Sabina
GOLD & SILVER CORP.

BACK RIVER PROJECT
Fuel Storage Tanks and Containment Facilities – Goose Site

Design Report and Drawings

PERMIT TO PRACTICE
SACRE- DAVEY ENGINEERING INC.
Signature _____
Date 2021-08-17
PERMIT NUMBER: P551
The Association of Professional Engineers, Geologists and Geophysicists NWT/NU

BACK RIVER PROJECT

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1. Introduction

The Back River Project (the Project) is a gold project owned by Sabina Gold & Silver Corp. (Sabina) within the West Kitikmeot region of south-western Nunavut. It is situated approximately 400 kilometres (km) southwest of Cambridge Bay, 95 km southeast of the southern end of Bathurst Inlet, and 520 km northeast of Yellowknife, Northwest Territories. The Project is located predominantly within the Queen Maud Gulf Watershed (Nunavut Water Regulations, Schedule 4).

The Project is comprised of two main areas with interconnecting winter ice roads: Goose Property and the Marine Laydown Area (MLA) situated along the western shore of southern Bathurst Inlet. The majority of annual resupply will be completed using the MLA, and an approximately 160 km long winter ice road will interconnect these sites.

1.1 PURPOSE OF THE REPORT

This report is intended to present the design basis and considerations, engineering design and drawings related to the fuel storage and containment facilities that will be installed for the Back River Project's Goose Plant location.

In accordance with Sabina's Type A Water Licence (No. 2AM-BRP1831), Sabina shall submit to the Nunavut Water Board (the Board) for review, at least sixty (60) days prior to Construction, final design and Construction drawings accompanied with a detailed report for the bulk fuel storage facilities (Part D, Item 2c). The detailed reports referred to in Part D, Item 2 shall include:

a)	Design rationale, requirements, criteria, parameters, standards analysis, methods, assumptions and limitations;	Section 2, 4
b)	Site specific data and analysis to support the design and management decisions;	Section 4, 5
c)	Geochemical analysis of Waste Rock and fill, demonstrating their Acid Rock Drainage and Metal Leaching characteristics;	Section 5.2
d)	Construction methods and procedures regarding how infrastructure will be put in place, including quality assurance and quality control measures and equipment to be used;	Section 4, 5,
e)	Technical specifications for sedimentation, erosion control and bank stabilization measures, including proposed materials, location and extent, place methods and quantities required;	Section 4, 5, Appendix C
f)	Timetable for submission, including date of Construction and proposed date of commissioning of infrastructure; and	Section 1.3

g)	Where required, signature and seal by the appropriately qualified Engineer.	Appendix C

1.2 SCOPE OF WORK

Sabina has retained Sacre Davey Engineering Inc. to design civil components of the bulk fuel storage facilities, and DT Engineers Ltd. to design the mechanical and electrical components of the bulk fuel storage facilities at the Goose site.

The report includes an overview of the Codes and Regulations that apply, the design criteria and construction details as well as site-specific considerations for the following facilities:

- One (1) fuel farm containing
  - 2021 construction: one (1) field-erected fuel storage tank (10 M liter)
  - Future construction: three (3) field erected 15 M liter fuel storage tanks, piping, pumping and controls systems
- Secondary containment for the fuel farm will be done during 2021 construction.

Sabina will submit to the Board for review, within ninety (90) days of completion of the 10 M liter tank, a Construction Summary Report prepared by a qualified Engineer(s) in accordance with Schedule D, Item 1 of 2AM-BRP1831.

1.3 SCHEDULE

The construction and installation of the first tank and secondary containment will begin in 2021. Installation of the additional tanks and pumping station and the piping network will not begin until late July 2022. The commissioning of the 10 M liter tank will not occur in 2021, but prior to first fill scheduled for Q3, 2022.

1.4 INCLUSIONS

The following items are included in the design report:

- 2021 Construction
  - Field erection of one (1) new 10 M liter fuel storage tank;
  - Accessories such as couplings, nozzles, blind flanges, stairs, steps and railings
  - Earthworks;
  - Tank foundations;
  - Fuel farm secondary containment system with liner.
- 2022 Construction
  - Three (3) field erected fuel 15 M liter storage tanks;
  - Accessories such as couplings, nozzles, stairs, steps, railings, fixed suction and piping;
  - Pumping stations;
  - Piping network;

- Dispensing modules;
- Testing, calibration and inspection requirements;
- Instrumentation and control;
- Tank foundations;

2. Codes and Standards

2.1 COMPLIANCE FOR FIELD ERECTED FUEL TANK

The system complies with the latest editions of the Codes and Standards relating to this project (Federal, Territorial, Municipal, NBCC, NFCC, CEC, CSA, NFPA, and API) as well as the directives of the authorities having jurisdiction over this project. Specific codes and standards as: Canadian Council of Ministers of Environment (CCME), National Fire Code of Canada (2015), R-125-95 NWT and Nunavut Mine Health and Safety Regulations (Mine Health and Safety Act) and RRNWT 1990, c F-12 Fire Prevention Regulations shall apply.

Additionally, the design and field-erected vertical fuel storage tanks shall conform to API Std. 650 Twelfth Edition - Welded Tank for Oil Storage, including Errata 1 (2013), Errata 2 (2014), Addendum 1 (2014), Addendum 2 (2016) and applicable Appendices.

- NBCC National Building Code of Canada
- NFCC National Fire Code of Canada
- CEC Canadian Electrical Code
- CSA Canadian Standards Association
- NFPA National Fire Protection Association
- API American Petroleum Institute
- R-125-95 NWT Consolidated Mine Health and Safety Act
- CCME Canadian Council of Ministers of the Environment – National Guidelines for the Landfilling of Hazardous Waste Landfills.

2.2 CODE ANALYSIS FOR FIELD-ERECTED FUEL TANK

The Field-erected Storage Tank System and pumping station design are first based on the compliance with the Storage Tank Systems for Petroleum Products and Allied Petroleum Products Regulations (SOR/2008-197). Article 14 (1) of this regulation mentions that for the installation of a fuel storage system, the system has to comply with the applicable requirements set out in the CCME Code of Practice (CCME PN1326).

Under the CCME, the main design criteria that apply to the design and installation of a new aboveground storage tank are defined in Part 3 and Part 5 applicable to the design and installation of new piping systems.

The Field-erected Storage Tank System design will comply with requirements of CCME 3.6.1(1) for aboveground storage Tank, more specifically API Std 650 for vertical single wall Tank.

In accordance with CCME section 3.3 and 3.4, the storage Tank will be equipped with an overfill protection to prevent spills.

In accordance with CCME section 5.4, all underground piping will be double-walled and installed such that leaks will be collected into an accessible sump.

In NFCC latest edition, the main design criteria are defined in Part 4 regarding flammable and combustible liquids. More specifically applicable are Section 4.1 which provides general information and requirements for fire protection and spill control of flammable and combustible liquid storage systems, Section 4.3 which provides the tank design and construction minimum requirements and Section 4.5 on piping and transfer systems.

The majority of the NFCC requirements for tank and piping systems are covered by CCME requirements but some additional ones exist such as Table 4.3.2.1 defining the minimum requirements for the location of aboveground storage Tank; Point 4.3.2.2 defining the minimum requirements for spacing between Tanks; or point 4.3.6.4.2 requesting that connections for filling or emptying storage Tank shall be kept closed to prevent leakage when not in use.

2.3 COMPLIANCE FOR SECONDARY CONTAINMENT

The secondary containment for the aboveground storage Tank will conform to NFCC. The base and walls of a secondary containment will be designed, constructed and maintained to withstand full hydrostatic head and provide a permeability of not more than 10-6 cm/s to the flammable liquids or combustible liquids contained in the storage Tank (art. 4.3.7.2). The Tank located in the fuel farms are placed entirely within a dyke area, with an impermeable barrier in the floor of the containment area and in the dyke walls. A liner will provide the appropriate level of impermeability.

See also section 4.5 of this report for more details.

A secondary containment will have the minimum volumetric capacity stated in art.4.3.7.3. The fuel farm secondary containment has a greater volumetric capacity than required (see more details in section 4.4 of this report).

3. Design – Field-Erected Fuel Tank

3.1 GENERAL

This section describes the criteria used to design the field-erected fuel storage tank, prepare general arrangements and select equipment and/or materials.

3.1.1 Field-erected Fuel Storage Tank – Goose Plant Fuel Farm

The fuel storage tank will be installed at the Goose Plant site. The site location of the fuel farm is shown in Figure 1 below.

Fuel will be transported via trucks over a seasonal winter ice road to the Goose fuel farm. Fuel may also be flown to site and transferred to the fuel farm via piping.

All surfaces on which the fuel tank and manoeuvring areas of the machinery are located are protected from accidental spills by a watertight membrane (geomembrane) that directs the flow to a low point of recovery. This recovery point is built inside the bermed secondary containment area.

Construction drawings for the Goose fuel farm are included in Appendix C.

