout was cleaned and informed to Alberta Environment immediately. Shaft 4 was checked for grout in the storm trunk....no sign of grout was found. Informed AEP that there was no grout in the storm trunk at shaft 4.<br>SCG is working to submit the detail incident report for this event.<br>This event has been reported to AEP (#360382). AEP has not requested a 7-day letter. | Reportable Release to Water - Other Regulated Substances |
| 2019 | 359790 | Goldbar Approval to Operate details that we must complete fence line monitoring for H2S daily with our Jerome meter that reads to ppb. On Oct 3rd the Crew did not complete this task. | Approval/Permit/Regulatory Requirement or Limit Not Met |

| Year | AEPA Reference# | Description WWC Event | Reason for Reporting |
|---|---|---|---|
| 2019 | 359139 | CKB is working the construction for Outfall 23C Rehabilitation. On September 19, at 1:36PM, a sediment plume was noted seeping from the silt curtain isolation. Turbidity within the sediment plume was 84 NTU greater than background. The nearest compliance point was 9.21 NTU greater than background, exceeding the water quality compliance criteria. This is considered a reportable exceedance, and was reported through Alberta Environment and Parks reporting hotline, followed by report to regulators within 7 days. Turbidity samples were collected throughout the day. Turbidity exceedances detected at 1:36PM, returned to within acceptable limits by 2:10PM. Samples remained acceptable for the rest of the day. | Approval/Permit/Regulatory Requirement or Limit Not Met |
| 2020 | AEP# 362459 | At the time, date and location standby crews were called out regarding a MH DR494453 discharging sewage. Pumpwells shut the pump down and vactor trucks were called to begin pumping. Discharge of sewage has stopped at this time. No evidence of discharge by nearby outfall. Control structure gate was also closed to prevent any sewage from exiting further. Equipment vactor trucks are pumping until the repair by construction is complete.<br><br>A follow-up environmental inspection (GEN-20200113-105819) was conducted at this site on January 9, 2020. This environmental inspection has been entered as a "Child Event" to ENV-20200104-747191.<br><br>This release has been reported to AEP (#362459). AEP has requested a 7-day letter. | Reportable Release to Water - Untreated Wastewater |
| 2020 | AEP# 362551 | Investigation of large volume of water flowing into EPCOR storm water CB287805 near Outfall #73.<br><br>Investigators took sample for E-Coli on December 16, 2019 to check for a possible cross connection. Results were received on January 8, 2020 with elevated E.coli (25000 CFU/100ML). Monitoring and Compliance will initiate investigation to find the source of release.<br><br>This release has been reported to AEP (#362551). AEP has requested a 7-day letter. | Reportable Release to Water - Untreated Wastewater |
| 2020 | AEP# 363081 | While inspection a trunkline, I can across a cross connection .150mm in size , pipe segment 338579 , facility id# R-17480-STM.<br>On January 28th, a dye test by Drainage staff confirmed the presence of a cross-connection. EPCOR will complete a priority repair of the EPCOR portion of the service and remove the cross-connection at this location.<br>This release has been reported to AEP (#363081). A written report was issued to AEP on January 30, 2020.. | Reportable Release to Water - Untreated Wastewater |
| 2020 | AEP# 363082 | While inspecting a trunkline I came across a cross connection. 150mm in size. facility ID- R-24960-STM , pipe segment 338578.<br>On January 30th, a dye test, televising and underground inspection by Drainage staff confirmed the presence of a cross-connection. EPCOR will complete a priority repair of the EPCOR portion of the service and remove the cross-connection at this location.<br>This release has been reported to AEP (#363082). AEP has requested a written report. | Reportable Release to Water - Untreated Wastewater |

| Year | AEPA Reference# | Description WWC Event | Reason for Reporting |
|---|---|---|---|
| 2020 | AEP# 363288 | During the technical review of documents associated with ongoing condition assessments associated with planning activities EPCOR Utilities Inc. identified a compromised membrane at 116 street and 108 avenue separating storm and sanitary mains at this location; the membrane would have allowed for the flow of untreated wastewater from the sanitary collection system to the storm collection system during high flow/wet weather or storm events.<br><br>At what time did the release occur? Investigation of the associated operational records was completed at approx. 3:30pm January 30, 2020 and following confirmation of the issue with the collection system (the compromised membrane) the incident was reported to the regulator under Drainage Services Approval 639-03-03.<br><br>Release of untreated wastewater would have been limited to wet weather events. Duration of the release is unknown. At this time the volume of untreated wastewater released is unknown. During dry weather flow is directed for treatment Gold Bar Wastewater Treatment Plant through Rat Creek diversion structure so the release of untreated wastewater occurring to the storm collection system and the environment would have been limited to wet weather events.<br><br>AEP has requested a 7-day letter (notification no. 363288)<br><br>No additional questions from the regulator at the time of the call. Information for event will be updated if additional contact with the regulator occurs. | Reportable Release to Water - Untreated Wastewater |
| 2020 | AEP# 363418 | On January 30, 2020 monitoring and compliance group were informed of a constant flow of water in storm water manhole 256917 while EPCOR employees were preforming repairs (conditions were dry at time). Compliance group responded and inspected downstream manhole to find possible source of water flow. At MH256913 we observed a pipe coming in from the south with a constant flow of water and sample was taken for E-Coli. Result came back on February 4, 2020 at 13:30 with a result of 260000 CFU/100mL. Tracing the line in the Drains software showed the line does connect with a combined line that goes to Goldbar Treatment facility but will release to the North Saskatchewan River in wet weather conditions from Outfall #54. This was reported to AEP #363418 (7-Day Letter is requested by AEP) and a further investigation is ongoing to determine the source of the water flow. | Reportable Release to Water - Untreated Wastewater |

| Year | AEPA Reference# | Description WWC Event | Reason for Reporting |
|---|---|---|---|
| 2020 | AEP# 364243 | During response to a potential plugged main on February 28, 2020, a collapsed 375mm sanitary main PIPE ID 90477 was discovered. EPCOR crews worked February 28 and February 29, 2020 isolating and bypassing the line in order to complete additional condition assessment. EPCOR coordinated response and completed the bypass and isolation of the line; including mobilizing equipment to pump and transport untreated wastewater downstream of the collapsed pipe. Construction crews have been mobilized to complete open cut repairs of impacted infrastructure. There is the potential to have been releasing untreated wastewater to the surrounding soil (unknown volume); Operations staff and the EMS team will reassess the release of untreated wastewater to soil from the collapsed pipe as part of associated incident management.<br><br>The extent of the required repairs is currently under investigation. Efforts are currently being undertaken to complete and review additional condition assessments, complete engineering and design work and open cut repair of impacted infrastructure. Impact to soil will be assessed as part of the construction work as required.<br><br>The event will be reported to AEP as EPCOR continues to assess the event. The event may not meet the Drainage Services reporting framework and will be reassessed during the regular monthly review of events for alignment with internal and corporate reporting framework.<br><br>This release was reported to AEP (#364243) on March 2, 2020 by the Drainage - Environmental Manager. AEP has requested a 7-day letter. | Reportable Release to Land- Untreated Wastewater |
| 2020 | AEP# 364890 | On March 18th an inspection of the EPCOR Regional Tunnel (PW 902) was completed. The inspection identified a small hole at the bottom of one pipe adjacent to a coupler. This pipe is currently out of use. The water was not tested and it is unknown the constituency. Water in the tunnel is removed by a sump pump that discharges into the river. Further investigation and repair will be identified as high priority.<br><br>This release has been reported to AEP (#364890). A written report was issued to AEP on March 30, 2020. See attached letter for further information. | Reportable Release to Water - Untreated Wastewater |

| Year | AEPA Reference# | Description WWC Event | Reason for Reporting |
|---|---|---|---|
| 2020 | AEP# 365564 | Gate #2 10370 Queen Elizabeth Park Road - was closed in response to the increase in level of the North Saskatchewan River (NSR). The level of the NSR started to come up rapidly on April 21, 2020 (estimated 4m increase).<br>A buildup of ice at the bottom of Gate #2 did not allow the gate to seat in the fully closed position. As the water level came up the warmer water melted the ice and water began to enter in to the wet well at PW 171. Levels at the pump station were being monitored on SCADA in near real time as other FCF staff were in the field closing gates at other locations due to the rising water levels. Staff were dispatched to investigate the rising levels at PW 171, assess the position of the gate and re-secure.<br><br>The duration of the water entering PW 171 is approximately 1 hour. The water was stopped when the gate was re-secured. As a precaution other gates were re-checked to ensure they were fully seated in the closed position and there was no buildup of ice that had prevented them from being fully closed.<br><br>Based on the hydraulic gradient and discussion with FCF there would have been the potential for a volume of untreated wastewater to intermingle with the water from the North Saskatchewan. Site investigation completed on April 22, 2020 showed there were no other exit points for water / untreated wastewater to enter the NSR.<br><br>The potential release of untreated wastewater was reported to AEP (reference no. 365564)<br><br>Additional standby crew from monitoring and compliance attended site. They were unable to further confirm or determine the release of untreated wastewater.<br><br>GeoFit Call Request 480350<br>AEP of the release reference 365564. AEP has requested a 7-day letter. | Reportable Release to Water - Untreated Wastewater |
| 2020 | 366241 | Operations reported a subsidence developed on 170 St northbound and engaged with Construction to barricade 2 lanes of 170 St northbound, south of Whitemud Drive. Project Management & Engineering were engaged at end of day May 6 to investigate and following further discussion on May 7, determined this to be related to a potential failure at the DDMH connection into the 1500 mm trunk line.<br><br>Engineering determined that there is a potential void at this location, resulting in a possible release of sewage into the surrounding soil and groundwater entry into the trunk, causing the surface subsidence.<br><br>Sr.Project Manager called in to report the situation to Drainage Control on May 7 at approx. 4:45pm, and Control has reported this incident to Alberta Environment & Parks (AEP#: 366241). No 7 day letter was requested.<br><br>An emergency project has been established to further investigate the source of the subsidence and rehabilitate the MH if required. | Reportable Release to Land- Untreated Wastewater |

| Year | AEPA Reference# | Description WWC Event | Reason for Reporting |
|---|---|---|---|
| 2020 | AEP# 366616 | EPCOR Drainage inspectors responded to an odour complaint at 4620-26 Avenue NW. During the odour investigation the inspectors discovered a plugged sanitary line (M.H.#203607). The foreman (F3) was contacted to inform them of the plugged line and to request a flusher unit to release the sanitary line. The inspectors stayed at the site until the flusher unit arrived.<br><br>The sanitary main was released at 11:20AM. There was no surcharge of untreated wastewater outside of the sanitary manhole. However, the inspectors observed that there was untreated wastewater infiltrating underground from the sanitary manhole into a nearby storm manhole (#203655) thru cracks in the barrel of the storm manhole. Contaminants were removed from the storm collection system by the EPCOR flusher unit.<br><br>This release was reported to AEP (#366616). AEP has requested a written report.<br>NOTE: Environment Canada would like a copy of the 7-day letter. See Internal Comments. | Reportable Release to Water - Untreated Wastewater |
| 2020 | AEP# 367673 | On June 15th 2020, a mechanical crew from Drainage Flow Control Facilities was operating the pumps at Station 159 Dunluce Pond. The crew noticed water seeping up from the ground in between the wet well and the stations exterior wall. After further investigation, the crew determined that the forcemain on pump #2 had broken. Pump #2 has been taken out of service until emergency repairs can be made.<br><br>This release has been reported to AEP (#367673). AEP has requested a 7-day letter. | Reportable Release to Water - Untreated Wastewater |
| 2020 | AEP# 367659 | On June 13th and 14th the City of Edmonton had 2 intense thunderstorms. On June 14th the RTC 3 gates 401 and 402 released wastewater to the North Saskatchewan River between 12:58 AM and 2:44AM then again between 9:19 PM to 2:16 AM July 15th. It was later discovered that the PLC was not controlling the 3 CSO gates based on its programed setpoints. Therefore, the gates did not modulate resulting in an increased combined sewer overflow volume.<br><br>This release has been reported to AEP (#367659). AEP has requested a written report. | Reportable Release to Water - Untreated Wastewater |

| Year | AEPA Reference# | Description WWC Event | Reason for Reporting |
|---|---|---|---|
| 2020 | AEP# 369135 | On July 17, 2020 FCF completed an analysis of the data from PW 102 (94 - Westbrook Drive) and PW 104 (12422 - 29A Ave) for the rainfall event on the evening of July 16, 2020.<br><br>Both stations were overwhelmed by the increased flow and reached the overflow level. This caused a release of untreated wastewater to the storm collections system. During the rain event the stations were being monitored in real-time by FCF staff.<br><br>The overflow occurred between 18:35 and 19:25 there is still additional analysis of the event occurring to verify sensor readings associated with PW 102.<br><br>An FCF crew attended both sites during that period to confirm that both stations pumps were running at full capacity and there were no mechanical / electrical issues at the stations.<br><br>This was reported to AEP by the Environmental Manager (reference no. 369135) upon receiving confirmation of the release. A 7-day letter will be required for the event. | Reportable Release to Water - Untreated Wastewater |
| 2020 | 369258 | An interconnection alarm was investigated by EPCOR Drainage inspectors. A blockage occurred in the mainline (pipe# 49447) activating the interconnection alarm in MH#255832. An unknown volume of untreated wastewater was released into the nearby storm line (#49362). Blockage caused by grease and fats. We called for a EPCOR flusher unit (crew 227). The unit arrived at 12:25 PM. The mainline released at 13:15.<br><br>An email was sent to the Drainage - Monitoring & Compliance investigators to inform them that there was a Grease / Fats blockage in the sewer line (#49447) at this location.<br><br>This release was reported to AEP (#369258). AEP has requested a 7-day letter. | Reportable Release to Water - Untreated Wastewater |
| 2020 | AEP# 369408 | On July 23rd at approximately 11 PM, Pump Station 160 (9059 167 Avenue NW) had a small release of untreated wastewater at the discharge manhole #301924 . Due to large volumes of rain, 2 pumps at the station where running at the same. The discharge manhole surcharged due the increased volume of flow. Approximately 100 Liters of wastewater was release on to the driveway at the pump station. An EPCOR vactor truck was called to cleanup the spill.<br><br>This release has been reported to AEP (#369408). AEP has requested a 7 day written report. | Reportable Release to Water - Untreated Wastewater |

| Year | AEPA Reference# | Description WWC Event | Reason for Reporting |
|---|---|---|---|
| 2020 | AEP# 369801 | Trestle #7 sanitary sewer leak at 56 avenue 141 street at Whitemud Creek. The pipe, supported over Whitemud creek along the trestle over Whitemud Creek, is a 900mm diameter steel pipe (PIP73515) carrying sanitary flow from multiple neighbourhoods. The leak discharged an unknown amount of untreated wastewater to Whitemud Creek ravine and Whitemud Creek. Leak appears to be central over the span, cannot delineate at this time where the leak is at on the pipe further inspection activity is in progress to further assess the pipe condition. The flow data and rain data is under review to further understand the upstream and downstream flow. The release of untreated wastewater stopped post rainfall event and crews remained on site to monitor the infrastructure.<br><br>Nearby rain gauges recorded approximately two inches of rain fell in about 1.5 hours. This is a significant rainfall event over a short duration. Multiple EPCOR crews responded to the event, event was escalated to senior leadership and reported to the regulator the evening of August 3rd.<br><br>AEP reference no. 369801 7-day letter required. City of Edmonton has also been informed of the event.<br><br>Drainage Services EOC has been activated in response to the event. Due to the remote location, environmental sensitivity and large number of customers the trestle services.<br><br>Inspection activity is underway to more fully understand trestle condition, the site has been secured and additional signage will be installed to inform the public of the issue and engineering and project management resources have been engaged to begin planning of repair. | Reportable Release to Water - Untreated Wastewater |
| 2020 | AEP# 369855 | A overflow alarm came in on SCADA (PW140) during a major rain event. The level reading was inaccurate because it was underwater. so the duration and volume of any overflow is unknown. Any overflow of untreated wastewater could be released into a nearby storm line. SCADA was monitoring the station throughout the storm event. The station was operating at capacity and per design with both pumps working to reduce the levels in the wetwell. There was no onsite crew sent to PW140 to visually confirm the release of untreated wastewater.<br><br>This event has been reported to AEP (#369855). AEP has requested a 7 day letter. | Reportable Release to Water - Untreated Wastewater |

| Year | AEPA Reference# | Description WWC Event | Reason for Reporting |
|---|---|---|---|
| 2020 | AEP# 369968 | As part of the Westridge Subsidence project, a EPCOR Drainage trunkline crew entered Storm MH221387 to continue patching the1650mm pipe. While patching the pipe, the trunkline crew noticed signs of sewage in Storm Pipe Segment #335442.<br><br>The trunkline crew investigated the cause of the sewage in the storm trunk line and found a unknown 200mm pipe connection between sanitary MH221327 (Photo#2) & Storm MH221381 (Photo#3). EPCOR Drainage had set-up a bypass pump 204m upstream that is causing the sewage to back up in the 450mm sanitary and then over flow into storm line #335442 through the connection between the manholes.<br><br>A 200mm plug was installed (6:15pm) into the upstream end of the unknown 200mm pipe connection, which stopped the release of untreated wastewater into the storm collection system.<br><br>This release has been reported to AEP (#369968). AEP has requested a 7-day letter. | Reportable Release to Water - Untreated Wastewater |
| 2020 | 372680 | A leak was identified, the bypass flow was immediately switched to the secondary discharge hose, resulting in a continuous operation. The spill was contained as soon as identified and the area cleaned up. The primary discharge hose is being replaced and tested before the flow will be switched back. The volume of the spill (~400  500 gallons) made it a reportable incident and as such it has been reported to Alberta Enviro.<br><br>The AE has created an initial report and the reference # is 372680. They have asked for a 7 day letter (incident report), but did not request any further decontamination of the CB (#278184) where the majority of the sewage spilled into or any additional cleanup than what has already been done. The CB was connected to a COMB line.<br><br>The bypass Subcontractor will send their Preliminary Incident Report to us this evening once they get the statement from the night shift and ours will follow tomorrow. | Reportable Release to Water - Untreated Wastewater |
| 2020 | AEP# 372762 | EPCOR Drainage investigators received an email on October 7, 2020 stating that EPCOR crews working in the area had noticed heavy flows in storm line 39301. Investigators collected a field sample on October 7th and analyzed for chlorine to ensure it was not a watermain break. Both field tests came back with no chlorine reading.<br><br>A E-coli/Fecal sample (storm manhole# 219319) was collected by Drainage investigators on October 7th to confirm whether there was a cross connection. Results were received on October 14, 2020 with elevated levels of E-coli (42000 CFU/100 mL). Cross connection confirmed. Drainage investigators will go back to collect additional samples to determine source of cross connection.<br><br>This release has been reported to AEP (#372762). AEP has requested a 7-day letter. | Reportable Release to Water - Untreated Wastewater |

| Year | AEPA Reference# | Description WWC Event | Reason for Reporting |
|---|---|---|---|
| 2020 | 372420 | EPCOR Drainage Services received notification of a potential release of untreated wastewater / water from Trestle #7 at 18:15 on October 3rd. Due to the previous release at this location (AEP reference no. 369801) EPCOR had already begun to mobilize field staff in response to high level alarms from the downstream combined sanitary system.<br><br>EPCOR staff and EPCOR contractor attended site and completed an initial evaluation of the scaffolding and pipe and confirmed that there was a release of untreated wastewater from the 900mm steel pipe running across Trestle #7. The 900mm pipe serves a dual purpose of supporting the structure of the trestle and conveyance of untreated wastewater. The trestle crosses Whitemud creek extending 224m in length and is at the highest point 30m above Whitemud Creek. Note: Trestle #7 services a drainage area of 1343 ha and an approximate customer base of 56,000. Due to the unknown condition of the pipe / structure, there was no way to safely access the area below the trestle or the trestle itself during the release to complete further assessments at the time of release. At 20:15 staff reported that the release stopped.<br><br>EPCOR began to mobilize additional resources to support the response and attempt to further evaluate the release and contacted Alberta Environment and Parks to report the environmental release. This included inspections of the downstream sanitary collection system.<br><br>Previously on August 3rd, areas within the City of Edmonton experienced an extreme weather event. Three rain gauges in the contributing area upstream of Trestle #7 showed more than a 1:200 storm event over a two hour period. Similarly downstream rain gauges showed a 1:50 storm event over a two hour period. The flow in the system during that period led to a surcharge condition and increased load and pressure in the 900mm steel pipe. The holes in the pipe during this period of elevated high load / pressure caused a release of untreated wastewater | Reportable Release to Water - Untreated Wastewater |

| Year | AEPA Reference# | Description WWC Event | Reason for Reporting |
|---|---|---|---|
| 2020 | AEP# 373764 | Call Request 487691<br>CITIZEN NOTICED SEWAGE COMING UP OUT OF A MH COVER IN FRONT OF 195 HYNDMAN CRESCENT NW. DISPTCHED VACTOR FOREMEN TO CONFIRM. IT WAS SEWAGE HE HAS A VACTOR ON THE WAY CITIZEN CALLED @19:45 TO REPORT THE INCIDENT. IT IS ENTERING A NEARBY CB THE STORM LINE DOES GO DIRECTLY TO THE RIVER THROUGH KENNEDALE RAVINE AND OUT OF OUTFALL #74<br><br>IWWI Team:<br>Surcharging from sanitary sewer line (MH397566). Blockage was 4 m upstream and had been cleared by the time Drainage investigators had arrived on the site. A Drainage work crew was in the process of cleaning out CB288184 (183-Hyndman Crescent NW) where the spill had entered the storm system and was going to proceed along PIP1854-STORM. It is estimated that several hundred litres of untreated wastewater had entered the storm system for over 2 hours. An unknown quantity of untreated wastewater may have entered the North Saskatchewan River at Outfall #74 (#374179).<br><br>This release was reported to AEP (#373764). AEP has requested a 7-day letter. | Reportable Release to Water - Untreated Wastewater |
| 2020 | AEP# 373819 | Drainage Operations crews responded to an automatic alarm at Interconnection # 134 (89 Street & lane south of 77 Ave). Call request (487729) made at 08:53 November 19/2020 by Monitoring & Compliance group. Crew 324 inspected this location at 13:30 and found a partially plugged mainline causing an overflow of untreated wastewater (approx. 1500-3000L) into storm manhole 246519. Crew 319 released the mainline at 14:25 using High Pressure Flushing. The blockage was due to a build-up of toilet paper and grease.<br><br>This release has been reported to AEP (#373819). AEP has requested a 7-day letter.<br><br>NOTE: The AEP representative would like to know the EPCOR Drainage approval to operate number, along with whether or not we have approval for unauthorized wastewater releases without having to provide a sample. He also is concerned about Environment Canada and our releases. | Reportable Release to Water - Untreated Wastewater |

| Year | AEPA Reference# | Description WWC Event | Reason for Reporting |
|---|---|---|---|
| 2020 | 363518 | During the technical review of documents associated with ongoing condition assessments associated with planning activities for the drill drop manhole rehabilitation program EPCOR Utilities Inc. identified 5 potential locations of contaminated soil due to identified structural deficiencies in drill drop manholes:<br><br>DR ID 247760 Saskatchewan Dr. and Gateway Blvd<br>DR ID 212361 42 Ave ad 99 St<br>DR ID 245746 108 St and 100 Ave<br>DR ID 262372 10055 - 106 St<br>DR ID 224345 122 St and 6s Ave<br><br>The structural deficiencies at these locations would have allowed for the flow of untreated wastewater from the sanitary collection system to the soil in the area adjacent to each structure. Duration of the release is unknown. At this time the volume of untreated wastewater released is unknown.<br><br>AEP has requested a 7-day letter (notification no. 363518) No additional questions from the regulator at the time of the call.<br><br>Information for event will be updated if additional contact with the regulator occurs.<br><br>Remediation activities will occur during the repair of the DDMH as required during rehabilitation work at these locations. Planning and Project Management associated with the discovery of these sites is underway as part of the drill drop manhole rehabilitation program. | Reportable Release to Water - Untreated Wastewater |
| 2020 | 364311 | Earlier today at 3:30 PM during a site walkthrough, ITL noticed trail of runoff on the snow just outside the gate at PW901 (167 Avenue NE east of 9 Street NE) and due to the amount of toilet paper debris at the facility door the spill was probably caused by a recent backup in the chamber at PW901.<br><br>This release was reported to AEP 364311. AEP has requested a 7 day letter.<br>See attached report for more details. | Reportable Release to Land- Untreated Wastewater |

| Year | AEPA Reference# | Description WWC Event | Reason for Reporting |
|---|---|---|---|
| 2020 | 364826 | Duggan Sanitary Large Trunk - Missing Wall.<br>A planned CCTV inspection conducted on March 18th, 2020, on 1650mm Sanitary Trunk Pipe ID_319876 was observed to have a portion of the wall missing. This is within 10m downstream of the Duggan Pump Station. There is potential for sewage to leak to surrounding soils. Ribs and lagging are visible where concrete is missing. Inspection videos are in Granite. The pipe crosses beneath the L.Y. Cairns School. Note that the new Duggan Tunnel will result in abandonment of this section of trunk, along with the Duggan Pump Station. A short term solution/options may be required (eg.repair, monitoring) until it can be abandoned. Further investigation, including engineering and operational considerations is required. Further development of initiative for concrete pipes immediately downstream of Pumps/Forcemains to continue, as system wide inspection and rehab planning of these similar locations.<br><br>This release was reported to AEP (#364826) by a representative of EMS team. AEP has requested a 7 day letter.<br><br>For more details and pictures please see attachment - 2020-03-25-Memo. | Reportable Release to Land- Untreated Wastewater |
| 2020 | 364829 | A Combined Large Trunk (Reach Cmb_8) was inspected using multi-sensor/CCTV and 3 holes were observed at the crown of pipe (Year 1960, Monolithic Arch Tunnel). Reference is MH 262873 to MH 263180. Pipe is located adjacent to Joe Clarke Athletic Grounds and Commonwealth Stadium.<br><br>The purpose of the inspection was part of a proactive inspection, and Large Trunk Rehabilitation project (Area C-2)#1008869. This reach is currently planned to be initiated in 2022 for design under a separate Capital Project. This reach would experience surcharging, as a result of combined sewage flows/wet weather and RTC#3 gate closures. Therefore there is potential that sewage could leak to surrounding soils. Overall the pipe shows wall loss and corrosion throughout and will require rehabilitation. Immediate short terms needs, to address the holes, are to be determined until complete rehabilitation can be done.<br><br>This release was reported to AEP (#364829). AEP has requested 7 day letter.<br>Environmental Incident Regulator Reporting Form was not complete for this event as the it was reported to AEP by a representative of EMS team.<br><br>UPDATE March 26, 2020: Upon further review there are another coupled defects noted on another reach (Cmb_104). See attached schematics and report. | Reportable Release to Land- Untreated Wastewater |

| Year | AEPA Reference# | Description WWC Event | Reason for Reporting |
|---|---|---|---|
| 2020 | 368519 | While inspecting control structure 585 , I notice a hydraulic leak (<5L) in the bottom of the control structure. I was unable to identify where the leak is coming from but I installed a oil sock in the trunkline downstream of the station to contain the leak.<br><br>EPCOR Drainage repaired this hydraulic leak on July 3, 2020.<br><br>This event has been reported to AEP (#368519). AEP has not requested a written report. | Reportable Release to Water - Other Regulated Substances |
| 2020 | AEP# 369666 | EPCOR Operations crew was inspecting Station #585 (Glastonbury #2) and noticed hydraulic fluid (5L) floating in chamber from a previous leak. Could possibly be leaking from the gate in the control structure. Set up a boom in downstream MH374976 to contain further oil entering the storm system.<br><br>EPCOR Drainage inspectors arrived on site to assist in the spill clean-up. Absorbent booms / pads have been placed inside the gate chamber to absorb hydraulic oil residue. A further investigation into the source of the hydraulic oil will be conducted by EPCOR Drainage.<br><br>This release has been reported to AEP (#369666). AEP has requested a written report. | Reportable Release to Water - Other Regulated Substances |
| 2020 | AEP# 372280 | Site inspection Sept 28th discovered BioMaxx liquid outside containment (<5L). as well as staining on asphalt leading to storm sewer grate (MH492163).<br>WR 486217 submitted to have the containment area looked at.<br><br>A follow-up investigation was conducted on September 30, 2020. Based on this investigation, it was determined that there was a potential for release of Biomaxx into the storm collection system between September 25th and 30th. Staining on the asphalt led to an onsite storm catch basin and precipitation on September 27th may have caused a small amount of chemical / storm water to enter the storm collection system.<br><br>This release has been reported to AEP (#372280). A written report was issued to AEP on October 7, 2020. | Reportable Release to Water - Other Regulated Substances |
| 2020 | AEP# 371474 | An EPCOR Contractor crew was working inside upstream of storm trunk ; doing slip lining. Crew was using Blue line cement grout.<br><br>Grout was mixing with / into storm water. Stormwater would be discharged to the North Saskatchewan River thru Outfall #30. Contractor is working in live flow conditions 47m upstream from MH252039.<br><br>Based on overall working area exposed to flow and quantity used to complete the task, estimates are under 2kg of mixed grout was released.<br><br>A sediment boom was placed downstream of the work and removed afterwards<br><br>The contractor reported this release to AEP (# 371474). AEP has not requested 7 day letter. | Reportable Release to Water - Other Regulated Substances |

| Year | AEPA Reference# | Description WWC Event | Reason for Reporting |
|---|---|---|---|
| 2020 | 366491 | EPCOR's approval to operate mandates a minimum of 190 samples to be analyzed for random monitoring purposes. In April and due to the many places, buildings and facilities that are closed because of COVID-19, we were able to collect only 177 samples. The violation was reported to AEP with Ref. # 366491. | Approval/Permit/Regulatory Requirement or Limit Not Met |
| 2020 | AEP# 370228 | Emergency pumping activity south of Aurum Road NE and 17 Street NE by Drainage Operations has negatively impacted bank stability north west of the 900mm culvert crossing 17 Street NE.<br><br>This emergency pumping activity was initiated due to the 900mm culvert crossing 17 Street NE being obstructed and causing overland flooding across 17 Street. To prevent long term damage to 17 Street dewatering was required to move the water downstream and to restore flow to the culvert. Culvert is currently partially released and is running at 1/4 flow. Pumps remain on site and road is closed as a precaution to respond to further rain events and/or discharges of stormwater from Strathcona County.<br><br>Additional investigation in to the cause of the obstruction in the 900mm culvert is ongoing. Historical drainage in this area is problematic and is also undergoing further evaluation as part of this event - including investigating options for replacement and upgrading the culvert crossing 17th Street.<br><br>Due to the erosion of the bank caused by pumping activity the pumping was reported to the regulator (Ref. no. 370228). They have requested a 7-day letter.<br><br>Note: regular pumping activity done on an emergency basis that follows the flow path of the culvert would not require reporting to the regulator. The impact to the bank required the escalation caused by discharge of dewatering the large volume of water being held back by the 17 Street. | Approval/Permit/Regulatory Requirement or Limit Not Met |
| 2020 | 365988 | The Oxidation Reduction Potential (ORP) of the solution in the EPT Chemical Scrubber fell below the minimum daily average of 300 mV, as outlined in our Approval to Operate 639-03-06, Table 5-2. The chemical pump that doses Sodium Hypochlorite (Bleach) into the scrubber to maintain the ORP was air locked and stopped dosing bleach. The scrubber blower continued to operate for the duration of this event. | Approval/Permit/Regulatory Requirement or Limit Not Met |

| Year | AEPA Reference# | Description WWC Event | Reason for Reporting |
|---|---|---|---|
| 2020 | 364663 | Two samples (Feb 18/20 Rossdale 0.040 mg/L and E.L. Smith 0.018 mg/L) were found to exceed the MAC for Bromate (0.01 mg/L) during the preparation of the monthly report (Wednesday March 18, 2020) and as reported at that time to AEP (Reference# 364663))<br><br>The elevated level of bromate was also seen in the raw water samples.<br><br>Testing was performed by an external laboratory as our internal IC analysis is currently out of service. Results are imported into LIMs directly. Elevate levels were not detected until the final report data file was generated later in March.<br><br>Bromate concentrations prior to and after these exceedances were all below the MAC.<br><br>An ERS event has been entered, AEP has been notified and Analytical Operations will be producing a 7-day letter. | Approval/Permit/Regulatory Requirement or Limit Not Met |
| 2021 | AEP# 375434 | At 05:15 am on 24-Jan-2021 a citizen called in a surcharging sanitary manhole on Roper Road NW and 67 Street NW. EPCOR Drainage Investigators were on site at 07:30 and observed MH232655 surcharging, with flow moving to the west along Roper Road NW and into storm CB449560. Investigators checked storm MH232839, and evidence of flow was apparent. At 8:45 OF196, which discharges into the Mill Creek, was inspected, and appeared to be flowing. A sample from the outfall (OF385992) was collected at 9:10 for routine parameters, metals, bacteria, hydrocarbons.<br><br>At 09:45, EPCOR Drainage crews cleared the blockage from pipe (PIP88330), which is a 300 mm pipe. The vac-truck crew observed a significant buildup of fats, oils, grease (FOG) and solids in MH232654, and have indicated that they will be clearing the street and catch basin of untreated wastewater once they have finished flushing the sanitary line. The actual volume of untreated wastewater that was released to the storm collection system is under investigation. Additional samples from Mill Creek (OF196) may be required.<br><br>This release was reported to AEP (Ref #375434). AEP requested a 7-day letter. | Reportable Release to Water - Untreated Wastewater |

| Year | AEPA Reference# | Description WWC Event | Reason for Reporting |
|---|---|---|---|
| 2021 | AEP# 376680 | EPCOR Drainage completed a CCTV inspection on March 3, 2021 of Drill Drop Manhole (DDMH#247738) located near 106 Street and Saskatchewan Dr. A section of the corrugated metal pipe was found to be fully deteriorated and a void behind the metal pipe with soil visible. The DDMH was part of the scope of a new Access Manhole project underway at the location, and was planned for abandonment. At the time of this reporting, construction crews are already implementing abandonment as a result of the void discovery.<br><br>The structural deficiency this location would have allowed for the flow of untreated wastewater from the combined sewer system to the soil in the area adjacent to the structure. Duration of the release is unknown. The volume of untreated wastewater released is unknown.<br><br>This event has been reported to AEP (Reference #376680) on March 5, 2021 by Drainage EMS. AEP has requested a 7-day letter. No additional questions were asked at the time of the call. | Reportable Release to Land- Untreated Wastewater |
| 2021 | AEP# 376802 | EPCOR Drainage responded to a report of sewage running down the road at PW 103. When Drainage staff arrived on site it was determined that EPCOR Water may have shut one of the gates controlling flow into the lift station and untreated wastewater was backing up and coming out of the sanitary manholes further up the sewer line. The gate was slowly opened so as to not overwhelm the station. Normal flow thru the pump station was restored.<br><br>The spill was reported to the Drainage Control Center. An EPCOR vacuum truck that was on site and cleaned up what they could of the sewage that was left on the road and the catch basin (CB547017) that the sewage was flowing into. Drainage - Monitor and Compliance investigators have been notified of this release.<br><br>This release has been reported to AEP (Ref # 376802). AEP has requested a 7-day letter.<br>Call Request #490310 | Reportable Release to Water - Untreated Wastewater |
| 2021 | AEP# 377186 | EPCOR Drainage (crew 438) responded to a alarm at Interconnection #78. A combined sewer line (PIP31904) was found to be partially plugged with grease and untreated wastewater was releasing thru the interconnection into a nearby storm manhole (MH263708).<br><br>A Drainage flusher unit (crew 104) was called in to clear the blockage (using high pressure flushing) from PIP31904 (WO# 217003). Partial blockage in combined sewer line was released at 12:50PM.<br><br>This release was reported to AEP (Ref #377186). AEP has requested a 7-day letter.<br>CR # 490787 | Reportable Release to Water - Untreated Wastewater |

| Year | AEPA Reference# | Description WWC Event | Reason for Reporting |
|---|---|---|---|
| 2021 | AEP# 379269 | An EPCOR employee outside of work hours was on a walk and could hear running water in a storm line on a hot dry day. The employee also noticed a musty smell.<br><br>EPCOR Drainage investigators responded to this report and a sample was taken from storm manhole (MH382685) which came back above the bylaw limits for E.coli (9700 CFU / 100ml). Another sample was collected and further samples will be taken to try to pin point the source(s) of the untreated wastewater.<br><br>Storm water from this area drains into the Hodgson SWMF (IOL422446). Stormwater then flows from the Hodgson SWMF and releases into the North Sask. River thru Outfall #9 (OF207873).<br><br>This release was reported to AEP (Ref #379269). AEP has requested a 7-day letter. | Reportable Release to Water - Untreated Wastewater |
| 2021 | AEP# 379297 | While investigating a previously noted sewage overflow (see ENV-20210525-575024) on the walking path west of the funicular stairs near Grierson hill, a Drainage work crew located the upstream combined manhole (MH245306) and performed a visual inspection.<br><br>The crew found that the flow in the combined sewer manhole was not going in the direction as noted in Geofit. The crew followed the path the pipe looked to be going. Near the walking path where the previous release (May 25, 2021) was identified, an unusual flow of water was detected. After checking the ground in the area, the crew found a broken pipe with moderate flow that seemed to be coming from the same direction as the unknown pipe at the combined manhole. This flow lines up perfectly with an unknown flow coming into storm manhole MH245286. The flow from MH245286 heads directly to Outfall #47 (OF245287). The crew was not able to confirm what kind of wastewater was flowing thru the storm line (storm or combined?), but the Drainage crew suspects that there is combined sewer flow going into the storm collection system.<br><br>This release has been reported to AEP (Ref# 379297) by the Drainage Environmental Manager. AEP has requested a 7-day letter. | Reportable Release to Water - Untreated Wastewater |

| Year | AEPA Reference# | Description WWC Event | Reason for Reporting |
|---|---|---|---|
| 2021 | AEP# 382823 | The only alarm that became active at PW#584 (RTC#3) was the Level discrepancy alarm (LOW priority alarm), which is designed for when the measured values of two level sensors installed at the Diversion shaft diverge. The alarm was acknowledged on the morning of August 23, and a WR was entered. Electricians were sent out to the site, and the issue was resolved by 1400. The procedure to resolve the discrepancy alarm resulted in false readings when the level returned to normal dry weather conditions. The level discrepancy alarm was activated again at 16:28. This time, the duty level sensor (LIT-701) read zero, resulting in gates 401 and 402 going to the fail-safe position of 100% open as per control logic to prevent potential downtown flooding. The after-hour operator put the alarm on hold until August 24, 07:05.<br><br>Later that evening, the rain started again in Edmonton. Between 21:22 and 23:13 on August 23, approximately 3,359 m3 of combined sanitary sewer and stormwater was released to the NSR at OF#54 (Rat Creek outfall). Gates at PW#584 (RTC#3) stayed open throughout the night, and no storage of combined wastewater happened in the collection system. The overflow alarm was put on hold from August 23 at 21:35 to August 24 at 07:05.<br><br>An electrician was sent to the site and troubleshot the problem on the morning of August 24.<br><br>This release was reported to AEP (Ref# 382823) by the Drainage Environmental Manager. AEP has requested a 7-day letter. | Reportable Release to Water - Untreated Wastewater |
| 2021 | 384147 | During a routine inspection of the combined MH 315875 evidence of untreated wastewater was seen entering the storm collection system. Trunkline was dispatched to site to confirm the release of untreated wastewater through an entry; upon entering the MH trunkline was able to confirm that a weir plate designed to direct untreated wastewater had shifted causing splashing of untreated wastewater transitioning in the line and a trickle flow to enter the storm collection system through a designed CSO location.<br><br>Trunkline was able to effect immediate repairs on site stopping the release of untreated wastewater. Additional investigation will be required to effect a longer term repair.<br><br>This event was reported to AEP (ref no. 384147) and a 7-day letter has been requested. Further investigation will be done in to the relevant flow data upstream and downstream to help to determine volume released from this location. | Reportable Release to Water - Untreated Wastewater |

| Year | AEPA Reference# | Description WWC Event | Reason for Reporting |
|---|---|---|---|
| 2021 | AEP# 375380 | Potable water (chlorinated) entered the storm collection system when an EPCOR Drainage combo unit (unit #C3723) struck a fire hydrant causing a water main break. An unknown amount of potable water entered a nearby storm catch basin (CB226546).<br><br>The Drainage foreman (F3) and Manager were notified of the incident by the Drainage crew. Additional crews were sent to assist with clean up and isolating the fire hydrant. De-chlorination pucks were also utilized to remove residual chlorine from the spill site. The duration of the release was 45 minutes.<br><br>This release has been reported to AEP (Ref #375380). AEP has requested a 7-day letter.<br>Caller Request #488925 | Reportable Release to Water - Other Regulated Substances |
| 2021 | 381004 | Utility crew was in the process of opening a fire hydrant located between digester 2 and boiler house 2 when the water line let go at approximately 14:10. An unknown quantity of chlorinated water flowed overland, into nearby catch basins, into outfall 20, and out to the North Saskatchewan River. Water Trouble was called to help isolate the main. Crews added de-chlorination pucks to the catch basins, and built a berm/dam with a temporary pump to limit the flow or water to the catch basins. A water sample at the outfall was taken to determine if there was any chlorine residual remaining at the discharge to the river. The broken water main was isolated at approximately 15:38, and flow to river stopped by 15:55. AEP was notified - reference number 381004. 7 day letter to follow. | Reportable Release to Water - Other Regulated Substances |
| 2021 | 384012 | This morning at approximately 7:10am, Contractor had a release on site when a centrifuge failed, allowing fresh water (approx 3000L) to release through the spoil bay and off lease. The release travelled along the gutter (north) on 66th street (south bound lane). The release was fresh water (no drilling additives) with contamination leached from spoil bay (concrete fines from drilling the shaft wall).<br><br>All environmental controls were in place at catch basins stopping concrete fines from entering storm water system(i.e. silt socks, etc.).<br><br>Contractor had a vac truck lined up for daylighting activities for 7:00am which was re-routed to complete clean-up of the release. Once the vac truck was onsite it began sucking/cleaning catch basins along 66st.<br><br>Upd Sept 28: EPCOR investigators arrived on site to check for chlorine levels in CB. Chlorine level is 0. No further clean up is required. See attached pictures for evidence.<br><br>This release was reported to AEP #384012, AEP Has requested a 7-day letter. | Reportable Release to Water - Other Regulated Substances |

| Year | AEPA Reference# | Description WWC Event | Reason for Reporting |
|---|---|---|---|
| 2021 | 376918 | The Prime Contractor initiated visual inspection along the tunnel alignment as a result of a loss of water detected by the slurry machine. At roughly 12:30 pm the Contractor noticed a hydro-fracture at the surface and a stream of water collecting at the lowland area in proximity to the MacKinnon Ravine paved trail.<br><br>At the time of fracture TBM was at the shallow point and was running at 50-70 PSI pressure.<br><br>All microtunneling related activity were immediately suspended and clean-up activities are currently underway.<br><br>TBM cannot be stopped for too long, as there is risk of it getting stuck. As a result, after clean up will be finished, contractor will re-start operation with the system in safe mode - under no-pressure on the section where water has breached surface. Contractor has located two points where water has came up to the surface. See attached preliminary investigation for more details.<br><br>EPCOR investigators were called out to site for further assessment. See attached report for more details.<br><br>This Incident was reported to AEP (376918) by contractor. 7-Day letter was requested by AEP. | Reportable Release to Land - Other Regulated Substances |

| Year | AEPA Reference# | Description WWC Event | Reason for Reporting |
|---|---|---|---|
| 2021 | AEP# 379245 | EPCOR DRAINAGE SERVICES RECIEVED A CALL FROM THE CITY OF EDMONTON (COE) - PARKS DEPARTMENT ABOUT A SANITARY LINE LEAKING TOILET PAPER AND SEWAGE ALL OVER THEIR TRAIL (SOUTH OF100-STREET & MCDOUGALL HILL NW).<br><br>Drainage investigators contacted the City of Edmonton (COE) parks representative at 11:53 to discuss the release that was identified at the trail between the McDougall Hill stairs and the funicular. Investigators set-up a meeting with the COE representative at the spill site to determine a plan of action. It was mentioned in the discussion that a steady wastewater flow was observed at the site and a noticeable smell & toilet paper was present.<br><br>Drainage investigators arrived on site at 12:30. The investigators parked at the bottom of McDougall Hill and walked up the stairs. A large flow of water was observed coming from the ground just east of where the stairs end and the paved path runs to the funicular. A COE crew roped off the access to the path as there were joggers running through the sewage. Fluctuating flow was coming right from the ground and a noticeable odor with signs of sanitary waste was present in the flow. The water was flowing out of the ground and going all the way down the path to the funicular. The flow then continued off the path and down the hill into the river valley.<br><br>Drainage investigators collected a sample at 13:15 from the leak site (on the ground). Investigators spoke to the Drainage environmental manager, who requested that MH321509 (combined sewer) be checked. Outfall #47 (OF245287) and another combined manhole (MH245306) was also checked to see if there was any unusual flow present. A lower than average was noticed entering MH321509 from the Northeast, and high flow from the West, as expected.<br><br>Drainage investigators collected a sample at OF #47 at 14:15. Only a very small trickle of water was observed exiting the outfall to the NSR. There was nothing concerning about this water and there was no sign of sanitary wast | Reportable Release to Water - Other Regulated Substances |

| Year | AEPA Reference# | Description WWC Event | Reason for Reporting |
|---|---|---|---|
| 2021 | AEP# 382897 | EPCOR Drainage investigators conducted a check of the Mill Creek watershed area for possible interconnections. These checks are not part of a spill, but rather the result of ongoing issues due to multiple interconnections (134, 135, 139, 151, 153, 154, 155, 156, 159, 161, 162, 164, and 268) between the combined and storm sewer system around the Mill Creek Watershed.<br><br>During an investigation into foaming at Outfall 44 (OF339884), a sample was collected from Mill Creek at the closest possible sample point: the inlet of PIP342083 (where Mill Creek disappears underground). The sample was analyzed for E.coli, and found to be in violation of EPCOR Drainage Bylaw 18100 for stormwater (limit = 200 CFU/100 mL, sample result = 690 CFU/100 mL). Note: more results are pending for this sample: TKN, TP, COD<br><br>Note: this sample was taken the day after two days of heavy rainfall, which likely resulted in combined overflowing into storm. Investigators noted a sewage like smell at the creek when sampling.<br><br>This release was reported to AEP (Ref #382897). AEP has requested a 7-day letter. | Reportable Release to Water - Other Regulated Substances |
| 2021 | 383597 | Request to televise section of pipe upstream of Outfall 23A. Discovered a large subsidence. Placed temporary fencing around location to protect foot traffic. Sent over to construction for further repair and discussion. Washout / sediment release to North Saskatchewan has occurred.<br><br>This incident was reported to AEP by the Environmental Manager. AEP has requested a 7 day letter. | Reportable Release to Water - Other Regulated Substances |
| 2021 | 378581 | Tandem v3152 radiator got a hole in the bottom. All of antifreeze drained out (approximately 35 litters). Crew contained it with spill kits and called drainage control for assistance. Some antifreeze made it to CB.<br><br>Currently M&C on site assessing the situation and assisting in clean up activities of CB.<br><br>UPDATE from M&C: Wastewater investigators arrived on site at 10:00AM. Hydrophilic booms and pads were laid to contain the remainder of the glycol on the roadway.<br><br>The Catchbasin was full of sediment (sand/soil) and therefore the glycol entered the CB and immediately travelled down the stormwater drainage system towards the North Saskatchewan River. The wastewater investigators added a boom to the Manhole (MH239421) closest to the OF where the stormwater system enters the river (OF31).<br><br>An estimated 30L likely was not contained, and entered the North Saskatchewan Rive. A hydrovac truck was called in and used to clean up the glycol from the gutter, roadway and catchbasin. 1 meter cubed of lightly impacted material (booms, pads, and water) was removed and disposed of.<br><br>This release was reported to AEP (378581). AEP Has requested as 7 day letter. | Reportable Release to Water - Other Regulated Substances |

| Year | AEPA Reference# | Description WWC Event | Reason for Reporting |
| --- | --- | --- | --- |
| 2021 | 383371 | At approximately 1:00pm, EPCOR Industrial Wastewater Investigator identified some sediment at a catch basin on 66thst. A pH test was conducted and confirmed levels exceeded bylaw levels. Contractor organized a vactruck for 4pm to clean out the catch basin. Notice to Comply was issued.<br><br>This incident was reported to AEP by a contractor. AEP has requested a 7 day letter. | Reportable Release to Water - Other Regulated Substances |
| 2021 | 384730 | On Friday October 15, 2021, Gold Bar WWTP Operations failed to complete the daily fence line H2S monitoring as required by our Approval to Operate 639-03-06, Table 6-2. AEP Ref #384730. 7 day letter required. | Approval/Permit/Regulatory Requirement or Limit Not Met |
| 2021 | 385858 | At 6:44 am on November 25, 2021, Gold Bar WWTP experienced a non-scheduled power outage that resulted in the UV disinfection process to be out of service for 4 minutes. During this outage approximately 0.45 ML of non-disinfected secondary effluent was discharged to the NSR. AEP Reference # 385858. 7 day letter to be provided | Approval/Permit/Regulatory Requirement or Limit Not Met |
| 2022 | AEP# 387065 | On November 12, 2021, odors from Outfall 57 (OF268556) initiated an investigation by the Drainage Compliance group.<br><br>Compliance Investigators traced back from Outfall 57 to a nearby school using sampling and analysis. When the source location was narrowed down, the compliance investigation was aided by EPCOR's Minor Repairs group, who televised sanitary line #9224 (PIP9224) and the surrounding storm sewerage system. On January 11, 2022 televising determined that a blockage (paper towels) at the end of PIP9224 was caused sanitary effluent to back up within the line, consequently resulting in the sanitary effluent to infiltrate an intersecting storm sewerage system (PIP9159).<br><br>Upon noticing the blockage, Minor Repairs contacted for an EPCOR Combo unit - the blockage was released the same day and the sanitary effluent was returned to its appropriate sewerage system.<br><br>Note: At this time, an additional investigation is ongoing to determine the condition of PIP9224 for possible repairs/replacement .<br>Additionally, EPCOR's Compliance group is to follow up with the titled lot owners of 10310 - 56 Street NW.<br><br>This release was reported to AEP (Ref# 387065). AEP has requested a 7-day letter. | Reportable Release to Water - Untreated Wastewater |

| Year | AEPA Reference# | Description WWC Event | Reason for Reporting |
|---|---|---|---|
| 2022 | AEP# 387302 | As part of a scheduled assessment program of the DDMH drop structures, deficiencies (structural) in the corrugated metal pipe (CMP) were identified that are allowing untreated wastewater to enter the surrounding soil along the drop structure. The release is contained to the surrounding soil and is not entering the storm collection system or tributaries at this time.<br><br>Results of the visual inspection will be forwarded to Planning / Construction for assessment and planning, but do not currently present an immediate risk of failure. The inspections occurred on January 20 &21, 2022 via CCTV. Videos are loaded into Granite for these locations:<br>MH257095 11315-108 Ave (combined)<br>MH257078 10811-115 St (combined)<br>MH225617 4809-142 St (sanitary)<br>MH253178 111 Ave &156 St (sanitary)<br><br>These incidents were reported to AEP (Ref# 387302) by the Drainage Environmental Manager. AEP has requested a written report. | Reportable Release to Land- Untreated Wastewater |
| 2022 | AEP# 388125, 388126, 388127 | As part of a scheduled assessment program of the DDMH drop structures/ CORE Program , deficiencies (structural) in the corrugated metal pipe (CMP) and concrete pipe were identified that are allowing untreated wastewater to enter the surrounding soil along the structure. The release is contained to the surrounding soil and is not entering the storm collection system or tributaries at this time.<br><br>Results of the visual inspection will be forwarded to Planning / Construction for assessment and planning, but do not currently present an immediate risk of failure. The Inspections occurred on February 19, 2022. Video's are loaded in to Granite for these locations:<br>MH239380 11716-100 AVE (Combined) AB ENV#388125<br>MH236858 100 AVE & 170 ST (Sanitary) AB ENV#388126<br>MH239408 100 AVE & 112 ST (Combined) AB ENV# 388127<br><br>These incidents were reported to AEP by the Drainage Environmental Manager. AEP has requested a written report(s). | Reportable Release to Land- Untreated Wastewater |

| Year | AEPA Reference# | Description WWC Event | Reason for Reporting |
|---|---|---|---|
| 2022 | AEP# 390975 | On May 26th, EPOCR Water employees observed untreated wastewater discharging from a combined sewer manhole (MH247804) and reported the release to EPCOR Drainage at 11:38 AM. NOTE: This release was originally entered into ERS (ENV-20220526-696920) by EPCOR Water, but this ERS event has now been rejected.<br><br>EPCOR Drainage investigators arrived on site at 12:41 and confirmed that untreated wastewater was being released from the manhole. Investigators spoke to an EPCOR vactor crew that was on site at 12:15 and they mentioned that the flow from the MH would geyser every 5-10 min or so when the upstream pump station would kick in. The vactor crew contacted Drainage FCF to shut down the Walterdale Pump Station (PS372246) and also contacted Drainage Construction (as the release could be due to the project on Gateway).<br><br>Investigators had their team lead call the City of Edmonton for assistance with public path and road control, as people were walking through the untreated wastewater flow path. Cones were set-up on either side of the flow path. Investigators went to the PS and walked about 50m east and found wet (but not flowing) braided channels with a sewage odour. Another flowing path was located about 100m away. The flow path went over the bank of the North Saskatchewan River (NSR) and investigators could see wastewater (odour) entering the NSR at 12:52 at a rate of approximately 1L/S. Homeless tents located near the NSR were also found in the sewage area. It appeared to the investigators that the flow of untreated wastewater was greater earlier in the day due to the previous channels. Investigators estimated that flows to the NSR could have been around 3 L/S.<br><br>The pump station was shut off at 13:15 and the discharge from MH247804 was stopped. Investigators went back to the release location and more EPCOR staff were present as well as a 3rd party contractor. EPCOR equipment was mobilized to the site to clean the walking path and road in the park area, as well as re | Reportable Release to Water - Untreated Wastewater |

| Year | AEPA Reference# | Description WWC Event | Reason for Reporting |
|---|---|---|---|
| 2022 | AEP #400597 | At approximately 2:30 PM on June 22nd the control gate at PW537 did not close as it should have resulting in unintentional release of untreated wastewater to the North Saskatchewan River at the Rat Creek Outfall #54 (OF377189).<br><br>The resulting combined sewer flow rate exceeded the North Highland Interceptor capacity and resulted in a mixture of untreated wastewater and storm water being released to the North Saskatchewan River (NSR) between 15:03 and 16:27 through Outfall #54. The failure of the gate to close would have allowed a relatively small additional amount of combined wastewater (best estimate 429 m3) to have mixed with the normal course combined sewer overflow volume to the NSR from the precipitation event (19,665 m3). A fractional increase in volume of untreated wastewater that was released during the CSO due to the above referenced gate not functioning as expected.<br><br>On June 23, 2022, EPCOR identified the issue with the gate at PW537. EPCOR staff were dispatched to the site; and restored the gate to regular operation. The repair of the gate at PW537 is expected to prevent this issue from reoccurring. The level sensing instruments, alarms, and gate control operation are undergoing further evaluation<br><br>This release has been reported to AEP (Ref# 400597) on June 23, 2022 by the Drainage Environmental Manager. AEP has requested a 7-day letter. | Reportable Release to Water - Untreated Wastewater |
| 2022 | AEP #400961 | EPCOR Drainage responded to a report of a sewer backup near 100-Street & McDougall Hill Road NW. A combined sewer main was plugged and surcharging, causing a release of untreated wastewater to ground at a combined sewer manhole (MH245306). No untreated wastewater left the vicinity to enter the storm system and/or North Saskatchewan River.<br><br>EPCOR equipment was mobilized to the site and the mainline was released and flushed. After the blockage was released, the discharge from the manhole was stopped.<br><br>This release was reported to AEP (Ref# 400961) by the Drainage - Monitoring & Compliance manager. AEP has requested a 7-day letter.<br>CR505284 | Reportable Release to Land- Untreated Wastewater |

| Year | AEPA Reference# | Description WWC Event | Reason for Reporting |
|---|---|---|---|
| 2022 | AEP #401267 | A Rogers outage caused a communication fail to all SCADA systems. When the communication were restored there was delay in the 5059 Pump Station receiving proper communication. This resulted in the 5059 Pump Station gate going into a fail safe mode of "closed". This caused excess storage and then a release of untreated wastewater into downstream regional tunnel.<br><br>The release of untreated wastewater into the tunnel created high levels in the tunnel which resulted in a leak from the regional tunnel. This leak caused a release of undetermined volume (still being confirmed) of untreated wastewater from Pump Station 902 Regional Tunnel on July 12/22 into the sump which pumps to the North Saskatchewan River. This sump is originally intended for groundwater. Upon discovery, the sump pump was turned off to stop the release and EPCOR vactors were deployed to the site. There was a sample collected, and results are pending.<br><br>This release was reported to AEP (Ref# 401267) by the Drainage Environmental Manager on July 12, 2022. AEP has requested a 7-day letter. | Reportable Release to Water - Untreated Wastewater |
| 2022 | AEP# 401580 | EPCOR Drainage investigators collected a sample from a storm manhole (MH212492) on July 7, 2022. Analytical results received on July 19th indicated high E. coli numbers (8,800,000 CFU/100 mL Escherichia coli).<br><br>The cause of the high E. coli is an unknown cross connection in a older, light industrial area. When sample was taken there was a strong sewage like smell and the water was grey with lots of fleck of toilet paper and some fecal mater. Storm water from the storm collection system as this location would be released to the North Saskatchewan River thru Outfall# 9 (OF207873). EPCOR Drainage investigators will conduct further investigative sampling to identify the source of the cross-connection. Once the source of the cross-connection has been confirmed, corrective action will be initiated to repair and correct the issue.<br><br>On July 19th (4:15 PM) EPCOR Drainage investigators were contacted by an Environment Canada investigator. The EC investigator was asking for further information on the high E. coli results from storm manhole MH212492. See attached EC conversation notes.<br><br>This release was reported to AEP (Ref# 401580). AEP has requested a 7-day letter. | Reportable Release to Water - Untreated Wastewater |

| Year | AEPA Reference# | Description WWC Event | Reason for Reporting |
|---|---|---|---|
| 2022 | AEP #401784 | EPCOR Drainage received a report of a plugged sanitary sewer mainline at 15:50. Drainage crews were dispatched to the site to release the sewer line. The crews arrived on site and found that an EPCOR sanitary manhole had surcharged and was running into a nearby EPCOR storm catch basin.<br><br>A Monitoring & Compliance investigations team was called at 16:48.<br>Investigators arrived on site at 18:30 and EPCOR vactor crews had already released the plugged mainline and were going back to clean out the impacted storm catch basin and clean untreated wastewater from the nearby road. A cover had been placed over the catch basin to prevent any further release of untreated wastewater, while the crew was releasing the plugged sanitary line.<br><br>The water level was above the lead when the vactor crew started cleaning the catch basin and an unknown amount of untreated wastewater was released into the storm collection system. The downstream storm manhole (MH216868) had a steady flow and no visible signs of sewage. Investigators collected a sample from MH216868 for E.coli testing. The storm lines in this area drain into Outfall #9 (OF207873).<br><br>The DRAINS information in the spill area has not been updated since the LRT infrastructure was added to the DRAINS mapping system. No facility ID is available for the EPCOR storm catch basins. Investigators could not identify the CB on the plans for LRT 2017-01.<br><br>This release was reported to AEP (Ref#401784). AEP has requested a 7 day letter. | Reportable Release to Water - Untreated Wastewater |
| 2022 | 405987 | Monitoring and Compliance received a call request regarding a surcharging combined manhole (MH243902) by Millcreek and flowing toward Mill Creek. Drainage investigators called Drainage control back at 18:37 requesting an EPCOR vacum truck be sent enroute.<br><br>The investigators arrived on site at 19:30, checked manholes 243043, 243914, 243903, three manholes were free and flowing. Manhole 243902 was under untreated wastewater in a sunken area of the ground, which contained most of the release. The EPCOR Vacuum truck operator stated that a plug was between manhole 243902 and 243903 and they should be able to release the blockage shortly.<br><br>The investigators followed the trail of wastewater downhill, and the trail of waste stopped at the bottom of the hill and had not yet entered Mill Creek. Approximately 4000 Litres of untreated wastewater was released from manhole pooled around manhole and trickled downhill. Vac crew finished clean-up and released plug at 21:19.<br><br>This release was reported to AEP (Ref# 405987 ). AEP has requested a 7 day letter. | Reportable Release to Land- Untreated Wastewater |

| Year | AEPA Reference# | Description WWC Event | Reason for Reporting |
|---|---|---|---|
| 2022 | 388491 | Contacted 250mm Watermain 75mmx25mm hole in watermain.<br>Water escaped into 250 CB (CB524320) lead then to main for approx 45 min to an hour.<br>Crew called to EMS representative as well as to Drainage Control. DC contacted Monitoring and Compliance to investigate. See M&C Spill Response Form in Evidence for report.<br>Water Dept came to shut off water main.<br><br>This release was reported to AEP (388491). AEP has requested a 7 Day letter.<br><br>This release occurred upstream of the Rossdale WTP. As a precaution the release was reported to the Rossdale plant by Drainage investigators. | Reportable Release to Water - Other Regulated Substances |
| 2022 | 401317 | A hose leaked during a liquid transfer between cells at Clover Bar lagoons. An estimated 0.5 cubic meters of supernatant liquid drained down the berm road into the City of Edmonton Cure site area. There was little to no liquid pooling and no drainage to any catch basins or water body. The incident was reported to AEP- reference #401317. | Reportable Release to Land- Partially Treated Wastewater\|Sludge\|Biosolid |
| 2022 | 405820 | On October 18, 2022, the Beverly Air Quality Monitoring Station managed by the Strathcona Industrial Association (SIA) measured a 1-hour average H2S reading of 11.2 ppb, exceeding the 1-hour limit of 10 ppb. It also measured a 24-hour average H2S readings of 3.4 ppb, exceeding the 24-hour limit of 3.0 ppb. WSP/SIA reported the incident to AEP (Ref# 405820). Gold Bar WWTP was notified of the events on Oct 19, 2022 around 13:30. Gold Bar staff completed a preliminary investigation. Operation of the odour equipment at the plant was normal, with exception of the Fermenter Scrubber, currently down for media replacement, but still hooked up to a temporary dry scrubber. WSP/SIA will follow up with 7 day letter to AEP. Gold Bar will support as required. | Approval/Permit/Regulatory Requirement or Limit Not Met |
| 2022 | 405885 | On October 19, 2022, the Beverly Air Quality Monitoring Station managed by the Strathcona Industrial Association (SIA) measured a 24-hour average H2S readings of 4.0 ppb, exceeding the 24-hour limit of 3.0 ppb. WSP/SIA reported the incident to AEP (Ref#405885). Gold Bar WWTP was notified of the event at 09:39 on Oct 20, 2022. Gold Bar staff completed a preliminary investigation. Operation of the odour equipment at the plant was normal, with the exception of the Fermenter Scrubber, currently down for media replacement. WSP/SIA will follow up with 7 day letter to AEP. Gold Bar will support as required. | Approval/Permit/Regulatory Requirement or Limit Not Met |

| Year | AEPA Reference# | Description WWC Event | Reason for Reporting |
|---|---|---|---|
| 2022 | 406086 | While working on Outfall 88, the contractor's Turbidity Monitoring subcontractor observed an overage in turbidity due the activities on site. Contractor was installing the temporary damning structure when this turbidity limit was exceeded.<br><br>The contractor was asked to shut down and report the incident to Alberta Environment.<br><br>Further reports to follow.<br><br>This release was reported to AEP (#406086). AEP has requested 7 day letter. | Approval/Permit/Regulatory Requirement or Limit Not Met |
| 2022 | 406778 | While pumping down the work area, a worker noticed turbidity in the water from sediment bag coming off of the end of the discharge hose. By the time this was caught the discharge hose was already releasing for a while and by the time it had got to the stream, the reading spiked . Pumping was immediately stopped.<br><br>A measure being taken is a double securement of the sediment bag incase 1 fails.<br><br>This release was reported to Alberta Environment and Protected Areas (AEPA) (#406778). AEPA requested a 7 day letter. | Approval/Permit/Regulatory Requirement or Limit Not Met |
| 2022 | 407066 | On Thursday, November 24th around 12:25 PM, the contractor informed EPCOR that they had another turbidity overage on site. The cause of the turbidity is being discussed with their environmental consultant.<br><br>The contractor has taken the necessary steps and procedures to control turbidity such as frequently replacing sediment bags, silt fence erected and they are discharging into a vegetated area.<br><br>The contractor is looking at the possibility that the clay subgrade layer they have dug down is so fine that the sediment bags are not able to capture them.<br><br>EPCOR is waiting for a formal report and draft AEPA (407066) letter. | Approval/Permit/Regulatory Requirement or Limit Not Met |
| 2023 | 410099 | On March 1, 2023 a first failed bacteriological result (total coliform positive) was reported to Alberta Environment and Protected Areas (AEPA) a week after the lab test result was known. The original sample was collected on February 22, 2023 from a residence and the test results were approved in the Rossdale Lab on February 23, 2023. A notification was called into AEPAs EDGE line (AEPA Reference # 410099). | Approval/Permit/Regulatory Requirement or Limit Not Met |

| Year | AEPA Reference# | Description WWC Event | Reason for Reporting |
|---|---|---|---|
| 2023 | 408624 | On January 12, 2023, EPCOR crews were conducting outfall inspections, a member of our team noticed a possible interconnection that was leading out to outfall 71. He followed it back and found the likely location at MH 270913.<br><br>On January 13, 2023, EPCOR crews televised the sanitary pipes near MH 270913. MH270913 has both pipes (sanitary & storm) running in the bottom and after a video inspection with the CPR camera they have found a blockage, plugging the sanitary pipe and allowed sewage to over flow into the storm pipe (visual grease and debris in the bottom of the manhole).<br><br>There is no more overflow, EPCOR vactor crews cleared the blockage on January 13th, 2023.<br><br>Still to be determined. Untreated wastewater probable for a release to the environment. Large amount frozen inside storm sewer system near OF71.<br><br>Epcor's monitoring and compliance group is currently investigating.<br><br>Sample obtained on January 13th, 2023 for untreated wastewater parameters.<br><br>This release was reported to AEPA (408624). AEPA has requested a 7 day letter. | Reportable Release to Water - Untreated Wastewater |
| 2023 | AEPA #410094 | During a routine inspection of a Double Barrel Trunkline, Drainage sub-sewer inspectors (SSI) found evidence of untreated wastewater (unknown volume) leaking thru a crack in the membrane between the two sewer lines. The untreated wastewater would have been released from the sanitary side (PIP66420) of the double barrel to the storm side (PIP66449). Untreated wastewater was not leaking at the time of the inspection, but there was evidence it had previously been leaking.<br><br>This release has been reported to AEPA (REF# 410094). AEPA has requested a 7-day letter. | Reportable Release to Water - Untreated Wastewater |

| Year | AEPA Reference# | Description WWC Event | Reason for Reporting |
|---|---|---|---|
| 2023 | AEPA# 416900 | On July 24, 2023 (2:43AM) at sanitary Pump Station 222 (PS480669) the pump tripped off due to thunderstorm activity in the area. A nearby resident had reported this release to the COE Fire Department, who then reported it to EPCOR Control. Epcor Trouble got called to investigate at 05:30AM.<br><br>Initially the water was thought to be from a possible water main break, but when the Standby Electrician fixed the pump at station 222, the surcharging wastewater stopped flowing. Untreated wastewater was visible surcharging from sanitary manholes MH515884, MH515885 and MH515911 and releasing into the storm collection system. Epcor Water also confirmed this was not a main break.<br><br>The surcharging untreated wastewater was stopped at 6:30AM. An estimated volume of 12,373 Litres of untreated wastewater was released between 2:43AM and 6:30AM. The untreated wastewater surcharged to ground and was released into the storm collection system in the area, flowing through MH515907 and into Keswick SWMF#3 (SWM495593).<br><br>At 7:03AM EPCOR Monitoring and Compliance was contacted to investigate. Upon arrival at the location at 8:35AM all signs of untreated wastewater had been washed away due to thunderstorm activities and heavy rainfalls. Drainage Investigators collected a sample from the SWMF (IOL495225) and the downstream MH493273 for AEPA parameters. The outlet valve for the facility was closed by the SWMF group at 9:40AM.<br><br>The release was reported to AEPA (Ref# 416900) at 15:30 on July 24, 2023 by EPCOR - Monitoring & Compliance. AEPA has requested a 7-day letter. | Reportable Release to Water - Untreated Wastewater |
| 2023 | AEPA# 418009 | On August 18, 2023 (11:35AM) a bulkhead (MH211864) at the connection between sanitary and stormwater systems was discovered to have a leak. E.coli results of 1,300,000 CFU/100mL from a sample collected on August 16, 2023 at a downstream sampling station led to the inspection of this location of the sewer system.<br><br>The discharge point is 500 m downstream of the Terwillegar Park footbridge on the right bank of the North Saskatchewan River near 727 Riddell St NW (Outfall #9). EPCOR Trunkline crews were mobilized to the site to repair the leaking bulkhead.<br><br>This release was reported to AEPA (Reference # 418009). AEPA has requested a 7-day letter. The AEPA operator did not inquire as to any sample results and/or mitigation or repairs. | Reportable Release to Water - Untreated Wastewater |

| Year | AEPA Reference# | Description WWC Event | Reason for Reporting |
|---|---|---|---|
| 2023 | 420584 | Investigators onsite 21:40. MH243862 was surcharging, pooling and running down the hill towards MH243899 (listed as abandoned, but looks like it was converted to storm drain with outlet towards OF116). Untreated wastewater was flowing from MH243899 to OF116, as well as towards the OF from the hill.<br><br>Trouble team was onsite coordinating cleanup with Vactor crew. Vactor crew attempting to reach surcharging MH from upstream as bridge across to pool area has no weight rating. Investigators offsite 20:50 to deliver samples to lab.<br><br>A sample was collected from OF116 and from MH243899 for 6 AEPA parameters.<br><br>The release was reported by EPCOR to AEPA Ref#420584. A 7-Day Letter was requested | Reportable Release to Water - Untreated Wastewater |
| 2023 | 421068 | At approximately 5:20 pm on October 20, 2023 a sanitary force main coming from the Twin Brooks Pump station across the Blackmud Creek and 111 St. failed at 12 Ave and 111 St. and a location South of the Blackmud Creek bridge. Portion of this line was being relocated to make way for the extension of the Capital Line LRT South. The failure occurred in two reconnection pits where recent relocation work was completed. Approximately 10-50L of untreated wastewater was released to soil and vegetated area.<br><br>Compliance investigators were on site at 21:35 to assess the site and collect samples. Investigators noted that approximately 1-2m3 of standing water was contained within the trench/berm area. The point of release is approximately 65 m from Blackmud Creek. Samples were collected from Blackmud Creek and from within the pit for the 6 AEPA parameters. Investigators did not observe any impacts to soil or vegetation in the vicinity of the release.<br><br>Bypass of the line is in place to maintain service to customers. The contractor is investigating to find the cause and repair the failure.<br><br>The release was reported to AEPA by the contractor (AEPA Reference #421068) and a 7 Day Letter was requested. | Reportable Release to Land- Untreated Wastewater |

| Year | AEPA Reference# | Description WWC Event | Reason for Reporting |
|---|---|---|---|
| 2023 | 421352 | Maintenance person for the community league reported sewage flowing out of manhole into parking lot. Drainage Trouble crew responded at 13:10 and found sanitary water coming out of MH314595 and 314596.<br><br>The wastewater had reached the private storm pond at the nearby gold course. Investigator had trouble crew send photos of the pond and outlet showing that the water level is well below the outlet and the pond is frozen so there is no potential for release to our system at this facility. Investigator called the complainant back and asked him to report the release to the City of Edmonton through 311 as the City owns that pond.<br><br>The release was reported to AEPA (Ref# 421352) by EPCOR Industrial Wastewater Investigators. A 7-day letter was requested. No sample was collected as the pond is currently frozen. | Reportable Release to Water - Untreated Wastewater |
| 2023 | 421477 | At around 3:03 PM on October 31st, the contractor reported that while installing plugs for the bypass on trestle 5, they have had sewage spill. The bridge has a high point in the middle and once plugged on the south end, all the sewage in the pipe backed up. The pipe leaked through and onto the ground. Approximately 100L was released.<br><br>The wastewater that was released was trapped and contained in a small shoring area. The wastewater was pumped back up into an upstream sanitary manhole (MH241389) and then into a sanitary bypass system that had been set-up at this location. The contaminated dirt was removed and was contained in a separate containment bag for disposal. There was no release of untreated wastewater down the hill in MacKenzie Ravine or into the North Saskatchewan River.<br><br>This release was reported to AEPA (421477). 7-day letter is required for this release. | Reportable Release to Land- Untreated Wastewater |
| 2023 | AEPA# 420691 | On October 11, 2023 (1:00PM) an EPCOR Contractor started work at Outfall 275 (OF327182) to set up stream isolation under the guidance of an Environmental specialist sub-contractor. On October 12, 2023 a plume was observed downstream of the site as a result of some rip rap being moved to allow for the isolation bags to seal. Work was stopped at 2:30PM and instream work resumed once turbidity samples were compliant.<br><br>This release was reported to AEPA (Ref# 420691) by the contractor. AEPA has requested a 7-day letter. | Reportable Release to Water - Other Regulated Substances |
| 2023 | 421530 | While taking down the Creek isolation following completion of the outfall instream work there was a turbidity exceedance observed and confirmed with samples at 12:15 pm, due to frozen conditions, disturbance of substrate, release of water from inside disturbed isolation, and people instream outside isolation structure. In stream work was halted until turbidity levels were compliant, at approximately 13:00.<br><br>The contractor reported the event to AEPA - reference #421530 and a 7-Day Letter was requested. | Reportable Release to Water - Other Regulated Substances |

| Year | AEPA Reference# | Description WWC Event | Reason for Reporting |
|---|---|---|---|
| 2023 | AEPA# 416233 | On July 5, 2023 EPCOR Communication received a public complaint & councilor inquiry of low water levels near the Mill Creek - Shamrock Inlet.<br><br>On July 6, 2023 the EPCOR Network Operations team completed an initial investigation at this location.<br><br>On July 7th, additional investigations confirmed that the Storm Outfall #249 (PIP 387155 and PIP 341733) was completely blocked with silt and there was zero flow in the creek. The downstream Conners storm inlet was also checked by Epcor staff and it was observed that the creek bed at this location was completely dry.<br><br>On July 12th, a 3rd party contractor (Precision Gradall Ltd) mobilized equipment to this site. Cleaning of the storm inlet was completed and flow was restored back to the creek.<br><br>This incident was reported to AEPA (Ref# 416233) by the EPCOR Drainage Environmental Manager. AEPA has requested a 7-day letter. | Approval/Permit/Regulatory Requirement or Limit Not Met |
| 2023 | #410410, 446/488/489/559/608/609/651 | EPCOR Drainage completed a maintenance project within Outfall #249 (Facility ID 339887) located along Mill Creek. TC Infrastructure Services Ltd. (TC) was contracted to conduct the maintenance work. Turbidity/total suspended sediment (TSS) water quality monitoring was required for the duration of instream work.<br><br>Project activity resulted in a number of sediment laden water releases as identified by the turbidity monitoring program:<br>March 8/9, 2023. Hydrovacing operations were the primary cause of the high turbidity levels. AEPA Reference # 410410 (7-day letter issued to AEPA on March 16, 2023).<br>March 10, 2023. It is suspected a downstream isolation barrier was not adequately sealed (i.e., water is able to travel through/under the gabion wall on either side of the channel where the isolation barrier is located). A plan was made to install a second isolation barrier at the bottom of the stormwater outfall to create a sump for pumping out sediment laden water. This second barrier was installed the following morning. AEPA Reference # 410446 (7-day letter issued to AEPA on March 16, 2023).<br>March 11, 2023. Directional drill equipment was used to push debris through the Outfall #249 culvert. Turbid water bypassed the downstream isolation barrier, causing turbidity guideline exceedances. A recommendation to cease drilling activities was not required as activities had already stopped. Sand/silt sediments and low flow conditions on site may have amplified the turbidity levels. AEPA Reference # 410488 (7-day letter issued to AEPA on March 16, 2023).<br>March 12, 2023. High water levels had breached the isolation barriers in the creek resulting in high turbidity levels. AEPA Reference # 410489 (7-day letter issued to AEPA on March 17, 2023).<br>March 13, 2023. Ineffective isolation barriers in the creek resulted in high turbidity levels. Sand/silt sediments and low flow conditions on site may have amplified the turbidity levels. AEPA Reference # 410608 (7-day lett | Approval/Permit/Regulatory Requirement or Limit Not Met |

| Year | AEPA Reference# | Description WWC Event | Reason for Reporting |
|---|---|---|---|
| 2023 | 421570 | The Gold Bar WWTP Ambient Air Quality Monitoring Station NO2 analyzer stopped working the morning of November 2, 2023. It is a requirement of Gold Bar WWTPs approval to operate (Table 5-2) to continuously monitor for this parameter. SLR reported the incident to AEPA (Reference #421570) at 4:45pm on November 3, 2023. SLR will follow up with a 7-day letter to AEPA. Gold Bar will support as required. The NO2 analyzer has been picked up by instrument supplier and is being repaired. Instrument is expected back early next week. | Approval/Permit/Regulatory Requirement or Limit Not Met |
| 2023 | 418703 | On August 23, 2023, the operating limit for Oxidation Reduction Potential (ORP) for the EPT Scrubber was not met. The limit, as per AEPA Approval to Operate 639-03-07, is a daily average 300 mV. There were issues with the EPT Scrubber bleach pump on this day causing the ORP value to go negative and the DeltaV totalizer calculation incorrectly added the negative values, thereby incorrectly estimating the daily average value. The actual average daily ORP for the EPT Scrubber on August 23 was 243 mV. The issue was not discovered until September 1 while completing monthly reporting calculations. The event has been reported to AEPA via the 24-hour hotline (Ref #418703). A 7-day letter is due by September 8. There were no odour complaints or air quality monitoring station exceedances during this time. | Approval/Permit/Regulatory Requirement or Limit Not Met |

| Year | AEPA Reference# | Description – WWTP Event | Reason for Reporting |
|---|---|---|---|
| 2014 | 285046 | OUTFAL-30 autosampler failed to collect composite sample for bypass event on June 6, 2014. Results to be estimated based on frozen grab samples collected by Operations at 0015 hrs and 0215 hrs. Reported to Alberta Environment and Sustainable Resource Development on June 9, 2014 at 15:02 hrs; reference no. 285046. 7-day letter required. Work request submitted by lab.<br><br>For corrective actions, refer to ENV-00758. | Approval/Permit/Regulatory Requirement or Limit Not Met |
| 2014 | 285097 | OUTFAL-30 autosampler failed to collect samples for May 27th (0000 to 0403 hrs) wet weather events. Results to be estimated based on frozen grab samples collected by Operations. Reported to Alberta Environment and Sustainable Resource Development on June 10, 2014 at 1327 hrs; reference no. 285097. 7-day letter required. | Approval/Permit/Regulatory Requirement or Limit Not Met |
| 2014 | 285097 | OUTFAL-30 autosampler failed to collect samples for May 30th (0000 hrs to 0427 hrs) wet weather event. Reported to Alberta Environment and Sustainable Resource Development on June 10, 2014 at 1327 hrs; reference no. 285097. 7-day letter required.<br><br>Refer to Corrective Actions from ENV-00758. | Approval/Permit/Regulatory Requirement or Limit Not Met |
| 2014 | 285263 | There was no sample collected by the Outfall 30 Autosampler on June 11, 2014. The two grab samples collected by operations at midnight and 2:00 a.m will be tested, but no composite sample exists. Reported to Alberta Environment June 14 at 9:24AM, Reference # 285263.<br><br>From 7 day letter:<br><br>For portions of the wet weather event on the above stated date, flow weighted composite samples were not collected from Outfall No. 30 from both the long term and short term auto samplers. Preliminary investigation indicates that the auto sampler timer was not synchronized to real-time for the wet weather event. As a contingency plan, two (2) grab samples are collected by the Operations dept. at 0000 Hrs. and 0200 Hrs. to provide an estimate of water quality discharged to the North Saskatchewan River during this wet weather event in case of issues with the auto samplers. The estimated water quality data will be reported on the monthly plant performance reports and attached the Wastewater Annual Report for 2014.<br><br>For corrective actions refer to ENV-00758. | Approval/Permit/Regulatory Requirement or Limit Not Met |

| Year | AEPA Reference# | Description – WWTP Event | Reason for Reporting |
|---|---|---|---|
| 2014 | 286593 | Untreated wastewater was observed leaking from the underside of a portion of the garage door on the north side of the Centre of Excellence Pilot Plant building. The material continued along the roadway for about 15 metres into a storm sewer on the right side of Division Street facing north. It is estimated that about a maximum of 100 litres of untreated waste water was released to the storm sewer which is based on greater than 10% of the approximately 1000 litres released over a maximum 45 min release duration at a rate of 6.2 US gallons per minute. The release was reported to ESRD at 4:36 PM and a reference number 286593 was issued. The other 90% or more of the release was contained in the Centre of Excellence facility and drained into the floor drain back to the headworks of Gold Bar Plant. | Reportable Release to Water - Untreated Wastewater |
| 2014 | 281190 | From 7 day letter: uncontrolled release of biogas from the digester 7 & 8 biogas system that occurred from 9:11 AM to 10:35 AM on March 6, 2014.<br><br>At approximately 6 AM an isolation of the sludge pumping system for the Gold Bar Wastewater Treatment Plant was started in order to do some capital upgrades on the sludge pumping systems. During the isolation, levels in Digesters 7 and 8 (and their shared overflow stand-pipe) reached and then exceeded the maximum operating level/capacity, most certainly due to excessive foaming. As a result, sludge was then redirected through the emergency overflow lines. This condition was controlled by turning on pumps to spray down the foam that had been shut off as part of the shutdown. The Operations Department began to flush the emergency overflow piping with final effluent to prevent sludge from solidifying in the lines. The emergency overflow lines have a built in P-trap that prevents biogas from escaping from the digester; the P-trap was the location being flushed.<br><br>While flushing the P-trap, the operator decided to open the drain valves to the P-trap which caused the liquid seal to be lost and allowed Digester 7 to release biogas out the air vent on the emergency overflow line. The location of the biogas release was discovered at approximately 09:56 AM and emergency response measures were initiated. Digester 7 stopped venting at approximately 10:35 AM. | Approval/Permit/Regulatory Requirement or Limit Not Met |
| 2015 | 301709 | On July 24 two samples from Outfall 30 (collected July 23) were prepared for E. coli determination and placed in an incubator. The samples should have been read back on July 25. They were not read back until July 27. The samples were over-aged and the results may include false positives and are, therefore, unreliable and cannot be reported. The incident was phoned into Alberta Environment & Parks at 16:30 on July 31 under Reference #301709. | Approval/Permit/Regulatory Requirement or Limit Not Met |
| 2015 | 302153 | pH testing was not performed on the composite sample collected from Outfall 30 on July 23. The incident was reported to Alberta Environment & Parks on August 13 under AEP Reference #302153. | Approval/Permit/Regulatory Requirement or Limit Not Met |

| Year | AEPA Reference# | Description – WWTP Event | Reason for Reporting |
|---|---|---|---|
| 2015 | 299043 | What: biosolids spill<br>Where: intersection of 137 Ave and Meridian St<br>When: Jun 1st 12:00PM - 4:30PM<br>How: At 2:30PM Jun 1st, Gold Bar received a notification from City of Edmonton in regards to a spill at the intersection of 137 Ave and Meridiam St by Waste Management Center of Excellence at Clover Bar. Leak confirmed on a 10" sludge transfer line from Gold Bar to Clover Bar Lagoons. Isolated the line and stopped the leak at 4:30PM Jun 1st. Estimated leak quantity is 0.5-1 ML. Canessco onsite on Jun 2nd morning to cleanup the spill with assistance of EWMC. Reported the spill to Alberta Environment (Ref #299043) and City. | Reportable Release to Land- Partially Treated Wastewater\|Sludge\|Biosolid |
| 2015 | 300064 | Approval 361975-00-00 requirements were not met. Raw influent pH was not measured from May 29 to Jun 27. Bypass (Outfall 30) pH was not measured on May 31, Jun 15, 19, 20. Online pH values are available for the raw influent.<br><br>New approval requirements were not effectively communicated to lab staff. | Approval/Permit/Regulatory Requirement or Limit Not Met |
| 2016 | 314942 | A representative composite sample is not available for the July 30, 2016 Bypass event (Outfall 30).<br><br>Outfall 30 composite sampler is designed to collect two samples at different frequencies - short-term and long-term. The long-term composite sample frequency is at 1/10 the frequency of the short-term sample. Therefore, large volume bypass events will overflow the short-term sample bottle and provide a useable volume (sufficient for required analyses) in the long-term sample bottle. On July 30, 2016, the estimated bypass was 163 ML. The short-term sampler overflowed but the long-term sample was not collected. Since the short-term sample bottle overflowed, the sample collected is not representative of the entire bypass event. Reason(s) for the composite long-term sampler failure are under investigation.<br><br>This contravention was not discovered until preparation for the July monthly report was underway and the sample collector's notes regarding the short-term sample overflow were noticed by the lab Team Lead.<br><br>Incident was reported into Alberta Environment and Parks. AEP Ref #314942. | Approval/Permit/Regulatory Requirement or Limit Not Met |
| 2016 | 307252 | Three (3) out of the four (4) scrubbers have been out of service since October 2015. This incident was reported to the AEP Call in Centre on January 12, 2016. Further details to follow once 7 day letter is finalized and sent to AEP. | Approval/Permit/Regulatory Requirement or Limit Not Met |
| 2016 | 315409 | U.V. Channel #5 went into service based on wet weather flow. The channel filled up and the discharge gate opened but no U.V. bulbs came on. This happened 3 different time on August 22nd. | Reportable Release to Water - Other Regulated Substances |

| Year | AEPA Reference# | Description – WWTP Event | Reason for Reporting |
|---|---|---|---|
| 2016 | 309149 | During the acid cleaning of the sludge distribution lines that was happening at Gold Bar an unknown quantity and concentration of H2S was released for a short duration from the contractors tank. This occurred at approximately 17:00. Operations confirmed at 17:10 the presence of H2S and the area was evacuated. The acid clean operation was shutdown and operations confirmed shortly after that no H2S was present in the area. The tank was capped.<br><br>Elevated H2S reading were recorded at the SIA Gold Bar Air Quality Monitoring (AQM) station for a 10 - 15 minute time duration. Concentration reached a peak of 40 ppb or more, however the one hour air ambient air quality guideline was not exceeded (max 10 ppb). | Approval/Permit/Regulatory Requirement or Limit Not Met |
| 2017 | 322851 | AEP was contacted at 780-422-4505 around 14:48 and the reporting employee spoke with Taryn while their Senior Manager was present. The employee stressed to AEP Reporting Hotline representative that this was a notification.<br><br>The employee told AEP Reporting Hotline that we had submitted an effluent sample to a sub-contract lab in March for toxicity testing and the lab had a problem with the Ceriodaphnia test. Consequently, there would be no result for Q1 and we would be submitting another sample today. Taryn insisted that the re-test would therefore be late, that this would be a contravention and require a seven-day letter.<br><br>The employee also informed AEP Reporting Hotline of the mortality results for Fathead Minnow and that we would be submitting another sample today for that test as well.<br><br>AEP Reporting Hotline cited Reference #322851.HP | Approval/Permit/Regulatory Requirement or Limit Not Met |
| 2017 | 324035 | At 3:00PM operations received a call from City of Edmonton Drainage that there was a leak in Hermitage Park which was probably coming from our supernatant return lines from Cloverbar. Operators went out to investigate and confirmed that it was supernatant coming from Line 2 which runs between the Distribution Chamber and D2 Chamber. Supernatant pumping was shutdown at 3:30PM. A vac truck was brought to site to clean up the supernatant and rescue crew arrived to assist operators going into chambers to isolate the line. Alberta Environment was called at 4:30PM (REF: 324035). The area is an off leash dog park so EPCOR staff helped manage the public passing right beside the spill to ensure public safety. Area was cleaned up of all surface supernatant by 8PM and snow fence was placed around the area where the leak had originated from. A total of 10.5 cubic meters of supernatant was removed from the area. | Reportable Release to Land- Partially Treated Wastewater\|Sludge\|Biosolid |
| 2018 | 335978 | At 12:50PM digested sludge was observed coming out of the ground west of the EPT building spilling onto the road. Control room was notified and shutdown sludge pumping out of the plant which slowed the leak significantly. Maintenance and operations contained the spill to prevent it from spreading too far, and Line 1 which was running at the time was isolated. Reported to AEP (ref #335978). | Reportable Release to Land- Partially Treated Wastewater\|Sludge\|Biosolid |

| Year | AEPA Reference# | Description – WWTP Event | Reason for Reporting |
|---|---|---|---|
| 2018 | 340222 | Alberta Environment was called today to report a potential glycol leak of unknown quantity and unknown location somewhere on the 340m of underground 200mm inhibited ethylene glycol pipe buried under North avenue at the Gold Bar WWTP. The pipe is approximately 40m South of the North Saskatchewan River (NSR).<br><br>The potential leak was discovered when a contractor performed a pressure test on June 22nd of the underground pipe and was unable to hold pressure during the testing. The pressure test report was received today (June 27th) and AEP (Ref#: 340222) was called after a brief review of the report showed that the pressure test had failed.<br><br>Update Sept 7/18- Further pressure testing with water was performed on the glycol line in question and that revealed the suspected leak location of the pipe. The location was excavated and samples were taken that confirmed several high ethylene glycol concentrations (higher than the Alberta Tier 1 soil standard) within the excavated area. Further auger samples will be performed within below the excavation surface location and based on the results more soil/ground water sampling may be performed to the west and north of the excavation area. | Reportable Release to Land - Other Regulated Substances |
| 2018 | 336093 | At 1:04PM UV Channel 3 was called to start to accommodate the rise in flow coming to the plant, lights and power came on normally.<br><br>Shortly after UV Channel 2 also opened the effluent gate but no power turned on and no lights were on. An operator noticed the abnormal state at 3:29PM and immediately put UV Channel 2 into hand and closed the gate.<br><br>A critical alarm was generated by the UV program at 1:19PM that stated UV Channel 2 outlet gate open but no bulbs on, but this alarm did not get to the Control room. PCA is currently investigating why this alarm did not come to the control room.<br><br>Trojan (UV Manufacturer) is on the plant site tomorrow for the UV capital hardware upgrade, PCA is going to see if they can help trouble shoot why this happened.<br><br>AEP was called to report the incident at 4:30PM (Ref#: 336093), a 7 day letter is required.<br><br>Approximately 12ML of non-UV disinfected water went to the river during the 2 hours (approximated 140MLD flowrate). | Approval/Permit/Regulatory Requirement or Limit Not Met |

| Year | AEPA Reference# | Description – WWTP Event | Reason for Reporting |
|---|---|---|---|
| 2019 | 350661 | Epcor water phoned in an overflowing manhole in Capilano park west of the Goldbar wastewater treatment facility. We arrived on site at to find the force main overflowing out of the concrete slabs that cover the manholes. (DR268723) The duration of the release is not known, but I would estimate that it started after the treatment plant reached capacity and the lines started backing up (Unknown). The surcharge ended just before 10pm. Due to the location, It was originally estimated that some sewage managed to make it to the river. However, a follow-up investigation confirmed that there was no release of untreated sewage to the river. It also saturated the soil around the manholes. This will be further investigated Monday morning.<br>This release has been reported to AEP (#350661). AEP has requested a 7-day letter. | Reportable Release to Water - Untreated Wastewater |
| 2019 | 361750 | A contractor truck left the highway trying to avoid another vehicle and rolled over spilling an estimated 8 dt of dewatered biosolids. | Reportable Release to Land- Partially Treated Wastewater\|Sludge\|Biosolid |
| 2019 | 359790 | Goldbar Approval to Operate details that we must complete fence line monitoring for H2S daily with our Jerome meter that reads to ppb. On Oct 3rd the Crew did not complete this task. | Approval/Permit/Regulatory Requirement or Limit Not Met |
| 2020 | 365988 | The Oxidation Reduction Potential (ORP) of the solution in the EPT Chemical Scrubber fell below the minimum daily average of 300 mV, as outlined in our Approval to Operate 639-03-06, Table 5-2. The chemical pump that doses Sodium Hypochlorite (Bleach) into the scrubber to maintain the ORP was air locked and stopped dosing bleach. The scrubber blower continued to operate for the duration of this event. | Approval/Permit/Regulatory Requirement or Limit Not Met |
| 2021 | 381004 | Utility crew was in the process of opening a fire hydrant located between digester 2 and boiler house 2 when the water line let go at approximately 14:10. An unknown quantity of chlorinated water flowed overland, into nearby catch basins, into outfall 20, and out to the North Saskatchewan River. Water Trouble was called to help isolate the main. Crews added de-chlorination pucks to the catch basins, and built a berm/dam with a temporary pump to limit the flow or water to the catch basins. A water sample at the outfall was taken to determine if there was any chlorine residual remaining at the discharge to the river. The broken water main was isolated at approximately 15:38, and flow to river stopped by 15:55. AEP was notified - reference number 381004. 7 day letter to follow. | Reportable Release to Water - Other Regulated Substances |
| 2021 | 384730 | On Friday October 15, 2021, Gold Bar WWTP Operations failed to complete the daily fence line H2S monitoring as required by our Approval to Operate 639-03-06, Table 6-2. AEP Ref #384730. 7 day letter required. | Approval/Permit/Regulatory Requirement or Limit Not Met |
| 2021 | 385858 | At 6:44 am on November 25, 2021, Gold Bar WWTP experienced a non-scheduled power outage that resulted in the UV disinfection process to be out of service for 4 minutes. During this outage approximately 0.45 ML of non-disinfected secondary effluent was discharged to the NSR. AEP Reference # 385858. 7 day letter to be provided | Approval/Permit/Regulatory Requirement or Limit Not Met |

| Year | AEPA Reference# | Description – WWTP Event | Reason for Reporting |
| --- | --- | --- | --- |
| 2022 | 401317 | A hose leaked during a liquid transfer between cells at Clover Bar lagoons. An estimated 0.5 cubic meters of supernatant liquid drained down the berm road into the City of Edmonton Cure site area. There was little to no liquid pooling and no drainage to any catch basins or water body. The incident was reported to AEP- reference #401317. | Reportable Release to Land- Partially Treated Wastewater\|Sludge\|Biosolid |
| 2022 | 405820 | On October 18, 2022, the Beverly Air Quality Monitoring Station managed by the Strathcona Industrial Association (SIA) measured a 1-hour average H2S reading of 11.2 ppb, exceeding the 1-hour limit of 10 ppb. It also measured a 24-hour average H2S readings of 3.4 ppb, exceeding the 24-hour limit of 3.0 ppb. WSP/SIA reported the incident to AEP (Ref# 405820). Gold Bar WWTP was notified of the events on Oct 19, 2022 around 13:30. Gold Bar staff completed a preliminary investigation. Operation of the odour equipment at the plant was normal, with exception of the Fermenter Scrubber, currently down for media replacement, but still hooked up to a temporary dry scrubber. WSP/SIA will follow up with 7 day letter to AEP. Gold Bar will support as required. | Approval/Permit/Regulatory Requirement or Limit Not Met |
| 2022 | 405885 | On October 19, 2022, the Beverly Air Quality Monitoring Station managed by the Strathcona Industrial Association (SIA) measured a 24-hour average H2S readings of 4.0 ppb, exceeding the 24-hour limit of 3.0 ppb. WSP/SIA reported the incident to AEP (Ref#405885). Gold Bar WWTP was notified of the event at 09:39 on Oct 20, 2022. Gold Bar staff completed a preliminary investigation. Operation of the odour equipment at the plant was normal, with the exception of the Fermenter Scrubber, currently down for media replacement. WSP/SIA will follow up with 7 day letter to AEP. Gold Bar will support as required. | Approval/Permit/Regulatory Requirement or Limit Not Met |
| 2023 | 421570 | The Gold Bar WWTP Ambient Air Quality Monitoring Station NO2 analyzer stopped working the morning of November 2, 2023. It is a requirement of Gold Bar WWTPs approval to operate (Table 5-2) to continuously monitor for this parameter. SLR reported the incident to AEPA (Reference #421570) at 4:45pm on November 3, 2023. SLR will follow up with a 7-day letter to AEPA. Gold Bar will support as required. The NO2 analyzer has been picked up by instrument supplier and is being repaired. Instrument is expected back early next week. | Approval/Permit/Regulatory Requirement or Limit Not Met |
| 2023 | 418703 | On August 23, 2023, the operating limit for Oxidation Reduction Potential (ORP) for the EPT Scrubber was not met. The limit, as per AEPA Approval to Operate 639-03-07, is a daily average 300 mV. There were issues with the EPT Scrubber bleach pump on this day causing the ORP value to go negative and the DeltaV totalizer calculation incorrectly added the negative values, thereby incorrectly estimating the daily average value. The actual average daily ORP for the EPT Scrubber on August 23 was 243 mV. The issue was not discovered until September 1 while completing monthly reporting calculations. The event has been reported to AEPA via the 24-hour hotline (Ref #418703). A 7-day letter is due by September 8. There were no odour complaints or air quality monitoring station exceedances during this time. | Approval/Permit/Regulatory Requirement or Limit Not Met |

# Appendix H Total Loading Calculation and Reporting Protocol

# Total Loading Calculation and Reporting Protocol

## 1. Purpose

The purpose is to estimate and report on loads from EPCOR's piped infrastructure (stormwater, combined sewer overflow, and WWTP outfalls) of key parameters to the NSR and tributaries to allow the evaluation of the effect on these receiving waterbodies. This is done through paired flow and water quality monitoring as well as scientifically robust estimation methods where monitoring is not done.

## 2. Monitoring

**Locations**

The specific sites in the collection system that will be monitored for water quality and/or flow quantity are as follows:

Combined sewer overflow (CSO) sites currently include:
- Rat Creek CSO;
- Capilano Hardisty CSO;
- Highlands CSO;
- Cromdale CSO; and
- Strathearn CSO.

Stormwater Outfalls currently include:
- 30th Avenue;
- Quesnell;
- Groat Road;
- Kennedale;
- Kennedale Wetland; and
- Belgravia.

Tributaries:
- Whitemud Creek;
- Gold Bar Creek;
- Mill Creek;
- Blackmud Creek;
- Fulton Creek;
- Wedgewood Creek; and
- Horsehills Creek.

NSR Sites:
- E.L. Smith Water Treatment Plant (WTP);
- Rossdale WTP;
- Suncor; and
- Dow Chemical.

Stormwater Management Facilities (SWMF):
- A storm water management facility monitoring program will be implemented as flow monitoring is installed at ponds. It is anticipated that up to ten ponds will be monitored regularly for water quality and flow with a new program being designed in 2025 when flow sensors will be installed.

WWTPs:
- Gold Bar Wastewater Treatment Plant (GBWWTP) Final Effluent channel (Outfall 10) and Bypass

channel (Outfall 30)

Additional water quality and/or flow monitoring sites may continue to be added as required.

**Parameters**

- Flow – continuous where sensors are installed
- Water quality – total suspended solids (TSS), total phosphorus (TP), nitrate plus nitrite ($NO_3$+$NO_2$), ammonia ($NH_3$), chloride (Cl), and *E. coli* are monitored to inform EPCOR's Total Loading Plan. Additional parameters are being monitored to align with the Surface Water Quality Management Framework but are not part of this protocol.

**Frequency**

Outfall monitoring captures a water quality sample for every rainfall/runoff event large enough to reach the preset trigger level at the monitored stormwater and CSO outfalls. Baseflow samples are also collected twice per month.

NSR water quality monitoring is designed to provide information on river water quality throughout the year with more frequent sampling during wet weather (spring snow melt and rain events). Up to ten intake sampling events are collected from each of the four intakes following river travel time. The E.L. Smith and Rossdale WTPs have a significantly more frequent sampling due to raw water testing. Samples are preferentially collected during the open water period (April – October) with more frequent sampling during spring melt and summer wet weather events.

Samples from the GBWWTP treated effluent channel are taken daily. Samples from the GBWWTP bypass channel are collected during events when it is operating.

**Sample Handling**

- All field work (sample collection and delivery, equipment inspection and maintenance, etc.) is conducted by the experienced professionals of the assigned consulting company or monitoring partner (field personnel) under the general direction and supervision of EPCOR personnel.
- Field personnel are to take adequate field notes that include time of sample collection, time of delivery and preparation, sampling location, and field observations during sampling.
- EPCOR will ensure that river monitoring sampling techniques, sample handling, sample delivery methodology, field data collection, and sampling notes are performed according to water quality handling procedures.
- Water quality samples are delivered to the EPCOR wastewater laboratory or other accredited laboratories under EPCOR's direction. Laboratory staff follow a standard operating procedure. Field personnel are to use accepted good sampling procedures in the collection and preparation of samples before they reach the analytical laboratories.
- EPCOR will ensure the production of properly collected, handled, analyzed, reported, high quality data. Proper sample collection and analysis are vital part of the monitoring program, therefore checks needed to catch potential problems are implemented through the Quality Assurance/Quality Control (QA/QC) practice. Some QA/QC practices apply to field operations and others apply to laboratory procedures.
- GBWWTP Laboratory staff retrieves samples at the effluent channel and the Gold Bar bypass channel. For these sampling procedures see the Standard Operating Procedure at the GBWWTP Laboratory.

# 3. Load Calculation and Estimation Methods

This part of the protocol provides a progressive and trackable method for calculation of the volumes and contaminant loadings for discharges to the North Saskatchewan River (NSR) from the City's piped infrastructure, provides a reasonable method for estimating missing flow and concentration data, and provides a tool that will make revisions or analysis easier to accommodate.

1. Water quality and quantity data obtained and supplied by EPCOR, consultants, Gold Bar Laboratory, and/or other accredited labs is reviewed.

2. Measurements of daily volumes from EPCOR are used to calculate loads. The following storm and combined sewer outfalls currently include:
   - 30th Avenue Storm;
   - Groat Road Storm;
   - Quesnell Storm;
   - Kennedale Storm;
   - Kennedale Wetland
   - Belgravia Storm;
   - Mill Creek Storm;
   - Rat Creek CSO;
   - Highlands CSO;
   - Capilano CSO;
   - Cromdale CSO; and
   - Strathearn CSO;

   Additional water quality and/or flow monitoring sites may continue to be added

3. Loads are calculated for the following parameters.
   - TSS;
   - TP;
   - $NO_3+NO_2$;
   - $NH_3$;
   - Cl; and
   - *E. coli*.

   Additional parameters may be added to meet emerging operational and regulatory needs.

4. Constituent concentrations between measured baseflow readings (twice per month) are interpolated unless interrupted by a storm runoff event. When a storm event occurs between two baseflow readings, the preceding baseflow measurement is used for every day up until the runoff event and then interpolated concentrations are used up to the next baseflow event. Rationale behind this is that runoff events typically produce high concentration-short duration pulses.

5. Gold Bar Laboratory provides measured and estimated daily volumes and concentrations for (Gold Bar Plant Performance Reports):
   - EPCOR's GBWWTP Combined Bypass; and
   - EPCOR's GBWWTP Final Effluent.

6. The volumes for the unmonitored drainage basins are estimated from rainfall data and land cover data. Currently it uses zoning data and associated runoff coefficents but is being updated for a more accurate land cover dataset using impervious data classifications (2024). The method for estimating volume and loads from unmonitored parts of the basin will continue to be improved over time and methodology will be summarized in the Annual Total Loading Report. For each unmonitored basin the daily rainfall total (DR), average rainfall intensity for the day (ADI), and the antecedent precipitation index (API) are needed to calculate flows. Each basin has its own

individual spreadsheet for the calculation of DR, ADI, and API.

Estimated loads will be determined for the following basins:
- Whitemud Creek;
- Gold Bar Creek;
- Mill Creek;
- Blackmud Creek;
- Fulton Creek;
- Wedgewood Creek;
- Horsehills Creek; and
- Other unmonitored outfalls (distributed across many outfalls to the NSR).

7. Stormwater loads for creeks and unmonitored outfalls are determined by multiplying the daily volumes by weighted average concentrations of the monitored stormwater outfalls. The long-term goal is to also calculate total loads of the tributaries and account for both the direct inputs from the collection system and the instream effects of stormwater flows. This will be implemented as hydrometric stations are installed on creeks. Whitemud Creek and Mill Creek already have flow monitoring and this will be incorporated in the load estimation methods for these creeks. Water quality monitoring also occurs on these creeks which will be used to apportion storm water loads.

8. Volumes from unmonitored CSOs are estimated using a combination of modelling and field flow monitoring. Loads from CSO sites are determined by multiplying daily volumes by the concentration of monitored CSO sites.

## 4. Reporting

The purpose of this section is to establish and maintain documented procedures in reporting to Alberta Environment and Protected Areas the monitored data every year as part of the Approval requirement. This procedure applies to EPCOR staff who are involved in the preparing/completing the Annual Total Loadings Report and Monthly Collection System Report.

**Annual Total Loadings Report**

The report includes (but is not limited to):
- Cover letter addressed to the Municipal Engineer of AEPA;
- Figures on annual total and estimated loads of the TSS, TP, $NO_3$+$NO_2$, $NH_3$, Cl, and *E. coli* from stormwater outfalls, CSOs, Gold Bar WWTP (Outfalls 10 and 30), ARROW WWTP and E.L. Smith and Rossdale WTPs;
- Tabular summaries of daily load and flow volumes from stormwater outfalls (30th Avenue, Groat Road, Quesnell, Belgravia and Kennedale) and CSOs (Rat Creek CSO, Highland CSO, Capilano CSO, Cromdale CSO, and Strathearn CSO) discharged into the river for the year being reported; and
- Tabular summaries of median monthly concentrations of TSS, TP, $NO_2$+$NO_3$, $NH_3$, Cl, and *E. coli* (in mg/L or MPN/100 mL) from stormwater and CSO outfalls for the year being reported.

**Monthly Collection System Report**

Includes (but is not limited to):
- Cover letter addressed to the Municipal Engineer of AEPA and signed by the designated EPCOR project manager. This letter includes chemical usage data, responsible operator, amount of biosolids disposed of, and a summary of operational problems;
- Flow monitoring figures and a tabular summary for each of the following sites covering the whole

month being reported where there were flows that discharged to the North Saskatchewan River (NSR); 30th Avenue storm, Groat Road storm, Quesnell storm, Kennedale storm, Rat Creek Combined Sewer Overflow (CSO), Highland CSO, Capilano CSO, Strathearn CSO, and Cromdale CSO outfalls;

- Total rainfall for the month as recorded by Environment and Climate Change Canada is indicated
- Stormwater and CSO outfall water quality data measured by the EPCOR's Gold Bar Wastewater Treatment Plant (GBWWTP) Laboratory, or other accredited labs; and
- Flow volume transferred from the EPCOR sanitary sewer system to the ARROW sanitary sewer system.

**<u>Three-year CSO Progress Report</u>**

Includes (but is not limited to):

- Updates to the status and improvements made to EPCOR's CSO system;
- Updates to the status and improvements made to measuring, estimating and modelling CSO flows; and
- Historical trend analysis of CSO discharge volumes, events and loads.

## Revision History

| Reviewed By | Approved By | Date Approved | Changes Made |
|---|---|---|---|
| -proposed draft- | | | |

2000 – 10423 101 St
NW, Edmonton,
Alberta
T5H 0E8 Canada
**epcor.com**

December 10, 2024
Environment and Protected Areas
111 Twin Atria Building 4999 98 Avenue NW
Edmonton AB T6B 2X3

Electronically to EPA.EPEAapplications@gov.ab.ca
Attention: **Mr. Mohammad M. Rahman, P. Eng.**
**EPEA Team Lead**

**Re: Addendum to Renewal Application for *EPEA* Approval No. 639-03 as amended (Edmonton Wastewater System)**

Dear Mr. Rahman,

In our September 11, 2024 renewal application for the Edmonton Wastewater System, we requested an approval amendment to add one additional flare to the Gold Bar Wastewater Treatment Plant (GBWWTP). In that application, EPCOR Water Services (EWS) identified the need for improvements to the existing biogas flaring system on site to provide adequate redundancy and meet future biogas generation capacity. Currently, untreated digester gas (raw biogas) generated from the GBWWTP digesters is collected and reused on site to provide heat through the plant's boilers and energy through the digester mixing system. Digester gas in excess of what can be reused on site is sent to the flaring system.

EWS is planning to install one new enclosed flare stack (also referred to as ground flare stacks) to meet the immediate need for redundancy and improve capacity of the flaring system to incinerate waste biogas generated from the treatment processes at the GBWWTP. The current project will install one enclosed flare stack and a new flare building over an abandoned primary clarifier in the GBWWTP. There are no additional sources of biogas being introduced at GBWWTP as part of this project.

This addendum to the September 11, 2024 renewal application gives further information to support this request.

Additional Supporting Information

The following information is attached in support of this request:

1. The report **"An Air Quality Dispersion Modelling for the Proposed Enclosed Flare at the Gold Bar Wastewater Treatment Plant, Stantec November 19 2024"** shows environmental performance for the proposed enclosed flare. This enclosed flare design initiates the combustion process at the base of the stack unlike a traditional flare stack where combustion occurs at the top of the stack; as such, it will function like the operation of an incinerator. Based on vendor data, the enclosed flare would have a height of 8.80 m above ground surface and have an inside diameter of 2,800 mm. The enclosed flare is designed to handle a maximum biogas flow rate of 47.5 103 m3/d (at 15°C and 101.325 kPa). The main air emission from this enclosed flare is sulphur dioxide ($SO_2$). Other emissions of typical criteria air contaminants (CAC) associated with combustion and incineration of waste biogas like carbon monoxide (CO), hydrogen sulphide ($H_2S$), oxides of nitrogen (NOX), and fine particulate matter ($PM_{2.5}$) are expected to be low; therefore, they were not evaluated as part of this assessment.

   We assumed a 100% conversion of $H_2S$ to $SO_2$ during combustion of the 1,600 Nm3/h of biogas with 0.30% $H_2S$, the calculated $SO_2$ emissions from all sources would be 3.81 g/s (0.329 t/d or 120 t/y). Note that the vendor stated an $H_2S$ conversion efficiency of 99.9% for this enclosed flare. The 2022 Alberta Emission Inventory Report (AEIR) reported a total average $SO_2$ emission rate of 61.0 t/y with the highest $SO_2$ emission rate being 69.2 t/y reported in 2021. As such, using the 120 t/y would reflect approximately twice the current average total $SO_2$ emission rate and should be a conservative estimate for the current normal operation emissions.

   Two scenarios were modelled in support of this application, a summer one in which 70% of the biogas went to flare and 30% to boilers, and a winter one with 30% to flare and 70% to boilers. All existing GBWWTP flares and boilers were included in each scenario. The results show that the addition of the enclosed flare results is a minor change to the predicted $SO_2$ concentrations at or near the GBWWTP. Most of the ground level impacts for predicted $SO_2$ concentrations under both summer and winter operational cases are from the combustion of biogas in the boilers. There are small areas of predicted exceedances of the AAAQO's beyond the plant fence line. However, the proposed flare alone is not predicted to exceed any AAAQO's.

   Note that our Gold Bar Air Quality Monitoring Station (AQMS) started collecting and reporting data to AEPA on July 1, 2022. The first complete year of data collection occurred in 2023 with 98.3% completeness for the $SO_2$ concentration data. In comparison to the air quality predictions, the maximum hourly $SO_2$ concentration measured at the station in 2023 was 102 μg/m3 (39 ppb) with an average annual $SO_2$ concentration of 5.43 μg/m3 in 2023 (2.08 ppb). These are well below the maximum AAAQO's of 450 μg/m3 (hourly average) and 20 μg/m3 (annual average) and the predicted concentrations.

2. **Gold Bar WWWTP Flare Capacity Expansion Issued for Construction** drawings stamped November 25 2024 show the technical design details for the new flare and flare facility.

Approval Request

The EPEA Approval 639-03-07 for the GBWWTP lists the existing two digester gas flare stacks as approved release sources to atmosphere (Part 4, Section 4.9) and lists the flare stack heights (Table 4-1). The GBWWTP Operations Plan also includes details on the digester gas system and current flares in Section 12 Digester Gas Protocol. Section 5.1.6 Expand Flare Capacity Project at Gold Bar Wastewater Treatment Plant of the renewal application gives some further description of this project.

As noted in the September 11, 2024 application, we are requesting the following amendment to the current approval:

*"4.9.3 The approval holder shall only release air effluent streams to the atmosphere from the following sources:*
*(m) the THREE (from two) digester gas flare stacks; "*

Timeline for Flare Project

As noted, the project will occur within the current GBWWTP plant boundary, in the area of the abandoned primary clarifier. Some demolition in preparation for new foundations will occur starting in January 2025. With an anticipated new approval or amendment to the current approval received around March 2025, further construction on the flare facility will occur at that time. We are planning to complete construction and commissioning of the new flare for December 2026.

If you have any questions, please feel free contact me by phone at 780-969-8445 or by email at gheise@epcor.com.

Sincerely,

Geoff Heise, M.Sc.
Senior Manager, Environment and Process Services

Attachments

cc: Cindy Shepel, Director Wastewater Treatment Plant
Trina Manning, Senior Manager WWTP Operations
David Slubik, Environment Manager
Kristi Hodson, Project Manager

Stantec

# Memo

| | | | |
|---|---|---|---|
| To: | Roxanne Richardson<br>Edmonton, Alberta | From: | Wade B. Gieni<br>Calgary |
| Project/File: | 1101000105 | Date: | December 16, 2024 |

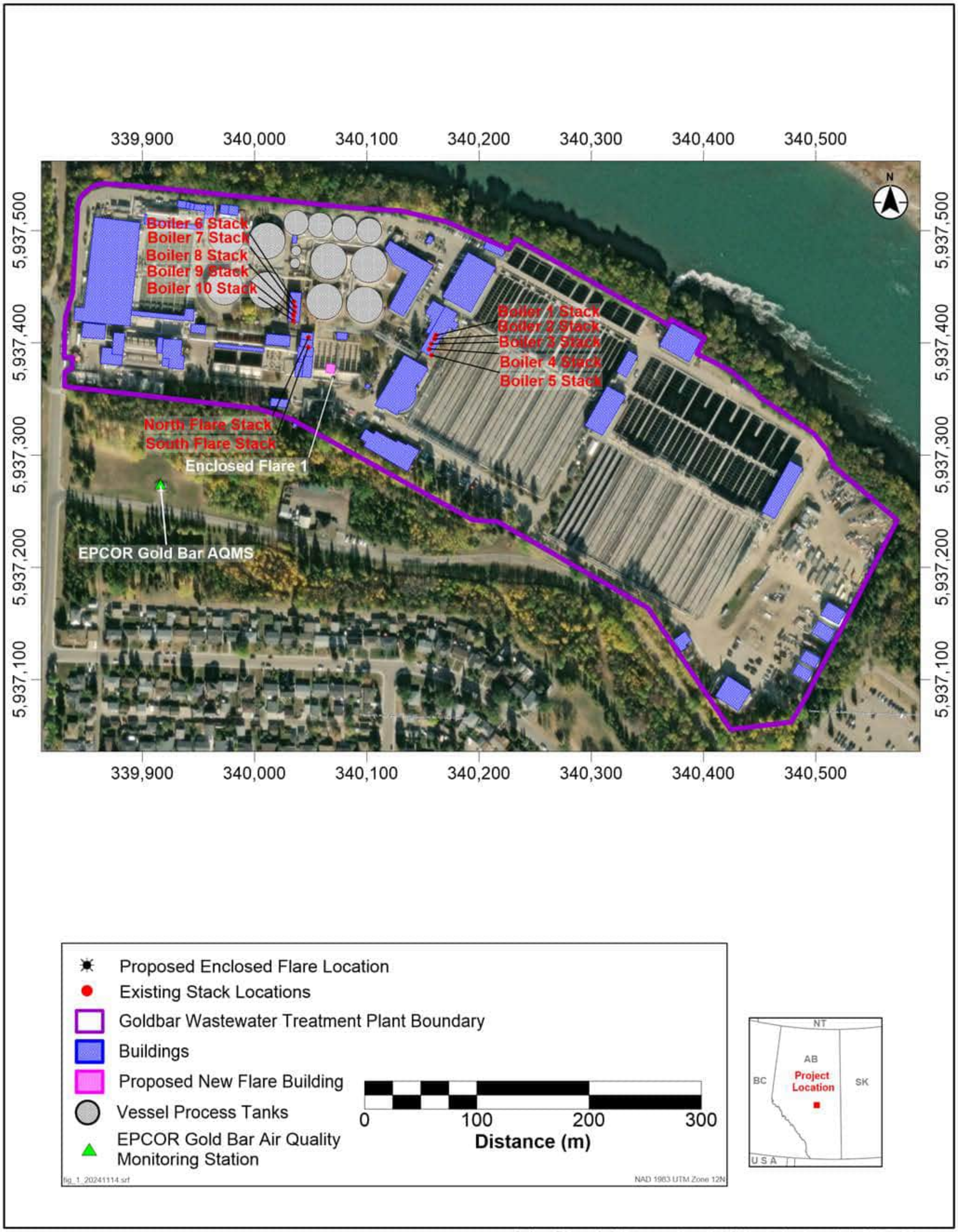
**Reference: Air Quality Dispersion Modelling for the Proposed Enclosed Flare at the Gold Bar Wastewater Treatment Plant**

# 1 Introduction

EPCOR Water Service Inc. (EPCOR) is planning to install an enclosed flare (also referred to as ground flare stack or enclosed combustor) to incinerate waste biogas generated from the water treatment processes at the Gold Bar wastewater treatment plant (GBWWTP). Stantec Consulting Ltd. (Stantec) has been retained by EPCOR to design the combustion system. As part of the design process, Stantec has conducted air quality dispersion modelling to evaluate the potential emissions from the planned enclosed flare based on the proposed design of the biogas combustion system.

The initial phase of the project will be to install one enclosed flare and a new flare building over the abandoned primary clarifier. As it is estimated that the volume of biogas requiring combustion will increase over time, this area is being designed to have a maximum of three enclosed flares. The first enclosed flare would be installed with the proposed building. The flare building will be located north of the enclosed flare stack. Figure 1 shows the layout of the GBWWTP including the locations of the proposed building and the enclosed flare.

The enclosed flares are designed to initiate the combustion process at the base of the stack unlike a traditional flare stack where combustion occurs at the top of the stack; as such they would be like the operation of an incinerator. Based on vendor data, the enclosed flares would have a height of 8.80 m (28.9 ft) above ground surface and have an inside diameter of 2,800 mm (110.2 inches). The enclosed flare would be mounted on a 0.92 m (3.02 ft) base which would increase the overall stack height to 9.72 m (31.9 ft) above the ground surface. The enclosed flares are designed to handle a maximum biogas flow rate of 47.5 $10^3 m^3/d$ (at 15°C and 101.325 kPa) and will be operated continuously during plant operations. Table 1 shows a summary of the locations of the proposed enclosed flare stack and the physical parameters for the stack.




Sources: Image Source: AbaData Website

Disclaimer: This map is for illustrative purposes to support this Stantec project; questions can be directed to the issuing agency.

**Plot Plan of the Gold Bar Wastewater Treatment Plant Showing the Locations of the Plant Boundary, Existing Boiler and Flare Stacks, Proposed Enclosed Flare Stack and Building, Buildings, and Vessel Process Tanks**

Stantec

Air Quality Dispersion Modelling for the Proposed Enclosed Flare at the Gold Bar Wastewater Treatment Plant

Figure 1

**Reference: Air Quality Dispersion Modelling for the Proposed Enclosed Flare at the Gold Bar Wastewater Treatment Plant**

***Table 1: Summary of the Location and Physical Stack Parameters for the Proposed Enclosed Flare at the Gold Bar Wastewater Treatment Plant***

| Parameter | Units | Proposed Enclosed Flare #1 |
|---|---|---|
| Stack Location (NAD83 UTM Zone 12) [1] | | |
| Easting | m East | 340,070 |
| Northing | m North | 5,937,369 |
| Elevation | m ASL | 623 |
| Physical Source Parameters [2] | | |
| Stack Tip Exit Height [3] | m | 9.72 |
| | ft | 31.9 |
| Stack Tip Exit Diameter | mm | 2,800 |
| | inches | 110.2 |
| Maximum Design Flow Rate | $Nm^3/h$ [4] | 1,875 |
| | $10^3m^3/d$ [5] | 47.5 |

Notes:

1. Enclosed flare location is based on current design of the proposed combustion system.
2. Information provided from submissions of enclosed flare specifications.
3. Includes the height of the enclosed flare (8.80 m) and flare base (0.92 m)
4. At normal conditions of 0°C and 101.325 kPa
5. At standard conditions of 15°C and 101.325 kPa

This air quality dispersion modelling assessment of the initial enclosed flare was completed in accordance with the Alberta Environment and Protected Areas (AEPA) Air Quality Model Guideline (AQMG; (AEP, 2021a)). This report summarizes the methodology for and results of the assessment.

# 2 Substances of Interest

The main air emission from the enclosed flares is sulphur dioxide ($SO_2$). Other emissions of typical criteria air contaminants (CAC) associated with combustion and incineration of waste biogas like carbon monoxide (CO), hydrogen sulphide ($H_2S$), oxides of nitrogen ($NO_X$), and fine particulate matter ($PM_{2.5}$) are expected to be low; therefore, they were not evaluated as part of this assessment.

## 2.1 Alberta Ambient Air Quality Objectives and Guidelines

Alberta Environment and Protected Areas (AEPA) have established ambient air quality objectives and guidelines for several substances to protect human health and minimize adverse effects on the receiving environment. They are collectively referred to as the Alberta Ambient Air Quality Objectives and Guidelines (AAAQO/AAAQG; (AEPA, 2024a)). The AAAQO are used to assess compliance and evaluate facility design. The AAAQG are used as a general performance indicator and not necessarily applied as compliance criteria.

**Table 2** presents a summary of the air quality objectives considered in the assessment.

*Table 2: Alberta Ambient Air Quality Objectives*

| Substance | | Averaging Period | AAAQO [1] (µg/m³) |
|---|---|---|---|
| Sulphur Dioxide | $SO_2$ | 1-hour | 450 |
| | | 24-hour | 125 |
| | | 30-day | 30 |
| | | Annual | 20 |

Notes:
1. AAAQO: Alberta Ambient Air Quality Objectives (AEPA, 2024a)
Criteria are referenced under the standard conditions of 25ºC and 101.325 kPa.

## 2.2 Interpretation of Predicted Concentrations

The Alberta Air Quality Model Guideline (AQMG; (AEP, 2021a)) recognizes that extreme, rare, and transient meteorological conditions can affect predicted 1-hour average ambient air concentrations. To address this issue, AEPA recommends "the highest eight 1-hour predicted average concentrations for each receptor in each single year should be disregarded". Therefore, for the assessment of 1-hour average concentrations, the 9$^{th}$ highest hourly values (roughly equal to the 99.9$^{th}$ percentile) for each year at a given location are used to determine compliance with the 1-hour AAAQO.

For averaging periods greater than 1 hour (e.g., 8-hour, 24-hour, and annual), no predicted exceedances of the AAAQO are acceptable (AEP, 2021a). Therefore, the maximum 24-hour, 30-day, and annual predicted concentrations are used in the assessment.

This air quality assessment is focused on the predicted $SO_2$ concentrations on or outside the GBWWTP boundary. Since public access is restricted within the GBWWTP, AAAQO are not applicable within the plant boundaries.

# 3 Source Characterization

EPCOR provided hourly biogas flow rates from 2019 to 2023 that were produced at the GBWWTP including the hydrogen sulphide ($H_2S$) content. Table 3 shows the measured annual average and maximum hourly biogas flow rates over the five-year period. The table also shows the average and maximum $H_2S$ content measured in the biogas over the same period. Based on the information provided it was determined that the 90$^{th}$ percentile biogas flow rate of 1,600 $Nm^3/h$ (40.5 $10^3m^3/d$) would be a conservative assumption to represent the current average biogas production. Similarly, a $H_2S$ content of 3,000 parts per million (ppm) or 0.30% (4.32 $g/m^3$) in the biogas was assumed. The biogas is utilized as a supplementary fuel source for the boilers that supply process and building heat with any excess amount of biogas being directed to the flares for safe disposal through the combustion of the gas.

*Table 3: Biogas Flow Rates and Hydrogen Sulphide Contents of the Biogas for 2019 to 2023*

| Year | Biogas Flow Rate | | | | $H_2S$ Content in the Biogas | | | |
|---|---|---|---|---|---|---|---|---|
| | Average [1] | Maximum [1] | Average | Maximum | Average [1] | Maximum [1] | Average | Maximum |
| | $Nm^3/h$ [2] | $Nm^3/h$ [2] | $10^3m^3/d$ [3] | $10^3m^3/d$ [3] | $g/m^3$ | $g/m^3$ | % | % |
| 2019 | 1,522 | 1,936 | 38.5 | 49.0 | 2.90 | 3.89 | 0.201 | 0.270 |
| 2020 | 1,540 | 1,962 | 39.0 | 49.7 | 2.38 | 3.75 | 0.165 | 0.260 |
| 2021 | 1,559 | 1,988 | 39.5 | 50.3 | 3.28 | 3.82 | 0.228 | 0.265 |
| 2022 | 1,578 | 2,014 | 40.0 | 51.0 | 2.97 | 4.11 | 0.206 | 0.285 |
| 2023 | 1,597 | 2,041 | 40.4 | 51.7 | 3.04 | 4.54 | 0.211 | 0.315 |

Notes:
1. Data provided by EPCOR Water Service Inc.
2. At normal conditions of 0°C and 101.325 kPa
3. At standard conditions of 15°C and 101.325 kPa

Assuming a 100% conversion of $H_2S$ to $SO_2$ during combustion of the 1,600 $Nm^3/h$ of biogas with 0.30% $H_2S$, the calculated $SO_2$ emissions from all sources would be 3.81 g/s (0.329 t/d or 120 t/y). The 2022 Alberta Emission Inventory Report (AEIR) reported a total average $SO_2$ emission rate of 61.0 t/y with the highest $SO_2$ emission rate being 69.2 t/y reported in 2021. As such, using the 120 t/y would reflect approximately twice the current average total $SO_2$ emission rate and should be a conservative estimate for the current normal operation emissions.

The sources of $SO_2$ emissions at the GBWWTP are the ten boilers and two flares that combust the biogas. Table 4 shows the locations and dispersion modelling parameters for these sources.

The boilers combust a mixture of biogas and natural gas at two boiler houses that provide heat for the wastewater treatment processes and for building heating during colder periods. The use of biogas in the boilers varies based on the heating needs in the Plant so there are periods where only a one or two boilers are combusting biogas and others where up to six of the ten boilers are using biogas as fuel. Based on operational information provided by EPCOR, it was determined that there were two extreme operation cases for the boilers. The first typically occurs during the warmer summer periods where building heat is not required so the boilers in Boiler House 1 (Boilers 1 to 5) are not using biogas for fuel and only a maximum of two boilers are used in Boiler House 2 (Boilers 6 to 10) to provide process heating. During colder winter months both boiler houses would have a maximum of three boilers that would be combusting biogas. The other boilers may be in stand-by mode or be combusting only natural gas so the $SO_2$ emissions from these sources is extremely low compared to the other sources. It should be noted that Boiler 5 and Boiler 10 never use biogas as a fuel.

There are two flares that combust the excess biogas not used in the Plant boilers. The North Flare is an enclosed flare that can combust a maximum flow rate of 1,024 $Nm^3/h$ (24.6 $10^3m^3/d$) of biogas. The South Flare is a candle stick flare that can combust a maximum flow rate of 1,024 $Nm^3/h$ (24.6 $10^3m^3/d$) of biogas. The excess biogas is first directed to the South Flare until it reaches its rated capacity, and the remaining volume of biogas is directed to the North Flare.

During the summer operation case, up to 70% of the biogas volume is directed to the flare stacks and 30% is combusted in the boilers. During the winter operation case, the ratio of the biogas distribution is 70% of the biogas is directed to the boilers and 30% is directed to the flare stacks. Table 5 shows the current baseline operational scenario (Scenario 1) for both operational cases and how the biogas volumes are directed to the existing sources for the summer and winter cases. Using this information the $SO_2$ emission rates were calculated assuming 100% conversion of $H_2S$ to $SO_2$ during the combustion process for each of the sources.

Scenario 2 uses the same biogas flow rates, $H_2S$ content and distribution of the biogas as Scenario 1. The biogas volumes directed to the exiting flare stacks was re-directed to the proposed enclosed flare stack. In both operational cases the enclosed flare capacity was enough to handle the complete volume of biogas being combusted. Therefore, for Scenario 2, the North and South flares were assumed to be inactive during normal Plant operations. Table 6 shows the distribution of the biogas volumes between the sources and the calculated $SO_2$ emission rates for each source.

Using the biogas production rates, Stantec and EPCOR projected the future 2040 biogas peak hourly flow rate would be 2,610 $Nm^3/h$ (66.1 $10^3m^3/d$). The same assumption of 0.30% (4.32 $g/m^3$) of $H_2S$ content was used to calculate a projected 2024 $SO_2$ emission rate of 6.22 g/s (0.537 t/d or 196 t/y). This would be approximately a 60% increase in emissions used for Scenario 1. Table 7 shows the distribution of the biogas volumes between the sources and the calculated $SO_2$ emission rates for each source for the future scenario (Scenario 3).

**Reference: Air Quality Dispersion Modelling for the Proposed Enclosed Flare at the Gold Bar Wastewater Treatment Plant**

*Table 4: Existing Sources of Sulphur Dioxide Emissions at the Gold Bar Wastewater Treatment Plant*

| Source Name [1] | UTM NAD83 Zone 12 [1,2] | | Elevation [3] | Stack Height [1] | Stack Diameter [1] | Exit Velocity [1] | Exit Temperature [1] | Rain Cap? [1] |
|---|---|---|---|---|---|---|---|---|
| | Easting | Northing | | | | | | |
| | m | m | m ASL | m | m | m/s | K | |
| Boiler 1 Stack | 340,161 | 5,937,407 | 620 | 10.78 | 0.50 | 1.90 | 473 | Yes |
| Boiler 2 Stack | 340,160 | 5,937,403 | 620 | 10.78 | 0.50 | 1.90 | 473 | Yes |
| Boiler 3 Stack | 340,157 | 5,937,399 | 620 | 10.78 | 0.50 | 1.90 | 473 | Yes |
| Boiler 4 Stack | 340,156 | 5,937,395 | 620 | 10.78 | 0.50 | 1.90 | 473 | Yes |
| Boiler 5 Stack | 340,158 | 5,937,389 | 620 | 10.78 | 0.50 | 1.90 | 473 | Yes |
| Boiler 6 Stack | 340,035 | 5,937,437 | 620 | 18.44 | 0.50 | 1.90 | 473 | Yes |
| Boiler 7 Stack | 340,036 | 5,937,432 | 620 | 18.44 | 0.50 | 1.90 | 473 | Yes |
| Boiler 8 Stack | 340,036 | 5,937,428 | 620 | 18.44 | 0.50 | 1.90 | 473 | Yes |
| Boiler 9 Stack | 340,035 | 5,937,424 | 621 | 18.44 | 0.50 | 1.90 | 473 | Yes |
| Boiler 10 Stack | 340,035 | 5,937,420 | 621 | 18.44 | 0.50 | 1.90 | 473 | Yes |
| North Flare Stack | 340,048 | 5,937,405 | 622 | 11.07 | 1.70 | 7.30 | 1,173 | No |
| South Flare Stack | 340,048 | 5,937,396 | 622 | 16.94 | 0.90 | 16.10 | 1,173 | No |

Notes:

1. Data provided by EPCOR Water Service Inc. in the 2022 Alberta Emission Inventory Report (AEIR) Submission.
2. Universal Transverse Mercator (UTM) North American Datum 1983 (NAD83)
3. Based on elevations above sea level (ASL) extracted based on the UTM Coordinates from the Canadian Digital Elevation Model (CDEM; (NRCan, 2016)).

**Reference: Air Quality Dispersion Modelling for the Proposed Enclosed Flare at the Gold Bar Wastewater Treatment Plant**

*Table 5: Scenario 1: Baseline – Existing Sources at 90th Percentile of the Hourly Biogas Flow Rate with 3,000 ppm (4.32 g/m$^3$) $H_2S$ Content*

| Case Description | Division Between Emission Types | | Biogas Flow Rates (Nm$^3$/h) [1] | | Division of Biogas Per Emission Group | | | Biogas Flow Rates Per Emission Group (Nm$^3$/h) [1] | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Boilers | Flares | Boilers | Flares | Boiler House 1 | Boiler House 2 | Flares | Boiler House 1 | Boiler House 2 | Flares |
| Worst Case Flare Emissions (Summer) | 30% | 70% | 480 | 1,120 | 0% | 30% | 70% | 0 | 480 | 1,120 |
| Worst Case Boiler Emissions (Winter) | 70% | 30% | 1,120 | 480 | 28% | 42% | 30% | 448 | 672 | 480 |

**Division of Biogas for Each Source**

| Case | Boiler House 1 | | | | | Boiler House 2 | | | | | Flares | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | B1 | B2 | B3 | B4 | B5 | B6 | B7 | B8 | B9 | B10 | N. Flare | S. Flare |
| Summer | 0% | 0% | 0% | 0% | 0% | 15% | 15% | 0% | 0% | 0% | 6% | 64% |
| Winter | 9.3% | 9.3% | 9.3% | 0% | 0% | 14% | 14% | 14% | 0% | 0% | 0% | 30% |

**Biogas Flow Rates for Each Source (Nm$^3$/h) [1]**

| Case | Boiler House 1 | | | | | Boiler House 2 | | | | | Flares | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | B1 | B2 | B3 | B4 | B5 | B6 | B7 | B8 | B9 | B10 | N. Flare | S. Flare |
| Summer | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 240 | 240 | 0.00 | 0.00 | 0.00 | 96.0 | 1,024 |
| Winter | 149 | 149 | 149 | 0.00 | 0.00 | 224 | 224 | 224 | 0.00 | 0.00 | 0.00 | 480 |

**$SO_2$ Emission Rates for Each Source (g/s) [2]**

| Case | Boiler House 1 | | | | | Boiler House 2 | | | | | Flares | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | B1 | B2 | B3 | B4 | B5 | B6 | B7 | B8 | B9 | B10 | N. Flare | S. Flare |
| Summer | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.5716 | 0.5716 | 0.0000 | 0.0000 | 0.0000 | 0.2286 | 2.4388 |
| Winter | 0.3557 | 0.3557 | 0.3557 | 0.0000 | 0.0000 | 0.5335 | 0.5335 | 0.5335 | 0.0000 | 0.0000 | 0.0000 | 1.1432 |

Notes:
1. At normal conditions of 0°C and 101.325 kPa.
2. Assumes 100% conversion of $H_2S$ to $SO_2$ during the combustion process.

**Reference: Air Quality Dispersion Modelling for the Proposed Enclosed Flare at the Gold Bar Wastewater Treatment Plant**

*Table 6: Scenario 2: Current Application – Existing Boilers and New Enclosed Flare at 90th Percentile of the Hourly Biogas Flow Rate with 3,000 ppm (4.32 g/m³) $H_2S$ Content*

| **Case Description** | **Division Between Emission Types** | | **Biogas Flow Rates ($Nm^3/h$) [1]** | | **Division of Biogas Per Emission Group** | | | **Biogas Flow Rates Per Emission Group ($Nm^3/h$) [1]** | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Boilers | Flares [2] | Boilers | Flares [2] | Boiler House 1 | Boiler House 2 | Flares [2] | Boiler House 1 | Boiler House 2 | Flares [2] |
| Worst Case Flare Emissions (Summer) | 30% | 70% | 480 | 1,120 | 0% | 30% | 70% | 0 | 480 | 1,120 |
| Worst Case Boiler Emissions (Winter) | 70% | 30% | 1,120 | 480 | 28% | 42% | 30% | 448 | 672 | 480 |

**Division of Biogas for Each Source**

| Case | Boiler House 1 | | | | | Boiler House 2 | | | | | Flares [2] | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | B1 | B2 | B3 | B4 | B5 | B6 | B7 | B8 | B9 | B10 | N & S | Encl. |
| Summer | 0% | 0% | 0% | 0% | 0% | 15% | 15% | 0% | 0% | 0% | 0% | 70% |
| Winter | 9.3% | 9.3% | 9.3% | 0% | 0% | 14% | 14% | 14% | 0% | 0% | 0% | 30% |

**Biogas Flow Rates for Each Source ($Nm^3/h$) [1]**

| Case | Boiler House 1 | | | | | Boiler House 2 | | | | | Flares [2] | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | B1 | B2 | B3 | B4 | B5 | B6 | B7 | B8 | B9 | B10 | N & S | Encl. |
| Summer | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 240 | 240 | 0.00 | 0.00 | 0.00 | 0.00 | 1,120 |
| Winter | 149 | 149 | 149 | 0.00 | 0.00 | 224 | 224 | 224 | 0.00 | 0.00 | 0.00 | 480 |

**$SO_2$ Emission Rates for Each Source (g/s) [3]**

| Case | Boiler House 1 | | | | | Boiler House 2 | | | | | Flares [2] | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | B1 | B2 | B3 | B4 | B5 | B6 | B7 | B8 | B9 | B10 | N & S | Encl. |
| Summer | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.5716 | 0.5716 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 2.6675 |
| Winter | 0.3557 | 0.3557 | 0.3557 | 0.0000 | 0.0000 | 0.5335 | 0.5335 | 0.5335 | 0.0000 | 0.0000 | 0.0000 | 1.1432 |

Notes:

1. At normal conditions of 0°C and 101.325 kPa.
2. It is assumed that all biogas flow rate allotted to the flares is directed to the new Enclosed Flare. The North Flare and South Flare would only be used for emergencies or if the biogas flow rate was higher than the maximum design capacity of the new Enclosed Flare.
3. Assumes 100% conversion of $H_2S$ to $SO_2$ during the combustion process.

**Reference: Air Quality Dispersion Modelling for the Proposed Enclosed Flare at the Gold Bar Wastewater Treatment Plant**

*Table 7: Scenario 3: Future Application – Existing Boilers and New Enclosed Flare at 2040 Projected Biogas Flow Rate of 2,610 $Nm^3/h$ with 3,000 ppm (4.32 $g/m^3$) $H_2S$ Content*

| Case Description | Division Between Emission Types | | Biogas Flow Rates ($Nm^3/h$) [1] | | Division of Biogas Per Emission Group | | | Biogas Flow Rates Per Emission Group ($Nm^3/h$) [1] | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Boilers | Flares [2] | Boilers | Flares [2] | Boiler House 1 | Boiler House 2 | Flares [2] | Boiler House 1 | Boiler House 2 | Flares [2] |
| Worst Case Flare Emissions (Summer) | 30% | 70% | 783 | 1,827 | 0% | 30% | 70% | 0 | 783 | 1,827 |
| Worst Case Boiler Emissions (Winter) | 70% | 30% | 1,827 | 783 | 28% | 42% | 30% | 731 | 1,096 | 783 |

**Division of Biogas for Each Source**

| Case | Boiler House 1 | | | | | Boiler House 2 | | | | | Flares [2] | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | B1 | B2 | B3 | B4 | B5 | B6 | B7 | B8 | B9 | B10 | N & S | Encl. |
| Summer | 0% | 0% | 0% | 0% | 0% | 15% | 15% | 0% | 0% | 0% | 0% | 70% |
| Winter | 9.3% | 9.3% | 9.3% | 0% | 0% | 14% | 14% | 14% | 0% | 0% | 0% | 30% |

**Biogas Flow Rates for Each Source ($Nm^3/h$) [1]**

| Case | Boiler House 1 | | | | | Boiler House 2 | | | | | Flares [2] | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | B1 | B2 | B3 | B4 | B5 | B6 | B7 | B8 | B9 | B10 | N & S | Encl. |
| Summer | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 391.50 | 391.50 | 0.00 | 0.00 | 0.00 | 0.00 | 1,827 |
| Winter | 244 | 244 | 244 | 0.00 | 0.00 | 365 | 365 | 365 | 0.00 | 0.00 | 0.00 | 783 |

**$SO_2$ Emission Rates for Each Source (g/s) [3]**

| Case | Boiler House 1 | | | | | Boiler House 2 | | | | | Flares [2] | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | B1 | B2 | B3 | B4 | B5 | B6 | B7 | B8 | B9 | B10 | N & S | Encl. |
| Summer | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.9324 | 0.9324 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 4.3513 |
| Winter | 0.5802 | 0.5802 | 0.5802 | 0.0000 | 0.0000 | 0.8703 | 0.8703 | 0.8703 | 0.0000 | 0.0000 | 0.0000 | 1.8648 |

Notes:

1. At normal conditions of 0°C and 101.325 kPa.
2. It is assumed that all biogas flow rate allotted to the flares is directed to the new Enclosed Flare. The North Flare and South Flare would only be used for emergencies or if the biogas flow rate was higher than the maximum design capacity of the new Enclosed Flare.
3. Assumes 100% conversion of $H_2S$ to $SO_2$ during the combustion process.

# 4 Evaluation Domain

## 4.1 Modelling Domain

A typical air quality modelling domain was used for the dispersion modelling assessment as being 10 km from the proposed enclosed flare 1 stack location as shown in Figure 1. This 20 km by 20 km modelling domain should be sufficient to determine the potential changes to the dispersion of the $SO_2$ emissions from the GBWWTP.

## 4.2 Gridded Receptors

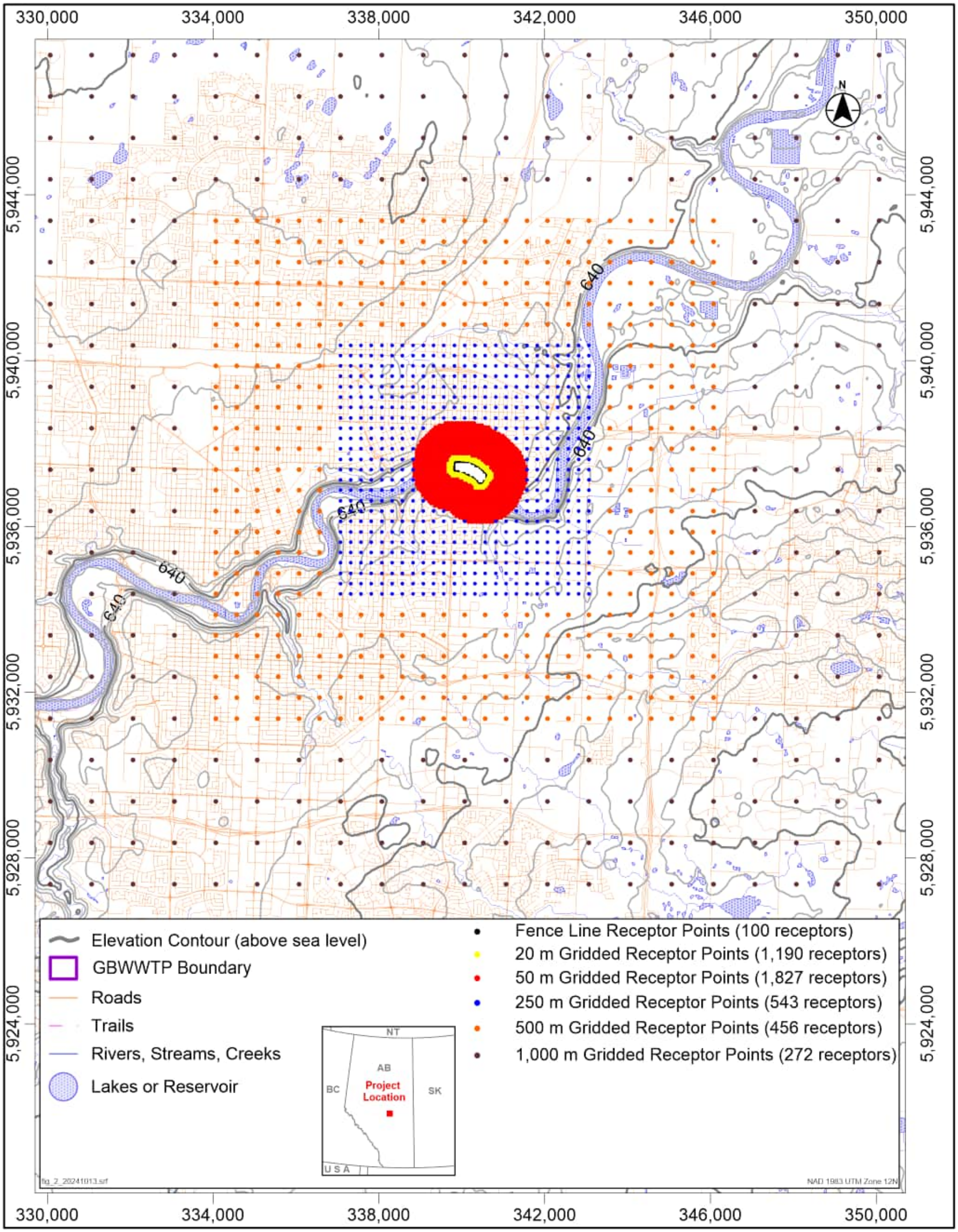
Table 8 shows the gridded receptor spacing that was defined for each tier and the number of resulting receptors following the guidance in the AQMG (AEP, 2021a). The GBWWTP boundary was defined using satellite imagery from Google Earth, using in-house terrain processing tools which utilizes a similar methodology as the AERMAP (U.S. EPA, 2018) preprocessor to extrapolate the elevations and critical hill height scale values for each receptor and output an AERMOD formatted text file. The elevation data was obtained by using Canadian Digital Elevation Model (CDEM; (NRCan, 2016)) data downloaded from Natural Resources Canada. Figure 2 shows the gridded receptors used for the dispersion modelling.

*Table 8: Nested Receptor Grid for Use in Refined Dispersion Modelling at the Gold Bar Wastewater Treatment Plant*

| Receptor Type | Grid Resolution (m) | Distance from Centre of Site (m) | Number of Receptor Points [1] |
|---|---|---|---|
| Fence Line | 20 | — | 121 |
| Gridded | 20 | 500 | 2,192 |
| Gridded | 50 | 1,500 | 3,280 |
| Gridded | 250 | 3,000 | 456 |
| Gridded | 500 | 6,000 | 456 |
| Gridded | 1,000 | 10,000 | 272 |
| Total Number of Receptor Points | | | 6,777 |

Notes:

1. Receptor grids created using Stantec's in-house terrain processor. Receptor elevation and hill-scale extracted from Canadian Digital Elevation Model data (CDEM; (NRCan, 2016)).




Sources: Base Data - Natural Resources Canada Canadian Digital Elevation Model (CDEM)

Disclaimer: This map is for illustrative purposes to support this Stantec project; questions can be directed to the issuing agency.

**Receptors Used in the Refined Dispersion Modelling using AERMOD for the Flaring Evaluation of the Gold Bar Wastewater Treatment Plant**

Stantec

Air Quality Dispersion Modelling for the Proposed Enclosed Flare at the Gold Bar Wastewater Treatment Plant

Figure 2

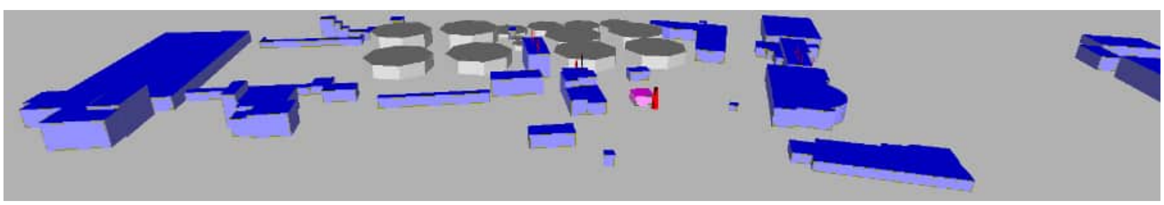
## 4.3 Building Downwash

Buildings or other solid structures can affect air flow near a source and cause building downwash effects (e.g., eddies on the downwind side), which have the potential to reduce plume rise and affect dispersion. Generally, building downwash problems typically occur if the height of the stack is less than 2.5 times the height of an adjacent building. Adjacent buildings may also affect the stack if the stack is in the building's region of influence defined as 5 times the lesser of the width or height of the crosswind face of the building.

Building downwash effects were considered for the Project stacks using the U.S. EPA Building Profile Input Program (BPIP; (U.S. EPA, 2004; 1997)). BPIP provides parameters that are used by the Plume Rise Model Enhancement (PRIME) downwash algorithms in AERMOD. The simplified plot plan of the GBWWTP in Figure 1 shows the locations of the buildings, vessel processing tanks, and proposed enclosed flare stacks. There are several buildings and tanks at the GBWWTP located in the vicinity of the enclosed flare locations as well as the new flare building proposed north of the proposed enclosed flare locations.

The building dimensions, locations, and heights were estimated based on the three-dimensional scans completed on building near the enclosed flare locations, the 2022 AEIR submission, plot plans provided by EPCOR, drone survey imagery and Google Earth 3D Building images. A three-dimensional representation of the buildings and other structures at the GBWWTP are shown in Figure 3. The dimensions of the buildings and structures considered in dispersion modelling are provided in Attachment A.

***Figure 3: Three-Dimensional Plot Plan of the Buildings, Vessel Processing Tanks, Existing Boiler Stacks, Existing Flare Stacks and Proposed Enclosed Flare 1 Stack Located at the Gold Bar Wastewater Treatment Plant***



Generated in Lakes AERMOD View Software

Existing buildings are blue, tanks and process vessels are grey, new flare building is magenta and the boilers, existing flare stacks and proposed enclosed flare 1 stack are red.

# 5 Meteorology

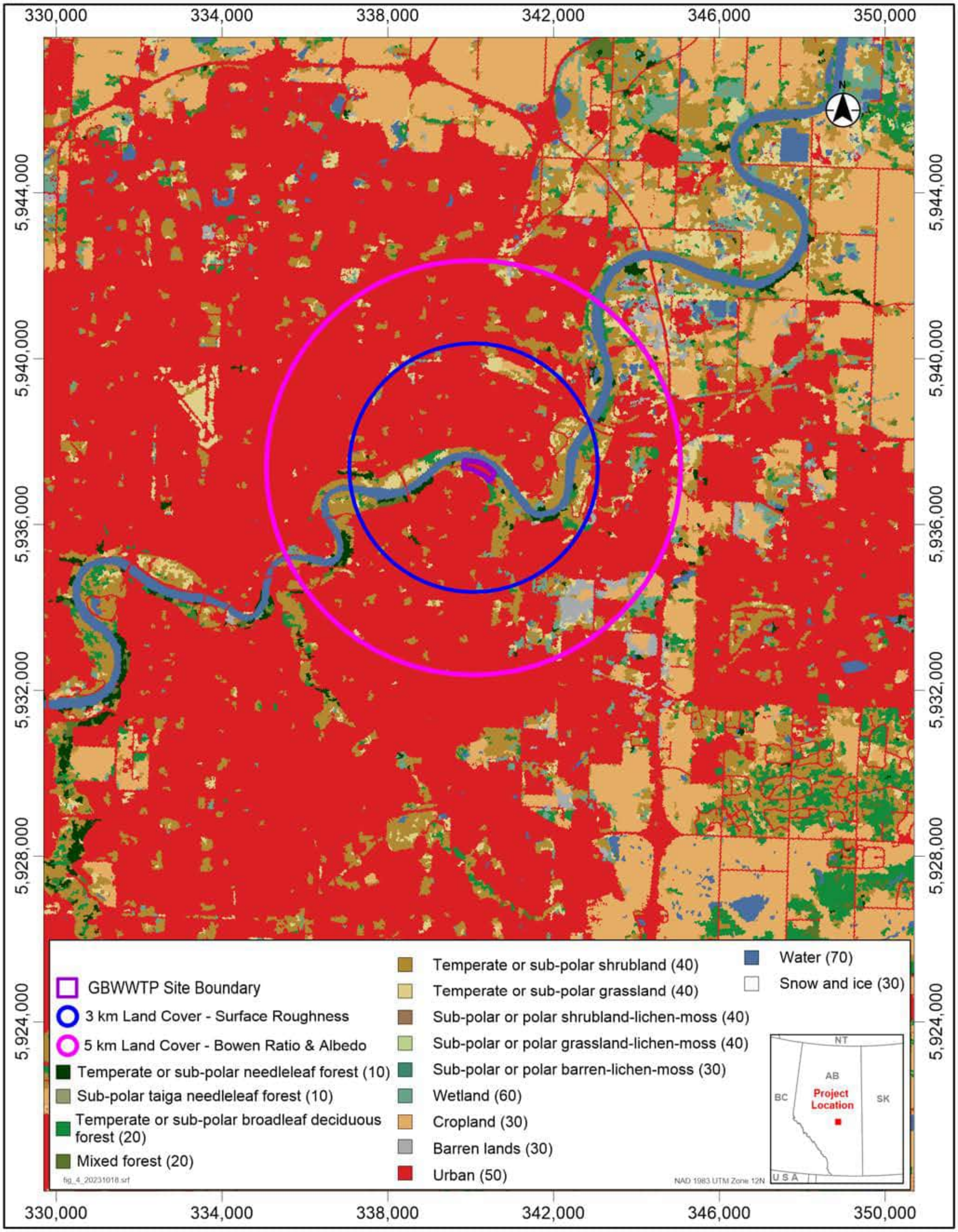
Climate and meteorology influence the way air emissions from industrial and natural sources disperse into the atmosphere, and hence have a direct effect on air quality. Atmospheric dispersion of emissions is governed by the amount of turbulence that exists in the mixed layer of air in contact with the ground. Turbulence levels are dependent on thermal effects (e.g., vertical temperature stratification) and mechanical effects caused by topography, surface roughness, and wind speed. The height of the mixing layer determines the vertical extent to which emissions can disperse.

AEPA provides a five-year (2015 to 2019) 4 km resolution prognostic meteorological data created using the Weather Research and Forecasting (WRF) model (NCAR, 2020) for use in dispersion modelling assessments in Alberta (AEPA, 2023). The AEPA provides the Multi-Model Extraction Utility Version 2 (MMEU2; (AEP, 2021b)) to extract the site-specific meteorological information for use in various dispersion models.

The MMEU2 was used to extract the site-specific meteorological data from the AEPA WRF data for use in the AERMET meteorological model for the GBWWTP for the full 5-year period. The MMEU2 provides a formatted standardized Solar and Meteorological Surface Observation Network (SAMSON) surface station file and a Radiosonde Observation (RAOBS) upper air station file that are readable by the AERMOD modelling system meteorological model AERMET (U.S. EPA, 2023b).

Land cover data is used in the AERMET model in the generation of the turbulence parameters for the AERMOD dispersion model. The 2015 land cover data (NRCan, 2019) was used in the assessment to determine site-specific surface characteristics within the assessment domain. Figure 4 shows the land cover within the assessment domain.

This data was processed using the AERSURFACE (U.S. EPA, 2020) pre-processor which determines the Bowen ratio (ratio of sensible to latent heat flux) and albedo (reflectivity of the surface) within a 5 km radius of the plant. The surface roughness was determined within 3 km of the site for any changes within twelve 30-degree sectors from the GBWWTP. To account for seasonal changes the surface characteristics are varied for each season (Winter: November to March; Spring: April and May; Summer: June to August; and Fall: September and October). Table 9, Table 10, and Table 11 show the albedo, Bowen Ratio, and surface roughness for each season and sector based on the land cover processed in AERSURFACE.




Sources: Base Data - Natural Resources Canada 2015 North American Land Cover Data

Disclaimer: This map is for illustrative purposes to support this Stantec project; questions can be directed to the issuing agency.

**2015 North American Land Cover Data (30 m Resolution) for the 20 km by 20 km Domain Centered on the Goldbar Wastewater Treatment Plant**

Stantec

Air Quality Dispersion Modelling for the
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Figure 4

***Table 9: Albedo used in the AERMET Meteorological Modelling for the Gold Bar Wastewater Treatment Plant***

| Sector (Degrees from North) | Winter [1] | Spring [2] | Summer [3] | Autumn [4] |
|---|---|---|---|---|
| >= 0 < 30 | 0.380 | 0.170 | 0.170 | 0.170 |
| >= 30 < 60 | 0.380 | 0.170 | 0.170 | 0.170 |
| >= 60 < 90 | 0.380 | 0.170 | 0.170 | 0.170 |
| >= 90 < 120 | 0.380 | 0.170 | 0.170 | 0.170 |
| >= 120 < 150 | 0.380 | 0.170 | 0.170 | 0.170 |
| >= 150 < 180 | 0.380 | 0.170 | 0.170 | 0.170 |
| >= 180 < 210 | 0.380 | 0.170 | 0.170 | 0.170 |
| >= 210 < 240 | 0.380 | 0.170 | 0.170 | 0.170 |
| >= 240 < 270 | 0.380 | 0.170 | 0.170 | 0.170 |
| >= 270 < 300 | 0.380 | 0.170 | 0.170 | 0.170 |
| >= 300 < 330 | 0.380 | 0.170 | 0.170 | 0.170 |
| >= 330 < 360 | 0.380 | 0.170 | 0.170 | 0.170 |

Notes:

1. Winter is defined as November, December, January, February, and March
2. Spring is defined as April and May
3. Summer is defined as June, July, and August
4. Autumn is defined as September and October

*Table 10: Bowen Ratio used in the AERMET Meteorological Modelling for the Gold Bar Wastewater Treatment Plant*

| Sector (Degrees from North) | Winter [1] | Spring [2] | Summer [3] | Autumn [4] |
|---|---|---|---|---|
| >= 0 < 30 | 0.470 | 0.840 | 0.900 | 1.02 |
| >= 30 < 60 | 0.470 | 0.840 | 0.900 | 1.02 |
| >= 60 < 90 | 0.470 | 0.840 | 0.900 | 1.02 |
| >= 90 < 120 | 0.470 | 0.840 | 0.900 | 1.02 |
| >= 120 < 150 | 0.470 | 0.840 | 0.900 | 1.02 |
| >= 150 < 180 | 0.470 | 0.840 | 0.900 | 1.02 |
| >= 180 < 210 | 0.470 | 0.840 | 0.900 | 1.02 |
| >= 210 < 240 | 0.470 | 0.840 | 0.900 | 1.02 |
| >= 240 < 270 | 0.470 | 0.840 | 0.900 | 1.02 |
| >= 270 < 300 | 0.470 | 0.840 | 0.900 | 1.02 |
| >= 300 < 330 | 0.470 | 0.840 | 0.900 | 1.02 |
| >= 330 < 360 | 0.470 | 0.840 | 0.900 | 1.02 |

Notes:

1. Winter is defined as November, December, January, February, and March
2. Spring is defined as April and May
3. Summer is defined as June, July, and August
4. Autumn is defined as September and October

***Table 11: Surface Roughness used in the AERMET Meteorological Modelling for the Gold Bar Wastewater Treatment Plant***

| Sector (Degrees from North) | Winter [1] | Spring [2] | Summer [3] | Autumn [4] |
|---|---|---|---|---|
| >= 0 < 30 | 0.100 | 0.159 | 0.164 | 0.159 |
| >= 30 < 60 | 0.106 | 0.165 | 0.170 | 0.165 |
| >= 60 < 90 | 0.0420 | 0.0720 | 0.0770 | 0.0720 |
| >= 90 < 120 | 0.0330 | 0.0550 | 0.0600 | 0.0550 |
| >= 120 < 150 | 0.0680 | 0.115 | 0.124 | 0.115 |
| >= 150 < 180 | 0.131 | 0.216 | 0.225 | 0.216 |
| >= 180 < 210 | 0.165 | 0.259 | 0.264 | 0.259 |
| >= 210 < 240 | 0.154 | 0.245 | 0.251 | 0.245 |
| >= 240 < 270 | 0.0270 | 0.0470 | 0.0520 | 0.0470 |
| >= 270 < 300 | 0.0790 | 0.125 | 0.131 | 0.125 |
| >= 300 < 330 | 0.0920 | 0.143 | 0.147 | 0.143 |
| >= 330 < 360 | 0.119 | 0.178 | 0.181 | 0.178 |

Notes:

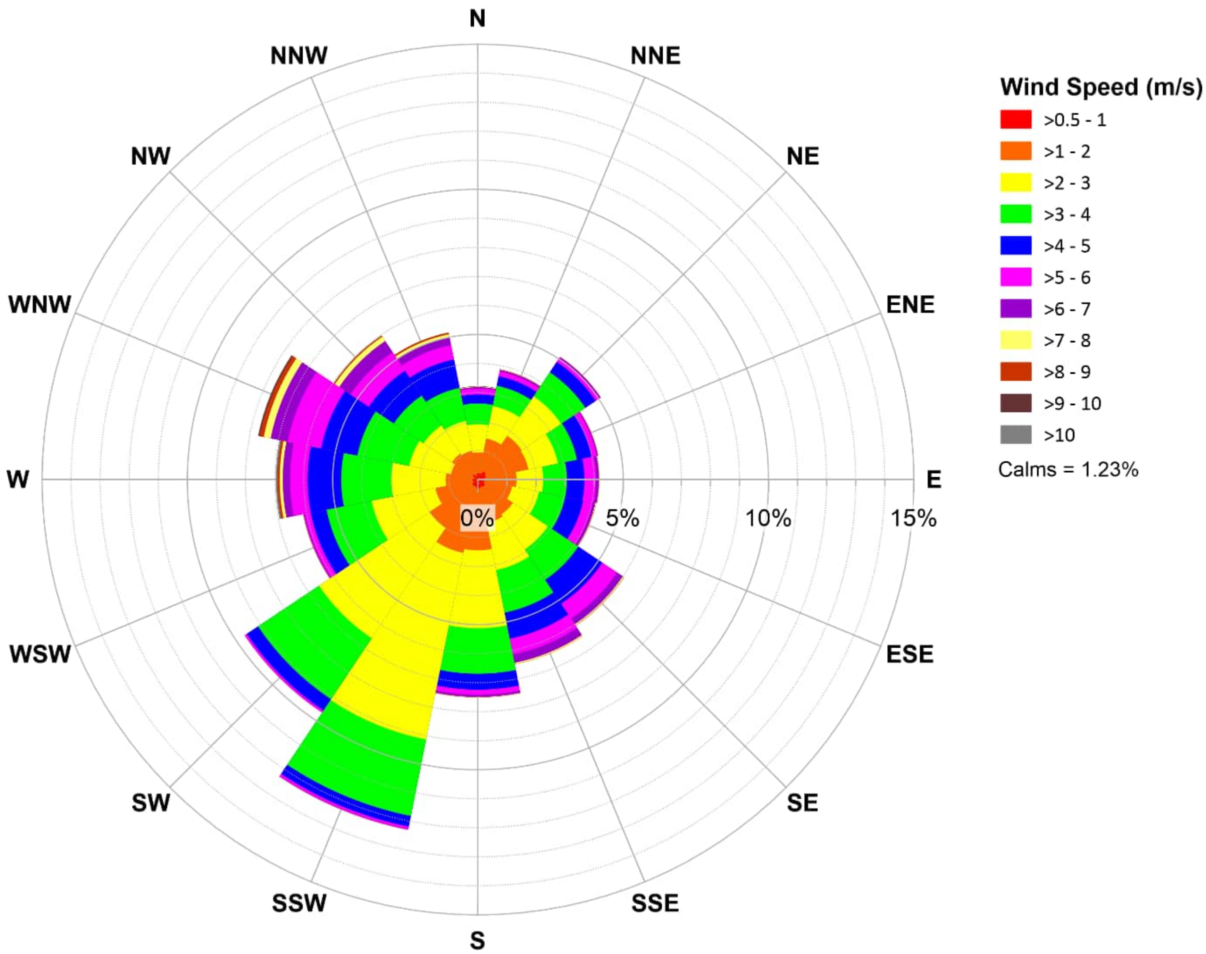
1. Winter is defined as November, December, January, February, and March
2. Spring is defined as April and May
3. Summer is defined as June, July, and August
4. Autumn is defined as September and October

## 5.1 Analysis of AERMET Meteorology

Figure 5 shows a joint frequency distribution plot or wind rose showing the distribution of wind speeds and directions at the Site based on the AERMET surface meteorological file. The wind rose shows that winds are generally blowing from the south southwest (12.4%) and southwest (9.70%) over the five-year period. Figure 6 shows the distribution of wind speeds at the GBWWTP. Most of the winds are between 1 m/s and 4 m/s (84.7%) with periods defined as calm (less than 0.5 m/s) occurring 1.23% of the five-year period.

**Reference:** **Air Quality Dispersion Modelling for the Proposed Enclosed Flare at the Gold Bar Wastewater Treatment Plant**

***Figure 5: Joint Frequency Distribution Plot (Wind Rose) from the AERMET Surface Meteorological Data File for the Gold Bar Wastewater Treatment Plant – 2015 to 2019 (43,824 hours)***



**Reference: Air Quality Dispersion Modelling for the Proposed Enclosed Flare at the Gold Bar Wastewater Treatment Plant**

***Figure 6: Wind Speed Histograms from the AERMET Surface Meteorological Data File for the Gold Bar Wastewater Treatment Plant – 2015 to 2019 (43,824 hours)***

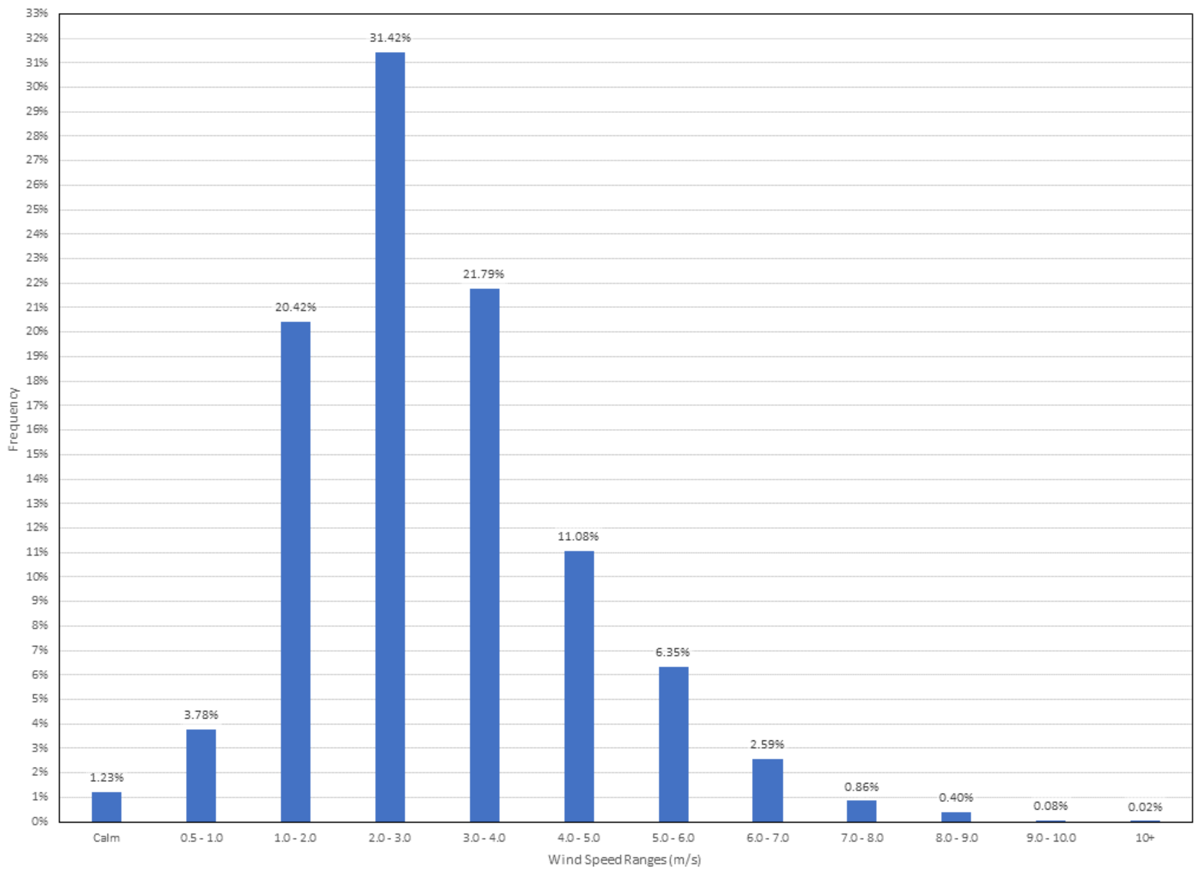


Figure 7 shows the hour-by-hour Pascal-Gifford stability classes predicted in the meteorological modelling which shows the diurnal pattern expected with unstable conditions (Classes A – C) occurring during the day and stable conditions (Classes E and F) occurring mainly at night. Neutral conditions (Class D) are distributed throughout the day.

***Figure 7: Stability Class Distribution by Hour of the Day from the AERMET Surface Meteorological Data File for the Gold Bar Wastewater Treatment Plant – 2015 to 2019 (43,824 hours)***

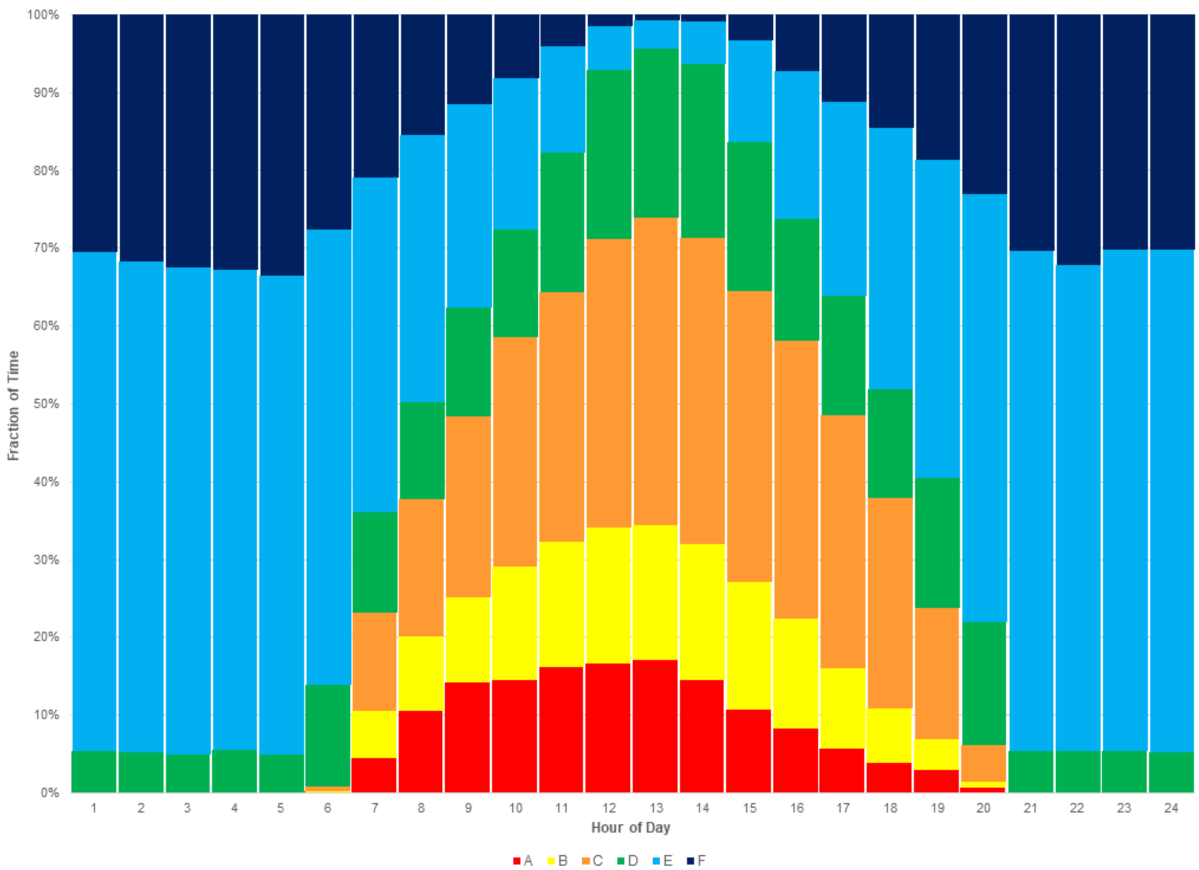


Figure 8 shows that the most unstable conditions (Class A) occur when the average wind speeds are below 1.57 m/s with Class B occurring between average wind speeds of 0.77 m/s and 2.80 m/s, and Class C occurring between averaged wind speeds of 1.90 m/s and 4.22 m/s. Neutral conditions (Class D) tends to occur during higher averaged wind speeds of 3.85 m/s and 5.02 m/s. Class E is associated with average wind speeds between 2.28 m/s and 3.05 m/s. Class F is associated with average wind speeds between 0.88 m/s and 1.38 m/s.

***Figure 8: Wind Speeds Associated by Stability Class for each Hour of the Day from the AERMET Surface Meteorological Data File for the Gold Bar Wastewater Treatment Plant – 2015 to 2019 (43,824 hours)***

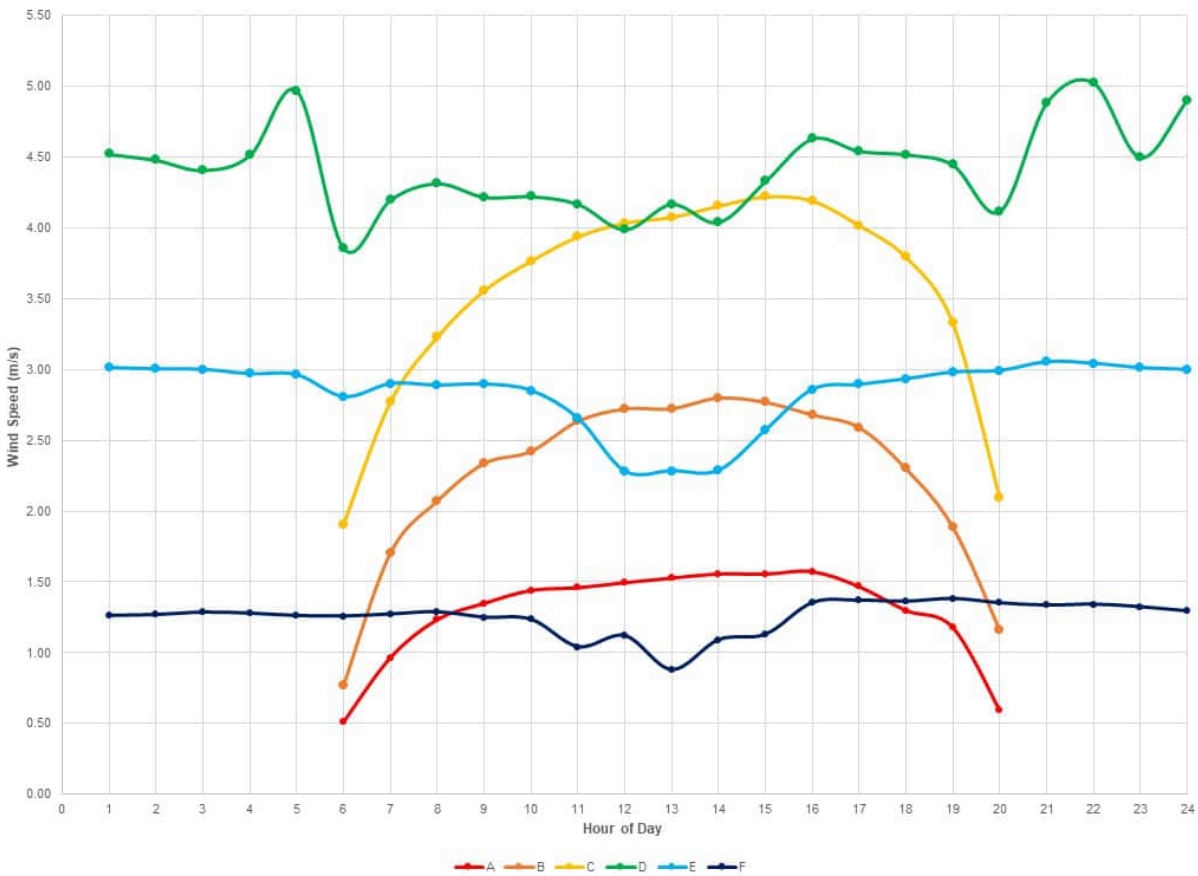


Figure 9 shows the relationship between the predicted mixing heights during each hour of the day for each of the stability classes. Overall, it shows that for unstable (Classes A-C) and neutral (Class D) conditions the mixing height increases during daylight hours. During nighttime hours during neutral conditions the mixing height decreases. During stable conditions (Classes E and F) the mixing height is relatively stable.

***Figure 9: Mixing Heights Associated by Stability Class for each Hour of the Day from the AERMET Surface Meteorological Data File for the Gold Bar Wastewater Treatment Plant – 2015 to 2019 (43,824 hours)***

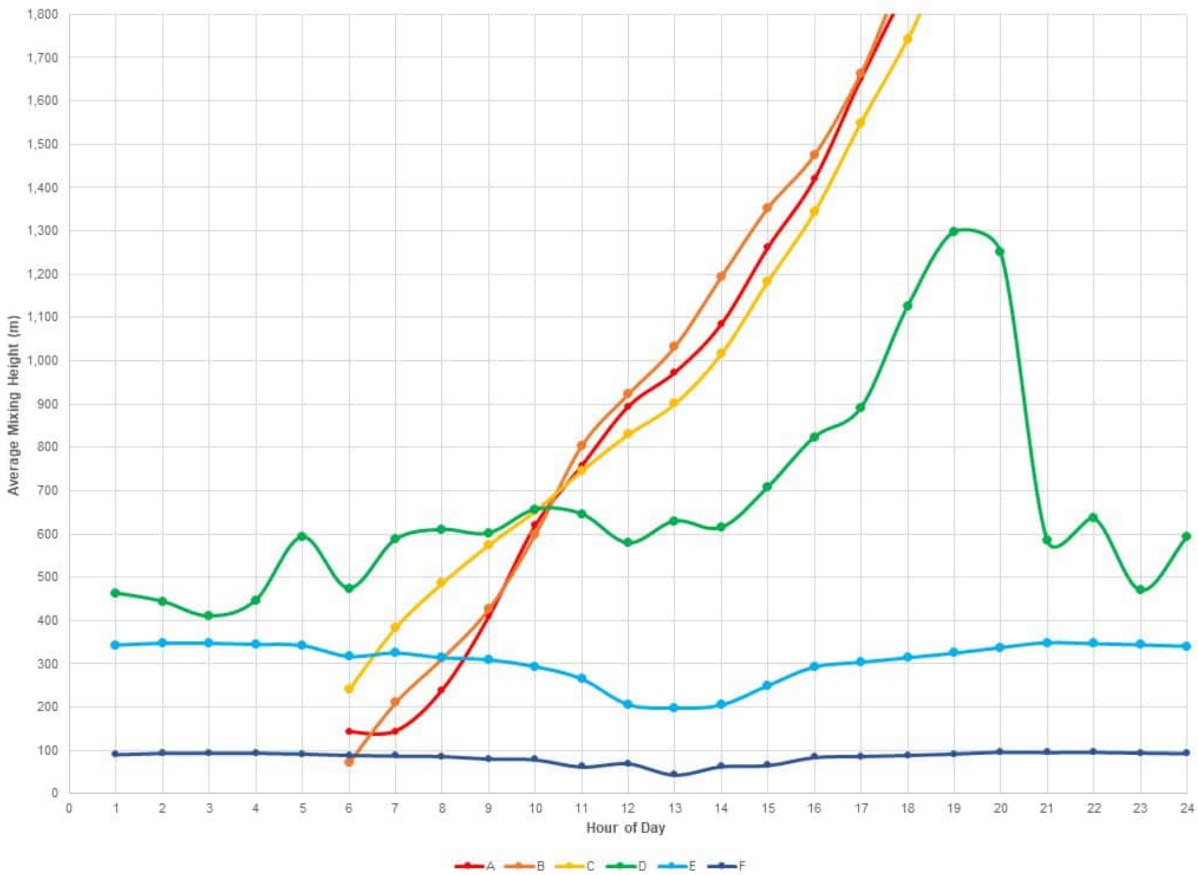
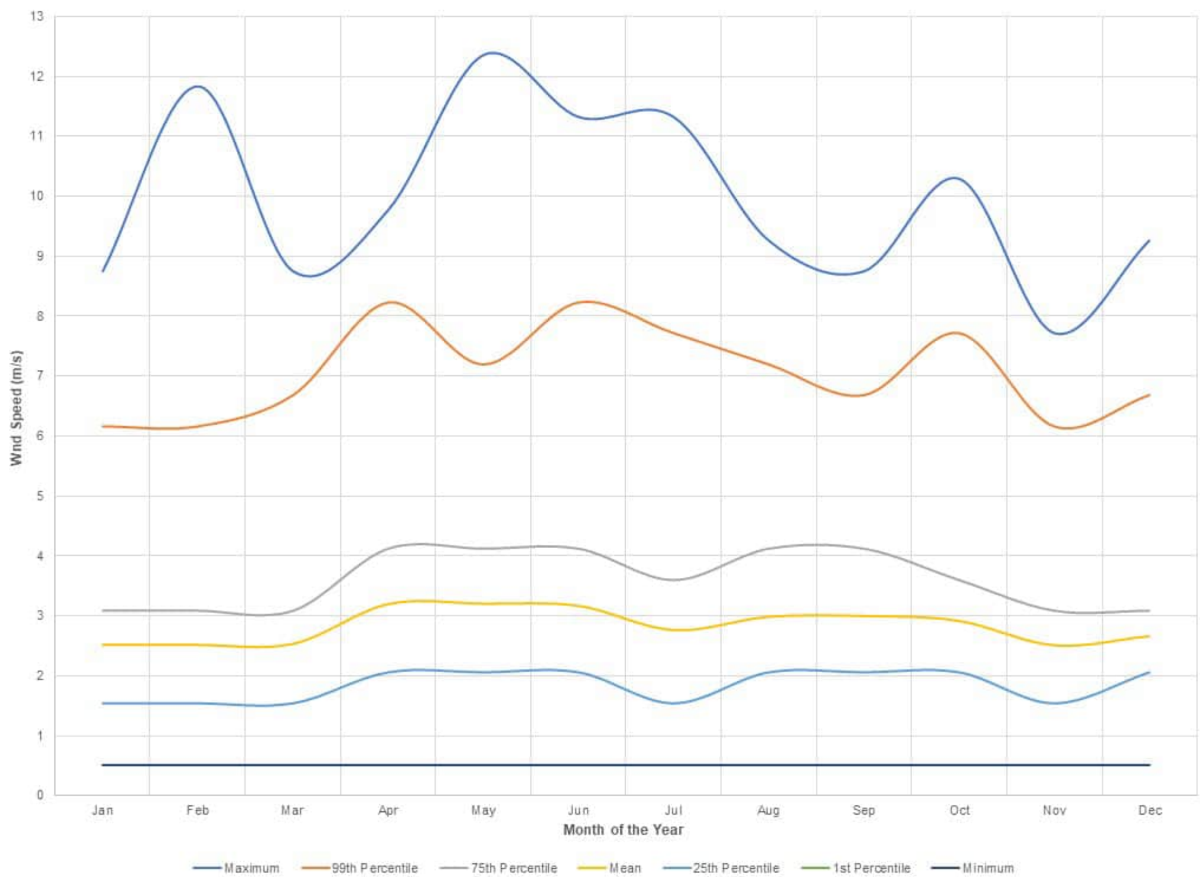


Figure 10 shows the average, minimum, maximum, and selected percentiles of the monthly wind speeds predicted in the meteorological modelling. This shows that higher wind speeds occur in February, May, June, and July. Lower wind speeds occurring during March, September, October, November, and December.

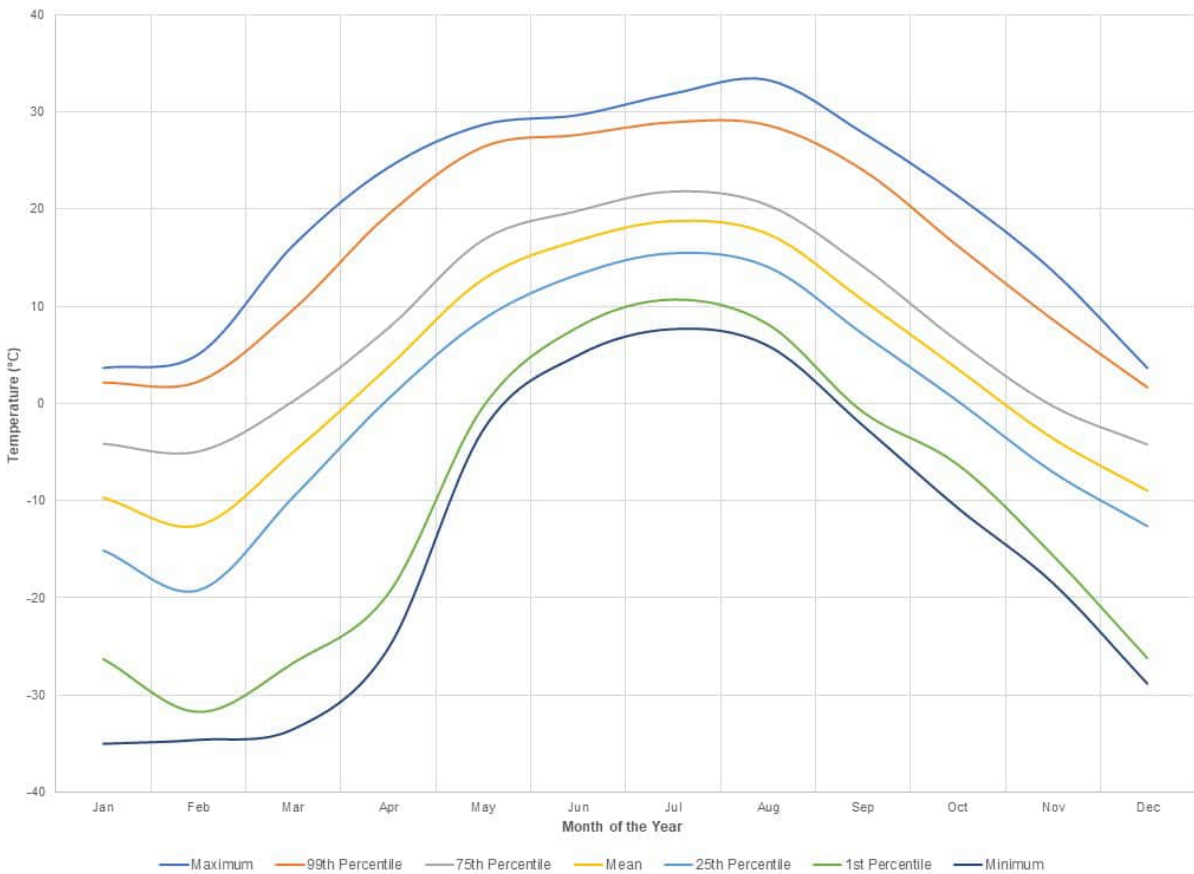
***Figure 10: Maximum, Average, Minimum and Selected Percentiles of Wind Speed by Month from the AERMET Surface Meteorological Data File for the Gold Bar Wastewater Treatment Plant – 2015 to 2019 (43,824 hours)***



**Reference: Air Quality Dispersion Modelling for the Proposed Enclosed Flare at the Gold Bar Wastewater Treatment Plant**

Figure 11 shows the average, minimum, maximum, and selected percentiles of the monthly temperatures predicted in the meteorological modelling. This shows that the expected distribution of temperatures is occurring in the meteorological model with the maximum ambient temperatures occurring in the summer months (June – August) and the minimum temperatures occurring in the winter months (November, December, January, February, and March).

***Figure 11: Maximum, Average, Minimum and Selected Percentiles of Ambient Temperature by Month from the AERMET Surface Meteorological Data File for the Gold Bar Wastewater Treatment Plant – 2015 to 2019 (43,824 hours)***




Overall, this analysis confirms that the AERMET meteorological modelling is sufficient for use with the AERMOD dispersion model for this Site.

# 6 Regional Background Air Quality

The regional background ambient air quality is the result of anthropogenic (man-made) and biogenic (natural) air emissions on a local, regional, and global scale. Representative background ambient air quality concentrations were determined based on analysis of regional ambient air quality monitoring data and were added to the model-predicted concentrations to account for other emission sources (anthropogenic or biogenic) in and outside the study area that may not have been captured in the air dispersion modelling.

The AQMG (AEP, 2021a) requires the most recent three years of monitoring data be used to establish background concentrations for substances of interest. Data are available from the AEPA Data Management Platform for Alberta Air Quality Data (AEPA, 2024b) for $SO_2$. The Edmonton Beverly and Edmonton Gold Bar ambient air quality monitoring stations from the Strathcona Industry Association (SIA) as well as the Alberta Capital Airshed (ACA) Edmonton East air quality monitoring station are closest to the GBWWTP and considered representative of the regional air quality. Table 12 shows the locations of the three sites. EPCOR recently installed an air quality monitoring station 182 m west southwest of the proposed enclosed flare 1 location, but the required three years of data were not available. Figure 12 shows a Google Earth Image showing the locations of the three sites and the EPCOR Gold Bar Air Quality Monitoring Station (AQMS).