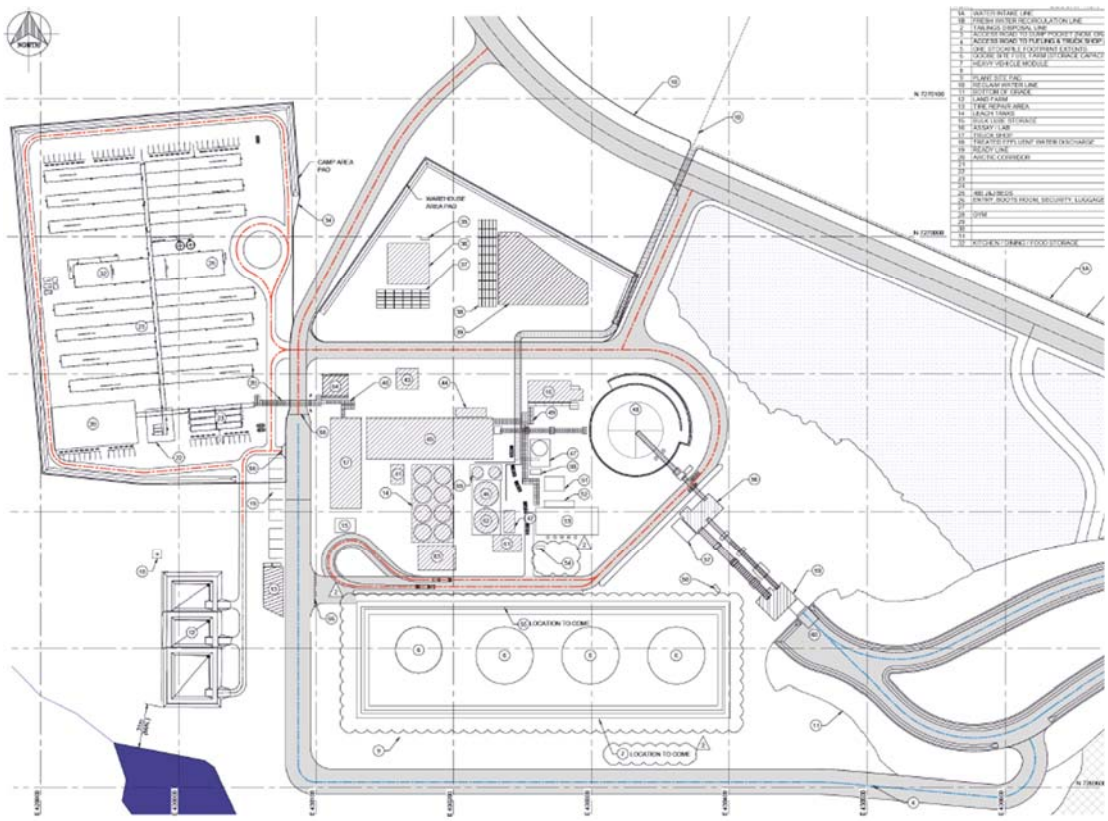

Figure 1 – Goose Site Overview

3.2 COMMISSIONING

The fabrication, erection, inspection, testing, welding and labelling of the vertical Tank will be to the latest edition of API Standard 650. Prior to putting a fuel storage tank in service, the tank will pass quality control checks as per API 650 requirements; finally, the tank will be cleaned, dried, strapped and closed to be ready for service.

3.3 SYSTEM OPERATION

System operation for the fuel farm consists of tank loading and unloading and fuel distribution. The following sections describe the operations for the Goose fuel farm.

Goose – Fuel Farm

Fuel will be transferred to the fuel farm via tanker trucks. The tanker trucks will be connected to a loading arm and the pumping station will allow the operator to transfer fuel to the tank. Each storage tank will be equipped with an overfill alarm system to notify the operator, automatically stop the pumping operation and close all fill valves. Valve position will be monitored by the central control system and interlocks will allow only one tank to be filled at a time. Level sensors and associated interlocks will prevent any tank from overfill.

For the distribution operation, a common tank discharge header will serve a light vehicle filling station, two haul truck filling stations and pumping module to provide fuel to the main power plant. Valve position will be monitored by the central control system and interlocks will allow discharge from only one tank at a time. Level sensors and associated interlocks will shut the tank off once fully discharged.

3.4 MAINTENANCE / INSPECTION

A qualified maintenance team will inspect the system (mechanical equipment and piping) on a regular basis as per regulations and codes. Part of the distribution piping will be installed above ground which means any leaks can be detected during the periodic visual inspection. The underground piping is comprised of double walled pipe, and transition sumps will allow for periodic visual inspection.

The field-erected storage Tank shall be inspected externally and internally as per CCME section 8.4 and API 653 standard.

Inspection and commissioning are discussed in Section 4.8.

4. Design of Fuel Storage Tank Farm

4.1 DESCRIPTION OF THE FUEL STORAGE TANK FARM

The Project includes the development a four (4) tank diesel fuel storage farm on the Goose fuel farm site.

The table below presents the tank main dimensions.

Table 1 – Description of the fuel farm

Fuel farm Description	Goose Fuel Farm
Product	Diesel
Volume (liter)	1 x 10M, 3 x15M
Diameter (m)	33.7, 41.6
Height (m)	12.2

The detailed design of the Fuel Farm is presented in drawings in Appendix C.

4.2 TANK FOUNDATIONS DESIGN

The tank foundation pad will be located approximately 1.5m above surrounding finished grade, which allows for the required secondary containment volume.

A 1 m shoulder will surround the tank with a slope of 1V:50H away from the tank. The embankments of the foundation pad will be no steeper than 1V:2H.

The table below presents the design parameters for the tank foundations.

Table 2 – Design parameters for the tank foundations

Tank Foundation Pad	
Tank Diameter (m)	33.7 (10ML), 41.6 (15ML)
Tank foundation pad top Diameter (m)	35.7 (10ML), 43.6 (15ML)
Tank foundation pad average thickness, above surrounding ground (m)	1.5
Slope on shoulder	1V:50H
Embankment slope	1V:2H

4.3 BERMS DESIGN

The storage tank is enclosed inside Berms in order to contain accidental spillage of fuel product. The Berms are made of granular material and are made impervious with a geomembrane.

The design parameters for the Berms surrounding the fuel Tank are presented in the table below.

Table 3 - Design parameters for fuel farm Berms

Tank Farm Berms	
Berms length (distance between the outer sides of the Berms) (m)	272
Berms width (distance between the outer sides of the Berms) (m)	84
Berms height (min) (m)	1.8
Containment height (m)	1.6
Berms flat top width (m)	2
Berms embankment slope	1V:2H
Impervious area (m^2)	± 22 800

4.4 SECONDARY CONTAINMENT CAPACITY

The required capacity of the fuel farms is calculated based on the following codes and regulations:

- National Fire Code of Canada (NFCC);
- National Fire Protection Association (NFPA); and
- Design Rationale for Fuel Storage and Distribution Facility (DRFS).

As per the latest edition of NFCC, art. 4.3.7.3, the required secondary containment capacity for a fuel farm with more than one storage tank must have a volumetric capacity of not less than the sum of:

a) The capacity of the largest storage tank located in the contained space, and;

b) 10% of the greater of:

   i. The capacity specified in Clause (a), or;
   ii. The aggregate capacity of all other storage Tanks located in the contained space.

The volume occupied by the Tank foundations, and roadway berm is taken into account in the total secondary containment capacity.

The height of the secondary containment capacity is 200 mm lower than the Berms' maximum elevation.

Based on the above mentioned, the secondary containment capacity requirements and the available capacity for fuel farms are summarized in the following table.

Table 4 – Fuel farm containment capacity

Fuel farm	
Volume (liter)	55 M
Required Containment Capacity (liter)	19 M
Available Containment Capacity (liter)	22 M
Is Available containment > Required containment	YES

4.5 SECONDARY CONTAINMENT IMPERVIOUSNESS

As per NFCC art. 4.3.7.2, the base and walls of the fuel farms secondary containment are designed and will be constructed and maintained to withstand full hydrostatic head and provide a permeability of not more than 10-6 cm/s to the flammable liquids or combustible liquids contained in the storage tank. The Berms area will be impervious in order to avoid any seepage into the environment. A SOLMAX HDPE liner will provide adequate imperviousness. Technical specifications for the liner are provided in section 5 of this report.

4.6 SECONDARY CONTAINMENT DRAINAGE

The finished grade of the secondary containment is sloped away from the Tank in order to drain the runoff water. The bottom of the Berms surface must be built with slopes that will allow accidental spills to be concentrated at a low point. A drainage basin located at the low point allows the recovery by pumping accumulations of rainwater and accidental spills.

Due to melting snow that accumulates over the winter and precipitation, contact water will be collected inside the secondary containment Berms. During visual inspections, the quantity of contact water collected inside the secondary containment Berms will be evaluated. If there is a visible sheen on the contact water or if water withdrawal is deemed necessary, water samples will be collected and analyzed. Accumulated water will be released into the receiving environment only if it meets discharge criteria.

4.7 DISTANCE RESTRICTIONS

4.7.1 Minimum Clearances for Tank Farm Design

The minimum clearances that were taken into account in the design of the Tank Farm are:

- The distance between the tank and the toe of the Berms shall not be less than 1.5 m (NFCC, art. 4.3.7.4);
- The distance between the tank and the centerline of the Berms shall not be less than ½ the height of the tank (DRFS art. 4.5);
- The distance between the property limit and the tank shall not be less than 160 ft (48 m) (NFPA 30, table 22.4.1.1);
- The distance between the property limit and the exterior toe of the Berms shall not be less than 3 m (NFPA 30, art. 22.11.2.3);
- The Tank must be located 9 m away from the public roads and buildings (NFCC, art.4.3.2.1).

4.8 INSPECTION AND COMMISSIONING

The manufacture and supply of the liner system for the fuel farm will comply with ASTM standard. The manufacturer will provide a certification stating that the material proposed has physical properties that meet the required values. The rolls of liner will be labelled, packaged, shipped, off-loaded, stored and handled by appropriate means to prevent damage to the material.

The subgrade surface will be inspected by the Engineer to verify suitability prior to installation of the liner system. A minimum thickness of fill covering the liner will be maintained for operating equipment over the liner to prevent any damage. The installation of the liner system will be performed by a qualified technician. All seaming, patching, welding operations, and testing will be performed by a qualified technician. Joints/seams between liners panels will be field welded using the manufacturer's recommended procedures and equipment. Any welds that have been rejected will be remedied to satisfactory requirements. The backfill material will be placed in accordance with the drawings and specifications for the maximum lift thickness, compaction requirements and final grade levels. The fuel farm including its liner system installation and testing documentation will be accepted by the Engineer prior to the filling of the storage tank.

A quality control program for seams is proposed during and after installation. This program includes the following procedures:

- Test seams shall be prepared and tested by the Geomembrane Installer to verify that seaming parameters (speed, temperature and pressure of welding equipment) are adequate.
- Field Seam testing (non-destructive): All field seams shall be non-destructively tested by the Geomembrane Installer over the full length of the seam before the seams are covered. Testing shall be done as the seaming work progresses. Non-destructive testing shall be performed using vacuum box (per ASTM D 4437 and D 5641) or air pressure (per ASTM D 5820 and D 4437) methods.
- Destructive testing or mechanical resistance of the seams: One destructive test sample per 150 linear m seam length shall be taken by the Geomembrane Installer from a location specified by the Owner's Representative. Seam testing shall be conducted in accordance with ASTM 5820 or D 4437.
- Each defective location shall be marked, numbered and repaired. Defective seams, tears or holes shall be re-seamed or repaired by applying an extrusion welded cap strip. Blisters, larger holes and contamination by foreign matter shall be repaired by patches and/or extrusion weld beads as required. All patching shall extend a minimum of 150 mm beyond all edges of defects.
- Each repair shall be non-destructively tested per the methods above.

5. Earth Works

5.1 CONSTRUCTION MATERIAL QUANTITIES

The table below presents the estimated in-place material quantities for the construction of the Fuel farms.

Table 5 - Material estimated in-place quantities for the construction of the Fuel farm

Item	
Levelling fill (m^3)	25,000
General Fill (m^3)	10,000
Crush Fill (m^3)	30,000
SOLMAX Liner (m^2)	25,000
Total Fill Material Volume (m^3)	**65,000**

5.2 CONSTRUCTION MATERIAL SPECIFICATIONS

Quarry operations at the Goose Property began with sourcing material from the existing quarry (Airstrip Quarry) for expansion of the Goose Airstrip and some all-weather roads. Once all-weather access to the Goose Plant Site area was established, material will be sourced by cutting bedrock material to create a suitable area for the Goose Plant Site and Goose Fuel Storage area.

Detailed geochemical characterization studies to assess the metal leaching / acid rock drainage (ML/ARD) potential of rock and overburden associated with the Property were carried out and can be found in the Geochemical Characterization Report (SRK 2015). Geochemical characterization was completed on samples of overburden, quarry rock and waste rock. Acid base accounting and trace metal analyses were performed on all samples and short-term leach testing on a subset of samples.

Overburden was found to have negligible ML/ARD potential while quarry rock had variable potential, and an appreciable portion of waste rock was potentially acid generation (PAG) or an un uncertain potential for acid generation.

Only NPAG quarry rock will be used for construction. This will be verified through the quarry rock confirmatory testing and segregation outlined in Sabina's approved Borrow Pits and Quarry Management Plan. In summary, at a minimum, 8 samples will be collected for every 100,000 tonnes of material to be excavated (MEND 2009). For borrow pits, operational monitoring samples will be collected from the excavated material or active pit face. For rock quarries, samples will be collected from blast holes drilled in the rock quarries prior to quarry excavation. For either quarry type, samples will be as follows:

- Each sample should weigh no less than 1 kg.
- Each sample should be labeled with a unique sample identification number.
- Each sample should be documented in terms of sample depth and location within the quarry, and the blast hole number in the case of rock quarries.
- Composite samples (more than one lithology) should be avoided where possible.

All samples will be submitted for total sulphur and total inorganic carbon analysis at an off-site, accredited laboratory, using LECO furnace analyser or a similar appropriate technique. Analytical methods must achieve a suitable detection limit for classification. Total sulphur will be used to calculate acid potential (AP) and TIC will be used to calculate neutralization potential (NP).

Additional laboratory testing on a subset of the samples collected will include acid base accounting and net acid generation (NAG) testing to confirm geochemical ARD classification. Short term leach testing following the shake flask extraction (SFE) method will also be conducted on a subset of samples to confirm the metal leaching (ML) potential of NPAG material; this testing is not required for PAG samples, as PAG waste rock will not be used for construction.

The general requirements for the materials are specified below. The requirements for each of the materials can vary slightly for a specific earth structure to meet specific design intents.

5.2.1 Levelling Fill

The levelling fill material shall consist of competent, non-acid-generating material from the quarries or foundation excavations and that is free from organic matter, frozen soil, snow and ice.

The material shall have a particle size distribution falling within the limits presented in Table 7.

Table 6 – Levelling Fill – Particle size distribution limits

Particle size (mm)	% Passing
200	100
100	60 - 100
50	40 – 70
20	20 – 50
10	0 - 30
5	0 -10

5.2.2 Crush Fill

Crush Fill shall consist of competent non-acid-generating rock from the quarries or foundation excavations, and that is free of organic matter, frozen soil, snow and ice.

The material shall have a particle size distribution falling within the limits presented in Table 8.

Table 7 – Crush Fill – Particle size distribution limits

Particle size (mm)	% Passing
38.0	100
25.0	60 - 100
12.5	25 – 100
5.0	10 – 50
0.63	2 - 20
0.08	1 - 15

5.2.3 General Fill (Run of Quarry)

Run-of-Quarry (ROQ) material shall consist of competent non-acid generating rock sourced from the quarries or foundation excavations, and that is free of organic matter, frozen soil, snow and ice.

ROQ material shall be well-graded, containing sufficient quantities of unfrozen gravel, sand and silt sized material to allow the material to be compacted. In areas where the overall ROQ fill thickness is less than 0.85 m, the maximum boulder size shall not exceed 500 mm, as measured in any direction. In areas where the overall ROQ fill thickness is greater than 0.85 m, the maximum boulder size shall not exceed 900 mm as measured in any direction.

Basic screening, or crushing and screening may be used to achieve the desired gradation.

The ROQ material shall be washed to remove blast residue, unless otherwise directed.

5.2.4 Liner – SOLMAX HDPE

An impervious SOLMAX HDPE geomembrane will be placed on granular material of varying thickness in order to contain the area in case of a spill. The liner will be a continuous membrane to ensure its imperviousness. The geomembrane is HDPE based in combination with a non-woven geotextile for mechanical resistance and specifically designed to guarantee waterproofing, chemical resistance and ageing behaviour.

Table 8 - Geomembrane specifications

Characteristics				Tolerance	
	Standard	Units	Values	Min	Max
Thickness (on finished product)	ASTM D 5994	mm	1.5	1.28	-
Resistance to Puncture	ASTM D 4833	N	535	535	-
Resistance to tearing	ASTM D 1004	N	200	200	-
Tensile properties: strength at yield	ASTM D 6693	kN/m	-	23	-
Tensile properties: elongation at yield		%	13	-	-
Tensile properties: strength at break		kN/m	-	23	-
Tensile properties: elongation at break		%	150	-	-

Table 9- Geomembrane specifications (cont'd)

Characteristics	Standard	Units	Values	Tolerance	
				Min	Max
Dimensional Stability	ASTM D 1204	%	-	-2	+2
Low Temperature Brittleness	ASTM D 746	°C	-77	-	
Stress Crack Resistance	ASTM D 5397	hr	500	-	
UV Resistance	ASTM D 5885	%	50	-	

Appendix A - Functional Description

See attached SBR6DTE-5000-G-RPT-0001 *Goose Fuel Farm – Design Basis Memorandum*

Title:	**Design Basis Memorandum**		
Project Doc. No.:	**SBR6DTE-5000-G-RPT-0001**	Revision No.:	**0**

Project Name:	**Goose Fuel Farm**	Project No.:	**SBR6DTE**
Client:	**Sabina Gold & Silver Corp**	Plant/Area No.:	**5300**

Rev	Date	Issued For	Prepared	Checked	Approved	Client
A	08-June-2021	Internal Review	IM	JG	MD	
B	11-June-2021	Client Review	IM	JG	MD	
0	12-Aug-2021	Design	IM	JG	MD	

Permit Stamp

REGISTERED PROFESSIONAL ENGINEER
W.C.I. MAK
LICENSEE
Aug-16-2021
NT/NU

PERMIT TO PRACTICE
DT ENGINEERS LTD.
Signature
Date 2021-08-17
PERMIT NUMBER: P 1348
NT/NU Association of Professional Engineers and Geoscientists

Engineer's Seal

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1 General

1.1 Introduction

Sabina Gold & Silver Corp (Sabina) is currently in the planning and design of a new gold mine project in Nunavut, Canada entitled Back River Project (the Project). DT Engineers Ltd (DT) was contracted to complete the detailed design and procurement support functions for the mechanical, piping, electrical, instrumentation and structural portions of Goose Fuel Farms, and will be working collaboratively with Sacré-Davey Engineering (SDE) who are responsible for the layout, earthworks and fire systems.

Goose Fuel Farm is approximately 170km away from the Marine Laydown Area (MLA) Fuel Farm located next to the fuel barge/ shipping unload facility. Goose Fuel Farm will store, distribute, and dispense diesel fuel to support activities at Goose Site. It consists of 1 x 10ML tanks, 3 x 15 ML tanks, 2 x diesel fuel tanker offloading modules, dispensing system (light vehicle and haul truck) and a diesel distribution pipeline to supply the power plant.

1.2 Purpose and Scope

The Design Basis Memorandum (DBM) document has been prepared as key reference document for the engineering design of Goose Fuel Farms. The document is expected to be organic and updated as the project is further defined

The Scope of the DBM is to:

- Document design and operating concepts;
- Document applicable design codes, maintenance, standards and regulations;
- Outline design assumptions and criteria;
- Serve as backup documentation for approval submission to applicable regulatory agencies;
- Provide a reference guide for project development and execution; and,
- Define areas requiring further evaluation and development.

1.3 Reference Documentation

Ref. No.	Document Title
[1]	MLA Fuel Farm Design Philosophy (7310-G-RPT-0001-RB)
[2]	Fuel Transfer Module Package Specification (SBR6DTE-7000-M-SPC-0001-R1)
[3]	Aluminum Petroleum Tri Axle Semi Trailer Specification Sheet
[4]	Fuel Farm Plan View Drawing by SDE (SBR6SDE-53-C-SKE-0001 FUEL FARM PLAN)

1.4 Industry Standards, Specification, and Guidelines

ASME B31.3	Process Piping
CSA Z662-19	Oil and Gas Pipeline Systems
National Fire Code of Canada	2015 Edition
NFPA	National Fire Protection Association – Applicable Codes
API	American Petroleum Institute - Applicable Standards, Recommendations, and Guidelines
API RP1004	Bottom Loading and Vapor Recovery for MC-306 & DOT-406 Tank Motor Vehicles
API RP 1007	Loading & Unloading of MC 306/DOT 406 Cargo Tank Motor Vehicles
Nunavut	Mine Health and Safety Regulations
North West Territories	Specification for fuel storage and Distribution Facilities
CSA C22.1-18	Canadian Electrical Code, Part I
NAPEG	Authentication of Documents/Use of Professional Stamps or Digital Signature Guidelines

2 Assumptions & Key Data

The following assumptions have been made and key data used which are integral to the validity of this Design Basis.