***Table 12: Summary of Continuous Ambient Monitoring Stations Selected for Analysis***

| Station Name | Operator | Location (UTM Zone 11, NAD83) Easting | Location (UTM Zone 11, NAD83) Northing | Base Elevation | Distance from Plant | Direction from Plant |
|---|---|---|---|---|---|---|
| | | m E | m N | m ASL | km | |
| Edmonton Beverly | SIA [1] | 341,166 | 5,938,015 | 656 | 1.27 | ENE |
| Edmonton East | ACA [2] | 343,110 | 5,935,866 | 670 | 3.39 | ESE |
| Edmonton Gold Bar | SIA [1] | 340,024 | 5,936,085 | 663 | 1.28 | S |

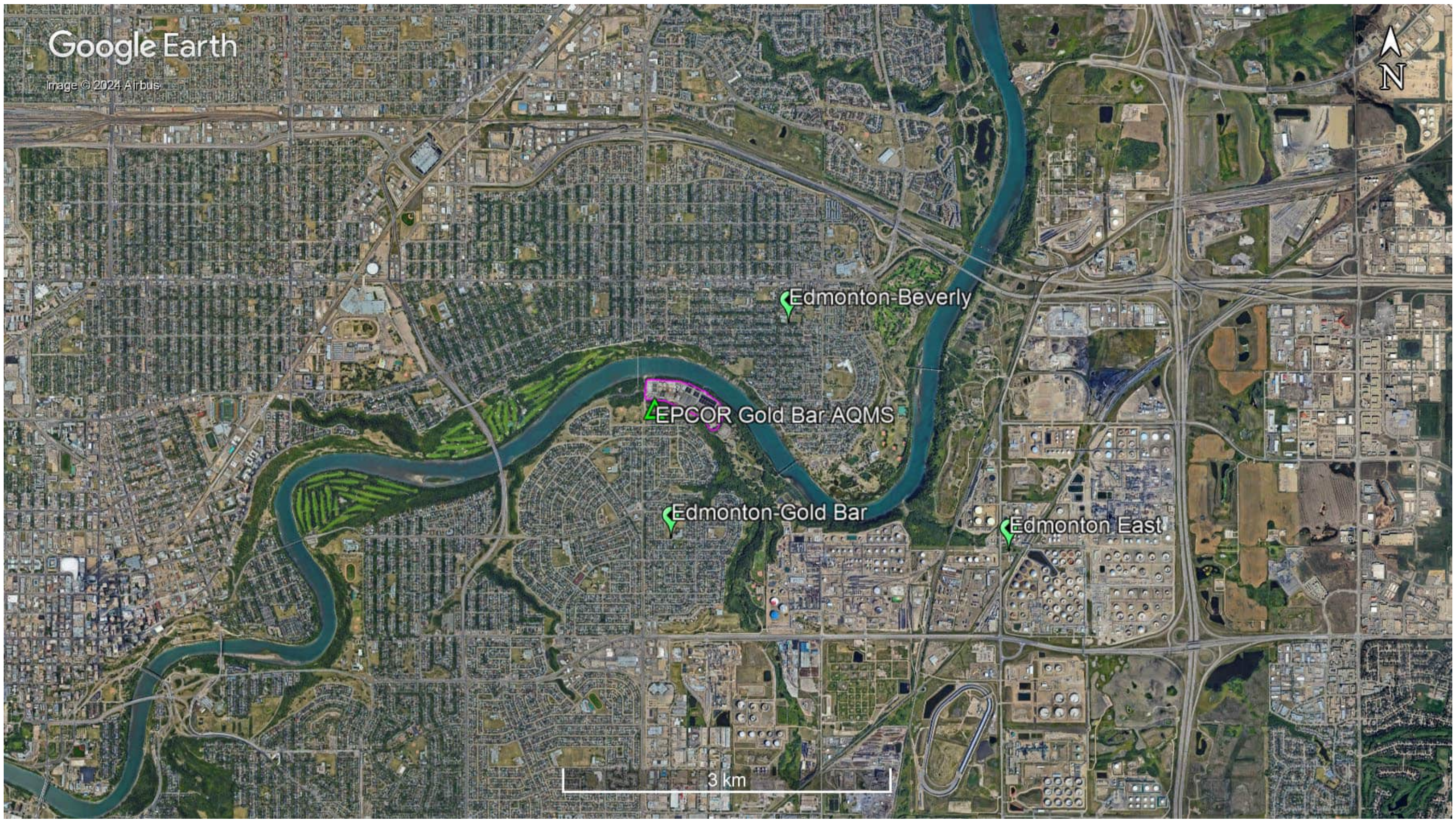
Notes:
1. Strathcona Industrial Association
2. Alberta Capital Airshed.

Source: Alberta Environment and Parks AirData Warehouse (AEPA, 2024b), Data period: 2021 - 2023

The ambient air quality data for all the stations were downloaded from the AEPA Data Management Platform for Alberta Air Quality Data (AEPA, 2024b) for the 2021 to 2023 monitoring years. All the data were above the 75% completeness requirement in the AQMG (AEP, 2021a) for use in dispersion modelling studies. As per the AQMG, the ambient air quality data was processed for refined-level assessments. Table 13 shows the baseline concentrations from the stations. The highlighted values (bolded) indicate the baseline concentrations used in this assessment.

**Reference:** **Air Quality Dispersion Modelling for the Proposed Enclosed Flare at the Gold Bar Wastewater Treatment Plant**

***Figure 12: Google Earth Image Showing the Locations of the Edmonton Beverly, Edmonton East, Edmonton Gold Bar and EPCOR Gold Bar Air Quality Monitoring Staton Locations***



**Reference: Air Quality Dispersion Modelling for the Proposed Enclosed Flare at the Gold Bar Wastewater Treatment Plant**

*Table 13: Statistics of Continuous Monitoring Data at the Regional Background Ambient Air Quality Stations*

| Substance | Averaging Period | AAAQO / AAAQG [4] | Measured Concentration [1,2,3] (µg/m$^3$) | | |
|---|---|---|---|---|---|
| | | | Edmonton Beverly | Edmonton East | Edmonton Gold Bar |
| $SO_2$ | 1-hour [5] | 450 | 11.9 | 5.16 | **3.86** |
| | 24-hour [5] | 125 | 6.49 | 3.08 | **2.47** |
| | 30-Day [5] | 30 | 3.29 | 1.65 | **1.38** |
| | Annual [5] | 20 | 2.42 | 1.00 | **1.02** |

Notes:

1. Data period: 2021-2023
2. Bold indicates baseline values added to model results.
3. Alberta Ambient Air Quality Objectives and Guidelines (AAAQO and AAAQG; (AEPA, 2024a))
4. Refined baseline concentrations based on the 90$^{th}$ percentile of 1-hour average measurements.
5. As per the AQMG (AEP, 2021a), for the 1 hour averaging period, percentiles are calculated from the complete hourly dataset. For other averaging periods (8-hour, 24-hour, 30-day, and annual), the maximum values are calculated from the reduced dataset (after removing 1-hour average concentrations greater than the 90$^{th}$ percentile).

The EPCOR Gold Bar Air Quality Monitoring Station (AQMS) started collecting and reporting data to AEPA on July 1, 2022. The first complete year of data collection occurred in 2023 with 98.3% completeness for the $SO_2$ concentration data. The maximum $SO_2$ concentration measured at the station in 2023 was 102 µg/m$^3$ (39 ppb) with an average annual $SO_2$ concentration of 5.43 µg/m$^3$ (2.08 ppb). Table 14 shows the statistics for the EPCOR Gold Bar AQMS process according to the AQMG for refined modelling.

Although the values from the EPCOR Gold Bar AQMS are closer to those of Edmonton East this could be a result of the proximity to the GBWWTP so it would not necessarily reflect the regional ambient air quality before it is influenced by the GBWWTP emissions. The Edmonton Gold Bar station is 1.28 km south of the GBWWTP and is at a similar elevation as the EPCOR AQMS (Elevation: 630 m ASL). As the air flow in this region will be influenced by the river valley and both stations are in the river valley, they would experience similar wind flow. Therefore, the Edmonton Gold Bar station it likely is more reflective of the regional air quality around the GBWWTP than either the Edmonton Beverly or Edmonton East stations.

**Reference: Air Quality Dispersion Modelling for the Proposed Enclosed Flare at the Gold Bar Wastewater Treatment Plant**

***Table 14: Statistics of Continuous Monitoring Data at the EPCOR Gold Bar Air Quality Monitoring Station***

| Substance | Averaging Period | AAAQO / AAAQG [2] | Measured Concentration [1] | |
|---|---|---|---|---|
| | | | µg/m³ | ppb |
| $SO_2$ | 1-hour [3,4] | 450 | 13.4 | 5.10 |
| | 24-hour [3,4] | 125 | 7.36 | 2.81 |
| | 30-Day [3,4] | 30 | 3.68 | 1.41 |
| | Annual [3,4] | 20 | 2.86 | 1.09 |

Notes:

1. Data period: 2023
2. Alberta Ambient Air Quality Objectives and Guidelines (AAAQO and AAAQG; (AEPA, 2024a))
3. Refined baseline concentrations based on the 90th percentile of 1-hour average measurements.
4. As per the AQMG (AEP, 2021a), for the 1 hour averaging period, percentiles are calculated from the complete hourly dataset. For other averaging periods (8-hour, 24-hour, 30-day, and annual), the maximum values are calculated from the reduced dataset (after removing 1-hour average concentrations greater than the 90th percentile).

# 7 Dispersion Modelling

## 7.1 AERMOD Model

The U.S. EPA AERMOD is a steady-state plume dispersion model which can simulate the effects of hourly varying meteorological conditions on air emission transport, dispersion, transformation, and deposition (U.S. EPA, 2023a). The model is designed to estimate near-field (less than 50 km) ground-level concentrations considering terrain influences. The concentration distribution in the plume is assumed to be Gaussian in both horizontal and vertical directions. AERMOD contains algorithms for near-source effects such as building downwash, transitional plume rise, and partial plume penetration.

AERMOD requires hourly meteorological data processed with the AERMET (U.S. EPA, 2023b) meteorological pre-processor including parameters that characterize the amount of turbulence in the atmosphere (friction velocity and Monin-Obukhov length). AERMOD produces hourly average pollutant concentrations that can be further processed to obtain predictions for other averaging periods. Input terrain elevations at receptor locations for the AERMOD model are assigned by the terrain pre-processor AERMAP (U.S. EPA, 2018). In addition to terrain elevations, AERMAP assigns a height scale to each receptor location which represents the terrain height that has the greatest influence on dispersion for an individual receptor.

The AERMOD dispersion model is accepted by AEPA for refined air quality assessments. This assessment is undertaken in accordance with the AQMG (AEP, 2021a). At the time that the modelling was completed, Version 23132 was the most recent version of the AERMOD model available from the U.S. EPA. As required in the AQMG, this version of the model was used in the assessment.

In this assessment, the total conversion method was applied for $NO_X$ to $NO_2$ conversion as the $NO_X$ emissions are low.

## 7.2 Modelling Scenarios

As per the AQMG refined modelling was completed using the AERMOD dispersion modelling. As discussed previously there are three scenarios with two operational cases per scenario. The scenarios that were modelled are:

- Scenario 1: Baseline – Existing sources at 90$^{th}$ percentile of the hourly biogas flow rate (1,600 $Nm^3/h$) with 3,000 ppm (4.32 $g/m^3$) $H_2S$ content
  - Summer flow rate (70% Flare (South flare 65% and north Flare 5%); and 30% boilers with boiler house 1 combusting no biogas and two boilers in boiler house 2 combusting biogas)
  - Winter Flow rate (30% Flare (South flare 30% and north flare 0%); and 70% boilers with three boilers in each boiler house combusting biogas)
- Scenario 2: Current Application – Existing boilers and new enclosed flare at 90$^{th}$ percentile of the hourly biogas flow rate (1,600 $Nm^3/h$) with 3,000 ppm (4.32 $g/m^3$) $H_2S$ content
  - Summer flow rate (70% Flare (enclosed flare 70% and existing flares 0%); and 30% boilers with boiler house 1 combusting no biogas and two boilers in boiler house 2 combusting biogas)
  - Winter Flow rate (30% Flare (enclosed flare 70% and existing flares 0%); and 70% boilers with three boilers in each boiler house combusting biogas)

- Scenario 3: Future Application – Existing boilers and enclosed flare in 2040 projected biogas flow rate of 2,610 $Nm^3/h$ with 3,000 ppm (4.32 $g/m^3$) $H_2S$ content
  - Summer flow rate (70% Flare (enclosed flare 70% and existing flares 0%); and 30% boilers with boiler house 1 combusting no biogas and two boilers in boiler house 2 combusting biogas)
  - Winter Flow rate (30% Flare (enclosed flare 30% and existing flares 0%); and 70% boilers with three boilers in each boiler house combusting biogas)

It was assumed that the Summer (Worst Case Flaring) and Winter (Worst Case Boilers) operational cases could potentially occur at any time during the year and are not restricted to specific times of the year. This is a conservative assumption from a modelling perspective as in actual operations most of the time the GBWWTP would be operating at lower biogas flow rates and the biogas would have lower $H_2S$ content.

# 8 Results

## 8.1 Scenario 1 – Baseline

Table 15 shows the predicted ground-level $SO_2$ concentrations for each of the averaging periods for the summer operations case for Scenario 1. The 9$^{th}$ highest 1-hour average concentration is predicted to be below the AAAQO with the boiler sources in Boiler House 2 contributing most of the predicted $SO_2$ ground-level concentrations. The maximum predicted ground-level 24-hour, 30-day, and annual average $SO_2$ concentrations are above the AAAQO. The predicted ground-level $SO_2$ concentrations from the existing flares are below the AAAQO for all averaging periods.

Figure B-1 to Figure B-4 shows the aerial extent of the predicted concentrations for the 9$^{th}$ highest 1-hour average, maximum 24-hour average, maximum 30-day average, and maximum annual average. These plots generally show that the highest concentrations occur on or near the boundary of the GBWWTP and decrease with increasing distance from the Plant. The area with the highest predicted 9$^{th}$ highest 1-hour average and maximum 24-hour average ground level concentrations occurs near the southwest corner of the Plant boundary. The area with the highest predicted 30-day and annual average ground level concentration occurs on the north northwestern Plant boundary. The longer-term averages tend to be more spread out to the northeast of the GBWWTP.

Table 16 shows the predicted ground-level $SO_2$ concentrations for each of the averaging periods for the winter operations case for Scenario 1. The predicted ground-level $SO_2$ concentrations are above the AAAQO for all the averaging periods. The predicted 9$^{th}$ highest 1-hour average concentrations are higher from Boiler House 1 than Boiler House 2. The predicted maximum 24-hour, 30-day, and annual average $SO_2$ concentrations are higher from Boiler House 2 than Boiler House 1. The predicted ground-level $SO_2$ concentrations from the existing flares are below the AAAQO for all averaging periods.

Figure B-5 to Figure B-8 shows the aerial extent of the predicted concentration for the 9$^{th}$ highest 1-hour average, maximum 24-hour average, maximum 30-day average, and maximum annual average. These plots generally show that the highest concentrations occur on or near the boundary of the GBWWTP and decrease with increasing distance from the Plant. The area with the highest predicted 9$^{th}$ highest 1-hour average ground level concentration occurs near the western Plant boundary. The area with the highest predicted 24-hour average ground level concentration occurs near the southwest corner of the Plant. The area with the highest predicted 30-day and annual average ground level concentration occurs on the north northwestern Plant boundary. The longer-term averages tend to be more spread out to the northeast of the GBWWTP.

**Reference: Air Quality Dispersion Modelling for the Proposed Enclosed Flare at the Gold Bar Wastewater Treatment Plant**

*Table 15: Predicted $SO_2$ Concentrations for Scenario 1 (Baseline) for the Summer Operations Case*

| Parameter | 9th Highest 1-hour Average | Maximum 24-hour Average | Maximum 30-day Average | Maximum Annual Average |
|---|---|---|---|---|
| Units | µg/m³ | µg/m³ | µg/m³ | µg/m³ |
| Background Concentrations [1] | 3.86 | 2.47 | 1.38 | 1.02 |
| AAAQO [2] | 450 | 125 | 30 | 20 |
| Predicted Concentrations | 325 | **217** | **58.1** | **26.8** |
| Predicted Concentrations + Background | 328 | **219** | **59.5** | **27.8** |
| Contribution (Excluding Background Concentrations) [4,5] | | | | |
| Boiler House 1 | — | — | — | — |
| Boiler House 2 | 325 | **217** | **58.1** | **26.4** |
| South Flare | 30.9 | 15.5 | 2.74 | 0.935 |
| North Flare | 7.98 | 4.80 | 0.479 | 0.107 |

Notes:

1. Regional background concentrations were measured at the Strathcona Industry Association (SIA) Gold Bar ambient air quality monitoring station during 2021 to 2023 and processed as per the AQMG (AEP, 2021a) for refined modelling (Table 13).
2. Alberta Ambient Air Quality Objectives (AAAQO; (AEPA, 2024a)).
3. **BOLD** text indicated predicted $SO_2$ concentrations were above the AAAQO.
4. Contribution concentrations shown are the predicted ground-level $SO_2$ concentrations resulting from the emissions from those sources in the source group (i.e., Boiler House 1 includes emissions from Boilers 1 – 5). When modelled independently they can result in higher concentrations occurring in different areas and at different times. As a result, the concentrations shown do not necessarily directly combine to sum up to the overall predicted ground level $SO_2$ concentrations when all sources are considered together.
5. "—" indicates that the predicted $SO_2$ concentrations were zero as the source was not actively combusting biogas.

*Table 16: Predicted $SO_2$ Concentrations for Scenario 1 (Baseline) for the Winter Operations Case*

| Parameter | 9th Highest 1-hour Average | Maximum 24-hour Average | Maximum 30-day Average | Maximum Annual Average |
|---|---|---|---|---|
| Units | µg/m³ | µg/m³ | µg/m³ | µg/m³ |
| Background Concentrations [1] | 3.86 | 2.47 | 1.38 | 1.02 |
| AAAQO [2] | 450 | 125 | 30 | 20 |
| Predicted Concentrations | **619** | **320** | **90.4** | **53.3** |
| Predicted Concentrations + Background | **623** | **322** | **91.8** | **54.3** |
| Contribution (Excluding Background Concentrations) [4,5] | | | | |
| Boiler House 1 | **500** | **266** | **47.1** | **23.5** |
| Boiler House 2 | **458** | **309** | **77.5** | **34.9** |
| South Flare | 14.5 | 7.25 | 1.28 | 0.438 |
| North Flare | — | — | — | — |

Notes:

1. Regional background concentrations were measured at the Strathcona Industry Association (SIA) Gold Bar ambient air quality monitoring station during 2021 to 2023 and processed as per the AQMG (AEP, 2021a) for refined modelling (Table 13).
2. Alberta Ambient Air Quality Objectives (AAAQO; (AEPA, 2024a)).
3. **BOLD** text indicated predicted $SO_2$ concentrations were above the AAAQO.
4. Contribution concentrations shown are the predicted ground-level $SO_2$ concentrations resulting from the emissions from those sources in the source group (i.e., Boiler House 1 includes emissions from Boilers 1 – 5). When modelled independently they can result in higher concentrations occurring in different areas and at different times. As a result, the concentrations shown do not necessarily directly combine to sum up to the overall predicted ground level $SO_2$ concentrations when all sources are considered together.
5. "—" indicates that the predicted $SO_2$ concentrations were zero as the source was not actively combusting biogas.

## 8.2 Scenario 2: Current Application

Table 17 shows the predicted ground-level $SO_2$ concentrations for each of the averaging periods for the summer operations case for Scenario 2. The 9th highest 1-hour average is predicted to below the AAAQO with the existing boilers in Boiler House 2 contributing most of the predicted $SO_2$ ground level concentrations. The maximum predicted ground-level 24-hour, 30-day, and annual average $SO_2$ concentrations are above the AAAQO. The predicted ground-level $SO_2$ concentrations from the proposed enclosed flare are below the AAAQO for all averaging periods. Overall, the difference between Scenario 1 and Scenario 2 is less than 1.5% with the largest difference being the annual average.

Figure B-9 to Figure B-12 shows the aerial extent of the predicted concentration for the 9th highest 1-hour average, maximum 24-hour average, maximum 30-day average, and maximum annual average. These plots generally show that the highest concentrations occur on or near the boundary of the GBWWTP and decrease with increasing distance from the Plant. The area with the highest predicted 9th highest 1-hour average and maximum 24-hour average ground level concentrations occurs near the southwest corner of the Plant boundary. The area with the highest predicted 30-day and annual average ground level concentrations occurs on the north northwestern Plant boundary. The longer-term averages tend to be more spread out to the northeast of the GBWWTP. These plots are nearly identical when comparing Scenario 1 and Scenario 2.

Table 18 shows the predicted ground-level $SO_2$ concentrations for each of the averaging periods for the winter operations case for Scenario 2. The predicted ground-level $SO_2$ concentrations are above the AAAQO for all the averaging periods. The predicted $SO_2$ concentrations are the highest from the existing boilers. The predicted ground-level $SO_2$ concentrations from the proposed enclosed flare are below the AAAQO for all averaging periods. The differences between Scenario 1 and Scenario 2 are less than 0.2%.

Figure B-13 to Figure B-16 shows the aerial extent of the predicted concentration for the 9th highest 1-hour average, maximum 24-hour average, maximum 30-day average, and maximum annual average. These plots generally show that the highest concentrations occur on or near the boundary of the GBWWTP and decrease with increasing distance from the Plant. The area with the highest predicted 9th highest 1-hour average ground level concentration occurs near the western Plant boundary. The area with the highest predicted 24-hour average ground level concentration occurs near the southwest corner of the Plant. The area with the highest predicted 30-day and annual average ground level concentration occurs on the north northwestern Plant boundary. The longer-term averages tend to be more spread out to the northeast of the GBWWTP. As with the summer operations case the plots are nearly identical to those for Scenario 1.

*Table 17: Predicted $SO_2$ Concentrations for Scenario 2 (Current Application) for the Summer Operations Case*

| Parameter | 9th Highest 1-hour Average | Maximum 24-hour Average | Maximum 30-day Average | Maximum Annual Average |
|---|---|---|---|---|
| Units | µg/m³ | µg/m³ | µg/m³ | µg/m³ |
| Background Concentrations [1] | 3.86 | 2.47 | 1.38 | 1.02 |
| AAAQO [2] | 450 | 125 | 30 | 20 |
| Predicted Concentrations | 325 | **217** | **58.6** | **27.2** |
| Predicted Concentrations + Background | 328 | **220** | **59.9** | **28.2** |
| % Change from Scenario 1 | 0.00 | 0.457 | 0.672 | 1.44 |
| Contribution (Excluding Background Concentrations) [4,5] | | | | |
| Existing Sources | 325 | **217** | **58.1** | **26.4** |
| Proposed Enclosed Flare | 151 | 78.5 | 6.37 | 2.42 |

Notes:

1. Regional background concentrations were measured at the Strathcona Industry Association (SIA) Gold Bar ambient air quality monitoring station during 2021 to 2023 and processed as per the AQMG (AEP, 2021a) for refined modelling (Table 13).
2. Alberta Ambient Air Quality Objectives (AAAQO; (AEPA, 2024a)).
3. **BOLD** text indicated predicted $SO_2$ concentrations were above the AAAQO.
4. Contribution concentrations shown are the predicted ground-level $SO_2$ concentrations resulting from the emissions from those sources in the source group (i.e., Existing Boilers includes emissions from Boilers 1 – 10). When modelled independently they can result in higher concentrations occurring in different areas and at different times. As a result, the concentrations shown do not necessarily directly combine to sum up to the overall predicted ground level $SO_2$ concentrations when all sources are considered together.
5. North and South flares were assumed to have zero emissions during normal operations as all excess biogas would be directed to the proposed enclosed flare stack.

**Reference: Air Quality Dispersion Modelling for the Proposed Enclosed Flare at the Gold Bar Wastewater Treatment Plant**

*Table 18: Predicted $SO_2$ Concentrations for Scenario 2 (Current Application) for the Winter Operations Case*

| Parameter | 9th Highest 1-hour Average | Maximum 24-hour Average | Maximum 30-day Average | Maximum Annual Average |
|---|---|---|---|---|
| Units | µg/m³ | µg/m³ | µg/m³ | µg/m³ |
| Background Concentrations [1] | 3.86 | 2.47 | 1.38 | 1.02 |
| AAAQO [2] | 450 | 125 | 30 | 20 |
| Predicted Concentrations | **619** | **319** | **90.4** | **53.4** |
| Predicted Concentrations + Background | **623** | **322** | **91.8** | **54.4** |
| % Change from Scenario 1 | 0.00 | 0.00 | 0.00 | 0.184 |
| Contribution (Excluding Background Concentrations) [4,5] | | | | |
| Existing Boilers | **619** | **319** | **90.2** | **53.1** |
| Proposed Enclosed Flare | 64.8 | 33.6 | 2.73 | 1.04 |

Notes:

1. Regional background concentrations were measured at the Strathcona Industry Association (SIA) Gold Bar ambient air quality monitoring station during 2021 to 2023 and processed as per the AQMG (AEP, 2021a) for refined modelling (Table 13).
2. Alberta Ambient Air Quality Objectives (AAAQO; (AEPA, 2024a)).
3. **BOLD** text indicated predicted $SO_2$ concentrations were above the AAAQO.
4. Contribution concentrations shown are the predicted ground-level $SO_2$ concentrations resulting from the emissions from those sources in the source group (i.e., Existing Boilers includes emissions from Boilers 1 – 10). When modelled independently they can result in higher concentrations occurring in different areas and at different times. As a result, the concentrations shown do not necessarily directly combine to sum up to the overall predicted ground level $SO_2$ concentrations when all sources are considered together.
5. North and South flares were assumed to have zero emissions during normal operations as all excess biogas would be directed to the proposed enclosed flare stack.

## 8.3 Scenario 3: Future Application

Table 19 shows the predicted ground-level $SO_2$ concentrations for each of the averaging periods for the summer operations case for Scenario 3. The predicted ground-level $SO_2$ concentrations are above the AAAQO for all averaging periods. Most of the $SO_2$ concentrations are associated with the existing boilers. The predicted ground-level $SO_2$ concentrations from the proposed enclosed flare are below the AAAQO for all averaging periods except for the 24-hour average. The predicted $SO_2$ concentrations increase between 61.0% and 62.5% from Scenario 2 mainly due 63.1% increase in the volume of biogas being combusted by the sources. This scenario would be representative of the enclosed flare operating 97.4% of the maximum design capacity.

Figure B-17 to Figure B-20 shows the aerial extent of the predicted concentration for the 9$^{th}$ highest 1-hour average, maximum 24-hour average, maximum 30-day average, and maximum annual average. These plots generally show that the highest concentrations occur on or near the boundary of the GBWWTP and decrease with increasing distance from the Plant. The area with the highest predicted 9$^{th}$ highest 1-hour average and maximum 24-hour average ground level concentrations occurs near the southwest corner of the Plant boundary. The area with the highest predicted 30-day and annual average ground level concentrations occurs on the north northwestern Plant boundary. The longer-term averages tend to be more spread out to the northeast of the GBWWTP. These plots are like Scenario 2 but the extents of the $SO_2$ isopleths extend further from the Plant.

Table 20 shows the predicted ground-level $SO_2$ concentrations for each of the averaging periods for the winter operations case for Scenario 3. The predicted ground-level $SO_2$ concentrations are above the AAAQO for all the averaging periods. The predicted $SO_2$ concentrations are the highest from the existing boilers. The predicted ground-level $SO_2$ concentrations from the proposed enclosed flare are below the AAAQO for all averaging periods. The predicted $SO_2$ concentrations increase between 62.1% and 62.8% from Scenario 2 mainly due 63.1% increase in the volume of biogas being combusted by the sources

Figure B-21 to Figure B-24 shows the aerial extent of the predicted concentration for the 9$^{th}$ highest 1-hour average, maximum 24-hour average, maximum 30-day average, and maximum annual average. These plots generally show that the highest concentrations occur on or near the boundary of the GBWWTP and decrease with increasing distance from the Plant. The area with the highest predicted 9$^{th}$ highest 1-hour average ground level concentration occurs near the western Plant boundary. The area with the highest predicted 24-hour average ground level concentration occurs near the southwest corner of the Plant. The area with the highest predicted 30-day and annual average ground level concentrations occurs on the north northwestern Plant boundary. The longer-term averages tend to be more spread out to the northeast of the GBWWTP. As with the summer operations case the plots are similar to those in Scenario 2 with the extents of the $SO_2$ isopleths extending further from the GBWWTP.

**Reference: Air Quality Dispersion Modelling for the Proposed Enclosed Flare at the Gold Bar Wastewater Treatment Plant**

*Table 19: Predicted $SO_2$ Concentrations for Scenario 3 (Future Application) for the Summer Operations Case*

| Parameter | 9th Highest 1-hour Average | Maximum 24-hour Average | Maximum 30-day Average | Maximum Annual Average |
|---|---|---|---|---|
| Units | µg/m³ | µg/m³ | µg/m³ | µg/m³ |
| Background Concentrations [1] | 3.86 | 2.47 | 1.38 | 1.02 |
| AAAQO [2] | 450 | 125 | 30 | 20 |
| Predicted Concentrations | **529** | **354** | **95.7** | **44.4** |
| Predicted Concentrations + Background | **533** | **357** | **97.1** | **45.4** |
| % Change from Scenario 2 | 62.5 | 62.3 | 61.8 | 61.0 |
| Contribution (Excluding Background Concentrations) [4,5] | | | | |
| Existing Boilers | **529** | **354** | **94.8** | **43.1** |
| Proposed enclosed flare | 247 | **128** | 10.4 | 3.95 |

Notes:

1. Regional background concentrations were measured at the Strathcona Industry Association (SIA) Gold Bar ambient air quality monitoring station during 2021 to 2023 and processed as per the AQMG (AEP, 2021a) for refined modelling (Table 13).
2. Alberta Ambient Air Quality Objectives (AAAQO; (AEPA, 2024a)).
3. **BOLD** text indicated predicted $SO_2$ concentrations were above the AAAQO.
4. Contribution concentrations shown are the predicted ground-level $SO_2$ concentrations resulting from the emissions from those sources in the source group (i.e., Existing Boilers includes emissions from Boilers 1 – 10). When modelled independently they can result in higher concentrations occurring in different areas and at different times. As a result, the concentrations shown do not necessarily directly combine to sum up to the overall predicted ground level $SO_2$ concentrations when all sources are considered together.
5. North and South flares were assumed to have zero emissions during normal operations as all excess biogas would be directed to the proposed enclosed flare stack.

**Reference: Air Quality Dispersion Modelling for the Proposed Enclosed Flare at the Gold Bar Wastewater Treatment Plant**

*Table 20: Predicted $SO_2$ Concentrations for Scenario 3 (Future Application) for the Winter Operations Case*

| Parameter | 9th Highest 1-hour Average | Maximum 24-hour Average | Maximum 30-day Average | Maximum Annual Average |
|---|---|---|---|---|
| Units | μg/m$^3$ | μg/m$^3$ | μg/m$^3$ | μg/m$^3$ |
| Background Concentrations [1] | 3.86 | 2.47 | 1.38 | 1.02 |
| AAAQO [2] | 450 | 125 | 30 | 20 |
| Predicted Concentrations | **1,010** | **521** | **147** | **87.1** |
| Predicted Concentrations + Background | **1,014** | **524** | **149** | **88.2** |
| % Change from Scenario 2 | 62.8 | 62.7 | 62.3 | 62.1 |
| Contribution (Excluding Background Concentrations) [4,5] | | | | |
| Existing Boilers | **1,010** | **521** | **147** | **86.6** |
| Proposed Enclosed Flare | 106 | 54.9 | 4.45 | 1.69 |

Notes:

1. Regional background concentrations were measured at the Strathcona Industry Association (SIA) Gold Bar ambient air quality monitoring station during 2021 to 2023 and processed as per the AQMG (AEP, 2021a) for refined modelling (Table 13).
2. Alberta Ambient Air Quality Objectives (AAAQO; (AEPA, 2024a)).
3. **BOLD** text indicated predicted $SO_2$ concentrations were above the AAAQO.
4. Contribution concentrations shown are the predicted ground-level $SO_2$ concentrations resulting from the emissions from those sources in the source group (i.e., Existing Boilers includes emissions from Boilers 1 – 10). When modelled independently they can result in higher concentrations occurring in different areas and at different times. As a result, the concentrations shown do not necessarily directly combine to sum up to the overall predicted ground level $SO_2$ concentrations when all sources are considered together.
5. North and South flares were assumed to have zero emissions during normal operations as all excess biogas would be directed to the proposed enclosed flare stack.

## 8.4 Summary of the Results

The results show that the replacement of the existing flares with an enclosed flare results is a minor change to the predicted $SO_2$ concentrations at or near the GBWWTP. Most of the predicted $SO_2$ concentrations under both summer and winter operational cases are from the combustion of biogas in the boilers. When the biogas flow rate is forecasted out to 2040 based on the biogas production history the operation of the enclosed flare does reach 97.4% of its design capacity during the summer operational case. When the enclosed flare combusts the 1,827 $Nm^3/h$ of biogas with 3,000 ppm $H_2S$ content (Scenario 3, Summer Operations Case) the predicted 24-hour average ground level $SO_2$ concentrations are above the AAAQO.

# 9 Closure

This document entitled “Preliminary Air Quality Dispersion Modelling for the Proposed Enclosed Flares at the Gold Bar Wastewater Treatment Plant” was prepared by Stantec Consulting Ltd. (“Stantec”) for the account of EPCOR Water Service Inc. (the “Client”). This document is to support the submission of the Preliminary Design Report (the “Report”) for the Gold Bar Wastewater Treatment Plant (the Plant or GBWWTP).

In connection therewith, this document may be reviewed and used by Alberta Environment and Protected Areas (AEPA) participating in the review process in the normal course of its duties. Except as set forth in the previous sentence, any reliance on this document by any other party or use of it for any other purpose is strictly prohibited. The material in it reflects Stantec’s professional judgment in light of the scope, schedule and other limitations stated in the document and in the contract between Stantec and the Client. The information and conclusions in the document are based on the conditions existing at the time the document was published and does not take into account any subsequent changes.

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**Reference: Air Quality Dispersion Modelling for the Proposed Enclosed Flare at the Gold Bar Wastewater Treatment Plant**

This report has been prepared by Wade Gieni, Air Quality Scientist. In accordance with the Stantec Project Management Framework Reid Person, Technical Discipline Lead completed the Quality Review and Michelle Xue, Senior Air Quality Engineer, completed the Independent Review. We trust that the information enclosed meets with your present requirements. Should you have any questions or require further information, please contact Wade Gieni directly at (403) 781-5471.

Regards,

**STANTEC CONSULTING LTD.**

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Attachment: Attachment A: Buildings, Vessel Processing Tanks, and Proposed Flare Building Inputs for BPIP
Attachment B: Predicted Concentration Isopleth Plots

# 10 References


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# ATTACHMENT A BUILDINGS, VESSEL PROCESSING TANKS, AND PROPOSED FLARE BUILDING INPUTS FOR BPIP

**Reference: Air Quality Dispersion Modelling for the Proposed Enclosed Flare at the Gold Bar Wastewater Treatment Plant**

*Table A-1: Vessel Processing Tanks at the Gold Bar Wastewater Treatment Plant*

| Tank ID [1] | Description [1] | Base Elevation [2] | Tier Height [1] | Tank Diameter [1] | Tank Center UTM Coordinates [1,4] | |
|---|---|---|---|---|---|---|
| | | m ASL | m AGS | m | m East | m North |
| TCT-20021 | DIGESTER #1 | 620.24 | 6.50 | 32.52 | 340,098 | 5,937,434 |
| TCT-20022 | DIGESTER #2 | 620.27 | 6.50 | 32.52 | 340,062 | 5,937,437 |
| TCT-20023 | DIGESTER #3 | 618.79 | 6.50 | 32.52 | 340,102 | 5,937,470 |
| TCT-20024 | DIGESTER #4 | 618.71 | 5.50 | 32.52 | 340,066 | 5,937,473 |
| TCT-20019 | DIGESTER #5 | 619.92 | 6.50 | 32.52 | 340,011 | 5,937,447 |
| TCT-20020 | DIGESTER #6 | 619.84 | 6.50 | 32.52 | 339,973 | 5,937,450 |
| TCT-45714 | DIGESTER #7 | 618.02 | 8.50 | 32.52 | 340,011 | 5,937,491 |
| TCT-45715 | DIGESTER #8 | 617.90 | 8.50 | 32.52 | 339,975 | 5,937,495 |
| TCT-15210 | BLEND TANK | 618.84 | 3.00 | 9.00 | 340,036 | 5,937,471 |
| TCT-15211 | BLEND TANK | 618.37 | 3.00 | 9.00 | 340,037 | 5,937,482 |
| TCT-28440 | FERMENTERS #1 | 617.28 | 3.50 | 22.32 | 340,102 | 5,937,500 |
| TCT-28520 | FERMENTERS #2 | 617.44 | 3.50 | 22.32 | 340,080 | 5,937,502 |
| TCT-28590 | FERMENTERS #3 | 617.35 | 3.50 | 22.32 | 340,058 | 5,937,505 |
| TCT-25220 | FERMENTERS #4 | 617.29 | 2.00 | 22.32 | 340,037 | 5,937,507 |

Notes:

1. Data provided by EPCOR Water Service Inc. in the 2022 Alberta Emission Inventory Report (AEIR) Submission, 3-D Scanning, Drone Survey Data, and Google Earth 3-D Building Data.
2. Based on elevations above sea level (ASL) extracted based on the UTM Coordinates from the Canadian Digital Elevation Model (CDEM; (NRCan, 2016)).
3. Above ground surface (AGS)
4. Universal Transverse Mercator (UTM) North American Datum 1983 (NAD83) Zone 12.

**Reference: Air Quality Dispersion Modelling for the Proposed Enclosed Flare at the Gold Bar Wastewater Treatment Plant**

*Table A-2: Buildings at the Gold Bar Wastewater Treatment Plant*

| Building ID [1] | Building Description [1] | Number of Tiers [1] | Base Elevation [2] | Tier Height [1,3] | Number of Coordinates [1,4] |
|---|---|---|---|---|---|
| | | | m ASL | m AGS | |
| B_01 | EPT Chemical Building | 1 | 623.33 | 7.00 | 4 |
| B_02 | Enhanced Primary #9, #10, #11, And #12 | 1 | 621.59 | 5.75 | 8 |
| B_03 | Screen Building 3 | 1 | 623.82 | 10.00 | 6 |
| B_04 | Screen Building 2 | 1 | 623.17 | 12.00 | 4 |
| B_05 | Scum House #2 | 1 | 621.17 | 3.75 | 8 |
| B_06 | Scum House#3 | 1 | 617.38 | 3.75 | 8 |
| B_07 | Grit Buildings | 1 | 622.40 | 12.75 | 4 |
| B_08 | Grit 6,7 Conveyor Enclosure | 1 | 623.65 | 6.75 | 4 |
| B_09 | Grit Buildings | 1 | 623.17 | 8.75 | 11 |
| B_10 | Substation #2 | 1 | 621.49 | 5.25 | 4 |
| B_11A | Odour Control Building West A | 1 | 616.99 | 4.50 | 4 |
| B_11B | Odour Control Building West B | 1 | 616.83 | 3.50 | 4 |
| B_11C | Odour Control Building West C | 1 | 616.80 | 5.75 | 4 |
| B_11D | Odour Control Building West D | 1 | 616.76 | 8.75 | 4 |
| B_11E | Odour Control Building West E | 1 | 616.73 | 11.50 | 4 |
| B_12 | Scum House #1 | 1 | 622.23 | 4.50 | 4 |
| B_13 | Red Trailer | 1 | 624.60 | 5.25 | 6 |
| B_14 | Strathcona Metering Building | 1 | 625.12 | 4.00 | 4 |
| B_15 | Screen Building #1 | 1 | 621.82 | 7.75 | 4 |
| B_16 | Storage | 1 | 622.92 | 6.50 | 4 |
| B_17 | Odour Control | 1 | 622.70 | 5.00 | 8 |
| B_18 | Odour Control Building East | 1 | 622.33 | 9.00 | 6 |
| B_19 | Flare Building | 1 | 621.91 | 8.50 | 4 |
| B_20 | Flare Support Building | 1 | 621.64 | 4.25 | 4 |
| B_21 | Boiler House #2 | 1 | 620.53 | 12.00 | 4 |
| B_22 | Fermenter Building | 1 | 617.92 | 6.00 | 4 |
| B_23 | Ph | 1 | 621.51 | 4.50 | 4 |
| B_24 | Laboratory Building | 1 | 624.20 | 3.75 | 15 |
| B_25 | Centre Of Excellence | 1 | 622.05 | 7.75 | 22 |
| B_26 | Bypass Sample | 1 | 622.47 | 2.50 | 4 |

**Reference: Air Quality Dispersion Modelling for the Proposed Enclosed Flare at the Gold Bar Wastewater Treatment Plant**

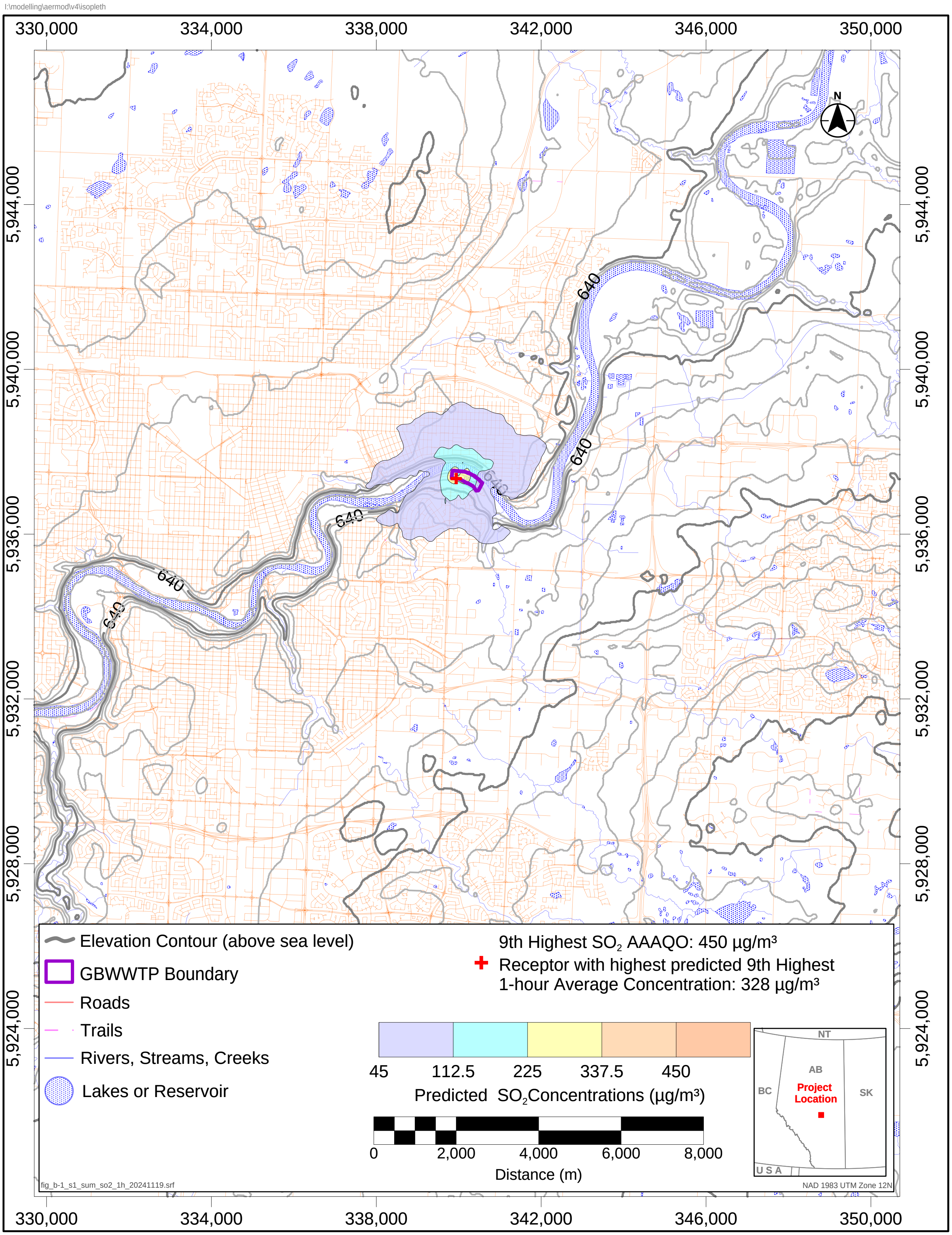
*Table A-2: Buildings at the Gold Bar Wastewater Treatment Plant (Continued)*

| | | | | | |
|---|---|---|---|---|---|
| B_27 | Boiler/Blower #1 Room | 1 | 619.39 | 7.75 | 11 |
| B_28 | Control Room (Old) | 1 | 619.65 | 5.00 | 8 |
| B_29 | Maintenance Building | 1 | 618.20 | 6.50 | 8 |
| B_30 | Oil Storage | 1 | 616.77 | 4.25 | 4 |
| B_31 | Administration Building | 1 | 617.63 | 8.75 | 4 |
| B_32 | North Administration Trailer | 1 | 616.03 | 4.25 | 4 |
| B_33 | Blower Building #2 | 1 | 618.05 | 11.00 | 4 |
| B_34 | Substation #1 | 1 | 616.31 | 7.50 | 4 |
| B_35 | UV Building | 1 | 614.81 | 5.50 | 4 |
| B_36 | Wet Well Building | 1 | 625.26 | 4.25 | 6 |
| B_37 | Membrane Treatment Plant | 1 | 618.91 | 8.00 | 4 |
| B_38 | Grit Recovery Facility | 1 | 624.73 | 7.50 | 6 |
| B_39 | Storage2 | 1 | 622.50 | 5.00 | 4 |
| B_40 | Storage3 | 1 | 622.09 | 5.00 | 4 |
| B_41 | Storage1 | 1 | 621.33 | 5.00 | 4 |
| B_42 | Storage4 | 1 | 620.88 | 8.00 | 4 |
| B_43 | New Flare Building | 1 | 622.85 | 4.20 | 4 |
| B_42 | Scrubber 5/6 Building (Tier 1) | 1 | 616.89 | 6.00 | 4 |
| B_43 | Scrubber 5/6 Building (Tier 2) | 1 | 616.87 | 10.00 | 4 |

Notes:

1. Data provided by EPCOR Water Service Inc. in the 2022 Alberta Emission Inventory Report (AEIR) Submission, 3-D Scanning, Drone Survey Data, and Google Earth 3-D Building Data.
2. Based on elevations above sea level (ASL) extracted based on the UTM Coordinates from the Canadian Digital Elevation Model (CDEM; (NRCan, 2016)).
3. Above ground surface (AGS)
4. Based on the number of identified corners of the building. Building corners can be provided upon request.

# ATTACHMENT B PREDICTED CONCENTRATION ISOPLETH PLOTS




Sources: Base Data - Natural Resources Canada Canadian Digital Elevation Model (CDEM)

Disclaimer: This map is for illustrative purposes to support this Stantec project; questions can be directed to the issuing agency.

**9th Highest 1-hour Average $SO_2$ Concentrations Predicted at the Gold Bar Wastewater Treatment Plant — Scenario 1: Baseline Existing Sources (Summer Case: Biogas Flow 70% to Flares and 30% to Boilers)**

Stantec

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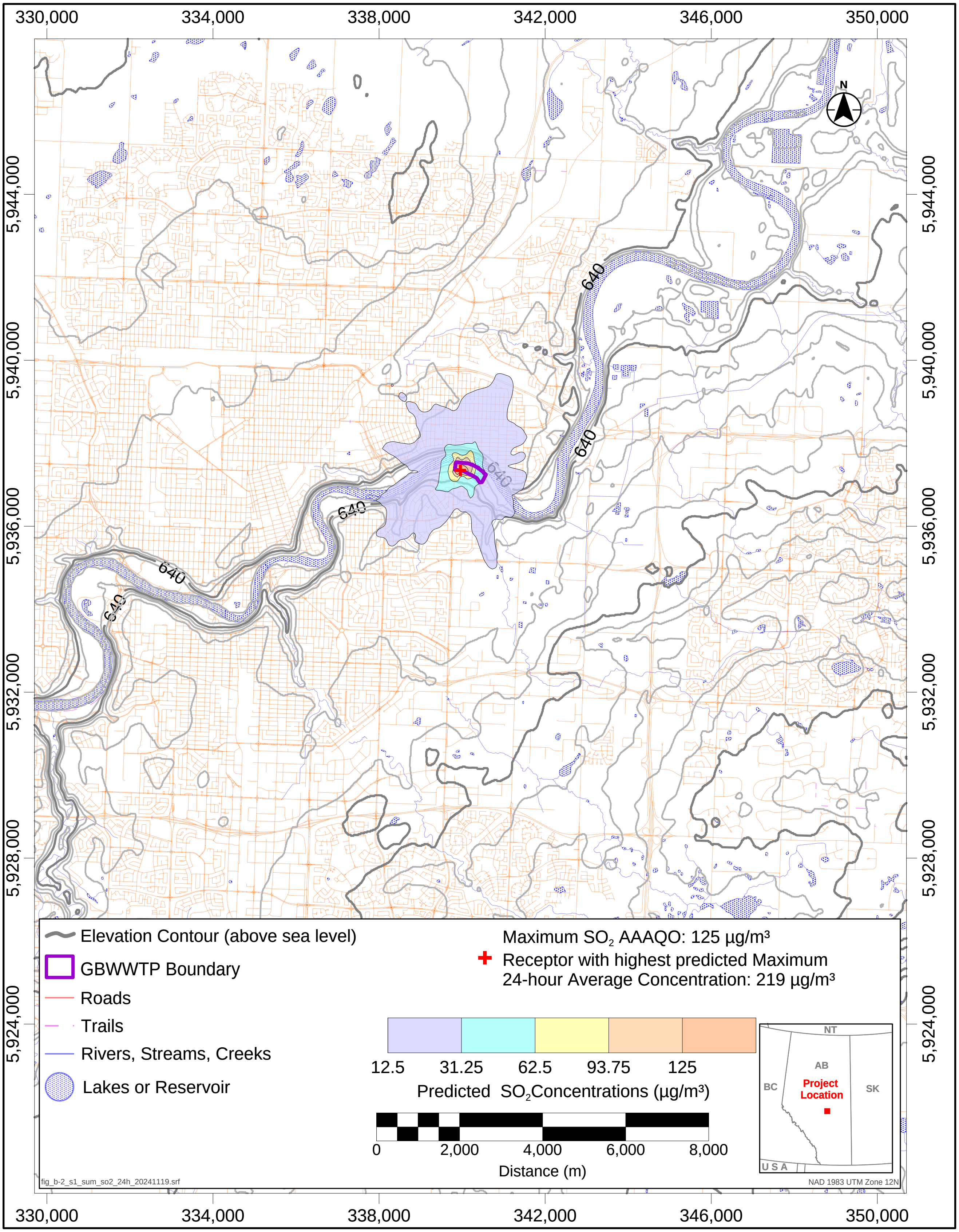
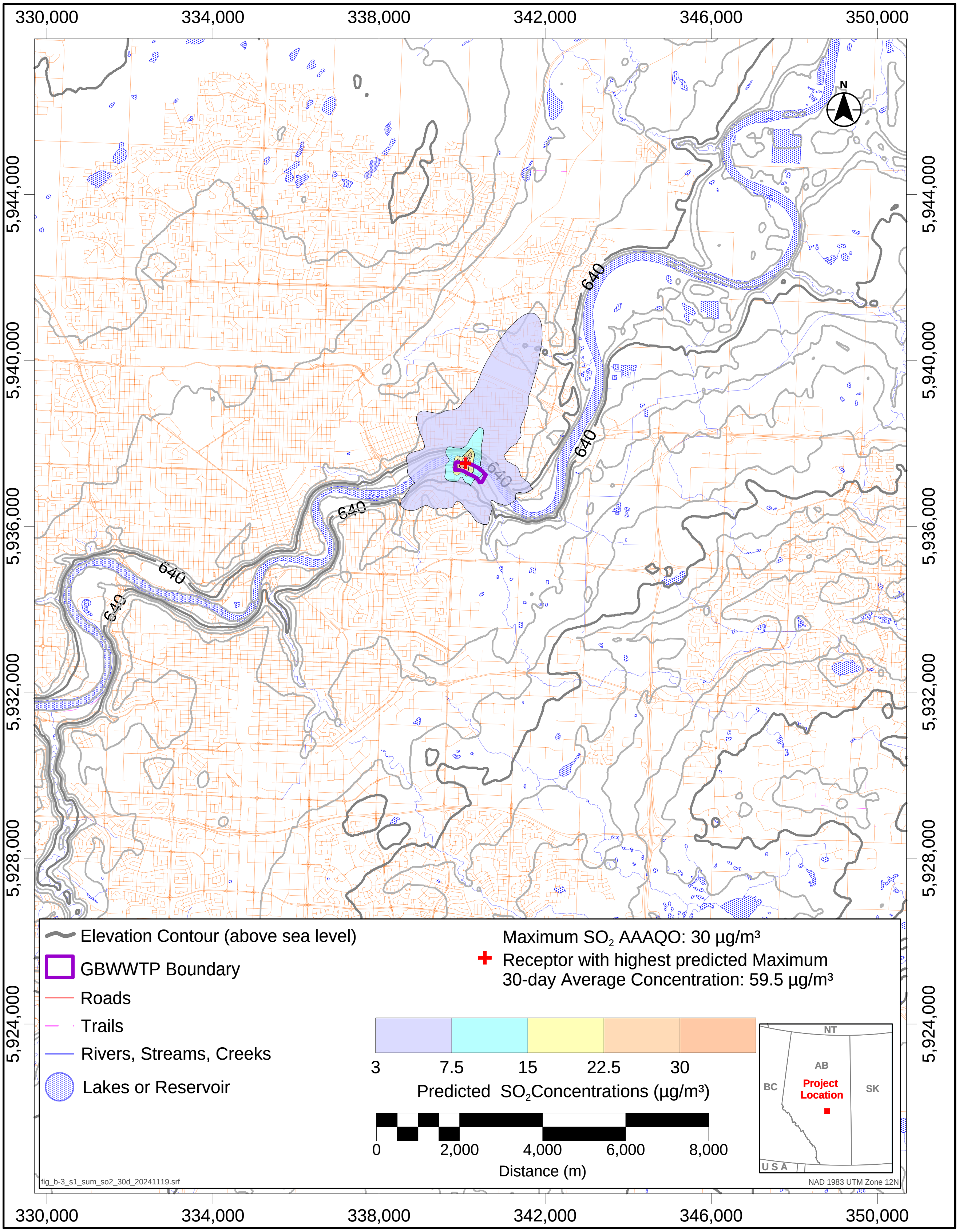



Sources: Base Data - Natural Resources Canada Canadian Digital Elevation Model (CDEM)

Disclaimer: This map is for illustrative purposes to support this Stantec project; questions can be directed to the issuing agency.

**Maximum 24-hour Average $SO_2$ Concentrations Predicted at the Gold Bar Wastewater Treatment Plant — Scenario 1: Baseline Existing Sources (Summer Case: Biogas Flow 70% to Flares and 30% to Boilers)**

Stantec




Sources: Base Data - Natural Resources Canada Canadian Digital Elevation Model (CDEM)

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**Maximum 30-day Average $SO_2$ Concentrations Predicted at the Gold Bar Wastewater Treatment Plant — Scenario 1: Baseline Existing Sources (Summer Case: Biogas Flow 70% to Flares and 30% to Boilers)**

Stantec

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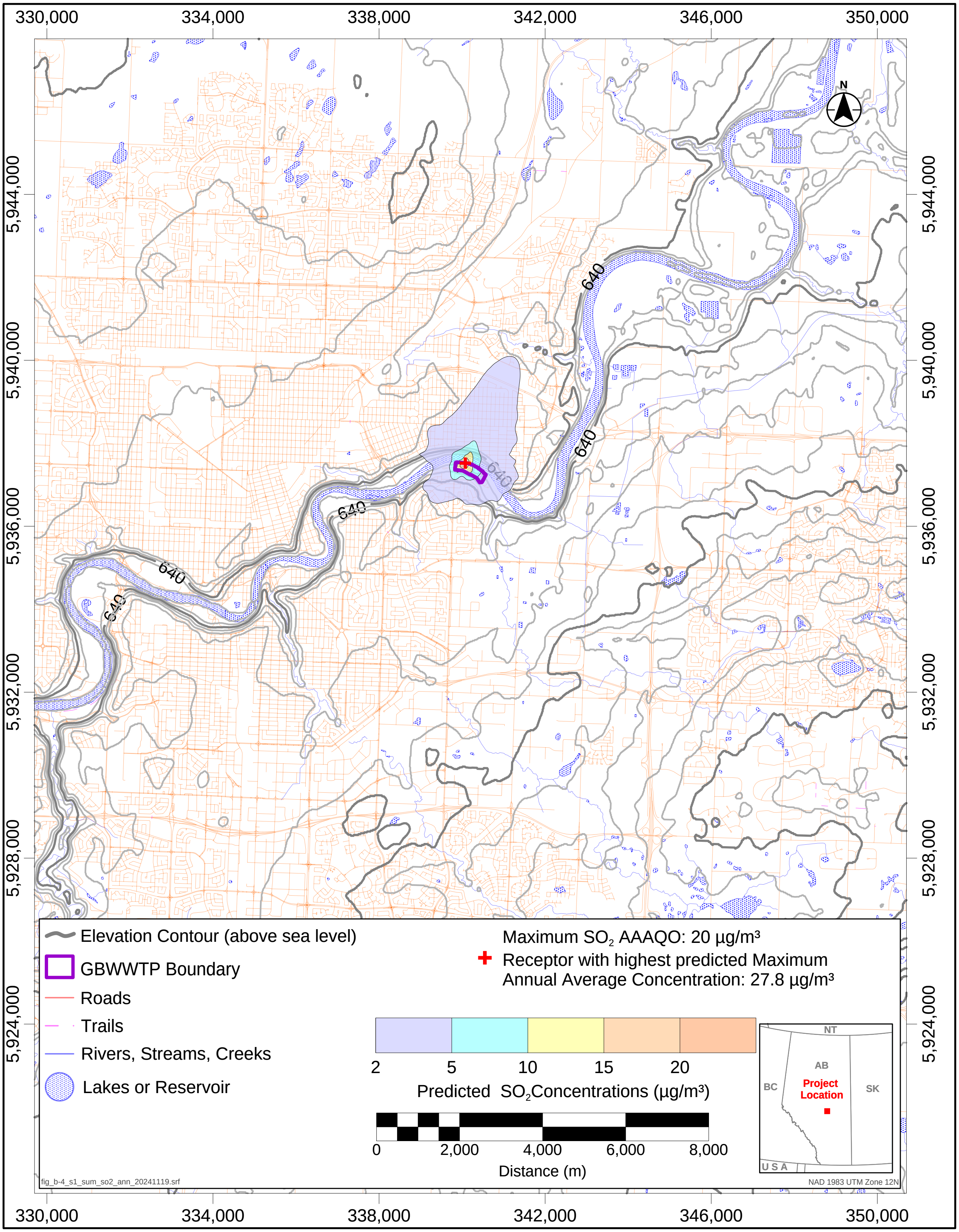
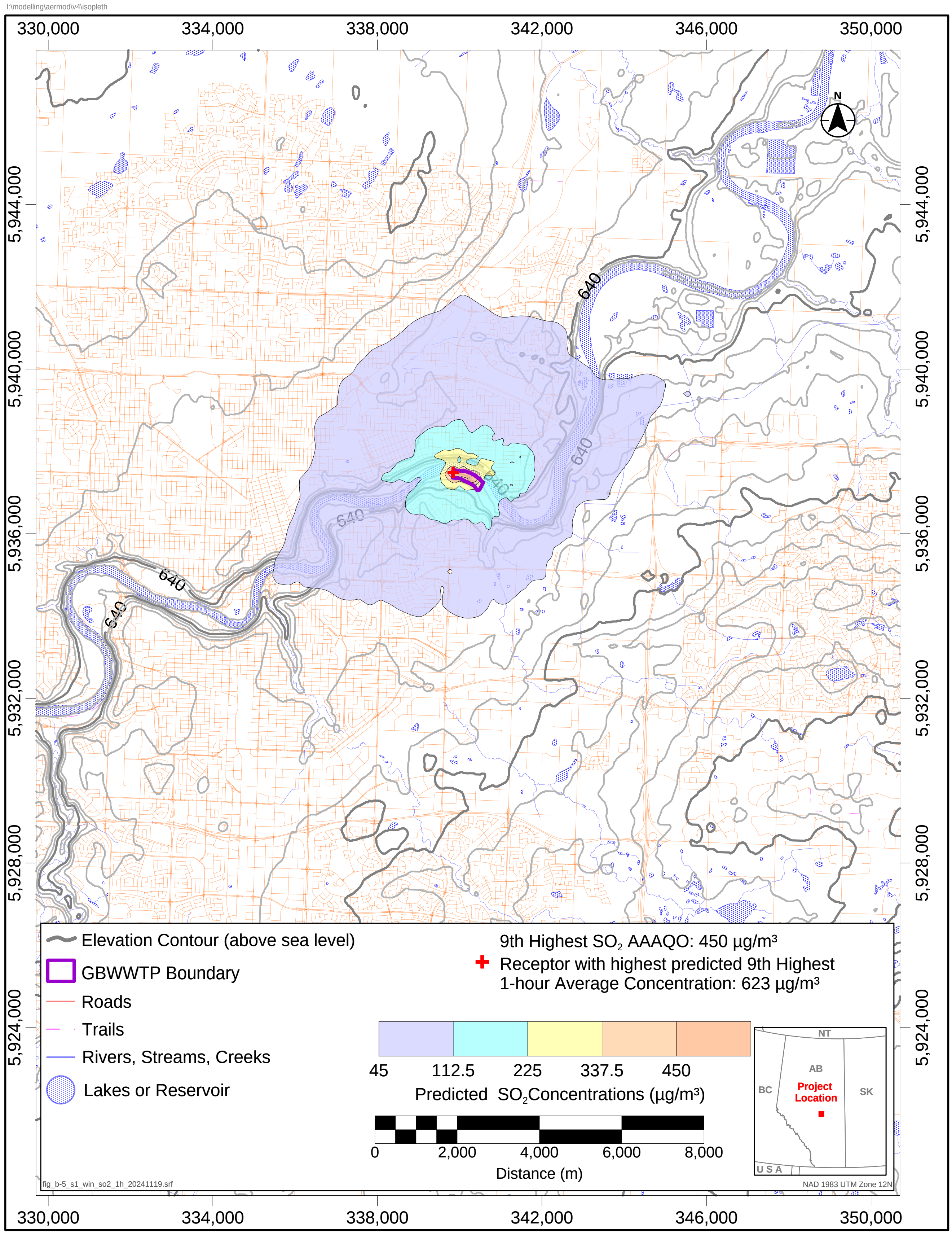



Sources: Base Data - Natural Resources Canada Canadian Digital Elevation Model (CDEM)

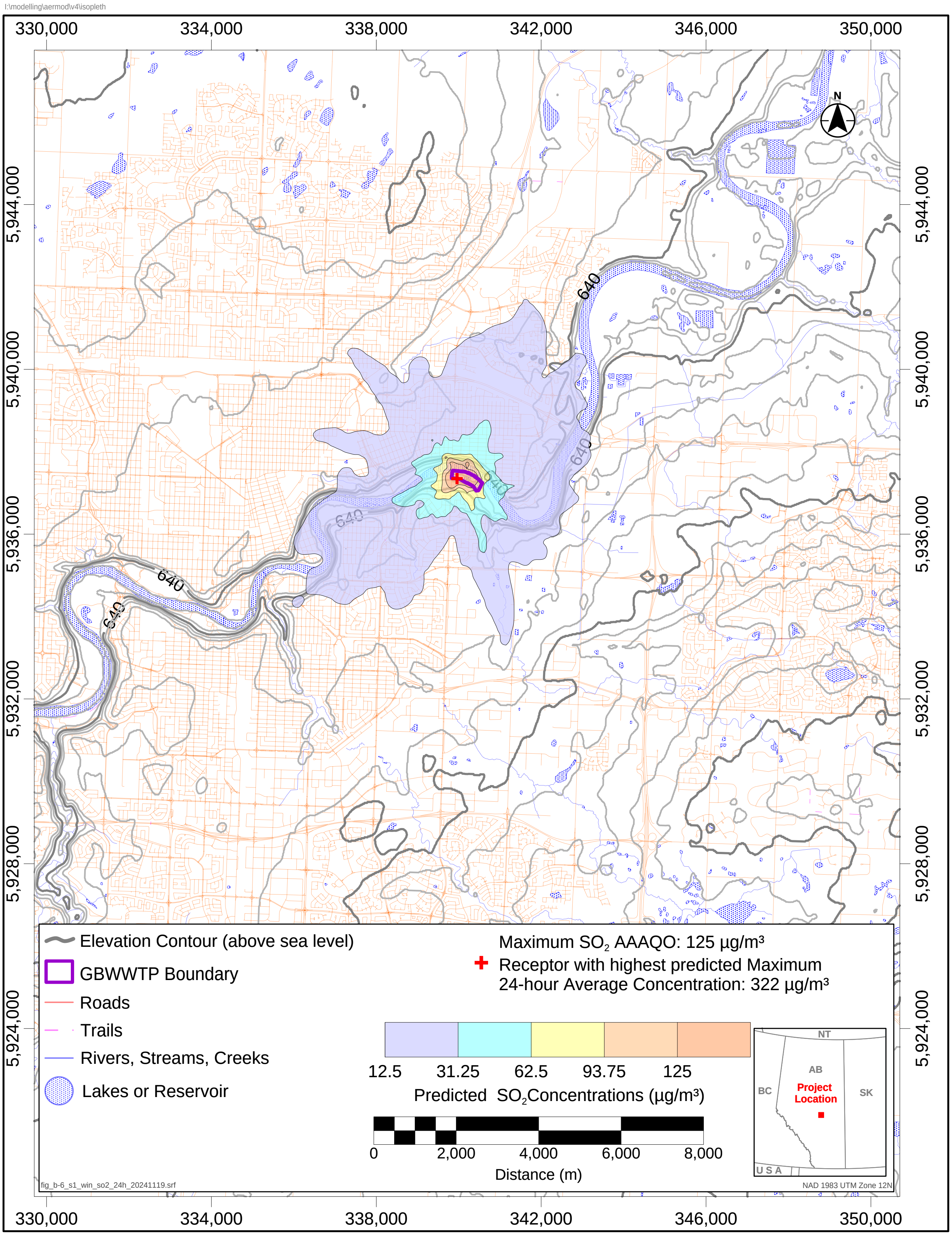
Disclaimer: This map is for illustrative purposes to support this Stantec project; questions can be directed to the issuing agency.

**Maximum Annual Average $SO_2$ Concentrations Predicted at the Gold Bar Wastewater Treatment Plant — Scenario 1: Baseline Existing Sources (Summer Case: Biogas Flow 70% to Flares and 30% to Boilers)**




**9th Highest 1-hour Average $SO_2$ Concentrations Predicted at the Gold Bar Wastewater Treatment Plant — Scenario 1: Baseline Existing Sources (Winter Case: Biogas Flow 30% to Flares and 70% to Boilers)**

Stantec




Sources: Base Data - Natural Resources Canada Canadian Digital Elevation Model (CDEM)

*Disclaimer: This map is for illustrative purposes to support this Stantec project; questions can be directed to the issuing agency.*

**Maximum 24-hour Average $SO_2$ Concentrations Predicted at the Gold Bar Wastewater Treatment Plant — Scenario 1: Baseline Existing Sources (Winter Case: Biogas Flow 30% to Flares and 70% to Boilers)**

Stantec

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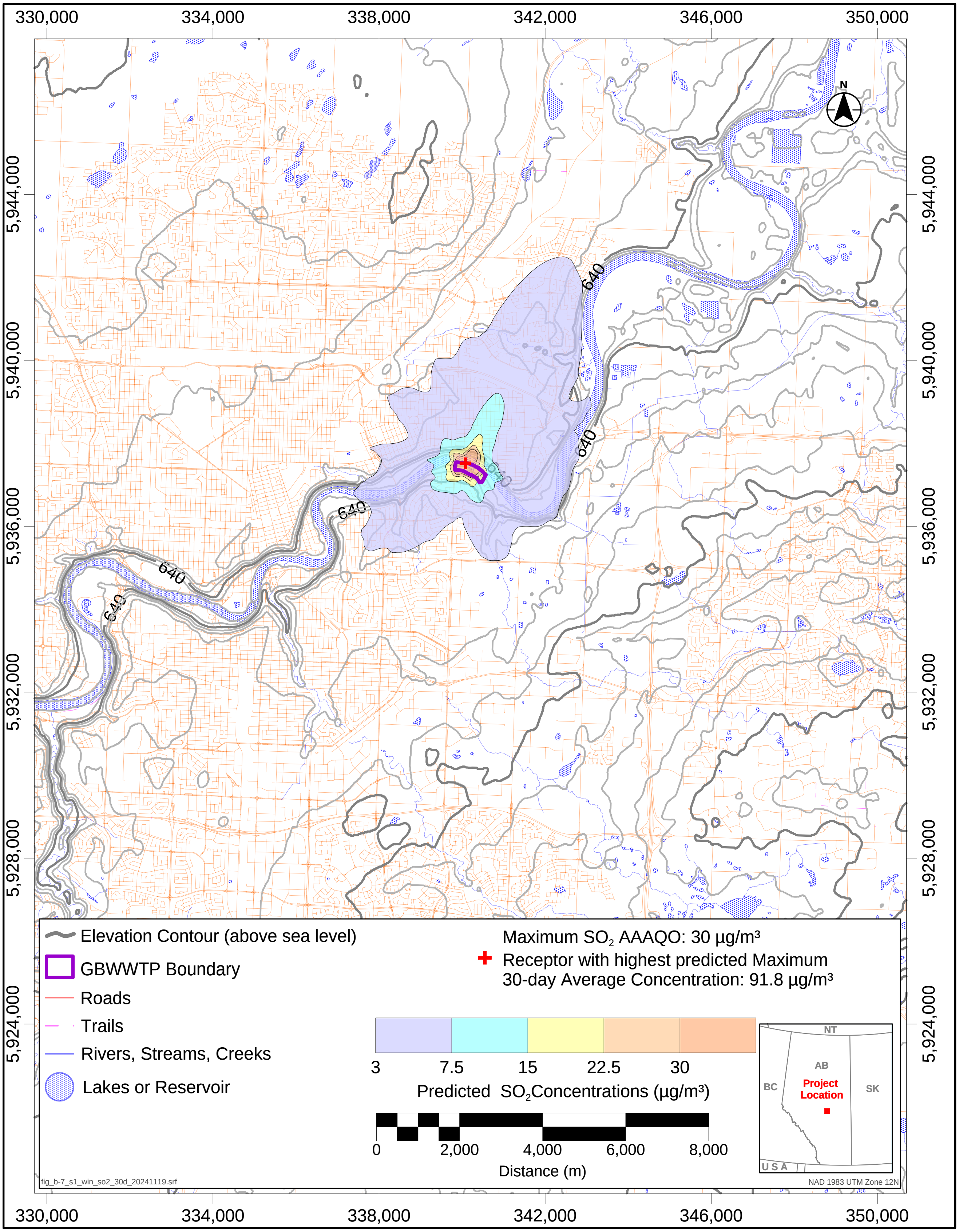


Sources: Base Data - Natural Resources Canada Canadian Digital Elevation Model (CDEM)

*Disclaimer: This map is for illustrative purposes to support this Stantec project; questions can be directed to the issuing agency.*

**Maximum 30-day Average $SO_2$ Concentrations Predicted at the Gold Bar Wastewater Treatment Plant — Scenario 1: Baseline Existing Sources (Winter Case: Biogas Flow 30% to Flares and 70% to Boilers)**

Stantec

B-7

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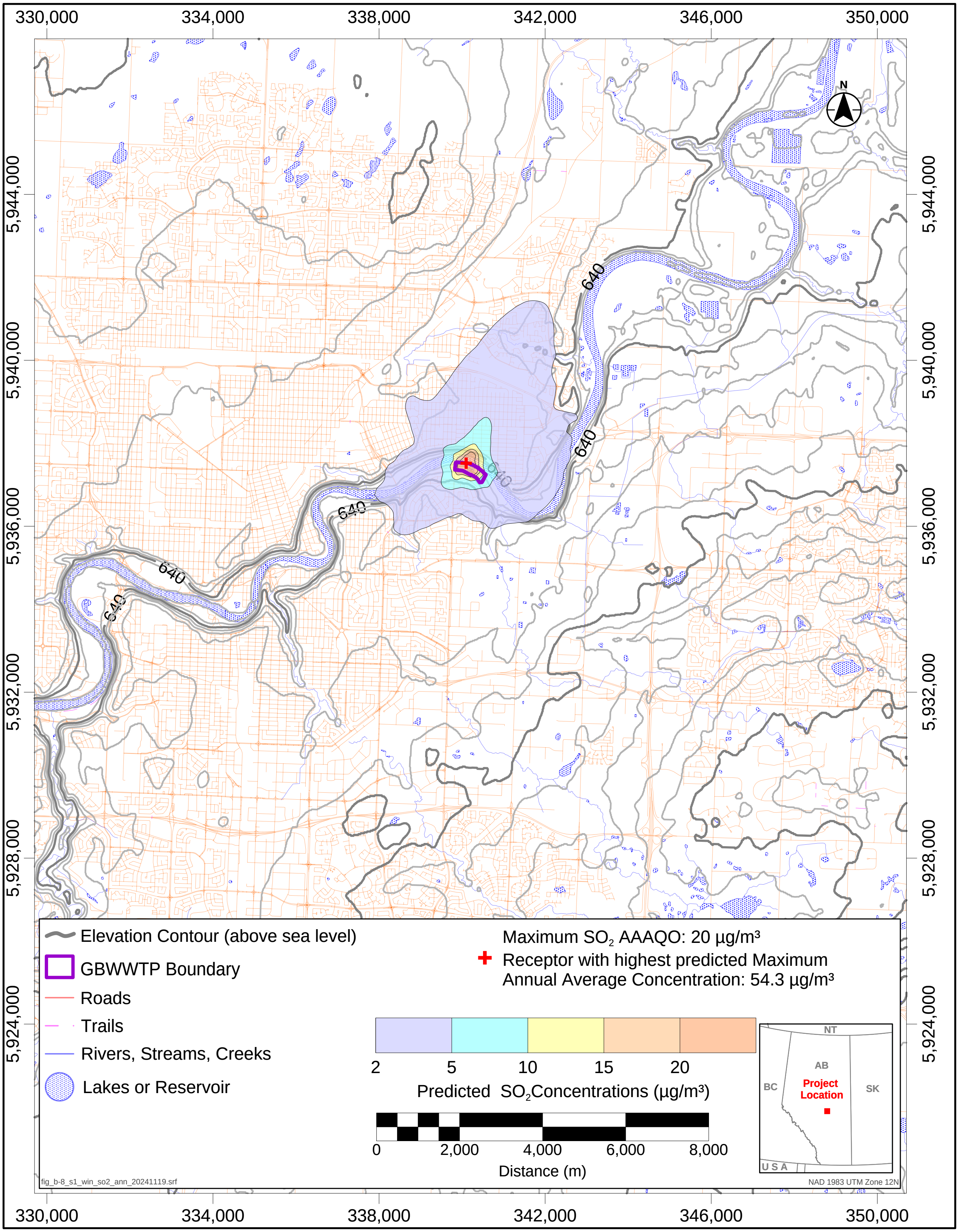


Sources: Base Data - Natural Resources Canada Canadian Digital Elevation Model (CDEM)

Disclaimer: This map is for illustrative purposes to support this Stantec project; questions can be directed to the issuing agency.

**Maximum Annual Average $SO_2$ Concentrations Predicted at the Gold Bar Wastewater Treatment Plant — Scenario 1: Baseline Existing Sources (Winter Case: Biogas Flow 30% to Flares and 70% to Boilers)**

Stantec

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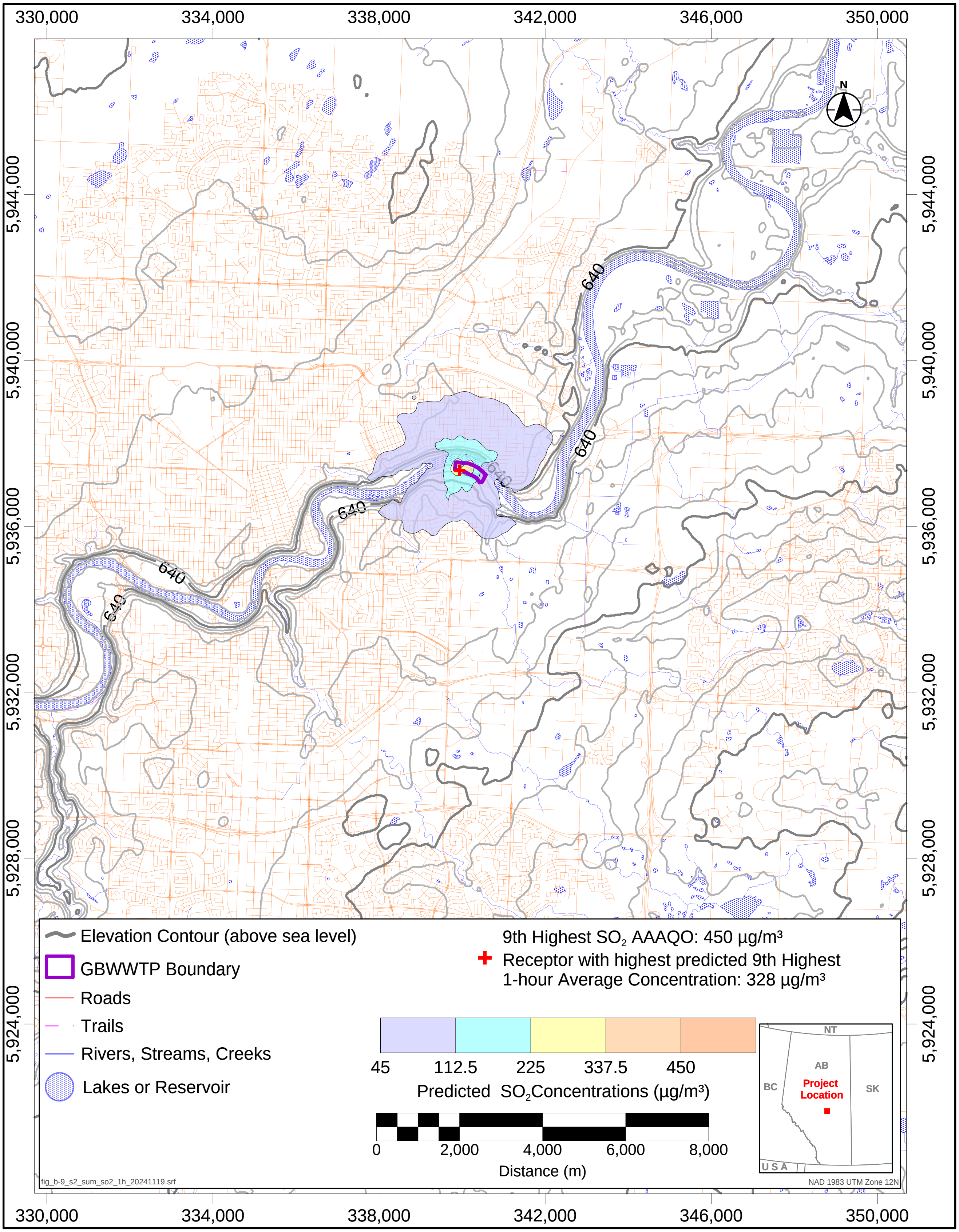
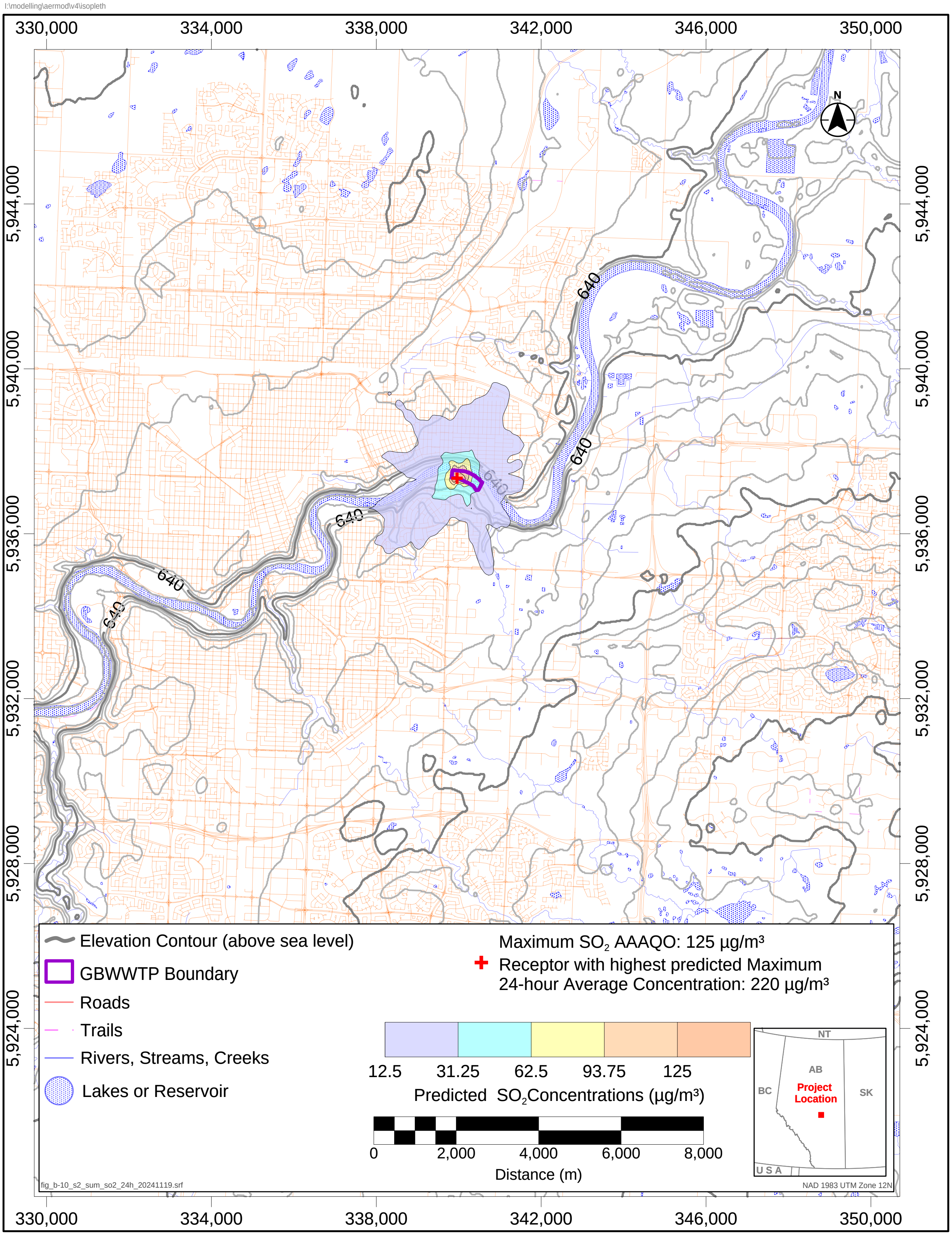



Sources: Base Data - Natural Resources Canada Canadian Digital Elevation Model (CDEM)

Disclaimer: This map is for illustrative purposes to support this Stantec project; questions can be directed to the issuing agency.

**9th Highest 1-hour Average $SO_2$ Concentrations Predicted Gold Bar Wastewater Treatment Plant — Scenario 2: Current Application Existing Boilers and Enclosed Flare (Summer Case: Biogas Flow 70% to Flares and 30% to Boilers)**

Stantec



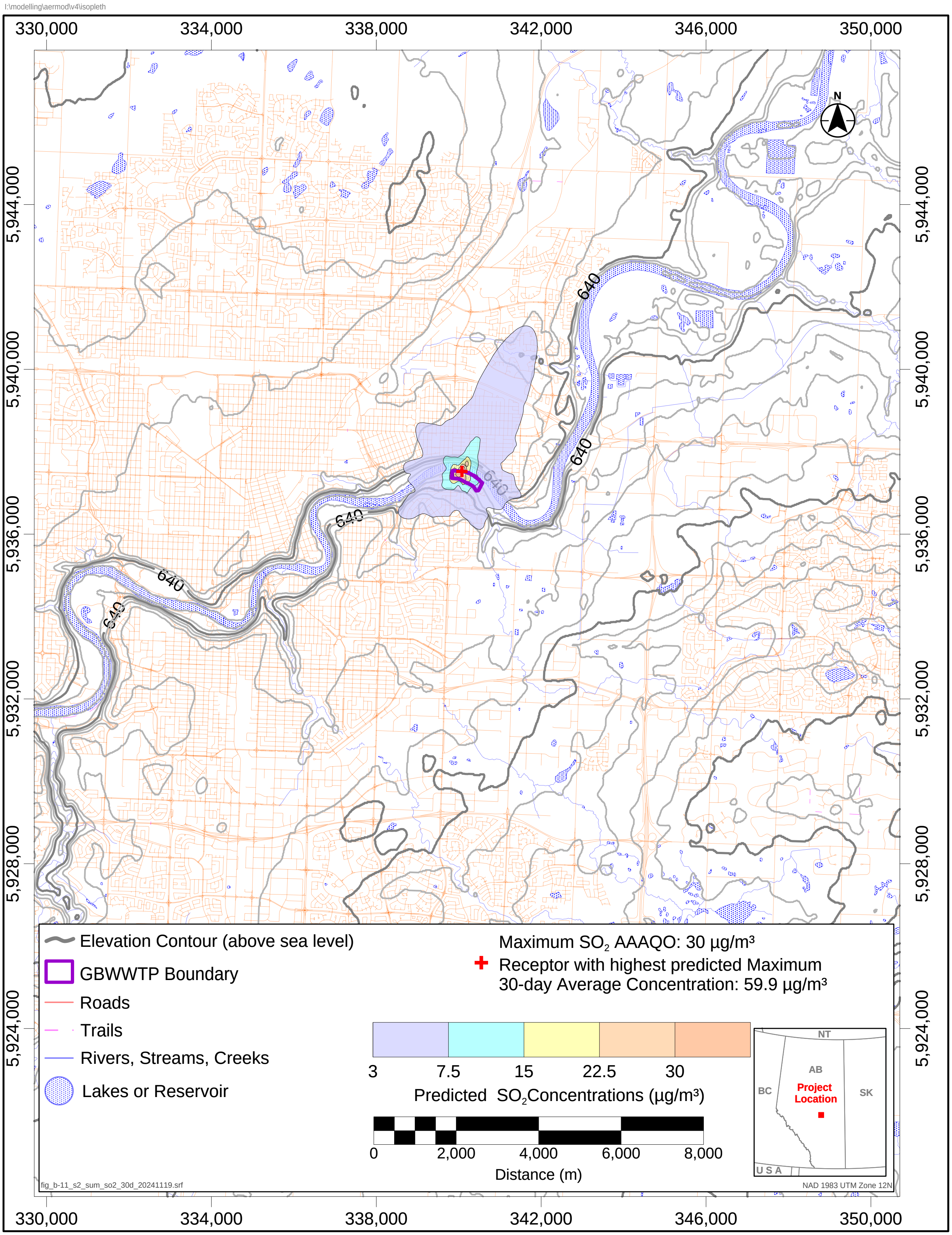

Sources: Base Data - Natural Resources Canada Canadian Digital Elevation Model (CDEM)

Disclaimer: This map is for illustrative purposes to support this Stantec project; questions can be directed to the issuing agency.

**Maximum 24-hour Average $SO_2$ Concentrations Predicted Gold Bar Wastewater Treatment Plant — Scenario 2: Current Application Existing Boilers and Enclosed Flare (Summer Case: Biogas Flow 70% to Flares and 30% to Boilers)**

B-10

Stantec

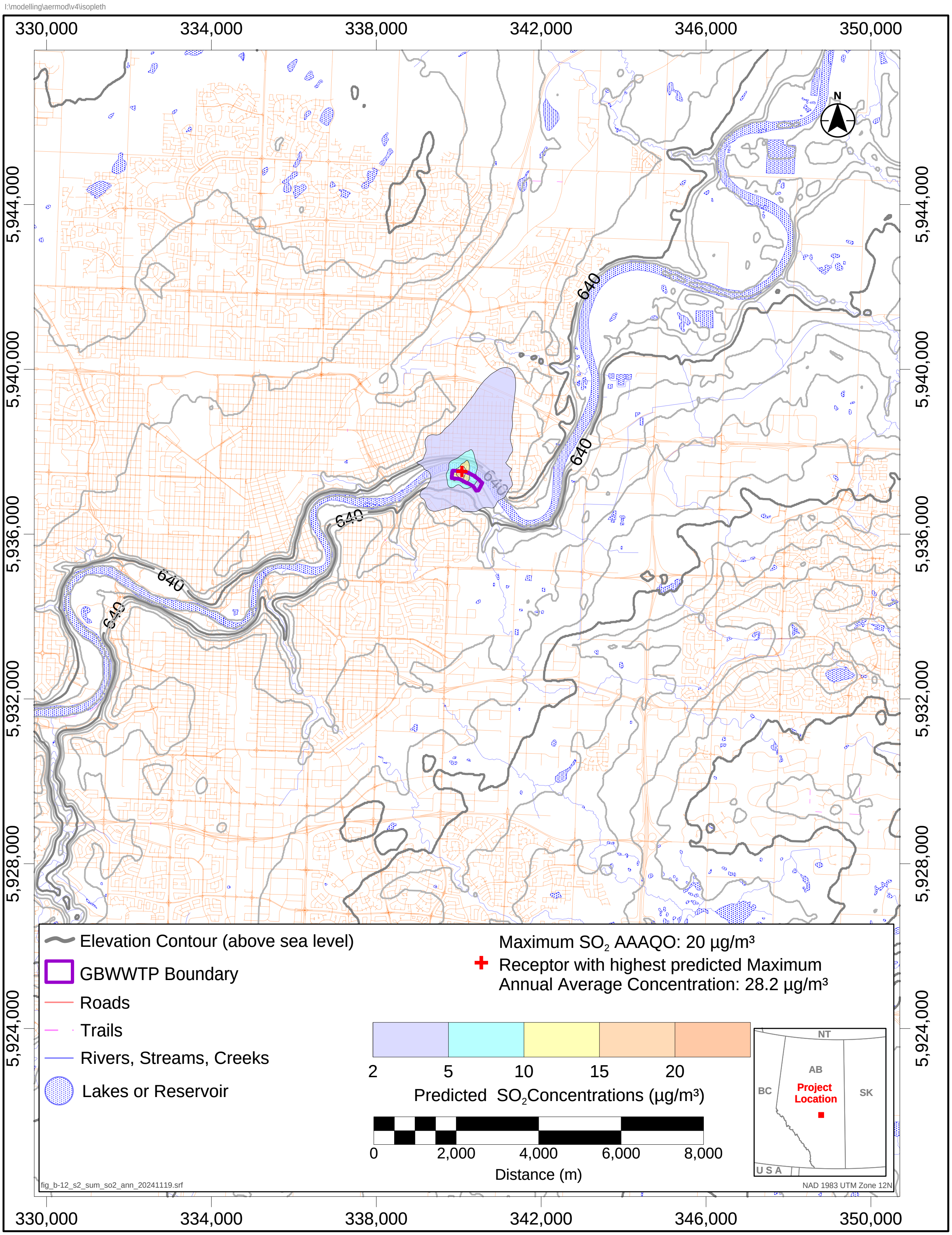



Sources: Base Data - Natural Resources Canada Canadian Digital Elevation Model (CDEM)

Disclaimer: This map is for illustrative purposes to support this Stantec project; questions can be directed to the issuing agency.

**Maximum 30-day Average $SO_2$ Concentrations Predicted Gold Bar Wastewater Treatment Plant — Scenario 2: Current Application Existing Boilers and Enclosed Flare (Summer Case: Biogas Flow 70% to Flares and 30% to Boilers)**

Stantec




Sources: Base Data - Natural Resources Canada Canadian Digital Elevation Model (CDEM)

Disclaimer: This map is for illustrative purposes to support this Stantec project; questions can be directed to the issuing agency.

**Maximum Annual Average $SO_2$ Concentrations Predicted Gold Bar Wastewater Treatment Plant — Scenario 2: Current Application Existing Boilers and Enclosed Flare (Summer Case: Biogas Flow 70% to Flares and 30% to Boilers)**

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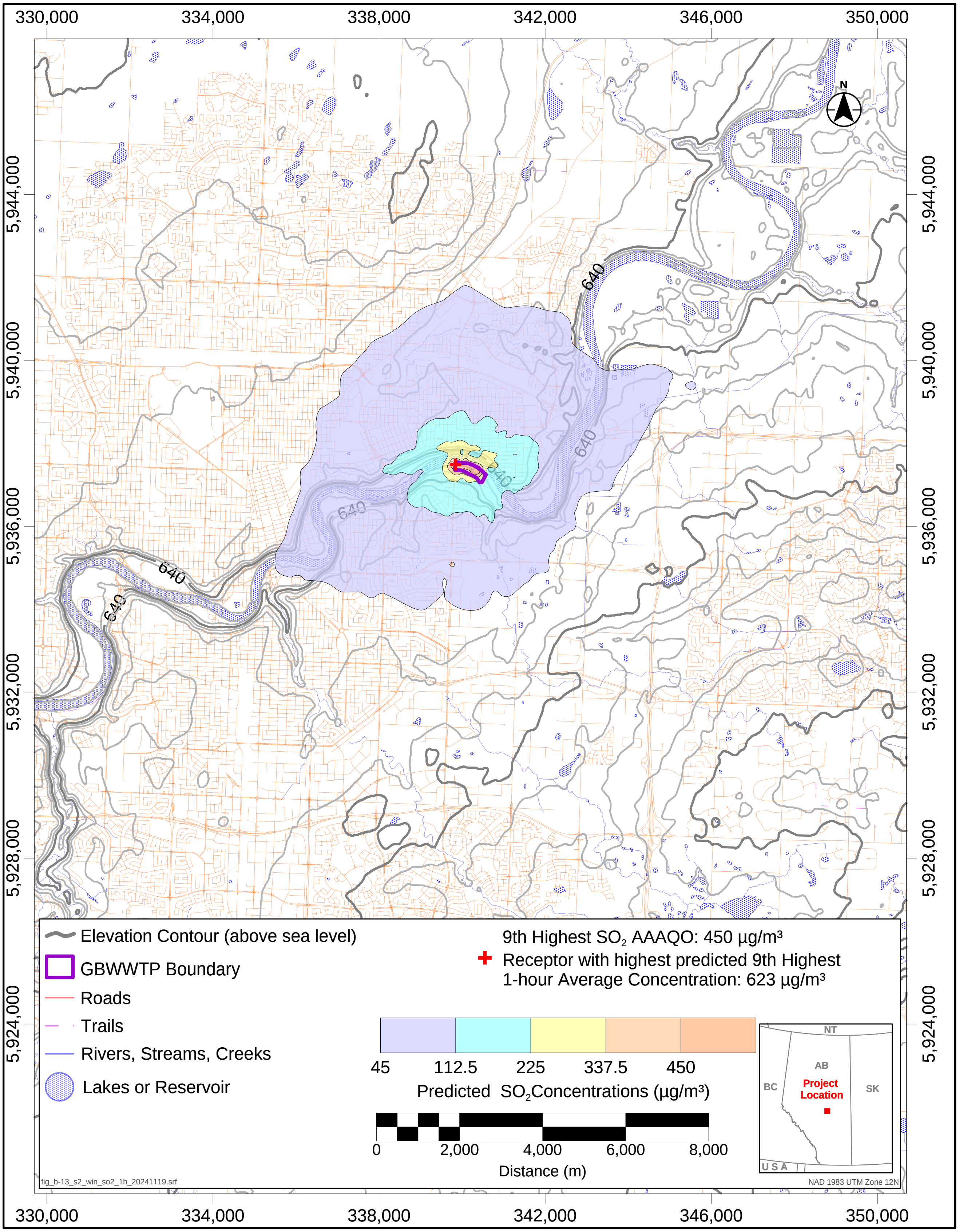


Sources: Base Data - Natural Resources Canada Canadian Digital Elevation Model (CDEM)

Disclaimer: This map is for illustrative purposes to support this Stantec project; questions can be directed to the issuing agency.

**9th Highest 1-hour Average $SO_2$ Concentrations Predicted Gold Bar Wastewater Treatment Plant — Scenario 2: Current Application Existing Boilers and Enclosed Flare (Winter Case: Biogas Flow 30% to Flares and 70% to Boilers)**

Stantec

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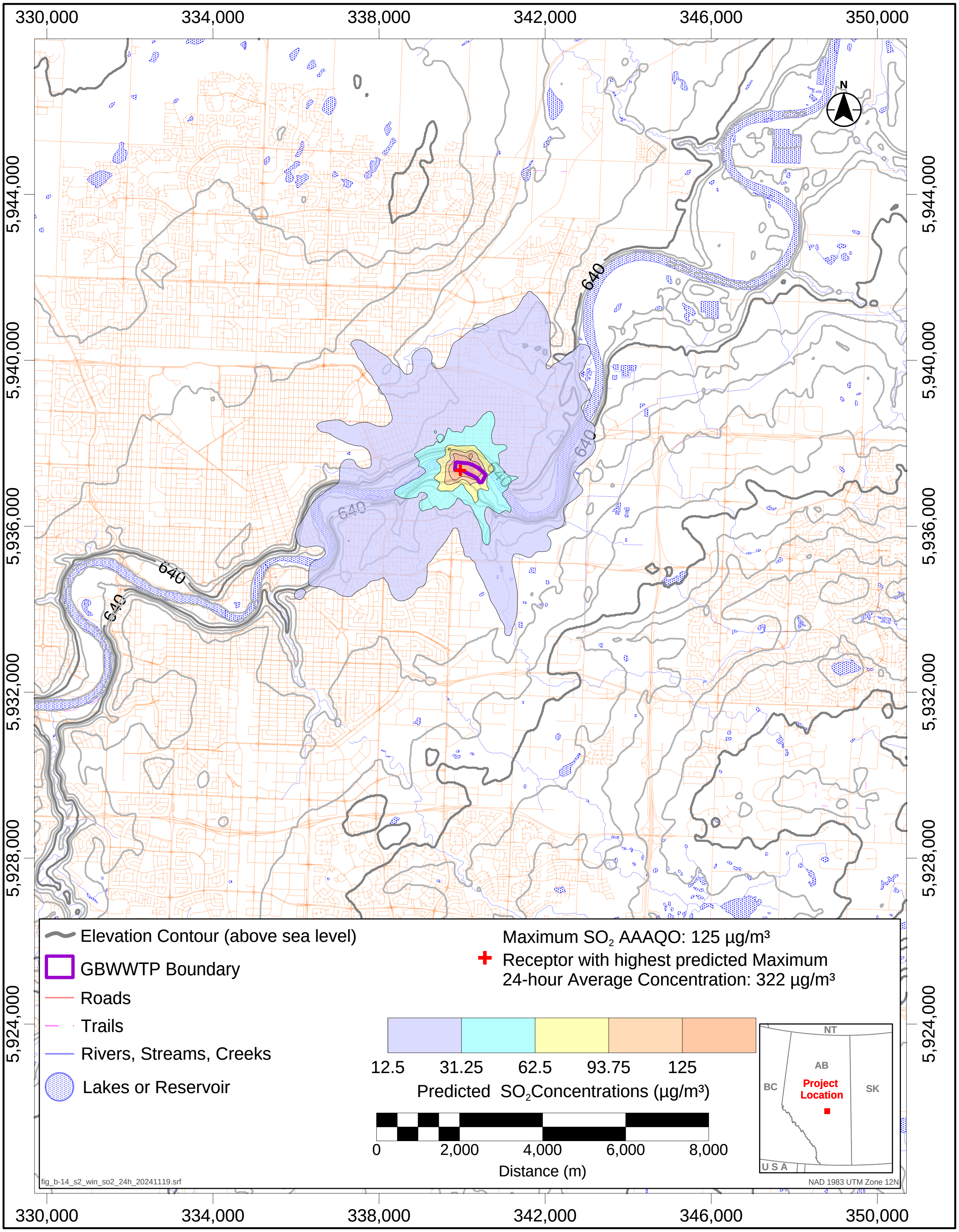


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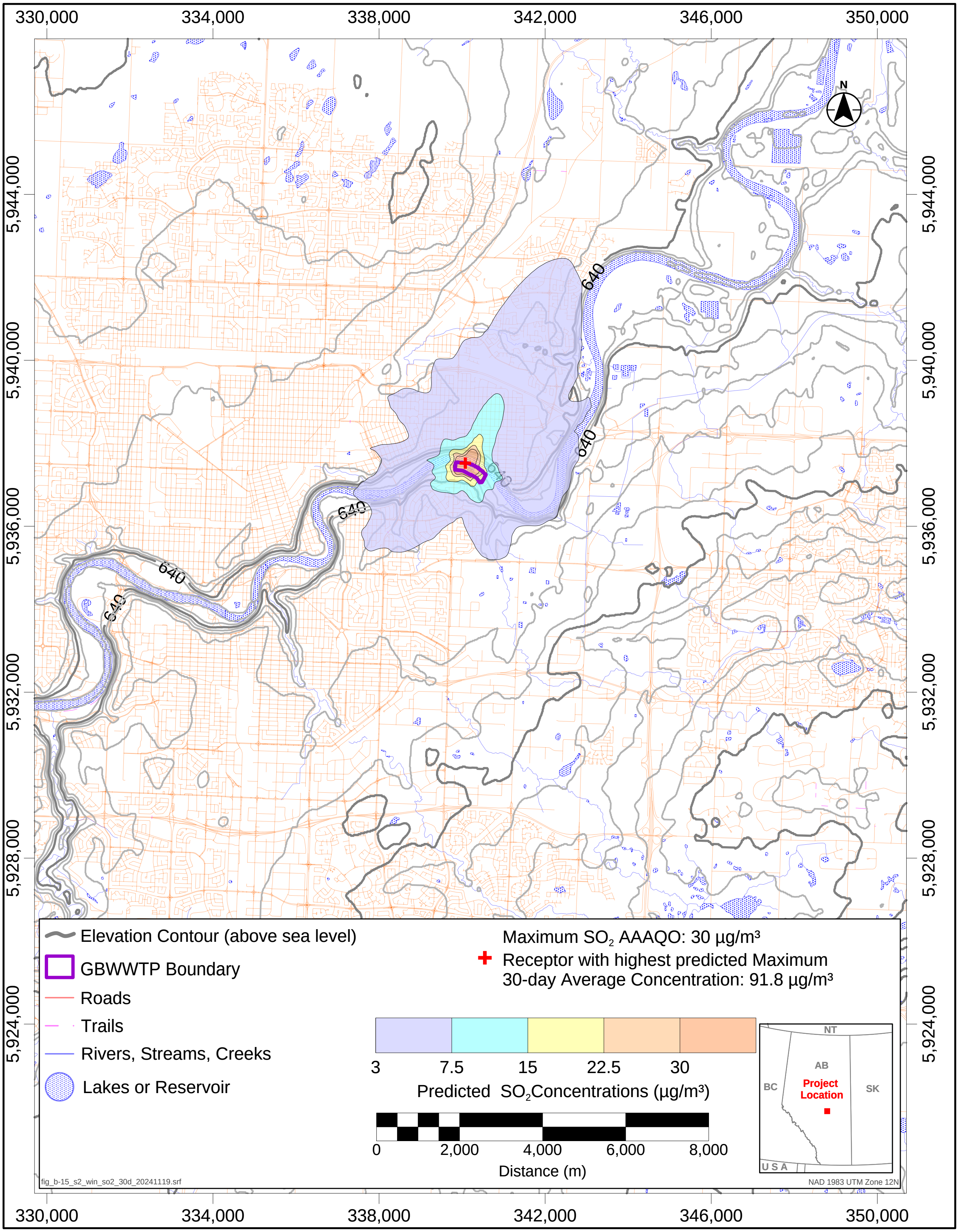


Sources: Base Data - Natural Resources Canada Canadian Digital Elevation Model (CDEM)

Disclaimer: This map is for illustrative purposes to support this Stantec project; questions can be directed to the issuing agency.

**Maximum 30-day Average $SO_2$ Concentrations Predicted Gold Bar Wastewater Treatment Plant — Scenario 2: Current Application Existing Boilers and Enclosed Flare (Winter Case: Biogas Flow 30% to Flares and 70% to Boilers)**

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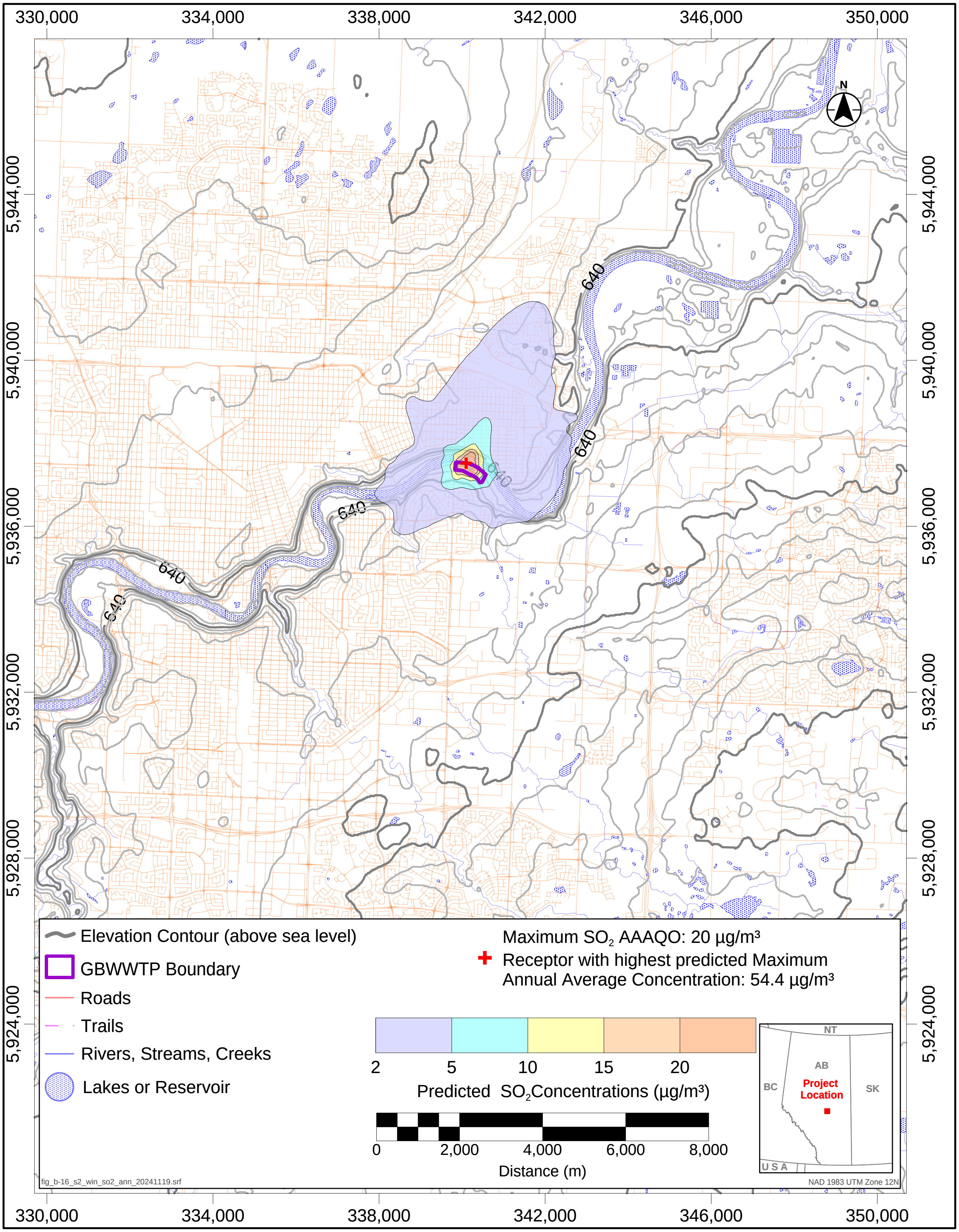


Sources: Base Data - Natural Resources Canada Canadian Digital Elevation Model (CDEM)

Disclaimer: This map is for illustrative purposes to support this Stantec project; questions can be directed to the issuing agency.

**Maximum Annual Average $SO_2$ Concentrations Predicted Gold Bar Wastewater Treatment Plant — Scenario 2: Current Application Existing Boilers and Enclosed Flare (Winter Case: Biogas Flow 30% to Flares and 70% to Boilers)**

Stantec

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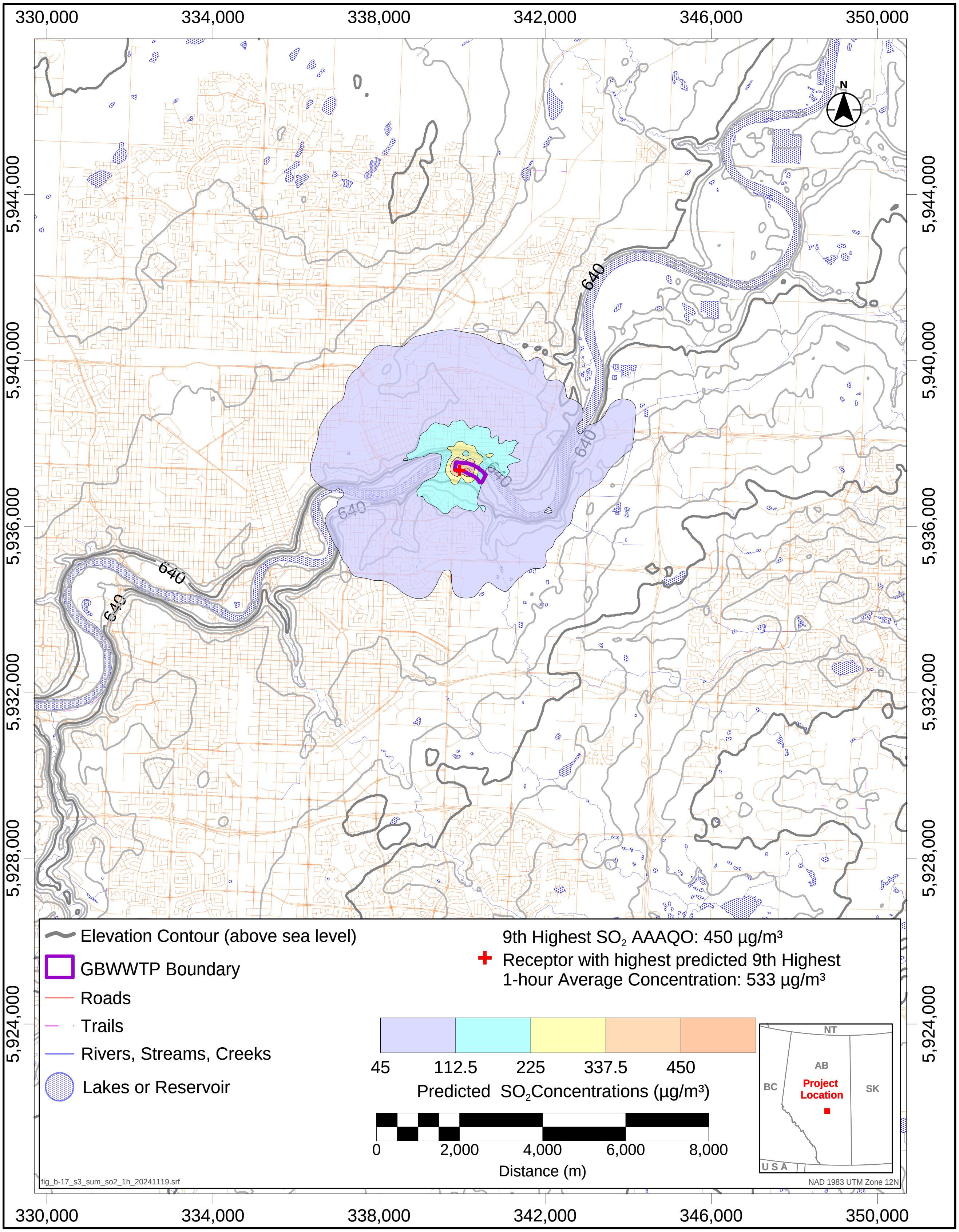
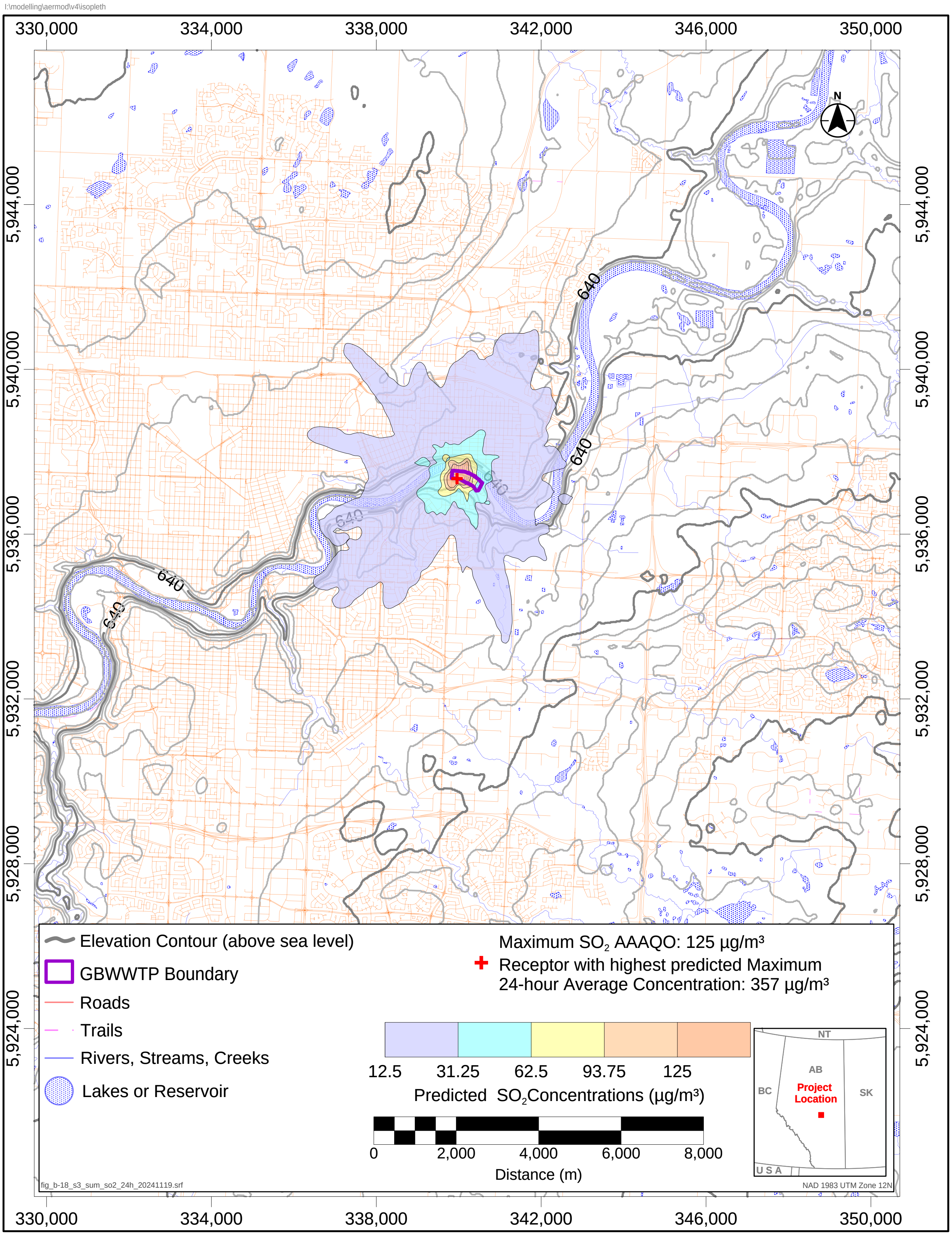



Sources: Base Data - Natural Resources Canada Canadian Digital Elevation Model (CDEM)

Disclaimer: This map is for illustrative purposes to support this Stantec project; questions can be directed to the issuing agency.

**9th Highest 1-hour Average $SO_2$ Concentrations Predicted Gold Bar Wastewater Treatment Plant — Scenario 3: Future Application Existing Boilers and Enclosed Flare (Summer Case: Biogas Flow 70% to Flares and 30% to Boilers)**



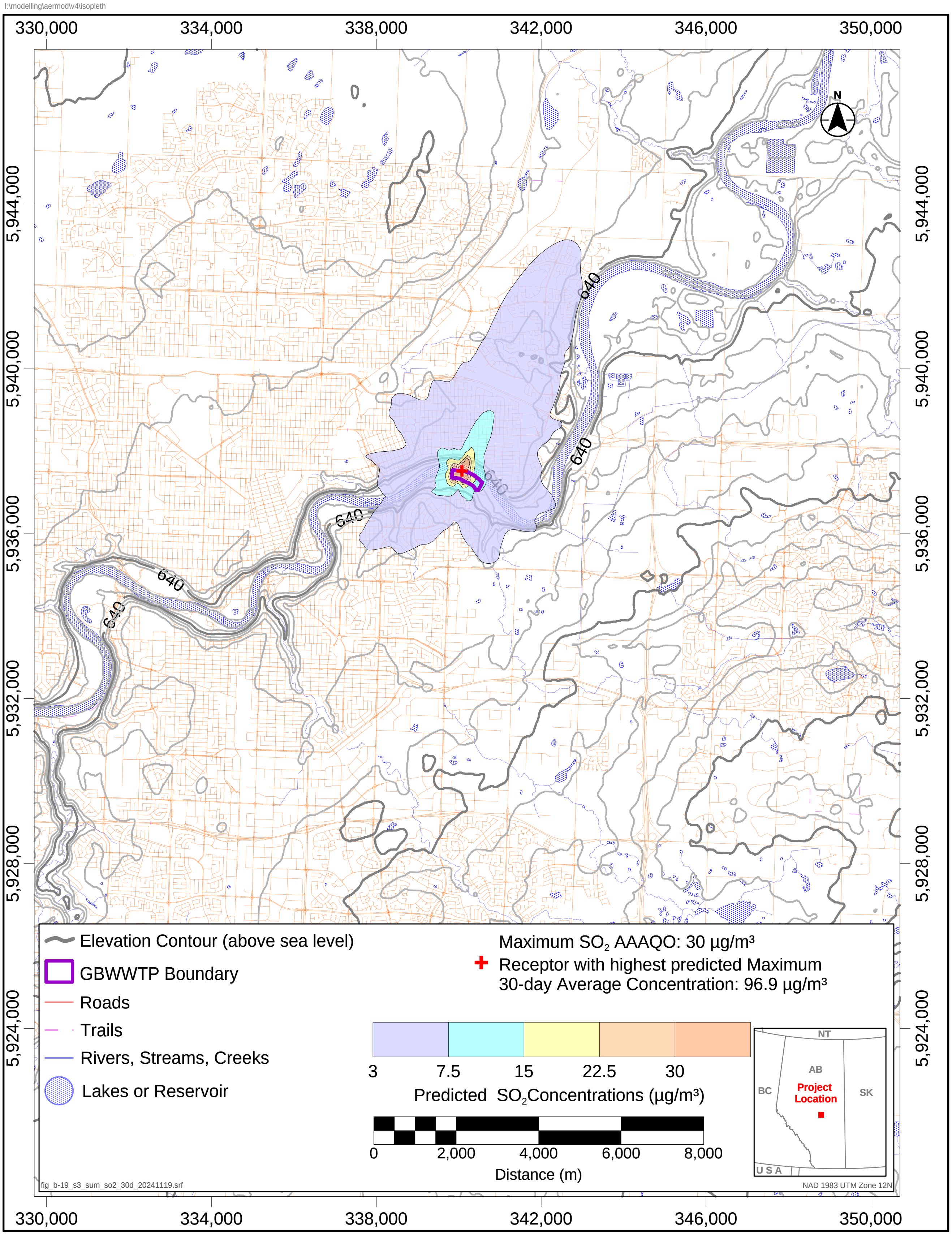

Sources: Base Data - Natural Resources Canada Canadian Digital Elevation Model (CDEM)

Disclaimer: This map is for illustrative purposes to support this Stantec project; questions can be directed to the issuing agency.

**Maximum 24-hour Average $SO_2$ Concentrations Predicted Gold Bar Wastewater Treatment Plant — Scenario 3: Future Application Existing Boilers and Enclosed Flare (Summer Case: Biogas Flow 70% to Flares and 30% to Boilers)**

Stantec

B-18




Sources: Base Data - Natural Resources Canada Canadian Digital Elevation Model (CDEM)

*Disclaimer: This map is for illustrative purposes to support this Stantec project; questions can be directed to the issuing agency.*

**Maximum 30-day Average $SO_2$ Concentrations Predicted**
**Gold Bar Wastewater Treatment Plant — Scenario 3: Future Application Existing Boilers and Enclosed Flare**
**(Summer Case: Biogas Flow 70% to Flares and 30% to Boilers)**

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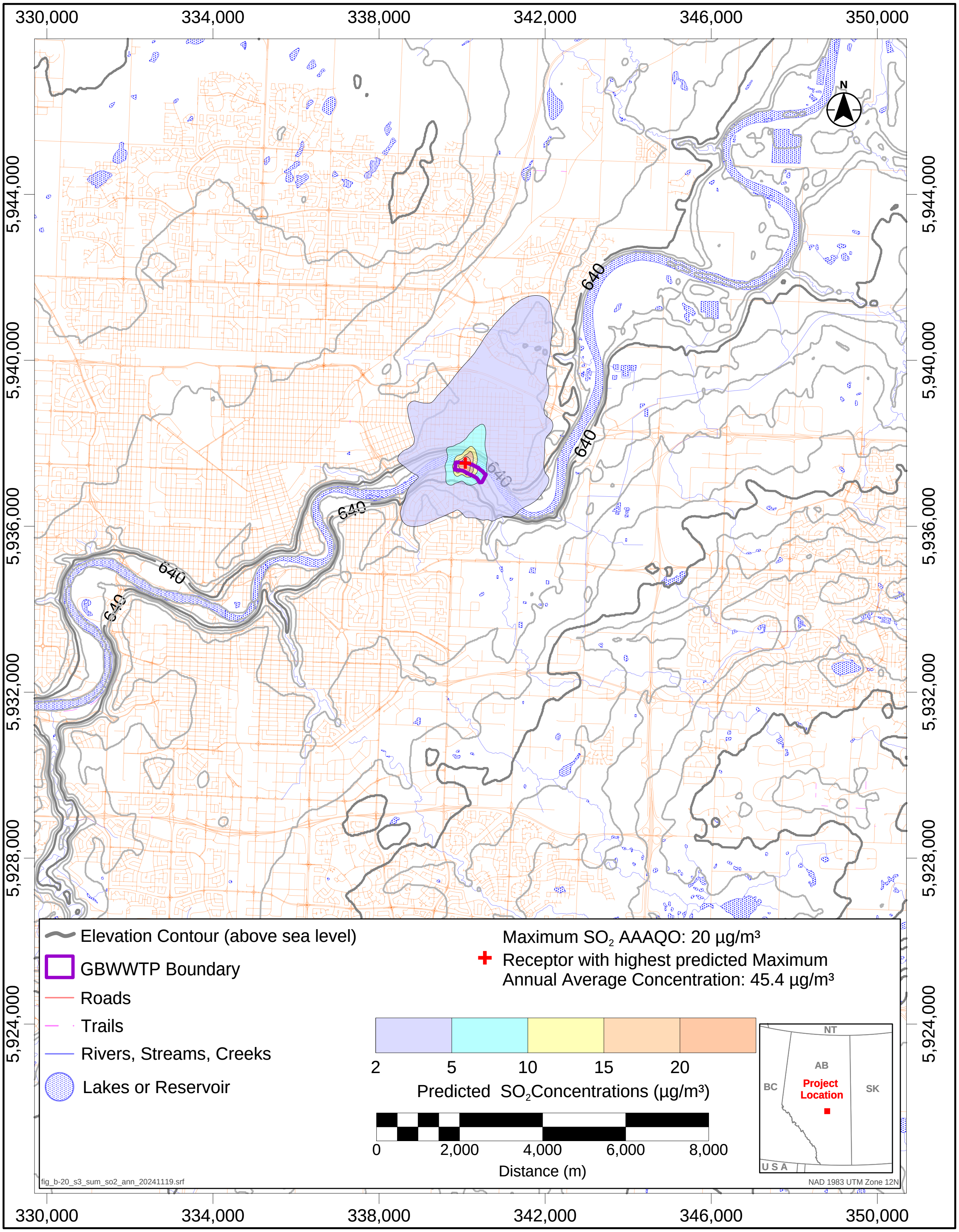


Sources: Base Data - Natural Resources Canada Canadian Digital Elevation Model (CDEM)

*Disclaimer: This map is for illustrative purposes to support this Stantec project; questions can be directed to the issuing agency.*

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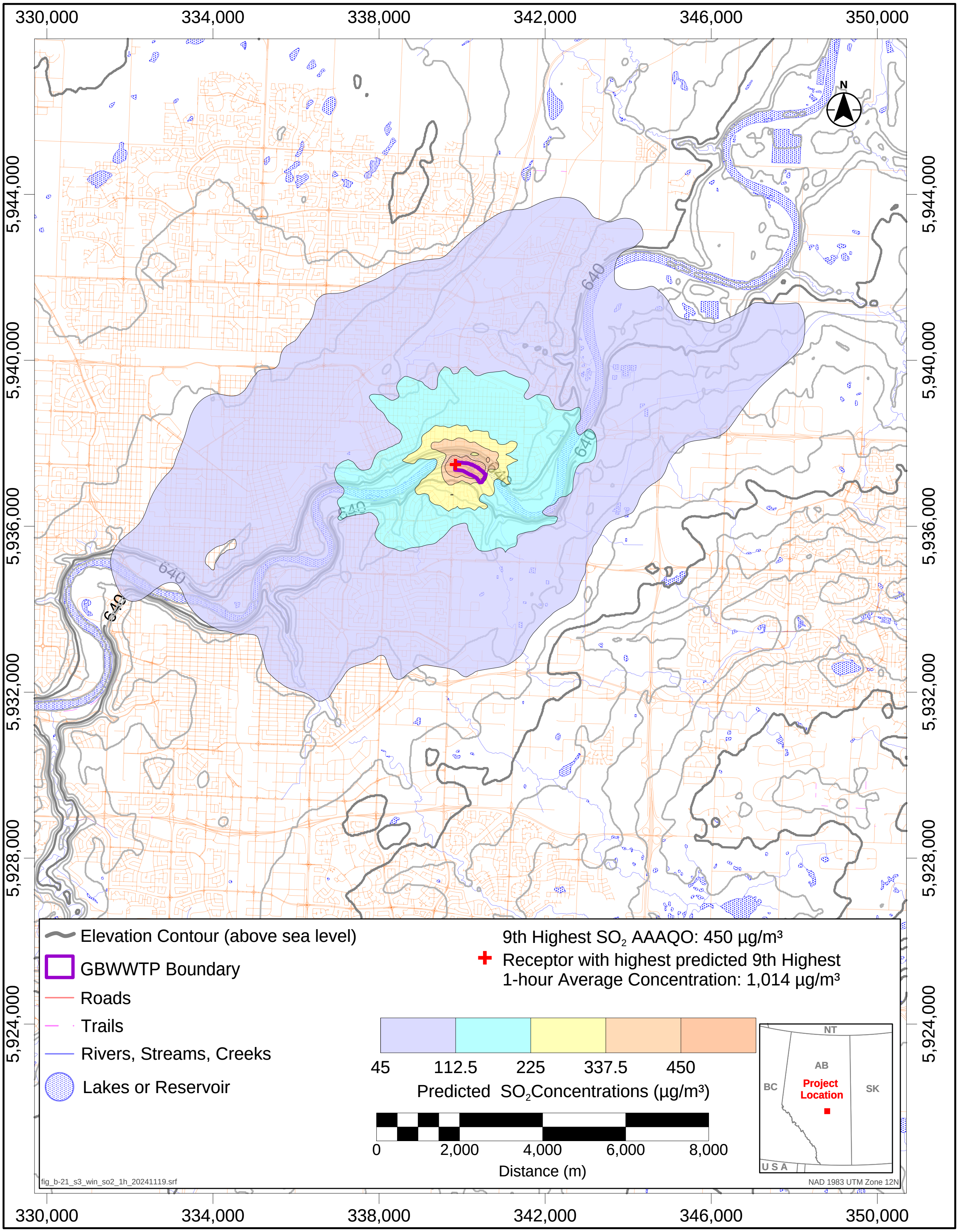


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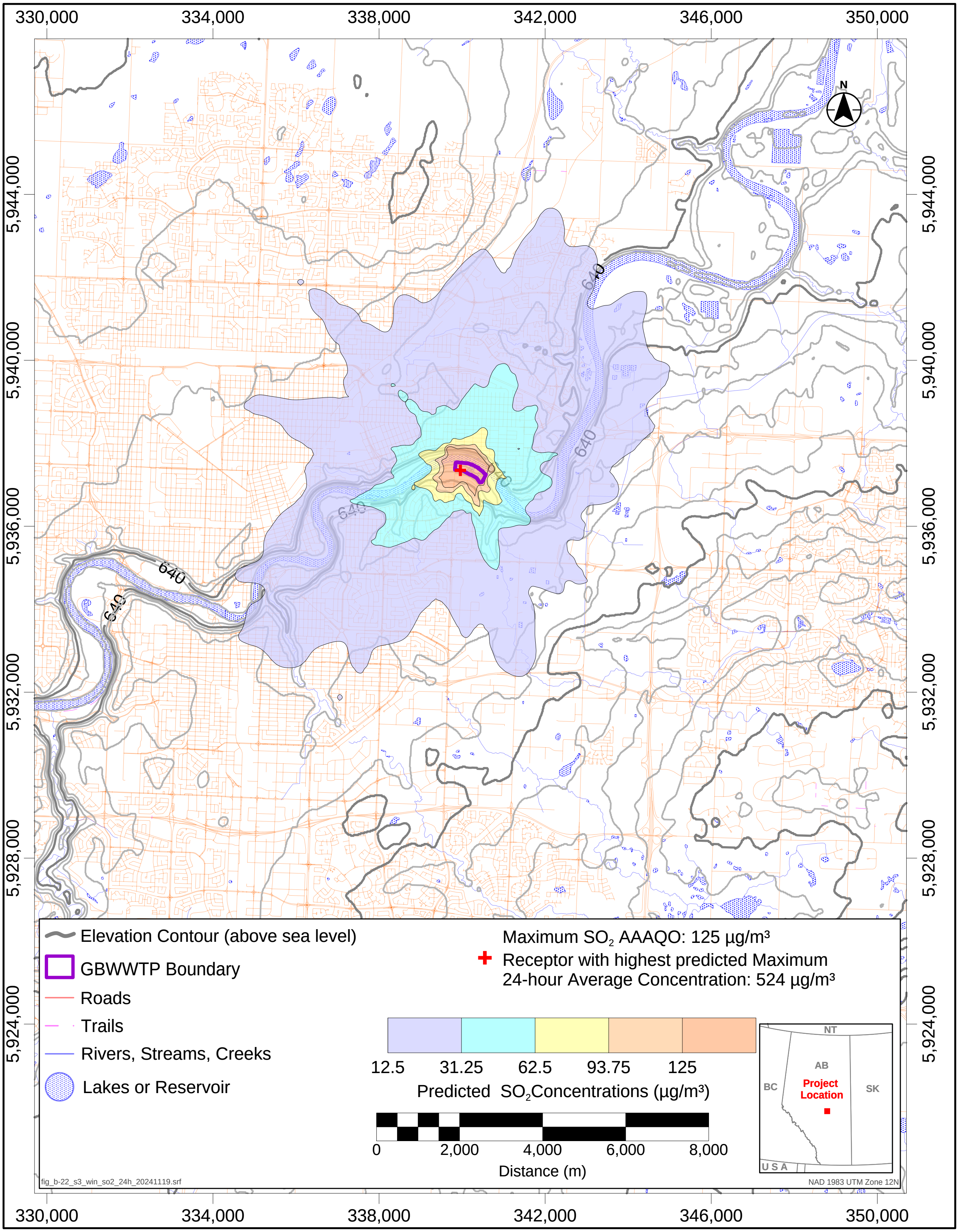


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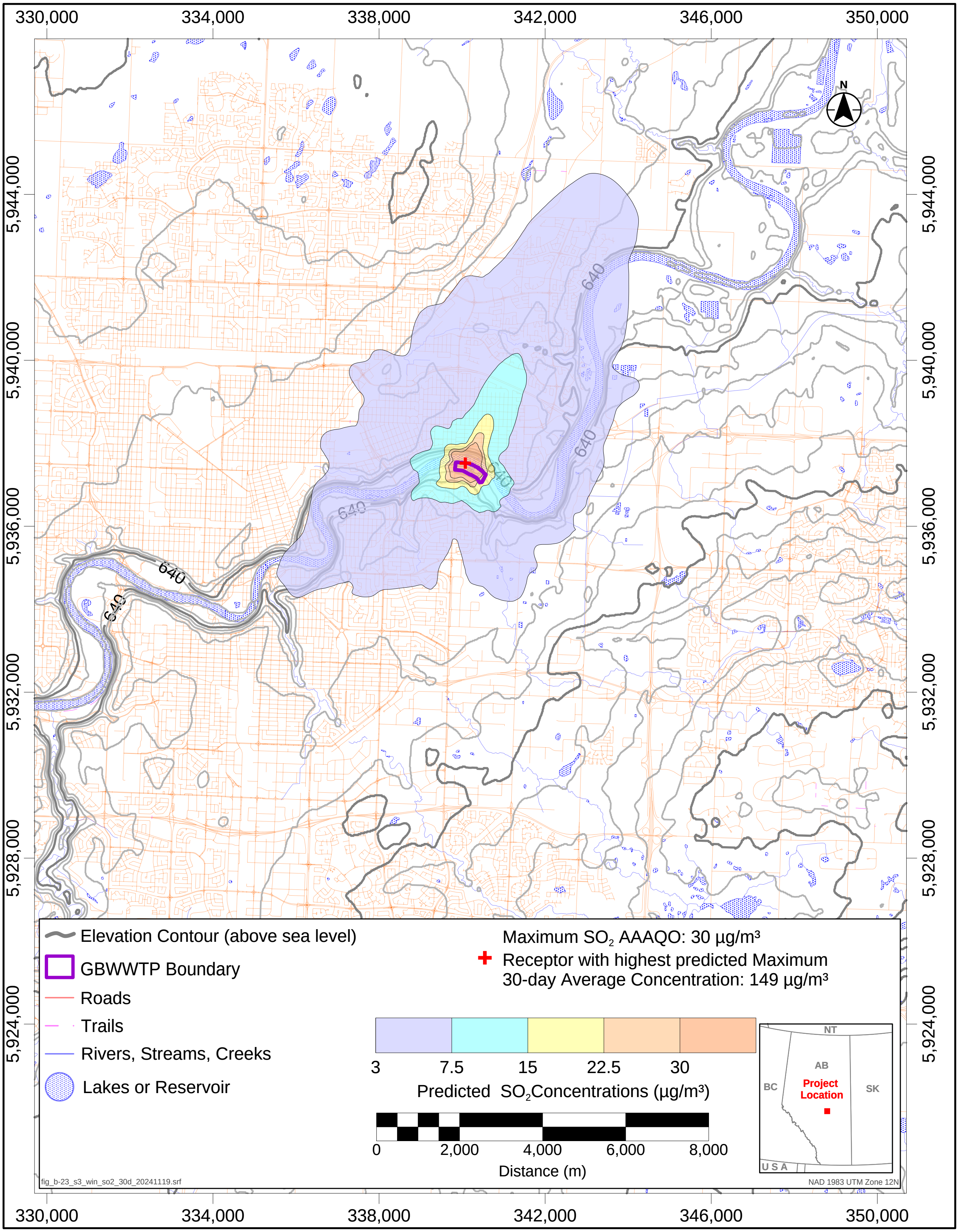


Sources: Base Data - Natural Resources Canada Canadian Digital Elevation Model (CDEM)

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**Maximum 30-day Average $SO_2$ Concentrations Predicted Gold Bar Wastewater Treatment Plant — Scenario 3: Future Application Existing Boilers and Enclosed Flare (Winter Case: Biogas Flow 30% to Flares and 70% to Boilers)**

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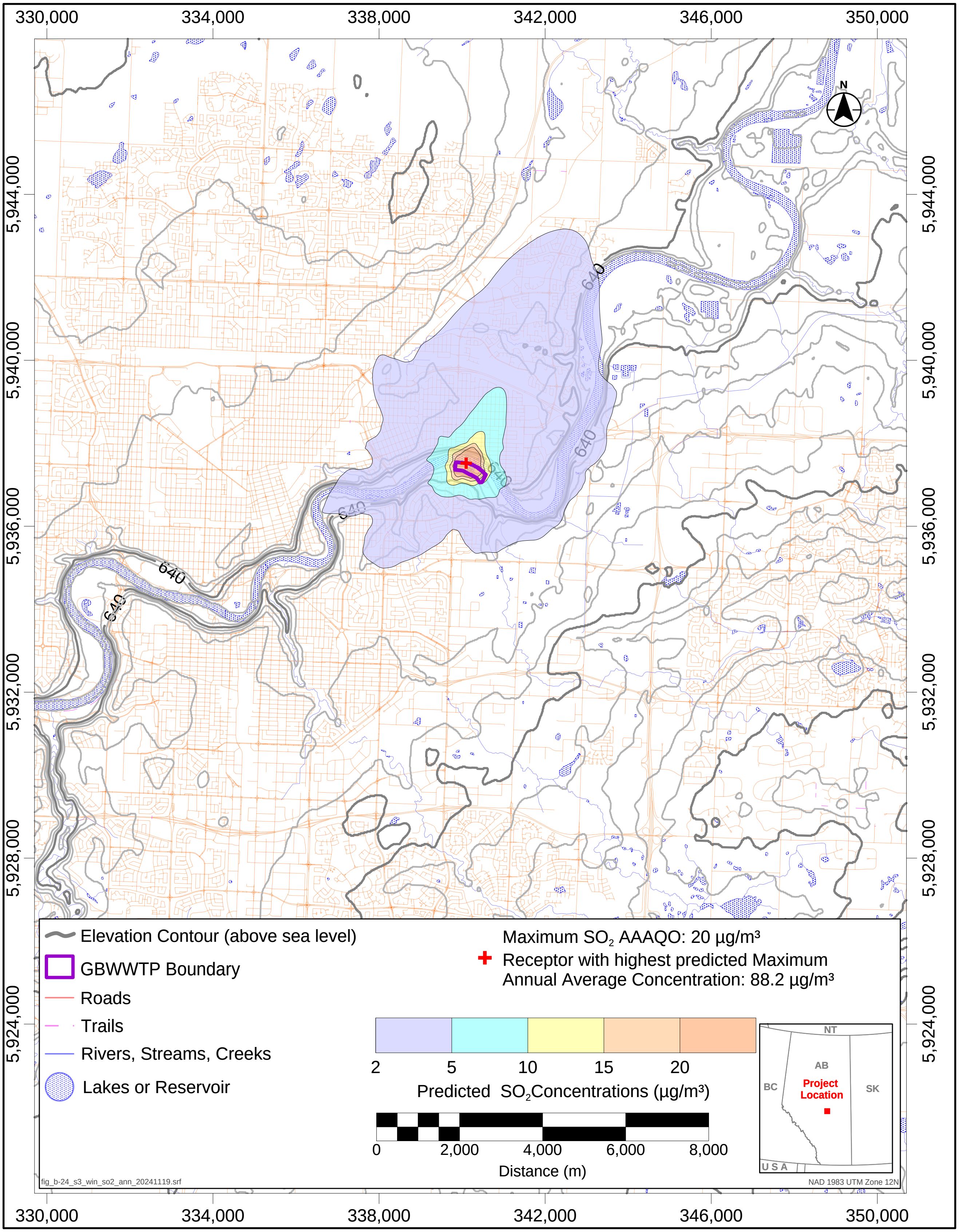


Sources: Base Data - Natural Resources Canada Canadian Digital Elevation Model (CDEM)

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EPCOR

# GOLD BAR WWTP
# FLARE CAPACITY EXPANSION

NOVEMBER 2024

PROJECT NUMBER: 1101000105

ISSUED FOR CONSTRUCTION

| FLOW# | FLOW PATH | PRED PIPE SIZE | EST. FLOW (ML/day) | NO. OF PIPES | FLOW VELOCITY (m/s) | PRESSURE (kPa) |
|---|---|---|---|---|---|---|
| 16 | COMMON HEADER TO FLARE | 16 | 15 | 1 | 1.5 | 95 |
| 17A/B | FLR-25000/25001 | – | – | – | – | 95 |
| 33A | BIO GAS TO USAGE COMPRESSOR 1 | 8 | 25 | 1 | 9.0 | 95 |
| 33B | BIO GAS FROM USAGE COMPRESSOR 1 | 6 | 25 | 1 | 15.5 | 300 |
| 34A | BIO GAS TO USAGE COMPRESSOR 2 | 8 | 0 | 1 | 0.0 | – |
| 34B | BIO GAS FROM USAGE COMPRESSOR 2 | 6 | 0 | 1 | 0.0 | – |
| 35 | BIO GAS TO LET DOWN VALVE | 6 | 20 | 1 | 12.4 | 300 |
| 36 | BIO GAS RE-CIRCULATION | 2 | 5 | 1 | 26.7 | 300 |
| 37 | BIO GAS TO BOILERS | – | – | – | – | 110 |


| REFERENCE DRAWING | | REVISION | | | | | | |
|---|---|---|---|---|---|---|---|---|
| DRAWING No. | DRAWING TITLE | Rev. | DATE | DESCRIPTION | BY | DES. | CHK. | ENG. |
| | | 0A | 06-JUL-2023 | ISSUED FOR PRELIMINARY DESIGN | JD | MA | GP | MA |
| | | 0B | 26-APR-2024 | ISSUED FOR 60% DESIGN | AY | AY | NB | GP |
| | | 0C | 30-AUG-2024 | ISSUED FOR 90% DESIGN | JD | AY | DS | GP |
| | | 0D | 15-NOV-2024 | ISSUED FOR CONSTRUCTION | JD | AY | DS | GP |

PERMIT STAMP

**PERMIT TO PRACTICE**
**STANTEC CONSULTING LTD**
RM SIGNATURE:
RM APEGA ID #: 49830
DATE: 2024-11-25
**PERMIT NUMBER: P000258**
The Association of Professional Engineers and Geoscientists of Alberta (APEGA)

ENGINEERING STAMP

PROFESSIONAL ENGINEER ALBERTA
ZACHARY PAQUIN
ID 157653
November 25 2024

Stantec

300-10220 103 Avenue NW
Edmonton AB T5J 0K4 CA
www.stantec.com

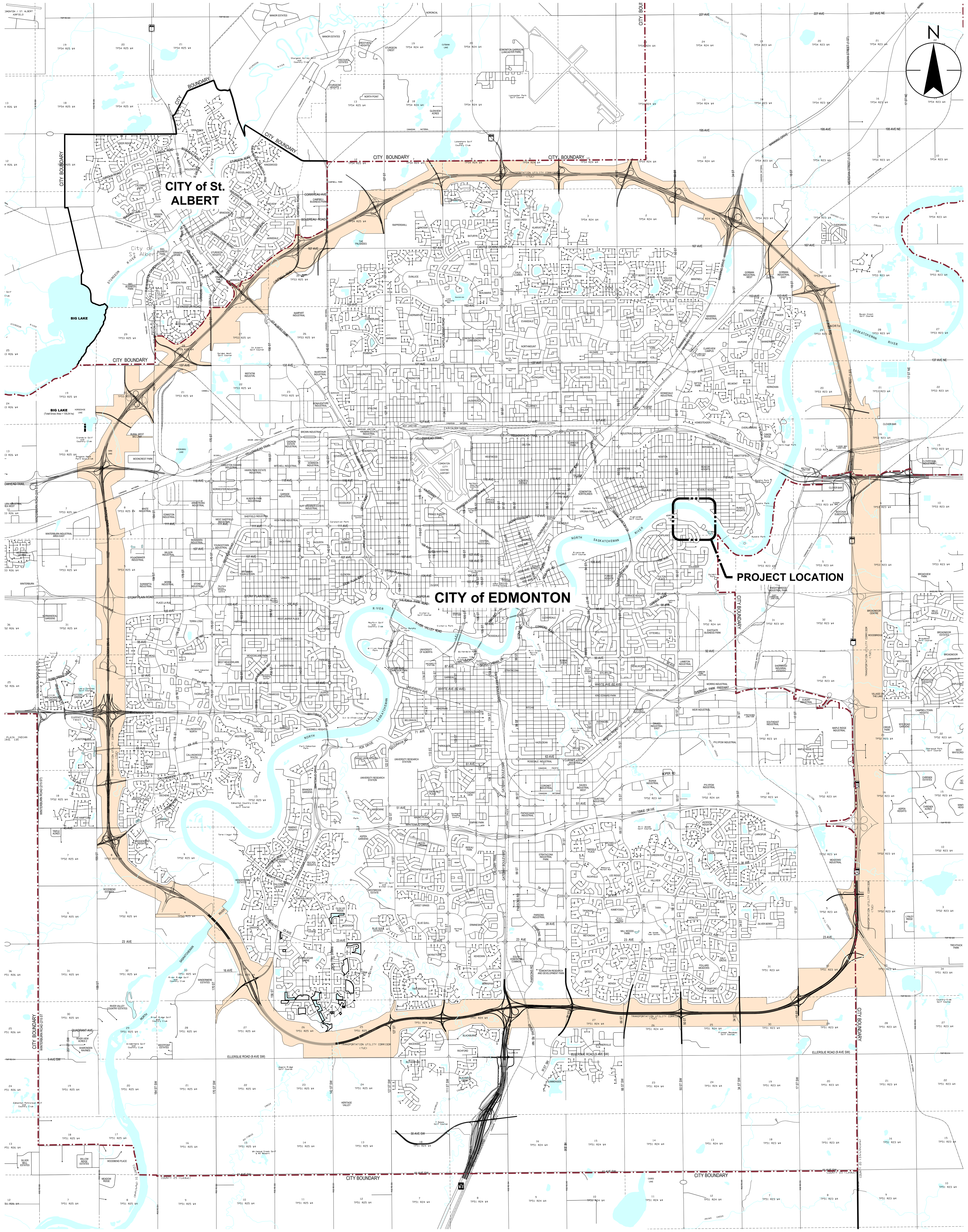


EPCOR

PLANT SITE: GOLD BAR WWTP
PLANT AREA: PLANT WIDE
PROJECT NAME: GBWWTP FLARE CAPACITY EXPANSION
DRAWING TITLE:

PROCESS
WASTE GAS BURNER BUILDING
PROCESS FLOW DIAGRAM

| CONSULTANT JOB No. | EPCOR PROJECT No. | SCALE | SHEET | DRAWING NUMBER |
|---|---|---|---|---|
| 1101000105 | PMO 1004723; PF14-015 | NTS | 1 OF 1 | PFD-DIG-003 |




## PROJECT LOCATION PLAN

1:75,000

# LIST OF DRAWINGS

## GENERAL

| DWG. No. | TITLE |
|---|---|
| PRJ-15-157-001 | COVER SHEET |
| PRJ-15-157-002 | PROJECT LOCATION AND INDEX OF DRAWINGS |
| PRJ-15-157-003 | EXISTING SITE |

## CIVIL

| DWG. No. | TITLE |
|---|---|
| PRJ-15-157-102 | EXISTING CONDITIONS AND DEMOLITION PLAN |
| PRJ-15-157-103 | SITE PLAN OVERALL AND GRADING |
| PRJ-15-157-104 | DETAILS |
| PRJ-15-157-105 | PRIMARY CLARIFIER #2 BACKFILL |

## STRUCTURAL

| DWG. No. | TITLE |
|---|---|
| PRJ-15-157-200 | 3D VIEWS |
| PRJ-15-157-201 | GENERAL NOTES |
| PRJ-15-157-202 | DESIGN TABLES |
| PRJ-15-157-203 | TYPICAL DETAILS - SHEET 1 |
| PRJ-15-157-204 | TYPICAL DETAILS - SHEET 2 |
| PRJ-15-157-205 | TYPICAL DETAILS - SHEET 3 |
| PRJ-15-157-205A | TYPICAL DETAILS - SHEET 4 |
| PRJ-15-157-206 | FOUNDATION DEMO PLAN |
| PRJ-15-157-207 | MAIN LEVEL DEMO PLAN |
| PRJ-15-157-208 | PILE LAYOUT AND FOUNDATION PLAN |
| PRJ-15-157-209 | MAIN FLOOR FRAMING PLAN |
| PRJ-15-157-209A | MAIN FLOOR PLAN |
| PRJ-15-157-210 | NEW FLARES AND FLARE BUILDING LAYOUT |
| PRJ-15-157-211 | VAPOUR HEADER STEEL FRAMING PLAN |
| PRJ-15-157-211A | VAPOUR HEADER STEEL FRAMING PLAN |
| PRJ-15-157-212 | BUILDING FLOOR PLAN AND ROOF FRAMING PLAN |
| PRJ-15-157-213 | ROOF SNOW LOAD, RAIN PONDING, AND WIND LIFT |
| PRJ-15-157-214 | BUILDING ELEVATIONS |
| PRJ-15-157-215 | BUILDING SECTIONS AND DETAILS |
| PRJ-15-157-216 | VAPOUR HEADER SECTIONS AND DETAILS |
| PRJ-15-157-217 | BUILDING SECTIONS AND DETAILS |
| PRJ-15-157-218 | ROOF LADDER PLATFORM PLAN AND DETAILS |
| PRJ-15-157-219 | SCHEDULES |
| PRJ-15-157-220 | SCHEDULES |

## ARCHITECTURAL

| DWG. No. | TITLE |
|---|---|
| PRJ-15-157-301 | GENERAL NOTES, CODE ANALYSIS & ASSEMBLIES |
| PRJ-15-157-302 | MAIN FLOOR PLAN |
| PRJ-15-157-303 | ELEVATIONS |
| PRJ-15-157-304 | BUILDING SECTIONS |
| PRJ-15-157-305 | BUILDING DETAILS |

## PROCESS MECHANICAL

| DWG. No. | TITLE |
|---|---|
| PRJ-15-157-401 | SYMBOLS AND ABBREVIATION - SHEET 1 OF 4 |
| PRJ-15-157-402 | SYMBOLS AND ABBREVIATION - SHEET 2 OF 4 |
| PRJ-15-157-403 | SYMBOLS AND ABBREVIATION - SHEET 3 OF 4 |
| PRJ-15-157-404 | SYMBOLS AND ABBREVIATION - SHEET 4 OF 4 |
| PDF-DIG-003 | WASTE GAS BURNER BUILDING - PROCESS FLOW DIAGRAM |
| PRJ-15-157-405 | WASTE GAS BURNER PIPING - PROCESS AND INSTRUMENTATION DIAGRAM |
| PRJ-15-157-406 | WASTE GAS BURNER BUILDING - PROCESS AND INSTRUMENTATION DIAGRAM |
| PRJ-15-157-407 | WASTE GAS BURNER SUMP PUMP - PROCESS AND INSTRUMENTATION DIAGRAM |
| PRJ-15-157-408 | WASTE GAS BURNER BUILDING - SITE PLAN |
| PRJ-15-157-409 | WASTE GAS BURNER BUILDING - BUILDING PLAN |
| PRJ-15-157-410 | WASTE GAS BURNER BUILDING - SECTION A |
| PRJ-15-157-411 | WASTE GAS BURNER BUILDING - SECTION B |
| PRJ-15-157-412 | WASTE GAS BURNER BUILDING - SECTION C |
| PRJ-15-157-413 | WASTE GAS BURNER BUILDING - SECTION D |
| PRJ-15-157-414 | WASTE GAS BURNER BUILDING - DEMOLITION PLAN & SECTIONS |
| PRJ-15-157-413 | PIPE SUPPORT STANDARD DETAIL - SHEET 1 |
| PRJ-15-157-413 | PIPE SUPPORT STANDARD DETAIL - SHEET 2 |
| PRJ-15-157-413 | PIPE SUPPORT STANDARD DETAIL - SHEET 3 |

## BUILDING MECHANICAL

| DWG. No. | TITLE |
|---|---|
| PRJ-15-157-501 | LEGEND, SCHEDULE |
| PRJ-15-157-502 | NATURAL GAS UTILITY SITE PLAN |
| PRJ-15-157-503 | MAIN FLOOR PLUMBING PLAN |
| PRJ-15-157-504 | EAST SCRUBBER BUILDING PLUMBING PLAN |
| PRJ-15-157-505 | MAIN FLOOR HVAC PLAN |
| PRJ-15-157-506 | HVAC -BUILDING SECTIONS |
| PRJ-15-157-507 | MECHANICAL DETAILS |

## ELECTRICAL

| DWG. No. | TITLE |
|---|---|
| PRJ-15-157-601 | SYMBOLS, LEGENDS AND ABBREVIATIONS - SHEET 1 |
| PRJ-15-157-602 | SYMBOLS, LEGENDS AND ABBREVIATIONS - SHEET 2 |
| PRJ-15-157-603 | STANDARD DETAILS - SHEET 1 |
| PRJ-15-157-604 | STANDARD DETAILS - SHEET 2 |
| PRJ-15-157-605 | STANDARD DETAILS - SHEET 3 |
| PRJ-15-157-606 | STANDARD DETAILS - SHEET 4 |
| PRJ-15-157-607 | HAZARDOUS AREA CLASSIFICATION PLAN |
| PRJ-15-157-608 | SITE PLAN - WASTE GAS BURNER BUILDING |
| PRJ-15-157-609 | GROUNDING PLAN |
| PRJ-15-157-610 | POWER PLAN |
| PRJ-15-157-611 | LIGHTING PLAN |
| PRJ-15-157-612 | BUILDING SYSTEMS PLAN |
| PRJ-15-157-613 | DIGESTER SQUARE ONE |
| PRJ-15-157-614 | PENTHOUSE 1 |
| PRJ-15-157-617 | HEAT TRACE PLAN |
| PRJ-15-157-618 | PANELBOARD SCHEDULE - LTG-81948U |
| PRJ-15-157-620 | LUMINAIRE SCHEDULE |
| PRJ-15-157-621 | FIRE ALARM AND ACCESS CONTROL RISER DIAGRAM |
| PRJ-15-157-622 | SECURITY AND ACCESS CONTROL SCHEMATICS DETAILS |
| PRJ-15-157-661 | MOTOR CONTROL CENTRE SCHEDULE EAST SCRUBBER BLDG. 743-MCC-14074 (NORMAL) |
| PRJ-15-157-662 | MOTOR CONTROL CENTRE SCHEDULE EAST SCRUBBER BLDG. 743-MCC-14074 (NORMAL) |
| PRJ-15-157-671 | GEF-81937 WIRING DIAGRAM |
| PRJ-15-157-672 | TYPICAL CONTROL STATION LAYOUT FVNR: UNCLASSIFIED |

## INSTRUMENTATION AND CONTROLS

| DWG. No. | TITLE |
|---|---|
| PRJ-15-157-701 | SYMBOLS, LEGENDS AND ABBREVIATIONS - SHEET 1 |
| PRJ-15-157-702 | SYMBOLS, LEGENDS AND ABBREVIATIONS - SHEET 2 |
| PRJ-15-157-703 | SYMBOLS, LEGENDS AND ABBREVIATIONS - SHEET 3 |
| PRJ-15-157-704 | STANDARD DETAILS - SHEET 1 |
| PRJ-15-157-705 | STANDARD DETAILS - SHEET 2 |
| PRJ-15-157-706 | FJB-81951 LAYOUT & BOM |
| PRJ-15-157-707 | IPJB-81969 LSYOUT, BOM & SHEDULE |
| PRJ-15-157-708 | WASTE GAS BURNER BUILDING - MAIN FLOOR INSTRUMENT LAYOUT |
| PRJ-15-157-709 | SITE PLAN - WASTE GAS BURNER BUILDING |
| PRJ-15-157-710 | COMMUNICATIONS SYSTEM ARCHITECTURE |
| PRJ-15-157-711 | CABLE AND CONDUIT SCHEDULE |
| PRJ-15-157-721 | LSHH-5717 LOOP DRAWING |
| PRJ-15-157-722 | AIT-5721 LOOP DRAWING |
| PRJ-15-157-723 | GAS DETECTION ALARM BEACONS & HORNS LOOP DRAWING |
| PRJ-15-157-724 | TIT-5723 LOOP DRAWING |
| PRJ-15-157-725 | TLSH-5724 & LSL-5724 LOOP DRAWING |
| PRJ-15-157-726 | TIT-5726 LOOP DRAWING |
| PRJ-15-157-727 | FIT-5727 LOOP DRAWING |
| PRJ-15-157-728 | PIT-5728 LOOP DRAWING |
| PRJ-15-157-729 | PCV-5729 LOOP DRAWING |
| PRJ-15-157-730 | PSL-5734 LOOP DRAWING |
| PRJ-15-157-731 | LSH-5745 & LSL-5746 LOOP DRAWING |

REFERENCE DRAWING

| DRAWING No. | DRAWING TITLE |
|---|---|
| . | . |

REVISION

| Rev. | DATE | DESCRIPTION | BY | DES. | CHK. | ENG. |
|---|---|---|---|---|---|---|
| 1 | 06-JUL-2023 | ISSUED FOR PRELIMINARY DESIGN | PA | MB | MD | MB |
| 2 | 26-APR-2024 | ISSUED FOR 60% DESIGN | PA | MB | MD | MB |
| 3 | 15-NOV-2024 | ISSUED FOR CONSTRUCTION | PA | MB | MD | MB |

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ID 157653
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PLANT SITE: GOLD BAR WWTP
PLANT AREA: PLANT WIDE
PROJECT NAME: GBWWTP FLARE CAPACITY EXPANSION
DRAWING TITLE: GENERAL PROJECT LOCATION AND INDEX OF DRAWINGS

| CONSULTANT JOB No. | EPCOR PROJECT No. | SCALE | SHEET | DRAWING NUMBER |
|---|---|---|---|---|
| 1101000105 | PMO 1004723; PF14-015 | AS NOTED | - OF - | PRJ-15-157-002 |


| REFERENCE DRAWING | | REVISION | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| DRAWING No. | DRAWING TITLE | Rev. | DATE | DESCRIPTION | BY | DES. | CHK. | ENG. |
| . | . | 0A | 07-JUL-2023 | ISSUED FOR PRELIMINARY DESIGN | PA | MB | MD | MB |
| | | 0B | 26-APR-2024 | ISSUED FOR 60% DESIGN | PA | MB | MD | MB |
| | | 0C | 30-AUG-2024 | ISSUED FOR 90% DESIGN | AB | MB | TL | MB |
| | | 0D | 15-NOV-2024 | ISSUED FOR CONSTRUCTION | RJ | MB | TL | MB |

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ID 157653
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PLANT SITE: GOLD BAR WWTP | PLANT WIDE

PROJECT NAME: GBWWTP FLARE CAPACITY EXPANSION

DRAWING TITLE:

GENERAL
EXISTING SITE

| CONSULTANT JOB No. | EPCOR PROJECT No. | SCALE | SHEET | DRAWING NUMBER |
|---|---|---|---|---|
| 1101000105 | PMO 1004723; PF14-015 | 1:150 | - OF - | PRJ-15-157-003 |


| REFERENCE DRAWING | | REVISION | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| DRAWING No. | DRAWING TITLE | Rev. | DATE | DESCRIPTION | BY | DES. | CHK. | ENG. |
| . | . | 0A | 07-JUL-2023 | ISSUED FOR PRELIMINARY DESIGN | PA | MB | MD | MB |
| | | 0B | 26-APR-2024 | ISSUED FOR 60% DESIGN | PA | MB | MD | MB |
| | | 0C | 30-AUG-2024 | ISSUED FOR 90% DESIGN | AB | MB | TL | MB |
| | | 0D | 15-NOV-2024 | ISSUED FOR CONSTRUCTION | RJ | MB | TL | MB |

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PROFESSIONAL ENGINEER
MICHAEL BOLSTER
ALBERTA
2024-11-25
ID #70819

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EPCOR

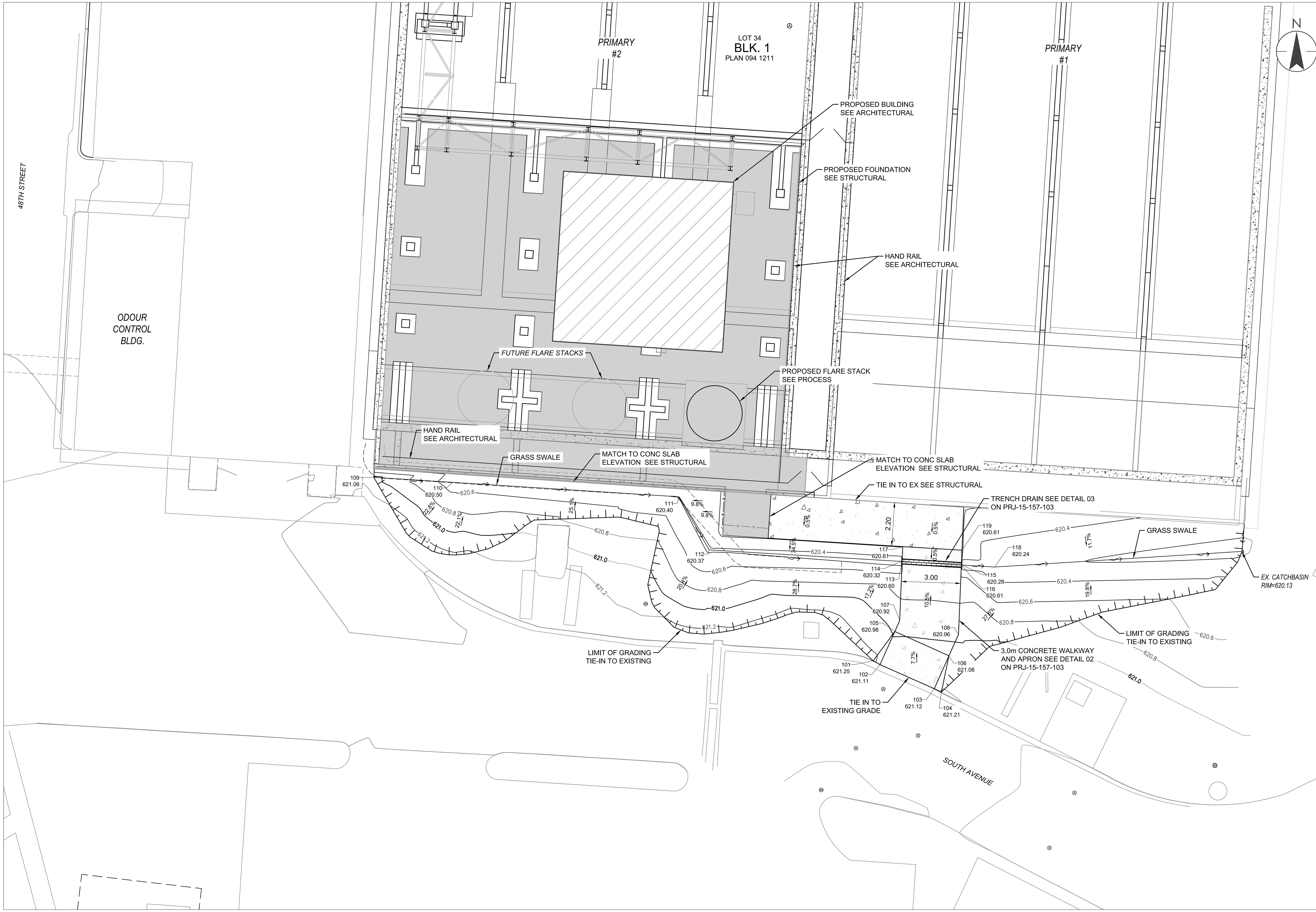
PLANT SITE: GOLD BAR WWTP | PLANT WIDE

PROJECT NAME: GBWWTP FLARE CAPACITY EXPANSION

DRAWING TITLE:

CIVIL
EXISTING CONDITIONS AND DEMOLITIONS PLAN

| CONSULTANT JOB No. | EPCOR PROJECT No. | SCALE | SHEET | DRAWING NUMBER |
|---|---|---|---|---|
| 1101000105 | PMO 1004723; PF14-015 | 1:100 | - OF - | PRJ-15-157-102 |




## NOTES

1. ALL DISTANCE AND COORDINATES ARE IN METRES.
2. ALL COORDINATES ARE IN NAD83/ALBERTA 3TM (REF. MERID. 114W)
3. ALL DIMENSIONS ARE IN MILLIMETRES, UNLESS NOTED OTHERWISE.
4. EXCESS MATERIAL TO BE REMOVED AND DISPOSED OF BY CONTRACTOR.
5. SITE SOILS SHALL NOT TO BE USED FOR ENGINEERED FILL IF NOT SUITABLE. CONTRACTOR TO SOURCE, HAUL AND PLACE ENGINEERED FILL MATERIAL AS PER SPECIFICATIONS. ALL UNSUITABLE SOILS TO BE REMOVED AND DISPOSED OF OFF-SITE AT CONTRACTOR'S EXPENSE.
6. ALL DISTURBED AREAS TO BE TOPSOILED AND SEEDED.

## LEGEND

- 620.8 EXISTING CONTOUR (0.2m INTERVAL)
- 621.0 PROPOSED CONTOUR (0.2m INTERVAL)
- PROPOSED SWALE AND DIRECTION OF FLOW
- PROPOSED SHEET FLOW AND DIRECTION OF FLOW
- 1.4% PROPOSED GRADE AND DIRECTION OF FLOW
- PROPOSED CONCRETE
- PROPOSED RECYCLED CONCRETE BACKFILL

### POINT TABLE

| POINT # | NORTHING | EASTING | ELEVATION | DESC |
|---|---|---|---|---|
| 101 | 5936585.40 | 38788.35 | 621.25 | EDGE OF CONCRETE |
| 102 | 5936585.20 | 38788.70 | 621.11 | EDGE OF CONCRETE |
| 103 | 5936583.98 | 38791.44 | 621.12 | EDGE OF CONCRETE |
| 104 | 5936583.81 | 38791.80 | 621.21 | EDGE OF CONCRETE |
| 105 | 5936586.88 | 38789.45 | 620.98 | EDGE OF CONCRETE |
| 106 | 5936585.65 | 38792.18 | 621.08 | EDGE OF CONCRETE |
| 107 | 5936587.43 | 38789.69 | 620.92 | EDGE OF CONCRETE |
| 108 | 5936586.73 | 38792.67 | 620.96 | EDGE OF CONCRETE |
| 109 | 5936594.67 | 38763.11 | 621.06 | SWALE |
| 110 | 5936594.42 | 38767.09 | 620.50 | SWALE |
| 111 | 5936593.69 | 38778.53 | 620.40 | SWALE |
| 112 | 5936591.01 | 38780.06 | 620.37 | SWALE |
| 113 | 5936590.42 | 38789.81 | 620.60 | EDGE OF CONCRETE |
| 114 | 5936590.42 | 38789.77 | 620.32 | SWALE |
| 115 | 5936590.24 | 38792.87 | 620.28 | SWALE |
| 116 | 5936590.24 | 38792.81 | 620.61 | EDGE OF CONCRETE |
| 117 | 5936591.17 | 38789.85 | 620.61 | EDGE OF CONCRETE |
| 118 | 5936590.14 | 38794.49 | 620.24 | SWALE |
| 119 | 5936590.99 | 38792.84 | 620.61 | EDGE OF CONCRETE |

| REFERENCE DRAWING | |
|---|---|
| DRAWING No. | DRAWING TITLE |
| . | . |

| REVISION | | | | | | |
|---|---|---|---|---|---|---|
| Rev. | DATE | DESCRIPTION | BY | DES. | CHK. | ENG. |
| 0A | 06-JUL-2023 | ISSUED FOR PRELIMINARY DESIGN | PA | MB | MD | MB |
| 0B | 26-APR-2024 | ISSUED FOR 60% DESIGN | PA | MB | MD | MB |
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| 0D | 15-NOV-2024 | ISSUED FOR CONSTRUCTION | PA | MB | TL | MB |

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ID #70819

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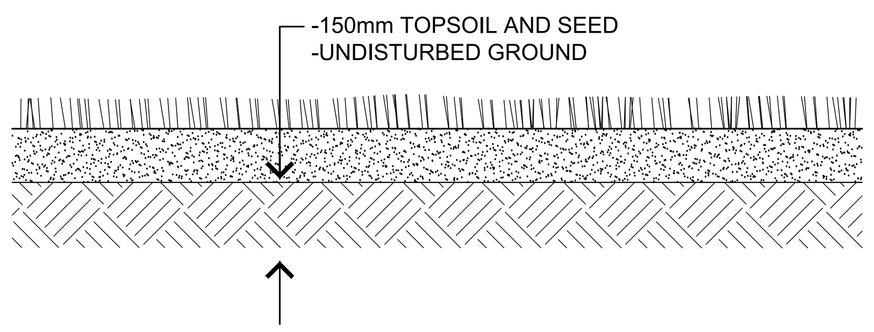
PLANT SITE: GOLD BAR WWTP | PLANT WIDE

PROJECT NAME: GBWWTP FLARE CAPACITY EXPANSION

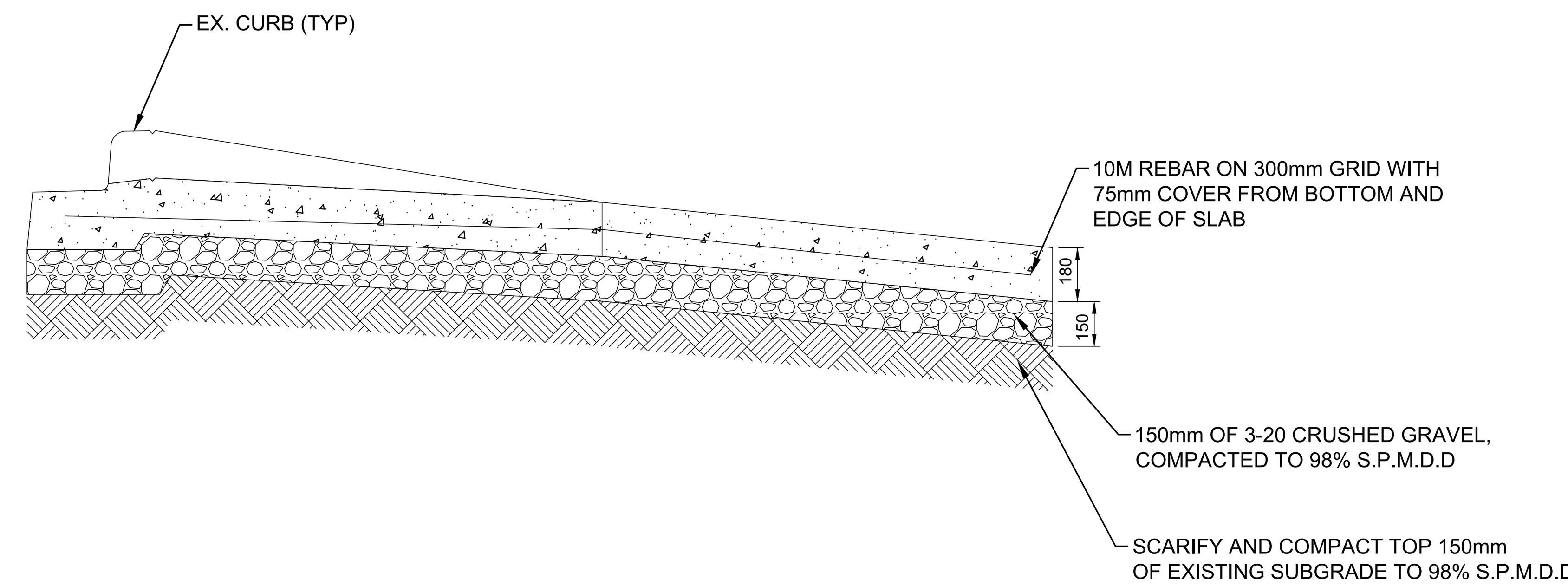
DRAWING TITLE:

CIVIL
OVERALL SITE PLAN AND GRADING

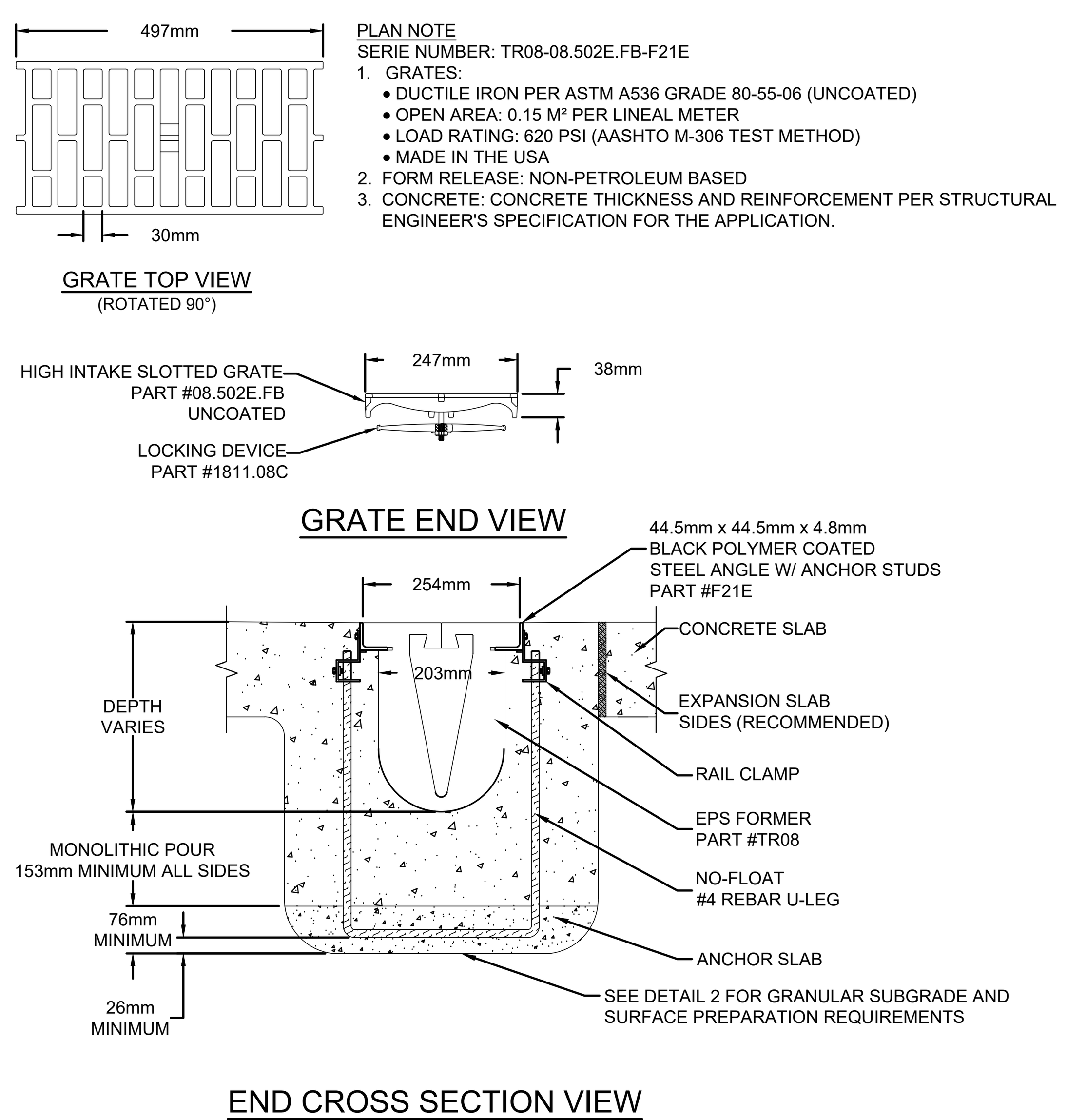
| CONSULTANT JOB No. | EPCOR PROJECT No. | SCALE | SHEET | DRAWING NUMBER |
|---|---|---|---|---|
| 1101000105 | PMO 1004723; PF14-015 | 1:100 | - OF - | PRJ-15-157-103 |




1 TYP **DETAIL - TOPSOIL AND SEED**
N.T.S.




2 103 **DETAIL - CONCRETE WALKWAY AND APPROACH**
N.T.S.




3 103 **DETAIL - TRENCH DRAIN**
N.T.S.

| REFERENCE DRAWING | | REVISION | | | | | | |
|---|---|---|---|---|---|---|---|---|
| DRAWING No. | DRAWING TITLE | Rev. | DATE | DESCRIPTION | BY | DES. | CHK. | ENG. |
| . | . | 0A | 26-APR-2024 | ISSUED FOR 60% DESIGN | PA | MB | MD | MB |
| | | 0B | 30-AUG-2024 | ISSUED FOR 90% DESIGN | AB | MB | TL | MB |
| | | 0C | 15-NOV-2024 | ISSUED FOR CONSTRUCTION | PA | MB | TL | MB |
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PROJECT NAME: GBWWTP FLARE CAPACITY EXPANSION

DRAWING TITLE:

CIVIL
DETAILS

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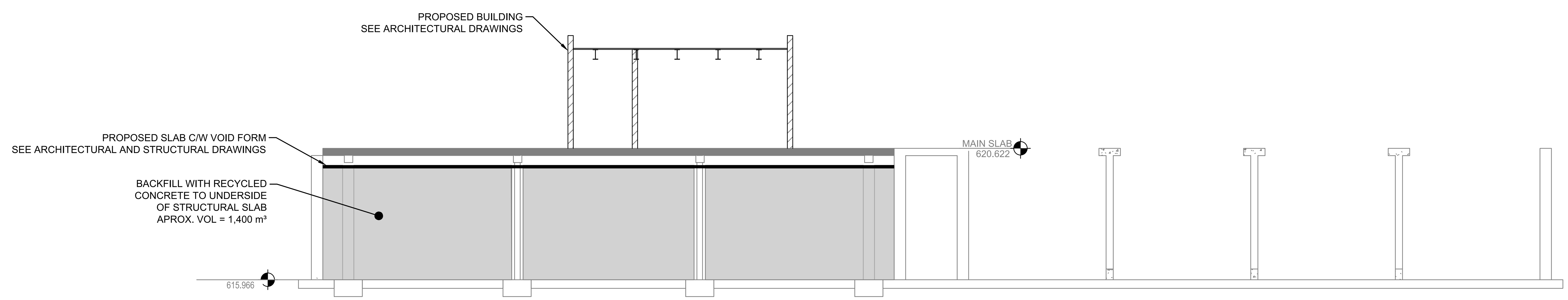
|---|---|---|---|---|
| 1101000105 | PMO 1004723; PF14-015 | AS SHOWN | - OF - | PRJ-15-157-104 |


A SECTION
1:100

1:100 0 1 3 5m

| REFERENCE DRAWING | |
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| DRAWING No. | DRAWING TITLE |
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| Rev. | DATE | DESCRIPTION | BY | DES. | CHK. | ENG. |
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PLANT SITE: GOLD BAR WWTP | PLANT WIDE

PROJECT NAME: GBWWTP FLARE CAPACITY EXPANSION

DRAWING TITLE:
CIVIL
PRIMARY CLARIFIER #2 BACKFILL

| CONSULTANT JOB No. | EPCOR PROJECT No. | SCALE | SHEET | DRAWING NUMBER |
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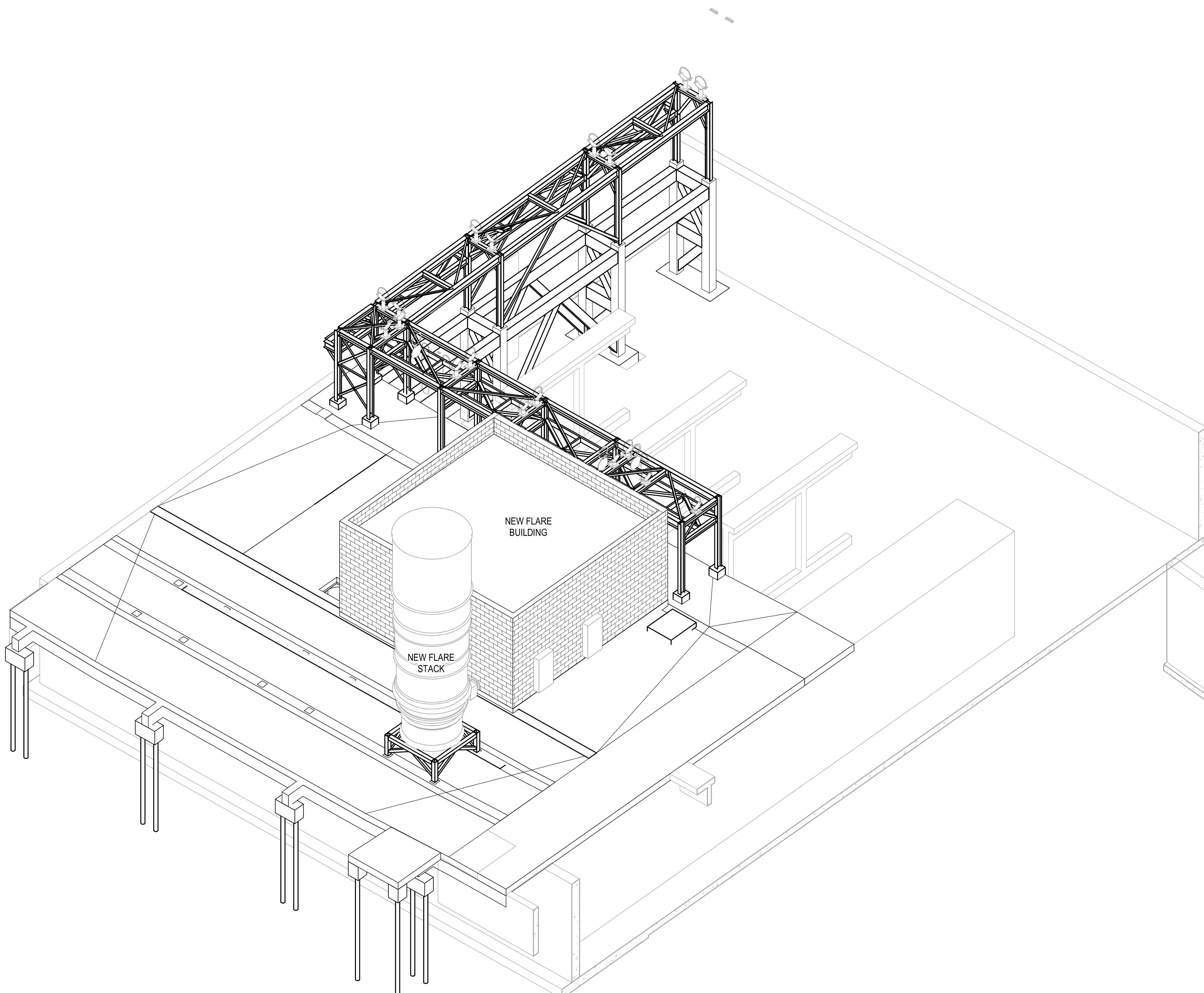
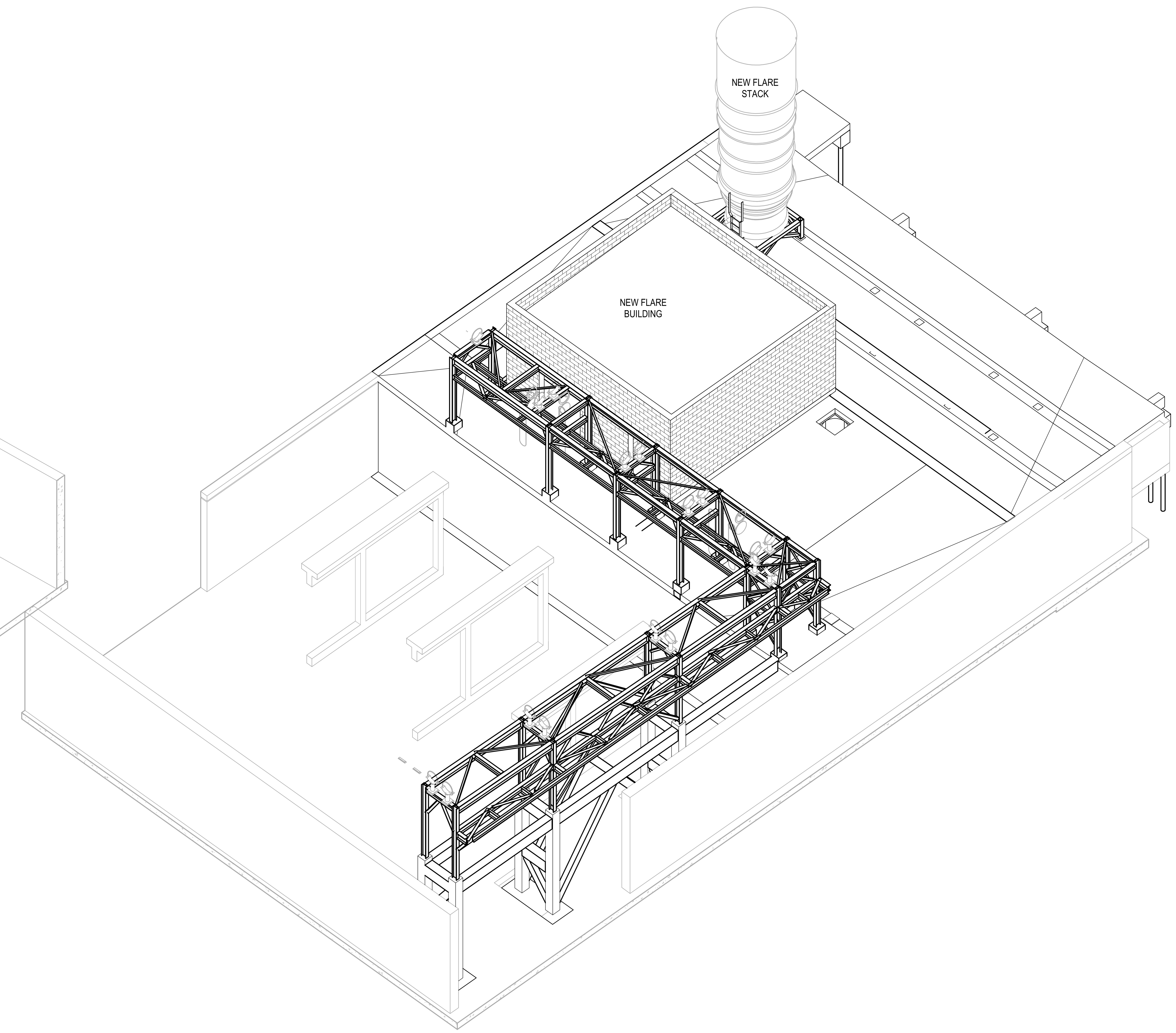



1
200
## 3D VIEW 1

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200
## 3D VIEW 2

| REFERENCE DRAWING | | REVISION | | | | | | | |
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| | | 0A | 06-JUL-2023 | ISSUED FOR PRELIMINARY DESIGN | JC | DD | PB | |
| | | 0B | 30-APR-2024 | ISSUED FOR 60% DESIGN | JN | MB | MB | PB |
| | | 0C | 30-AUG-2024 | ISSUED FOR 90% REVIEW | | RPJ | | |
| | | 0D | 15-NOV-2024 | ISSUED FOR CONSTRUCTION | AC | MB | MB | PB |
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PROFESSIONAL ENGINEER ALBERTA
MOHAMMAD R. BEHBAHANIFARD
ID: 90867
November 25 2024

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EPCOR

PLANT SITE: GOLD BAR WWTP
PLANT AREA: PRIMARY CLARIFIER #2
PROJECT NAME: GBWWTP FLARE CAPACITY EXPANSION
DRAWING TITLE:

STRUCTURAL
3D VIEWS

| CONSULTANT JOB No. | EPCOR PROJECT No. | SCALE | SHEET | DRAWING NUMBER |
|---|---|---|---|---|
| 1101000105 | PMO 1004723; PF14-105 | NTS | 1 of 17 | PRJ-15-157-200 |


Project Files\01_WIP\06_structural\model_files\1101000105_mod_struct.rvt
11/25/2024 1:24:18 PM

**DESIGN NOTES**

**GENERAL**

1. CODES REFERENCED ARE TO BE THE LATEST VERSION AT THE DATE OF ISSUE.
2. DESIGN IS BASED ON THE NATIONAL BUILDING CODE - 2023 ALBERTA EDITION.
3. READ THESE DESIGN NOTES IN CONJUNCTION WITH THE CONTRACT SPECIFICATIONS AND ALL OTHER CONTRACT DOCUMENTS.
4. OBTAIN ENGINEER'S APPROVAL BEFORE CUTTING, BORING, OR SLEEVING LOAD-BEARING MEMBERS UNLESS NOTED OTHERWISE.
5. THE STRUCTURAL DRAWINGS ARE FOR THE COMPLETED PROJECT. STABILITY OF EXISTING AND/OR NEW STRUCTURES DURING CONSTRUCTION REMAINS THE RESPONSIBILITY OF THE CONTRACTOR.
6. REFER TO ARCHITECTURAL, MECHANICAL, ELECTRICAL, AND PROCESS DRAWINGS FOR SMALL OPENINGS, SLEEVES, RECESSES, DEPRESSIONS, SUMPS, TRENCHES, CURBS, HOUSEKEEPING PADS, EQUIPMENT BASES, AND SLOPES NOT INDICATED ON THE STRUCTURAL DRAWINGS.
7. OPENINGS AND SLEEVES INDICATED ON THE STRUCTURAL DRAWINGS ARE FOR REFERENCE ONLY. COORDINATE ALL OPENING LOCATIONS AND DIMENSIONS WITH THE APPROPRIATE CONSULTANT AND THE SUB-CONTRACTOR PRIOR TO CONSTRUCTION.
8. REVIEW ALL DRAWINGS AND CHECK DIMENSIONS PRIOR TO IMPLEMENTING THE WORK. REPORT ANY DISCREPANCIES TO THE CONSULTANT FOR CLARIFICATION BEFORE PROCEEDING.
9. COORDINATE PLACEMENT AND LOCATION OF ITEMS BY SUBSEQUENT TRADES. RELEVANT TRADES SHALL REVIEW PRIOR TO ERECTION AND/OR INSTALLATION.
10. NOTIFY THE ENGINEER A MINIMUM OF 48 HOURS PRIOR TO ANY REQUIRED SITE REVIEWS.