2.1 General and Site Conditions

Item	**Value**	**Ref no.**
Site Location	N 7269800 E 430400	
Arctic Diesel Fuel	Arctic Diesel Fuel CAN/CGSB-3.517 Type A-ULA, Automotive Low Sulphur Diesel Fuel CAN/CGSB-3.2 Type 0, Heating Fuel Oil (Stove Oil) Maximum Kinematic Viscosity = 48.0mm^2/s at -45 deg C S.G 0.80-0.85	[1,2]
Design Temperature of Goose Fuel Farm Piping Systems	-45^{o}C low +38^{o}C high	[1,2]
Design Pressure of Goose Fuel Farm Piping Systems	1034 kPa (150 psig)	[1]
Site Power	600V, 3 ph	[2]

2.2 Tanker Fuel Offloading

Diesel fuel will be delivered to Goose Fuel Farms from MLA Fuel Farm via 57,000 L tridem axle tankers. Upon arrival the tanker will connect to one of the two offloading stations. These modules are responsible for emptying the tankers and transferring the fuel to the fuel storage tanks. Tanker ground check interlocks and local on/off functionality will be present at the module. Metering information, as well as pump/valve control and status will be available via HMI screens in a local control kiosk, as well as the main plant control room.

Item	**Value**	**Ref no.**
Fuel Tanker Volume	57,000L (tridem axle tanker)	[3]
Fuel Tanker MAWP	2.75 kPag (3.3 Psig)	[3]
Fuel Tanker Offload Time	60 min total (including metering and admin)	[2]

Fuel Tanker Off Loading Rate	2000L/min per station	[2]
Tanker Connection Type	UNIQUE manifold 4”x3” air operated actuators. 2 x 4” gravity drops with Locking Wet/dry Valves 4” Male Camlock and Cap	[3]
Pump	Rotary Gear Pumps, ANSI 150# Connections	[2]
Strainer	60 Mesh w/ bypass & Air eliminator	[2]
Flow Meter	Temperature compensated Accuracy level ##+/ ##-	[2]
Containment	Each module shall contain a catchment sump with explosion proof level switch	[2]

2.3 Tanks

The tank farm will contain a total storage capacity of 55 ML (1x10ML and 3 x 15ML). The tanks will be field welded API 650 fuel storage tank equip with temperature and level instruments with output back to the main control station. The tanks act as a reserve to supply the power plant, haul truck fuel dispenser, and light vehicle fuel dispenser. Each tank will be connected to three (3) headers, inlet, outlet, and overflow. The tanks will be filled and emptied one at a time, and flow will be controlled to each tank via enclosed and heated motor operated on-off valves located on each fill and discharge nozzle. The operator will manually select the desired tank to be filled and/or emptied from the main control station. Necessary interlocks and ESD’s will prevent mis-operation and tank over filling.

Item	**Value**	**Ref no.**
Configurations	1 x 10ML, 3 x 15 ML	[4]
Tank Style	Single wall field constructed API 650	
Level Control	Float control ESD Valve, (HH: XX%, H: XX%, L, XX%, LL: XX%)Tanks are equipped with overflow piping feeding a common header.	
Flame Arrestor	API 2000	
Manway	2 x 24” Tank Wall, 1 x24” Tank Roof	
Secondary Containment	110% Granular dikes with impervious liners.	

2.4 Fuel Dispensing

There will be a total of 3 dispensing stations, 2 for haul trucks and 1 for light vehicles. Each dispensing module houses a pump, temperature compensated flow meter, local display, and local start/stop inputs. Dispensers will also be equipped with an overfilling prevention device to automatically stop the pump upon detecting a full tank. Metering information will be provided to the control kiosk and main control room HMIs. At this stage, there is no provision for future cardlock or equivalent access control.

Item	**Value**	**Ref no.**
Dispensing Modules	2 Haul Truck, 1 light Vehicle	
Haul Truck Fuel Capacity	Caterpillar 775 Capacity 795L	
Hauler Truck Flow rate	160L/min	
Light Vehicle Dispense Rate	46L/min	[2]
Strainer	60 Mesh w/ Air eliminator and bypass	[2]
Flow Meter	Temperature compensated Accuracy level +##/ -##	
Pump	Rotary Gear Pump, ANSI 150# Connections	[2]
Containment	Each module shall contain a catchment sump with explosion proof level switch	[2]

2.5 Fuel Distribution

The fuel distribution module will be responsible for maintaining the required fuel level in the powerplant's day tanks. For redundancy, the module will consist of 2 pumps, one (1) operational and one (1) on stand-by. Alarms will be annunciated at the main control room HMI in the event of a pump failure, and switchover will be manual via the HMI, employing motor operated valves. The module's flow rate will be controlled by a local VFD and PLC that is connected to fuel level sensors and switches on the day tanks. The tanks and powerplant's are design by others; the interface point is at the inlet of the day tank nozzle.

Item	**Value**	**Ref no.**
Length of Pipeline	~60 m	
Power Plant Engines	By Others: 4 total, 947L/hr (250 Gal/hr) each @ 100% duty	
Power Plant Heaters	2 x 5MW	
Power Plant Day Tanks	By Others: 2 x 65,000 L Westeel Fuel-Vault Dual Wall Tanks	
Flow Rate	Max: 6 x 947L/hr = 5678L/hr (1500 Gal/hr)	
Pump	2x 100 Rotary Gear Pump, ANSI 150# Connections, VFD, 10:1 turn down	
Flow Meter	Temperature compensated Accuracy level +##/ -##	
Strainer	60 Mesh w/ bypass & Air eliminator	[2]
Containment	Each module shall contain a catchment sump with explosion proof level switch	[2]

2.6 Fire Suppression/ Fire Foam System

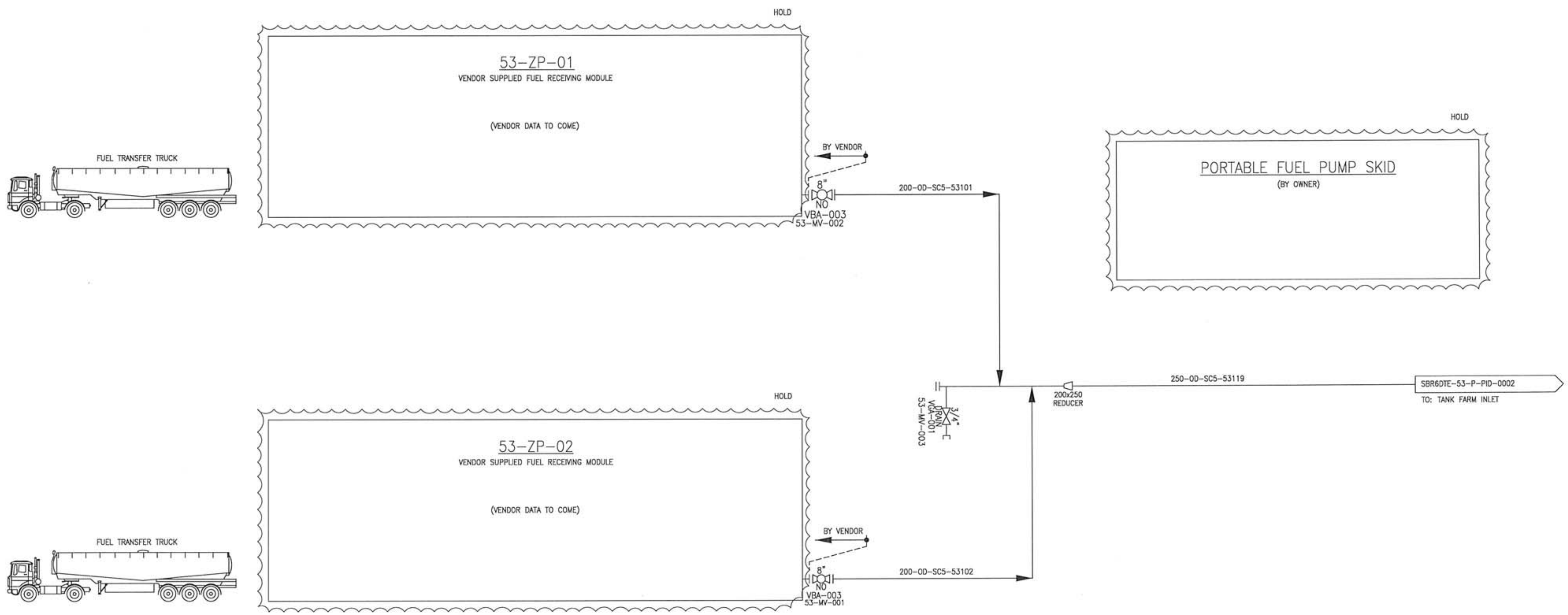
The fire monitoring and suppression system is designed by others and will use a fire foam suppression system located at the four corners of the secondary containment. Upon detection of a fire, a signal will be sent to the main control station triggering an emergency shut down of all pumps, and the closure of all motorized valves on the tank.

Appendix B - Engineering Drawings List

The following list of drawings covers the technical requirements for this package.

Drawings	Title	Rev
SBR6DTE-5310-P-PID-0001	P&ID – Fuel Truck Receiving Module	RC
SBR6DTE-5310-P-PID-0002	P&ID – Tank Farm	RC
SBR6DTE-5310-P-PID-0003	P&ID – Tank Farm and Power Plant	RC
SBR6DTE-5310-P-PID-0004	P&ID – Haul Truck Dispensing Module and Light Vehicle Module	RC
SBR6SDE-53-C-SKE-0001	Fuel Farm Plan View Sketch (Storage Capacity 55M Litres)	RE
SBR6SDE-53-C-PLN-0005	Fuel Farm Plan View (Storage Capacity 55M Litres)	R0
SBR6SDE-53-C-DET-0010	Fuel Farm Sections (Storage Capacity 55M Litres) Sheet 1	R0
SBR6SDE-53-C-DET-0011	Fuel Farm Sections (Storage Capacity 55M Litres) Sheet 2	R0
SBR6SDE-53-C-DET-0012	Fuel Farm Sections (Storage Capacity 55M Litres) Sheet 3	R0
SBR6SDE-53-C-DET-0013	Fuel Farm - Typical Sections & Details Sh. 1	R0
SBR6SDE-53-C-DET-0014	Fuel Farm - Typical Sections & Details Sh. 2	R0
SAB110-2018-1	General Tank Elevation	R1
SAB110-2018-2	Roof & Nozzle Plan	R1
SAB110-2018-3	General Tank Details	R1
SAB110-2018-4	General Tank Details	R1
SAB110-2018-5	Floor Plate Layout and Weld Map	R1
SAB110-2018-6	Roof Plate Layout and Weld Map	R1
SAB110-2018-7	Shell Weld Map and Radiograph Test Map	R1

Appendix C - Engineering Drawings



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A	ISSUED FOR INTERNAL REVEW	18JUN2021	RSB		