**DESIGN LOADS**

1. UNLESS NOTED OTHERWISE, THE LOADS NOTED IN TABLES AND ON DRAWINGS ARE UNFACTORED.
2. CLIMATIC INFORMATION - REFER TO CLIMATIC INFORMATION TABLE
3. SITE INFORMATION - REFER TO SITE INFORMATION TABLE
4. DESIGN LOADS - REFER TO DESIGN LOADS TABLE
5. LATERAL LOADS
   1. LATERAL LOADS FROM WIND AND SEISMIC LOADS ARE RESISTED BY THE FOLLOWING ELEMENTS: MASONRY AND CONCRETE SHEAR WALLS.
   2. SEE FORCE MODIFICATION FACTORS TABLE.
6. CONSTRUCTION LOADS SHALL NOT EXCEED THE LOADS NOTED ON THE DRAWINGS.
7. RAIN PONDING LOADS HAVE BEEN CALCULATED BASED ON ROOF SLOPES, PARAPETS, AND SCUPPERS ASSUMING THAT DRAINS ARE ACCIDENTALLY PLUGGED FOR A PERIOD OF 24 HOURS.

**EXISTING STRUCTURES**

1. THE STRUCTURAL DESIGN IS BASED ON INFORMATION GATHERED FROM THE RECORD DRAWINGS AND FROM LIMITED VISUAL OBSERVATIONS ON SITE AND 3D SCAN.
2. VERIFY ALL EXISTING DIMENSIONS AND CONDITIONS ON SITE PRIOR TO IMPLEMENTING AFFECTED WORK.
3. NOTIFY THE CONSULTANT OF ANY SITE CONDITIONS THAT DIFFER FROM THE CONTRACT DOCUMENTS OR THE RECORD DRAWINGS.
4. SHORE AND UNDERPIN EXCAVATIONS AS REQUIRED TO PREVENT DISTURBANCE TO ADJACENT STRUCTURES, STREETS, SIDEWALKS AND UTILITIES.

**DELEGATED DESIGN**

1. PORTIONS OF THE DETAILED DESIGN ARE DELEGATED TO THE CONTRACTOR. RETAIN A PROFESSIONAL ENGINEER TO COMPLETE THE DESIGN WHO IS REGISTERED IN THE PROVINCE OF ALBERTA.
2. THE ENGINEER RESPONSIBLE FOR COMPLETING THE WORK SHALL SUBMIT LETTERS OF COMMITMENT, ADDRESSED TO THE CONSULTANT, PRIOR TO STARTING WORK. THE LETTERS OF COMMITMENT SHALL BEAR THE SEAL OF A PROFESSIONAL ENGINEER REGISTERED IN THE PROVINCE OF ALBERTA.
3. THE ENGINEER RESPONSIBLE FOR DESIGN AND FIELD REVIEW SHALL CONFIRM IN WRITING IF THEIR RESPONSIBILITY IS TERMINATED AT ANYTIME DURING THE COURSE OF DESIGN OR CONSTRUCTION.
4. SUBMIT SHOP DRAWINGS FOR COMPONENTS REQUIRING DELEGATED DESIGN UNDER THE SEAL AND SIGNATURE OF THE ENGINEER RESPONSIBLE FOR THE DESIGN.
5. THE FOLLOWING COMPONENTS REQUIRE DELEGATED DESIGN:
   1. MICROPILE FOUNDATIONS
   2. MORTAR, GROUT, AND CONCRETE MIX DESIGNS
   3. STRUCTURAL STEEL CONNECTIONS
   4. STEEL DECK
   5. LIGHTWEIGHT STRUCTURAL STEEL FRAMING INCLUDING CONNECTIONS TO MAIN STRUCTURAL ELEMENTS.
   6. PIPE SUPPORT INCLUDING CONNECTIONS TO MAIN STRUCTURAL ELEMENTS, UNO ON DRAWINGS.
   7. FALL ARREST INCLUDING CONNECTIONS TO MAIN STRUCTURAL ELEMENTS.
6. THE ENGINEER RESPONSIBLE FOR THE DESIGN IS ALSO RESPONSIBLE FOR REVIEW OF FABRICATION AND INSTALLATION OF THE COMPONENTS. UPON COMPLETION OF THE WORK, CERTIFY IN WRITING TO THE CONSULTANT THAT SUCH REVIEW HAS BEEN COMPLETED.
7. REFER TO SPECIFICATIONS FOR FURTHER REQUIREMENTS.

**FOUNDATION AND GEOTECHNICAL NOTES**

1. FOUNDATION DESIGN IS BASED ON GEOTECHNICAL REPORT PREPARED BY STANTEC CONSULTING LTD., ENTITLED "GOLD BAR WASTEWATER TREATMENT PLANT FLARE EXPANSION" DATED SEPTEMBER 21, 2023. ENSURE THAT ALL THE REQUIREMENTS OUTLINED IN THE REPORT AND ADDENDUM ARE READ AND UNDERSTOOD PRIOR TO COMMENCING WITH FOUNDATION WORK.
2. BRING OVER-EXCAVATION AND CAVITIES IN THE FOOTING BASE UP TO THE REQUIRED LEVELS WITH 10 MPa CONCRETE.
3. REMOVE ALL ORGANIC MATERIAL FROM THE BUILDING AREA AS OUTLINED IN THE GEOTECHNICAL REPORT.
4. REMOVE ALL LOOSE OR SATURATED MATERIAL AND GROUNDWATER FROM THE BASE OF FOOTING EXCAVATIONS BY APPROVED METHODS PRIOR TO PLACING FOUNDATIONS.
5. PROTECT EXCAVATIONS FOR FOOTINGS FROM RAIN, SNOW, FREEZING TEMPERATURES, STANDING WATER, LOSS OF MOISTURE AND DEGRADATION BY APPROVED METHODS.
6. GEOTECHNICAL TESTING AGENCY TO BE APPROVED BY AND RESPONSIBLE TO THE ENGINEER, AND ENGAGED AND PAID FOR BY THE OWNER.
7. UNLESS OTHERWISE SHOWN ON PLAN, FOUNDATION ELEMENTS ARE TO BE CENTERED UNDER WALLS, GRADE BEAMS, AND COLUMNS.
8. PROVIDE DOWELS FROM GRADE BEAMS, PILES, AND PILE CAPS TO MATCH ALL VERTICAL COLUMN AND WALL REINFORCEMENT OR AS NOTED ON THE DRAWINGS, MIN 4-15M.
9. DO NOT BACKFILL BEHIND FOUNDATION WALLS UNTIL THE FLOOR SLAB(S) TO WHICH IT IS TIED ARE COMPLETE AND CONCRETE HAS REACHED 28-DAY DESIGN STRENGTH.
10. BACKFILL WALLS BELOW GRADE EVENLY ON BOTH SIDES ENSURING THAT NO PORTION OF THE FILL IS PLACED MORE THAN 600 mm ABOVE ANY OTHER PORTION OF THE FILL DURING BACKFILLING.

**DRILLED MICRO PILES**

1. MICRO PILES SHALL CONSIST OF 36 mm DIAMETER THREADBAR (AS A MINIMUM) IN ACCORDANCE WITH ASTM A615/CSA G30.18M WITH MINIMUM YIELD/TENSILE STRENGTH OF 517/690 MPa. REINFORCING STEEL SHALL BE DEFORMED BARS IN ACCORDANCE WITH ASTM A 615/AASHTO M31, GRADE 420 OR GRADE 520 OR ASTM A 722/AASHTO M275, GRADE 1035. WHEN A BEARING PLATE AND NUT ARE REQUIRED TO BE THREADED ONTO THE TOP END OF REINFORCING BARS FOR THE PILE TOP TO FOOTING ANCHORAGE, THE THREADING MAY BE CONTINUOUS SPIRAL DEFORMED RIBBING PROVIDED BY THE BAR DEFORMATIONS (E.G., DYWIDAG OR WILLIAMS CONTINUOUS THREADBARS) OR MAY BE CUT INTO A REINFORCING BAR. IF THREADS ARE CUT INTO A REINFORCING BAR, THE NEXT LARGER BAR NUMBER DESIGNATION FROM THAT SHOWN ON THE PLANS SHALL BE PROVIDED, AT NO ADDITIONAL COST.
2. INSTALLATION OF DRILLED MICRO PILES TO BE INSPECTED IN THE FIELD BY A PROFESSIONAL GEOTECHNICAL ENGINEER REGISTERED IN THE PROVINCE OF ALBERTA PRIOR TO GROUTING. IMPROVE SUBGRADE AS DIRECTED IN WRITING BY A PROFESSIONAL GEOTECHNICAL ENGINEER REGISTERED IN THE PROVINCE OF ALBERTA.
3. GEOTECHNICAL TESTING AGENCY TO BE APPROVED BY AND RESPONSIBLE TO THE CONSULTANT AND PAID FOR BY THE DESIGN BUILDER.
4. CONTRACTOR DRILLING OPERATION SHOULD NOT CAUSE UNACCEPTABLE LOSS OF GROUND. UNACCEPTABLE LOSS OF GROUND SHALL BE REMEDIATED AS PER THE GEOTECHNICAL ENGINEER REGISTERED IN THE PROVINCE OF ALBERTA.
5. THE FOLLOWING CORROSION PROTECTION SHALL BE PROVIDED:
   1. CORRUGATED SHEATHING SHALL BE HARD PVC MATERIAL MEETING THE REQUIREMENTS OF DIN 7748 AND DIN...
   2. PVC MATERIAL SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 103 MPa AND SHALL CONFORM TO ASTM D 1784, CLASS 13464-B. THE CORRUGATED PVC SHALL BE SUCH THAT A MINIMUM BOND OF 4.8 MPa WHEN A MINIMUM COMPRESSIVE STRENGTH OF THE GROUT OF 27 MPa IS DEVELOPED.
   3. CORROSION PROTECTION FOR STEEL CASING SUBJECT TO COMPRESSIVE LOADS IN AGGRESSIVE ENVIRONMENTS IS TYPICALLY CONSIDERED BY INCLUDING A SACRIFICIAL STEEL THICKNESS IN THE DESIGN.
6. ANCHOR PLATES, NUTS AND COUPLERS SHALL BE COMPATIBLE WITH THREADBAR SYSTEM. ANCHORAGES SHALL BE DEVELOPED TO AT LEAST 125% OF THE YIELD STRENGTH OF THREADBAR IN TENSION AND COMPRESSION.
7. THE FOLLOWING GROUT REQUIREMENTS SHALL BE PROVIDED AS PER CSA A23.1/2 AND AASHTO T106/ASTM C109:
   1. CEMENT RICH GROUT SHALL BE COMPOSED OF HS OR HSb CEMENT, CLEAN WATER FREE FROM OIL AND ALKALI.
   2. CEMENT AND WATER SHALL BE PROPORTIONED TO PRODUCE A CEMENT RICH GROUT COMPRESSIVE STRENGTH OF NOT LESS THAN 25 MPa AT 5 DAYS AND 35 MPa AT 28 DAYS.
   3. PERMANENT PIPE CASING SHALL MEET THE REQUIREMENTS OF ASTM A252, GRADE 3, EXCEPT THE YIELD STRENGTH SHALL BE A MINIMUM OF 345 MPa TO 552 MPa.
8. REFER TO DRAWINGS FOR PILE LAYOUT AND DESIGN LOADS.
9. REFER TO COMPREHENSIVE NOTES FOR DRILLED MICRO PILES (ISSUED ALONG WITH STRUCTURAL SPECIFICATIONS) FOR ADDITIONAL REQUIREMENTS.

**CAST-IN-PLACE REINFORCED CONCRETE**

1. CONCRETE MATERIALS, QUALITY, MIXING, PLACING, FORMWORK AND OTHER CONSTRUCTION PRACTICES TO CONFORM TO CSA-A23.1.
2. SUPPLY CONTROLLED CONCRETE IN ACCORDANCE WITH CSA-A23.1 WITH PROPERTIES NOTED IN CONTROLLED CONCRETE TABLE.
3. USE TYPE MS CEMENT FOR ALL CONCRETE IN CONTACT WITH NATIVE SOIL. USE TYPE GU CEMENT FOR ALL OTHER CONCRETE.
4. MAXIMUM FLY ASH CONTENT NOT TO EXCEED 25% OF THE TOTAL CEMENTITIOUS MATERIAL EXCEPT AS...
   1. CONCRETE FOR FOOTINGS, PILES, COLUMNS, WALLS, GRADE BEAMS: MAXIMUM 40%.
   2. CONCRETE FOR FLATWORK OR WITH EXPOSURE CLASSES C-XL, C-1 AND C-2: MAXIMUM 15%.
5. LIMIT CaO CONTENT IN FLY ASH TO LESS THAN 12% FOR CONCRETE WITH EXPOSURE CLASSES S-1, S-2, AND S-3.
6. NOTIFY CONSULTANT 48 HOURS PRIOR TO CONCRETE POURS TO ALLOW FOR REVIEW OF REINFORCEMENT.
7. DO NOT USE ADMIXTURES CONTAINING CALCIUM CHLORIDE.
8. FOR FLOOR SLABS, DESIGN THE CONCRETE MIX WITH AGGREGATE GRADING AND WATER TO CEMENTING MATERIALS RATIO TO MINIMIZE SHRINKAGE.
9. SEE FLOOR TOLERANCE TABLE FOR LEVELNESS AND FLATNESS REQUIREMENTS.
10. CONSTRUCTION JOINTS
    1. VERTICAL CONSTRUCTION JOINTS IN WALLS SHALL BE AT MID-SPAN EXCEPT WHERE OTHERWISE SHOWN ON THE DRAWINGS OR WHERE AUTHORIZED BY THE ENGINEER.
    2. VERTICAL CONSTRUCTION JOINTS IN BEAMS AND SLABS SHALL BE AT 1/3 OF THE SPAN EXCEPT WHERE OTHERWISE SHOWN ON THE DRAWINGS OR WHERE AUTHORIZED BY THE ENGINEER.
    3. HORIZONTAL CONSTRUCTION JOINTS IN BEAMS AND WALLS ARE NOT PERMITTED EXCEPT WHERE SHOWN ON THE DRAWINGS OR WHERE AUTHORIZED BY THE ENGINEER.
    4. CONSTRUCTION JOINTS MUST BE SU7BMITTED TO EOR FOR REVIEW AND APPROVAL.
11. FIELD AND LABORATORY TESTING OF CONCRETE TO BE COMPLETED BY A THIRD PARTY TESTING AND INSPECTION AGENCY APPROVED BY AND RESPONSIBLE TO THE ENGINEER. TESTING AGENCY SHALL BE...
12. CAST IN ELECTRICAL CONDUITS SHALL CONFORM TO THE FOLLOWING CONDITIONS:
    1. BE PLACED WITHIN THE MIDDLE THIRD OF THE SLAB.
    2. CROSS CONDUIT OVER ONE ANOTHER AT 90 DEGREE ANGLES.
    3. MAX TWO LAYERS OF CONDUIT WHEN CROSSING, MAX ONE LAYER OTHERWISE.
    4. DEPTH OF CONDUITS CROSSING NOT TO EXCEED 25% OF THE MEMBER DEPTH.
    5. DO NOT PLACE CONDUIT IN BEAMS OR SLAB BANDS.
    6. CONDUITS SHALL BE PLACED A MINIMUM OF 150 mm APART OR AT A SPACING OF 3 TIMES THE LARGER CONDUIT DIAMETER, WHICHEVER IS GREATER.
    7. DO NOT PLACE CONDUIT WITHIN 1.2 m OF COLUMNS.

**CONCRETE PROTECTION FROM COLD WEATHER**

1. CONCRETE SHALL BE PROTECTED, PLACED, FINISHED, AND CURED IN ACCORDANCE WITH CSA A23.1.
2. COLD WEATHER PROTECTION IS REQUIRED WHEN THE ACTUAL AIR OR FORECASTED TEMPERATURE FALLS BELOW 5°C.
3. DO NOT PLACE CONCRETE AGAINST FROZEN GROUND OR OTHER FROZEN MATERIAL.
4. PROVIDE PROTECTION AND SUPPLEMENTARY HEAT AS REQUIRED TO ENSURE ADEQUATE CURING OF...
5. MAINTAIN CONCRETE TEMPERATURE AT 10°C OR HIGHER FOR A MINIMUM 72 HOURS OR UNTIL CONCRETE HAS ATTAINED 40% OF THE SPECIFIED STRENGTH, WHICH EVER IS LONGER.
6. WHERE SUPPLEMENTARY HEAT IS PROVIDED, USE APPROVED COCNRETE HEATERS WITH EXHAUST VENTED AWAY FROM THE SURFACE OF THE CONCRETE.

**CONCRETE FORMWORK**

1. DESIGN, FABRICATION, ERECTION, AND OTHER CONSTRUCTION PRACTICES TO CONFORM TO CAN/CSA-S269.3.
2. PROVIDE VOID FORM BELOW ALL STRUCTURAL SLABS AT GRADE, WALLS, GRADE BEAMS, PILE CAP, AND WHERE SHOWN ON THE DRAWINGS PRIOR TO INSTALLATION OF REINFORCEMENT.
   1. STRUCTURAL SLABS AT GRADE – 6 mm HARDBOARD OVER BIODEGRADABLE WAX MAT CARDBOARD, COMPLETE WITH MOISTURE RESISTANT TREATED PAPER FACES, WITH SUFFICIENT STRENGTH TO SUPPORT THE WEIGHT OF WET CONCRETE UNTIL INITIAL SET. PROVIDE 12 mm THICK PRESSURE TREATED PLYWOOD AROUND PERIMETER OF SLAB TO PROTECT VOID SPACE.
   2. OTHER LOCATIONS INCLUDING BUT NOT LIMITED TO GRADE BEAMS, PILECAPS, AND WHERE SHOWN ON DRAWINGS PROVIDE 150 mm EXPANDED POLYSTYRENE CRUSHABLE FILL MATERIAL.
3. REFER TO SPECIFICATIONS AND ARCHITECTURAL DRAWINGS FOR CHAMFERS ON CORNERS FOR BEAMS, COLUMNS, AND WALLS.

**CONCRETE REINFORCEMENT**

1. REINFORCEMENT STEEL TO CONFORM TO CSA-G30.18 GRADE 400.
2. DO NOT WELD REINFORCEMENT UNLESS APPROVED IN WRITING BY THE ENGINEER. REINFORCEMENT TO BE WELDED TO CONFORM TO CSA-G30.18, GRADE 400W. WELDING ONLY PERMITTED BY AN ORGANIZATION CERTIFIED TO CSA-W186.
3. NOTIFY THE ENGINEER PRIOR TO CONCRETE PLACEMENT TO ALLOW FOR REVIEW OF REINFORCEMENT.
4. SUBMIT SHOP DRAWINGS AND DETAILS FOR ALL REINFORCEMENT FOR REVIEW PRIOR TO FABRICATION.
5. REINFORCEMENT NOTED WITH "G" AS 10MG IS TO BE GALVANIZED.
6. CLEAR CONCRETE COVER TO REINFORCEMENT – REFER TO CLEAR CONCRETE COVER TO REINFORCEMENT...
7. STANDARD END HOOK LENGTHS FOR REINFORCEMENT – REFER TO STANDARD END HOOKS TABLE.
8. REINFORCEMENT SPLICES – REFER TO REINFORCEMENT SPLICES TABLE.
   1. WHERE SPLICES ARE INDICATED ON THE DRAWINGS, SUCH DIMENSIONS SHALL APPLY.
   2. WHERE THE DRAWINGS INDICATE TENSION OR COMPRESSION SPLICES, IT SHALL BE AS INDICATED IN REINFORCEMENT SPLICES TABLE.
   3. WHERE NO SPLICE OR SPLICE TYPE IS INDICATED ON THESE DRAWINGS, IT SHALL BE A TENSION SPLICE EXCEPT FOR COLUMNS WHICH SHALL BE A COMPRESSION SPLICE.
9. EMBEDMENT OF DOWELS – REFER TO REINFORCEMENT SPLICES TABLE
   1. WHERE EMBEDMENT IS DIMENSIONED ON THE DRAWINGS, SUCH DIMENSIONS SHALL APPLY.
   2. WHERE THE DRAWINGS INDICATE TENSION OR COMPRESSION EMBEDMENT, IT SHALL BE AS NOTED IN THE REINFORCEMENT SPLICES TABLE.
   3. WHERE NO EMBEDMENT OR EMBEDMENT TYPE IS INDICATED ON THESE DRAWINGS, IT SHALL BE A TENSION EMBEDMENT EXCEPT FOR COLUMNS WHICH SHALL BE A COMPRESSION EMBEDMENT.
10. REINFORCE ALL INTERIOR AND EXTERIOR SLABS ON GRADE WITH 10M AT 400 mm ON CENTRE UNLESS NOTED OTHERWISE. [SIDEWALKS AND SMALL SLABS TO BE REINFORCED WITH 10M AT 300 mm ON CENTRE UNLESS NOTED OTHERWISE.] [PROVIDE [10M] DOWELS TO MATCH REINFORCEMENT SPACING FROM SLAB ON GRADE INTO ALL GRADE BEAMS AND WALLS; DOWEL SHALL BE FULLY DEVELOPED.
11. OPENINGS IN WALLS AND SLABS – PROVIDE TWO 15M BARS EACH SIDE, ONE EACH FACE, EXTENDING 600 mm PAST THE OPENINGS, PLUS TWO 15M DIAGONAL BARS 1.5 TIMES THE LENGTH OF SHORTEST SIDE OF OPENING OR MINIMUM 500 mm AND MAXIMUM 1500 mm IN LENGTH AT EACH CORNER.UNO ON DRAWING.
12. DO NOT CUT REINFORCEMENT AT OPENINGS WHERE IT CAN BE SPREAD CONTINUOUS AROUND OPENING.
13. TYPICAL BEAM REINFORCEMENT UNLESS OTHERWISE NOTED – TOP REINFORCEMENT TO BE CONTINUOUS OVER SUPPORTS; SPLICE 450 mm AT MIDSPAN. BOTTOM REINFORCEMENT TO BE CONTINUOUS BETWEEN SUPPORTS; SPLICE 450 mm AT SUPPORTS.
14. ALL REINFORCEMENT TO BE SUPPORTED AT 900 mm MAXIMUM SPACING.

**STRUCTURAL STEEL**

1. DESIGN, FABRICATION, ERECTION, AND OTHER CONSTRUCTION PRACTICES TO CONFORM TO CSA-S16 AND THE CISC CODE OF STANDARD PRACTICE FOR STRUCTURAL STEEL.
2. STEEL TO BE FABRICATED AND ERECTED BY A SHOP CERTIFIED BY THE CANADIAN WELDING BUREAU TO THE REQUIREMENTS OF CSA-W47.1, DIVISION 1 OR 2.1 ONLY.
3. SUBMIT SHOP DRAWINGS SHOWING ALL STRUCTURAL STEEL MEMBERS FOR REVIEW PRIOR TO FABRICATION. WELDING TO CONFORM TO CSA-W59.
4. WELDING TO REINFORCEMENT STEEL ONLY BY A SHOP CERTIFIED TO CSA-W186 WITH REINFORCEMENT CONFORMING TO CSA-G30.18, GRADE 400W.
5. SHOP GALVANIZING TO CONFORM TO CAN/CSA-G164.
6. MEMBERS HAVE BEEN DESIGN BASED ON THE FOLLOWING VERTICAL DEFLECTION CRITERIA:
   1. ROOFS - SUPPORTING FINISHES SUSCEPTIBLE TO CRACKING L/360, MEMBERS SUPPORTING FINISHES NOT SUSCEPTIBLE OT CRACKING L/300.
   2. FLOORS - SUPPORTING FINISHES SUSCEPTIBLE TO CRACKING L/360, MEMBERS SUPPORTING FINISHES NOT SUSCEPTIBLE OT CRACKING L/300.
7. ALL EXPOSED WELDS TO BE CONTINUOUS. GRIND ALL EXPOSED WELDS SMOOTH, INCLUDING PAINTED STEEL.
8. SUPPLY STEEL WITH PROPERTIES NOTED IN STEEL GRADES TABLE.
9. CONNECTIONS NOT DETAILED ON THE STRUCTURAL DRAWINGS SHALL BE DESIGNED AND DETAILED BY A PROFESSIONAL STRUCTURAL ENGINEER REGISTERED IN THE PROVINCE OF ALBERTA AT THE STEEL FABRICATOR'S EXPENSE.
10. UNLESS NOTED OTHERWISE, DESIGN CONNECTIONS FOR NON-COMPOSITE BEAMS FOR A FACTORED SHEAR FORCE EQUAL TO 50% OF THE TOTAL BEAM LOAD TABULATED IN THE CISC HANDBOOK OF STEEL...
11. UNLESS NOTED OTHERWISE, DESIGN MOMENT CONNECTIONS FOR NON-COMPOSITE BEAMS FOR A FACTORED MOMENT EQUAL TO THE FULL MOMENT CAPACITY OF THE SMALLER MEMBER JOINED.
12. DESIGN BRACE CONNECTIONS FOR THE LOADS SHOWN ON THE DRAWINGS. IF LOADS ARE NOT SHOWN DESIGN CONNECTIONS OF HSS OR W-SECTIONS FOR 50% OF THEIR TENSION CAPACITY, FOR ALL OTHER MEMBER DESIGN CONNECTIONS FOR 100% OF THEIR TENSION CAPACITY
13. PROVIDED A MINIMUM OF 2 BOLTS IN BOLTED CONNECTIONS.
14. ALL BOLTED CONNECTIONS TO USE SNUG-TIGHTENED HIGH-STRENGTH BOLTS UNLESS OTHERWISE NOTED ON THE DRAWINGS.
15. PROVIDE 10 mm PLATE STIFFENERS EACH SIDE OF BEAM WHERE AT ALL BEARING CONNECTIONS UNLESS OTHERWISE NOTED ON THE DRAWINGS.
16. DO NOT SPLICE MATERIAL WITHOUT THE WRITTEN APPROVAL OF THE ENGINEER. WHERE GRANTED, A COMPLETE NON-DESTRUCTIVE EXAMINATION WILL BE MANDATORY AND PAID FOR BY THE [SUB-CONTRACTOR] [TRADE CONTRACTOR].
17. PROVIDE 10 mm WEEP HOLES AT TOP AND BOTTOM OF ALL HSS COLUMNS.
18. PROVIDE CAP PLATE FOR ALL HSS COLUMNS.
19. ALL GROUT UNDER BEARING PLATES AND BASE PLATES SHALL BE NON-METALLIC, NON-SHRINK TYPE WITH MINIMUM 7 DAY COMPRESSIVE STRENGTH OF 30 MPa, INSTALLED IN ACCORDANCE WITH THE SPECIFICATION AND MANUFACTURER'S RECOMMENDATIONS. PROVIDE GROUT WEEP HOLES IN COLUMN BASE PLATES WHERE...
20. SQUARE CUT OR FULL STRENGTH WELD ALL COLUMNS AT BASE PLATES AND AT TOP WHERE BEARING UNDER CONTINUOUS BEAMS.
21. REFER TO SPECIFICATION 05 12 00 FOR FINISHING.
22. CLEAN, PREPARE AND PRIME ALL STRUCTURAL STEEL AND ANCHOR PLATES. DO NOT PRIME ANCHOR BOLTS OR SURFACES IN CONTACT WITH CONCRETE.
23. CLEAN ALL INTERIOR STRUCTURAL STEEL NOT TO BE FINISH PAINTED BY WIRE BRUSHING. REMOVE ALL RUST, DIRT, MILL SCALE, WELD SPATTER AND ALL OTHER EXTRANEOUS MATERIAL IN ACCORDANCE WITH SSPC SPECIFICATIONS SP2 BEFORE APPLYING ONE-COAT PAINT TO ALL SURFACES EXCEPT THOSE TO BE IN CONTACT WITH CONCRETE OR TO BE FIRE-SPRAY PROTECTED. REFER TO ARCHITECTURAL ROOM FINISH SCHEDULES FO...
24. CLEAN ALL INTERIOR STRUCTURAL STEEL THAT IS TO BE FINISH PAINTED BY COMMERCIAL BLAST IN ACCORDANCE WITH SSPC SPECIFICATIONS SP6 TO ENSURE BASE STEEL IS THOROUGHLY CLEANED OF ALL RUST, DIRT, MILL SPATTER AND ALL OTHER EXTRANEOUS MATERIAL FOLLOWED BY SOLVENT CLEANING BEFORE APPLYING PRIMER. REFER TO ARCHITECTURAL ROOM FINISH SCHEDULE FOR EXTENT. CONFIRM COMPATIBILITY BETWEEN PAINT AND PRIMER.
25. TOUCH-UP FIELD WELDS, CONNECTIONS AND ABRASIONS TO MATCH THE SHOP PRIMER.
26. SHOP AND FIELD INSPECTION OF STEEL FABRICATION AND ERECTION TO BE COMPLETED BY A THIRD PARTY TESTING AND INSPECTION AGENCY APPROVED BY AND RESPONSIBLE TO THE ENGINEER. TESTING AGENCY SHALL BE CERTIFIED TO CSA-W178. TESTING PAID FOR BY [OWNER] [CONTRACTOR] [CONSTRUCTION MANAGER].

**STEEL DECK**

1. DESIGN, FABRICATION, ERECTION, AND OTHER CONSTRUCTION PRACTICES TO CONFORM TO CAN/CSA-S136.
2. WELDING TO CONFORM TO CSA-W59. PLATE WASHERS MAY BE ELIMINATED ONLY IF WELDERS OR WELDING OPERATORS HAVE BEEN CERTIFIED BY THE CANADIAN WELDING BUREAU WITH QUALIFIED PROCEDURES FOR WELDING METAL DECK.
3. SHEET STEEL TO CONFORM TO ASTM A653/A653M, GRADE A STRUCTURAL QUALITY GRADE 230.
4. COMPOSITE STEEL FLOOR DECK – UNLESS NOTED OTHERWISE ON DRAWINGS, 38 mm DEEP PREFORMED ZINC-COATED STEEL IN ACCORDANCE WITH CSSBI 12M. FLUTES SPACED AT 150 mm MAXIMUM ON CENTRE. MINIMUM THICKNESS BEFORE GALVANIZING TO BE 0.76 mm. GALVANIZED WITH ZINC COATING OF ZF75 AS DESIGNATED BY ASTM A653/A653M.
5. COMPOSITE STEEL FLOOR DECK SHALL BE DESIGNED TO ACHIEVE A FIRE RATING BASED ON UNDERWRITERS LABORATORIES (UL) NUMBER D916 USING THE LOAD RESTRICIONS PER FIRE-RESISTANCE RATINGS - CAN/ULC-S101 CERTIFIED FOR CANADA.
6. STEEL ROOF DECK – UNLESS NOTED OTHERWISE ON DRAWINGS, 38 mm DEEP PREFORMED ZINC-COATED STEEL IN ACCORDANCE WITH CSSBI 10M. FLUTES SPACED AT 150 mm MAXIMUM ON CENTRE. MINIMUM THICKNESS BEFORE GALVANIZING TO BE 0.76 mm. GALVANIZED WITH ZINC COATING OF ZF75 AS DESIGNATED BY ASTM...
7. UNLESS NOTED OTHERWISE, LIMIT ALLOWABLE DEFLECTION FOR COMPOSITE STEEL FLOOR DECK TO THE FOLLOWING:
8. LIVE LOAD - SPAN/360
9. TOTAL LOAD - SPAN/240
10. UNLESS NOTED OTHERWISE, LIMIT ALLOWABLE DEFLECTION FOR STEEL ROOF DECK TO THE FOLLOWING:
11. LIVE LOAD - SPAN/360
12. TOTAL LOAD - SPAN/240
13. THE STEEL ROOF DECK ACTS AS A DIAPHRAGM FOR THE DISTRIBUTION OF WIND AND SEISMIC FORCES TO THE LATERAL LOAD RESISTING ELEMENTS.
14. MINIMUM BASE METAL DECK THICKNESS, FLUTE HEIGHT AND FASTENING REQUIREMENTS SEE STEEL DECK...
15. DECK UNITS TO BE CONTINUOUS OVER AT LEAST THREE SUPPORTS WHERE STRUCTURAL FRAMING PERMITS.
16. PROVIDE L64x64x6.4 ANGLE TO SUPPORT ALL EDGES OF DECK. PROVIDE CLOSURE STRIPS AS REQUIRED FOR UNSUPPORTED FLUTE EDGES.
17. PROVIDE L76x76x6.4 ANGLE TO SUPPORT DECK EDGES AT ALL OPENINGS UP TO 400 mm IN SIZE. FOR LARGER OPENINGS, REFER TO TYPICAL DETAILS.
18. CAST IN ELECTRICAL CONDUITS IN CONCRETE TOPPING ON METAL DECK SHALL CONFORM TO THE FOLLOWING CONDITIONS:
    1. BE PLACED BELOW THE TOP REINFORCEING AND MINIMUM 25 mm ABOVE THE METAL DECK.
    2. CROSS CONDUIT OVER ONE ANOTHER AT 90 DEGREE ANGLES.
    3. MAX TWO LAYERS OF CONDUIT WHEN CROSSING, MAX ONE LAYER OTHERWISE.
    4. DEPTH OF CONDUITS CROSSING NOT TO EXCEED 30% OF THE MEMBER DEPTH.
    5. CONDUITS SHALL BE PLACED A MINIMUM OF 150 mm APART OR AT A SPACING OF 3 TIMES THE LARGER CONDUIT DIAMETER, WHICHEVER IS GREATER.

**MASONRY**

1. DESIGN, FABRICATION, ERECTION, AND OTHER CONSTRUCTION PRACTICES TO CONFORM TO CSA S304.1 AND CSA A371.
2. CONCRETE BLOCK TO CONFORM TO CAN/CSA-A165 WITH A MINIMUM COMPRESSIVE STRENGTH OF 20 MPa BASED ON THE NET CROSS-SECTIONAL AREA OF THE UNITS WITH VOIDS.
3. FILL CELLS CONTAINING VERTICAL REINFORCEMENT WITH CONCRETE DESIGNATED AS MASONRY COREFILL IN THE CONTROLLED CONCRETE TABLE. SITE MIXING OF CONCRETE NOT PERMITTED FOR EXTERIOR OR LOAD-BEARING WALLS.
4. PUDDLE OR VIBRATE MASONRY COREFILL IN LIFTS NOT EXCEEDING 1200 mm.
5. FORM HORIZONTAL JOINTS BY STOPPING POUR 40 mm BELOW THE TOP OF UNIT.
6. USE ONLY TYPE S MORTAR CONFORMING TO CSA-A179. DO NOT USE MASONRY CEMENT. USE PORTLAND CEMENT AND LIME ONLY.
7. PROVIDE CLEAN-OUT OPENINGS AT THE BOTTOM OF EACH LIFT FOR ALL CELLS BEING FILLED. THE INSIDE OF THE CELL IS TO BE FREE FROM DEBRIS AND OBSTRUCTION.
8. HORIZONTAL JOINT REINFORCEMENT TO CONFORM TO ASTM A185/A185M. PROVIDE CONTINUOUS REINFORCEMENT CONSISTING OF 2 - 9 GAUGE DIAMETER WIRE LADDER TYPE REINFORCEMENT WITH WELDED CROSS-TIES AT EVERY SECOND COURSE FOR RUNNING BOND.
9. ALTERNATE HORIZONTAL JOINT REINFORCING TO BOND ADJOINING WALLS.
10. MASONRY WALLS TO BE RUNNING BOND UNLESS NOTED OTHERWISE.
11. EXTEND VERTICAL REINFORCEMENT TO WITHIN 50 mm OF TOP OF WALLS.
12. PROVIDE VERTICAL DOWELS INTO SUPPORTING CONCRETE TO MATCH BLOCK WALL REINFORCEMENT.
13. PROVIDE 400 mm DEEP BOND BEAMS REINFORCED WITH 2-15M TOP AND BOTTOM AT THE TOPS OF ALL WALLS AND AT THE BOTTOM OF INTERIOR PARTITION WALLS AND AT 2400 mm VERTICAL SPACING. USE SPECIAL BOND BEAM UNITS TO PROVIDE CONTINUITY OF HORIZONTAL REINFORCEMENT. LAP SPLICE 800 mm MINIMUM. PROVIDE CORNER BARS AT WALL INTERSECTIONS.
14. PROVIDE VERTICAL REINFORCEMENT AS NOTED IN MASONRY WALL REINFORCEMENT TABLE UNLESS NOTED OTHERWISE ON DRAWINGS. PROVIDE ADDITIONAL COREFILLS WITH DESIGNATED REINFORCEMENT AT ENDS OF WALLS, WALL INTERSECTIONS, CORNERS, AND EACH SIDE OF WINDOW OPENING, DOOR OPENINGS, CONTROL JOINTS, AND UNDER ALL LOAD BEARING ELEMENTS.
15. PROVIDE MASONRY LINTELS ABOVE OPENINGS AS NOTED IN MASONRY LINTEL DETAILS. USE 400 mm DEEP LINTEL BLOCKS FOR 2 COURSE LINTELS. USE A 400 mm DEEP LINTEL BLOCK WITH AN UPSIDE DOWN BOND BEAM BLOCK ON TOP FOR 3 COURSE LINTELS. LINTELS TO CONTINUE MINIMUM 400 mm PAST EACH SIDE OF OPENINGS. BLOCK VOIDS BELOW BEARING ENDS TO BE CORE FILLED AND REINFORCED WITH 2 – 15M BARS VERTICALLY EXTENDING INTO LINTELS UNLESS NOTED OTHERWISE.
16. REINFORCEMENT SPLICES – REFER TO MASONRY LAP SPLICES TABLE.
17. INSTALL VERTICAL CONTROL JOINTS AT 6000 mm MAX. LOCATE JOINTS AT LATERAL SUPPORTS PROVIDED BY COLUMNS, PILASTERS, CORNERS, AND INTERSECTING WALLS.
18. TYPICAL LOOSE ANGLE LINTEL SIZES FOR 90mm THICK BRICK OR MASONRY VENEER ARE AS FOLLOWS, UNO:
    1. SPAN UPTO 1200mm: L102x102x9.5
    2. SPAN 1201mm TO 2400mm: L127x102x9.5 LLV
    3. SPAN 2401Mmm TO 3600mm: L152x102x9.5 LLV

| REFERENCE DRAWING | | REVISION | | | | | | |
|---|---|---|---|---|---|---|---|---|
| DRAWING No. | DRAWING TITLE | Rev. | DATE | DESCRIPTION | BY | DES. | CHK. | ENG. |
| | | 0A | 06-JUL-2023 | ISSUED FOR PRELIMINARY DESIGN | JC | DD | PB | |
| | | 0B | 30-APR-2024 | ISSUED FOR 60% DESIGN | JN | MB | MB | PB |
| | | 0C | 30-AUG-2024 | ISSUED FOR 90% REVIEW | | RPJ | | |
| | | 0D | 15-NOV-2024 | ISSUED FOR CONSTRUCTION | AC | MB | MB | PB |

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November 25 2024

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PLANT SITE: GOLD BAR WWTP
PLANT AREA: PRIMARY CLARIFIER #2
PROJECT NAME: GBWWTP FLARE CAPACITY EXPANSION
DRAWING TITLE:
STRUCTURAL
GENERAL NOTES

| CONSULTANT JOB No. | EPCOR PROJECT No. | SCALE | SHEET | DRAWING NUMBER |
|---|---|---|---|---|
| 1101000105 | PMO 1004723; PF14-105 | | 2 of 17 | PRJ-15-157-201 |

Project Files\01_WIP\06_structural\model_files\1101000105_mod_struct.rvt
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## SITE INFORMATION

| TO BE READ IN CONJUNCTION WITH DESIGN LOADS DESIGN NOTES | |
|---|---|
| IMPORTANCE CATEGORY | POST-DISASTER |
| WIND EXPOSURE TYPE | OPEN TERRAIN |
| INTERNAL PRESSURE CATEGORY | 2 |
| FOUNDATION SITE CLASS | D |

## CLIMATIC INFORMATION

| TO BE READ IN CONJUNCTION WITH DESIGN LOADS DESIGN NOTES | |
|---|---|
| SNOW LOAD (1/50), Ss | 1.7 kPa |
| SNOW LOAD (1/50), Sr | 0.1 kPa |
| ONE DAY RAIN (1/50) | 97 mm |
| HOURLY WIND PRESSURE (1/10) | 0.35 kPa |
| HOURLY WIND PRESSURE (1/50) | 0.45 kPa |
| SEISMIC RESPONSE, Sa(0.2) | 0.103 |
| SEISMIC RESPONSE, Sa(0.5) | 0.062 |
| SEISMIC RESPONSE, Sa(1.0) | 0.036 |
| SEISMIC RESPONSE, Sa(2.0) | 0.018 |
| SEISMIC RESPONSE, Sa(5.0) | 0.0053 |
| SEISMIC RESPONSE, Sa(10.0) | 0.0022 |
| SEISMIC RESPONSE, PGA | 0.064 |

## FORCE MODIFICATION FACTORS

| TO BE READ IN CONJUNCTION WITH DESIGN LOADS DESIGN NOTES | | |
|---|---|---|
| LATERAL LOAD RESISTANCE SYSTEM | MODIFICATION FACTOR | |
| | DUCTILITY RELATED, RD | OVERSTRENGTH RELATED, RO |
| MASONRY AND CONCRETE SHEAR WALLS | 1.5 | 1.5 |

## DESIGN LOADS

| TO BE READ IN CONJUNCTION WITH DESIGN LOADS DESIGN NOTES | |
|---|---|
| FLARE BUILDING MAIN FLOOR | |
| SUPERIMPOSED DEAD LOAD | 2.4 kPa |
| LIVE LOAD | 9.6 kPa |
| FLARE BUILDING ROOF | |
| DEAD LOAD | 1.5 kPa |
| BASIC SNOW LOAD | 1.83 kPa |
| MAIN FLOOR SLAB EXTERIOR | |
| SUPERIMPOSED DEAD LOAD | 1.15 kPa |
| CABLE TRAY | 0.75 kPa |
| BASIC SNOW LOAD | 1.83 kPa |
| LIVE LOAD | 12 kPa |
| WALL CLADDING DEAD LOADS | |
| BRICK OR STONE | 2.2 kPa |

FOR FLARE DESIGN LOADS, REFER TO NOTES ON DRAWING PRJ-15-157-209.
FOR PIPE RACK DESIGN LOADS, REFER TO NOTES ON DRAWING PRJ-15-167-211

## GRANULAR AGGREGATE GRADATION

| TO BE READ IN CONJUNCTION WITH FOUNDATIONS AND GEOTECHNICAL DESIGN NOTES | |
|---|---|
| SIEVE SIZE (mm) | % PASSING BY WEIGHT |
| 25 | 100 |
| 20 | 95-100 |
| 10 | 60-80 |
| 5 | 40-60 |
| 2.5 | 28-48 |
| 0.63 | 13-29 |
| 0.314 | 9-21 |
| 0.16 | 6-15 |
| 0.08 | 4-10 |

## CONTROLLED CONCRETE

TO BE READ IN CONJUNCTION WITH CAST-IN-PLACE CONCRETE DESIGN NOTES

| CONCRETE ELEMENT | CLASS OF EXPOSURE | MINIMUM COMPRESSIVE STRENGTH AT 28 DAYS (MPa) | MAXIMUM AGGREGATE SIZE (mm) | AIR CONTENT CATEGORY | MAXIMUM W/C RATIO | CEMENT TYPE |
|---|---|---|---|---|---|---|
| EXTERIOR CONCRETE | | | | | | |
| PILES | S-2 | 32 | 20 | 1 | 0.45 | MS or MSb |
| PILE CAPS | S-2 | 32 | 20 | 1 | 0.45 | MS or MSb |
| GRADE BEAMS | S-2 | 32 | 20 | 1 | 0.45 | MS or MSb |
| STRUCTURAL SLABS AND BEAMS | C-1 | 35 | 20 | 1 | 0.4 | GU |
| SITE CONCRETE (NON-STRUCTURAL) | C-2 | 32 | 20 | 1 | 0.45 | GU |
| INTERIOR CONCRETE | | | | | | |
| STRUCTURAL SLABS AND BEAMS | N | 32 | 20 | 1 | 0.55 | GU |
| MASONRY COREFILL | N | 25 | 12 | 1 | 0.55 | GU |
| HOUSEKEEPING PADS | N | 25 | 20 | 1 | - | GU |

* CORROSION INHIBITING ADMIXTURE REQUIRED

## CLEAR CONCRETE COVER TO REINFORCEMENT

TO BE READ IN CONJUNCTION WITH CONCRETE REINFORCEMENT DESIGN NOTES

| EXPOSURE CONDITION | EXPOSURE CLASS | | |
|---|---|---|---|
| | N | F-1, F-2, S-1, S-2, S-3 | C-XL, C-1, C-2, C-3, A-1, A-2, A-3 |
| CAST AGAINST AND PERMANENTLY EXPOSED TO EARTH | - | 75 mm | 75 mm |
| BEAMS, GIRDERS, COLUMNS, AND PILES TO TIES / STIRRUPS (EXCEPT AS NOTED BELOW) | 30 mm | 40 mm | 60 mm |
| SLABS, WALLS, JOISTS, SHELLS, AND FOLDED PLATES (EXCEPT AS NOTED BELOW) | 20 mm | 40 mm | 60 mm |
| RATIO OF COVER TO NOMINAL BAR DIAMETER | 1.0 | 1.5 | 2.0 |
| RATIO OF COVER TO NOMINAL MAXIMUM AGGREGATE SIZE | 1.0 | 1.5 | 2.0 |

NOTE
THE LARGEST COVER REQUIRED FOR ANY ONE ELEMENT SHALL GOVERN.

## REINFORCEMENT SPLICES

TO BE READ IN CONJUNCTION WITH CONCRETE REINFORCEMENT DESIGN NOTES

| BAR SIZE | COMPRESSION SPLICE(mm) | TENSION SPLICE (mm) | |
|---|---|---|---|
| | | VERTICAL OR BOTTOM HORIZONTAL BARS | TOP HORIZONTAL BARS* |
| | | UNCOATED BARS | UNCOATED BARS |
| 10M | 300 | 400 | 500 |
| 15M | 450 | 550 | 750 |
| 20M | 600 | 700 | 900 |
| 25M | 750 | 1100 | 1400 |
| 30M | 900 | 1300 | 1700 |
| 35M | 1025 | 1550 | 2000 |
| NOTE 1: | THIS TABLE IS BASED ON NORMAL WEIGHT CONCRETE f'c = 35 MPa AND ON REINFORCING STEEL fy = 400 MPa. | | |
| NOTE 2: | *TOP HORIZONTAL BARS ARE DEFINED AS HORIZONTAL REINFORCEMENT PLACED SUCH THAT MORE THAN 300 mm OF CONCRETE IS CAST IN THE MEMBER BELOW THE REINFORCEMENT. | | |
| NOTE 3: | FOR STANDARD EMBEDMENT DEPTH INTO CONCRETE, DIVIDE BASIC TENSION LAP SPLICE NUMBERS BY 1.3. | | |

## STEEL GRADES

| TO BE READ IN CONJUNCTION WITH STRUCTURAL STEEL DESIGN NOTES | |
|---|---|
| MEMBER TYPE | GRADE |
| ROLLED W-SHAPES, TEES | CSA G40.21 350W OR ASTM A992 GRADE 50 |
| WELDED WIDE FLANGE SECTIONS | CSA G40.21 350W |
| HOLLOW STRUCTURAL SECTIONS | CSA G40.21 350W CLASS C |
| OTHER STRUCTURAL SHAPES AND PLATES | CSA G40.21 300W |
| BOLTS | ASTM A325 |
| ANCHOR RODS | ASTM F1554 GRADE [36] |
| THREADED ROD | ASTM A36 |

## STANDARD END HOOKS

TO BE READ IN CONJUNCTION WITH CONCRETE REINFORCEMENT DESIGN NOTES

| BAR SIZE | 10M | 15M | 20M | 25M |
|---|---|---|---|---|
| | 180 | 260 | 310 | 400 |
| | 140 | 180 | 210 | 280 |

## FLOOR TOLERANCE TABLE

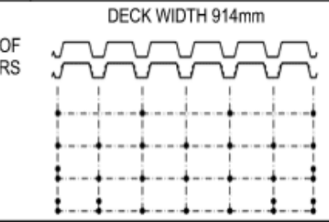
TO BE READ IN CONJUNCTION WITH CAST-IN-PLACE CONCRETE DESIGN NOTES

| | FLOOR FLATNESS (FF) | FLOOR LEVELNESS (FL) |
|---|---|---|
| LEVEL 1 (SUSPENDED SLAB) | 20 | N/A |

## STEEL DECK

TO BE READ IN CONJUNCTION WITH STRUCTURAL STEEL DECK DESIGN NOTES

| DECK FASTENING SCHEDULE | | | | | DECK WIDTH 914mm |
|---|---|---|---|---|---|
| ZONE[1] | DECK GAUGE | FLUTE HEIGHT | FASTENING PATTERN[2] | SIDELAP SPACING[3] | NUMBER OF FASTENERS |
| RD1 | 0.76 mm | 38 mm | 914/4 | 300 | 914/4 |
| RD2 | 0.91 mm | 38 mm | 914/7 | 300 | 914/7 |
| FD3 | 0.76 mm | 76 mm | 914/4 | 300 | 914/9 |
| FD4 | 0.91 mm | 76 mm | 914/4 | 300 | 914/11 |



1. ROOF DECK (RD), COMPOSITE FLOOR DECK (FD).
2. FASTENERS SHALL CONFORM TO ONE OF THE FOLLOWING TYPES:
   1. 20 mm DIAMETER FUSION WELDS.
   2. HILTI X-HSN 24 FASTENER WHERE TOP FLANGE OR CHORD THICKNESSES ARE BETWEEN 3mm AND 9.5mm (⅛" AND ⅜"). FOR TOP FLANGE OR CHORD SECTIONS GREATER THAN 6.4mm (¼"), USE HILTI X-ENP 19.
3. SIDELAP CONNECTORS SHALL CONFORM TO ONE OF THE FOLLOWING TYPES:
   1. 5mm (#10) SELF DRILLING SCREWS.
   2. HILTI SLC-02 SCREWS.
4. FASTEN FLUTES PARALLEL WITH BEAMS @ 300mm UNO.
5. FASTEN END LAPS WITH 20mm PUDDLE WELDS AT EACH FLUTE OR HILTI ENP-19/HSN24 PINS AT EACH FLUTE OR 150mm MAX SPACING PARALLEL TO FLUTES.
6. DECK GAUGE NOTED IS THE MINIMUM TO SATISFY DIAPHRAGM, INCREASE THICKNESS AS REQUIRED TO SUPPORT GRAVITY LOAD AND TO SATISFY DEFLECTION LIMITS.

## MASONRY REINFORCEMENT LAP SPLICES

| TO BE READ IN CONJUNCTION WITH MASONRY DESIGN NOTES | |
|---|---|
| BAR SIZE | REINFORCEMENT |
| 10M | 450 |
| 15M | 600 |
| 20M | 900 |

## STANDARD STRUCTURAL ABBREVIATIONS

| | | | | | |
|---|---|---|---|---|---|
| AR or A.ROD | ANCHOR ROD | FDN | FOUNDATION | PRCST | PRECAST |
| ADDL | ADDITIONAL | FS | FAR SIDE | PERIM | PERIMETER |
| ALT | ALTERNATE | FTG | FOOTING | PERP | PERPENDICULAR |
| ALUM | ALUMINUM | FTS | FULL TENSION SPLICE | PKG | PACKAGE |
| APPD | APPROVED | GA | GAUGE | PL | PLATE |
| APPROX or ± | APPROXIMATELY | GALV | GALVANIZED | PLYWD | PLYWOOD |
| ARCH | ARCHITECT | GR BM | GRADE BEAM | PL | PROPERTY LINE |
| B/B | BACK TO BACK | H OR HT | HIGH OR HEIGHT | POLY | POLYETHYLENE |
| BOT | BOTTOM | H1E | HOOK ONE END | PROJ | PROJECT |
| BLK | BLOCK | H2E | HOOK TWO ENDS | QTY | QUANTITY |
| BLL | BOTTOM LOWER LAYER | HORIZ | HORIZONTAL | RAD | RADIUS |
| BM | BEAM | HR | HOUR | R/W | REINFORCE WITH |
| BRG | BEARING | ID | INSIDE DIAMETER | REINF | REINFORCING |
| BTWN | BETWEEN | I/F | INSIDE FACE | REM | REMAINDER |
| BU | BUILT-UP | INCL | INCLUDING | REQD | REQUIRED |
| BUL | BOTTOM UPPER LAYER | INSUL | INSULATION | RTU | ROOF TOP UNIT |
| C/W | COMPLETE WITH | INT | INTERIOR | SDL | SUPER IMPOSED DEAD LOAD |
| CWN | COMPLETE WITH NAILS | LG | LONG | | |
| CANT | CANTILEVER | LOC | LOCATION | SECT | SECTION |
| CIP | CAST IN PLACE | LL | LIVE LOAD | SIM | SIMILAR |
| CJ | CONTROL JOINT | LLH | LONG LEG HORIZONTAL | SJ | SAWCUT JOINT |
| ℄ | CENTRELINE | LLV | LONG LEG VERTICAL | SOG | SLAB ON GRADE |
| CLR | CLEAR | LONGIT | LONGITUDINAL | SPMDD | STANDARD PROCTOR MAXIMUM DRY DENSITY |
| COL | COLUMN | MAX | MAXIMUM | | |
| CONC | CONCRETE | MECH | MECHANICAL | SQ | SQUARE |
| CONN | CONNECTION | MEZZ | MEZZANINE | SS | STAINLESS STEEL |
| CONT | CONTINUOUS | MID | MIDDLE | SST | SIMPSON STRONG TIE |
| D or DP | DEEP or DEPTH | MIN | MINIMUM | STD | STANDARD |
| DET | DETAIL | MISC | MISCELLANEOUS | STIF | STIFFENER |
| DIA or Ø | DIAMETER | MC | MOMENT CONNECTION | STIR | STIRRUP |
| DIAG | DIAGONAL | NIC | NOT IN CONTRACT | STRUCT | STRUCTURAL |
| DL | DEAD LOAD | NS | NEAR SIDE | SYMM | SYMMETRICAL |
| DO | DITTO | N STUD | NELSON STUD | T&B | TOP & BOTTOM |
| DWG | DRAWING | NTS | NOT TO SCALE | THK | THICK |
| DWL | DOWEL | NUM or # | NUMBER | TLL | TOP LOWER LAYER |
| EE | EACH END | O/C | ON CENTER | T/O | TOP OF |
| EF | EACH FACE | OD | OUTSIDE DIAMETER | TUL | TOP UPPER LAYER |
| EJ | EXPANSION JOINT | O/F | OUTSIDE FACE | TYP | TYPICAL |
| ES | EACH SIDE | OPP | OPPOSITE | UNO | UNLESS NOTED OTHERWISE |
| EW | EACH WAY | OPNG | OPENING | | |
| EL | ELEVATION | OWSJ | OPEN WEB STEEL JOIST | U/S | UNDERSIDE |
| ELEC | ELECTRICAL | | | VERT | VERTICAL |
| EMBED | EMBEDDED | | | WP | WORKING POINT |
| EQ | EQUAL | | | W/ | WITH |
| EXIST | EXISTING | | | WWM | WELDED WIRE MESH |
| EXT | EXTERIOR | | | | |

## STRUCTURAL UNITS - METRIC (SI)

| | | |
|---|---|---|
| kg | KILOGRAM | MASS |
| kg/m | KILOGRAM PER METRE | MASS PER UNIT LENGTH |
| $kg/m^2$ | KILOGRAM PER METRE SQUARED | MASS PER UNIT AREA |
| kN | KILONEWTON | FORCE OR WEIGHT |
| kN/m | KILONEWTON PER METRE | LINEAR FORCE |
| $kN/m^2$ | KILONEWTON PER METRE SQUARED | FORCE PER UNIT AREA |
| kN-m | KILONEWTON METRE | MOMENT |
| kN-m/m | KILONEWTON METRE PER METRE | LINEAR MOMENT |
| $kN/m^3$ | KILONEWTON PER METRE CUBED | UNIT WEIGHT |
| kPa | KILOPASCAL | STRESS/PRESSURE |
| MPa | MEGAPASCAL | STRESS/PRESSURE |
| m | METRE | LINEAR LENGTH |
| mm | MILLIMETRE | LINEAR LENGTH |
| $m^2$ | METRE SQUARED | AREA |
| $mm^2$ | MILLIMETRE SQUARED | AREA |
| $m^3$ | METRE CUBED | VOLUME |
| Cf | COMPRESSION | kN |
| f'c | SPECIFIED COMPRESSIVE STRENGTH OF CONCRETE | MPa |
| $F_y$, fy | YIELD STRENGTH OF STEEL | MPa |
| $M_x$ | MOMENT (STRONG AXIS) | kN-m |
| $M_y$ | MOMENT (WEAK AXIS) | kN-m |
| Tf | TENSION | kN |
| Tor | TORSION | kN-m |
| $V_x$ | VERTICAL SHEAR (STRONG AXIS) | kN |
| $V_y$ | VERTICAL SHEAR (WEAK AXIS) | kN |

| REFERENCE DRAWING | | REVISION | | | | | | |
|---|---|---|---|---|---|---|---|---|
| DRAWING No. | DRAWING TITLE | Rev. | DATE | DESCRIPTION | BY | DES. | CHK. | ENG. |
| | | 0A | 06-JUL-2023 | ISSUED FOR PRELIMINARY DESIGN | JC | DD | PB | |
| | | 0B | 30-APR-2024 | ISSUED FOR 60% DESIGN | JN | MB | MB | PB |
| | | 0C | 30-AUG-2024 | ISSUED FOR 90% REVIEW | | RPJ | | |
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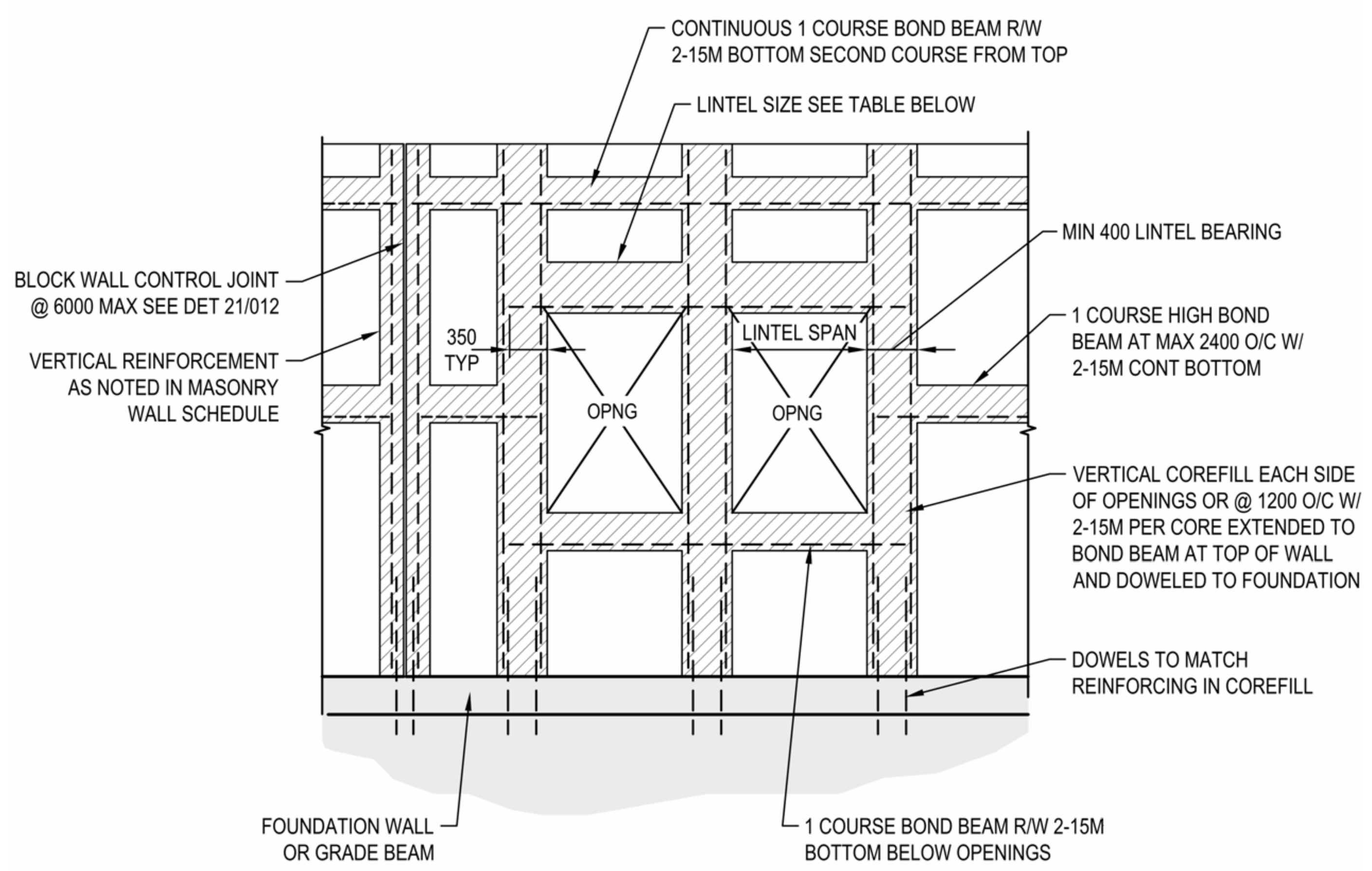
EPCOR

PLANT SITE: GOLD BAR WWTP
PLANT AREA: PRIMARY CLARIFIER #2
PROJECT NAME: GBWWTP FLARE CAPACITY EXPANSION
DRAWING TITLE: STRUCTURAL DESIGN TABLES

| CONSULTANT JOB No. | EPCOR PROJECT No. | SCALE | SHEET | DRAWING NUMBER |
|---|---|---|---|---|
| 1101000105 | PMO 1004723; PF14-105 | | 3 of 17 | PRJ-15-157-202 |

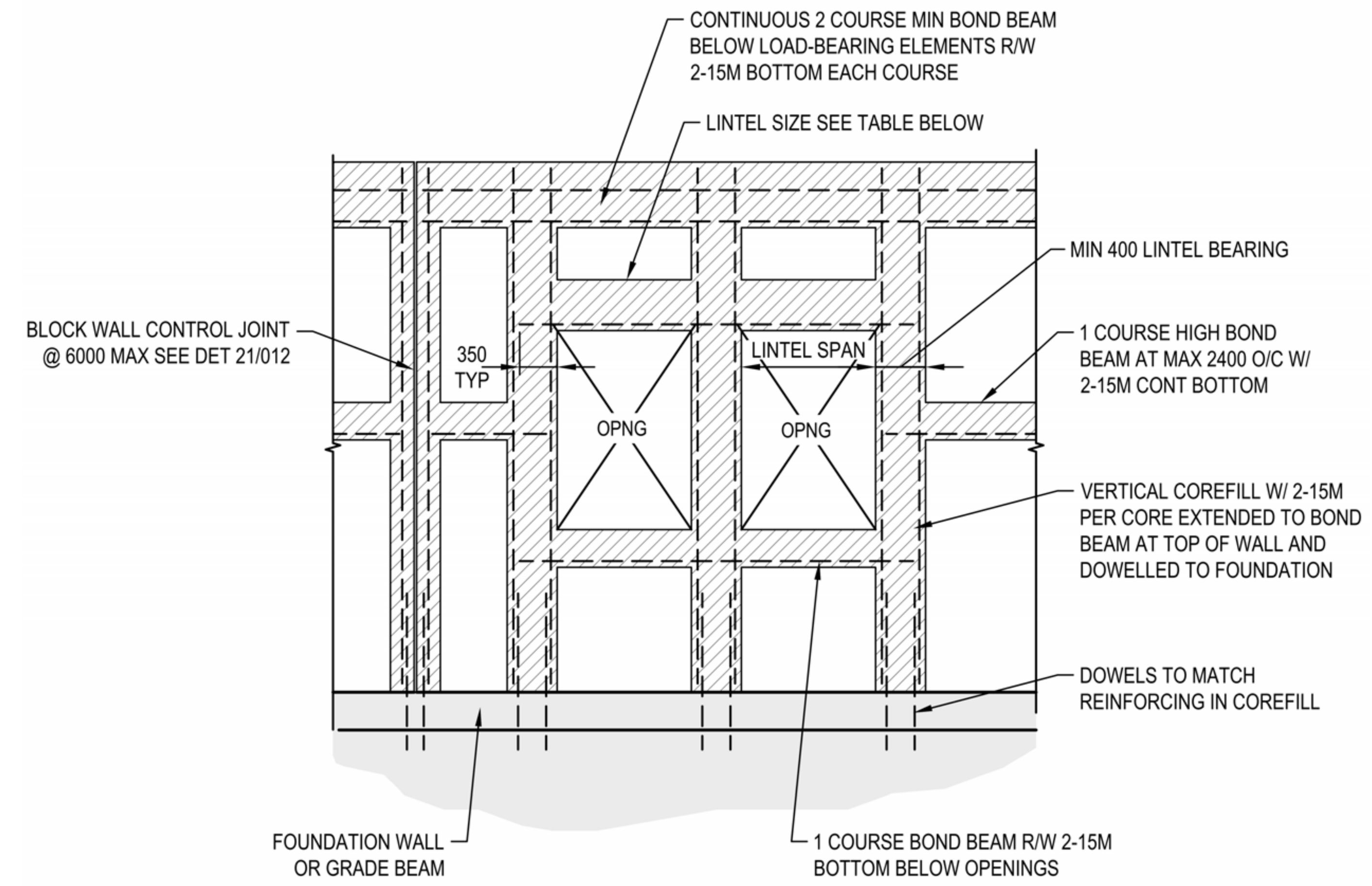



| LINTEL SCHEDULE (TYPICAL UNO) * | | |
|---|---|---|
| SPAN | SIZE (W x D) | REINFORCEMENT |
| UP TO 2000 | 240x400 | 1-10M TOP, 1-10M BOT |

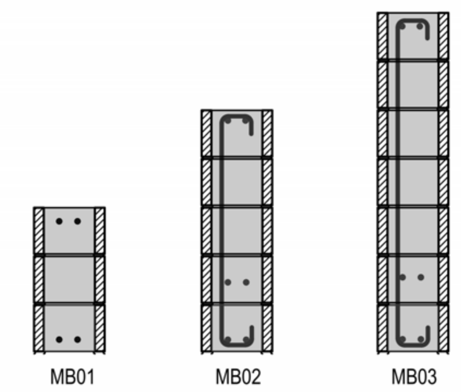
* NOTE: NO CONCENTRATED LOADS ALLOWED

**ELEVATION**

## 1 NON-LOAD BEARING CONC BLOCK WALL REINF
203 1 : 1




| LINTEL SCHEDULE (TYPICAL UNO) * | | | | | | |
|---|---|---|---|---|---|---|
| TYPE | SIZE (W x D) | REINFORCEMENT | | | | |
| | | SPAN | TOP | BOTTOM | INTERMEDIATE | STIRRUPS |
| MB01 | 290x600 | UP TO 1600 | 2-15M | 2-15M | - | - |
| MB02 | 290X1000 | 1600 TO 4000 | 2-15M | 2-20M | 2-15M | 10M @ 200 mm O/C |
| MB03 | 290x1600 | 4000 TO 5000 | 2-15M | 2-20M | 2-15M | 10M @ 200 mm O/C |

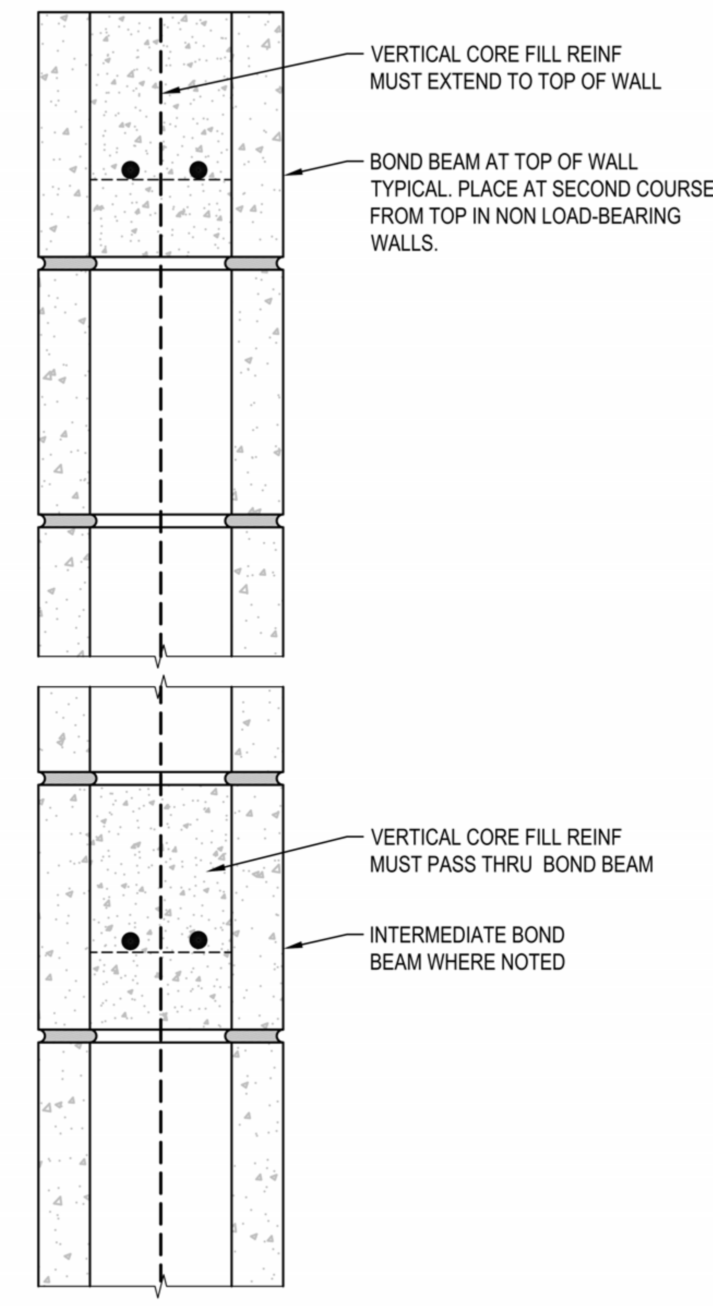



**NOTES:**

1. PLACE INTERMEDIATE REINFORCEMENT IN SECOND COURSE FROM BOTTOM OF LINTEL.
2. ALTERNATE STIRRUP DIRECTION IN ADJACENT CORES.

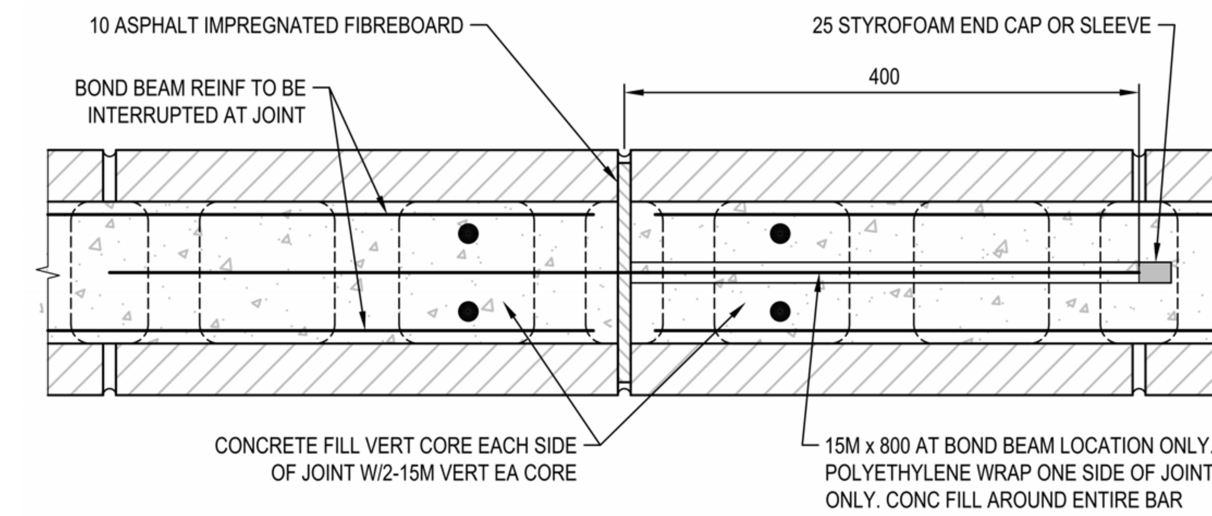
**ELEVATION**

## 2 LOAD BEARING CONC BLOCK WALL REINF
203 1 : 1



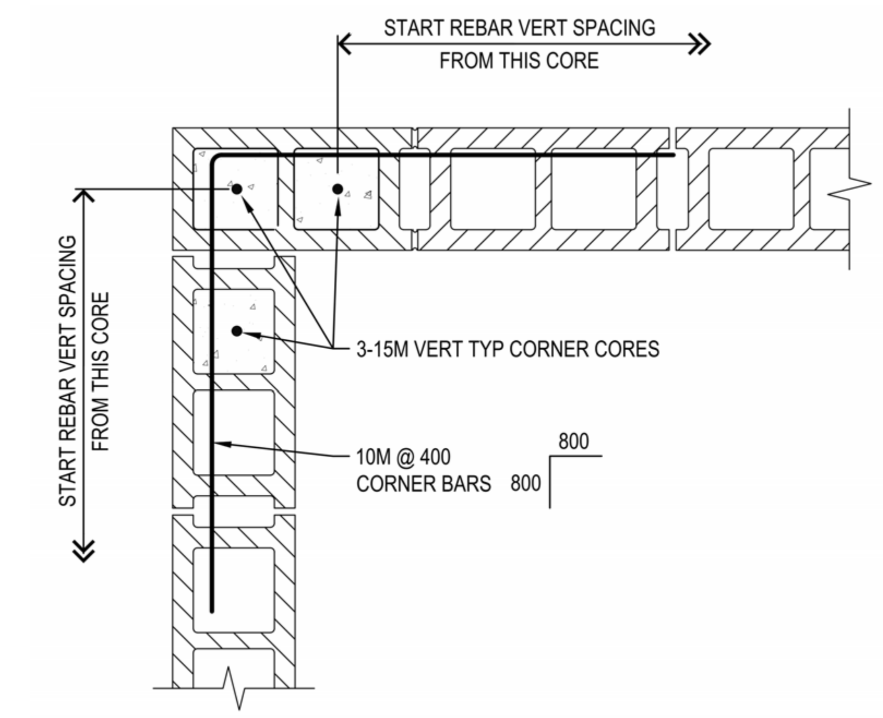

**SECTION ELEVATION**

## 3 HORIZ BOND BEAM IN CONC BLOCK WALLS
203 1 : 1



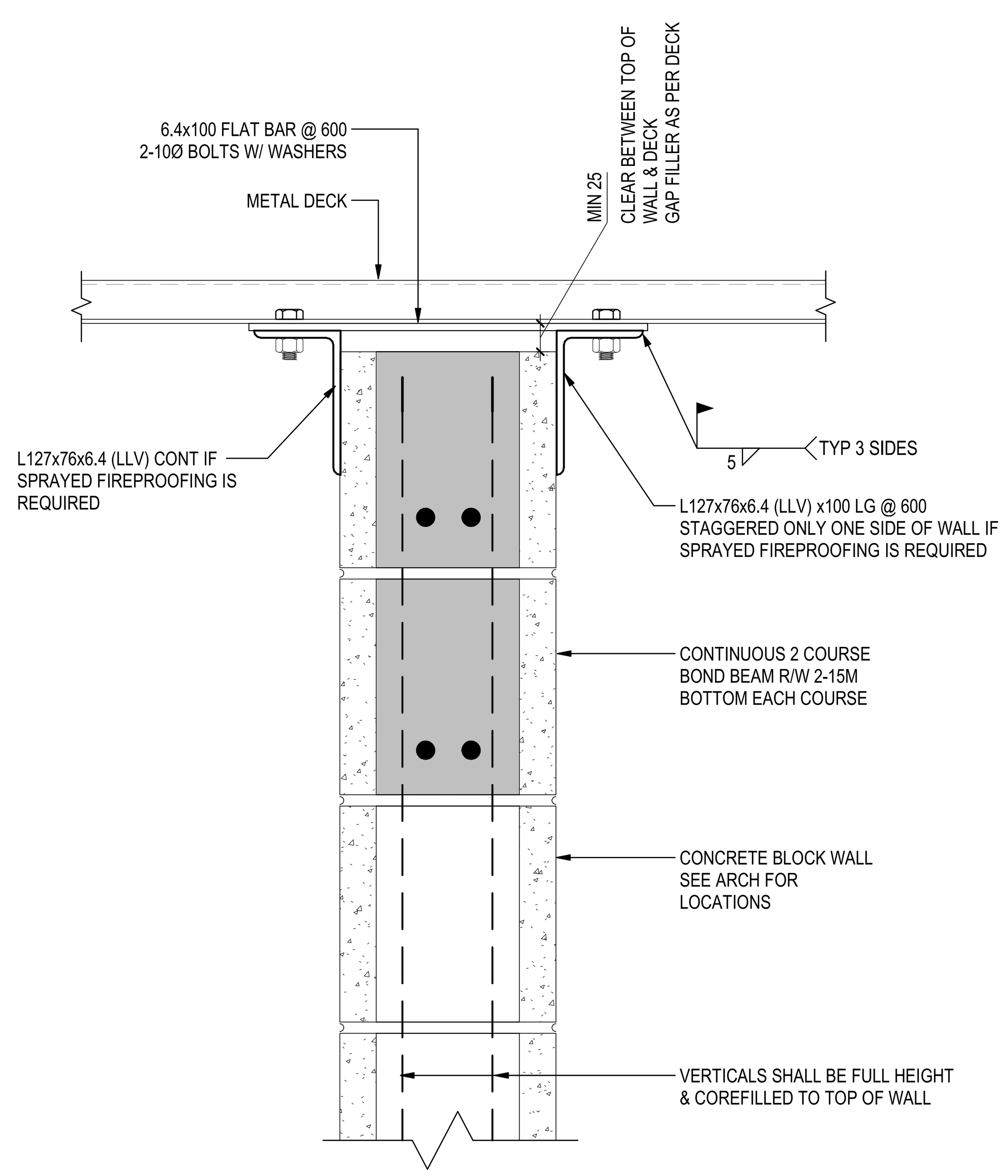

**SECTION PLAN**

## 4 CONTROL JOINT CONCRETE BLOCK WALL
203 1 : 1

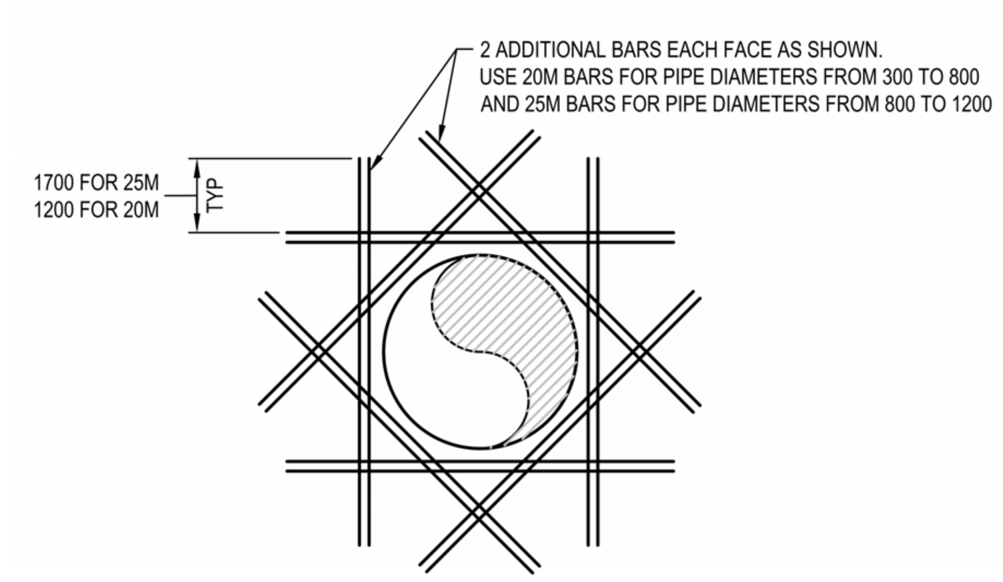



**PLAN**

## 5 CONC BLOCK WALL CORNER VERT REINF
203 1 : 1




## 6 LATERAL SUPPORT FOR NON LOAD BEARING CONC BLOCK WALL TO DECK
203 1 : 5

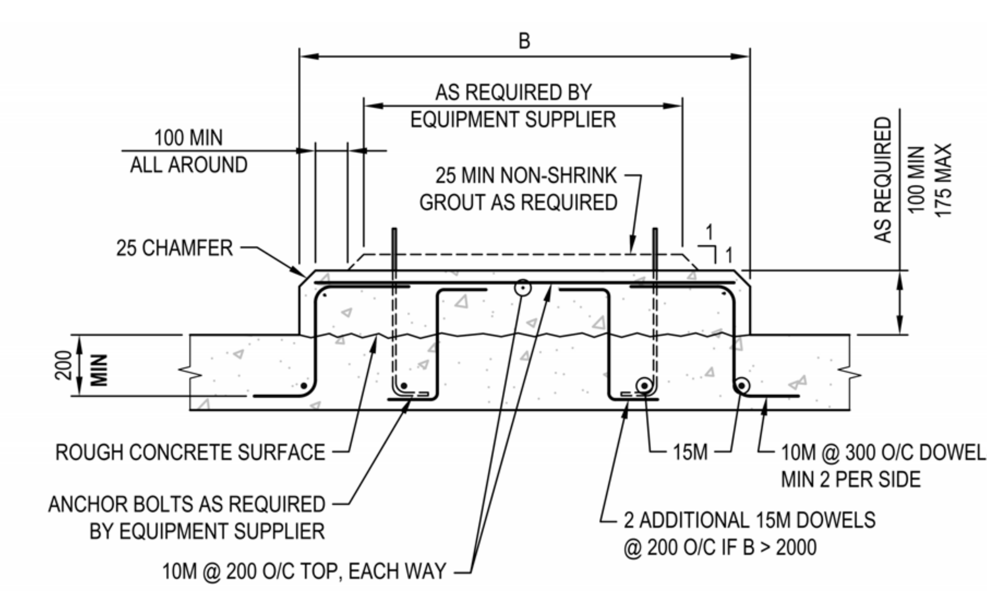



**NOTES:**

1. NUMBER OF REINFORCING BARS TO BE CUT AT OPENING TO BE KEPT TO A MINIMUM.
2. REINFORCING BARS TO BE KEPT 75 mm CLEAR OF OPENING.
3. PROVIDE STANDARD HOOKS ON ADDITIONAL REINFORCING WHERE IT IS NOT POSSIBLE TO INSTALL REINFORCING WITH REQUIRED LENGTH.

**PIPE DIA. 300 TO 1200 IN CONCRETE SLABS AND WALLS**

## 7 ADDITIONAL REINFORCING AROUND PIPES IN CONC SLAB
203 1 : 1




**NOTES:**

1. PAD SIZE SHALL BE MINIMUM INDICATED OR AS SHOWN ON THE PLANS OR AS DETERMINED BY THE EQUIPMENT MANUFACTURER AND APPROVED BY THE ENGINEER.
2. THE SIZE, NUMBER, TYPE, LOCATION, AND THREAD PROJECTION OF THE ANCHOR BOLTS SHALL BE DETERMINED BY THE EQUIPMENT MANUFACTURER, AND SHALL BE AS APPROVED BY THE ENGINEER. ANCHOR BOLTS SHALL BE HELD IN POSITION WITH A TEMPLATE WHILE PAD IS BEING PLACED.
3. EQUIPMENT BASES SHALL BE INSTALLED LEVEL UNLESS SPECIFIED OTHERWISE.
4. WEDGES OR SHIMS SHALL BE USED TO SUPPORT THE BASE WHILE THE NON-SHRINK GROUT IS PLACED. TEMPORARY LEVELING NUTS SHALL BE BACKED OFF. IF LEFT IN, THE WEDGES OR SHIMS SHALL NOT BE EXPOSED TO VIEW.

**SECTION ELEVATION**

## 8 TYP HOUSEKEEPING PAD FOR EQUIPMENT ON FLOOR SLAB
203 1 : 1

| REFERENCE DRAWING | | REVISION | | | | | | |
|---|---|---|---|---|---|---|---|---|
| DRAWING No. | DRAWING TITLE | Rev. | DATE | DESCRIPTION | BY | DES. | CHK. | ENG. |
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MOHAMMAD R. BEHBAHANI
ID: 90867
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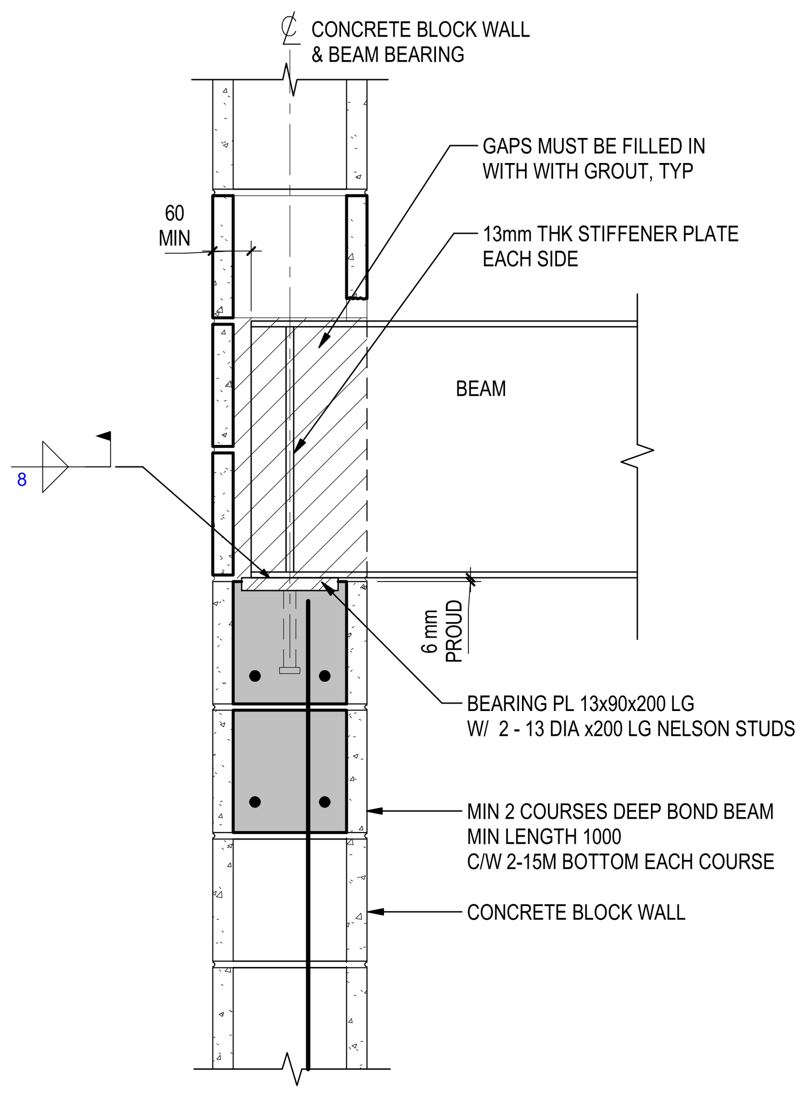
PLANT SITE: GOLD BAR WWTP
PLANT AREA: PRIMARY CLARIFIER #2
PROJECT NAME: GBWWTP FLARE CAPACITY EXPANSION
DRAWING TITLE: STRUCTURAL TYPICAL DETAILS (SHEET 1 OF 4)

| CONSULTANT JOB No. | EPCOR PROJECT No. | SCALE | SHEET | DRAWING NUMBER |
|---|---|---|---|---|
| 1101000105 | PMO 1004723; PF14-105 | As indicated | 4 of 17 | PRJ-15-157-203 |

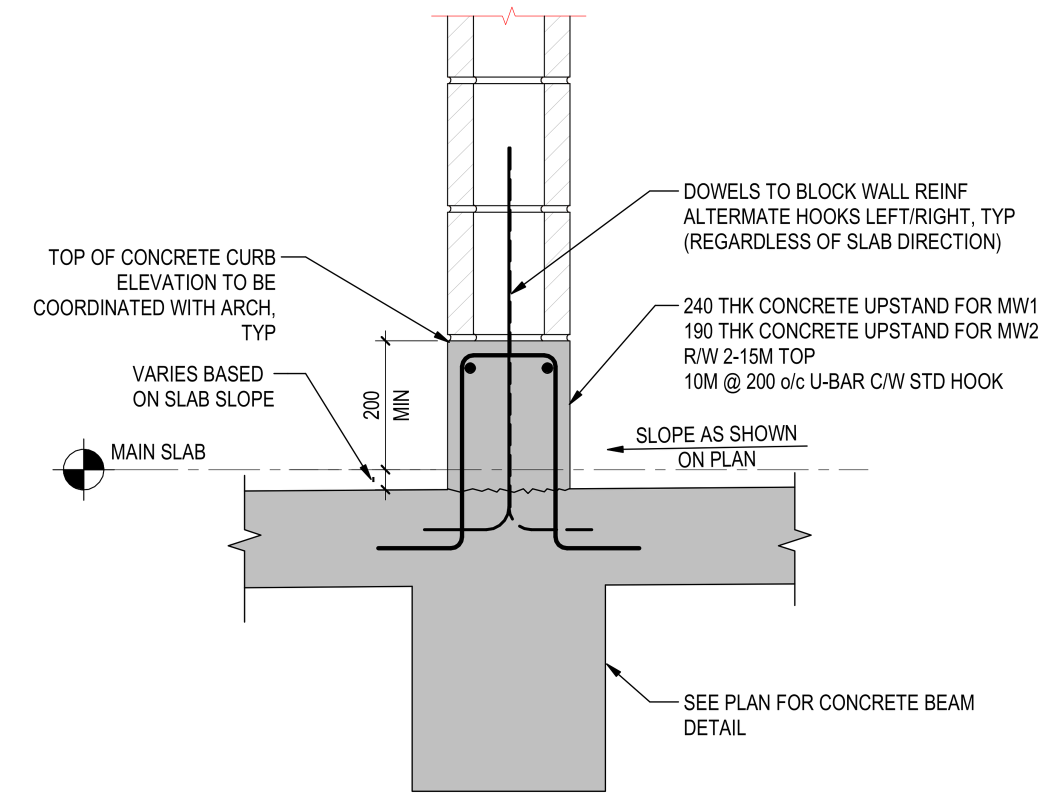
Project Files\01_WIP\06_structural\model_files\1101000105_mod_struct.rvt
11/25/2024 1:24:24 PM




SECTION

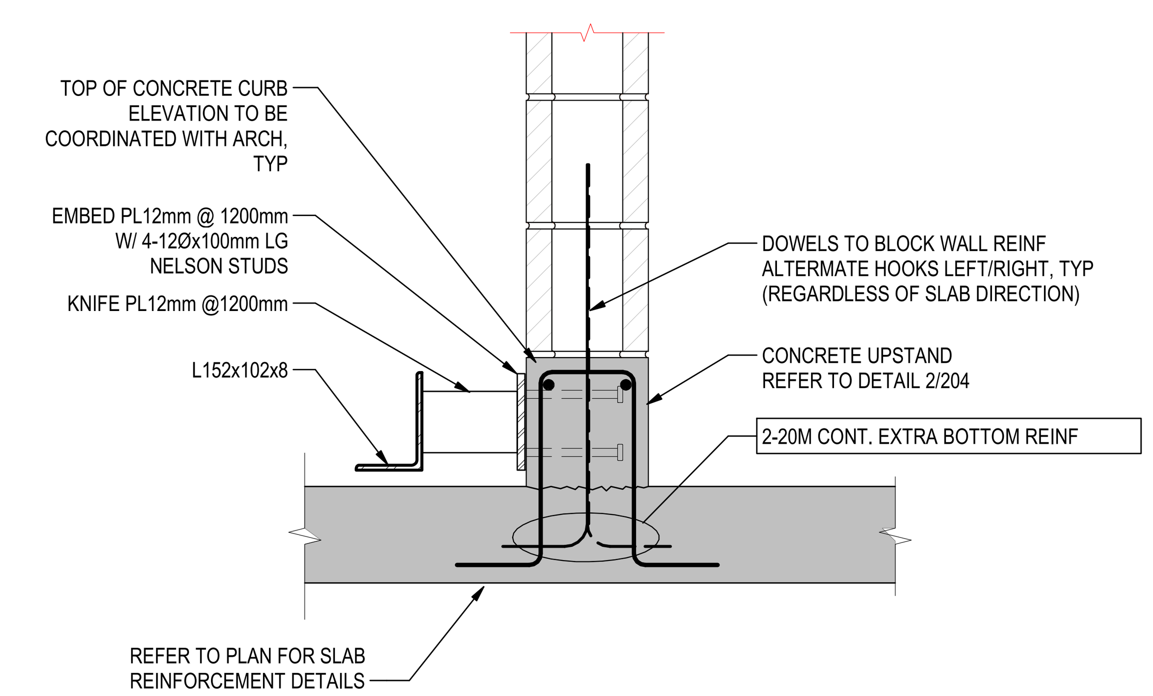
## DETAIL - TYPICAL STEEL BEAM BEARING IN CONCRETE BLOCK WALL

1 / 204 NTS



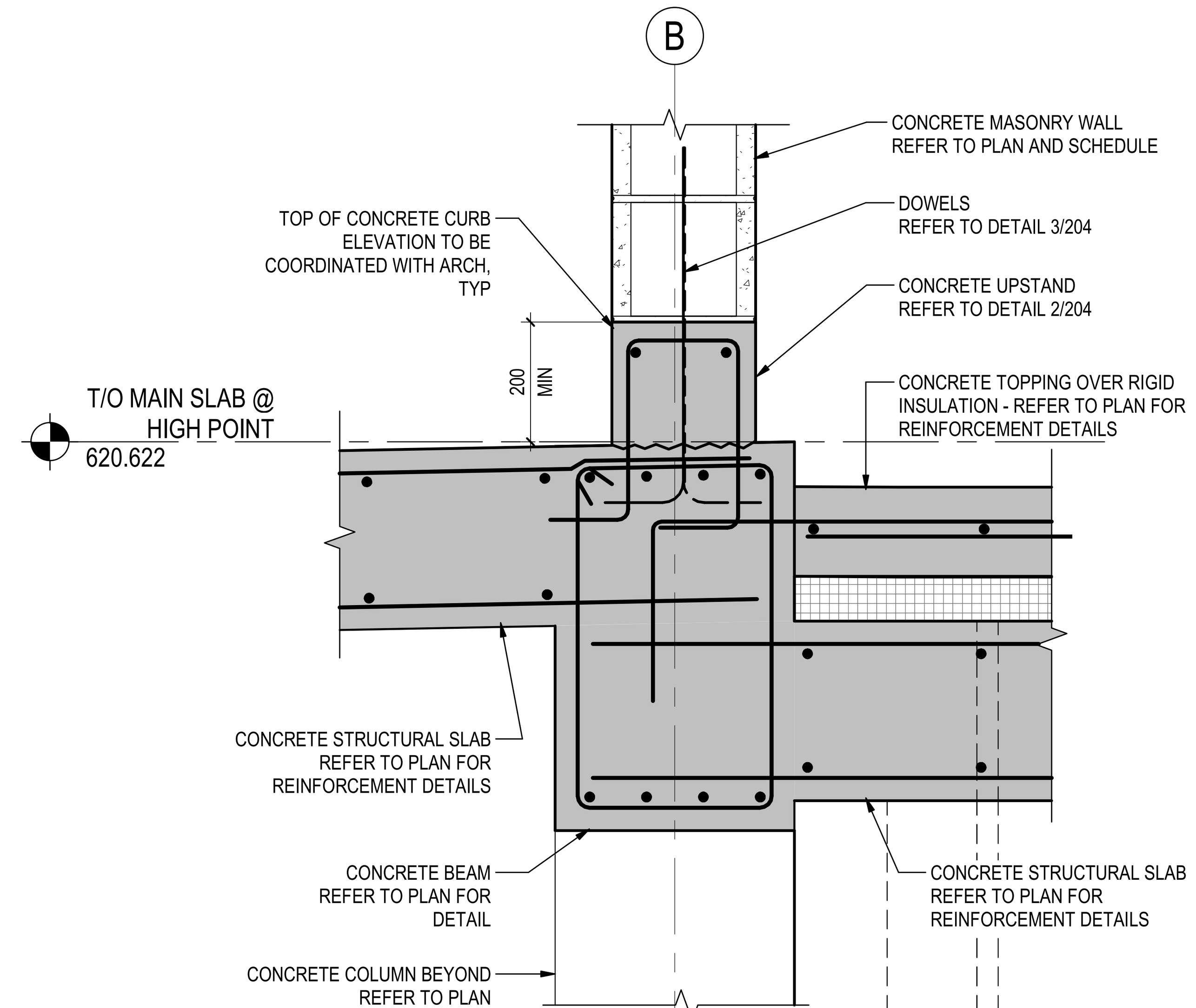

## DETAIL - TYPICAL BLOCK WALL ON CONCRETE BEAM

2 / 204 1 : 10



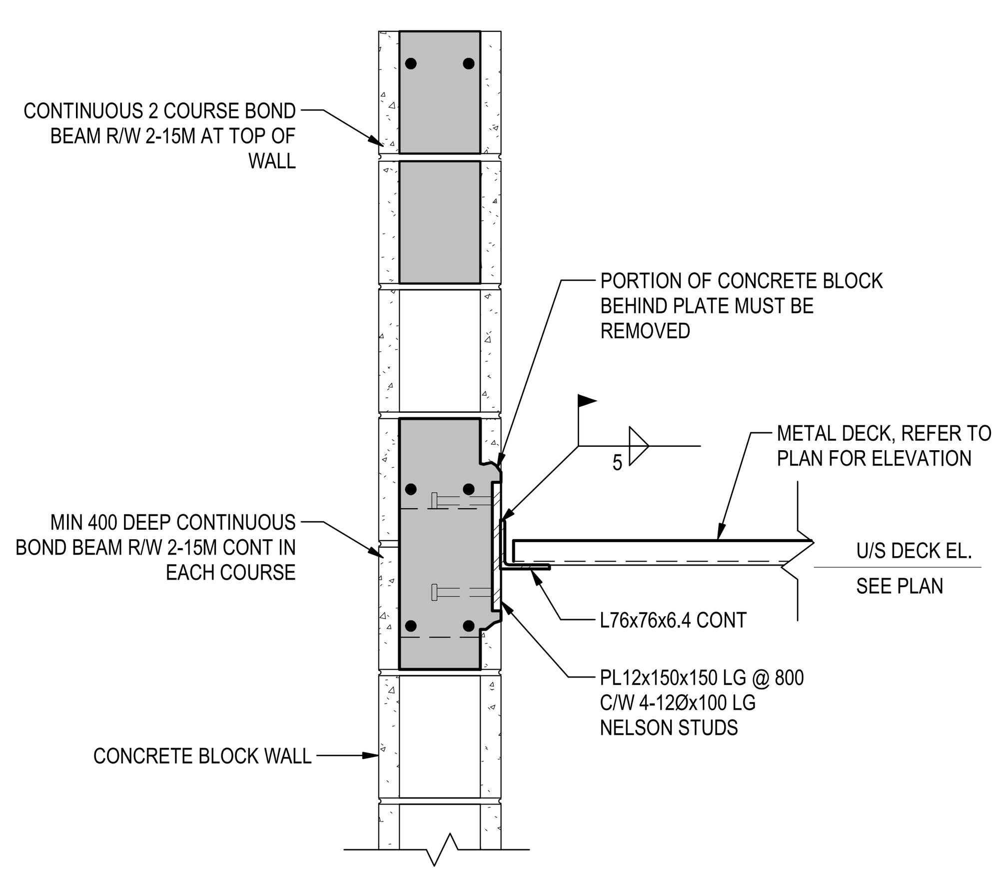

## DETAIL - TYPICAL BLOCK WALL ON ONE WAY SLAB

3 / 204 1 : 10




## DETAIL - TYPICAL CHANGE IN SLAB ELEVATION

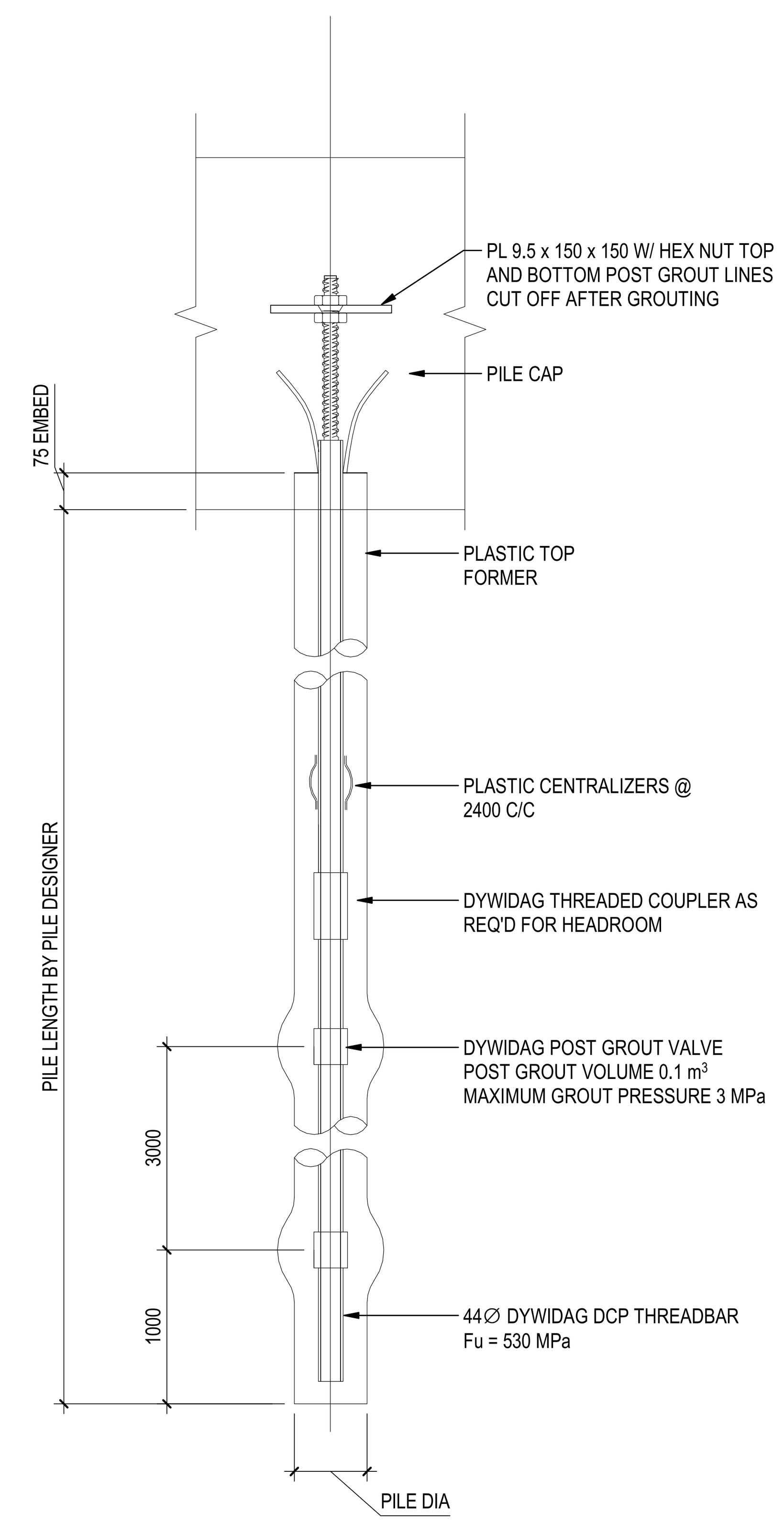
4 / 204 1 : 10




VERTICAL SECTION

## DETAIL - TYPICAL METAL DECK SUPPORT AT CONCRETE BLOCK WALL

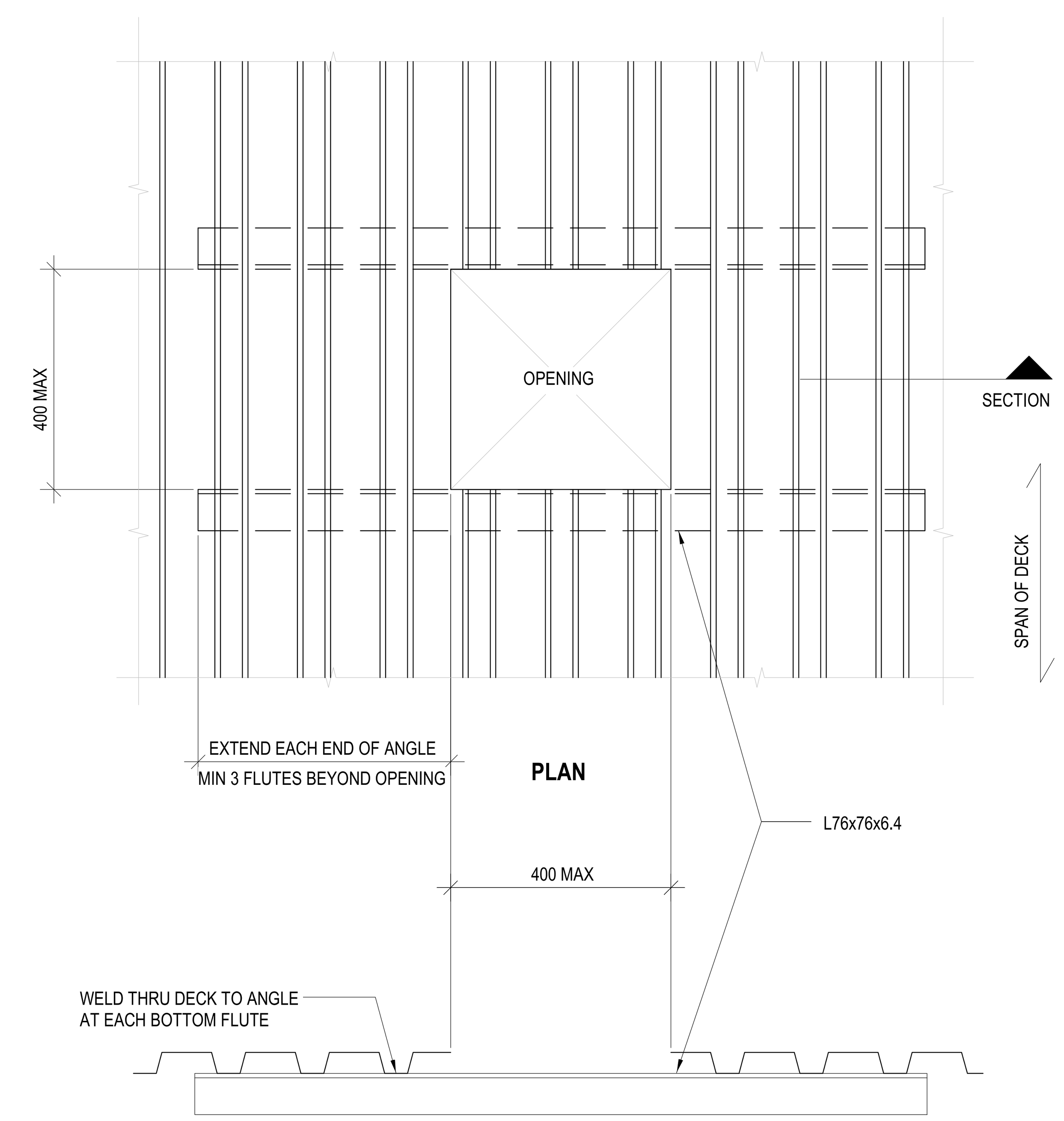
5 / 204 1 : 10




NOTE 1:
MOVE REBAR UP TO 50mm. DO NOT CUT REINFORCEMENT.
NOTE 2:
MAY BE ADJUSTED BY CONSULTANT AS PER RESULTS OF GENERAL ACCEPTANCE TESTS.
NOTE 3:
AFTER COMPLETION OF TESTING, COMPLETE STAGE 2 GROUTING.
NOTE 4:
#14 ANCHORS TO BE DESIGNED FOR 400 kN AND #11 ANCHORS TO BE DESIGNED FOR 325 kN FACTORED TENSILE LOAD AND TO MEET GENERAL ACCEPTANCE CRITERIA AS PER SPECIFICATIONS.
NOTE 5:
ANCHOR INCLINATION NOT SHOWN IN DETAIL. PROVIDE REQUIRED COMPONENTS FROM THREADBAR MANUFACTURER DESIGNED FOR ANCHOR INCLINATION INCLUDING WEDGE WASHER AND BEARING WASHER.
NOTE 6:
DESIGN AND SUPPLY OF SPIRAL REINFORCEMENT BY ANCHOR SYSTEM SUPPLIER.

## DETAIL - TYPICAL MICRO PILE

6 / 204 NTS




## DETAIL - TYPICAL OPENING THROUGH METAL DECK (MAX SIZE 400x400)

7 / 204 1 : 10

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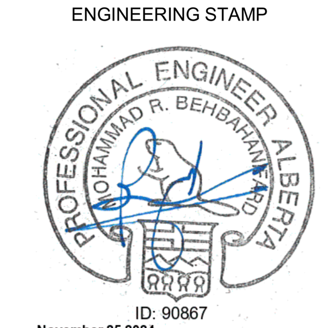


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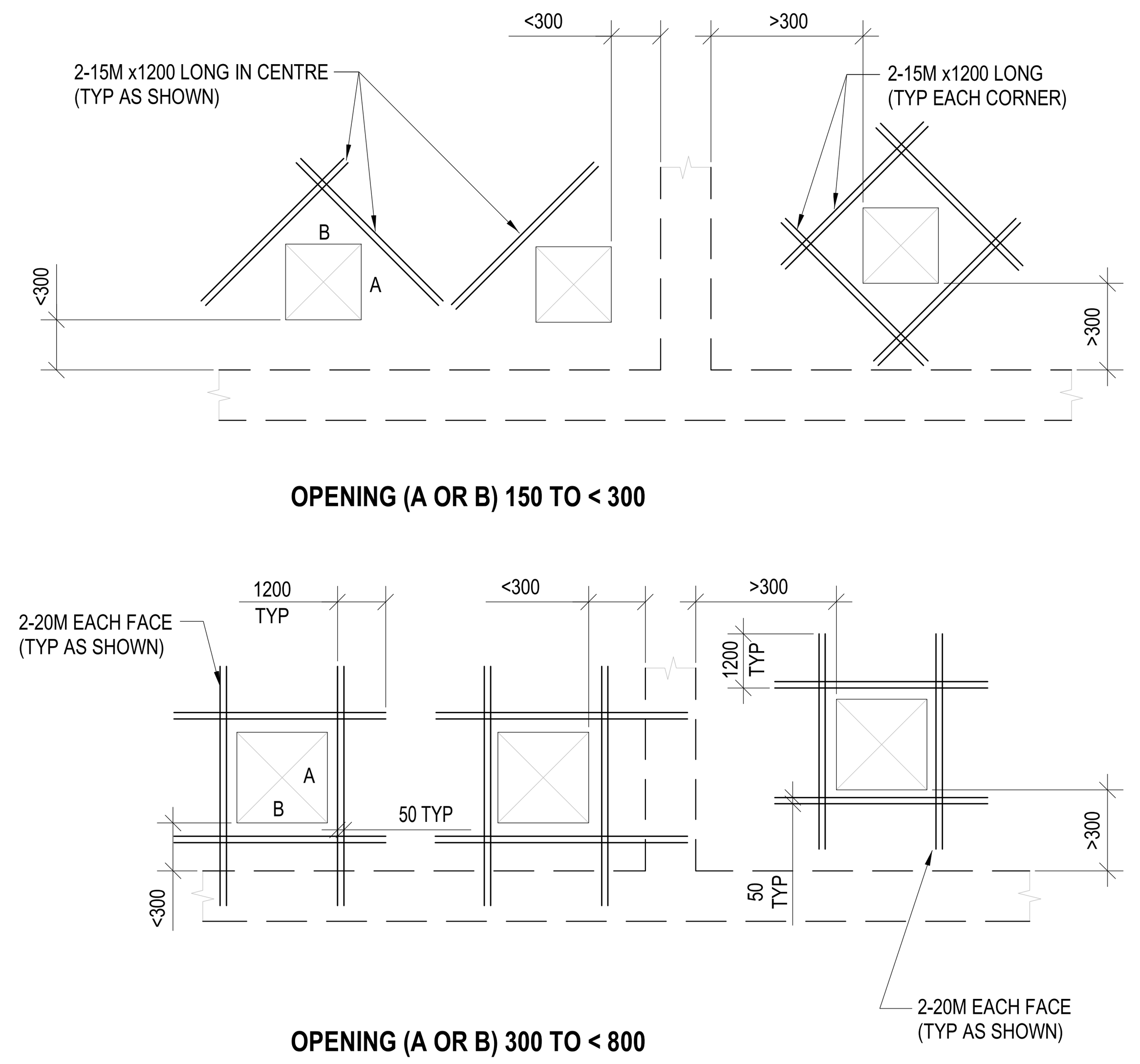
PROJECT NAME: GBWWTP FLARE CAPACITY EXPANSION
DRAWING TITLE:

STRUCTURAL
TYPICAL DETAILS
(SHEET 2 OF 4)

| CONSULTANT JOB No. | EPCOR PROJECT No. | SCALE | SHEET | DRAWING NUMBER |
|---|---|---|---|---|
| 1101000105 | PMO 1004723; PF14-105 | As indicated | 5 of 17 | PRJ-15-157-204 |

Project Files\01_WIP\06_structural\model_files\1101000105_mod_struct.rvt
11/25/2024 1:24:27 PM

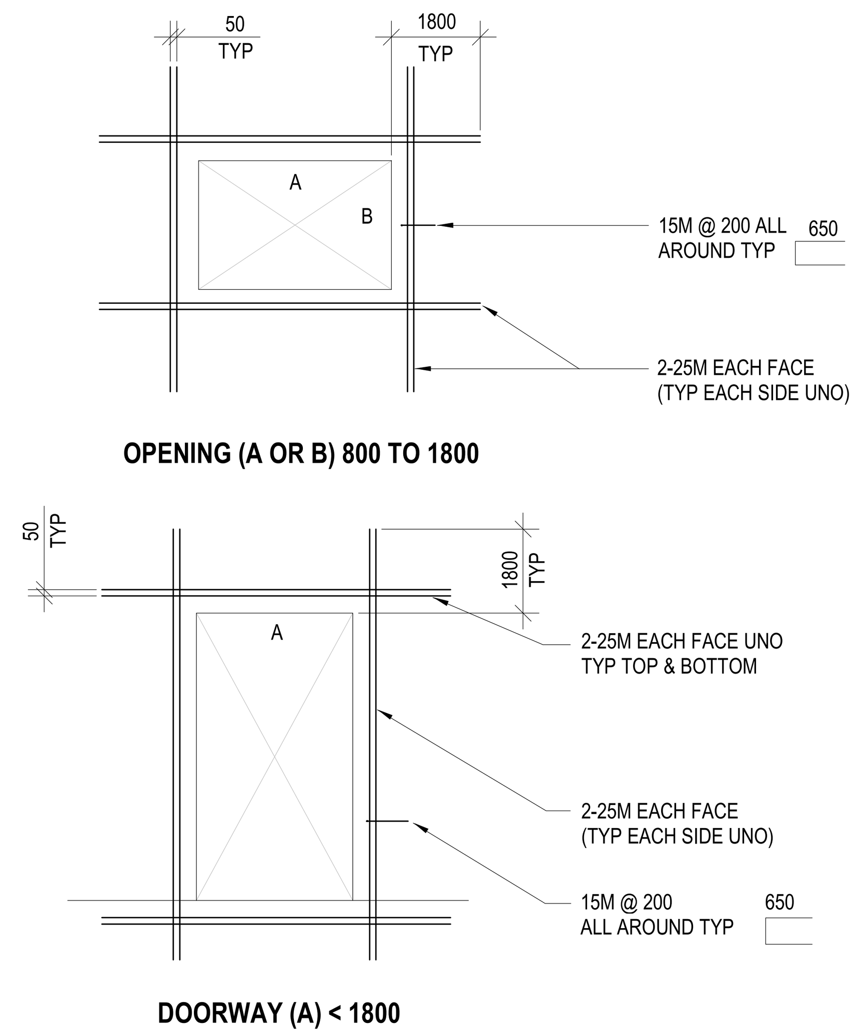



NOTES:

1. NUMBER OF REINFORCING BARS TO BE CUT AT OPENING TO BE KEPT TO A MINIMUM.
2. REINFORCING BARS TO BE KEPT 50 mm CLEAR OF OPENING.
3. CIRCULAR OPENINGS TO BE TREATED IN SAME MANNER AS RECTANGULAR UNLESS OTHERWISE DETAILED.
4. PROVIDE STANDARD HOOKS ON ADDITIONAL REINFORCING WHERE IT IS NOT POSSIBLE TO INSTALL REINFORCING WITH REQUIRED LENGTH.

## DETAIL - TYPICAL ADDITIONAL REINFORCING AROUND OPENINGS IN CONCRETE SLABS AND WALLS

1 / 205 — 1 : 10




NOTES:

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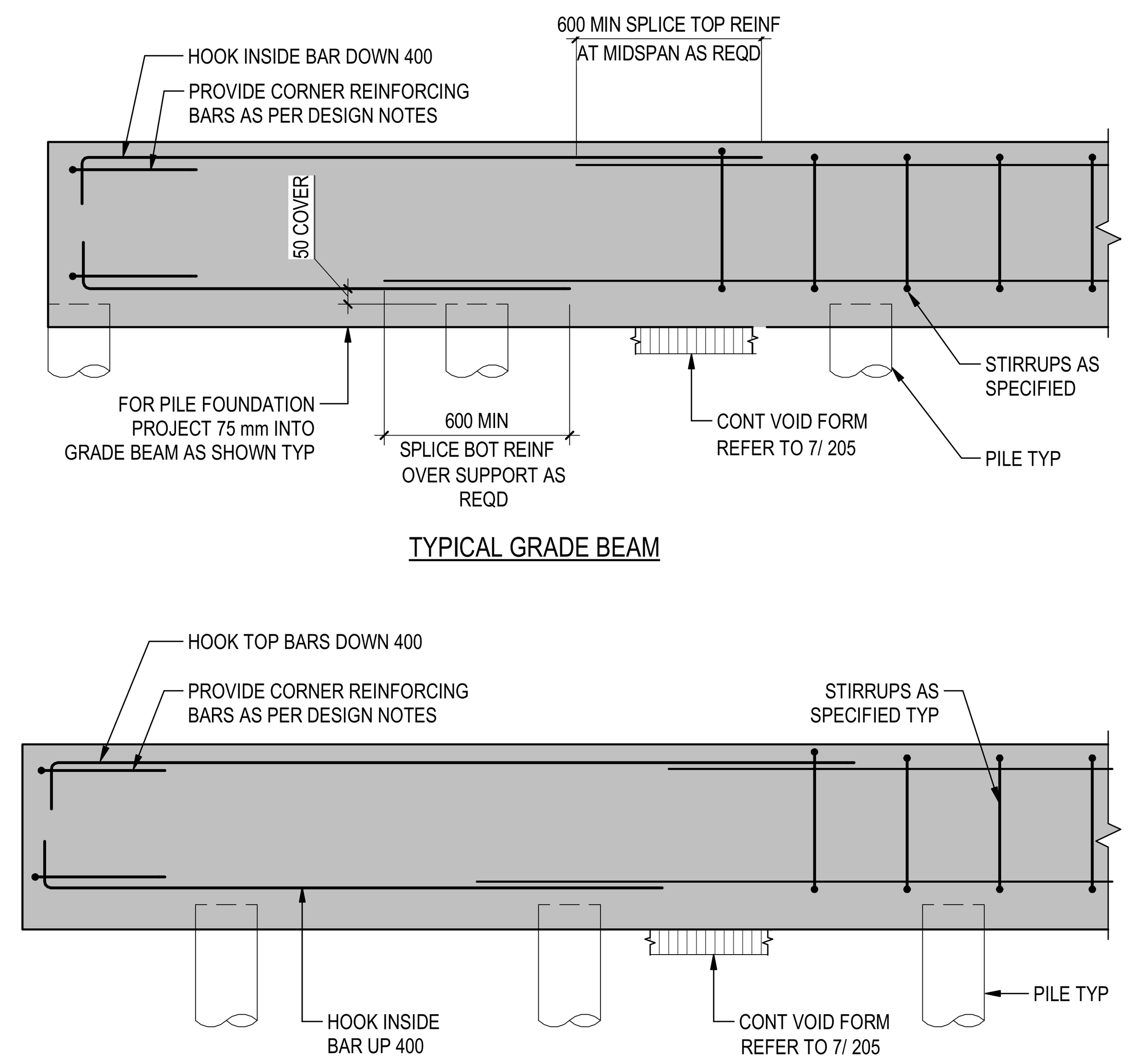
2. REINFORCING BARS TO BE KEPT 50 mm CLEAR OF OPENING.
3. CIRCULAR OPENINGS TO BE TREATED IN SAME MANNER AS RECTANGULAR UNLESS OTHERWISE DETAILED.
4. PROVIDE STANDARD HOOKS ON ADDITIONAL REINFORCING WHERE IT IS NOT POSSIBLE TO INSTALL REINFORCING WITH REQUIRED LENGTH.

## DETAIL - TYPICAL ADDITIONAL REINFORCING AROUND OPENINGS IN CONCRETE WALLS

2 / 205 — 1 : 10

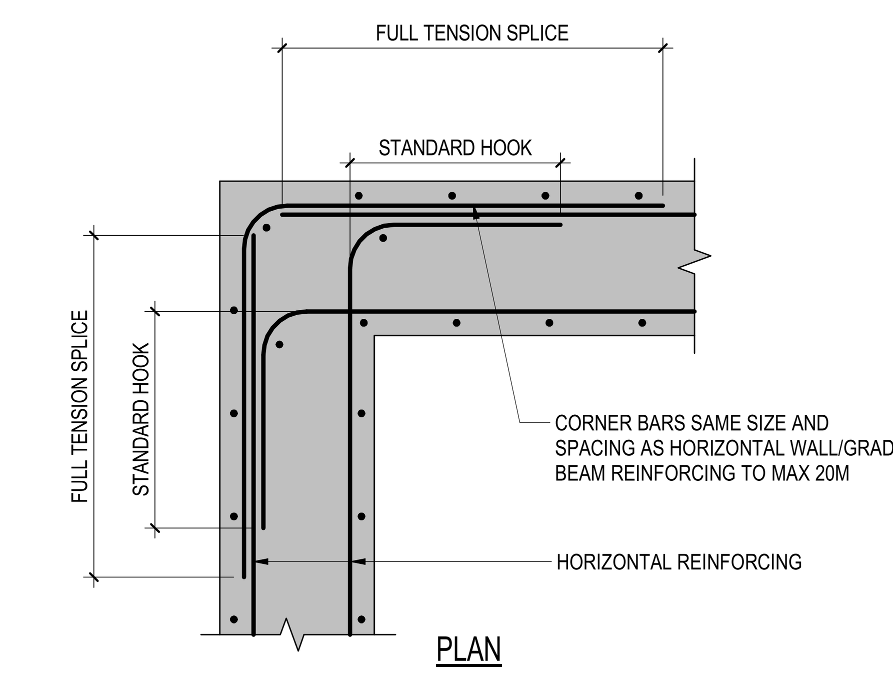



TYPICAL GRADE BEAM

TYPICAL CANTILEVERED GRADE BEAM

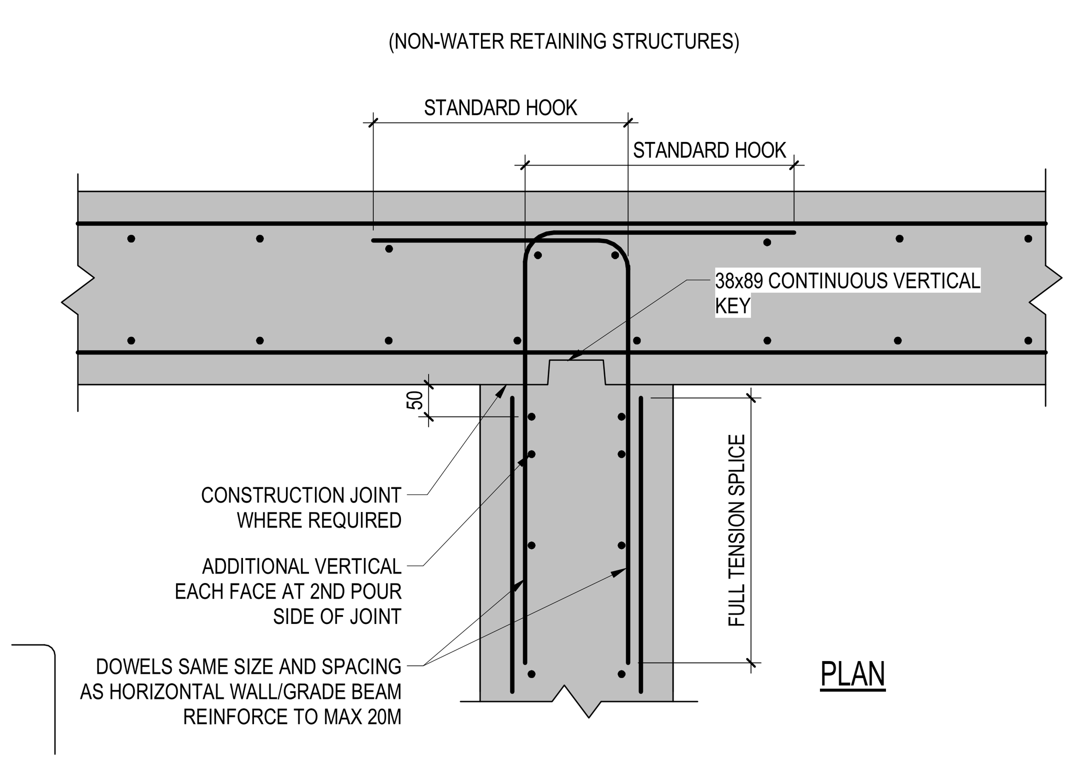
## DETAIL - TYPICALGRADE BEAM / PILE CAP DETAIL

3 / 205 — 1 : 20




## DETAIL - TYPICAL REINFORCEMENT AT CORNER WALL/GRADE BEAM INTERSECTION

4 / 205 — 1 : 10



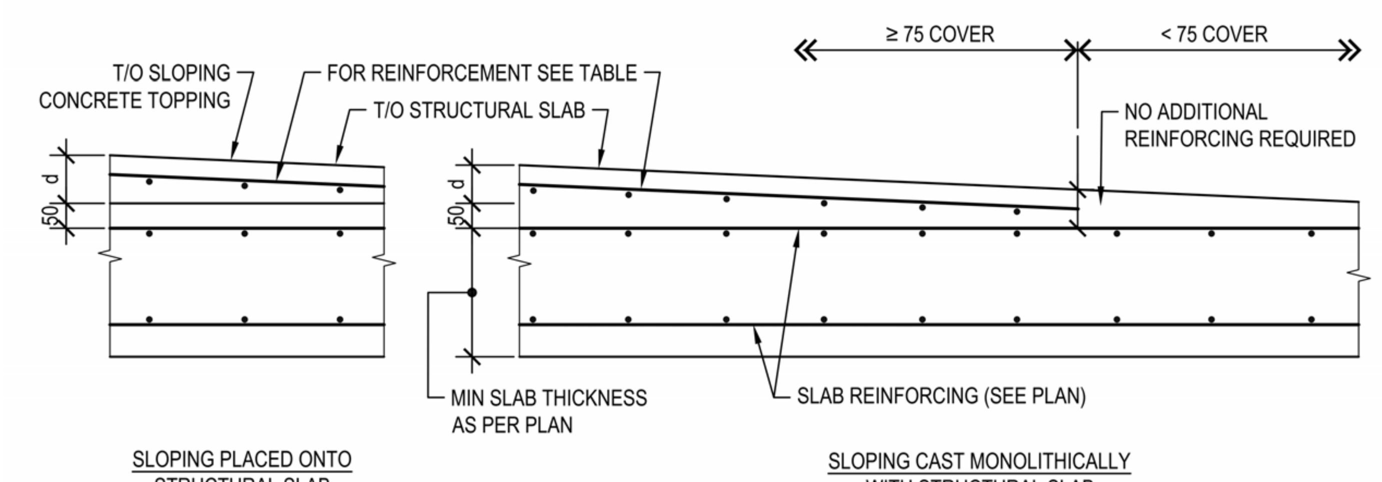

## DETAIL - TYPICAL REINFORCEMENT AT WALL/GRADE BEAM INTERSECTION

5 / 205 — 1 : 10

| REINFORCEMENT TABLE | |
|---|---|
| PROVIDE 0.3% OF (d x 1m) REINFORCEMENT STEEL AREA, BUT NOT LESS THAN: | |
| REINFORCING | TOPPING THICKNESS (d) |
| 150x150x35x35 WWM | d ≤ 75 mm |
| 10M @ 200 EACH WAY | d ≤ 165 mm |
| 15M @ 200 EACH WAY | d = 330 mm |
| 20M @ 200 EACH WAY | d > 330 mm |

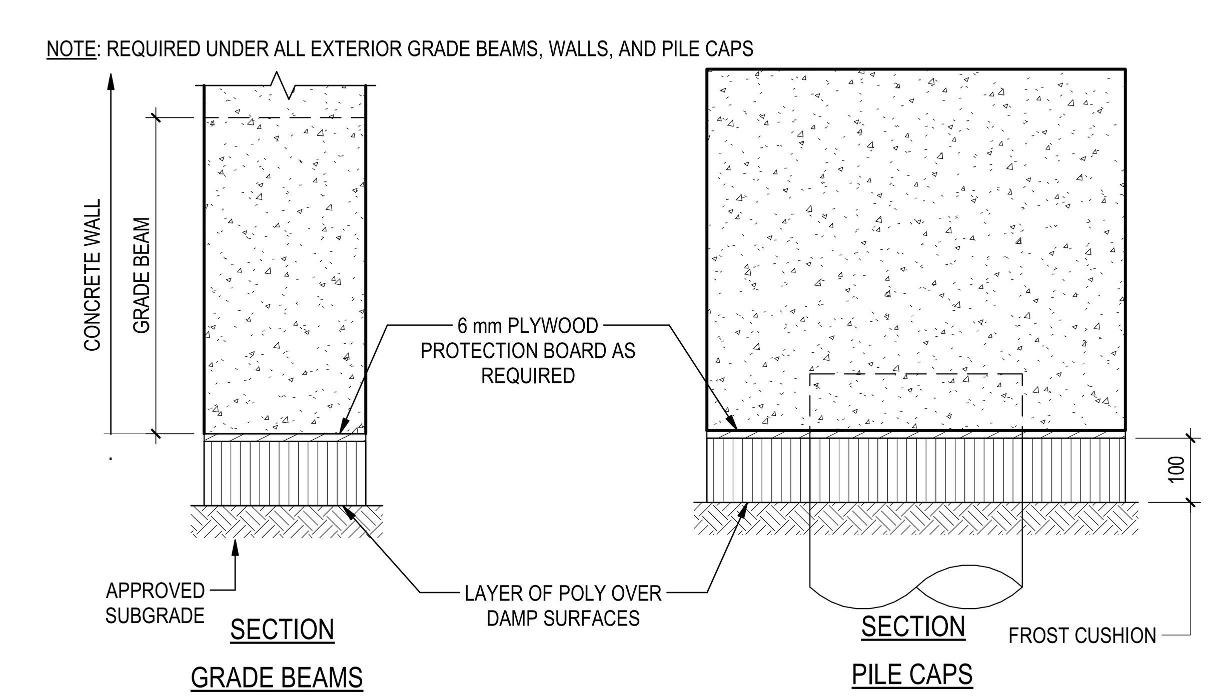
NOTES:

1. PLACE CONCRETE TOPPING OVER THOROUGHLY CLEANED DEGREASED AND ROUGHENED SURFACES. SEE SPECIFICATIONS FOR PLACING TOPPING.
2. CONTINUE JOINTS FROM UNDERLYING SLAB TO TOP OF CONCRETE TOPPING.



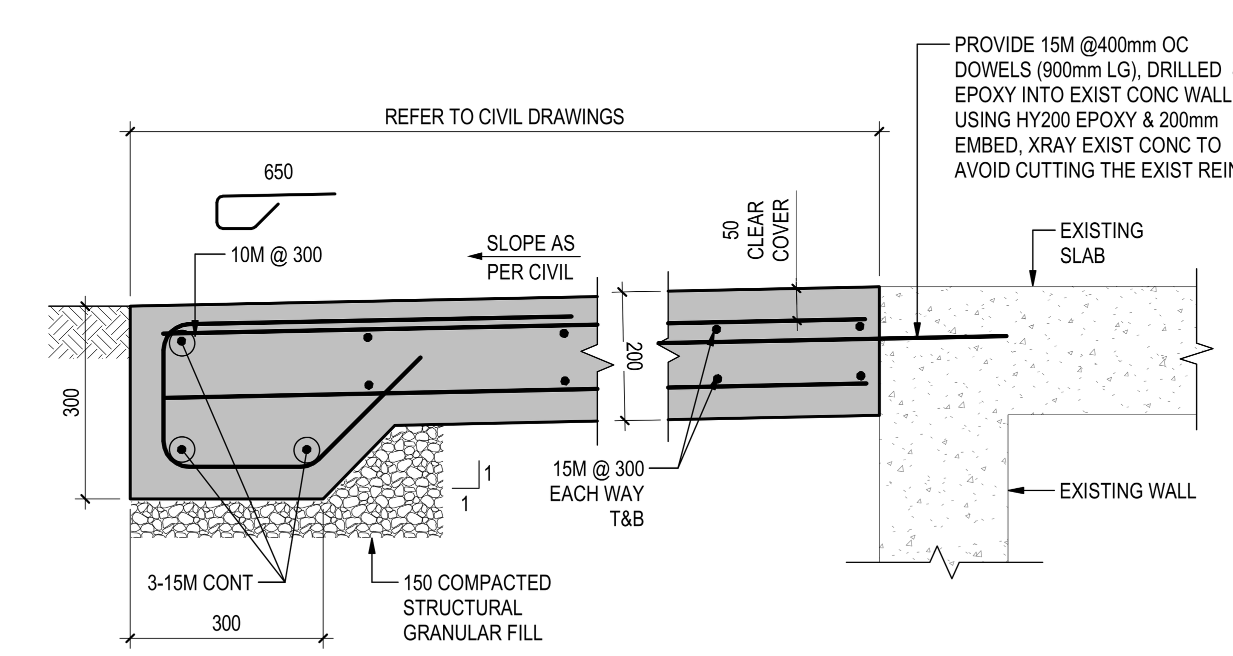

## DETAIL - CONC SLAB W/ TOPPING OR VARTING CONC COVER

6 / 205 — 1 : 1




## DETAIL - TYPICAL VOID FORM DETAILS

7 / 205 — 1 : 10




## TYPICAL APRON SLAB TO EXISTING WALL/SLAB DETAIL

8 / 205 — 1 : 10

| REFERENCE DRAWING | | REVISION | | | | | | |
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PROJECT NAME: GBWWTP FLARE CAPACITY EXPANSION
DRAWING TITLE: STRUCTURAL TYPICAL DETAILS (SHEET 3 OF 4)

| CONSULTANT JOB No. | EPCOR PROJECT No. | SCALE | SHEET | DRAWING NUMBER |
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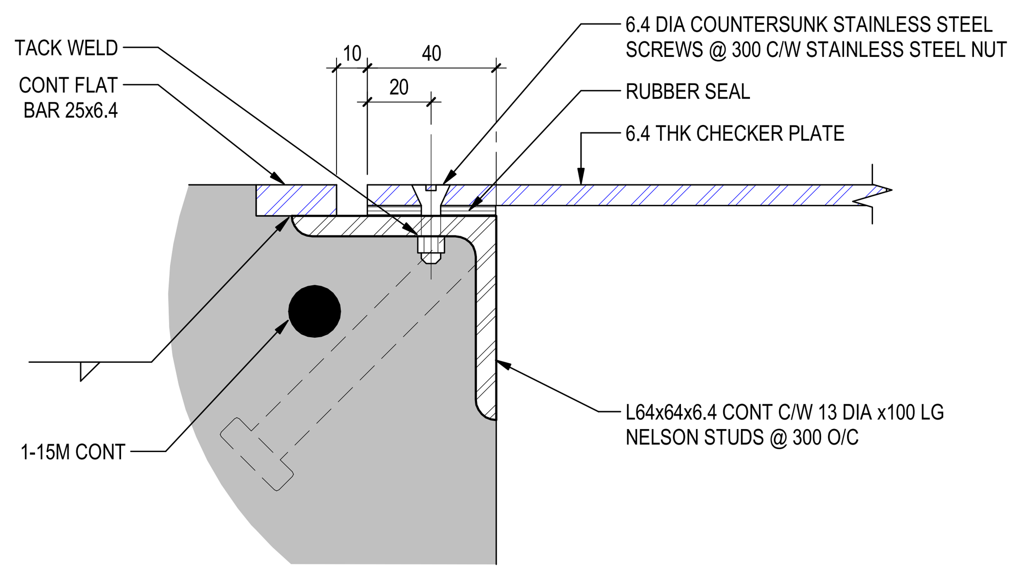
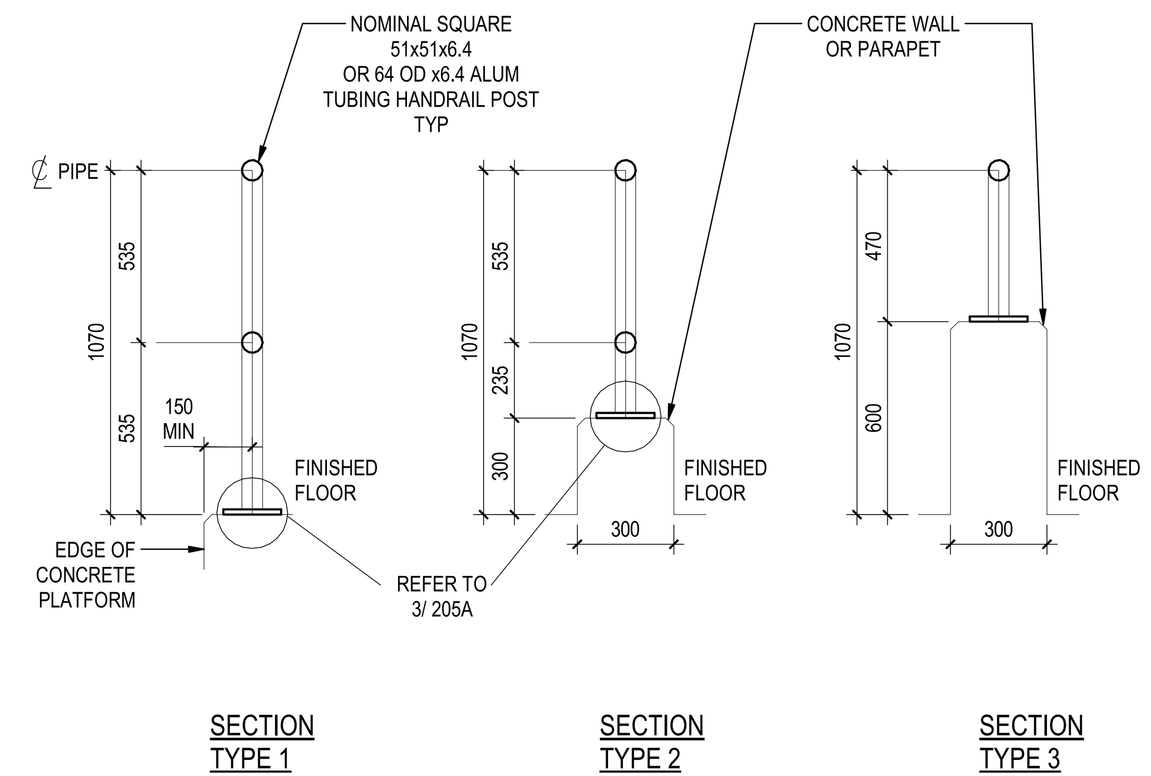


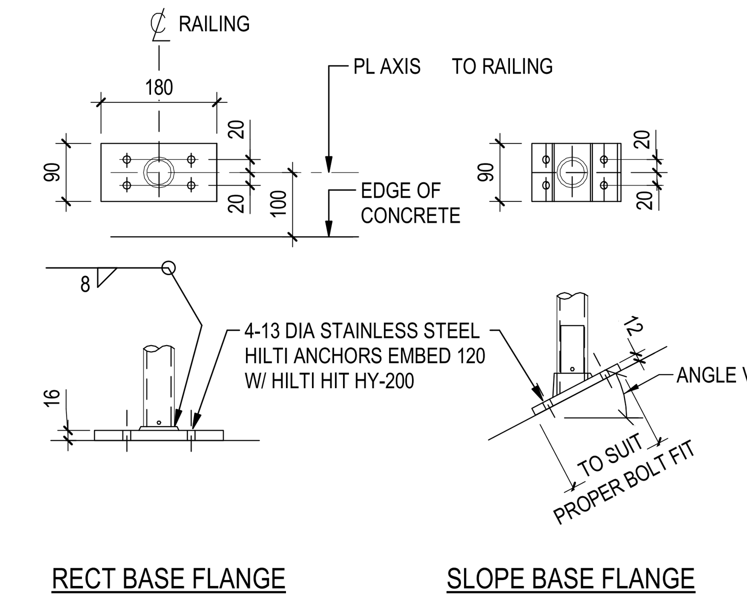

## 1 205A TYPICAL SEALED/ UNSEALED COVER EDGE SUPPORT DETAIL

1 : 2



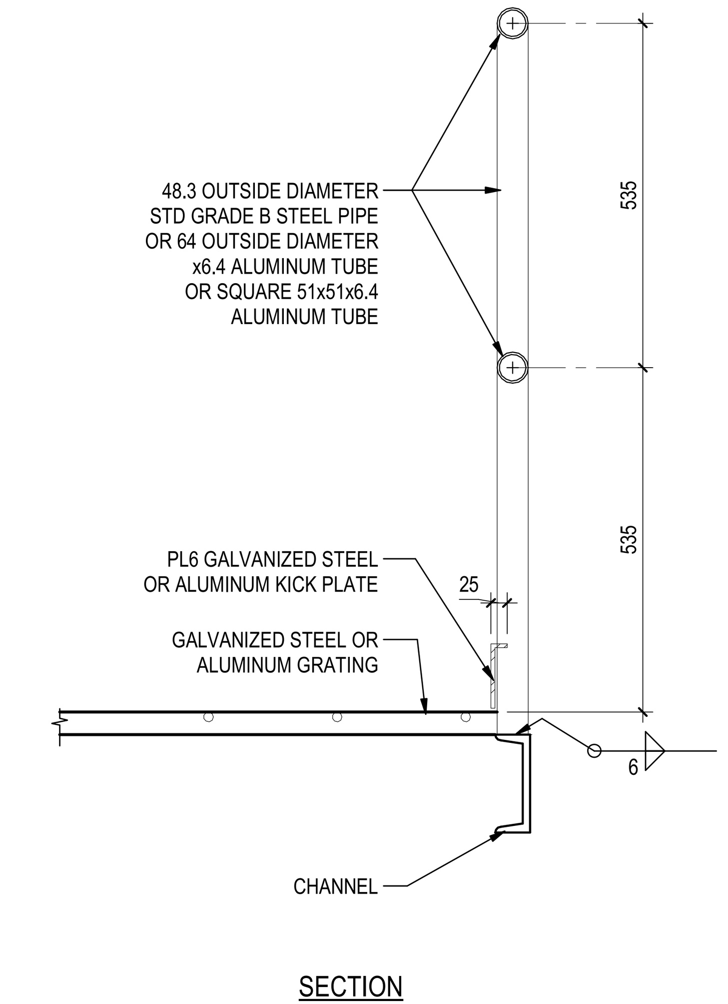

## 2 205A TYPICAL ALUMINUM RAILING ON CONCRETE PLATFORM

1 : 20



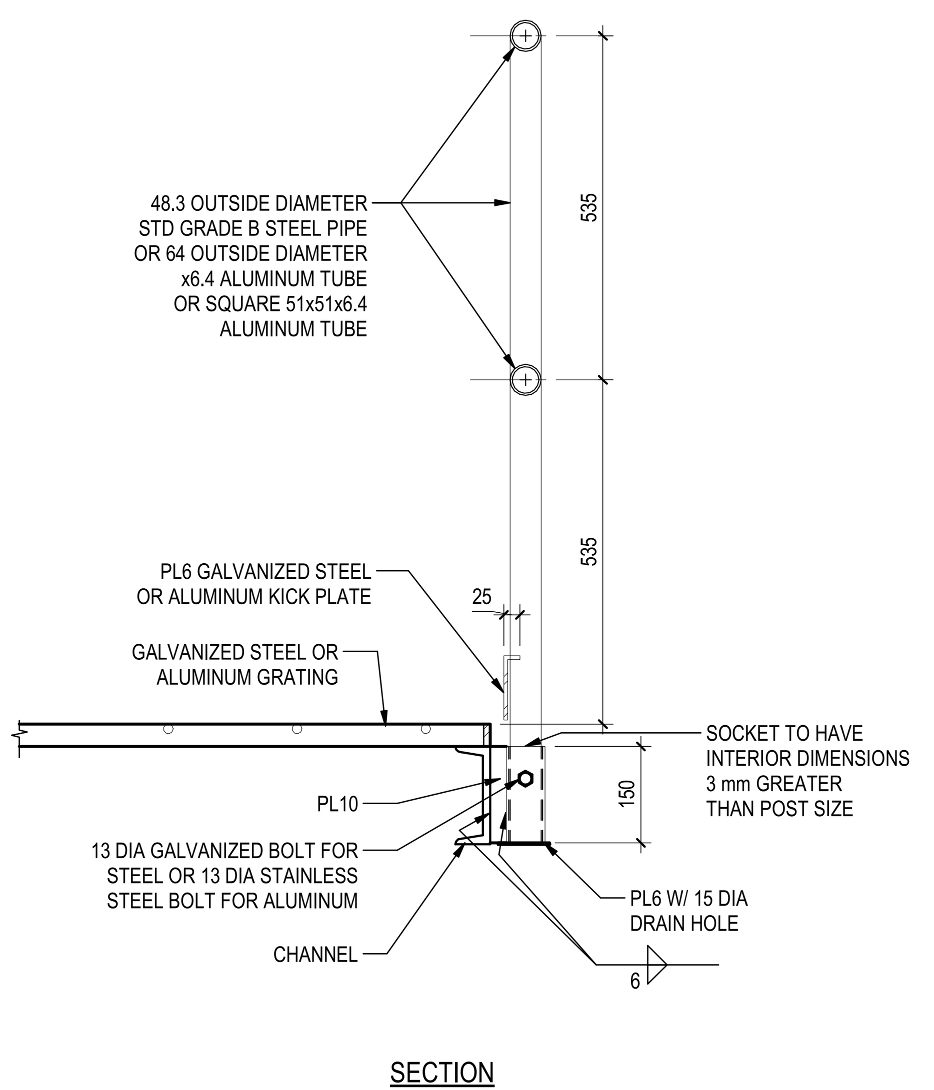

## 3 205A TYPICAL ALUMINUM RAILING CONNECTION DETAILS TO CONCRETE

1 : 10



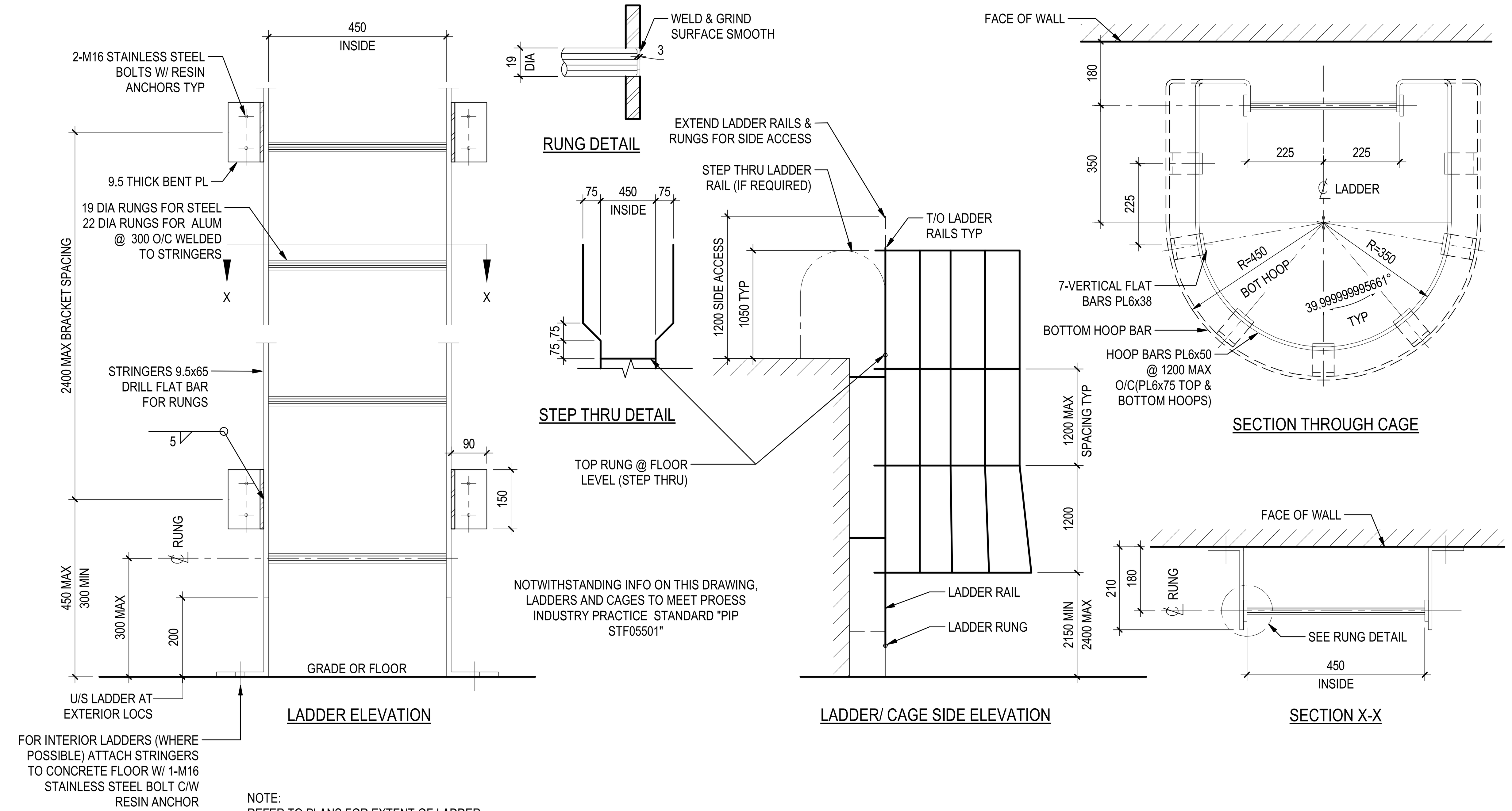

## 4 205A TYPICAL STEEL OR ALUMINUM HANDRAIL ON PLATFORM

1 : 10



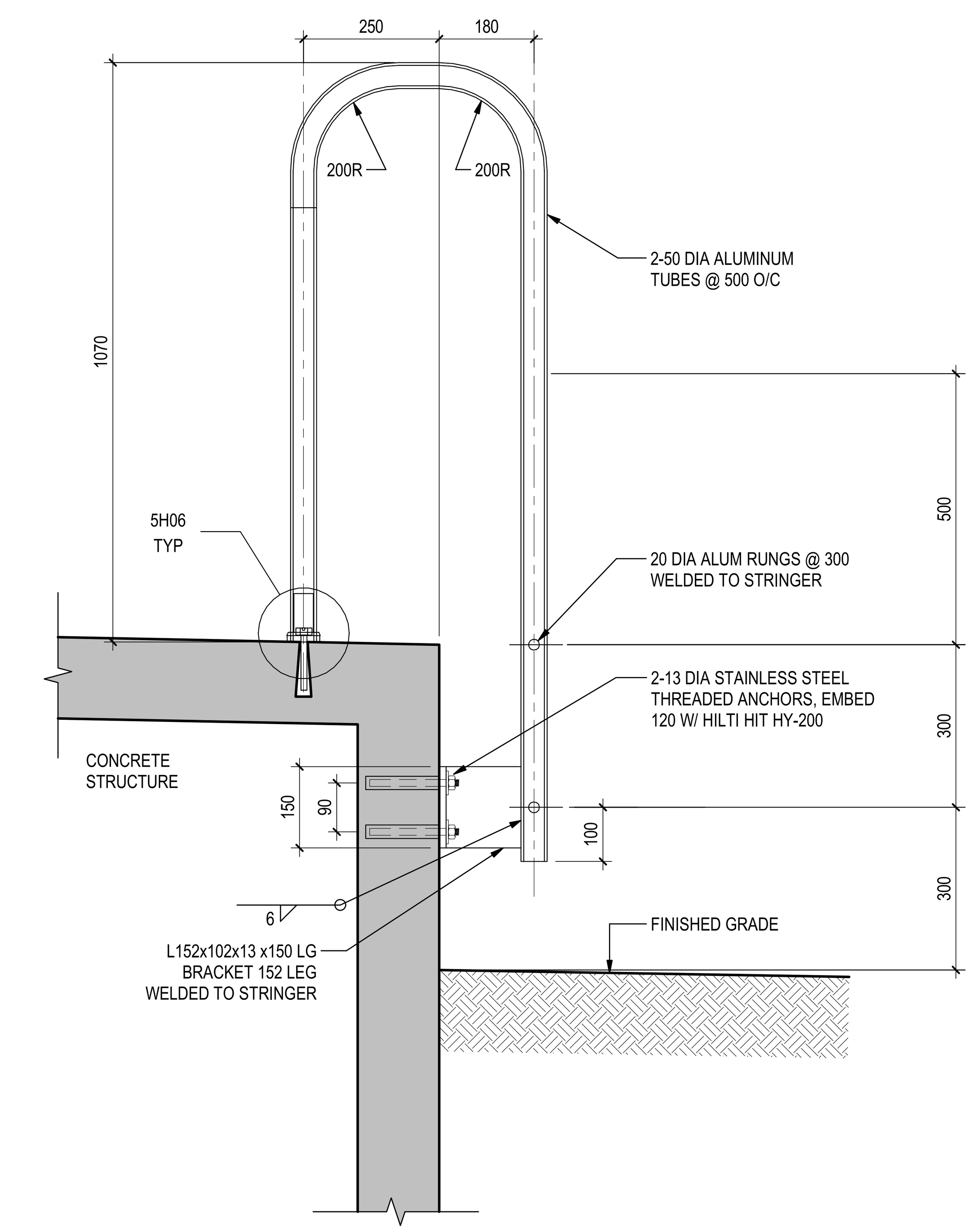

## 5 205A TYPICAL STEEL OR ALUMINUM HANDRAIL ON PLATFORM (ALTERNATE)

1 : 10




## 6 205A TYPICAL STEEL OR ALUMINUM LADDER DETAILS

1 : 10




## 7 205A TYPICAL ALUMINUM LADDER DETAIL

1 : 10

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DRAWING TITLE:
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TYPICAL DETAILS
(SHEET 4 OF 4)

| CONSULTANT JOB No. | EPCOR PROJECT No. | SCALE | SHEET | DRAWING NUMBER |
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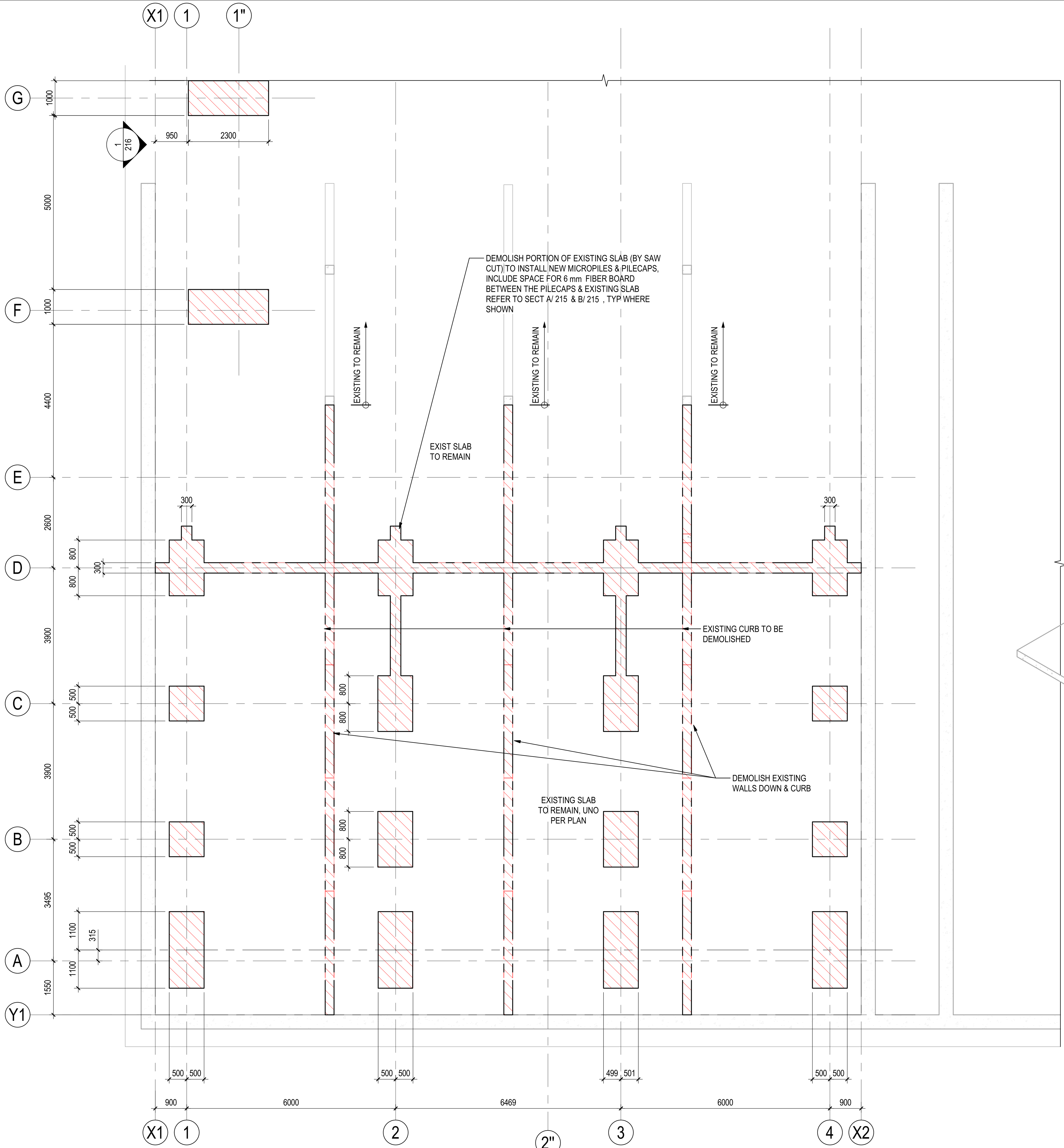
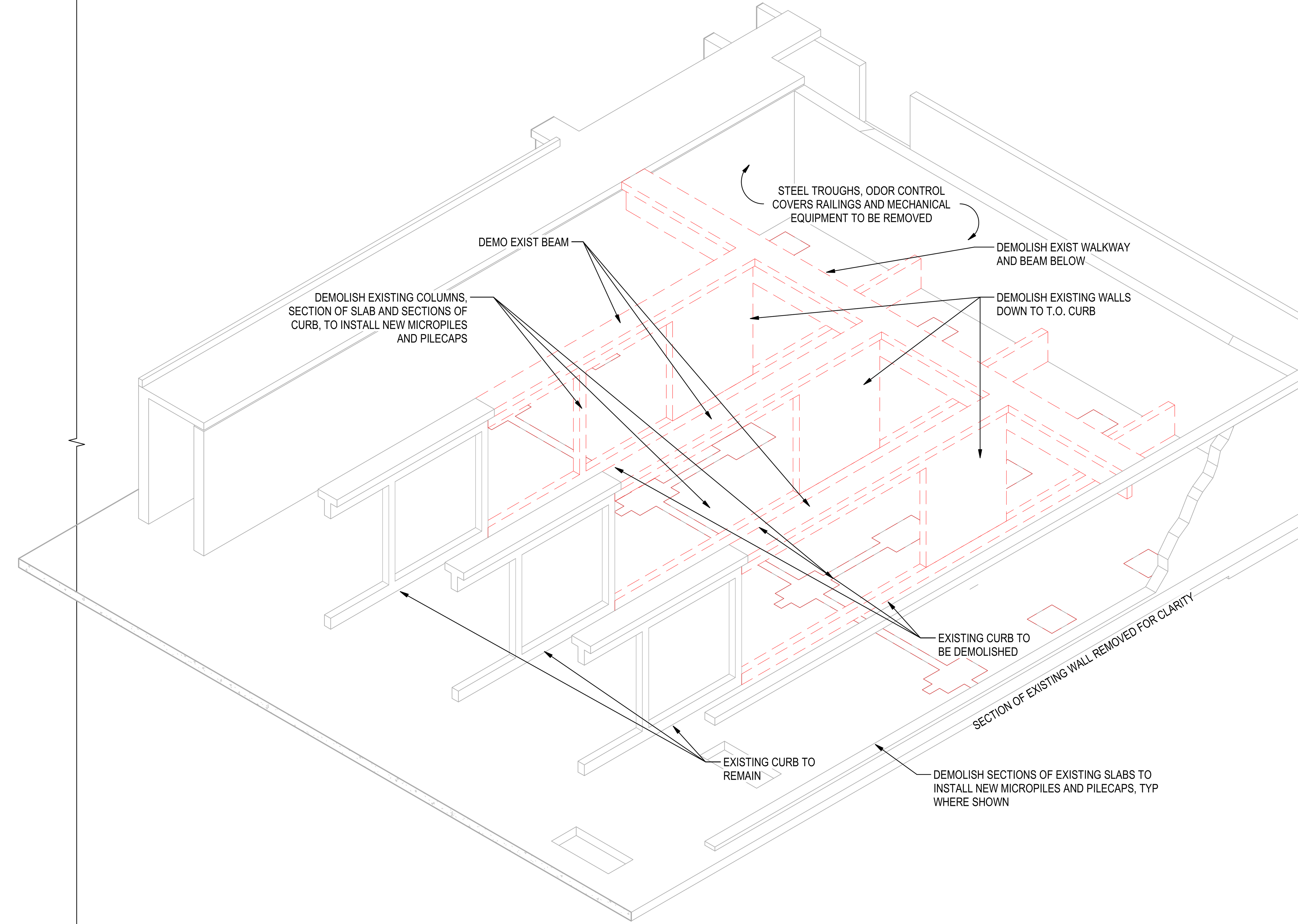



1
206
## DEMOLITION PLAN - LOWER LEVEL AT TOC ELEVATION 615.966
1 : 75




2
206
## 3D DEMOLITION VIEW

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PLANT SITE: GOLD BAR WWTP
PLANT AREA: PRIMARY CLARIFIER #2
PROJECT NAME: GBWWTP FLARE CAPACITY EXPANSION
DRAWING TITLE:

# STRUCTURAL FOUNDATION DEMO PLAN

| CONSULTANT JOB No. | EPCOR PROJECT No. | SCALE | SHEET | DRAWING NUMBER |
|---|---|---|---|---|
| 1101000105 | PMO 1004723; PF14-105 | 1 : 75 | 7 of 17 | PRJ-15-157-206 |

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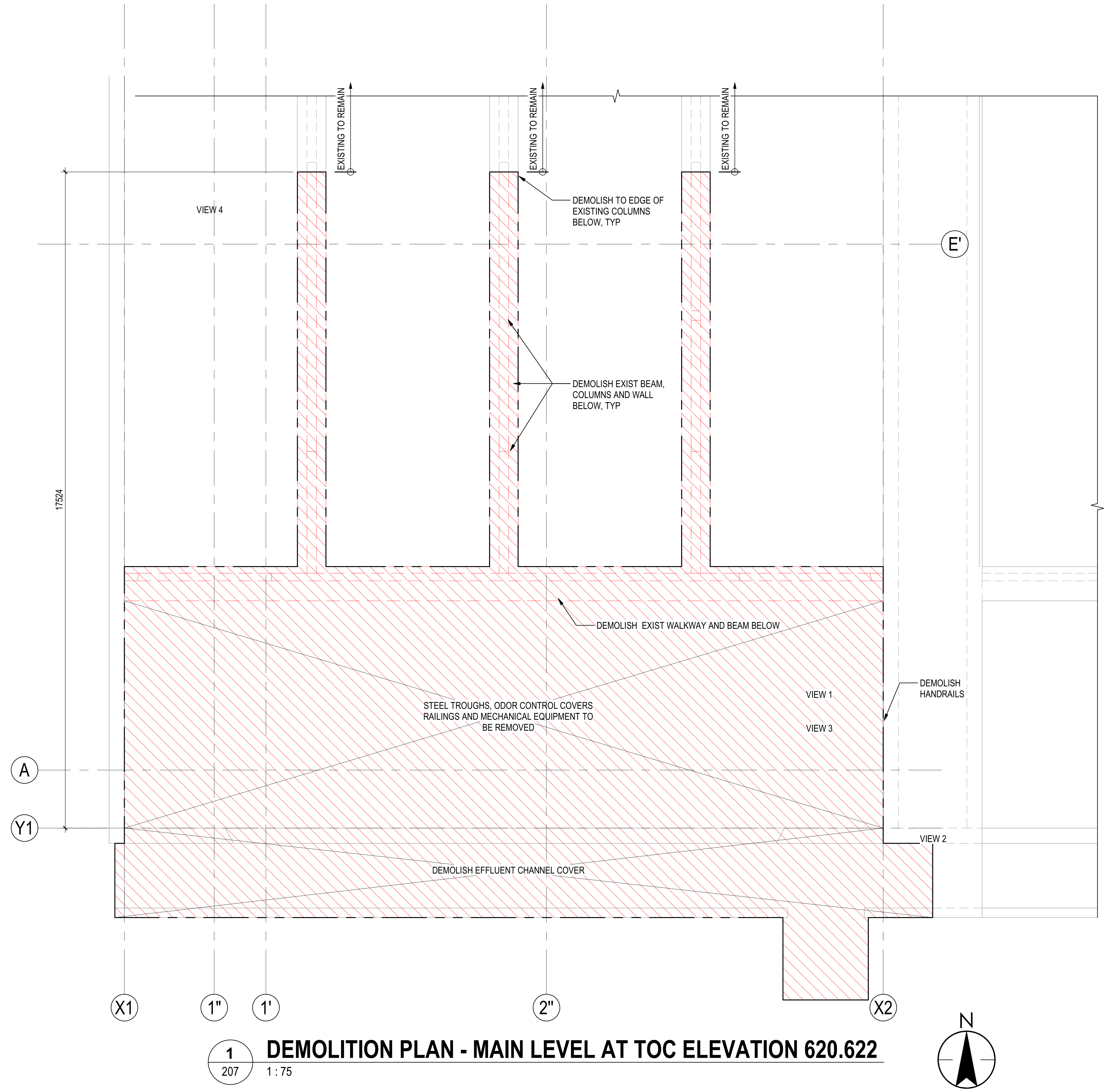


1
207
**DEMOLITION PLAN - MAIN LEVEL AT TOC ELEVATION 620.622**
1 : 75


**PHOTO - DEMO VIEW 1**


**PHOTO - DEMO VIEW 2**


**PHOTO - DEMO VIEW 3**


**PHOTO - DEMO VIEW 4**

| REFERENCE DRAWING | | REVISION | | | | | | |
|---|---|---|---|---|---|---|---|---|
| DRAWING No. | DRAWING TITLE | Rev. | DATE | DESCRIPTION | BY | DES. | CHK. | ENG. |
| | | 0A | 06-JUL-2023 | ISSUED FOR PRELIMINARY DESIGN | JC | DD | PB | |
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PROJECT NAME: GBWWTP FLARE CAPACITY EXPANSION
DRAWING TITLE:

STRUCTURAL
MAIN LEVEL DEMO PLAN

| CONSULTANT JOB No. | EPCOR PROJECT No. | SCALE | SHEET | DRAWING NUMBER |
|---|---|---|---|---|
| 1101000105 | PMO 1004723; PF14-105 | As indicated | 8 of 17 | PRJ-15-157-207 |

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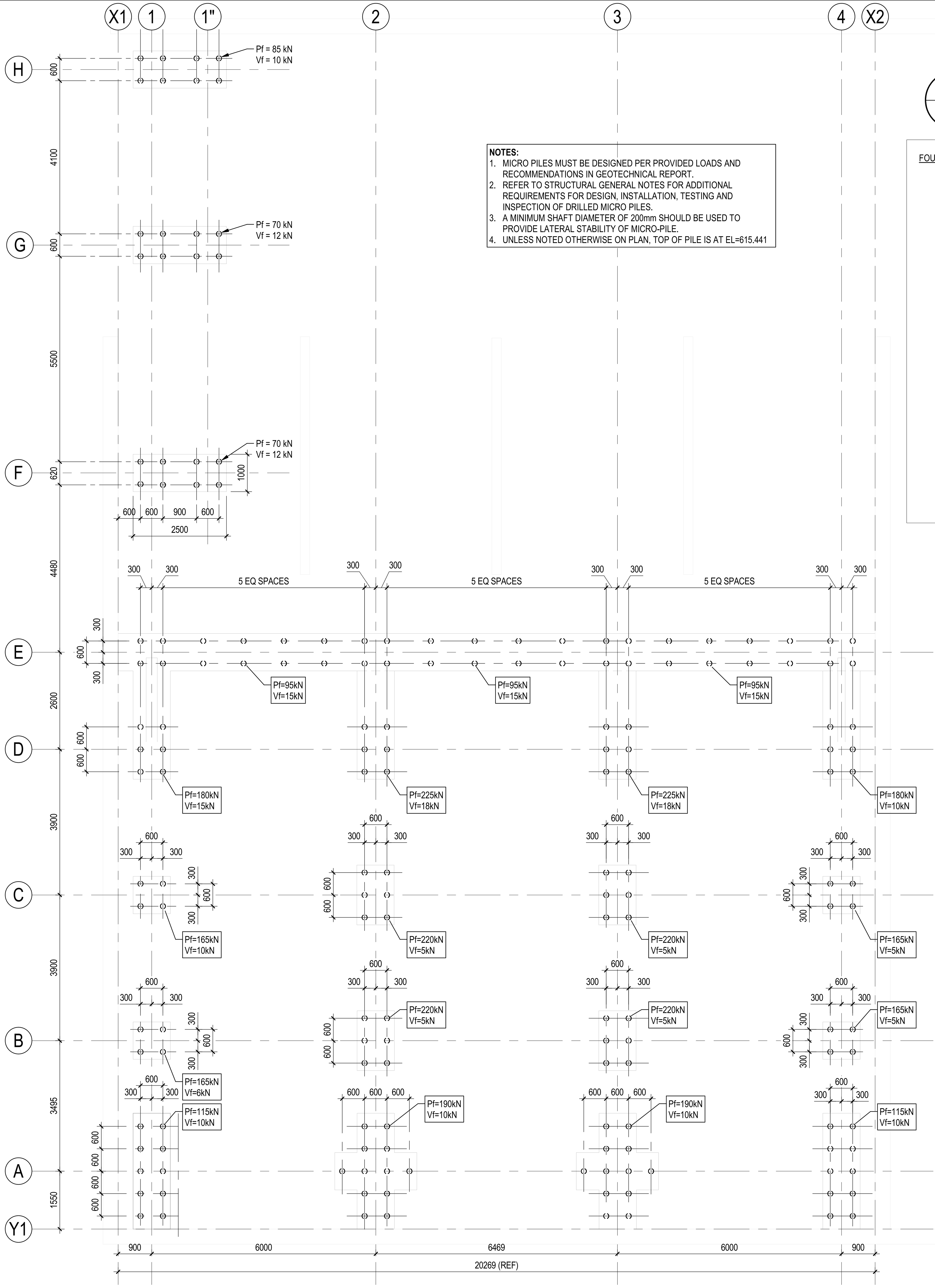



**NOTES:**
1. MICRO PILES MUST BE DESIGNED PER PROVIDED LOADS AND RECOMMENDATIONS IN GEOTECHNICAL REPORT.
2. REFER TO STRUCTURAL GENERAL NOTES FOR ADDITIONAL REQUIREMENTS FOR DESIGN, INSTALLATION, TESTING AND INSPECTION OF DRILLED MICRO PILES.
3. A MINIMUM SHAFT DIAMETER OF 200mm SHOULD BE USED TO PROVIDE LATERAL STABILITY OF MICRO-PILE.
4. UNLESS NOTED OTHERWISE ON PLAN, TOP OF PILE IS AT EL=615.441

**FOUNDATION LEGEND:**

Pf=XXXkN
Vf=XXXkN — DENOTES PILE FACTORED LOADS @ EACH PILE

MICRO PILE, TYP
REFER TO PILE LAYOUT 1/ 208
FOR DETAILS,
REFER TO 6/ 204

PC# — DENOTES PILECAP & TYPE
REFER TO PILECAP SCHEDULE ON DWG 217

CC# — DENOTES CONCRETE COLUMN & TYPE
REFER TO CONCRETE COLUMN SCHEDULE ON DWG 217

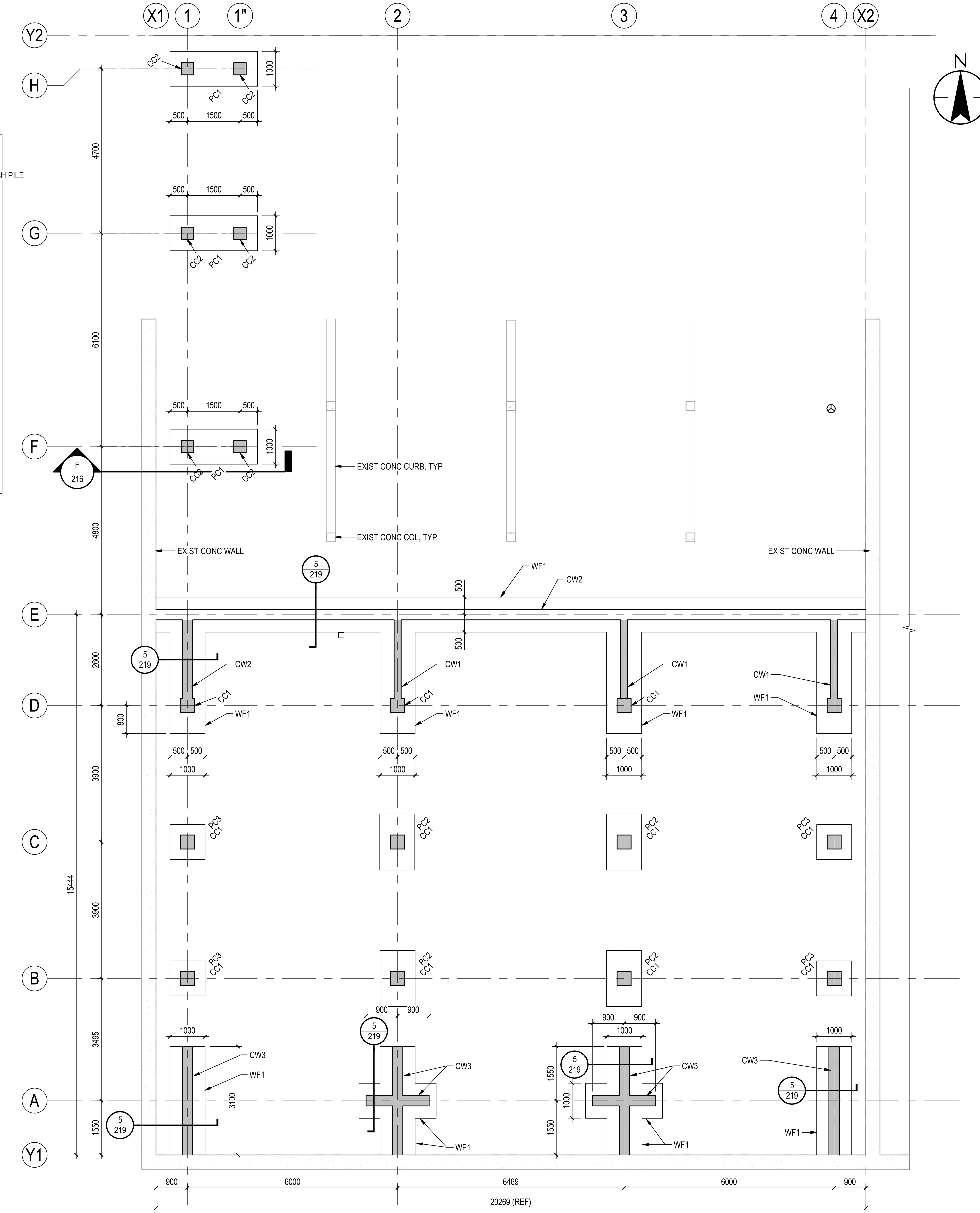
SC# — DENOTES STEEL COLUMN / MARK
REFER TO STEEL COLUMN SCHEDULE ON DWG 217

CW# — DENOTES CONCRETE WALL & TYPE
REFER TO CONCRETE WALL SCHEDULE ON DWG 217

WF# — DENOTES CONCRETE WALL FOOTING & TYPE
REFER TO CONCRETE WALL FOOTING SCHEDULE ON DWG 217

1 / 208 **NEW FLARE BUILDING AND PIPE RACK MICRO PILE LAYOUT PLAN**

1 : 75




2 / 208 **NEW FLARE BUILDING AND PIPE RACK FOUNDATION PLAN**

1 : 75

| REFERENCE DRAWING | | REVISION | | | | | | |
|---|---|---|---|---|---|---|---|---|
| DRAWING No. | DRAWING TITLE | Rev. | DATE | DESCRIPTION | BY | DES. | CHK. | ENG. |
| | | 0A | 06-JUL-2023 | ISSUED FOR PRELIMINARY DESIGN | JC | DD | PB | |
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| | | 0C | 30-AUG-2024 | ISSUED FOR 90% REVIEW | | RPJ | | |
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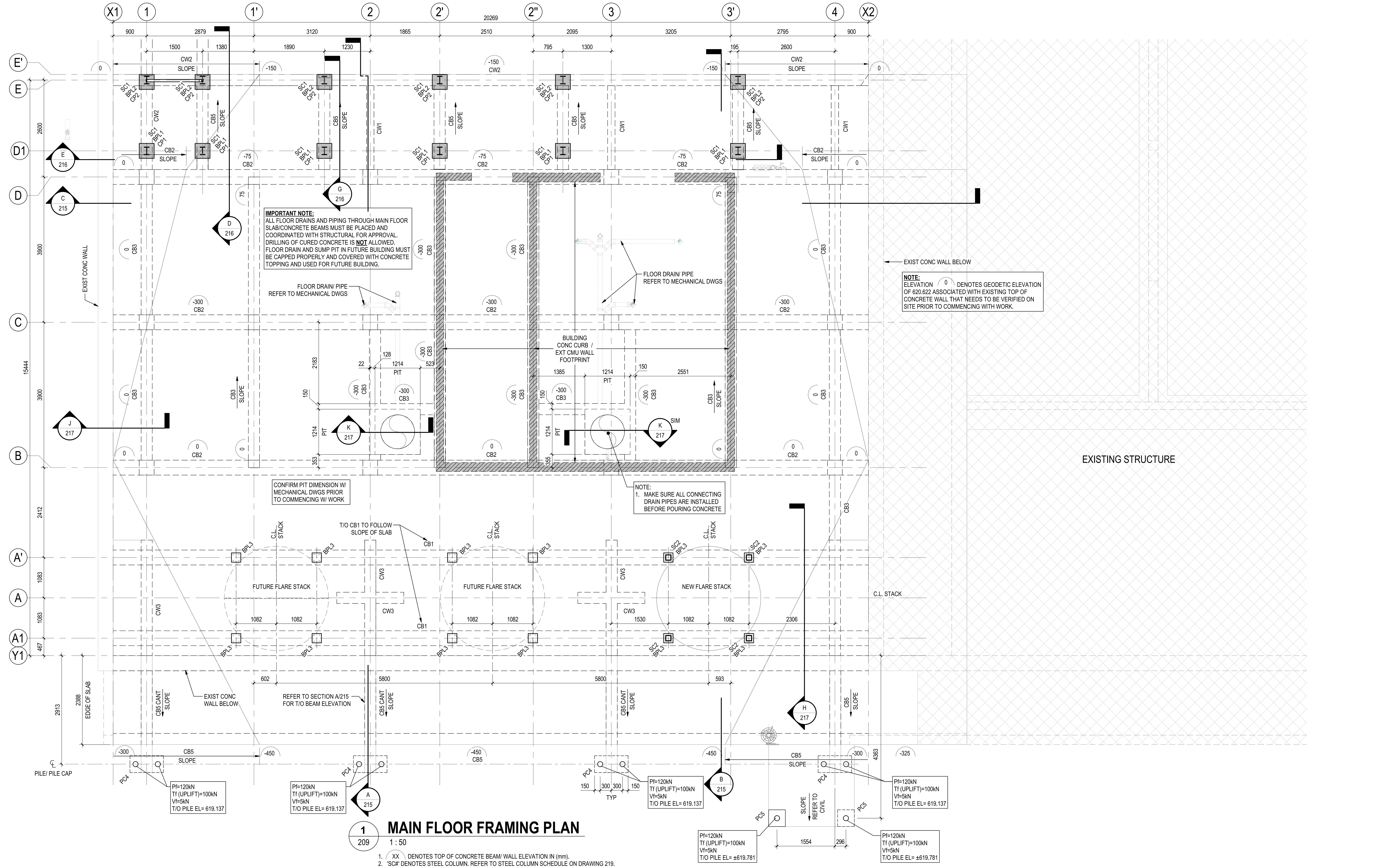
PROJECT NAME: GBWWTP FLARE CAPACITY EXPANSION

DRAWING TITLE:

STRUCTURAL
PILE LAYOUT AND FOUNDATION PLAN

| CONSULTANT JOB No. | EPCOR PROJECT No. | SCALE | SHEET | DRAWING NUMBER |
|---|---|---|---|---|
| 1101000105 | PMO 1004723; PF14-105 | 1 : 75 | 9 of 17 | PRJ-15-157-208 |

Project Files\01_WIP\06_structural\model_files\1101000105_mod_struct.rvt
11/25/2024 1:24:31 PM




## 1 / 209 MAIN FLOOR FRAMING PLAN

1 : 50

1. (XX) DENOTES TOP OF CONCRETE BEAM/ WALL ELEVATION IN (mm).
2. 'SC#' DENOTES STEEL COLUMN. REFER TO STEEL COLUMN SCHEDULE ON DRAWING 219.
3. 'CP#' DENOTES CONCRETE PEDESTAL. REFER TO DETAIL ON DRAWING 219.
4. 'BPL#' DENOTES BASE PLATE. REFER TO BASE PLATE DETAILS ON DRAWING 219.

| REFERENCE DRAWING | | REVISION | | | | | | |
|---|---|---|---|---|---|---|---|---|
| DRAWING No. | DRAWING TITLE | Rev. | DATE | DESCRIPTION | BY | DES. | CHK. | ENG. |
| | | 0A | 06-JUL-2023 | ISSUED FOR PRELIMINARY DESIGN | JC | DD | PB | |
| | | 0B | 30-APR-2024 | ISSUED FOR 60% DESIGN | JN | MB | MB | PB |
| | | 0C | 30-AUG-2024 | ISSUED FOR 90% REVIEW | | RPJ | | |
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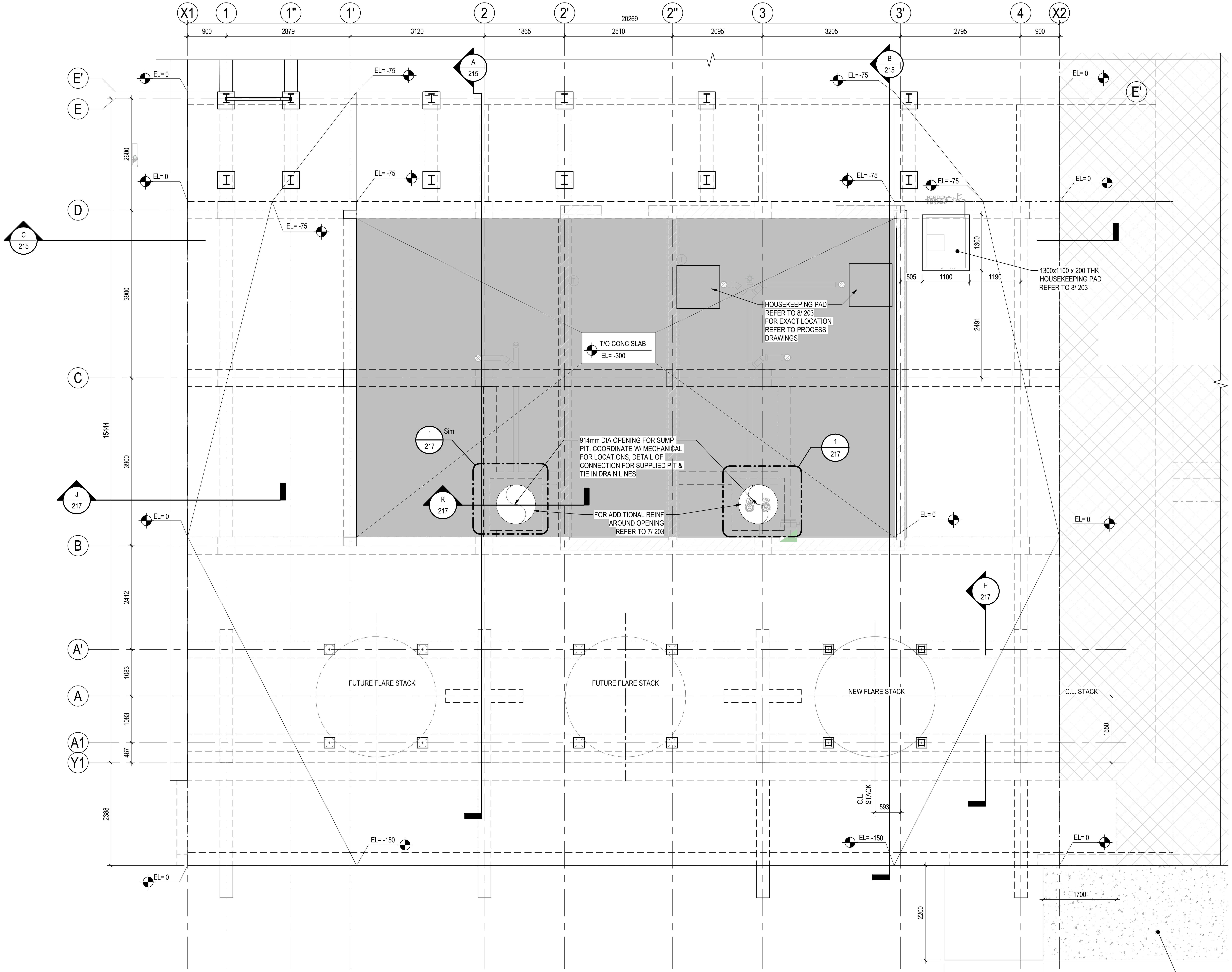
PLANT SITE: GOLD BAR WWTP
PLANT AREA: PRIMARY CLARIFIER #2
PROJECT NAME: GBWWTP FLARE CAPACITY EXPANSION
DRAWING TITLE:

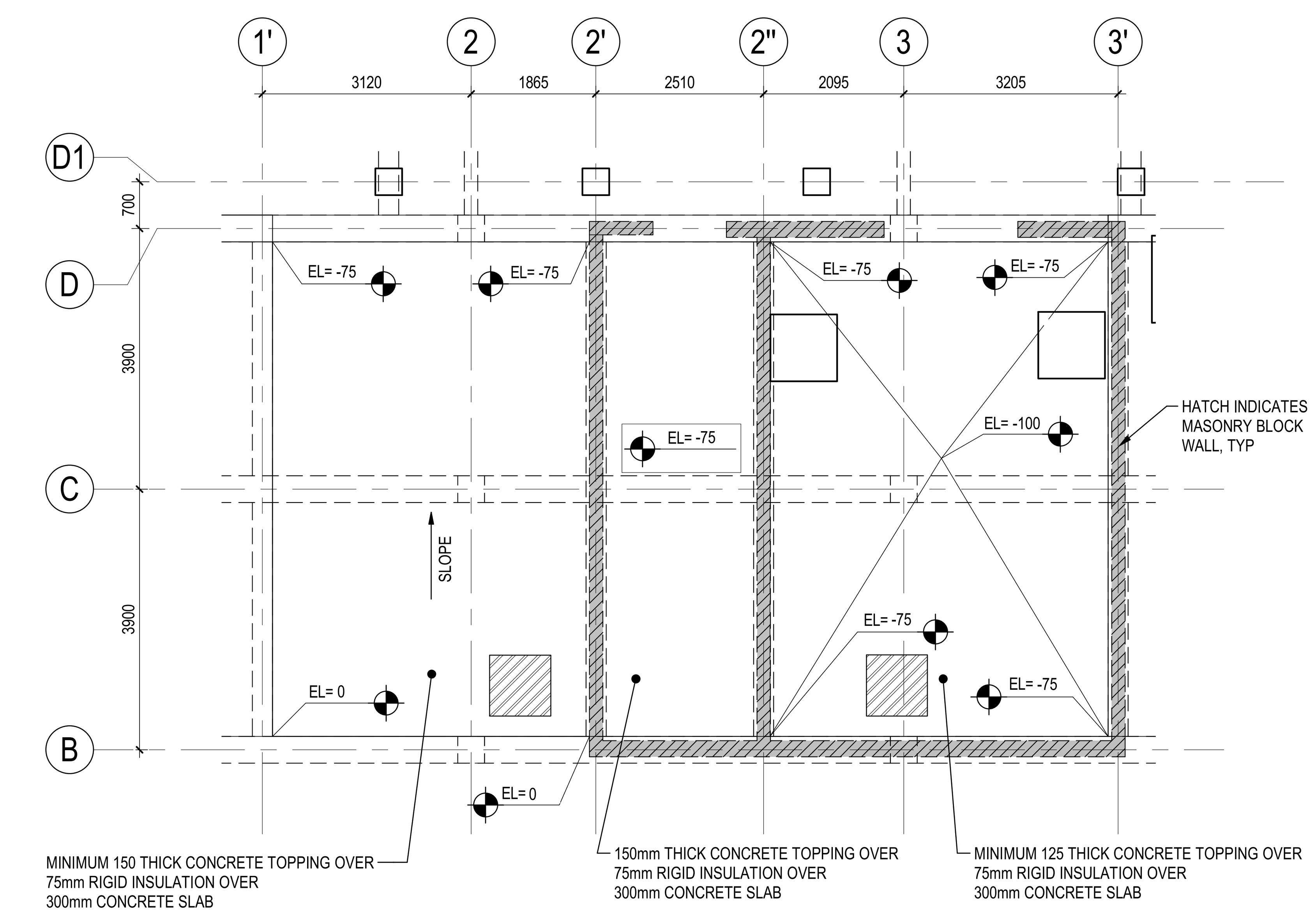
STRUCTURAL
MAIN FLOOR FRAMING PLAN

| CONSULTANT JOB No. | EPCOR PROJECT No. | SCALE | SHEET | DRAWING NUMBER |
|---|---|---|---|---|
| 1101000105 | PMO 1004723; PF14-105 | 1 : 50 | 10 of 17 | PRJ-15-157-209 |

Project Files\01_WIP\06_structural\model_files\1101000105_mod_struct.rvt
11/25/2024 1:24:32 PM




1 / 209A **MAIN FLOOR STRUCTURAL SLAB PLAN**
1 : 50




2 / 209A **CONCRETE TOPPING PLAN**
1 : 75

**NOTE:**
1. U.N.O. ON PLAN, CONCRETE TOPPING TO BE R/W 10M @ 300 EW MIDDLE.
2. FOR ADDITIONAL NOTES, SEE MAIN FLOOR STRUCTURAL SLAB PLAN NOTES BELOW.
3. INDICATES REMOVABLE GALVANIZED COVER PLATE. REFER TO 1/ 205A

**MAIN FLOOR STRUCTURAL SLAB PLAN NOTES**

1. U.N.O. ON PLAN, ALL CONCRETE SLABS ARE 300mm THICK R/W
   20M @ 200 TT & BB (NORTH-SOUTH DIRECTION)
   15M @ 200 BT & TB (EAST-WEST DIRECTION)
2. T/O MAIN FLOOR SLAB IS AT EL= 0
   (GEODETIC ELEVATION EL=620.622), U.N.O. ON PLAN.
3. SLAB TOP OF CONCRETE ELEVATIONS SHOWN ON PLAN MUST BE FOLLOWED FOR PROPER SLOPE.
4. MINIMUM THICKNESS OF SLAB MUST BE MAINTAINED THROUGHOUT.
5. SLAB AND TOP PORTION OF SUPPORTING CONCRETE BEAMS MUST BE POURED MONOLITHICALLY.

| REFERENCE DRAWING | | REVISION | | | | | | |
|---|---|---|---|---|---|---|---|---|
| DRAWING No. | DRAWING TITLE | Rev. | DATE | DESCRIPTION | BY | DES. | CHK. | ENG. |
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PROJECT NAME: GBWWTP FLARE CAPACITY EXPANSION
DRAWING TITLE:
STRUCTURAL
MAIN FLOOR PLAN

| CONSULTANT JOB No. | EPCOR PROJECT No. | SCALE | SHEET | DRAWING NUMBER |
|---|---|---|---|---|
| 1101000105 | PMO 1004723; PF14-105 | As indicated | 10 of 17 | PRJ-15-157-209A |

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# 1 / 210 NEW FLARES AND FLARE BUILDING LAYOUT

1 : 50

**IMPORTANT NOTE FOR FLARE SUPPORT DESIGN:**

1. PER SHOP DRAWINGS PROVIDED BY VAREC BIOGAS DATED AUGUST 16, 2024, THE APPROXIMATE WEIGHT OF FLARE IS 13,120 lbs, DIA OF 2783mm AT TOP, AND TOTAL HEIGHT OF 8823mm.
2. THE STAMPED, SEALED FLARE SHOP DRAWINGS INCLUDING THE GEOMETRY, FINAL ASSEMBLED WEIGHT AND CONNECTION DETAILS TO THE CONCRETE SLAB, MUST BE PROVIDED BY SUPPLIER, BEFORE FINALIZING THE FOUNDATION DESIGN FOR CONSTRUCTION.

| REFERENCE DRAWING | | REVISION | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| DRAWING No. | DRAWING TITLE | Rev. | DATE | DESCRIPTION | BY | DES. | CHK. | ENG. |
| | | 0A | 06-JUL-2023 | ISSUED FOR PRELIMINARY DESIGN | JC | DD | PB | |
| | | 0B | 30-APR-2024 | ISSUED FOR 60% DESIGN | JN | MB | MB | PB |
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PROJECT NAME: GBWWTP FLARE CAPACITY EXPANSION
DRAWING TITLE:
STRUCTURAL
NEW FLARES AND FLARE BUILDING LAYOUT

| CONSULTANT JOB No. | EPCOR PROJECT No. | SCALE | SHEET | DRAWING NUMBER |
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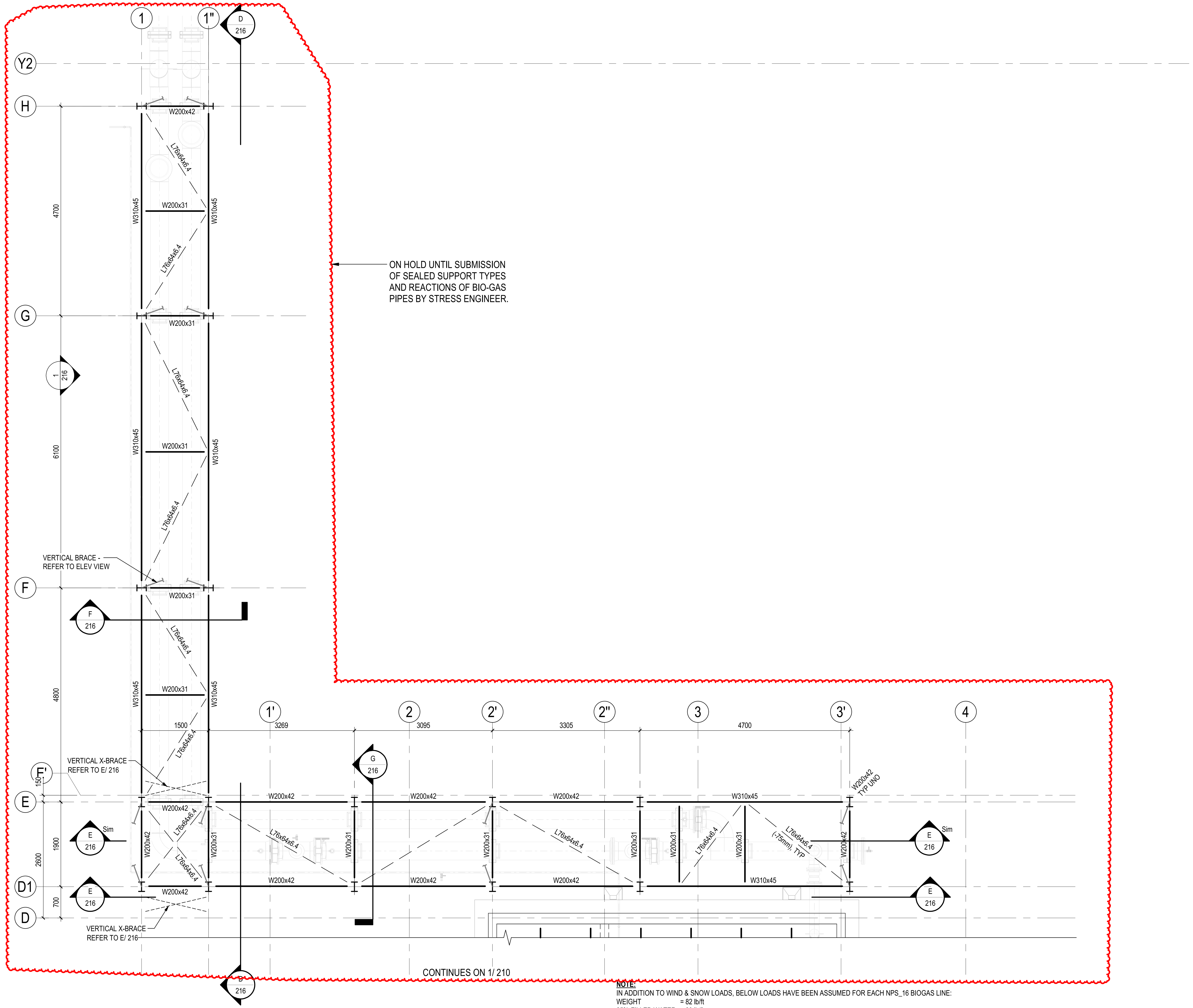
| 1101000105 | PMO 1004723; PF14-105 | 1 : 50 | 11 of 17 | PRJ-15-157-210 |

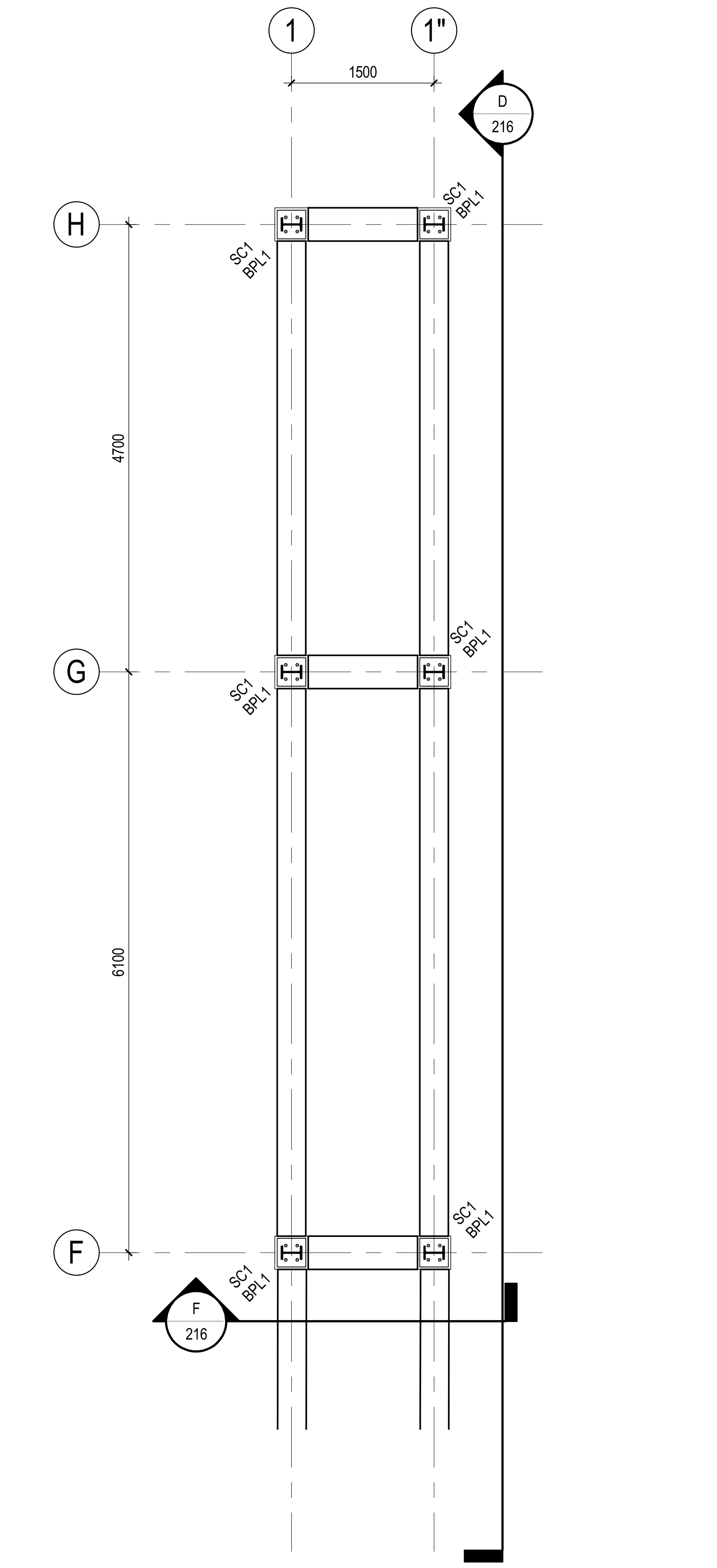



## 1 BIOGAS PIPE RACK
211 1 : 50

REFER TO SECTION DETAILS FOR TOS ELEVATIONS

**NOTE:**
IN ADDITION TO WIND & SNOW LOADS, BELOW LOADS HAVE BEEN ASSUMED FOR EACH NPS_16 BIOGAS LINE:

| | |
|---|---|
| WEIGHT | = 82 lb/ft |
| 25% FILLED WATER | = 20 lb/ft |
| INSULATION | = 8 lb/ft |
| ICE | = 26 lb/ft |




## 2 COLUMN AND BASE PLATE PLAN
211 1 : 50

1. FOR GENERAL NOTES, REFER TO MAIN FLOOR FRAMING PLAN NOTES ON DRAWING 209.

| REFERENCE DRAWING | | REVISION | | | | | | |
|---|---|---|---|---|---|---|---|---|
| DRAWING No. | DRAWING TITLE | Rev. | DATE | DESCRIPTION | BY | DES. | CHK. | ENG. |
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PROJECT NAME: GBWWTP FLARE CAPACITY EXPANSION
DRAWING TITLE:
STRUCTURAL
VAPOUR HEADER STEEL FRAMING PLAN

| CONSULTANT JOB No. | EPCOR PROJECT No. | SCALE | SHEET | DRAWING NUMBER |
|---|---|---|---|---|
| 1101000105 | PMO 1004723; PF14-105 | 1 : 50 | 12 of 17 | PRJ-15-157-211 |

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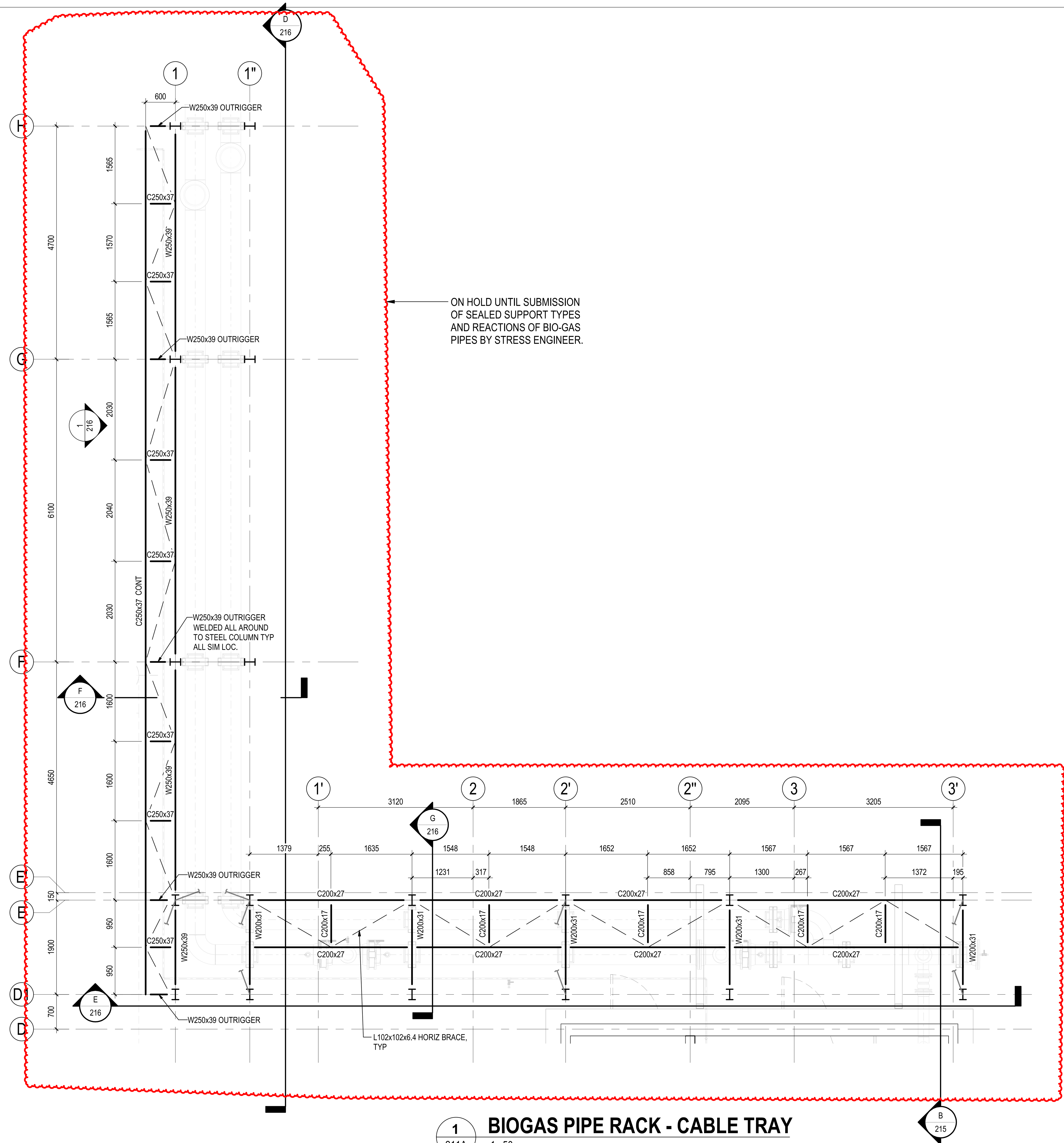


1
211A
**BIOGAS PIPE RACK - CABLE TRAY**
1 : 50

| REFERENCE DRAWING | | REVISION | | | | | | |
|---|---|---|---|---|---|---|---|---|
| DRAWING No. | DRAWING TITLE | Rev. | DATE | DESCRIPTION | BY | DES. | CHK. | ENG. |
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PROJECT NAME: GBWWTP FLARE CAPACITY EXPANSION
DRAWING TITLE:

STRUCTURAL
VAPOUR HEADER STEEL FRAMING PLAN

| CONSULTANT JOB No. | EPCOR PROJECT No. | SCALE | SHEET | DRAWING NUMBER |
|---|---|---|---|---|
| 1101000105 | PMO 1004723; PF14-105 | 1 : 50 | 12 of 17 | PRJ-15-157-211A |

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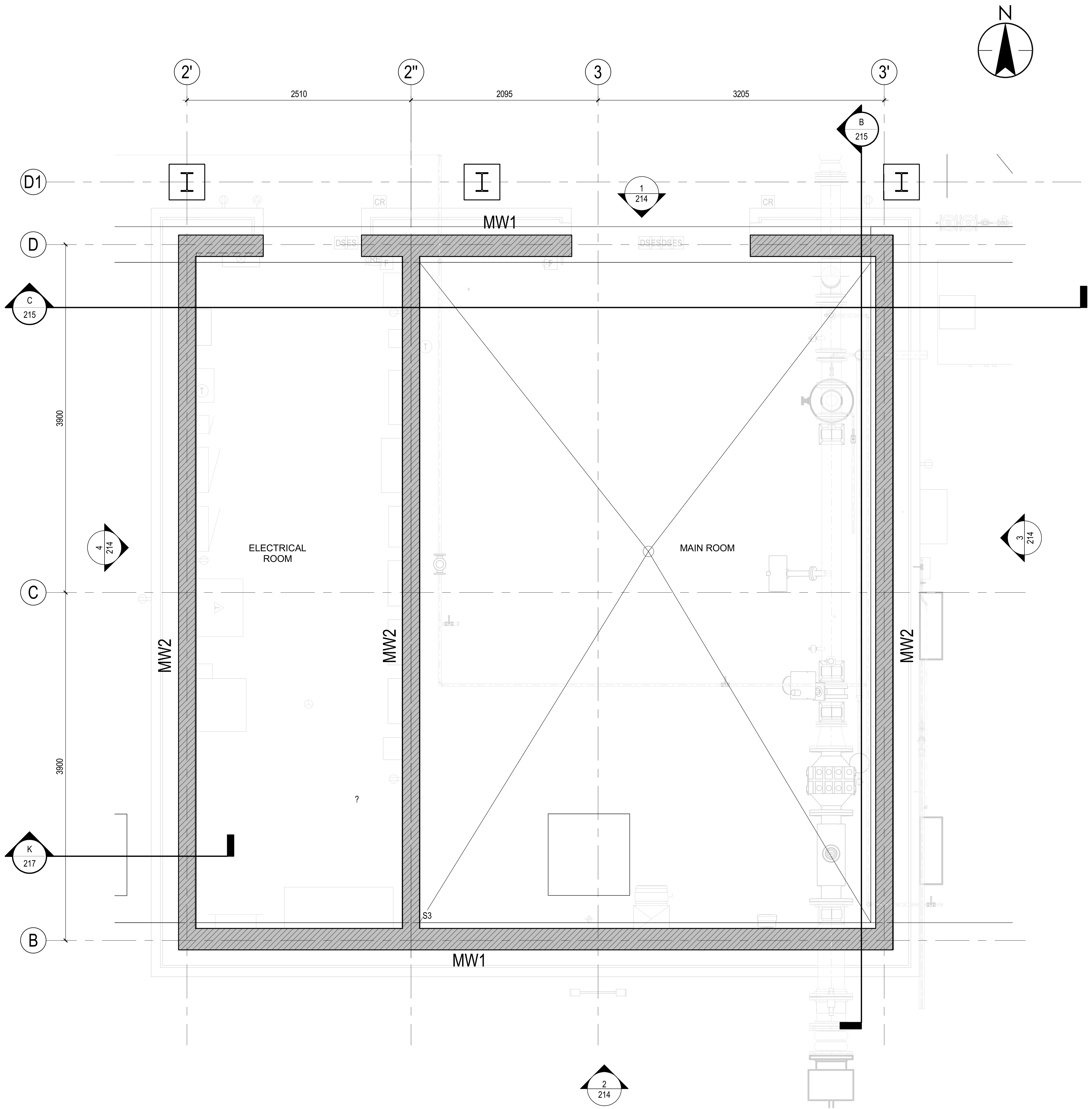
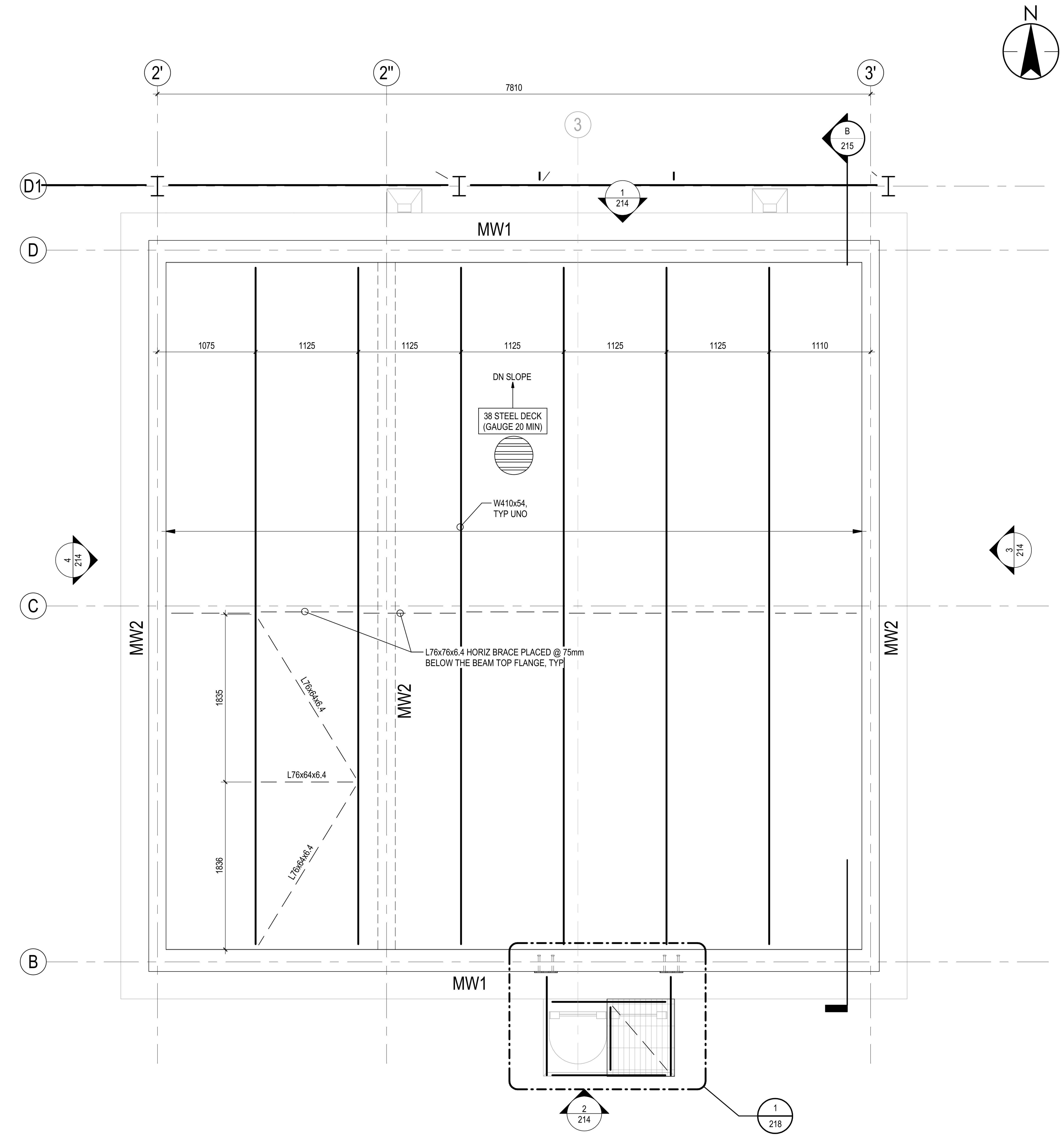



## 1 MASONRY WALL LAYOUT PLAN
212 — 1 : 30




## 2 ROOF FRAMING PLAN
212 — 1 : 30

| REFERENCE DRAWING | | REVISION | | | | | | |
|---|---|---|---|---|---|---|---|---|
| DRAWING No. | DRAWING TITLE | Rev. | DATE | DESCRIPTION | BY | DES. | CHK. | ENG. |
| | | 0A | 06-JUL-2023 | ISSUED FOR PRELIMINARY DESIGN | JC | DD | PB | |
| | | 0B | 30-APR-2024 | ISSUED FOR 60% DESIGN | JN | MB | MB | PB |
| | | 0C | 30-AUG-2024 | ISSUED FOR 90% REVIEW | | RPJ | | |
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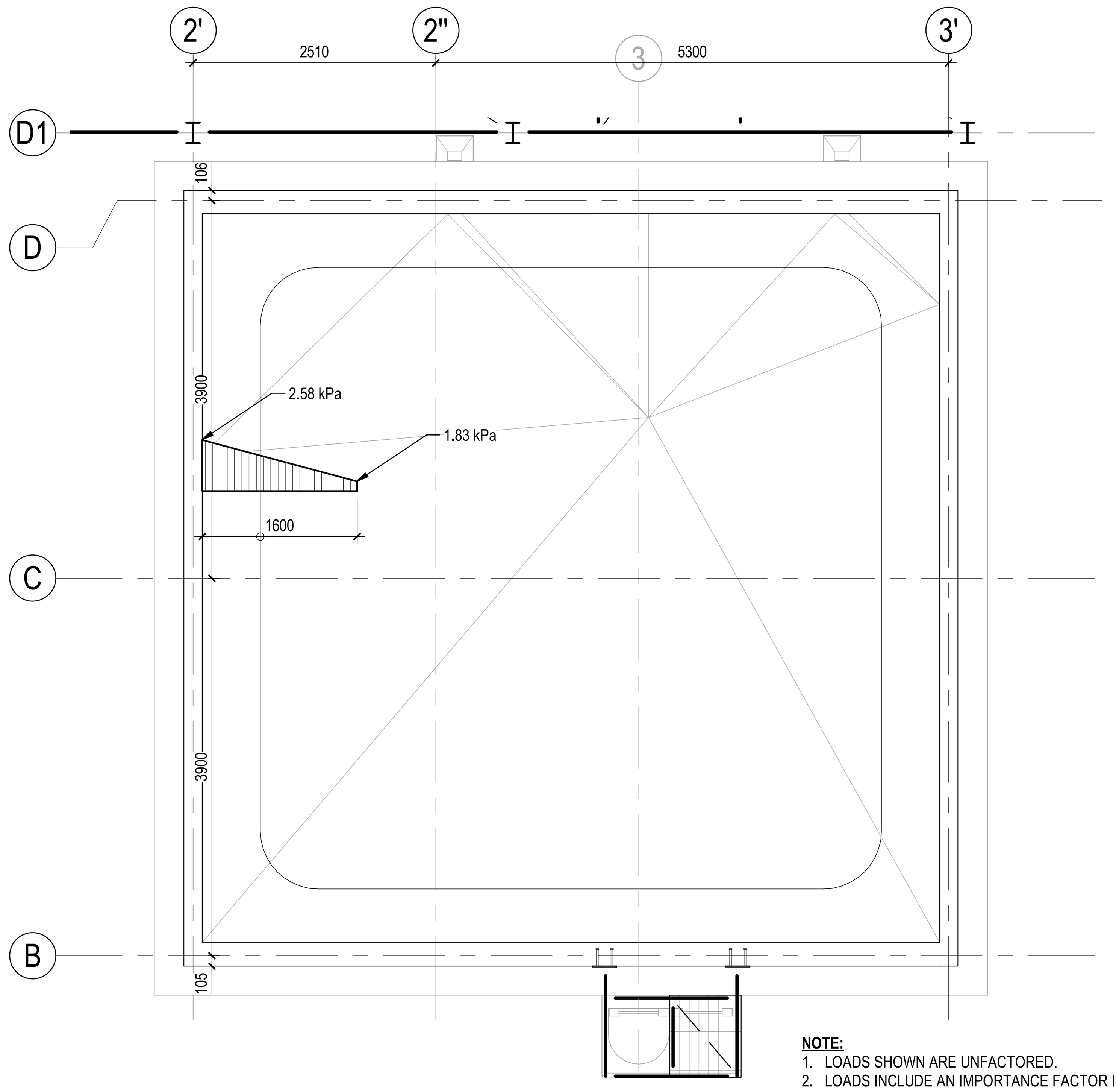
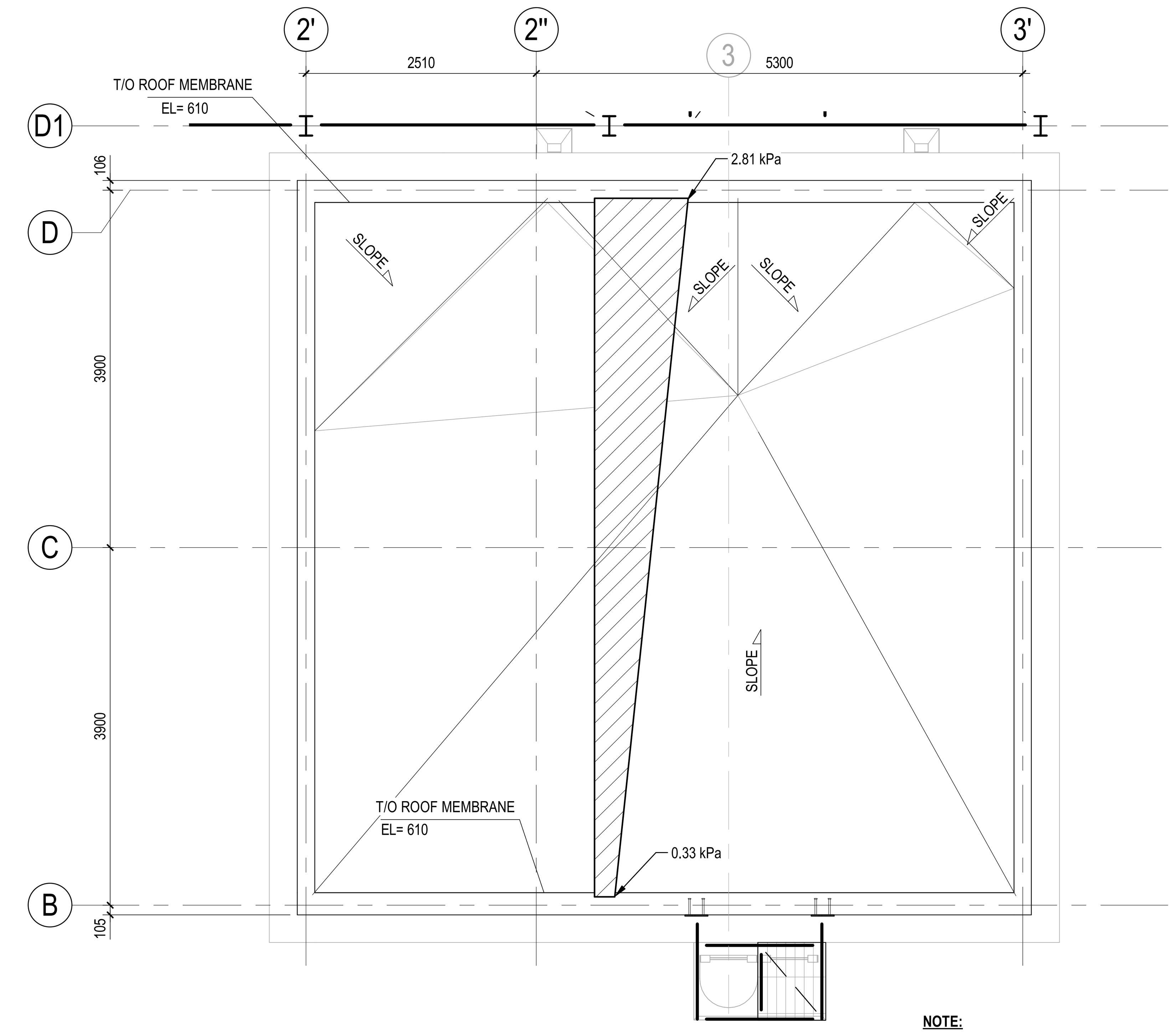
PLANT SITE: GOLD BAR WWTP
PLANT AREA: PRIMARY CLARIFIER #2
PROJECT NAME: GBWWTP FLARE CAPACITY EXPANSION
DRAWING TITLE: STRUCTURAL BUILDING FLOOR PLAN AND ROOF FRAMING PLAN

| CONSULTANT JOB No. | EPCOR PROJECT No. | SCALE | SHEET | DRAWING NUMBER |
|---|---|---|---|---|
| 1101000105 | PMO 1004723; PF14-105 | 1 : 30 | 13 of 17 | PRJ-15-157-212 |



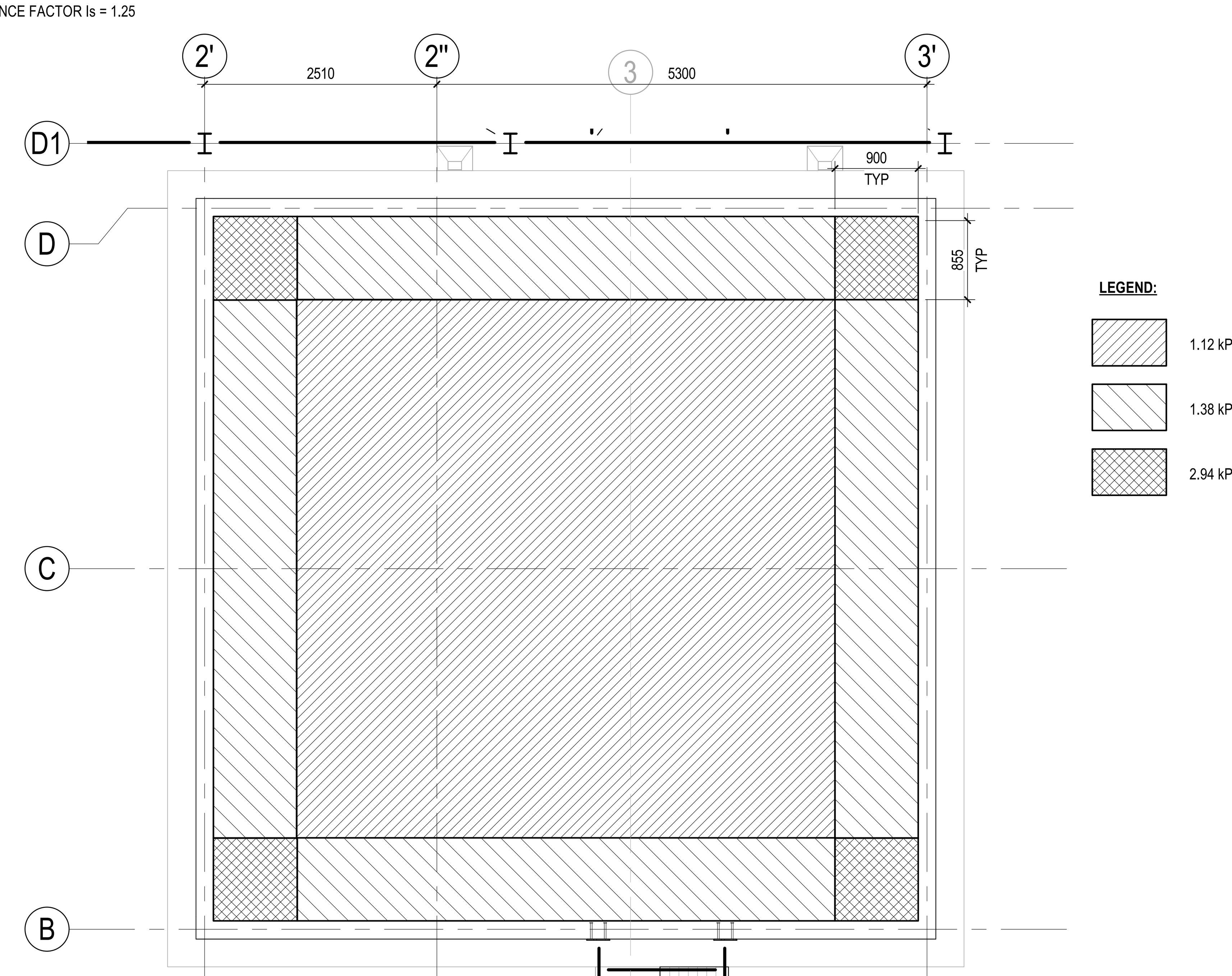

NOTE:
1. LOADS SHOWN ARE UNFACTORED.
2. LOADS INCLUDE AN IMPORTANCE FACTOR Is = 1.25

1
213
## ROOF SNOW LOAD PLAN
1 : 50




NOTE:
1. LOADS SHOWN ARE UNFACTORED.

2
213
## ROOF RAIN PONDING PLAN
1 : 50




NOTE:
1. LOADS SHOWN ARE UNFACTORED.
2. LOADS INCLUDE AN IMPORTANCE FACTOR Iw = 1.25.
3. LOADS INCLUDE INTERNAL PRESSURE.

3
213
## ROOF WIND UPLIFT PLAN
1 : 50

| REFERENCE DRAWING | | REVISION | | | | | | |
|---|---|---|---|---|---|---|---|---|
| DRAWING No. | DRAWING TITLE | Rev. | DATE | DESCRIPTION | BY | DES. | CHK. | ENG. |
| | | 0A | 06-JUL-2023 | ISSUED FOR PRELIMINARY DESIGN | JC | DD | PB | |
| | | 0B | 30-APR-2024 | ISSUED FOR 60% DESIGN | JN | MB | MB | |
| | | 0C | 30-AUG-2024 | ISSUED FOR 90% REVIEW | | RPJ | | |
| | | 0D | 15-NOV-2024 | ISSUED FOR CONSTRUCTION | AC | MB | MB | PB |

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ALBERTA
ID: 90867
November 25 2024

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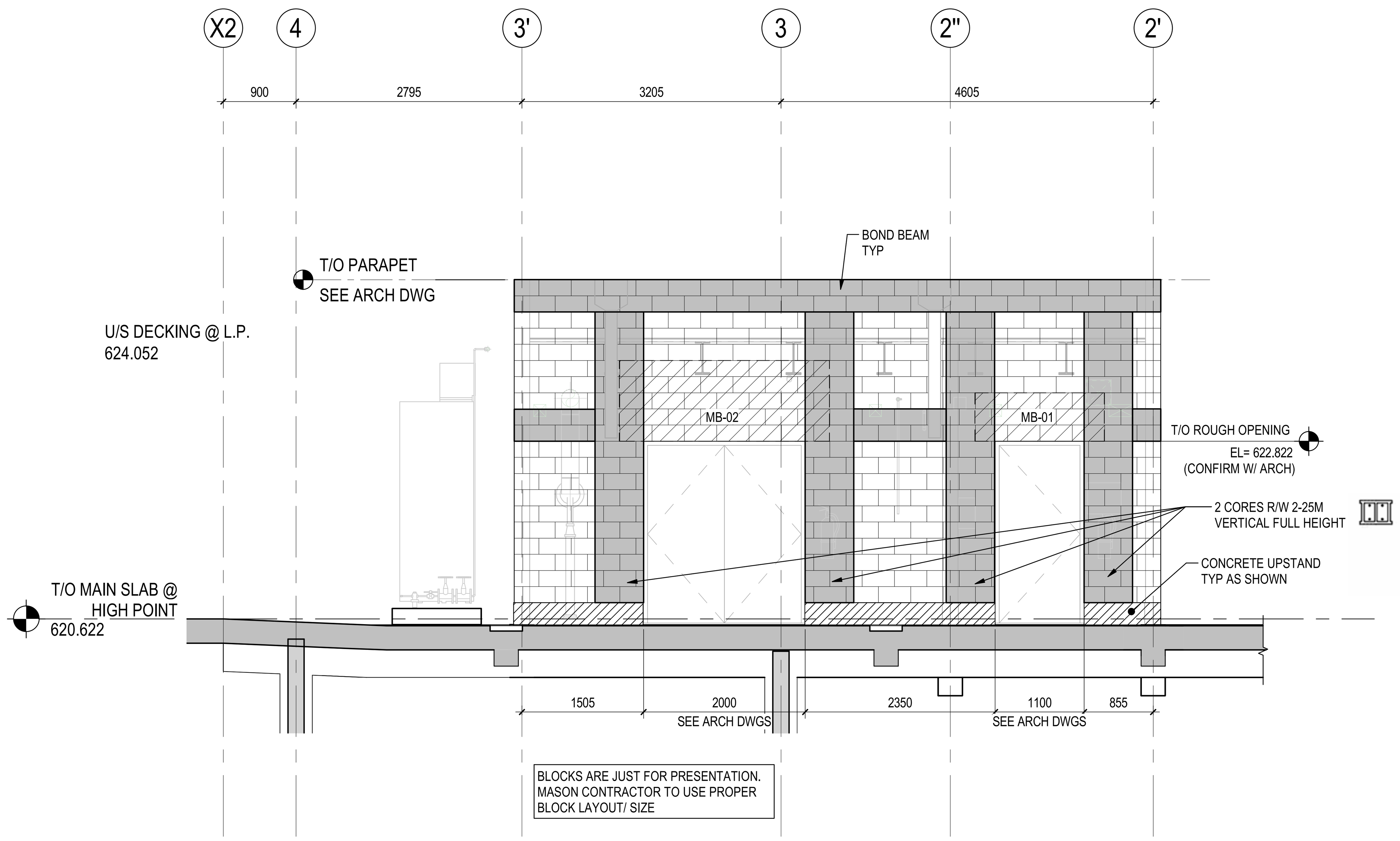
EPCOR

PLANT SITE: GOLD BAR WWTP
PLANT AREA: PRIMARY CLARIFIER #2
PROJECT NAME: GBWWTP FLARE CAPACITY EXPANSION
DRAWING TITLE:
# STRUCTURAL ROOF SNOW LOAD, RAIN PONDING & WIND LIFT

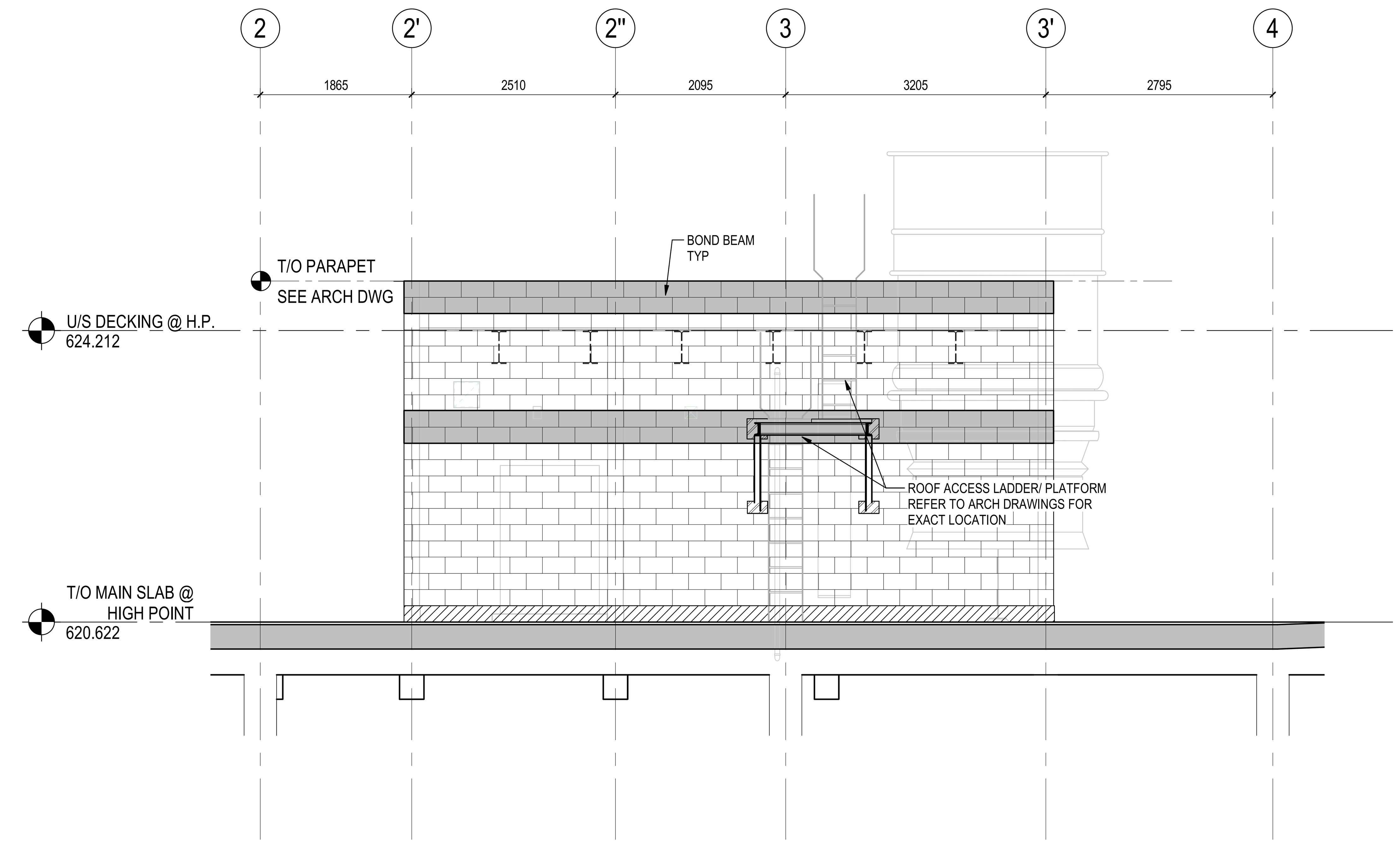
| CONSULTANT JOB No. | EPCOR PROJECT No. | SCALE | SHEET | DRAWING NUMBER |
|---|---|---|---|---|
| 1101000105 | PMO 1004723; PF14-105 | 1 : 50 | 13 of 17 | PRJ-15-157-213 |

Project Files\01_WIP\06_structural\model_files\1101000105_mod_struct.rvt
11/25/2024 1:24:48 PM

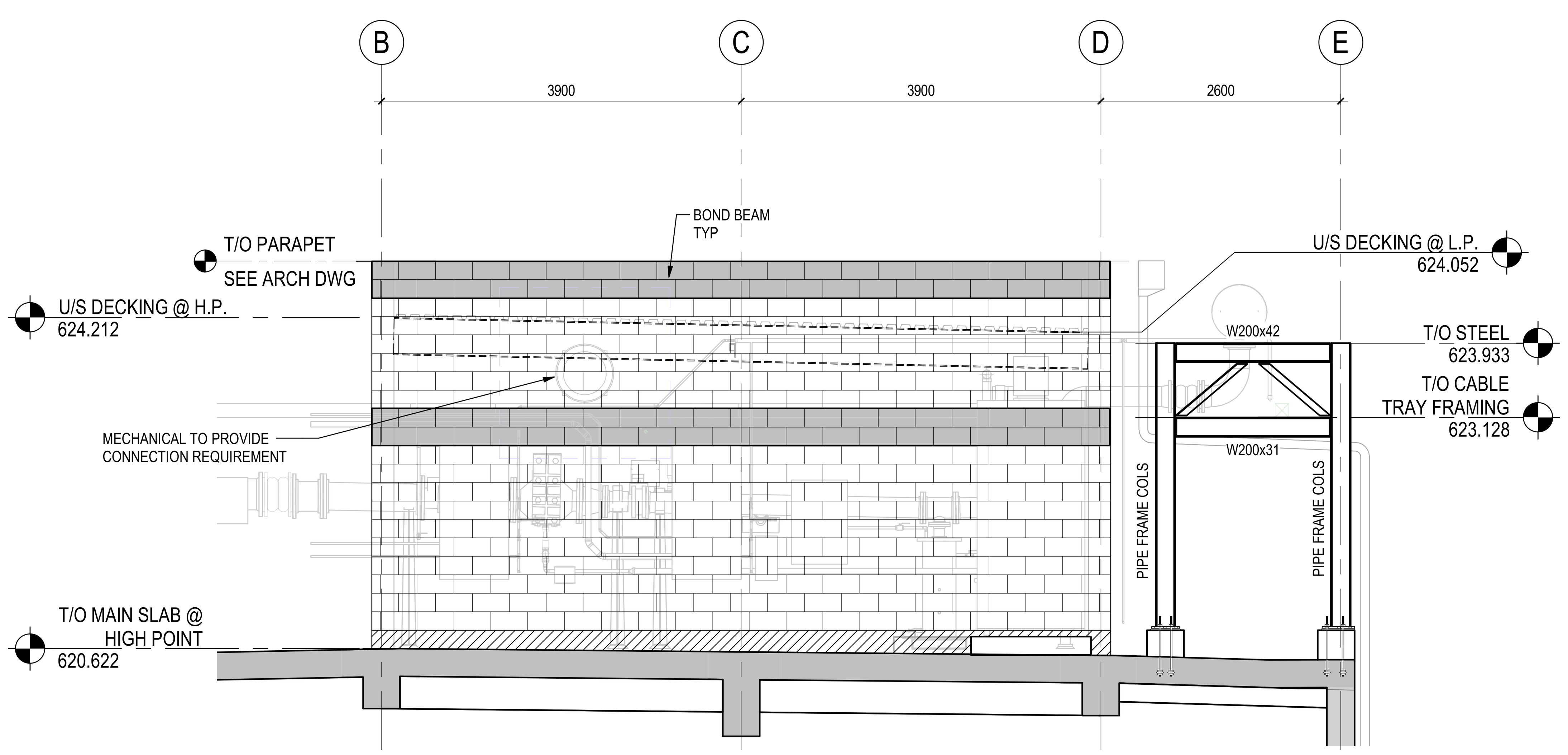



1 / 214 **NORTH ELEVATION**
1 : 50

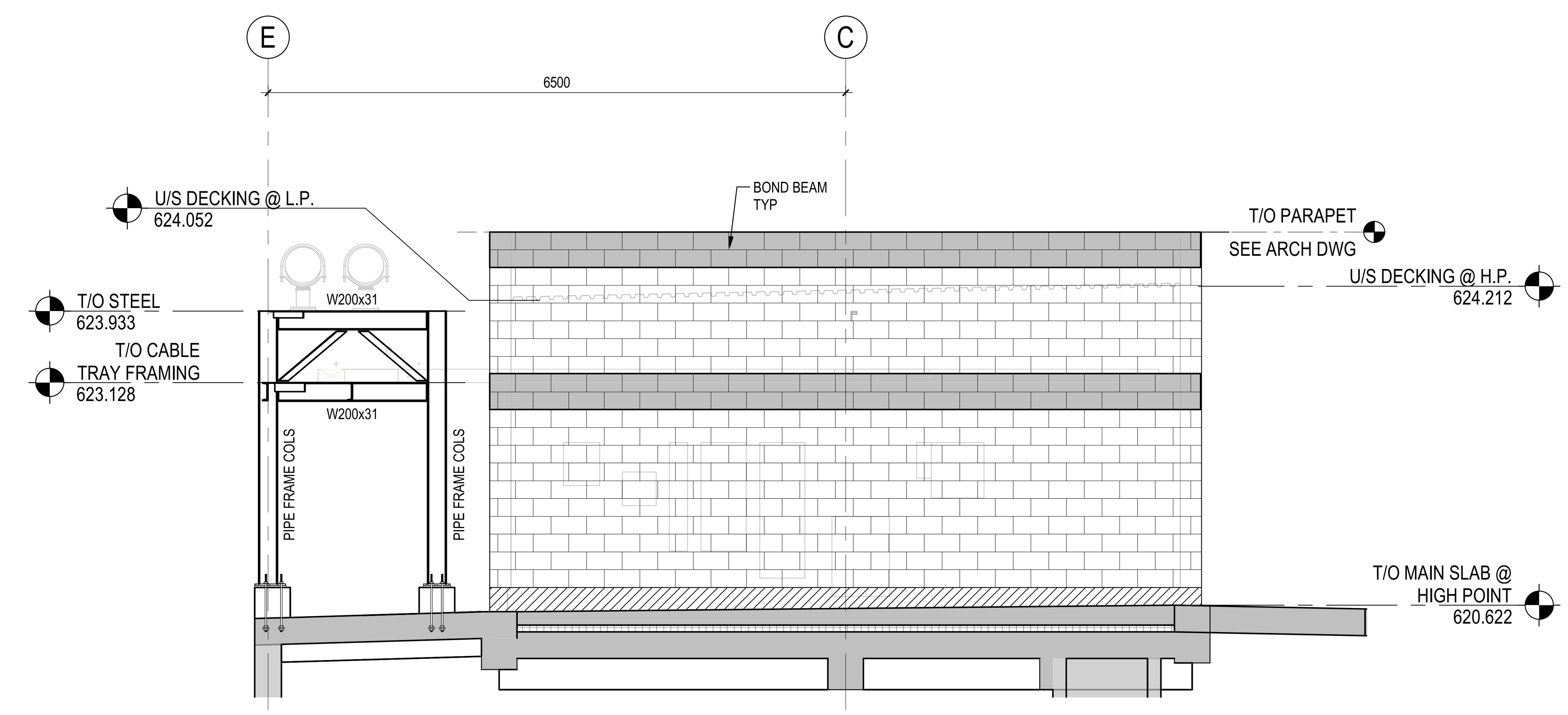
**NOTE:**
ELEVATIONS DO NOT SHOW ALL REQUIRED REINFORCEMENT.
REFER TO GENERAL NOTES, WALL SCHEDULES, & TYP DETAILS
FOR REINFORCEMENT NOT SHOWN HERE.




2 / 214 **SOUTH ELEVATION**
1 : 50




3 / 214 **EAST ELEVATION**
1 : 50




4 / 214 **WEST ELEVATION**
1 : 50

| REFERENCE DRAWING | | REVISION | | | | | | |
|---|---|---|---|---|---|---|---|---|
| DRAWING No. | DRAWING TITLE | Rev. | DATE | DESCRIPTION | BY | DES. | CHK. | ENG. |
| | | 0A | 06-JUL-2023 | ISSUED FOR PRELIMINARY DESIGN | JC | DD | PB | |
| | | 0B | 30-APR-2024 | ISSUED FOR 60% DESIGN | JN | MB | MB | PB |
| | | 0C | 30-AUG-2024 | ISSUED FOR 90% REVIEW | | RPJ | | |
| | | 0D | 15-NOV-2024 | ISSUED FOR CONSTRUCTION | AC | MB | MB | PB |

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ID: 90867
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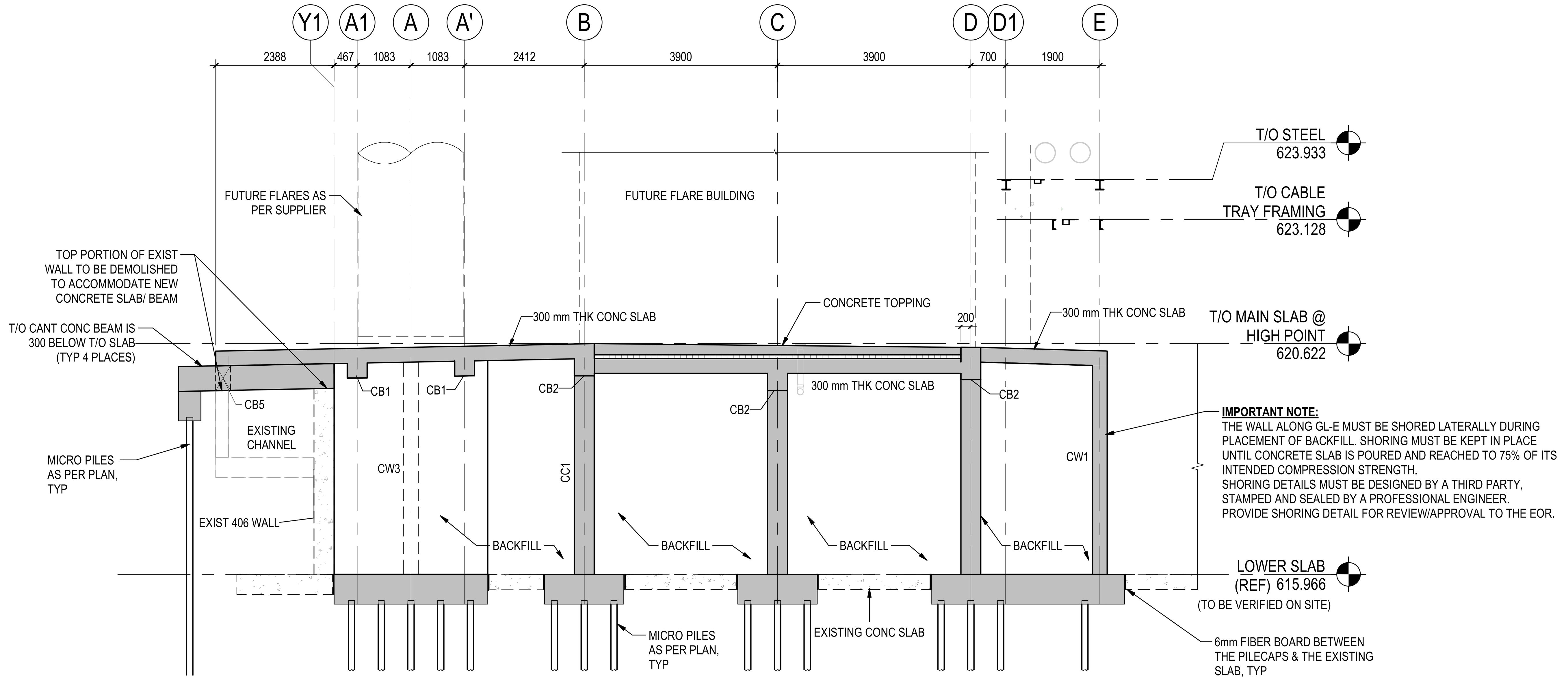
PLANT AREA: PRIMARY CLARIFIER #2
PROJECT NAME: GBWWTP FLARE CAPACITY EXPANSION
DRAWING TITLE:

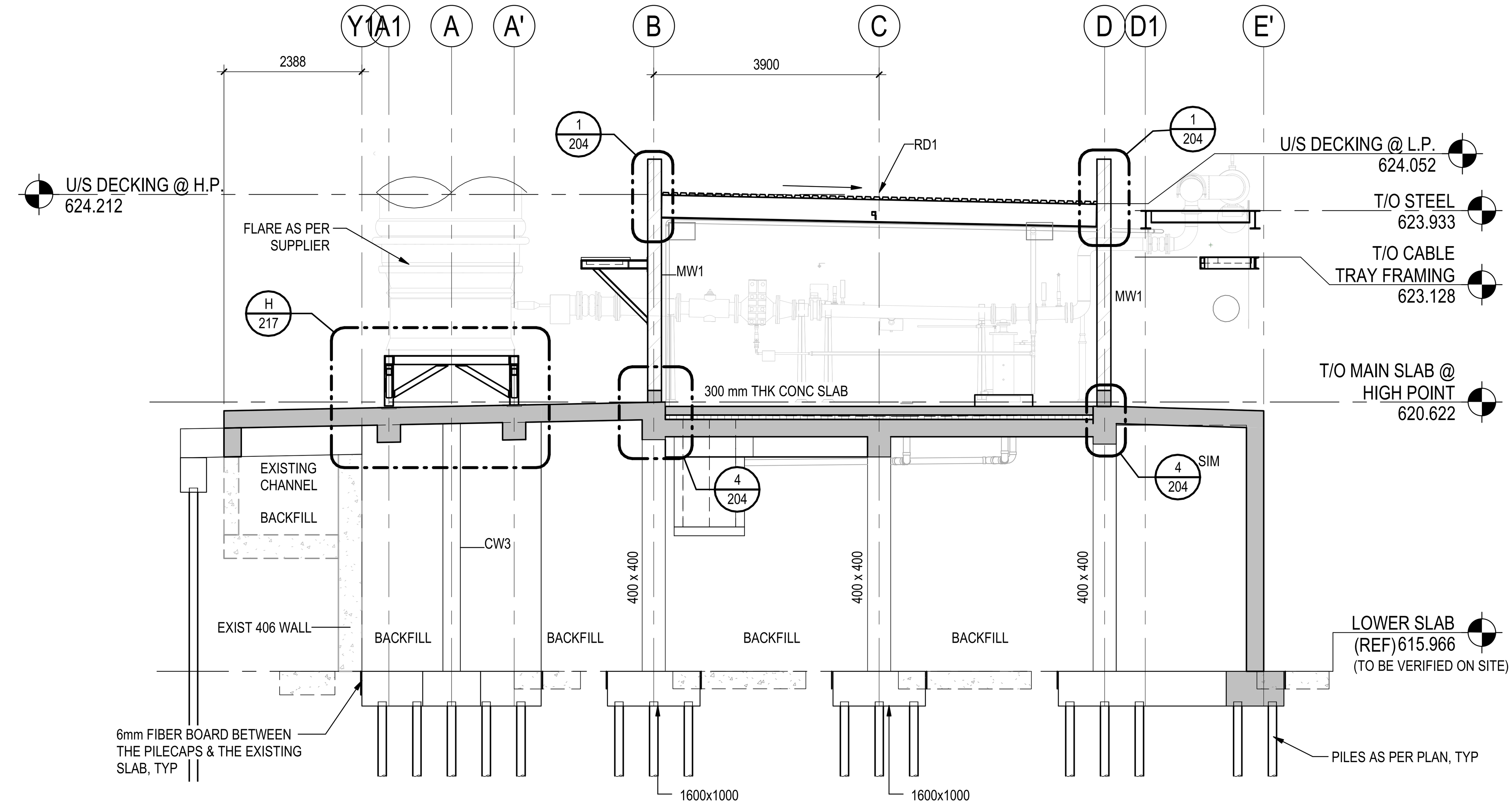
**STRUCTURAL
BUILDING ELEVATIONS**

| CONSULTANT JOB No. | EPCOR PROJECT No. | SCALE | SHEET | DRAWING NUMBER |
|---|---|---|---|---|
| 1101000105 | PMO 1004723; PF14-105 | As indicated | 14 of 17 | PRJ-15-157-214 |

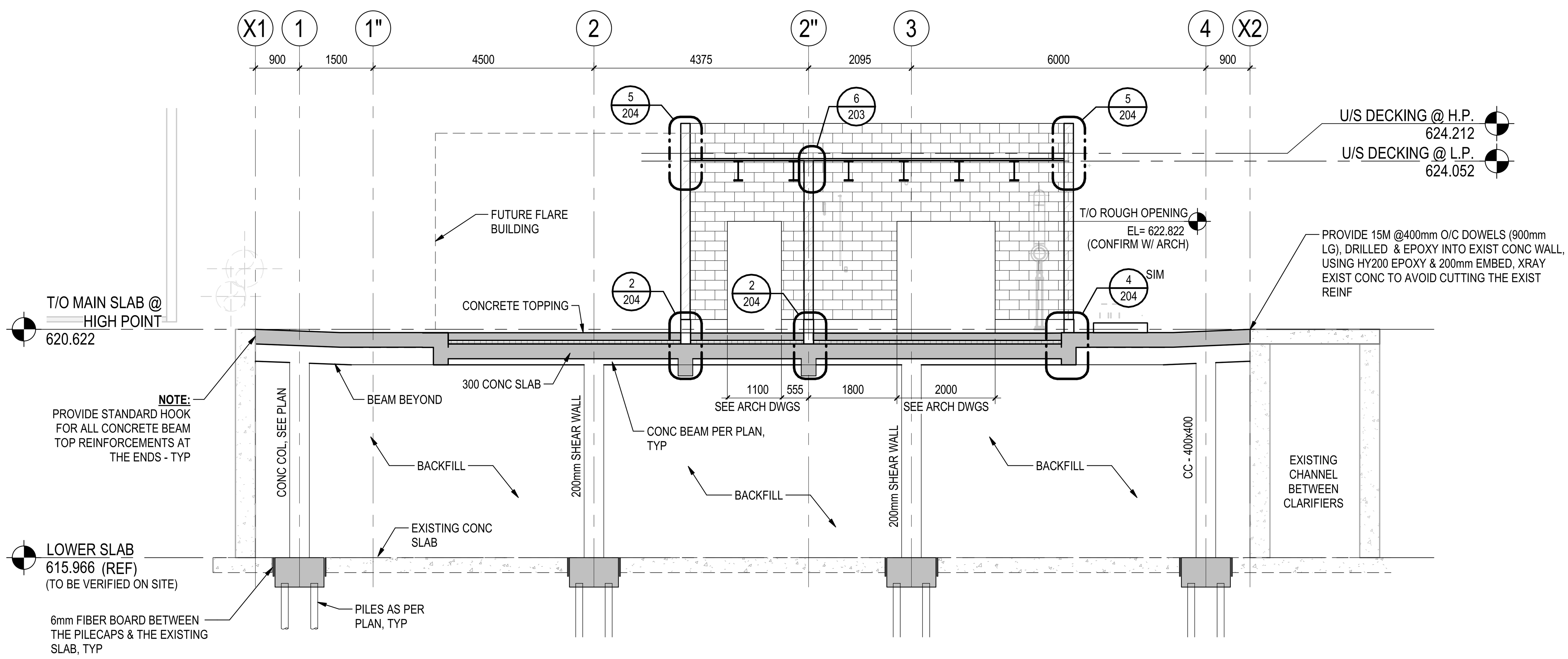
Project Files\01_WIP\06_structural\model_files\1101000105_mod_struct.rvt
11/25/2024 1:24:54 PM




A 215 **SECTION**
1 : 75




B 215 **SECTION**
1 : 75




C 215 **SECTION**
1 : 75

**NOTES:**
1. REFER TO CIVIL DRAWINGS FOR BACKFILL DETAILS & MATERIAL.
2. ALL CONCRETE COLUMNS & WALLS MUST BE PROTECTED DURING BACKFILLING PROCESS TO AVOID DISTRESS AND FORCES IN LATERAL DIRECTION.
3. A FULL TIME GEOTECHNICAL ENGINEER MUST OBSERVE THE BACKFILL & SIGN OFF APPROVAL.

| REFERENCE DRAWING | | REVISION | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| DRAWING No. | DRAWING TITLE | Rev. | DATE | DESCRIPTION | BY | DES. | CHK. | ENG. |
| | | 0A | 06-JUL-2023 | ISSUED FOR PRELIMINARY DESIGN | JC | DD | PB | |
| | | 0B | 30-APR-2024 | ISSUED FOR 60% DESIGN | JN | MB | MB | PB |
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ALBERTA
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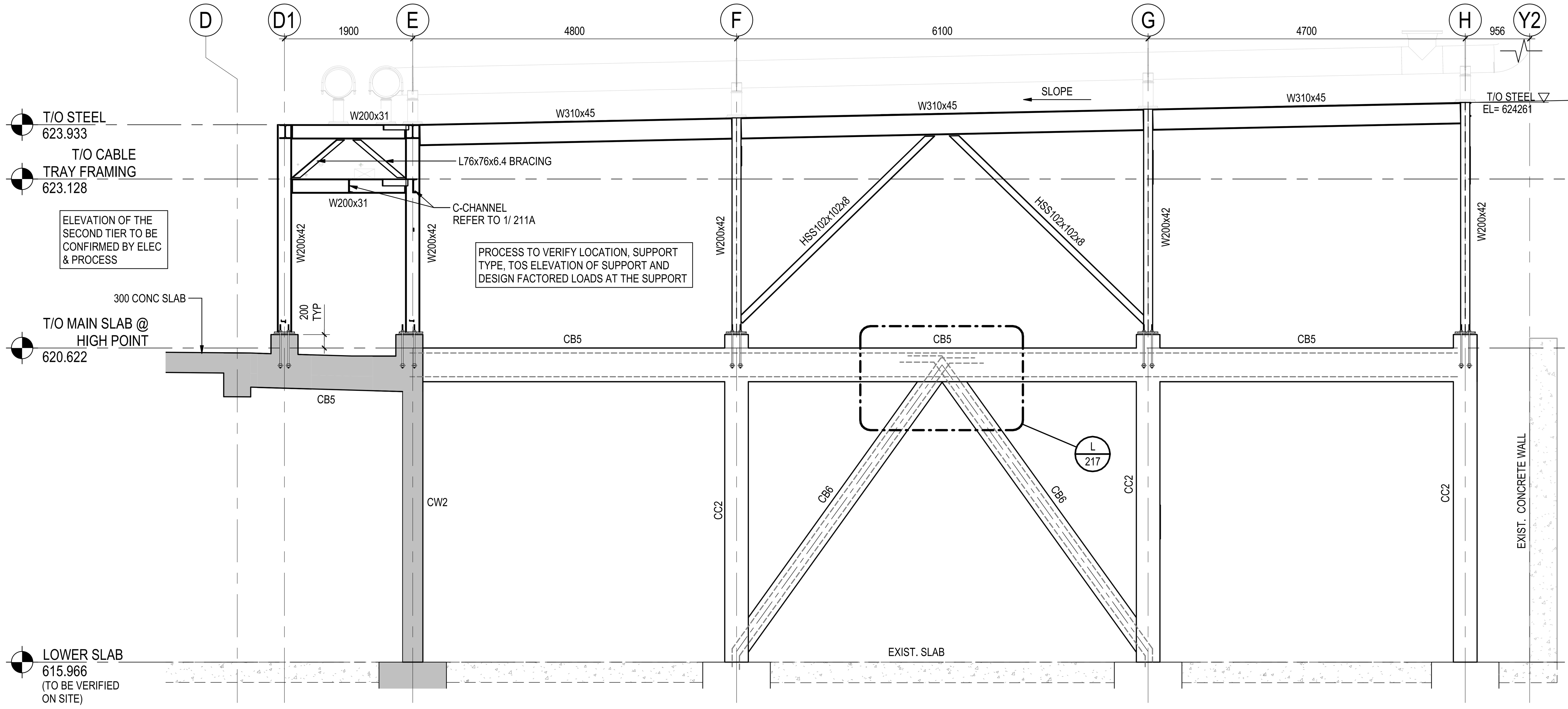
PLANT AREA: PRIMARY CLARIFIER #2
PROJECT NAME: GBWWTP FLARE CAPACITY EXPANSION
DRAWING TITLE:

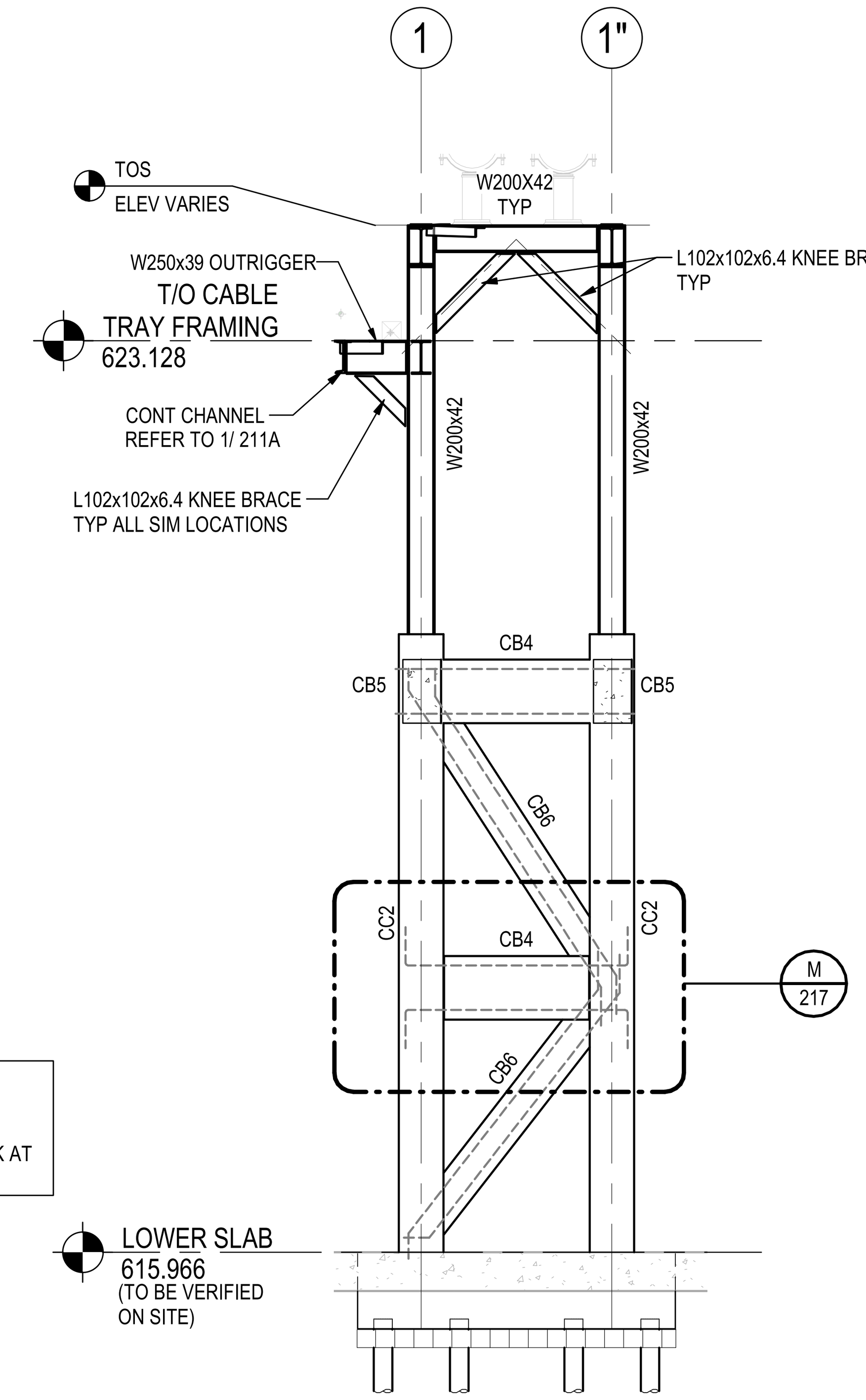
STRUCTURAL
BUILDING SECTIONS AND DETAILS

| CONSULTANT JOB No. | EPCOR PROJECT No. | SCALE | SHEET | DRAWING NUMBER |
|---|---|---|---|---|
| 1101000105 | PMO 1004723; PF14-105 | 1 : 75 | 15 of 17 | PRJ-15-157-215 |

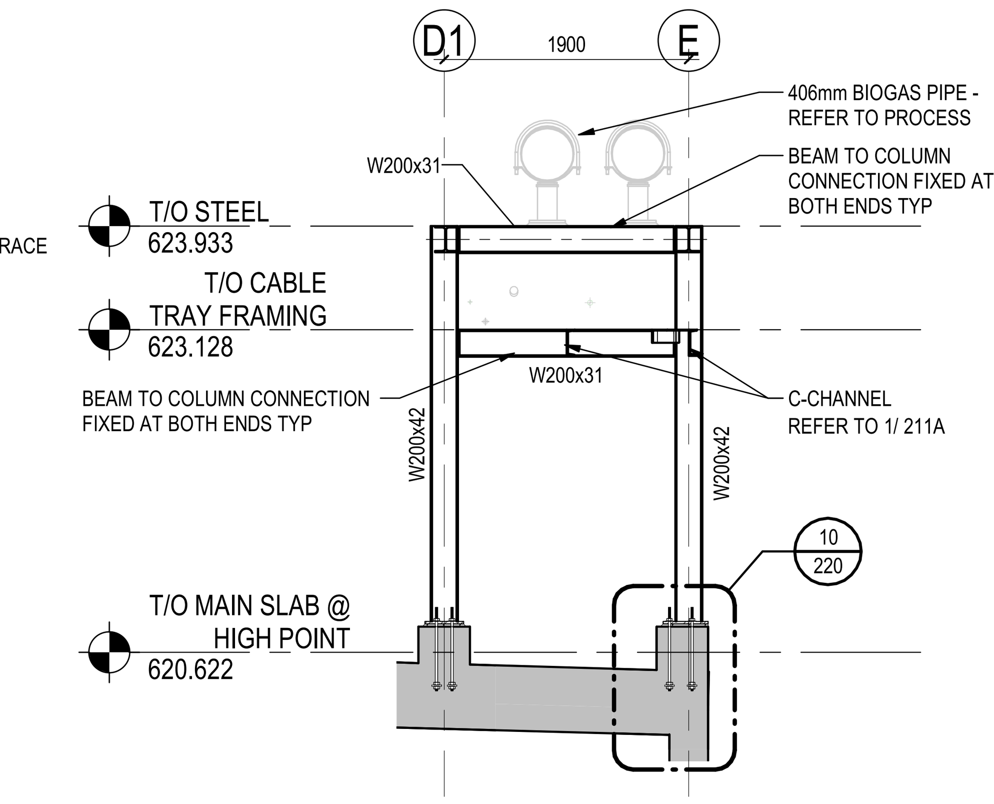
Project Files\01_WIP\06_structural\model_files\1101000105_mod_struct.rvt
11/25/2024 1:24:57 PM



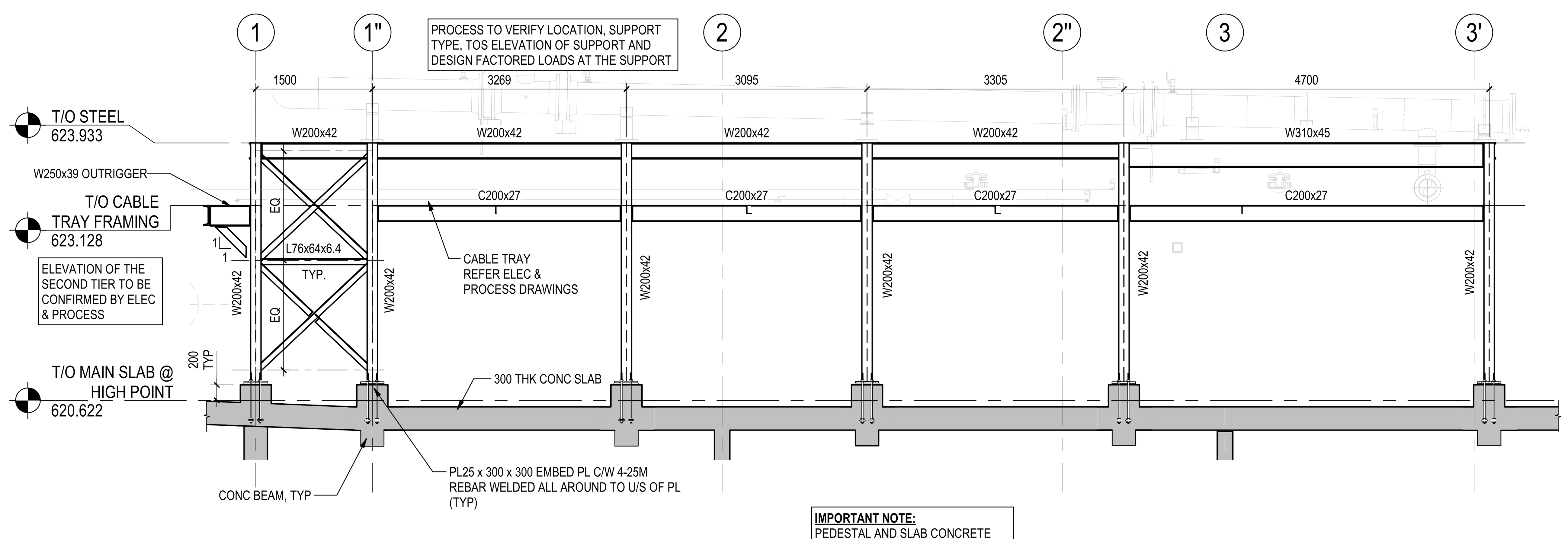

**D 216 SECTION - PIPE RACK 1**
1 : 50



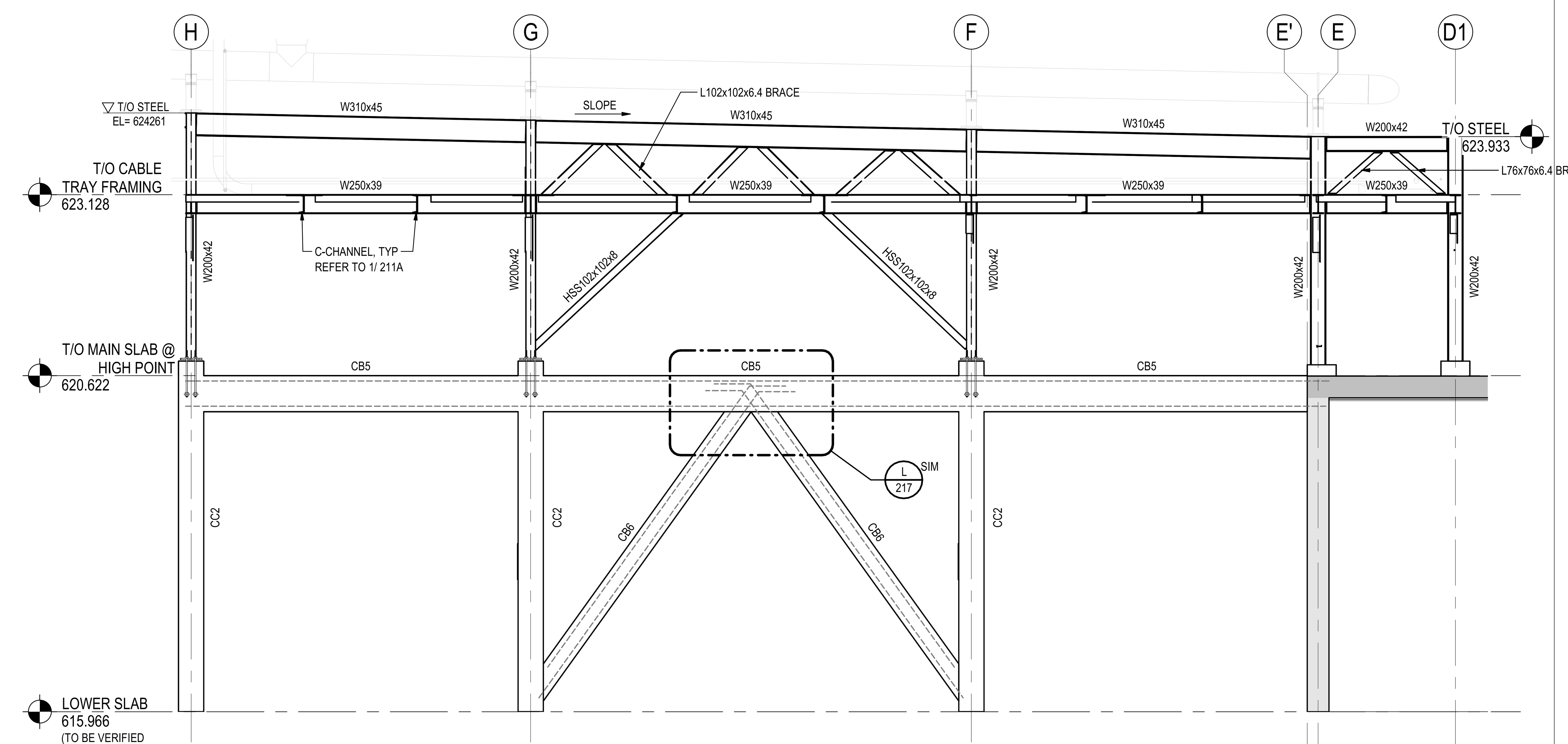

**F 216 SECTION**
1 : 50




**G 216 SECTION**
1 : 50




**E 216 SECTION - PIPE RACK 2**
1 : 50




**1 216 ELEVATION**
1 : 50

| REFERENCE DRAWING | |
|---|---|
| DRAWING No. | DRAWING TITLE |

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| Rev. | DATE | DESCRIPTION | BY | DES. | CHK. | ENG. |
|---|---|---|---|---|---|---|
| 0A | 06-JUL-2023 | ISSUED FOR PRELIMINARY DESIGN | JC | DD | PB | |
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ID: 90867
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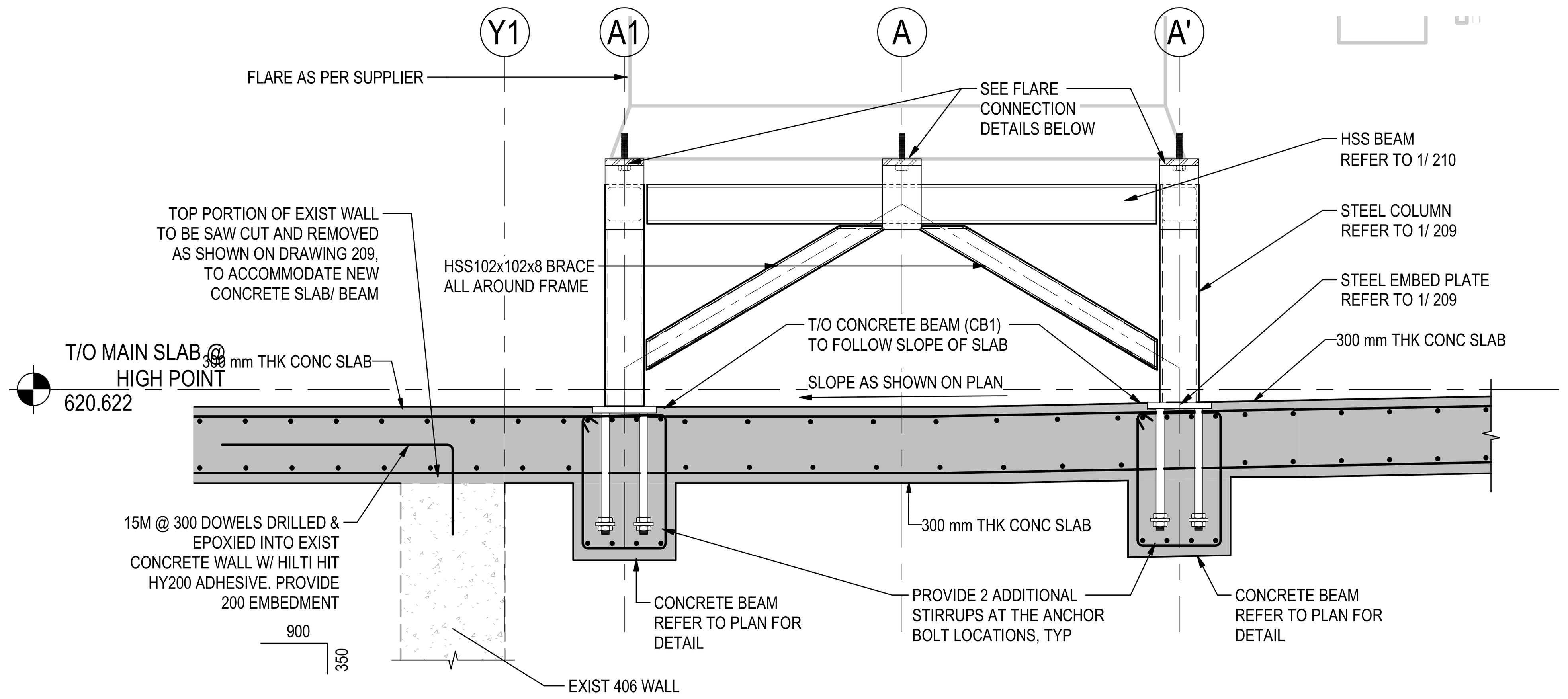
PROJECT NAME: GBWWTP FLARE CAPACITY EXPANSION
DRAWING TITLE:

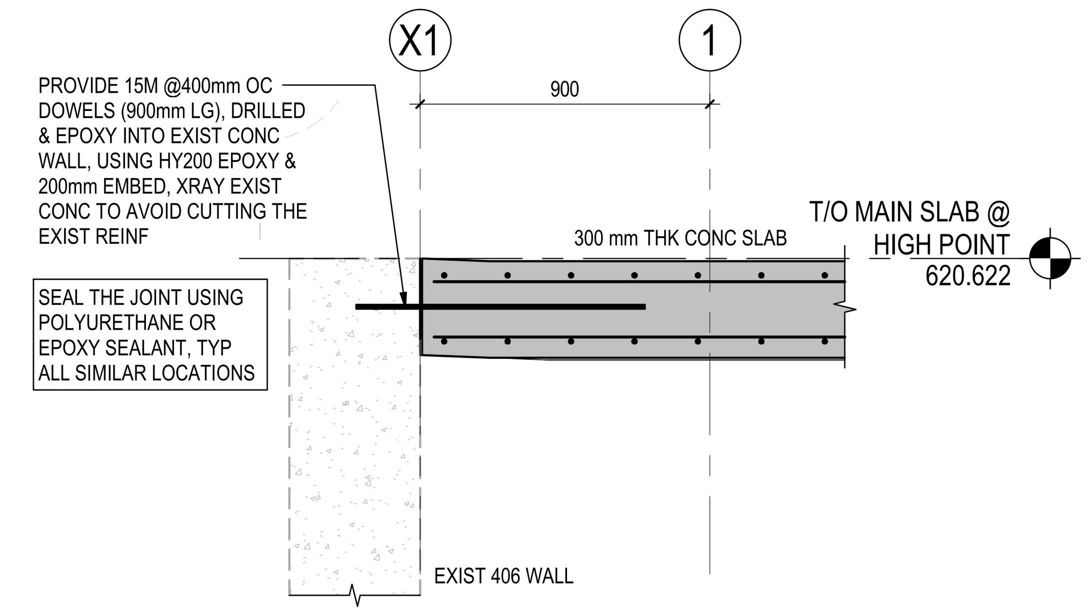
# STRUCTURAL VAPOUR HEADER SECTIONS AND DETAILS

| CONSULTANT JOB No. | EPCOR PROJECT No. | SCALE | SHEET | DRAWING NUMBER |
|---|---|---|---|---|
| 1101000105 | PMO 1004723; PF14-105 | 1 : 50 | 16 of 17 | PRJ-15-157-216 |

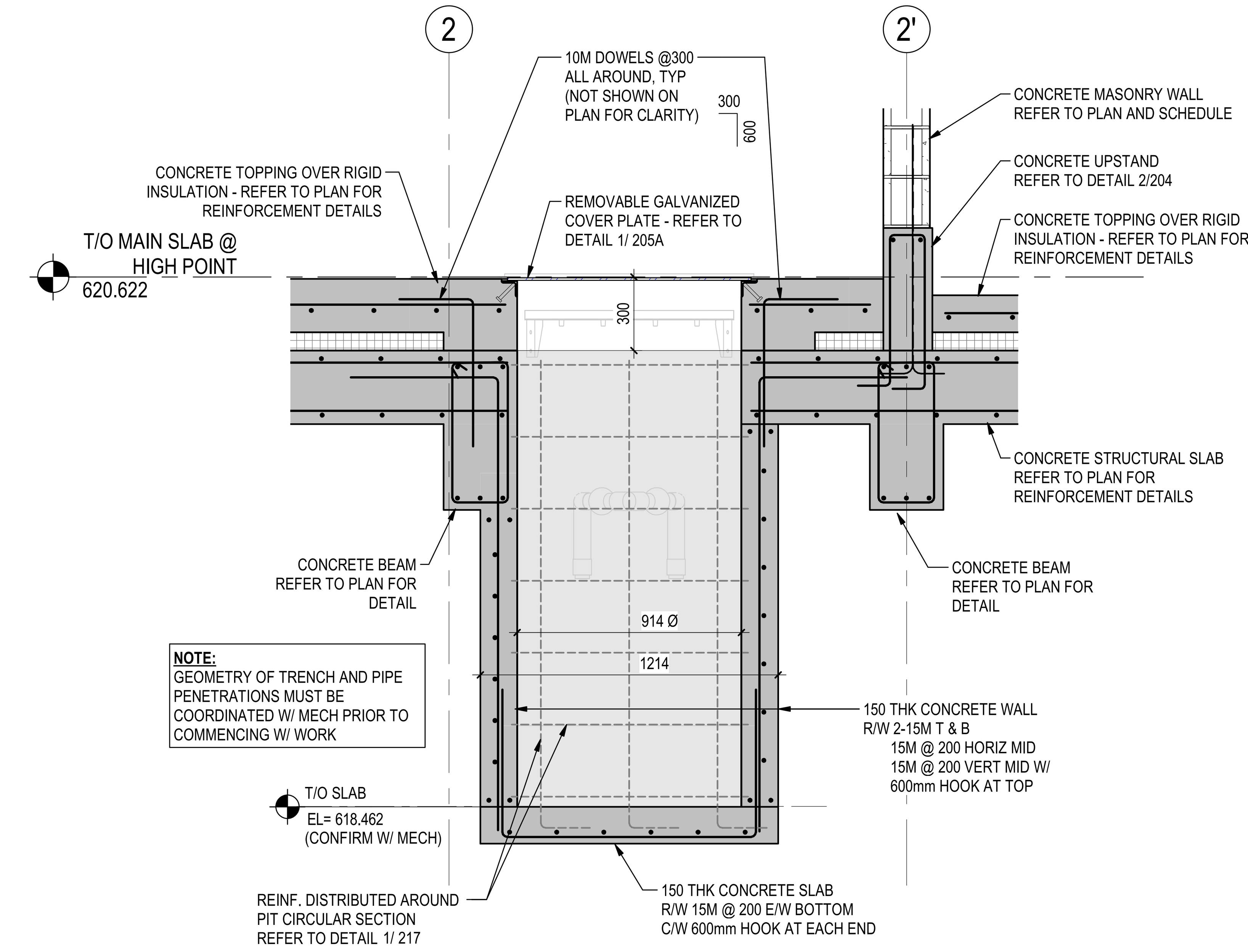
Project Files\01_WIP\06_structural\model_files\1101000105_mod_structr.rvt
11/25/2024 1:24:59 PM



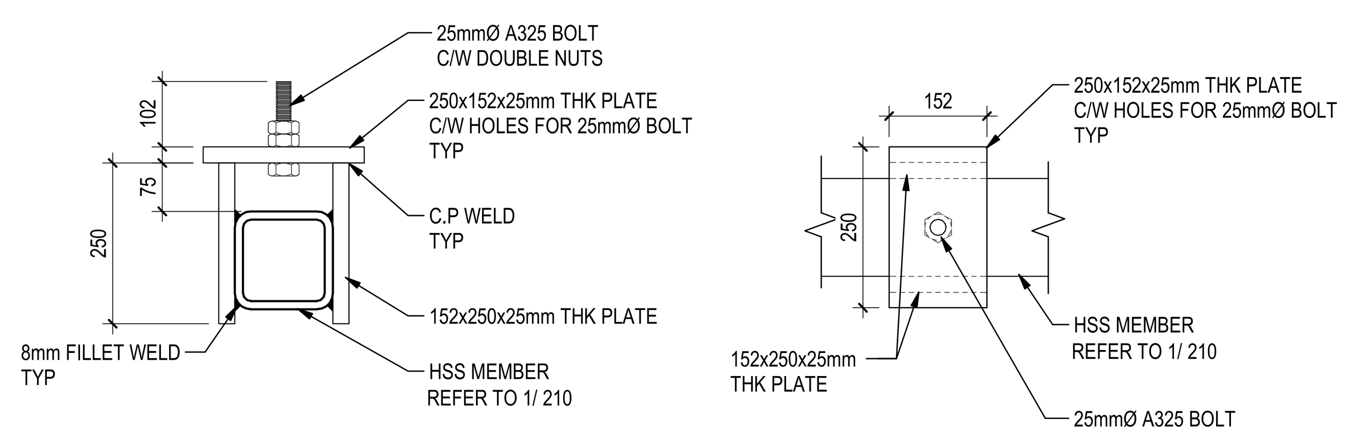

H / 217 **SECTION**
1 : 20




J / 217 **SECTION**
1 : 20



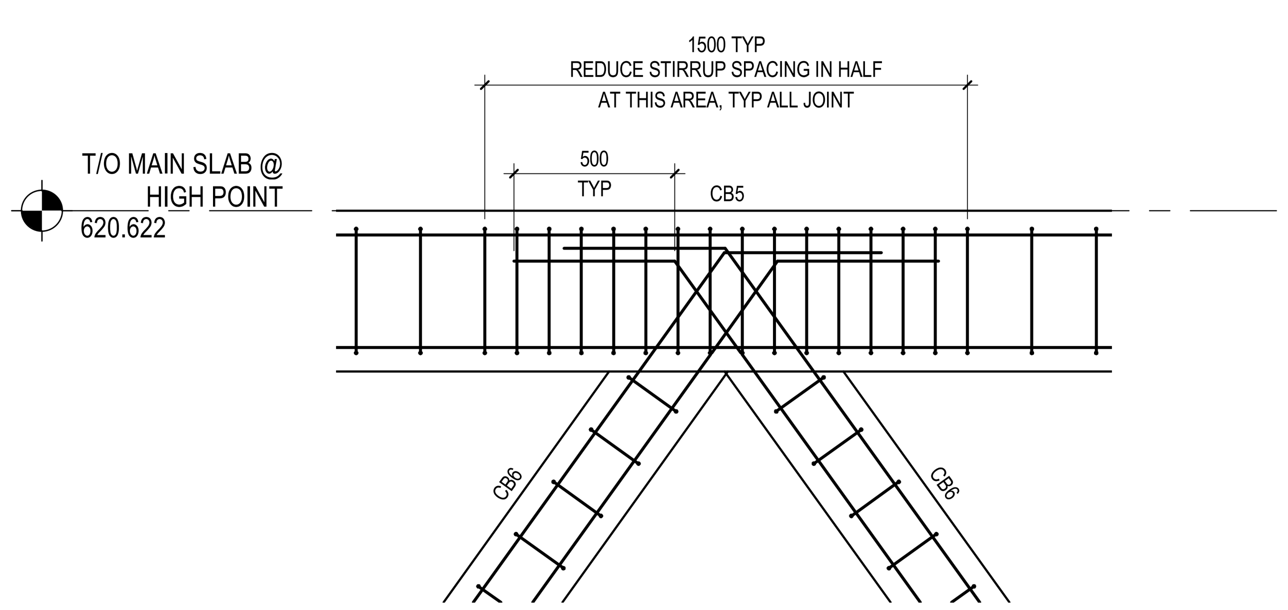

K / 217 **SECTION**
1 : 20



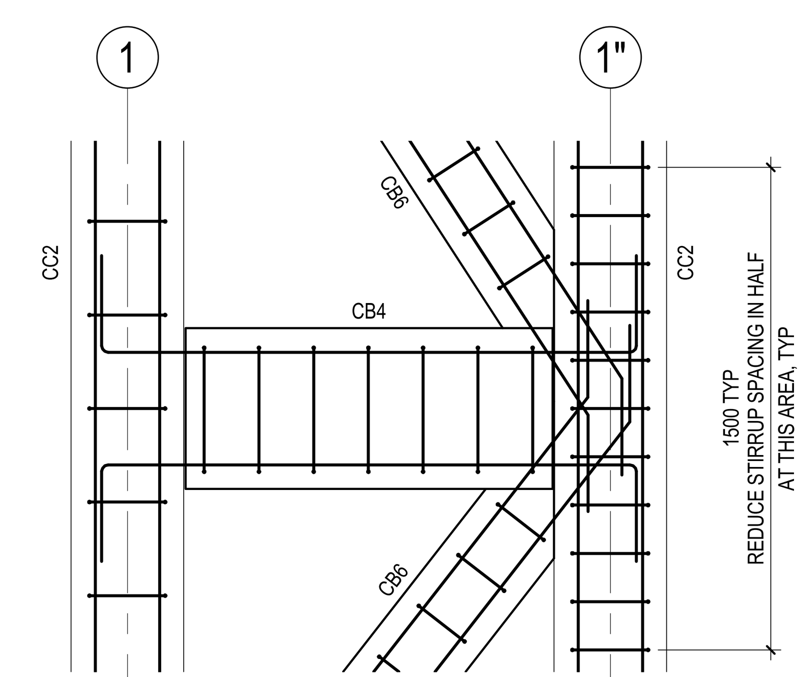

SECTION

PLAN DETAIL

3 / 217 **FLARE CONNECTION DETAILS**
1 : 10

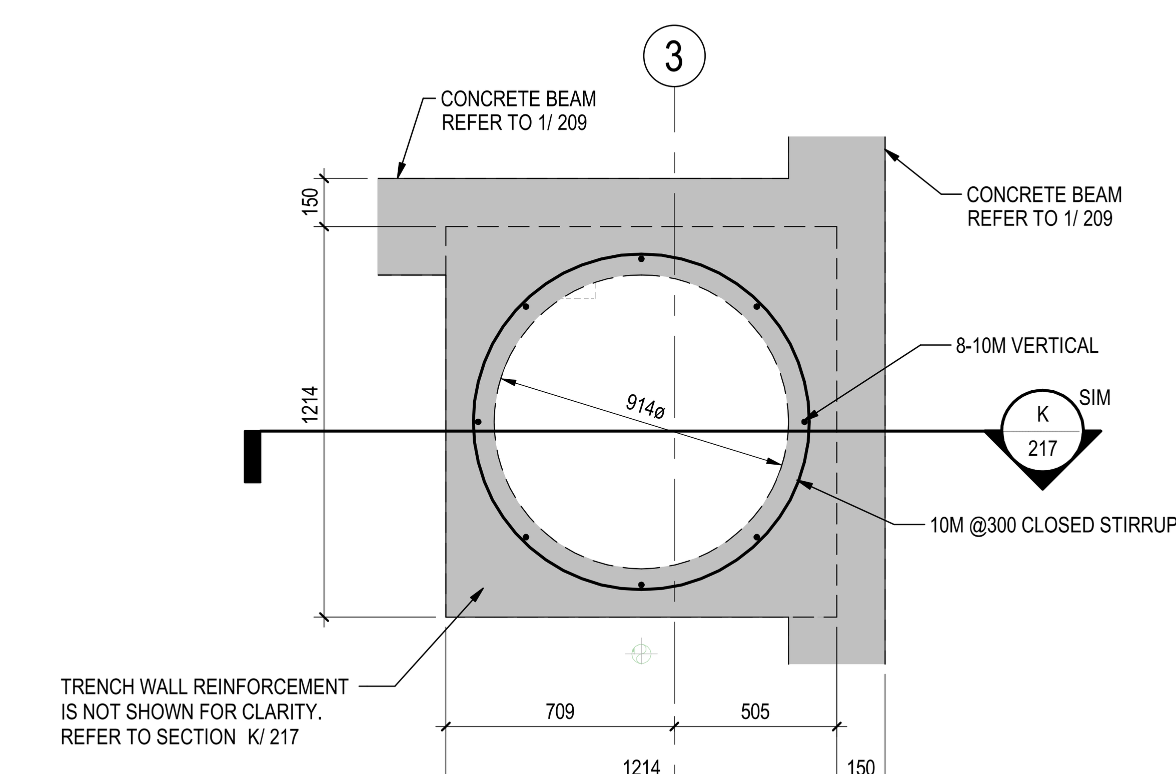



L / 217 **SECTION**
1 : 20




**NOTE:**
UNO, ALL BEAM TOP AND BOTTOM REINFORCMENT TO BE EXTENDED INTO CONCRETE COLUMN WITH STANDARD HOOK AT BOTH ENDS, TYP

M / 217 **SECTION**
1 : 20




1 / 217 **SUMP PIT DETAIL**
1 : 20

| REFERENCE DRAWING | | REVISION | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| DRAWING No. | DRAWING TITLE | Rev. | DATE | DESCRIPTION | BY | DES. | CHK. | ENG. |
| | | 0A | 06-JUL-2023 | ISSUED FOR PRELIMINARY DESIGN | JC | DD | PB | |
| | | 0B | 30-APR-2024 | ISSUED FOR 60% DESIGN | JN | MB | MB | PB |
| | | 0C | 30-AUG-2024 | ISSUED FOR 90% REVIEW | | RPJ | | |
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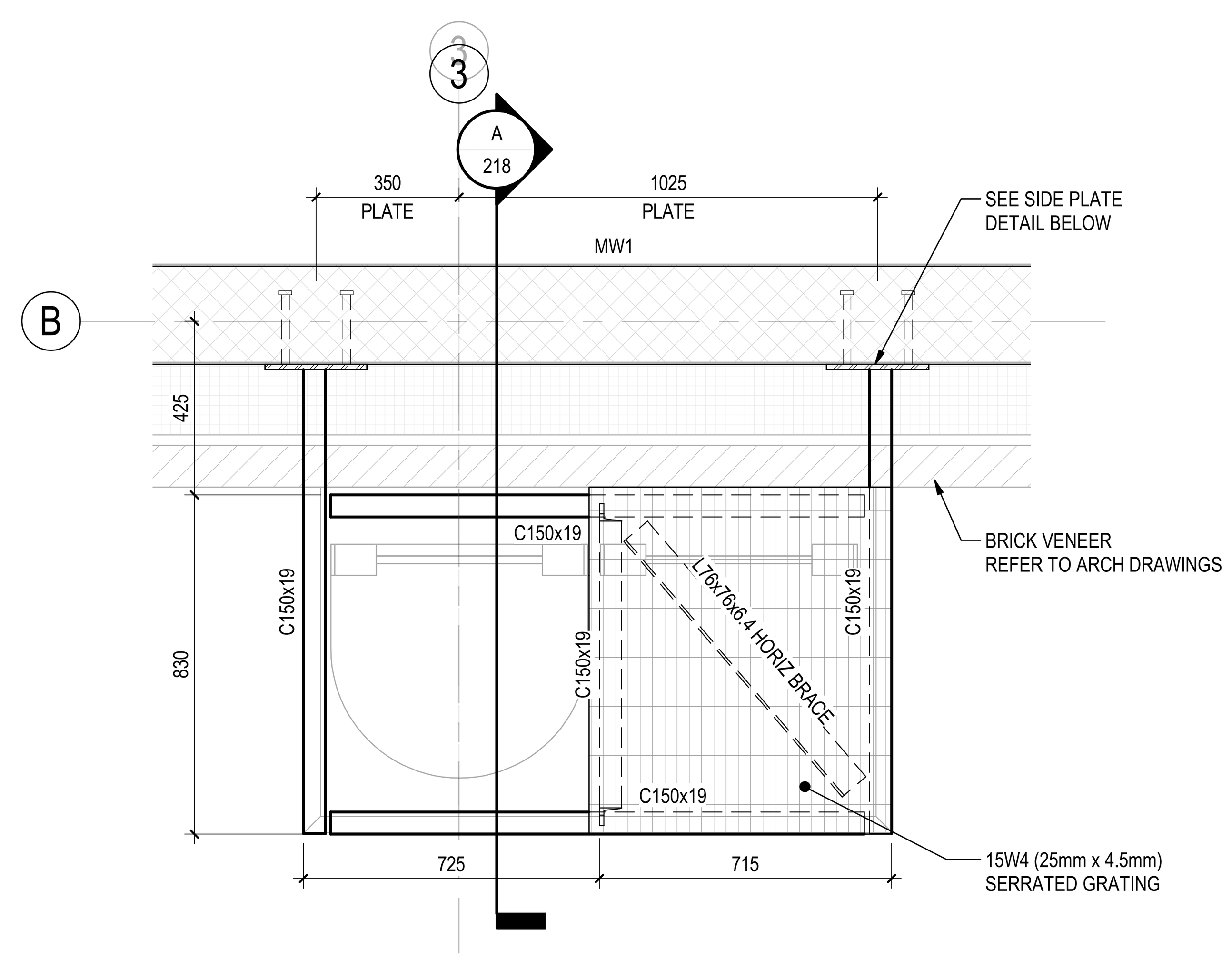
PROJECT NAME: GBWWTP FLARE CAPACITY EXPANSION
DRAWING TITLE:

STRUCTURAL
BUILDING SECTIONS AND DETAILS

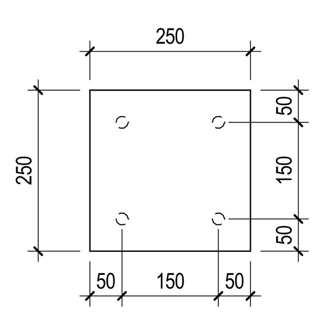
| CONSULTANT JOB No. | EPCOR PROJECT No. | SCALE | SHEET | DRAWING NUMBER |
|---|---|---|---|---|
| 1101000105 | PMO 1004723; PF14-105 | As indicated | 15 of 17 | PRJ-15-157-217 |

Project Files\01_WIP\06_structural\model_files\1101000105_mod_struct.rvt
11/25/2024 1:25:03 PM



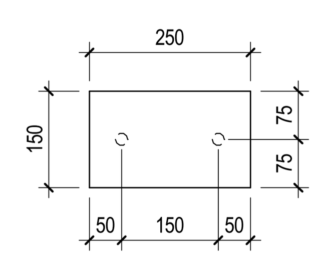

**NOTE:**
ALL STEEL MUST BE GALVANIZED

## 1 / 218 ROOF ACCESS LADDER PLATFORM FRAMING
1 : 15



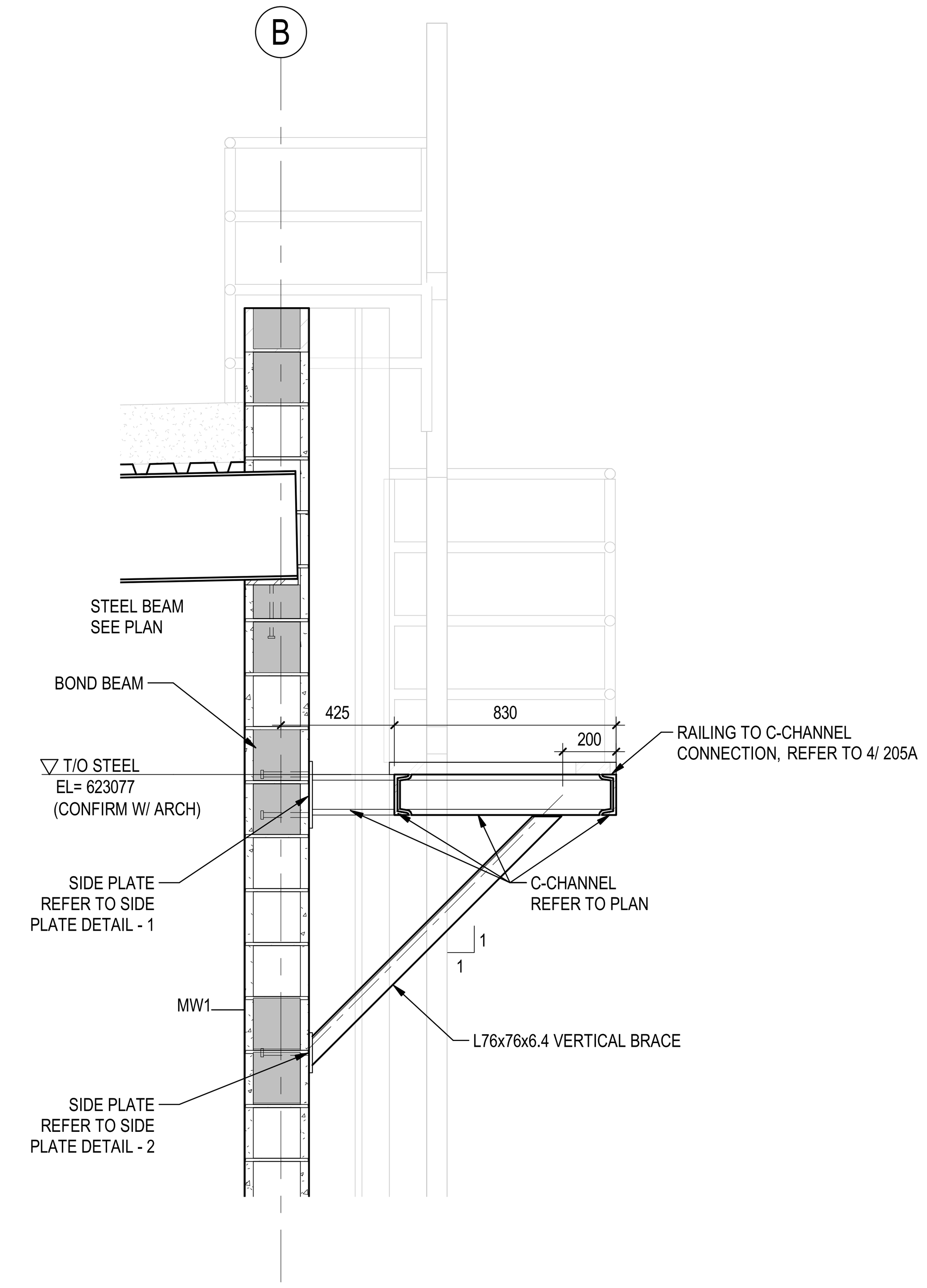

250x250x12.5mm THK SIDE PLATE
C/W 4-19mmØ x180mm LG
NELSON STUDS

## SIDE PLATE DETAIL - 1
1 : 10




250x150x12.5mm THK SIDE PLATE
C/W 2-19mmØ x180mm LG
NELSON STUDS

## SIDE PLATE DETAIL - 2
1 : 10




## A / 218 LADDER PLATFORM SECTION
1 : 20

| REFERENCE DRAWING | | REVISION | | | | | | |
|---|---|---|---|---|---|---|---|---|
| DRAWING No. | DRAWING TITLE | Rev. | DATE | DESCRIPTION | BY | DES. | CHK. | ENG. |
| | | 0A | 06-JUL-2023 | ISSUED FOR PRELIMINARY DESIGN | JC | DD | PB | |
| | | 0B | 30-APR-2024 | ISSUED FOR 60% DESIGN | JN | MB | MB | PB |
| | | 0C | 30-AUG-2024 | ISSUED FOR 90% REVIEW | | RPJ | | |
| | | 0D | 15-NOV-2024 | ISSUED FOR CONSTRUCTION | AC | MB | MB | PB |

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PLANT AREA: PRIMARY CLARIFIER #2
PROJECT NAME: GBWWTP FLARE CAPACITY EXPANSION
DRAWING TITLE: STRUCTURAL ROOF LADDER PLATFORM PLAN AND DETAILS

| CONSULTANT JOB No. | EPCOR PROJECT No. | SCALE | SHEET | DRAWING NUMBER |
|---|---|---|---|---|
| 1101000105 | PMO 1004723; PF14-105 | As indicated | 13 of 17 | PRJ-15-157-218 |

## CONCRETE PILE CAP SCHEDULE

| TYPE | SIZE (L x W) | DEPTH (mm) | COMMENTS |
|---|---|---|---|
| PC1 | 2500 x1000 | 600 | |
| PC2 | 1600x1000 | 600 | |
| PC3 | 1000x1000 | 600 | |

PC, DENOTES PILE CAP

## STEEL COLUMN SCHEDULE

| TYPE | SIZE |
|---|---|
| SC1 | W200x42 |
| SC2 | HSS152x152x11 |

## CONCRETE COLUMN SCHEDULE

| MARK | SIZE (LxW) | REINFORCEMENT VERTICALS | REINFORCEMENT TIES |
|---|---|---|---|
| CC1 | 400 x 400 | 8-20M | 10M @ 300 O/C CLOSED TIES (PAIR) |
| CC2 | 350 X 350 | 8-15M | 10M @ 300 O/C CLOSED TIES (PAIR) |

CC, DENOTES CONCRETE COLUMN

## CONCRETE BEAM SCHEDULE

| TYPE | SIZE (WxD) | REINFORCEMENT TOP BAR | REINFORCEMENT BOTTOM BAR | REINFORCEMENT STIRRUPS |
|---|---|---|---|---|
| CB1 | 400 x 600 | 4 - 25M | 4 - 25M | 15M @ 200 O/C (CLOSED STIRRUPS) |
| CB2 | 400 x 650 | 4 - 25M | 4 - 25M | 10M @ 200 O/C (CLOSED STIRRUPS) |
| CB3 | 300 x 650 | 3 - 25M | 3 - 25M | 10M @ 300 O/C (CLOSED STIRRUPS) |
| CB4 | 350 x 500 | 3 - 20M | 3 - 20M | 10M @ 300 O/C (CLOSED STIRRUPS) |
| CB5 | 300 x 500 | 3 - 20M | 3 - 20M | 10M @ 200 O/C (CLOSED STIRRUPS) |
| CB6 | 200 x 300 | 2- 20M | 2 - 20M | 10M @ 200 O/C (CLOSED STIRRUPS) |

## CONCRETE WALL SCHEDULE

| TYPE MARK | WALL THICKNESS | VERTICAL | HORIZONTAL | COMMENTS |
|---|---|---|---|---|
| CW1 | 200 THK | 20M @ 150 O/C VERT EACH SIDE | 15M @ 200 O/C HORIZ EACH SIDE | HORIZ BARS ARE PLACED ON EXTERIOR FACE AND HOOKED TO THE ENDS |
| CW2 | 300 THK | 20M @ 150 O/C VERT EACH SIDE | 20M @ 300 O/C HORIZ | VERTICAL BARS TO BE PLACED ON EXTERIOR FACE OF THE WALL |
| CW3 | 300 THK | 20M @ 200 O/C VERT EACH SIDE | 15M @ 200 O/C HORIZ EACH SIDE | HORIZ BARS ARE PLACED ON EXTERIOR FACE AND HOOKED TO THE SIDES FULL DEPTH |

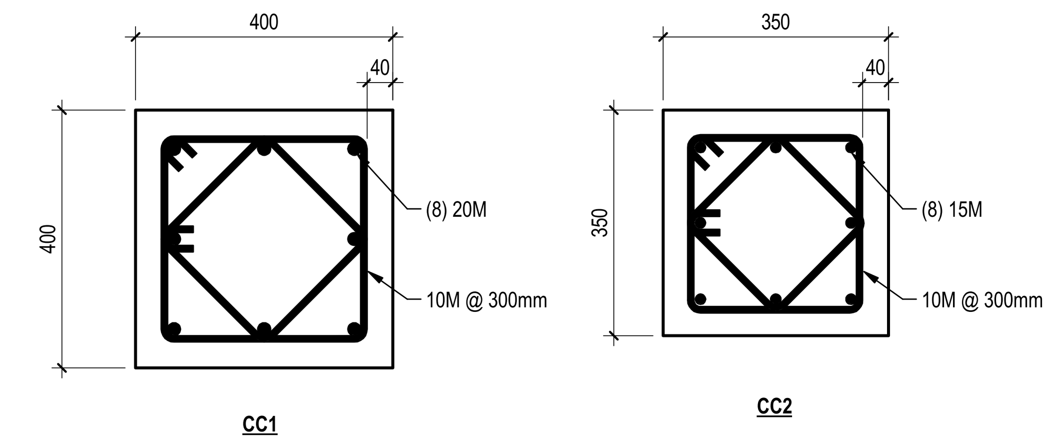
CW, DENOTES CONCRETE WALL

## MASONRY WALL SCHEDULE

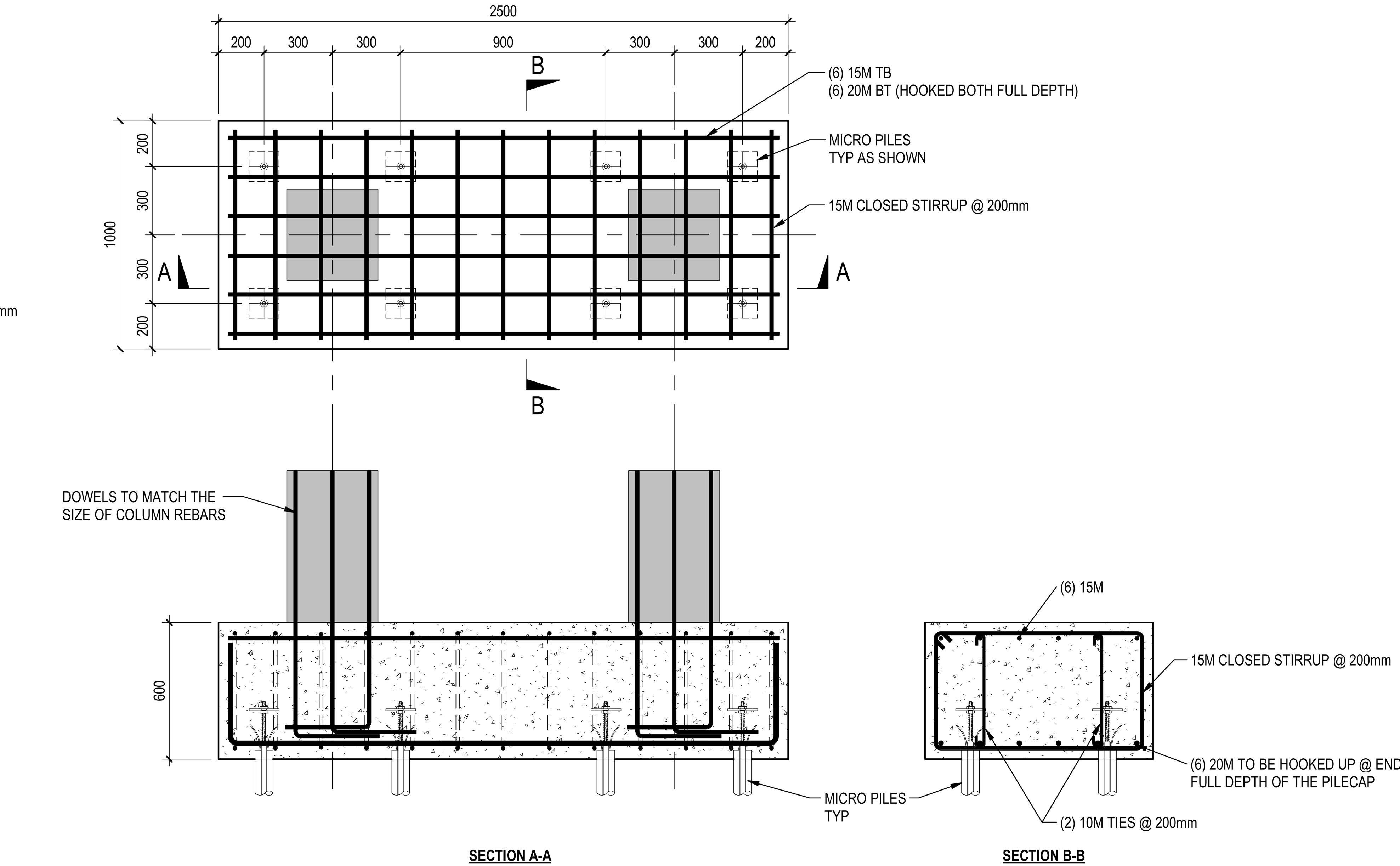
| MARK | WALL THICKNESS | REINFORCEMENT VERTICAL | REINFORCEMENT HORIZONTAL | COMMENT |
|---|---|---|---|---|
| MW1 | 240 | 15M @ 200mm | (2) 10M @ 400mm | FULLY GROUTED |
| MW2 | 190 | 15M @ 400mm | REFER TO NOTE 2 | |

MW, DENOTES MASONRY WALL

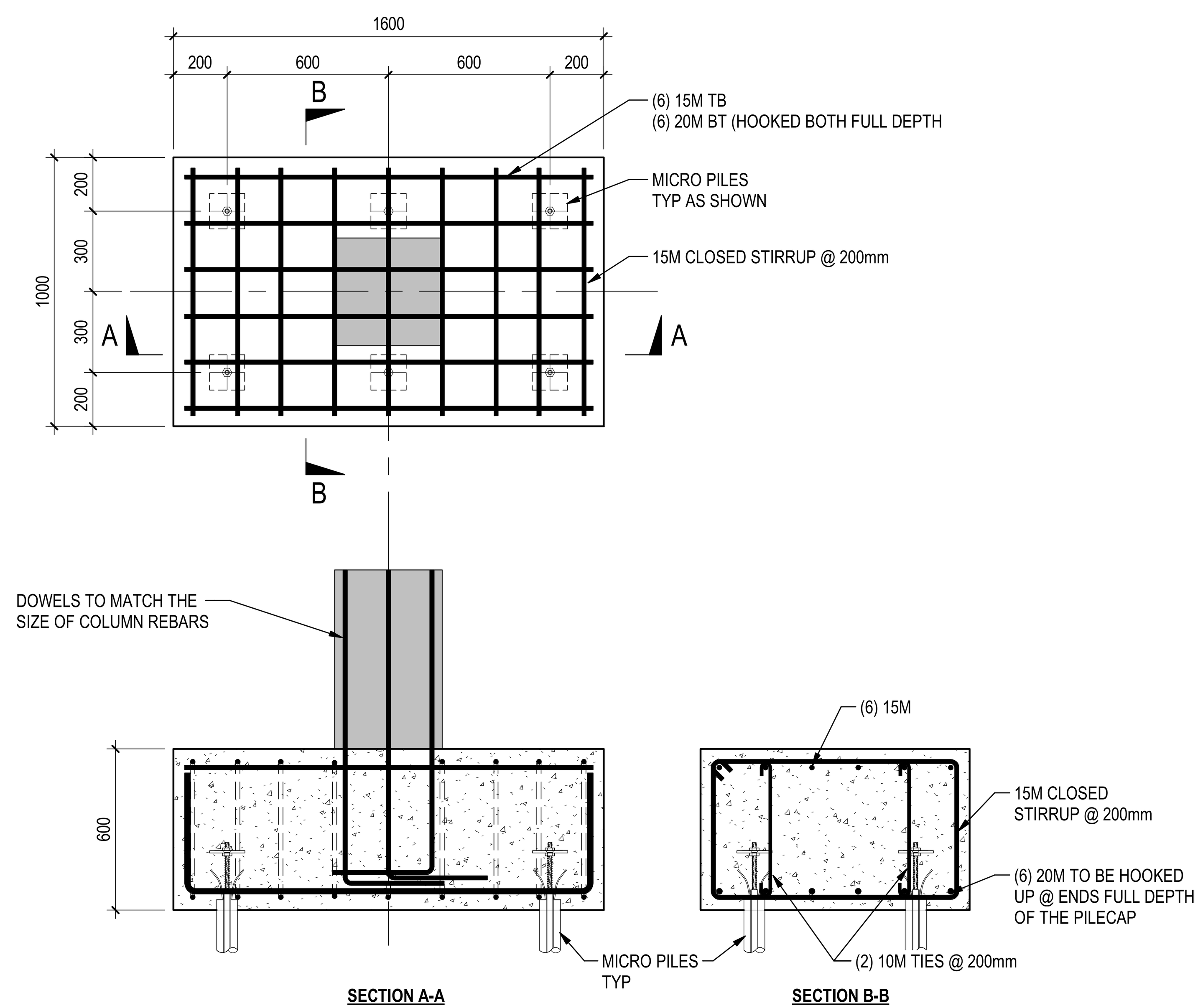
**NOTES:**
1. REFER TO DRAWING PRJ-15-157-214 FOR WALL ELEVATIONS.
2. REFER TO MASONRY DESIGN NOTES FOR TYPICAL HORIZONTAL REINFORCEMENT.



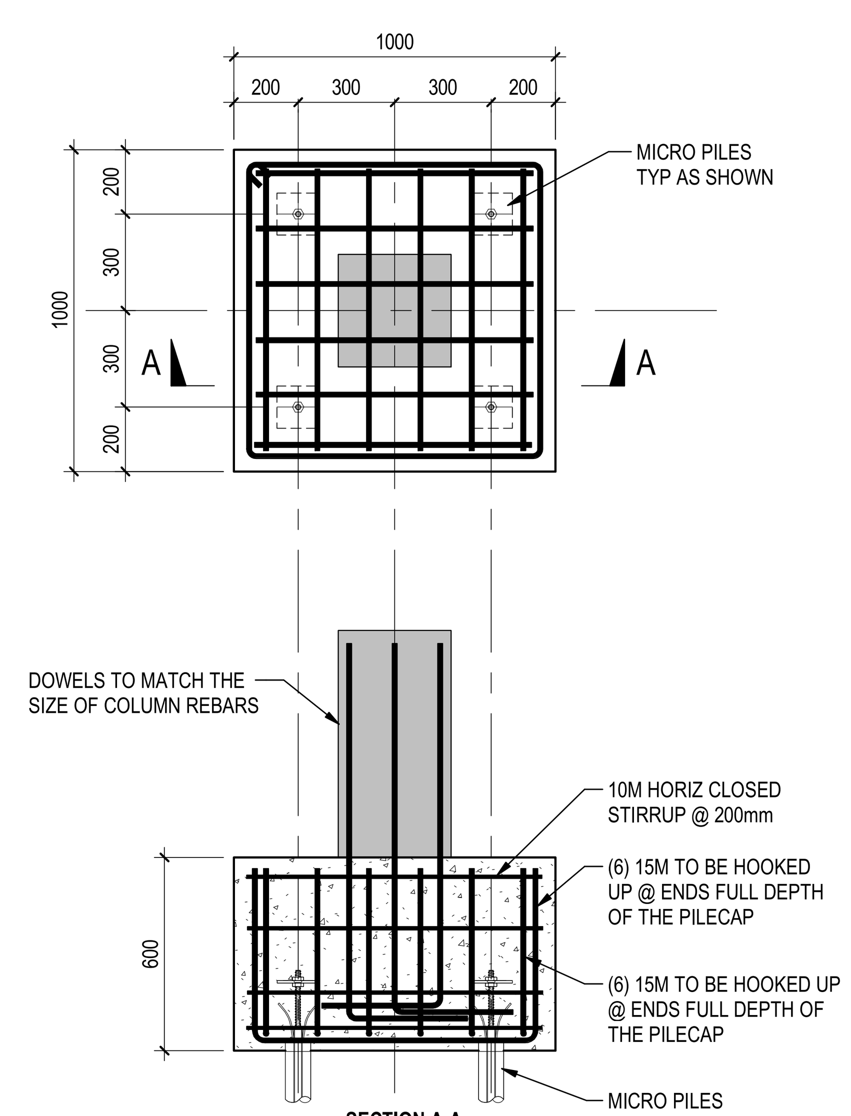

**1 COLUMN SECTION** 219 1 : 10



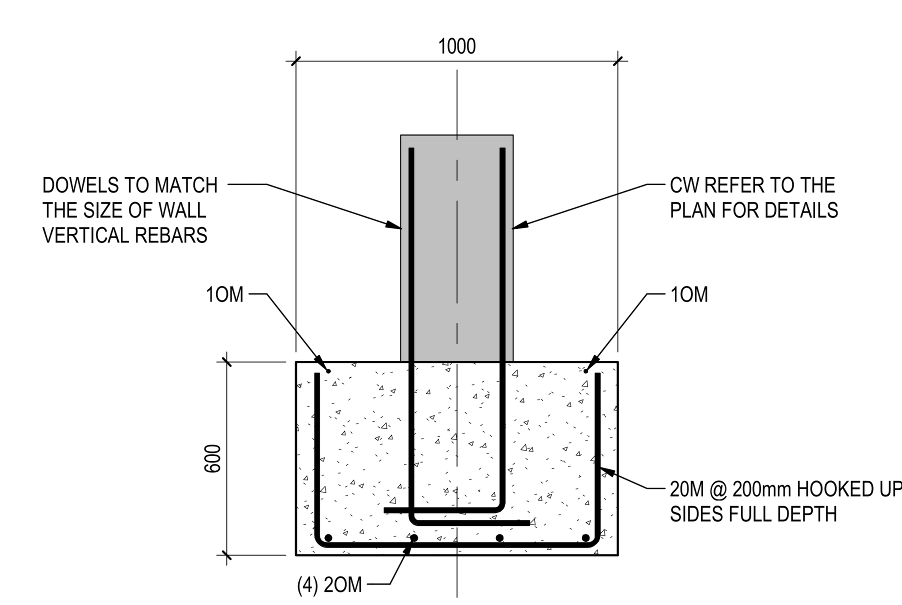

**2 PC1 DETAIL** 219 1 : 20



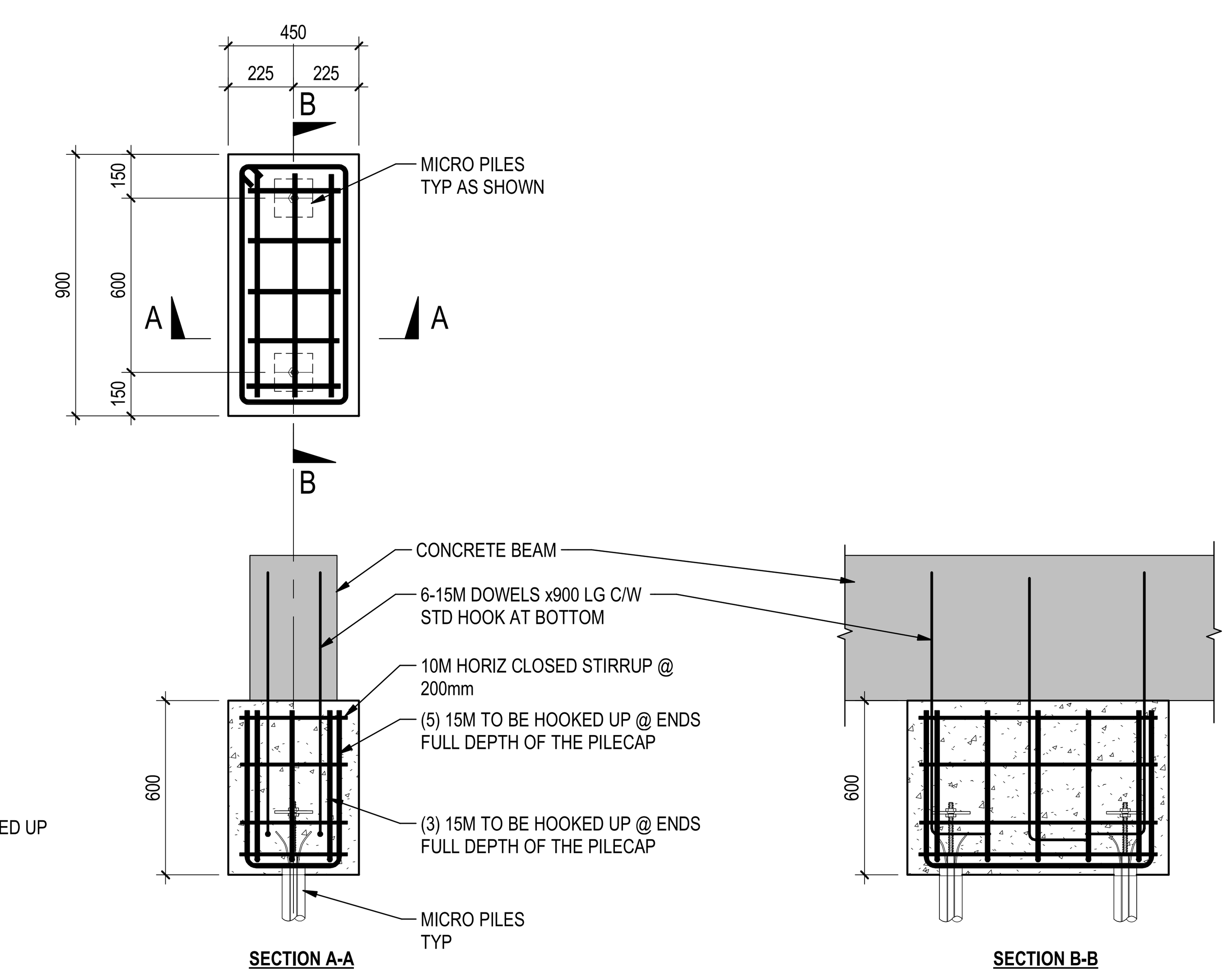

**3 PC2 DETAIL** 219 1 : 20



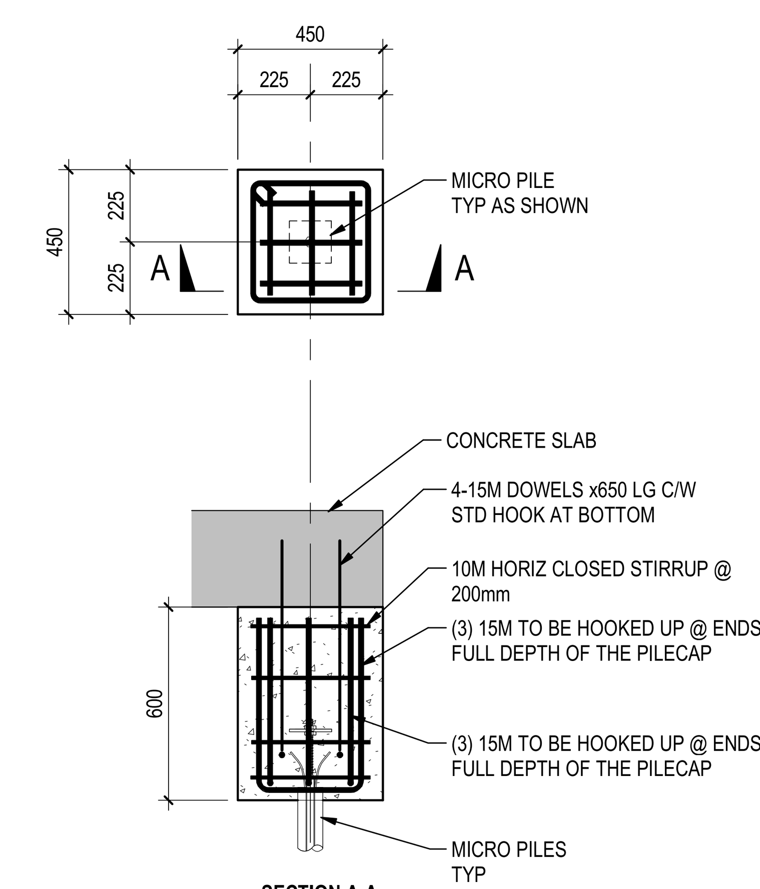

**4 PC3 DETAIL** 219 1 : 20




**5 WF - TYP SECTION** 219 1 : 20




**6 PC4 DETAIL** 219 1 : 20




**7 PC5 DETAIL** 219 1 : 20

| REFERENCE DRAWING | | REVISION | | | | | | |
|---|---|---|---|---|---|---|---|---|
| DRAWING No. | DRAWING TITLE | Rev. | DATE | DESCRIPTION | BY | DES. | CHK. | ENG. |
| | | 0A | 06-JUL-2023 | ISSUED FOR PRELIMINARY DESIGN | JC | DD | PB | |
| | | 0B | 30-APR-2024 | ISSUED FOR 60% DESIGN | JN | MB | MB | PB |
| | | 0C | 30-AUG-2024 | ISSUED FOR 90% REVIEW | | RPJ | | |
| | | 0D | 15-NOV-2024 | ISSUED FOR CONSTRUCTION | AC | MB | MB | PB |

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RM APEGA ID #: 49830
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PROFESSIONAL ENGINEER ALBERTA
MOHAMMAD R. BEHBAHANI
ID: 90887
November 25 2024

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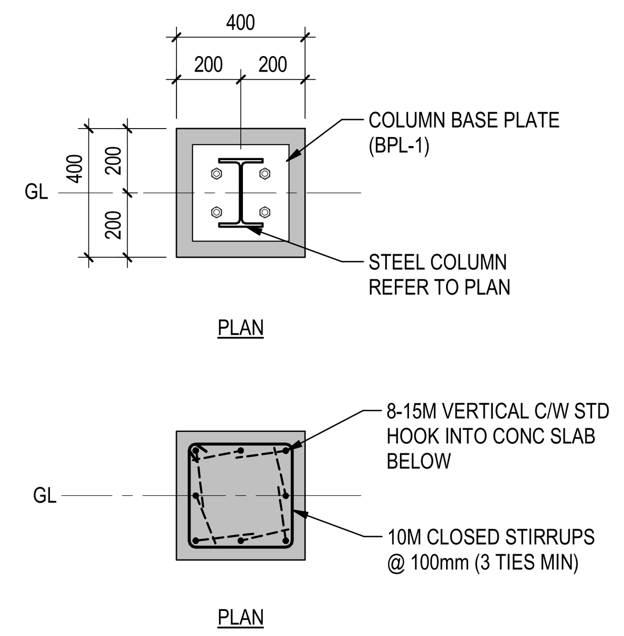
EPCOR

PLANT SITE: GOLD BAR WWTP
PLANT AREA: PRIMARY CLARIFIER #2
PROJECT NAME: GBWWTP FLARE CAPACITY EXPANSION
DRAWING TITLE: STRUCTURAL SCHEDULES (SHEET 1 of 2)

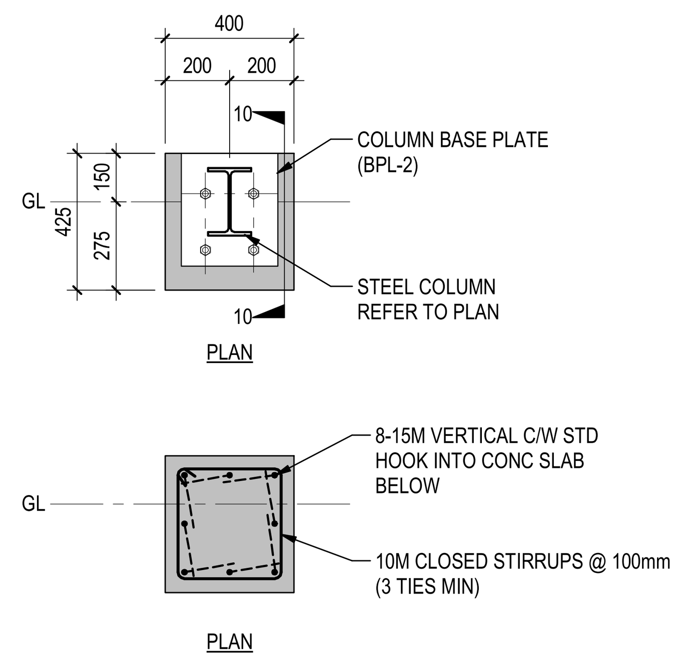
| CONSULTANT JOB No. | EPCOR PROJECT No. | SCALE | SHEET | DRAWING NUMBER |
|---|---|---|---|---|
| 1101000105 | PMO 1004723; PF14-105 | As indicated | 17 of 17 | PRJ-15-157-219 |

Project Files\01_WIP\06_structural\model_files\1101000105_mod_structrvt
11/25/2024 1:25:05 PM

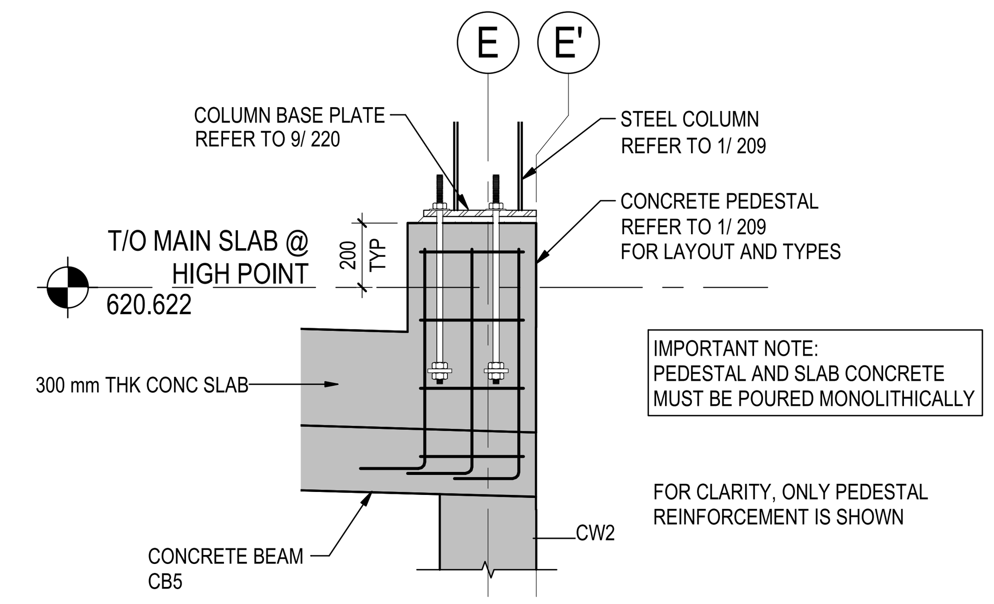



NOTE:
VERTICAL REBARS MUST BE EXTENDED TO BOTTOM OF SUPPORTING BEAM AS SHOWN ON SECTION DETAIL, TYP

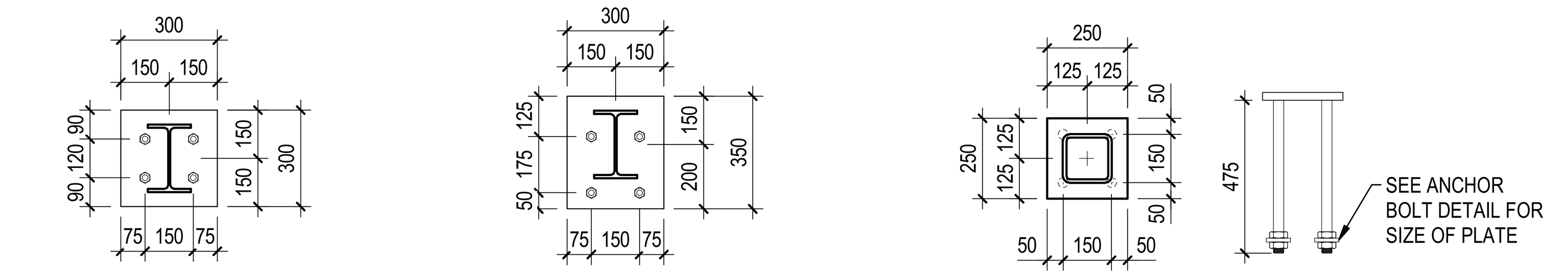
## 8 / 220 CP1 - PLAN DETAIL
1 : 20




## 9 / 220 CP2 - PLAN DETAIL
1 : 20




## 10 / 220 SECTION
1 : 20



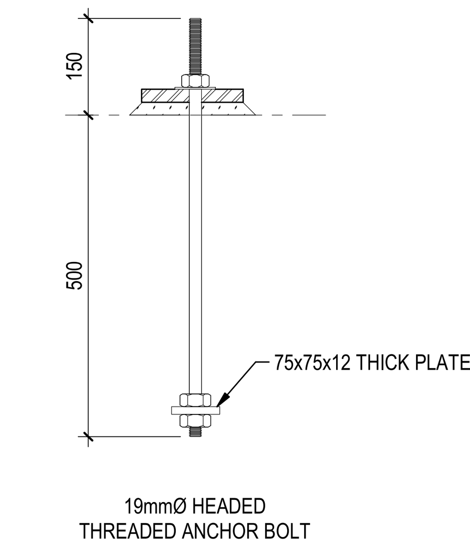

**BASE PLATE - BPL-1**
300x300x19mm THK C/W HOLES FOR 4-19mmØ HEADED THREADED ANCHOR BOLTS ON MIN 20mm NON-SHRINKABLE GROUT.

**BASE PLATE - BPL-2**
300x350x19mm THK C/W HOLES FOR 4-19mmØ HEADED THREADED ANCHOR BOLTS ON MIN 20mm NON-SHRINKABLE GROUT.

**EMBED PLATE - BPL-3**
250x250x25mm THK C/W 4-32mmØ x475mm LG HEADED ANCHOR BOLTS. FULL PENETRATION WELD TO CONNECT THE RODS TO THE EMBED PLATE.
ALL MATERIAL MUST BE STAINLESS STEEL OR GALVANIZED.

**NOTE:**
MIN 125mm DISTANCE IS REQUIRED FOR THE ANCHOR BOLTS TO THE CONCRETE EDGE, TYPICAL

## 11 / 220 BASE PLATE DETAILS
1 : 20




## ANCHOR BOLT DETAIL
1 : 10

| REFERENCE DRAWING | |
|---|---|
| DRAWING No. | DRAWING TITLE |
| | |

| REVISION | | | | | | |
|---|---|---|---|---|---|---|
| Rev. | DATE | DESCRIPTION | BY | DES. | CHK. | ENG. |
| 0A | 06-JUL-2023 | ISSUED FOR PRELIMINARY DESIGN | JC | DD | PB | |
| 0B | 30-APR-2024 | ISSUED FOR 60% DESIGN | JN | MB | MB | PB |
| 0C | 30-AUG-2024 | ISSUED FOR 90% REVIEW | | RPJ | | |
| 0D | 15-NOV-2024 | ISSUED FOR CONSTRUCTION | AC | MB | MB | PB |

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PROFESSIONAL ENGINEER MOHAMMAD R. BEHBAHANI ALBERTA
ID: 90867
November 25 2024

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EPCOR

PLANT SITE: GOLD BAR WWTP
PLANT AREA: PRIMARY CLARIFIER #2
PROJECT NAME: GBWWTP FLARE CAPACITY EXPANSION
DRAWING TITLE:
STRUCTURAL SCHEDULES (SHEET 2 of 2)

| CONSULTANT JOB No. | EPCOR PROJECT No. | SCALE | SHEET | DRAWING NUMBER |
|---|---|---|---|---|
| 1101000105 | PMO 1004723; PF14-105 | As indicated | 17 of 17 | PRJ-15-157-220 |

# CONSTRUCTION ASSEMBLIES

## EXTERIOR WALL TYPES:

**W1 - BRICK VENEER**
- 90mm BRICK VENEER (RUNNING BOND)
- BRICK TIES LOCATED 600mm HORIZONTALLY AND 400mm VERTICALLY
- 25mm AIR SPACE
- 152mm SEMI-RIGID INSULATION R28 MIN
- AIR/VAPOUR BARRIER
- 190mm CONCRETE BLOCK
- PAINT

**W1 - BRICK VENEER**
- 90mm BRICK VENEER (RUNNING BOND)
- BRICK TIES LOCATED 600mm HORIZONTALLY AND 400mm VERTICALLY
- 25mm AIR SPACE
- 152mm SEMI-RIGID INSULATION R28 MIN
- AIR/VAPOUR BARRIER
- 240mm CONCRETE BLOCK
- PAINT

## INTERIOR WALL TYPES:

**P1 - CONCRETE BLOCK 1HR RATED (UL 905) TO U/S DECK**
- PAINT
- 200mm CONCRETE BLOCK (RUNNING BOND)
- PAINT

## FLOOR TYPES:

**F1 - INSULATED CONCRETE SLAB**
- EPOXY FLOOR PAINT
- 150mm CONCRETE TOPPING SLOPED TO DRAIN (SEE STRUCT)
- 75mm HIGH DENSITY RIGID INSULATION (R4/25MM)
- 300mm STRUCTURAL SLAB (SEE STRUCT)
- 6mil VAPOUR BARRIER
- BACKFILL OPEN CAVITY WITH RECYCLED CONCRETE

## ROOF TYPES:

**R1 - SBS ROOF**
- 2 PLY SBS ROOF MEMBRANE
- 10mm PROTECTION BOARD
- 200mm POLYISO RIGID INSULATION
- SELF ADHERED AIR VAPOUR BARRIER
- 13mm EXTERIOR PROTECTION BOARD
- STRUCTURAL STEEL DECK
- PAINT ALL STRUCTURAL BEAMS

## GENERAL NOTES:

1. ALL WORK TO CONFORM TO THE NATIONAL BUILDING CODE - 2023 ALBERTA EDITION
2. ARCHITECTURAL DRAWINGS TO BE READ IN CONJUNCTION WITH STRUCTURAL, MECHANICAL, ELECTRICAL, CIVIL AND LANDSCAPE DRAWINGS.
3. ALL WORK TO BE PERFORMED IN ACCORDANCE WITH GOOD BUILDING PRACTICES. CONTRACTOR TO CAREFULLY INSPECT THE SITE OF WORK AND BE FULLY INFORMED OF CONDITIONS AND LIMITATIONS.
4. CONTRACTOR TO CONFIRM ALL DIMENSIONS ON SITE AND IMMEDIATELY REPORT ANY DISCREPANCIES TO THE DESIGN TEAM PRIOR TO PROCEEDING.
5. CONTRACTOR ASSUMES COMPLETE RESPONSIBILITY TO ENSURE ALL FIXTURES & EQUIPMENT SUPPLIED UNDER THIS CONTRACT ARE C.S.A. APPROVED.
6. CONTRACTOR IS RESPONSIBLE TO CONFIRM AND PROVIDE STORM, SANITARY, WATER, ELECTRICITY, AND GAS REQUIREMENTS AND INSTALLATION TO THE APPROVAL OF ALL APPLICABLE CODES AND LOCAL INSPECTORS.
7. CONTRACTOR TO SUBMIT SAMPLES AND / OR ILLUSTRATIONS OF FITTINGS, FIXTURES AND FINISHES TO THE CONSULTANT FOR OWNER'S APPROVAL PRIOR TO ORDER AND INSTALLATION.
8. DOOR SIZES ARE NOMINAL. CONTRACTOR TO CONSULT SUPPLIER FOR EXACT SIZES AND ROUGH OPENINGS.
9. PROVIDE ALL FRAMING / BLOCKING AS REQUIRED TO ENSURE PROPER SECUREMENT OF ALL MATERIALS, EQUIPMENT, ACCESSORIES, ETC.
10. ALL MATERIALS ARE TO BE PRIMED AND PAINTED U.N.O. PROVIDE COLOR COORDINATED SEALANT BETWEEN DISSIMILAR MATERIALS.
11. MAINTAIN SAFE ACCESS TO ALL REQUIRED EXITS AT ALL TIMES.
12. ALL ELEVATIONS TO BE VERIFIED. CONTRACTOR TO COORDINATE LOCATIONS OF ALL MECHANICAL & ELECTRICAL EQUIPMENT PRIOR TO ROUGH-IN AND INSTALLATION.
13. ALL DIMENSIONS, DETAILS & CONDITIONS INDICATED AND SHALL BE CONFIRMED ON THE JOB SITE. MODIFICATIONS AND/OR ADJUSTMENTS SHALL BE MADE ACCORDINGLY AS REQUIRED UPON INSTRUCTIONS FROM THE CONSULTANT.
14. PROVIDE ALL GIRDERS, HANGERS, SUPPORTS, HARDWARE, BRACING, ETC. AS REQUIRED.
15. PROVIDE FLASHING OVER ALL EXTERIOR DOORS AND WINDOWS. FLASHING TO BE PREFINISHED TO SUIT COLOUR SCHEME.
16. PROVIDE CONTINUOUS ROD & SEALANT JOINT AT ALL JUNCTIONS OF DISSIMILAR MATERIALS, CONTROL JOINTS & OTHER LOCATIONS INDICATED.
18. MAINTAIN INTEGRITY OF THE VAPOUR / AIR BARRIER MEMBRANE IN THE EXTERIOR WALLS & ROOF STRUCTURE. ALL MEMBRANES ARE TO BE CONTINUOUS & HAVE A MINIMUM OVERLAP OF 200mm AT ALL PARAPETS, FLASHINGS, JOINTS, CHANGES IN DIRECTION, WINDOWS, DOORS, ETC.
19. WHERE MECHANICAL DUCTS AND ELECTRICAL CONDUIT PENETRATE THE EXTERIOR BUILDING ENVELOPE CONTRACTOR TO SEAL PENETRATIONS TO ENSURE CONTINUITY OF THE AIR / VAPOR BARRIER MEMBRANES
21. WHERE MECHANICAL DUCTS AND ELECTRICAL CONDUIT PENETRATE FIRE SEPARATIONS OR WALLS WHICH ARE CONSTRUCTED TO U/S OF STRUCTURE, PROVIDE FIRE AND SMOKE SEALS AT PENETRATED FIRE SEPARATIONS.
22. WHEN INSTALLING PLUMBING, INSTALL GASKETS AT ALL SUPPORT CONNECTIONS. PIPES MUST NOT COME INTO DIRECT CONTACT WITH METAL STUDS, METAL SUSPENSION SYSTEMS, OR CONCRETE FLOORS.
23. INTERIOR DIMENSIONS TO FACE OF CONCRETE BLOCK WALL

## Door Schedule

| DOOR TAG | WIDTH | HEIGHT | DOOR FINISH | DOOR MATERIAL | FRAME MATERIAL | FRAME FINISH | HARD WARE | NOTES |
|---|---|---|---|---|---|---|---|---|
| D101 | 1900 | 2200 | PAINT | INSULATED METAL | INSULATED METAL | PAINT | 1 | ASTRAGAL ON ACTIVE DOOR, NON ACTIVE DOOR SWINGS IN |
| D102 | 1000 | 2200 | PAINT | INSULATED METAL | INSULATED METAL | PAINT | 2 | |

**Hardware Group No. 001 - PROX READER**

For use on Door #(s):
D101
Provide each with the following:

| QTY | | DESCRIPTION | CATALOG NUMBER | FINISH | MFR |
|---|---|---|---|---|---|
| 6 | EA | HINGE | 5BB1HW 114X114MM NRP | 630 | IVE |
| 1 | EA | POWER TRANSFER | EPT10 CON | 689 | VON |
| 1 | EA | EU MORTISE LOCK | L9092PEU 03B RX LX DPS CON 12/24 VDC | 626 | SCH |
| 1 | EA | MORTISE CYLINDER | ABLOY PROTEC2 CLIQ X CAM TO SUIT | 626 | ABL |
| 1 | EA | OH STOP | 100S | 630 | GLY |
| 2 | EA | SURFACE CLOSER | 4040XP EDA | 689 | LCN |
| 2 | EA | KICK PLATE | 8400 255MM X 40MM LDW B-CS | 630 | IVE |
| 1 | EA | WEATHERSTRIPPING | 485AA-S X 1/DW X 2/DH | AA | ZER |
| 1 | EA | ASTRAGAL | 43SP X DH | SP | ZER |
| 2 | EA | DOOR SWEEP | 8192AA X DR WIDTH | AA | ZER |
| 1 | EA | THRESHOLD | 626A-223 X OPENING WIDTH | A | ZER |
| 1 | EA | WIRE HARNESS | CON-50 | | SCH |
| 1 | EA | WIRE HARNESS | CON__TO SUIT | | SCH |
| 1 | EA | WIRE HARNESS | CON-6W | | SCH |
| 1 | EA | DOOR CONTACT | 679-05HM | BLK | SCE |
| 1 | EA | POWER SUPPLY | PS902 BBK 900-2RS KL900 120/240 VAC | LGR | SCE |
| 1 | | PROX READER | WORK OF DIVISION 28 | | |

**VALID CREDENTIALS WILL MOMENTARILY SHUNT THE DOOR CONTACT AND UNLOCK THE ELECTRIC LOCK. FREE EXITING BY INSIDE LEVER.**

**Hardware Group No. 002 - PROX READER**

For use on Door #(s):
D102
Provide each with the following:

| QTY | | DESCRIPTION | CATALOG NUMBER | FINISH | MFR |
|---|---|---|---|---|---|
| 3 | EA | HINGE | 5BB1HW 114X114MM NRP | 630 | IVE |
| 1 | EA | POWER TRANSFER | EPT10 CON | 689 | VON |
| 1 | EA | EU MORTISE LOCK | L9092PEU 03B RX LX DPS CON 12/24 VDC | 626 | SCH |
| 1 | EA | MORTISE CYLINDER | ABLOY PROTEC2 CLIQ X CAM TO SUIT | 626 | ABL |
| 1 | EA | OH STOP | 100S | 630 | GLY |
| 1 | EA | SURFACE CLOSER | 4040XP EDA | 689 | LCN |
| 1 | EA | KICK PLATE | 8400 255MM X 40MM LDW B-CS | 630 | IVE |
| 1 | EA | WEATHERSTRIPPING | 485AA-S X 1/DW X 2/DH | AA | ZER |
| 1 | EA | DOOR SWEEP | 8192AA X DR WIDTH | AA | ZER |
| 1 | EA | THRESHOLD | 626A-223 X OPENING WIDTH | A | ZER |
| 1 | EA | WIRE HARNESS | CON-50 | | SCH |
| 1 | EA | WIRE HARNESS | CON__TO SUIT | | SCH |
| 1 | EA | WIRE HARNESS | CON-6W | | SCH |
| 1 | EA | DOOR CONTACT | 679-05HM | BLK | SCE |
| 1 | EA | POWER SUPPLY | PS902 BBK 900-2RS KL900 120/240 VAC | LGR | SCE |
| 1 | | PROX READER | WORK OF DIVISION 28 | | |

**VALID CREDENTIALS WILL MOMENTARILY SHUNT THE DOOR CONTACT AND UNLOCK THE ELECTRIC LOCK. FREE EXITING BY INSIDE LEVER.**

# 2023 NBC: ALBERTA EDITON SUMMARY

| ITEM | REFERENCES ARE TO DIVISION B UNLESS NOTED [A] FOR DIVISION A OR [C] FOR DIVISION C | NBCC REFERENCES |
|---|---|---|
| 00 | THE FOLLOWING TABLE IS A SUMMARY BUILDING CODE ANALYSIS PROVIDED FOR PROJECT COORDINATION AND FUTURE PROJECT INFORMATION. DETAILED REQUIREMENTS IDENTIFIED IN THE NBCC AND OTHER APPLICABLE LEGISLATION APPLY. INTERPRETATION OF APPLICABLE CODES IS SUBJECT TO THE AUTHORITIES HAVING JURISDICTION. | |
| 01 | **PROJECT INFORMATION** — PROJECT NAME: **GBWWTP FLARE CAPACITY EXPANSION**; STANTEC PROJECT #: **1101000105**; PREPARED BY: **PETER CRITTENDEN**; REVISED: **OCT 17, 2024** | |
| 02 | **PROPERTY LOCATION** — LEGAL DESCRIPTION: **PLAN 0941211, BLOCK 1, LOT 34**; CIVIC ADDRESS: **10977 50 ST NW, T6A 2E9 EDMONTON, AB** | |
| 03 | **PROJECT DESCRIPTION** — ☒ NEW ☐ ALTERATION ☒ PART 3 BUILDING ☐ ADDITION ☐ CHANGE OF USE ☐ PART 9 BUILDING | 1.1.2. [A] |
| 04 | **OCCUPANCY CLASSIFICATION** — **MAJOR** GROUP: F DIVISION: **3 – ASSEMBLY OCCUPANCY OTHER**; **MINOR** GROUP: ____ DIVISION: __________ | 3.1.2.1.(1) |
| 06 | **IMPORTANCE CATEGORY** — ☐ LOW ☐ NORMAL ☐ HIGH ☒ POST-DISASTER | 4.1.2.1.(3), 5.2.2.1.(2) |
| 07 | **BUILDING AREA ($m^2$)** — Existing: ____ $m^2$ New: 74 $m^2$ Total: 74 $m^2$ | 1.4.1.2. [A] |
| 08 | **GROSS AREA ($m^2$)** — Existing: ____ $m^2$ New: 74 $m^2$ Total: 74 $m^2$ | |
| | | |
| 10 | **NUMBER OF STOREYS** — Existing: ____ Above Grade: ____ Below Grade: ____; Proposed: ____ Above Grade: one (1) Below Grade: zero (0) | 1.4.1.2. [A], 3.2.1.1. |
| 11 | **HEIGHT OF BUILDING** — **4.2 m** **HIGH BUILDING** ☐ YES / ☒ NO | 3.2.6.1, 3.2.2.3. |
| 12 | **NO. OF STREETS FOR FIRE FIGHTER ACCESS** — **ONE** | 3.2.2.10, 3.2.5. |
| 13 | **BUILDING CLASSIFICATION** — **GROUP F, DIVISION 3, ONE STOREY** | 3.2.2.89 |
| 14 | **CONSTRUCTION RESTRICTIONS** / **ACTUAL CONSTRUCTION** — ☐ COMBUSTIBLE ☒ NON-COMBUSTIBLE ☐ BOTH; **HEAVY TIMBER**: ☐ YES / ☒ NO | 3.2.2.34, 3.1.4.6 |
| 15 | **REQUIRED FIRE SEPARATIONS FIRE RESISTANCE RATING (FRR)** | 3.2.2.25, 3.2.1.4. |
| 16 | **SPRINKLER SYSTEM** — ☐ ENTIRE BUILDING ☐ BASEMENT ☐ IN LIEU OF ROOF RATING ☐ SELECTED COMPARTMENTS ☐ SELECTED FLOOR AREAS ☒ NOT REQUIRED ☐ NFPA-13 ☐ NFPA-13D ☐ NFPA-13R | 3.2.2.25, 3.2.1.5., 3.2.2.17. |
| | **STANDPIPE** — REQUIRED ☐ YES / ☒ NO; PROVIDED ☐ YES / ☒ NO | 3.2.5.8.-.9 |
| | | 3.2.8.6 |
| 17 | **FIRE ALARMS** — REQUIRED ☒ YES / ☐ NO; TYPE PROVIDED ☒ SINGLE STAGE ☐ TWO STAGE ☐ NONE | 3.2.4.1 |
| 20 | **OCCUPANT LOAD** — ☐ $m^3$/person ☒ UNOCCUPIED BUILDING | 3.1.17 |
| 21 | **SPATIAL SEPARATION** – Construction of Exterior Walls (EBF – Exposed Building Face) | 3.2.3. Table 3.2.3.1.-B Table 3.2.3.7 |

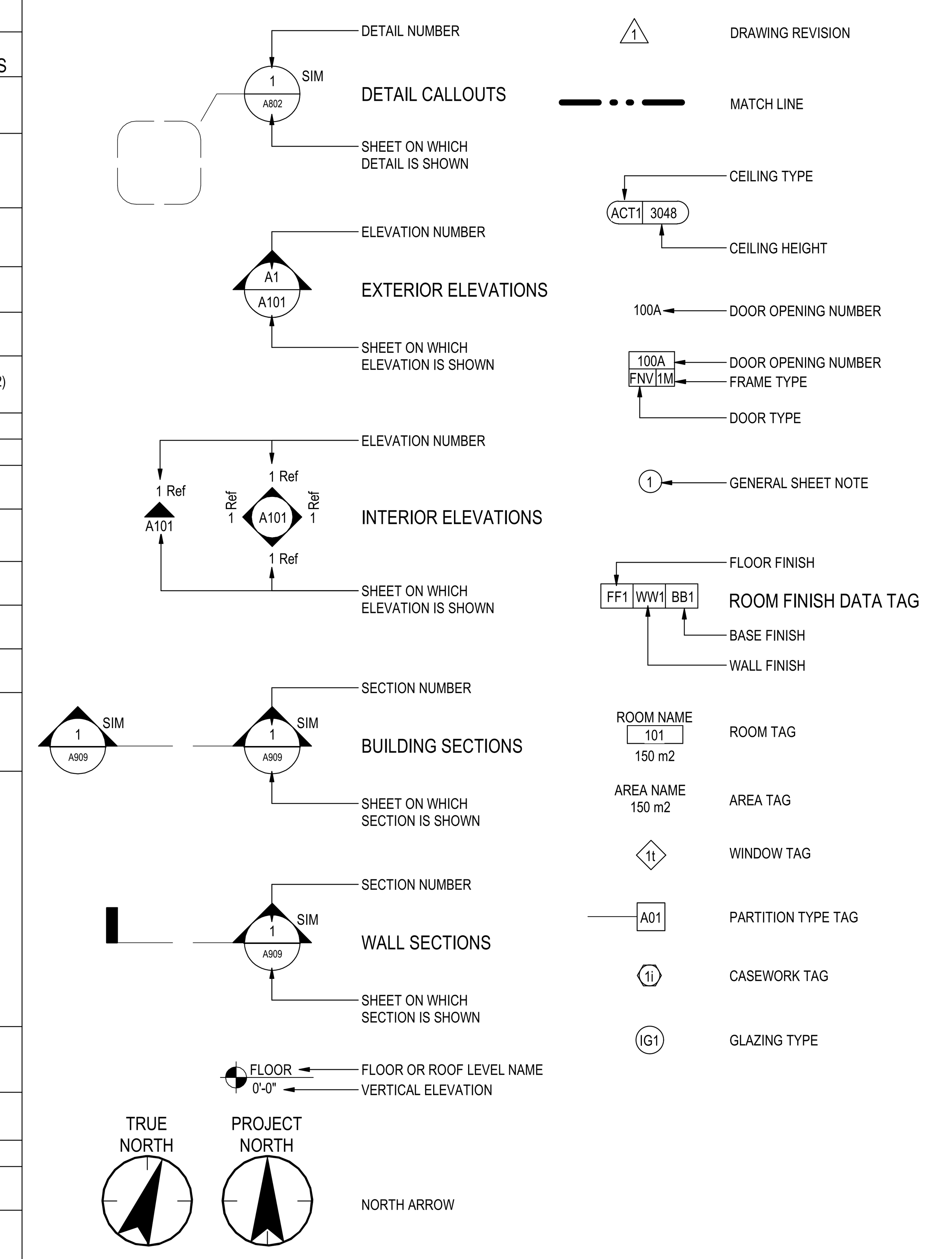
**Other Fire Separations** (Item 15)

| Location | FRR of Separations | Closures | | NBCC REFERENCES |
|---|---|---|---|---|
| Service Rooms (*): Electrical, Mechanical | 60 min | 45 min | | 3.6.2.1, 3.3.1.21 |

Notes to Service Rooms (*):
- The enclosure shall include the walls and ceiling of the room or enclosure.
- Fire separations are to be constructed as continuous elements extending from floor through ceiling elements and horizontal service spaces to the underside of the floor or roof deck above.
- Fire rated assemblies are to be listed by ULC, cUL, Intertek (WH) or Appendix D of NBCC.
- Closures in fire separations are required to have appropriate listed closers and hardware.