REFERENCE DRAWINGS

REF NO	DWG NO	DWG TITLE
3	SBR6DTE-53-P-PID-0004	HAUL TRUCK DISPENSING MODULE AND LIGHT VEHICLE MODULE
2	SBR6DTE-53-P-PID-0003	TANK FARM AND POWER PLANT
1	SBR6DTE-53-P-PID-0002	TANK FARM

PROJECT NO.	DRAWN BY	DATE
221050	RSB	16AUG2021

BACK RIVER PROJECT
GOOSE PLANT SITE
FUEL TRUCK RECEIVING MODULE

SCALE	DRAWING NO.	REVISION
NTS	SBR6DTE-53-P-PID-0001	C

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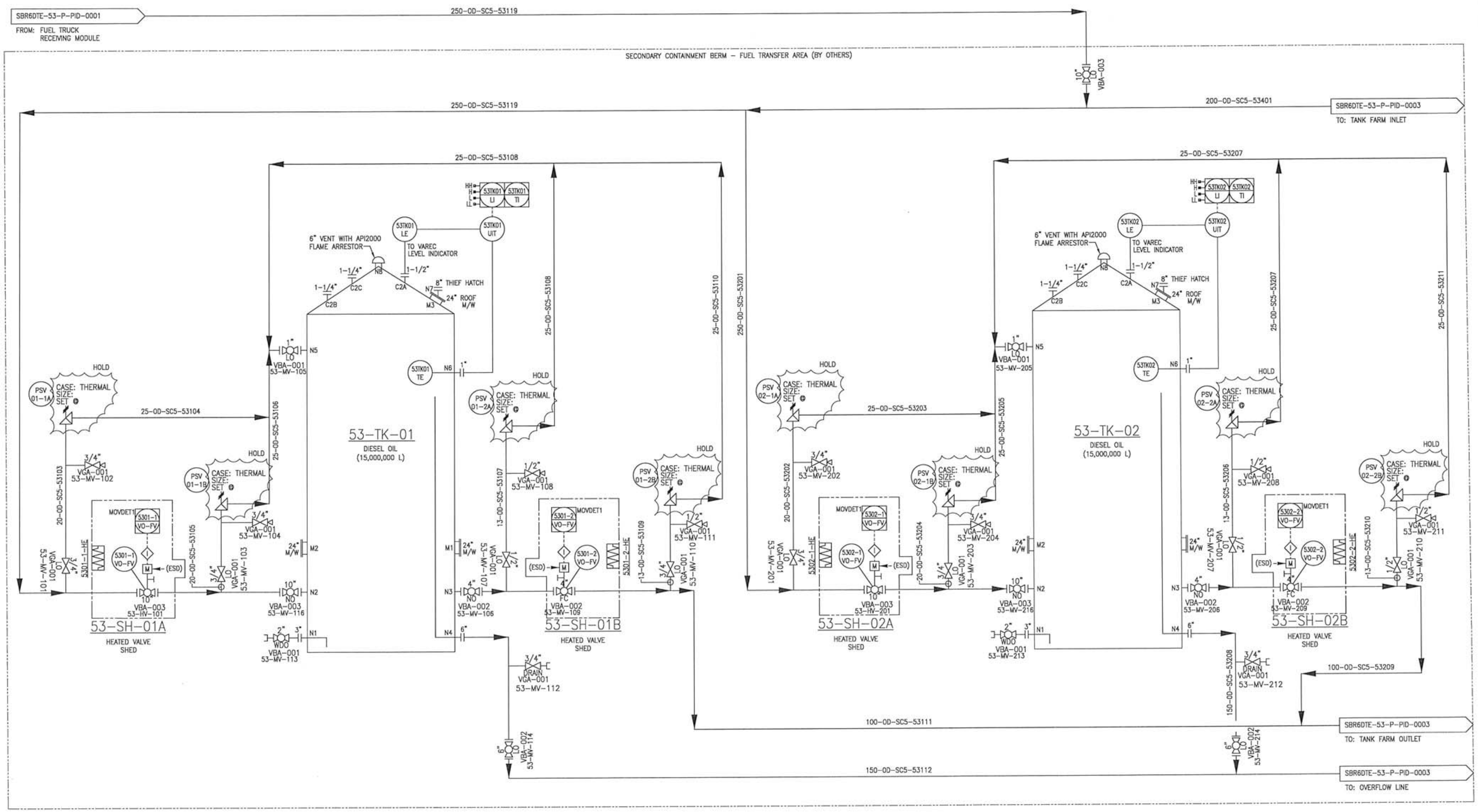

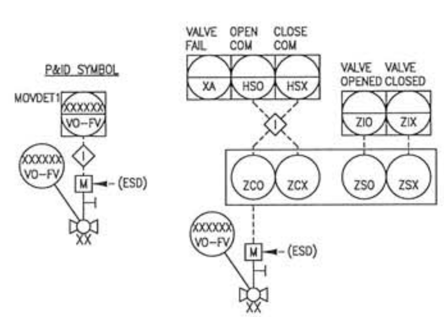

MOVDET1 – MOTORIZED VALVE DETAIL 1

ON-OFF VALVE W/ ELECTRIC ACTUATOR AND REMOTE CONTROLS

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B	ISSUED FOR CLIENT REVEW	08JUL2021	RSB			2	SBR6DTE-53-P-PID-0003	TANK FARM AND POWER PLANT
A	ISSUED FOR INTERNAL REVEW	18JUN2021	RSB			1	SBR6DTE-53-P-PID-0001	FUEL TRUCK RECEIVING MODULE
REV NO	ISSUED FOR	DATE	BY	CHK	APP	REF NO	DWG NO	DWG TITLE

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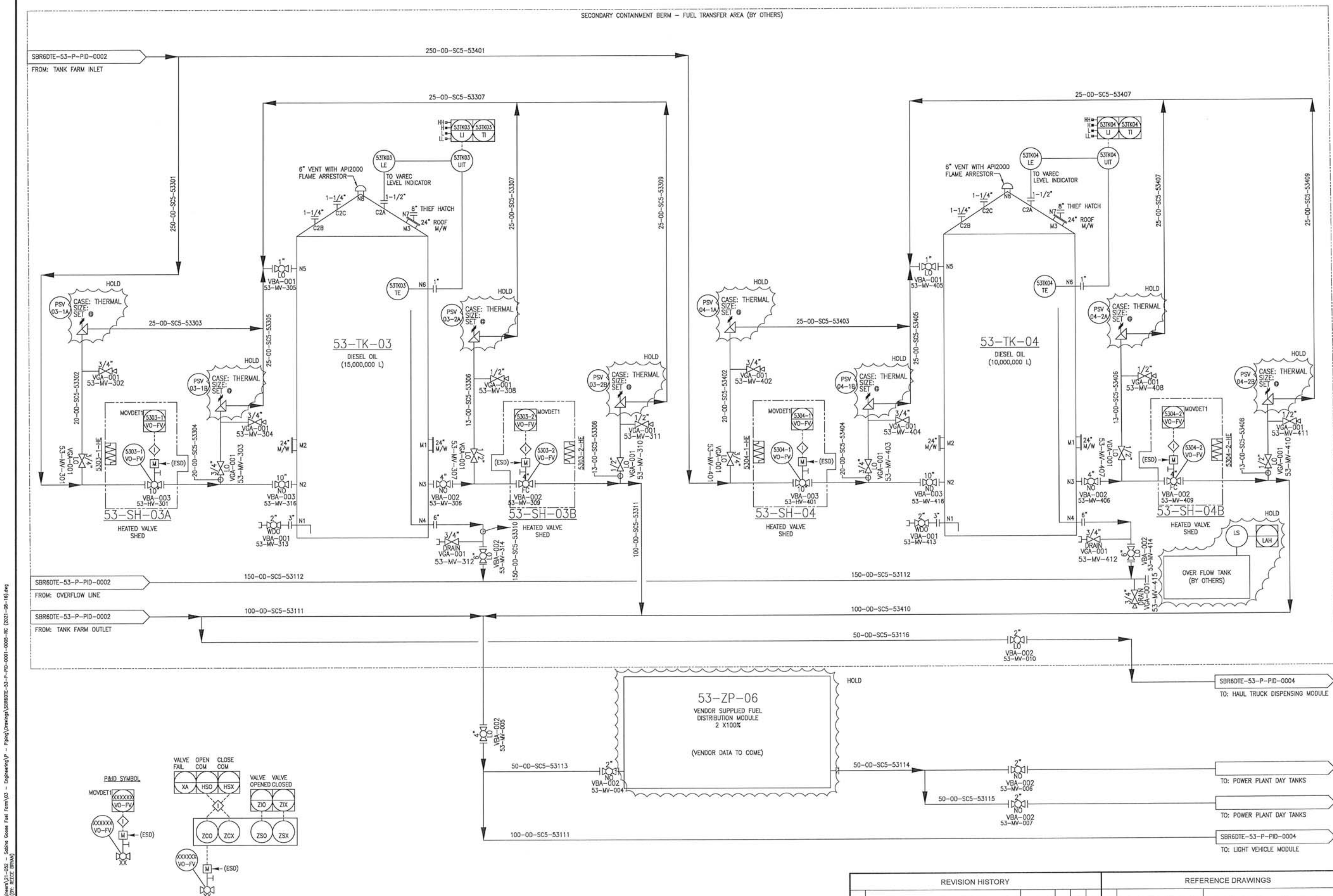
BACK RIVER PROJECT
TANK FARM

SCALE	DRAWING NO.	REVISION
NTS	SBR6DTE-53-P-PID-0002	C



MOVDET1 – MOTORIZED VALVE DETAIL 1

ON-OFF VALVE W/ ELECTRIC ACTUATOR AND REMOTE CONTROLS

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A	ISSUED FOR INTERNAL REVIEW	18JUN2021	RSB		

REFERENCE DRAWINGS

REF NO	DWG NO	DWG TITLE
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2	SBR6DTE–53–P–PID–0002	TANK FARM
1	SBR6DTE–53–P–PID–0001	FUEL TRUCK RECEIVING MODULE

PROJECT NO.	DRAWN BY	DATE
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BACK RIVER PROJECT
TANK FARM AND POWER PLANT

SCALE	DRAWING NO.	REVISION
NTS	SBR6DTE–53–P–PID–0003	C

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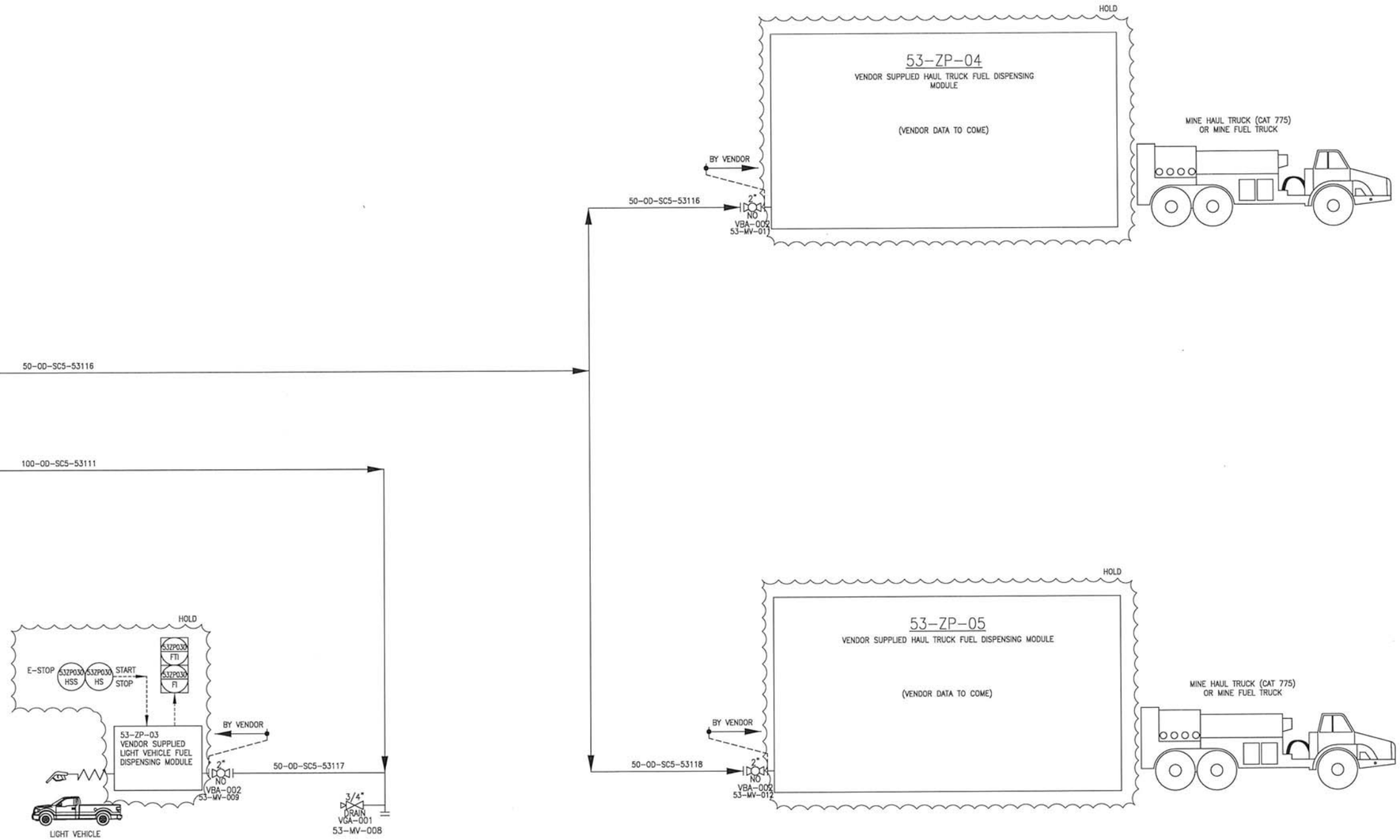

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A	ISSUED FOR INTERNAL REVEW	18JUN2021	RSB			1	SBR6DTE-53-P-PID-0001	FUEL TRUCK RECEIVING MODULE
REV NO	ISSUED FOR	DATE	BY	CHK	APP	REF NO	DWG NO	DWG TITLE

PROJECT NO.	DRAWN BY	DATE
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BACK RIVER PROJECT
HAUL TRUCK DISPENSING MODULE AND LIGHT VEHICLE MODULE

SCALE	DRAWING NO.	REVISION
NTS	SBR6DTE-53-P-PID-0004	C

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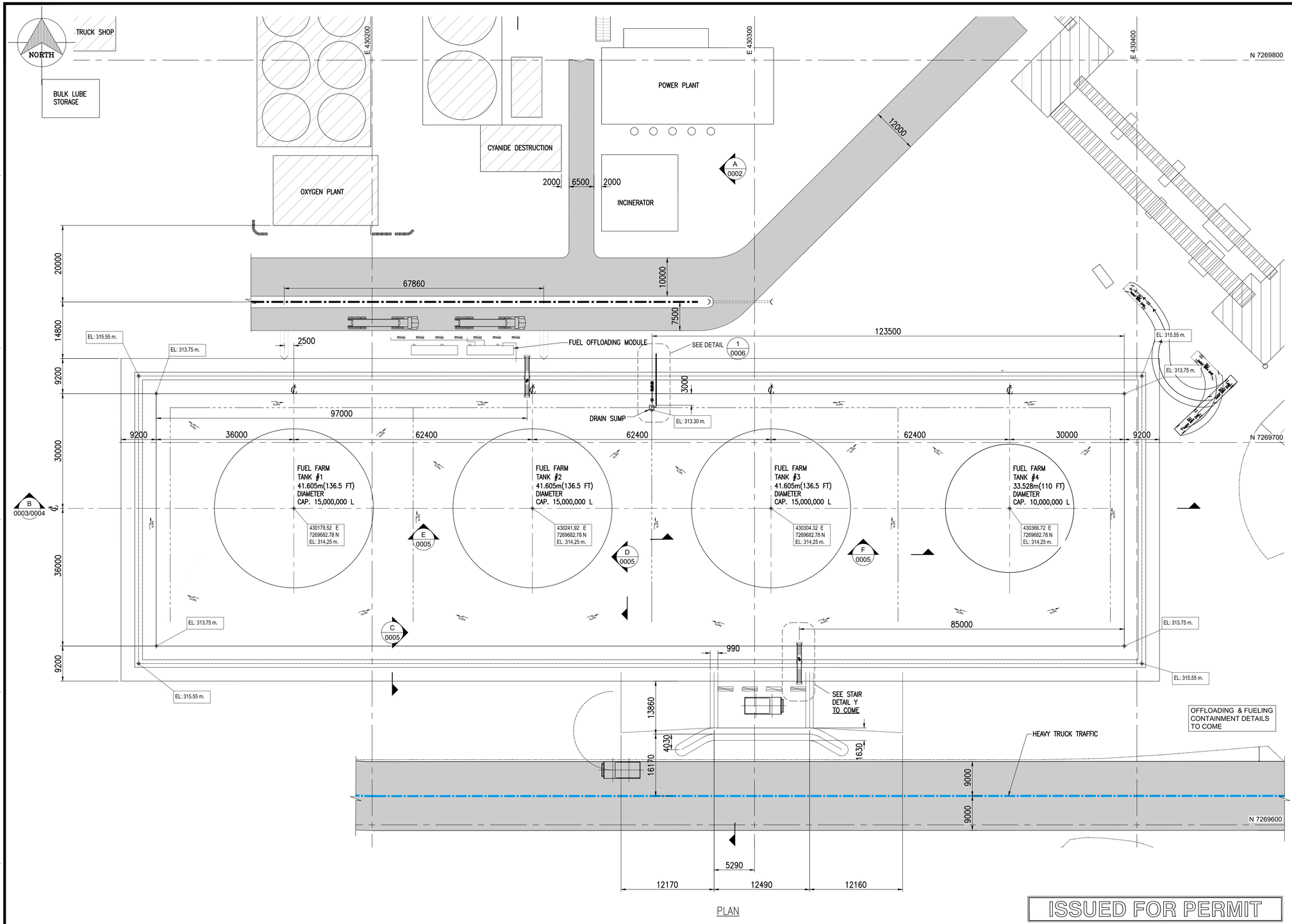

PLAN

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												C		ISSUED FOR REVIEW	23JUN21	RC
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DESIGNED BY:	K.SAVAGE	03JUN21	
DRAWN BY:	R.CHONG	03JUN21	
CHECKED BY:	D.THIBODEAU	17AUG21	
APPROVED BY:			

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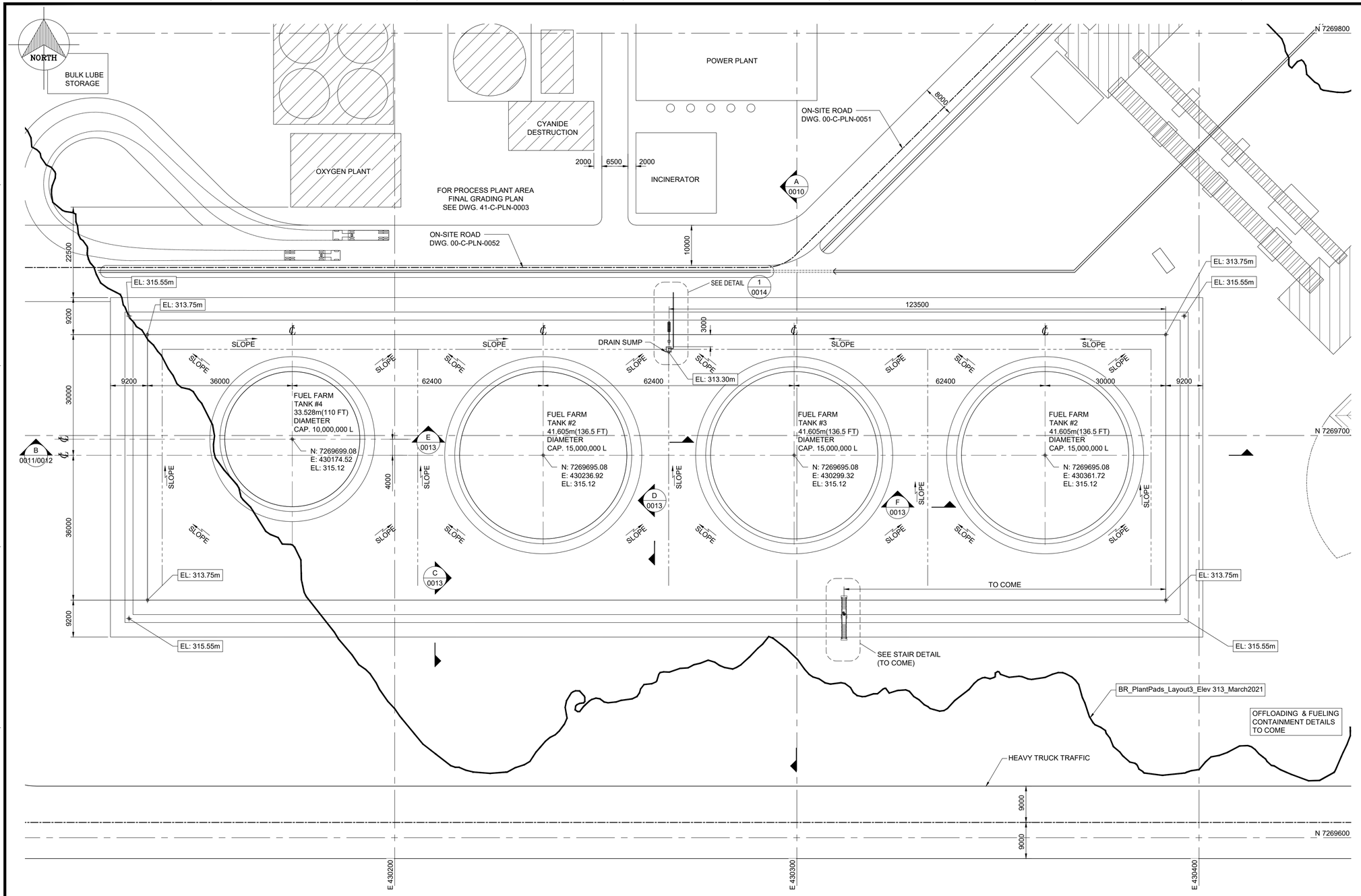
GOOSE PROJECT