**SPATIAL SEPARATION** – Construction of Exterior Walls (Item 21) — EBF – Exposed Building Face

| EXPOSED WALL | AREA of EBF ($m^2$) | L.D. (m) | L/H or H/L | % of UNPROTECTED OPENINGS PERMITTED | % of UNPROTECTED OPENINGS PROPOSED | FRR (hrs) | CONSTRUCTION REQUIRED COMB. | CONSTRUCTION REQUIRED NON-COMB | CLADDING REQUIRED COMB. | CLADDING REQUIRED NON-COMB |
|---|---|---|---|---|---|---|---|---|---|---|
| NORTH | 33.6 | 17.5 | 2:1 | 100 | 19 | | ● | ❍ | ❍ | ● |
| SOUTH | 33.6 | 14 | 2:1 | 100 | 0 | | ● | ❍ | ❍ | ● |
| EAST | 33.6 | 27.42 | 2:1 | 100 | 0 | | ● | ❍ | ❍ | ● |
| WEST | 33.6 | 7 | 2:1 | 89 | 0 | | ● | ❍ | ❍ | ● |




| REFERENCE DRAWING | | REVISION | | | | | | |
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| | | 0A | 06-JULY-2023 | ISSUED FOR PRELIMINARY DESIGN | | | | |
| | | 0B | 26-APR-2024 | ISSUED FOR 60% DESIGN | | | | |
| | | 0C | 30-AUG-2024 | ISSUED FOR 90% DESIGN | | | | |
| | | 0D | 15-NOV-2024 | ISSUED FOR CONSTRUCTION | | | | |

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EPCOR

PLANT SITE: GOLD BAR WWTP
PLANT AREA: PLANT WIDE
PROJECT NAME: GBWWTP FLARE CAPACITY EXPANSION
DRAWING TITLE: ARCHITECTURAL GENERAL NOTES, CODE ANALYSIS & ASSEMBLIES

| CONSULTANT JOB No. | EPCOR PROJECT No. | SCALE | SHEET | DRAWING NUMBER |
|---|---|---|---|---|
| 1101000105 | PMO 1004723; PF14-015 | As indicated | of 99 | PRJ-15 -157 -301 |

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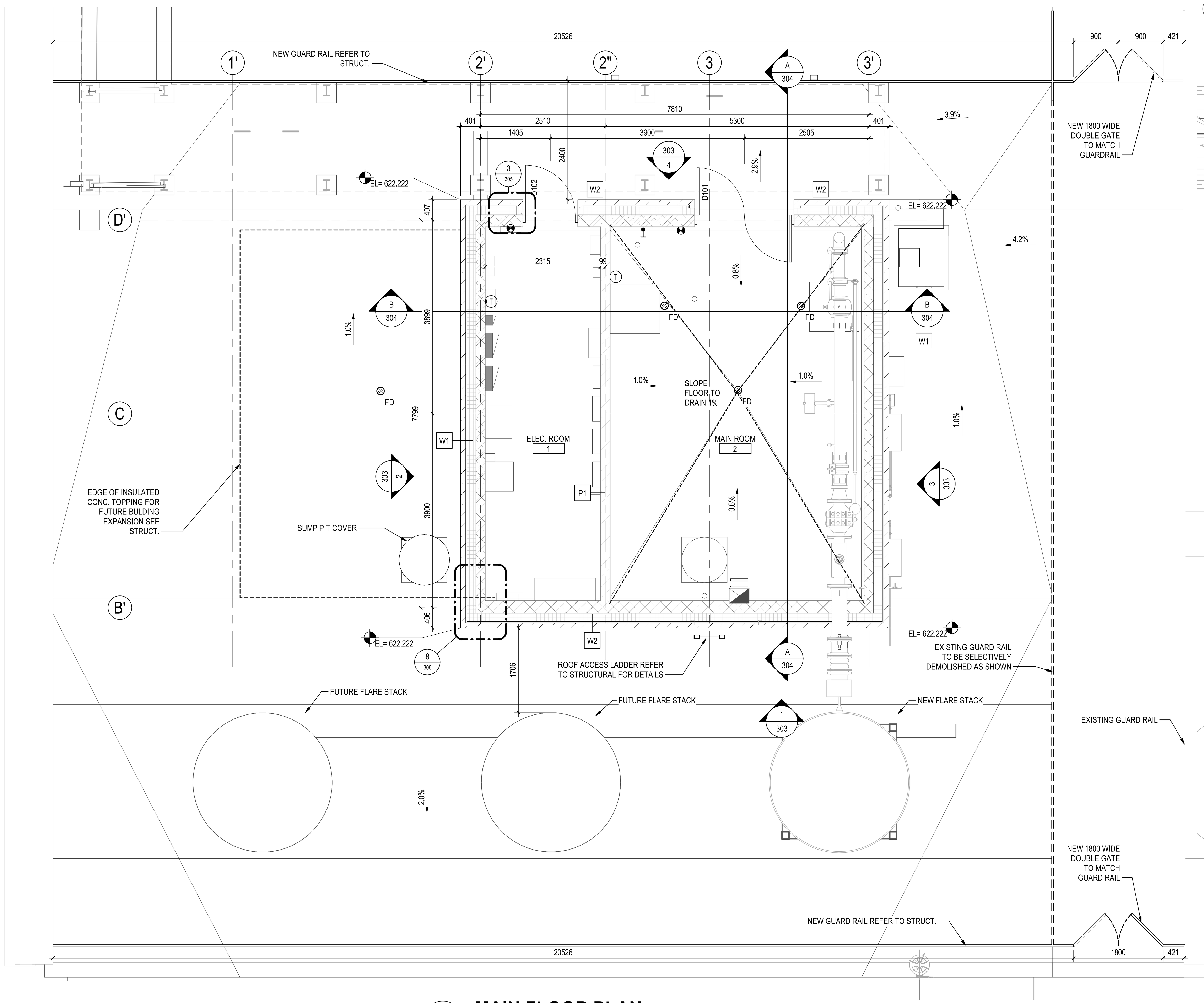
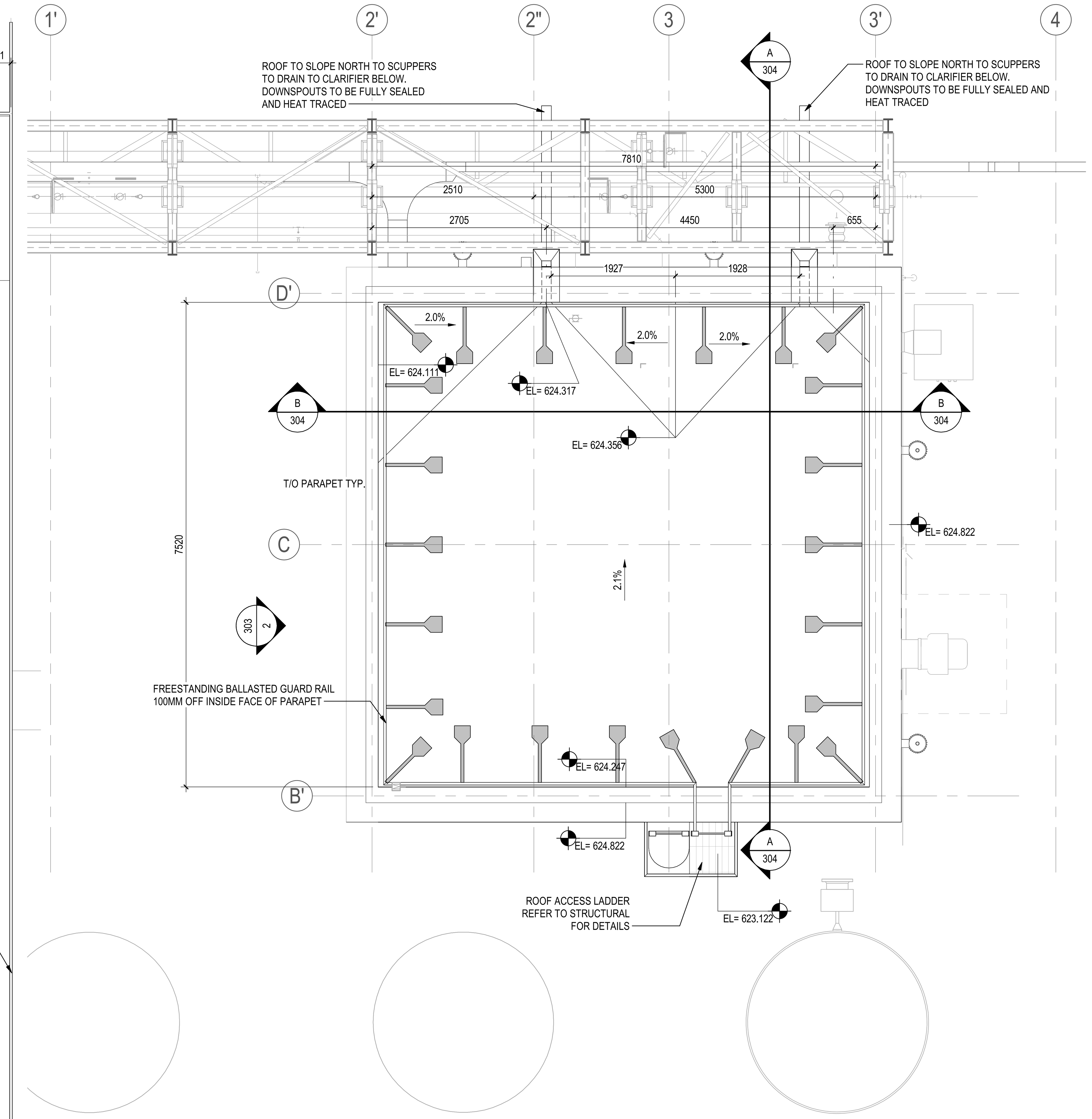
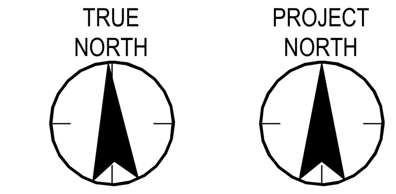
11/22/2024 3:08:44 PM




## 2 / 302 MAIN FLOOR PLAN
1 : 50




## 1 / 302 ROOF PLAN
1 : 50




| REFERENCE DRAWING | |
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| DRAWING No. | DRAWING TITLE |
| | |

| Rev. | DATE | DESCRIPTION | BY | DES. | CHK. | ENG. |
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EPCOR

PLANT SITE: GOLD BAR WWTP — PLANT AREA: PLANT WIDE

PROJECT NAME: GBWWTP FLARE CAPACITY EXPANSION

DRAWING TITLE:
ARCHITECTURAL
MAIN FLOOR PLAN

| CONSULTANT JOB No. | EPCOR PROJECT No. | SCALE | SHEET | DRAWING NUMBER |
|---|---|---|---|---|
| 1101000105 | PMO 1004723; PF14-015 | 1 : 50 | of 99 | PRJ-15 -157 -302 |

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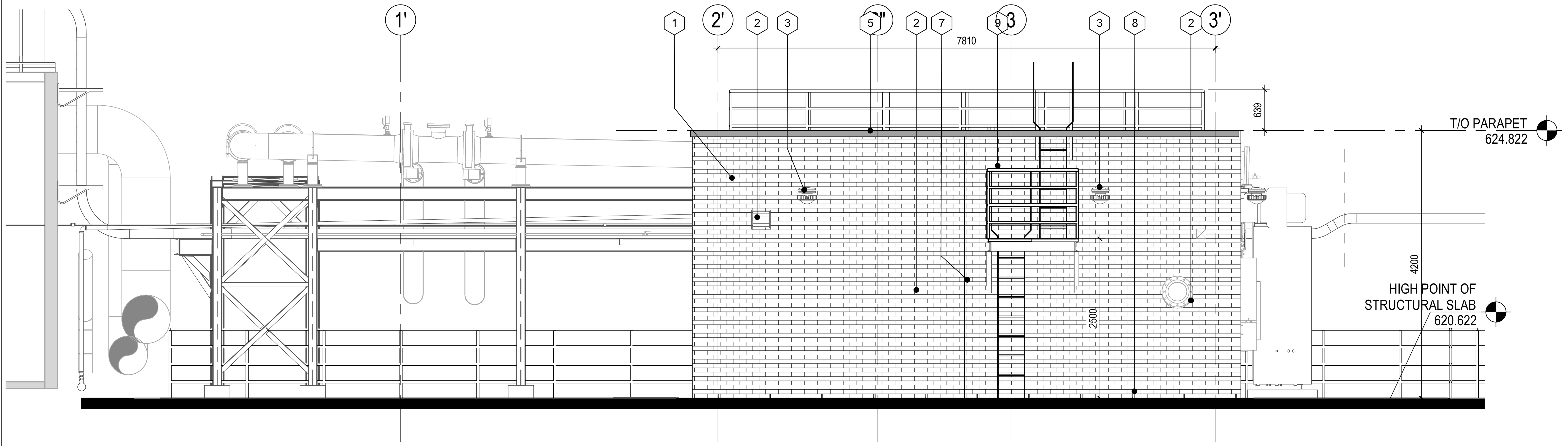
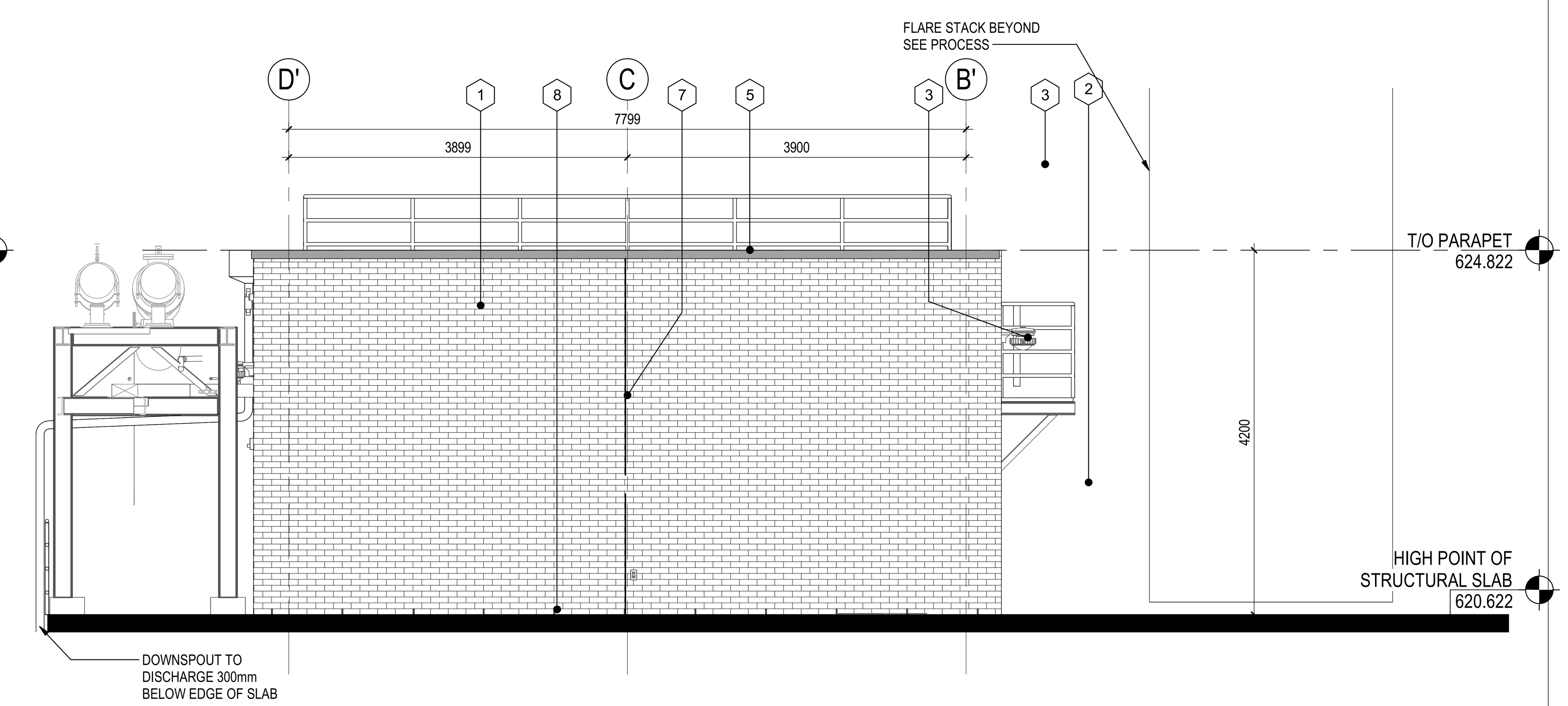
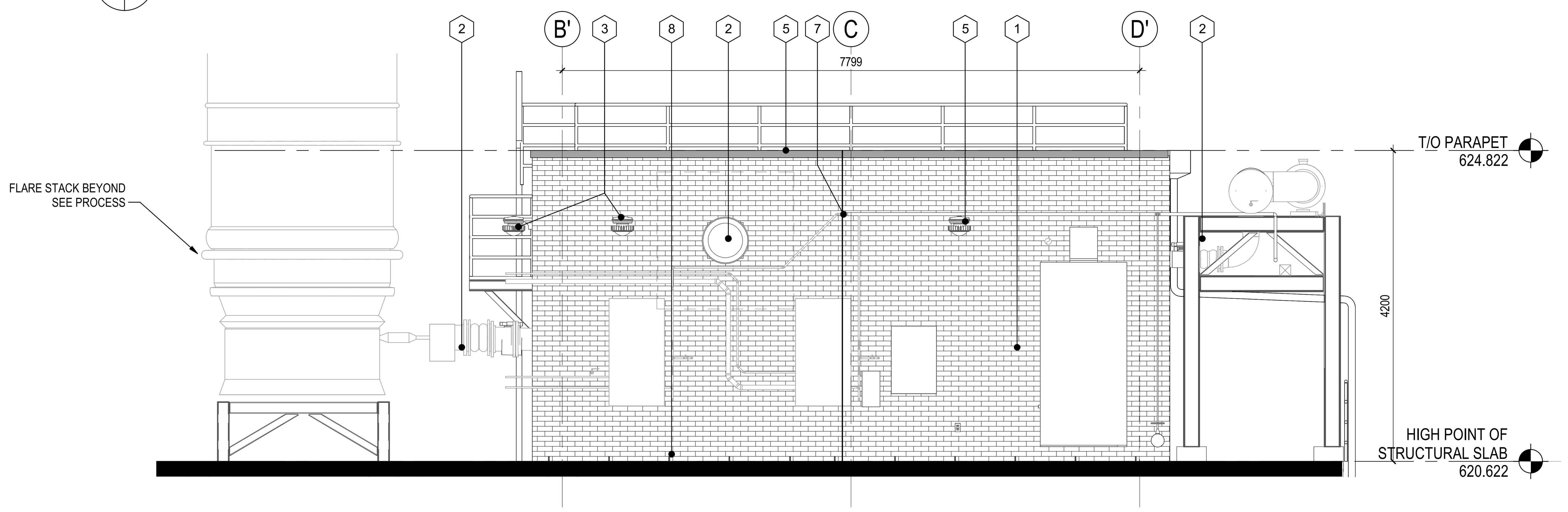


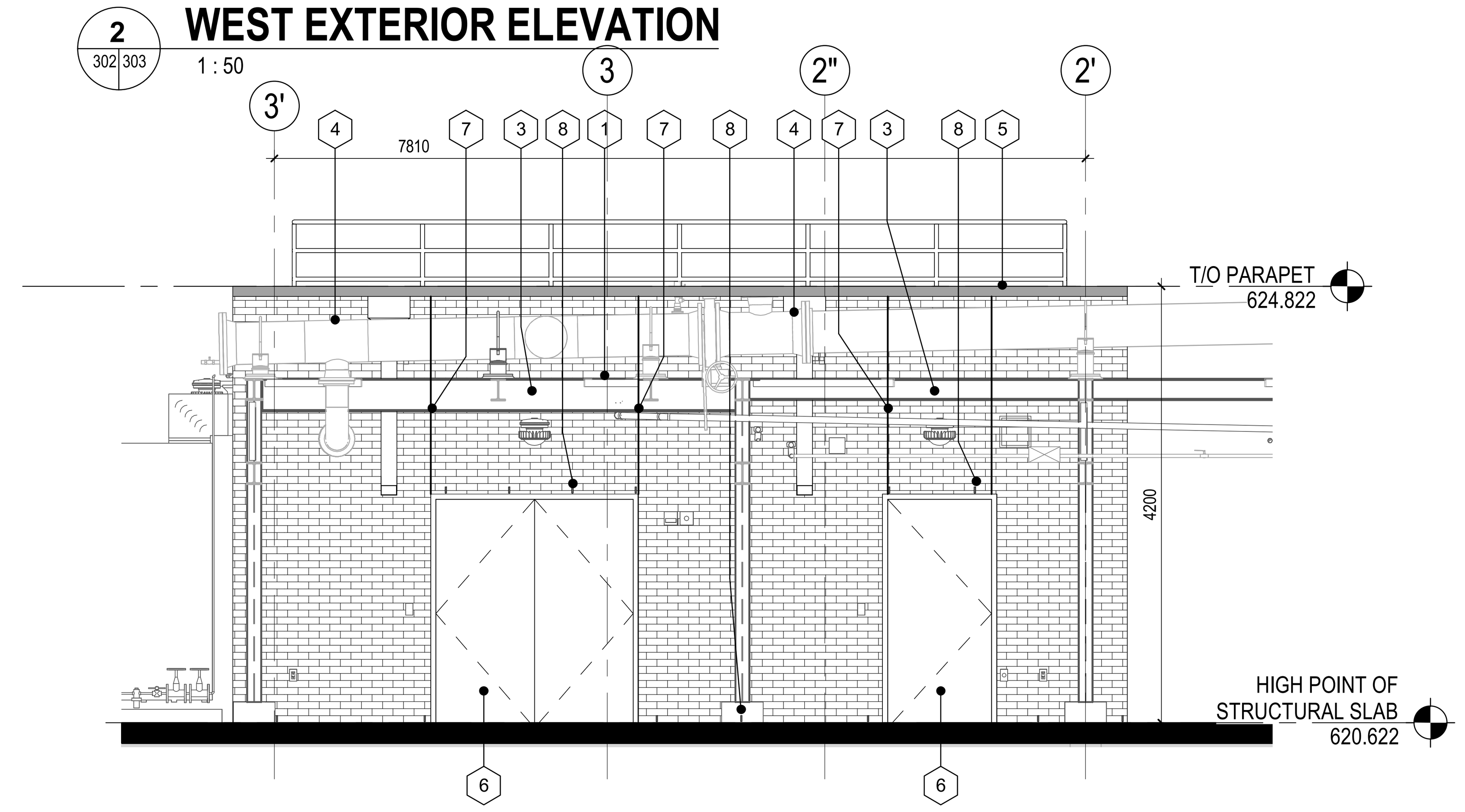

# 1 SOUTH EXTERIOR ELEVATION
302 | 303
1 : 50




# 2 WEST EXTERIOR ELEVATION
302 | 303
1 : 50




# 3 EAST EXTERIOR ELEVATION
302 | 303
1 : 50




# 4 NORTH EXTERIOR ELEVATION
302 | 303
1 : 50

## ELEVATION KEYNOTES

1. RUNNING BOND BRICK - OBSIDIAN
2. PROCESS PIPING AND MECHANICAL PENETRATIONS (REFER TO MECH AND PROCESS DRAWINGS FOR DETAILS)
3. EXTERIOR LIGHT (REFER TO ELECTRICAL DRAWINGS FOR DETAILS)
4. THRU-WALL SCUPPER AND DOWNSPOUT. DOWNSPOUT TO BE FULLY SEALED AND HEAT TRACED (CHARCOAL BLACK COLOUR
5. PREFINISHED METAL PARAPET FLASHING. COLOUR: CHARCOAL BLACK
6. EXTERIOR MAN DOOR - COLOUR: CHARCOAL BLACK
7. MASONRY RELIEF JOINT
8. WEEP VENT EVERY 800MM MAX
9. MULTI-PLATFORM LADDER, REFER TO STRUCTURAL FOR DETAILS

REFERENCE DRAWING

| DRAWING No. | DRAWING TITLE |
|---|---|
| | |

REVISION

| Rev. | DATE | DESCRIPTION | BY | DES. | CHK. | ENG. |
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| 0C | 28-AUG-2024 | ISSUED FOR 90% DESIGN | | | | |
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EPCOR

PLANT SITE: GOLD BAR WWTP
PLANT AREA: PLANT WIDE

PROJECT NAME: GBWWTP FLARE CAPACITY EXPANSION

DRAWING TITLE:
ARCHITECTURAL
ELEVATIONS

| CONSULTANT JOB No. | EPCOR PROJECT No. | SCALE | SHEET | DRAWING NUMBER |
|---|---|---|---|---|
| 1101000105 | PMO 1004723; PF14-015 | As indicated | of 99 | PRJ-15 -157 -303 |

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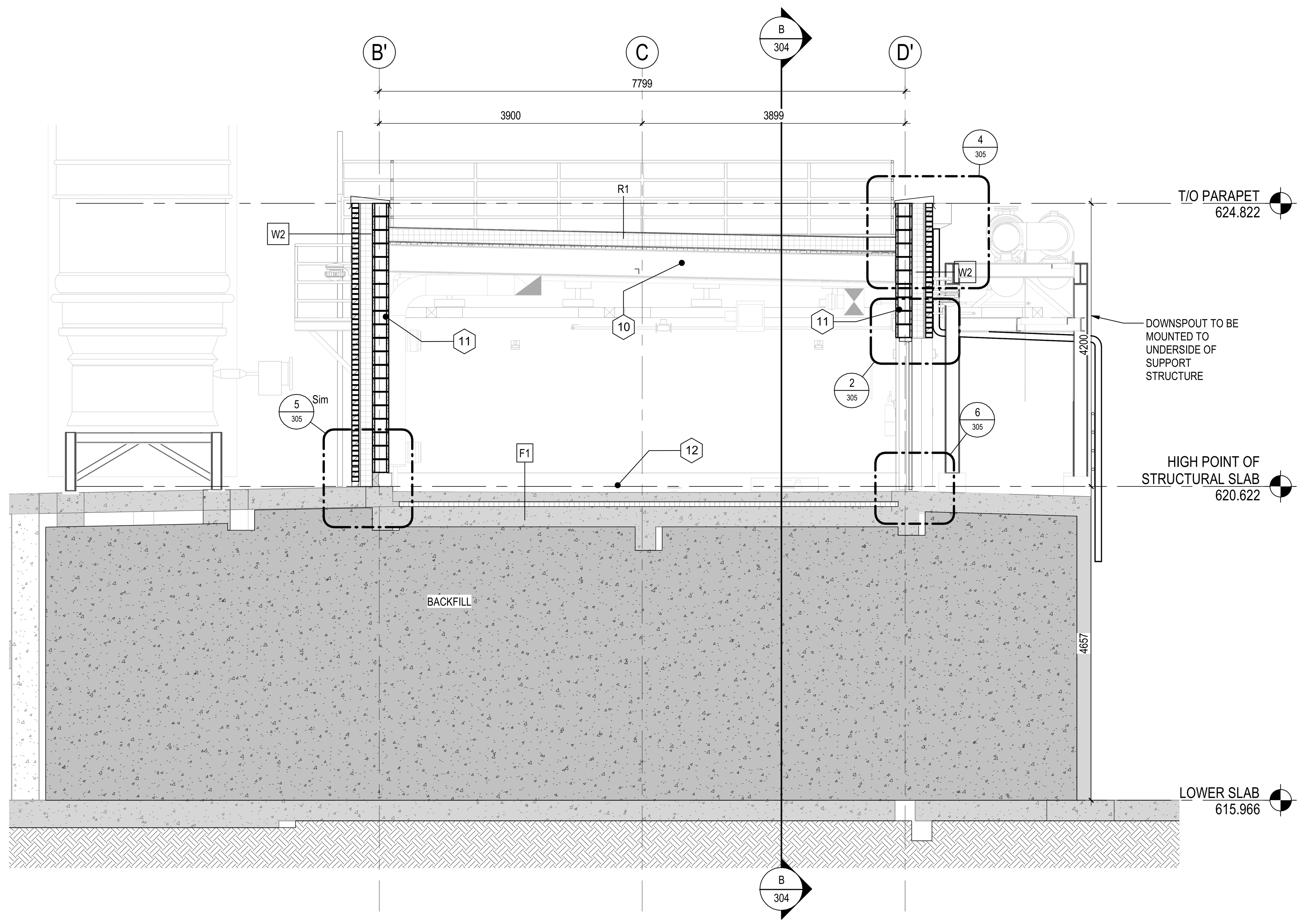
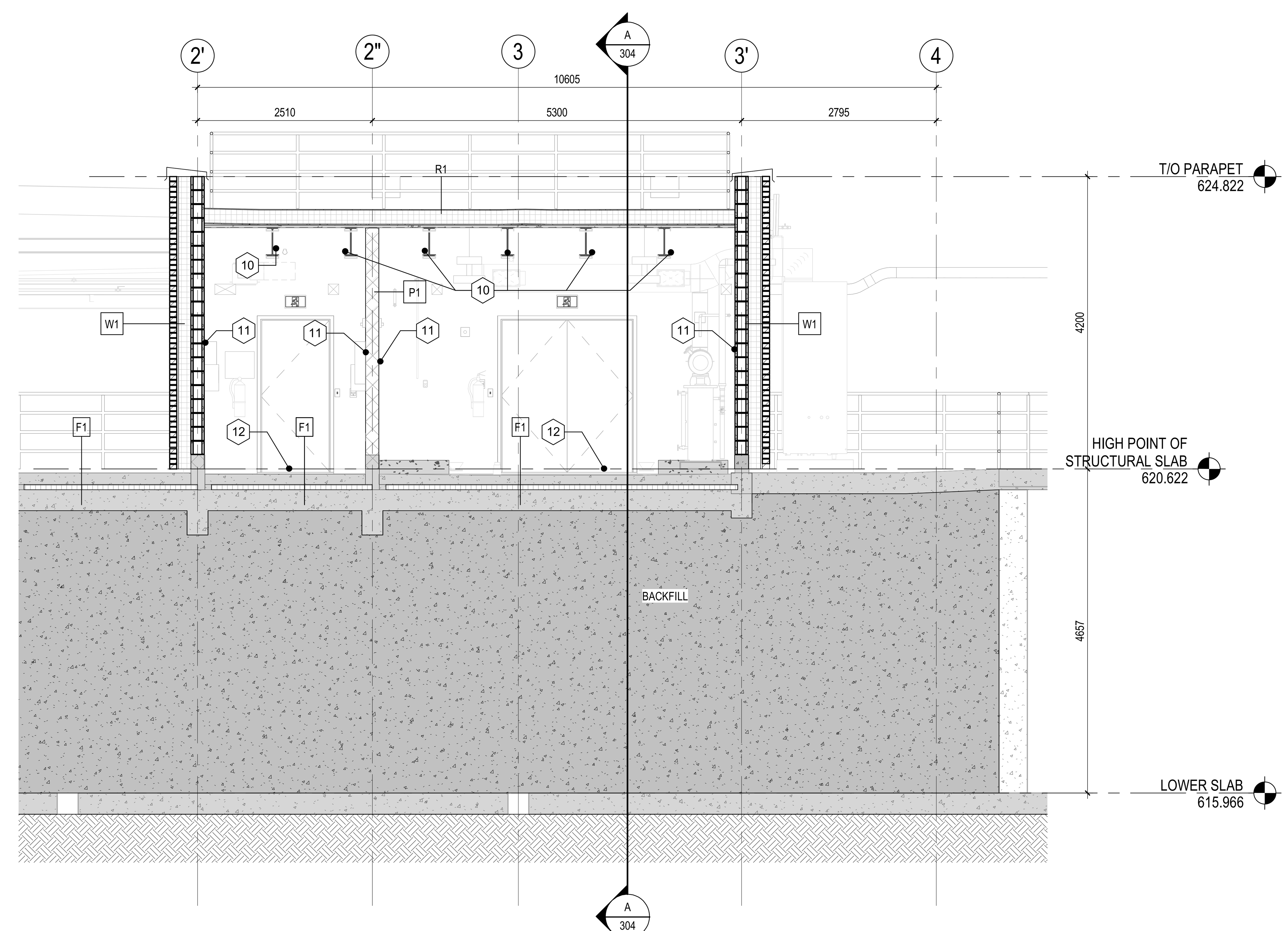



A 302 | 304 **BUILDING SECTION N/S**
1 : 50




B 302 | 304 **BUILDING SECTION E/W**
1 : 50

## SECTION KEYNOTE LEGEND

- 10 PAINT ALL EXPOSED FACES OF STRUCTURAL BEAMS
- 11 PAINT ALL EXPOSED INTEROR FACES OF WALL
- 12 PAINT CONCRETE FLOOR WITH A 2 - PART EPOXY PAINT

| REFERENCE DRAWING | | REVISION | | | | | | |
|---|---|---|---|---|---|---|---|---|
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PROJECT NAME: GBWWTP FLARE CAPACITY EXPANSION

DRAWING TITLE:

ARCHITECTURAL
BUILDING SECTIONS

| CONSULTANT JOB No. | EPCOR PROJECT No. | SCALE | SHEET | DRAWING NUMBER |
|---|---|---|---|---|
| 1101000105 | PMO 1004723; PF14-015 | As indicated | of 99 | PRJ-15 -157 -304 |

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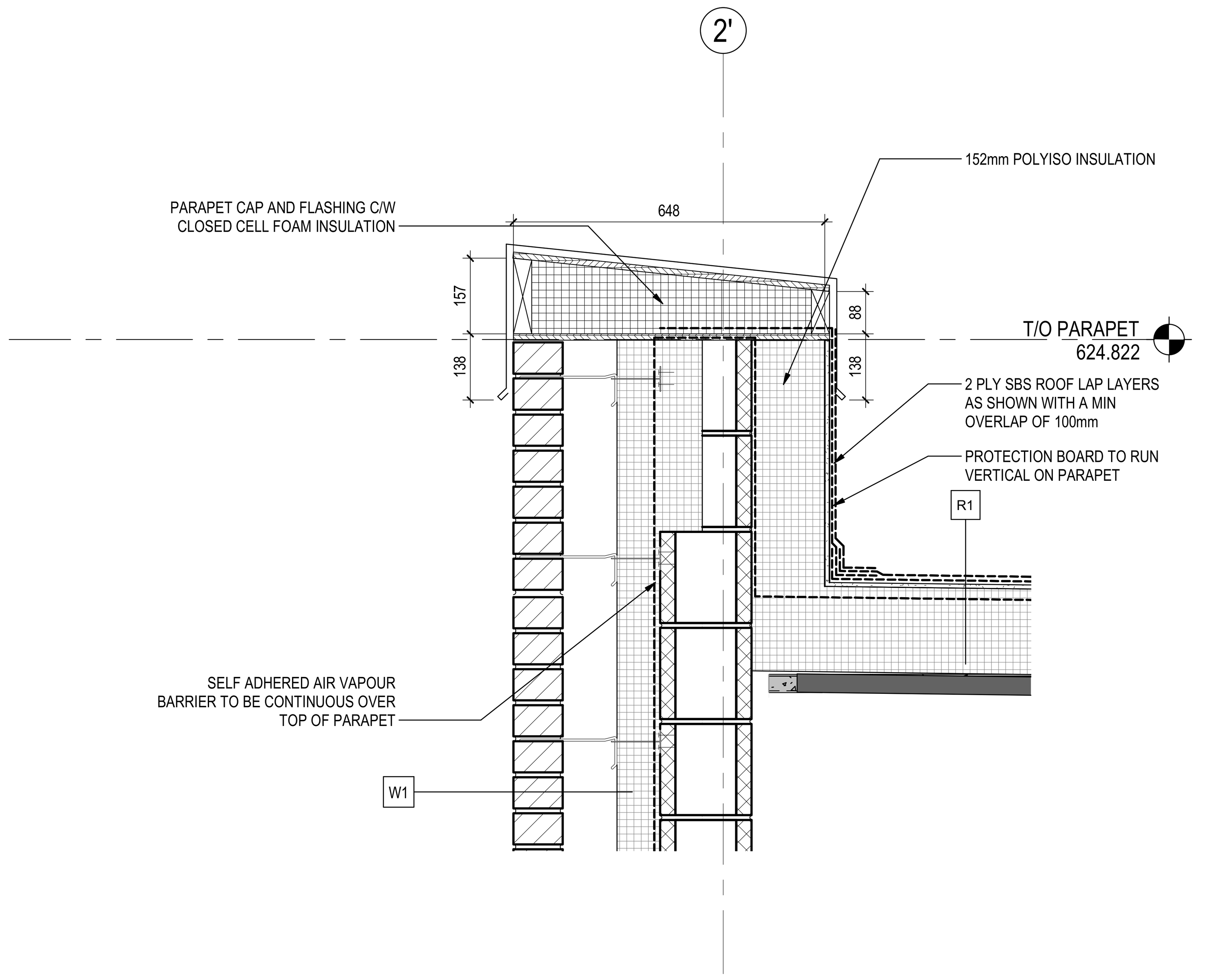
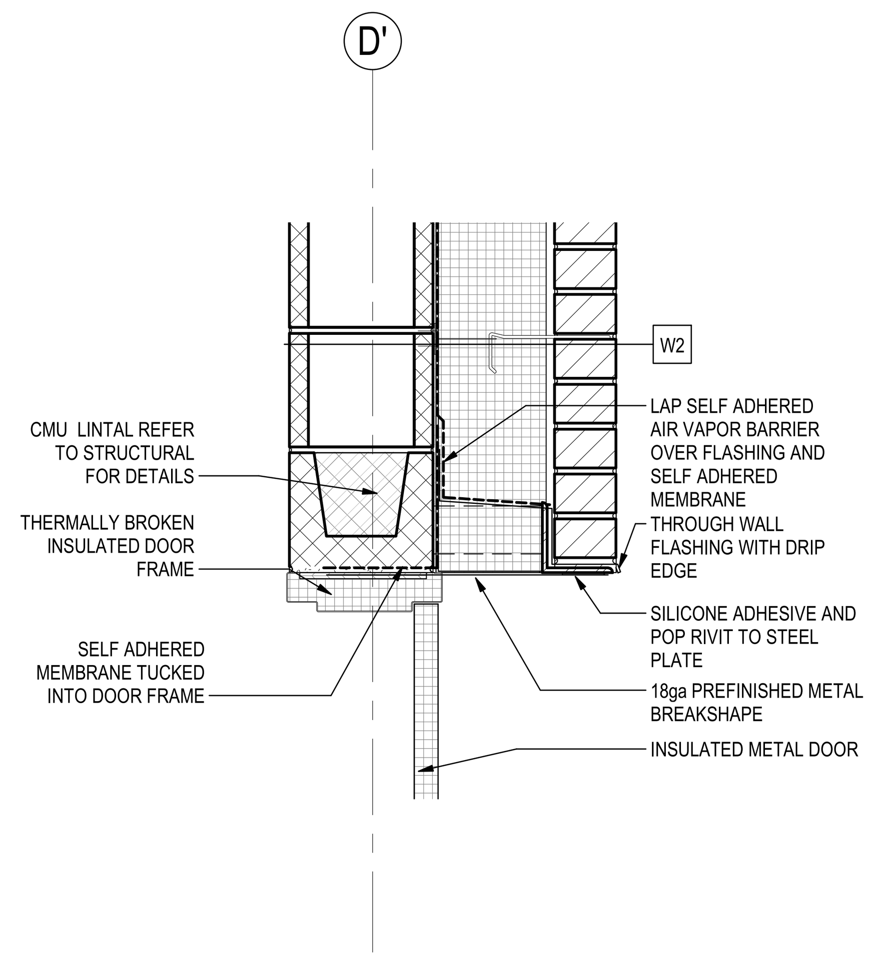
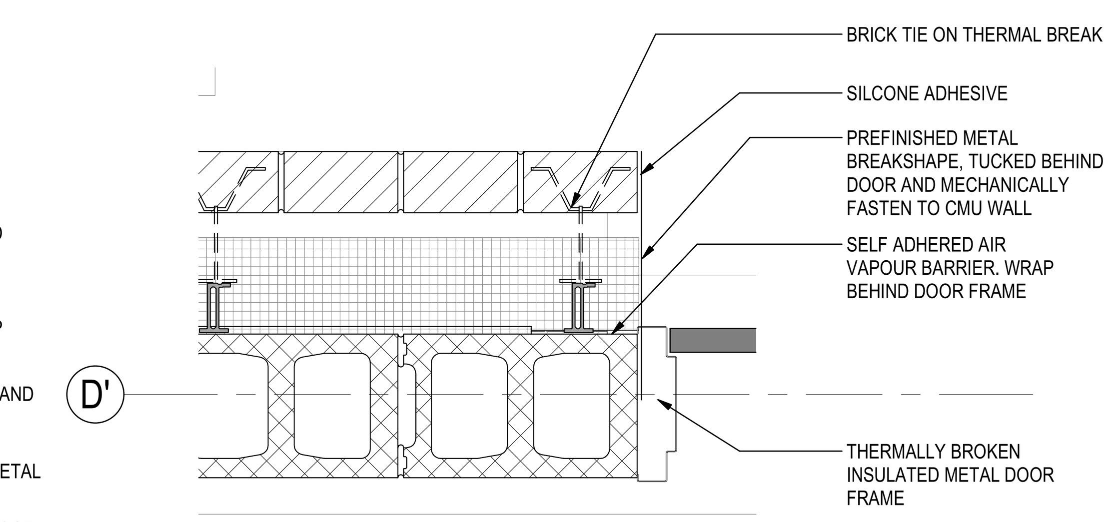


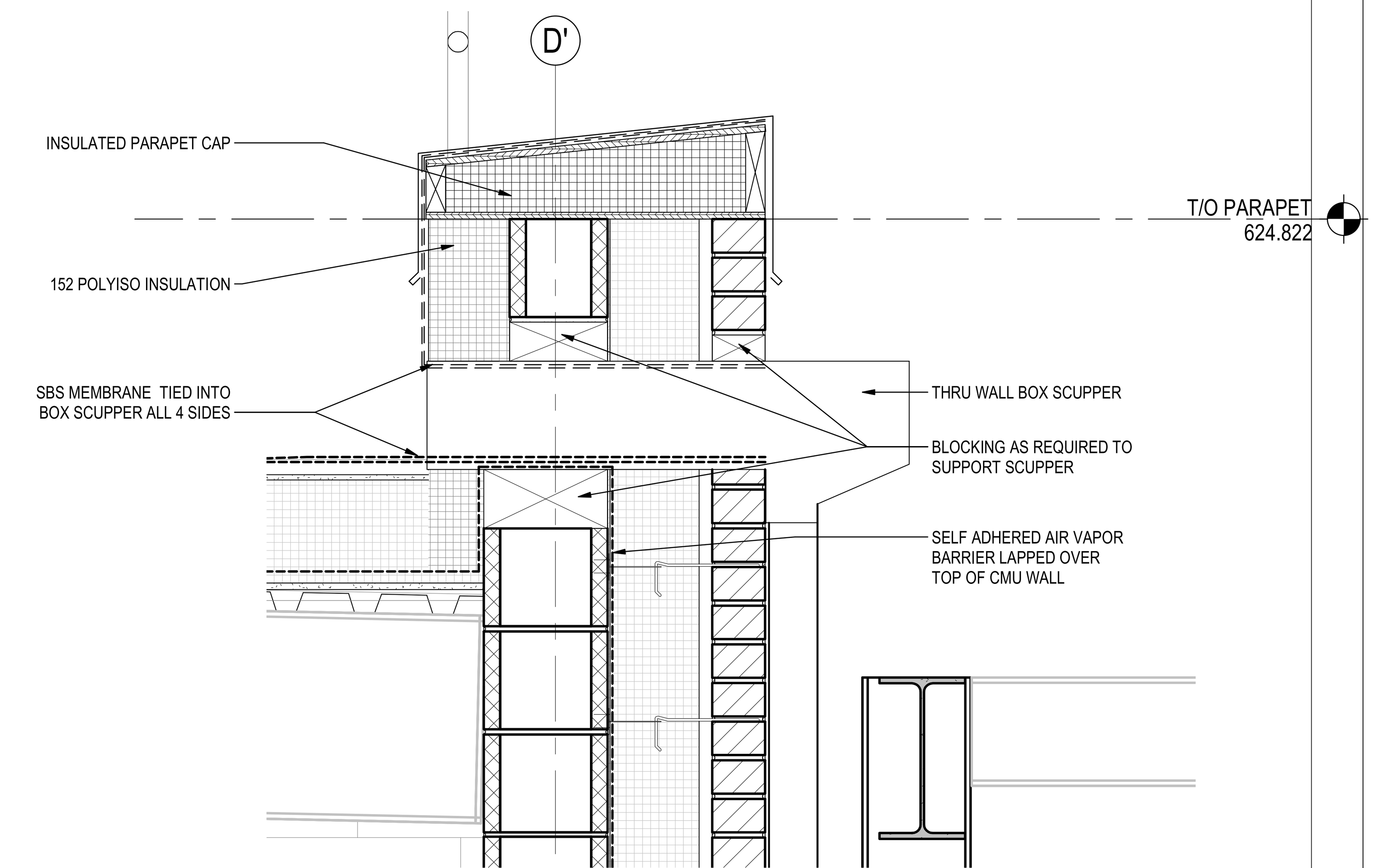

## 1 DETAIL - PARAPET
305
1 : 10



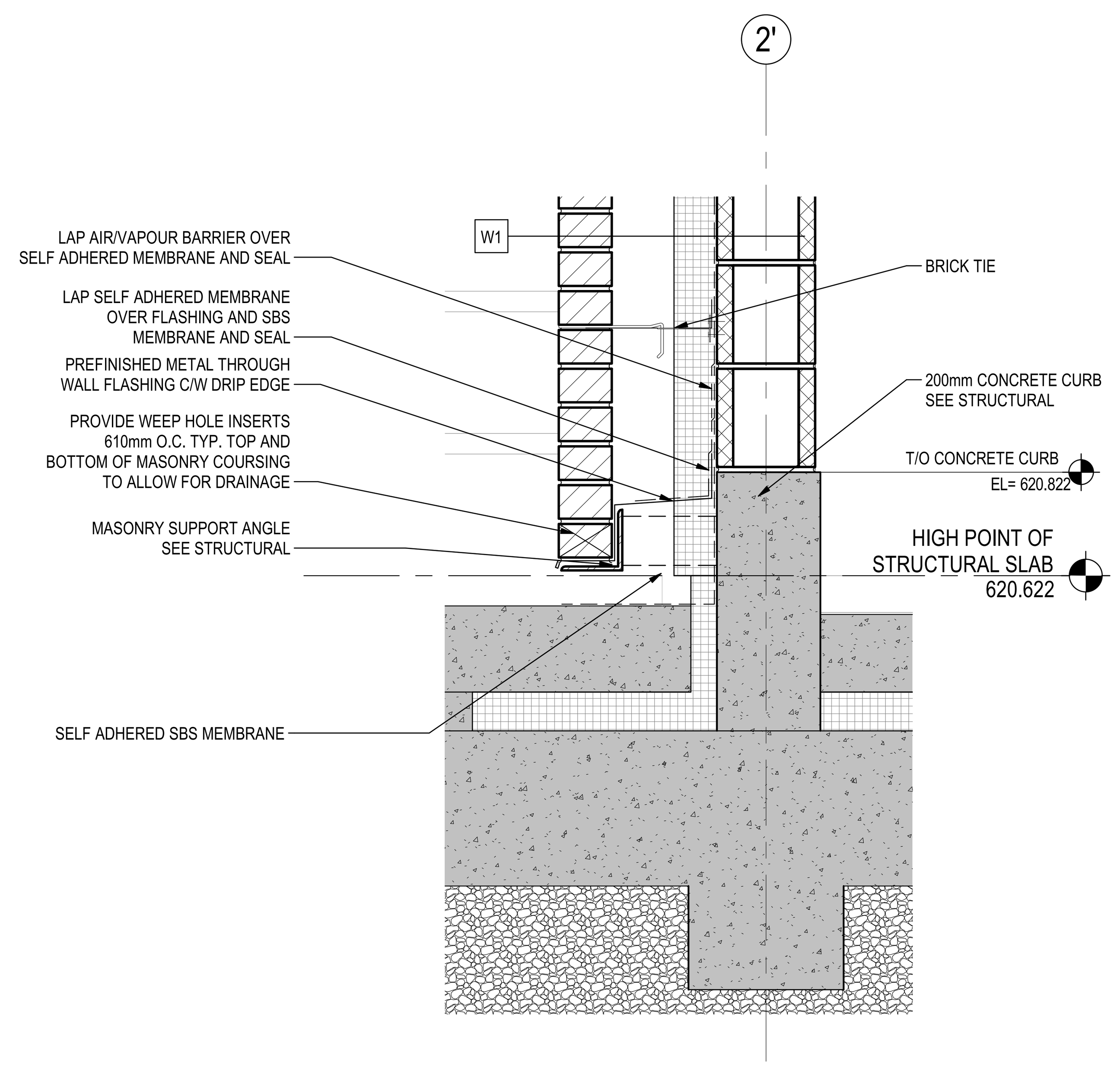

## 2 DETAIL - DOOR HEAD
304 305
1 : 10



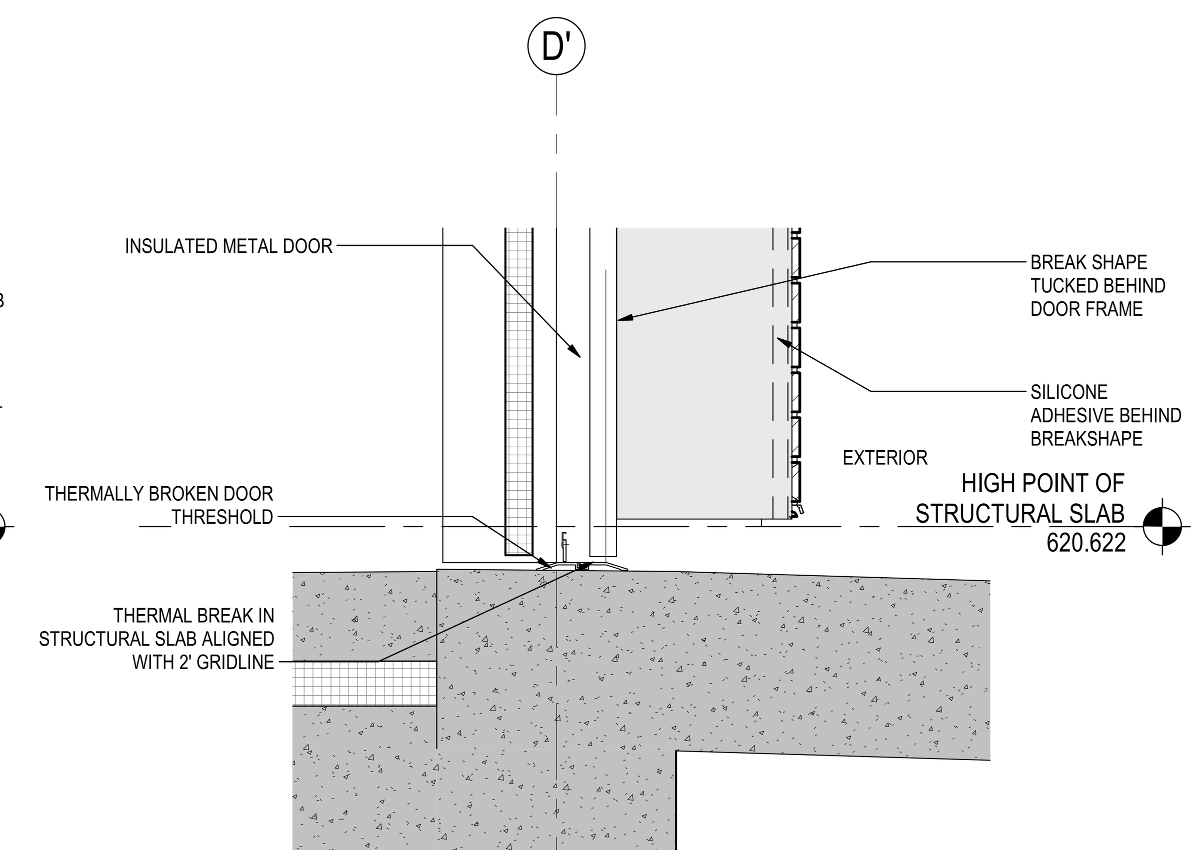

## 3 DETAIL - DOOR JAMB TYP
302 305
1 : 10



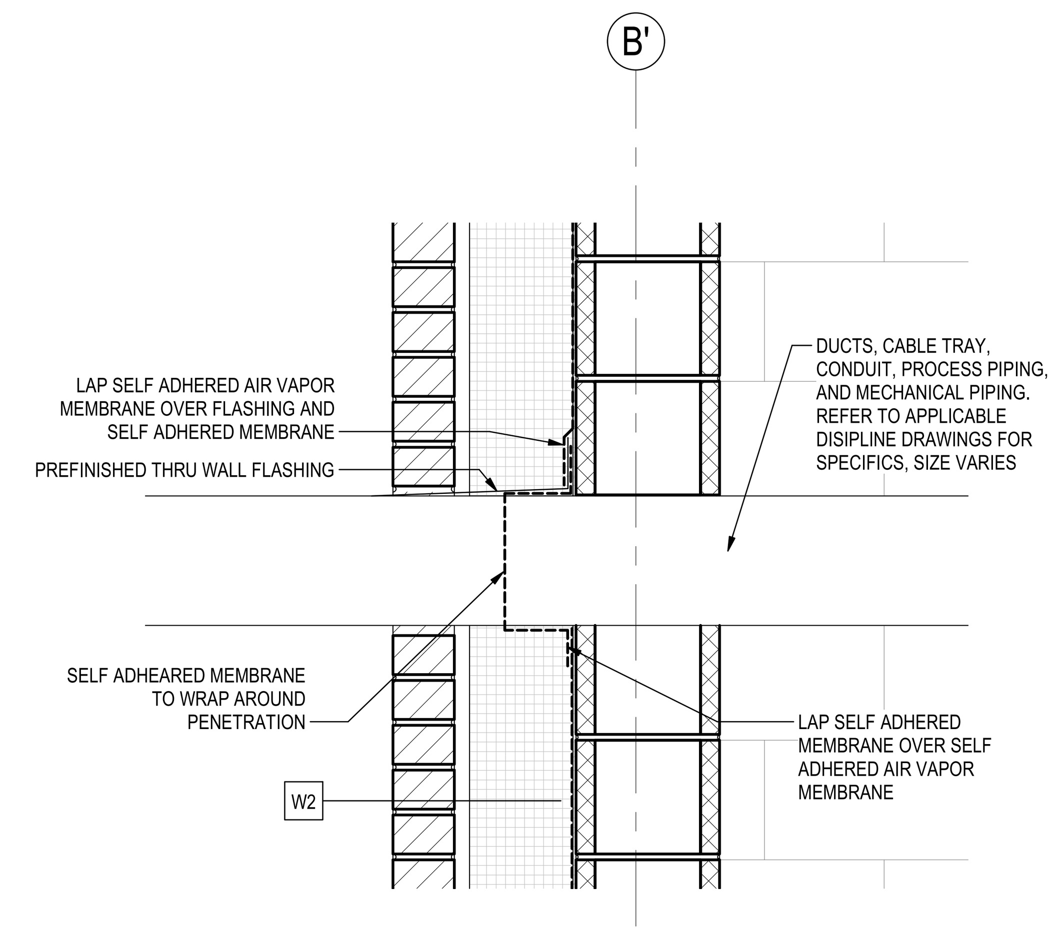

## 4 DETAIL - SCUPPER
304 305
1 : 10



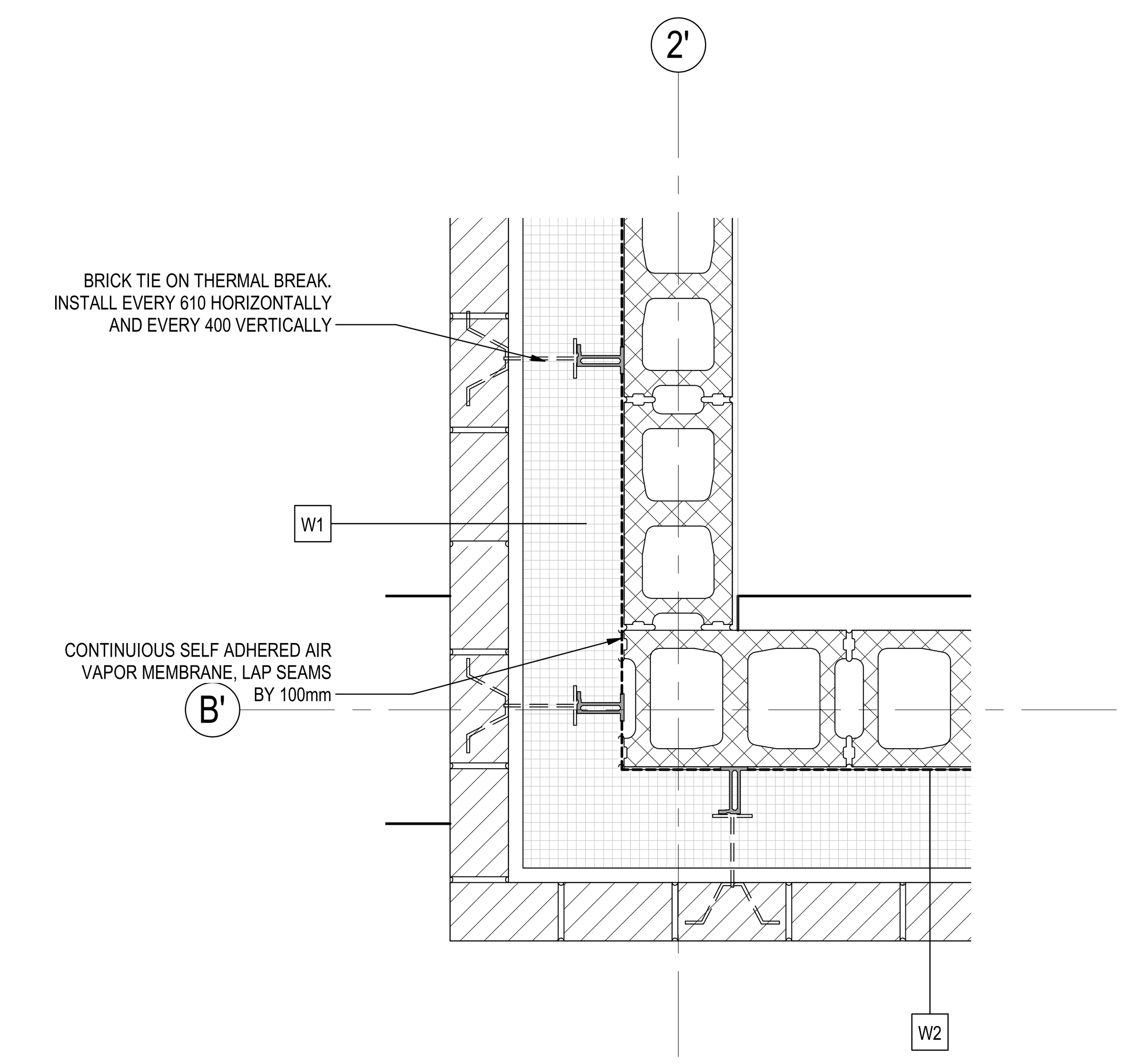

## 5 DETAIL - WALL BASE
304 305
1 : 10




## 6 DETAIL - DOOR THRESHOLD
304 305
1 : 10




## 7 DETAIL - WALL PENETRATION
305
1 : 10




## 8 DETAIL - CORNER
302 305
1 : 10

| REFERENCE DRAWING | | REVISION | | | | | | |
|---|---|---|---|---|---|---|---|---|
| DRAWING No. | DRAWING TITLE | Rev. | DATE | DESCRIPTION | BY | DES. | CHK. | ENG. |
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PLANT AREA: PLANT WIDE
PROJECT NAME: GBWWTP FLARE CAPACITY EXPANSION
DRAWING TITLE:
ARCHITECTURAL
BUILDING DETAILS

| CONSULTANT JOB No. | EPCOR PROJECT No. | SCALE | SHEET | DRAWING NUMBER |
|---|---|---|---|---|
| 1101000105 | PMO 1004723; PF14-015 | 1 : 10 | of 99 | PRJ-15 -157 -305 |

<Pick location in Project Information>
11/22/2024 3:06:55 PM

## EQUIPMENT FUNCTIONAL IDENTIFIERS

| ABBREV. | DESCRIPTION |
|---|---|
| AMM | AMMETER |
| ANC | SAFETY ANCHOR |
| ATS | AUTOMATIC TRANSFER SWITCH |
| BAT | BATTERY BANK |
| BKR | BREAKER |
| CAL | CALIBRATION CHAMBER, CYLINDER OR COLUMN |
| CAP | CAPACITOR BANK |
| CBC | BELT CONVEYOR |
| CCH | CONVEYANCE - CHANNEL |
| CDP | CENTRAL DISTRIBUTION PANEL |
| CHG | BATTERY CHARGER |
| CMC | COMMUNICATION CABLE (FIBER OPTIC/ETHERNET/TELEPHONE) |
| COL | COLLECTOR |
| CPI | CONVEYANCE - PIPE |
| CRN | CRANE |
| CRV | ROTARY VANE FEEDER |
| CSC | SCREW CONVEYOR |
| DCC | DIGITAL CONTROL CABINET |
| DCP | D.C. POWER SUPPLY |
| DSC | DISCONNECT SWITCH |
| ECAB | ELECTRICAL CABINET |
| ECP | CONTROL TERMINAL STATION (DELTA V OR PLC) |
| EDC | CAMERA |
| FAP | FIRE ALARM PANEL |
| FFJB | FIELDBUS JUNCTION BOX |
| FJB | FIBER OPTICS JUNCTION BOX |
| FLR | FLARE |
| GAH | AIR HANDLING UNIT |
| GBB | BLOWER |
| GBX | GEARBOX |
| GCC | CENTRIFUGAL COMPRESSOR |
| GEF | EXHAUST FANS |
| GEN | GENERATORS |
| GRC | RECIPROCATING COMPRESSOR |
| GSF | SUPPLY FANS |
| GTC | ROTARY COMPRESSOR |
| GTW | GATEWAY TERMINAL CABINET |
| HFL | HARMONIC FILTER |
| HVC | HIGH VOLTAGE CABLE (ABOVE 750 VOLTS) |
| HWT | HOT WATER HEATER OR IMMERSION HEATER |
| IJB | INSTRUMENT JUNCTION BOX |
| IJP | INSTRUMENT POWER JUNCTION BOX |
| LCP | LOCAL CONTROL PANEL |
| LTG | LIGHTING PANEL |
| LVC | LOW VOLTAGE CABLE (LESS THAN 30 VOLTS) |
| MCC | MOTOR CONTROL CENTER |
| MMS | MOTOR STARTER |
| MTP | MARSHALLING TERMINAL PANEL |
| MTR | ELECTRIC MOTOR |
| MTS | MANUAL TRANSFER SWITCH |
| MVC | MEDIUM VOLTAGE CABLE (BETWEEN 31 VOLTS AND 749 VOLTS) |
| MXA | MIXER OR AGITATOR |
| MXI | INLINE MIXER |
| MXS | STATIC VANE MIXER |
| MXT | MIXING TEE |

| ABBREV. | DESCRIPTION |
|---|---|
| PCP | CENTRIFUGAL PUMP |
| PDP | POSITIVE DISPLACEMENT PUMP |
| PSP | SUBMERSIBLE PUMP |
| QBP | BACKFLOW PREVENTOR |
| QEN | ENGINE |
| QEW | EYE WASH STATION |
| QMD | DOOR OPERATOR |
| QPD | PULSATION DAMPER |
| QRD | BACKDRAFT / PRESSURE RELIEF DAMPERS |
| QRO | RESTRICTION ORIFICE / ROTAMETER |
| QSS | SAFETY SHOWER |
| QSU | STERILIZING UNIT, OR OZONE GENERATOR |
| QUS | UTILITY STATION - AIR / WATER / STEAM |
| SCD | SCADA TERMINAL CABINET |
| SCR | FIXED SCREEN |
| SCY | CYCLONE |
| SEP | SEPARATOR |
| SFI | FILTER |
| SHS | WEIR OR HYDROSCREEN |
| SMT | SEDIMENT AND MOISTURE TRAP |
| SPL | SPLITTER |
| SSB | SCRUBBER |
| SST | TANK RAKE |
| STR | STRAINER |
| STW | TRAVELING WATER SCREEN |
| TCT | CONE ROOF TANK |
| TEL | TELEPHONE CABINET |
| TFR | TRANSFORMER |
| TGT | GAS HOLDER |
| THT | HOPPER |
| TOT | OPEN TANK |
| TST | SPHERE / CYLINDER TANK |
| UFM | MULTI-FUNCTION METER/RELAY (MULTILIN/POWERLOGIC/OVERCURRENT/UNDERVOLTAGE) |
| UPS | UNINTERRUPTED POWER SUPPLY |
| VFD | VARIABLE FREQUENCY DRIVE |
| XFB | FIRETUBE BOILER |
| XFF | FIN FAN |
| XHC | COOLER, OR AIR CONDITIONING |
| XPP | PROCESS / PROCESS EXCHANGER |
| XRD | RADIATOR |
| XSB | STEAM BOILER |
| XUH | UNIT HEATERS/MAKE-UP AIR UNIT |
| XXX | UNKNOWN |
| ZAG | MACERATOR |

## VALVE FUNCTIONAL IDENTIFIERS

| ABBREV. | DESCRIPTION |
|---|---|
| ARV | AIR RELEASE VALVE |
| PRV | PRESSURE REGULATING VALVE |
| PSV | PRESSURE SAFETY / RELIEF VALVE |
| PVSV | PRESSURE AND VACUUM SAFETY / RELIEF VALVE |
| TSV | THERMAL SAFETY RELIEF VALVE |
| VAV | VARIABLE AIR VOLUME |
| VCK | CHECK VALVE |
| VLG | STOP LOG |
| VMA | MANUAL ATTACHMENT VALVE - PURGE/VENT, SAMPLE, DRAIN, BYPASS |
| VMI | MANUAL ISOLATION VALVE |
| VSG | MANUAL VALVE - SLUICE / SLIDE GATE |
| VSV | VACUUM SAFETY / RELIEF VALVE |

## COMMODITY ABBREVIATIONS

| ABBREV. | DESCRIPTION |
|---|---|
| ALUM | ALUM (ALUMINUM SULPHATE) |
| BG | BIOGAS |
| BLCH | BLEACH (SODIUM HYPOCHLORITE) |
| BS | BLENDED SLUDGE |
| CSTC | CAUSTIC (SODIUM HYDROXIDE) |
| CTRC | CITRIC ACID |
| SUB | DAF SUBNATANT WATER |
| DSU | DAF SUPERNATANT |
| DSL | DIESEL FUEL |
| DS | DIGESTED SLUDGE |
| DRN | DRAIN PIPING |
| WW-EWMC | EWMC WASTEWATER (ENERKEM, GREYS) |
| FSL | FERMENTED SLUDGE |
| FS | FERMENTED SUPERNATANT |
| FE | FINAL EFFLUENT |
| FW | FIRE WATER |
| GAS | GASOLINE |
| GLR | GLYCOL RETURN |
| GLS | GLYCOL SUPPLY |
| GR | GRIT |
| HWR | HOT WATER RETURN |
| HWS | HOT WATER SUPPLY |
| H2O2 | HYDROGEN PEROXIDE |
| IA | INSTRUMENT AIR |
| ML | MIXED LIQUOR |
| MWD | MEMBRANE WATER DRAIN |
| MPW | MEMBRANE PRODUCT WATER |
| NG | NATURAL GAS |
| NU | NUTRIGOLD |
| ODR | ODOUR CONTROL (FOUL AIR) |
| OIL | OIL |
| PER | PERMEATE (MEMBRANE) |
| IN | PLANT INFLUENT |
| POLY | POLYMER |
| PW | POTABLE WATER |
| PE | PRIMARY EFFLUENT |
| PI | PRIMARY INFLUENT |
| PS | PRIMARY SLUDGE |
| PA | PROCESS AIR |
| PWD | PROCESS WATER DRAIN |
| PRPN | PROPANE |
| RAS | RETURN ACTIVATED SLUDGE |
| SL | SAMPLE LINE |
| SCBR | SCRUBBER SOLUTION |
| SC | SCUM |
| SE | SECONDARY EFFLUENT |
| SS | SECONDARY SLUDGE |
| SBS | SODIUM BISULPHITE (38%) |
| SW | SOFTENED WATER |
| SO2 | SULFITE (NaSO2) |
| SU | SUPERNATANT (LAGOONS, DIGESTERS-OVERFLOW) |
| TPS | THICKENED PRIMARY SLUDGE |
| TWAS | THICKENED WASTE ACTIVATED SLUDGE |
| UW | UTILITY WATER |
| VNT | VENT LINE |
| WAS | WASTE ACTIVATED SLUDGE |

## TYPICAL EQUIPMENT CALLUPS

TXX-XXXXX
TANK NAME
DIM(HxØ): X.Xm x X.XmØ
CAPACITY: XXXXX L
HLL: X.Xm,LLL: X.Xm, HLA X.Xm

PXX-XXXXX
PUMP NAME
RATED POINT: XXXXX ML/DAY @ XXm
MOTOR TAG: MTR-XXXXX
SPEED/HP: XXXX RPM, XXX hp

SXX-XXXXX
VESSEL NAME
PRESS @ TEMP: XXXX kPag @ XXX°C
DIM(HxØ): X.Xm x X.XmØ
CAPACITY: XXXXX L
HLL: X.Xm, LLL: X.Xm, HLA X.Xm

SXX-XXXXX
SCREEN NAME
WIDTH/MAX WATER LEVEL: X.Xm/X.Xm
BAR SPACING/THICKNESS: XXmm/XXmm
DESIGN FLOW/HEADLOSS: XX ML/DAY @ XXmm
MAX RAKE SPEED: X.X m/MIN

GXX-XXXXX
BLOWER/COMPRESSOR NAME
INLET PRESSURE: XXX kPAG
OUTLET PRESSURE: XXX kPag
FLOW RATE: Nm3/hr
TEMP IN/OUT: XX°C/XX°C
MOTOR TAG: MTR-XXXXXX
SPEED/HP: XXXX RPM, XXX hp

XXX-XXXXX
EXCHANGER NAME
SHELL SIDE: FLUID NAME
PRESS @ TEMP: XXXX kPag @ XXX°C
TEMP IN, OUT: X°C, X°C
FLOW RATE: XXXX ML/DAY
TUBE SIDE: FLUID NAME
PRESS @ TEMP: XXXX kPag @ XXX°C
TEMP IN, OUT: X°C, X°C
FLOW RATE: XXXX ML/DAY

COL-XXXXX
COLLECTOR NAME
SPEED: XXX m/min
POWER: XXX hp

## PIPE SPECIFICATION (SEE GB-ES-402)

| ABBREV. | DESCRIPTION |
|---|---|
| DI(101) | GLASS LINED DUCTILE IRON, CLASS 53 ANSI/AWWA, C151/A251.5 |
| PVC(101) | PVC BASIC - ASTM D1785/ASTM F441/SCH80 |
| PVC(102) | PVC BLEACH - ASTM F441/SCH80 |
| PVC(103) | PVC CHEMICAL - ASTM D1785/ASTM F441/SCH80 |
| ST(101) | ---TO BE ANNOUNCED--- |
| ST(102) | CSA GAS - ASTM A53/GR.B/ERW/S/SCH40 |
| ST(103) | GALVANIZED - ASTM A53/GR.B/ERW/S/SCH40, SS316/316L |
| ST(104) | BLACK / SS - ASTM A53/GR.B/ERW/S/XS/STD/SCH80 |
| ST(105) | BLACK, EPOXY LINED - ASTM A312/ERW/S/SCH40, ASTM A53/GR.B/ERW/S |
| ST(106) | BLACK / SS - ASTM A53/GR.B/ERW/S/STD/SCH80, ASTM A312/ERW/S/SCH 40/TP316/316L |
| ST(107) | BLACK, EPOXY LINED - ASTM A312/ERW/S/SCH40, ASTM A53/GR.B/ERW/S/STD |
| ST(108) | BLACK, WELDED - ASTM A106 GR.B/SMLS/SCH40 |
| ST(109) | BLACK, LOW TEMP - ASTM A333 GR.B/SMLS/STD OR XS |
| ST(204) | BLACK / SS - ASTM A53/GR.B/ERW/S/XS/STD/SCH80 |
| SS(101) | ---TO BE ANNOUNCED--- |
| SS(102) | CSA GAS - ASTM A312/ERW/S/SCH40/SCH10/TP316L |
| SS(103) | SS, WELDED - ASTM A312/ERW/S/SCH40/SCH10/TP316L |

## GENERIC PIPE ABBREVIATIONS

| ABBREV. | DESCRIPTION |
|---|---|
| CI | CAST IRON |
| DI | DUCTILE IRON |
| PVC | POLYVINYL CHLORIDE |
| CPVC | CHLORINATED POLYVINYL CHLORIDE |
| PP | POLYPROPYLENE |
| HDPE | HIGH DENSITY POLYETHYLENE |
| PVDF | POLYVINYLIDENE FLUORIDE |
| PTFE | POLYTETRAFLUOROETHYLENE |
| ST | STEEL |
| SS | STAINLESS STEEL |

## PROCESS LINES

SECONDARY OR NON-PROCESS PIPING
PRIMARY PROCESS PIPING
FUTURE
VENDOR PACKAGE BOUNDARY
BOUNDARY MATCHLINE
CHANGE

## LINE SOURCE OR DESTINATION TAG

FLUID/COMMODITY NAME
PID CODE/ DWG#
TO/FROM DESCRIPTION

FLUID/COMMODITY NAME
PID CODE/DWG#
TO/FROM DESCRIPTION

A ON PAGE CONNECTOR

### OPTIONAL CONTINUATION INDICATOR

FLUID/COMMODITY NAME
X PID CODE/ DWG#
TO/FROM DESCRIPTION

FLUID/COMMODITY NAME
PID CODE/DWG# X
TO/FROM DESCRIPTION

FLUID/COMMODITY NAME
PID CODE/ DWG# X
TO/FROM DESCRIPTION

FLUID/COMMODITY NAME
X PID CODE/DWG#
TO/FROM DESCRIPTION

## PIPING LINE IDENTIFICATION TAG

200 - DI(101) - RAS

COMMODITY CODE / ABBREVIATION
PIPE SPECIFICATION MATERIAL / CODE (SEE GB-ES-402)
NOMINAL LINE SIZE (mm)

## ELECTRICAL & PROCESS EQUIPMENT IDENTIFICATION TAG

ZAG - 12345

SEQUENTIAL IDENTIFIER (5 DIGIT NO.) ( UNIQUE FIVE (5) DIGIT NUMBER )
FUNCTIONAL IDENTIFICATION CODE (SEE GB-ES-003)

## EQUIVALENT NOMINAL DIAMETERS OF PIPE

| mm | INCHES | mm | INCHES | mm | INCHES |
|---|---|---|---|---|---|
| 3 | 1/8" | 65 | 2-1/2" | 375 | 15" |
| 6 | 1/4" | 75 | 3" | 450 | 18" |
| 10 | 3/8" | 90 | 3-1/2" | 500 | 20" |
| 15 | 1/2" | 100 | 4" | 600 | 24" |
| 20 | 3/4" | 125 | 5" | 750 | 30" |
| 25 | 1" | 150 | 6" | | |
| 30 | 1-1/4" | 200 | 8" | | |
| 40 | 1-1/2" | 250 | 10" | | |
| 50 | 2" | 300 | 12" | | |

REFERENCE DRAWING

| DRAWING No. | DRAWING TITLE |
|---|---|
| | |

REVISION

| Rev. | DATE | DESCRIPTION | BY | DES. | CHK. | ENG. |
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| 0C | 30-AUG-2024 | ISSUED FOR 90% DESIGN | JD | AY | NB | GP |
| 0D | 15-NOV-2024 | ISSUED FOR CONSTRUCTION | JD | AY | NB | GP |

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EPCOR

PLANT SITE: GOLD BAR WWTP
PLANT AREA: PLANT WIDE
PROJECT NAME: GBWWTP FLARE CAPACITY EXPANSION
DRAWING TITLE: PROCESS SYMBOLS AND ABBREVIATIONS SHEET 1 OF 4

| CONSULTANT JOB No. | EPCOR PROJECT No. | SCALE | SHEET | DRAWING NUMBER |
|---|---|---|---|---|
| 1101000105 | PMO 1004723; PF14-015 | NTS | 1 OF 4 | PRJ-15-157-401 |


| REFERENCE DRAWING | | REVISION | | | | | | |
|---|---|---|---|---|---|---|---|---|
| DRAWING No. | DRAWING TITLE | Rev. | DATE | DESCRIPTION | BY | DES. | CHK. | ENG. |
| | | 0A | 06-JUL-2023 | ISSUED FOR PRELIMINARY DESIGN | - | - | - | - |
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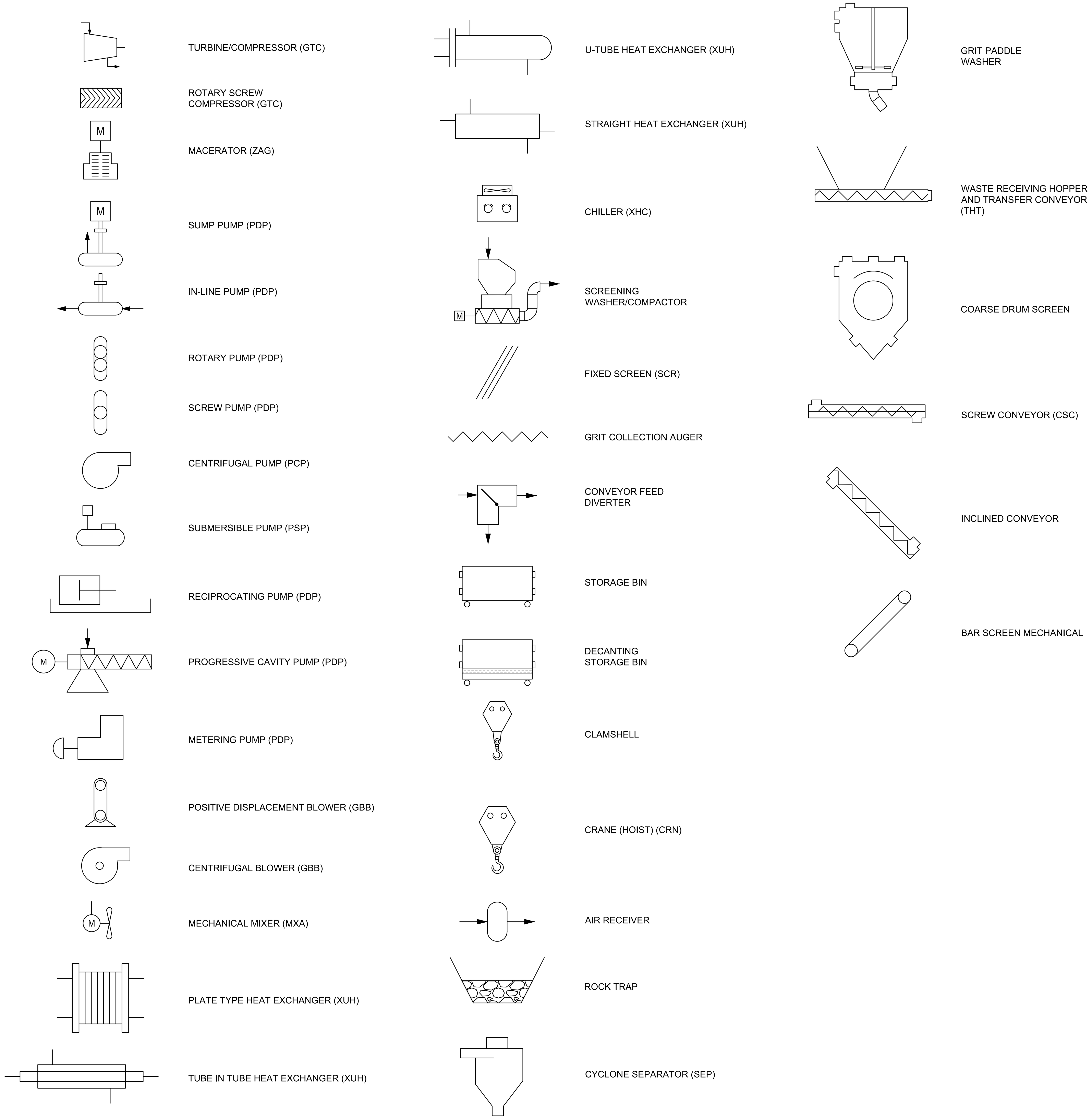
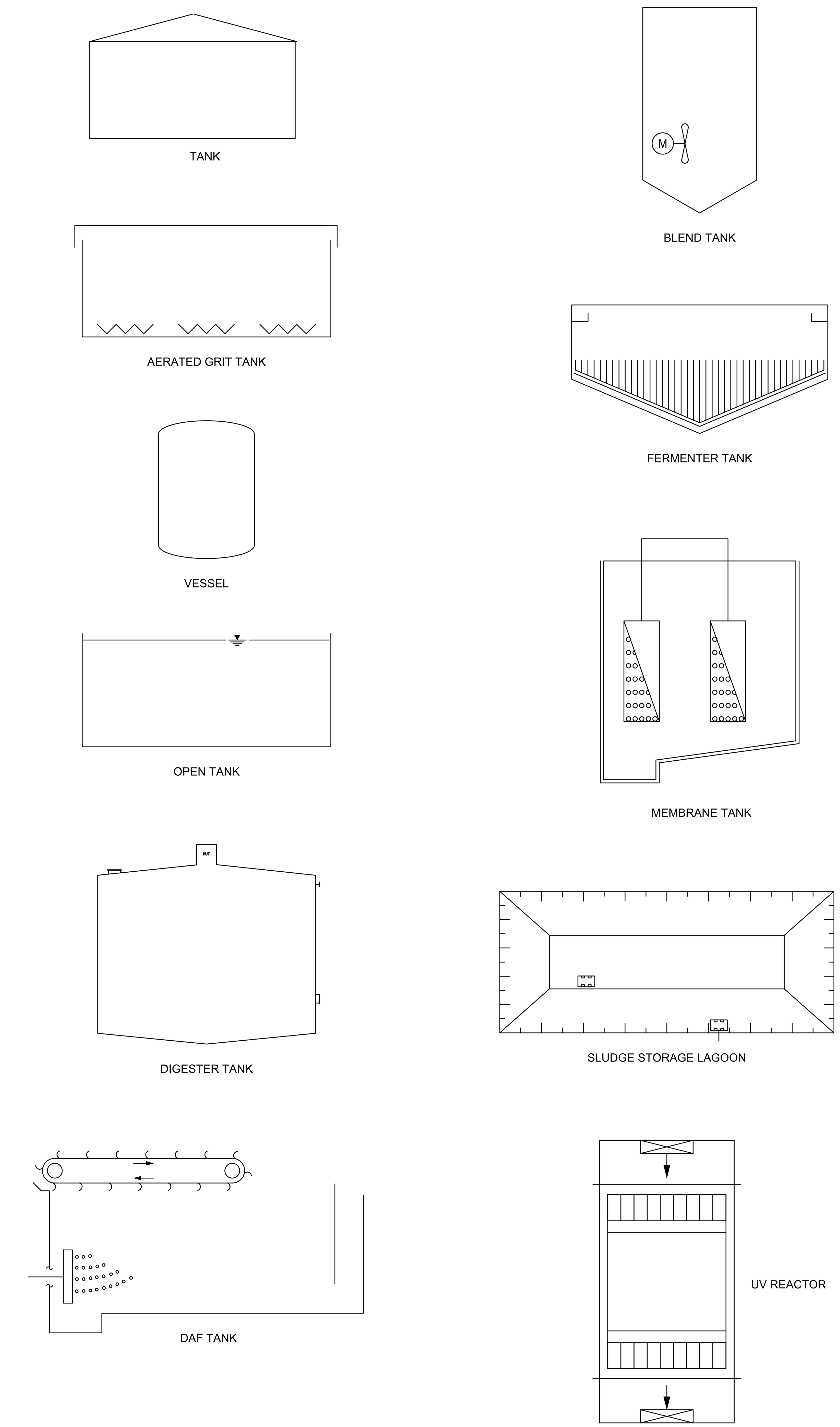
PLANT SITE: GOLD BAR WWTP
PLANT AREA: PLANT WIDE
PROJECT NAME: GBWWTP FLARE CAPACITY EXPANSION
DRAWING TITLE: PROCESS SYMBOLS AND ABBREVIATIONS SHEET 2 OF 4

| CONSULTANT JOB No. | EPCOR PROJECT No. | SCALE | SHEET | DRAWING NUMBER |
|---|---|---|---|---|
| 1101000105 | PMO 1004723; PF14-015 | NTS | 2 OF 4 | PRJ-15-157-402 |

## EQUIPMENT




## VESSELS & TANKS




| REFERENCE DRAWING | | REVISION | | | | | | |
|---|---|---|---|---|---|---|---|---|
| DRAWING No. | DRAWING TITLE | Rev. | DATE | DESCRIPTION | BY | DES. | CHK. | ENG. |
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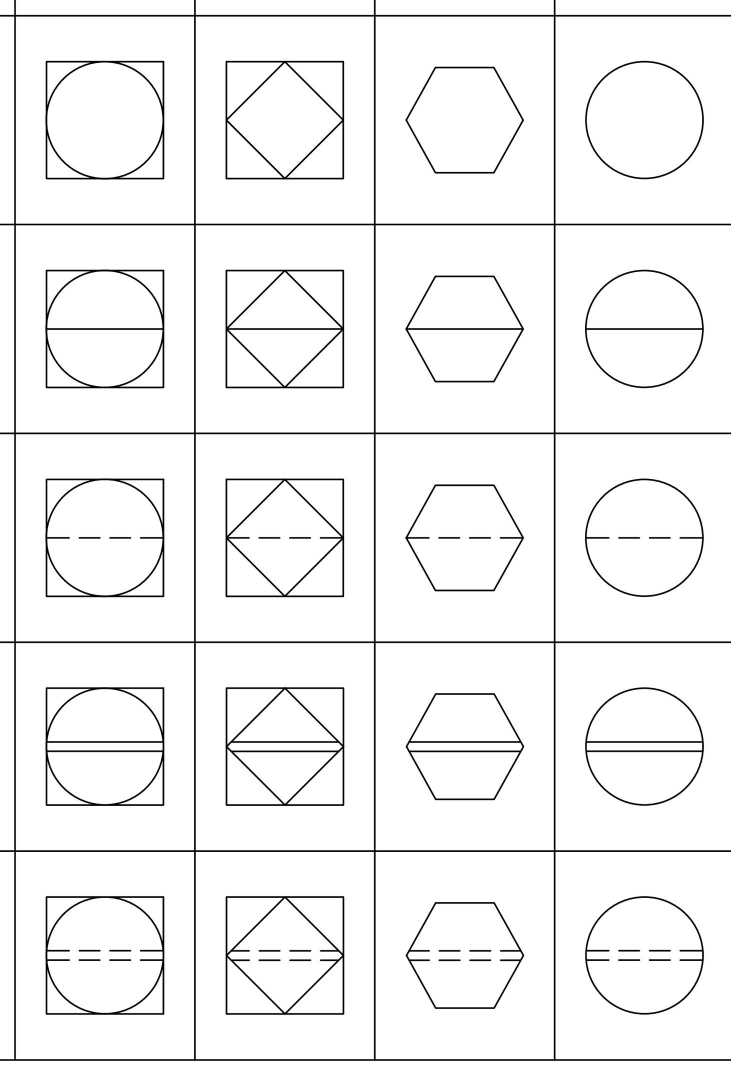
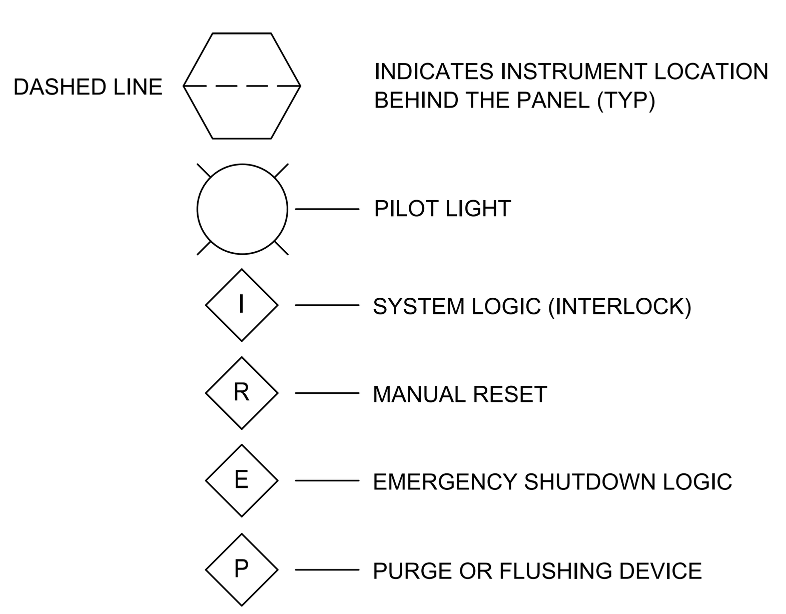
PLANT AREA: PLANT WIDE
PROJECT NAME: GBWWTP FLARE CAPACITY EXPANSION
DRAWING TITLE: PROCESS SYMBOLS AND ABBREVIATIONS SHEET 3 OF 4

| CONSULTANT JOB No. | EPCOR PROJECT No. | SCALE | SHEET | DRAWING NUMBER |
|---|---|---|---|---|
| 1101000105 | PMO 1004723; PF14-015 | NTS | 3 OF 4 | PRJ-15-157-403 |

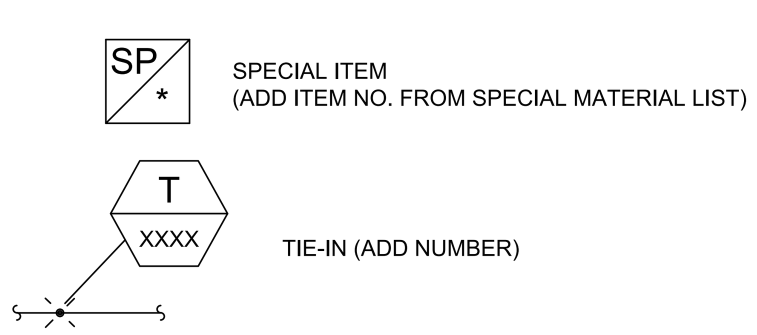
## INSTRUMENTATION DEVICE AND FUNCTION SYMBOLS

| No. | SHARED DISPLAY, SHARED CONTROL A: PRIMARY CHOICE OR BASIC PROCESS CONTROL SYSTEM | SHARED DISPLAY, SHARED CONTROL B: ALTERNATE CHOICE OR SAFETY INSTRUMENTED SYSTEM | C: COMPUTER SYSTEMS AND SOFTWARE | D: DISCRETE | LOCATION & ACCESSIBILITY |
|---|---|---|---|---|---|
| 1 | | | | | • LOCATED IN FIELD.<br>• NOT PANEL, CABINET, OR CONSOLE MOUNTED.<br>• VISIBLE AT FIELD LOCATION.<br>• NORMALLY OPERATOR ACCESSIBLE. |
| 2 | | | | | • LOCATED IN OR ON FRONT OF CENTRAL OR MAIN PANEL OR CONSOLE.<br>• VISIBLE ON FRONT OF PANEL OR ON VIDEO DISPLAY.<br>• NORMALLY OPERATOR ACCESSIBLE AT PANEL FRONT OR CONSOLE. |
| 3 | | | | | • LOCATED IN REAR OF CENTRAL OR MAIN PANEL.<br>• LOCATED IN CABINET BEHIND PANEL.<br>• NOT VISIBLE ON FRONT OF PANEL OR ON VIDEO DISPLAY.<br>• NOT NORMALLY OPERATOR ACCESSIBLE AT PANEL OR CONSOLE. |
| 4 | | | | | • LOCATED IN OR ON FRONT OF SECONDARY OR LOCAL PANEL OR CONSOLE.<br>• VISIBLE ON FRONT OF PANEL OR ON VIDEO DISPLAY.<br>• NORMALLY OPERATOR ACCESSIBLE AT PANEL FRONT OR CONSOLE. |
| 5 | | | | | • LOCATED IN REAR OF SECONDARY OR LOCAL PANEL.<br>• LOCATED IN FIELD CABINET.<br>• NOT VISIBLE ON FRONT OF PANEL OR ON VIDEO DISPLAY.<br>• NOT NORMALLY OPERATOR ACCESSIBLE AT PANEL OR CONSOLE. |





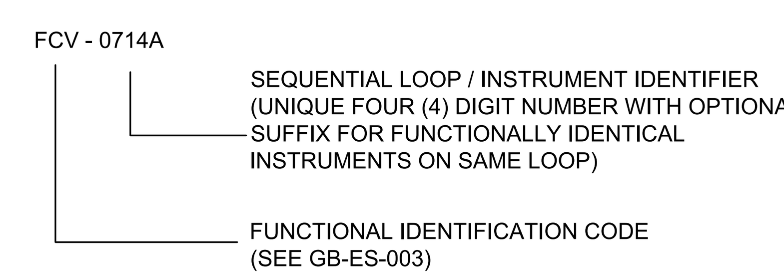

## REFERENCE SYSTEMS



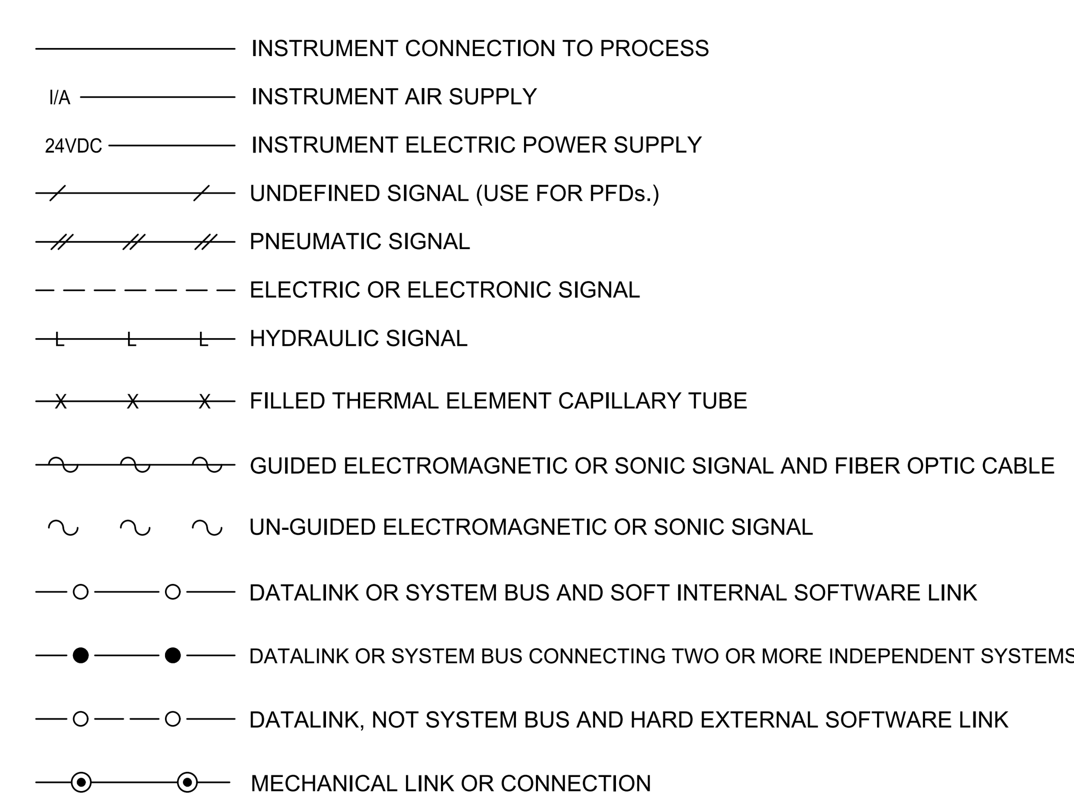

## INSTRUMENT IDENTIFICATION

| VARIABLE | PRIMARY ELEMENT | INDICATOR | RECORDER | CONTROLLER | | | TRANS-MITTER | ALARM-SHUTDOWN | | CONTROL VALVE OR REGULATOR | SELF-ACTUATING VALVE | RELAY OR CONVERTER | INDICATOR TOTALIZER | INTEGRATOR | MULTIPLEX |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | BLIND | INDICATING | RECORDING | | SWITCH | ALARM | | | | | | |
| ANALYSIS | AE | AI | AR | AC | AIC | ARC | AT | AS | AA | AV | | AY | | | AJY |
| BURNER FLAME | BE | BI | BR | BC | | | BT | BS | BA | BV | | BY | | | BJY |
| CONDUCTIVITY | CE | CI | CR | | CIC | CRC | CT | CS | CA | CV | | CY | | | CJY |
| DENSITY | DE | DI | DR | | DIC | DRC | DT | DS | DA | DV | | DY | | | DJY |
| VOLTAGE (EMF) | EE | EI | ER | EC | EIC | ERC | ET | ES | EA | EV | | EY | | | |
| FLOW | FE | FI | FR | FC | FIC | FRC | FT | FS | FA | FV | FCV | FY | FQI | FQ | |
| FLOW RATIO | | FFI | FFR | FFC | FFIC | FFRC | | FFS | FFA | FFV | | | | | |
| GAGING (DIMENSIONAL) | GE | GI | GR | GC | GIC | GRC | GT | GS | GA | GV | | | | | |
| HAND | | | | HC | HIC | | | HS | | HV | HCV | | | | |
| CURRENT | IE | II | IR | IC | IIC | IRC | IT | IS | IA | | | IY | | | |
| POWER | JE | JI | JR | JC | JIC | JRC | JT | JS | JA | | | JY | | | |
| TIME | | KI | KR | KC | KIC | KRC | KT | KS | KA | | | KY | | | |
| LEVEL | LE | LI | LR | LC | LIC | LRC | LT | LS | LA | LV | LCV | LY | | | LJY |
| MOISTURE | ME | MI | MR | MC | MIC | MRC | MT | MS | MA | MV | | MY | | | MJY |
| USER'S CHOICE | NE | | | | | | | | | | | | | | |
| TORQUE | OE | OI | OR | OC | OIC | ORC | OT | OS | OA | OV | | OY | | | |
| PRESSURE | PE | PI | PR | PC | PIC | PRC | PT | PS | PA | PV | PCV | PY | | | PJY |
| PRESSURE DIFFERENTIAL | PDE | PDI | PDR | PDC | PDIC | PDRC | PDT | PDS | PDA | PDV | PDCV | | | | |
| QUANTITY OR EVENT | | QI | QR | QC | QIC | QRC | QT | QS | QA | QV | | QY | | | |
| RADIATION | RE | RI | RR | RC | RIC | RRC | RT | RS | RA | | | RY | | | |
| SPEED OR FREQUENCY | | SI | SR | SC | SIC | SRC | ST | SS | SA | | | SY | | | |
| TEMPERATURE | TE | TI | TR | TC | TIC | TRC | TT | TS | TA | TV | TCV | TY | | | TJY |
| TEMPERATURE DIFFERENTIAL | | TDI | TDR | TDC | TDIC | TDRC | TDT | TDS | TDA | TDV | TDCV | | | | |
| MULTI-VARIABLE | | UI | UR | UC | UIC | URC | | US | UA | UV | | UY | | | |
| VISCOSITY OR VIBRATION | VE | VI | VR | VC | VIC | VRC | VT | VS | VA | VV | | VY | | | |
| WEIGHT | WE | WI | WR | WC | WIC | WRC | WT | WS | WA | WV | | WY | WQI | WQ | |
| UNCLASSIFIED | XE | XI | XR | XC | XIC | XRC | XT | XS | XA | XV | | XY | | | |
| USER'S CHOICE | | | | | | | | | | | | YY | | | |
| POSITION | ZE | ZI | ZR | ZC | ZIC | ZRC | ZT | ZS | ZA | | | ZY | | | |

## INSTRUMENT IDENTIFICATION TAG




## INSTRUMENT LINE SYMBOLS




## INSTRUMENT SUBSCRIPT ABBREVIATIONS

| | | | |
|---|---|---|---|
| ACK | ACKNOWLEDGE | M/A | MANUAL/AUTO |
| A/S | AIR SUPPLY | NAH | HIGH TORQUE |
| BRG | BEARING | NAHH | HIGH HIGH TORQUE |
| CT | CURRENT TRANSFORMER | O2 | OXYGEN |
| CL2 | CHLORINE GAS | OBD | OUTBOARD |
| COMB | COMBUSTIBLE | O/C | OPEN/CLOSE |
| DIFF | DIFFERENTIAL | O/L | OVERLOAD |
| DISCH | DISCHARGE | O/O | ON/OFF |
| DO | DISSOLVED OXYGEN | OIL | OIL |
| D/P | DIFFERENTIAL PRESSURE | OH | OVERHEAT |
| ESO | EMERGENCY SHUTDOWN | ORP | OXYGEN REDUCTION POTENTIAL |
| ETM | ELAPSED TIME METER | PH | PH |
| FC | FAIL CLOSED | PAR | PROCESS ALARM RELAY |
| FO | FAIL OPEN | RESET | RESET |
| H | HIGH | S2 | SULFUR DIOXIDE |
| HH | HIGH HIGH | SP | SET POINT |
| HK | ADJUSTABLE SPEED SETPOINT | SW | SELECTOR SWITCH |
| H/O/A | HAND/OFF/AUTO | S/S | STOP/START |
| HORN | ANNUNCIATOR HORN | TURB | TURBIDITY |
| H/O/R | HAND/OFF/REMOTE | TR | TROUBLE |
| H2S | HYDROGEN SULPHIDE | VIB | VIBRATION |
| IBD | INBOARD | WDG | WINDING |
| I/I | CURRENT/CURRENT ISOLATION | ZLC | POSITION LIGHT CLOSED |
| I/P | CURRENT TO PNEUMATIC | ZLO | POSITION LIGHT OPEN |
| LL | LOW LOW | ZSC | SWITCH POSITION CLOSED |
| LEL | LOWER EXPLOSIVE LIMIT | ZSO | SWITCH POSITION OPEN |
| L/R | LOCAL/REMOTE | | |

REFERENCE DRAWING

| DRAWING No. | DRAWING TITLE |
|---|---|
| | |

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PLANT AREA: PLANT WIDE

PROJECT NAME: GBWWTP FLARE CAPACITY EXPANSION

DRAWING TITLE: PROCESS SYMBOLS AND ABBREVIATIONS SHEET 4 OF 4

| CONSULTANT JOB No. | EPCOR PROJECT No. | SCALE | SHEET | DRAWING NUMBER |
|---|---|---|---|---|
| 1101000105 | PMO 1004723; PF14-015 | NTS | 4 OF 4 | PRJ-15-157-404 |


**NOTES:**

1. ALL PIPING TO HAVE A MINIMUM SLOPE OF 2% EVERYWHERE.
2. CONNECTION FOR FUTURE FLARE.
3. DRAWING PID-DIG-053 IS THE ANTICIPATED FINAL DOCUMENT NUMBER FOR THAT P&ID, PART OF THE NEW BIOGAS MIXING COMPRESSOR UNIT (BY OTHERS). PIPING TIE-IN WITH BLOCK VALVE LOCATED ON THAT DRAWING.
4. ALL BUTTERFLY VALVES ARE TO BE HIGH-PERFORMANCE BUTTERFLY VALVES, CONFORMING TO API 607.
5. NATURAL GAS CONNECTION FOR FUTURE FLARE BUILDING ADDITION AND PILOT GAS ASSEMBLY FOR THIRD FUTURE FLARE.
6. NATURAL GAS CONNECTION FOR FUTURE PILOT GAS ASSEMBLY FOR SECOND FUTURE FLARE.
7. UTILITY WATER CONNECTIONS FOR FUTURE FLARE TRAIN CONDENSATE ACCUMULATORS.
8. FUTURE TIE-IN POINT FOR EXISTING BIOGAS HEADERS FOR WHEN EXISTING FLR-25000 AND FLR-25001 ARE EVENTUALLY DECOMMISSIONED.

REFERENCE DRAWING

| DRAWING No. | DRAWING TITLE |
|---|---|
| PRJ-15-157-410 | NEW BIOGAS FLARE FACILITY |

REVISION

| Rev. | DATE | DESCRIPTION | BY | DES. | CHK. | ENG. |
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| 0B | 26-APR-2024 | ISSUED FOR 60% DESIGN | AY | AY | NB | GP |
| 0C | 30-AUG-2024 | ISSUED FOR 90% DESIGN | JD | AY | DS | GP |
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PLANT AREA: PLANT WIDE
PROJECT NAME: GBWWTP FLARE CAPACITY EXPANSION
DRAWING TITLE: PROCESS
WASTE GAS BURNER PIPING
PROCESS AND INSTRUMENTATION DIAGRAM

| CONSULTANT JOB No. | EPCOR PROJECT No. | SCALE | SHEET | DRAWING NUMBER |
|---|---|---|---|---|
| 1101000105 | PMO 1004723; PF14-015 | NTS | 1 OF 1 | PRJ-15-157-405 |


**NOTES:**

1. PLACEMENT OF CONDENSATE COLLECTION DEVICES TO BE CONFIRMED PENDING FINALIZED PIPING LAYOUT. CONDENSATE TO BE COLLECTED FROM ANY AND ALL LOW POINTS IN THE VAPOUR HEADER.
2. ALL PIPING TO HAVE A MINIMUM SLOPE OF 2% EVERYWHERE.
3. DETAILS OF FLAME TRAP, BIOGAS FLARE, AND FUEL GAS PIPING TO BE CONFIRMED BY SELECTED EQUIPMENT VENDOR. DETAILS SHOWN HERE ARE REPRESENTATIVE ONLY.
4. DRAINS FROM CONDENSATE ACCUMULATOR TO BE SENT TO FLARE BUILDING SUMP.
5. BEACON AND HORN INSTALLED OUTSIDE NEW FLARE BUILDING.
6. VENDOR INSTRUMENTATION AND WIRING TO BE SUPPLIED BY VENDOR AND TERMINATED BY CONTRACTOR.
7. ALL ANALOG INPUT DEVICES ARE TO HAVE HART FUNCTIONALITY UNLESS OTHERWISE SPECIFIED.
8. FLOW RESTRICTOR VALVE FOR TRAP FIRMING SET @ 2.0L/min.
9. VENT LINE TO TERMINATE OUTDOORS AT A POINT NOT LESS THAN 2.5 m ABOVE GRADE OR OPERATING LEVEL; AND TERMINATE IN A 180° BEND AND BUG SCREEN.

SMT-81930
CONDENSATE ACCUMULATOR

| | |
|---|---|
| MATERIAL: | STAINLESS STEEL |
| PRESS @ TEMP: | 2.5 kPag @ 40°C |
| DIM (HxØ): | 1250mm x 483 mm |
| CAPACITY: | 49 L |
| HLL: | TBC |

PROFESSIONAL ENGINEER ALBERTA
JOYLYN GRAY
ID#115821 2024-11-25

| REFERENCE DRAWING | | REVISION | | | | | | |
|---|---|---|---|---|---|---|---|---|
| DRAWING No. | DRAWING TITLE | Rev. | DATE | DESCRIPTION | BY | DES. | CHK. | ENG. |
| PRJ-15-157-410 | NEW BIOGAS FLARE FACILITY | 0A | 06-JUL-2023 | ISSUED FOR PRELIMINARY DESIGN | JD | MA | GP | MA |
| | | 0B | 26-APR-2024 | ISSUED FOR 60% DESIGN | AY | AY | NB | GP |
| | | 0C | 30-AUG-2024 | ISSUED FOR 90% DESIGN | JD | AY | DS | GP |
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ID 157653
November 25 2024

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EPCOR

PLANT SITE: GOLD BAR WWTP
PLANT AREA: PLANT WIDE
PROJECT NAME: GBWWTP FLARE CAPACITY EXPANSION
DRAWING TITLE:
PROCESS
WASTE GAS BURNER BUILDING
PROCESS AND INSTRUMENTATION DIAGRAM

| CONSULTANT JOB No. | EPCOR PROJECT No. | SCALE | SHEET | DRAWING NUMBER |
|---|---|---|---|---|
| 1101000105 | PMO 1004723; PF14-015 | NTS | 1 OF 1 | PRJ-15-157-406 |


PSP-81931
FLARE BUILDING SUMP PUMP 1

| | |
|---|---|
| TYPE: | SUBMERSIBLE |
| CAPACITY: | 48.6 m³/hr |
| TDH: | 22.9 m |
| MOTOR: | 0.37 kW |

PSP-81972
FLARE BUILDING SUMP PUMP 2

| | |
|---|---|
| TYPE: | SUBMERSIBLE |
| CAPACITY: | 48.6 m³/hr |
| TDH: | 22.9 m |
| MOTOR: | 0.37 kW |

PROFESSIONAL ENGINEER
JOYLYN GRAY
ALBERTA
ID#115821 2024-11-26

REFERENCE DRAWING

| DRAWING No. | DRAWING TITLE |
|---|---|
| | |

REVISION

| Rev. | DATE | DESCRIPTION | BY | DES. | CHK. | ENG. |
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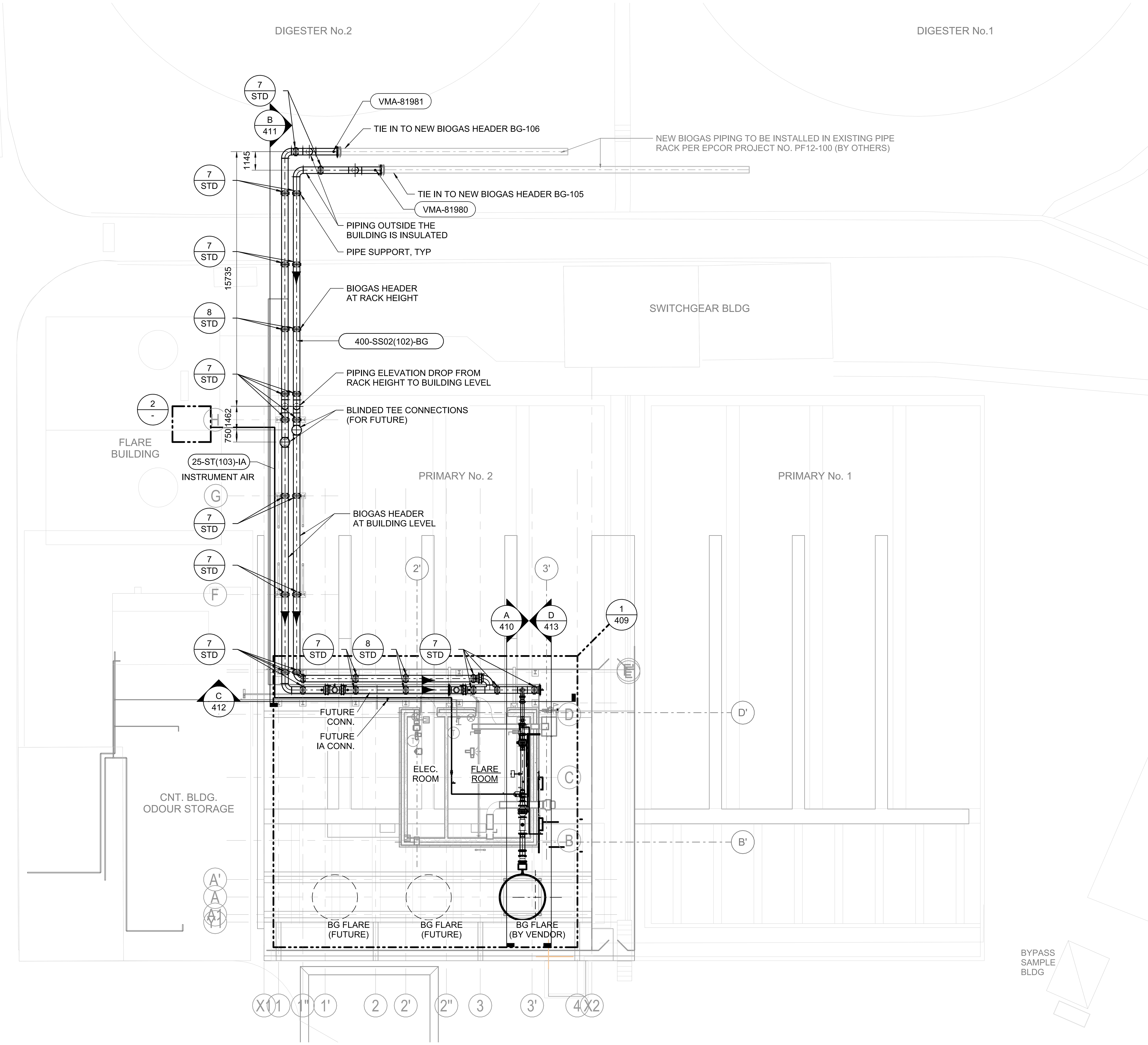
PLANT SITE: GOLD BAR WWTP
PLANT AREA: PLANT WIDE
PROJECT NAME: GBWWTP FLARE CAPACITY EXPANSION
DRAWING TITLE:
PROCESS
WASTE GAS BURNER SUMP PUMP
PROCESS AND INSTRUMENTATION DIAGRAM

| CONSULTANT JOB No. | EPCOR PROJECT No. | SCALE | SHEET | DRAWING NUMBER |
|---|---|---|---|---|
| 1101000105 | PMO 1004723; PF14-015 | NTS | 1 OF 1 | PRJ-15-157-407 |

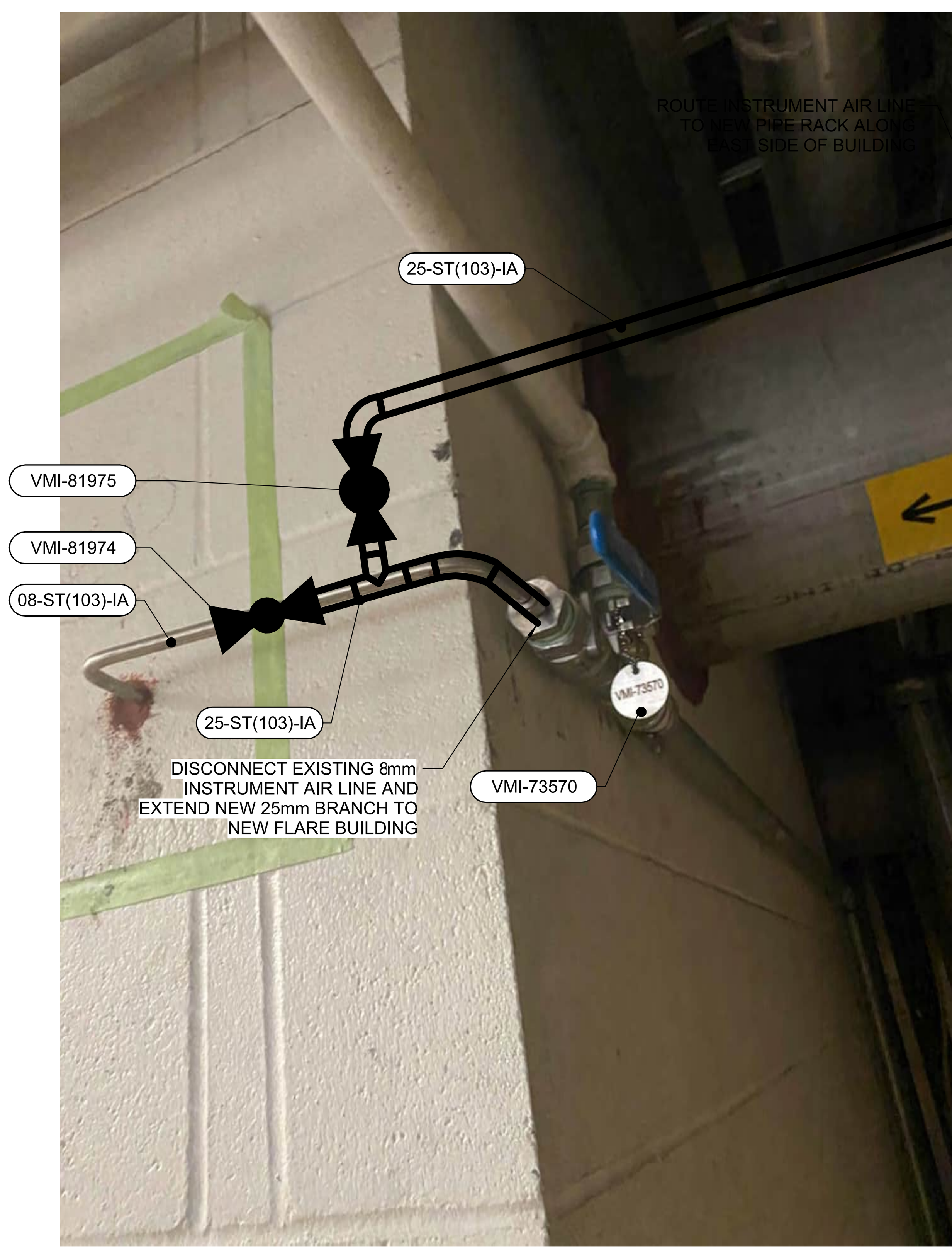



NOTES:

1. PIPE SUPPORT TYPE, PLACEMENT, AND LOCATION TO BE FINALIZED AFTER COMPLETION OF PIPE STRESS ANALYSIS (DELEGATION DESIGN) BY CONTRACTOR.

1 SITE PLAN

SCALE: 1 : 150




2 INSTRUMENT AIR TIE-IN (EAST SCRUBBER BUILDING)

NO SCALE

| REFERENCE DRAWING | | REVISION | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| DRAWING No. | DRAWING TITLE | Rev. | DATE | DESCRIPTION | BY | DES. | CHK. | ENG. |
| | | 0A | 06-JUL-2023 | ISSUED FOR PRELIMINARY DESIGN | JD | MA | GP | MA |
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ID 157653
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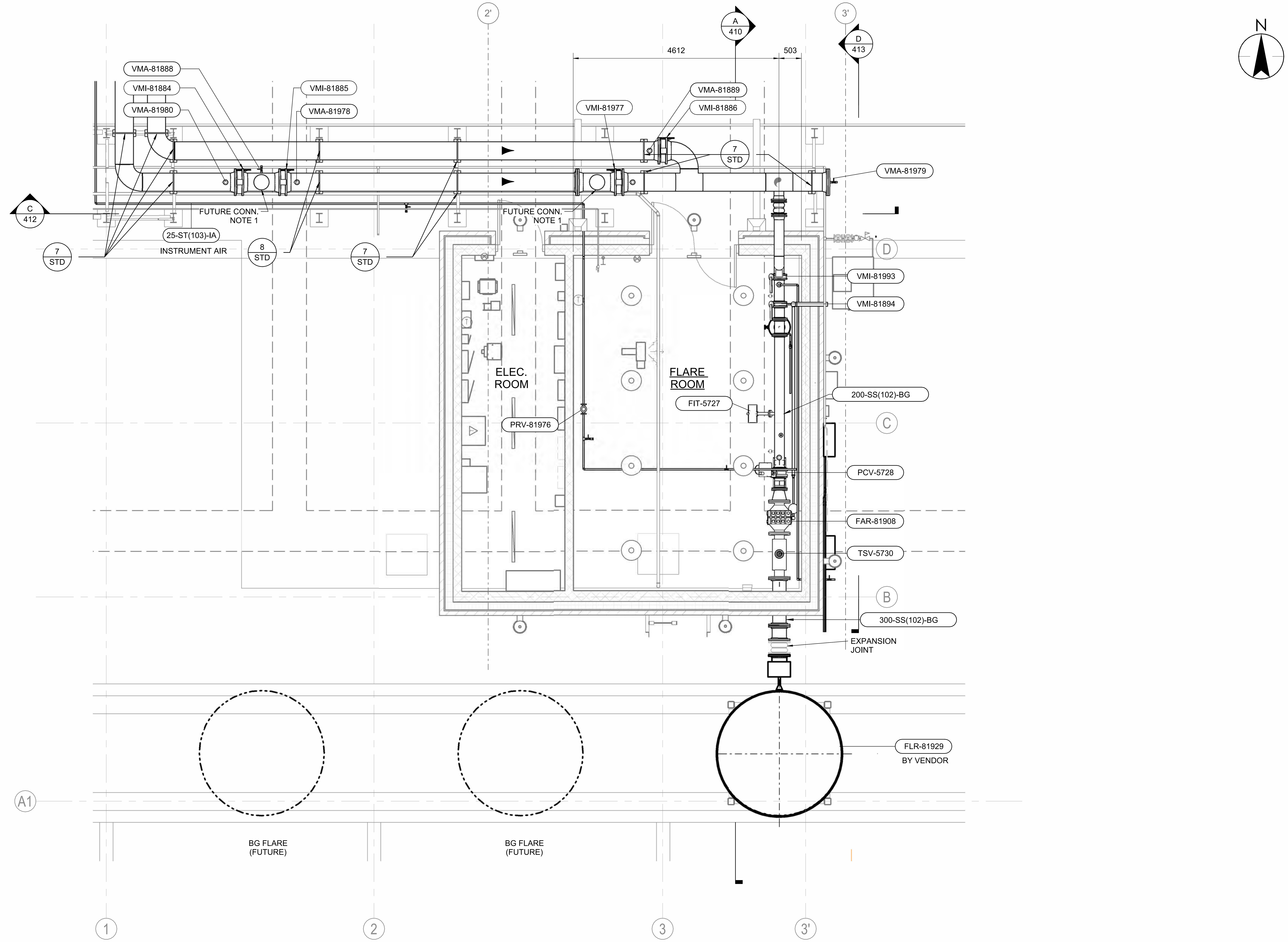
PLANT SITE: GOLD BAR WWTP
PLANT AREA: PLANT WIDE
PROJECT NAME: GBWWTP FLARE CAPACITY EXPANSION
DRAWING TITLE:

PROCESS
WASTE GAS BURNER BUILDING
SITE PLAN

| CONSULTANT JOB No. | EPCOR PROJECT No. | SCALE | SHEET | DRAWING NUMBER |
|---|---|---|---|---|
| 1101000105 | PMO 1004723; PF14-015 | As indicated | 1 of 6 | PRJ-15-157-408 |

11/22/2024 2:40:02 PM




1 BUILDING FLOOR PLAN

SCALE: 1 : 50

408

NOTES:

1. FUTURE FLARE CONNECTION FLANGE TO BE ORIENTATED VERTICALLY TO AVOID CONDENSATE LOW POINT IN PIPING. SPOOL PIECE TO BE ROTATED 180 DEGREES (FLARE CONNECTION FLANGE FACING DOWN) TO MATCH PIPE CONFIGURATION OF FLR-81929, WHEN OTHER NEW FLARES ARE INSTALLED.
2. PIPE SUPPORT TYPE, PLACEMENT, AND LOCATION TO BE FINALIZED AFTER COMPLETION OF PIPE STRESS ANALYSIS (DELEGATION DESIGN) BY CONTRACTOR.

| REFERENCE DRAWING | | REVISION | | | | | | |
|---|---|---|---|---|---|---|---|---|
| DRAWING No. | DRAWING TITLE | Rev. | DATE | DESCRIPTION | BY | DES. | CHK. | ENG. |
| | | 0A | 06-JUL-2023 | ISSUED FOR PRELIMINARY DESIGN | JD | | GP | |
| | | 0B | 26-APR-2024 | ISSUED FOR 60% DESIGN | AY | | NB | |
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PLANT SITE: GOLD BAR WWTP | PLANT AREA: PLANT WIDE

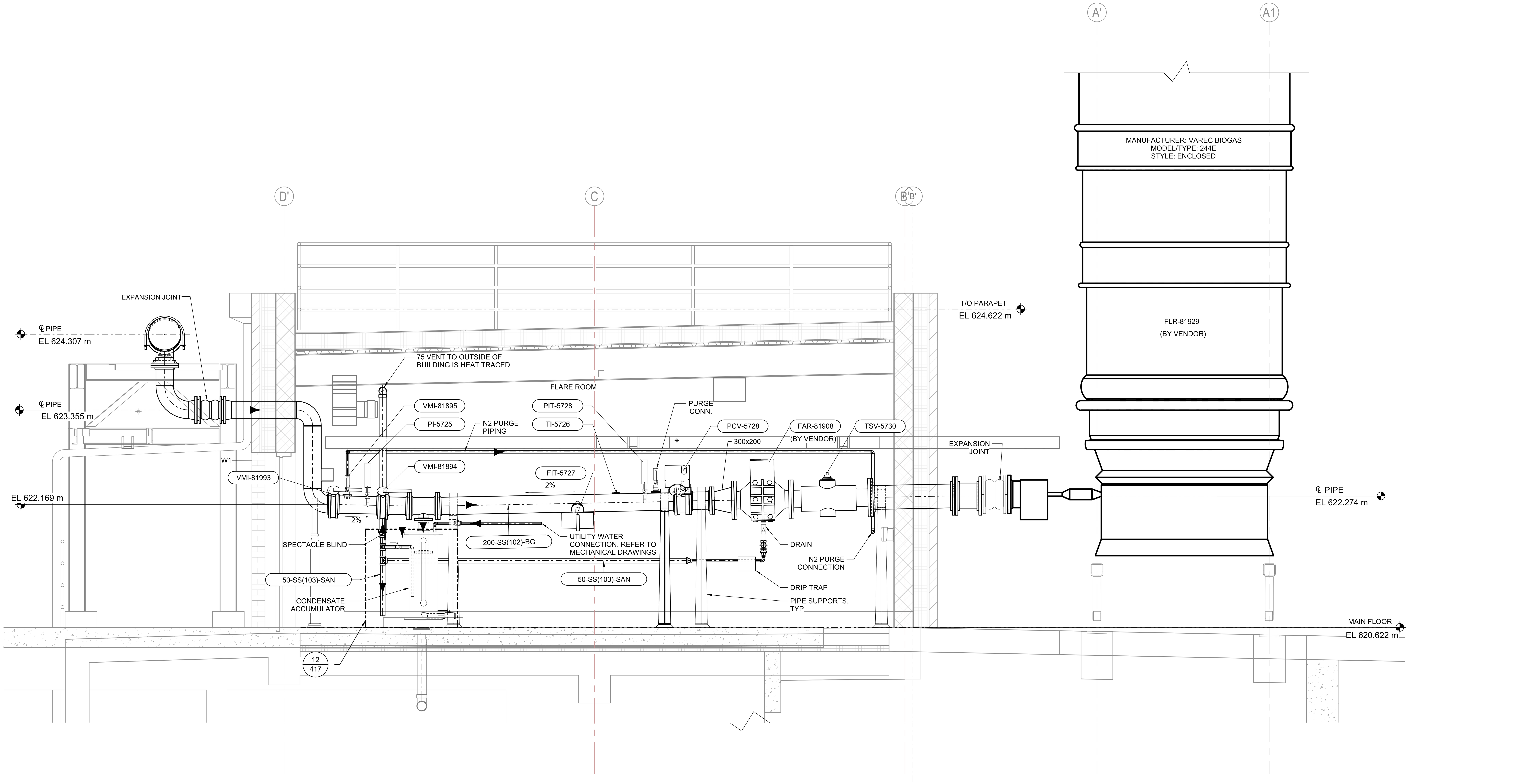
PROJECT NAME: GBWWTP FLARE CAPACITY EXPANSION

DRAWING TITLE:

PROCESS
WASTE GAS BURNER BUILDING
BUILDING PLAN

| CONSULTANT JOB No. | EPCOR PROJECT No. | SCALE | SHEET | DRAWING NUMBER |
|---|---|---|---|---|
| 1101000105 | | 1 : 50 | 2 of 6 | PRJ-15-157-409 |

11/22/2024 2:40:06 PM




A / 408 SECTION A

SCALE: 1 : 25

| REFERENCE DRAWING | | REVISION | | | | | | |
|---|---|---|---|---|---|---|---|---|
| DRAWING No. | DRAWING TITLE | Rev. | DATE | DESCRIPTION | BY | DES. | CHK. | ENG. |
| | | 0A | 06-JUL-2023 | ISSUED FOR PRELIMINARY DESIGN | JD | MA | GP | MA |
| | | 0B | 26-APR-2024 | ISSUED FOR 60% DESIGN | AY | AY | NB | AY |
| | | 0C | 04-SEP-2024 | ISSUED FOR 90% DESIGN | AY | AY | | AY |
| | | 0D | 15-NOV-2024 | ISSUED FOR CONSTRUCTION | AY | AY | | AY |

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PLANT SITE: GOLD BAR WWTP
PLANT AREA: PLANT WIDE
PROJECT NAME: GBWWTP FLARE CAPACITY EXPANSION
DRAWING TITLE:
PROCESS
WASTE GAS BURNER BUILDING
SECTION A

| CONSULTANT JOB No. | EPCOR PROJECT No. | SCALE | SHEET | DRAWING NUMBER |
|---|---|---|---|---|
| 1101000105 | PMO 1004723; PF14-015 | 1 : 25 | 3 of 6 | PRJ-15-157-410 |

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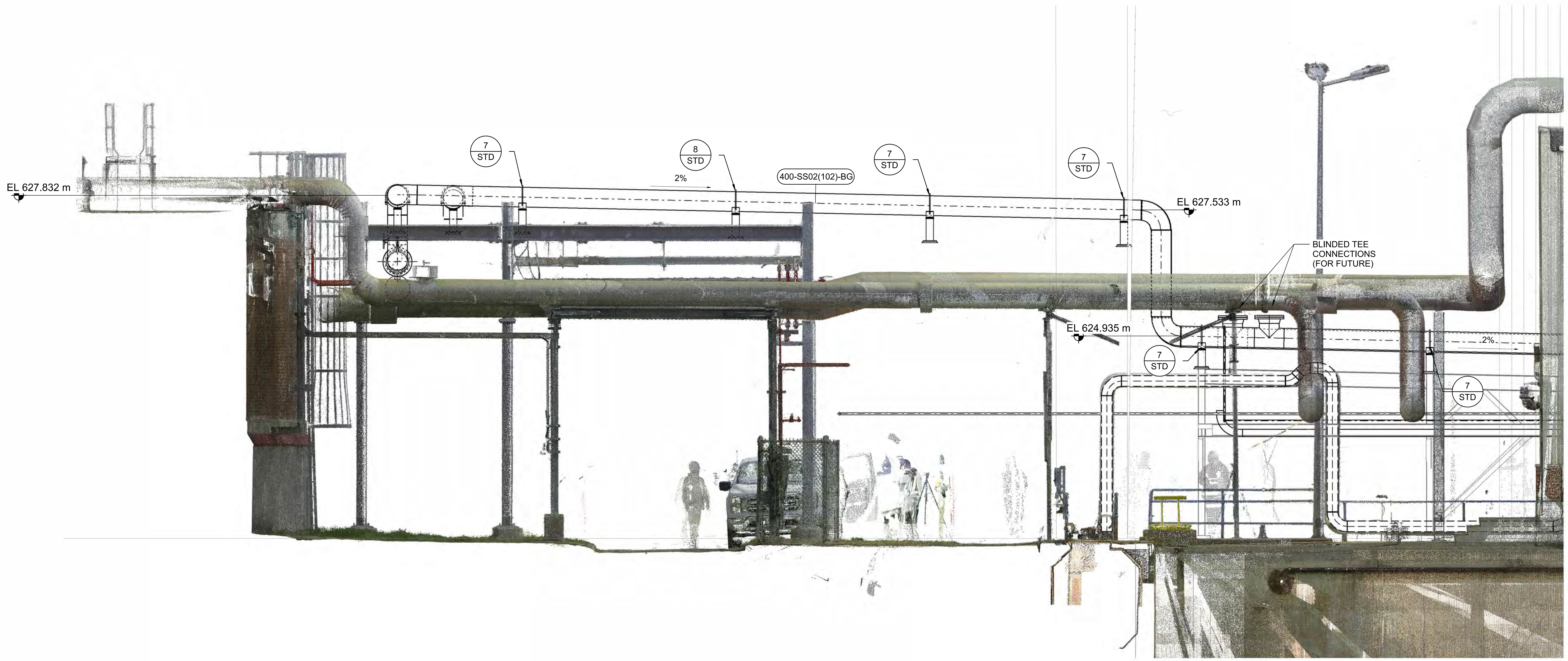


B
408
SECTION B
SCALE: 1 : 50

NOTES:

1. PIPE SUPPORT TYPE, PLACEMENT, AND LOCATION TO BE FINALIZED AFTER COMPLETION OF PIPE STRESS ANALYSIS (DELEGATION DESIGN) BY CONTRACTOR.

| REFERENCE DRAWING | | REVISION | | | | | | |
|---|---|---|---|---|---|---|---|---|
| DRAWING No. | DRAWING TITLE | Rev. | DATE | DESCRIPTION | BY | DES. | CHK. | ENG. |
| | | 0A | 06-JUL-2023 | ISSUED FOR PRELIMINARY DESIGN | JD | MA | GP | MA |
| | | 0B | 26-APR-2024 | ISSUED FOR 60% DESIGN | AY | AY | NB | AY |
| | | 0C | 04-SEP-2024 | ISSUED FOR 90% DESIGN | AY | AY | | AY |
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PLANT SITE: GOLD BAR WWTP
PLANT AREA: PLANT WIDE
PROJECT NAME: GBWWTP FLARE CAPACITY EXPANSION
DRAWING TITLE:
PROCESS
WASTE GAS BURNER BUILDING
SECTION B

| CONSULTANT JOB No. | EPCOR PROJECT No. | SCALE | SHEET | DRAWING NUMBER |
|---|---|---|---|---|
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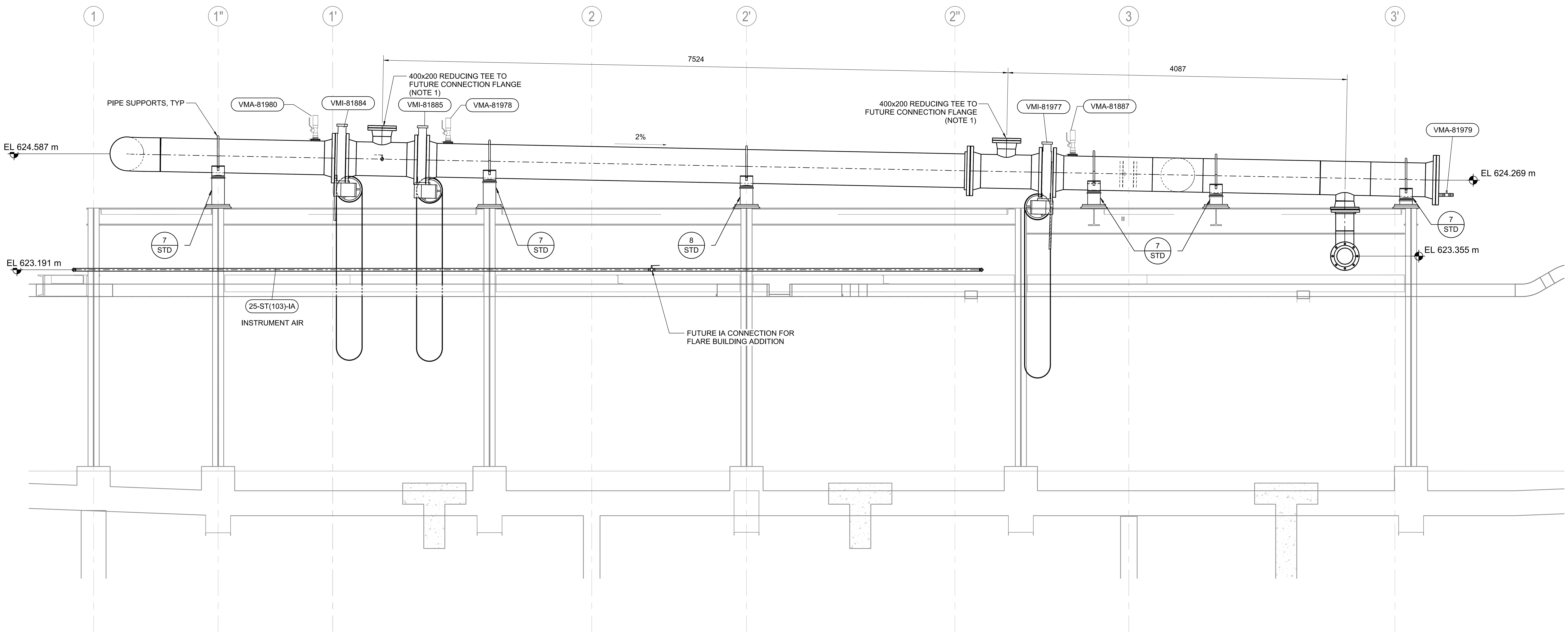


C 408 SECTION C

SCALE: 1 : 25

NOTES:

1. FUTURE FLARE CONNECTION FLANGE TO BE ORIENTATED VERTICALLY TO AVOID CONDENSATE LOW POINT IN PIPING. SPOOL PIECE TO BE ROTATED 180 DEGREES (FLARE CONNECTION FLANGE FACING DOWN) TO MATCH PIPE CONFIGURATION OF FLR-81929, WHEN OTHER NEW FLARES ARE INSTALLED.
2. PIPE SUPPORT TYPE, PLACEMENT, AND LOCATION TO BE FINALIZED AFTER COMPLETION OF PIPE STRESS ANALYSIS (DELEGATION DESIGN) BY CONTRACTOR.

| REFERENCE DRAWING | | REVISION | | | | | | |
|---|---|---|---|---|---|---|---|---|
| DRAWING No. | DRAWING TITLE | Rev. | DATE | DESCRIPTION | BY | DES. | CHK. | ENG. |
| | | 0A | 06-JUL-2023 | ISSUED FOR PRELIMINARY DESIGN | JD | MA | GP | MA |
| | | 0B | 26-APR-2024 | ISSUED FOR 60% DESIGN | AY | AY | NB | AY |
| | | 0C | 04-SEP-2024 | ISSUED FOR 90% DESIGN | AY | AY | | AY |
| | | 0D | 15-NOV-2024 | ISSUED FOR CONSTRUCTION | AY | AY | | AY |

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PLANT AREA: PLANT WIDE
PROJECT NAME: GBWWTP FLARE CAPACITY EXPANSION
DRAWING TITLE: PROCESS WASTE GAS BURNER BUILDING SECTION C

| CONSULTANT JOB No. | EPCOR PROJECT No. | SCALE | SHEET | DRAWING NUMBER |
|---|---|---|---|---|
| 1101000105 | PMO 1004723; PF14-015 | 1 : 25 | 5 of 6 | PRJ-15-157-412 |

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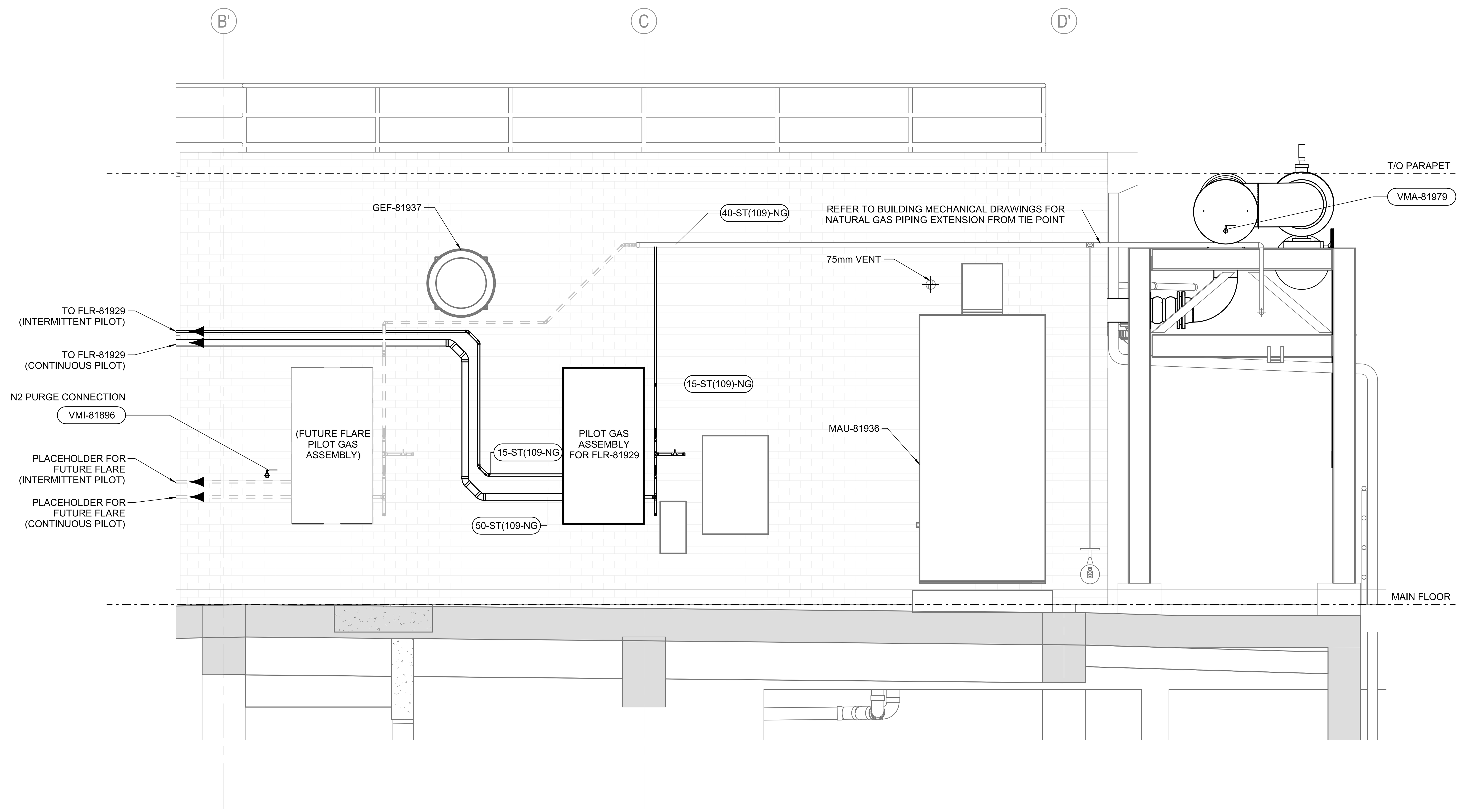


D
408
SECTION D - FLARE BUILDING EAST EXTERIOR WALL
SCALE: 1 : 25

NOTES:

1. NATURAL GAS PIPING LEAVING THE PILOT GAS ASSEMBLY PANEL REQUIRE A MINIMUM 1.2m STRAIGHTRUN (VENDOR REQUIREMENT).
2. NATURAL GAS PIPING BETWEEN PILOT GAS ASSEMBLY PANEL AND FLARE TO UTILIZE 45 DEGREE BENDS INSTEAD OF 90 DEGREE BENDS (VENDOR REQUIREMENT).

| REFERENCE DRAWING | | REVISION | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| DRAWING No. | DRAWING TITLE | Rev. | DATE | DESCRIPTION | BY | DES. | CHK. | ENG. |
| | | 0A | 06-JUL-2023 | ISSUED FOR PRELIMINARY DESIGN | JD | MA | GP | MA |
| | | 0B | 26-APR-2024 | ISSUED FOR 60% DESIGN | AY | AY | NB | AY |
| | | 0C | 04-SEP-2024 | ISSUED FOR 90% DESIGN | | | | |
| | | 0D | 15-NOV-2024 | ISSUED FOR CONSTRUCTION | AY | AY | | AY |

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PLANT SITE: GOLD BAR WWTP
PLANT AREA: PLANT WIDE
PROJECT NAME: GBWWTP FLARE CAPACITY EXPANSION
DRAWING TITLE:
PROCESS
WASTE GAS BURNER BUILDING
SECTION D

| CONSULTANT JOB No. | EPCOR PROJECT No. | SCALE | SHEET | DRAWING NUMBER |
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| 1101000105 | PMO 1004723; PF14-015 | 1 : 25 | 6 of 6 | PRJ-15-157-413 |

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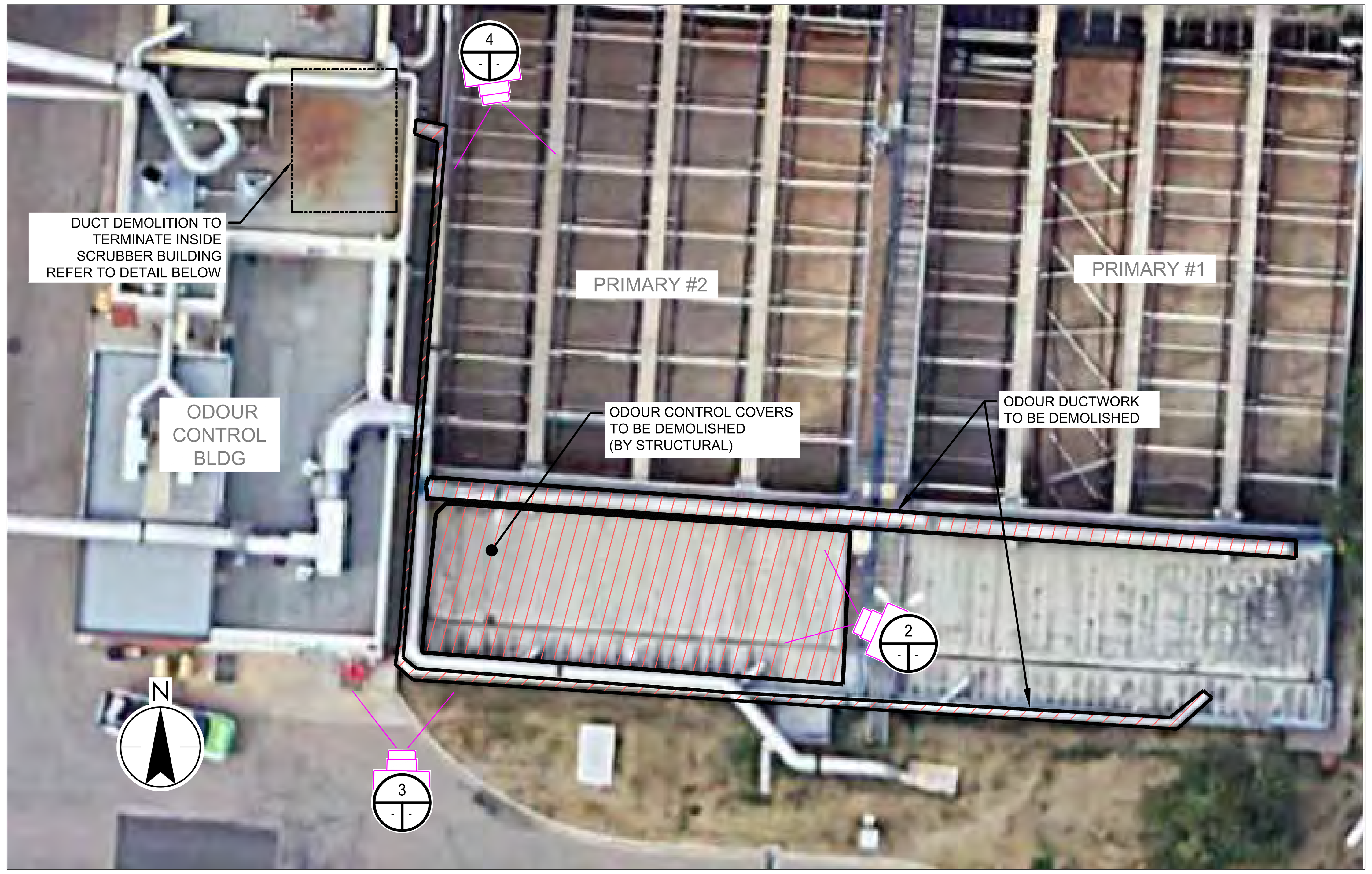
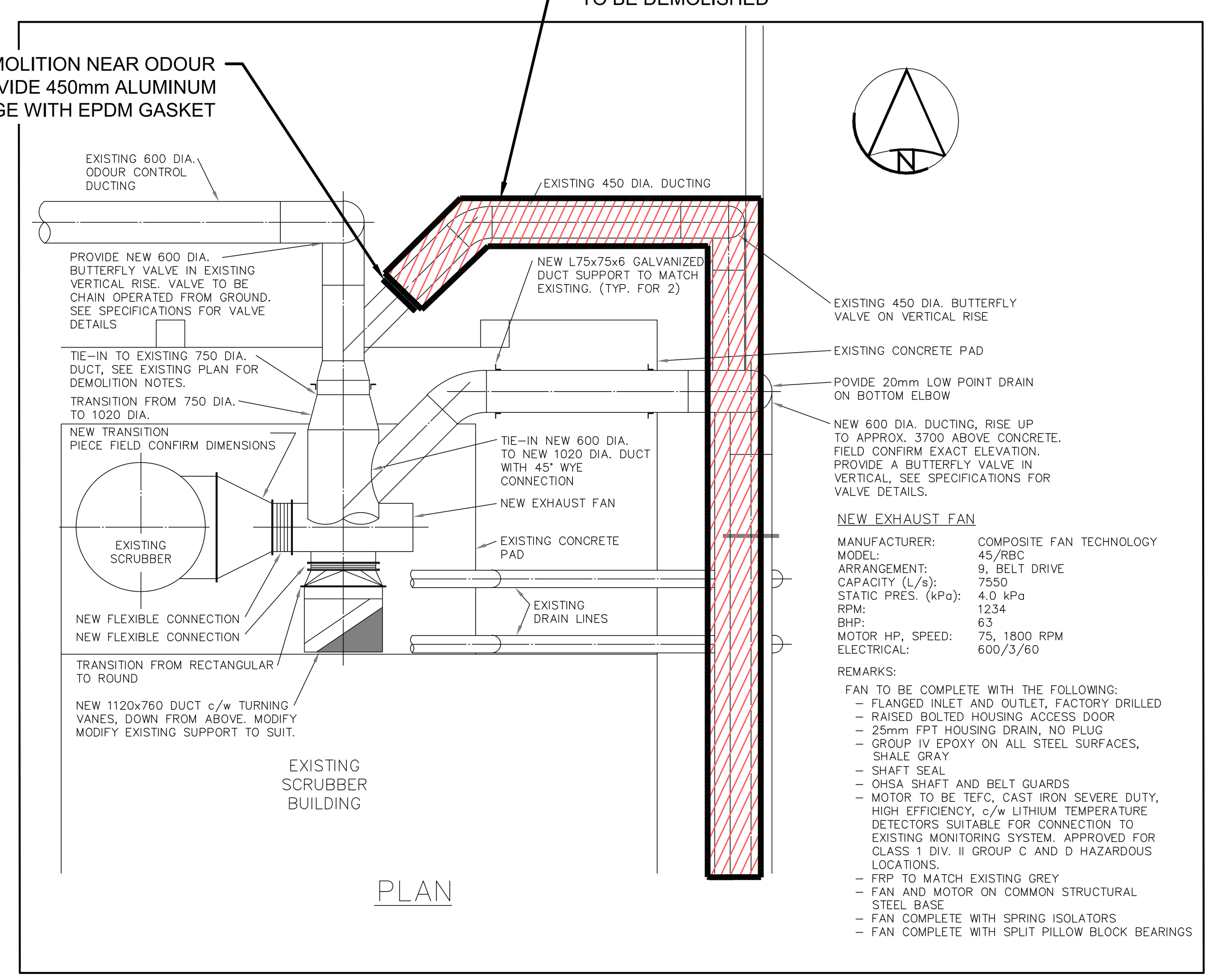



1 / - PHOTO 1 - ABOVE GROUND DUCTING DEMO PLAN
NTS


2 / - PHOTO 2 - LOOKING WEST
NTS


3 / - PHOTO 3 - LOOKING NORTH
NTS




4 / - DETAIL - DEMOLITION INSIDE EAST SCRUBBER BUILDING
NTS

NOTES:

1. TWO ABANDONED DUCTS / PIPING RUNS WHICH ONCE WERE USED BY THE ABANDONED CLARIFIER MUST BE REMOVED FROM THE AREA THAT HAS BEEN DESIGNATED FOR THE NEW FLARE INSTALLATION. ANY ASSOCIATED RAILINGS, PIPING SUPPORTS, VENTS, AND OTHER APPURTENANCES MUST ALSO BE REMOVED FROM THE VICINITY TO FACILITATE CONSTRUCTION AND TO ENSURE CLEAR ACCESS TO THE NEW FLARES FROM THE SOUTH.

LEGEND:

TO BE DEMOLISHED


5 / - PHOTO 4 - LOOKING SOUTH EAST
NTS

| REFERENCE DRAWING | | REVISION | | | | | | |
|---|---|---|---|---|---|---|---|---|
| DRAWING No. | DRAWING TITLE | Rev. | DATE | DESCRIPTION | BY | DES. | CHK. | ENG. |
| | | 0A | 06-JUL-2023 | ISSUED FOR PRELIMINARY DESIGN | JD | MA | GP | MA |
| | | 0B | 26-APR-2024 | ISSUED FOR 60% DESIGN | AY | AY | NB | GP |
| | | 0C | 30-AUG-2024 | ISSUED FOR 90% DESIGN | JD | AY | DS | GP |
| | | 0D | 15-NOV-2024 | ISSUED FOR CONSTRUCTION | JD | AY | NB | GP |

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ZACHARY PAQUIN
ID 157653
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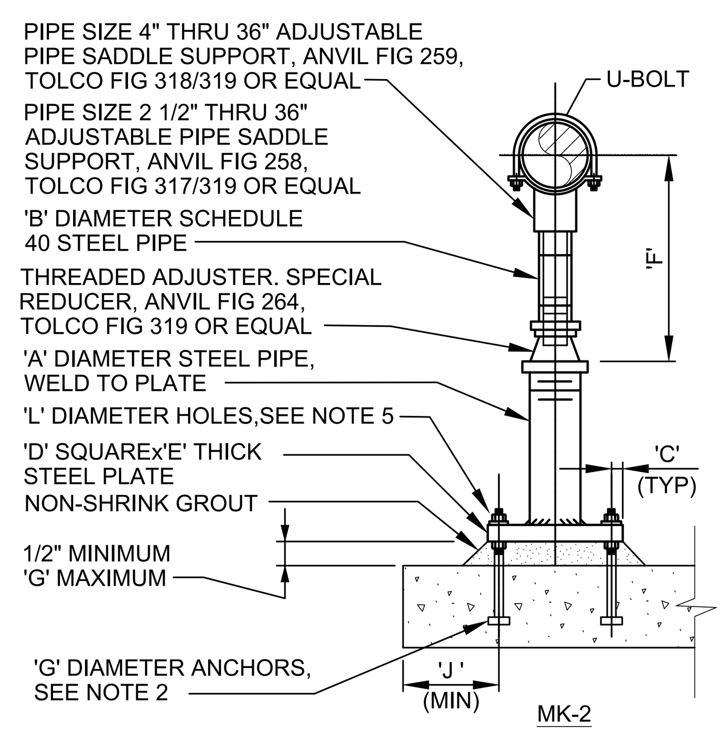
EPCOR

PLANT SITE: GOLD BAR WWTP
PLANT AREA: PLANT WIDE
PROJECT NAME: GBWWTP FLARE CAPACITY EXPANSION
DRAWING TITLE:
PROCESS
WASTE GAS BURNER BUILDING
DEMOLITION PLAN & SECTIONS

| CONSULTANT JOB No. | EPCOR PROJECT No. | SCALE | SHEET | DRAWING NUMBER |
|---|---|---|---|---|
| 1101000105 | PMO 1004723; PF14-015 | NTS | 1 OF 1 | PRJ-15-157-414 |




| DIMENSIONS IN INCHES | | | | | | | | | | | | | Sds≤0.5 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NOMINAL PIPE DIAMETER | 'A' (SCH 40 UNO) | 'B' | 'C' | 'D' | 'E' | 'F' (APPROX) (MINIMUM) | 'F' (APPROX) (MAXIMUM) | 'G' | 'H' | 'J' | 'K' | 'L' | LOAD MAX (LBS) | 'M' |
| 2 1/2 | * 2 / 2 1/2 | 1 1/2 | 1 | 8 | 7/16 | 7 | 11 1/2 | 1/2 | 4 | 6 | 3/8 | 13/16 | 1400 | 500 |
| 3 | * 2 / 2 1/2 | 1 1/2 | 1 | 8 | 7/16 | 7 5/16 | 11 13/16 | 1/2 | 4 | 6 | 3/8 | 13/16 | 1400 | 500 |
| 3 1/2 | * 2 / 2 1/2 | 1 1/2 | 1 | 8 | 7/16 | 7 9/16 | 12 1/16 | 1/2 | 4 | 6 | 3/8 | 13/16 | 1400 | 500 |
| 4 | 3 | * 2 1/2 / 3 | 1 1/4 | 10 | 5/8 | 10 1/4 | 14 3/4 | 5/8 | 5 | 8 | 7/16 | 1 1/16 | 2650 | 1100 |
| 6 | 3 | * 2 1/2 / 3 | 1 1/4 | 10 | 5/8 | 11 9/16 | 16 1/16 | 5/8 | 5 | 8 | 7/16 | 1 1/16 | 2650 | 1100 |
| 8 | 3 | * 2 1/2 / 3 | 1 1/4 | 10 | 5/8 | 13 9/16 | 18 1/16 | 5/8 | 5 | 8 | 7/16 | 1 1/16 | 2650 | 1100 |
| 10 | 3 | * 2 1/2 / 3 | 1 1/4 | 10 | 5/8 | 14 5/8 | 19 1/8 | 5/8 | 5 | 8 | 7/16 | 1 1/16 | 2650 | 1100 |
| 12 | 3 | * 2 1/2 / 3 | 1 1/4 | 10 | 5/8 | 15 5/8 | 20 1/8 | 5/8 | 5 | 8 | 7/16 | 1 1/16 | 2650 | 1100 |
| 14 | 4 | 3 | 1 3/8 | 12 | 3/4 | 18 7/8 | 23 3/8 | 3/4 | 7 | 10.5 | 1/2 | 1 5/16 | 4200 | 2200 |
| 16 | 4 | 3 | 1 3/8 | 12 | 3/4 | 19 7/8 | 24 3/8 | 3/4 | 7 | 10.5 | 1/2 | 1 5/16 | 4200 | 2200 |
| 18 | 6 (SCH 80) | * 4 / 3 1/2 | 1 5/8 | 14 | 1 1/4 | 22 1/4 | 26 3/4 | 7/8 | 8 | 12 | 11/16 | 1 9/16 | 6050 | 2775 |
| 20 | 6 (SCH 80) | * 4 / 3 1/2 | 1 5/8 | 14 | 1 1/4 | 23 1/4 | 27 3/4 | 7/8 | 8 | 12 | 11/16 | 1 9/16 | 6050 | 2775 |
| 24 | 6 (SCH 80) | 4 | 1 5/8 | 14 | 1 1/4 | 26 1/2 | 31 | 7/8 | 8 | 12 | 11/16 | 1 9/16 | 6050 | 2775 |
| 30 | 6 (SCH 80) | 4 | 1 7/8 | 16 | 1 1/4 | 29 5/8 | 34 1/8 | 1 | 8 | 12 | 11/16 | 1 13/16 | 8150 | 3100 |
| 32 | 6 (SCH 80) | 4 | 1 7/8 | 16 | 1 1/4 | 30 5/8 | 35 1/8 | 1 | 8 | 12 | 11/16 | 1 13/16 | 8150 | 3100 |
| 36 | 6 (SCH 80) | 4 | 1 7/8 | 16 | 1 1/4 | 32 5/8 | 37 1/8 | 1 | 8 | 12 | 11/16 | 1 13/16 | 8150 | 3100 |

* SEE MANUFACTURER

NOTES:

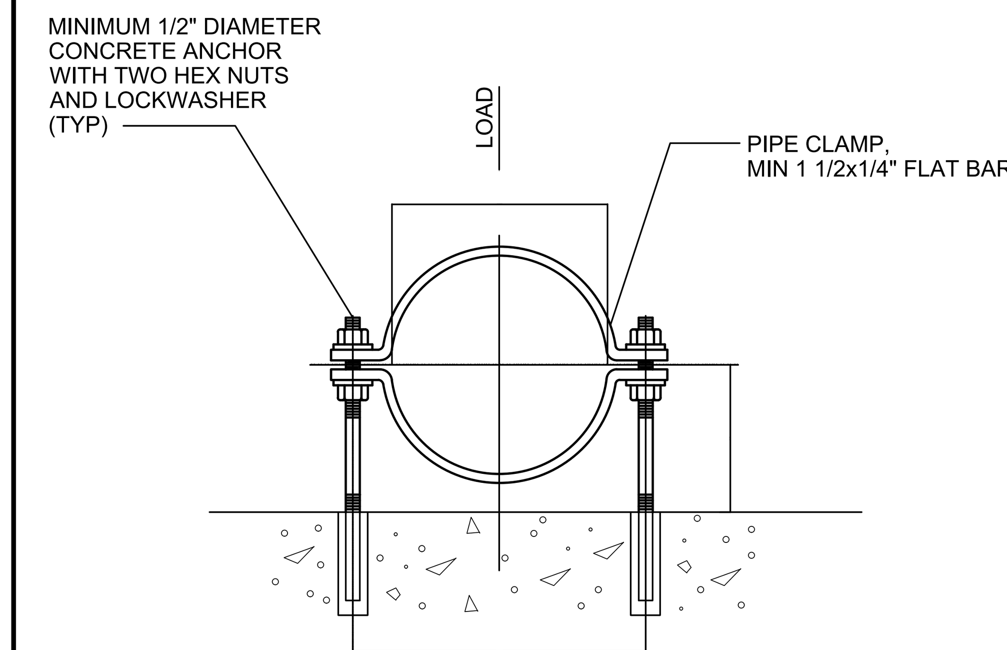
1. HOT DIP GALVANIZE PARTS AFTER FABRICATION, UNO. PROVIDE 316 SS PARTS AND BOLTS IN SUBMERGED OR CORROSIVE CONDITIONS.
2. PROVIDE CAST-IN-PLACE HEAVY HEX HEAD ASTM F1554 GR 36 ANCHORS, UNO.
3. REFER TO TABLE FOR MAXIMUM ALLOWABLE SERVICE LOAD ON EACH SUPPORT.
4. FOR 3/4" ANCHORS AND LARGER, PROVIDE SQUARE WASHERS PER AISC MANUAL OF STEEL CONSTRUCTION TABLE 14-2 WITH STD HOLES WELDED TO PLATE WITH 3/16" FILLETS. USE 1 3/4" SQx3/16" THICK WASHERS FOR 5/8" ANCHORS.
5. IF ADHESIVE ANCHORS ARE USED (SIMPSON SET XP, OR EQUAL), USE REDUCED MAX LOADS IN COLUMN 'M'. OVERSIZED HOLES AND WASHERS ARE NOT REQUIRED.
6. PIPE SUPPORT SPACING SHALL NOT EXCEED 6 M.

SEISMIC AND WIND COMPLIANT DESIGN CRITERIA

1. THE SUPPORTS ARE ADEQUATE FOR SEISMIC RESPONSE COEFFICIENT (SDS) GIVEN IN THE TABLE. SEISMIC FORCE ASSUMPTIONS (ASCE 7-10, EQN 13.3-1): ap=2.5, Rp=6, Ωo=2.5, Ip=1.0, z/h=1.0.
2. THE SUPPORTS, DESIGNED FOR SEISMIC LOADS, ARE ALSO ADEQUATE FOR A DESIGN WIND SPEED (Vult) OF UP TO 165 MPH WITH A MAXIMUM HEIGHT ABOVE GRADE OF 40'. WIND FORCE ASSUMPTIONS: EXPOSURE CATEGORY C, Kzt=1.0, Kz=1.04, Kd=0.95, G=0.85, Cf=1.2 (DESIGNED PER ASCE 7-10 SECTION 29.5 - OTHER STRUCTURES).

1 / STD — ADJ PIPE SUPPORT W OR W/O 'U' BOLT

(BETWEEN BIOGAS BUILDING AND FLARE)



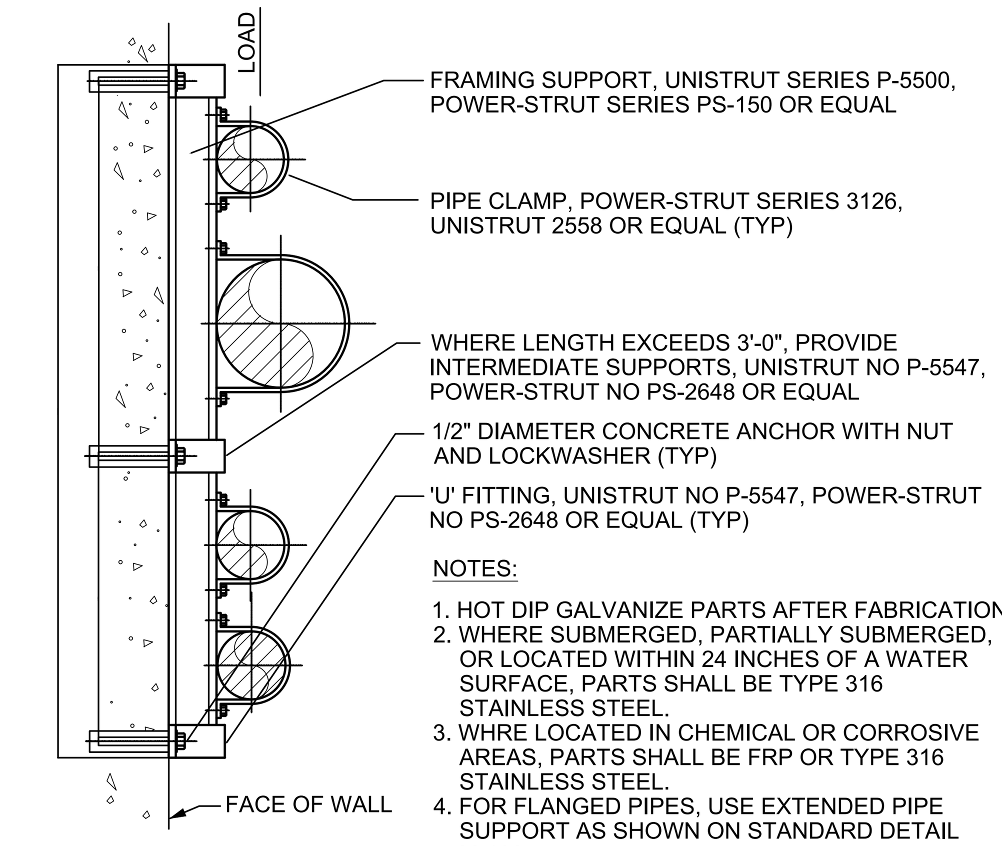

NOTES:

1. HOT DIP GALVANIZE PARTS AFTER FABRICATION.
2. WHERE SUBMERGED, PARTIALLY SUBMERGED, OR LOCATED WITHIN 24 INCHES OF A WATER SURFACE, PARTS SHALL BE TYPE 316 STAINLESS STEEL.
3. WHERE LOCATED IN CHEMICAL OR CORROSIVE AREAS, PARTS SHALL BE FRP OR TYPE 316 STAINLESS STEEL.

2 / STD — PIPE CLAMP

(FOR PIPE 4" DIAMETER AND SMALLER)

REV 010119



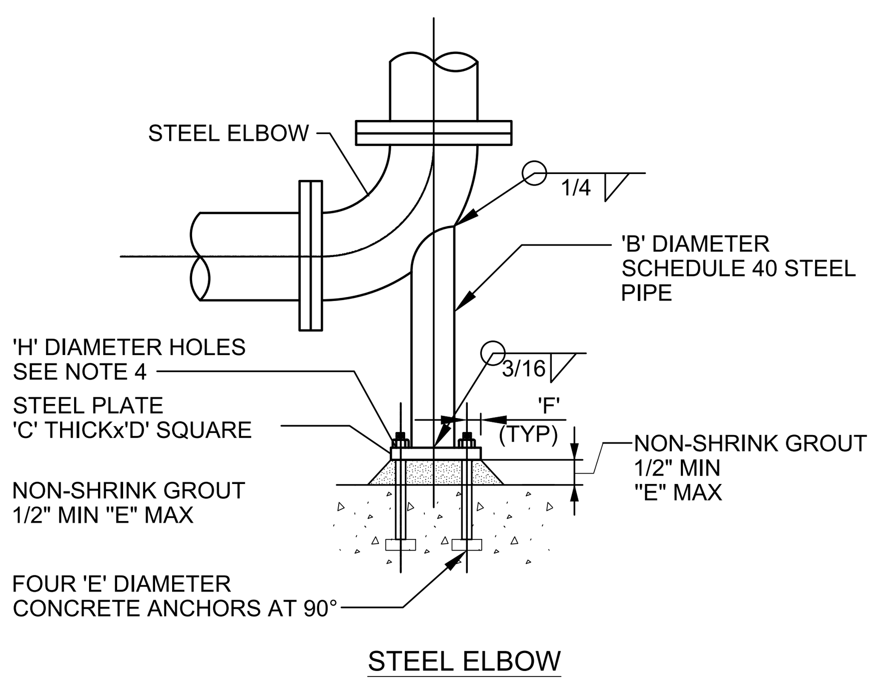

NOTES:

1. HOT DIP GALVANIZE PARTS AFTER FABRICATION.
2. WHERE SUBMERGED, PARTIALLY SUBMERGED, OR LOCATED WITHIN 24 INCHES OF A WATER SURFACE, PARTS SHALL BE TYPE 316 STAINLESS STEEL.
3. WHRE LOCATED IN CHEMICAL OR CORROSIVE AREAS, PARTS SHALL BE FRP OR TYPE 316 STAINLESS STEEL.
4. FOR FLANGED PIPES, USE EXTENDED PIPE SUPPORT AS SHOWN ON STANDARD DETAIL M-103.

3 / STD — FLUSH MOUNTED PIPE SUPPORT

(FOR PIPE 4" DIAMETER AND SMALLER)

REV 010119




| DIMENSIONS IN INCHES (UNO) | | | | | | | | | Sds≤0.5 | |
|---|---|---|---|---|---|---|---|---|---|---|
| NOMINAL PIPE DIAMETER | 'B' | `C' | `D' | 'E' | 'F' | 'H' | 'J' | 'K' | 'L' | 'L' ADH |
| 4 | 2 | 3/8 | 6 | 5/8 | 1 3/8 | 1 1/16 | 4 1/2 | 12 | 33' | 17' |
| 6 | 2 1/2 | 3/8 | 7 | 5/8 | 1 3/8 | 1 1/16 | 8 | 12 | 38' | 19' |
| 8 | 4 | 1/2 | 10 | 5/8 | 1 3/8 | 1 1/16 | 8 | 12 | 43' | 22' |
| 10 | 4 | 1/2 | 10 | 5/8 | 1 3/8 | 1 1/16 | 8 | 12 | 43' | 22' |
| 12 | 6 | 5/8 | 11 | 7/8 | 1 7/8 | 1 9/16 | 9 | 12 | 48' | 18' |
| 14 | 6 | 5/8 | 11 | 7/8 | 1 7/8 | 1 9/16 | 9 | 12 | 48' | 18' |
| 16 | 6 | 5/8 | 17 | 1 | 2 1/4 | 1 13/16 | 9 | 13 | 52' | 20' |
| 18 | 8 | 5/8 | 17 | 1 | 2 1/4 | 1 13/16 | 9 | 13 | 52' | 20' |
| 20 | 8 | 3/4 | 21 | 1 | 2 1/4 | 1 13/16 | 9 | 13 | 57' | 22' |
| 24 | 8 | 3/4 | 21 | 1 | 2 1/4 | 1 13/16 | 9 | 13 | 57' | 22' |
| 30 | 10 | 7/8 | 24 | 1 1/4 | 2 5/8 | 2 1/16 | 9 | 16 | 57' | 22' |
| 36 | 12 | 7/8 | 32 | 1 1/4 | 2 5/8 | 2 1/16 | 9 | 16 | 57' | 22' |
| 42 | 16 | 1 | 32 | 1 1/2 | 3 | 2 5/16 | 11 | 16 | 57' | NA |
| 48 | 18 | 1 1/8 | 38 | 1 3/4 | 3 1/2 | 2 3/4 | 12 | 22 | 57' | NA |

NOTES:

1. PROVIDE CAST-IN-PLACE HEAVY HEX HEAD ASTM F1554 GR 36 ANCHORS, UNO.
2. HOT DIP GALVANIZE PARTS AFTER FABRICATION, UNO. PROVIDE 316SS PARTS AND BOLTS IN SUBMERGED OR CORROSIVE CONDITIONS.
3. 'L' IS ALLOWABLE LONGITUDINAL TRIBUTARY LENGTH, DEFINED AS 1/2 THE VERTICAL DISTANCE TO THE NEXT LATERAL PIPE SUPPORT (Lv) PLUS 1/2 THE HORIZONTAL DISTANCE TO THE NEXT LONGITUDINAL PIPE SUPPORT (Lh). REFER TO TABLE FOR MAXIMUM ALLOWABLE 'L' FOR EACH SUPPORT.
4. FOR 3/4" ANCHORS AND LARGER, PROVIDE SQUARE WASHERS PER AISC MANUAL OF STEEL CONSTRUCTION TABLE 14-2 WITH STD HOLES WELDED TO PLATE WITH 3/16" FILLETS. USE 1 3/4" SQx3/16" THICK WASHERS FOR 5/8" ANCHORS.
5. IF ADHESIVE ANCHORS ARE USED (SIMPSON SET XP, OR EQUAL), USE REDUCED ALLOWABLE LONGITUDINAL TRIBUTARY LENGTH, 'L' ADH, GIVEN IN TABLE. OVERSIZED HOLES AND WASHERS ARE NOT REQUIRED. DO NOT USE ADHESIVE ANCHORS FOR PIPES LARGER THAN 36" DIAMETER.

4 / STD — ELBOW SUPPORT

(INSIDE BIOGAS BUILDING)

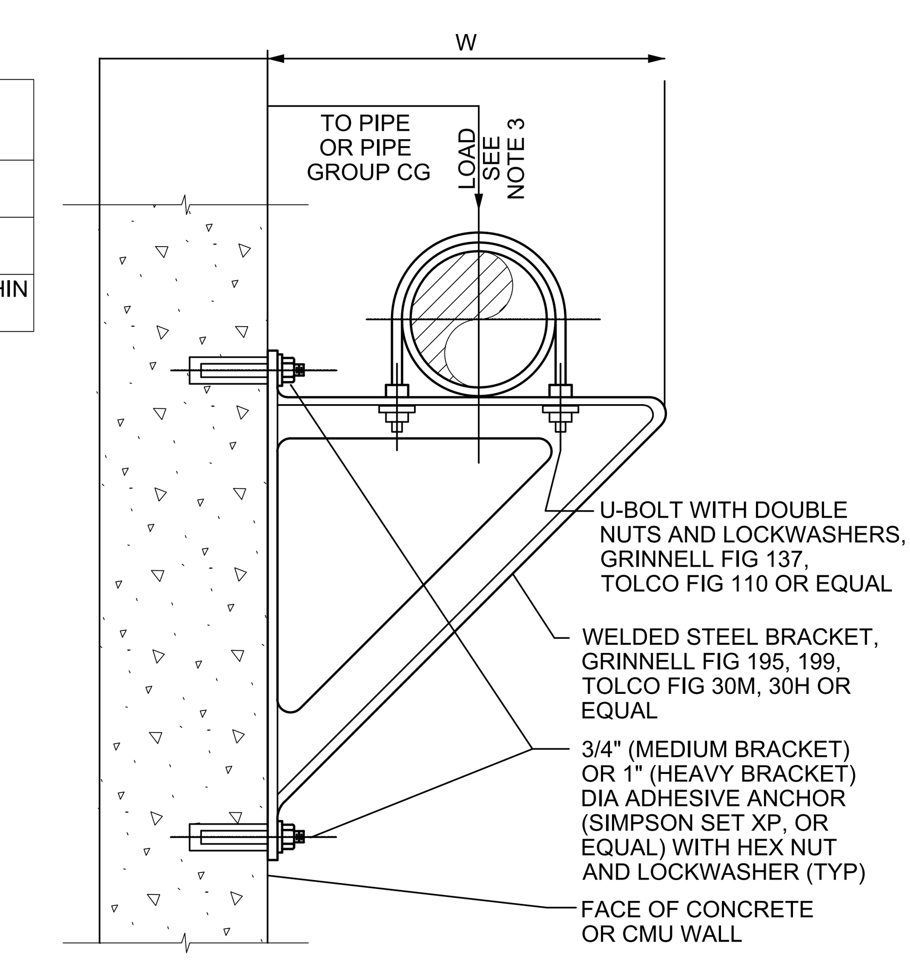
| | | | | | | | Sds≤0.5 | |
|---|---|---|---|---|---|---|---|---|
| WALL TYPE | ANVIL FIG | TOLCO FIG | THREADED ROD DIA | MIN EDGE DISTANCE | EMBED | WALL THICK MIN (t) | MAX LOAD (LB) | NOTES |
| CONC | 195 | 30M | 3/4" | 12" | 7.5" | 10" | 1500 | |
| CONC | 199 NO 2-5 | 30H NO 3-6 | 1" | 12" | 9.5" | 12" | 2100 | |
| CMU | 195 | 30M | 3/4" | 12" | 6 3/4" | 8" | 900 | NO ANCHOR PLACED WITHIN 1/2" OF HEAD JOINT |

NOTES :

1. HOT DIP GALVANIZE BRACKET AND PARTS AFTER FABRICATION, UNO. PROVIDE 316 SS BRACKET AND PARTS IN SUBMERGED OR CORROSIVE CONDITIONS (VERIFY CHEMICAL COMPATIBILITY WITH STAINLESS STEEL).
2. THIS PIPE BRACKET IS LIMITED TO A SINGLE PIPE OF 16" DIAMETER OR A GROUP OF PIPES 16" WIDE, INCLUSIVE.
3. REFER TO TABLE FOR MAXIMUM ALLOWED SERVICE LOAD ON EACH BRACKET. IN NO CASE, SHALL THE LOAD ON THE BRACKET EXCEED THE LOADS SHOWN IN THE TABLE.
4. PROVIDE ANCHORS AT MANUFACTURER'S BRACKET HOLE LOCATIONS.
5. FOR TOLCO 30H BRACKETS WITH 1 1/8"Ø HOLES, PROVIDE 1/4" THICK PLATE WASHER WITH STANDARD 1 1/16"Ø HOLE FOR 1"Ø THREADED ROD. WELD PLATE WASHER ALL AROUND WITH 3/16" FILLET WELD.
6. DEVIATIONS FROM THIS DETAIL MUST BE VERIFIED WITH CALCULATIONS AND SUBMITTED TO ENGINEER FOR REVIEW.

SEISMIC AND WIND COMPLIANT DESIGN CRITERIA

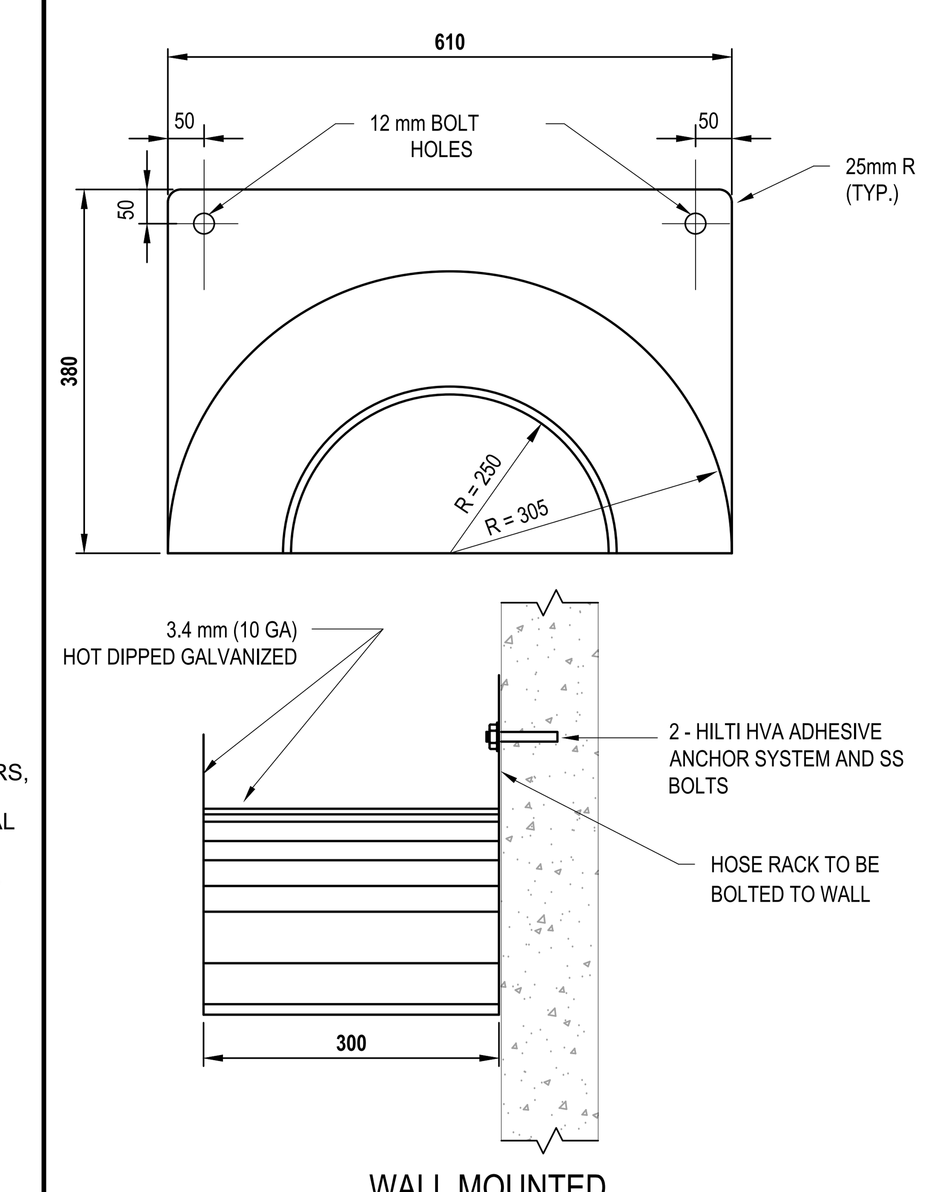
1. THE SUPPORT IS ADEQUATE FOR SEISMIC RESPONSE COEFFICIENT (SDS) GIVEN IN THE TABLE. SEISMIC FORCE ASSUMPTIONS (ASCE 7-10, EQN 13.3-1): ap=2.5, Rp=3.0, Ωo=2.5, Ip=1.0, z/h=1.0.
2. THE SUPPORT, DESIGNED FOR SEISMIC LOADS ARE ALSO ADEQUATE FOR A DESIGN WIND SPEED (Vult) OF UP TO 180 MPH WITH A MAXIMUM HEIGHT ABOVE GRADE OF 40'. WIND FORCE ASSUMPTIONS: EXPOSURE CATEGORY C, Kzt=1.0, Kz=1.04, Kd=0.85, G=0.85, Gcp=1.4,Cf=1.1 (DESIGNED PER ASCE 7-10 SECTION 29.5 - OTHER STRUCTURES).




5 / STD — PIPE BRACKET

(FOR PIPE 16" DIAMETER AND SMALLER)

REV 010119




NOTE:

1. PROVIDE HOSE RACK ADJACENT TO EACH INTERIOR UTILITY STATION.
2. ROUND ALL SHARP EDGES.

6 / STD — HOSE RACK INSTALLATION

NTS

| REFERENCE DRAWING | | REVISION | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| DRAWING No. | DRAWING TITLE | Rev. | DATE | DESCRIPTION | BY | DES. | CHK. | ENG. | |
| | | 0C | 30-AUG-2024 | ISSUED FOR 90% DESIGN | JD | AY | DS | GP | |
| | | 0D | 15-NOV-2024 | ISSUED FOR CONSTRUCTION | JD | AY | NB | GP | |

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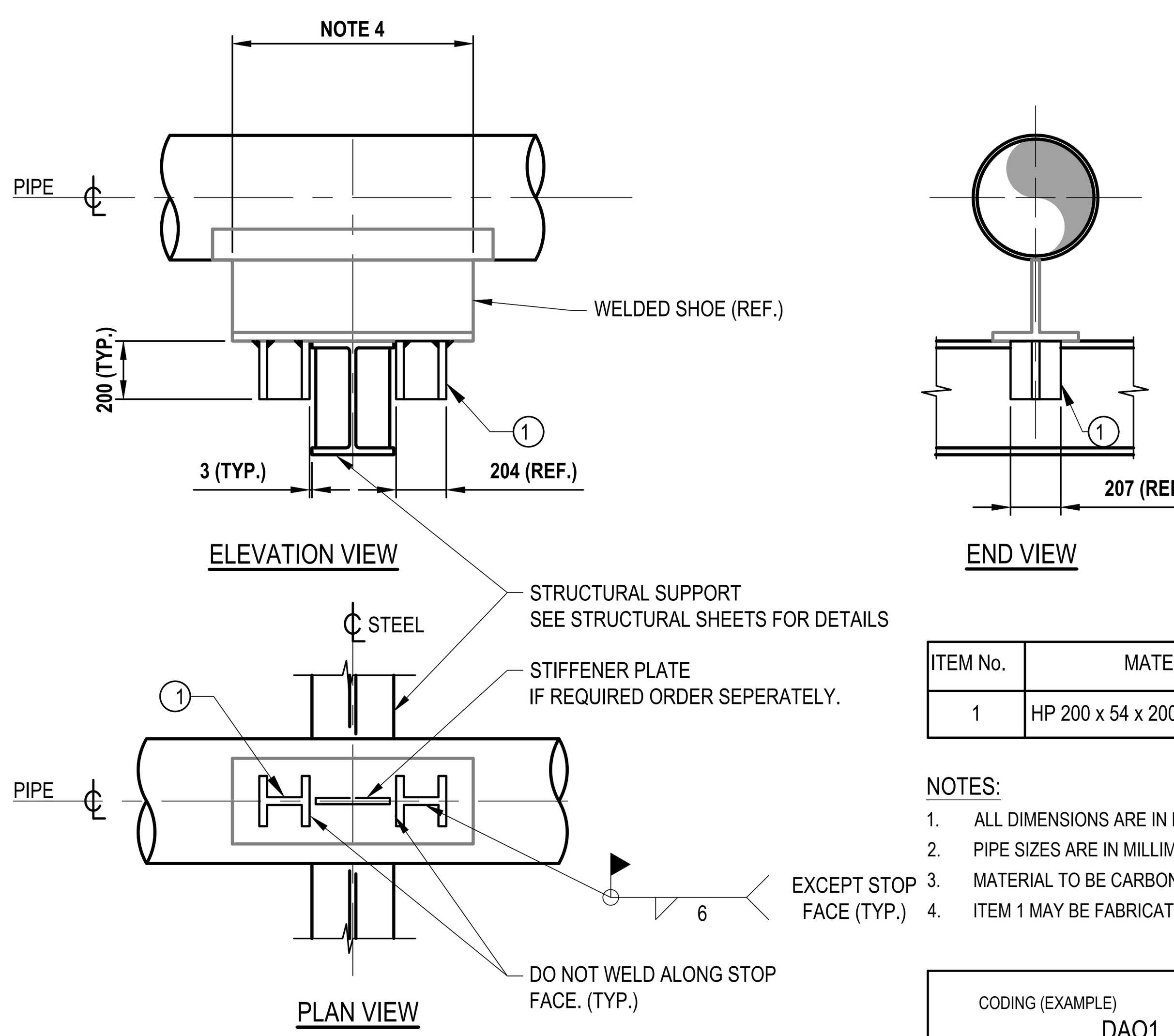
EPCOR

PLANT SITE: GOLD BAR WWTP | PLANT AREA: PLANT WIDE

PROJECT NAME: GBWWTP FLARE CAPACITY EXPANSION

DRAWING TITLE: PROCESS STANDARD DETAILS SHEET 1

| CONSULTANT JOB No. | EPCOR PROJECT No. | SCALE | SHEET | DRAWING NUMBER |
|---|---|---|---|---|
| 1101000105 | PMO 1004723; PF14-015 | NTS | 1 OF 1 | PRJ-15-157-415 |



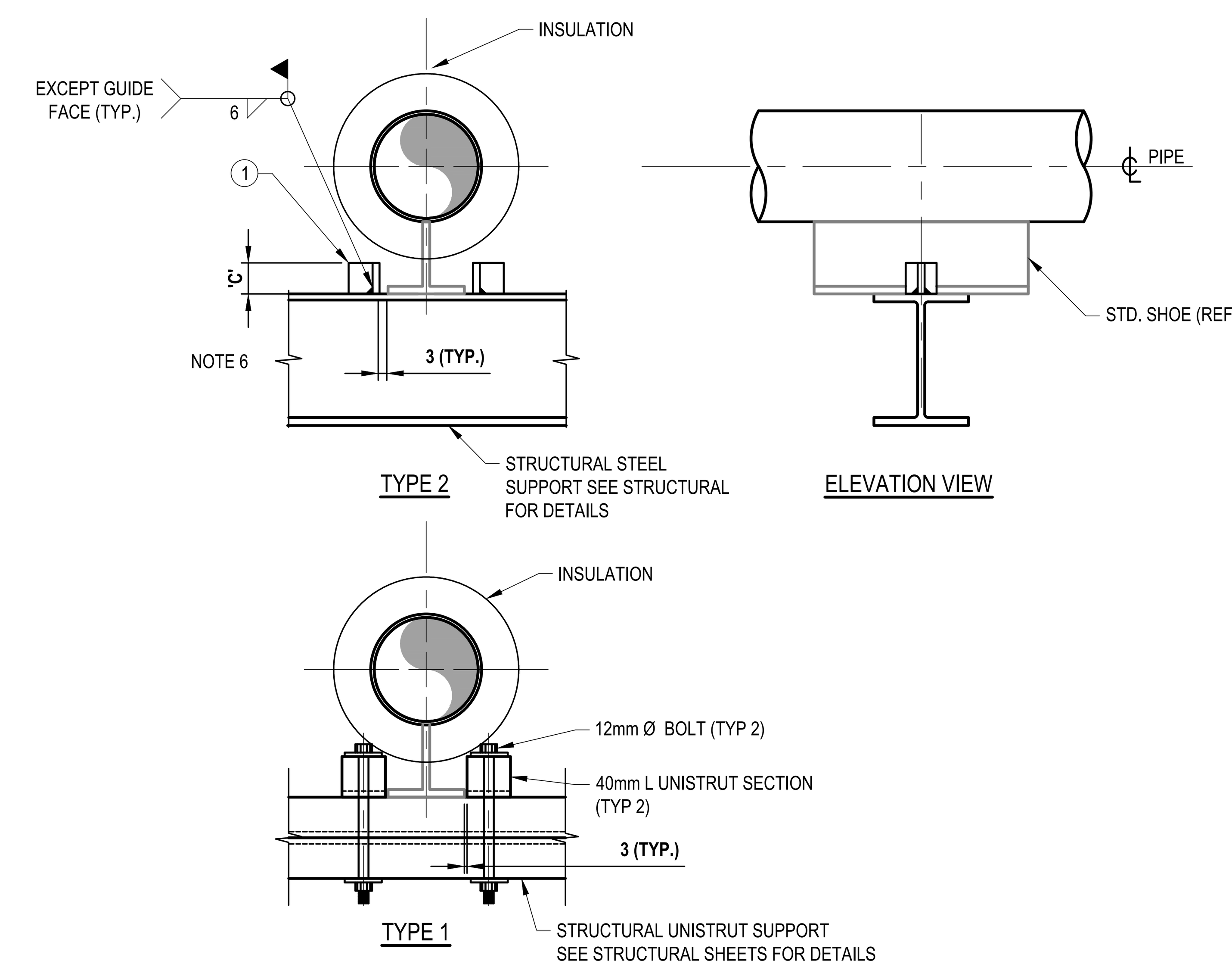

| ITEM No. | MATERIAL DESCRIPTION | QTY. |
|---|---|---|
| 1 | HP 200 x 54 x 200 LONG, SEE NOTE 3. | 2 |

NOTES:
1. ALL DIMENSIONS ARE IN MILLIMETRES
2. PIPE SIZES ARE IN MILLIMETRES
3. MATERIAL TO BE CARBON STEEL
4. ITEM 1 MAY BE FABRICATED FROM 12mm PLATE

CODING (EXAMPLE)
DAO1
DETAIL No

## 7 STD DIRECTIONAL ANCHOR FOR INSULATED LINES PIPE SIZES 50mm TO 600mm

NTS



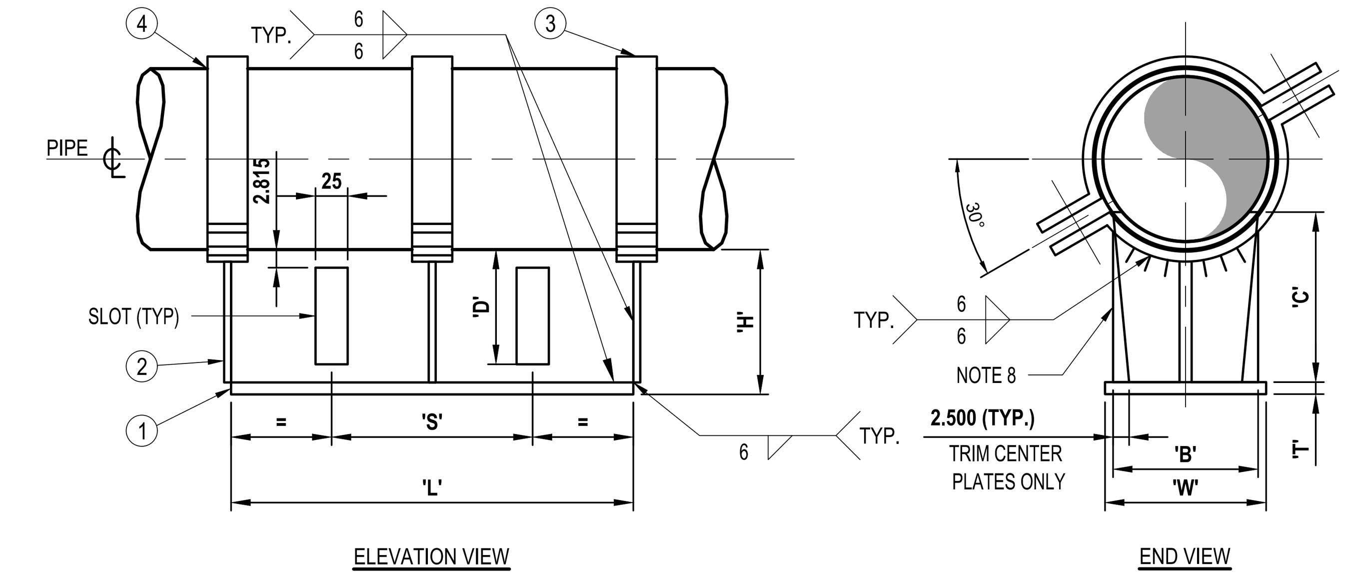

| ITEM No. | MATERIAL DESCRIPTION | QTY. | DIM."C" |
|---|---|---|---|
| 1 | WT 75 x 12 | 2 | 50 |

NOTES:
1. ALL STRUCTURAL MEMBERS ARE METRIC
2. ALL DIMENSIONS ARE IN MILLIMETRES
3. PIPE SIZES ARE IN MILLIMETRES
4. MATERIAL TO BE CARBON STEEL
5. CHECK FOR INTERFERENCE WITH ADJACENT PIPES OR GUIDES, STAGGER GUIDES OFF CENTER IF NECESSARY
6. TRIM HEIGHT TO FIT AS REQUIRED

CODING (EXAMPLE)
GUO1
DETAIL No

## 8 STD GUIDE FOR INSULATED LINES PIPE SIZES 50mm TO 600mm

NTS




| TYPE | ITEM No. | MATERIAL DESCRIPTION | QTY | DIMENSIONS 'W' | 'T' | 'H' | 'D' | 'B' | 'C' | INSULATION |
|---|---|---|---|---|---|---|---|---|---|---|
| A | 1 | WT 100 x 15.7 x 'L' | 1 | 134 | 10.2 | 50 | 30 | - | - | 0-75 THK. |
| | 2 | 12 THK. PLATE | 2 OR 3 | - | - | - | - | 125 | 150 | |
| | 3 | PIPE CLAMP (NOTE 9) | 2 OR 3 | - | - | - | - | - | - | |
| | 4 | 3 THK. LINER (NOTE 8) | 2 OR 3 | - | - | - | - | - | - | |
| B | 1 | WT 155 x 22.3 x 'L' | 1 | 166 | 11.2 | 150 | 130 | - | - | 76-125 THK. |
| | 2 | 12 THK. PLATE | 2 OR 3 | - | - | - | - | 160 | 200 | |
| | 3 | PIPE CLAMP (NOTE 4) | 2 OR 3 | - | - | - | - | - | - | |
| | 4 | 3 THK. LINER (NOTE 8) | 2 OR 3 | - | - | - | - | - | - | |

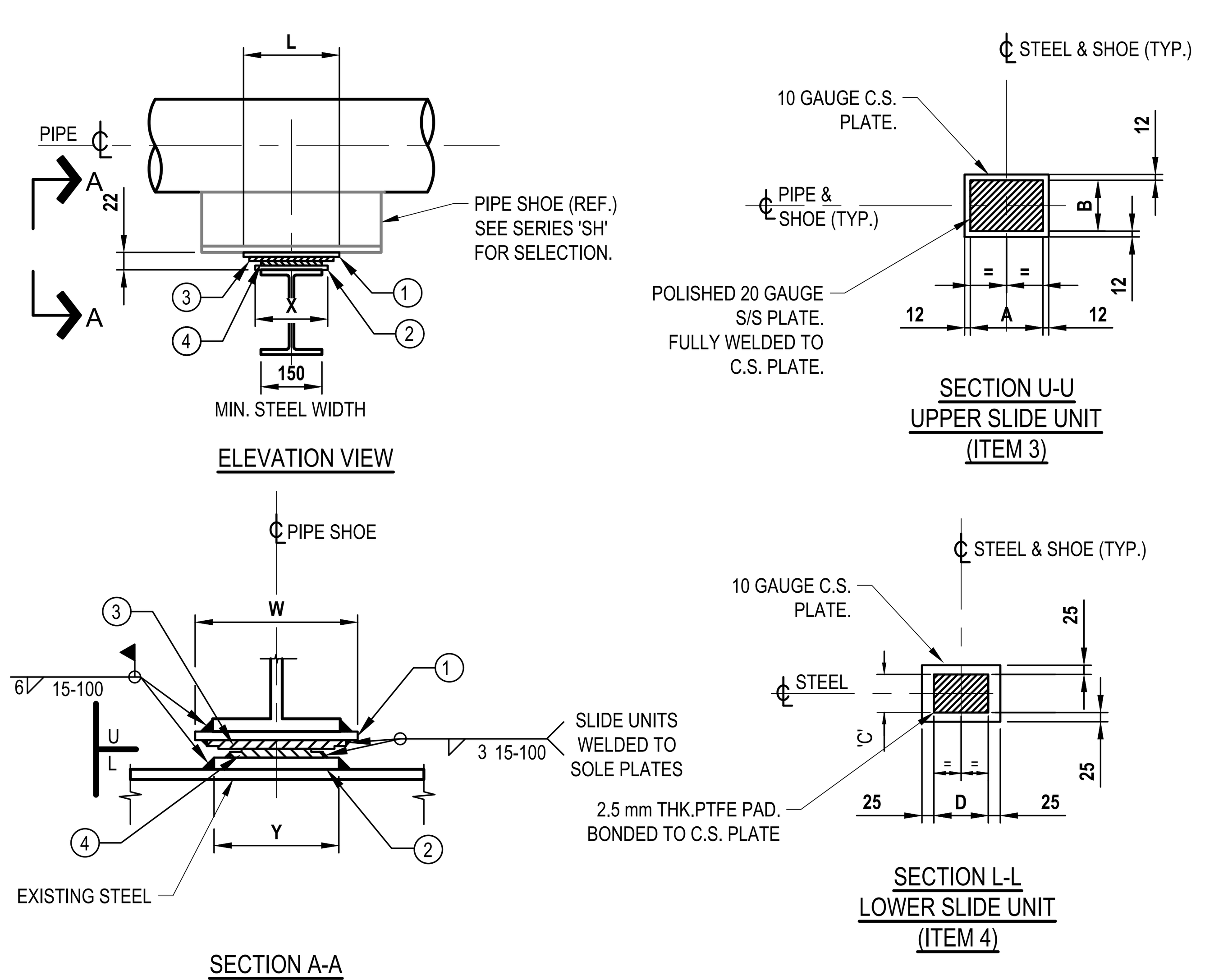
| MARK No. | DIMENSIONS 'L' | 'S' | THERMAL MOVEMENT | SLOTS No. |
|---|---|---|---|---|
| 3 | 300 | 150 | 0-75 | 2 |
| 4 | 450 | 225 | 75-150 | 2 |
| 6 | 600 | 300 | 150-225 | 2 |
| 7 | 750 | 375 | 225-300 | 2 |

CODING (EXAMPLE)
SHO1-A-3-200
DETAIL No / TYPE / PIPE SIZE / MARK No

NOTES:
1. ALL STRUCTURAL MEMBERS ARE METRIC
2. ALL DIMENSIONS ARE IN MILLIMETRES
3. PIPE SIZES ARE IN MILLIMETRES
4. MATERIAL IS CARBON STEEL
5. PIPE CLAMPS ARE PER ANVIL FIG 216, OR EQUIVALENT
6. MIDDLE PLATE REQUIRED ONLY FOR MARK No. 6 AND 7, CUT AND TRIM AS REQUIRED
7. ASSEMBLY TO BE STAMPED WITH TAG NUMBER IN CENTRAL POSITION FOR EASY IDENTIFICATION
8. SHAPE PLATES TO SUIT RADIUS OF CLAMP
9. FIBREGLASS CLOTH "THERMOFAB" OR EQUIVALENT, TO BE ADDED BETWEEN CLAMPS AND PIPES, USE ONLY IF LINE IS STAINLESS STEEL

## 10 STD CLAMP ON SHOE FOR PIPE SIZES 200mm TO 600mm

NTS




| ITEM No. | MATERIAL DESCRIPTION | QTY. |
|---|---|---|
| 1 | L x W x 6mm THK C.S. TOP SOLE PLATE | 1 |
| 2 | X x Y x 6mm THK C.S. BOTTOM SOLE PLATE | 1 |
| 3 | UPPER SLIDE UNIT - AS PER FABREEKA TYPE FUS-202-10 TO DIMENSIONS SHOWN, OR EQUAL. | 1 |
| 4 | LOWER SLIDE UNIT - AS PER FABREEKA TYPE FLS-213-10 TO DIMENSIONS SHOWN, OR EQUAL. | 1 |

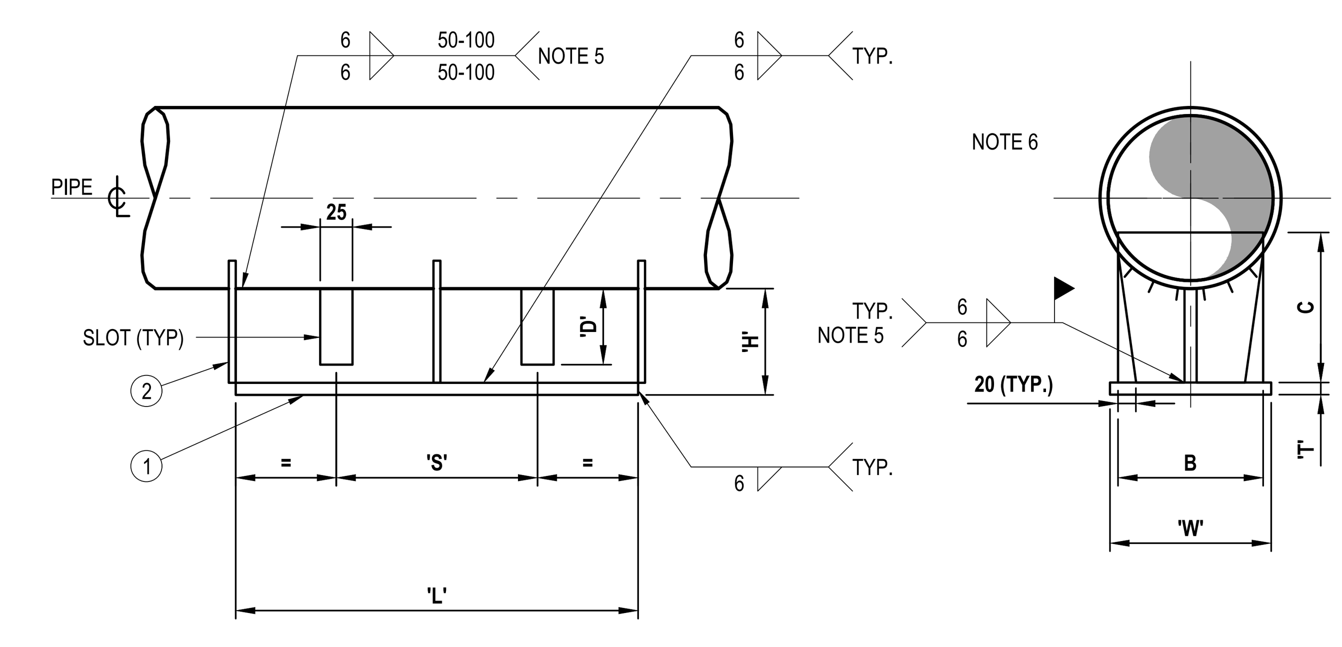
| PIPE SIZE | MIN. SHOE LENGTH | MARK No. | SLIDE PLATE DIMS. A | B | C | D | ITEM 1 L | W | ITEM 2 X | Y | MAX MOVEMENT LONG. | SIDE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3" TO 36" | 300 | 1 | 120 | 140 | 80 | 80 | 170 | 180 | 170 | 160 | 10 | 20 |
| | | 2 | 220 | | | | 270 | | | | 60 | |
| | 450 | 3 | 370 | | | | 420 | | | | 135 | |

NOTES:
1. LONG. = LONGITUDINAL MOVEMENT.
SIDE = SIDEWAYS MOVEMENT.
2. ALL DIMENSIONS ARE IN MILLIMETERS, PIPE SIZES ARE IN INCHES.
3. MAX. BEARING STRESS FOR PTFE PAD = 10 N/mm², MIN. = 1.3 N/mm², COEFFICIENT OF FRICTION EQUALS 0.1 OR LESS.
4. PTFE SURFACE TO BE MASKED PRIOR TO PAINTING LOCAL STEEL.
5. AVOID WELD SPLATTERS.
6. WIPE PTFE SURFACE CLEAN OF LOOSE PARTICLES BEFORE INSTALLATION UNDER SIDE SHOE.