BACK RIVER GOLD DISTRICT NUNAVUT
FUEL FARM
PLAN VIEW
(STORAGE CAPACITY: 55M LITRES)

FILENAME	PROJECT NUMBER	DRAWING NUMBER	REV.
SBR6SDE-53-C-SKE-0001_DWG	SBR6SDE	SBR6SDE-53-C-SKE-0001	E



FUEL FARM - PLAN
SCALE: 1:500

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PROJECTION: TRANSVERSE MERCATOR
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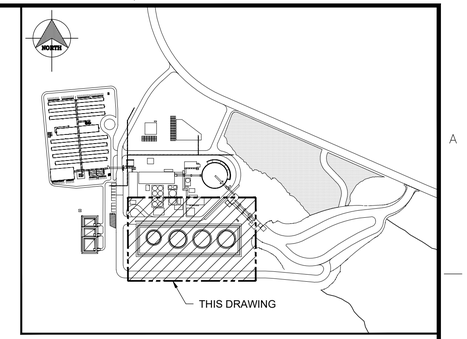

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00-C-PLN-0051	ON-SITE ROAD – PLAN & PROFILE SH.2
41-C-PLN-0003	PROCESS PLANT AREA – FINAL GRADING – PLAN
53-C-DET-0014	FUEL TANK – TYPICAL SECTIONS & DETAILS SH.2
53-C-DET-0013	FUEL TANK – TYPICAL SECTIONS & DETAILS SH.1
53-C-DET-0012	FUEL FARM – SECTIONS SH.3 – (STORAGE CAPACITY: 55M LITRES)
53-C-DET-0011	FUEL FARM – SECTIONS SH.2 – (STORAGE CAPACITY: 55M LITRES)
53-C-DET-0010	FUEL FARM – SECTIONS SH.1 – (STORAGE CAPACITY: 55M LITRES)
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DESIGNED BY:	K.S.A	29JUL21
DRAWN BY:	T.M.U	29JUL21
CHECKED BY:	D.T.H	29JUL21
APPROVED BY:		

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GOOSE PROJECT
BACK RIVER GOLD DISTRICT NUNAVUT
FUEL FARM
PLAN VIEW
(STORAGE CAPACITY: 55M LITRES)

FILENAME	PROJECT NUMBER	DRAWING NUMBER	REV.
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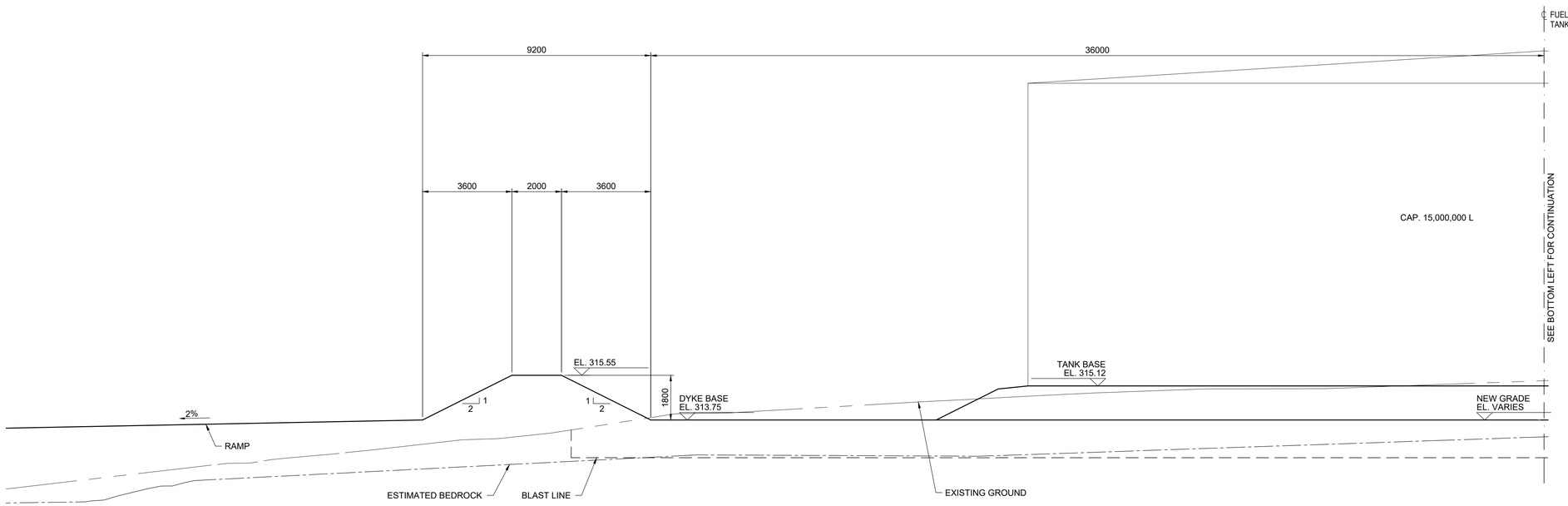

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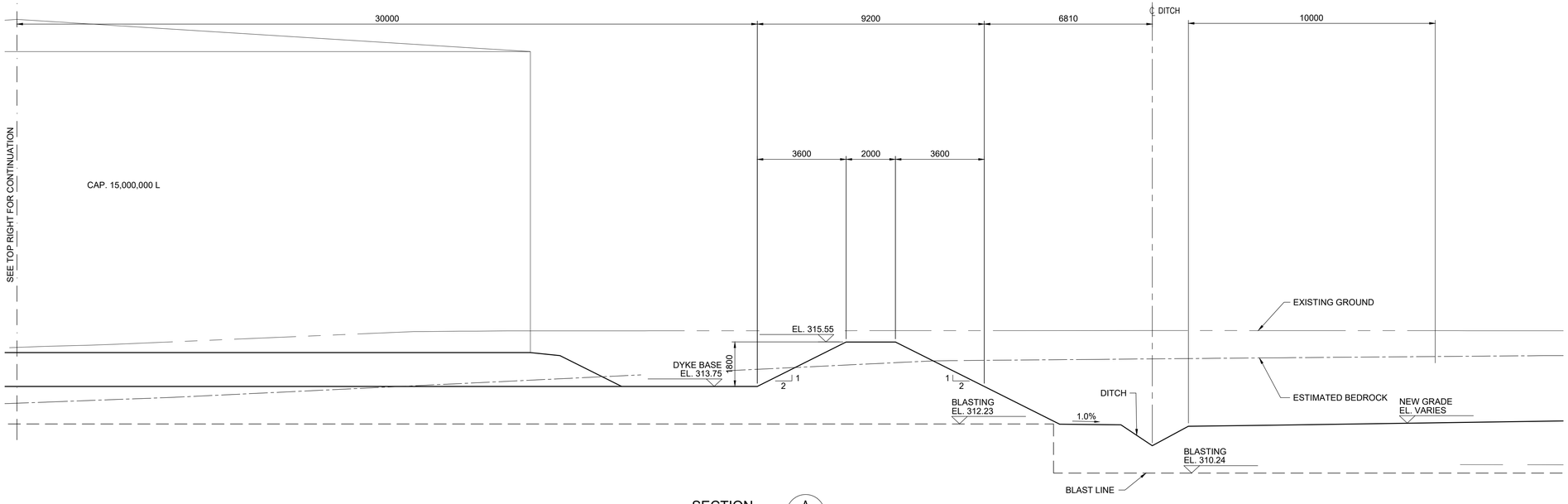

SECTION A 0005
SCALE: 1:100

NOTES:

1. ALL ELEVATIONS AND CO-ORDINATES ARE IN METERS.

PERMIT TO PRACTICE
SACRE-DAVEY ENGINEERING INC.
PERMIT NUMBER: P551
THE ASSOCIATION OF PROFESSIONAL ENGINEERS, GEOLOGISTS AND GEOPHYSICISTS NWT/NU

ISSUED FOR CONSTRUCTION

DWG. NO.	REFERENCE DRAWINGS
53-C-PLN-0005	FUEL FARM – PLAN VIEW – (STORAGE CAPACITY 55M LITRES)

REGISTERED PROFESSIONAL ENGINEER
K.A. SAVAGE
LICENSEE
NT/NU
2021-08-17

REV. No.	ISSUE No.	DESCRIPTION	DATE	BY
0		ISSUED FOR CONSTRUCTION	29JUL21	TM

CLIENT / PROJMAN. / PROJ.ENG. / PROCESS / ELECTR. / INSTR. / PIPING / MECH. / STRUCT. / SERVICES / ARCH. / LAYOUT

		DATE
DISCIPLINE:	CIVIL	
SCALE:	1:100	
DESIGNED BY:	K.S.A	29JUL21
DRAWN BY:	T.M.U	29JUL21
CHECKED BY:	D.T.H	29JUL21
APPROVED BY:		

Sacré-Davey ENGINEERING INC.
315 MOUNTAIN HIGHWAY
NORTH VANCOUVER, BC
SACRE-DAVEY.COM

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Sabina GOLD & SILVER CORP.