CODING (EXAMPLE)
SP01
DETAIL No

## 9 STD SLIDE PLATE ASSEMBLY FOR PIPE SHOE, PIPE SIZES 3" TO 48"

NTS




CODING (EXAMPLE)
SHO3-A-3-200
DETAIL No / TYPE / PIPE SIZE / MARK No

| TYPE | ITEM No. | MATERIAL DESCRIPTION | QTY | DIMENSIONS 'W' | 'T' | 'H' | 'D' | 'B' | 'C' | INSULATION |
|---|---|---|---|---|---|---|---|---|---|---|
| A | 1 | WT 100 x 15.7 x 'L' | 1 | 134 | 10.2 | 100 | 80 | - | - | 0-75 THK |
| | 2 | 12 THK. PLATE | 2 OR 3 | - | - | - | - | 125 | 150 | |
| B | 1 | WT 155 x 19.5 x 'L' | 1 | 166 | 11.2 | 150 | 130 | - | - | 76-125 THK |
| | 2 | 12 THK. PLATE | 2 OR 3 | - | - | - | - | 160 | 200 | |

| MARK No. | DIMENSIONS 'L' | 'S' | THERMAL MOVEMENT | SLOTS No. |
|---|---|---|---|---|
| 3 | 300 | 150 | 0-75 | 2 |
| 4 | 450 | 225 | 75-150 | 2 |
| 6 | 600 | 300 | 150-225 | 2 |
| 7 | 750 | 375 | 225-300 | 2 |

NOTES:
1. ALL STRUCTURAL MEMBERS ARE METRIC
2. ALL DIMENSIONS ARE IN MILLIMETRES
3. PIPE SIZES ARE IN MILLIMETRES
4. MIDDLE PLATE REQUIRED ONLY FOR MARK No. 6 AND 7, CUT AND TRIM AS REQUIRED
5. ASSEMBLY TO BE STAMPED WITH TAG NUMBER IN CENTRAL POSITION FOR EASY IDENTIFICATION
6. SHAPE PLATES TO SUIT RADIUS OF PIPE
7. MATERIAL STAINLESS STEEL

## 11 STD WELDED SHOE FOR PIPE SIZES 200mm TO 600mm

NTS

| REFERENCE DRAWING | |
|---|---|
| DRAWING No. | DRAWING TITLE |

| Rev. | DATE | DESCRIPTION | BY | DES. | CHK. | ENG. |
|---|---|---|---|---|---|---|
| 0D | 15-NOV-2024 | ISSUED FOR CONSTRUCTION | RM | AY | NB | GP |

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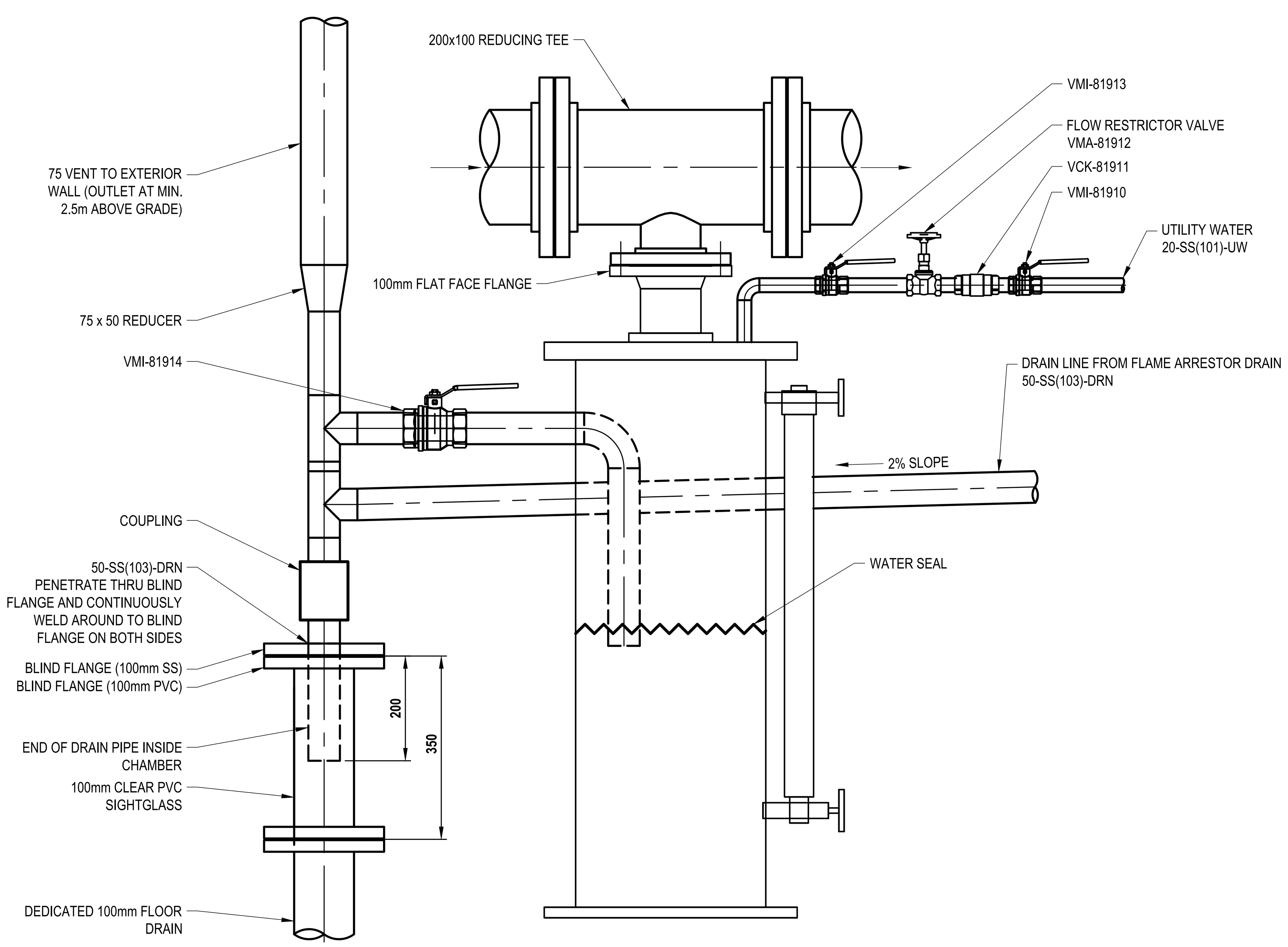
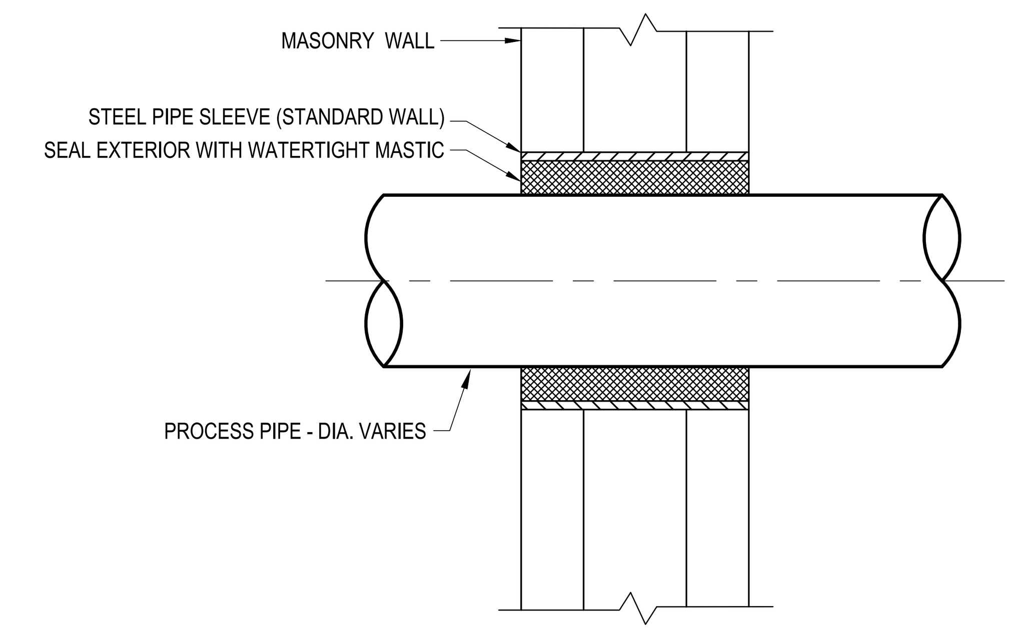
PROJECT NAME: GBWWTP FLARE CAPACITY EXPANSION
DRAWING TITLE: PROCESS STANDARD DETAILS SHEET 2

| CONSULTANT JOB No. | EPCOR PROJECT No. | SCALE | SHEET | DRAWING NUMBER |
|---|---|---|---|---|
| 1101000105 | PMO 1004723; PF14-015 | NTS | 1 OF 1 | PRJ-15-157-416 |



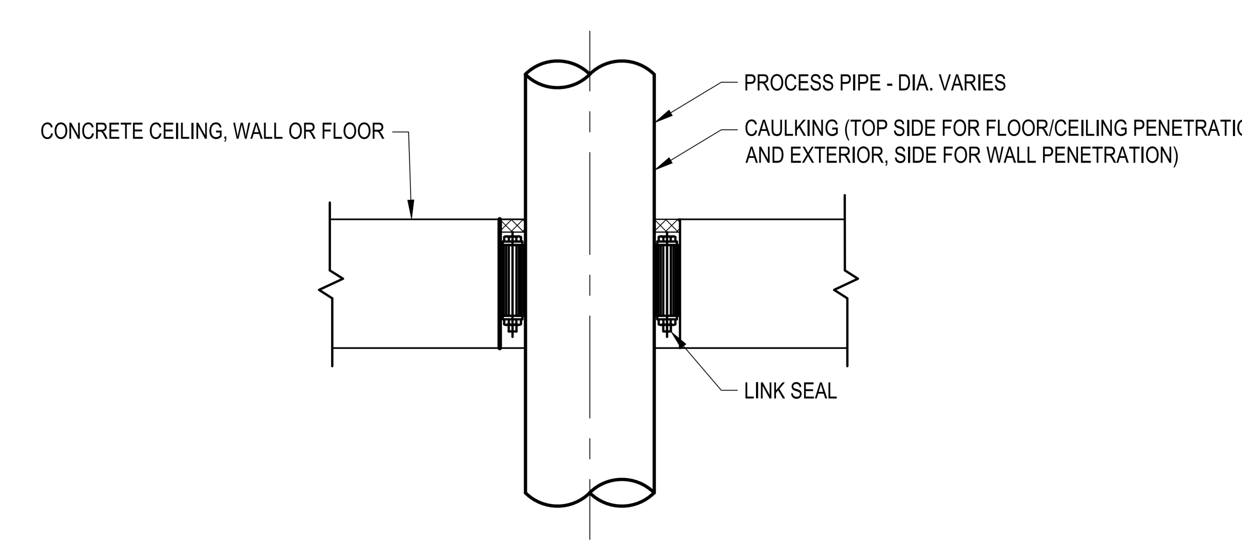

12
STD

## DETAIL - CONDENSATE ACCUMULATOR DRIP TRAP
NTS




13
STD

## DETAIL - MASONRY WALL PIPE PENETRATION
NTS




14
STD

## DETAIL - PIPE FLOOR/WALL PENETRATION
NTS

| REFERENCE DRAWING | | REVISION | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| DRAWING No. | DRAWING TITLE | Rev. | DATE | DESCRIPTION | BY | DES. | CHK. | ENG. |
| | | 0D | 15-NOV-2024 | ISSUED FOR CONSTRUCTION | RM | AY | NB | GP |

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EPCOR

PLANT SITE: GOLD BAR WWTP
PLANT AREA: PLANT WIDE
PROJECT NAME: GBWWTP FLARE CAPACITY EXPANSION
DRAWING TITLE: PROCESS STANDARD DETAILS SHEET 3

| CONSULTANT JOB No. | EPCOR PROJECT No. | SCALE | SHEET | DRAWING NUMBER |
|---|---|---|---|---|
| 1101000105 | PMO 1004723; PF14-015 | NTS | 1 OF 1 | PRJ-15-157-417 |

# VENTILATION (HVAC)

* NOTE: ALL DUCT SIZES ARE INTERIOR, FREE DIMENSIONS

| Symbol | Description |
|---|---|
| SA | SUPPLY AIR |
| RA | RETURN AIR |
| OA | OUTDOOR AIR |
| EA(G) | GENERAL EXHAUST AIR |
| EA(W) | WASHROOM EXHAUST AIR |
| EA(K) | KITCHEN EXHAUST AIR |
| | AIR FLOW ARROW |
| 450x250 450x250 | RECTANGULAR DUCT AND SIZE* |
| 450Ø 450Ø | ROUND DUCT AND SIZE* |
| 450x250Ø 450x250Ø | FLAT OVAL DUCT AND SIZE* |
| | EXTERIOR DUCT TREATMENT* |
| | RECTANGULAR DUCT WITH ACOUSTIC LINING* |
| 450x250 | DUCT SECTION, SUPPLY AIR. SIZE* IS HORIZONTAL DIM. x VERTICAL DIM. APPLIES TO RECT., ROUND AND OVAL |
| | DUCT SECTION, OUTSIDE AIR. APPLIES TO RECT., ROUND AND OVAL |
| | DUCT SECTION, RETURN AIR. APPLIES TO RECT., ROUND AND OVAL |
| | DUCT SECTION, EXHAUST AIR. APPLIES TO RECT., ROUND AND OVAL |
| | FLEXIBLE DUCT |
| | ELBOW TURN, SUPPLY DOWN. APPLIES TO RECT., ROUND AND OVAL |
| | ELBOW TURN, OUTSIDE AIR DOWN. APPLIES TO RECT., ROUND AND OVAL |
| | ELBOW TURN, RETURN DOWN. APPLIES TO RECT., ROUND AND OVAL |
| | ELBOW TURN, EXHAUST DOWN. APPLIES TO RECT., ROUND AND OVAL |
| | CHANGE IN DUCT ELEVATION RISING |
| | CHANGE IN DUCT ELEVATION DROPPING |
| | END CAP |
| | ELBOW, RECTANGULAR, SMOOTH RADIUS WITHOUT VANES (1.5 R/W DEFAULT) |
| | ELBOW, ROUND, SMOOTH RADIUS (1.5 R/W DEFAULT) |
| OR | MITERED ELBOW, RECTANGULAR, WITH TURNING VANES |
| | RECTANGULAR TO ROUND TRANSITION |
| AD AD AD | DUCT ACCESS DOOR (TOP, SIDE, BOTTOM) |
| BDD | BACKDRAFT DAMPER |
| | MANUAL DAMPER |
| M | MOTORIZED DAMPER |
| | FIRE DAMPER |
| | SMOKE DAMPER |
| | SMOKE AND FIRE DAMPER |
| FC | FLEXIBLE CONNECTION |
| X | CONTROL DEVICE (REFER TO CONTROLS LEGEND) |
| | AIR FLOW MEASURING STATION (REFER TO CONTROLS LEGEND) |
| | UNIT HEATER |
| QUANTITY / TYPE / SIZE (mmØ) / VOLUME (L/s) | AIR OUTLET OR INLET TAG (REFER TO SCHEDULE) |
| | RECTANGULAR DIFFUSER, SUPPLY. OPTIONAL ARROWS SHOW THE FLOW DIRECTION. |
| | RECTANGULAR REGISTER OR GRILLE, RETURN |
| | RECTANGULAR REGISTER OR GRILLE, EXHAUST |
| | ROUND DIFFUSER, SUPPLY |
| | LINEAR DIFFUSER |
| | SIDEWALL REGISTER OR GRILLE, SUPPLY |
| | SIDEWALL GRILLE, RETURN OR EXHAUST |
| | TRANSFER GRILLE OR LOUVER |
| | * NOTE: ALL DUCT SIZES ARE INTERIOR, FREE DIMENSIONS (ALWAYS WIDTH X HEIGHT IN FLOOR PLAN AND SECTION) |
| ID-# | EQUIPMENT TAG |
| | CONTROL WIRE |

# PLUMBING AND PIPING

| Symbol | Description |
|---|---|
| 50 | PIPE SIZING |
| XX | PIPING ROUTED BELOW SLAB OR GRADE |
| DCW | DOMESTIC COLD WATER |
| SAN | SANITARY DRAIN |
| SAN(P) | SANITARY DRAIN (PUMPED) |
| V | SANITARY VENT |
| | PIPE INSULATION |
| | FIXTURE TRAP |
| FD | FLOOR DRAIN |
| FFD | FUNNEL FLOOR DRAIN |
| HB | HOSE BIBB |
| | PLUMBING FIXTURES |
| TYPE / QUANTITY | PLUMBING FIXTURE TAG (REFER TO SCHEDULE) |

## MOTORIZED DAMPER SCHEDULE

| MARK | MANUFACTURER | MODEL | SERVICE | ASSOCIATED FAN SYSTEM | LOCATION | NOMINAL SIZE (mm x mm) | BLADE ARRANGEMENT | FAIL POSITION | CONTROL | SUPPLIED BY |
|---|---|---|---|---|---|---|---|---|---|---|
| QAD-81940 | TAMCO | 9000 | ELEC. ROOM 1 | SF-1 | ELEC. ROOM 1 | 300x300 | OPPOSED | OPEN | ON/OFF | CONTROLS CONTRACTOR |
| QAD-81942 | TAMCO | 9000 | ELEC. ROOM 1 | - | ELEC. ROOM 1 | 300x300 | OPPOSED | OPEN | ON/OFF | CONTROLS CONTRACTOR |

## LOUVER SCHEDULE

NOTES:
1. C/W BIRDSCREEN.
2. CONFIRM COLOUR WITH ARCHITECT PRIOR TO ORDERING.
3. SUBMIT APPROVAL SAMPLE.

| MARK | FREE AREA (%) | CONSTRUCTION | FINISH | MANUFACTURER | MODEL | NOTES |
|---|---|---|---|---|---|---|
| L-1 | 57.5 | DRAINABLE, EXTRUDED ALUMINUM | BAKED ENAMEL | E.H.PRICE | DE635 | 1,2,3 |

## FIRE EXTINGUISHER SCHEDULE

| MARK | TYPE | CAPACITY (kg) | ULC RATING | MANUFACTURER | MODEL | MOUNTING TYPE |
|---|---|---|---|---|---|---|
| FE-1 | MULTI-PURPOSE DRY CHEMICAL - PRESSURE TYPE | 5 | 6A:80B:C | NATIONAL FIRE EQUIPMENT | WBDL-ABC10 | WALL HUNG ON BRACKET |

## GRILLE, REGISTER, DIFFUSER SCHEDULE

NOTES:
1. PROVIDE ALL FRAMES AND ACCESSORIES AS REQUIRED FOR PROPER INSTALLATION.
2. COLOR TO BE SELECTED BY ARCHITECT FROM STANDARD COLORS.

| MARK | DESCRIPTION | FINISH | MANUFACTURER | MODEL | NOTES |
|---|---|---|---|---|---|
| E-1 | ALUMINUM EGG CRATE EXHAUST GRILLE; 13mm (1/2") CORE; GRILLES TO BE SUITABLE FOR T-BAR LAY-IN | WHITE POWDER COAT (B12) | E.H.PRICE | SERIES 80 | 1,2 |
| S-1 | STEEL DOUBLE DEFLECTION GRILLE; 19mm (3/4") BLADE SPACING; FRONT BLADES TO BE PARALLEL TO LONG DIMENSION; GRILLES TO BE SUITABLE FOR SURFACE OR DUCT MOUNTING (BORDER STYLE F); INTEGRAL BALANCING DAMPER | WHITE POWDER COAT (B12) | E.H.PRICE | SERIES 520 | 1,2 |

## ELECTRIC DUCT HEATER SCHEDULE

| UNIT IDENTIFICATION | | COIL | | | | AIR | | | | V/Ph/Hz | MANUFACTURER | MODEL | NOTES |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MARK | LOCATION | CAPACITY (kW) | HEIGHT (mm) | LENGTH (mm) | DEPTH (mm) | AIRFLOW (L/s) | EDB (°C) | LDB (°C) | FACE VELOCITY (m/s) | | | | |
| XUH-81941 | ELEC. ROOM 1 | 2.24 | 150 | 150 | 250 | 36 | -33.0 | 18.0 | 1.6 | 208/1/60 | E.H. PRICE | DF CI00H | C/W MODULATING CONTROL |

## PUMP SCHEDULE

NOTES:
1. C/W PREPACKAGED AUTOMATIC EXPLOSION PROOF SYSTEM, 36"x84" FIBERGLASS SUMP WITH COVER, FM LISTED FOR CLASS 1 DIVISION 1 ENVIRONMENT, EXPLOSION PROOF SWITCH (NEMA 7), DOUBLE POLE FLOAT SWITCH, EXPLOSION PROOF JUNCTION BOX AND FITTINGS.
2. PROVIDE WITH REMOTE MOUNTED SUMP CONTROL PANEL & FLOATS.
3. PROVIDE LIFT OUT RAIL ASSEMBLY.
4. PROVIDE WEATHERPROOF COVER TO BE SEALED FOR FUTURE USE.

| UNIT IDENTIFICATION | | PUMP TYPE | PERFORMANCE | | | PUMP MOTOR | | ELECTRICAL | | | MANUFACTURER | MODEL | NOTES |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MARK | SYSTEM SERVED | | FLUID TYPE | FLOW (L/s) | PUMP HEAD (kPa) | POWER (kW) | SPEED (RPM) | FLA | VOLTS | PHASE | | | |
| PSP-81931 | SANITARY SUMP | DUPLEX EXPLOSION PROOF SUBMERSIBLE SUMP PUMP | EFFLUENT | 0.63 | 39 | 373 | 1725 | 15.0 | 120 | 1 | ZOELLER | NX6292 | 1,2,3 |
| PSP-81972 | SANITARY SUMP | DUPLEX EXPLOSION PROOF SUBMERSIBLE SUMP PUMP | EFFLUENT | 0.63 | 39 | 373 | 1725 | 15.0 | 120 | 1 | ZOELLER | NX6292 | 1,2,3,4 |

## MAKEUP AIR UNIT SCHEDULE

| MARK | FAN | | | | HEATING SECTION | | | | | | | MIN. TURN DOWN | FILTERS | | | | ELECTRICAL | | | | | | MANUFACTURER | MODEL | NOTES |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | AIRFLOW (L/s) | ESP (Pa) | SPEED (RPM) | POWER (kW) | INPUT CAPACITY (kW) | OUTPUT CAPACITY (kW) | THERMAL EFFICIENCY (%) | EDB (°C) | LDB (°C) | FUEL TYPE | BURNER CONTROL | | PRE (Y/N) | PRE MERV | FINAL (Y/N) | FINAL MERV | POWER (kW) | MCA | MOCP | FLA | VOLTS | PHASE | | | |
| MAU-81936 | 456 | 125 | 1759 | 0.19 | 37.8 | 30.2 | 80 | -33.0 | 21.2 | NATURAL GAS | MODULATING | 4:1 | Yes | 8 | Yes | 13 | 0.75 | 1.5 | 15 | 2.1 | 575 | 3 | SOLUTION AIR | IFC-11-150 | C/W DISCONNECT, PACKAGED CONTROLS, REMOTE CONTROL PANEL W/ DISCHARGE TEMPERATURE CONTROL, FILTER, HEAT, FAN, & ALARM STATUS LIGHTS, HOA SWITCH. |

## PLUMBING FIXTURE SCHEDULE

| FIXTURE TAG | TYPE | CONNECTIONS | | | | | DESCRIPTION |
|---|---|---|---|---|---|---|---|
| | | COLD (Ømm) | HOT (Ømm) | TEMPERED (Ømm) | VENT (Ømm) | WASTE (Ømm) | |
| FD-01 | FLOOR DRAIN | 0 | 0 | 0 | 40 | 100 | WATTS #FD-100-C-A5-1-7 FLOOR DRAIN - EPOXY COATED CAST IRON BODY, REVERSIBLE FLASHING CLAMP WITH PRIMARY AND SECONDARY WEEPHOLES, TRAP PRIMER CONNECTION WITH PLUG, NO HUB OUTLET WATTS -A5-1 5" (127 MM) DIAMETER, NICKEL BRONZE, ADJUSTABLE ROUND STRAINER. COMPLETE WITH MI-FAB #MI-GARD-4 INLINE FLOOR DRAIN TRAP SEAL, UV RESISTANT ABS PLASTIC FRAME, SILICON RUBBER SEALING FLAPPER AND FLEXIBLE SEALING RIBS, DIAMETER TO MATCH DRAIN CONNECTION SIZE. |
| FFD-01 | FUNNEL FLOOR DRAIN | 0 | 0 | 0 | 40 | 100 | WATTS #FD-100-C-A5-1-7-F4-1 FLOOR DRAIN - EPOXY COATED CAST IRON BODY, REVERSIBLE FLASHING CLAMP WITH PRIMARY AND SECONDARY WEEPHOLES, TRAP PRIMER CONNECTION WITH PLUG, NO HUB OUTLET WATTS -A5-1-F4-1 5" (127 MM) DIAMETER, NICKEL BRONZE, ADJUSTABLE ROUND STRAINER, 4"Ø (102 MM) NICKEL BRONZE FUNNEL. COMPLETE WITH MI-FAB #MI-GARD-4 INLINE FLOOR DRAIN TRAP SEAL, UV RESISTANT ABS PLASTIC FRAME, SILICON RUBBER SEALING FLAPPER AND FLEXIBLE SEALING RIBS, DIAMETER TO MATCH DRAIN CONNECTION SIZE. |
| HB-01 | HOSE BIBB | 20 | 0 | 0 | 0 | 0 | WATTS #LFSC8-6 CAST BRASS HOSE BIBB, HEX SHOULDER, ADJUSTABLE PACKING NUT, 3/4 NPT WITH TEE HANDLE AND SEPARATE TAMPER-PROOF VACUUM BREAKER. |

## UNIT HEATER - ELECTRIC SCHEDULE

| UNIT IDENTIFICATION | | TYPE | MOUNTING | CAPACITY (kW) | FAN | | AIRFLOW (L/s) | ELECTRICAL | | CONTROL TYPE | MANUFACTURER | MODEL | NOTES |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MARK | LOCATION | | | | SPEED (RPM) | WATTS | | VOLTS | PHASE | | | | |
| XUH-81938 | MAIN ROOM 2 | EXPLOSION RESISTANT UNIT HEATER | CEILING SUSPENDED | 7.5 | 1550 | 25 | 283 | 600 | 3 | REMOTE THERMOSTAT | REZNOR | EXUB7 | |
| XUH-81943 | ELEC. ROOM 1 | INDUSTRIAL UNIT HEATER | CEILING SUSPENDED | 7.5 | 1550 | 25 | 283 | 600 | 3 | REMOTE THERMOSTAT | REZNOR | EGHB7 | |

## FAN SCHEDULE

NOTES:
1. SPARK B CONSTRUCTION FOR SPARK RESISTANCE; EXP MOTOR AND ENCLOSURE; LOOSE DISCONNECT SWITCH NEMA-7 AND 9, TOGGLE, SHIPPED WITH UNIT; FOAM CURB SEAL (FACTORY INSTALLED); 300 SERIES STAINLESS STEEL FASTENERS; STAINLESS STEEL BIRD SCREEN (NOM. 86% FREE AREA); 300MM HIGH ROOF CURB.
2. C/W VARI-GREEN ECM; VARI-GREEN DIAL ON EXTERIOR OF FAN HOUSING, MOUNTED AND WIRED UNIVERSAL MOUNTING CONTROL; JUNCTION BOX MOUNTED AND WIRED; LOOSE DISCONNECT SWITCH NEMA-1, TOGGLE, SHIPPED WITH UNIT; 300 SERIES STAINLESS STEEL FASTENERS; ALUMINUM WHEEL MATERIAL; MOTOR COVER; SHIPPED LOOSE ISOLATORS AND BRACKETS.

| UNIT IDENTIFICATION | | AIRFLOW (L/s) | ESP (Pa) | FAN TYPE | FAN MOTOR | | | VOLTS | PHASE | NOISE | MANUFACTURER | MODEL | NOTES |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MARK | LOCATION | | | | POWER (W) | SPEED (RPM) | DRIVE TYPE | | | SONES | | | |
| GEF-81937 | EXTERIOR WALL | 502 | 125 | UPBLAST CENTRIFUGAL EXHAUST FAN | 186 | 1140 | DIRECT | 575 | 3 | 10.1 | GREENHECK | CUE-130-B | 1 |
| GEF-81939 | ELEC. ROOM 1 | 36 | 112 | INLINE CABINET FAN | 30 | 1095 | DIRECT | 120 | 1 | 0.4 | GREENHECK | CSP-A510-VG | 2 |

| REFERENCE DRAWING | | REVISION | | | | | | |
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| | | 0A | 06-JUL-2023 | ISSUED FOR PRELIMINARY DESIGN | DL | IG | DN | RR |
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EPCOR

PLANT SITE: GOLD BAR WWTP | PLANT AREA: PLANT WIDE

PROJECT NAME: GBWWTP FLARE CAPACITY EXPANSION

DRAWING TITLE: BUILDING MECHANICAL LEGENDS AND SCHEDULES

| CONSULTANT JOB No. | EPCOR PROJECT No. | SCALE | SHEET | DRAWING NUMBER |
|---|---|---|---|---|
| 1101000105 | PMO 1004723; PF14-015 | 1 : 100 | 1 of 7 | PRJ-15 -157 -501 |

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## GAS LEGEND

NOTES:
1. PLANT GAS DISTRIBUTION AT 20PSI (141kPa). PROVIDE PRV AS INDICATED FOR APPLIANCE REQUIRED PRESSURE. VENT ALL PRV'S TO ATMOSPHERE.
2. DOUBLE BLOCK AND BLEED ISOLATION UPSTREAM OF EACH EQUIPMENT CONNECTION (REFER TO P&ID FOR DETAILS).

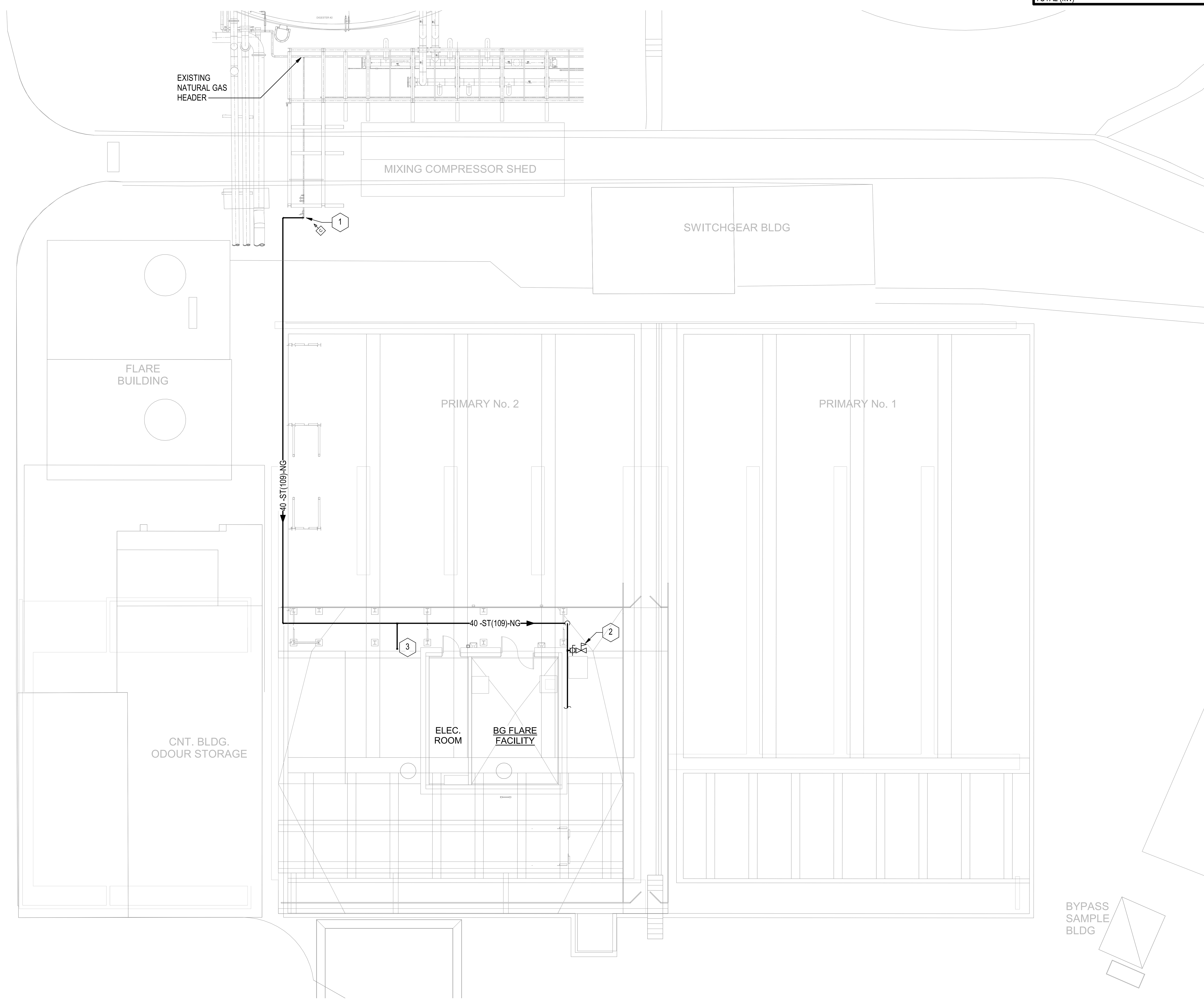
| MARK | EQUIPMENT | GAS INPUT (kW) |
|---|---|---|
| MAU-81936 | MAKEUP AIR UNIT | 38 |
| TOTAL (kW) | | 38 |

## GENERAL NOTES

1. TOP OF SLAB ELEVATION OF 100.00 IS EQUAL TO 620.622 GEODETIC.
2. MAKE CONNECTIONS TO SITE SERVICES AT APPROXIMATE LOCATION SHOWN ON DRAWINGS. COORDINATE WITH EXISTING SITE SERVICES AND EPCOR FOR FINAL TIE-IN LOCATION.

## KEYNOTES

1. CONNECT TO EXISTING 50Ø PLANT NATURAL GAS LINE CAPPED IN PLACE COMPLETE WITH DOUBLE BLOCK AND BLEED VALVES.
2. REDUCE TO 1.74 kPa AND VENT TO OUTDOORS.
3. STUB CONNECTION FOR FUTURE FLARE BUILDING.




1 / 502 **SITE PLAN**
1 : 150


2 **SITE PHOTO - NATURAL GAS TIE POINT**
N.T.S.

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| REFERENCE DRAWING | | REVISION | | | | | | |
|---|---|---|---|---|---|---|---|---|
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EPCOR

PLANT SITE: GOLD BAR WWTP
PLANT AREA: PLANT WIDE
PROJECT NAME: GBWWTP FLARE CAPACITY EXPANSION
DRAWING TITLE:

# BUILDING MECHANICAL NATURAL GAS UTILITY SITE PLAN

| CONSULTANT JOB No. | EPCOR PROJECT No. | SCALE | SHEET | DRAWING NUMBER |
|---|---|---|---|---|
| 1101000105 | PMO 1004723; PF14-015 | As Noted | 2 of 7 | PRJ-15 -157 -502 |

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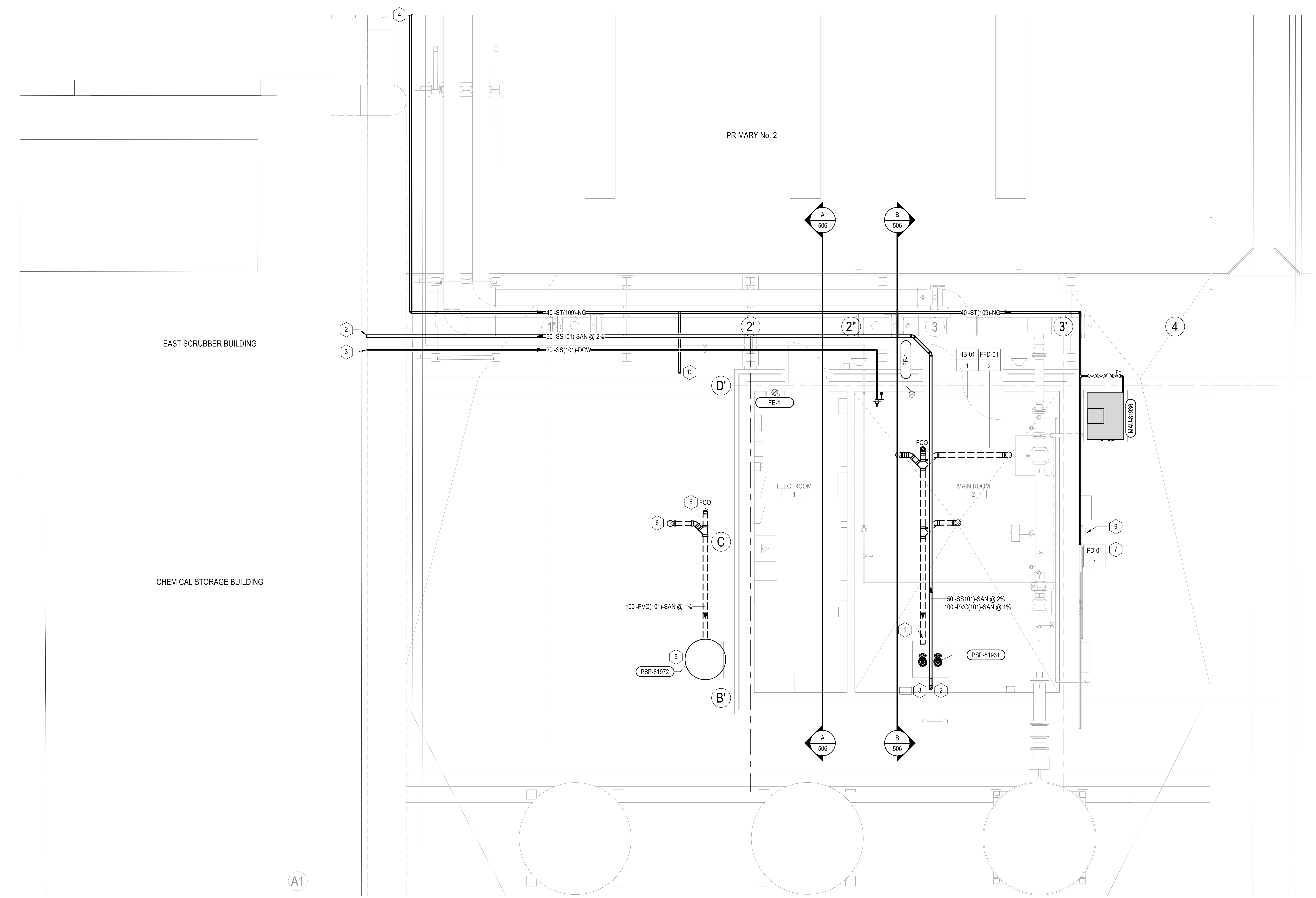


# 1 MAIN FLOOR PLUMBING PLAN
503
1 : 50

## GENERAL NOTES

1. VENT ALL FIXTURES IN ACCORDANCE WITH THE NATIONAL PLUMBING CODE.
2. BELOW GRADE SERVICES TO BE COORDINATED WITH STRUCTURAL FOOTING AND PILE LOCATIONS TO AVOID INTERFERENCE.
3. TOP OF SLAB ELEVATION OF 100.00 IS EQUAL TO 620.622 GEODETIC.
4. ALL SANITARY DRAIN LINES AND DOMESTIC COLD WATER LINE FROM EAST SCRUBBER BUILDING TO FLARE EXPANSION FACILITY EXPOSED TO THE OUTDOORS & NOTED ON DRAWINGS TO BE HEAT TRACED AND INSULATED. REFER TO ELECTRICAL DRAWING FOR DETAILS.
5. PROVIDE P-TRAP AND TRAP PRIMERS TO ALL DRAINS AS PER SPECIFICATIONS.
6. ALL PLUMBING FIXTURES TO HAVE ISOLATION VALVES.
7. ALL EXPOSED PIPING IN OCCUPIED SPACES SUBJECT TO ARCHITECTURAL APPROVAL PRIOR TO INSTALLATION.
8. ALL NEW PIPING TO BE COORDINATED WITH NEW DUCT WORK TO AVOID CONFLICTS.
9. INDIVIDUAL FIXTURE PIPE SIZES AS PER PLUMBING FIXTURE SCHEDULE.
10. PROVIDE DOUBLE BLOCK AND BLEED VALVES UPSTREAM OF APPLIANCES AS SHOWN.

## KEYNOTES

1. 100Ø SANITARY DRAIN TO PACKAGED EXPLOSION PROOF SUMP PUMP SYSTEM.
2. 50Ø BUILDING DRAINAGE PUMPED UP TO PIPE RACK AT HIGH LEVEL AS SHOWN. PIPE TO BE GRAVITY DRAINED, HEAT TRACED AND INSULATED, AND TIE INTO EXISTING SUMP INSIDE EAST SCRUBBER BUILDING. INSTALL SANITARY PIPE AS TIGHT TO UNDERSIDE OF STRUCTURE AS POSSIBLE. REFER TO DRAWING 504 FOR CONTINUATION.
3. 20Ø DOMESTIC COLD WATER SUPPLY LINE FROM EXISTING UTILITY WATER LINE FROM EAST SCRUBBER BUILDING. PIPE TO BE HEAT TRACED AND INSULATED. REFER TO DRAWING 504 FOR CONTINUATION.
4. NEW NATURAL GAS TO TIE INTO EXISTING 50Ø NATURAL GAS BRANCH FROM PLANT UTILITY RACK. REFER TO DRAWING 504 FOR CONTINUATION. PROVIDE PRV AS INDICATED FOR APPLIANCE PRESSURE. VENT ALL PRV TO ATMOSPHERE.
5. PROVIDE EXPLOSION PROOF PACKAGED SUMP PUMP SYSTEM AS SHOWN. SUMP COVER TO BE WEATHERPROOF AND SEALED FOR FUTURE USE.
6. NEW FLOOR DRAIN AND FLOOR CLEANOUT TO BE CAPPED AND COVERED IN PLACE FOR FUTURE USE.
7. ALL DRAINS SHALL BE PROVIDED WITH TRAP PRIMER AND TRAP SEAL.REFER TO PLUMBING FIXTURE SCHEDULE ON DRAWING 501.
8. PROVIDE WALL MOUNTED SUMP PUMP CONTROL PANEL AT LOCATION SHOWN.
9. 15Ø NATURAL GAS LINE TO PILOT GAS PANEL FOR FLARE. REFER TO PROCESS DRAWING 413 FOR DETAILS.
10. STUB CONNECTION FOR FUTURE FLARE BUILDING.

| REFERENCE DRAWING | | REVISION | | | | | | |
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EPCOR

PLANT SITE: GOLD BAR WWTP
PLANT AREA: PLANT WIDE
PROJECT NAME: GBWWTP FLARE CAPACITY EXPANSION
DRAWING TITLE:
BUILDING MECHANICAL
MAIN FLOOR PLUMBING PLAN

| CONSULTANT JOB No. | EPCOR PROJECT No. | SCALE | SHEET | DRAWING NUMBER |
|---|---|---|---|---|
| 1101000105 | PMO 1004723; PF14-015 | As Noted | 3 of 7 | PRJ-15 -157 -503 |

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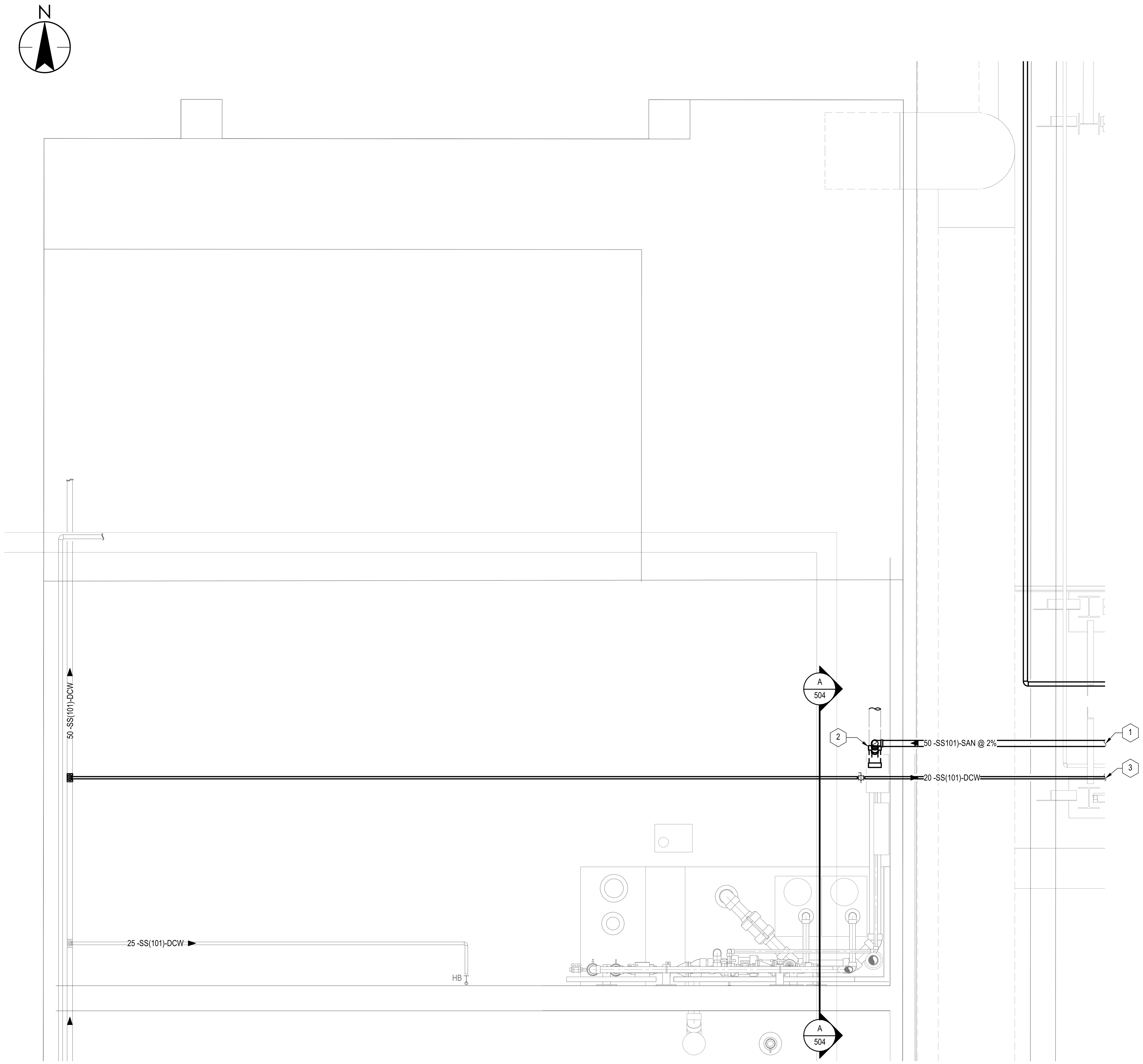
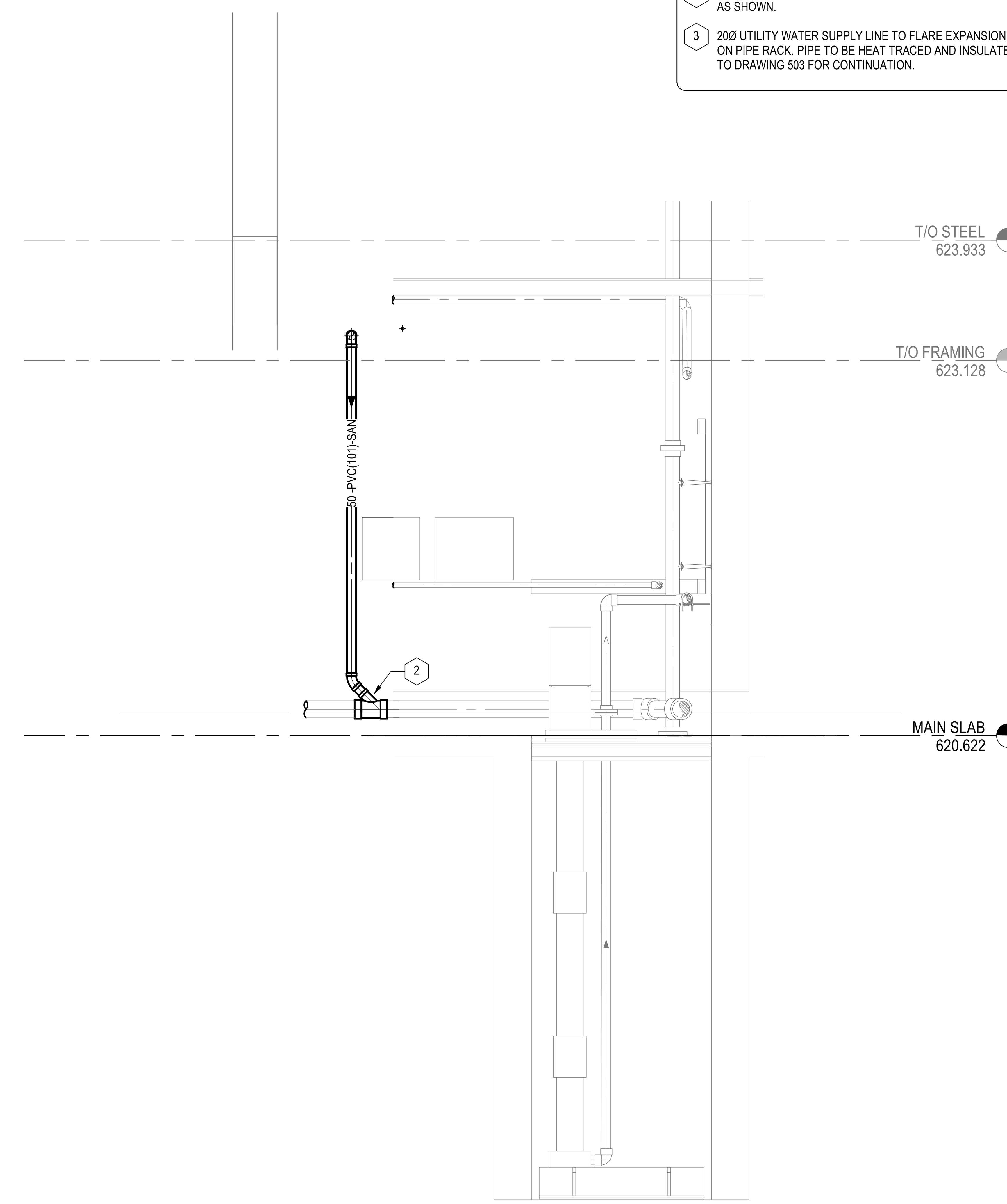



## 1 / 504 EAST SCRUBBER BUILDING - PARTIAL PLUMBING PLAN
1 : 25




## A / 504 EAST SRCUBBER BUILDING SECTION
1 : 25

### GENERAL NOTES

1. VENT ALL FIXTURES IN ACCORDANCE WITH THE NATIONAL PLUMBING CODE.
2. PROVIDE P-TRAP AND TRAP PRIMERS TO ALL DRAINS AS PER SPECIFICATIONS.
3. ALL NEW PIPING TO BE COORDINATED WITH EXISTING DUCT WORK, PIPING, ELECTRICAL EQUIPMENT TO AVOID CONFLICTS.
4. ALL SANITARY DRAIN LINES AND DOMESTIC COLD WATER LINE FROM EAST SCRUBBER BUILDING TO FLARE EXPANSION FACILITY EXPOSED TO THE OUTDOORS & NOTED ON DRAWINGS TO BE HEAT TRACED AND INSULATED. REFER TO ELECTRICAL DRAWING FOR DETAILS.

### KEYNOTES

1. 50Ø DRAINAGE PIPE FROM FLARE EXPANSION BUILDING AT HIGH LEVEL ON UTILITY RACK. PIPE TO BE HEAT TRACED AND INSULATED. REFER TO DRAWING 503 FOR CONTINUATION.
2. CONNECT TO EXISTING SANITARY MAIN TO EAST SCRUBBER SUMP AS SHOWN.
3. 20Ø UTILITY WATER SUPPLY LINE TO FLARE EXPANSION BUILDING ON PIPE RACK. PIPE TO BE HEAT TRACED AND INSULATED. REFER TO DRAWING 503 FOR CONTINUATION.

| REFERENCE DRAWING | | REVISION | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| DRAWING No. | DRAWING TITLE | Rev. | DATE | DESCRIPTION | BY | DES. | CHK. | ENG. |
| | | 0A | 06-JUL-2023 | ISSUED FOR PRELIMINARY DESIGN | DL | IG | DN | RR |
| | | 0B | 26-APR-2024 | ISSUED FOR 60% DESIGN | DL | IG | BE | RR |
| | | 0C | 30-AUG-2024 | ISSUED FOR 90% DESIGN | DL | IG | BE | RR |
| | | 0D | 15-NOV-2024 | ISSUED FOR CONSTRUCTION | DL | IG | BE | RR |

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APEGA ID#: 185655 2024-11-25

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PLANT SITE: GOLD BAR WWTP
PLANT AREA: PLANT WIDE
PROJECT NAME: GBWWTP FLARE CAPACITY EXPANSION
DRAWING TITLE: BUILDING MECHANICAL EAST SCRUBBER BUILDING PLUMBING PLAN

| CONSULTANT JOB No. | EPCOR PROJECT No. | SCALE | SHEET | DRAWING NUMBER |
|---|---|---|---|---|
| 1101000105 | PMO 1004723; PF14-015 | As Noted d | 4 of 7 | PRJ-15 -157 -504 |

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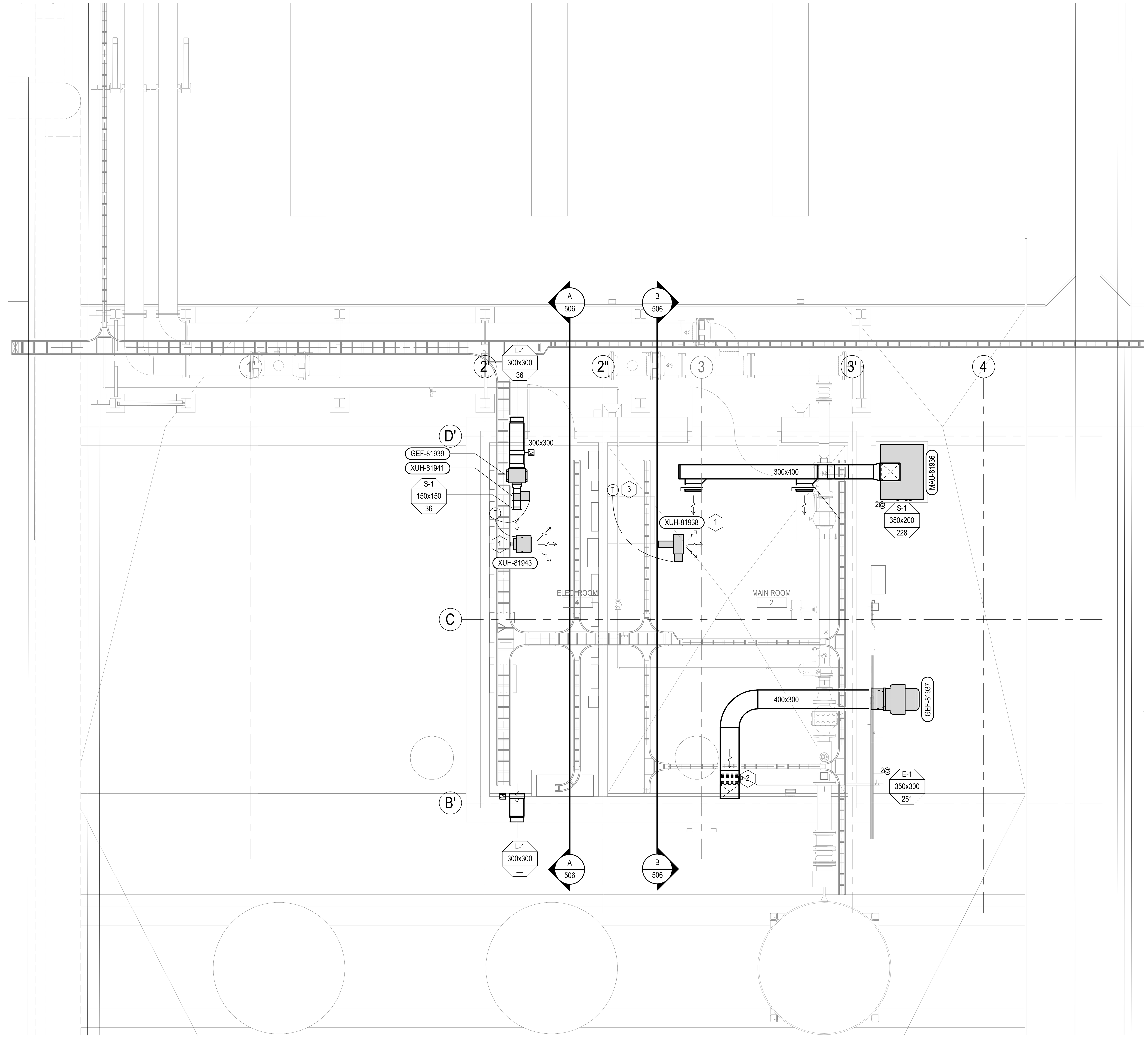


## 1 / 505 MAIN FLOOR HVAC PLAN

1 : 50

### GENERAL NOTES

1. MECHANICAL EQUIPMENT, DUCTS AND PIPING ARE TO BE COORDINATED WITH STRUCTURAL JOISTS AND CROSS BRACING.
2. PROVIDE BALANCING DAMPERS ON ALL BRANCH DUCTS SERVING AIR OUTLETS.
3. ALL DUCTWORK TO BE COORDINATED WITH ELECTRICAL CABLE TRAYS TO AVOID CONFLICTS.
4. INSTALL INTAKE AND EXHAUST AIR GRILLES A MINIMUM OF 3.0m APART.
5. INSTALL DUCT WORK AS HIGH AS POSSIBLE TO UNDERSIDE OF STRUCTURE.
6. ALL EQUIPMENT IN THE MAIN ROOM SHALL BE BOTH RATED FOR USE IN A HAZARDOUS AREA, CLASS 1 DIV 1 RATED AND NEMA 4X RATED, INCLUDING THERMOSTATS.

### KEYNOTES

1. MOUNT ELECTRIC UNIT HEATER AT MAXIMUM 2400 mm A.F.F.
2. 400x300 DUCT DROP DOWN TO 300mm ABOVE FINISHED FLOOR. REFER TO DRAWING 506 FOR EXHAUST GRILLE MOUNTING ARRANGEMENT.
3. CONTROL DEVICE TO BE EXPLOSION PROOF RATED AND SUITABLE FOR INSTALLATION WITHIN ZONE 1 HAZARDOUS LOCATION.

| REFERENCE DRAWING | | REVISION | | | | | | |
|---|---|---|---|---|---|---|---|---|
| DRAWING No. | DRAWING TITLE | Rev. | DATE | DESCRIPTION | BY | DES. | CHK. | ENG. |
| | | 0A | 06-JUL-2023 | ISSUED FOR PRELIMINARY DESIGN | DL | IG | DN | RR |
| | | 0B | 26-APR-2024 | ISSUED FOR 60% DESIGN | DL | IG | BE | RR |
| | | 0C | 30-AUG-2024 | ISSUED FOR 90% DESIGN | DL | IG | BE | RR |
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PLANT AREA: PLANT WIDE
PROJECT NAME: GBWWTP FLARE CAPACITY EXPANSION
DRAWING TITLE:

BUILDING MECHANICAL
MAIN FLOOR HVAC PLAN

| CONSULTANT JOB No. | EPCOR PROJECT No. | SCALE | SHEET | DRAWING NUMBER |
|---|---|---|---|---|
| 1101000105 | PMO 1004723; PF14-015 | As Noted | 5 of 7 | PRJ-15 -157 -505 |

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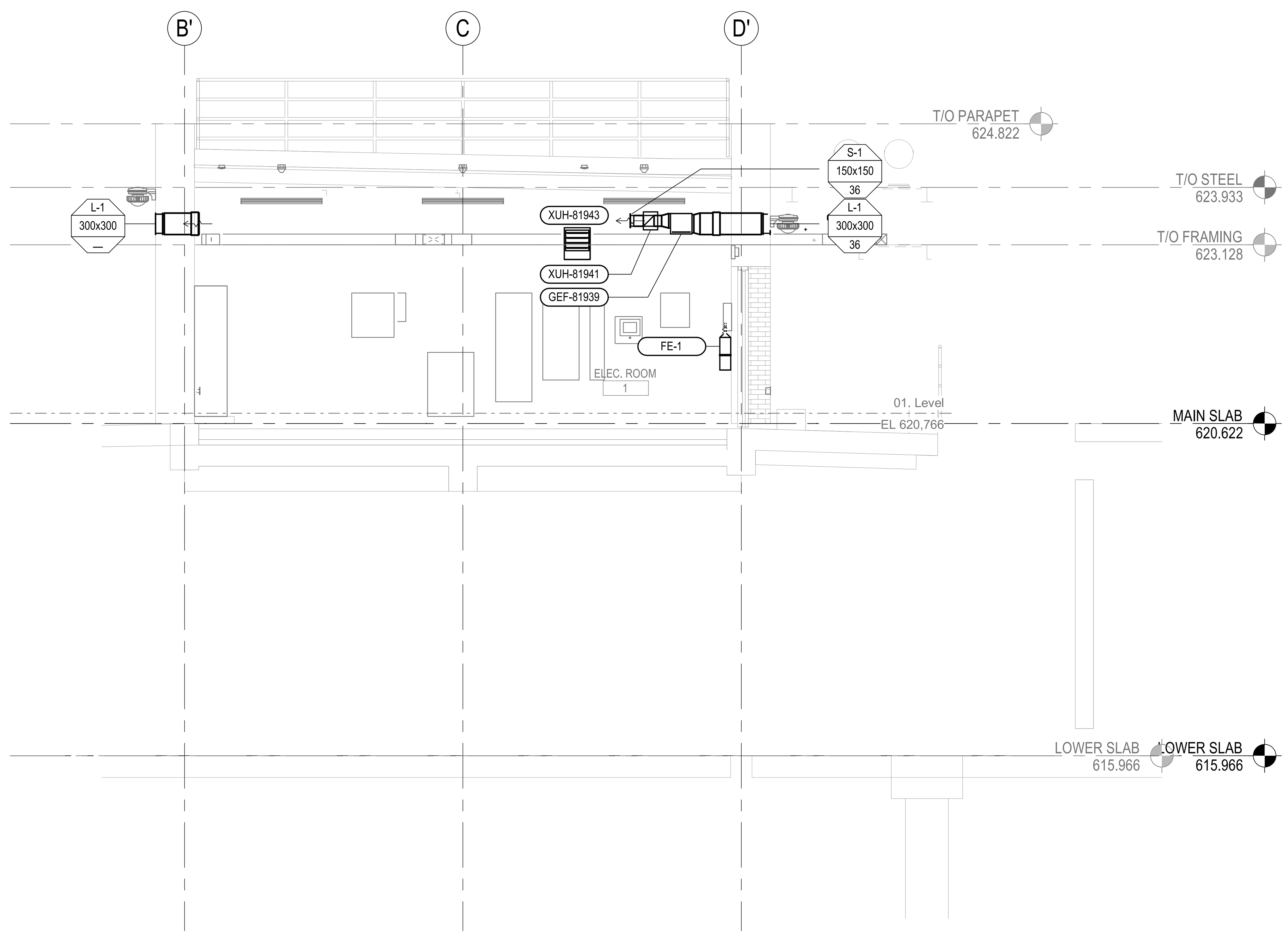
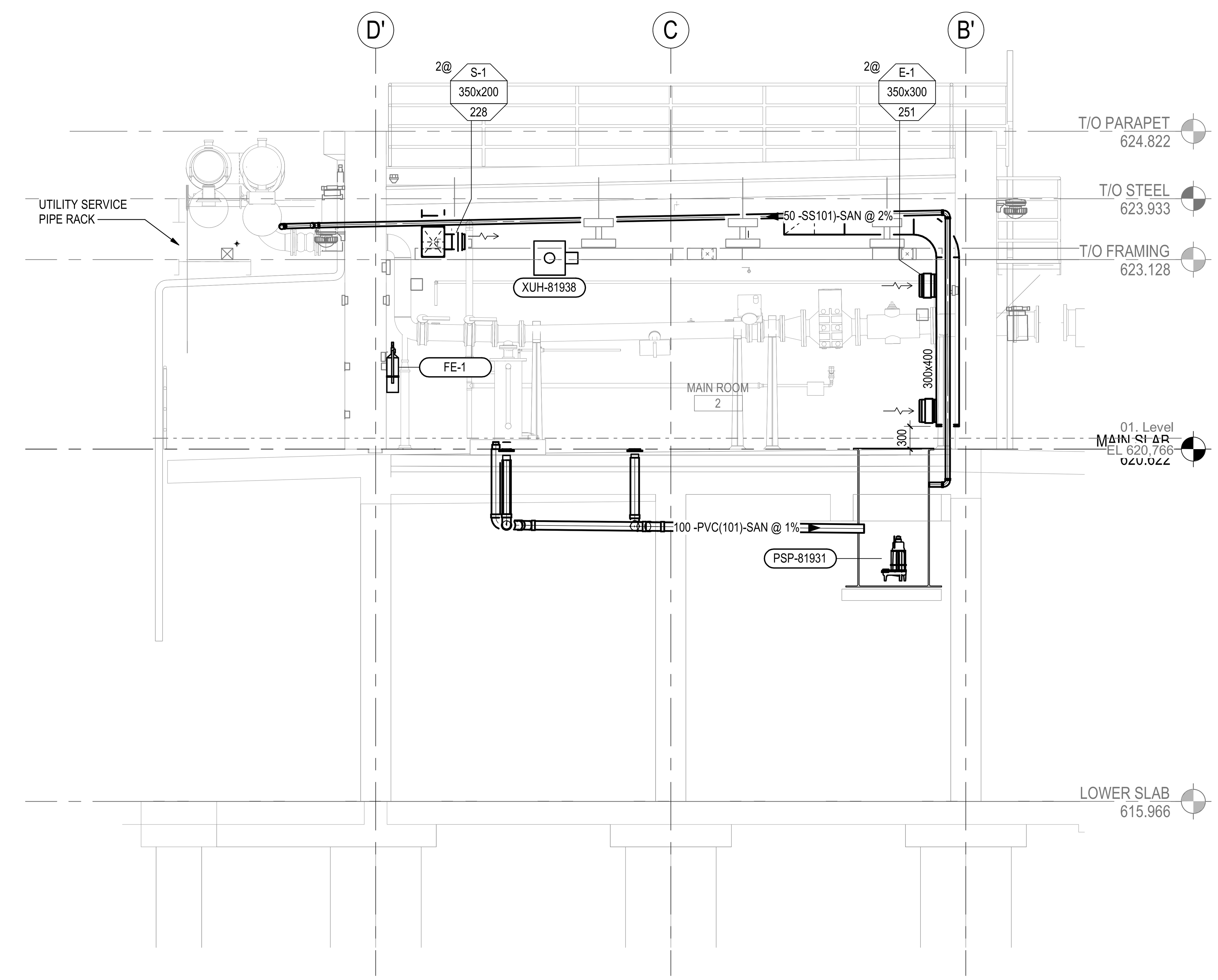



## A 506 SECTION - BUILDING (WEST FACING)

1 : 50




## B 506 SECTION - BUILDING (EAST FACING)

1 : 50

| REFERENCE DRAWING | | REVISION | | | | | | |
|---|---|---|---|---|---|---|---|---|
| DRAWING No. | DRAWING TITLE | Rev. | DATE | DESCRIPTION | BY | DES. | CHK. | ENG. |
| | | 0A | 06-JUL-2023 | ISSUED FOR PRELIMINARY DESIGN | DL | IG | DN | RR |
| | | 0B | 26-APR-2024 | ISSUED FOR 60% DESIGN | DL | IG | BE | RR |
| | | 0C | 30-AUG-2024 | ISSUED FOR 90% DESIGN | DL | IG | BE | RR |
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EPCOR

PLANT SITE: GOLD BAR WWTP
PLANT AREA: PLANT WIDE
PROJECT NAME: GBWWTP FLARE CAPACITY EXPANSION
DRAWING TITLE:

# BUILDING MECHANICAL HVAC - BUILDING SECTIONS

| CONSULTANT JOB No. | EPCOR PROJECT No. | SCALE | SHEET | DRAWING NUMBER |
|---|---|---|---|---|
| 1101000105 | PMO 1004723; PF14-015 | 1 : 50 | 6 of 7 | PRJ-15 -157 -506 |

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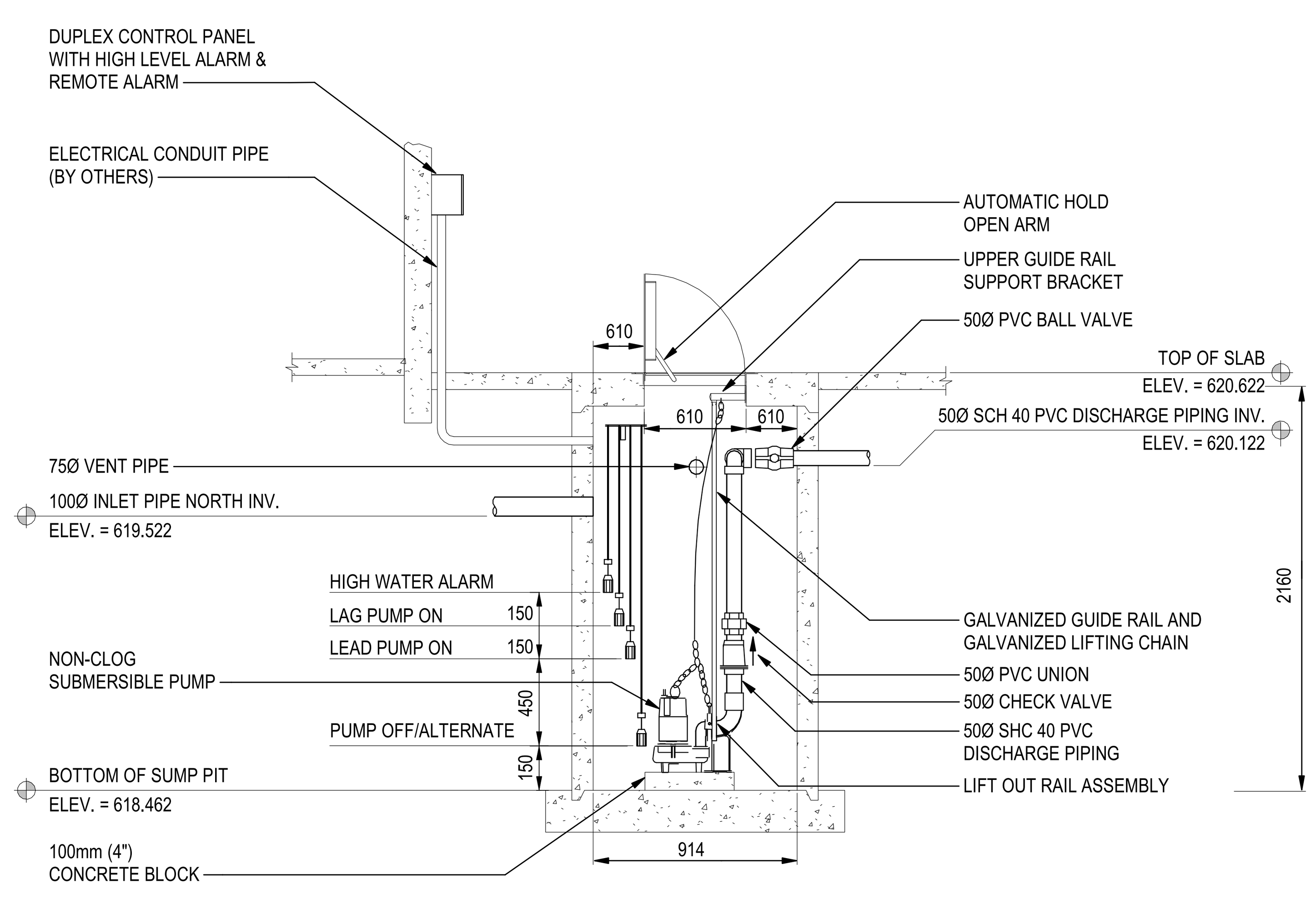
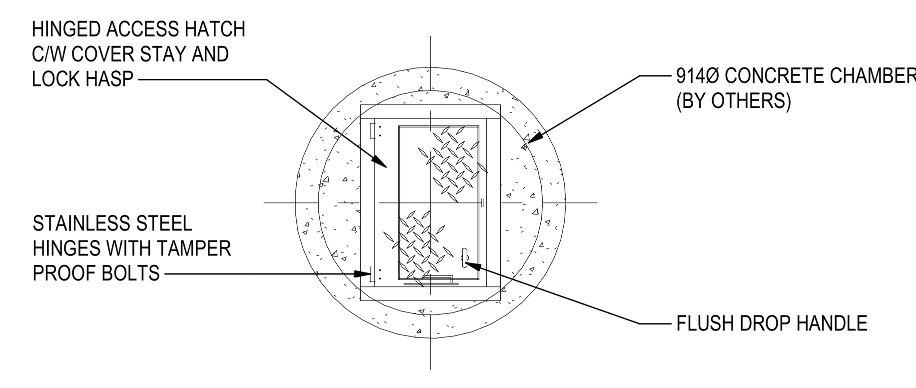
***NOTES:***

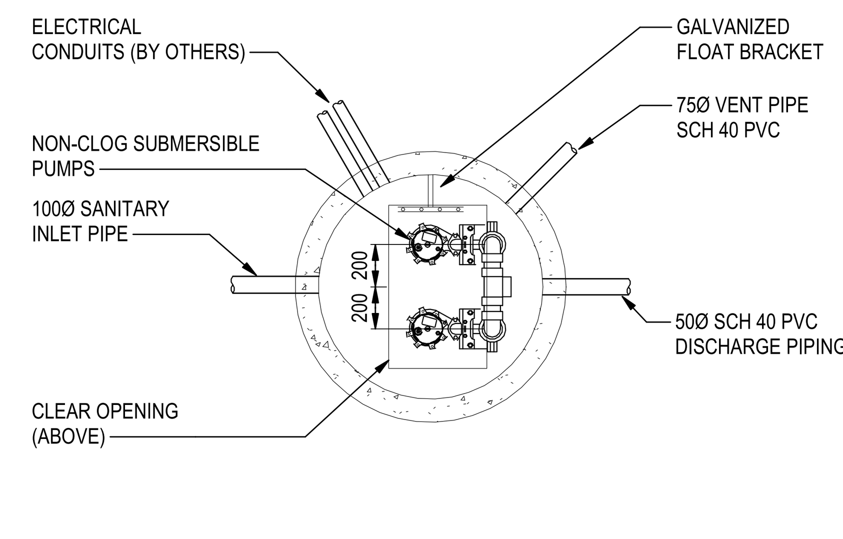
1. GENERAL CONTRACTOR SHALL PROVIDE CAST IN PLACE SUMP PIT, STEEL COVER PLATE C/W ACCESS HATCH, ANGLE IRON FRAME AND FASTENING.
2. REFER TO STRUCTURAL DRAWINGS FOR STRUCTURAL DETAILS.




SECTIONAL ELEVATION

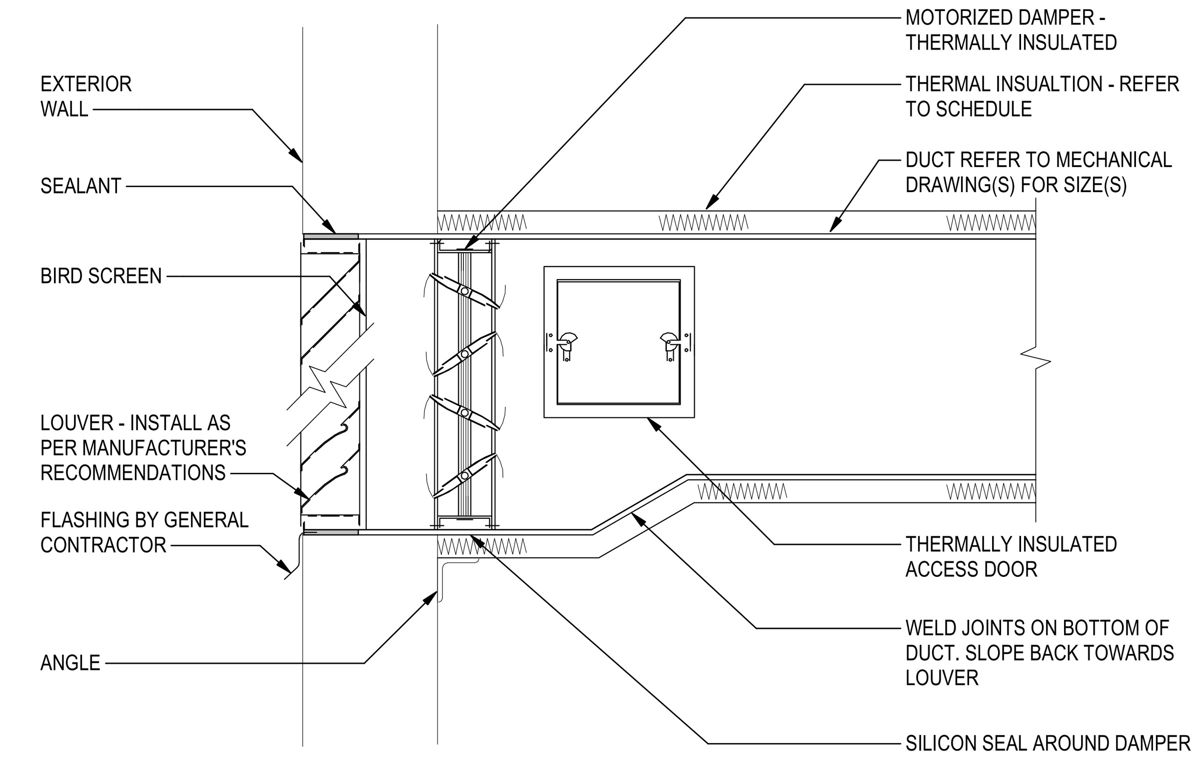



PLAN VIEW

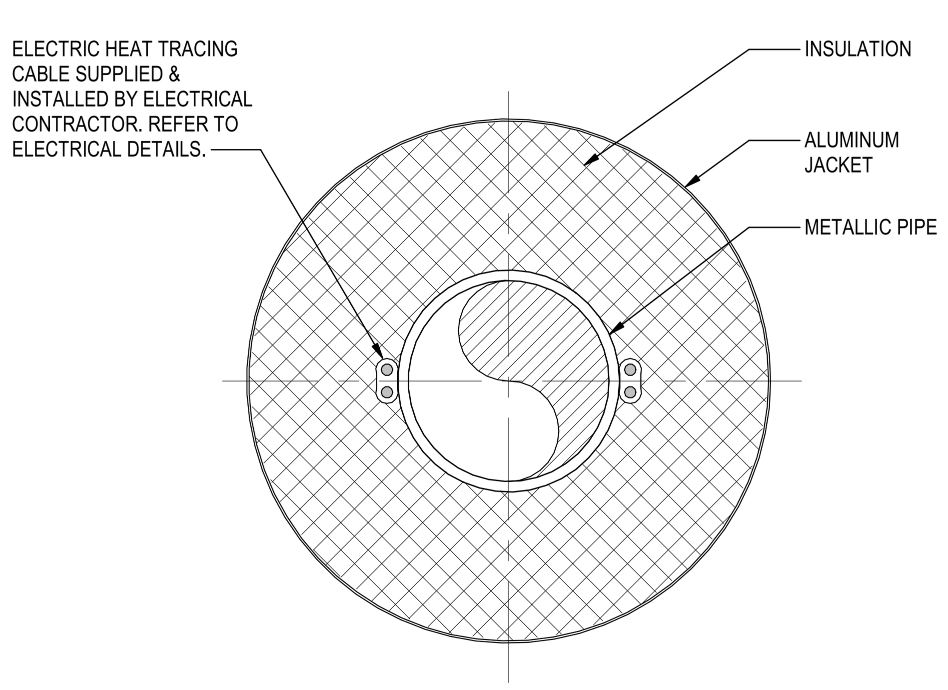



ORIENTATION PLAN VIEW
(COVER REMOVED FOR CLARITY)

## 1 / 507 SANITARY ROUND SUMP PIT DETAIL
N.T.S.




## 2 / 507 LOUVER INSTALLATION DETAIL
N.T.S.




NOTES:

1. ALL PIPES EXPOSED TO THE OUTDOORS & NOTED ON THE DRAWINGS TO BE HEAT TRACED AND INSULATED.
2. INSULATION AND JACKET ARE TO BE INSTALLED ONLY AFTER INSPECTION & APPROVAL OF HEAT TRACING.
3. REFER TO SPECIFICATION FOR INSULATION & JACKET REQUIREMENTS.

## 3 / 507 ELECTRIC HEAT TRACING DETAIL
N.T.S.

| REFERENCE DRAWING | | REVISION | | | | | | |
|---|---|---|---|---|---|---|---|---|
| DRAWING No. | DRAWING TITLE | Rev. | DATE | DESCRIPTION | BY | DES. | CHK. | ENG. |
| | | 0A | 06-JUL-2023 | ISSUED FOR PRELIMINARY DESIGN | DL | IG | DN | RR |
| | | 0B | 26-APR-2024 | ISSUED FOR 60% DESIGN | DL | IG | BE | RR |
| | | 0C | 30-AUG-2024 | ISSUED FOR 90% DESIGN | DL | IG | BE | RR |
| | | 0D | 15-NOV-2024 | ISSUED FOR CONSTRUCTION | DL | IG | BE | RR |

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EPCOR

PLANT SITE: GOLD BAR WWTP — PLANT AREA: PLANT WIDE

PROJECT NAME: GBWWTP FLARE CAPACITY EXPANSION

DRAWING TITLE: BUILDING MECHANICAL
MECHANICAL DETAILS

| CONSULTANT JOB No. | EPCOR PROJECT No. | SCALE | SHEET | DRAWING NUMBER |
|---|---|---|---|---|
| 1101000105 | PMO 1004723; PF14-015 | N.T.S. | 7 of 7 | PRJ-15 -157 -507 |

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## ELECTRICAL SYMBOLS - SINGLE LINE DRAWINGS

### PROTECTIVE DEVICES & ACCESSORIES:

5A — FUSE

600A 3P — LOW VOLTAGE THERMAL/MAGNETIC BREAKER
MODIFIERS: 600A - TRIP
3P - # OF POLES
LSIG - TRIP FUNCTIONS
100% - 100% RATED
MCP - MOTOR PROTECTOR

SPD 250kA — SURGE PROTECTION DEVICE, TYPE 1 OR TYPE 2 DEVICE, 250kA RATED, 20kA NOMINAL DISCHARGE. PER UL 1449 - 3rd EDITION

1600AT 2000AF 100%,3P LSIG — LOW VOLTAGE POWER CIRCUIT BREAKER (LVPCB) ELECTRICALLY OPERATED
MODIFIERS:
2000AF - FRAME RATING
1600AT - TRIP UNIT RATING
LSIG - TRIP FUNCTIONS
100% - 100% RATED
3P,4P - # OF POLES

600:5 3 — CURRENT TRANSFORMER
MODIFIERS: 3 PHASES, CURRENT RATIO (600:5)

ZCT — ZERO SEQUENCE CURRENT TRANSFORMER

POTENTIAL TRANSFORMER WITH PRIMARY FUSES, MODIFIERS: VOLTAGE RATIO (600/120V), 3 PHASES.

DM — DIGITAL INFO METER

XP — HORSEPOWER-RATED DISCONNECT PLUG/RECEPTACLE ASSEMBLY; MELTRIC OR EQUAL MODIFIERS: RATING (4X, XP)

AUXILLIARY CONTACTS FOR BREAKER POSITION MONITORING

### EQUIPMENT AND OTHER DEVICES:

1500/1725kVA KNAN/KNAF 4160V-600/347V 3Ø,4W,5.75%Z — SUBSTATION TYPE POWER TRANSFORMER, DELTA-WYE, SOLIDLY GROUNDED SECONDARY. MODIFIERS: KVA RATING, TYPE, VOLTAGES, NUMBER OF PHASES, IMPEDANCE

45kVA 600V-120/208V 3Ø,4W — DRY TYPE DISTRIBUTION TRANSFORMER, DELTA-WYE, SOLIDLY GROUNDED SECONDARY. MODIFIERS: KVA RATING, VOLTAGES, NUMBER OF PHASES

DN F R FVR SMART O/L — FULL VOLTAGE REVERSING COMBINATION MAGNETIC MOTOR STARTER AND INTELLIGENT SOLID-STATE OVERLOAD, MODIFIERS: NEMA SIZE, DEVICENET COMMUNICATIONS MODULE

2.2HP SCREENINGS SCREW CONVEYOR #1 (GC-115) — MOTOR, MODIFIERS: HORSEPOWER RATING, MOTOR TAG

52 — 15kV-RATED VACUUM BREAKER (DRAW-OUT TYPE)

50 51 — MICROPROCESSOR-TYPE FEEDER PROTECTION RELAY

PROTECTION RELAY
27 = UNDERVOLTAGE
49 = THERMAL RELAY
50/51/N = OVERCURRENT RELAY (3Ø AND GROUND)
60 = PHASE BALANCE RELAY
63 = SUDDEN PRESSURE RELAY
85 = PILOT WIRE RELAY
86 = LOCKOUT RELAY

600/347V 225A,3Ø,4W 42CCT 35kAIC — POWER DISTRIBUTION PANELBOARD MODIFIERS: PANEL TAG, VOLTAGE, AMP RATING, PHASES, WIRES, # OF POLES, WITHSTAND/INTERUPPTING RATING

30A 4X — SAFETY DISCONNECT SWITCH, MODIFIERS: AMPACITY RATING, ENCLOSURE RATING (NEMA 4X)

DN F FVNR SIZE 1 SMART O/L — FULL VOLTAGE NON-REVERSING COMBINATION MAGNETIC MOTOR STARTER AND INTELLIGENT SOLID-STATE OVERLOAD, MODIFIERS: NEMA SIZE, DEVICENET COMMUNICATIONS MODULE

DN LINE FILTER VFD LONG LEAD FILTER — VARIABLE FREQUENCY DRIVE c/w LINE FILTER FOR HARMONIC MITIGATION AND LONG LEAD FILTER MODIFIERS: DEVICENET COMMUNICATIONS MODULE

| INDEX | DESCRIPTION |
|---|---|
| 700 | PLANT HEADWORKS, MAIN INFLUENT CHANNELS, MAIN INFLUENT GATES, STRATHCONA METERING BUILDING, INFLUENT SAMPLE BUILDINGS, NE DIVERSION SYSTEM |
| 701 | CHEMICAL BUILDING - ELECTRICAL ROOM / GENERATOR ROOM |
| 702 | GRIT BUILDING #1, GRIT TANKS #1-3, GRIT CRANE, DEWATER ROOM, PRIMARY AIR BLOWER #1-3 |
| 703 | EPT CLARIFIER GALLERY |
| 704 | SCRUBBER BUILDING EAST AND WEST, CHEMICAL BUILDING, STORAGE BUILDING |
| 705 | PRIMARY #1-2 SETTLING TANKS, COLLECTORS, SCUM REMOVAL AREA |
| 706 | PRIMARY #1-2 PUMP STATION, RAW SLUDGE LINES, AND TUNNEL NORTH |
| 708 | DIGESTERS #1-4 BUILDING, AND TUNNEL EAST, GAS ROOM #1, CHILLER ROOM |
| 714 | DIGESTERS #1, #2, #3, #4 |
| 718 | PRIMARY #3-4 SETTLING TANKS, COLLECTORS AND SCUM REMOVAL AREA |
| 719 | PRIMARY #3-4 PUMPING STATION, RAW SLUDGE LINES AND TUNNEL NORTH |
| 721 | DIGESTER #5-8, DIGESTER BUILDING #5-8, GAS ROOM #2 |
| 725 | FERMENTER GALLERY / SURROUNDING AREA |
| 731 | GRIT BUILDING #2, GRIT TANKS #4-5, TEACUPS #1-2, ROCK BASKET CRANE, AND TUNNEL A |
| 732 | SCREEN BUILDING #2, PRIMARY AIR BLOWER #4-6, UNWATERING PUMPS |
| 734 | PRIMARY #5-8 SETTLING TANKS, COLLECTORS, SCUM REMOVAL AREAS, TUNNEL B, TUNNEL D AND TUNNEL E |
| 736 | SUBSTATION #2 (15KV) - SOUTHWEST OF PRIMARY CONTROL ROOM |
| 738 | PRIMARY #5-8, PUMP STATION, RAW SLUDGE LINES, AND PRIMARY CONTROL BUILDING |
| 745 | BOILER BUILDING 2 - BETWEEN DIG. SQ. 1 AND DIG. SQ. 2 |
| 761 | MAINTENANCE BUILDING, MAINTENANCE STORGE BUILDING |
| 764 | BLOWER BUILDING #1, CONTROL ROOM #1, GAS ROOM #1, AND BOILER ROOM |
| 770 | WASTE ACTIVATED SLUDGE - THICKENER BUILDING |
| 773 | ADMINISTRATION BUILDING AND TUNNEL SOUTH |
| 775 | LABORATORY AND LAB STORE ROOMS |
| 776 | SECONDARY SECTIONS #1-5 |
| 780 | SUBSTATION #1 (15KV) - NORTH OF BLOWER BUILDING #2 |
| 786 | SECONDARY SECTIONS #6-8 |
| 787 | SECONDARY SECTIONS #9-10 |
| 791 | BLOWER BUILDING #2 |
| 795 | U/V BUILDING, OUTFALL BUILDING |
| 900 | DIGESTED SLUDGE PUMP STATION |

### ELECTRICAL EQUIPMENT IDENTIFICATION LEGEND (TYPICAL THROUGHOUT)

XXX-AAA-XXXXX — CURRENT EQUIPMENT NUMBERING STANDARD
EQUIPMENT IDENTIFICATION NUMBER (UNIQUE)
EQUIPMENT TYPE
AREA IDENTIFIER (SEE TABLE)

XXX-AAA-XXX — FORMER EQUIPMENT NUMBERING SYSTEM (NO LONGER USED)
EQUIPMENT IDENTIFICATION NUMBER (NOT UNIQUE)
EQUIPMENT TYPE
AREA IDENTIFIER (SEE TABLE)

X = NUMBER
A = LETTER

## LINETYPES AND BORDERS

EQUIPMENT BOUNDARY OUTLINE

WIRE/CABLE

CONTROL SIGNAL (I/O) WIRING

INCOMING LINE

OUTGOING LINE

BUSBAR

BURIED CABLE

DEVICE INTERLOCK

FIELDBUS

CONNECTION

GROUND

## MISC. ABBREVIATIONS LIST

AFF - ABOVE FINISHED FLOOR

BOF - BOTTOM OF FIXTURE
BOT - BOTTOM OF TRAY

CC - CONDENSING UNIT
CDP - CENTRAL DISTRIBUTION PANEL

DSC - DISCONNECT SWITCH

EBB - ELECTRICAL BASEBOARD HEATER
ER - EXISTING DEVICE IN RELOCATED POSITION
EX - EXISTING DEVICE TO REMAIN

RE - EXISTING DEVICE TO BE REMOVED
RL - EXISTING DEVICE RELOCATED

TYP - TYPICAL

## GENERAL NOTES / LEGEND

1. PROVIDE CIRCUITS SIZED AT MINIMUM 2#12 + 1#12 GND IN 21mmC UNLESS OTHERWISE NOTED. REFER TO PANEL SCHEDULES AND SPECIFICATIONS FOR ADDITIONAL WIRING REQUIREMENTS.
2. PERMANENTLY LABEL ALL MOTORS, POWER DISCONNECTS, AND REMOTE LOADS WITH THE PANEL AND CIRCUIT NUMBER SERVING THE DEVICE.
3. UNLESS OTHERWISE NOTED, ALL CIRCUIT CONDUCTORS SHALL BE TYPE RW90, 90°C RATED, OR TECK90, 90°C RATED. REFER TO PANEL SCHEDULES, CABLE SCHEDULES AND SPECIFICATIONS FOR ADDITIONAL INFORMATION.
4. SHARING OF NEUTRAL CONDUCTORS IS NOT PERMITTED; PROVIDE ALL SINGLE-PHASE CIRCUITS WITH A DEDICATED NEUTRAL.
5. CIRCUITS ARE SIZED ASSUMING NO MORE THAN THREE CURRENT-CARRYING CONDUCTORS IN A SINGLE CONDUIT; FOR CONDUITS CONTAINING MORE THAN THREE CURRENT-CARRYING CONDUCTORS, PROVIDE APPROPRIATE DERATING AS PER CEC REQUIREMENTS.
6. FIRE ALARM, SECURITY, AND ESSENTIAL SERVICE CABLING SHALL EACH BE INSTALLED IN SEPARATE CABLES AND/OR CONDUITS AND SHALL NOT BE INSTALLED IN NORMAL POWER AND CONTROL CONDUITS.
7. PROVIDE A SAFETY DISCONNECT SWITCH FOR HVAC AND OTHER EQUIPMENT WHERE REQUIRED BY MANUFACTURER AND NOT INCLUDED IN VENDOR EQUIPMENT SUPPLY PACKAGE. REFER TO SINGLE LINE AND WIRING SCHEMATIC DRAWINGS FOR SPECIFIC REQUIREMENTS.
8. REFER TO ARCHITECTURAL, CIVIL, STRUCTURAL, PROCESS AND MECHANICAL DRAWINGS FOR ADDITIONAL DETAILS AND SYSTEMS COORDINATION.
9. BRANCH CIRCUITS ARE NOT ALWAYS SHOWN ON DRAWINGS BUT ARE IMPLIED BY PANEL CIRCUIT NUMBER.
10. PROVIDE BONDING FOR ALL MECHANICAL EQUIPMENT AND CONTROL PANELS AS PER REQUIREMENTS OF SPECIFICATIONS SECTION 16062. PROVIDE BONDING OF ALL BUILDING METAL PARTS, CABLE TRAYS, MAJOR PROCESS EQUIPMENT, PUMP CASING, EQUIPMENT SKIDS, ETC.
11. USE TECK CABLE FOR ALL POWER AND CONTROL FEEDERS. WHERE INDICATED ON DRAWINGS, POWER FEEDERS FOR MOTORS CONTROLLED BY VARIABLE FREQUENCY DRIVES SHALL BE SPECIALTY DRIVE (VFD) TECK90 CABLE; REFER TO SPECIFICATIONS SECTION 16122.
12. ALL UNDERGROUND WORK SHALL BE DONE IN RPVC SCHEDULE 40.

## MOUNTING HEIGHTS (UNLESS OTHERWISE NOTED)

WALL SWITCHES:

1400mm AFF TO CENTER OF SWITCH.

WALL RECEPTACLES:

OFFICE AREA: 450mm AFF TO CENTER OF RECEPTACLE.
TECHNICAL AREAS: 1400mm AFF TO CENTER OF RECEPTACLE.

WALL TELEPHONE/DATA OUTLETS:

OFFICE AREA: 450mm AFF TO CENTER OF OUTLET.
TECHNICAL AREAS: 1400mm AFF TO CENTER OF OUTLET.

WALL MOUNTED EMERGENCY LIGHT FIXTURE:

2100mm AFF TO CENTER OF FIXTURE

WALL MOUNTED EXIT SIGNS:

300mm ABOVE TOP OF DOOR TO CENTER OF FIXTURE

WALL MOUNTED EXTERIOR LIGHTING:

10000mm ABOVE FINISHED GRADE

## ELECTRICAL ABBREVIATIONS LIST

A - AMPERES
AI - ANALOG INPUT
AJB - ANALOG JUNCTION BOX
ATS - AUTOMATIC TRANSFER SWITCH
AMM - AMP METER
AO - ANALOG OUTPUT

BP - BYPASS
BU - BATTERY UNIT
BKR - CIRCUIT BREAKER
BMS - BUILDING MANAGEMENT SYSTEM

CDP - CENTRAL DISTRIBUTION PANEL
CHARM - CHARACTERIZATION MODULE
CEC - CANADIAN ELECTRICAL CODE
CJB - CONTROL JUNCTION BOX
COM - COMMON
CPU - COMPUTER
CSO - CLOSE-STOP-OPEN SWITCH
CT - CURRENT TRANSFORMER

DCS - DISTRIBUTED CONTROL SYSTEM
DI - DISCRETE INPUT
DM - DIGITAL POWER METER
DSC - SAFETY DISCONNECT SWITCH
DO - DISCRETE OUTPUT

E/C - DIV 16 CONTRACTOR
ESD - EMERGENCY STOP DEVICE

FAS - FIRE ALARM PANEL
FF - FOUNDATION FIELDBUS
FIR - FIXED INFRARED
FO - FIBRE OPTIC MULTIMODE CABLE
F/R - FORWARD/REVERSE SWITCH
FS - FIBRE OPTIC SINGLE MODE CABLE
FSL - LOW FLOW SWITCH
FVNR - FULL VOLTAGE NON-REVERSIBLE STARTER
FVR - FULL VOLTAGE REVERSIBLE STARTER

GCS - GENERATION CONTROL SYSTEM
GND - GROUND
GEN - GENERATOR

HMI - HUMAN MACHINE INTERFACE
HOA - HAND-OFF-AUTO SWITCH
HS - HAND SWITCH
HZD - HAZARDOUS RATED

IED - INTELLIGENT ELECTRONIC DEVICES
I/O - INPUT/OUTPUT
IJB - INSTRUMENT JUNCTION BOX
IJP - INSTRUMENT POWER JUNCTION BOX

kA - KILO-AMPERES
kVA - KILOVOLT-AMPERES
kV - KILOVOLTS
kW - KILOWATTS

L - LINE
LCP - LOCAL CONTROL PANEL
LTG - LIGHTING CONTROL PANEL

MTR - MOTOR
MB - MODBUS - TCP
MCC - MOTOR CONTROL CENTRE
MCP - MOTOR CIRCUIT PROTECTOR
MGB - MAIN GROUND BUS
MH - ELECTRICAL MANHOLE
MMS - MOTOR START
MTS - MANUAL TRANSFER SWITCH
MVA - MEGAVOLT-AMPERES
MVC - MEDIUM VOLTAGE CABLE
MW - MEGAWATTS
MZ - MAGNETIC MOTOR STARTER

N - NEUTRAL
N.C. - NORMALLY CLOSED
NET - NETWORK/COMMUNICATION EQUIPMENT
N.O. - NORMALLY OPEN

O/L - OVERLOAD

PB - PROFIBUS
PF - POWER FACTOR
PFM - POWER FACTOR METER
PLC - PROGRAMMABLE LOGIC CONTROLLER
PMCS SYSTEM - POWER MANAGEMENT & CONTROL
PMG - PERMANENT MAGNET GENERATOR
PNL - PANEL
PRM - PARALLEL REDUNDANCY MODULE
PSH - HIGH PRESSURE SWITCH
PT - POTENTIAL TRANSFORMER
PTZ - PAN-TILT-ZOOM

RIO - REMOTE INPUT AND OUTPUT (CONTROL PANEL)
RLY - RELAY (IED)
RTD - RESISTANCE TEMPERATURE DETECTOR
RTU - REMOTE TERMINAL UNIT

SCADA - SUPERVISORY CONTROL AND DATA ACQUISITION
SEP - SERVICE ENTRY POINT
SG - SWITCHGEAR
SPD - SURGE PROTECTION DEVICE

SPL - SPLITTER
SS - SPEED SWITCH

TFR - TRANSFORMER
TU - TRIP UNIT

V - VOLTS
VAC - VOLTAGE (ALTERNATING CURRENT, RMS)
VARM - VOLT AMPERE REACTIVE METER
VDC - VOLTAGE (DIRECT CURRENT)
VF - VARIABLE FREQUENCY CONTROLLER
VFD - VARIABLE FREQUENCY DRIVE
VM - VOLT METER

UPS - UNINTERRUPTIBLE POWER SUPPLY

WM - WATTMETER
WP - WEATHER PROOF
WSH - HIGH TORQUE SWITCH

XP - EXPLOSION PROOF

REFERENCE DRAWING

| DRAWING No. | DRAWING TITLE |
|---|---|
| | |

REVISION

| Rev. | DATE | DESCRIPTION | BY | DES. | CHK. | ENG. |
|---|---|---|---|---|---|---|
| 0A | 06-JUL-2023 | ISSUED FOR PRELIMINARY DESIGN | TS | AMG | JA | AMG |
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EPCOR

PLANT SITE: GOLD BAR WWTP
PLANT AREA: PLANT WIDE
PROJECT NAME: GBWWTP FLARE CAPACITY EXPANSION
DRAWING TITLE: ELECTRICAL SYMBOLS, LEGENDS AND ABBREVIATIONS SHEET 1

| CONSULTANT JOB No. | EPCOR PROJECT No. | SCALE | SHEET | DRAWING NUMBER |
|---|---|---|---|---|
| 1101000105 | PMO 1004723; PF14-015 | 1:1 | - OF - | PRJ-15-157-601 |

## FIRE ALARM

| Symbol | Description |
|---|---|
| | FIRE SERVICE PHONE STATION OUTLET |
| | FLAME DETECTOR |
| HZD | FLAME DETECTOR, HAZARDOUS RATED |
| CO | GAS DETECTOR, CARBON MONOXIDE |
| | HORN AND STROBE LIGHT, CEILING MOUNTED |
| | HORN AND STROBE LIGHT, WALL MOUNTED |
| HZD | HORN AND STROBE LIGHT, WALL MOUNTED, HAZARDOUS RATED |
| | REMOTE INDICATOR, CEILING MOUNTED |
| | REMOTE INDICATOR, WALL MOUNTED |
| | SPEAKER AND STROBE LIGHT, CEILING MOUNTED |
| | SPEAKER AND STROBE LIGHT, WALL MOUNTED |
| | STROBE LIGHT, CEILING MOUNTED |
| | STROBE LIGHT, WALL MOUNTED |
| AIM | ADDRESSABLE INPUT MODULE |
| ARCM | AREA OF REFUGE COMMUNICATION MASTER UNIT |
| ARCR | AREA OF REFUGE COMMUNICATION REMOTE UNIT |
| AOM | ADDRESSABLE OUTPUT MODULE |
| D | ELECTRICALLY OPERATED SMOKE OR FIRE/SMOKE DAMPER CONNECTION |
| DCL | DOOR CLOSER |
| DH | DOOR HOLDER |
| | CHIME, WALL MOUNTED |
| | HORN, CEILING MOUNTED |
| | HORN, WALL MOUNTED |
| F | PULL STATION |
| F HZD | PULL STATION, HAZARDOUS RATED |
| FAA | FIRE ALARM ANNUNCIATOR |
| FACP | FIRE ALARM CONTROL PANEL |
| FAT | FIRE ALARM TRANSMITTER |
| FATC | FIRE ALARM TERMINAL CABINET |
| GAP | GRAPHIC ANNUNCIATOR PANEL |
| H | HEAT DETECTOR |
| NAC | FIRE ALARM NOTIFICATION APPLIANCE CIRCUIT PANEL |
| PS | PRESSURE DETECTOR/SWITCH |
| R | INTERFACE RELAY |
| S | SMOKE DETECTOR, CEILING MOUNTED |
| S | SMOKE DETECTOR, WALL MOUNTED |
| SS | SMOKE DETECTOR, SINGLE STATION |
| S H | SMOKE/HEAT DETECTOR |
| S H CO | SMOKE/HEAT/CARBON MONOXIDE DETECTOR |
| | SPEAKER, CEILING MOUNTED |
| | SPEAKER, WALL MOUNTED |
| VS | VALVE SUPERVISORY TAMPER SWITCH |
| WF | FLOW DETECTOR/SWITCH |

## HEAT/SMOKE DETECTOR TYPES

| Symbol | Description |
|---|---|
| H C#/F# | FIXED TEMPERATURE, # INDICATES °C OR °F |
| H R | RATE OF RISE |
| H RC#/F# | COMBINED RATE OF RISE/FIXED TEMPERATURE |
| S AS | AIR SAMPLING |
| S BR | BEAM DETECTOR RECEIVER |
| S BT | BEAM DETECTOR TRANSMITTER |
| S E | ELEVATOR RECALL |
| S I | IONIZATION |
| S ID | IN DUCT |
| S P | PHOTOELECTRIC |

## ELECTRONIC SECURITY

| Symbol | Description |
|---|---|
| | CCTV CAMERA, CEILING MOUNTED |
| | CCTV CAMERA, PENDANT MOUNTED |
| | CCTV CAMERA, POLE MOUNTED |
| | CCTV CAMERA, WALL MOUNTED |
| | CCTV CAMERA, 360° FIELD OF VIEW |
| | CCTV CAMERA, FIXED AIM, WEDGE INDICATES AIMING |
| | CCTV CAMERA, PAN/TILT/ZOOM, WEDGE INDICATES DEFAULT AIMING |
| | DOOR HARDWARE MARK |
| | GLASS BREAKAGE SENSOR, CEILING MOUNTED |
| | GLASS BREAKAGE SENSOR, WALL MOUNTED |
| | WIRELESS RECEIVER |
| | LOCAL ALARM |
| ACP | ACCESS CONTROL PANEL |
| BR | BIOMETRIC READER |
| CC | CCTV MONITOR |
| CR | CARD READER |
| CK | CARD READER/KEYPAD COMBINATION |
| | DURESS ALARM BUTTON |
| DA | VOICE DURESS ALARM |
| | VOICE DURESS ALARM WITH STROBE, PEDESTAL MOUNTED |
| | VOICE DURESS ALARM WITH STROBE, WALL MOUNTED |
| DS | DOOR CONTACT SWITCH |
| EL | ELECTRIC LOCK |
| ES | ELECTRIC STRIKE |
| EX | ELECTRIC LATCH RETRACTION |
| IAD | INTRUSION ARM/DISARM |
| IDP | INTRUSION DETECTION PANEL |
| IM | MASTER INTERCOM STATION, AUDIO ONLY |
| | MASTER INTERCOM STATION, AUDIO/VIDEO |
| | MASTER INTERCOM STATION, AUDIO ONLY, DOOR RELEASE |
| | MASTER INTERCOM STATION, AUDIO/VIDEO, DOOR RELEASE |
| IS | SLAVE INTERCOM STATION, AUDIO ONLY |
| | SLAVE INTERCOM STATION, AUDIO/VIDEO |
| | SLAVE INTERCOM STATION, AUDIO ONLY, DOOR RELEASE |
| | SLAVE INTERCOM STATION, AUDIO/VIDEO, DOOR RELEASE |
| KP | KEYPAD |
| M | MOTION DETECTOR, CEILING MOUNTED |
| | MOTION DETECTOR, WALL MOUNTED |
| PSP | POWER SUPPLY PANEL |
| RE | REQUEST TO EXIT DETECTOR |

## CONTROLS

| Symbol | Description |
|---|---|
| | NON-FUSED SAFETY SWITCH |
| | FUSED SAFETY SWITCH, FUSE RATING INDICATED |
| | COMBINATION MOTOR STARTER AND FUSED SAFETY SWITCH, FUSE RATING INDICATED |
| | MOTOR STARTER |
| | MANUAL MOTOR STARTER |
| | AUTOMATIC DOOR PUSHPLATE |
| | DEAD FRONT GFCI |
| | EMERGENCY SHUTDOWN |
| | ENCLOSED CIRCUIT BREAKER |
| | ENCLOSED CONTACTOR |
| | PUSH BUTTON CONTROL STATION |
| M | TOGGLE SWITCH, MOTOR RATED |
| | TOUCHLESS AUTOMATIC DOOR OPENER |
| DDC | DIRECT DIGITAL CONTROL PANEL |
| R | RELAY |
| | THERMOSTAT |
| TC | TIME CLOCK |
| VFD | VARIABLE FREQUENCY DRIVE |

## LIGHTING CONTROLS

| Symbol | Description |
|---|---|
| $ | SINGLE POLE SWITCH |
| | INDICATES WIRELESS CONTROL |
| | INDICATES BATTERY POWER |
| $ a | LOWER-CASE LETTER(S) NEAR SWITCH DENOTE SWITCH LEG(S) |
| $ 2 | DOUBLE POLE SWITCH |
| $ 3 | THREE-WAY SWITCH |
| $ 4 | FOUR-WAY SWITCH |
| $ D | DIMMER SWITCH |
| $ K | KEY OPERATED SWITCH |
| $ LV | MOMENTARY CONTACT LOW VOLTAGE SWITCH |
| $ O | OCCUPANCY SENSOR SWITCH |
| $ P | SWITCH WITH PILOT LIGHT |
| $ PC | PHOTOCELL SWITCH |
| $ T | TIMER SWITCH |
| • | COMBINATIONS OF THE ABOVE DESIGNATIONS MAY BE USED |
| CS# | LOW VOLTAGE CONTROL STATION, # INDICATES STATION IDENTIFICATION |
| DSC | DIMMING SYSTEM CONTROL PANEL |
| ELCU | EMERGENCY LIGHTING CONTROL UNIT |
| LCP | LIGHTING CONTROL PANEL |
| OP | COMBINATION OCCUPANCY/PHOTO SENSOR SWITCH, CEILING MOUNTED |
| OS | OCCUPANCY SENSOR SWITCH, CEILING MOUNTED |
| PC | PARTITION SENSOR CONTROL |
| PS | PHOTO SENSOR CONTROL |
| PS | PHOTO SENSOR CONTROL, CEILING MOUNTED |
| R | RELAY |
| T | LOW VOLTAGE TRANSFORMER |

## TELECOM OUTLETS

- OUTLET
- OUTLET, CEILING MOUNTED
- FURNITURE SYSTEMS OUTLET
- OUTLET, MOUNTED IN FLOOR BOX
- OUTLET, MOUNTED IN POKE THRU
- OUTLET, MOUNTED IN POWER POLE

## TELECOM OUTLET TYPES

| Symbol | Description |
|---|---|
| # | # INDICATES QUANTITY OF DATA JACKS, PULLSTRING ALWAYS PROVIDED. WHERE NO QUANTITY IS NOTED, 2 DATA JACKS AND PULLSTRING. |
| AC | MOUNTED 3" ABOVE COUNTER BACKSPLASH |
| B | BLANK FACEPLATE, ROUGH-IN ONLY |
| D | DIRECT CONNECTION TO PANEL |
| M | PATIENT MONITORING |
| P | PAY TELEPHONE |
| R | RACEWAY MOUNTED |
| W | WALL MOUNTED TELEPHONE HANDSET OUTLET |
| WAP | WIRELESS ACCESS POINT CONNECTION |

## TELECOM MISC.

| Symbol | Description |
|---|---|
| | CABLE TRAY WITH FLANGE SIDE RAILS AND LADDER RUNGS |
| | CABLE TRAY |
| | BUNDLED CABLE SUPPORT, J-HOOK SYSTEM |
| | BUNDLED CABLE SUPPORT, J-HOOK SYSTEM, CEILING MOUNTED |
| | BUNDLED CABLE SUPPORT, J-HOOK SYSTEM, PENDANT MOUNTED |
| | GROUND BAR, LENGTH TO SCALE |
| | RAISED FLOOR GROMMET |
| WAP | WIRELESS ACCESS POINT |
| WAP | WIRELESS ACCESS POINT, CEILING MOUNTED |

## LIGHTNING PROTECTION

- CONDUCTOR
- GROUND ROD
- AIR TERMINAL
- DOWN CONDUCTOR

## LUMINAIRES

| CIRCUITS EMERGENCY | CIRCUITS NORMAL | Description |
|---|---|---|
| N/A | L01 | LUMINAIRE IDENTIFICATION, SEE LUMINAIRES SCHEDULE |
| N/A | a | LOWER-CASE LETTER(S) NEAR LUMINAIRE DENOTE SWITCH LEG(S) |
| | | RECESSED RECTANGULAR LUMINAIRE, DRAWN TO SCALE |
| | | SURFACE MOUNTED RECTANGULAR LUMINAIRE, DRAWN TO SCALE |
| | | RECESSED VOLUMETRIC LUMINAIRE, DRAWN TO SCALE |
| | | STRIP LUMINAIRE, LENGTH TO SCALE |
| | | WALL MOUNTED RECTANGULAR LUMINAIRE, LENGTH TO SCALE (NUMBER OF MOUNTING POINTS WILL VARY WITH THE LUMINAIRE LENGTH AND ARE NOT INDICATED.) |
| | | SURFACE MOUNTED OR SUSPENDED LUMINAIRE |
| | | RECESSED DOWNLIGHT LUMINAIRE |
| | | SURFACE MOUNTED CEILING LUMINAIRE |
| | | PENDANT MOUNTED LUMINAIRE |
| | | LINEAR PENDANT MOUNTED LUMINAIRE, LENGTH TO SCALE (NUMBER OF MOUNTING POINTS WILL VARY WITH THE LUMINAIRE LENGTH AND ARE NOT INDICATED.) |
| | | WALL MOUNTED LUMINAIRE |
| | | WALL MOUNTED VERTICALLY ORIENTED LUMINAIRE |
| | | WALL MOUNTED RECESSED LINEAR LUMINAIRE, LENGTH TO SCALE |
| | N/A | EXIT SIGN, FILLED SIDES INDICATE ILLUMINATED ANNOTATION, ARROWS INDICATE DIRECTIONAL GRAPHICS |
| | N/A | WALL MOUNTED EXIT SIGN, FILLED SIDES INDICATE ILLUMINATED ANNOTATION, ARROWS INDICATE DIRECTIONAL GRAPHICS |
| | N/A | EXIT SIGN WITH EMERGENCY BATTERY PACK |
| | N/A | WALL MOUNTED EXIT SIGN WITH EMERGENCY BATTERY PACK |
| | N/A | EMERGENCY BATTERY PACK, NUMBER OF LAMPS NOT INDICATED |
| | N/A | WALL MOUNTED EMERGENCY BATTERY PACK, NUMBER OF LAMPS NOT INDICATED |
| | N/A | EMERGENCY WITH REMOTE BATTERY PACK, NUMBER OF LAMPS NOT INDICATED |
| | N/A | WALL MOUNTED EMERGENCY WITH REMOTE BATTERY PACK, NUMBER OF LAMPS NOT INDICATED |
| | | RECESSED LINEAR WALL WASH LUMINAIRE, LENGTH TO SCALE |
| | | LINEAR PENDANT MOUNTED WALL WASH LUMINAIRE, LENGTH TO SCALE |
| | | RECESSED WALL WASH LUMINAIRE |
| | | SURFACE MOUNTED WALL WASH LUMINAIRE |
| | | PENDANT MOUNTED WALL WASH LUMINAIRE |
| | | RECESSED ACCENT LUMINAIRE |
| | | SURFACE MOUNTED ACCENT LUMINAIRE |
| | | PENDANT MOUNTED ACCENT LUMINAIRE |
| | | MONOPOINT LUMINAIRE |
| N/A | | TRACK LIGHTING |
| N/A | | CONTINUOUS SOURCE LUMINAIRE, PATH AS INDICATED |
| | | MULTI-LAMP ACCENT LUMINAIRE, NUMBER OF LAMPS NOT INDICATED |
| | | WALL MOUNTED MULTI-LAMP ACCENT LUMINAIRE, NUMBER OF LAMPS NOT INDICATED |
| | | OVERCOUNTER TASK LUMINAIRE |
| | | UNDERCABINET TASK LUMINAIRE |
| | | FIBER OPTIC REMOTE SOURCE |
| | | STEP LUMINAIRE |
| | | ILLUMINATED SIGN |
| | | WALL MOUNTED ILLUMINATED SIGN |
| | | NIGHT LIGHT |
| | | WALL MOUNTED STROBE LIGHT |

## ELECTRICAL EQUIPMENT

| Symbol | Description |
|---|---|
| | 208V OR 240V POWER PANELBOARD |
| | 480V OR 600V POWER PANELBOARD |
| | EQUIPMENT CABINET OR PANEL |
| | EQUIPMENT CONNECTION, FILL INDICATES EMERGENCY CIRCUIT |
| | GROUND BAR |
| | MOTOR CONNECTION, 1Ø |
| | MOTOR CONNECTION, 3Ø |
| | BUS DUCT |
| ATS | AUTOMATIC TRANSFER SWITCH |
| | BUS DUCT PLUG |
| SPD | SURGE PROTECTIVE DEVICE |
| T | TRANSFORMER, NOT TO SCALE |
| | TRANSFORMER, DRAWN TO SCALE |

## WORK DEFINITION

| Symbol | Description |
|---|---|
| | NEW WORK |
| | EXISTING |
| | REMOVE EXISTING |
| | REMOVE EXISTING ELECTRICAL EQUIPMENT |
| | FUTURE |
| | TEMPORARY, AS NOTED |
| ?-## | KEY NOTE |
| ??? | EQUIPMENT IDENTIFICATION |

## RACEWAYS

| Symbol | Description |
|---|---|
| | RACEWAY CONCEALED IN CEILING OR WALL. EXPOSED RACEWAY IS ALLOWED ONLY WHERE NOTED. |
| | RACEWAY BELOW SLAB OR UNDERGROUND |
| | RACEWAY UP |
| | RACEWAY DOWN |
| | RACEWAY CONTINUATION |
| | RACEWAY STUB-OUT WITH BUSHING |
| | SURFACE RACEWAY (HORIZONTAL/VERTICAL) |
| J | JUNCTION BOX, CEILING OR ABOVE CEILING MOUNTED |
| J | JUNCTION BOX, WALL MOUNTED |
| J | JUNCTION BOX, IN-GROUND |
| PB | PULL BOX |

## RECEPTACLES

| CIRCUITS EMERGENCY | CIRCUITS NORMAL | Description |
|---|---|---|
| | | SINGLE RECEPTACLE, 120V |
| | | SINGLE RECEPTACLE, 120V, CEILING MOUNTED |
| | | DUPLEX RECEPTACLE, 120V |
| | | DUPLEX RECEPTACLE, 120V, CEILING MOUNTED |
| | | DOUBLE DUPLEX RECEPTACLE, 120V |
| | | DOUBLE DUPLEX RECEPTACLE, 120V, CEILING MOUNTED |
| | | SPLIT WIRED RECEPTACLE, 120V, TOP CONTROLLED, BOTTOM CONSTANTLY ENERGIZED |
| # | # | RECEPTACLE, NEMA # |
| # | # | RECEPTACLE, NEMA #, CEILING MOUNTED |
| # | # | COMBINATION RECEPTACLE, NEMA # AND 120V |
| | | FURNITURE SYSTEMS RECEPTACLE, 120V |
| N/A | | INDICATES FULLY CONTROLLED |
| N/A | | INDICATES 15A |
| N/A | | INDICATES TWIST LOCK |
| N/A | | INDICATES MOUNTED 3" (75 MM) ABOVE COUNTER BACKSPLASH |
| N/A | | MULTI-SERVICE FLOOR BOX (RECEPTACLES/OUTLETS AS INDICATED) |
| N/A | | MULTI-SERVICE POKE THRU (RECEPTACLES/OUTLETS AS INDICATED) |
| N/A | | MULTI-SERVICE POWER POLE (RECEPTACLES/OUTLETS AS INDICATED) |
| N/A | | MULTI-SERVICE ASSEMBLY (RECEPTACLES/OUTLETS AS INDICATED) |
| N/A | | PLUG STRIP (HORIZONTAL/VERTICAL) |
| N/A | | CLOCK RECEPTACLE, 120V |
| | | CORD DROP, 120V |
| | | CEILING CORD DROP, 120V |

## RECEPTACLE TYPES

| Symbol | Description |
|---|---|
| A | ARC FAULT CIRCUIT INTERRUPTER |
| AT | ARC FAULT CIRCUIT INTERRUPTER AND TAMPER RESISTANT |
| D | DEDICATED CIRCUIT |
| G | GROUND FAULT CIRCUIT INTERRUPTER |
| GT | GROUND FAULT CIRCUIT INTERRUPTER AND TAMPER RESISTANT |
| IG | ISOLATED GROUND |
| S | SURGE PROTECTOR |
| T | TAMPER RESISTANT |
| U | INTEGRAL USB PORT(S) |
| WP | WEATHER RESISTANT COVER |

| REFERENCE DRAWING | | REVISION | | | | | | |
|---|---|---|---|---|---|---|---|---|
| DRAWING No. | DRAWING TITLE | Rev. | DATE | DESCRIPTION | BY | DES. | CHK. | ENG. |
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DRAWING TITLE:
ELECTRICAL
SYMBOLS, LEGENDS AND ABBREVIATIONS
SHEET 2

| CONSULTANT JOB No. | EPCOR PROJECT No. | SCALE | SHEET | DRAWING NUMBER |
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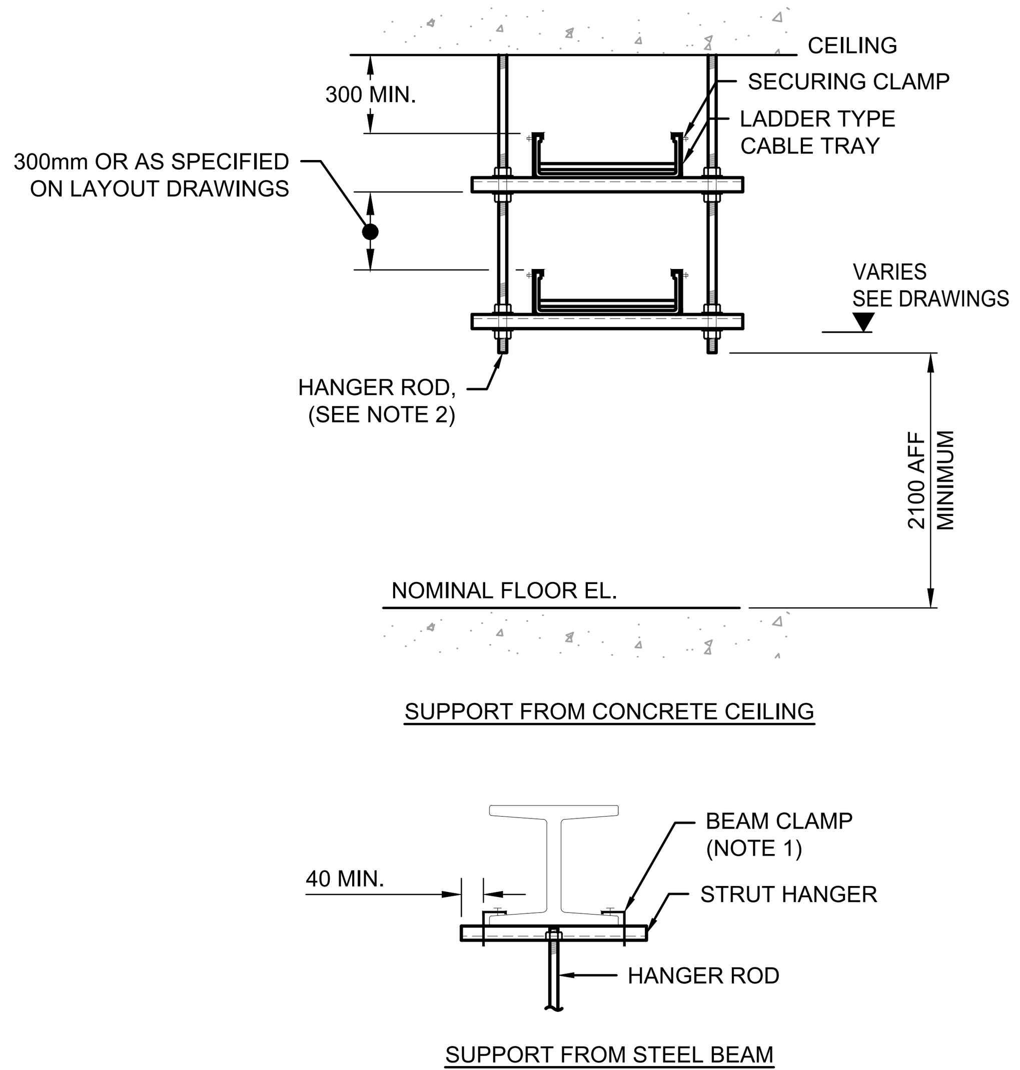
| 1101000105 | PMO 1004723; PF14-015 | 1 : 1 | of 0 | PRJ-15-157-602 |

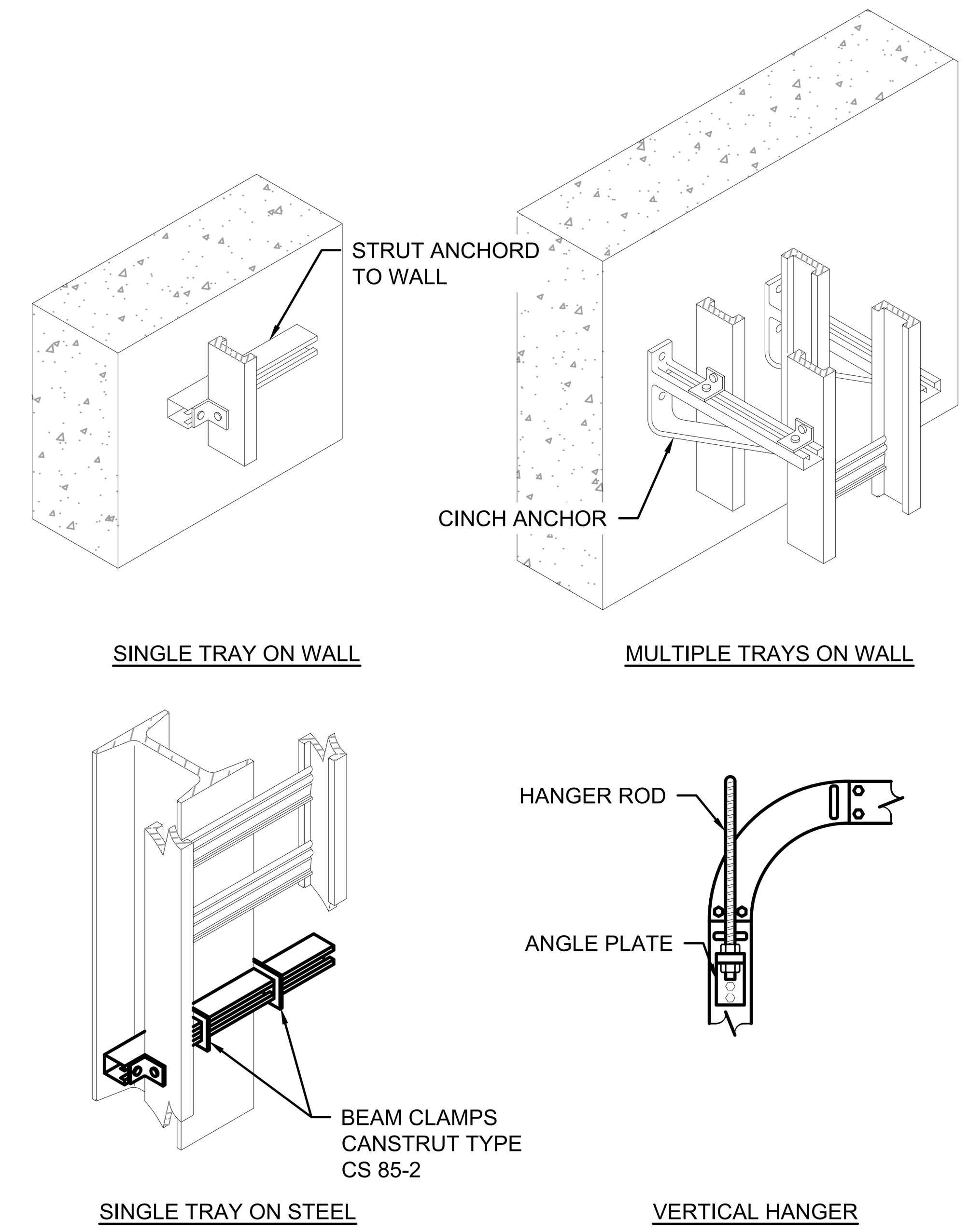
10/30/2024 10:12:41 AM



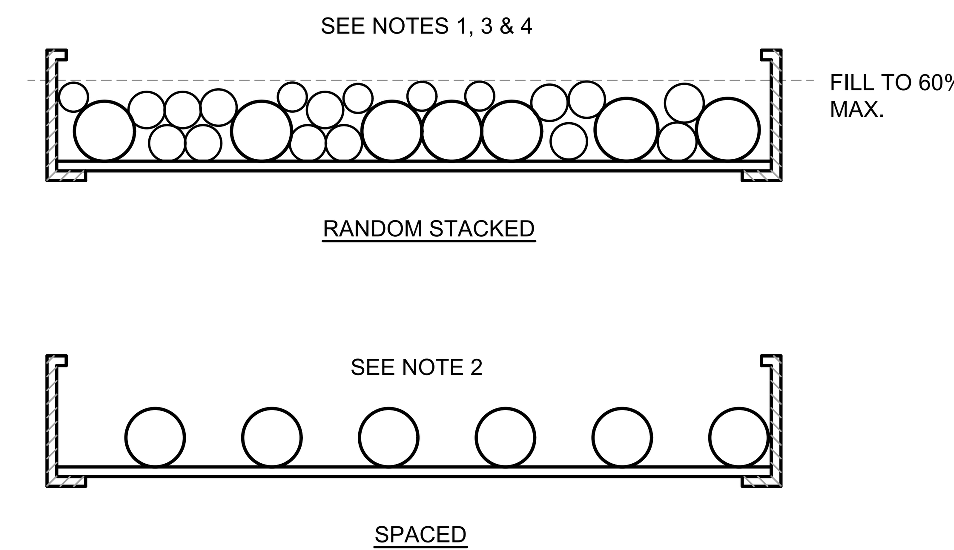

NOTES:

1. CLAMP TO SUIT BEAM, PURLIN, TRUSS OR OTHER SIMILAR MEMBERS.
2. SEE SPECIFICATION FOR CABLE TRAY REQUIREMENTS.

1 STD CABLE TRAY INSTALLATION DETAIL (CEILING MOUNTED TRAY SUPPORT)
NO SCALE



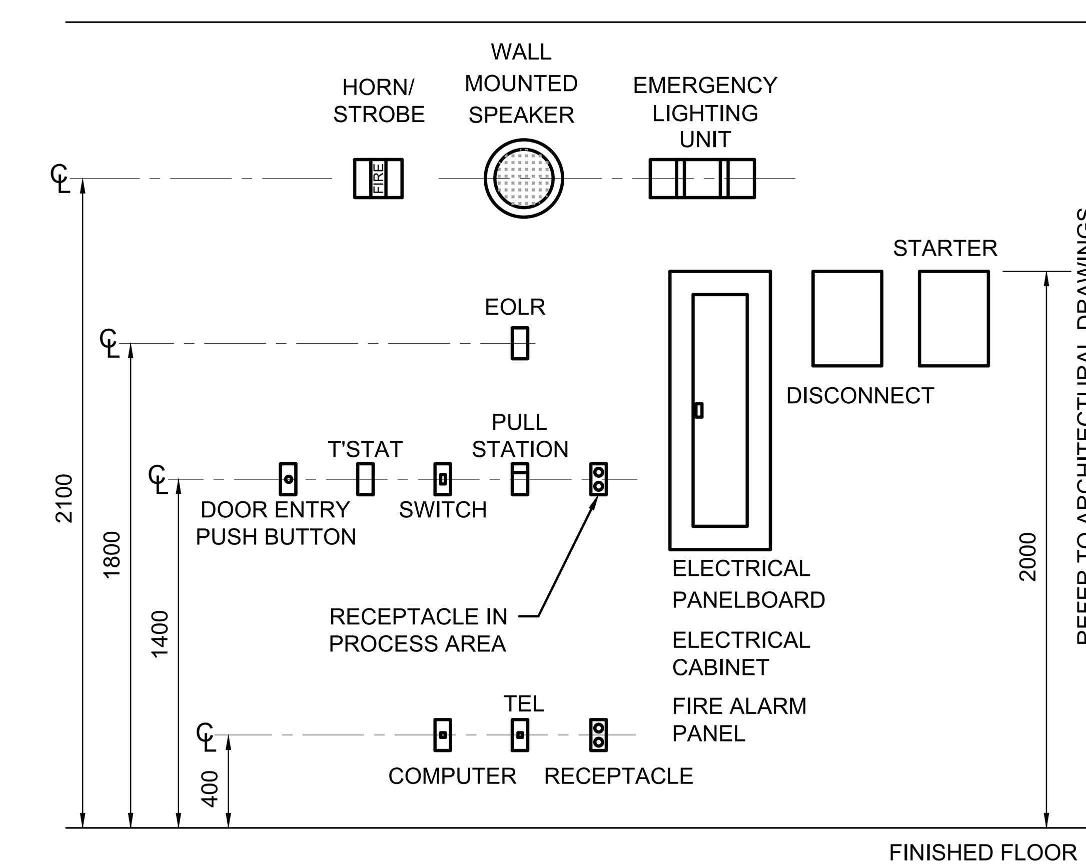

2 STD CABLE TRAY INSTALLATION DETAIL (VERTICAL TRAY SUPPORT ASSEMBLY)
NO SCALE




NOTES:

1. RANDOM STACKED FOR 120/208V AND CONTROL CABLING ONLY- TO ALLOW FOR FUTURE EXPANSION ASSUME MORE THAN 43 POWER CONDUCTORS PER CABLE TRAY, AMPACITY SHALL BE DERATED TO 50% FOR CABLES UP TO 1000V.
2. SPACED CABLES - INSTALL CABLES MINIMUM ONE DIAMETER SEPARATION TO PROVIDE 100% AMPACITY RATING UNLESS INDICATED OTHERWISE.
3. ASSOCIATED CONTROL CABLES MAY BE INCLUDED WITHOUT AFFECTING RATING; CABLES OF DIFFERENT INSULATION CLASS SHALL BE SEPARATED BY A METALLIC BARRIER.

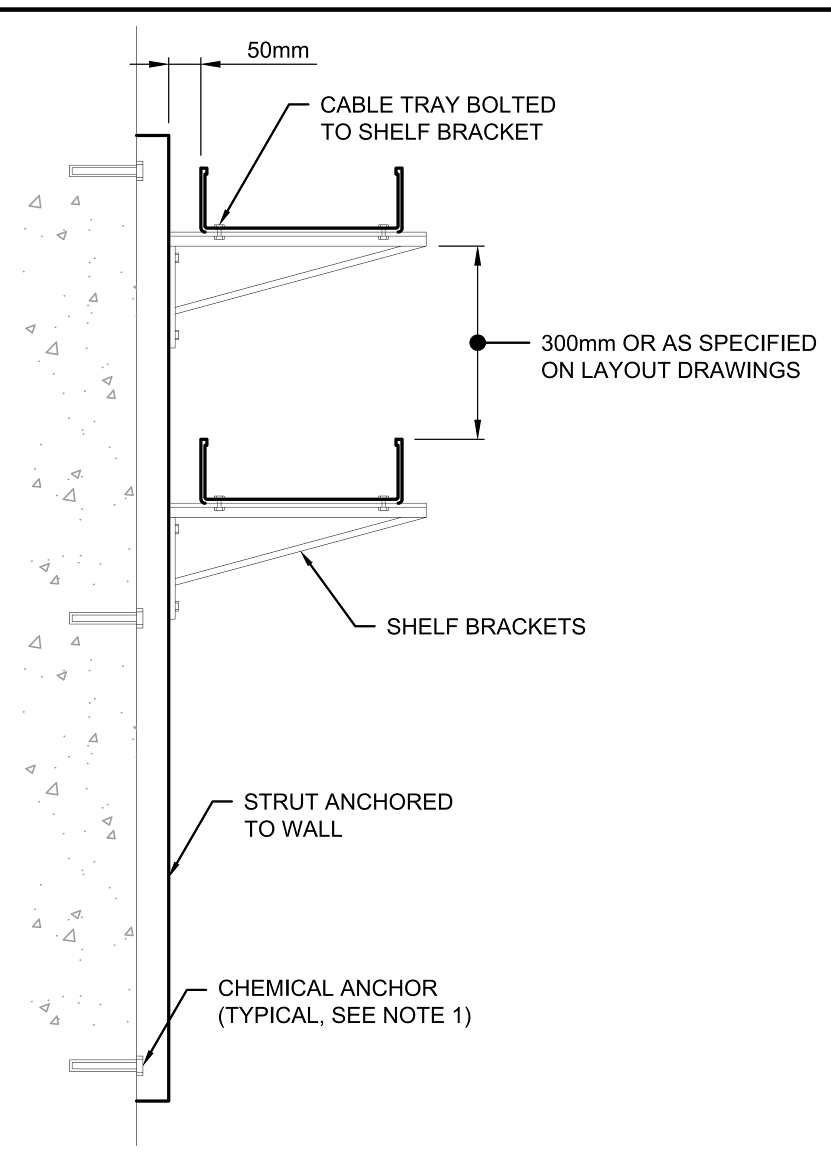
3 STD CABLE TRAY FILL
NO SCALE




NOTES:

1. ALIGN ALL EQUIPMENT VERTICALLY AND HORIZONTALLY.

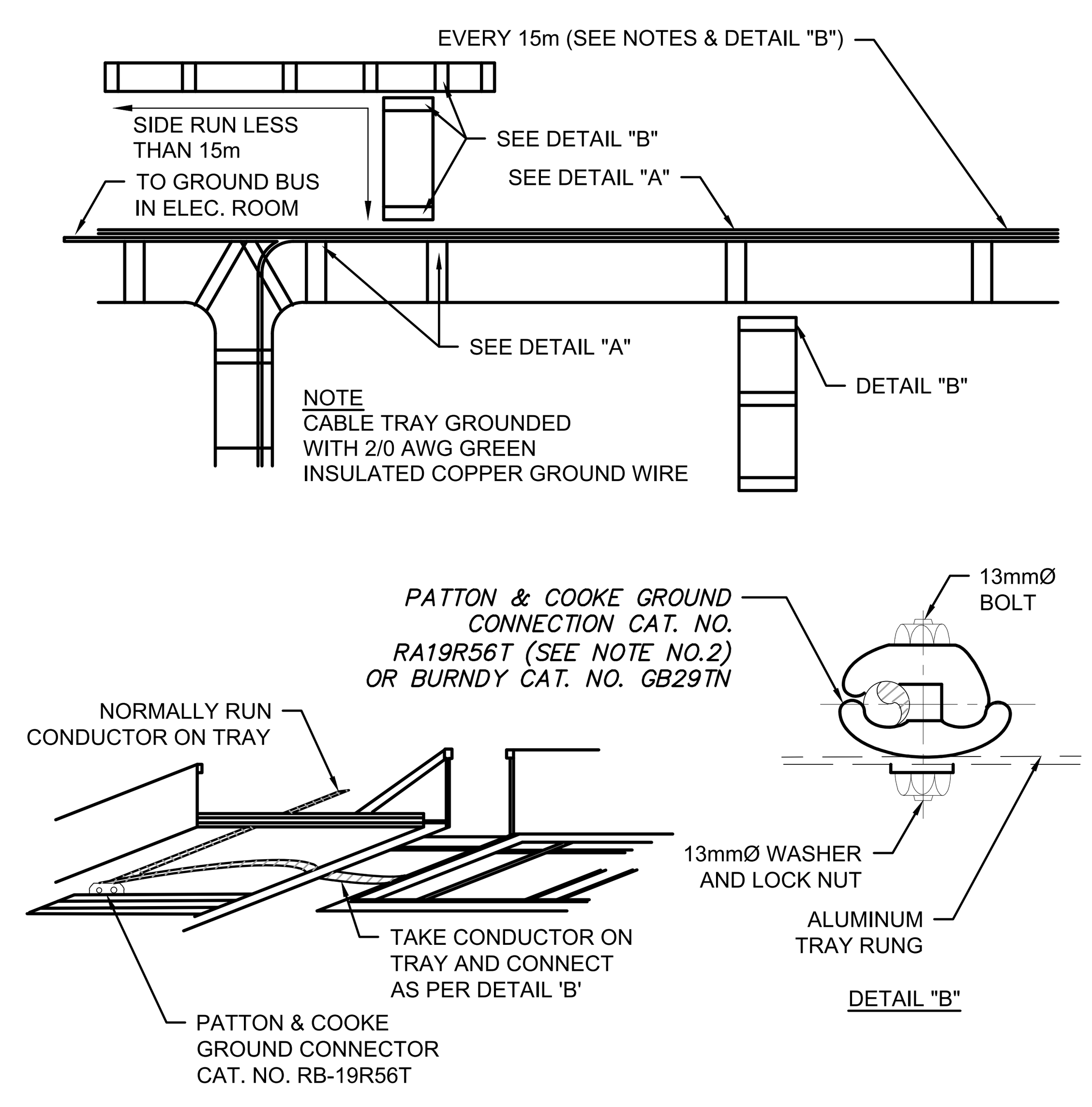
4 STD DEVICE MOUNTING HEIGHT DETAIL
NO SCALE




NOTES:

1. CHEMICAL ANCHOR SHALL BE "HILTI HIT" OR EQUIVALENT AND AS PER SECTION 03150 - CONCRETE ACCESSORIES. MOUNTING DETAIL SHOWS INTENT OF ANCHORING, SPECIFIC BRACING SHALL BE PROVIDED IN ACCORDANCE WITH SECTION 16195 - SEISMIC RESTRAINTS.

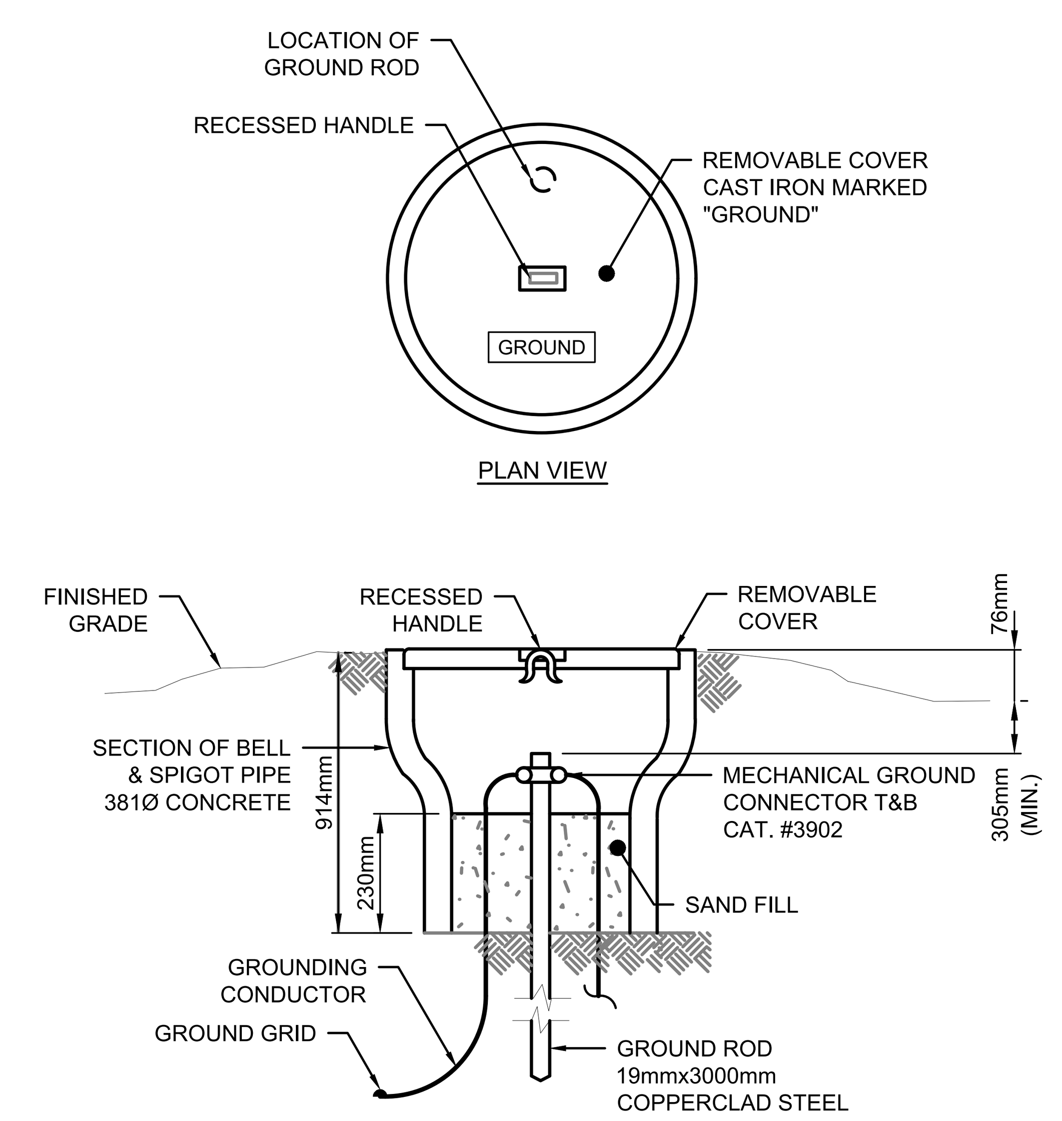
5 STD CABLE TRAY INSTALLATION DETAIL
NO SCALE



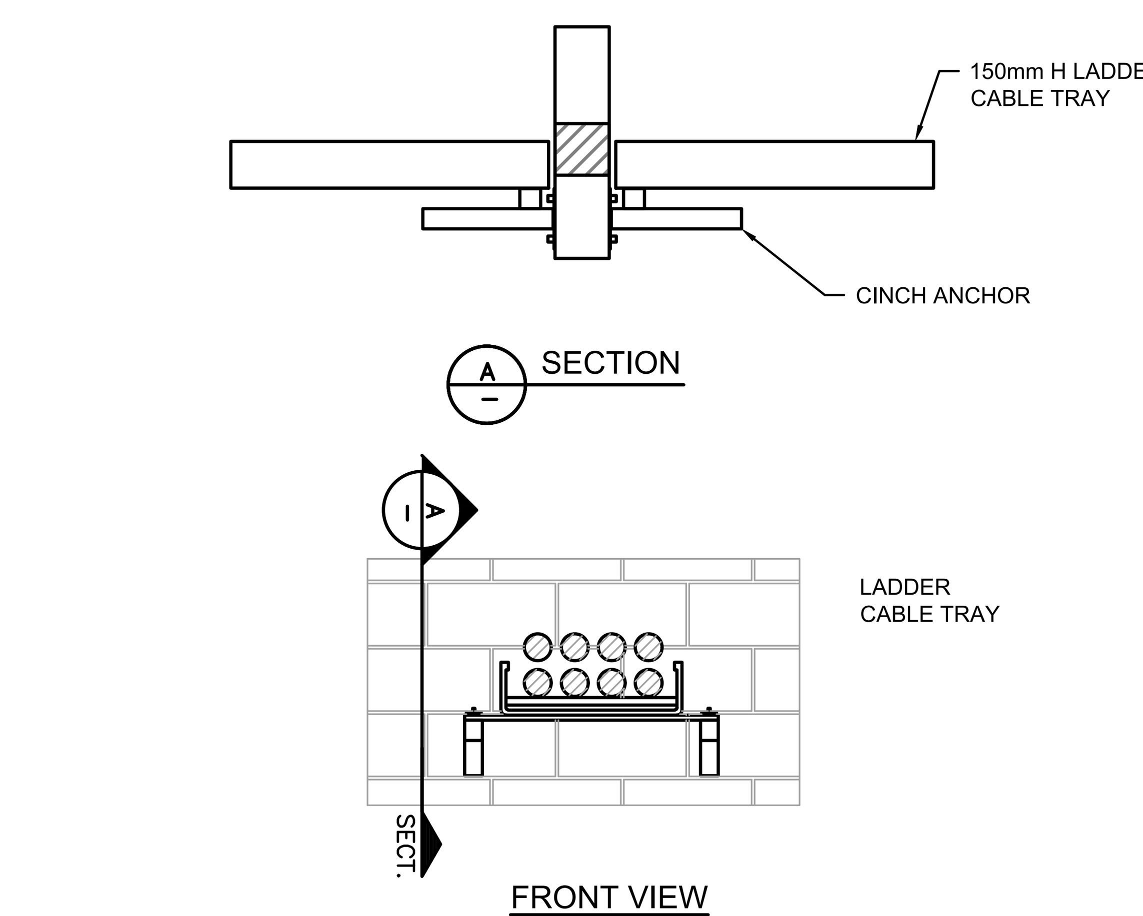

NOTES:

1. THE CABLE TRAY SHALL BE ADEQUATELY GROUNDED AT INTERVALS NOT EXCEEDING 15m AS SHOWN.

6 STD CABLE TRAY INSTALLATION DETAIL
NO SCALE




7 STD GROUNDING TEST STATION DETAIL
NO SCALE




NOTES:

1. CORE DRILL 6" PENETRATIONS THROUGH CONCRETE FLOOR/BLOCK WALL. COORDINATE PENETRATION LOCATIONS WITH STRUCTURAL ENGINEER. COORDINATE WITH OWNER TO X-RAY WALLS PRIOR TO CORE DRILLING EXISTING CONCRETE.
2. INSTALL HILTI FS-ONE FIRESTOP SEALANT IN ANY VOID AREA THAT MAY EXISTING AROUND CABLES
3. MAXIMUM COMBINED AREA OF OPENINGS = 1742 CM²

8 STD CABLE TRAY THROUGH CONCRETE FLOOR/BLOCK WALL
NO SCALE

| REFERENCE DRAWING | | REVISION | | | | | | |
|---|---|---|---|---|---|---|---|---|
| DRAWING No. | DRAWING TITLE | Rev. | DATE | DESCRIPTION | BY | DES. | CHK. | ENG. |
| | | 0A | 06-JUL-2023 | ISSUED FOR PRELIMINARY DESIGN | TS | AMG | JA | AMG |
| | | 0B | 26-APR-2024 | ISSUED FOR 60% DESIGN | EGD | AMG | JA | AMG |
| | | 0C | 30-AUG-2024 | ISSUED FOR 90% DESIGN | EGD | AMG | JA | AMG |
| | | 0D | 15-NOV-2024 | ISSUED FOR CONSTRUCTION | EGD | AMG | JA | AMG |

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ID: 107144
2024-11-24

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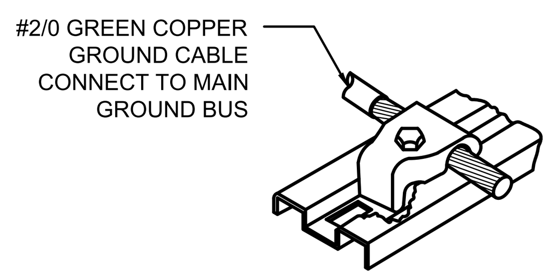
PLANT SITE: GOLD BAR WWTP
PLANT AREA: PLANT WIDE
PROJECT NAME: GBWWTP FLARE CAPACITY EXPANSION
DRAWING TITLE: ELECTRICAL STANDARD DETAILS SHEET 1

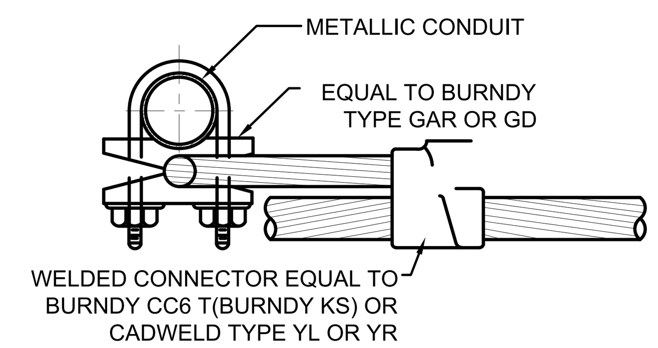
| CONSULTANT JOB No. | EPCOR PROJECT No. | SCALE | SHEET | DRAWING NUMBER |
|---|---|---|---|---|
| 1101000105 | PMO 1004723; PF14-015 | 1:1 | - OF - | PRJ-15-157-603 |




NOTE: ONE PER EACH TRAY LENGTH

9 STD TYPICAL GROUND CLAMP (CABLE TRAY)

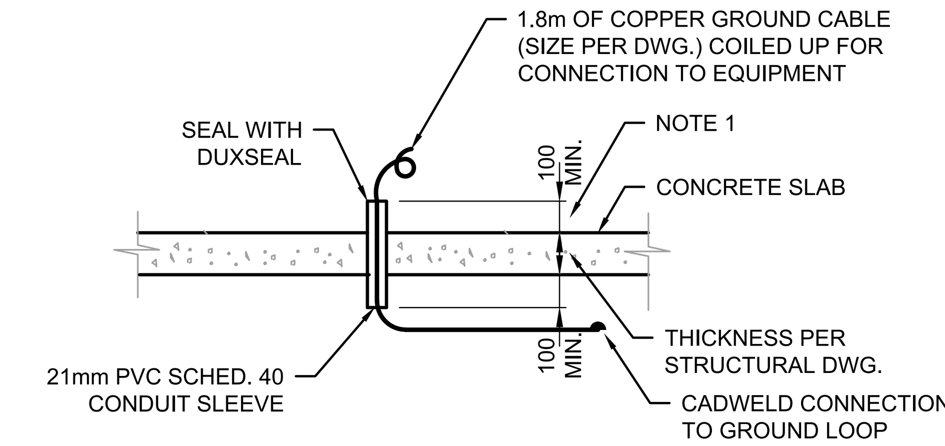
NO SCALE




GROUNDING INSTALLATION DETAILS

10 STD TYPICAL GROUNDING OF METAL CONDUITS

NO SCALE

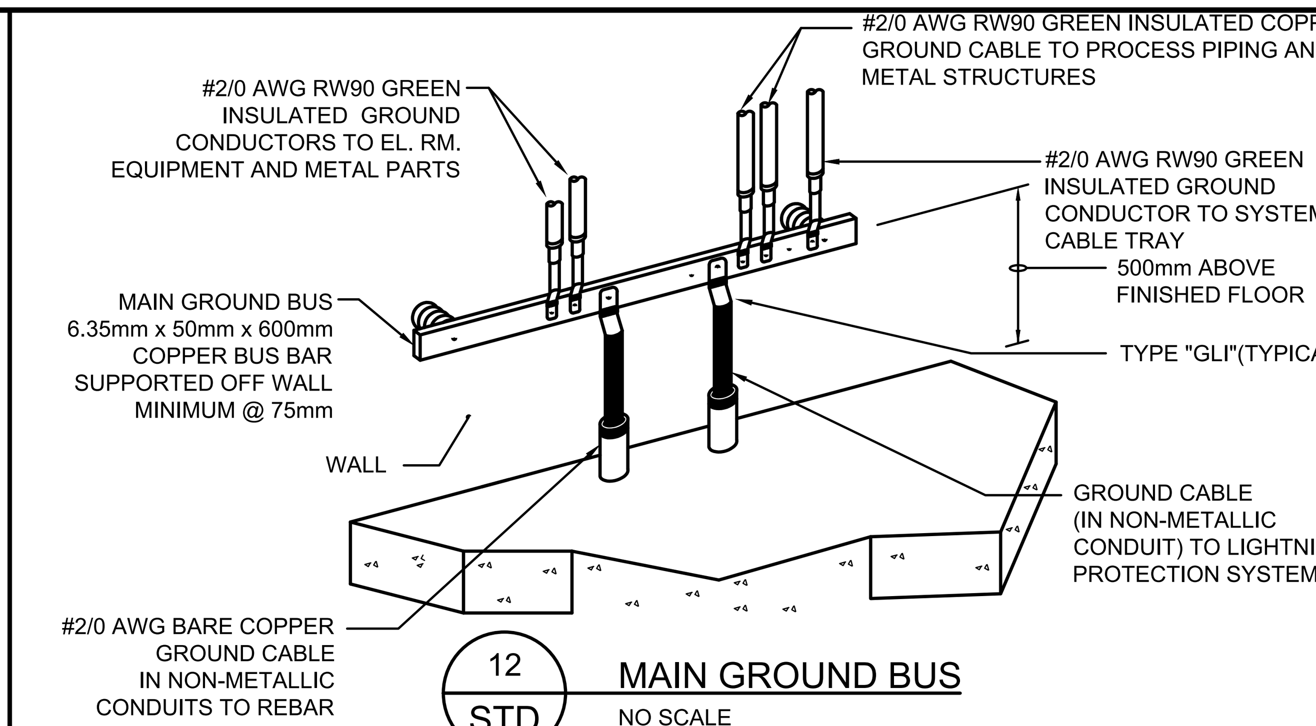



NOTES:

1. REDUCE TO 75mm AT MCC'S AND SWITHCGEARS.

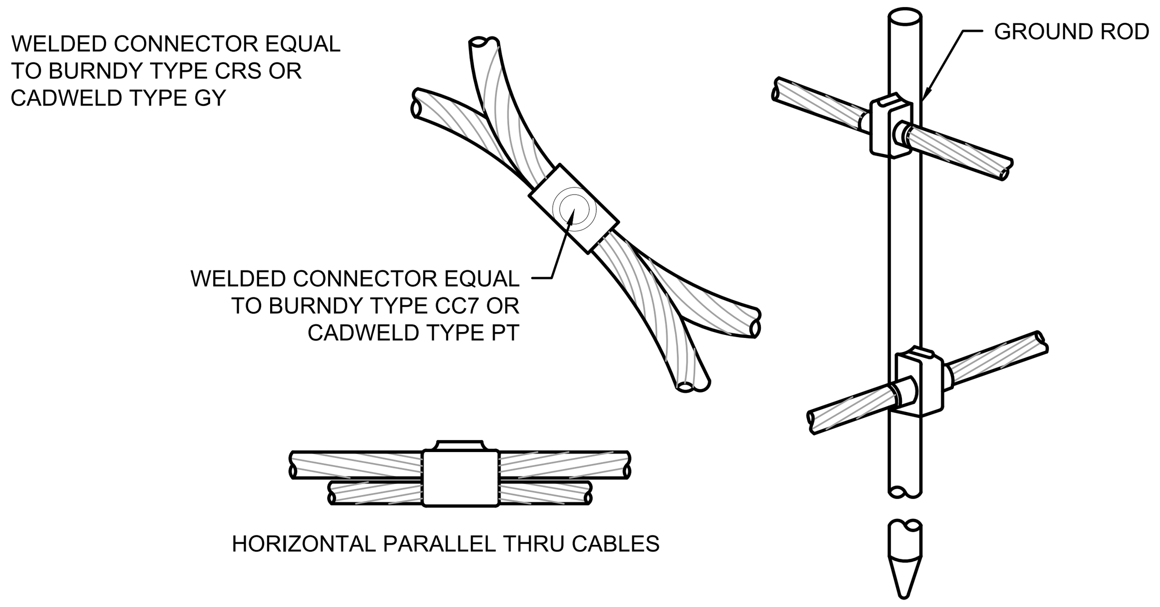
11 STD EQUIPMENT GROUND CABLE STUB-UP

NO SCALE




12 STD MAIN GROUND BUS

NO SCALE

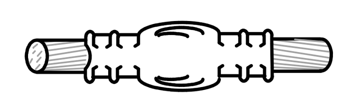



13 STD TYPICAL GROUND CONNECTIONS DETAIL

NO SCALE

MATERIAL: HIGH CONDUCTIVITY CAST COPPER
FINISH: TIN PLATE

| T & B CAT. NO. | CABLE | DIE CODE |
|---|---|---|
| 53507 | #2 | 45 |
| 53508 | #1 | |
| 53509 | 1/0 | |
| 53510 | 2/0 | 66 |
| 53511 | 3/0 | |
| 53512 | 4/0 | |



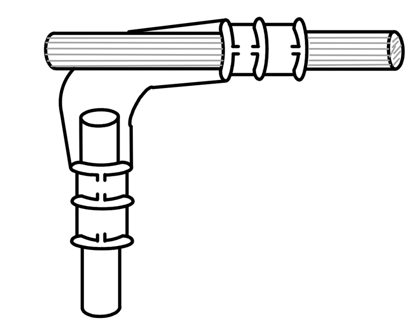
14 STD 2-WAY CONNECTOR FOR COPPER CABLE

NO SCALE

MATERIAL: HIGH CONDUCTIVITY CAST COPPER

| BURNDY | | DIE INDEX | | |
|---|---|---|---|---|
| CAT No. | RANGE | RUN | TAP | DIA" |
| YGLR29C34 | #2-250MCM | 998 | 997 | 0.5 |

| T & B CAT. #53071 |
|---|
| ROD END DIE } CAT. #15506<br>WIRE END DIE } CODE 87H |
| WIRE - #4/0 TO 250 MCM |
| ROD - 3/4 " |

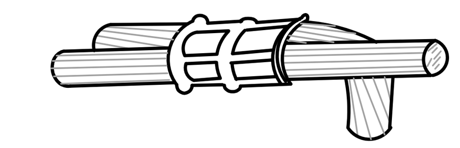


15 STD 'GR' COMPRESSION GROUND ROD CONNECTOR

NO SCALE

MATERIAL: HIGH CONDUCTIVITY CAST COPPER

| T & B CAT. #54760 | | |
|---|---|---|
| WIRE GROOVE 'A' - #2/0 TO #4/0 | | |
| WIRE GROOVE 'B' - #4 TO #4/0 | | |
| SEE CATALOG FOR TOOLS & DIES | | |
| BURNDY CAT.# | RANGE | DIE INDEX |
| YGHC26C26 | #1 - 2/0 | 0 |
| YGHC29C26 | 3/0-250 MCM | 997 |



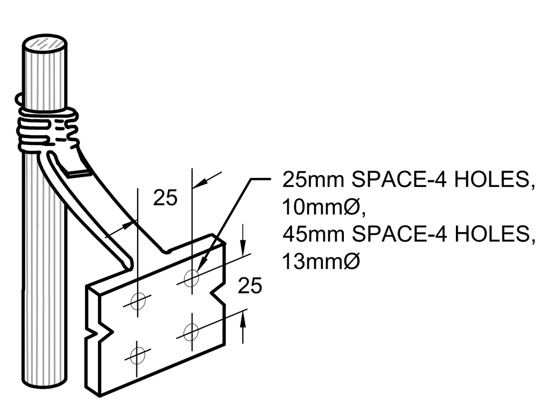
16 STD 'CT' CONNECTION - WITH COMPRESSION C TAP

NO SCALE

MATERIAL: HIGH CONDUCTIVITY CAST COPPER

| T & B CAT. NO. | CABLE | STUD DIE |
|---|---|---|
| 52090 | 1/0-2/0 | 3/8" 66 |
| 52092 | 4/0-250 | 3/8" 87H |

| BURNDY | | |
|---|---|---|
| CAT No. | RANGE | DIE INDEX |
| YGF29-4N | #2-250MCM | 997 |



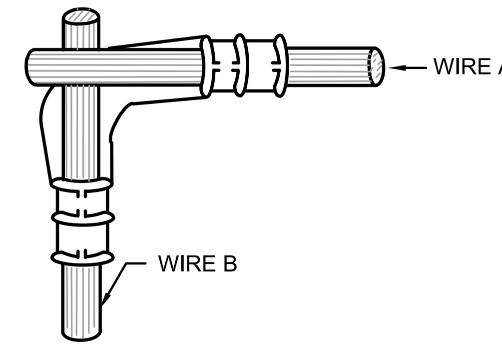

17 STD 'GP' COMPRESSION GROUND FLUSH PLATE

NO SCALE

MATERIAL: HIGH CONDUCTIVITY CAST COPPER

| T & B CAT.No. | WIRE 'A' | WIRE 'B' | DIE No. | CODE |
|---|---|---|---|---|
| 53055 | 1/0-2/0 | 1/0-2/0 | 15534 | 66 |
| 53060 | 4/0-250 | 1/0-2/0 | 15506 | 87H |
| 53065 | 4/0-250 | 4/0-250 | 15506 | 87H |

| BURNDY | | DIE INDEX | | |
|---|---|---|---|---|
| CAT No. | RANGE | RUN | TAP | DIA" |
| YGL29C29 | #2-250MCM | 997 | 997 | 0.5 |



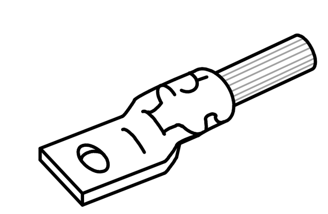

18 STD 'CX' COMPRESSION X CONNECTOR

NO SCALE

FOR TERMINATIONS AT COLUMNS AND EQUIPMENT

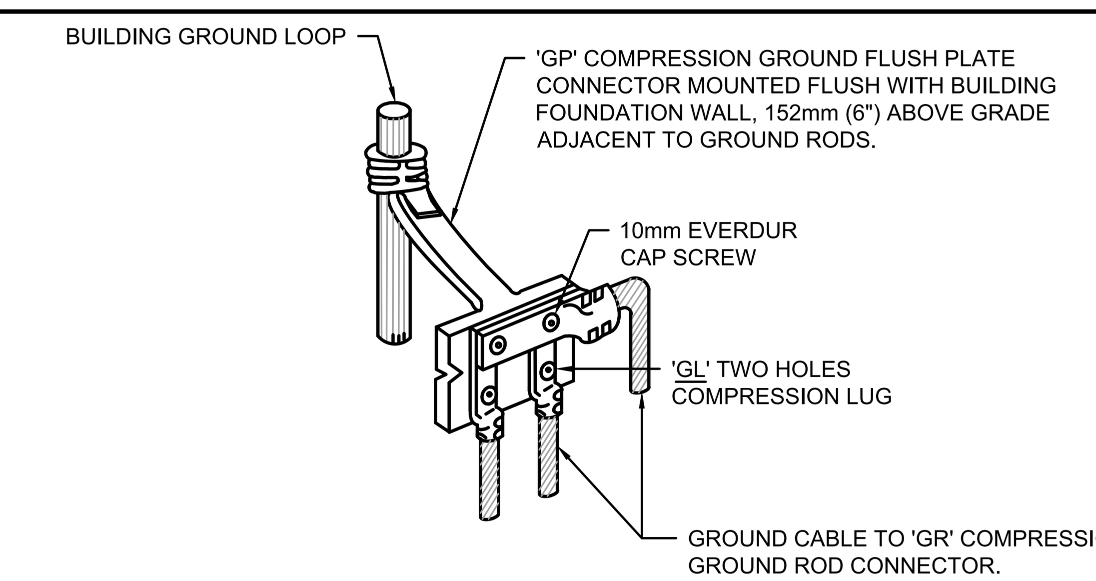
| T & B CAT. NO. | CABLE | BOLT |
|---|---|---|
| 54110 | 2/0 | 3/8" |
| 54111 | 3/0 | 3/8" |
| 54112 | 4/0 | 3/8" |
| 54113 | 250 | 1/2" |

| BURNDY | | |
|---|---|---|
| CAT No. | CABLE | BOLT |
| YAL26T12 | 2/0 | 1/2" |
| YAL28T12 | 4/0 | 1/2" |



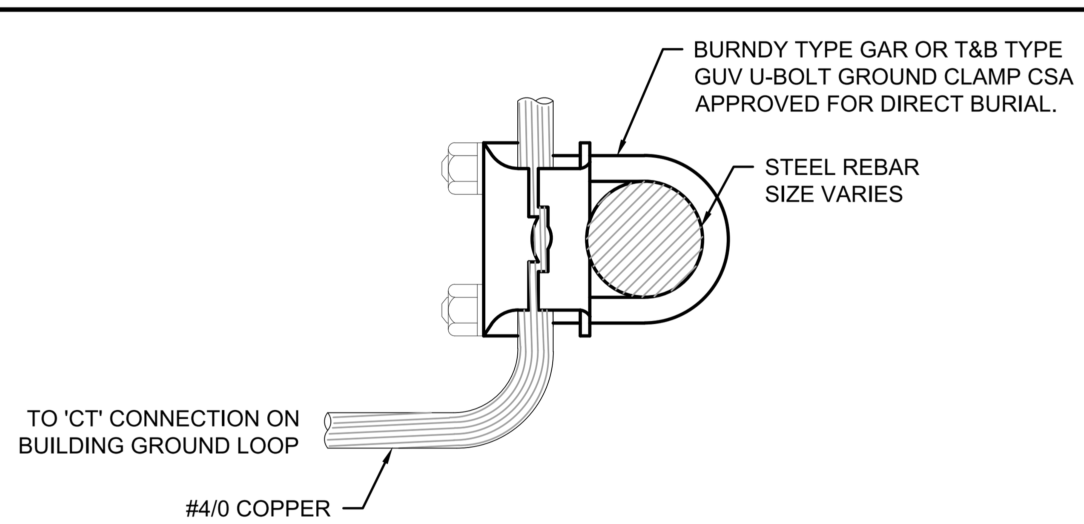
19 STD 'GL' GROUND LUG - ONE HOLE LUG FOR COPPER CABLE

NO SCALE



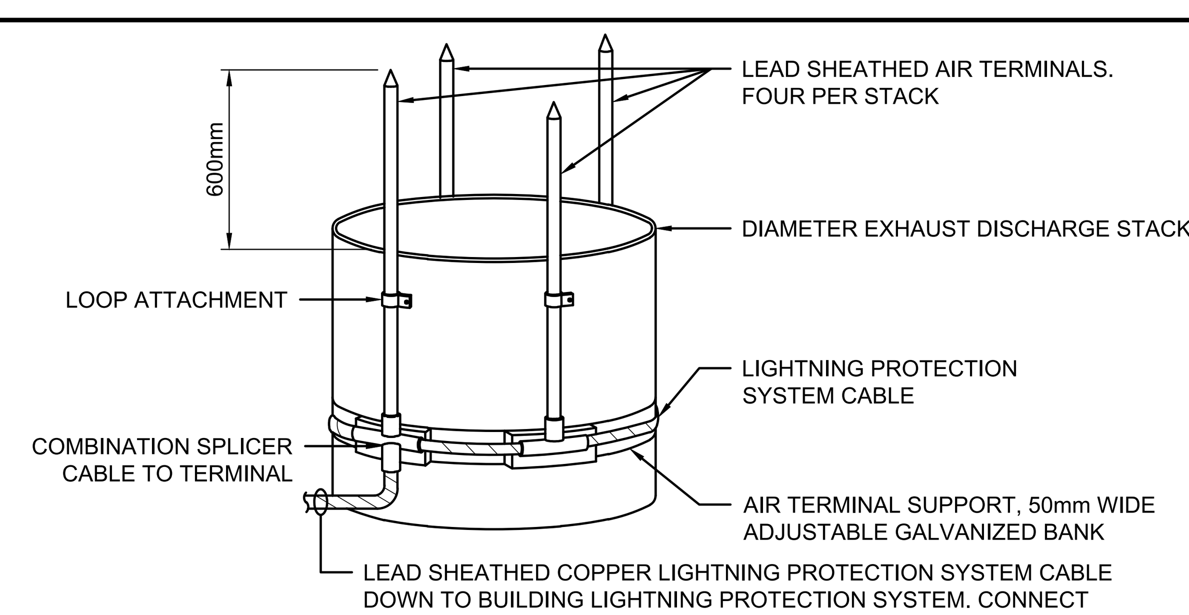

20 STD GROUNDING PLATE CONNECTION DETAIL

NO SCALE




21 STD 'GU' TYPICAL CONNECTION BUILDING LOOP TO FOUNDATION REBAR

NO SCALE




22 STD FOUL AIR EXHAUST STACK LIGHTNING PROTECTION DETAIL

NO SCALE

| REFERENCE DRAWING | |
|---|---|
| DRAWING No. | DRAWING TITLE |
| | |

| REVISION | | | | | | |
|---|---|---|---|---|---|---|
| Rev. | DATE | DESCRIPTION | BY | DES. | CHK. | ENG. |
| 0A | 26-APR-2024 | ISSUED FOR 60% DESIGN | EGD | AMG | JA | AMG |
| 0B | 30-AUG-2024 | ISSUED FOR 90% DESIGN | EGD | AMG | JA | AMG |
| 0C | 15-NOV-2024 | ISSUED FOR CONSTRUCTION | EGD | AMG | JA | AMG |

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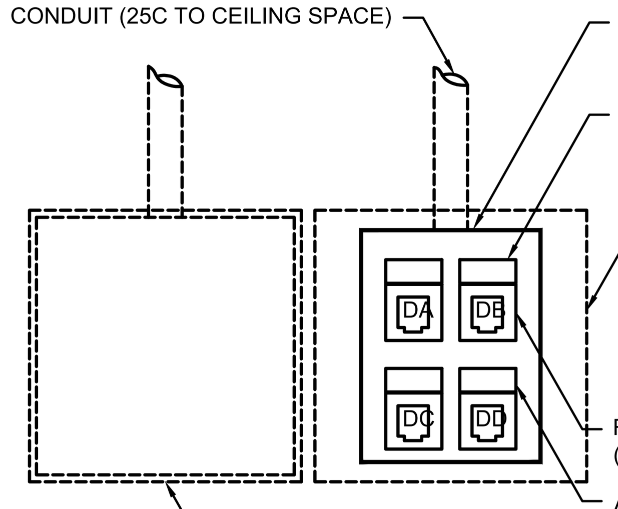
PLANT SITE: GOLD BAR WWTP
PLANT AREA: PLANT WIDE

PROJECT NAME: GBWWTP FLARE CAPACITY EXPANSION

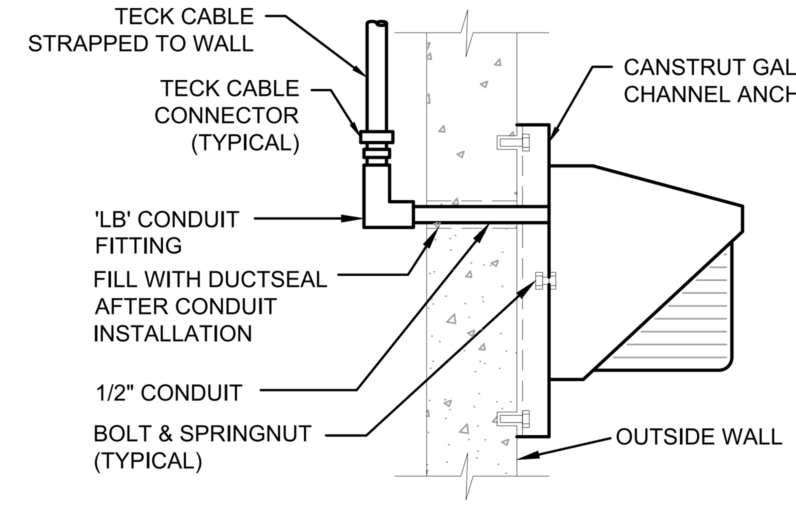
DRAWING TITLE:

ELECTRICAL
STANDARD DETAILS
SHEET 2

| CONSULTANT JOB No. | EPCOR PROJECT No. | SCALE | SHEET | DRAWING NUMBER |
|---|---|---|---|---|
| 1101000105 | PMO 1004723; PF14-015 | 1:1 | - OF - | PRJ-15-157-604 |



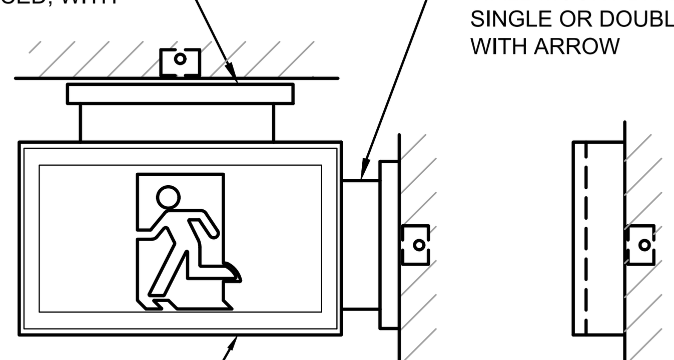

23 - DUPLEX DATA OUTLET (WALL MOUNTED)
NO SCALE



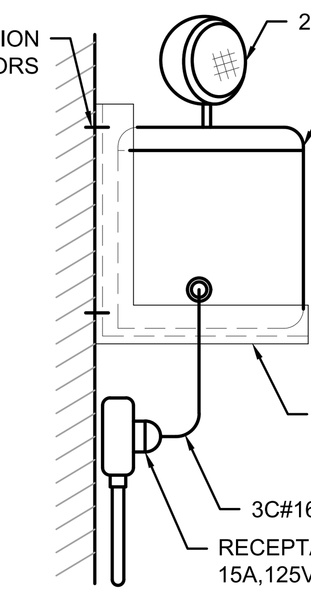

NOTE:

1. ALL CABLE RUNS SHALL BE INSIDE BUILDING.

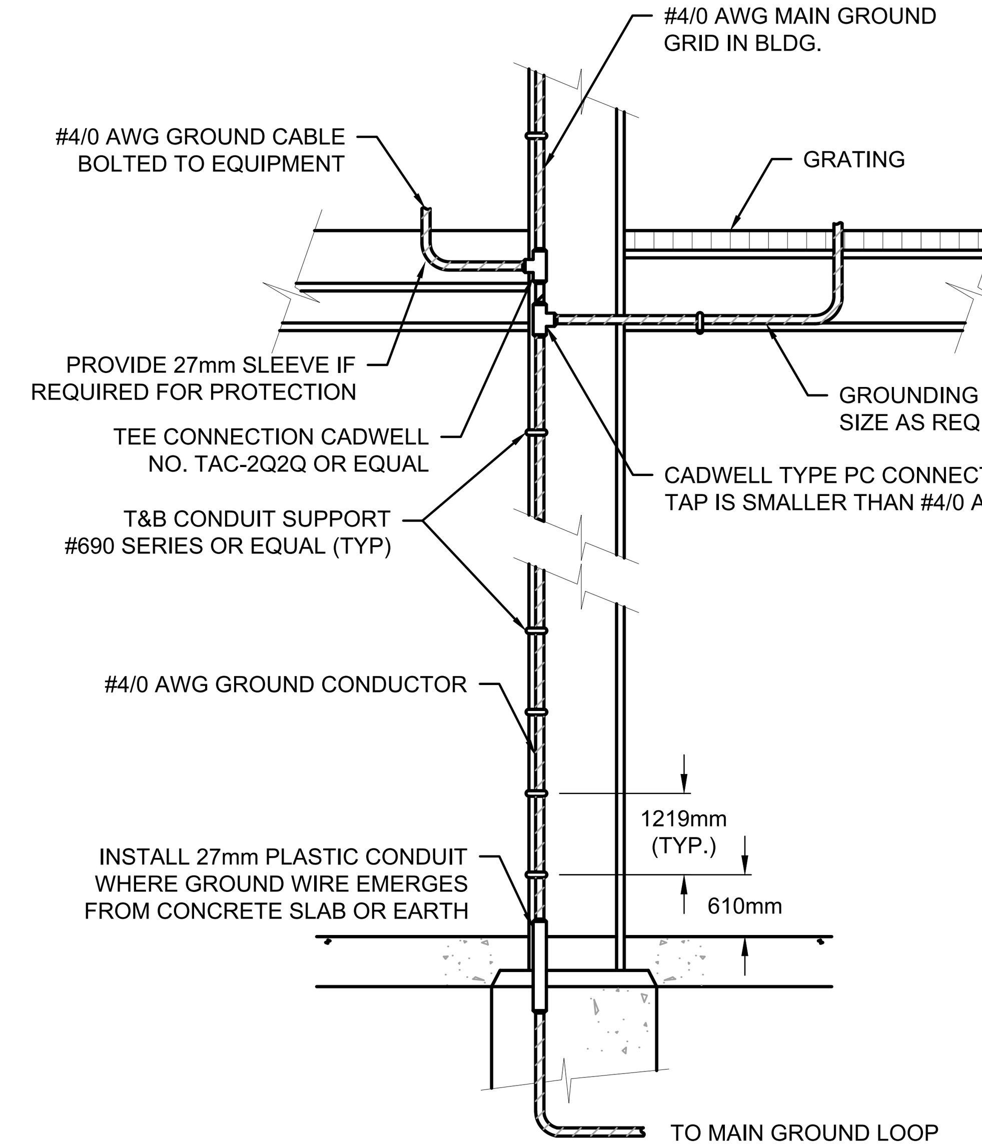
25 - OUTDOOR LIGHT FIXTURE MOUNTING DETAIL
NO SCALE



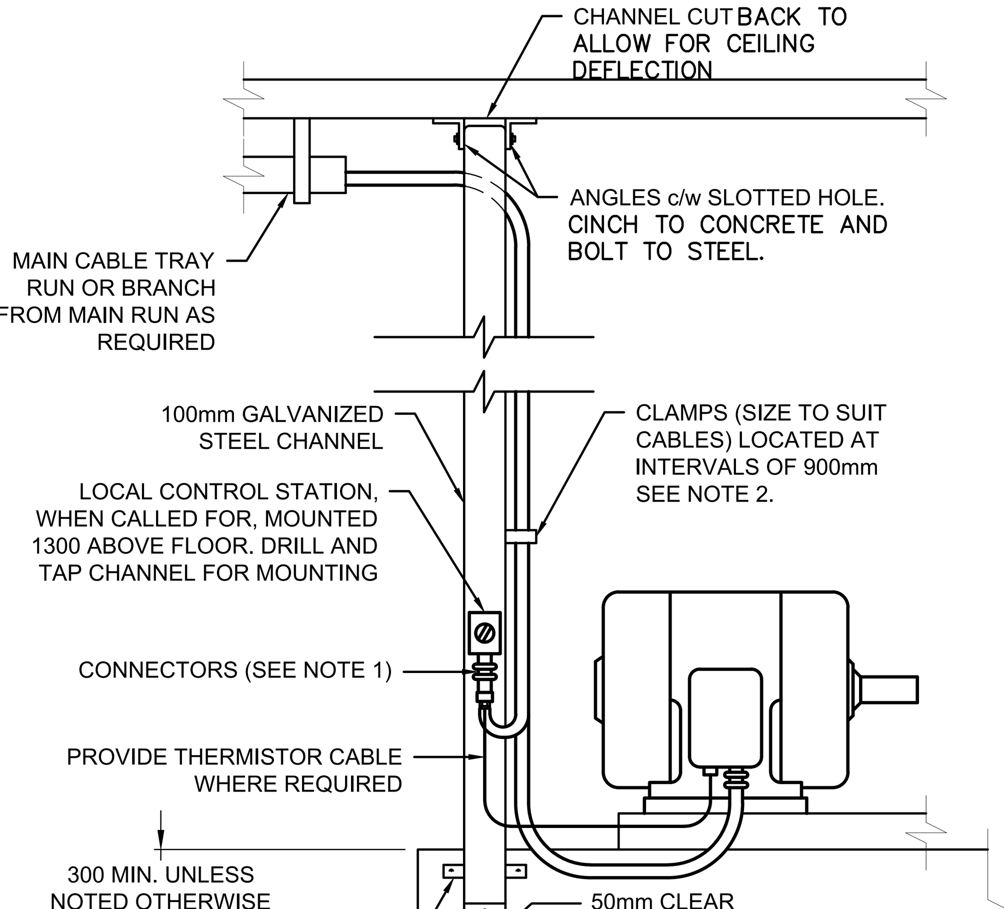

24 - EXIT LIGHT DETAIL
NO SCALE




26 - EMERGENCY LIGHT DETAIL
NO SCALE



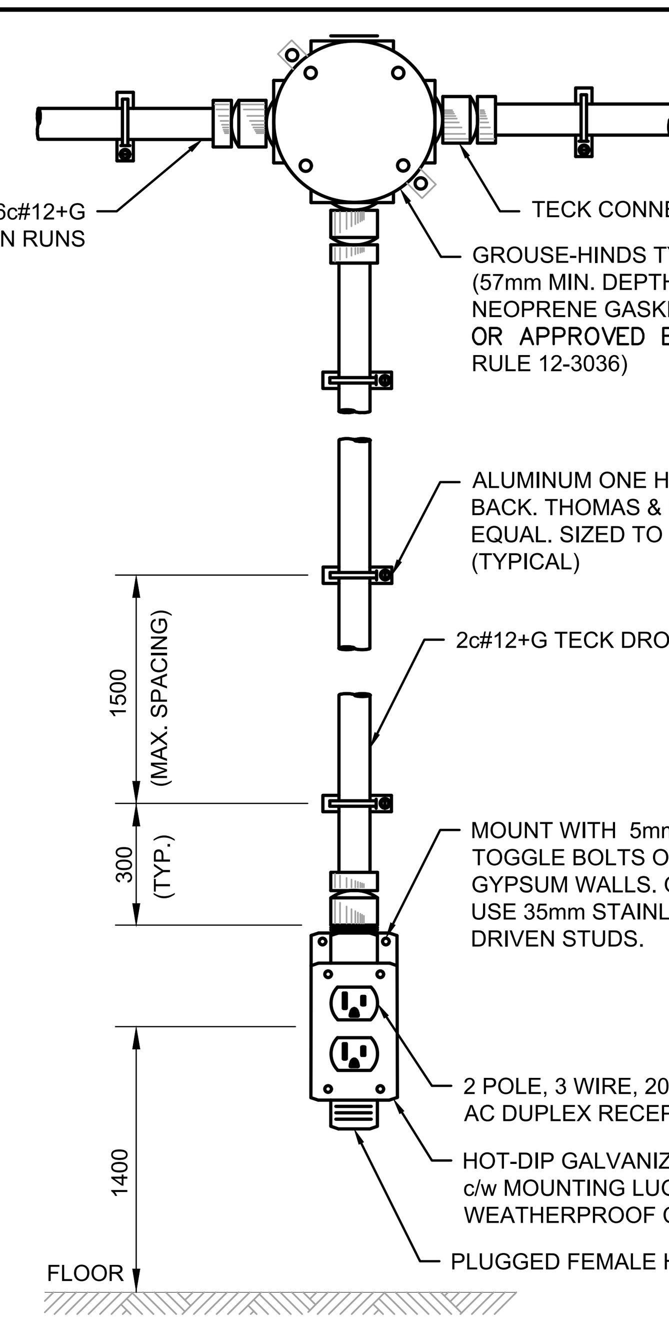

28 STD - GROUNDING CONDUCTOR CONNECTION & SUPPORT
NO SCALE



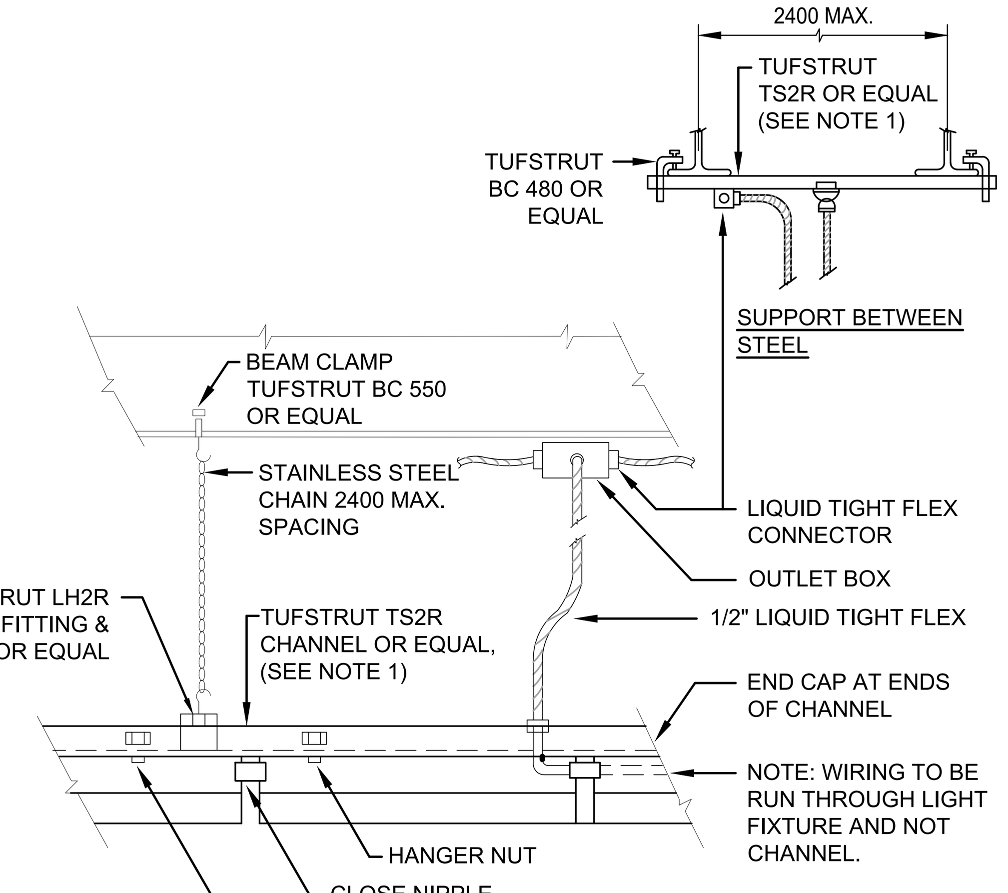

NOTES:

1. ALL WATERTIGHT CONNECTORS WITH THREADED HUBS SHALL BE USED FOR TECK CABLES. CONDUIT REDUCERS MAY BE REQUIRED TO REDUCE MOTOR AND PUSHBUTTON STATION HUBS DOWN TO CABLE CONNECTOR HUB SIZES.
2. WHEN MOTOR MOUNTED ON SLIDE RAILS/BASE, ALLOW SUFFICIENT SLACK TO PERMIT FULL TRAVEL OF MOTOR.
3. LOCATE SUPPORT TO ALLOW FOR FUTURE REMOVAL OF THE MOTOR.

29 STD - MOTOR POWER AND CONTROL STATION INSTALLATION DETAIL
NO SCALE




30 STD - DUPLEX RECEPTACLE MOUNTING DETAIL - WALL MOUNTED
NO SCALE

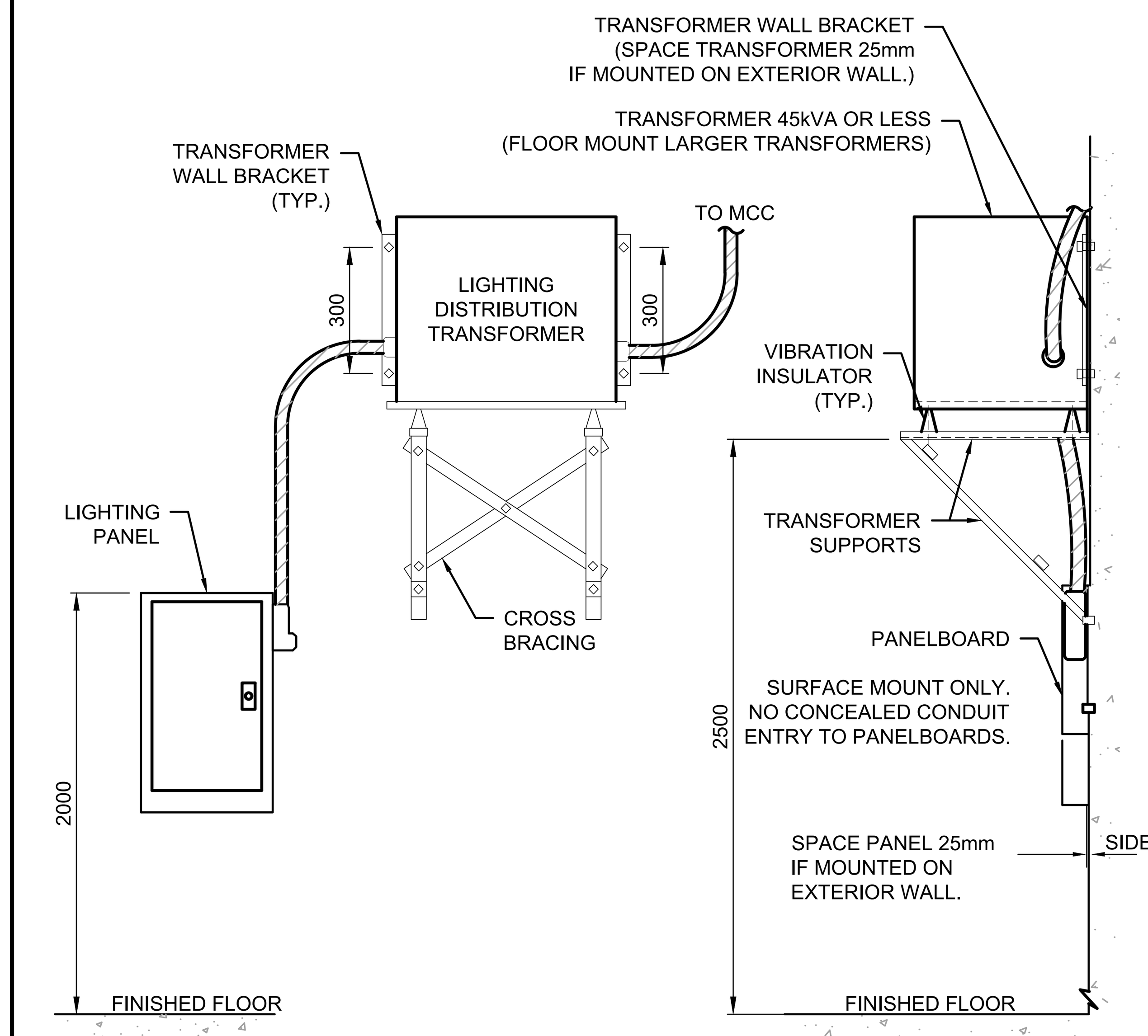



FIXTURES MOUNTED WITH CHANNEL

NOTE:

1. CHANNEL SHALL BE RIGID ALUMINUM, UNLESS NOTED OTHERWISE.

31 - LED SUSPENDED FIXTURE MOUNTING DETAIL
NO SCALE




NOTES:

1. WIRING IN WET OR PROCESS AREAS TO ENTER PANELS FROM SIDE OR BOTTOM.
2. COORDINATE SUPPORTS WITH SEISMIC ENGINEER.

32 - POWER/LIGHTING PANEL MOUNTING DETAIL
NO SCALE

| REFERENCE DRAWING | | REVISION | | | | | | |
|---|---|---|---|---|---|---|---|---|
| DRAWING No. | DRAWING TITLE | Rev. | DATE | DESCRIPTION | BY | DES. | CHK. | ENG. |
| | | 0A | 26-APR-2024 | ISSUED FOR 60% DESIGN | EGD | AMG | JA | AMG |
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ANDREW M. GRIESCHNER
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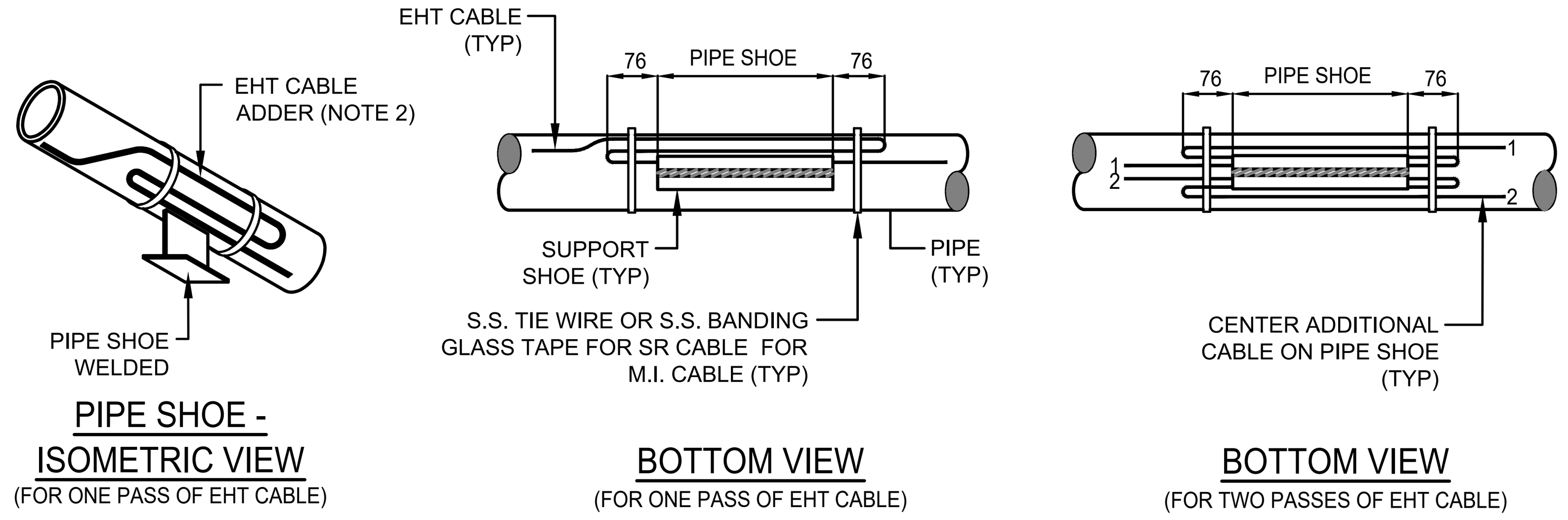
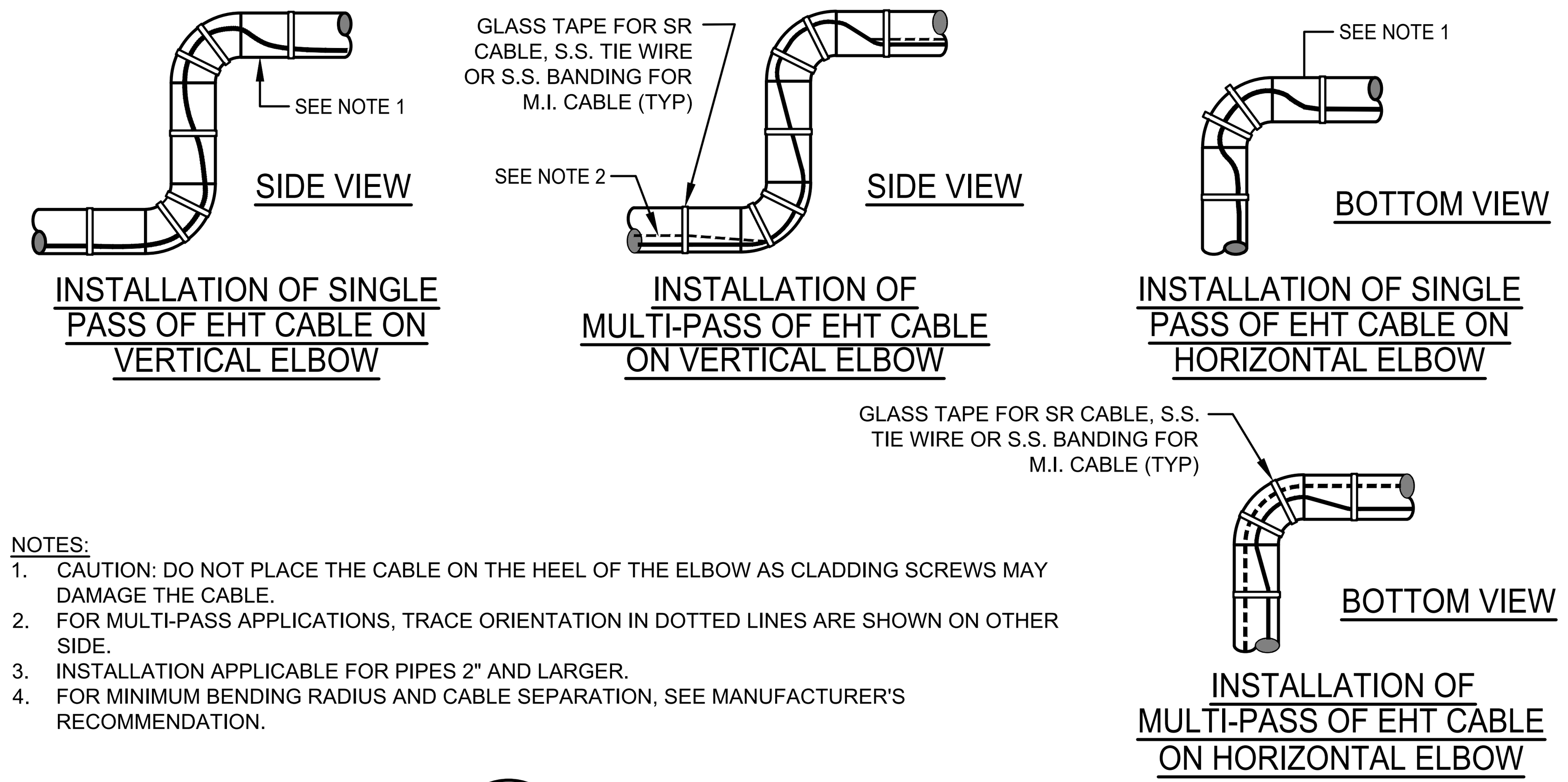
PLANT AREA: PLANT WIDE
PROJECT NAME: GBWWTP FLARE CAPACITY EXPANSION
DRAWING TITLE: ELECTRICAL STANDARD DETAILS SHEET 3

| CONSULTANT JOB No. | EPCOR PROJECT No. | SCALE | SHEET | DRAWING NUMBER |
|---|---|---|---|---|
| 1101000105 | PMO 1004723; PF14-015 | 1:1 | - OF - | PRJ-15-157-605 |



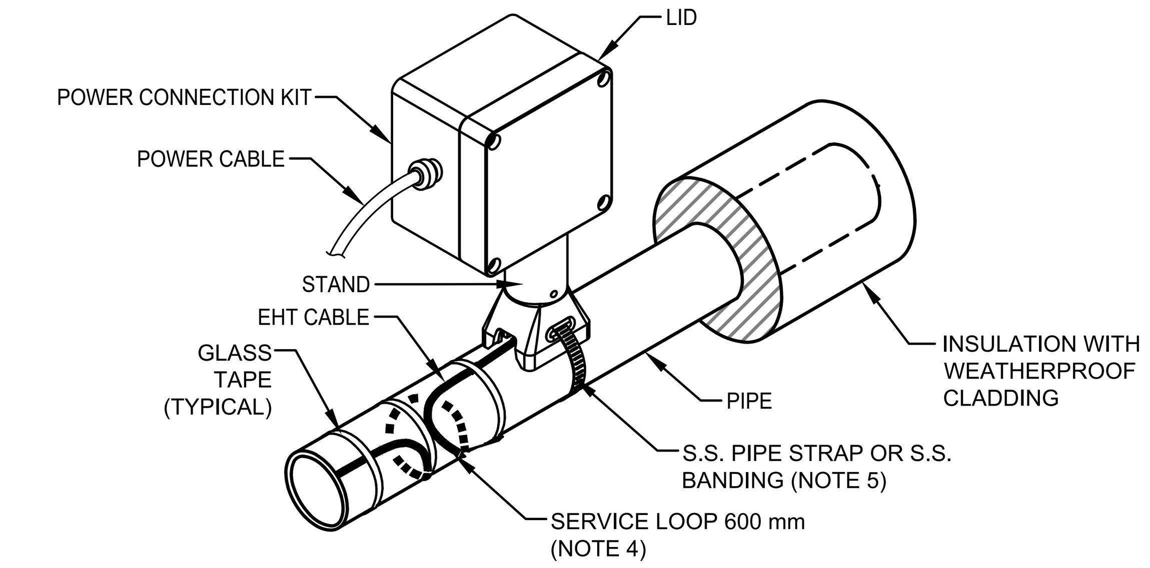

NOTES:
1. FOR MINIMUM BENDING RADIUS AND CABLE SEPARATION, SEE MANUFACTURER DATA AND RECCOMENDATION.
2. FOR PIPES WITH MORE THAN ONE PASS OF EHT CABLE, APPLY THE FULL PIPE SHOE ADDER FOR EACH PASS.

33 STD HEATER CABLE PIPE SHOE DETAIL
NO SCALE




NOTES:
1. CAUTION: DO NOT PLACE THE CABLE ON THE HEEL OF THE ELBOW AS CLADDING SCREWS MAY DAMAGE THE CABLE.
2. FOR MULTI-PASS APPLICATIONS, TRACE ORIENTATION IN DOTTED LINES ARE SHOWN ON OTHER SIDE.
3. INSTALLATION APPLICABLE FOR PIPES 2" AND LARGER.
4. FOR MINIMUM BENDING RADIUS AND CABLE SEPARATION, SEE MANUFACTURER'S RECOMMENDATION.

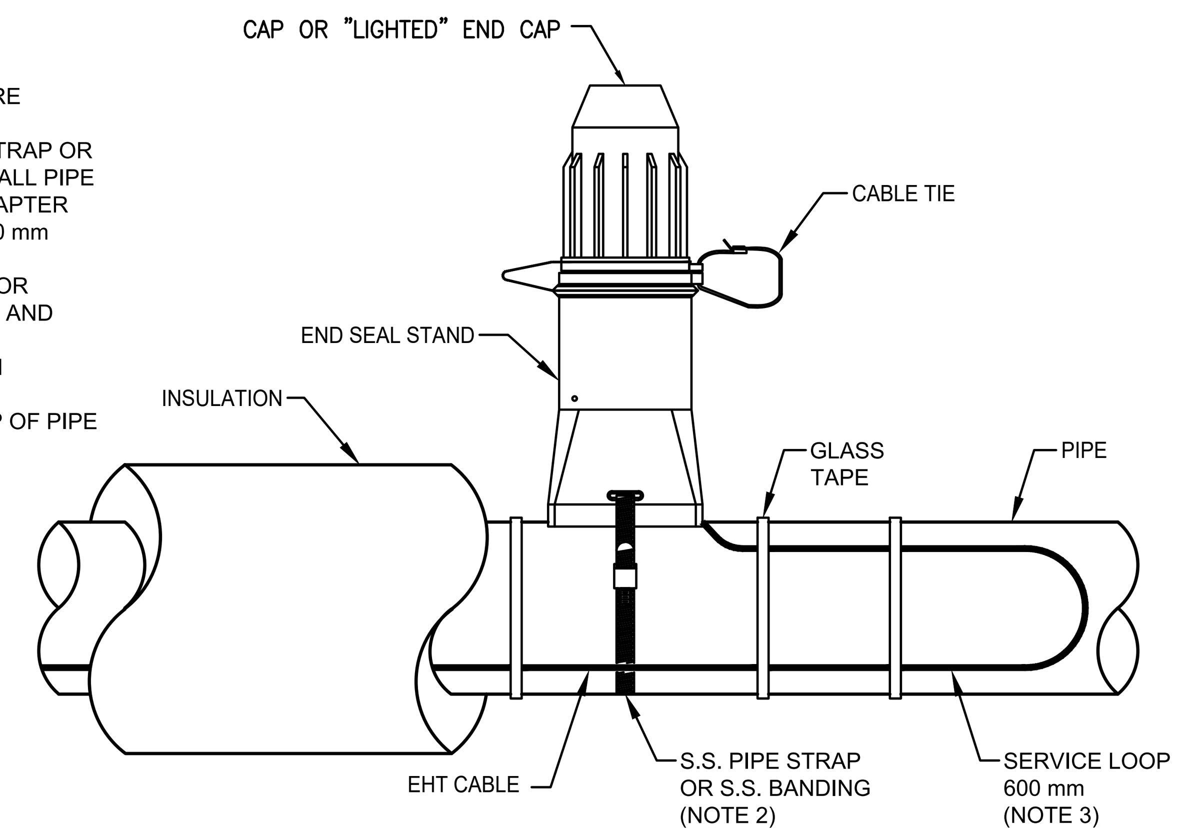
34 STD HEATER CABLE ELBOW DETAIL
NO SCALE



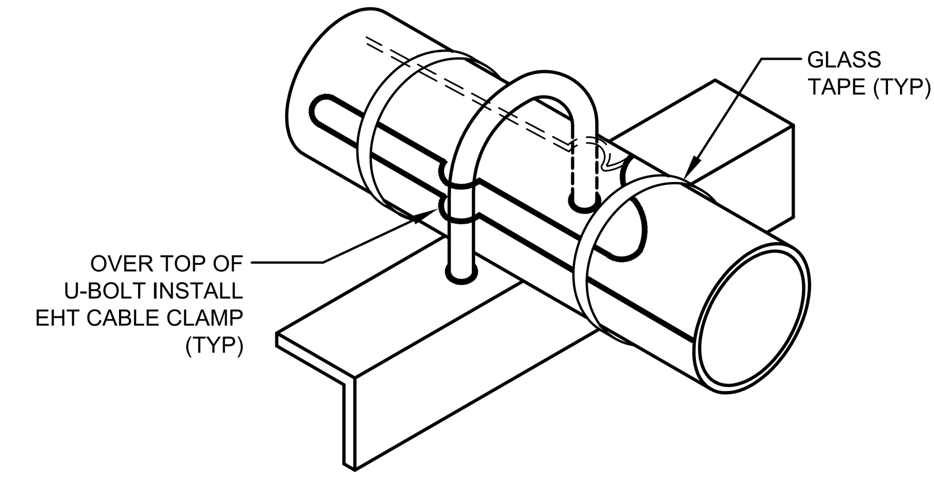

NOTES:
1. DETAILED MANUFACTURER INSTALLATION INSTRUCTIONS FOR TERMINATING SR CABLE ARE SUPPLIED WITH THE POWER CONNECTION KIT.
2. ALL EHT PENETRATIONS THROUGH INSULATION CLADDING SHALL BE WEATHER PROOFED.
3. PREFERRED LOCATION OF POWER CONNECTION KIT IS ON TOP OF PIPE (12 O'CLOCK) UNLESS NOTED OTHERWISE ON DRAWINGS.
4. SERVICE LOOP OF 60O mm MAY BE REDUCED FOR SMALL BORE (50 mm DIAMETER AND LESS) PIPE AND TUBING.
5. SMALL PIPE ADAPTER REQUIRED FOR PIPE AND TUBING LESS THAN 50 mm DIAMETER.

35 STD POWER KIT MOUNTING DETAIL
NO SCALE

NOTES:
1. DETAILED MANUFACTURER INSTALLATION INSTRUCTIONS FOR TERMINATING SR CABLE ARE SUPPLIED WITH THE END CONNECTION KIT.
2. FASTEN END SEAL TO TOP OF PIPE WITH S.S. STRAP OR S.S. BANDING. DO NOT PINCH EHT CABLE. INSTALL PIPE STRAP UNDER THE EHT CABLE. SMALL PIPE ADAPTER REQUIRED FOR PIPE AND TUBING LESS THAN 50 mm DIAMETER.
3. SERVICE LOOP OF 60O mm MAY BE REDUCED FOR SMALL BORE (50 mm DIAMETER AND LESS) PIPE AND TUBING.
4. ALL EHT PENETRATIONS THROUGH INSULATION CLADDING SHALL BE WEATHER PROOFED.
5. PREFERRED LOCATION OF END SEAL IS ON TOP OF PIPE (12 O'CLOCK) UNLESS NOTED OTHERWISE.

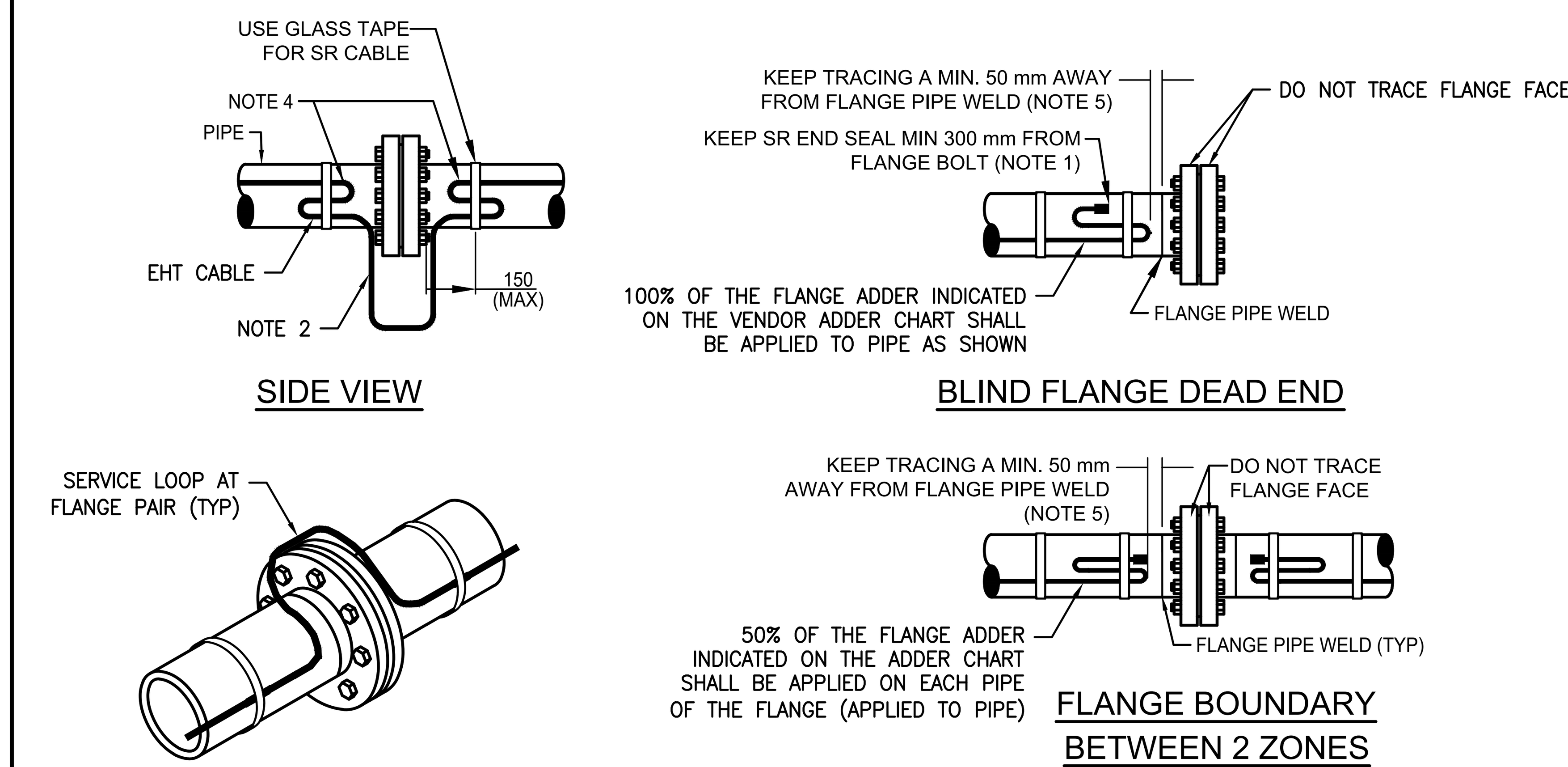



36 STD END KIT MOUNTING DETAIL
NO SCALE

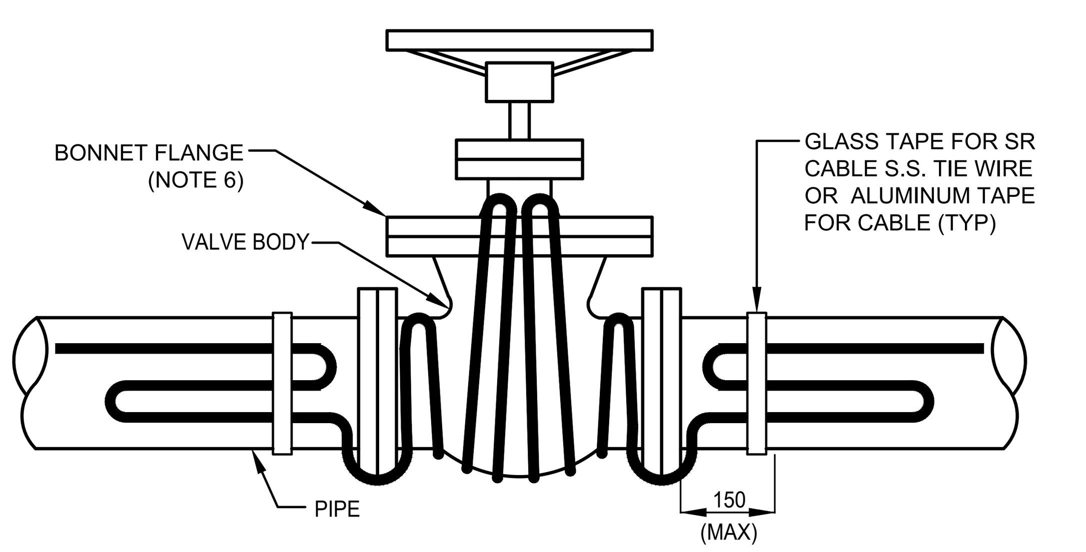



NOTES:
1. FOR MINIMUM BENDING RADIUS AND CABLE SEPARATION, SEE MANUFACTURER'S RECOMMENDATIONS.
2. ENSURE THAT THE PIPING AT THE U-BOLT IS WELL INSULATED & WELL SEALED.

37 STD HEATER CABLE U-BOLT DETAIL
NO SCALE

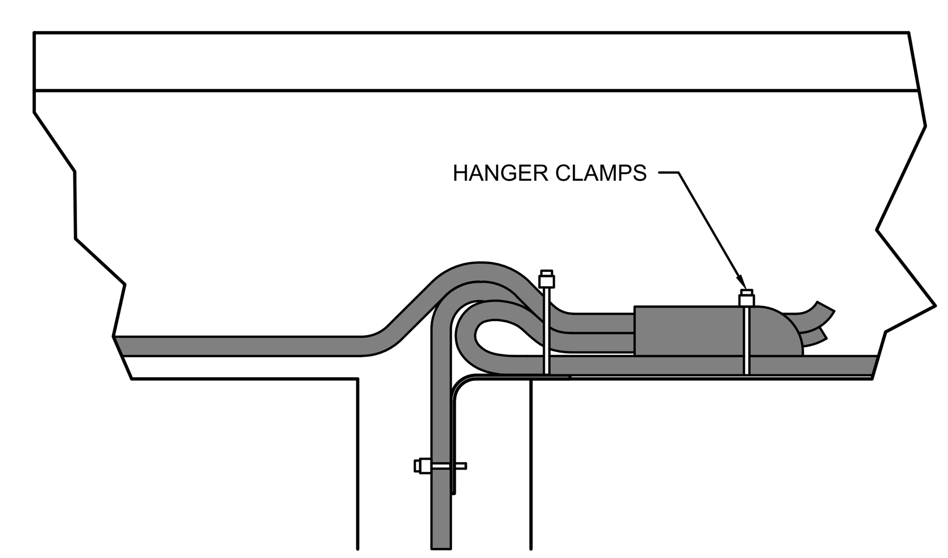



38 STD HEATER CABLE FLANGE DETAIL
NO SCALE




NOTES:
1. FOR PIPES WITH MORE THAN ONE PASS OF EHT CABLE, APPLY THE FULL VALVE ADDER FOR EACH PASS OF EHT CABLE. EXAMPLE: FOR A 300lb FLANGED VALVE ON AN 200 mm NPS LINE, ADDER ALLOWANCE FOR VALVE WOULD BE 2.4 m PER PASS AND 4.8 m TOTAL.
2. FOR MINIMUM BENDING RADIUS AND CABLE SEPARATION, SEE MANUFACTURER'S RECOMMENDATIONS.
3. FOR STANDARD ELECTRICAL HEAT TRACE ADDER CHART, SEE MANUFACTURER'S RECOMMENDATIONS FOR THE TYPE OF CABLE.
4. FINAL INSTALLATION WILL LOOK DIFFERENT FOR DIFFERENT VALVE SHAPES AND EHT CABLE LENGTHS.
5. FOR CHECK VALVES ADDER SHALL BE REDUCED TO SUIT VALVE SURFACE AREA.
6. EHT SHOULD EXTEND OVER BONNET FLANGES ON GATE AND GLOBE VALVES.

39 STD HEATER CABLE VALVE DETAIL
NO SCALE




NOTES:
1. EACH HEATING CABLE NEEDS TO BE ATTACHED AT THE TOP OF EACH DOWNSPOUT USING ONE DOWNSPOUT HANGER PER HEATING CABLE.

40 STD HEATER CABLE DOWNSPOUT HANGER DETAIL
NO SCALE

| REFERENCE DRAWING | | REVISION | | | | | | |
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| | | 0A | 28-AUG-2024 | ISSUED FOR 95% DESIGN | EGD | AMG | JA | AMG |
| | | 0B | 30-AUG-2024 | ISSUED FOR 90% DESIGN | EGD | AMG | JA | AMG |
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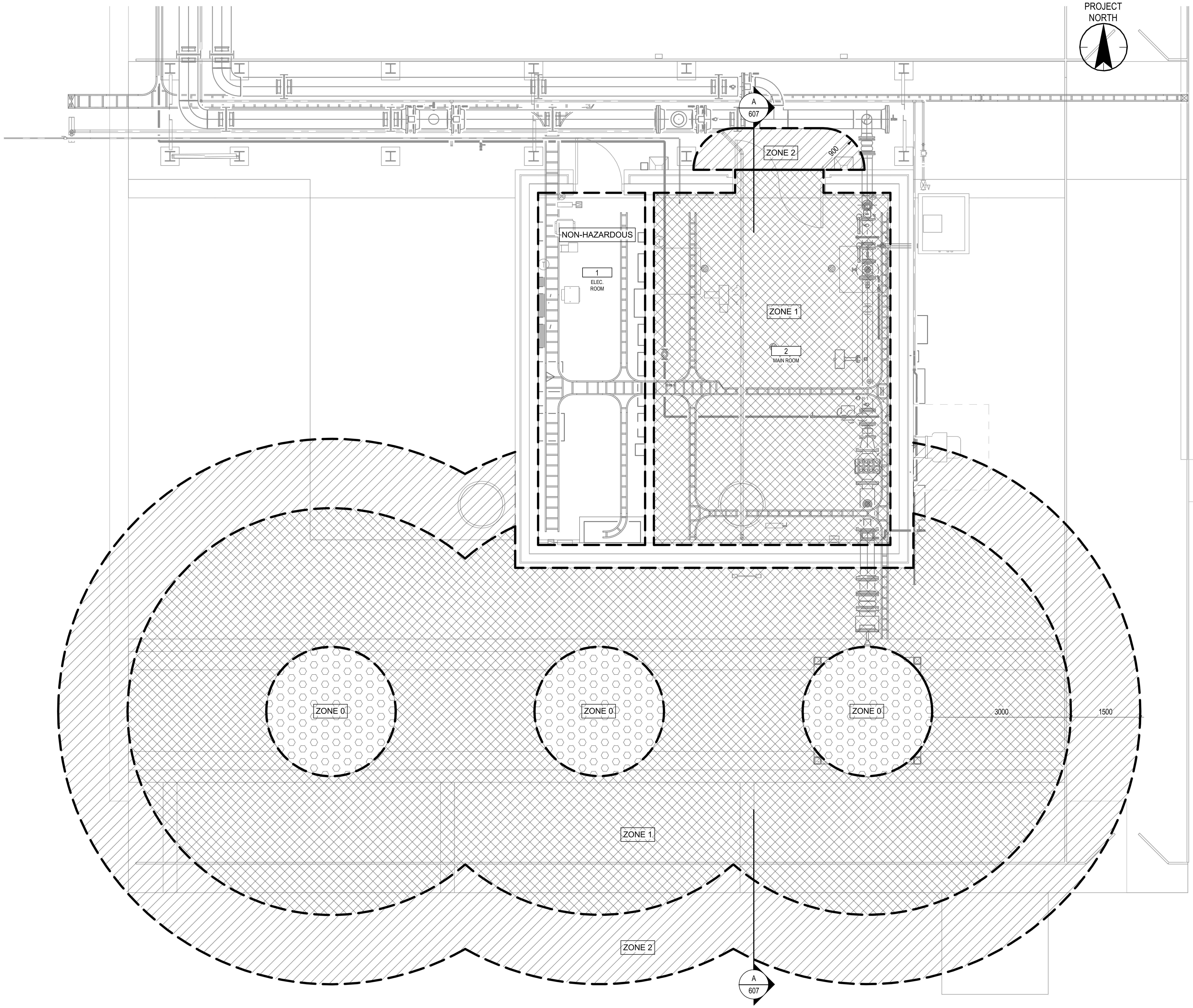
EPCOR

PLANT SITE: GOLD BAR WWTP
PLANT AREA: PLANT WIDE
PROJECT NAME: GBWWTP FLARE CAPACITY EXPANSION
DRAWING TITLE: ELECTRICAL STANDARD DETAILS SHEET 4

| CONSULTANT JOB No. | EPCOR PROJECT No. | SCALE | SHEET | DRAWING NUMBER |
|---|---|---|---|---|
| 1101000105 | PMO 1004723; PF14-015 | 1:1 | - OF - | PRJ-15-157-606 |




1
607
## MAIN LEVEL
1 : 50

## LEGENDS:

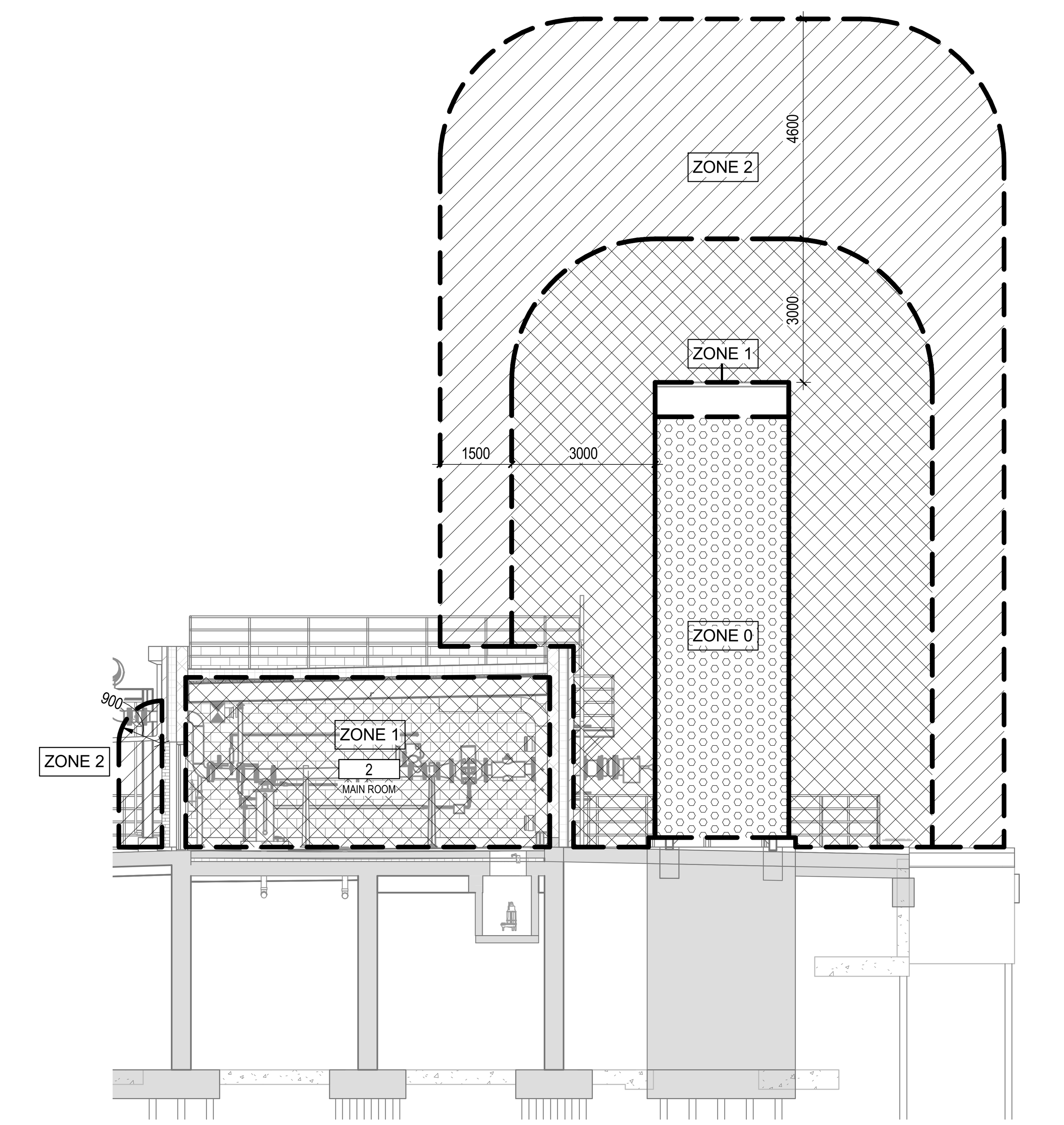
ZONE 0
GAS GROUP IIA & IIB
TEMP. CODE T3 (200°C)

ZONE 1
GAS GROUP IIA & IIB
TEMP. CODE T3 (200°C)

ZONE 2
GAS GROUP IIA & IIB
TEMP. CODE T3 (200°C)

NON-HAZARDOUS

| | |
|---|---|
| METHOLOGY | THE CLASSIFICATION HAS BEEN ESTABLISHED BASED ON THE NFPA 820 STANDARD PRESCRIPTIONS. |
| FLAMMABLE SUBSTANCE(S) | THE FLARE BURNS EXCESS BIOGAS FROM THE DIGESTER. BIOGAS CONSIST OF UP TO 0.4% H2S, 60-65% METHANE GAS AND 34-38% CO2. |
| RELEASE MECHANISM | THE BIOGAS PIPING FLANGES HAVE THE POTENTIAL TO LEAK BIOGAS, BUT IT IS NOT EXPECTED TO LEAK DURING NORMAL OPERATION. THERE IS A RISK OF BIOGAS RELEASE AT THE TOP OF THE FLARE STACK SHOULD THE PILOT FLAME GO OUT. |
| VENTILATION AND DILUTION | THE FLARE BUILDING IS COMPRISED OF A PROCESS AREA THAT IS PROVIDED WITH 12 ACH AND AN ELECTRICAL ROOM THAT IS PROVIDED WITH 6 ACH. |
| EQUIPMENT HAZLOC RATING | THE EQUIPMENT INSTALLED IN THE FLARE BUILDING WILL BE RATED FOR HAZARDOUS LOCATION WITH THE EXCEPTION OF THE ELECTRICAL ROOM. |
| CLASSIFICATION RATIONALE | THE FLARE BUILDING IS CONSIDERED A "WASTE GAS BURNER - COMBUSTING EXCESS GAS" AND IS THEREFORE CLASSIFIED ZONE 1 AS PER TABLE 6.2.2 ROW 20A OF NFPA 820.<br><br>FOR THE GAS PIPING AND APPURTENANCES LOCATED OUTSIDE THE BUILDING A ZONE 1 ENVELOPE OF 3M MUST BE CONSIDERED. AN ADDITIONAL 1.5M ZONE 2 ENVELOPE MUST BE CONSIDERED FROM THE ZONE 1 ENVELOPE.<br><br>THE ELECTRICAL ROOM IS PHYSICALLY SEPARATED FROM THE FLARE BUILDING AND IS CONSIDERED UNCLASSIFIED. IT IS RECOMMENDED TO MAINTAIN POSITIVE PRESSURE INSIDE THE ELECTRICAL ROOM IN ORDER TO REDUCE THE RISK OF FLAMMABLE GAS ENTERING THE ROOM. |




A
607
## SECTION
1 : 100

| REFERENCE DRAWING | | REVISION | | | | | | | |
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| DRAWING No. | DRAWING TITLE | Rev. | DATE | DESCRIPTION | BY | DES. | CHK. | ENG. |
| | | 0A | 26-APR-2024 | ISSUED FOR 60% DESIGN | EGD | AMG | JA | AMG |
| | | 0B | 30-AUG-2024 | ISSUED FOR 90% DESIGN | EGD | AMG | JA | AMG |
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ID: 107144
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EPCOR

PLANT SITE: GOLD BAR WWTP
PLANT AREA: PLANT WIDE
PROJECT NAME: GBWWTP FLARE CAPACITY EXPANSION
DRAWING TITLE:
ELECTRICAL
HAZARDOUS AREA CLASSIFICATION PLAN

| CONSULTANT JOB No. | EPCOR PROJECT No. | SCALE | SHEET | DRAWING NUMBER |
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| 1101000105 | PMO 1004723; PF14-015 | As indicated | of 0 | PRJ-15-157-607 |

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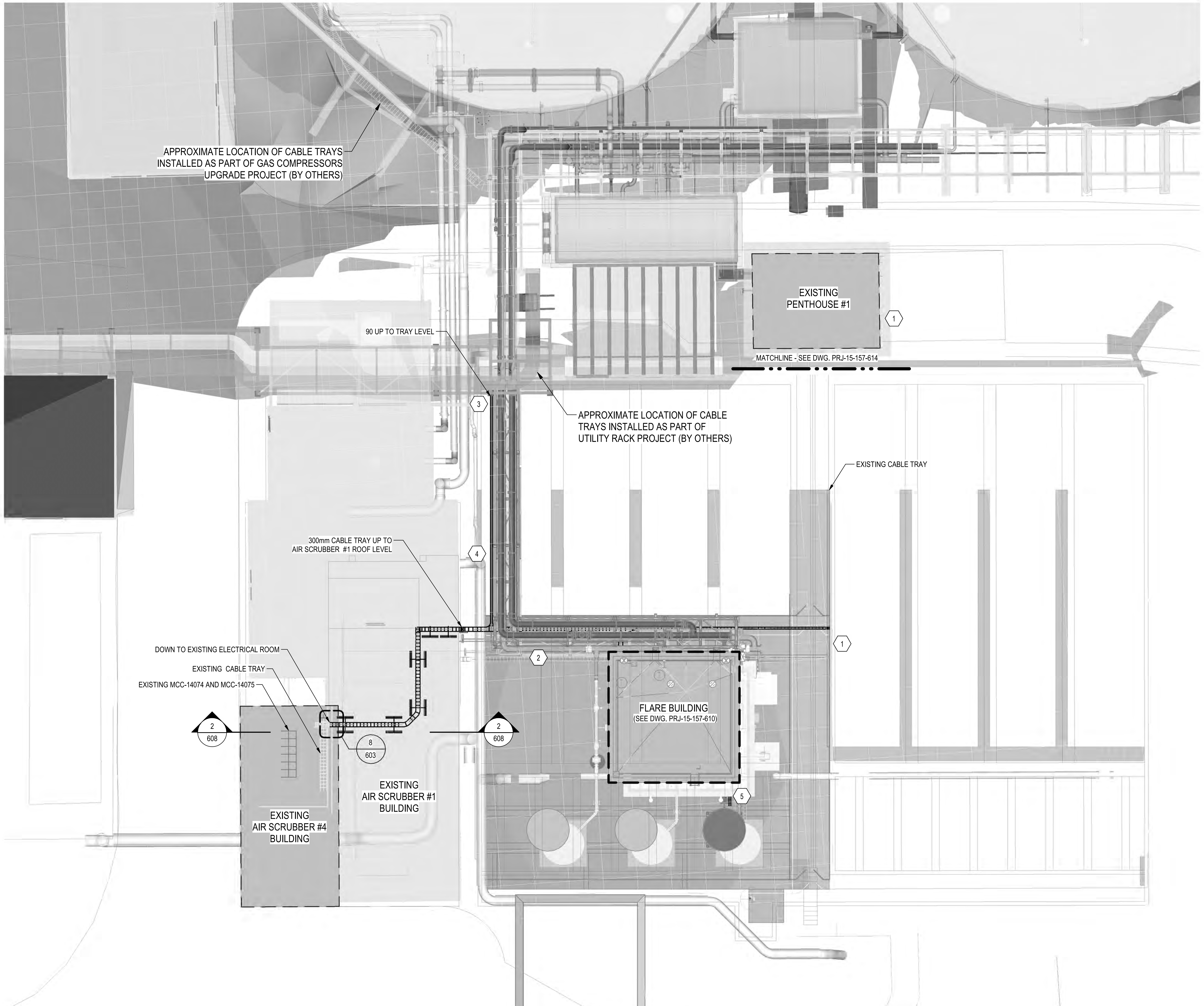
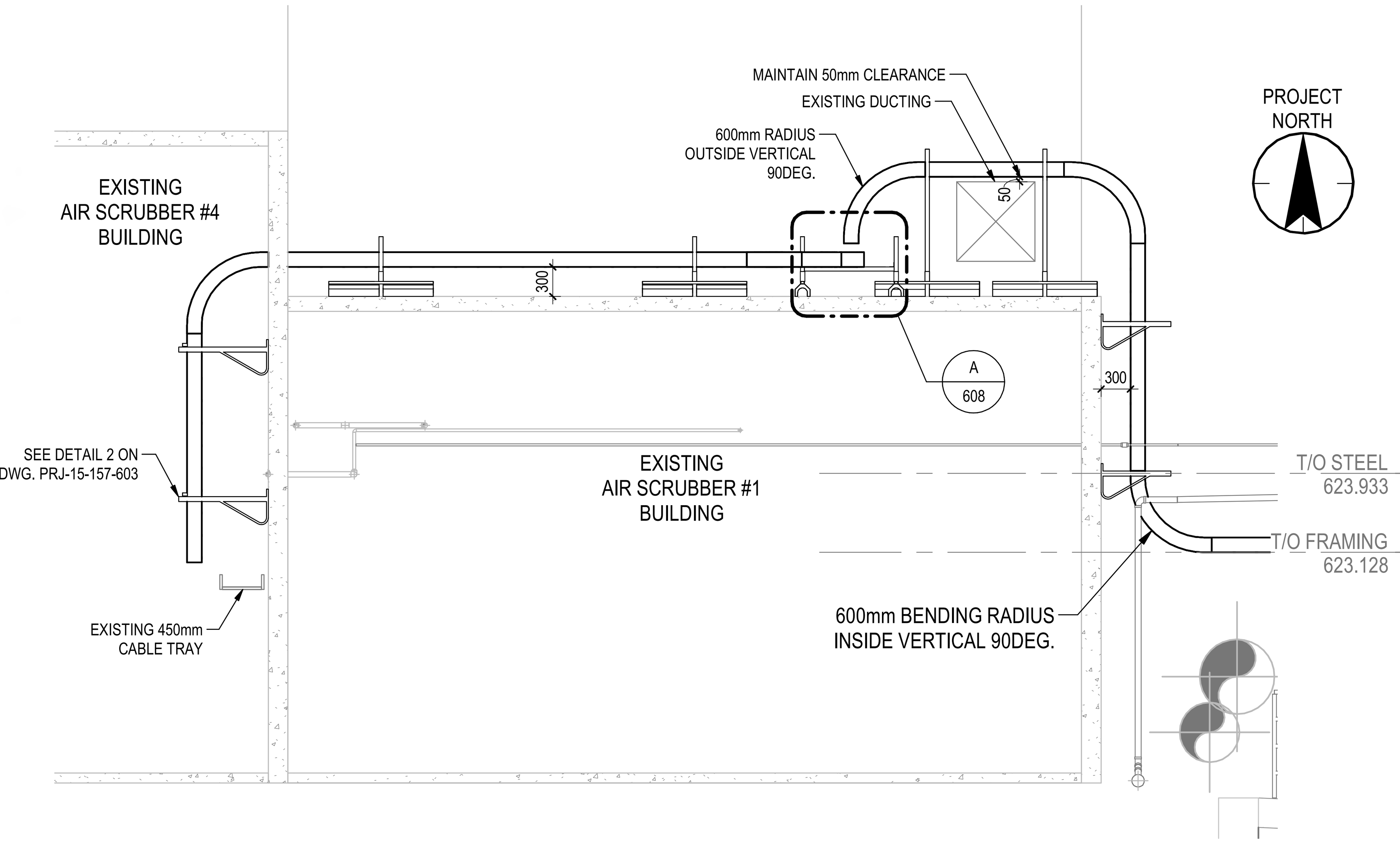
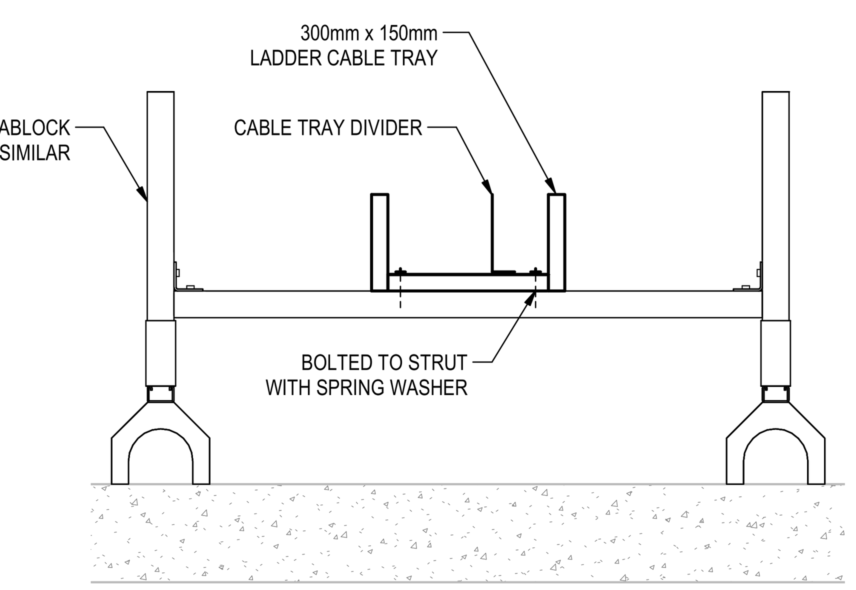



1
608
## SITE PLAN
1 : 150




PROJECT NORTH

2
608
## SECTION
1 : 50




A
608
## CABLE TRAY MOUNTING
1 : 10

## CONSTRUCTION KEYNOTES:

1. CONTRACTOR TO PROVIDE 150mm CABLE TRAY TO EXISTING CABLE TRAY SYSTEM INSTALLED ON PRIMARY WALKWAY. EXTEND UPS CIRCUITS FROM ECAB-81573 to ECAB-81354 USING 3x2C #8 AWG TECK90 600V. SEE WIRING SCHEMATIC ON DRAWING PRJ-15-157-614.
2. RUN NEW 300mm CABLE TRAY USING SUPPORTS INSTALLED BY THIS PROJECT.
3. CONTRACTOR TO PROVIDE NEW 3P-30A BREAKER IN LTG-47084U CCT 16,18,20 IN BOILER BUILDING #2. SUBFEED LTG-81948U USING 4C #1 TECK90 600V, USING TRAYS INSTALLED BY THE GAS UPGRADES PROJECT TO THE UTILITY RACK, TRAYS INSTALLED BY THE UTILITY RACK, AND TRAYS INSTALLED BY THIS PROJECT.
4. PROVIDE NEW 150MM CABLE TRAYS ON SUPPORTS INSTALLED BY THIS PROJECT. TIE INTO CABLE TRAYS INSTALLED BY RACK PROJECT, (BY OTHERS).
5. CONTRACTOR TO PROVIDE ALL INTERCONNECTING WIRING BETWEEN VENDOR FLARE STACK AND EQUIPMENT INSTALLED IN FLARE BUILDING AS PER APPROVED SHOP DRAWINGS.

| REFERENCE DRAWING | | REVISION | | | | | | |
|---|---|---|---|---|---|---|---|---|
| DRAWING No. | DRAWING TITLE | Rev. | DATE | DESCRIPTION | BY | DES. | CHK. | ENG. |
| | | 0A | 21-JUN-2023 | ISSUED FOR PRELIMINARY DESIGN | EGD | AMG | JA | AMG |
| | | 0B | 26-APR-2024 | ISSUED FOR 60% DESIGN | EGD | AMG | JA | AMG |
| | | 0C | 30-AUG-2024 | ISSUED FOR 90% DESIGN | EGD | AMG | JA | AMG |
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EPCOR

PLANT SITE: GOLD BAR WWTP
PLANT AREA: PLANT WIDE
PROJECT NAME: GBWWTP FLARE CAPACITY EXPANSION
DRAWING TITLE:
ELECTRICAL
SITE PLAN - WASTE GAS BURNER BUILDING

| CONSULTANT JOB No. | EPCOR PROJECT No. | SCALE | SHEET | DRAWING NUMBER |
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| 1101000105 | PMO 1004723; PF14-015 | As indicated | of 0 | PRJ-15-157-608 |

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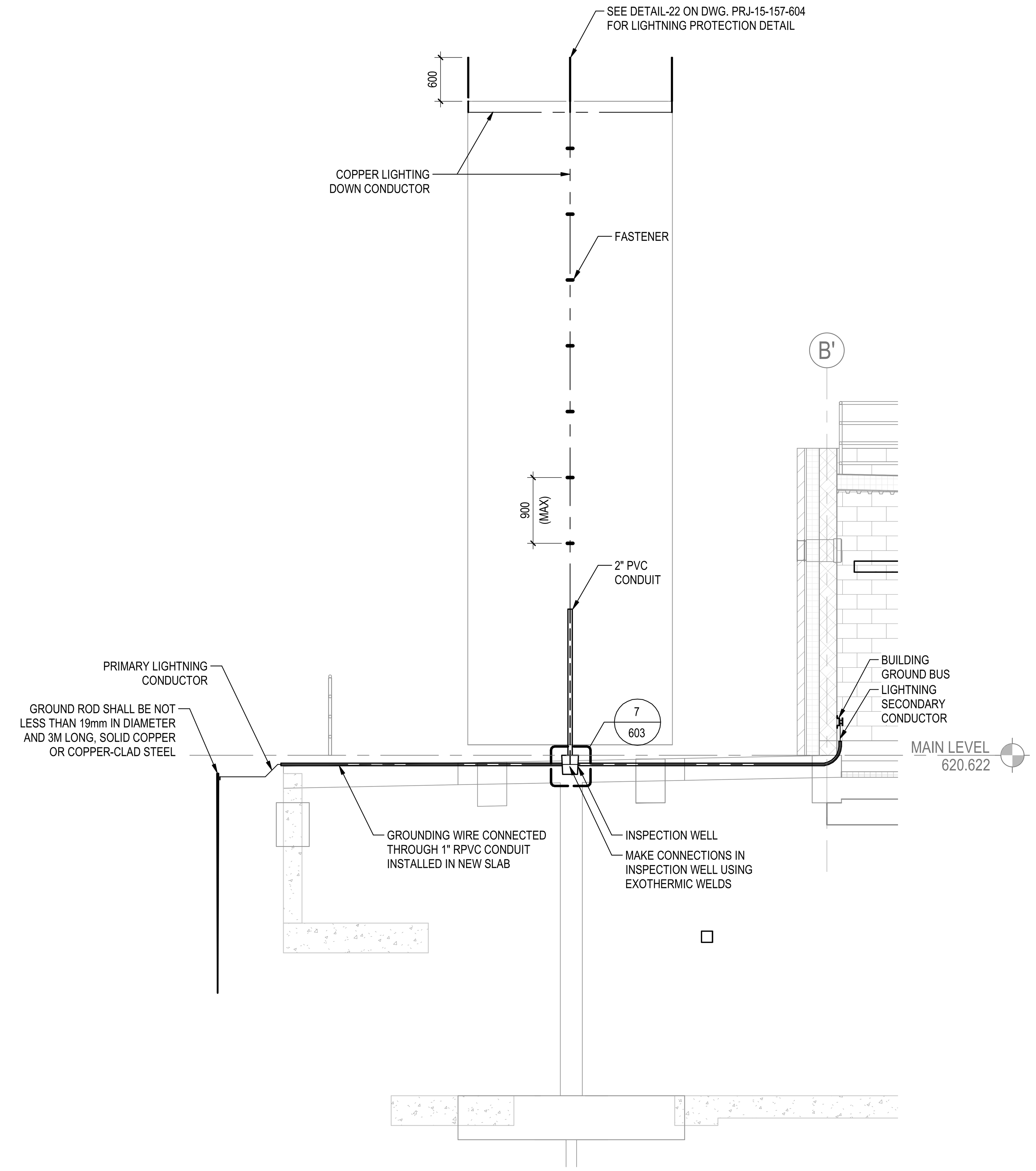
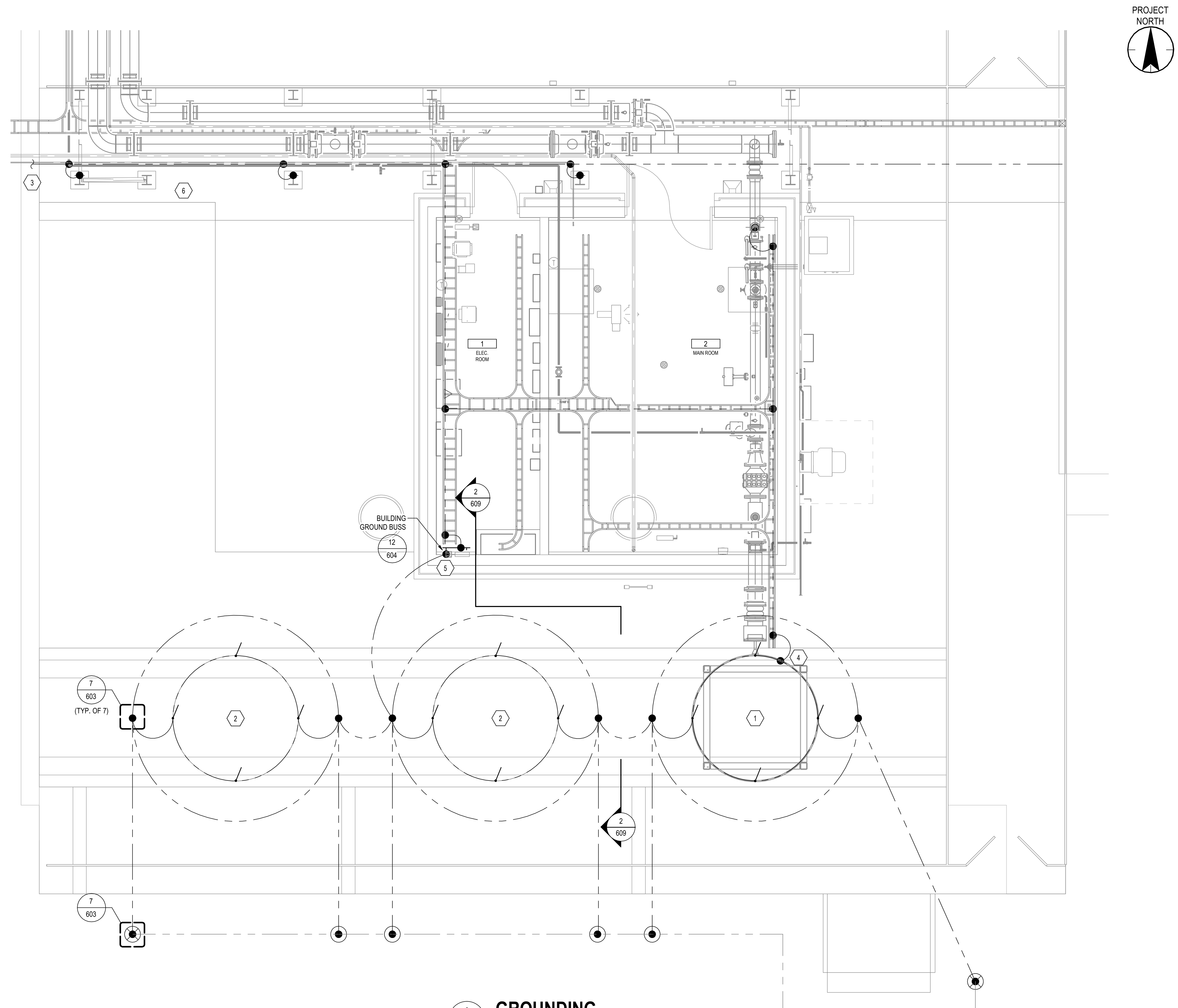



## 2 / 609 LIGHTNING DETAIL
1 : 50




## 1 / 609 GROUNDING
1 : 50

## CONSTRUCTION KEYNOTES:

1. CONTRACTOR TO COORDINATE LIGHTNING PROTECTION SYSTEM WITH LIGHTING PROTECTION SYSTEM DESIGNER TO PROVIDE LIGHTNING PROTECTION SYSTEM FOR FLARE STACK.
2. PROVIDE ALL CONCRETE EMBEDDED AND BELOW GRADE INFRASTRUCTURE FOR FUTURE STACKS, PROVIDE CONDUIT AND PULL STRING FOR FUTURE FLARE DOWN CONDUCTOR, CAP AND SEAL FOR FUTURE LIGHTNING PROTECTION SYSTEM.
3. CONNECT TRAY GROUND TO EXISTING GROUNDING SYSTEM IN AIR SCRUBBER #4 AND EXTEND TO GROUND BUS INSTALLED IN FLARE BUILDING USING GREEN JACKETED #4/0 COPPER GROUND WIRE. BOND SLAB REBAR, ALL NON-CURRENT CARRYING EXPOSED METAL SURFACES AND EQUIPMENT WITHIN FLARE BUILDING TO GROUND BUS.
4. BOND FLARE STACK TO TRAY GROUND.
5. TIE FLARE LIGHTNING PROTECTION SYSTEM TO BUILDING GROUND BUS. NO OTHER CONNECTIONS BETWEEN LIGHTNING PROTECTION SYSTEM AND GROUND ARE PERMITTED.
6. GROUND EACH CABLE TRAY SECTION.

| REFERENCE DRAWING | | REVISION | | | | | | |
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PLANT AREA: PLANT WIDE
PROJECT NAME: GBWWTP FLARE CAPACITY EXPANSION
DRAWING TITLE:
ELECTRICAL
GROUNDING PLAN

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| 1101000105 | PMO 1004723; PF14-015 | 1 : 50 | of 0 | PRJ-15-157-609 |

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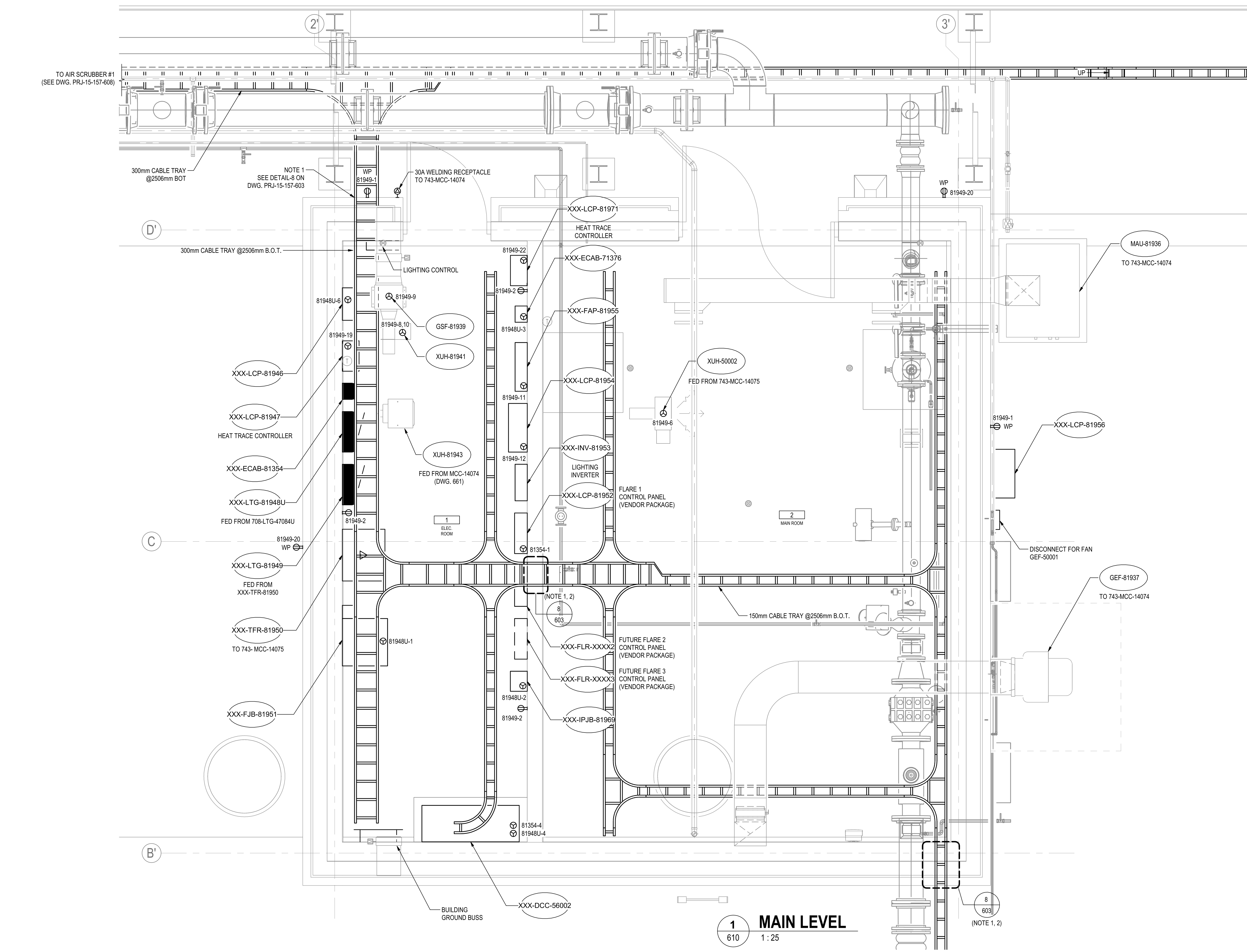


1 / 610 **MAIN LEVEL**
1 : 25

## NOTES:

1. CONTRACTOR TO SEAL ALL BUILDING PENETRATIONS TO MAINTAIN INTEGRITY OF WALL FIRE RATING.
2. CONTRACTOR TO SEAL PENETRATION TO PREVENT MIGRATION OF HAZARDOUS GASSES.

### EQUIPMENT TAGS

| | | |
|---|---|---|
| ECAB | 81354 | GAS DETECTION ELECTRICAL CABINET - FLARE BUILDING - ELECTRICAL... |
| LCP | 81945 | LIGHTING CONTROL PANEL - FLARE BUILDING - ELECTRICAL ROOM |
| LCP | 81946 | ACCESS CONTROL PANEL - FLARE BUILDING - ELECTRICAL ROOM |
| LCP | 81947 | HEAT TRACE CONTROL PANEL - FLARE BUILDING - ELECTRICAL ROOM |
| LTG | 81948U | UPS PANEL - FLARE BUILDING - ELECTRICAL ROOM |
| LTG | 81949 | LIGHTING PANEL - FLARE BUILDING - ELECTRICAL ROOM |
| TFR | 81950 | 600V TO 120/208V TRANSFORMER - FLARE BUILDING - ELECTRICAL ROOM |
| FJB | 81951 | NETWORK CABINET - FLARE BUILDING - ELECTRICAL ROOM |
| DCC | 56002 | DISTRIBUTED CONTROL CABINET (RIO) - FLARE BUILDING - ELECTRICAL... |
| INV | 81953 | LIGHTING INVERTER - FLARE BUILDING - ELECTRICAL ROOM |
| LCP | 81954 | BUILDING MANAGEMENT SYSTEM PANEL - FLARE BUILDING - ELECTRICAL... |
| FAP | 81955 | FIRE ALARM PANEL - FLARE BUILDING - ELECTRICAL ROOM |
| ECAB | 71376 | GAS DETECTION ELECTRICAL CABINET - FLARE BUILDING - ELECTRICAL... |
| LCP | 81956 | CONTROL PANEL - MAU50001 |
| LCP | 81971 | HEAT TRACE CONTROL PANEL - FLARE BUILDING - ELECTRICAL ROOM |
| | | |

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| DRAWING No. | DRAWING TITLE |
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| | |

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| Rev. | DATE | DESCRIPTION | BY | DES. | CHK. | ENG. |
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| 0A | 06-JUL-2023 | ISSUED FOR PRELIMINARY DESIGN | EGD | AMG | JA | AMG |
| 0B | 26-APR-2024 | ISSUED FOR 60% DESIGN | EGD | AMG | JA | AMG |
| 0C | 30-AUG-2024 | ISSUED FOR 90% DESIGN | EGD | AMG | JA | AMG |
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PROJECT NAME: GBWWTP FLARE CAPACITY EXPANSION
DRAWING TITLE:
ELECTRICAL
POWER PLAN

| CONSULTANT JOB No. | EPCOR PROJECT No. | SCALE | SHEET | DRAWING NUMBER |
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| 1101000105 | PMO 1004723; PF14-015 | 1 : 25 | of 0 | PRJ-15-157-610 |

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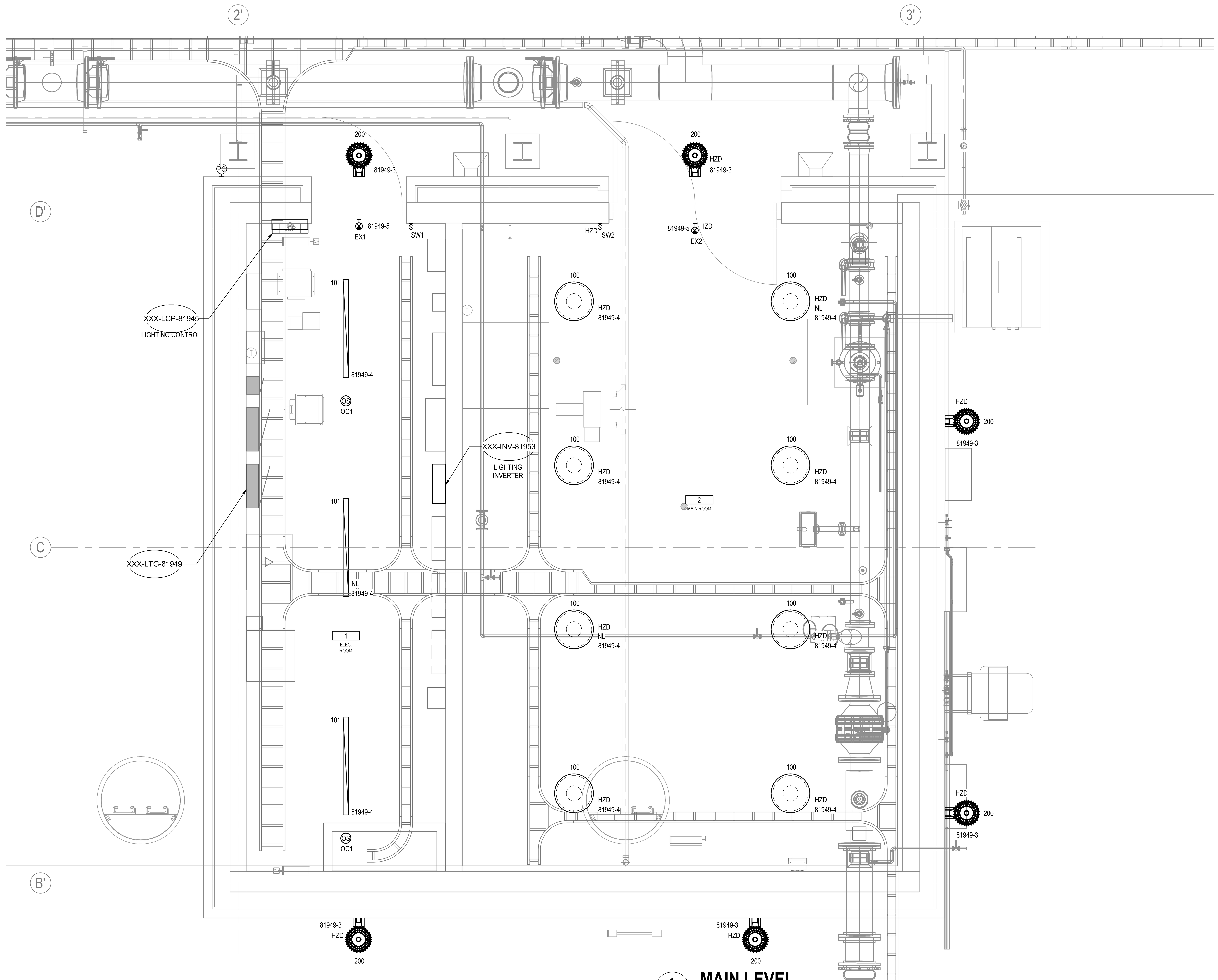


1
611
**MAIN LEVEL**
1 : 25

PROJECT NORTH

## NOTES:

1. SEE DWG. PRJ-15-157-620 FOR LUMINAIRE SCHEDULE.

| REFERENCE DRAWING | |
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| DRAWING No. | DRAWING TITLE |
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| Rev. | DATE | DESCRIPTION | BY | DES. | CHK. | ENG. |
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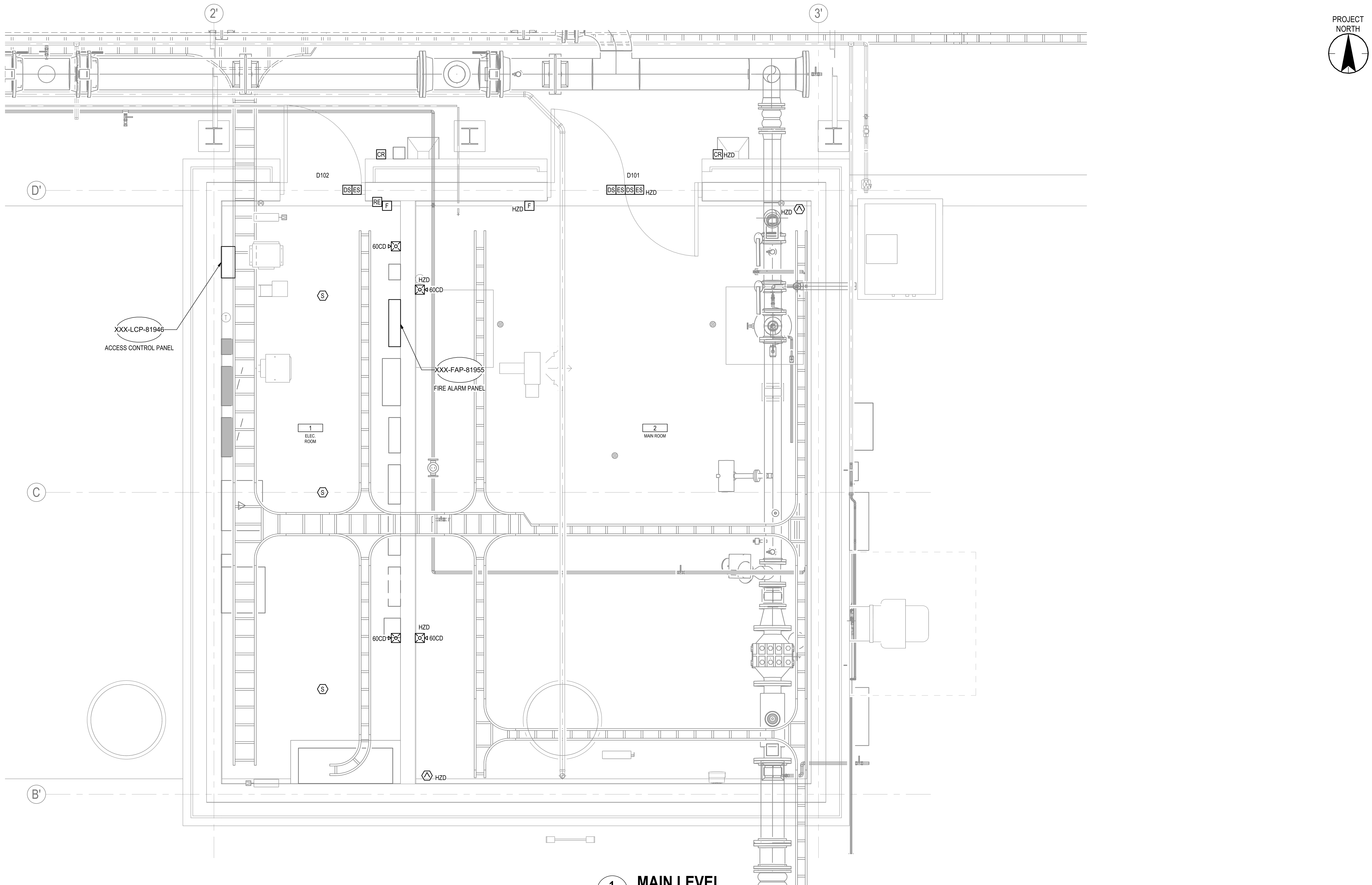
PLANT AREA: PLANT WIDE
PROJECT NAME: GBWWTP FLARE CAPACITY EXPANSION
DRAWING TITLE:

ELECTRICAL LIGHTING PLAN

| CONSULTANT JOB No. | EPCOR PROJECT No. | SCALE | SHEET | DRAWING NUMBER |
|---|---|---|---|---|
| 1101000105 | PMO 1004723; PF14-015 | 1 : 25 | of 0 | PRJ-15-157-611 |

11/19/2024 2:50:06 PM




1 / 612 **MAIN LEVEL**
1 : 25

| REFERENCE DRAWING | | REVISION | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| DRAWING No. | DRAWING TITLE | Rev. | DATE | DESCRIPTION | BY | DES. | CHK. | ENG. |
| | | 0A | 26-APR-2024 | ISSUED FOR 60% DESIGN | EGD | AMG | JA | AMG |
| | | 0B | 30-AUG-2024 | ISSUED FOR 90% DESIGN | EGD | AMG | JA | AMG |
| | | 0C | 15-NOV-2024 | ISSUED FOR CONSTRUCTION | EGD | AMG | JA | AMG |
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EPCOR

PLANT SITE: GOLD BAR WWTP | PLANT AREA: PLANT WIDE

PROJECT NAME: GBWWTP FLARE CAPACITY EXPANSION

DRAWING TITLE:
ELECTRICAL
BUILDING SYSTEMS PLAN

| CONSULTANT JOB No. | EPCOR PROJECT No. | SCALE | SHEET | DRAWING NUMBER |
|---|---|---|---|---|
| 1101000105 | PMO 1004723; PF14-015 | 1 : 25 | of 0 | PRJ-15-157-612 |

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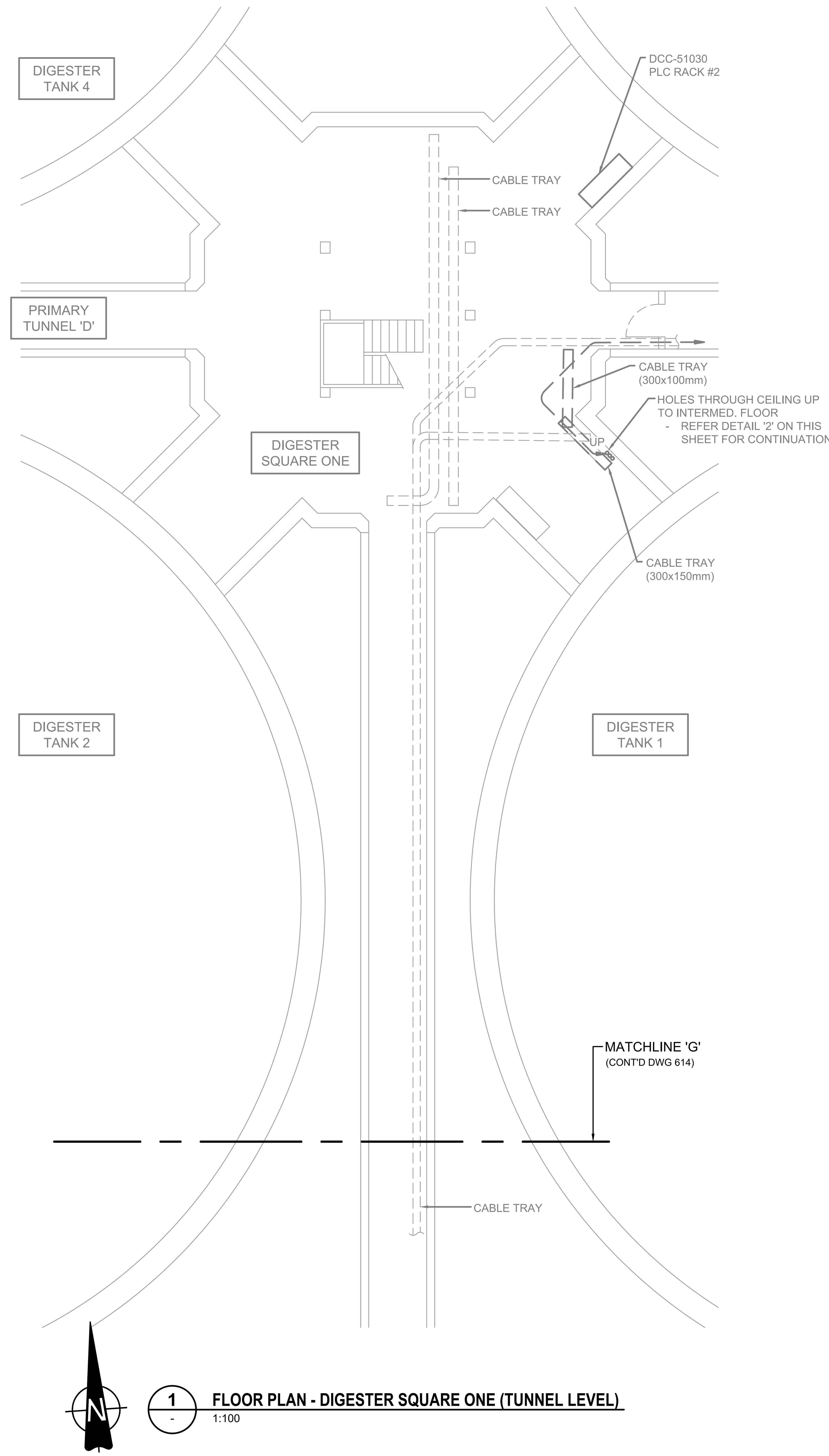
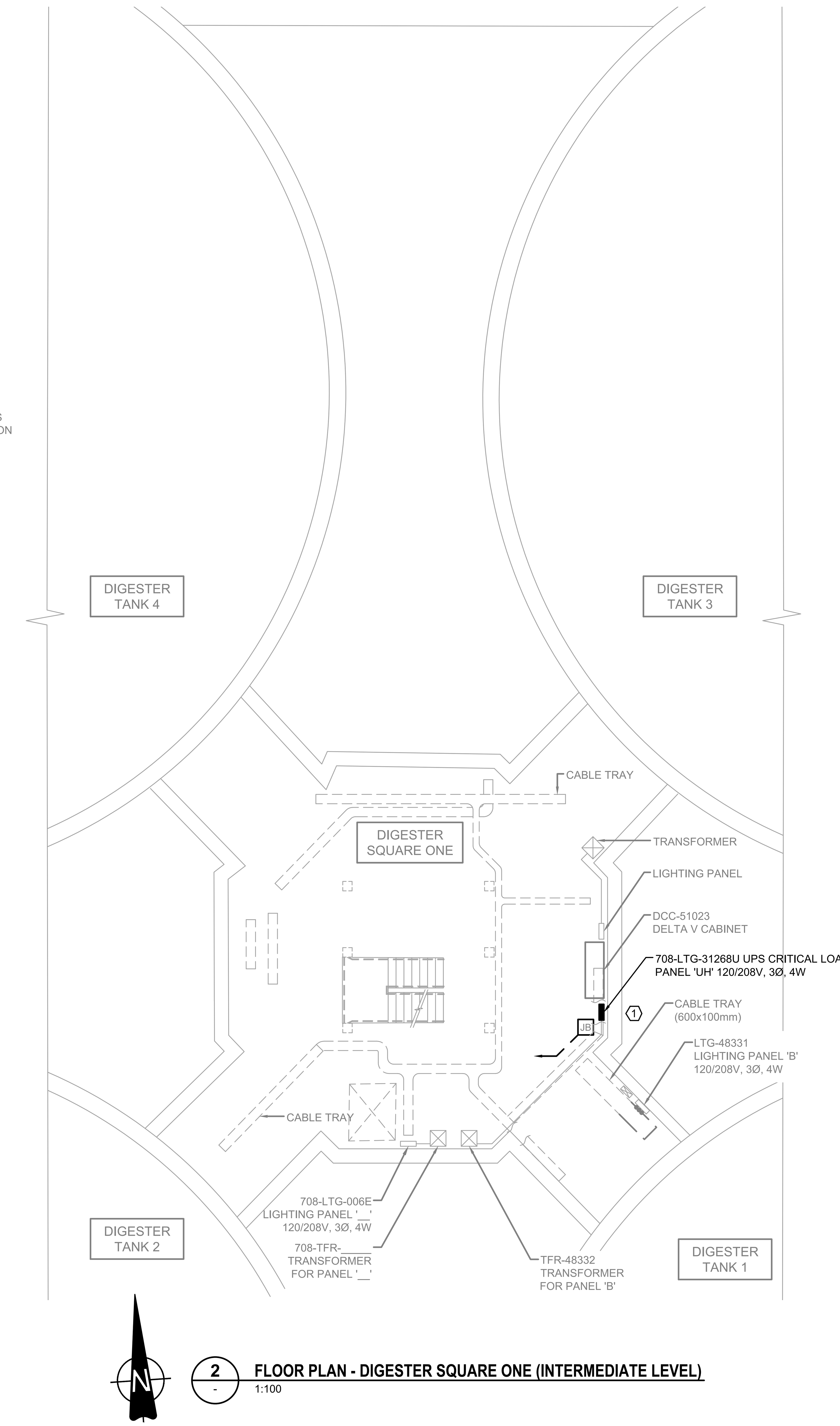



1 - **FLOOR PLAN - DIGESTER SQUARE ONE (TUNNEL LEVEL)**
1:100




2 - **FLOOR PLAN - DIGESTER SQUARE ONE (INTERMEDIATE LEVEL)**
1:100

CONSTRUCTION KEYNOTES:
1. UPDATE PANEL SCHEDULE TO REFLECT NEW LOADS, SEE DWG PRJ-15-157-614.

| REFERENCE DRAWING | | REVISION | | | | | | |
|---|---|---|---|---|---|---|---|---|
| DRAWING No. | DRAWING TITLE | Rev. | DATE | DESCRIPTION | BY | DES. | CHK. | ENG. |
| 420-13-078-637 | UPS FLOOR PLAN DIGESTER SQUARE ONE | 0A | 30-AUG-2024 | ISSUED FOR 90% DESIGN | EGD | AMG | JA | AMG |
| | | 0B | 15-NOV-2024 | ISSUED FOR CONSTRUCTION | EGD | AMG | JA | AMG |

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ID: 107144
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EPCOR

PLANT SITE: GOLD BAR WWTP
PLANT AREA: PLANT WIDE
PROJECT NAME: GBWWTP FLARE CAPACITY EXPANSION
DRAWING TITLE: ELECTRICAL FLOOR PLAN DIGESTER SQUARE ONE

| CONSULTANT JOB No. | EPCOR PROJECT No. | SCALE | SHEET | DRAWING NUMBER |
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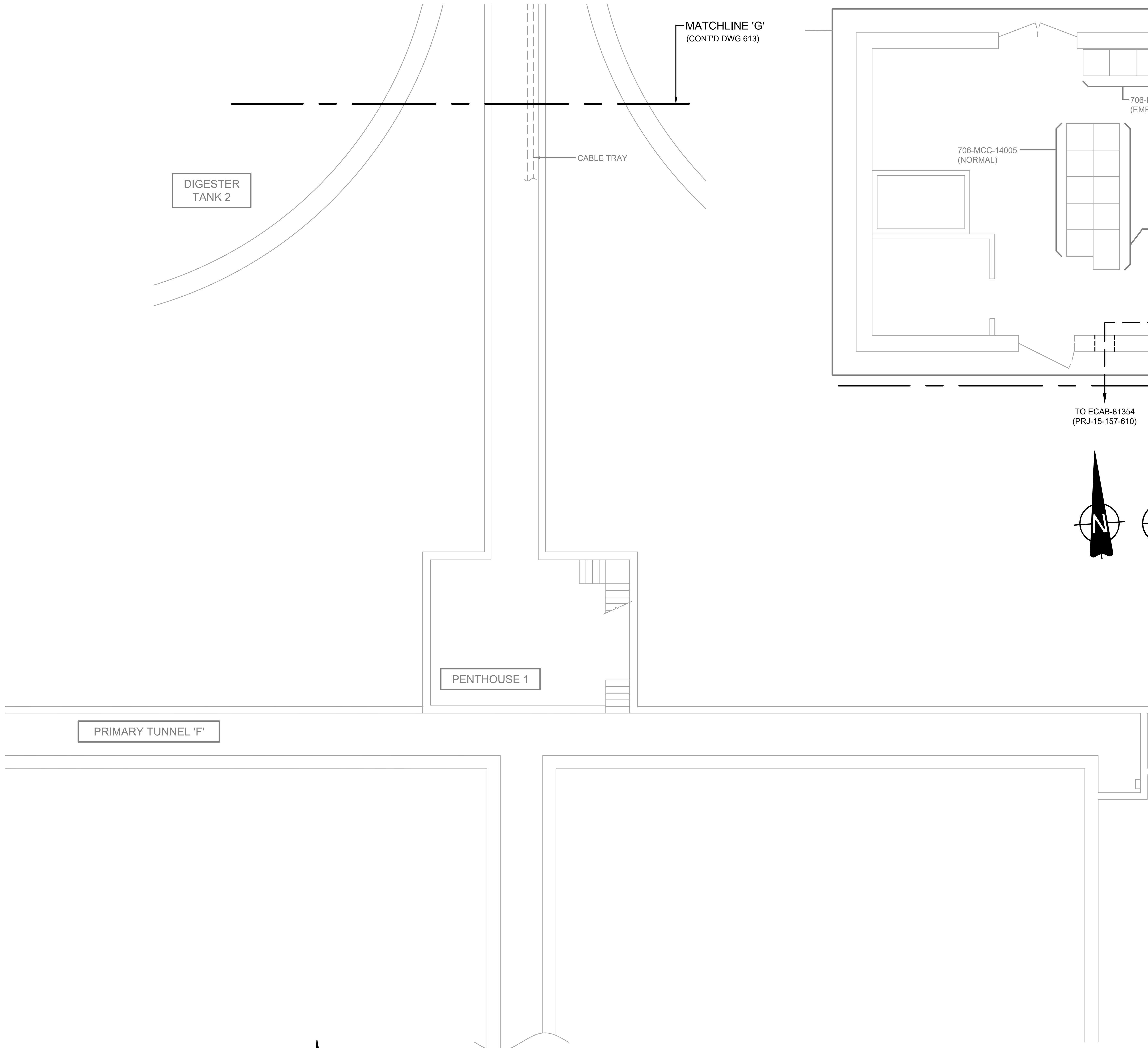
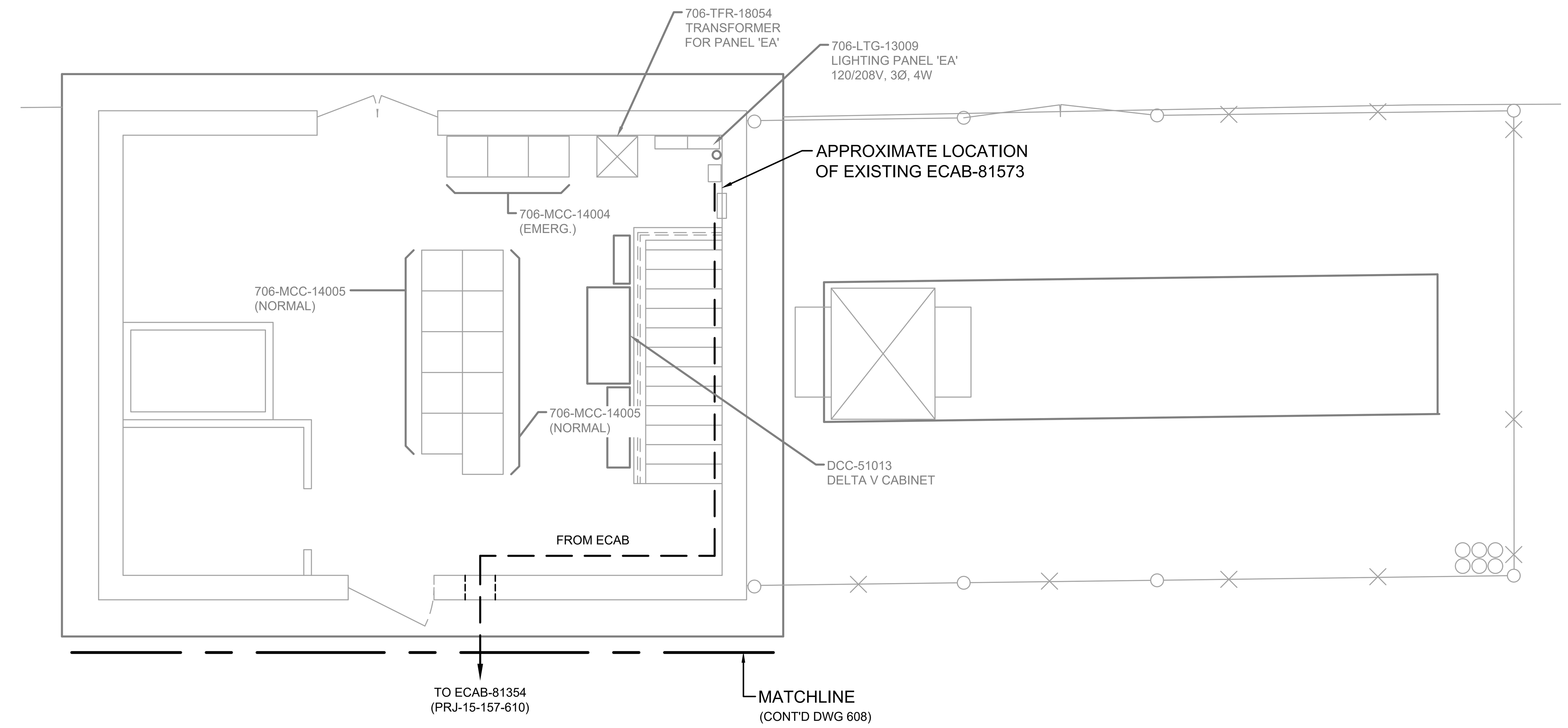
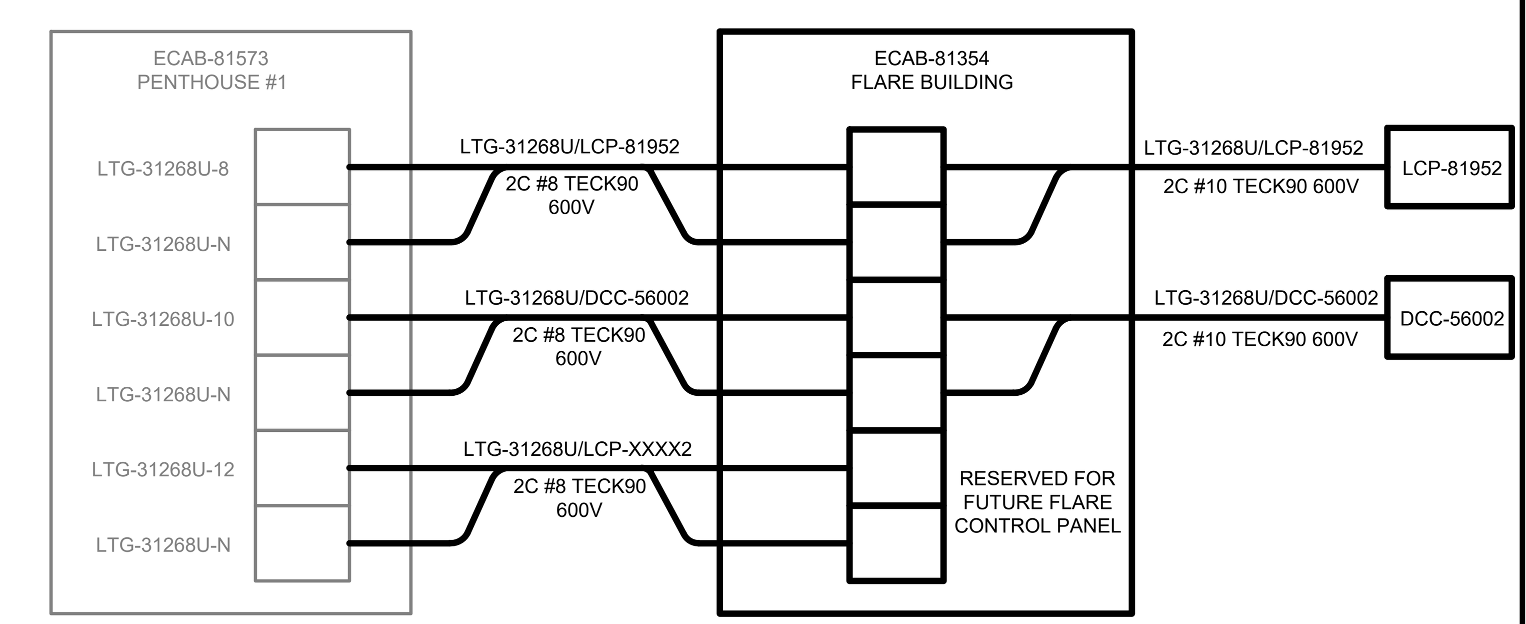
| 1101000105 | PMO 1004723; PF14-015 | 1:100 | - OF - | PRJ-15-157-613 |




**1 FLOOR PLAN - PENTHOUSE 1 (TUNNEL LEVEL)**
1:100




**2 FLOOR PLAN - PENTHOUSE 1**
1:50




**A UPS WIRING SCHEMATIC**
M-501
SCALE: 1/4" =1'-0"

| REFERENCE DRAWING | |
|---|---|
| DRAWING No. | DRAWING TITLE |
| 420-13-078-638 | UPS FLOOR PLAN PENTHOUSE 1 |
| | |
| | |
| | |
| | |

| REVISION | | | | | | |
|---|---|---|---|---|---|---|
| Rev. | DATE | DESCRIPTION | BY | DES. | CHK. | ENG. |
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| 0B | 15-NOV-2024 | ISSUED FOR CONSTRUCTION | EGD | AMG | JA | AMG |
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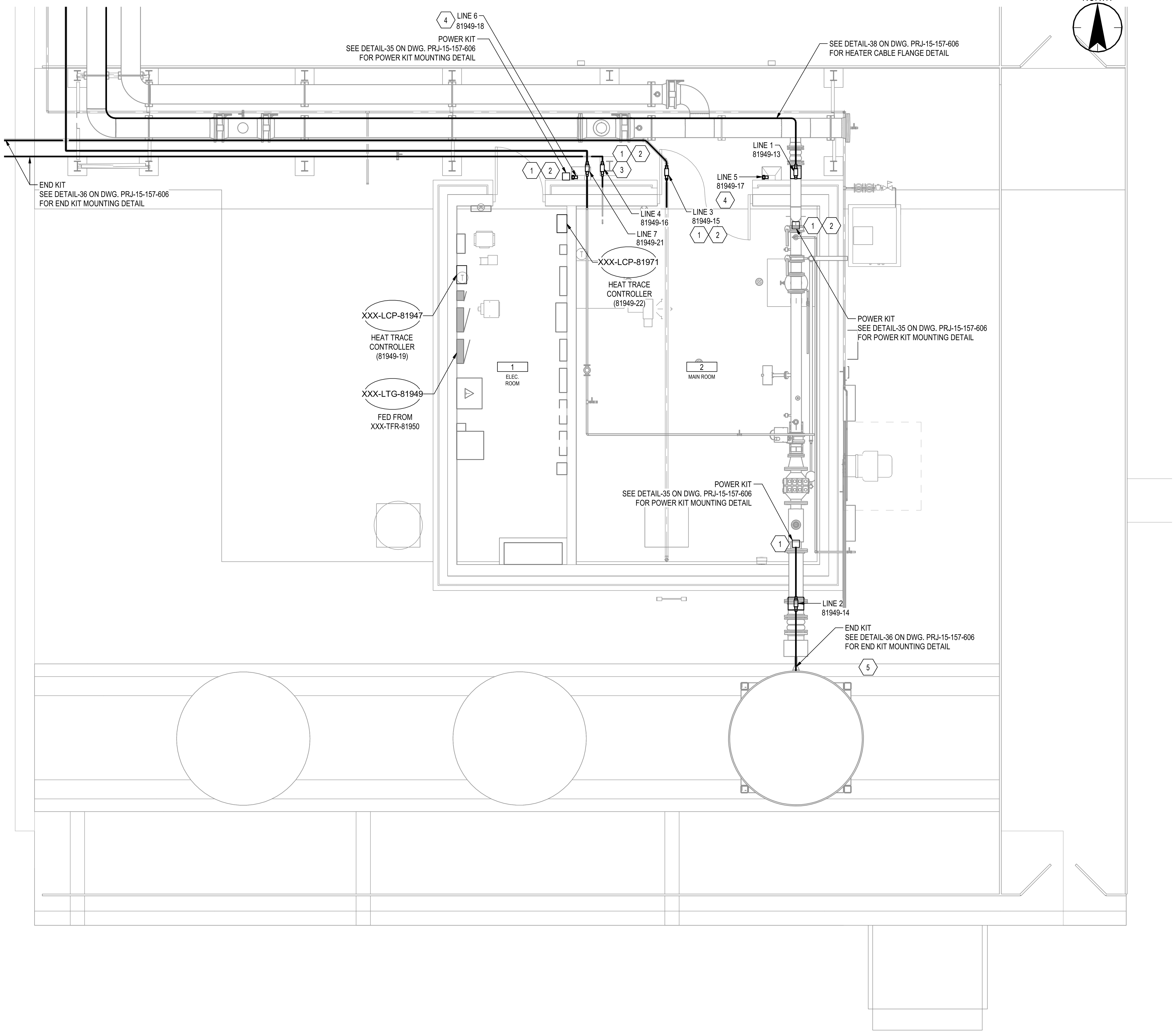
EPCOR

PLANT SITE: GOLD BAR WWTP
PLANT AREA: PLANT WIDE
PROJECT NAME: GBWWTP FLARE CAPACITY EXPANSION
DRAWING TITLE: ELECTRICAL FLOOR PLAN PENTHOUSE 1

| CONSULTANT JOB No. | EPCOR PROJECT No. | SCALE | SHEET | DRAWING NUMBER |
|---|---|---|---|---|
| 1101000105 | PMO 1004723; PF14-015 | AS SHOWN | - OF - | PRJ-15-157-614 |

PROJECT NORTH




## 1 HEAT TRACE
617 1 : 50

| HEAT TRACE SCHEDULE | | | | | |
|---|---|---|---|---|---|
| LINE NUMBER | DESCRIPTION | BREAKER NUMBER LTG-81949 | TRACE RATIO | CABLE RATING | HEATER LENGTH (APPROX.) |
| 1 | PIPING TO FLARE BUILDING | 13 | 2 | 10W/ft | 46.2m |
| 2 | PIPING TO FLARE STACK 1 | 14 | 2 | 10W/ft | 5.7m |
| 3 | SUMP PUMP DRAIN LINE | 15 | 1 | 5W/ft | 23m |
| 4 | UTILITY WATER LINE | 15 | 1 | 3W/ft | 26m |
| 5 | DOWNSPOUT | 15 | 1 | 3W/ft | 15m |
| 6 | DOWNSPOUT | 15 | 1 | 3W/ft | 15m |
| 7 | INSTRUMENT AIR LINE | 15 | 1 | 3W/ft | 48m |

## CONSTRUCTION KEYNOTES:

1. PROVIDE HEAT TRACE SYSTEM. PROVIDE NEW 1P-30A BREAKERS IN PANEL INDICATED AND CONNECT TO 2C #8 AWG + GND 600V TECK90 CABLE. HEAT TRACE CONTROLLER GFCI PROTECTION PREFERRED, CONTRACTOR TO PROVIDE 30mA GFCI IN BREAKER WHERE NOT AVAILABLE.
2. HEAT TRACE TO BEGIN NOT LESS THAN 150mm WITHIN BUILDING BOUNDARY. EXTEND RTD THROUGH WALL AND INSTALL NOT LESS THAN 300mm AWAY FROM BUILDING.
3. HEAT TRACE TO BE RUN NOT LESS THAN 150mm WITHIN BUILDING BOUNDARY AND LOOPED BACK OUTSIDE.
4. CONTRACTOR TO PROVIDE LINE 5 AND LINE 6 AND LEAVE DRIP LOOPS BELOW THE DOWNSPOUTS AT BOTTOM. SEE DETAIL-40 ON DWG. PRJ-15-157-606 FOR DOWNSPOUT HANGER DETAILS.
5. CONTRACTOR TO PROVIDE POWER FOR VENDOR HEAT TRACE CIRCUITS AS PER APPROVED SHOP DRAWINGS. PROVIDE HEAT TRACE CONTROLLERS WHERE NOT PROVIDED BY VENDOR.

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| DRAWING No. | DRAWING TITLE | Rev. | DATE | DESCRIPTION | BY | DES. | CHK. | ENG. |
| | | 0A | 21-JUN-2023 | ISSUED FOR PRELIMINARY DESIGN | EGD | AMG | JA | AMG |
| | | 0B | 26-APR-2024 | ISSUED FOR 60% DESIGN | EGD | AMG | JA | AMG |
| | | 0C | 30-AUG-2024 | ISSUED FOR 90% DESIGN | EGD | AMG | JA | AMG |
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PLANT SITE: GOLD BAR WWTP
PLANT AREA: PLANT WIDE
PROJECT NAME: GBWWTP FLARE CAPACITY EXPANSION
DRAWING TITLE:
ELECTRICAL
HEAT TRACE PLAN

| CONSULTANT JOB No. | EPCOR PROJECT No. | SCALE | SHEET | DRAWING NUMBER |
|---|---|---|---|---|
| 1101000105 | PMO 1004723; PF14-015 | 1 : 50 | of 0 | PRJ-15-157-617 |

11/22/2024 10:38:11 AM

**Stantec**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Name: | **XXX-LTG-81948U** | Volts: | 208Y/120V | Mains Type: | MCB | Type: | Panel |
| Location: | ELEC. ROOM 1 | Phases: | 3 | Mains Rating: | 225 A | AIC Rating: | 10kA |
| Supply From: | 708-LTG-47084U | Wires: | 4 | MCB Rating: | 30 A | Mounting: | Surface |
| Serves: | | | | Lugs: | Single Lugs | Enclosure: | Type 1 |

**Notes:**

| CKT | Circuit Description | Trip | Poles | CB | A | | B | | C | | CB | Poles | Trip | Circuit Description | CKT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | XXX-FJB-81951 | 15 A | 1 | | 0 | 0 | | | | | | 1 | 15 A | XXX-IPJB-81969 | 2 |
| 3 | XXX-ECAB-71376 | 15 A | 1 | | | | 0 | 0 | | | | 1 | 15 A | XXX-DCC-56002 | 4 |
| 5 | | | | | | | | | | 0 | | 1 | 15 A | XXX-LCP-81946 | 6 |
| 7 | | | | | | | | | | | | | | | 8 |
| 9 | | | | | | | | | | | | | | | 10 |
| 11 | | | | | | | | | | | | | | | 12 |
| 13 | | | | | | | | | | | | | | | 14 |
| 15 | | | | | | | | | | | | | | | 16 |
| 17 | | | | | | | | | | | | | | | 18 |
| 19 | | | | | | | | | | | | | | | 20 |
| 21 | | | | | | | | | | | | | | | 22 |
| 23 | | | | | | | | | | | | | | | 24 |
| 25 | | | | | | | | | | | | | | | 26 |
| 27 | | | | | | | | | | | | | | | 28 |
| 29 | | | | | | | | | | | | | | | 30 |
| | | | | **Total Load:** | **0.00 kVA** | | **0.00 kVA** | | **0.00 kVA** | | | | | | |
| | | | | **Total Amps:** | **0 A** | | **0 A** | | **0 A** | | | | | | |

| Load Classification | Connected Load | Demand Factor | Estimated Demand | Panel Totals | |
|---|---|---|---|---|---|
| Power | 0 VA | 0.00% | 0 VA | | |
| | | | | **Total Conn. Load:** | **0 VA** |
| | | | | **Total Est. Demand:** | **0 VA** |
| | | | | **Total Conn.:** | **0 A** |
| | | | | **Total Est. Demand:** | **0 A** |

**CB Legend (blank = circuit breaker):**
G = GFCI S = Shunt Trip D = Switching Duty A = AFCI H = HID Rated C = HACR Rated † = Existing Circuit ‡ = Revised Circuit

**Notes:**

**Stantec**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Name: | **XXX-LTG-81949** | Volts: | 208Y/120V | Mains Type: | MLO | Type: | Panel |
| Location: | ELEC. ROOM 1 | Phases: | 3 | Mains Rating: | 225 A | AIC Rating: | 10kA |
| Supply From: | XXX-TFR-81950 | Wires: | 4 | Max Rating: | 100 A | Mounting: | Surface |
| Serves: | | | | Lugs: | Single Lugs | Enclosure: | Type 1 |

**Notes:**

| CKT | Circuit Description | Trip | Poles | CB | A | | B | | C | | CB | Poles | Trip | Circuit Description | CKT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | EXTERIOR RECEPTACLES | 15 A | 1 | | 360 | 540 | | | | | | 1 | 15 A | ELEC. RM. RECEPTACLES | 2 |
| 3 | EXTERIOR LIGHTING | 20 A | 1 | | | | 300 | 493 | | | | 1 | 20 A | ELEC. RM. AND MAIN RM. LIGHTING | 4 |
| 5 | EXIT LIGHTS | 15 A | 1 | | | | | | 0 | 2500 | | 1 | 15 A | XUH-50002 | 6 |
| 7 | | | | | | 2500 | | | | | | 2 | 15 A | XUH-81941 | 8 |
| 9 | GSF-81939 | 15 A | 1 | | | | 2500 | 2500 | | | -- | -- | -- | -- | 10 |
| 11 | XXX-FAP-81955 | 15 A | 1 | | | | | | 0 | 0 | | 1 | 15 A | XXX-LCP-81954 | 12 |
| 13 | HEAT TRACE LINE 1 | 30 A | 1 | | 0 | 0 | | | | | | 1 | 30 A | HEAT TRACE LINE 2 | 14 |
| 15 | HEAT TRACE LINE 3 | 30 A | 1 | | | | 0 | 0 | | | | 1 | 30 A | HEAT TRACE LINE 4 | 16 |
| 17 | HEAT TRACE LINE 5 | 30 A | 1 | | | | | | 0 | 0 | | 1 | 30 A | HEAT TRACE LINE 6 | 18 |
| 19 | XXX-LCP-81947 HEAT TRACE... | 15 A | 1 | | 0 | 360 | | | | | | 1 | 15 A | EXTERIOR RECEPTACLES | 20 |
| 21 | HEAT TRACE LINE 7 | 30 A | 1 | | | | 0 | 0 | | | | 1 | 15 A | XXX-LCP-81971 HEAT TRACE... | 22 |
| 23 | | | | | | | | | | | | | | | 24 |
| 25 | | | | | | | | | | | | | | | 26 |
| 27 | | | | | | | | | | | | | | | 28 |
| 29 | | | | | | | | | | | | | | | 30 |
| 31 | | | | | | | | | | | | | | | 32 |
| 33 | | | | | | | | | | | | | | | 34 |
| 35 | | | | | | | | | | | | | | | 36 |
| 37 | | | | | | | | | | | | | | | 38 |
| 39 | | | | | | | | | | | | | | | 40 |
| 41 | | | | | | | | | | | | | | | 42 |
| | | | | **Total Load:** | **3.76 kVA** | | **5.79 kVA** | | **2.50 kVA** | | | | | | |
| | | | | **Total Amps:** | **33 A** | | **50 A** | | **21 A** | | | | | | |

| Load Classification | Connected Load | Demand Factor | Estimated Demand | Panel Totals | |
|---|---|---|---|---|---|
| HVAC | 10000 VA | 100.00% | 10000 VA | | |
| Lighting | 493 VA | 125.00% | 616 VA | **Total Conn. Load:** | **12053 VA** |
| Other | 300 VA | 100.00% | 300 VA | **Total Est. Demand:** | **12176 VA** |
| Power | 0 VA | 0.00% | 0 VA | **Total Conn.:** | **33 A** |
| Receptacle | 1260 VA | 100.00% | 1260 VA | **Total Est. Demand:** | **34 A** |

**CB Legend (blank = circuit breaker):**
G = GFCI S = Shunt Trip D = Switching Duty A = AFCI H = HID Rated C = HACR Rated † = Existing Circuit ‡ = Revised Circuit

**Notes:**

| REFERENCE DRAWING | | REVISION | | | | | | |
|---|---|---|---|---|---|---|---|---|
| DRAWING No. | DRAWING TITLE | Rev. | DATE | DESCRIPTION | BY | DES. | CHK. | ENG. |
| | | 0A | 26-APR-2024 | ISSUED FOR 60% DESIGN | EGD | AMG | JA | AMG |
| | | 0B | 30-AUG-2024 | ISSUED FOR 90% DESIGN | EGD | AMG | JA | AMG |
| | | 0C | 15-NOV-2024 | ISSUED FOR CONSTRUCTION | EGD | AMG | JA | AMG |
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ANDREW M. GRESCHNER
ALBERTA
2024-11-24

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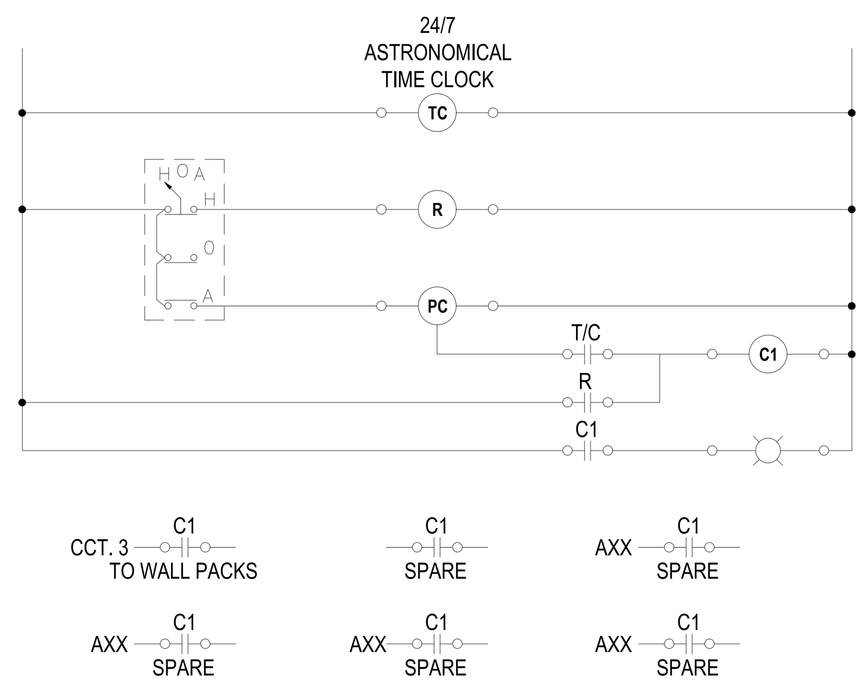
PLANT AREA: PLANT WIDE
PROJECT NAME: GBWWTP FLARE CAPACITY EXPANSION
DRAWING TITLE: ELECTRICAL PANELBOARD SCHEDULE LTG-XXXXX

| CONSULTANT JOB No. | EPCOR PROJECT No. | SCALE | SHEET | DRAWING NUMBER |
|---|---|---|---|---|
| 1101000105 | PMO 1004723; PF14-015 | | of 0 | PRJ-15-157-618 |

11/19/2024 5:08:25 PM



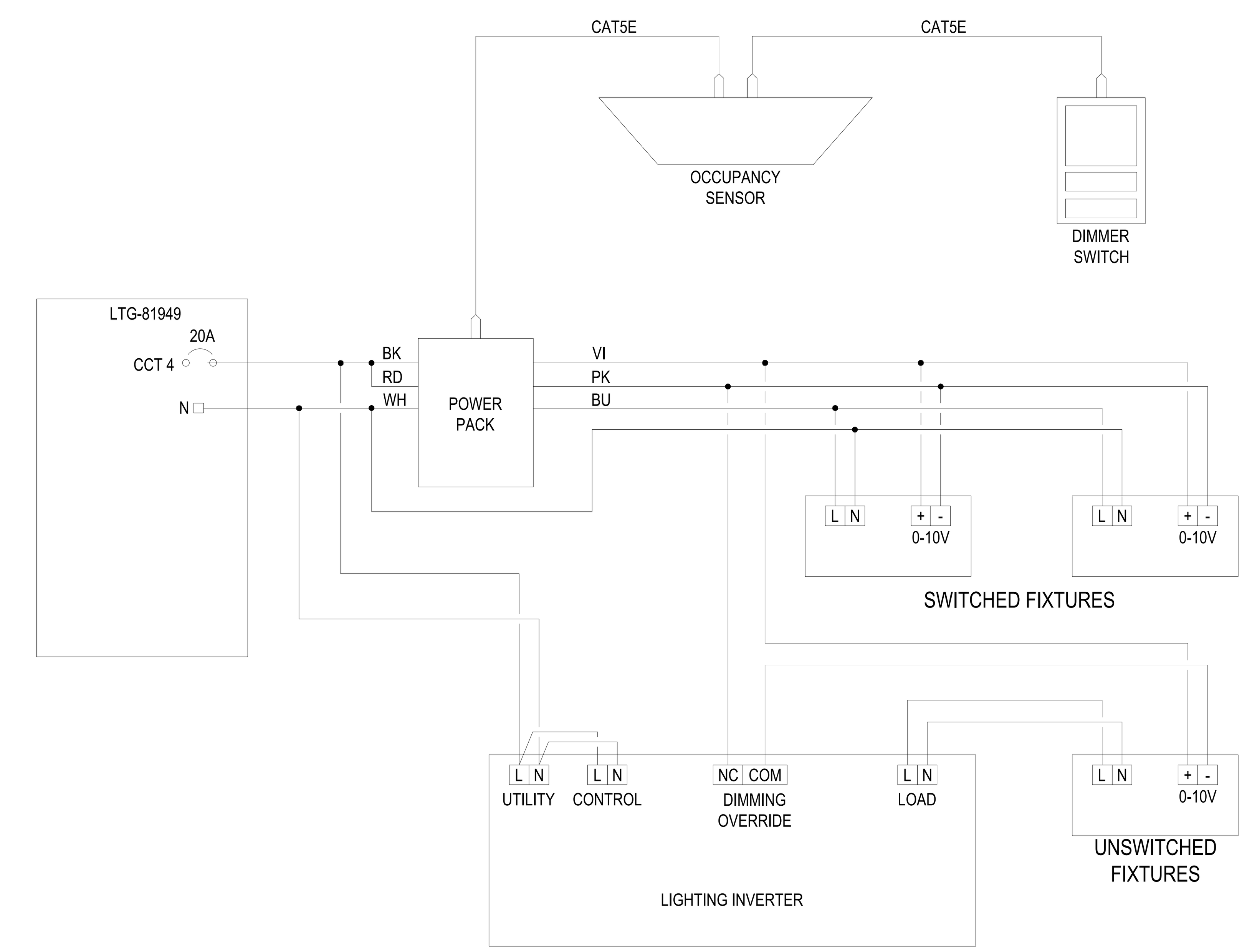

**A** 620 **LIGHTING CONTROL PANEL LCP-81945**
N.T.S.

| Luminaire Schedule | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Fixture Tag | Description | Manufacturer | ordering Number | Power | Output | Colour Temp (K) | Mounting | Comments |
| 100 | Hazardous Area Highbay | Rig-a-lite | ALU06-L2-U-LPC-C | 50 | 4806 | 4000 | Ceiling Mounted | |
| 101 | Suspended LED Strip | Signify | FSS440L840-UNV-DIM;C/W FSSWG4; DACH120 - "DB" Adjustable CBL HGR 120" | 31 | 4000 | 4000 | Suspended Linear | BOF 12' AFF |
| 200 | Medium Wallpack | Rig-a-lite | ALU06-L2-U-LCG-W | 50 | 4806 | 3000 | Wall Mount | BOF 10' Above Grade |
| | | | | | | | | |
| EX1 | Green Running Man Unit | Aimlite | RPSTUMWHT-BAT | | | | | |
| EX2 | Hazardous Area Running Man | Aimlite | RPHZ1W12 | | | | | |
| | | | | | | | | |
| OC1 | High Ceiling Mounted PDT | Leviton | OSC20-RMW | | | | | |
| SW1 | Low Voltage Dimming Switch | Leviton | PLVSW-4LW | | | | | |
| SW2 | Hazardous Rated Switch | Killark | XS-48C | | | | | |

| LIGHTING CONTROL SCHEDULE | | |
|---|---|---|
| ROOM | DESCRIPTION | CONTROL |
| 100 | ELECTRICAL ROOM | MANUAL ON FOR 10 MIN., AUTOMATIC OFF |
| 200 | MAIN ROOM | MANUAL ON, MANUAL OFF |

GENERAL NOTES:

1. NIGHT LIGHT FIXTURES TO BE UNSWITCHED AND FED FROM EMERGENCY LIGHTING INVERTER.




NOTE: BONDING NOT SHOWN, PROVIDE GROUND TO EACH FIXTURE AND LIGHTING INVERTER

**B** 620 **TYPICAL INTERIOR LIGHTING CONTROL SCHEMATIC**
N.T.S.

| REFERENCE DRAWING | | REVISION | | | | | | |
|---|---|---|---|---|---|---|---|---|
| DRAWING No. | DRAWING TITLE | Rev. | DATE | DESCRIPTION | BY | DES. | CHK. | ENG. |
| | | 0A | 26-APR-2024 | ISSUED FOR 60% DESIGN | EGD | AMG | JA | AMG |
| | | 0B | 30-AUG-2024 | ISSUED FOR 90% DESIGN | EGD | AMG | JA | AMG |
| | | 0C | 15-NOV-2024 | ISSUED FOR CONSTRUCTION | EGD | AMG | JA | AMG |

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PROJECT NAME: GBWWTP FLARE CAPACITY EXPANSION
DRAWING TITLE:

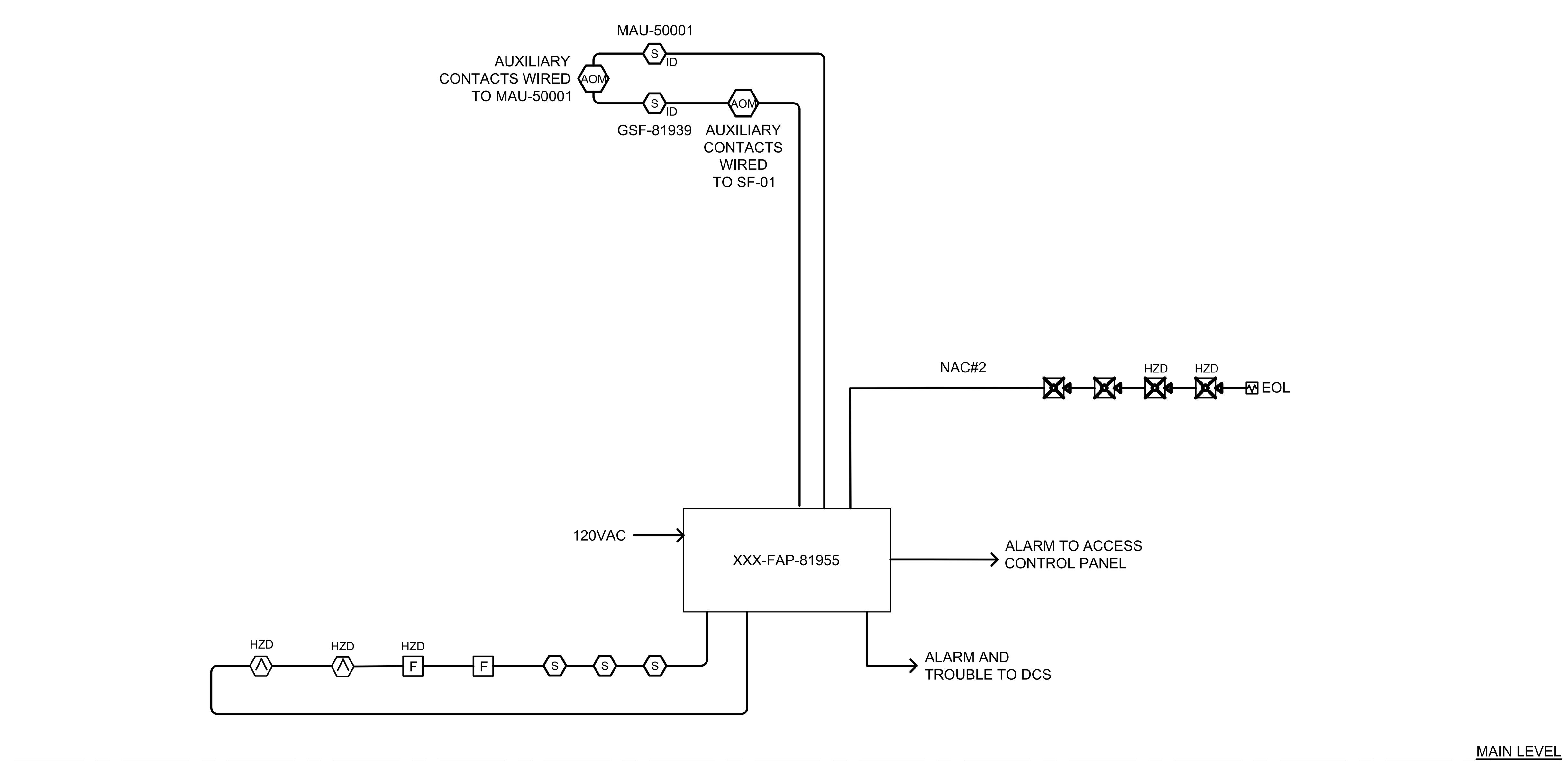
# ELECTRICAL LUMINAIRE SCHEDULE

| CONSULTANT JOB No. | EPCOR PROJECT No. | SCALE | SHEET | DRAWING NUMBER |
|---|---|---|---|---|
| 1101000105 | PMO 1004723; PF14-015 | NOT TO SCALE | - OF - | PRJ-15-157-620 |

| FIRE ALARM ZONING | |
|---|---|
| ZONE | ZONE DESCRIPTION |
| 1 | MAIN FLOOR |
| 2 | MAU-50001 |
| 3 | GSF-81939 |

GENERAL NOTES:

1. REFER TO FLOOR PLAN FOR THE EXACT QUANTITY AND ARRANGEMENT OF DEVICES. RISER DIAGRAM IS FOR DIAGRAMMATIC PURPOSES ONLY.
2. SIGNALING CIRCUITS SHALL NOT SERVE MORE THAN ONE FLOOR. EACH SIGNALING CIRCUIT SHALL HAVE A MINIMUM 25% SPARE CAPACITY FOR FUTURE DEVICES. PROVIDE CIRCUITS AS PER MANUFACTURER'S RECOMMENDATIONS.
3. PROVIDE LINE ISOLATORS AS REQUIRED BY CODE.
4. PROVIDE RELAY INTERFACE FOR ALL VENTILATION EQUIPMENT.

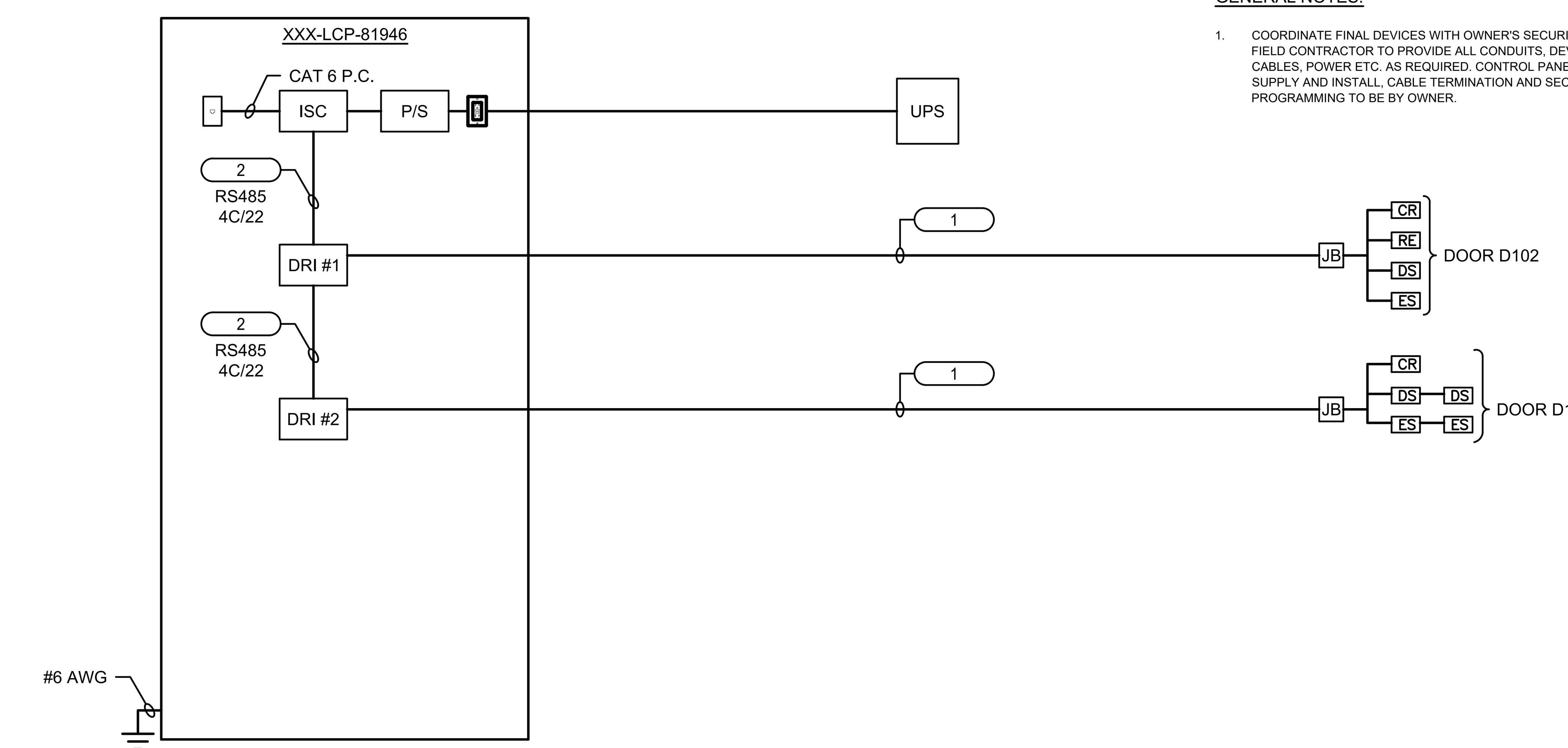



A
621
**FIRE ALARM RISER DIAGRAM**
N.T.S.

| ACCESS CONTROL CABLE SCHEDULE | |
|---|---|
| CABLE NO. | DESCRIPTION |
| 1 | BELDEN B558 AFS + C22S SHIELDED (BANANA CABLE) |
| | - GREY: 4#18 (ELECTRIC LOCK/STRIKE) |
| | - ORANGE: 6#22 (CARD READER) |
| | - WHITE: 2#22 (DOOR CONTACT) |
| | - BLUE: 4#22 (PIR, IR SENSOR OR RTE) |
| 2 | RS485 - 4C#22 |
| 3 | 2#22 (DOOR CONTACT) |

GENERAL NOTES:

1. COORDINATE FINAL DEVICES WITH OWNER'S SECURITY CONTRACTOR. FIELD CONTRACTOR TO PROVIDE ALL CONDUITS, DEVICE BOXES, CABLES, POWER ETC. AS REQUIRED. CONTROL PANEL AND DEVICE SUPPLY AND INSTALL, CABLE TERMINATION AND SECURITY SYSTEM PROGRAMMING TO BE BY OWNER.




B
621
**SECURITY RISER DIAGRAM**
N.T.S.

| REFERENCE DRAWING | |
|---|---|
| DRAWING No. | DRAWING TITLE |
| | |
| | |
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| REVISION | | | | | | |
|---|---|---|---|---|---|---|
| Rev. | DATE | DESCRIPTION | BY | DES. | CHK. | ENG. |
| 0A | 26-APR-2024 | ISSUED FOR 60% DESIGN | EGD | AMG | JA | AMG |
| 0B | 30-AUG-2024 | ISSUED FOR 90% DESIGN | EGD | AMG | JA | AMG |
| 0C | 15-NOV-2024 | ISSUED FOR CONSTRUCTION | EGD | AMG | JA | AMG |
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| | | | | | | |

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**PERMIT NUMBER: P000258**
The Association of Professional Engineers and Geoscientists of Alberta (APEGA)

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PROFESSIONAL ENGINEER ALBERTA
ANDREW M. GRESCHNER
ID: 107149
2024-11-24

CONSULTANT LOGO

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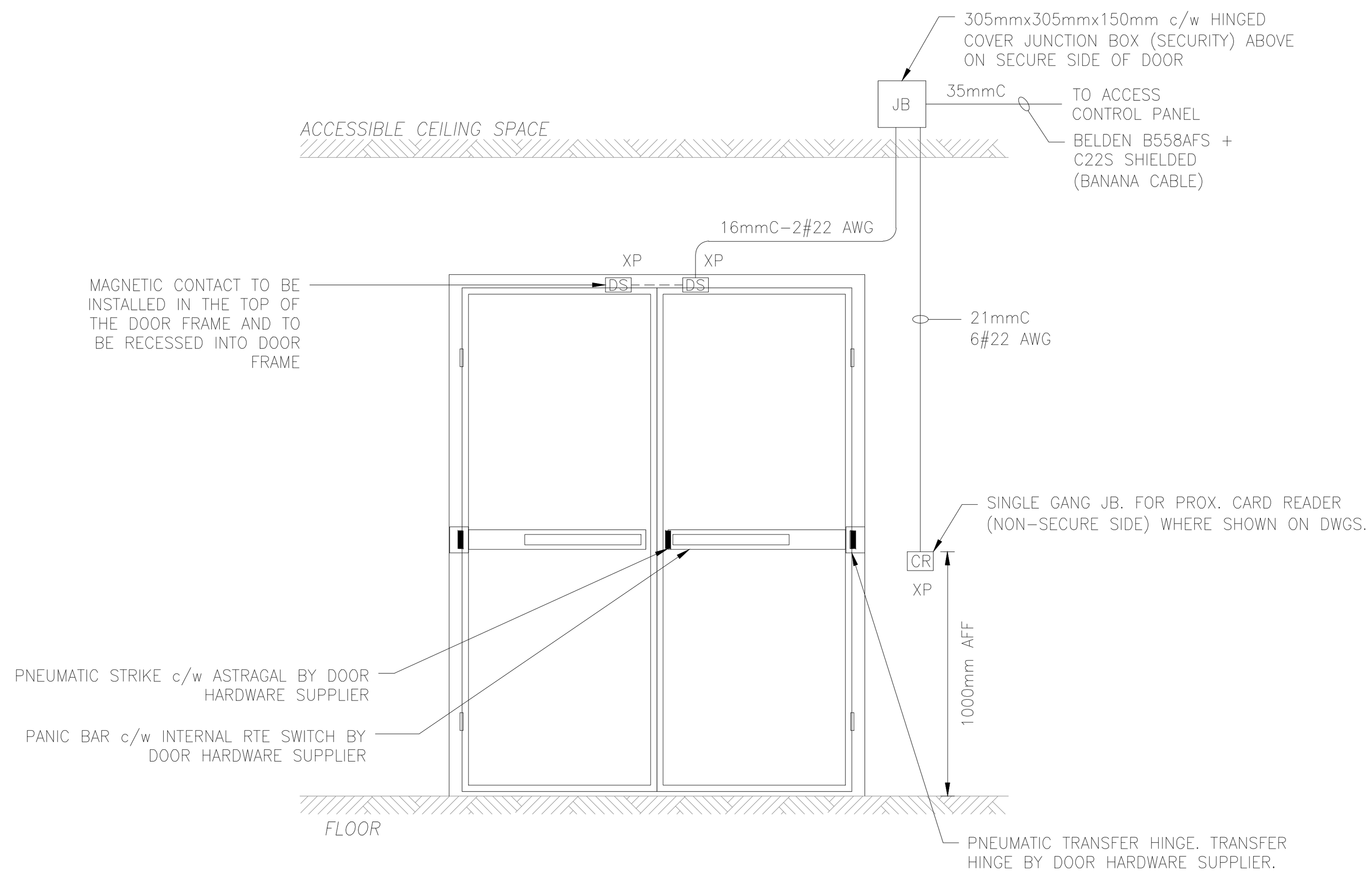
EPCOR

PLANT SITE: GOLD BAR WWTP
PLANT AREA: PLANT WIDE
PROJECT NAME: GBWWTP FLARE CAPACITY EXPANSION
DRAWING TITLE: ELECTRICAL FIRE ALARM AND ACCESS CONTROL RISER DIAGRAM

| CONSULTANT JOB No. | EPCOR PROJECT No. | SCALE | SHEET | DRAWING NUMBER |
|---|---|---|---|---|
| 1101000105 | PMO 1004723; PF14-015 | 1:1 | - OF - | PRJ-15-157-621 |

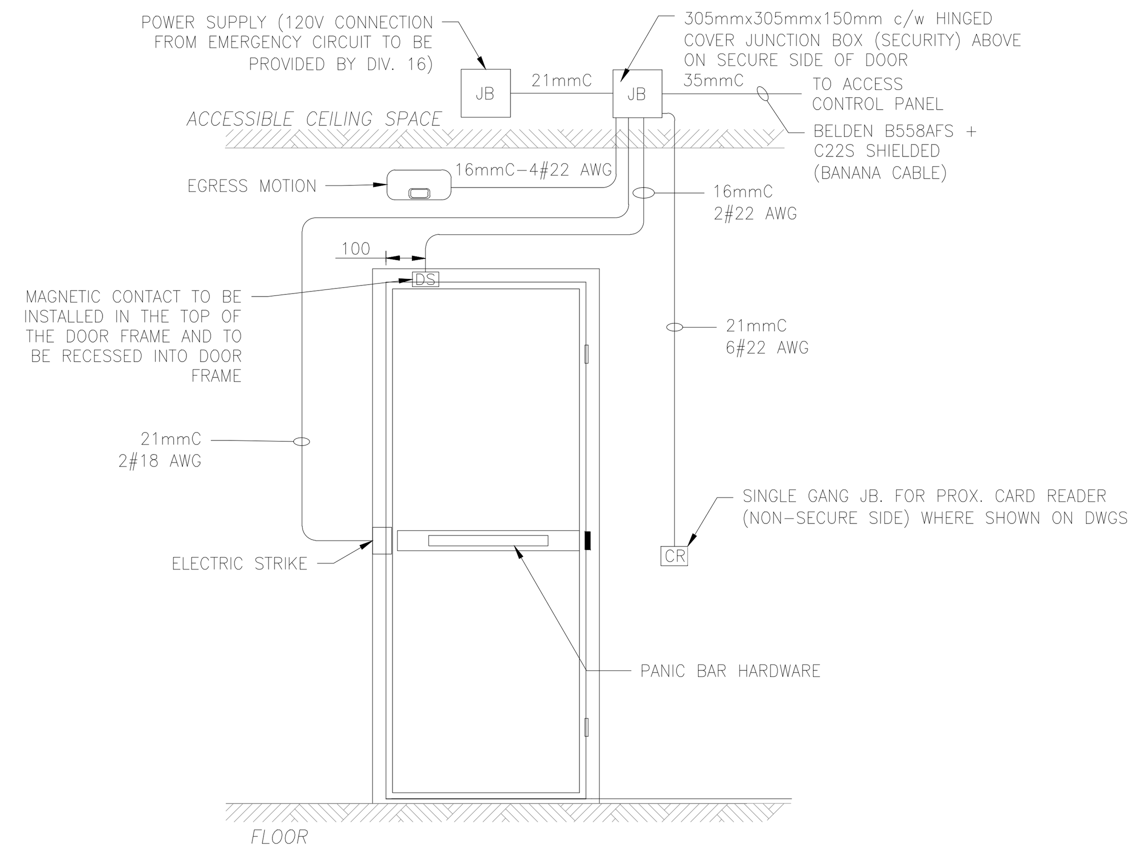



1 TYP. SECURITY DOOR TYPE 'A'

N.T.S.

NOTE:

1. ALL WIRING IS TO BE INSTALLED IN CONDUIT. NO EXPOSED CABLES PERMITTED.
2. PROVIDE 36" OF SLACK CABLE FOR EACH FIELD DEVICE AND COIL CABLE IN JUNCTION BOX. FOR BANANA CABLE PULL APART THE CABLE THEN COIL UP IN JUNCTION BOX.
3. TO BE CONFIRMED WITH SITE SECURITY SUPPLIER.




2 TYP. SECURITY DOOR TYPE 'B'

N.T.S.

NOTE:

1. ALL WIRING IS TO BE INSTALLED IN CONDUIT. NO EXPOSED CABLES PERMITTED.
2. PROVIDE 36" OF SLACK CABLE FOR EACH FIELD DEVICE AND COIL CABLE IN JUNCTION BOX. FOR BANANA CABLE PULL APART THE CABLE THEN COIL UP IN JUNCTION BOX.
3. TO BE CONFIRMED WITH SITE SECURITY SUPPLIER.

## SECURITY DOOR SCHEDULE

LEGEND:

| | | | |
|---|---|---|---|
| CR | - CARD READER DEVICE | DRI | - DUAL READER INTERFACE BOARD |
| ES | - ELECTRIC STRIKE | ICM | - INPUT CONTROL MODULE |
| RE | - REQUEST TO EXIT DEVICE | | |
| DS | - DOOR CONTACT/DOOR POSITION SWITCH | | |
| PS | - PNEUMATIC STRIKE | | |
| PT | - PNEUMATIC TRANSFER HINGE | | |
| DHO | - DOOR HOLD OPEN (ALARM BUZZER) | | |
| P.BAR | - ELECTRIFIED PANIC HARDWARE WITH INTERNAL RTE SWITCH | | |

| DOOR NO. | SECURITY DOOR TYPE | HARDWARE (ACCESS AND SECURITY) | | | | | | | | CONNECTED TO | NOTES |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | CR | ES | PS | RE | DS | PT | DHO | P.BAR | | |
| D101 | A | X | | X | | X | X | | X | DRI #2 | |
| D102 | B | X | X | | X | X | | | | DRI #1 | |

NOTE:

1. ALL WIRING IS TO BE INSTALLED IN CONDUIT. NO EXPOSED CABLES PERMITTED.
2. PROVIDE 36" OF SLACK CABLE FOR EACH FIELD DEVICE AND COIL CABLE IN JUNCTION BOX. FOR BANANA CABLE PULL APART THE CABLE THEN COIL UP IN JUNCTION BOX.
3. TO BE CONFIRMED WITH SITE SECURITY SUPPLIER.

| REFERENCE DRAWING | | REVISION | | | | | | |
|---|---|---|---|---|---|---|---|---|
| DRAWING No. | DRAWING TITLE | Rev. | DATE | DESCRIPTION | BY | DES. | CHK. | ENG. |
| | | 0A | 15-NOV-2024 | ISSUED FOR CONSTRUCTION | EGD | AMG | JA | AMG |

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2024-11-24

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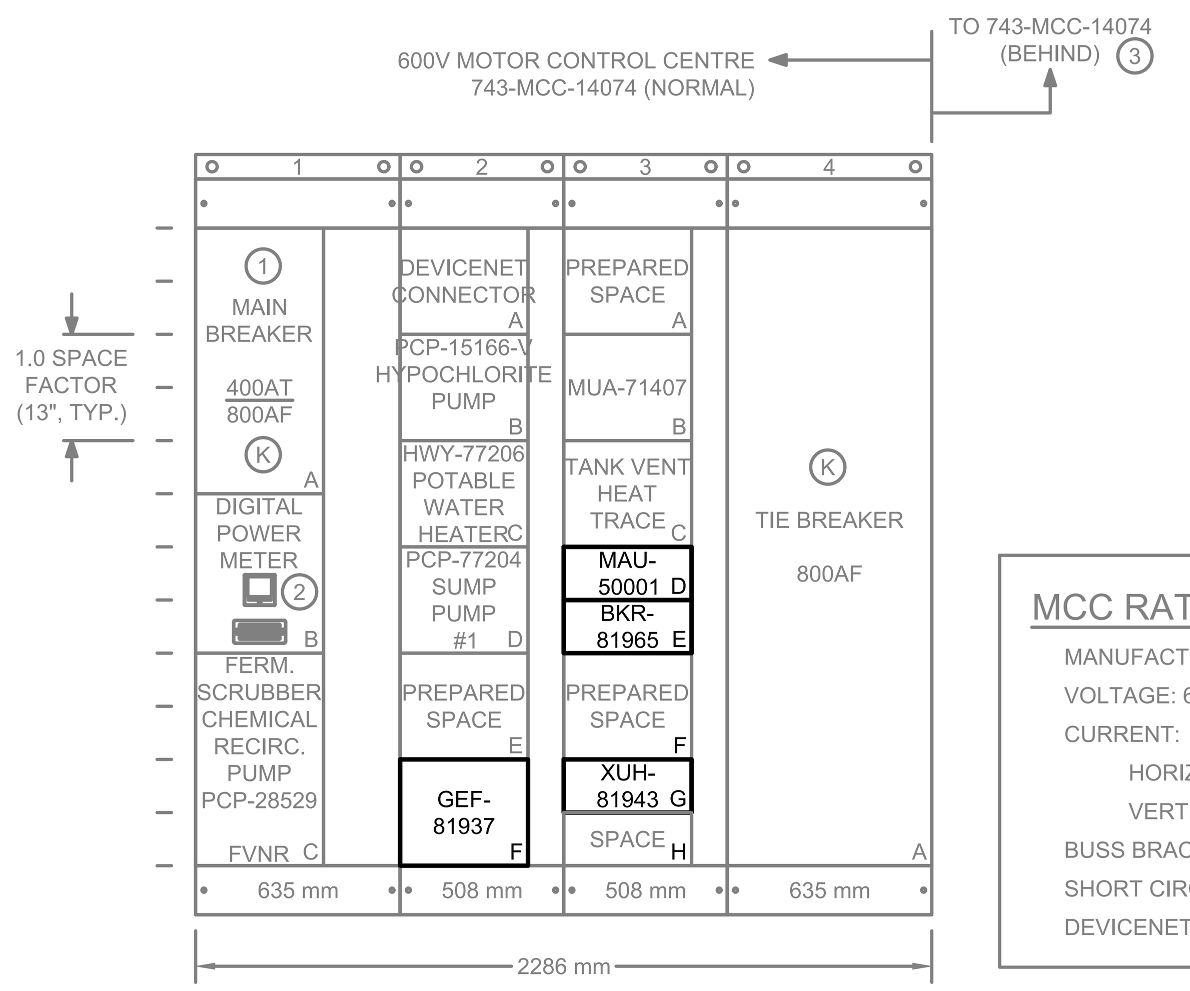
EPCOR

PLANT SITE: GOLD BAR WWTP
PLANT AREA: PLANT WIDE
PROJECT NAME: GBWWTP FLARE CAPACITY EXPANSION
DRAWING TITLE: ELECTRICAL SECURITY AND ACCESS CONTROL SCHEMATICS DETAILS

| CONSULTANT JOB No. | EPCOR PROJECT No. | SCALE | SHEET | DRAWING NUMBER |
|---|---|---|---|---|
| 1101000105 | PMO 1004723; PF14-015 | 1:1 | - OF - | PRJ-15-157-622 |




1 MOTOR CONTROL CENTRE ELEVATION - 743-MCC-14074 (NORMAL)

SCALE = N.T.S.

## MCC RATINGS:

MANUFACTURER: ALLEN-BRADLEY - CENTERLINE 2100
VOLTAGE: 600 V, 3Ø, 3W
CURRENT:
HORIZONTAL BUS - 800 A
VERTICAL BUS - 300 A
BUSS BRACING: 42 kA
SHORT CIRCUIT CURRENT RATING: 42 kA (MIN.)
DEVICENET NETWORK CABLE THROUGH ALL SECTIONS

## KEY NOTES:

1. MAIN BREAKER IS C/W ELECTRONIC TYPE LSI TRIP UNIT, 100% RATED. INCOMING CABLES TO BE TOP ENTRY. ADDITIONAL 127mm (5-INCH) WIREWAY WIDTH PROVIDED TO ACCOMMODATE CABLES.
2. DIGITAL METERING CUBICLE PROVIDED C/W POWERLOGIC METER TO INTERFACE WITH PLANT NETWORK. FOR CURRENT AND VOLTAGE MEASUREMENTS, THE METERING CUBICLE INCLUDES 3-CT'S (400:5A) AND UTILIZES FUSED 600VAC VOLTAGE INPUTS (NO PT'S) ALONG WITH FT1 TEST BLOCK.
3. THE BUS TRANSITION BETWEEN MCC'S IS THROUGH THE BACK BETWEEN THE TIE BREAKER SECTION OF 743-MCC-14075 TO THE OPPOSING SECTION ON 743-MCC-14074.
4. FOR HEAT TRACE CIRCUIT, 3-POLE THERMAL MAG. TRIP CIRCUIT BREAKER IS USED (RATING PER SCHEDULE) c/w 120VAC SHUNT TRIP OPTION, 600-120VAC CONTROL POWER TRANSFORMER, 'POWER ON' LED PILOT LIGHT (WHITE LENS), GROUND FAULT MONITOR, AND GROUND FAULT SENSOR (LITTELFUSE/STARTCO SE-704 EARTH-LEAKAGE MONITOR. ADJUSTABLE TRIP OF THE SE-704 UNIT IS SET TO OPERATE ON A GROUND FAULT CURRENT OF 30mA (@ 0.3 SECONDS).

## GENERAL NOTES:

1. MCC IS PRE-WIRED BY THE VENDOR WITH DEVICENET WIRING ACROSS THE ENTIRE LENGTH OF THE MCC ALONG WITH VERTICAL DROPS IN ALL SECTIONS. EACH VERTICAL DROP INCLUDES A MINIMUM OF 6-TAPS, c/w AN END-CAP ON ALL UNUSED CABLE CONNECTORS.
2. MCC CONSTRUCTED TO ALLOW TOP AND BOTTOM CABLE ENTRY.
3. IN ADDITION TO THE MANUFACTURER'S STANDARD MCC CONSTRUCTION, BARRIERS ARE INSTALLED WITHIN THE MCC IN THE FOLLOWING LOCATIONS:
   - BOTTOM OF EACH VERTICAL SECTION
   - BETWEEN VERTICAL WIREWAY AND CUBICLES
   - VARIOUS TERMINATION POINTS (MAIN LUGS, LARGE FEEDER BREAKERS, ETC.)
4. 743-MCC-14074 IS INSTALLED BACK TO BACK WITH 743-MCC-14075. TRANSITION SECTION ALLOWS FOR MAIN-TIE-MAIN CONFIGURATION OF THE ENTIRE LINEUP. KEY INTERLOCK BETWEEN MAIN AND TIE BREAKERS IS PROVIDED TO PREVENT PARALLEL CONNECTION OF UPSTREAM SOURCES.

## LEGEND:

K KIRK KEY INTERLOCK

SLD ELE-02-007 — LOCATION: EAST SCRUBBER BUILDING

**Motor Control Centre - Load Schedule** — MCC Ratings: **600 VAC, 3-Ph, 3-Wire, 600 A, 42 kAic (min.)** — MCC Designation: **743-MCC-14074**

| Equipment Tag Number | Description | Location | "Device Location (in MCC)" | Load Ratings: Power (HP, kW, kVA) | Current (A) | Phases (1 or 3) | Starter / Breaker Details: Manual | Magnetic | Size (NEMA) | Circuit Breaker Only | Comb.: Fuse | Circuit Breaker (MCP) | Features: Overload Relay (SSOL) | Hand-Off-Auto (HOA) Sel. Sw. | Start/Stop Pushbutton | On-Off Sel. Sw. | Pilot Lights (L.E.D.) | Reset Pushbutton (for SSOL) | Other: | Other: | Subfeed Bkr / Fuse (A) | Feeder Details: Cable (Teck90) | Conduit / Wire | Conductor Qty. and Size (AWG) | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 743-BKR-76910 | Main Breaker | - | 1A | | 400 | 3 Ph | | | | X | | | | | | | | | | | 400 | | | | Main Breaker for 743-MCC-14074, 400AT/800AF, Electronic Trip [LSI] |
| - | Digital Power Meter | - | 1B | | | | | | | | | | | | | | | | | | | | | | |
| PCP-28529 | Fermenter Scrubber Chemical Recirc. Pump | East Scrubber Pump Room | 1C | 30 HP | | 3 Ph | | | 3 | | | | X | | | | X | X | | | By Mfr. | X | | 3C #6 (Power) | Connect to terminal box on existing motor |
| | | | | | | | | | | | | | | | | | | | | | | | | | |
| - | Devicenet Connector | - | 2A | | | | | | | | | | | | | | | | | | | | | | |
| 704-PCP-15166-V | Hypochlorite Pump | East Scrubber Pump Room | 2B | 0.75 | | 3 Ph | | | 1 | | | | X | | | | X | X | | | By Mfr. | X | | 3C #12 (Power) | Connect to terminal box on existing motor |
| HWT-77206 | Potable Water Heater | East Scrubber Pump Room | 2C | 45 kW | | 3 Ph | | | | X | | | | | | | | | | | 60 | X | | 3C #6 (Power) | Connect to terminal box on existing hot water tank |
| PCP-77204 | Sump Pump #1 | East Scrubber Pump Room | 2D | 1 kW | | 3 Ph | | | 1 | | | | X | | | | X | X | | | By Mfr. | X | | 3C #12 (Power) | Connect to terminal box on existing motor (control shared with sump pump 2) |
| - | Prepared Space | - | 2E | | | | | | | | | | | | | | | | | | | | | | |
| GEF-81937 | Exhaust Fan | Outside Flare Bldg. | 2F | 1/4 HP | | 3 Ph | | | 1 | | | X | X | | | | X | X | | | 15 | X | | 3C #12 (Power) 8C #14 (Control) | Provide w/ DeviceNet card, to be left unconnected. |
| | | | | | | | | | | | | | | | | | | | | | | | | | |
| - | Prepared Space | - | 3A | | | | | | | | | | | | | | | | | | | | | | |
| MAU-71407 | Make Up Air Unit | Scrubber Room | 3B | | | 3 Ph | | | | X | | | | | | | | | | | 40 | X | | 3C #8 (Power) | Connect to existing make up air unit via new junction box |
| - | Heat Trace | Tank Piping and Vents | 3C | | | 3 Ph | | | | X | | | | | | | X | | | | 15 | X | | 3C #12 (Power) | Connect to existing junction box of existing heat trace circuit. Include control power tx., ground fault sensor & monitor, and pilot light. |
| MAU-50001 | Supply Fan | Outside Flare Bldg. | 3D | 0.37 kW | | 3 Ph | | | | X | | | | | | | | | | | 15 | X | | 3C #12 (Power) | |
| BKR-81965 | Welding Receptacle | Outside Flare Bldg. | 3E | | | 3 Ph | | | | X | | | | | | | | | | | 30 | X | | 3C #6 (Power) | |
| - | Prepared Space | - | 3F | | | | | | | | | | | | | | | | | | | | | | |
| XUH-81943 | Unit Heater | Flare Bldg. Process Room | 3G | 7.5 kW | | 3 Ph | | | | X | | | | | | | | | | | 15 | X | | 3C #12 (Power) | |
| | | | | | | | | | | | | | | | | | | | | | | | | | |
| 743-BKR-76911 | Tie Breaker | - | 4A | | | | | | | X | | | | | | | | | | | N/A | | | | Transition section between 743-MCC-14074 and 743-MCC-14075 containing transition bus |
| | | | | | | | | | | | | | | | | | | | | | | | | | |

| REFERENCE DRAWING: DRAWING No. | DRAWING TITLE | REVISION: Rev. | DATE | DESCRIPTION | BY | DES. | CHK. | ENG. |
|---|---|---|---|---|---|---|---|---|
| ELE-02-743E-R0 | MOTOR CONTROL CENTRE SCHED. EAST SCRUBB. BLDG. 743-MCC-14074 (NORM.) | 0A | 30-AUG-2024 | ISSUED FOR 90% DESIGN | EGD | AMG | JA | AMG |
| | | 0B | 15-NOV-2024 | ISSUED FOR CONSTRUCTION | EGD | AMG | JA | AMG |

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PROFESSIONAL ENGINEER ANDREW M. GRIESSMER ALBERTA
2024-11-24

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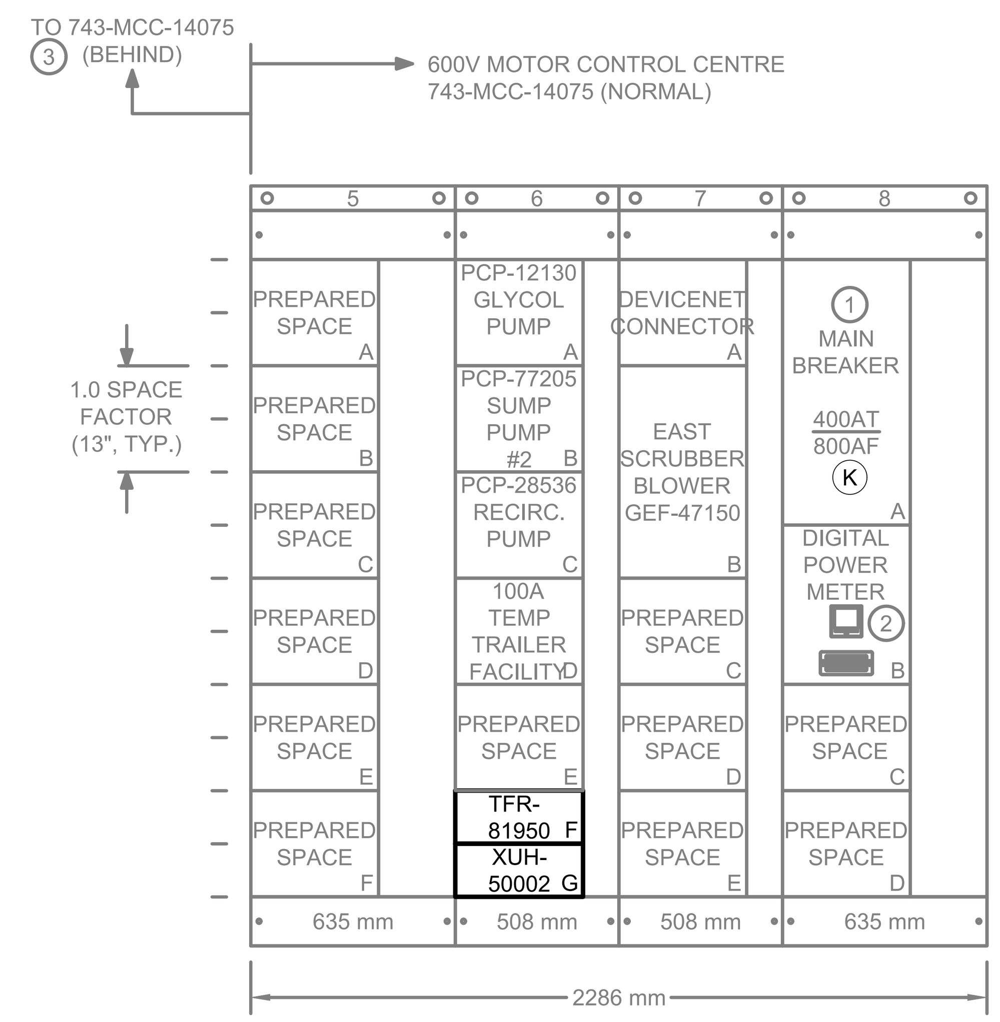
EPCOR

PLANT SITE: GOLD BAR WWTP — PLANT AREA: PLANT WIDE

PROJECT NAME: GBWWTP FLARE CAPACITY EXPANSION

DRAWING TITLE:
ELECTRICAL
MOTOR CONTROL CENTRE SCHEDULE
EAST SCRUBBER BLDG. 743-MCC-14074 (NORMAL)

| CONSULTANT JOB No. | EPCOR PROJECT No. | SCALE | SHEET | DRAWING NUMBER |
|---|---|---|---|---|
| 1101000105 | PMO 1004723; PF14-015 | NOT TO SCALE | - OF - | PRJ-15-157-661 |




1 MOTOR CONTROL CENTRE ELEVATION - 743-MCC-14075 (NORMAL)

SCALE = N.T.S.

## MCC RATINGS:

MANUFACTURER: ALLEN-BRADLEY - CENTERLINE 2100

VOLTAGE: 600 V, 3Ø, 3W

CURRENT:

- HORIZONTAL BUS - 800 A
- VERTICAL BUS - 300 A

BUSS BRACING: 42 kA

SHORT CIRCUIT CURRENT RATING: 42 kA (MIN.)

DEVICENET NETWORK CABLE THROUGH ALL SECTIONS

## GENERAL NOTES:

1. MCC IS PRE-WIRED BY THE VENDOR WITH DEVICENET WIRING ACROSS THE ENTIRE LENGTH OF THE MCC ALONG WITH VERTICAL DROPS IN ALL SECTIONS. EACH VERTICAL DROP INCLUDES A MINIMUM OF 6-TAPS, c/w AN END-CAP ON ALL UNUSED CABLE CONNECTORS.
2. MCC CONSTRUCTED TO ALLOW TOP AND BOTTOM CABLE ENTRY.
3. IN ADDITION TO THE MANUFACTURER'S STANDARD MCC CONSTRUCTION, BARRIERS ARE INSTALLED WITHIN THE MCC IN THE FOLLOWING LOCATIONS:
   - BOTTOM OF EACH VERTICAL SECTION
   - BETWEEN VERTICAL WIREWAY AND CUBICLES
   - VARIOUS TERMINATION POINTS (MAIN LUGS, LARGE FEEDER BREAKERS, ETC.)
4. 743-MCC-14075 IS INSTALLED BACK TO BACK WITH 743-MCC-14074. TRANSITION SECTION ALLOWS FOR MAIN-TIE-MAIN CONFIGURATION OF THE ENTIRE LINEUP. KEY INTERLOCK REQUIRED BETWEEN MAIN AND TIE BREAKERS TO PREVENT PARALLEL CONNECTION OF UPSTREAM SOURCES.

## LEGEND:

K KIRK KEY INTERLOCK

## KEY NOTES:

1. MAIN BREAKER IS C/W ELECTRONIC TYPE LSI TRIP UNIT, 100% RATED. INCOMING CABLES TO BE TOP ENTRY. ADDITIONAL 127mm (5-INCH) WIREWAY WIDTH PROVIDED TO ACCOMMODATE CABLES.
2. DIGITAL METERING CUBICLE PROVIDED C/W POWERLOGIC METER TO INTERFACE WITH PLANT NETWORK. FOR CURRENT AND VOLTAGE MEASUREMENTS, THE METERING CUBICLE INCLUDES 3-CT'S (400:5A) AND UTILIZES FUSED 600VAC VOLTAGE INPUTS (NO PT'S) ALONG WITH FT1 TEST BLOCK.
3. THE BUS TRANSITION BETWEEN MCC'S IS THROUGH THE BACK BETWEEN THE TIE BREAKER SECTION OF 743-MCC-14075 TO THE OPPOSING SECTION ON 743-MCC-14074.

SLD ELE-02-007 — LOCATION: EAST SCRUBBER BUILDING

**Motor Control Centre - Load Schedule** — MCC Ratings: **600 VAC, 3-Ph, 3-Wire, 600 A, 42 kAic (min.)** — MCC Designation: **743-MCC-14075**

| Equipment Tag Number | Description | Location | Device Location (in MCC) | Load Ratings: Power (HP, kW, kVA) | Load Ratings: Current (A) | Load Ratings: Phases (1 or 3) | Starter / Breaker Details: Manual | Magnetic | Size (NEMA) | Circuit Breaker Only | Comb.: Fuse | Comb.: Circuit Breaker (MCP) | Features: Overload Relay (SSOL) | Hand-Off-Au to (HOA) Sel. Sw. | Start/Stop Pushbutton | On-Off Sel. Sw. | Pilot Lights (L.E.D.) | Reset Pushbutton (for SSOL) | Other: | Other: | Subfeed Bkr / Fuse (A) | Feeder Details: Cable (Teck90) | Conduit / Wire | "Conductor Qty. and Size (AWG)" | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| - | Prepared Space | - | 5A | | | | | | | | | | | | | | | | | | N/A | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | |
| PCP-12130 | Glycol Pump | East Scrubber Electrical Room | 6A | 10 HP | | | | | | X | | | | | | | | | | | 15 | X | | 3C #10 (Power) | Connect to VFD integrally mounted to motor |
| PCP-77205 | Sump Pump #2 | East Scrubber Pump Room | 6B | 1 HP | | 3 Ph | | | 1 | | | | X | | | | X | X | | | By Mfr. | X | | 3C #12 (Power) | Connect to terminal box on existing motor (control shared with sump pump 1) |
| PCP-28536 | East Scrubber Chemical Recirc. Pump | Scrubber Room | 6C | 7.5 HP | | 3 Ph | | | 1 | | | | X | | | | X | X | | | By Mfr. | X | | 3C #10 (Power) 10C #14 (CONTROL) | Connect to terminal box on existing motor |
| | Temp. Trailer Facility | | 6D | | 100 | | | | | | | | | | | | | | | | | | | | |
| - | Prepared Space | - | 6E | | | | | | | | | | | | | | | | | | N/A | | | | |
| TFR-81950 | 30 kVA Transformer | Flare Bldg. Elec. Room | 6F | 30 kVA | | 3 Ph | | | | X | | | | | | | | | | | 40 | | | 3C #4 (Power) | |
| XUH-50002 | Unit Heater | Main Room | 6G | 7.5 kVA | | 3 Ph | | | | X | | | | | | | | | | | 15 | | | 3C #12 (Power) | |
| | | | | | | | | | | | | | | | | | | | | | | | | | |
| - | Devicenet Connector | - | 7A | | | | | | | | | | | | | | | | | | | | | | |
| GEF-47150 | East Scrubber Blower | Scrubber Room | 7B | 75 HP | | 3 Ph | | | 4 | | | | X | | | | X | X | | | By Mfr. | X | | 3C #3 (Power) 10C #14 (CONTROL) | Connect to conduit on North wall of pump room, new control cable remote HOA/E-stop at pump. |
| - | Prepared Space | | 7C | | | | | | | | | | | | | | | | | | | | | | |
| - | Prepared Space | | 7D | | | | | | | | | | | | | | | | | | | | | | |
| - | Prepared Space | - | 7E | | | | | | | | | | | | | | | | | | N/A | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | |
| 743-BKR-76912 | Main Breaker | - | 8A | | 400 | 3 Ph | | | | X | | | | | | | | | | | 400 | | | | Main Breaker for 743-MCC-14075, 400AT/800AF, Electronic Trip [LSI] |
| - | Digital Power Meter | | 8B | | | | | | | | | | | | | | | | | | | | | | |
| - | Prepared Space | | 8C | | | | | | | | | | | | | | | | | | | | | | |
| - | Prepared Space | | 8D | | | | | | | | | | | | | | | | | | | | | | |

| REFERENCE DRAWING: DRAWING No. | DRAWING TITLE |
|---|---|
| ELE-02-743F-R0 | MOTOR CONTROL CENTRE SCHED. EAST SCRUBB. BLDG. 743-MCC-14075 (NORM.) |

| REVISION: Rev. | DATE | DESCRIPTION | BY | DES. | CHK. | ENG. |
|---|---|---|---|---|---|---|
| 0A | 30-AUG-2024 | ISSUED FOR 90% DESIGN | EGD | AMG | JA | AMG |
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ENGINEERING STAMP

PROFESSIONAL ENGINEER ANDREW M. GRESCHNER ALBERTA
2024-11-24

CONSULTANT LOGO

Stantec

300-10220 103 Avenue NW
Edmonton AB T5J 0K4 CA
www.stantec.com



EPCOR

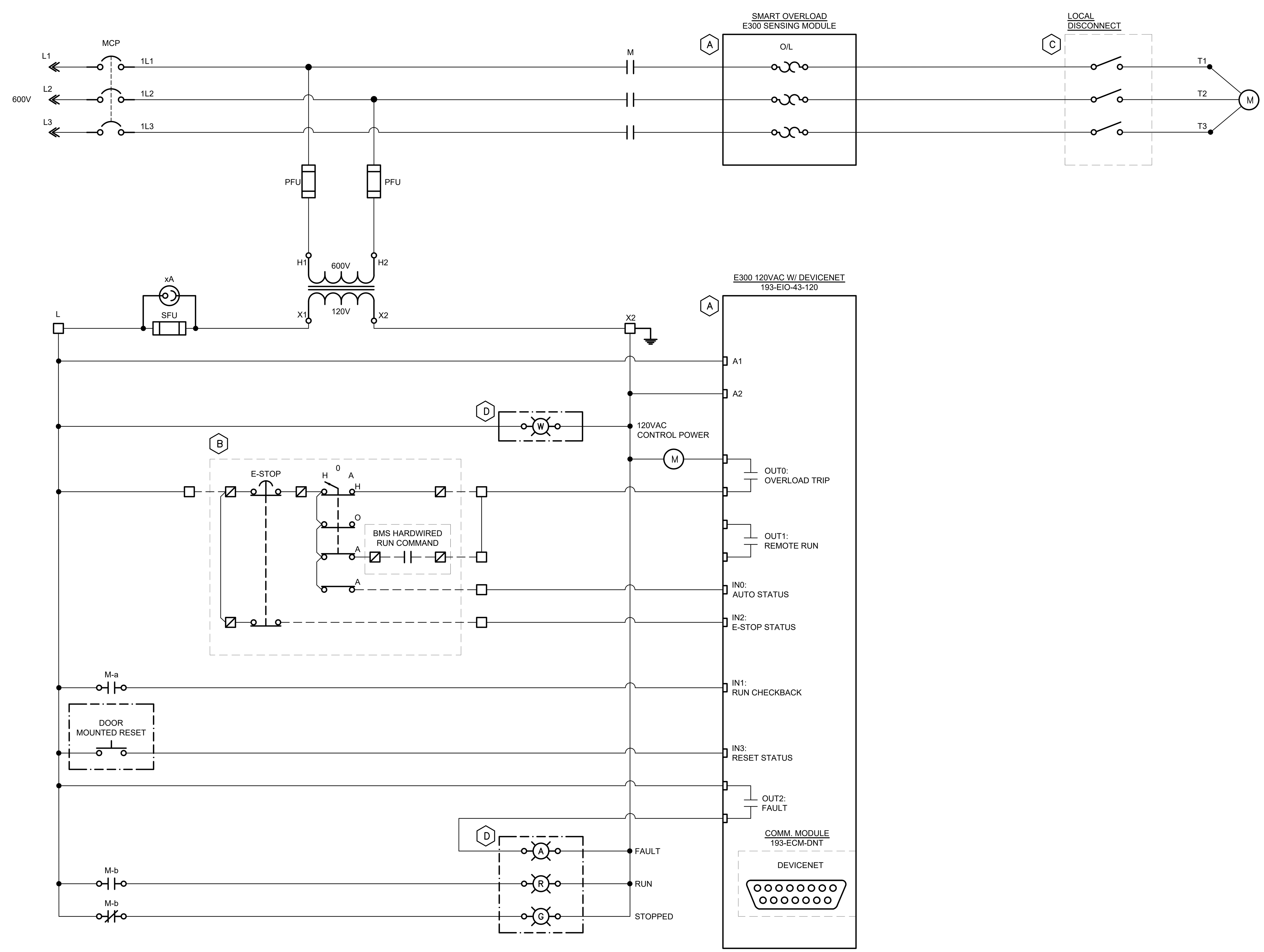
PLANT SITE: GOLD BAR WWTP — PLANT AREA: PLANT WIDE

PROJECT NAME: GBWWTP FLARE CAPACITY EXPANSION

DRAWING TITLE: ELECTRICAL MOTOR CONTROL CENTRE SCHEDULE EAST SCRUBBER BLDG. 743-MCC-14075 (NORMAL)

| CONSULTANT JOB No. | EPCOR PROJECT No. | SCALE | SHEET | DRAWING NUMBER |
|---|---|---|---|---|
| 1101000105 | PMO 1004723; PF14-015 | NOT TO SCALE | - OF - | PRJ-15-157-662 |

## MOTOR CONTROL CENTRE




## MAJOR COMPONENT LIST

- (A) INTELLIGENT STARTER/MOTOR PROTECTION RELAY
- (B) REMOTE FIELD-MOUNTED LOCAL CONTROL STATIONS.
- (C) FIELD-MOUNTED MOTOR SAFETY DISCONNECT SWITCH.
- (D) LOCAL PUSH TO TEST PILOT LIGHTS. ALL ASSOCIATED CONTROL COMPONENT, INTERNAL WIRING, AND TERMINAL BLOCKS SHALL BE INCLUDED IN MCC DOOR BY MCC VENDOR.

## LEGEND

- FIELD-MOUNTED DEVICE; CONTROL WIRING TO/FROM DEVICE SHALL BE HARD-WIRED AS INDICATED
- DEVICE TO BE MOUNTED ON MCC DOOR
- TERMINAL LOCATED IN FIELD-MOUNTED PANEL, ENCLOSURE OR DEVICE
- TERMINAL LOCATED IN STARTER CABINET

## FUNCTION LOGIC TABLE

| HS-1: HOA SWITCH | OPERATING FUNCTIONALITY |
|---|---|
| H: HAND | RUNNING |
| O: OFF | STOP/DISABLE |
| A: AUTO | CONTROL BY HARDWIRED CONNECTION TO BMS |

## GENERAL NOTES

1. ALL FUNCTIONALITY INDICATED OR IMPLIED BY THIS DRAWING IS TO BE PROVIDED, INCLUDING ANY AUXILIARY EQUIPMENT AND CONNECTIONS REQUIRED FOR FULL AND RELIABLE OPERATION OF THE STARTER AND THE CONTROLLED MOTOR LOAD.
2. SUPPLIER IS RESPONSIBLE TO ENSURE ALL DEVICES SUPPLIED IN THE MCC PACKAGE ARE ADEQUATELY SIZED, RATED, AND SUITED FOR THEIR INTENDED APPLICATION.
3. THIS WIRING DIAGRAM IS PROVIDED TO SCHEMATICALLY DESCRIBE THE INTENDED FUNCTIONALITY OF A TYPICAL MOTOR CONTROL UNIT; REFER TO SPECIFICATIONS SECTION 16225 FOR ADDITIONAL INFORMATION. MCC SUPPLIER SHALL PROVIDE A UNIQUE WIRING SCHEMATIC FOR EACH INDIVIDUAL MOTOR CONTROL UNIT WITH SHOP DRAWING PACKAGE. CONTRACTOR SHALL PRODUCE RED LINED MARK-UPS OF ALL WIRING SCHEMATICS DURING CONSTRUCTION AND SUBMIT TO MCC SUPPLIER FOR INCORPORATION INTO AS-BUILT SCHEMATICS. THE CONTRACTOR IS RESPONSIBLE FOR COORDINATING ANY CHANGES THAT MAY BE REQUIRED TO THE TYPICAL SCHEMATIC TO SUIT EXISTING INSTALLATION AND/OR UNIQUE CONTROL REQUIREMENTS OF INDIVIDUAL LOADS.
4. FAULT OUTPUT TO CLOSE ON OVERLOAD AND ON STARTER FAULT.

REFERENCE DRAWING

| DRAWING No. | DRAWING TITLE |
|---|---|
| | |

REVISION

| Rev. | DATE | DESCRIPTION | BY | DES. | CHK. | ENG. |
|---|---|---|---|---|---|---|
| 0A | 30-AUG-2024 | ISSUED FOR 90% DESIGN | EGD | AMG | JA | AMG |
| 0B | 15-NOV-2024 | ISSUED FOR CONSTRUCTION | EGD | AMG | JA | AMG |

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PERMIT NUMBER: P000258
The Association of Professional Engineers and Geoscientists of Alberta (APEGA)

ENGINEERING STAMP

PROFESSIONAL ENGINEER ALBERTA
ANDREW M. GRESCHNER
ID: 107144
2024-11-24

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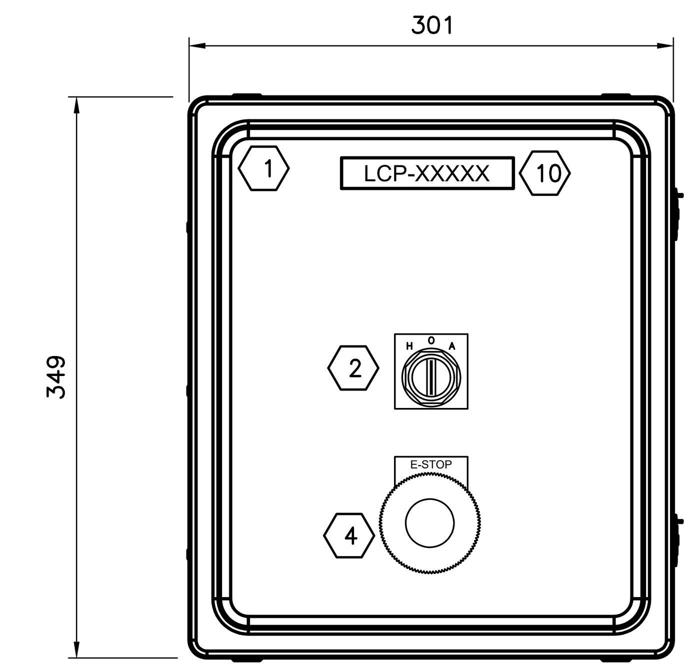
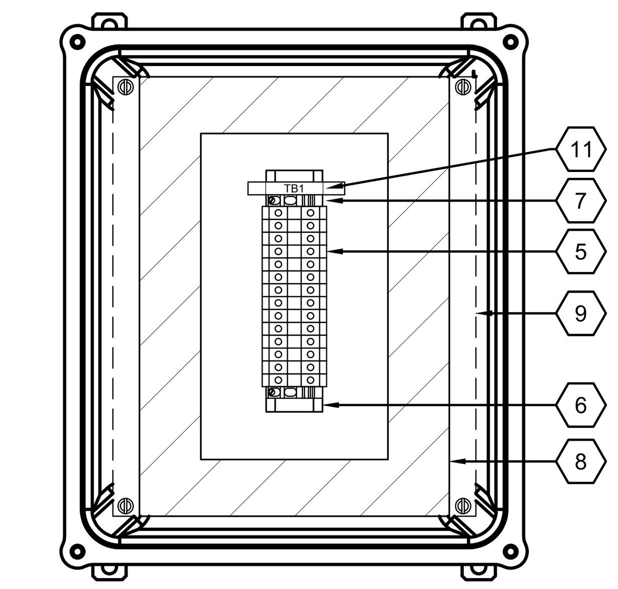
EPCOR

PLANT SITE: GOLD BAR WWTP
PLANT AREA: PLANT WIDE
PROJECT NAME: GBWWTP FLARE CAPACITY EXPANSION
DRAWING TITLE: ELECTRICAL GEF-81937 WIRING DIAGRAM

| CONSULTANT JOB No. | EPCOR PROJECT No. | SCALE | SHEET | DRAWING NUMBER |
|---|---|---|---|---|
| 1101000105 | PMO 1004723; PF14-015 | NOT TO SCALE | - OF - | PRJ-15-157-671 |




FRONT PANEL LAYOUT




INTERNAL PANEL LAYOUT

| BILL OF MATERIALS | | | | |
|---|---|---|---|---|
| ITEM NO. | DESCRIPTION | MANUFACTURER | MODEL | QTY. |
| 1 | ENCLOSURE - NEMA 4X RATED, HEAVY-DUTY, FIBREGLASS REINFORCED POLYESTER - INDOOR ONLY (OR STAINLESS STEEL), WALL MOUNTABLE, LOCKABLE C/W STAINLESS STEEL HARDWARE AND BACK PANEL | HAMMOND | PJ SERIES (1414N4SS) | 1 |
| 2 | 30.5mm NEMA 4X, 3 POSITION ROTARY SELECTOR SWITCH c/w LEGEND PLATE. | ALLEN BRADLEY | 800H SERIES | 1 |
| 3 | NOT USED | - | - | - |
| 4 | 30.5mm NEMA 4X, TWIST RELEASE, RED 60MM PLASTIC HEAD, c/w LEGEND PLATE | ALLEN BRADLEY | 800H SERIES | 1 |
| 5 | FEED THROUGH TERMINAL BLOCK. | WEIDMULLER | 800H SERIES | LOT |
| 6 | DIN RAIL. | WEIDMULLER | TS35 | LOT |
| 7 | END PLATE | WEIDMULLER | - | 2 |
| 8 | 32mm WIDE LIGHT GREY WIREWAY | PANDUIT | - | LOT |
| 9 | BACK PANEL. | - | - | 1 |
| 10 | LAMACOID NAMEPLATE. BLACK LETTERING, WHITE BACKGROUND. | - | - | 1 |
| 11 | LABEL CARRIER | WEIDMULLER | - | 1 |

NOTES

1. ENCLOSURE MODEL FOR STAINLESS STEEL SHOWN IN BRACKETS. ALTERNATE ENCLOSURE AND COMPONENT MANUFACTURER'S REQUIRED ENGINEER'S APPROVAL.
2. THE CONTRACTOR SHALL PROVIDE A SUFFICIENT AMOUNT OF ITEMS IDENTIFIED AS 'LOT' IN THE QTY. COLUMN AS REQUIRED BY THE DESIGN.
3. "ITEM No." SYMBOLS ARE SHOWN ONCE ON PANEL LAYOUTS; HOWEVER THEY APPLY TO ALL INSTANCES OF THE IDENTIFIED ITEMS.
4. ONLY MAJOR COMPONENTS ARE INDICATED. ALL OTHER ITEMS OBVIOUSLY REQUIRED OR IMPLIED BY THE LAYOUT NECESSARY FOR A COMPLETE AND FUNCTIONING, SYSTEM SHALL BE PROVIDED.
5. THE INDICATED LAYOUT IS BASED ON THE PRODUCTS SPECIFIED ABOVE. FINAL LAYOUT AND PANEL SIZE SHALL BE DETERMINED AT THE TIME OF SHOP DRAWINGS AND SHALL BE BASED UPON SELECTED PRODUCTS.

1
- | -

UNCLASSIFIED FVNR LOCAL CONTROL STATION

1:4

| REFERENCE DRAWING | | REVISION | | | | | | |
|---|---|---|---|---|---|---|---|---|
| DRAWING No. | DRAWING TITLE | Rev. | DATE | DESCRIPTION | BY | DES. | CHK. | ENG. |
| | | 0A | 30-AUG-2024 | ISSUED FOR 90% DESIGN | EGD | AMG | JA | AMG |
| | | 0B | 15-NOV-2024 | ISSUED FOR CONSTRUCTION | EGD | AMG | JA | AMG |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

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2024-11-24

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EPCOR

PLANT SITE: GOLD BAR WWTP
PLANT AREA: PLANT WIDE
PROJECT NAME: GBWWTP FLARE CAPACITY EXPANSION
DRAWING TITLE: ELECTRICAL
TYPICAL CONTROL STATION LAYOUT
FVNR: UNCLASSIFIED

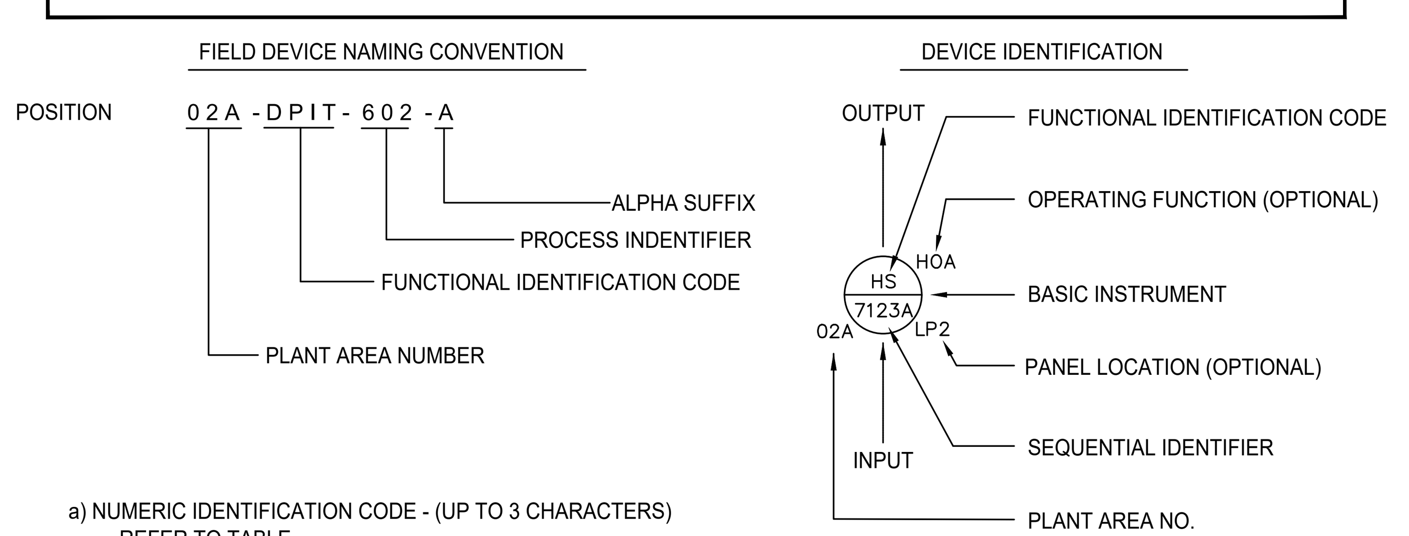
| CONSULTANT JOB No. | EPCOR PROJECT No. | SCALE | SHEET | DRAWING NUMBER |
|---|---|---|---|---|
| 1101000105 | PMO 1004723; PF14-015 | NOT TO SCALE | - OF - | PRJ-15-157-672 |

## FUNCTIONAL IDENTIFICATION CODES

| | FIRST LETTER (4) | | SUCCEEDING-LETTERS (3) | | | DESCRIPTION |
|---|---|---|---|---|---|---|
| | MEASURED OR INITIATING VARIABLE | MODIFIER | READOUT OR PASSIVE FUNCTION | OUTPUT FUNCTION | MODIFIER | I/O TYPES - TYPICAL POINT TYPES |
| A | ANALYSIS | | ALARM | | | DI |
| B | BURNER, COMBUSTION | | | CLOSE-STOP DECREASE | | DO |
| C | CONDUCTIVITY, pH (ACIDITY) | | CLOSE | CONTROL OR CONTROLLER | | DI/AO |
| D | DENSITY | DIFFERENTIAL | | OPEN-START-INCREASE | | DO |
| E | VOLTAGE | | SENSOR (PRIMARY ELEMENT) | | | |
| F | FLOW | RATIO (FRACTION) | | | FAIL | DI |
| G | GAS, GAUGING (DIMENSIONAL) | | GLASS VIEWING DEVICE | | | |
| H | HAND | | | | H-HIGH-(ALARM) HH-HIGH- (SHUTDOWN) | DI |
| I | CURRENT (ELECTRICAL) | | INDICATE | | | AI |
| J | POWER | SCAN | | | | DO/AI |
| K | TIME, TIME SCHEDULE | TIME RATE OF CHANGE | | CONTROL STATION | | DO/AO |
| L | LEVEL | | LIGHT | | L-LOW-(ALARM) LL-LOW- (SHUTDOWN) | DI |
| M | MOTOR | MOMENTARY | ON OR OPERATE | | MIDDLE, INTERMEDIATE | DI |
| N | USER'S CHOICE | | | START/STOP-OPEN/CLOSE ON/OFF | | DO |
| O | TORQUE | | OPEN ORIFICE, RESTRICTION POINT TEST) CONNECTION | | OVERLOAD | DO |
| P | PRESSURE, VACUUM | | | PNEUMATIC | | |
| Q | QUANTITY | INTEGRATE, TOTALIZE | | INTEGRATE OR TOTALIZE | | DI/AI |
| R | RADIATION | | RECORD | | | AI |
| S | SPEED, FREQUENCY | SAFETY | | SWITCH, OR SAFETY | | DI/DO |
| T | TEMPERATURE | | | TRANSMIT | | AI |
| U | MULTIVARIABLE | | MULTIFUNCTION | MULTIFUNCTION | MULTIFUNCTION | DI |
| V | VIBRATION, VISCOSITY, MECHANICAL ANALYSIS | | | VALVE, DAMPER, LOUVRE | | |
| W | WEIGHT, FORCE | | WELL | | | |
| X | ON/OFF | X AXIS | UNCLASSIFIED | UNCLASSIFIED | UNCLASSIFIED | DI/DO |
| Y | EVENT, STATE, PRESENCE | Y AXIS | | RELAY, COMPUTE, CONVERT | USER'S CHOICE | |
| Z | POSITION, DIMENSION | Z AXIS | | DRIVER, ACTUATOR, UNCLASSIFIED - FINAL CONTROL ELEMENT | | |

## TYPICAL INSTRUMENT IDENTIFICATION

NOTE: IN ADDITION TO THE REQUIREMENTS DETAILED BELOW, REFER TO DIGITAL POINT NAMING CONVENTIONS WHEN INSTRUMENT INTERFACES TO DSC

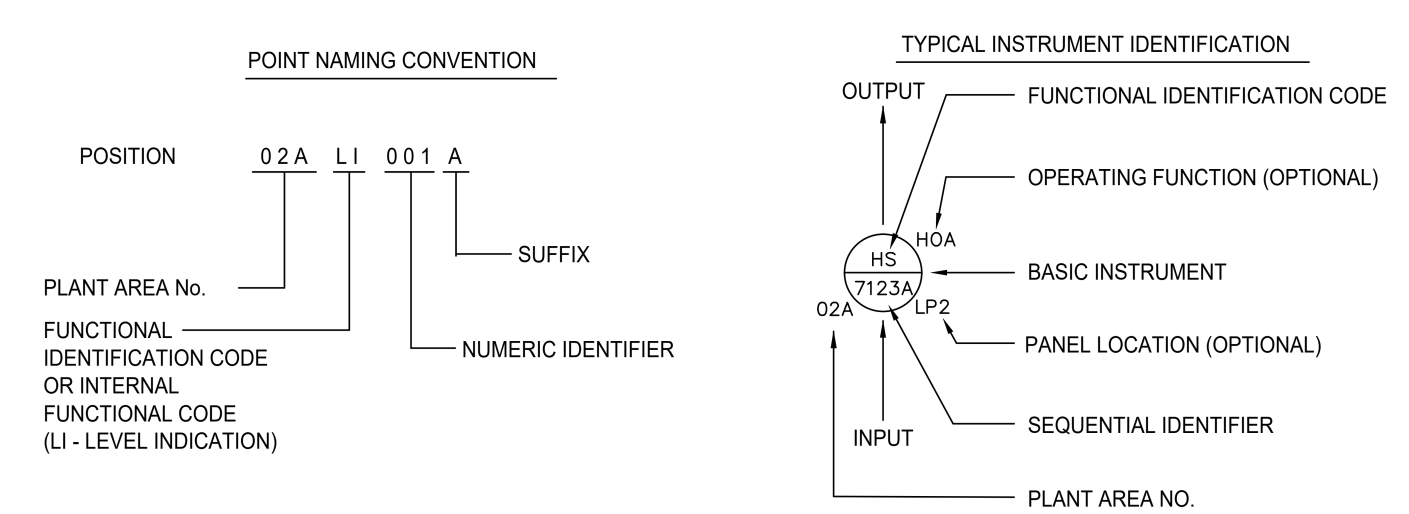



a) NUMERIC IDENTIFICATION CODE - (UP TO 3 CHARACTERS)
- REFER TO TABLE

b) PROCESS IDENTIFIER - (3 NUMERALS)
- TYPICALLY SIMILAR NUMBERS AS ASSOCIATED LINE OR EQUIPMENT.
- CHARACTER SUFFIX IN POSITION 12 IS INCREMENTED TO DIFFERENTIATE SIMILAR DEVICES.

## DIGITAL POINT NAMING CONVENTION

NOTE: ALL DEVICES INTERFACED WITH DCS MUST FOLLOW THE DIGITAL POINT NAMING CONVENTION.




## INSTRUMENT OPERATING FUNCTIONS

### ANALYTICAL FUNCTIONS

| | |
|---|---|
| LEL | LOWER EXPLOSIVE LIMIT |
| $H_2S$ | HYDROGEN SULFIDE |
| pH | pH |
| TSS | TOTAL SUSPENDED SOLIDS |
| SPEC | MULTIVARIABLE ANALYZER |

### SWITCHING FUNCTIONS

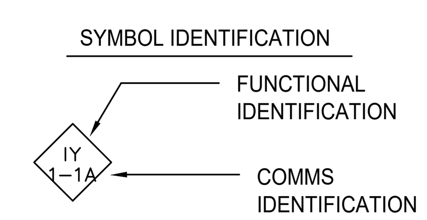
| | |
|---|---|
| A/B | POS. A - POS. B |
| HOR | HAND-OFF-REMOTE SELECTION |
| C/O | CLOSED-OPEN |
| SPEED SEL | SPEED SELECTION |
| OSC | OPEN-STOP-CLOSE SELECTION |
| O/O | ON-OFF SELECTION |
| LOR | LOCAL-OFF REMOTE SELECTION |
| ESD | EMERGENCY SHUTDOWN |
| ACK | ACKNOWLEDGE (ALARM) |
| F/R | FORWARD-REVERSE |
| POT | POTENTIOMETER |

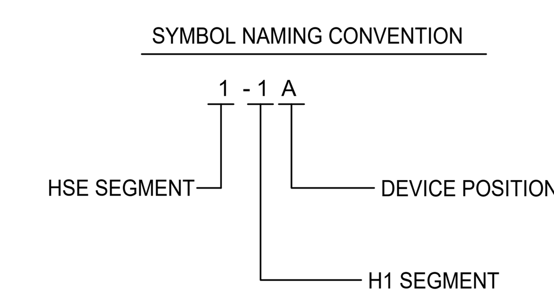
### OTHER FUNCTIONS

| | |
|---|---|
| D/P | DIFFERENTIAL PRESSURE |
| IXP | CURRENT TO PRESSURE |
| IBD | INBOARD BEARING |
| OBD | OUTBOARD BEARING |
| VIB | VIBRATION |
| OL | OVERLOAD |
| TOR | TORQUE |

## INSTRUMENT AND FUNCTION SYMBOLS

| No. | SHARED DISPLAY, SHARED CONTROL - A: PRIMARY CHOICE OR BASIC PROCESS CONTROL SYSTEM | SHARED DISPLAY, SHARED CONTROL - B: ALTERNATE CHOICE OR SAFETY INSTRUMENTED SYSTEM | C: COMPUTER SYSTEMS AND SOFTWARE | D: DISCRETE | LOCATION & ACCESSIBILITY |
|---|---|---|---|---|---|
| 1 | | | | | • LOCATED IN FIELD.<br>• NOT PANEL, CABINET, OR CONSOLE MOUNTED.<br>• VISIBLE AT FIELD LOCATION.<br>• NORMALLY OPERATOR ACCESSIBLE. |
| 2 | | | | | • LOCATED IN OR ON FRONT OF CENTRAL OR MAIN PANEL OR CONSOLE.<br>• VISIBLE ON FRONT OF PANEL OR ON VIDEO DISPLAY.<br>• NORMALLY OPERATOR ACCESSIBLE AT PANEL FRONT OR CONSOLE. |
| 3 | | | | | • LOCATED IN REAR OF CENTRAL OR MAIN PANEL.<br>• LOCATED IN CABINET BEHIND PANEL.<br>• NOT VISIBLE ON FRONT OF PANEL OR ON VIDEO DISPLAY.<br>• NOT NORMALLY OPERATOR ACCESSIBLE AT PANEL OR CONSOLE. |
| 4 | | | | | • LOCATED IN OR ON FRONT OF SECONDARY OR LOCAL PANEL OR CONSOLE.<br>• VISIBLE ON FRONT OF PANEL OR ON VIDEO DISPLAY.<br>• NORMALLY OPERATOR ACCESSIBLE AT PANEL FRONT OR CONSOLE. |
| 5 | | | | | • LOCATED IN REAR OF SECONDARY OR LOCAL PANEL.<br>• LOCATED IN FIELD CABINET.<br>• NOT VISIBLE ON FRONT OF PANEL OR ON VIDEO DISPLAY.<br>• NOT NORMALLY OPERATOR ACCESSIBLE AT PANEL OR CONSOLE. |




## INSTRUMENT SIGNAL SYMBOLS

- INSTRUMENT SUPPLY, PROCESS TAPS
- PNEUMATIC SIGNAL
- ELECTRIC SIGNAL
- ELECTROMAGNETIC OR SONIC SIGNAL (GUIDED)
- ELECTROMAGNETIC OR SONIC SIGNAL (UNGUIDED)
- COMMUNICATION SIGNAL (DEVICENET, FOUNDATION FIELDBUS)

## LINE DESIGNATIONS

| | |
|---|---|
| ES | ELECTRIC POWER SUPPLY 120 VAC 60 HZ (UNLESS OTHERWISE NOTED) |
| SA | SERVICE AIR SUPPLY |
| IA | INSTRUMENT QUALITY AIR SUPPLY |
| EW | WATER SUPPLY EW, PW, ETC. |

## MISCELLANEOUS SYMBOLS

- I — INTERLOCK - SEE CONTROL STRATEGY DESCRIPTION
- R — RESET FOR LATCH-TYPE OPERATOR
- GROUND
- ANNUNCIATOR HORN
- BOND
- INSTRUMENT LOOP SHIELD GROUND
- DIGITAL INPUT
- ANALOG INPUT
- DIGITAL OUTPUT
- ANALOG OUTPUT

## GENERAL NOTES

| REFERENCE DRAWING | |
|---|---|
| DRAWING No. | DRAWING TITLE |
| | |

| Rev. | DATE | DESCRIPTION | BY | DES. | CHK. | ENG. |
|---|---|---|---|---|---|---|
| 0A | 21-JUN-2023 | ISSUED FOR PRELIMINARY DESIGN | JM | JG | MM | JG |
| 0B | 26-APR-2024 | ISSUED FOR 60% DESIGN | JFA | JFA | BP | JG |
| 0C | 28-AUG-2024 | ISSUED FOR 90% DESIGN | OL | JG | BP | JG |
| 0D | 15-NOV-2024 | ISSUED FOR CONSTRUCTION | MC | JG | BC | JG |

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ENGINEERING STAMP

PROFESSIONAL ENGINEER JOVLYN GRAY ALBERTA
ID#115821 2024-11-25

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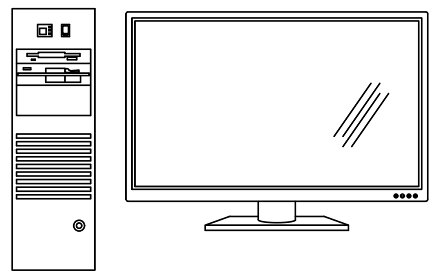
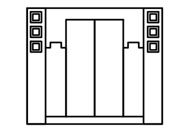
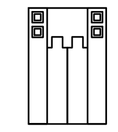
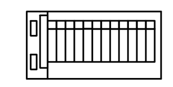
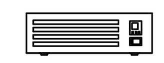
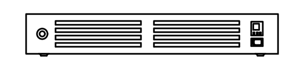
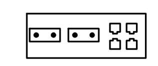
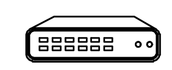
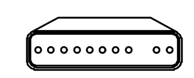
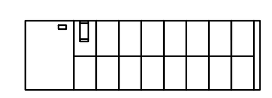
EPCOR

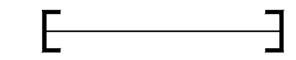
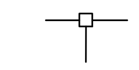
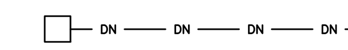
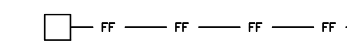
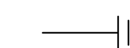
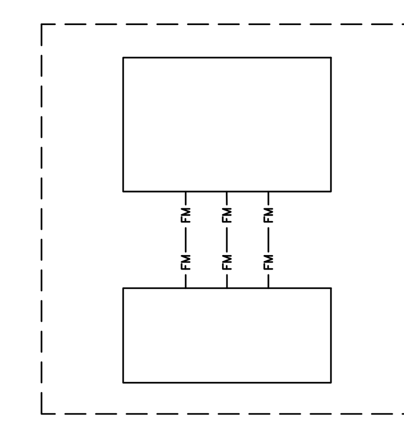
| | | | | |
|---|---|---|---|---|
| PLANT SITE: GOLD BAR WWTP | | PLANT AREA: PLANT WIDE | | |
| PROJECT NAME: GBWWTP FLARE CAPACITY EXPANSION | | | | |
| DRAWING TITLE: INSTRUMENTATION SYMBOLS, LEGENDS AND ABBREVIATIONS - SHEET 1 | | | | |
| CONSULTANT JOB No. | EPCOR PROJECT No. | SCALE | SHEET | DRAWING NUMBER |
| 1101000105 | PMO 1004723; PF14-015 | NOT TO SCALE | 1 OF 3 | PRJ-15-157-701 |

## INSTRUMENTATION & CONTROL ARCHITECTURE SYMBOLS

| Symbol | Description |
|---|---|
|  | LOCAL OPERATOR INTERFACE |
|  | ENGINEERING WORKSTATION |
|  | DELTAV OPERATOR WORKSTATION |
|  | DELTAV PK CARRIER AND CONTROLLER |
|  | DELTAV CIOC2 CARRIER |
|  | DELTAV CHARM I/O |
|  | MISC. NETWORK EQUIPMENT - REFER TO LABEL |
|  | 19" RACK MOUNT COMPUTER / SERVER |
|  | MULTI PORT SWITCH |
|  | MANAGED ETHERNET NETWORK SWITCH |
|  | MISCELLANEOUS NETWORK EQUIPMENT SEE INSTANCE FOR PURPOSE |
|  | PLC CONTROLLER |
|  | GENERATOR |
| AAA XXXXX BBB | CONTINUATION TAG |



## LINETYPES AND BORDERS:

| Symbol | Description |
|---|---|
|  | EQUIPMENT BOUNDARY OUTLINE |
|  | NETWORK CONNECTION |
|  | DELTA V LOCAL CONNECTION |
|  | DEVICENET DP SEGMENT CONNECTION |
|  | FOUNDATION FIELDBUS SEGMENT |
|  | GROUND |
|  | SHIELD NOT CONNECTED |
|  | DIVIDE LINE |
|  | FIBER OPTIC CABLE, SINGLE MODE |
|  | FIBER OPTIC CABLE, MULTI MODE |
|  | FIBRE OPTIC PATCH CABLE |
|  | HARDWIRED I/O CONNECTION |
|  | POWER OVER ETHERNET |
|  | CATEGORY 6 ETHERNET |
|  | FADED INDICATES FUTURE EQUIPMENT |

| REFERENCE DRAWING | | REVISION | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| DRAWING No. | DRAWING TITLE | Rev. | DATE | DESCRIPTION | BY | DES. | CHK. | ENG. |
| | | 0A | 21-JUN-2023 | ISSUED FOR PRELIMINARY DESIGN | JM | JG | MM | JG |
| | | 0B | 26-APR-2024 | ISSUED FOR 60% DESIGN | JFA | JFA | BP | JG |
| | | 0C | 28-AUG-2024 | ISSUED FOR 90% DESIGN | OL | JG | BP | JG |
| | | 0D | 15-NOV-2024 | ISSUED FOR CONSTRUCTION | MC | JG | BC | JG |

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PROFESSIONAL ENGINEER JOYLYN GRAY ALBERTA
ID#115821 2024-11-25


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EPCOR

PLANT SITE: GOLD BAR WWTP | PLANT AREA: PLANT WIDE

PROJECT NAME: GBWWTP FLARE CAPACITY EXPANSION

DRAWING TITLE: INSTRUMENTATION SYMBOLS, LEGENDS AND ABBREVIATIONS - SHEET 2

| CONSULTANT JOB No. | EPCOR PROJECT No. | SCALE | SHEET | DRAWING NUMBER |
|---|---|---|---|---|
| 1101000105 | PMO 1004723; PF14-015 | NOT TO SCALE | 2 OF 3 | PRJ-15-157-702 |

## ELECTRICAL ABBREVIATIONS LIST

A - AMPERES
AJB - ANALOG JUNCTION BOX
ATS - AUTOMATIC TRANSFER SWITCH
AM - AMMETER

BP - BYPASS
BU - BATTERY UNIT
BK - CIRCUIT BREAKER
BMS - BUILDING MANAGEMENT SYSTEM

CEC - CANADIAN ELECTRICAL CODE
CJB - CONTROL JUNCTION BOX
COM - COMMON
CPU - COMPUTER
CSO - CLOSE-STOP-OPEN SWITCH
CT - CURRENT TRANSFORMER

DB - DISTRIBUTION PANELBOARD
DM - DIGITAL POWER METER
DS - SAFETY DISCONNECT SWITCH
DN - DEVICENET

ESD - EMERGENCY STOP DEVICE

FB - FIRE ALARM PANEL
FIR - FIXED INFRARED
F/R - FORWARD/REVERSE SWITCH
FVNR - FULL VOLTAGE NON-REVERSIBLE STARTER
FVR - FULL VOLTAGE REVERSIBLE STARTER
FOPP - FIBER OPTIC PATCH PANEL

GCS - GENERATION CONTROL SYSTEM
GND - GROUND
GN - GENERATOR
GR - GENERATOR, RECIPROCATING ENGINE
GT - GENERATOR, TURBINE ENGINE

HMI - HUMAN MACHINE INTERFACE
HOA - HAND-OFF-AUTO SWITCH
HS - HAND SWITCH

IEC - IEC 61850 COMMUNICATION STANDARD
IED - INTELLIGENT ELECTRONIC DEVICES
I/O - INPUT/OUTPUT

kA - KILO-AMPERES
kVA - KILOVOLT-AMPERES
kV - KILOVOLTS
kW - KILOWATTS

L - LINE
LB - LIGHTING DISTRIBUTION PANELBOARD
LCP - LOCAL CONTROL PANEL
LKB - LIGHTING CONTROL PANEL

M - MOTOR
MB - MODBUS - TCP
MC - MOTOR CONTROL CENTRE
MCP - MOTOR CIRCUIT PROTECTOR
MGB - MAIN GROUND BUS
MH - ELECTRICAL MANHOLE
MS - MOTOR START
MTS - MANUAL TRANSFER SWITCH
MVA - MEGAVOLT-AMPERES

MW - MEGAWATTS
MZ - MAGNETIC MOTOR STARTER

N - NEUTRAL
N.C. - NORMALLY CLOSED
NET - NETWORK/COMMUNICATION EQUIPMENT
NL - NIGHT LIGHT, NOT SWITCHED
N.O. - NORMALLY OPEN

O/L - OVERLOAD

PCC - POINT OF COMMON COUPLING
PF - POWER FACTOR
PFM - POWER FACTOR METER
PLC - PROGRAMMABLE LOGIC CONTROLLER
PMG - PERMANENT MAGNET GENERATOR
PNL - PANEL
PSH - HIGH PRESSURE SWITCH
PT - POTENTIAL TRANSFORMER
PTZ - PAN-TILT-ZOOM

RIO - REMOTE INPUT AND OUTPUT
RLY - RELAY (IED)
RTD - RESISTANCE TEMPERATURE DETECTOR
RTU - REMOTE TERMINAL UNIT

SCADA - SUPERVISORY CONTROL AND DATA ACQUISITION
SDP - STEERING DIODE PANEL
SG - SWITCHGEAR
SIT - SPEED INDICATING TRANSMITTER
SPD - SURGE PROTECTION DEVICE
SS - SPEED SWITCH
STS - STATIC TRANSFER SWITCH

TDD(i) - TOTAL CURRENT DEMAND DISTRIBUTION
TU - TRIP UNIT

UPS - UNINTERRUPTIBLE POWER SUPPLY
UX - UPS DISTRIBUTION PANELBOARD

V - VOLTS
VARM - VOLT AMPERE REACTIVE METER
VDC - VOLTAGE (DIRECT CURRENT)
VF - VARIABLE FREQUENCY CONTROLLER
VFD - VARIABLE FREQUENCY DRIVE
VM - VOLT METER

WM - WATTMETER
WP - WEATHER PROOF
WSH - HIGH TORQUE SWITCH

XP - EXPLOSION PROOF
XF - TRANSFORMER

## INSTRUMENTATION & CONTROLS ABBREVIATIONS LIST

AI - ANALOG INPUT
AJB - ANALOG JUNCTION BOX
AO - ANALOG OUTPUT
AU - MAKE-UP AIR UNIT

CHARM - CHARACTERIZATION MODULE
CB - CONTROL CABINET/PANEL
CCTV - CLOSED CIRCUIT TELEVISION
CIOC2 - CHARM I/O 2
CSLC - CHARMS SMART LOGIC SOLVER
CTRL - DELTAV CONTROLLER

DCS - DISTRIBUTED CONTROL SYSTEM
DCC - DELTAV CONTROL CABINET
DI - DISCRETE INPUT
DMZ - DEMILITARIZED ZONE
DO - DISCRETE OUTPUT
DNS - DEVICENET SCANNER
DNJB - DEVICENET JUNCTION BOX

EF - EXHAUST FAN
ESD - EMERGENCY STOP DEVICE
ESW - UNMANAGED ETHERNET SWITCH
ECAB - ELECTRICAL CABINET

FM - FIBRE OPTIC MULTIMODE CABLE
FS - FIBRE OPTIC SINGLE MODE CABLE
FZ - FLAME SCANNER
FJB - FIBRE OPTIC CABLE JUNCTION BOX
FPP - FIBRE PATCH PANEL

GF - GROUND FAULT
GTW - NETWORK / GATEWAY CABINET

HMI - HUMAN MACHINE INTERFACE
HL - HAZARDOUS LOCATIONS
HVAC - HEATING VENTILATION AND COOLING

I/O - INPUT/OUTPUT

LCP - LOCAL CONTROL PANEL (LCP)
LOI - LOCAL OPERATOR INTERFACE

MB - MODBUS - TCP

NET - NETWORK COMMUNICATION EQUIPMENT

PDU - POWER DISTRIBUTION UNIT
PGH - POWER GENERATION AND HEATING
PLC - PROGRAMMABLE LOGIC CONTROLLER
PPH - PRIMARY PUMP HOUSE

RE - REMOVE EXISTING DEVICE
RIOC - REMOTE I/O CABINET
RL - RELOCATE EXISTING DEVICE

SIS - SAFETY INSTRUMENTAL SYSTEM

TDS - TERMINAL DOCKING STATION
TYP - TYPICAL

UB A - CONTROL BUILDING AND MAINTENANCE SHOP
UB B - UTILITY BUILDING EAST

UH - UNIT HEATER

WAP - WIRELESS ACCESS POINT
WWTP - WASTEWATER TREATMENT PLANT

## CABLE IDENTIFICATION SYSTEM

| EQUIPMENT TYPE | TAGGING METHODS | TAG CONTENT | SAMPLE TAG | SUG. SIZE |
|---|---|---|---|---|
| PUMPS | LAMICOID<br>BLACK TEXT ON WHITE<br>ATTACH TO PUMP BASE WITH ADHESIVE TAPE AND SCREWS | THE PUMP TAG NUMBER<br>THE DRIVER TAG NUMBER<br>FUNCTIONAL LOCATION<br>THE PROCESS EQUIPMENT NAME | PCP-19050 (MTR-19051)<br>DIGESTER SQUARE 1<br>SLUDGE TRANSFER PUMP | 6" x 1.5" |
| MCC TUBS | LAMICOID<br>BLACK TEXT ON WHITE<br>ATTACH TO CUBICLE WITH ADHESIVE TAPE AND SCREWS | THE DEVICE POWERED<br>THE DRIVEN PROCESS EQUIPMENT<br>THE PROCESS EQUIPMENT NAME | MTR-19051<br>(PCP-19050)<br>DIGESTER SQUARE 1<br>SLUDGE TRANSFER PUMP | 6" x 1.5" |
| VFDS | LAMICOID<br>BLACK TEXT ON WHITE<br>ATTACH TO CABINET WITH ADHESIVE TAPE AND SCREWS | THE VFD TAG<br>THE MOTOR AND DRIVEN EQUIPMENT TAG<br>THE PROCESS EQUIPMENT TAG | VFD-19052<br>PCP-19050 / MTR-19051<br>DIGESTER SQUARE 1<br>SLUDGE TRANSFER PUMP | 6" x 1.5" |
| JUNCTION BOXES | LAMICOID<br>BLACK TEXT ON WHITE<br>ATTACH TO JUNCTION BOX WITH ADHESIVE TAPE AND SCREWS | THE JUNCTION BOX NUMBER<br>A BRIEF DESCRIPTION | IJB-46952<br>FIELD BUS JUNCTION BOX | 3" x 1" |
| INTRUMENT POWER BOXES | LAMICOID<br>BLACK TEXT ON WHITE<br>ATTACH TO JUNCTION BOX WITH ADHESIVE TAPE AND SCREWS | IJP<br>LIGHTING PANEL NUMBER<br>CIRCUIT BREAKER NUMBER | IJB-EA-35<br>INSTRUMENT POWER JUNCTION BOX | 3" x 1" |
| LOOP CONDUCTOR | HEAT SHRINK<br>BLACK TEXT ON WHITE | LOOP FUNCTION<br>LOOP IDENTIFIER<br>WIRE IDENTIFIER | LT-0125A-1 | 1" x AS REQ. |
| CABLES | MYLAR OR ENGRAVED SS PUNCHED AT FOUR CORNERS FOR STRAPPING | FROM DEVICE<br>TO DEVICE<br>(THE "TO" DEVICE IS FURTHER IN THE FIELD. BOTH ENDS OF THE CABLE HAVE IDENTICAL TAGS) | FROM: MTP-499999<br>TO: LIT-9958 | 3" x 3/4" |
| VALVES | BODY STICKER OR ENGRAVED SS LABEL SIZE SHOULD BE APPROPRIATE TO LOCATION | LOOP FUNCTION<br>LOOP IDENTIFIER<br>WIRE IDENTIFIER | VMI-44569 | AS REQ. |

| REFERENCE DRAWING | |
|---|---|
| DRAWING No. | DRAWING TITLE |
| | |

| REVISION | | | | | | |
|---|---|---|---|---|---|---|
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| 0D | 15-NOV-2024 | ISSUED FOR CONSTRUCTION | MC | JG | BC | JG |

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JOYLYN GRAY
ID#115821 2024-11-25

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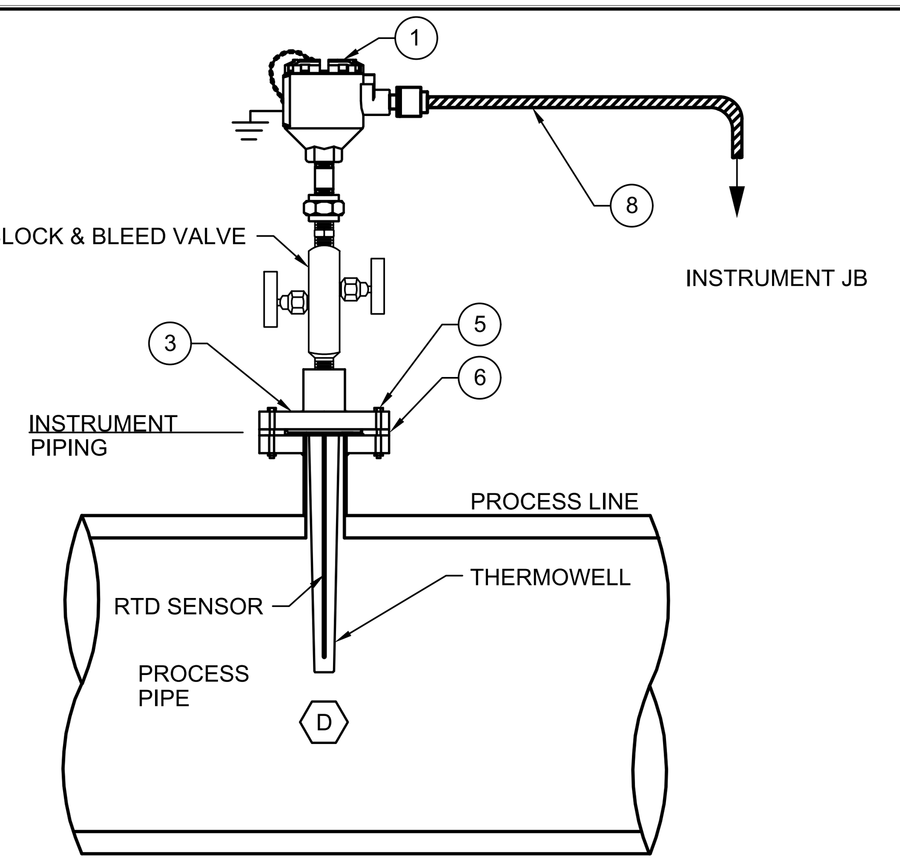
EPCOR

PLANT SITE: GOLD BAR WWTP
PLANT AREA: PLANT WIDE

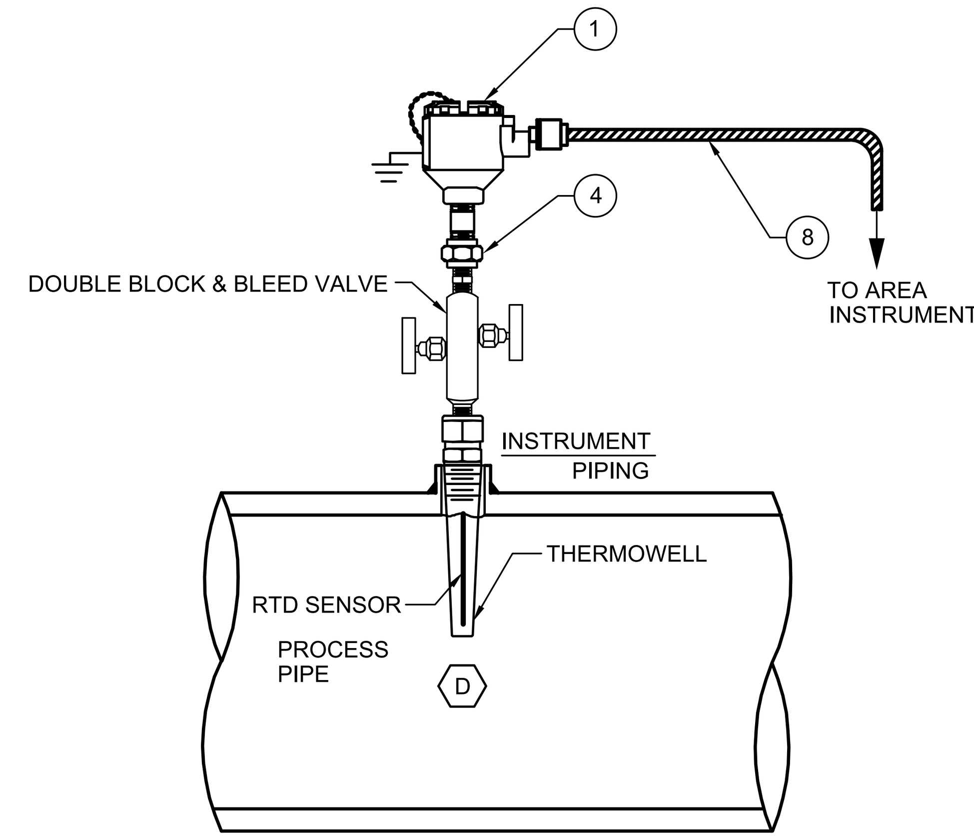
PROJECT NAME: GBWWTP FLARE CAPACITY EXPANSION

DRAWING TITLE: INSTRUMENTATION SYMBOLS, LEGENDS AND ABBREVIATIONS - SHEET 3

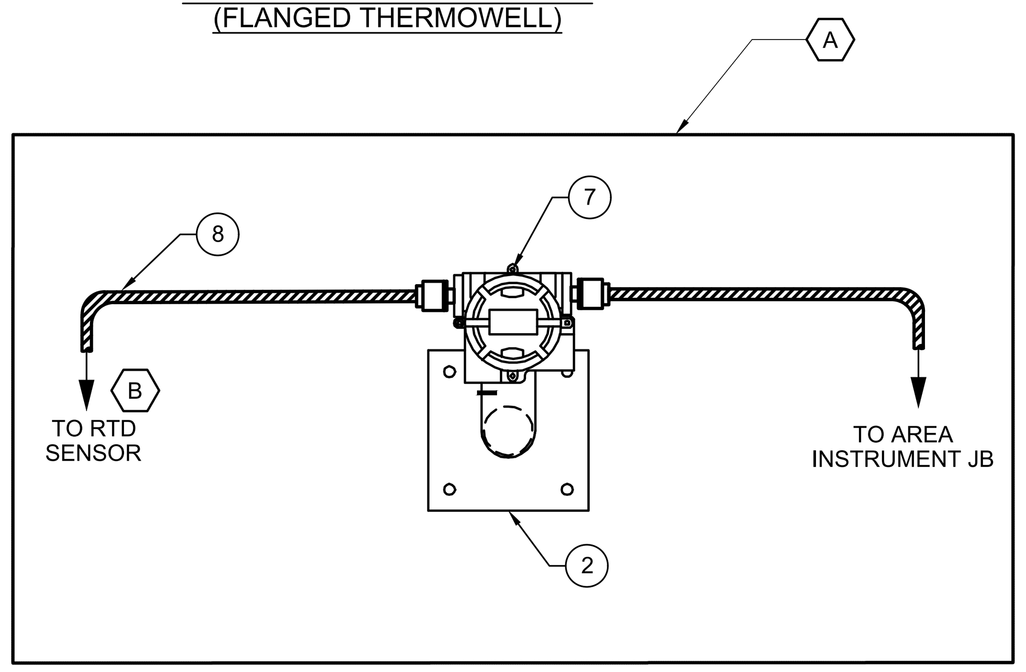
| CONSULTANT JOB No. | EPCOR PROJECT No. | SCALE | SHEET | DRAWING NUMBER |
|---|---|---|---|---|
| 1101000105 | PMO 1004723; PF14-015 | NOT TO SCALE | 3 OF 3 | PRJ-15-157-703 |




PIPE INSTALLED - INTEGRAL MOUNTED
TEMPERATURE TRANSMITTER
(FLANGED THERMOWELL)




PIPE INSTALLED - INTEGRAL MOUNTED
TEMPERATURE TRANSMITTER (THREADED THERMOWELL)




REMOTE MOUNTED TEMPERATURE TRANSMITTER FRONT VIEW

GENERAL NOTES:

1. PROVIDE MECHANICAL SUPPORT AND FITTINGS FOR ROUTED CONDUIT.
2. REFER TO P&IDS AND DATA SHEETS FOR PROCESS PIPING SIZE AND MATERIAL.
3. REFER TO MECHANICAL SECTIONS AND TANK DATA SHEETS FOR FLANGED NOZZLE SIZE AND MATERIAL.
4. WETTED MATERIALS SHALL BE CHEMICALLY INERT TO THE PROCESS.
5. REFER TO DIVISION 16 SPECIFICATIONS FOR FLEX AND RIGID CONDUIT MATERIAL AND USAGE LIMITATIONS.
6. USE SPRING-LOADED PROBE FOR THERMOWELL INSTALLATION.
7. APPLY SEALANT TO MALE THREADS.

KEYNOTES:

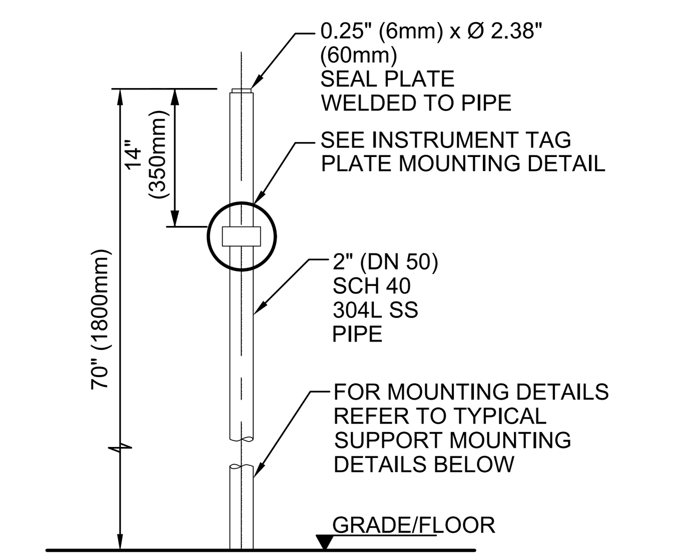
A. WALL OR INSTRUMENT-STAND MOUNT PER DETAIL I-02.
B. SENSOR CABLE SPLICE OF ANY KIND SHALL NOT BE ACCEPTABLE.
C. HASTELLOY C PREFERRED. HOWEVER ENGINEER APPROVED FINAL SELECTION BASED ON PRESSURE, FLOW VELOCITY AND MATERIAL CHEMICAL COMPATIBILITY.
D. INSERTION LENGTH: HALF PIPE DIAMETER OR 4-INCHES, WHICHEVER IS SHORTER.

BILL OF MATERIALS

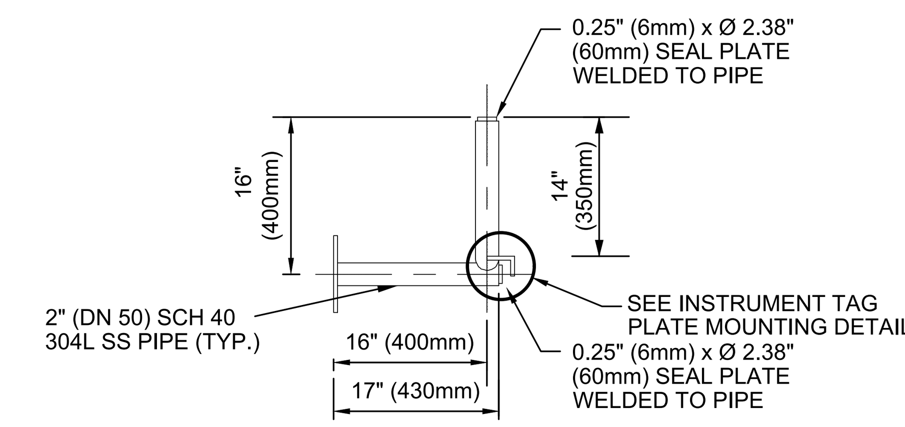
| ITEM | QTY | DESCRIPTION | SUPPLY | MATERIAL/ RATING (WATER) | MATERIAL/ RATING (CHEMICAL) |
|---|---|---|---|---|---|
| 1 | 1 | ELECTRONIC HOUSING | MANF | EPOXY COATED ALUMINUM | EPOXY COATED ALUMINUM |
| 2 | 1 | MOUNTING SUPPORT BRACKET AND HARDWARE. | CONT | 316 SS | 316 SS |
| 3 | 1 | TEMPERATURE ELEMENT ASSEMBLY, 1"(25mm) FLANGED TAPERED THERMOWELL | MANF | 316 SS | C |
| 4 | 1 | TEMPERATURE ELEMENT ASSEMBLY, 1/2" (15mm) NPT TAPERED THERMOWELL | MANF | 316 SS | C |
| 5 | 4 | BOLTS, WASHER + NUTS | MANF | 316 SS | 316 SS |
| 6 | 1 | GASKET | CONT | VITON | VITON |
| 7 | 1 | TRANSMITTER HOUSING | MANF | EPOXY COATED ALUMINUM | EPOXY COATED ALUMINUM |
| 8 | AS REQ. | INSTRUMENT CONNECTION CABLE (WITHIN CONDUIT) | CONT | PER DIV 17 | - |

I-01 STD TEMPERATURE TRANSMITTER

NO SCALE

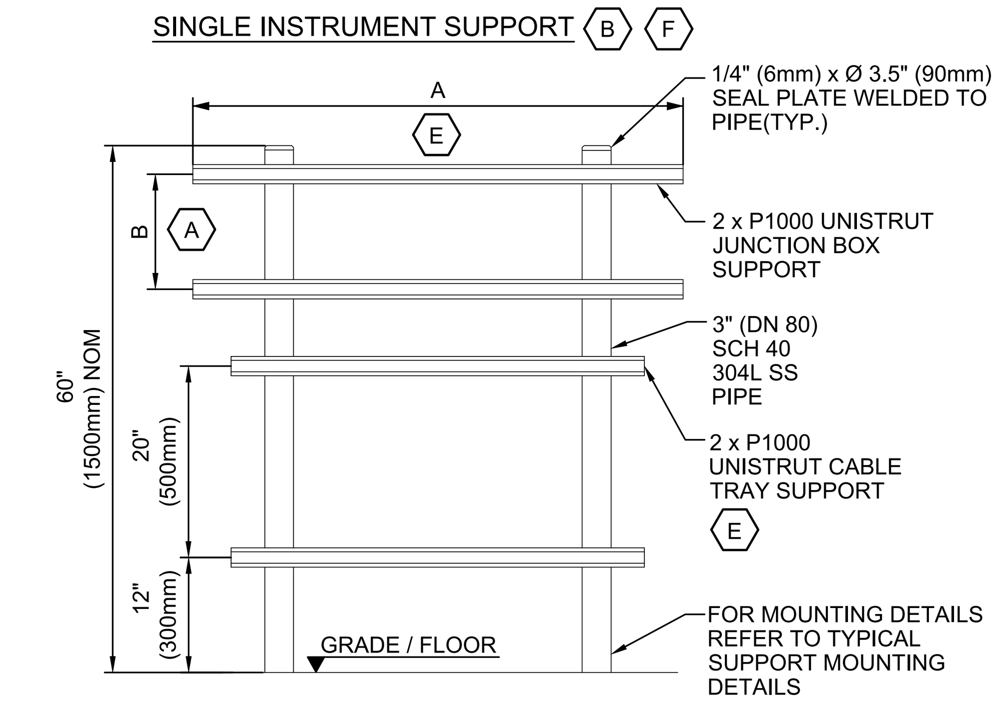



GRADE / FLOOR MOUNTED

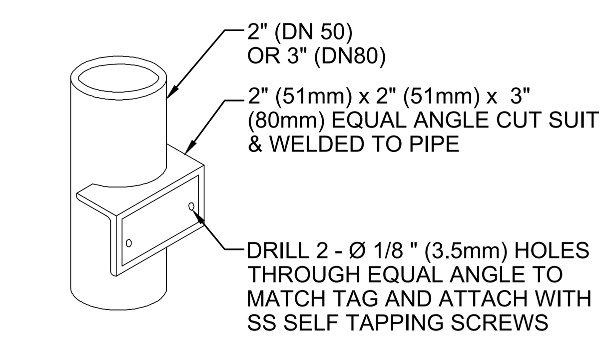



WALL / COLUMN MOUNTED

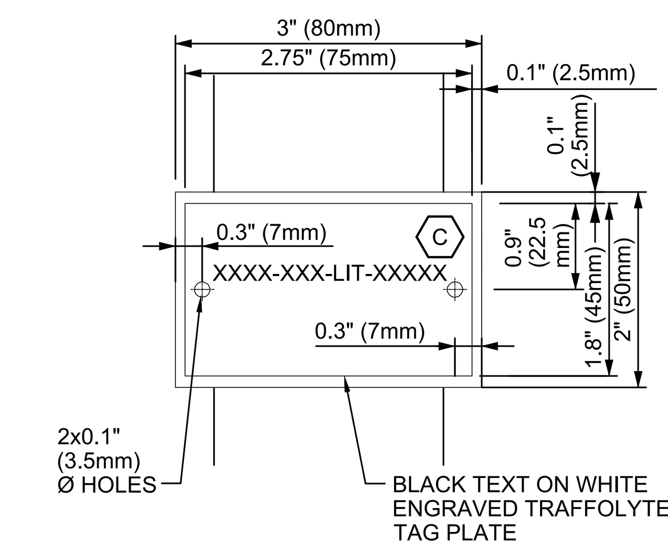
SINGLE INSTRUMENT SUPPORT B F



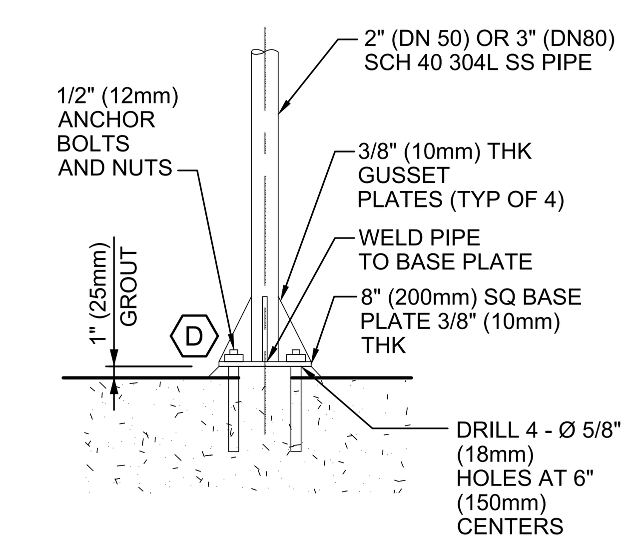

PANEL / JUNCTION BOX SUPPORT B F



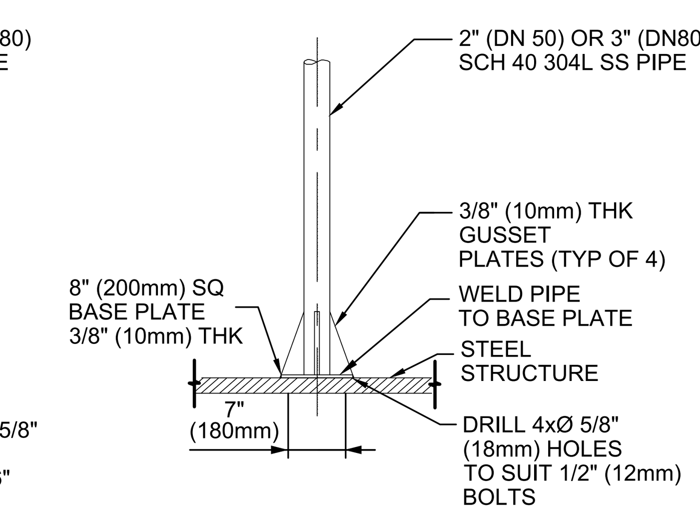

INSTRUMENT TAG PLATE MOUNTING DETAIL




INSTRUMENT TAG MOUNTING PLATE B F




CONCRETE SLAB MOUNTING




STEEL STRUCTURE MOUNTING

TYPICAL SUPPORT MOUNTING DETAILS

GENERAL NOTES:

1. INSTRUMENT DISPLAY SHALL BE SITUATED 48" (1220mm) ABOVE GRADE. REQUEST FOR DEVIATION SHALL BE SUBMITTED IN WRITING TO THE ENGINEER FOR APPROVAL.
2. AFTER FABRICATION REMOVE ALL SHARP EDGES, BURRS ETC.
3. ALL WELDS SHALL BE 0.2" (6mm) CONTINUOUS FILLET WELDS FULL PERIMETER UNLESS NOTED OTHERWISE.
4. STANDS ARE TYPICAL; SITE MODIFICATION MAY BE NECESSARY TO ACCOMMODATE INSTALLATION.

KEYNOTES:

A. DIMENSION "B" TO SUIT JUNCTION BOX MOUNTING BRACKETS.
B. ALL HEAT AFFECTED WELD AREAS TO BE PAINTED WITH ZINC CHROMATE.
C. REFER TO PROJECT INSTRUMENT SCHEDULE FOR TAG NUMBERING DETAILS.
D. BASEPLATES TO BE FIXED TO CONCRETE USING 1/2" (12mm) 316 SS ANCHOR BOLTS (QTY=4) USING MULTI EPOXY ADHESIVE ANCHORS. IF CONCRETE THICKNESS IS INSUFFICIENT FOR MOUNTING VERTICAL BASE PLATES, EMPLOY A THROUGH BOLTED CONNECTION.
E. DIMENSION "A" LENGTH AND CABLE TRAY SUPPORT LENGTH AS REQUIRED TO SUIT NUMBER OF JUNCTION BOXES OR CONTROL PANELS.
F. SUPPORT ASSEMBLY SHALL BE HOT DIP GALVANIZED AFTER FABRICATION.

I-02 STD INSTRUMENT STAND MOUNTING DETAIL

NO SCALE

| REFERENCE DRAWING | | REVISION | | | | | | |
|---|---|---|---|---|---|---|---|---|
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| | | 0A | 21-JUN-2023 | ISSUED FOR PRELIMINARY DESIGN | JM | JG | MM | JG |
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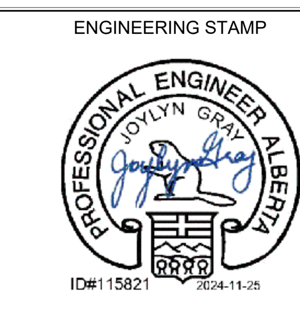
ENGINEERING STAMP

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EPCOR

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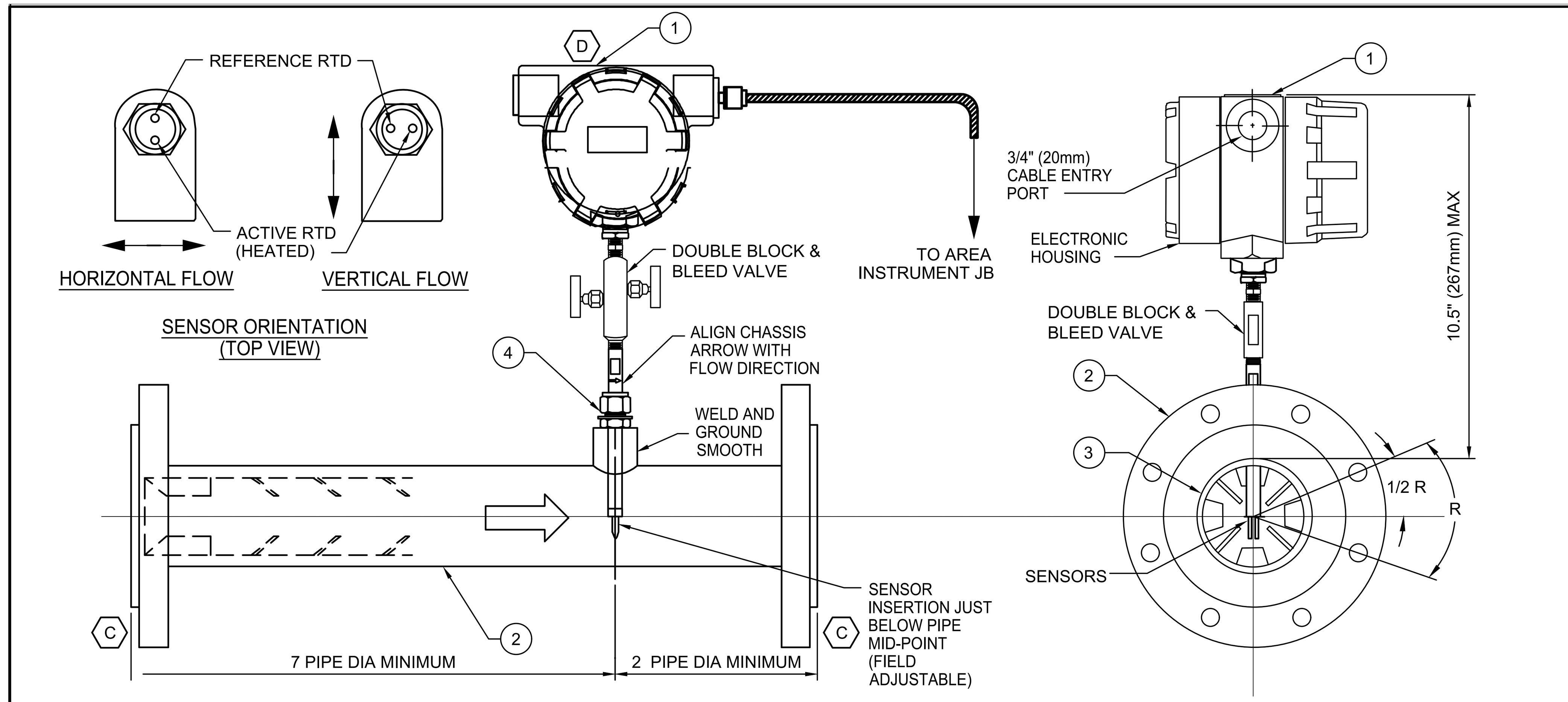
PLANT AREA: PLANT WIDE
PROJECT NAME: GBWWTP FLARE CAPACITY EXPANSION
DRAWING TITLE:
INSTRUMENTATION
STANDARD DETAILS - SHEET 1

| CONSULTANT JOB No. | EPCOR PROJECT No. | SCALE | SHEET | DRAWING NUMBER |
|---|---|---|---|---|
| 1101000105 | PMO 1004723; PF14-015 | NOT TO SCALE | 1 OF 2 | PRJ-15-157-704 |




THERMAL MASS FLOWMETER WITH INTEGRAL TRANSMITTER AND FLOW CONDITIONER (SIDE VIEW)

THERMAL MASS FLOWMETER WITH INTEGRAL TRANSMITTER AND FLOW CONDITIONER (INLINE VIEW)

GENERAL NOTES:

1. PROVIDE MECHANICAL SUPPORT FOR ROUTED CONDUIT.
2. REFER TO P&IDS AND DATA SHEETS FOR PROCESS PIPING SIZE AND MATERIAL.
3. INSTALLATION OF FLANGED ELEMENTS SHALL BE CARRIED OUT IN COOPERATION WITH THE PIPING CONTRACTOR WITH ISOLATION OF DISSIMILAR MATERIALS ACCOMMODATED AS NECESSARY.
4. WETTED MATERIALS SHALL BE CHEMICALLY INERT TO THE PROCESS.
5. REFER TO DIVISION 16 SPECIFICATIONS FOR FLEX AND RIGID CONDUIT MATERIAL AND USAGE LIMITATIONS.
6. ENSURE INSTALLED PROBE AND ELECTRONICS ARE A VENDOR MATCHED PAIR.
7. APPLY SEALANT TO MALE THREADS.
8. FLEX CONDUIT USED IN HAZARDOUS LOCATIONS SHALL BE EXPLOSION PROOF AND RATED FOR THE AREA OF INSTALL.

KEYNOTES:

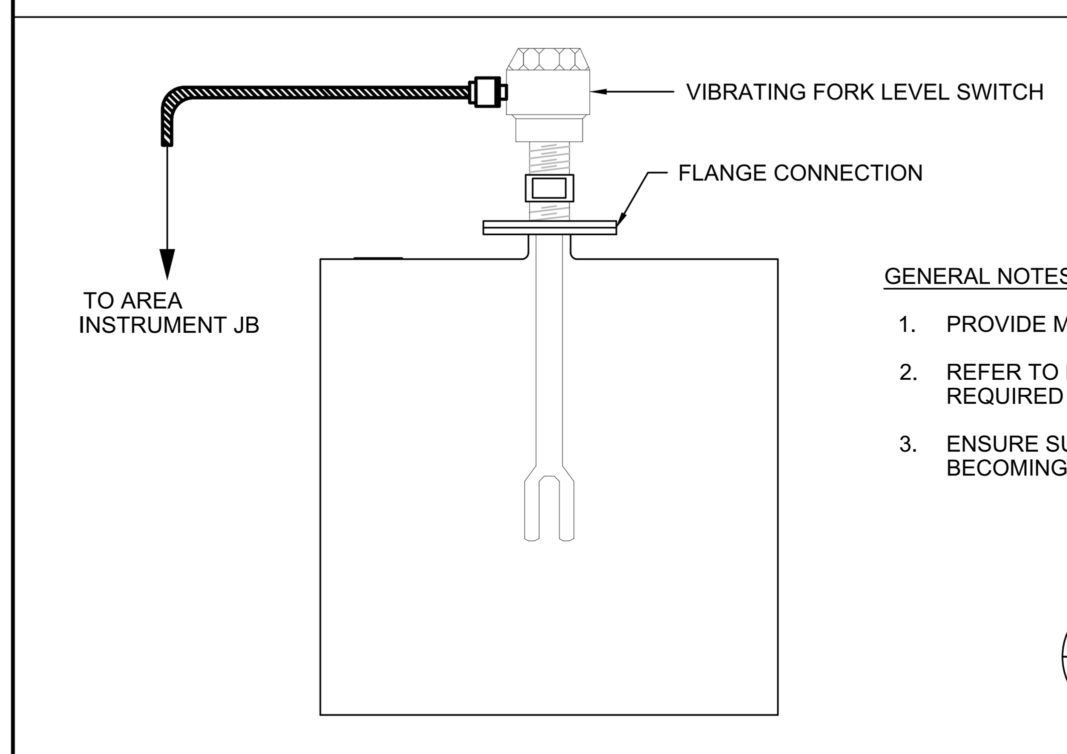
A. 316 SS OR NON-METALLIC MATERIAL PREFERRED. HOWEVER ENGINEER APPROVED FINAL SELECTION BASED ON SYSTEM PRESSURES AND MATERIAL CHEMICAL COMPATIBILITY.
B. IF FLOW CONDITIONING TUBE IS NOT USED, METER MUST BE INSTALLED WITH A MINIMUM OF 15 STRAIGHT PIPE DIAMETERS UPSTREAM AND 5 DOWNSTREAM FOR LINE SIZES OF 6-INCHES OR GREATER. FOR LINE SIZES LESS THAN 6-INCHES, A MINIMUM OF 20 DIAMETERS UPSTREAM AND 9 DOWNSTREAM ARE REQUIRED.
C. MATING FLANGE GASKETS FURNISHED AND INSTALLED BY CONTRACTOR.
D. WALL OR INSTRUMENT-STAND MOUNT PER DETAIL I-02.

BILL OF MATERIALS

| | ITEM | QTY | DESCRIPTION | SUPPLY | MATERIAL/RATING (WATER) | MATERIAL/RATING (CHEMICAL) |
|---|---|---|---|---|---|---|
| | 1 | 1 | THERMAL MASS FLOWMETER HOUSING | MANF | EPOXY COATED ALUMINUM | EPOXY COATED ALUMINUM |
| B | 2 | 1 | FLANGED FLOW CONDITIONING TUBE WITH INTEGRAL STRAIGHTENING VEINS C | MANF | A | A |
| | 3 | 1 | FLOW MEASURING ELEMENT (WETTED PARTS) | MANF | 316 SS | 316 SS OR HASTELLOY C |
| | 4 | 1 | 3/4" (20mm) NPT PROCESS CONNECTION WITH ADJUSTABLE TEFLON FERRULE. | MANF | 316 SS | 316 SS |
| | 5 | 1 | REMOTE TRANSMITTER WITH DISPLAY | MANF | POWDER COATED ALUMINUM | POWDER COATED ALUMINUM |

I-03 STD THERMAL MASS FLOW METER

NO SCALE

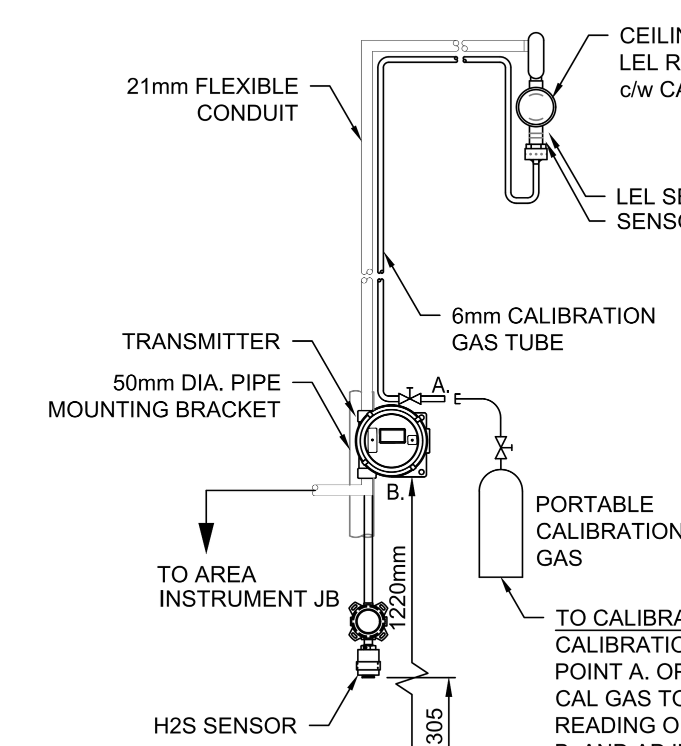



GENERAL NOTES:

1. PROVIDE MECHANICAL SUPPORT AND FITTINGS FOR ROUTED CONDUIT.
2. REFER TO MANUFACTURER'S SPECIFICATIONS FOR MINIMUM INSERTING LENGTH AND MINIMUM REQUIRED SENSOR CLEARANCES.
3. ENSURE SUFFICENT SPACE BETWEEN SUMP PIT WALL AND SENSOR TO PREVENT SENSOR FROM BECOMING COATED IN ANY ANTICIPATED WALL BUILDUP.

I-04 STD TYPICAL FLANGE MOUNTED VIBRATING FORK LEVEL SWITCH

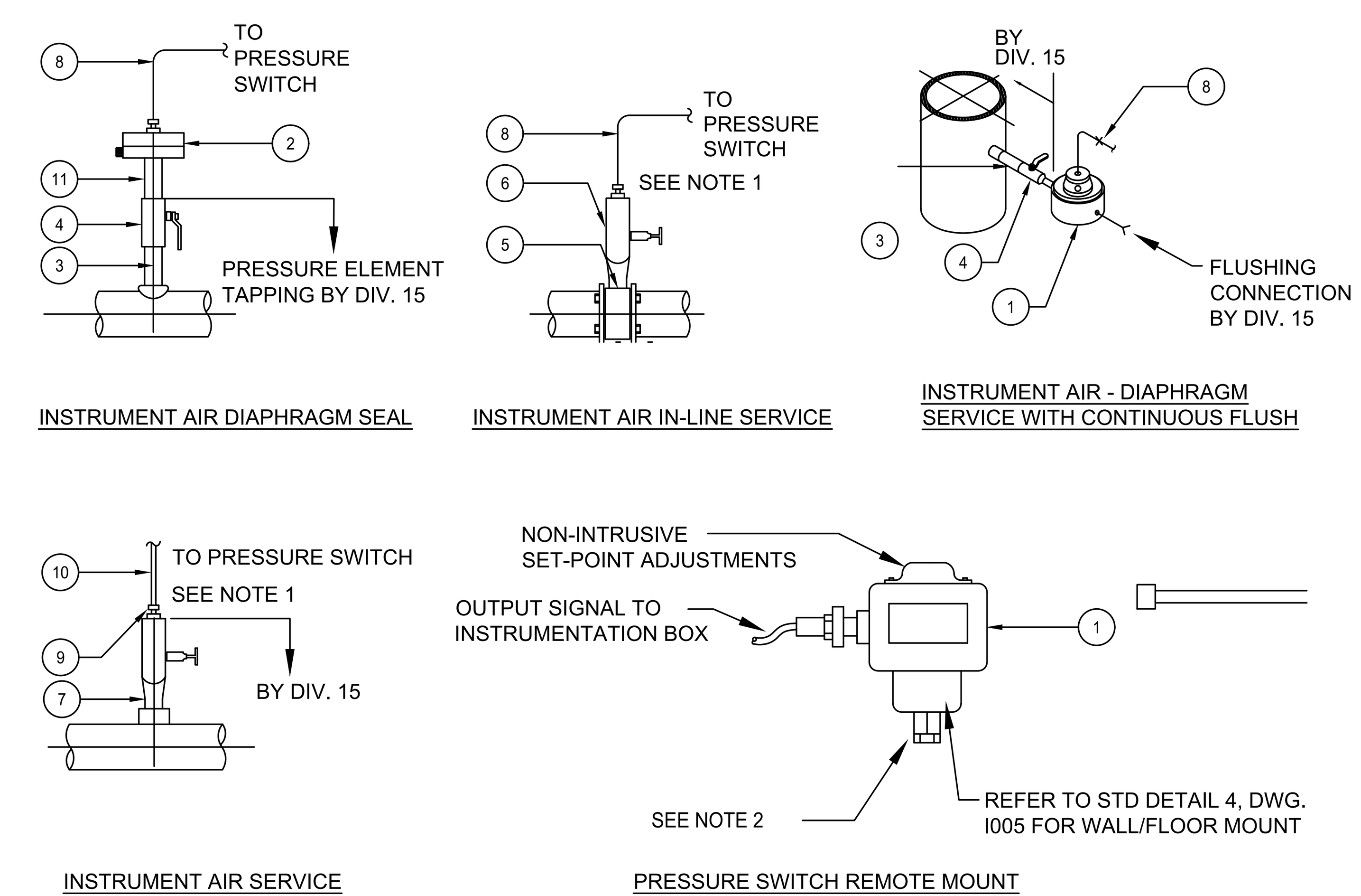
NO SCALE




TO CALIBRATE:
CALIBRATION GAS BOTTLE IS CONNECTED AT POINT A. OPEN VALVE ON CONTAINER TO FLOW CAL GAS TO SENSOR THROUGH TUBE. OBSERVE READING ON DISPLAY IN TRANSMITTER HOUSING B. AND ADJUST USING HAND HELD REMOTE CONTROL TO CAUSE READING TO AGREE WITH CALIBRATION GAS VALUE, COVER OF THE TRANSMITTER IS NOT OPENED DURING CALIBRATION.

I-05 STD WALL MOUNTED H2S/LEL COMBUSTIBLE GAS SENSOR

NO SCALE




GENERAL NOTES:

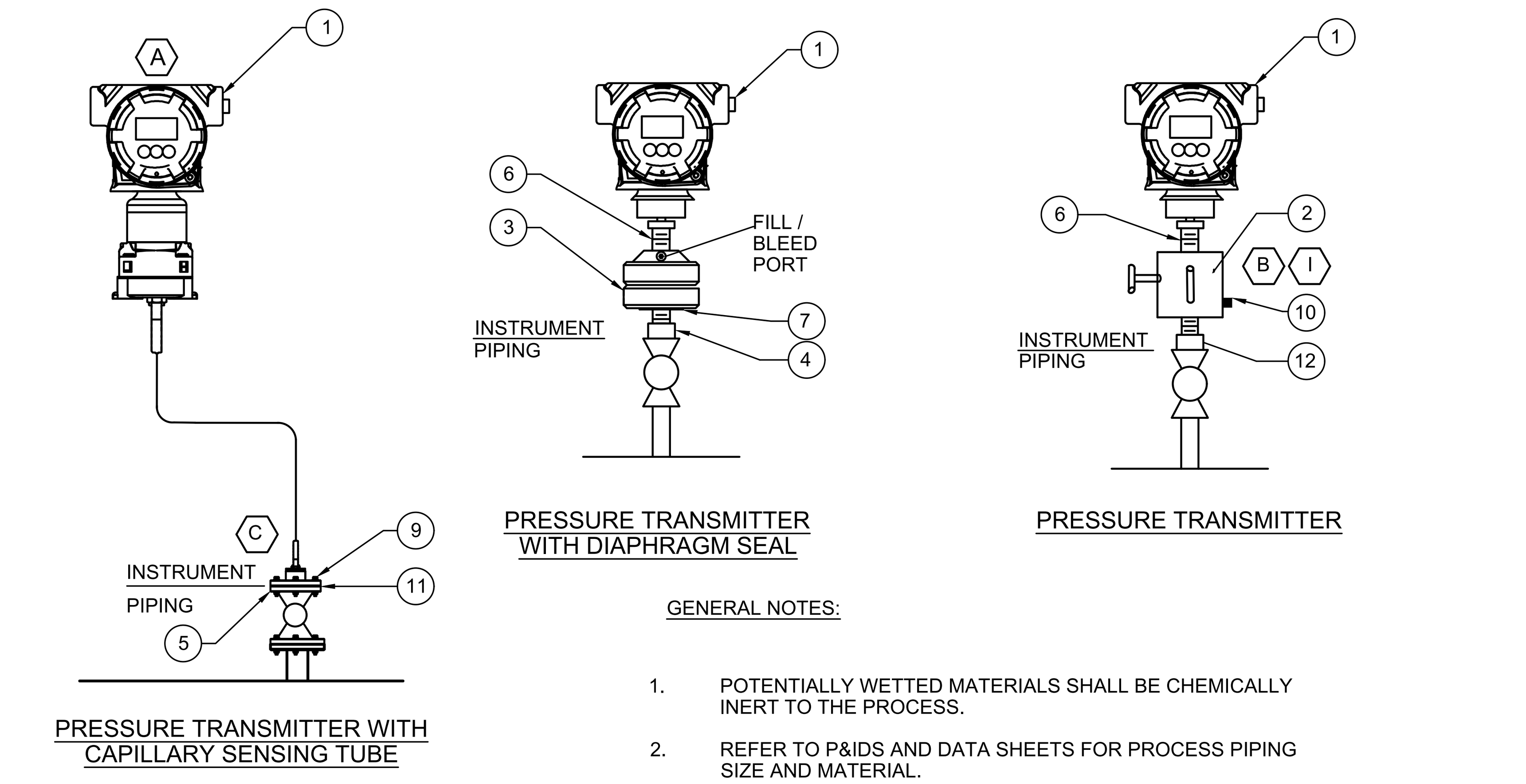
1. WHEN BOTH PRESSURE GAUGE AND PRESSURE SWITCH REQUIRED BY APPLICATION - SEE P&ID DRAWINGS.
2. PROVIDE REQUIRED CONNECTOR TO ACCOMMODATE PROCESS CONNECTION TO PRESSURE SWITCH.
3. SUPPLIED AND INSTALLED BY DIVISION 15.

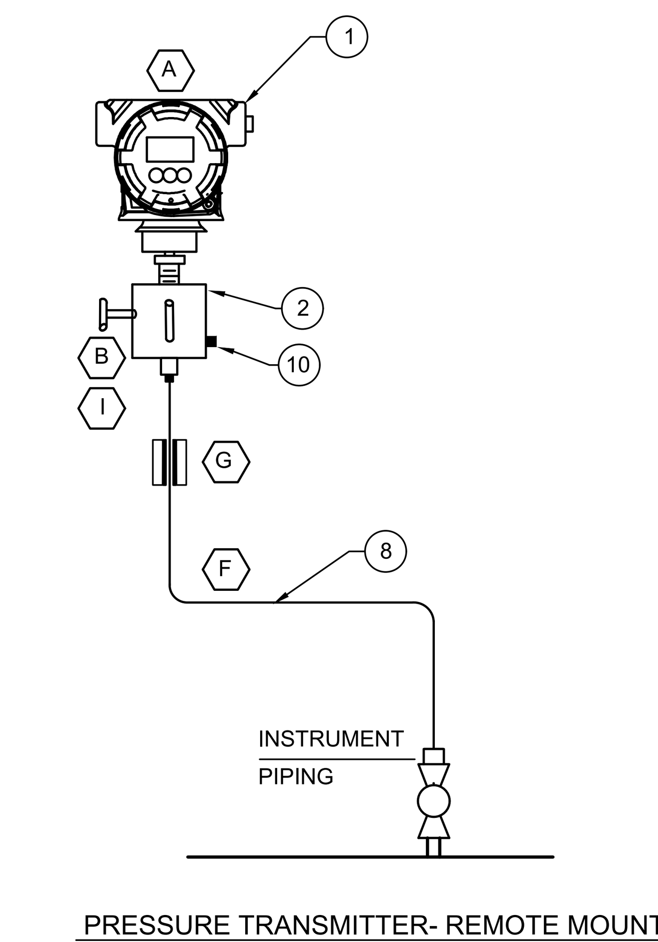
DESCRIPTION:

1. PRESSURE SWITCH, 12mm (NPT) PROCESS CONNECTION
2. DIAPHRAGM SEAL, ASHCROFT TYPE 101, C/W FLUSHING AND FILL CONN.
3. LONG NIPPLE, 20mm DIA x 50 mm, SEE NOTE 3
4. BALL VALVE - BV02, 20mm DIA, REFER TO SECTION 15105, SEE NOTE 3
5. THRU IN-LINE PRESSURE SENSOR, 12mm (NPT) CONN., BY SECTION 17210
6. MULTI-PORT GAUGE VALVE, STRAIGHT THROUGH TYPE, 12mm x 12mm (NPT)
7. MULTI-PORT GAUGE VALVE, STRAIGHT THROUGH TYPE, 12mm x 20mm (NPT), SEE NOTE 3
8. CAPILLARY TUBING, C/W 316SST ARMOURED SHEATH
9. MALE CONNECTOR, 12mm x 10mm (NPT)
10. TUBING, 10mm DIA, 316SST
11. LONG NIPPLE, 20mm DIA X 50mm LONG

I-06 STD TYPICAL PRESSURE SWITCH REMOTE-MOUNT

NO SCALE




GENERAL NOTES:

1. POTENTIALLY WETTED MATERIALS SHALL BE CHEMICALLY INERT TO THE PROCESS.
2. REFER TO P&IDS AND DATA SHEETS FOR PROCESS PIPING SIZE AND MATERIAL.
3. PIPING SIDE ISOLATION VALVES FURNISHED AND INSTALLED BY MECHANICAL CONTRACTOR.
4. REFER TO DIVISION 16 SPECIFICATIONS FOR FLEX AND RIGID CONDUIT MATERIAL AND USAGE LIMITATIONS.

KEYNOTES:

A. WALL OR INSTRUMENT-STAND MOUNT PER DETAIL I-02.
B. FURNISH 1/4" (8mm) OD MALE CONNECTOR AND 1/4" OD (1.5mm WALL THICKNESS) 316SS DOWN-TURNED DRAIN TUBING FOR FIELD INSTALLATION. ENSURE VENT / DRAIN IS DIRECTED TO SAFE LOCATION.
C. CAPILLARY DIAPHRAGM SEAL SYSTEM
D. ARMORED CAPILLARIES: 316 SS. FLANGE: 316 SS OR HASTELLOY C PREFERRED. HOWEVER ENGINEER APPROVED FINAL SELECTION BASED ON MATERIAL CHEMICAL COMPATIBILITY.
E. FOR AMBIENT TEMPERATURE APPLICATIONS LOWER THAN -10 degC, ETHYLENE GLYCOL FILL FLUID REQUIRED IN LIEU OF STANDARD SILICONE OIL.
F. IN GENERAL, FOR GAS APPLICATIONS IMPULSE TUBING SHALL BE SLOPED UP TO THE SWITCH OR GAUGE. FOR LIQUID APPLICATIONS, IMPULSE TUBING SHALL BE SLOPED DOWN TO THE SWITCH OR GAUGE. MINIMUM APPLIED SLOPE SHALL BE 1:12 TUBING LENGTHS SHALL BE APPROXIMATELY EQUALIZED AND KEPT AS SHORT AS POSSIBLE.
G. 1/2" TUBING SHALL BE SUPPORTED / BRACED EVERY 3-FT. THERMALLY INSULATING SPACER MATERIAL SHALL BE APPLIED TO SEPARATE THE TUBING FROM THE SUPPORTS. PIGTAIL LOOP REQUIRED FOR HIGH VIBRATION INSTALLATIONS ONLY.
H. 316 SS OR HASTELLOY C PREFERRED. HOWEVER ENGINEER APPROVED FINAL SELECTION BASED ON MATERIAL CHEMICAL COMPATIBILITY.
I. VENT / DRAIN TO SAFE LOCATION (GRADE / DRAIN).

BILL OF MATERIALS

| ITEM | QTY | DESCRIPTION | SUPPLY | MATERIAL/ RATING (WATER) | MATERIAL/ RATING (CHEMICAL) |
|---|---|---|---|---|---|
| 1 | 1 | PRESSURE TRANSMITTER ELECTRONIC HOUSING | MANF | EPOXY COATED ALUMINUM | 316 SS |
| 2 | 1 | 2 VALVE MANIFOLD WITH INTEGRAL BLEED | MANF | 316 SS | 316 SS OR PVC |
| 3 | AS REQ | ISOLATION DIAPHRAGM SEAL; SILICONE OIL FILL FLUID E | MANF | 316 SS | HASTELLOY C OR PVC |
| 4 | 1 | HEX REDUCING BUSHING 1"x1/2" (25mmx15mm) | CONT | 316 SS | 316 SS OR PVC |
| 5 | 2 | END FLANGES (CLASS TO SUIT PIPING) | MANF | EPOXY COATED CARBON STEEL | 316 SS OR PVC |
| 6 | AS REQ | 1/2" MALE TO MALE NIPPLE | CONT | 316 SS | 316 SS OR PVC |
| 7 | 1 | ANNULAR SEAL; SILICONE OIL FILL FLUID E | MANF | TEFLON COATED BUNA-N | PTFE OR TEFLON COATED VITON |
| 8 | AS REQ | IMPULSE TUBING (1/2" (15mm) OD AND 1.5mm WALL THICKNESS) AND COMPRESSION FITTINGS F G | CONT | 316 SS | H |
| 9 | AS REQ | CAPILLARY DIAPHRAGM SEAL SYSTEM FLANGE (SIZED AND RATED TO MATCH ISOLATION VALVE FLANGE AND PROCESS REQUIREMENTS) WITH INTEGRAL 1/4" (8MM) ARMORED CAPILLARY TUBE (LENGTH AS REQUIRED); SILICONE OIL FILL FLUID. | MANF | 316 SS (FLANGES AND CAPILLARIES) | D E |
| 10 | 1 | 1/4" NPT VENT PIPE PLUG | MANF | 316 SS | 316 SS OR PVC |
| 11 | 2 | GASKETS | CONT | VITON | VITON |
| 12 | 1 | INSTRUMENT REMOVAL DEVICE AND 1/2" STEM | MANF | 316 SS | 316 SS OR PVC |

I-07 STD PRESSURE TRANSMITTER

NO SCALE

| REFERENCE DRAWING | | REVISION | | | | | | |
|---|---|---|---|---|---|---|---|---|
| DRAWING No. | DRAWING TITLE | Rev. | DATE | DESCRIPTION | BY | DES. | CHK. | ENG. |
| | | 0A | 21-JUN-2023 | ISSUED FOR PRELIMINARY DESIGN | JM | JG | MM | JG |
| | | 0B | 26-APR-2024 | ISSUED FOR 60% DESIGN | JFA | JFA | BP | JG |
| | | 0C | 28-AUG-2024 | ISSUED FOR 90% DESIGN | OL | JG | BP | JG |
| | | 0D | 15-NOV-2024 | ISSUED FOR CONSTRUCTION | MC | JFA | BC | JG |

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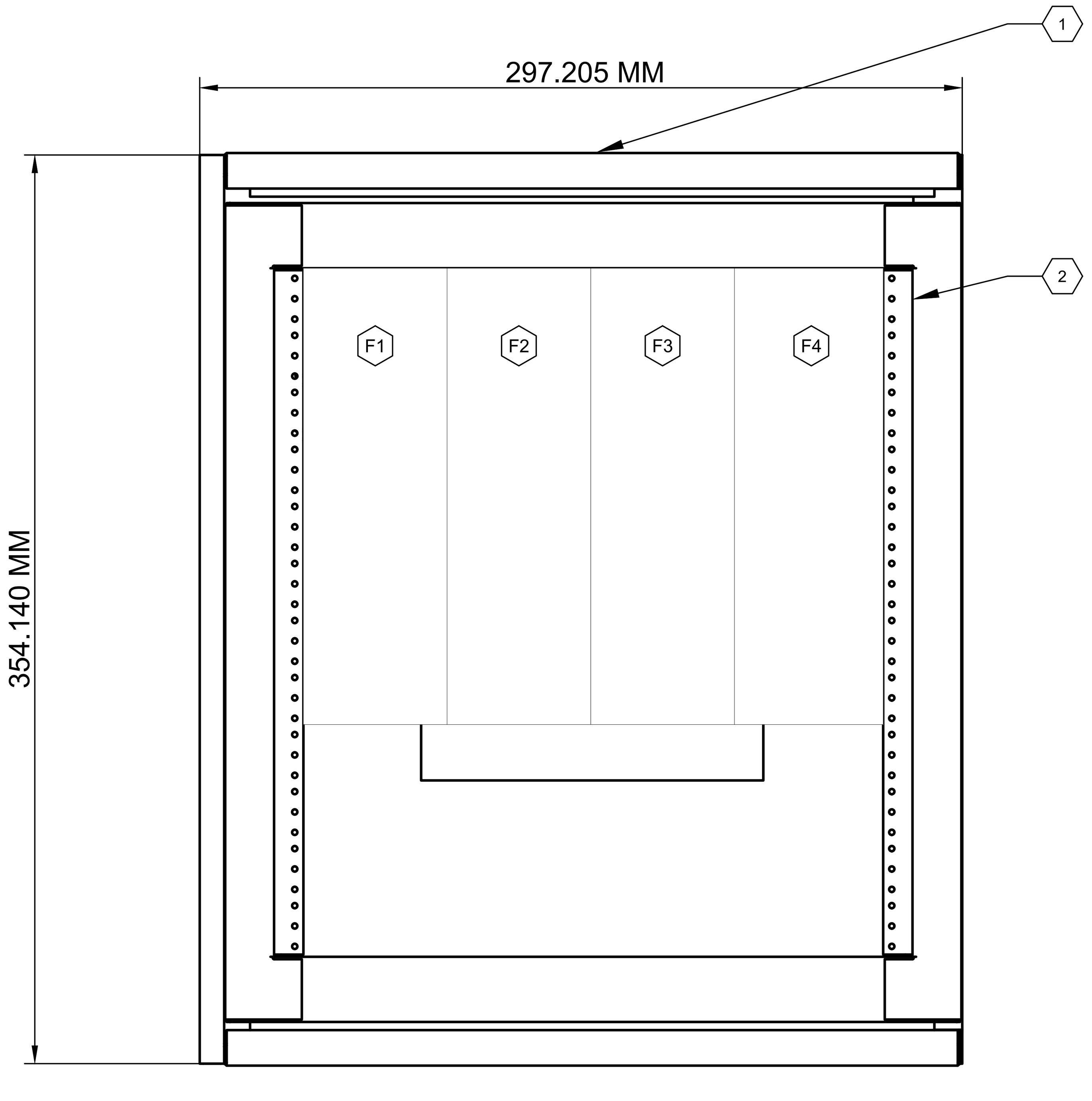
EPCOR

PLANT SITE: GOLD BAR WWTP | PLANT AREA: PLANT WIDE

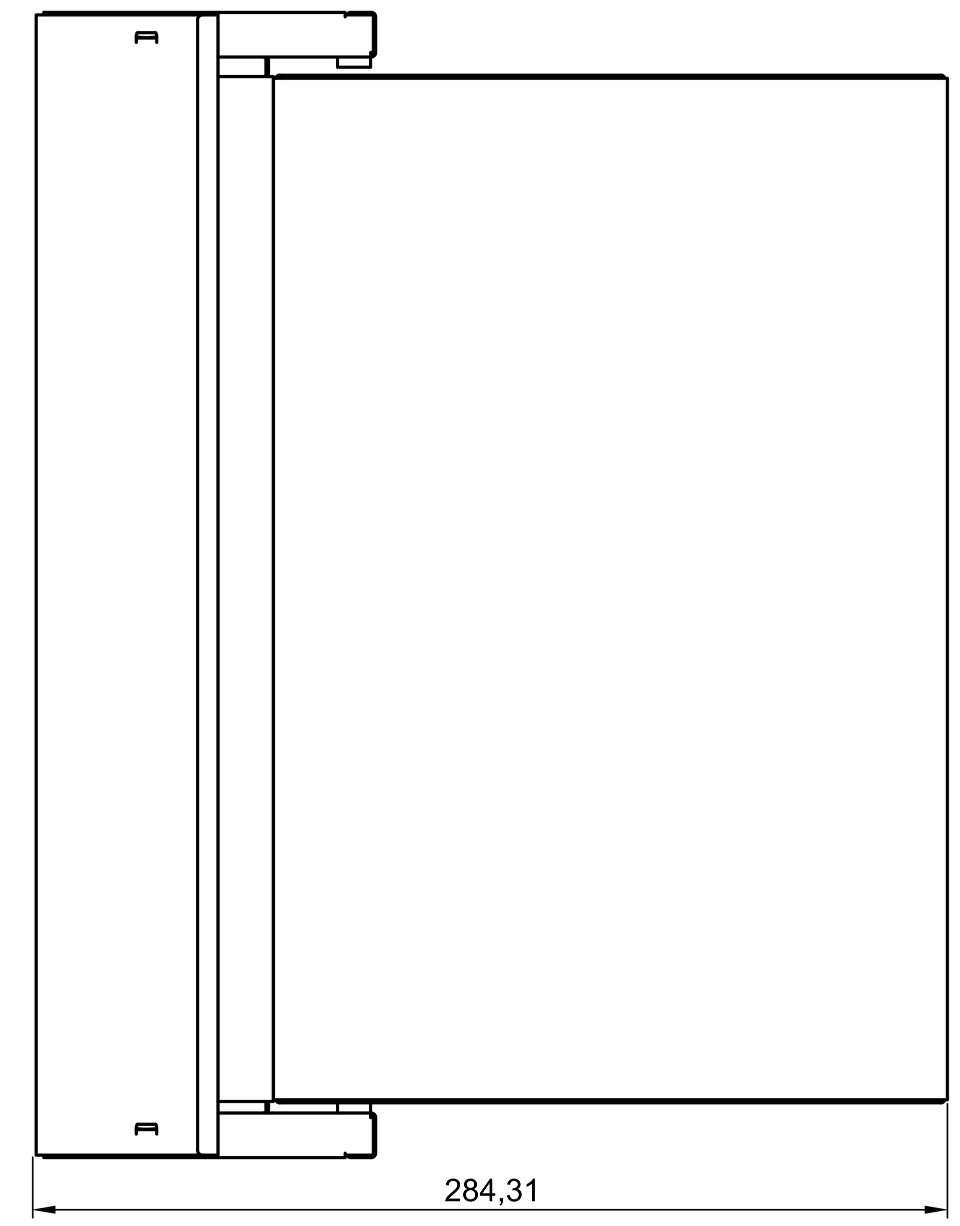
PROJECT NAME: GBWWTP FLARE CAPACITY EXPANSION

DRAWING TITLE: INSTRUMENTATION STANDARD DETAILS - SHEET 2

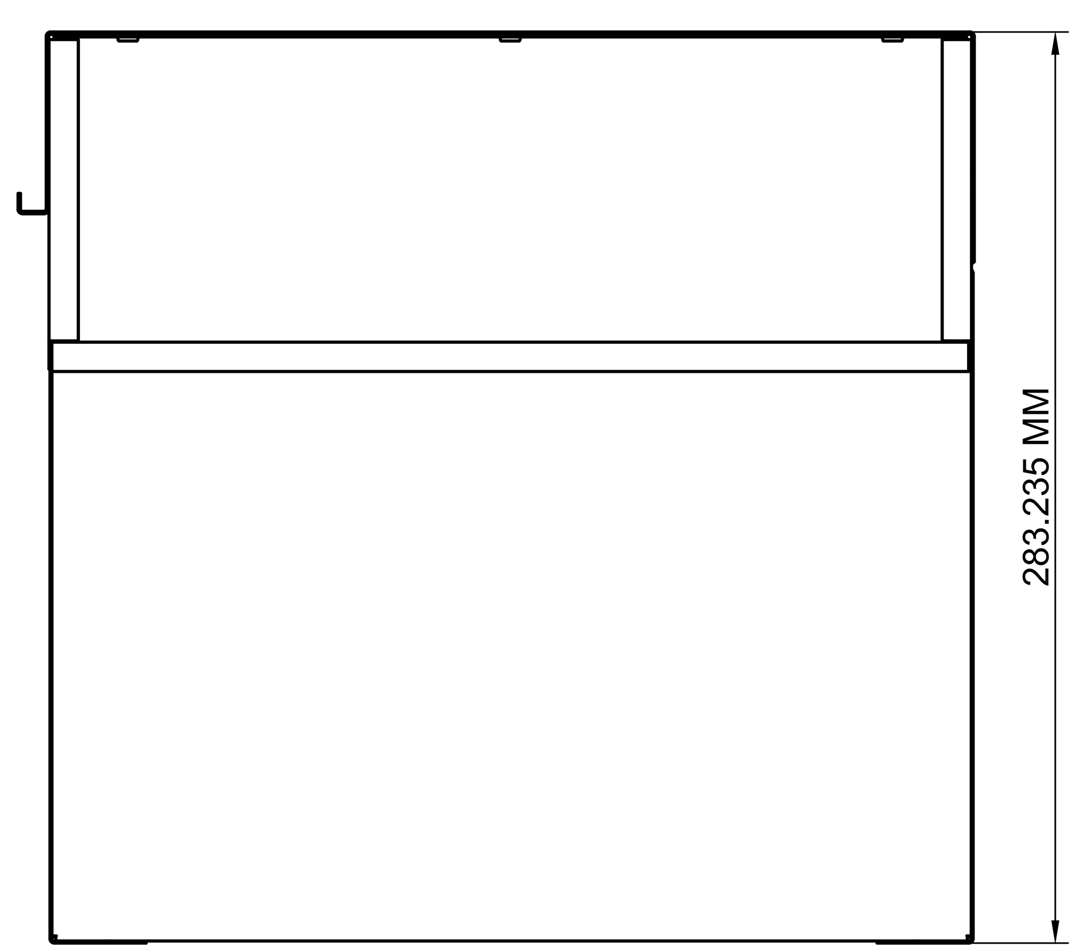
| CONSULTANT JOB No. | EPCOR PROJECT No. | SCALE | SHEET | DRAWING NUMBER |
|---|---|---|---|---|
| 1101000105 | PMO 1004723; PF14-015 | NOT TO SCALE | 2 OF 2 | PRJ-15-157-705 |



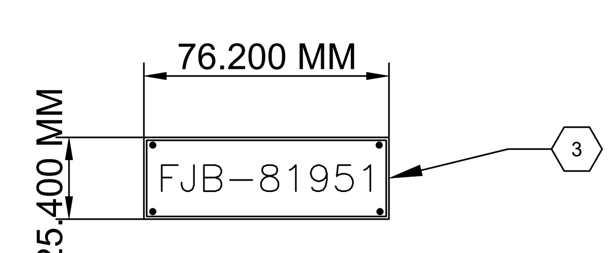

1 FJB-81951
FRONT VIEW
1:4




2 FJB-81951
SIDE VIEW
1:4




3 FJB-81951
TOP VIEW
1:4




4 FJB-81951
LAMACOID DETAIL
1:4

| BILL OF MATERIALS | | | | | |
|---|---|---|---|---|---|
| ITEM NO. | DESCRIPTION | MANUFACTURER | MODEL | QTY | NOTE |
| 1 | RACK MOUNT ENCLOSURE - WALL MOUNT, CONTINUOUS HINGE, 10 U MINIMUM | MIDDLE ATLANTIC PRODUCTS | EWR-12-22SD | 1 | 1 |
| 2 | FIBER OPTIC PATCH PANEL - RACK MOUNT KIT FOR MINIMUM OF (4) 12 STRAND SINGLE MODE CONNECTIONS | - | - | 1 | 1 |
| 3 | LABEL - LAMACOID NAMEPLATE | - | - | 1 | 1 |

| FIBER PATCH PANEL | | |
|---|---|---|
| NO. | FAP SCHEDULE | STRANDS |
| F1 | PRIMARY DCS NETWORK CIOC #1 | 12 |
| F2 | PRIMARY DCS NETWORK CIOC #2 | 12 |
| F3 | SECONDARY DCS NETWORK CIOC #1 | 12 |
| F4 | SECONDARY DCS NETWORK CIOC #2 | 12 |

## NOTES:

1. OR CLIENT APPROVED EQUAL. REFER TO PLANT STANDARDS FOR MORE INFORMATION.
2. "ITEM NO." SYMBOLS ARE SHOWN ONCE ON PANEL LAYOUTS; HOWEVER THEY APPLY TO ALL INSTANCES OF THE IDENTIFIED ITEMS.
3. THE CONTRACTOR SHALL PROVIDE A SUFFICIENT AMOUNT OF THE ITEM AS REQUIRED BY THE DESIGN.
4. ONLY MAJOR COMPONENTS ARE INDICATED. ALL OTHER ITEMS NECESSARY FOR A COMPLETE AND FUNCTIONING SYSTEM SHALL BE PROVIDED.
5. THE INDICATED LAYOUT IS BASED ON THE PRODUCTS SPECIFIED. FINAL LAYOUT AND PANEL SIZE SHALL BE DETERMINED AT THE TIME OF SHOP DRAWINGS AND BASED UPON SELECTED PRODUCTS.

| REFERENCE DRAWING | |
|---|---|
| DRAWING No. | DRAWING TITLE |
| | |
| | |
| | |
| | |
| | |

| REVISION | | | | | | |
|---|---|---|---|---|---|---|
| Rev. | DATE | DESCRIPTION | BY | DES. | CHK. | ENG. |
| 0A | 28-AUG-2024 | ISSUED FOR 90% DESIGN | OL | JG | BP | JG |
| 0B | 15-NOV-2024 | ISSUED FOR CONSTRUCTION | MC | JFA | BC | JG |
| | | | | | | |
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| | | | | | | |

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ALBERTA
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EPCOR

PLANT SITE: GOLD BAR WWTP
PLANT AREA: PLANT WIDE
PROJECT NAME: GBWWTP FLARE CAPACITY EXPANSION
DRAWING TITLE: INSTRUMENTATION
FJB-81951
LAYOUT & BOM

| CONSULTANT JOB No. | EPCOR PROJECT No. | SCALE | SHEET | DRAWING NUMBER |
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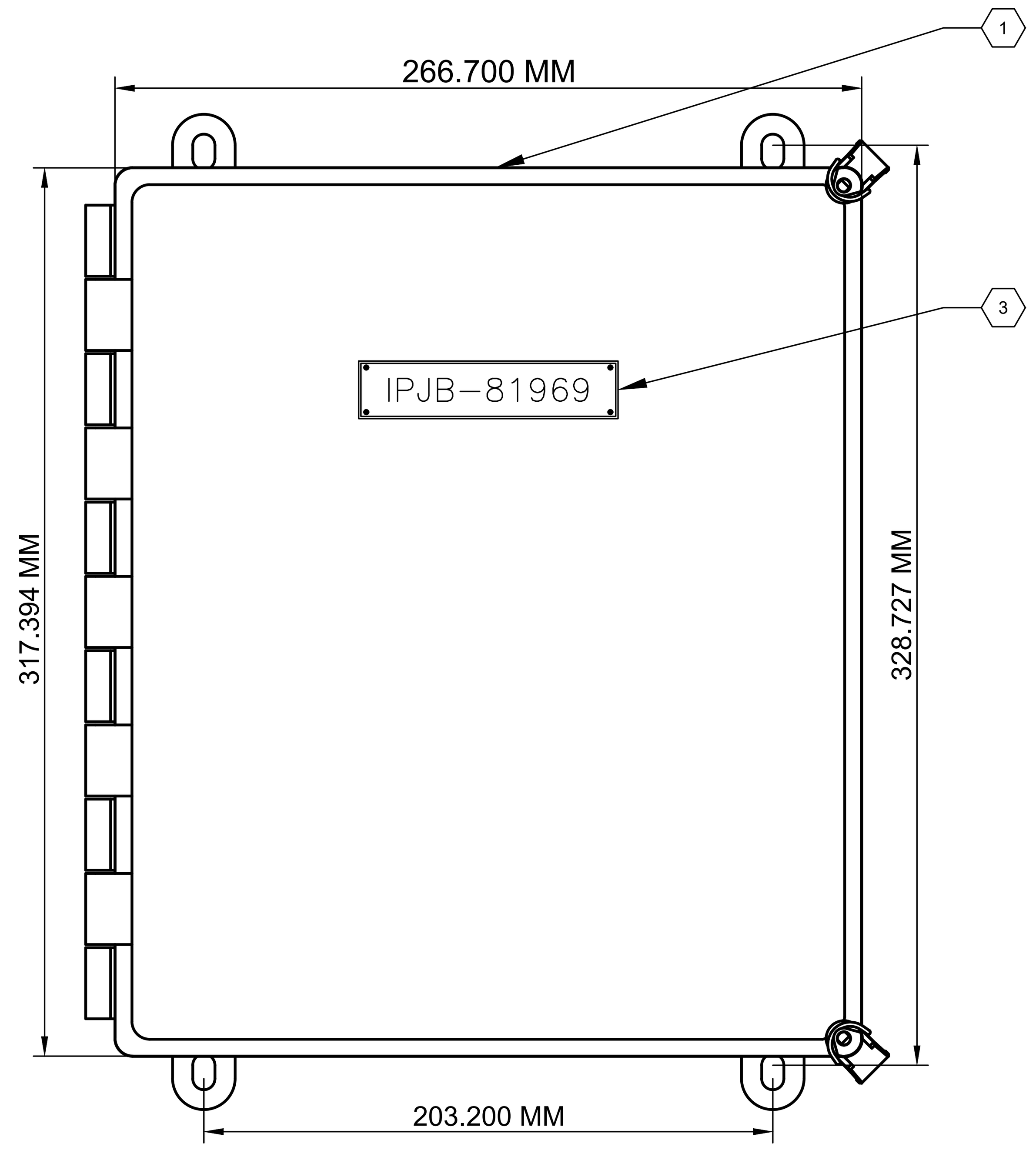
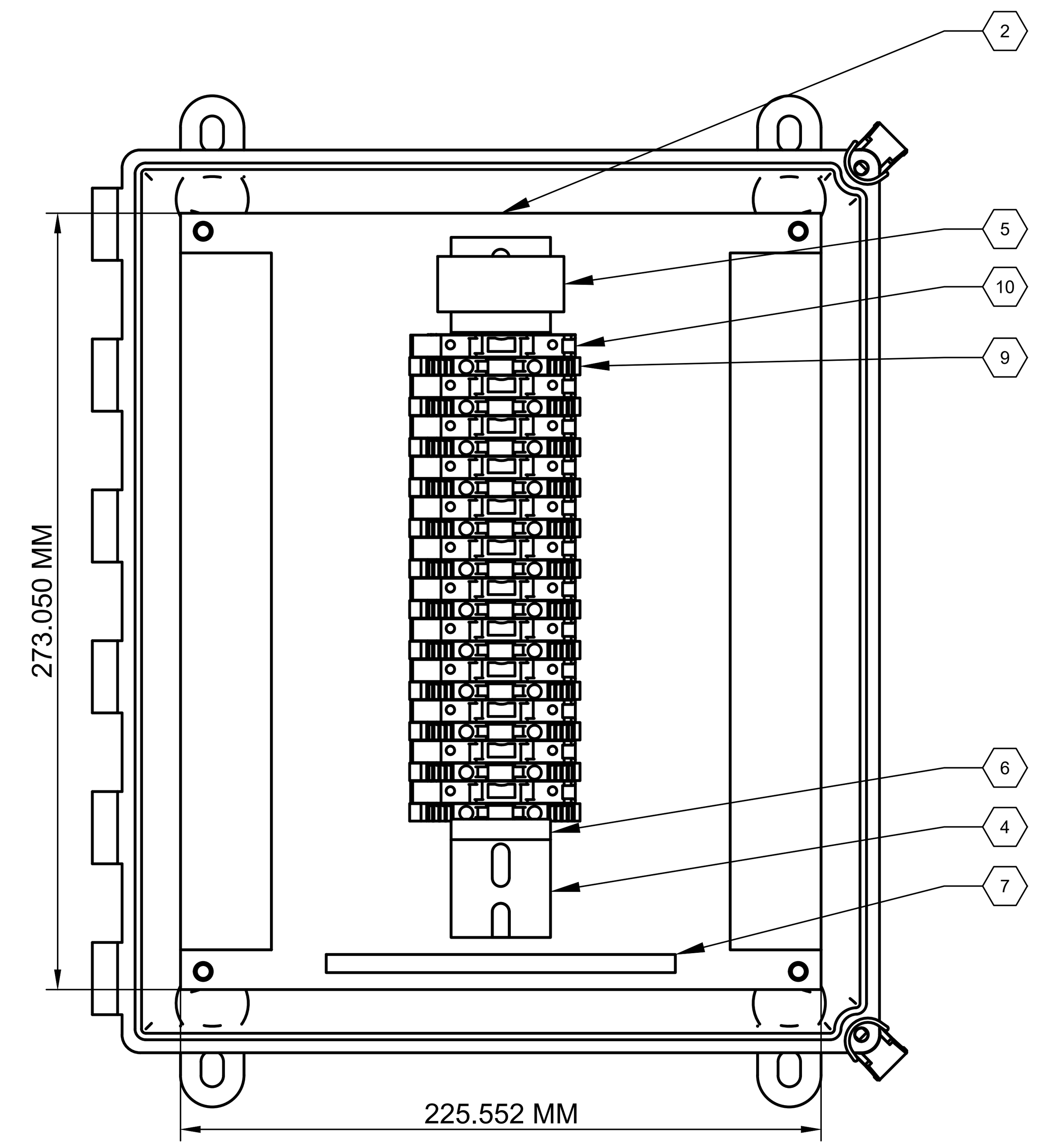
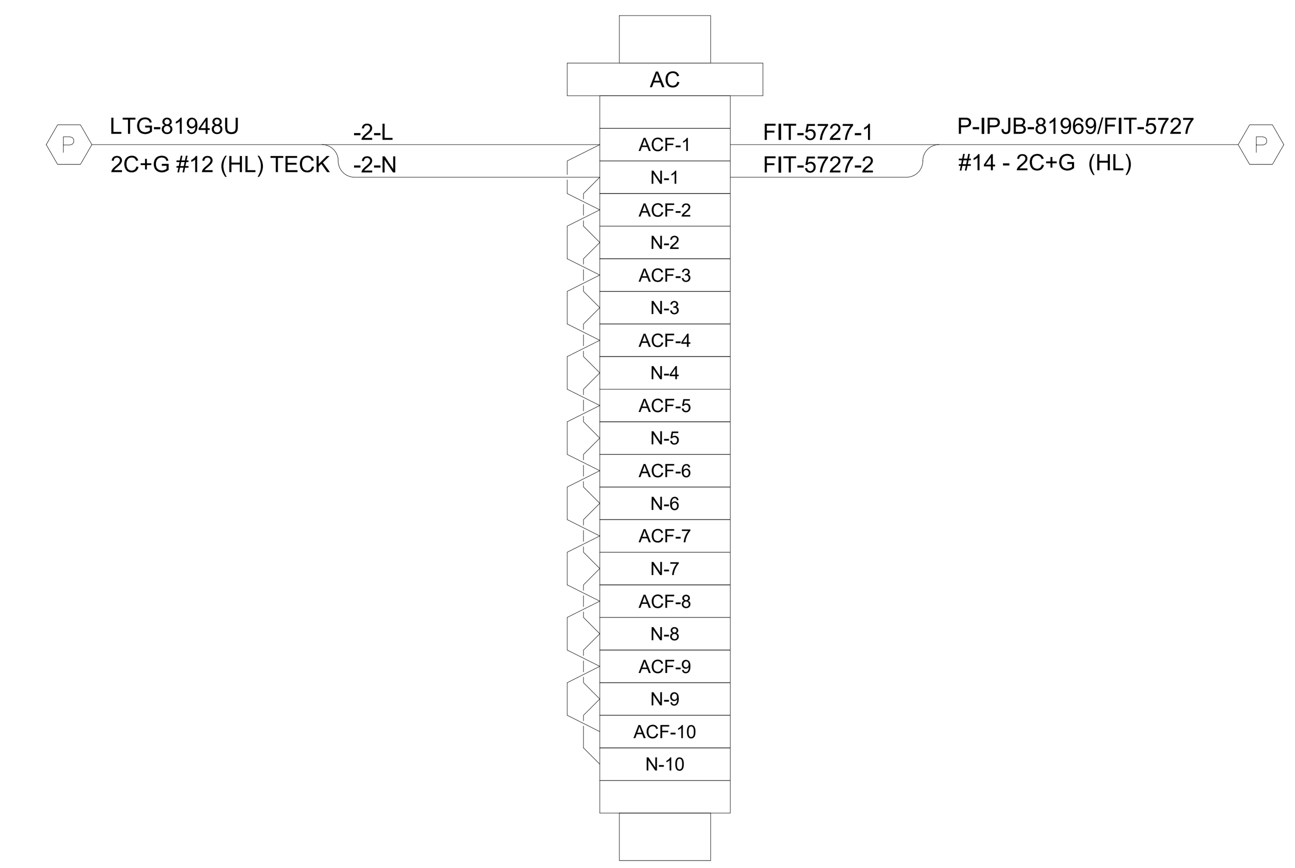
| 1101000105 | PMO 1004723; PF14-015 | AS SHOWN | 1 OF 1 | PRJ-15-157-706 |




1 IPJB-81969
FRONT LAYOUT
1:2

2 IPJB-81969
INNER LAYOUT
1:2

3 IPJB-81969
SCHEDULE
N.T.S.

**BILL OF MATERIALS**

| ITEM NO. | DESCRIPTION | MANUFACTURER | MODEL | QTY | NOTE |
|---|---|---|---|---|---|
| 1 | ENCLOSURE - NEMA 4X, FIBERGLASS, WALL MOUNTABLE, CONTINUOUS HINGE, C/W STAINLESS STEEL QUICK RELEASE LATCH | HOFFMAN | A-12106CHQRFG | 1 | 1 |
| 2 | ENCLOSURE BACK PANEL - 273 MM (W) X 226 MM (H), POWDER COATED WHITE | HOFFMAN | A12P10 | 1 | 1 |
| 3 | LABEL - LAMACOID NAMEPLATE | - | - | 1 | 1 |
| 4 | DIN RAIL - TS SLOTTED, 35 MM (W) X 7.5 MM (D) | - | - | LOT | 3 |
| 5 | LABEL TAG CARRIER - DIN RAIL MOUNT C/W LABEL & COVER | WEIDMULLER | SCHT5 | 1 | |
| 6 | TERMINAL BLOCK - END BRACKET TYPE | WEIDMULLER | WEW 35/2 | 2 | 3 |
| 7 | GROUND BUS BAR - NON-ISOLATED C/W SCREWS | ILSCO | - | 1 | |
| 8 | WIRING DUCT - 32 MM (W) x 55 MM (D), TYPE F, LIGHT GRAY | PANDUIT | F1X2LG6 | LOT | 3 |
| 9 | TERMINAL BLOCK - FEED THROUGH TYPE | WEIDMULLER | WDU-4 | 10 | 3 |
| 10 | TERMINAL BLOCK - GLASS FUSE TYPE C/W GLASS FUSE | WEIDMULLER | ASK-1/EN | 10 | 3 |

## NOTES:

1. OR CLIENT APPROVED EQUAL. REFER TO PLANT STANDARDS FOR MORE INFORMATION.
2. "ITEM NO." SYMBOLS ARE SHOWN ONCE ON PANEL LAYOUTS; HOWEVER THEY APPLY TO ALL INSTANCES OF THE IDENTIFIED ITEMS.
3. THE CONTRACTOR SHALL PROVIDE A SUFFICIENT AMOUNT OF THE ITEM AS REQUIRED BY THE DESIGN.
4. ONLY MAJOR COMPONENTS ARE INDICATED. ALL OTHER ITEMS NECESSARY FOR A COMPLETE AND FUNCTIONING SYSTEM SHALL BE PROVIDED.
5. THE INDICATED LAYOUT IS BASED ON THE PRODUCTS SPECIFIED. FINAL LAYOUT AND PANEL SIZE SHALL BE DETERMINED AT THE TIME OF SHOP DRAWINGS AND BASED UPON SELECTED PRODUCTS.

| REFERENCE DRAWING | | REVISION | | | | | | |
|---|---|---|---|---|---|---|---|---|
| DRAWING No. | DRAWING TITLE | Rev. | DATE | DESCRIPTION | BY | DES. | CHK. | ENG. |
| | | 0A | 15-NOV-2024 | ISSUED FOR CONSTRUCTION | JFA | JFA | BC | JG |

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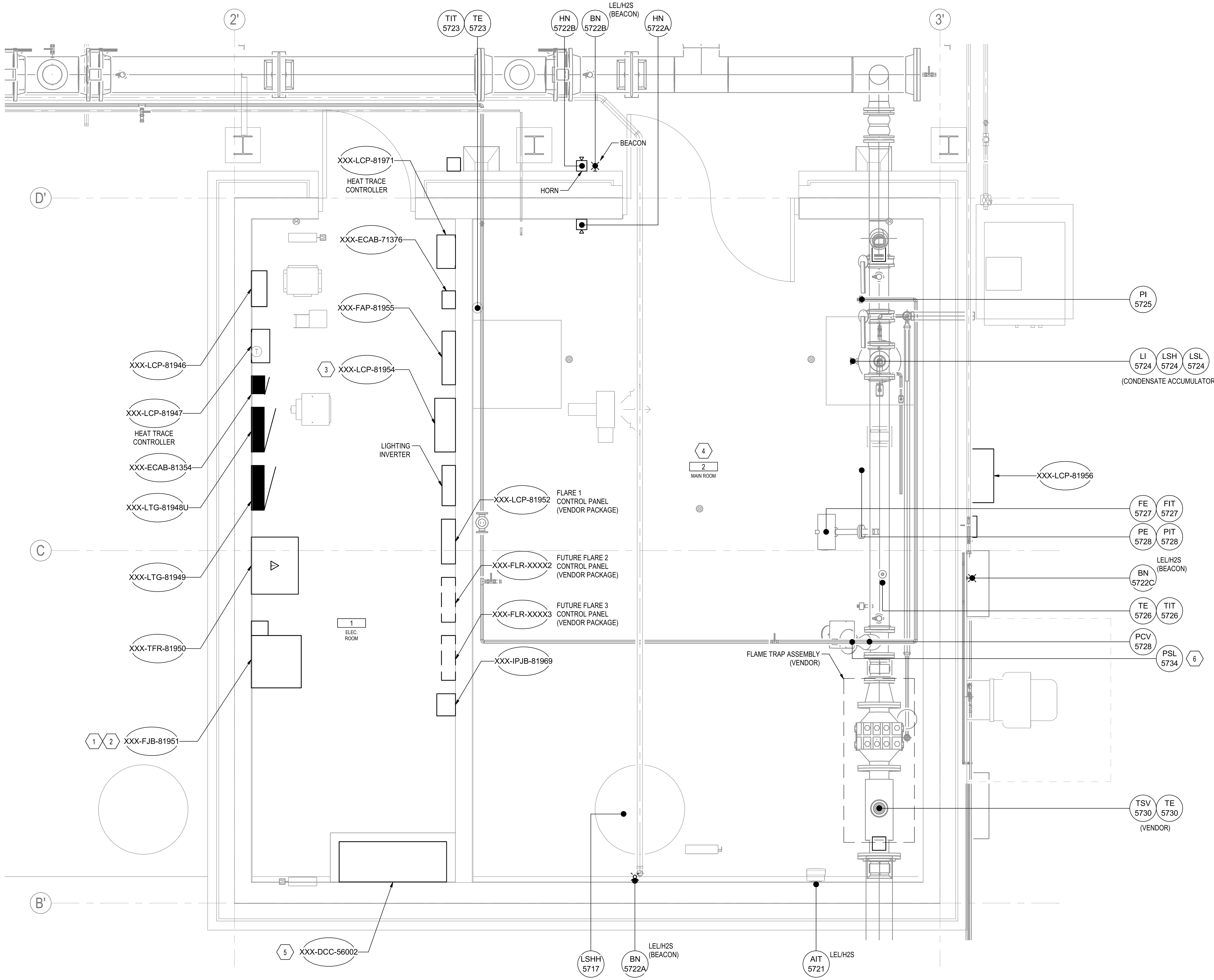
EPCOR

PLANT SITE: GOLD BAR WWTP
PLANT AREA: PLANT WIDE
PROJECT NAME: GBWWTP FLARE CAPACITY EXPANSION
DRAWING TITLE: INSTRUMENTATION IPJB-81969 LAYOUT, BOM & SCHEDULE

| CONSULTANT JOB No. | EPCOR PROJECT No. | SCALE | SHEET | DRAWING NUMBER |
|---|---|---|---|---|
| 1101000105 | PMO 1004723; PF14-015 | AS SHOWN | 1 OF 1 | PRJ-15-157-707 |




1 / 708 **MAIN LEVEL** 1 : 25

## GENERAL NOTES:

1. THE LABELS ARE FOR REPRESENTATION OF LOCATION ONLY.
2. REFER TO DWG. PRJ-15-157-710 FOR NETWORK CONNECTION DETAILS.
3. CONTRACTOR TO INSTALL CABLES AS PER PRJ-15-157-710 UP TO EACH CABINET. ROUTING IS TO PRIORITIZE THE CONTROL CABLE TRAY.
4. ALL NEW CABLE INSTALLATIONS ARE TO BE COMPLETED BY CONTRACTOR. ONLY TERMINATIONS IN DCC-56002 ARE TO BE TERMINATED BY EPCOR.
5. VENDOR CONNECTIONS ARE TO BE TERMINATED IN THE VENDOR PANELS BY THE VENDOR. TERMINATION IN DESTINATION CABINETS ARE TO BE COMPLETED BY EPCOR.
6. REFER TO DWG. PRJ-15-157-607 FOR HAZARDOUS AREA CLASSIFICATION PLAN.
7. CONTRACTOR TO INSTALL A HOUSEKEEPING PAD OF 100mm (H) x 1320mm (W) x 208mm (D) FOR DCC-56002. REFER TO PRJ-15-157-203 DETAILS 8 AND 9.

## KEYNOTES:

1. CONTRACTOR TO SUPPLY AND INSTALL THE FIBER OPTIC JUNCTION BOX FJB-81951.
2. CONTRACTOR TO COMPLETE ALL FIBER OPTIC CONNECTIONS FROM FJB-81951 TO EXISTING CABINET DJB-50542 IN PENTHOUSE #1 ELECTRICAL ROOM AND TO DJB-50543 IN TUNNEL F. REFER TO PRJ-15-157-709 FOR FURTHER DETAILS.
3. CONTRACTOR TO CONNECT THE BMS/HVAC CONTROL PANEL TO FJB-76998. REFER TO DIVISION 15 FOR MECHANICAL SPECIFICATIONS.
4. THE MAIN ROOM IS A ZONE 1 (CLASS 1, DIVISION 1) HAZARDOUS RATED AREA. ALL ELECTRICAL EQUIPMENT WITHIN THIS ROOM SHALL BE RATED FOR ZONE 1 (CLASS 1, DIVISION 1) AND SHALL BE INSTALLED AND WIRED IN ACCORDANCE WITH SECTION 18 OF THE CANADIAN ELECTRICAL CODE (CSA22.1-21).
5. DCC-56002 TO BE SUPPLIED BY EPCOR. CONTRACTOR TO COORDINATE WITH EPCOR FOR PROCUREMENT. THE CONTRACTOR IS RESPONSIBLE FOR ALL WIRING RUNS TO THE PANEL. EPCOR WILL BE RESPONSIBLE FOR TERMINATIONS WITHIN THE PANEL.
6. CONTRACTOR TO INSTALL PSL-5734 ON THE INSTRUMENT AIR PIPING THAT GOES TO PCV-5728. REFER TO THE P&ID ON PRJ-15-157-406 FOR FURTHER DETAILS.

| REFERENCE DRAWING | | REVISION | | | | | | |
|---|---|---|---|---|---|---|---|---|
| DRAWING No. | DRAWING TITLE | Rev. | DATE | DESCRIPTION | BY | DES. | CHK. | ENG. |
| | | 0A | 05-JUL-2023 | ISSUED FOR PRELIMINARY DESIGN | JM | JG | MM | JG |
| | | 0B | 26-APR-2024 | ISSUED FOR 60% DESIGN | JFA | JFA | AG | JG |
| | | 0C | 30-AUG-2024 | ISSUED FOR 90% DESIGN | EGD | JFA | AG | JG |
| | | 0D | 15-NOV-2024 | ISSUED FOR CONSTRUCTION | EGD | JFA | AG | JG |

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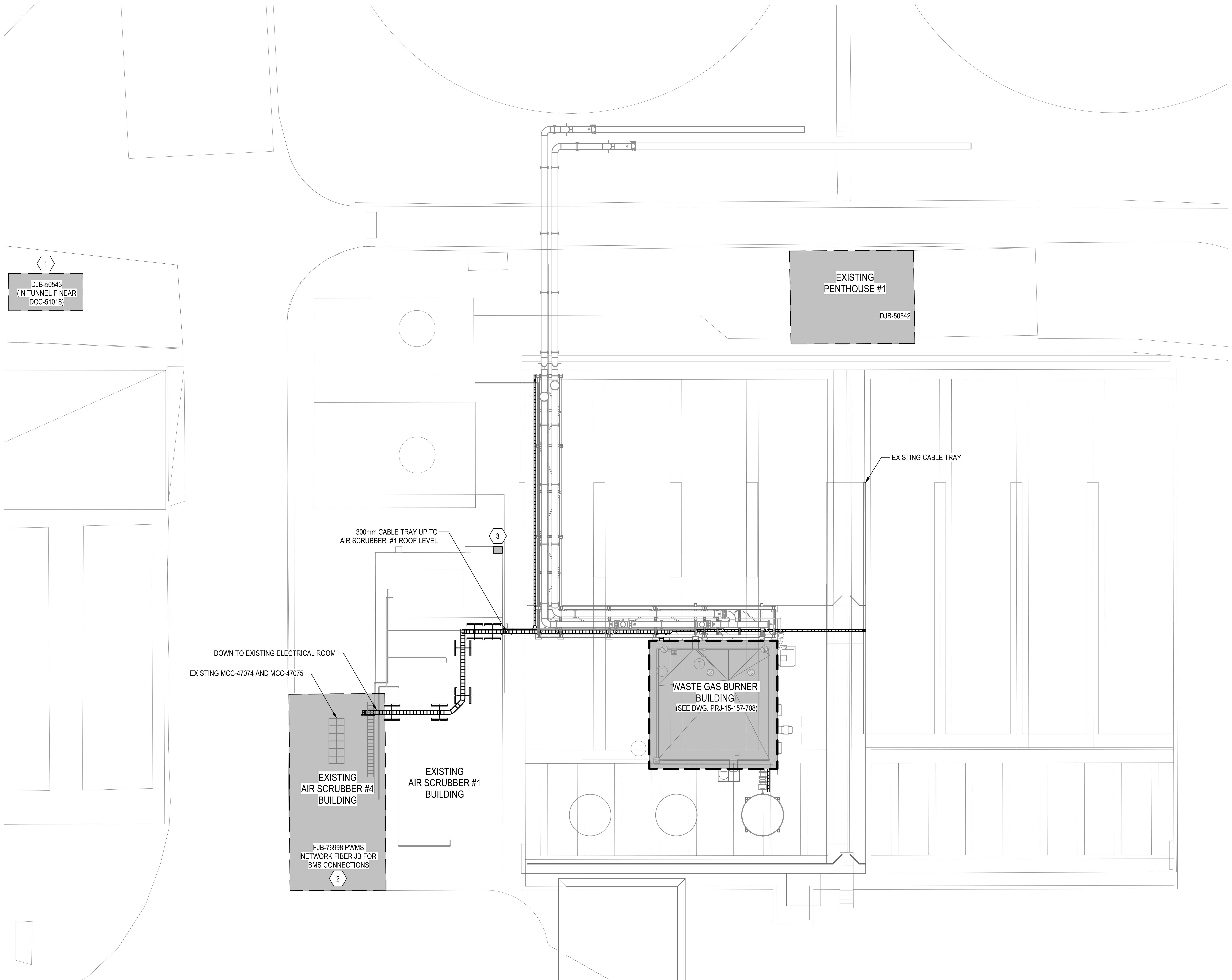
EPCOR

PLANT SITE: GOLD BAR WWTP
PLANT AREA: PLANT WIDE
PROJECT NAME: GBWWTP FLARE CAPACITY EXPANSION
DRAWING TITLE:
INSTRUMENTATION
WASTE GAS BURNER BUILDING
MAIN FLOOR INSTRUMENT LAYOUT

| CONSULTANT JOB No. | EPCOR PROJECT No. | SCALE | SHEET | DRAWING NUMBER |
|---|---|---|---|---|
| 1101000105 | PMO 1004723; PF14-015 | 1 : 25 | 1 of 0 | PRJ-15-157-708 |

11/18/2024 2:09:18 PM

PROJECT NORTH




1
709
**SITE PLAN**
1 : 150

## CONSTRUCTION KEYNOTES:

1. CONTRACTOR TO COMPLETE ALL FIBER CONNECTIONS FROM THE FIBER JUNCTION BOX FJB-81951 TO EXISTING CABINET DJB-50542 IN PENTHOUSE #1 ELECTRICAL ROOM AND TO EXISTING CABINET DJB-50543 IN TUNNEL F. CONTRACTOR TO COORDINATE WITH EPCOR ALL FIBER CONNECTION CABLE ROUTING ON-SITE.
2. CONTRACTOR TO CONNECT THE WASTE GAS BURNER BUILDING BMS PANEL LCP-81954 TO EXISTING FJB-76998 PWMS NETWORK FIBER JB IN AIR SCRUBBER #4 BUILDING TO TIE IN TO THE PLANTWIDE MONITORING NETWORK.
3. CONTRACTOR TO COORDINATE WITH EPCOR TO CONFIRM THE EXISTING SECURITY NETWORK SWITCH CABINET LOCATION IN AIR SCRUBBER #1 BUILDING, CONNECT WASTE GAS BURNER BUILDING SECURITY ACCESS CONTROL PANEL ACP-81946 TO THE EXISTING PANEL TO TIE IN TO THE EXISTING SECURITY NETWORK.

| REFERENCE DRAWING | | REVISION | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| DRAWING No. | DRAWING TITLE | Rev. | DATE | DESCRIPTION | BY | DES. | CHK. | ENG. |
| | | 0A | 30-AUG-2024 | ISSUED FOR 90% DESIGN | EGD | JG | AG | JG |
| | | 0B | 15-NOV-2024 | ISSUED FOR CONSTRUCTION | EGD | JG | AG | JG |
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ALBERTA
ID#115821 2024-11-25

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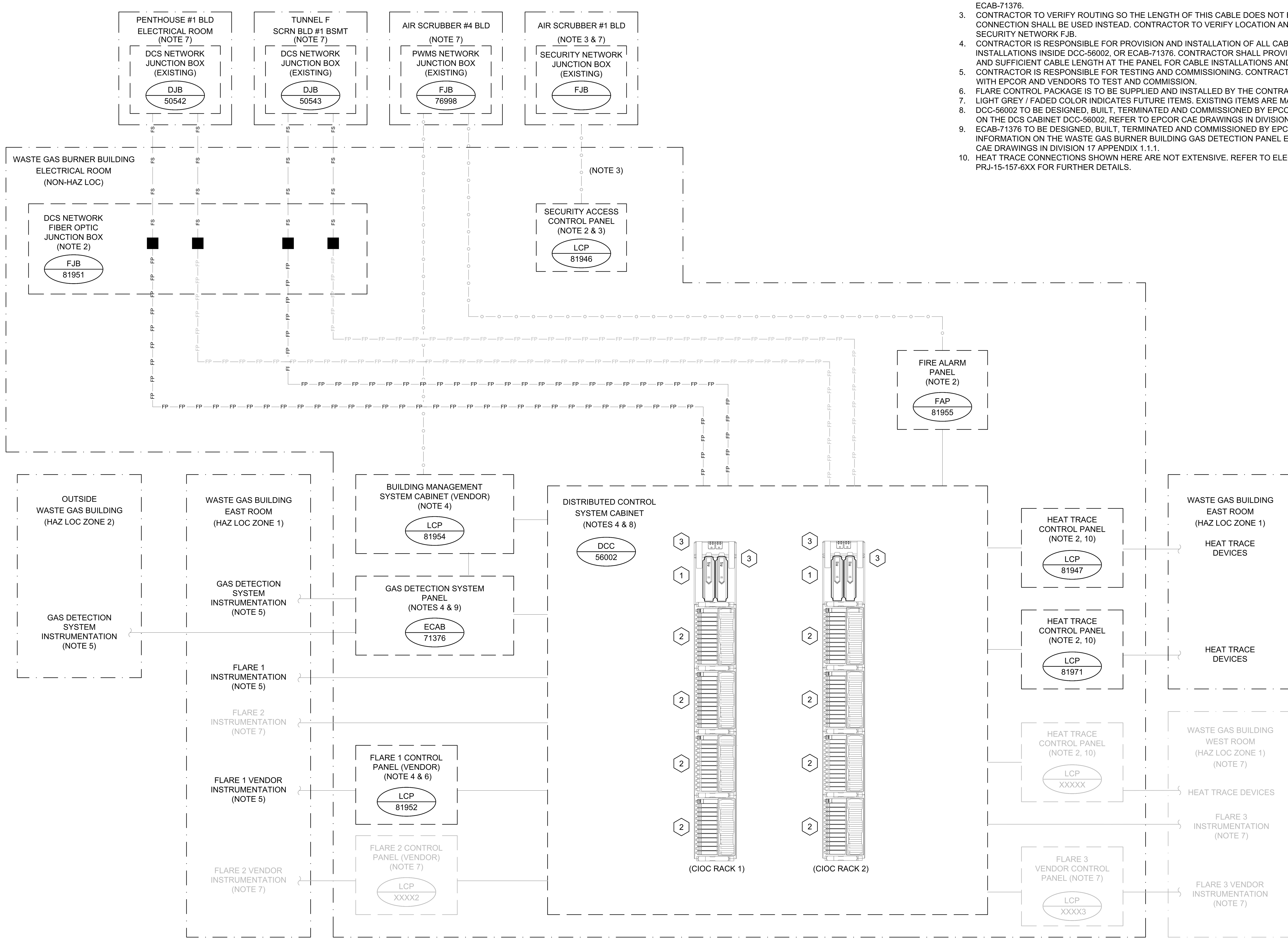
PLANT SITE: GOLD BAR WWTP
PLANT AREA: PLANT WIDE
PROJECT NAME: GBWWTP FLARE CAPACITY EXPANSION
DRAWING TITLE:
INSTRUMENTATION
SITE PLAN - WASTE GAS BURNER BUILDING

| CONSULTANT JOB No. | EPCOR PROJECT No. | SCALE | SHEET | DRAWING NUMBER |
|---|---|---|---|---|
| 1101000105 | PMO 1004723; PF14-015 | 1 : 150 | of 0 | PRJ-15-157-709 |

11/18/2024 2:11:29 PM




## NOTES:

1. CONTRACTOR SHALL PROVIDE AND INSTALL ALL CONNECTIONS SHOWN USING APPROPRIATE CABLES AS PER SPECIFICATIONS AND APPLICABLE STANDARDS.
2. CONTRACTOR TO PROVIDE AND INSTALL ALL NEW CABINETS SHOWN, WITH THE EXCEPTION OF DCC-56002 & ECAB-71376.
3. CONTRACTOR TO VERIFY ROUTING SO THE LENGTH OF THIS CABLE DOES NOT EXCEED 90 M, OTHERWISE FM CONNECTION SHALL BE USED INSTEAD. CONTRACTOR TO VERIFY LOCATION AND EQUIPMENT TAG OF THE SECURITY NETWORK FJB.
4. CONTRACTOR IS RESPONSIBLE FOR PROVISION AND INSTALLATION OF ALL CABLES, WITH THE EXCEPTION OF INSTALLATIONS INSIDE DCC-56002, OR ECAB-71376. CONTRACTOR SHALL PROVIDE CONNECTORS, LABELING AND SUFFICIENT CABLE LENGTH AT THE PANEL FOR CABLE INSTALLATIONS AND TERMINATIONS.
5. CONTRACTOR IS RESPONSIBLE FOR TESTING AND COMMISSIONING. CONTRACTOR SHALL COORDINATE WORK WITH EPCOR AND VENDORS TO TEST AND COMMISSION.
6. FLARE CONTROL PACKAGE IS TO BE SUPPLIED AND INSTALLED BY THE CONTRACTOR.
7. LIGHT GREY / FADED COLOR INDICATES FUTURE ITEMS. EXISTING ITEMS ARE MARKED AS "(EXISTING)".
8. DCC-56002 TO BE DESIGNED, BUILT, TERMINATED AND COMMISSIONED BY EPCOR. FOR FURTHER INFORMATION ON THE DCS CABINET DCC-56002, REFER TO EPCOR CAE DRAWINGS IN DIVISION 17 APPENDIX 1.1.
9. ECAB-71376 TO BE DESIGNED, BUILT, TERMINATED AND COMMISSIONED BY EPCOR. FOR FURTHER INFORMATION ON THE WASTE GAS BURNER BUILDING GAS DETECTION PANEL ECAB-71376, REFER TO EPCOR CAE DRAWINGS IN DIVISION 17 APPENDIX 1.1.1.
10. HEAT TRACE CONNECTIONS SHOWN HERE ARE NOT EXTENSIVE. REFER TO ELECTRICAL DRAWINGS PRJ-15-157-6XX FOR FURTHER DETAILS.

## LEGEND:

- FS — SINGLE MODE FIBER OPTIC CABLE
- FP — FIBER OPTIC PATCH CABLE
- CAT 6 ETHERNET CABLE
- HARDWIRED SIGNAL CABLE(S)
- AREA DIVISION LINE
- PANEL DIVISION LINE

## KEY NOTES:

1. CHARM I/O CARD MODULES (REDUNDANT) AND CARRIER
2. CHARMS, I/O TERMINAL BLOCKS, BASE PLATE AND LABELS
3. FIBER TERMINATION PORTS (REDUNDANT)

| REFERENCE DRAWING | |
|---|---|
| DRAWING No. | DRAWING TITLE |
| | |

| Rev. | DATE | DESCRIPTION | BY | DES. | CHK. | ENG. |
|---|---|---|---|---|---|---|
| 0A | 21-JUN-2023 | ISSUED FOR PRELIMINARY DESIGN | JM | JG | MM | JG |
| 0B | 26-APR-2024 | ISSUED FOR 60% DESIGN | JFA | JFA | BP | JG |
| 0C | 28-AUG-2024 | ISSUED FOR 90% DESIGN | OL | JG | BP | JG |
| 0D | 15-NOV-2024 | ISSUED FOR CONSTRUCTION | MC | JFA | BC | JG |

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RM SIGNATURE:
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DATE: 2024-11-25
PERMIT NUMBER: P000258
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PROFESSIONAL ENGINEER ALBERTA
JOVLYN GRAY
ID#115821 2024-11-25

Stantec

300-10220 103 Avenue NW
Edmonton AB T5J 0K4 CA
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EPCOR

PLANT SITE: GOLD BAR WWTP
PLANT AREA: PLANT WIDE
PROJECT NAME: GBWWTP FLARE CAPACITY EXPANSION
DRAWING TITLE:

# INSTRUMENTATION COMMUNICATIONS SYSTEM ARCHITECTURE

| CONSULTANT JOB No. | EPCOR PROJECT No. | SCALE | SHEET | DRAWING NUMBER |
|---|---|---|---|---|
| 1101000105 | PMO 1004723; PF14-015 | NOT TO SCALE | 1 OF 1 | PRJ-15-157-710 |

## GBWWTP Cable/Conduit Index (I-Cable)

Note: I-000 ID identifies all analog cables (4-20ma, temperature,etc.)

| Cable # | From | From Location | To / Purpose | To Location | # of conducto | # of spar | Cable Type | Conduit Size | Rev Updated |
|---|---|---|---|---|---|---|---|---|---|
| I-DCC-56002/AIT-5721 | DCC-56002 | FLARE BLDG ELEC ROOM | AIT-5721 | FLARE BLDG EAST ROOM | #16 - 2 PR | 0 | TC-ACIC 300V HL (BELDEN 23527D) | - | IFC |
| I-DCC-56002/TIT-5723 | DCC-56002 | FLARE BLDG ELEC ROOM | TIT-5723 | FLARE BLDG EAST ROOM | #16 - 1 PR | 0 | TC-ACIC 300V HL (BELDEN 23527D) | - | IFC |
| I-DCC-56002/FIT-5727 | DCC-56002 | FLARE BLDG ELEC ROOM | FIT-5727 | FLARE BLDG EAST ROOM | #16 - 2 PR | 1 PR | TC-ACIC 300V HL (BELDEN 23527D) | - | IFC |
| I-DCC-56002/TIT-5726 | DCC-56002 | FLARE BLDG ELEC ROOM | TIT-5726 | FLARE BLDG EAST ROOM | #16 - 1 PR | 0 | TC-ACIC 300V HL (BELDEN 23527D) | - | IFC |
| I-DCC-56002/PIT-5727 | DCC-56002 | FLARE BLDG ELEC ROOM | PIT-5727 | FLARE BLDG EAST ROOM | #16 - 1 PR | 0 | TC-ACIC 300V HL (BELDEN 23527D) | - | IFC |
| I-DCC-56002/PCV-5728 | DCC-56002 | FLARE BLDG ELEC ROOM | PCV-5728 | FLARE BLDG EAST ROOM | #16 - 1 PR | 0 | TC-ACIC 300V HL (BELDEN 23501D) | - | IFC |
| I-DCC-56002/LCP-81952 | DCC-56002 | FLARE BLDG ELEC ROOM | LCP-81952 | FLARE BLDG EAST ROOM | #16 - 1 PR | 0 | TC-ACIC 300V HL (BELDEN 23501D) | - | IFC |
| I-LCP-81952/TE-5731A | LCP-81952 | FLARE BLDG ELEC ROOM | TE-5731A | FLARE STACK | #16 - 1 PR | 0 | TC-ACIC 300V HL (BELDEN 23501D) | - | IFC |
| I-LCP-81952/TE-5731B | LCP-81952 | FLARE BLDG ELEC ROOM | TE-5731B | FLARE STACK | #16 - 1 PR | 0 | TC-ACIC 300V HL (BELDEN 23501D) | - | IFC |
| I-LCP-81952/TE-5733 | LCP-81952 | FLARE BLDG ELEC ROOM | TE-5733 | FLARE STACK | #16 - 1 PR | 0 | TC-ACIC 300V HL (BELDEN 23501D) | - | IFC |

## GBWWTP Cable/Conduit Index (C-Cable)

Note: C-000 identifies control cable (Start/Stop and 120 V Status, interlocking inst./elect.)

| Cable # | From | From Location | To / Purpose | To Location | # of conductors | # of spare | Cable Type | Conduit Size | Rev Updated |
|---|---|---|---|---|---|---|---|---|---|
| C-DCC-56002/FAP-81955 | DCC-56002 | FLARE BLDG ELEC ROOM | FAP-81955 | FLARE BLDG ELEC ROOM | #14 - 4C+G | 0 | TECK90 (HL) 600V | - | IFC |
| C-DCC-56002/HTC-81947 | DCC-56002 | FLARE BLDG ELEC ROOM | HTC-81947 | FLARE BLDG ELEC ROOM | #14 - 2C+G | 0 | TECK90 (HL) 600V | - | IFC |
| C-DCC-56002/HTC-81971 | DCC-56002 | FLARE BLDG ELEC ROOM | HTC-81971 | FLARE BLDG ELEC ROOM | #14 - 2C+G | 0 | TECK90 (HL) 600V | - | IFC |
| C-DCC-56002/LCP-81954 | DCC-56002 | FLARE BLDG ELEC ROOM | LCP-81954 | FLARE BLDG ELEC ROOM | #14 - 4C+G | 0 | TECK90 (HL) 600V | - | IFC |
| C-DCC-56002/ECAB-71376 | DCC-56002 | FLARE BLDG ELEC ROOM | ECAB-71376 | FLARE BLDG ELEC ROOM | #14 - 12C+G | 0 | TECK90 (HL) 600V | - | IFC |
| C-ECAB-71376/LCP-81954 | ECAB-71376 | FLARE BLDG ELEC ROOM | LCP-81954 | FLARE BLDG ELEC ROOM | #14 - 4C+G | 2 | TECK90 (HL) 600V | - | IFC |
| C-DCC-56002/LSHH-5717 | DCC-56002 | FLARE BLDG ELEC ROOM | LSHH-5717 | FLARE BLDG EAST ROOM | #14 - 4C+G | 0 | TECK90 (HL) 600V | - | IFC |
| C-DCC-56002/LSL-5746 | DCC-56002 | FLARE BLDG ELEC ROOM | LSL-5746 | FLARE BLDG EAST ROOM | #14 - 4C+G | 0 | TECK90 (HL) 600V | - | IFC |
| C-DCC-56002/LSH-5745 | DCC-56002 | FLARE BLDG ELEC ROOM | LSH-5745 | FLARE BLDG EAST ROOM | #14 - 4C+G | 0 | TECK90 (HL) 600V | - | IFC |
| C-ECAB-71376/AIT-5721 | ECAB-71376 | FLARE BLDG ELEC ROOM | AIT-5721 | FLARE BLDG EAST ROOM | #14 - 8C+G | 0 | TECK90 (HL) 600V | - | IFC |
| C-ECAB-71376/BN-5722A | ECAB-71376 | FLARE BLDG ELEC ROOM | BN-5722A | FLARE BLDG EAST ROOM | #14 - 2C+G | 0 | TECK90 (HL) 600V | - | IFC |
| C-ECAB-71376/HN-5722A | ECAB-71376 | FLARE BLDG ELEC ROOM | HN-5722A | FLARE BLDG EAST ROOM | #14 - 2C+G | 0 | TECK90 (HL) 600V | - | IFC |
| C-ECAB-71376/BN-5722B | ECAB-71376 | FLARE BLDG ELEC ROOM | BN-5722B | NORTH WALL FLARE BLDG (OUTSIDE) | #14 - 2C+G | 0 | TECK90 (HL) 600V | - | IFC |
| C-ECAB-71376/HN-5722B | ECAB-71376 | FLARE BLDG ELEC ROOM | HN-5722B | NORTH WALL FLARE BLDG (OUTSIDE) | #14 - 2C+G | 0 | TECK90 (HL) 600V | - | IFC |
| C-ECAB-71376/BN-5722C | ECAB-71376 | FLARE BLDG ELEC ROOM | BN-5722C | EAST WALL FLARE BLDG (OUTSIDE) | #14 - 2C+G | 0 | TECK90 (HL) 600V | - | IFC |
| C-DCC-56002/LSL-5724 | DCC-56002 | FLARE BLDG ELEC ROOM | LSL-5724 | FLARE BLDG EAST ROOM | #14 - 4C+G | 0 | TECK90 (HL) 600V | - | IFC |
| C-DCC-56002/LSH-5724 | DCC-56002 | FLARE BLDG ELEC ROOM | LSH-5724 | FLARE BLDG EAST ROOM | #14 - 4C+G | 0 | TECK90 (HL) 600V | - | IFC |
| C-DCC-56002/LCP-81952 | DCC-56002 | FLARE BLDG ELEC ROOM | LCP-81952 | FLARE BLDG ELEC ROOM | #14 - 20C+G | 0 | TECK90 (HL) 600V | - | IFC |
| C-LCP-81952/LCP-81970 | LCP-81952 | FLARE BLDG ELEC ROOM | LCP-81970 | FLARE BLDG EAST - SPARK PNL | #14 - 6C+G | 0 | TECK90 (HL) 600V | - | IFC |
| C-DCC-56002/PSL-5734 | DCC-56002 | FLARE BLDG ELEC ROOM | PSL-5734 | FLARE BLDG EAST ROOM | #14 - 2C+G | 0 | TECK90 (HL) 600V | - | IFC |

## GBWWTP Cable/Conduit Index (COM-Cable)

Note: COM-000 ID identifies all Data cable wiring. (Modbus Plus, Ethernet Cat 5e, Fiber optics, RS-232, RS-485 etc.)

| Cable # | From | From Location | To / Purpose | To Location | # of conducto | # of spar | Cable Type | Conduit Size | Rev Updated |
|---|---|---|---|---|---|---|---|---|---|
| COM-DJB-50542/FJB-81951 | DJB-50542 | PENTHOUSE NO.1 ELEC ROOM | FJB-81951 | FLARE BLDG ELEC ROOM | 2 | 1 | FO 12 STR SM OM1 OFCR/FT4 RISER | - | IFC |
| COM-DJB-50543/FJB-81951 | DJB-50543 | TUNNEL F | FJB-81951 | FLARE BLDG ELEC ROOM | 2 | 1 | FO 12 STR SM OM1 OFCR/FT4 RISER | - | IFC |
| COM-FJB-81951/DCC-56002 | FJB-81951 | FLARE BLDG ELEC ROOM | DCC-56002 | FLARE BLDG ELEC ROOM | 4 | 2 | FO 12 STR SM OM1 OFCR/FT4 RISER | - | IFC |
| COM-FJB-76998/LCP-81954 | FJB-76998 | AIR SCRUBBER #4 BLDG | LCP-81954 | FLARE BLDG ELEC ROOM | 1 | 1 | CAT 6 ETHERNET (NORAMCO | - | IFC |
| COM-FJB-76998/FAP-81955 | FJB-76998 | AIR SCRUBBER #4 BLDG | FAP-81955 | FLARE BLDG ELEC ROOM | 1 | 1 | CAT 6 ETHERNET (NORAMCO | - | IFC |
| COM-LCP-XXXXX/LCP-81946 | LCP-XXXXX | AIR SCRUBBER #1 BLDG | LCP-81946 | FLARE BLDG ELEC ROOM | 1 | 1 | CAT 6 ETHERNET (NORAMCO | - | IFC |

## GBWWTP Cable/Conduit Index (P-Cable)

Note: P-000 identifies power cables (120 V power supply to Inst equipment)

| Cable # | From | From Location | To / Purpose | To Location | # of conducto | # of spar | Cable Type | Conduit Size | Rev Updated |
|---|---|---|---|---|---|---|---|---|---|
| P-LTG-81948U/IPJB-81969 | LTG-81948U | FLARE BLDG ELEC ROOM | IPJB-81969 | FLARE BLDG ELEC ROOM | #12 - 2C+G | 0 | TECK90 (HL) 600V | - | IFC |
| P-IPJB-81969/FIT-5727 | IPJB-81969 | FLARE BLDG ELEC ROOM | FIT-5727 | FLARE BLDG EAST ROOM | #14 - 2C+G | 0 | TECK90 (HL) 600V | - | IFC |

| REFERENCE DRAWING | | REVISION | | | | | | |
|---|---|---|---|---|---|---|---|---|
| DRAWING No. | DRAWING TITLE | Rev. | DATE | DESCRIPTION | BY | DES. | CHK. | ENG. |
| | | 0A | 21-JUN-2023 | ISSUED FOR PRELIMINARY DESIGN | JM | JG | MM | JG |
| | | 0B | 26-APR-2024 | ISSUED FOR 60% DESIGN | JFA | JFA | BP | JG |
| | | 0C | 28-AUG-2024 | ISSUED FOR 90% DESIGN | OL | JG | BP | JG |
| | | 0D | 15-NOV-2024 | ISSUED FOR CONSTRUCTION | JFA | JFA | BC | JG |

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PROFESSIONAL ENGINEER ALBERTA
JOYLYN GRAY
ID#115821 2024-11-25

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300-10220 103 Avenue NW
Edmonton AB T5J 0K4 CA
www.stantec.com





EPCOR

PLANT SITE: GOLD BAR WWTP
PLANT AREA: PLANT WIDE
PROJECT NAME: GBWWTP FLARE CAPACITY EXPANSION
DRAWING TITLE: INSTRUMENTATION CABLE AND CONDUIT SCHEDULE

| CONSULTANT JOB No. | EPCOR PROJECT No. | SCALE | SHEET | DRAWING NUMBER |
|---|---|---|---|---|
| 1101000105 | PMO 1004723; PF14-015 | NOT TO SCALE | 1 OF 1 | PRJ-15-157-711 |

| FIELD | JUNCTION BOX | DCS | SOFTWARE |
|---|---|---|---|

WASTE GAS BURNER BUILDING
EAST FLARE ROOM

HAZARDOUS AREA:
ZONE 1, GROUP IIA & IIB, T3 (MAX 200°C)
Ex ib

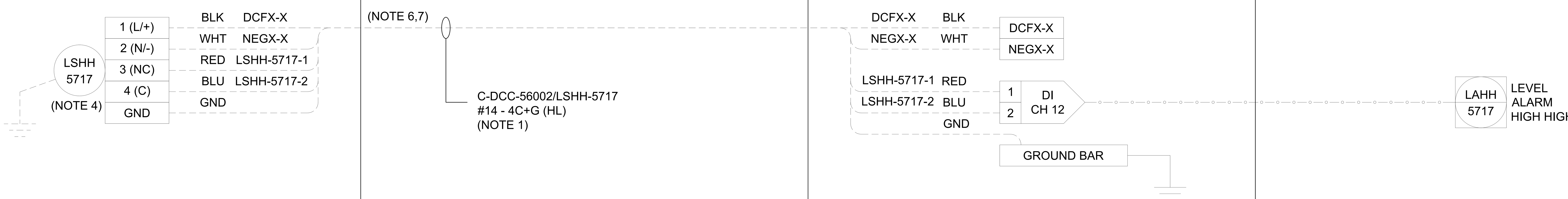
EAST FLARE ROOM SUMP TANK
LEVEL SWITCH HIGH
LSHH-5717
(CSA (XP) CLASS 1, DIVISION 1, GROUP CD
Ta = -40°C TO 70°C
Tp = -50°C TO 150°C)

WASTE GAS BURNER BUILDING
ELECTRICAL ROOM

NON-HAZARDOUS AREA

(NOTE 5)

| | |
|---|---|
| DCS CABINET: | DCC-56002 |
| CARRIER: | CIOC1 |
| BASEPLATE: | BP04 |
| CHANNEL: | 12 |
| CHARM TYPE: | SE4301T02 |
| CHARM DESC: | DI 24V DC LOW-SIDE SENSE |




NOTES:

1. METAL CABLE SHEATH REQUIRED AND MUST BE UNINTERRUPTED BETWEEN THE TERMINATION POINTS IN THE EXPLOSION-PROOF ENCLOSURE & THE ENTRY POINT TO ZONE 1. EXPLOSION BARRIER REQUIRED AT ALL ZONE 1 TERMINATION POINTS.
2. SHIELDS SHALL BE PULLED BACK AND COVERED WITH HEATSHRINK WHERE THEY ARE SHOWN AS NOT TERMINATED.
3. CONTRACTOR SHALL PROVIDE AS-BUILT REDLINES FOR ALL LOOP DRAWING CHANGES.
4. CONTRACTOR SHALL WORK WITH EPCOR FOR ALL TESTING AND COMMISSIONING. ALL SETPOINTS AND UNITS SHALL BE VERIFIED BY EPCOR.
5. DCS CABINET DCC-56002 IS TO BE BUILT, TERMINATED AND COMMISSIONED BY EPCOR. FOR FURTHER INFORMATION ON THE DCS CABINET DCC-56002, REFER TO EPCOR CAE DRAWINGS IN DIVISION 17 APPENDIX 1.1.
6. CONTRACTOR TO PROVIDE CABLE LABELING AND APPROPRIATE CABLE LENGTH AT DCS CABINET FOR TERMINATION BY EPCOR. CONTRACTOR TO PROVIDE AND INSTALL APPROPRIATE SEALS & FITTINGS FOR ALL POINTS OF ENTRY IN HAZARDOUS LOCATIONS.
7. ENSURE ALL REQUIREMENTS FOR INSTALLATIONS IN HAZARDOUS LOCATIONS ARE FOLLOWED AS PER APPLICABLE STANDARDS AND RECOMMENDATIONS BY THE MANUFACTURER.

LEGEND:

INTERNAL SOFTWARE LINK
PANEL WIRING
FIELD WIRING
DEVICENET DATALINK

| REFERENCE DRAWING | | REVISION | | | | | | |
|---|---|---|---|---|---|---|---|---|
| DRAWING No. | DRAWING TITLE | Rev. | DATE | DESCRIPTION | BY | DES. | CHK. | ENG. |
| | | 0A | 15-NOV-2024 | ISSUED FOR CONSTRUCTION | MC | JFA | BC | JG |

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EPCOR

PLANT SITE: GOLD BAR WWTP
PLANT AREA: PLANT WIDE
PROJECT NAME: GBWWTP FLARE CAPACITY EXPANSION
DRAWING TITLE:
INSTRUMENTATION
LSHH-5717
LOOP DRAWING

| CONSULTANT JOB No. | EPCOR PROJECT No. | SCALE | SHEET | DRAWING NUMBER |
|---|---|---|---|---|
| 1101000105 | PMO 1004723; PF14-015 | NOT TO SCALE | 1 OF 1 | PRJ-15-157-721 |


NOTES:

1. METAL CABLE SHEATH REQUIRED AND MUST BE UNINTERRUPTED BETWEEN THE TERMINATION POINTS IN THE EXPLOSION-PROOF ENCLOSURE & THE ENTRY POINT TO ZONE 1. EXPLOSION BARRIER REQUIRED AT ALL ZONE 1 TERMINATION POINTS.
2. SHIELDS SHALL BE PULLED BACK AND COVERED WITH HEATSHRINK WHERE THEY ARE SHOWN AS NOT TERMINATED.
3. CONTRACTOR SHALL PROVIDE AS-BUILT REDLINES FOR ALL LOOP DRAWING CHANGES.
4. CONTRACTOR SHALL WORK WITH EPCOR FOR ALL TESTING AND COMMISSIONING. ALL SETPOINTS AND UNITS SHALL BE VERIFIED BY EPCOR.
5. DCS CABINET DCC-56002 AND ECAB-71376 ARE TO BE BUILT, TERMINATED AND COMMISSIONED BY EPCOR. FOR FURTHER INFORMATION ON THE DCS CABINET DCC-56002 OR ECAB-71376, REFER TO EPCOR CAE DRAWINGS IN DIVISION 17 APPENDIX 1.1 AND DIVISION 17 APPENDIX 1.1.1 RESPECTIVELY.
6. CONTRACTOR TO PROVIDE CABLE LABELING AND APPROPRIATE CABLE LENGTH AT DCS CABINET FOR TERMINATION BY EPCOR. CONTRACTOR TO PROVIDE AND INSTALL APPROPRIATE SEALS & FITTINGS FOR ALL POINTS OF ENTRY IN HAZARDOUS LOCATIONS.
7. ENSURE ALL REQUIREMENTS FOR INSTALLATIONS IN HAZARDOUS LOCATIONS ARE FOLLOWED AS PER APPLICABLE STANDARDS AND RECOMMENDATIONS BY THE MANUFACTURER.

LEGEND:

INTERNAL SOFTWARE LINK
PANEL WIRING
FIELD WIRING
DEVICENET DATALINK

| REFERENCE DRAWING | | REVISION | | | | | | |
|---|---|---|---|---|---|---|---|---|
| DRAWING No. | DRAWING TITLE | Rev. | DATE | DESCRIPTION | BY | DES. | CHK. | ENG. |
| | | 0A | 28-AUG-2024 | ISSUED FOR 90% DESIGN | OL | JG | BP | JG |
| | | 0B | 15-NOV-2024 | ISSUED FOR CONSTRUCTION | MC | JFA | BC | JG |

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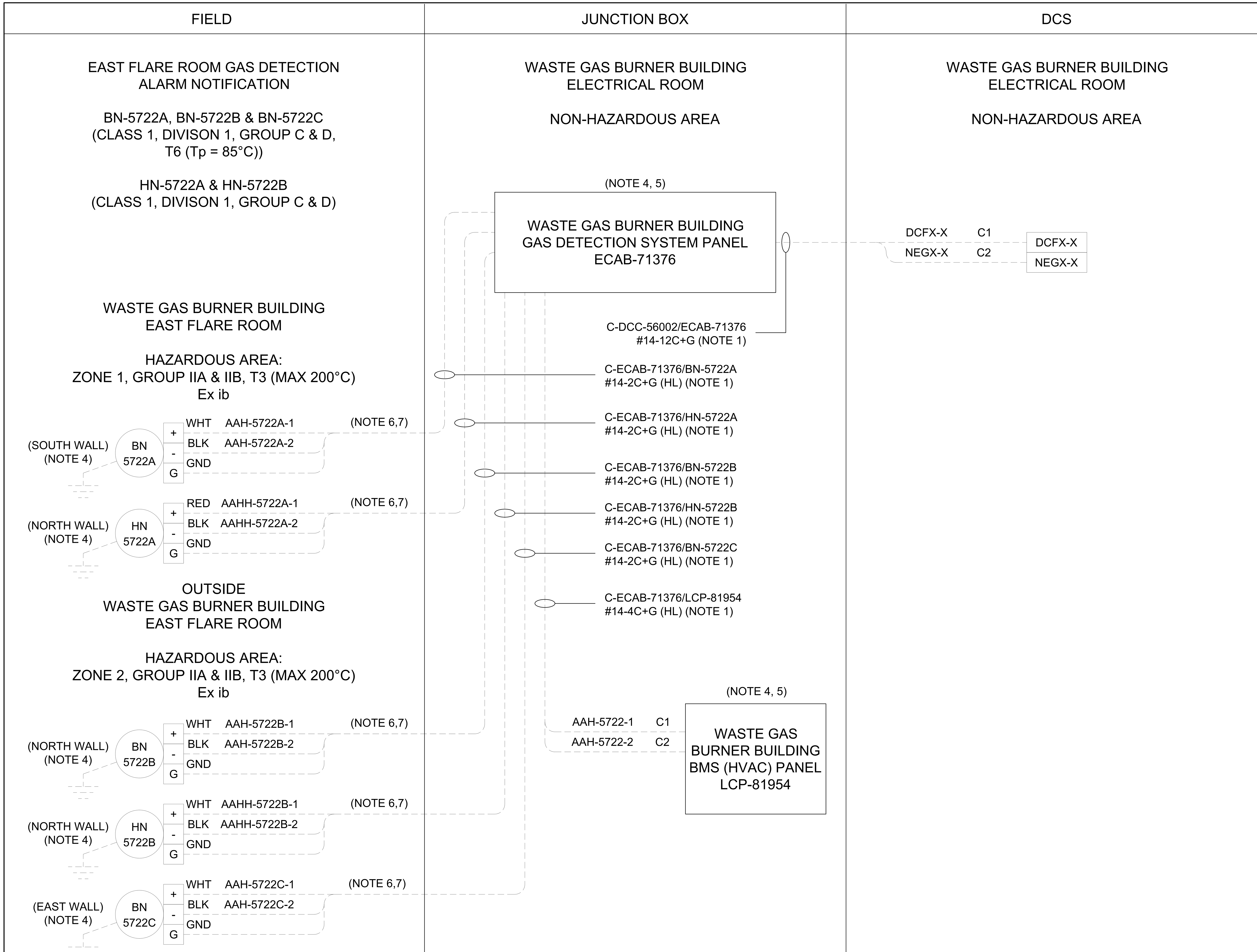
EPCOR

PLANT SITE: GOLD BAR WWTP
PLANT AREA: PLANT WIDE
PROJECT NAME: GBWWTP FLARE CAPACITY EXPANSION
DRAWING TITLE: INSTRUMENTATION AIT-5721 LOOP DRAWING

| CONSULTANT JOB No. | EPCOR PROJECT No. | SCALE | SHEET | DRAWING NUMBER |
|---|---|---|---|---|
| 1101000105 | PMO 1004723; PF14-015 | NOT TO SCALE | 1 OF 1 | PRJ-15-157-722 |




NOTES:

1. METAL CABLE SHEATH REQUIRED AND MUST BE UNINTERRUPTED BETWEEN THE TERMINATION POINTS IN THE EXPLOSION-PROOF ENCLOSURE & THE ENTRY POINT TO ZONE 1 OR 2. EXPLOSION BARRIER REQUIRED AT ALL ZONE 1 OR 2 TERMINATION POINTS.
2. SHIELDS SHALL BE PULLED BACK AND COVERED WITH HEATSHRINK WHERE THEY ARE SHOWN AS NOT TERMINATED.
3. CONTRACTOR SHALL PROVIDE AS-BUILT REDLINES FOR ALL LOOP DRAWING CHANGES.
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7. ENSURE ALL REQUIREMENTS FOR INSTALLATIONS IN HAZARDOUS LOCATIONS ARE FOLLOWED AS PER APPLICABLE STANDARDS AND RECOMMENDATIONS BY THE MANUFACTURER.

LEGEND:

- INTERNAL SOFTWARE LINK
- PANEL WIRING
- FIELD WIRING
- DN DN DEVICENET DATALINK

| REFERENCE DRAWING | |
|---|---|
| DRAWING No. | DRAWING TITLE |
| | |
| | |
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REVISION

| Rev. | DATE | DESCRIPTION | BY | DES. | CHK. | ENG. |
|---|---|---|---|---|---|---|
| 0A | 28-AUG-2024 | ISSUED FOR 90% DESIGN | OL | JG | BP | JG |
| 0B | 15-NOV-2024 | ISSUED FOR CONSTRUCTION | MC | JFA | BC | JG |
| | | | | | | |
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RM SIGNATURE:
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DATE: 2024-11-25
PERMIT NUMBER: P000258
The Association of Professional Engineers and Geoscientists of Alberta (APEGA)

ENGINEERING STAMP

PROFESSIONAL ENGINEER ALBERTA
JOYLYN GRAY
ID#115821 2024-11-25

Stantec
300-10220 103 Avenue NW
Edmonton AB T5J 0K4 CA
www.stantec.com



PLANT SITE: GOLD BAR WWTP
PLANT AREA: PLANT WIDE
PROJECT NAME: GBWWTP FLARE CAPACITY EXPANSION
DRAWING TITLE: INSTRUMENTATION GAS DETECTION ALARM BEACONS & HORNS LOOP DRAWING

| CONSULTANT JOB No. | EPCOR PROJECT No. | SCALE | SHEET | DRAWING NUMBER |
|---|---|---|---|---|
| 1101000105 | PMO 1004723; PF14-015 | NOT TO SCALE | 1 OF 1 | PRJ-15-157-723 |

| FIELD | JUNCTION BOX | DCS | SOFTWARE |
|---|---|---|---|

## FIELD

WASTE GAS BURNER BUILDING
EAST FLARE ROOM

HAZARDOUS AREA:
ZONE 1, GROUP IIA & IIB, T3 (MAX 200°C)
Ex ib

## DCS

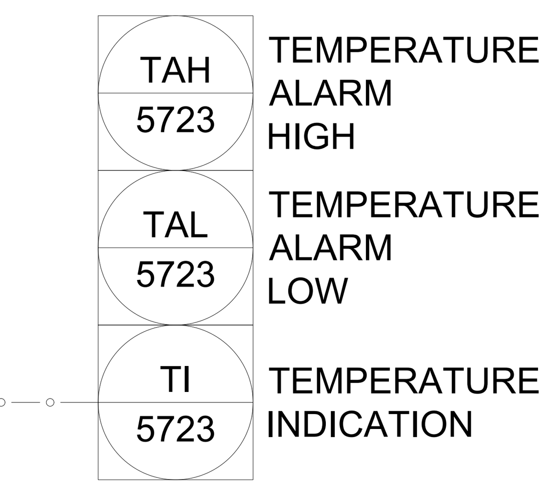
WASTE GAS BURNER BUILDING
ELECTRICAL ROOM

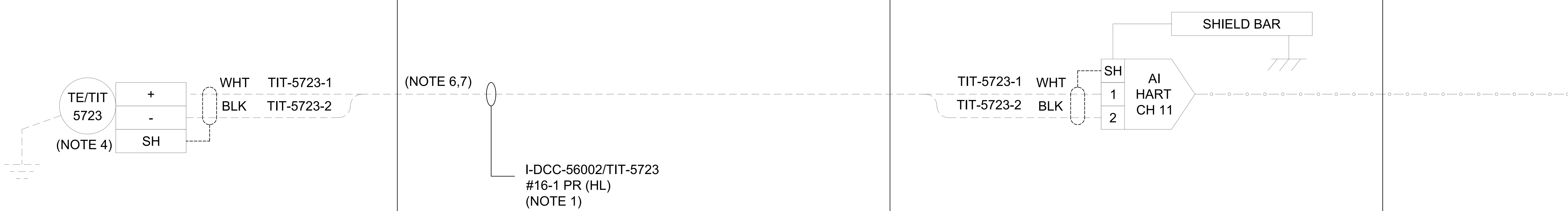
NON-HAZARDOUS AREA

(NOTE 5)

| | |
|---|---|
| DCS CABINET: | DCC-56002 |
| CARRIER: | CIOC1 |
| BASEPLATE: | BP01 |
| CHANNEL: | 11 |
| CHARM TYPE: | SE4303T01 |
| CHARM DESC: | AI 4-20mA HART |

EAST FLARE ROOM AMBIENT TEMPERATURE
TIT-5723
(Ex ia IIC T4 Gb; CLASS 1 DIVISION 1, GROUP CD
ENCLOSURE: Ta = -60°C TO 80°C
SENSOR: Tp = -40°C TO 170°C)




NOTES:

1. METAL CABLE SHEATH REQUIRED AND MUST BE UNINTERRUPTED BETWEEN THE TERMINATION POINTS IN THE EXPLOSION-PROOF ENCLOSURE & THE ENTRY POINT TO ZONE 1. EXPLOSION BARRIER REQUIRED AT ALL ZONE 1 TERMINATION POINTS.
2. SHIELDS SHALL BE PULLED BACK AND COVERED WITH HEATSHRINK WHERE THEY ARE SHOWN AS NOT TERMINATED.
3. CONTRACTOR SHALL PROVIDE AS-BUILT REDLINES FOR ALL LOOP DRAWING CHANGES.
4. CONTRACTOR SHALL WORK WITH EPCOR FOR ALL TESTING AND COMMISSIONING. ALL SETPOINTS AND UNITS SHALL BE VERIFIED BY EPCOR.
5. DCS CABINET DCC-56002 IS TO BE BUILT, TERMINATED AND COMMISSIONED BY EPCOR. FOR FURTHER INFORMATION ON THE DCS CABINET DCC-56002, REFER TO EPCOR CAE DRAWINGS IN DIVISION 17 APPENDIX 1.1.
6. CONTRACTOR TO PROVIDE CABLE LABELING AND APPROPRIATE CABLE LENGTH AT DCS CABINET FOR TERMINATION BY EPCOR. CONTRACTOR TO PROVIDE AND INSTALL APPROPRIATE SEALS & FITTINGS FOR ALL POINTS OF ENTRY IN HAZARDOUS LOCATIONS.
7. ENSURE ALL REQUIREMENTS FOR INSTALLATIONS IN HAZARDOUS LOCATIONS ARE FOLLOWED AS PER APPLICABLE STANDARDS AND RECOMMENDATIONS BY THE MANUFACTURER.

LEGEND:

- INTERNAL SOFTWARE LINK
- PANEL WIRING
- FIELD WIRING
- DEVICENET DATALINK

| REFERENCE DRAWING | | REVISION | | | | | | |
|---|---|---|---|---|---|---|---|---|
| DRAWING No. | DRAWING TITLE | Rev. | DATE | DESCRIPTION | BY | DES. | CHK. | ENG. |
| | | 0A | 28-AUG-2024 | ISSUED FOR 90% DESIGN | OL | JG | BP | JG |
| | | 0B | 15-NOV-2024 | ISSUED FOR CONSTRUCTION | MC | JFA | BC | JG |

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**PERMIT NUMBER: P000258**
The Association of Professional Engineers and Geoscientists of Alberta (APEGA)

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PROFESSIONAL ENGINEER ALBERTA
JOYLYN GRAY
ID#115821 2024-11-25

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Edmonton AB T5J 0K4 CA
www.stantec.com




EPCOR

PLANT SITE: GOLD BAR WWTP PLANT AREA: PLANT WIDE

PROJECT NAME: GBWWTP FLARE CAPACITY EXPANSION

DRAWING TITLE: INSTRUMENTATION
TIT-5723
LOOP DRAWING

| CONSULTANT JOB No. | EPCOR PROJECT No. | SCALE | SHEET | DRAWING NUMBER |
|---|---|---|---|---|
| 1101000105 | PMO 1004723; PF14-015 | NOT TO SCALE | 1 OF 1 | PRJ-15-157-724 |

| FIELD | JUNCTION BOX | DCS | SOFTWARE |
|---|---|---|---|

WASTE GAS BURNER BUILDING
EAST FLARE ROOM

HAZARDOUS AREA:
ZONE 1, GROUP IIA & IIB, T3 (MAX 200°C)
Ex ib

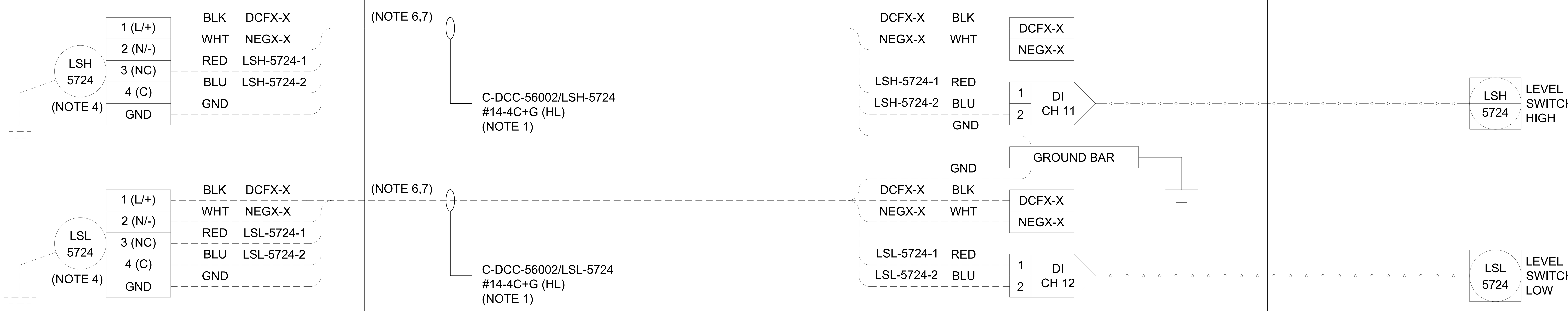
FLR-81929
BIOGAS HEADER CONDENSATE ACCUMULATOR
LEVEL SWITCHES
LSH-5724 & LSL-5724
(CSA (XP) CLASS 1, DIVISION 1, GROUP CD
Ta = -40°C TO 70°C
Tp = -50°C TO 150°C)

WASTE GAS BURNER BUILDING
ELECTRICAL ROOM

NON-HAZARDOUS AREA

(NOTE 5)

| | |
|---|---|
| DCS CABINET: | DCC-56002 |
| CARRIER: | CIOC1 |
| BASEPLATE: | BP02 |
| CHANNEL: | 11 & 12 |
| CHARM TYPE: | SE4301T02 |
| CHARM DESC: | DI 24V DC LOW-SIDE SENSE |




NOTES:

1. METAL CABLE SHEATH REQUIRED AND MUST BE UNINTERRUPTED BETWEEN THE TERMINATION POINTS IN THE EXPLOSION-PROOF ENCLOSURE & THE ENTRY POINT TO ZONE 1. EXPLOSION BARRIER REQUIRED AT ALL ZONE 1 TERMINATION POINTS.
2. SHIELDS SHALL BE PULLED BACK AND COVERED WITH HEATSHRINK WHERE THEY ARE SHOWN AS NOT TERMINATED.
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LEGEND:

- INTERNAL SOFTWARE LINK
- PANEL WIRING
- FIELD WIRING
- DEVICENET DATALINK

| REFERENCE DRAWING | | REVISION | | | | | | |
|---|---|---|---|---|---|---|---|---|
| DRAWING No. | DRAWING TITLE | Rev. | DATE | DESCRIPTION | BY | DES. | CHK. | ENG. |
| | | 0A | 15-NOV-2024 | ISSUED FOR CONSTRUCTION | MC | JFA | BC | JG |

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ID#115821 2024-11-25

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EPCOR

| | |
|---|---|
| PLANT SITE: GOLD BAR WWTP | PLANT AREA: PLANT WIDE |
| PROJECT NAME: | GBWWTP FLARE CAPACITY EXPANSION |
| DRAWING TITLE: | INSTRUMENTATION<br>LSH-5724 & LSL-5724<br>LOOP DRAWING |

| CONSULTANT JOB No. | EPCOR PROJECT No. | SCALE | SHEET | DRAWING NUMBER |
|---|---|---|---|---|
| 1101000105 | PMO 1004723; PF14-015 | NOT TO SCALE | 1 OF 1 | PRJ-15-157-725 |

| FIELD | JUNCTION BOX | DCS | SOFTWARE |
|---|---|---|---|

## FIELD

WASTE GAS BURNER BUILDING
EAST FLARE ROOM

HAZARDOUS AREA:
ZONE 1, GROUP IIA & IIB, T3 (MAX 200°C)
Ex ib

EAST FLARE ROOM AMBIENT TEMPERATURE
TT-5726
(Ex ia IIC T4 Gb; CLASS 1 DIVISION 1, GROUP CD
ENCLOSURE: Ta = -60°C TO 80°C
SENSOR: Tp = -40°C TO 300°C)

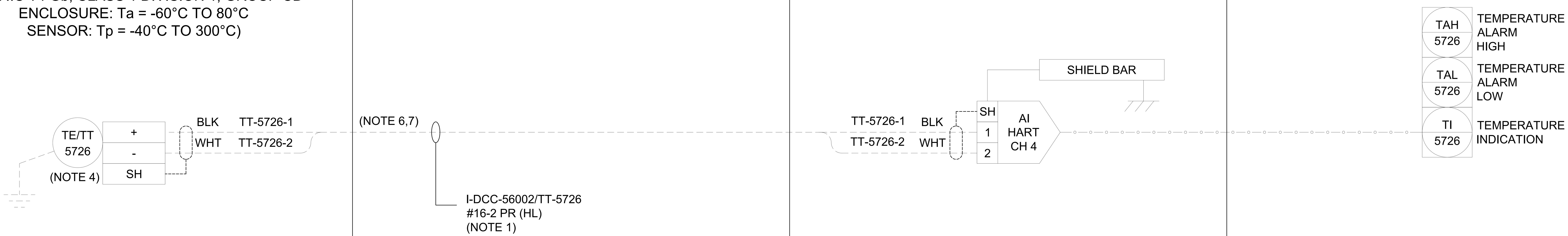
## DCS

WASTE GAS BURNER BUILDING
ELECTRICAL ROOM

NON-HAZARDOUS AREA

(NOTE 5)

| | |
|---|---|
| DCS CABINET: | DCC-56002 |
| CARRIER: | CIOC1 |
| BASEPLATE: | BP03 |
| CHANNEL: | 4 |
| CHARM TYPE: | SE4303T01 |
| CHARM DESC: | AI 4-20mA HART |




NOTES:

1. METAL CABLE SHEATH REQUIRED AND MUST BE UNINTERRUPTED BETWEEN THE TERMINATION POINTS IN THE EXPLOSION-PROOF ENCLOSURE & THE ENTRY POINT TO ZONE 1. EXPLOSION BARRIER REQUIRED AT ALL ZONE 1 TERMINATION POINTS.
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7. ENSURE ALL REQUIREMENTS FOR INSTALLATIONS IN HAZARDOUS LOCATIONS ARE FOLLOWED AS PER APPLICABLE STANDARDS AND RECOMMENDATIONS BY THE MANUFACTURER.

LEGEND:

- INTERNAL SOFTWARE LINK
- PANEL WIWIRING
- FIELD WIRING
- DEVICENET DATALINK

| REFERENCE DRAWING | | REVISION | | | | | | |
|---|---|---|---|---|---|---|---|---|
| DRAWING No. | DRAWING TITLE | Rev. | DATE | DESCRIPTION | BY | DES. | CHK. | ENG. |
| | | 0A | 15-NOV-2024 | ISSUED FOR CONSTRUCTION | JFA | JFA | BC | JG |

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PROFESSIONAL ENGINEER ALBERTA
JOYLYN GRAY
ID#115821 2024-11-25

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EPCOR

PLANT SITE: GOLD BAR WWTP
PLANT AREA: PLANT WIDE
PROJECT NAME: GBWWTP FLARE CAPACITY EXPANSION
DRAWING TITLE: INSTRUMENTATION TIT-5726 LOOP DRAWING

| CONSULTANT JOB No. | EPCOR PROJECT No. | SCALE | SHEET | DRAWING NUMBER |
|---|---|---|---|---|
| 1101000105 | PMO 1004723; PF14-015 | NOT TO SCALE | 1 OF 1 | PRJ-15-157-726 |

| FIELD | JUNCTION BOX | DCS | SOFTWARE |
|---|---|---|---|

WASTE GAS BURNER BUILDING
EAST FLARE ROOM

HAZARDOUS AREA:
ZONE 1, GROUP IIA & IIB, T3 (MAX 200°C)
Ex ib

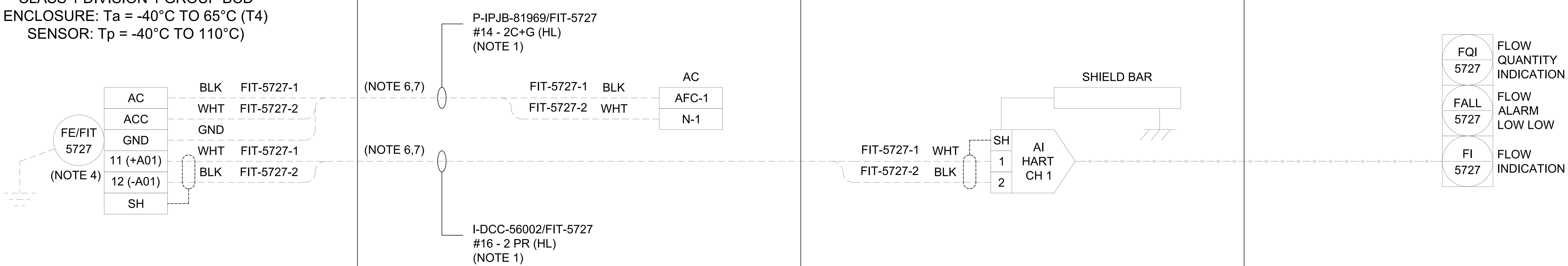
WASTE GAS BURNER BUILDING
ELECTRICAL ROOM

NON-HAZARDOUS AREA

(NOTE 5)

| | |
|---|---|
| DCS CABINET: | DCC-56002 |
| CARRIER: | CIOC1 |
| BASEPLATE: | BP03 |
| CHANNEL: | 1 |
| CHARM TYPE: | SE4303T01 |
| CHARM DESC: | AI 4-20mA HART |

FLR-81929
BIOGAS HEADER FLOW
FIT-5727
(Ex db IIB + H2 T5...T3 Gb
CLASS 1 DIVISION 1 GROUP BCD
ENCLOSURE: Ta = -40°C TO 65°C (T4)
SENSOR: Tp = -40°C TO 110°C)




NOTES:

1. CABLE MARKERS REQUIRED AT BOTH ENDS OF EACH CABLE, WITH ORIGIN/DESTINATION AS PREFIX, AND CABLE TYPE SHOWN ON DRAWING AS SUFFIX.
2. SHIELDS SHALL BE PULLED BACK AND COVERED WITH HEATSHRINK WHERE THEY ARE SHOWN AS NOT TERMINATED.
3. CONTRACTOR SHALL PROVIDE AS-BUILT REDLINES FOR ALL LOOP DRAWING CHANGES.
4. CONTRACTOR SHALL WORK WITH EPCOR FOR ALL TESTING AND COMMISSIONING. ALL SETPOINTS AND UNITS SHALL BE VERIFIED BY EPCOR.
5. DCS CABIENT DCC-56002 IS TO BE BUILT, TERMINATED AND COMMISSIONED BY EPCOR. FOR FURTHER INFORMATION ON THE DCS CABINET DCC-56002, REFER TO EPCOR CAE DRAWINGS IN DIVISION 17 APPENDIX 1.1.
6. CONTRACTOR TO PROVIDE AND INSTALL CABLES FROM THE FIELD DEVICE UP TO DCS CABINET AND APPROPRIATE CABLE LABELING AND LENGTH FOR TERMINATION AT THE DCC CABIENT BY EPCOR.
7. CONTRACTOR TO PROVIDE AND INSTALL APPROPRIATE SEALS & FITTINGS FOR ALL POINTS OF ENTRY IN HAZARDOUS LOCATIONS. ENSURE ALL REQUIREMENTS FOR INSTALLATIONS IN HAZARDOUS LOCATIONS ARE FOLLOWED AS PER APPLICABLE STANDARDS AND RECOMMENDATIONS BY THE MANUFACTURER.

LEGEND:

- INTERNAL SOFTWARE LINK
- PANEL WIRING
- FIELD WIRING
- DEVICENET DATALINK

| REFERENCE DRAWING | | REVISION | | | | | | |
|---|---|---|---|---|---|---|---|---|
| DRAWING No. | DRAWING TITLE | Rev. | DATE | DESCRIPTION | BY | DES. | CHK. | ENG. |
| | | 0A | 28-AUG-2024 | ISSUED FOR 90% DESIGN | OL | JG | BP | JG |
| | | 0B | 15-NOV-2024 | ISSUED FOR CONSTRUCTION | MC | JFA | BC | JG |

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EPCOR

GOLD BAR WWTP | PLANT WIDE

GBWWTP FLARE CAPACITY EXPANSION

INSTRUMENTATION
FIT-5727
LOOP DRAWING

| | | | | |
|---|---|---|---|---|
| 1101000105 | PMO 1004723; PF14-015 | NOT TO SCALE | 1 OF 1 | PRJ-15-157-727 |

| FIELD | JUNCTION BOX | DCS | SOFTWARE |
|---|---|---|---|

WASTE GAS BURNER BUILDING
EAST FLARE ROOM

HAZARDOUS AREA:
ZONE 1, GROUP IIA & IIB, T3 (MAX 200°C)
Ex ib

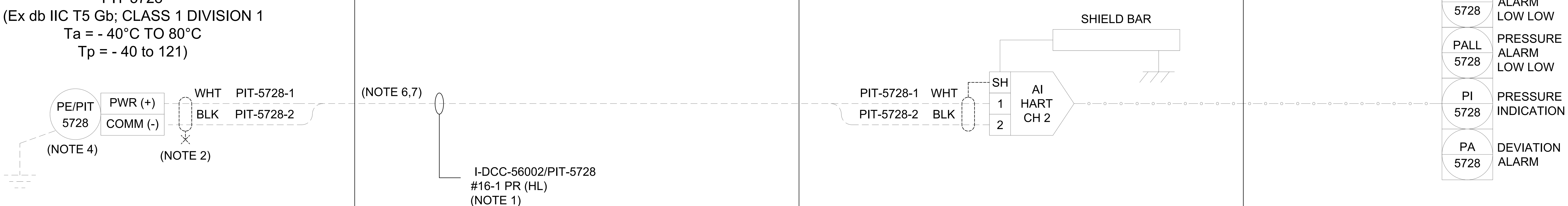
WASTE GAS BURNER BUILDING
ELECTRICAL ROOM

NON-HAZARDOUS AREA

(NOTE 5)

| | |
|---|---|
| DCS CABINET: | DCC-56002 |
| CARRIER: | CIOC1 |
| BASEPLATE: | BP03 |
| CHANNEL: | 2 |
| CHARM TYPE: | SE4303T01 |
| CHARM DESC: | AI 4-20mA HART |

FLR-81929
BIOGAS HEADER PRESSURE
PIT-5728
(Ex db IIC T5 Gb; CLASS 1 DIVISION 1
Ta = - 40°C TO 80°C
Tp = - 40 to 121)




NOTES:

1. METAL CABLE SHEATH REQUIRED AND MUST BE UNINTERRUPTED BETWEEN THE TERMINATION POINTS IN THE EXPLOSION-PROOF ENCLOSURE & THE ENTRY POINT TO ZONE 1. EXPLOSION BARRIER REQUIRED AT ALL ZONE 1 TERMINATION POINTS.
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LEGEND:

- INTERNAL SOFTWARE LINK
- PANEL WIRING
- FIELD WIRING
- DEVICENET DATALINK

| REFERENCE DRAWING | | REVISION | | | | | | |
|---|---|---|---|---|---|---|---|---|
| DRAWING No. | DRAWING TITLE | Rev. | DATE | DESCRIPTION | BY | DES. | CHK. | ENG. |
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EPCOR

PLANT SITE: GOLD BAR WWTP
PLANT AREA: PLANT WIDE
PROJECT NAME: GBWWTP FLARE CAPACITY EXPANSION
DRAWING TITLE: INSTRUMENTATION PIT-5728 LOOP DRAWING

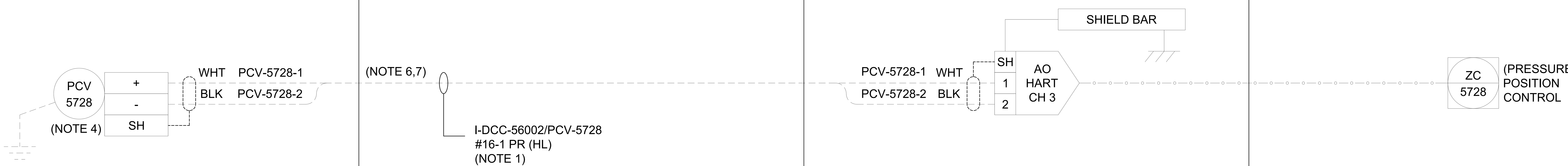
| CONSULTANT JOB No. | EPCOR PROJECT No. | SCALE | SHEET | DRAWING NUMBER |
|---|---|---|---|---|
| 1101000105 | PMO 1004723; PF14-015 | NOT TO SCALE | 1 OF 1 | PRJ-15-157-728 |

| FIELD | JUNCTION BOX | DCS | SOFTWARE |
|---|---|---|---|
| WASTE GAS BURNER BUILDING<br>EAST FLARE ROOM<br><br>HAZARDOUS AREA:<br>ZONE 1, GROUP IIA & IIB, T3 (MAX 200°C)<br>Ex ib | WASTE GAS BURNER BUILDING<br>ELECTRICAL ROOM<br><br>NON-HAZARDOUS AREA | WASTE GAS BURNER BUILDING<br>ELECTRICAL ROOM<br><br>NON-HAZARDOUS AREA | |

(NOTE 5)

| | |
|---|---|
| DCS CABINET: | DCC-56002 |
| CARRIER: | CIOC1 |
| BASEPLATE: | BP03 |
| CHANNEL: | 3 |
| CHARM TYPE: | SE4304T01 |
| CHARM DESC: | AO 4-20mA HART |

FLR-81929
BIOGAS HEADER PRESSURE CONTROLLER
PCV-5728
(Ex d IIC T5; CLASS 1 DIVISION 1 GP B,C,D
Ta = - 52°C TO 80°C
FAIL CLOSED)




NOTES:

1. METAL CABLE SHEATH REQUIRED AND MUST BE UNINTERRUPTED BETWEEN THE TERMINATION POINTS IN THE EXPLOSION-PROOF ENCLOSURE & THE ENTRY POINT TO ZONE 1. EXPLOSION BARRIER REQUIRED AT ALL ZONE 1 TERMINATION POINTS.
2. SHIELDS SHALL BE PULLED BACK AND COVERED WITH HEATSHRINK WHERE THEY ARE SHOWN AS NOT TERMINATED.
3. CONTRACTOR SHALL PROVIDE AS-BUILT REDLINES FOR ALL LOOP DRAWING CHANGES.
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LEGEND:

- INTERNAL SOFTWARE LINK
- PANEL WIRING
- FIELD WIRING
- DEVICENET DATALINK

| REFERENCE DRAWING | | REVISION | | | | | | |
|---|---|---|---|---|---|---|---|---|
| DRAWING No. | DRAWING TITLE | Rev. | DATE | DESCRIPTION | BY | DES. | CHK. | ENG. |
| | | 0A | 28-AUG-2024 | ISSUED FOR 90% DESIGN | OL | JG | BP | JG |
| | | 0B | 15-NOV-2024 | ISSUED FOR CONSTRUCTION | MC | JFA | BC | JG |

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EPCOR

PLANT SITE: GOLD BAR WWTP
PLANT AREA: PLANT WIDE
PROJECT NAME: GBWWTP FLARE CAPACITY EXPANSION
DRAWING TITLE: INSTRUMENTATION PCV-5728 LOOP DRAWING

| CONSULTANT JOB No. | EPCOR PROJECT No. | SCALE | SHEET | DRAWING NUMBER |
|---|---|---|---|---|
| 1101000105 | PMO 1004723; PF14-015 | NOT TO SCALE | 1 OF 1 | PRJ-15-157-729 |

| FIELD | JUNCTION BOX | DCS | SOFTWARE |
|---|---|---|---|

WASTE GAS BURNER BUILDING
EAST FLARE ROOM

HAZARDOUS AREA:
ZONE 1, GROUP IIA & IIB, T3 (MAX 200°C)
Ex ib

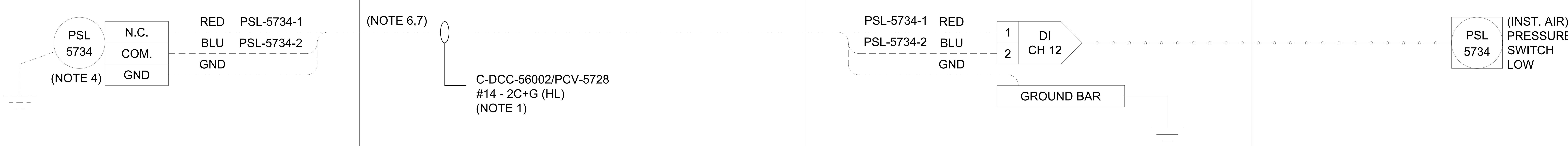
FLR-81929
INSTRUMENT AIR LOW PRESSURE SWITCH
PSL-5734
(EX db IIC T6 Gb, CL 1 DIV 1 GP B,C,D
Ta = -50°C TO 71°C)

WASTE GAS BURNER BUILDING
ELECTRICAL ROOM

NON-HAZARDOUS AREA

(NOTE 5)

| | |
|---|---|
| DCS CABINET: | DCC-56002 |
| CARRIER: | CIOC1 |
| BASEPLATE: | BP01 |
| CHANNEL: | 12 |
| CHARM TYPE: | SE4302T02 |
| CHARM DESC: | DI 24V DC |




NOTES:

1. METAL CABLE SHEATH REQUIRED AND MUST BE UNINTERRUPTED BETWEEN THE TERMINATION POINTS IN THE EXPLOSION-PROOF ENCLOSURE & THE ENTRY POINT TO ZONE 1. EXPLOSION BARRIER REQUIRED AT ALL ZONE 1 TERMINATION POINTS.
2. SHIELDS SHALL BE PULLED BACK AND COVERED WITH HEATSHRINK WHERE THEY ARE SHOWN AS NOT TERMINATED.
3. CONTRACTOR SHALL PROVIDE AS-BUILT REDLINES FOR ALL LOOP DRAWING CHANGES.
4. CONTRACTOR SHALL WORK WITH EPCOR FOR ALL TESTING AND COMMISSIONING. ALL SETPOINTS AND UNITS SHALL BE VERIFIED BY EPCOR.
5. DCS CABINET DCC-56002 IS TO BE BUILT, TERMINATED AND COMMISSIONED BY EPCOR. FOR FURTHER INFORMATION ON THE DCS CABINET DCC-56002, REFER TO EPCOR CAE DRAWINGS IN DIVISION 17 APPENDIX 1.1.
6. CONTRACTOR TO PROVIDE CABLE LABELING AND APPROPRIATE CABLE LENGTH AT DCS CABINET FOR TERMINATION BY EPCOR. CONTRACTOR TO PROVIDE AND INSTALL APPROPRIATE SEALS & FITTINGS FOR ALL POINTS OF ENTRY IN HAZARDOUS LOCATIONS.
7. ENSURE ALL REQUIREMENTS FOR INSTALLATIONS IN HAZARDOUS LOCATIONS ARE FOLLOWED AS PER APPLICABLE STANDARDS AND RECOMMENDATIONS BY THE MANUFACTURER.

LEGEND:

—o—o—o— INTERNAL SOFTWARE LINK
PANEL WIRING
FIELD WIRING
—DN—DN— DEVICENET DATALINK

| REFERENCE DRAWING | | REVISION | | | | | | |
|---|---|---|---|---|---|---|---|---|
| DRAWING No. | DRAWING TITLE | Rev. | DATE | DESCRIPTION | BY | DES. | CHK. | ENG. |
| | | 0A | 15-NOV-2024 | ISSUED FOR CONSTRUCTION | MC | JFA | BC | JG |

PERMIT STAMP

**PERMIT TO PRACTICE**
**STANTEC CONSULTING LTD**
RM SIGNATURE:
RM APEGA ID #: 49830
DATE: 2024-11-25
**PERMIT NUMBER: P000258**
The Association of Professional Engineers and Geoscientists of Alberta (APEGA)

ENGINEERING STAMP

PROFESSIONAL ENGINEER JOYLYN GRAY ALBERTA
ID#115821 2024-11-25


Stantec
300-10220 103 Avenue NW
Edmonton AB T5J 0K4 CA
www.stantec.com




EPCOR

PLANT SITE: GOLD BAR WWTP
PLANT AREA: PLANT WIDE
PROJECT NAME: GBWWTP FLARE CAPACITY EXPANSION
DRAWING TITLE: INSTRUMENTATION PSL-5734 LOOP DRAWING

| CONSULTANT JOB No. | EPCOR PROJECT No. | SCALE | SHEET | DRAWING NUMBER |
|---|---|---|---|---|
| 1101000105 | PMO 1004723; PF14-015 | NOT TO SCALE | 1 OF 1 | PRJ-15-157-730 |

| FIELD | JUNCTION BOX | DCS | SOFTWARE |
|---|---|---|---|

WASTE GAS BURNER BUILDING
EAST FLARE ROOM

HAZARDOUS AREA:
ZONE 1, GROUP IIA & IIB, T3 (MAX 200°C)
Ex ib

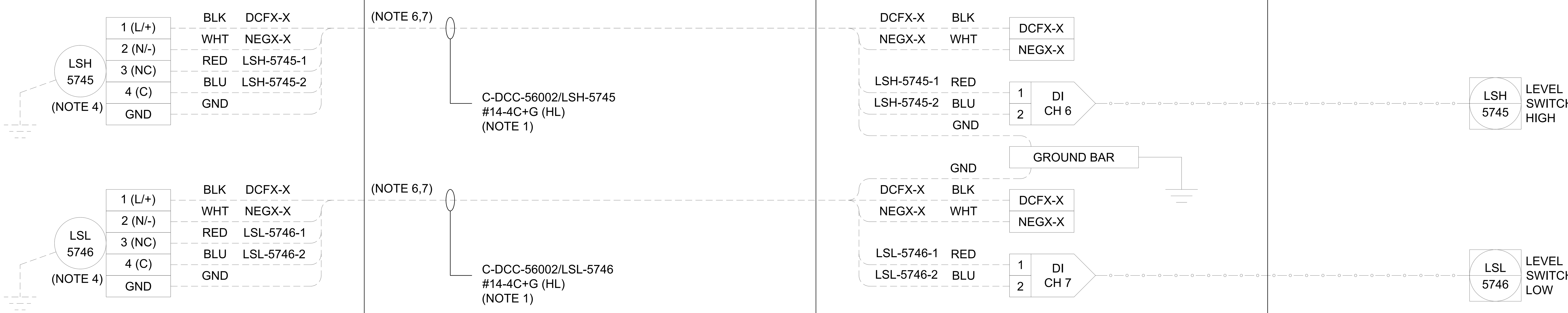
EAST FLARE ROOM SUMP TANK
LEVEL SWITCH HIGH LSH-5745
LEVEL SWITCH LOW LSL-5746
(CSA (XP) CLASS 1, DIVISION 1, GROUP CD
Ta = -40°C TO 70°C
Tp = -50°C TO 150°C)

WASTE GAS BURNER BUILDING
ELECTRICAL ROOM

NON-HAZARDOUS AREA

(NOTE 5)

| | |
|---|---|
| DCS CABINET: | DCC-56002 |
| CARRIER: | CIOC1 |
| BASEPLATE: | BP03 |
| CHANNEL: | 6 & 7 |
| CHARM TYPE: | SE4301T02 |
| CHARM DESC: | DI 24V DC LOW-SIDE SENSE |




NOTES:

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LEGEND:

INTERNAL SOFTWARE LINK
PANEL WIRING
FIELD WIRING
DN DN DEVICENET DATALINK

| REFERENCE DRAWING | | REVISION | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| DRAWING No. | DRAWING TITLE | Rev. | DATE | DESCRIPTION | BY | DES. | CHK. | ENG. |
| | | 0A | 15-NOV-2024 | ISSUED FOR CONSTRUCTION | MC | JFA | BC | JG |

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JOYLYN GRAY
ID#115821 2024-11-25

Stantec

300-10220 103 Avenue NW
Edmonton AB T5J 0K4 CA
www.stantec.com



EPCOR

PLANT SITE: GOLD BAR WWTP
PLANT AREA: PLANT WIDE
PROJECT NAME: GBWWTP FLARE CAPACITY EXPANSION
DRAWING TITLE: INSTRUMENTATION LSH-5745 & LSL-5746 LOOP DRAWING

| CONSULTANT JOB No. | EPCOR PROJECT No. | SCALE | SHEET | DRAWING NUMBER |
|---|---|---|---|---|
| 1101000105 | PMO 1004723; PF14-015 | NOT TO SCALE | 1 OF 1 | PRJ-15-157-731 |