GOOSE PROJECT

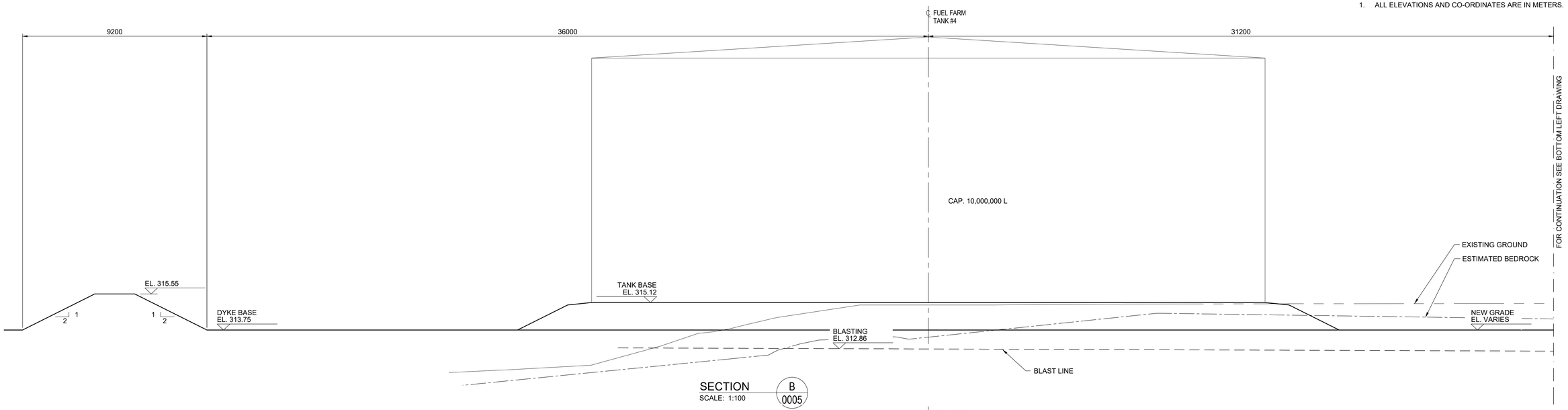
BACK RIVER GOLD DISTRICT NUNAVUT
FUEL FARM
SECTIONS SH.1
(STORAGE CAPACITY: 55M LITRES)

FILENAME	PROJECT NUMBER	DRAWING NUMBER	REV.
SBR6SDE-53-C-DET-0010_DWG	SBR6SDE	SBR6SDE-53-C-DET-0010	0

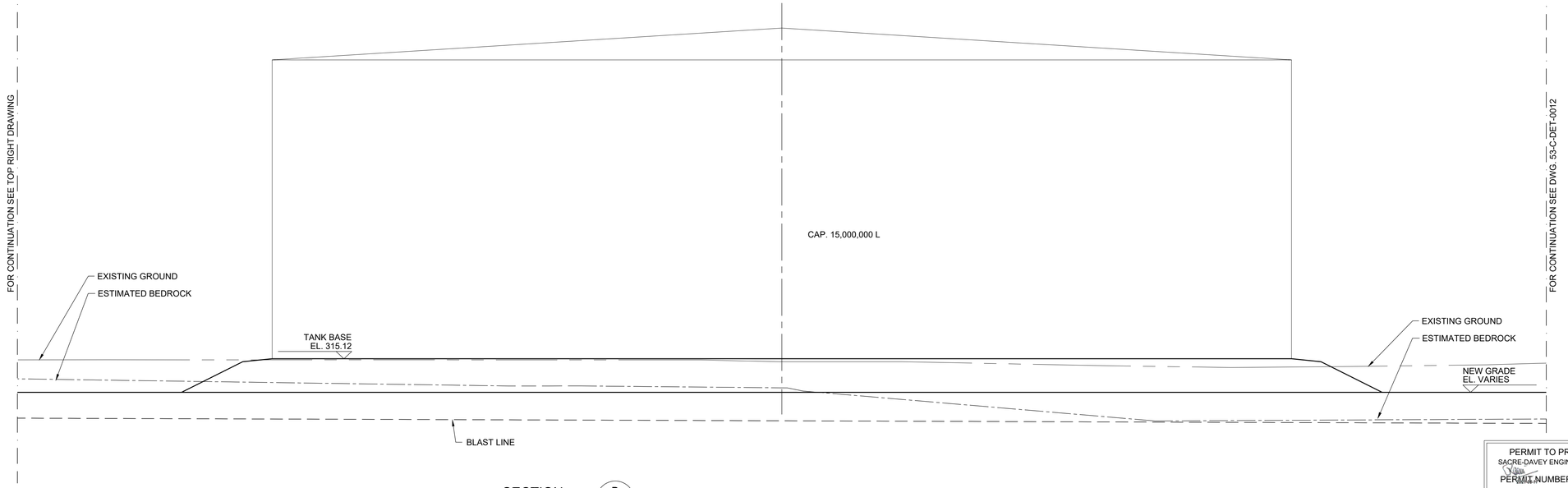
ORIGINAL SHEET SIZE D 22"x34" [559x864] – PLOTTED: 7/29/2021 10:05:06 AM, BY: TAMIM MUNIR

NOTES:

1. ALL ELEVATIONS AND CO-ORDINATES ARE IN METERS.



SECTION B
SCALE: 1:100
0005



SECTION B
SCALE: 1:100
0005

PERMIT TO PRACTICE
SACRE-DAVEY ENGINEERING INC.
PERMIT NUMBER: P551
THE ASSOCIATION OF PROFESSIONAL ENGINEERS, GEOLOGISTS AND GEOPHYSICISTS NWT/NU

ISSUED FOR CONSTRUCTION

Sacré-Davey ENGINEERING INC.
315 MOUNTAIN HIGHWAY
NORTH VANCOUVER, BC
SACRE-DAVEY.COM

DWG. NO.	REFERENCE DRAWINGS
53-C-PLN-0005	FUEL FARM – PLAN VIEW – (STORAGE CAPACITY 55M LITRES)
53-C-DET-0012	FUEL FARM – SECTIONS SH.3 – (STORAGE CAPACITY: 55M LITRES)

REGISTERED PROFESSIONAL ENGINEER
K.A. SAVAGE
LICENSEE
NT/NU
2021-08-17

REV. No.	ISSUE No.	DESCRIPTION	DATE	BY
0		ISSUED FOR CONSTRUCTION	29JUL21	TM

CLIENT, PROJMAN, PROJENG, PROCESS, ELECTR., INSTR., PIPING, MECH., STRUCT., SERVICES, ARCH., LAYOUT

		DATE
DISCIPLINE:	CIVIL	
SCALE:	1:100	
DESIGNED BY:	K.S.A	29JUL21
DRAWN BY:	T.M.U	29JUL21
CHECKED BY:	D.T.H	29JUL21
APPROVED BY:		

Sabina GOLD & SILVER CORP.

GOOSE PROJECT

BACK RIVER GOLD DISTRICT NUNAVUT
FUEL FARM
SECTIONS SH.2
(STORAGE CAPACITY: 55M LITRES)

FILENAME	PROJECT NUMBER	DRAWING NUMBER	REV.
SBR6SDE-53-C-DET-0011_DWG	SBR6SDE	SBR6SDE-53-C-DET-0011	0

ORIGINAL SHEET SIZE D 22"x34" [559x864] – PLOTTED: 7/29/2021 10:12:10 AM, BY: TAMIM MUNIR

NOTES:

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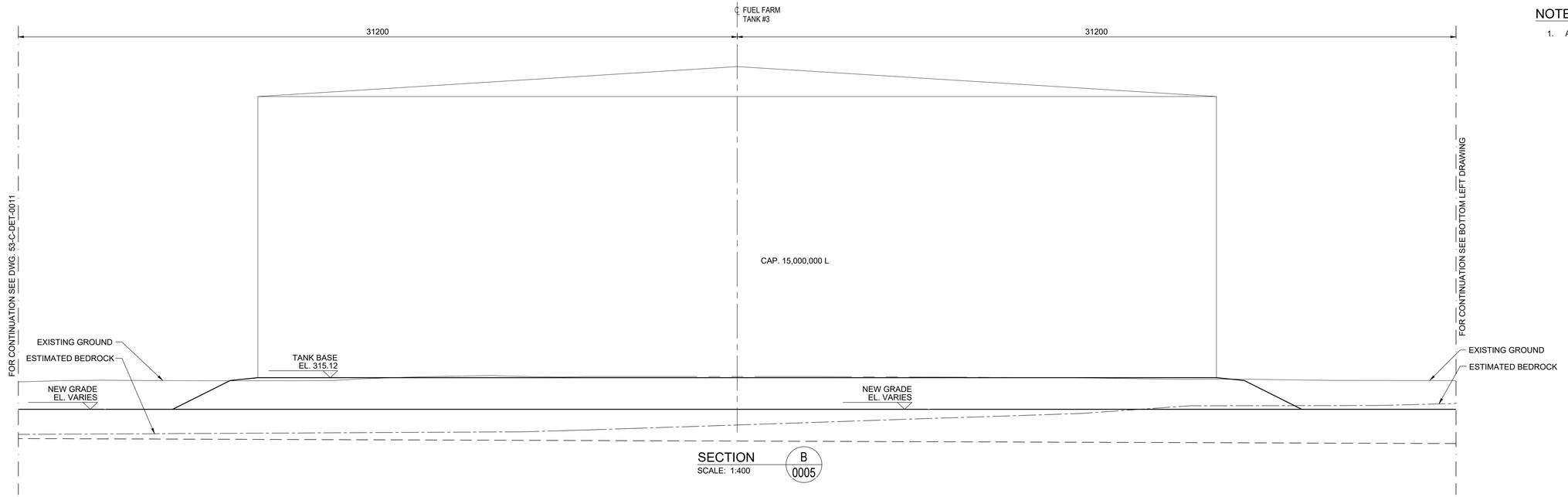

SECTION B 0005
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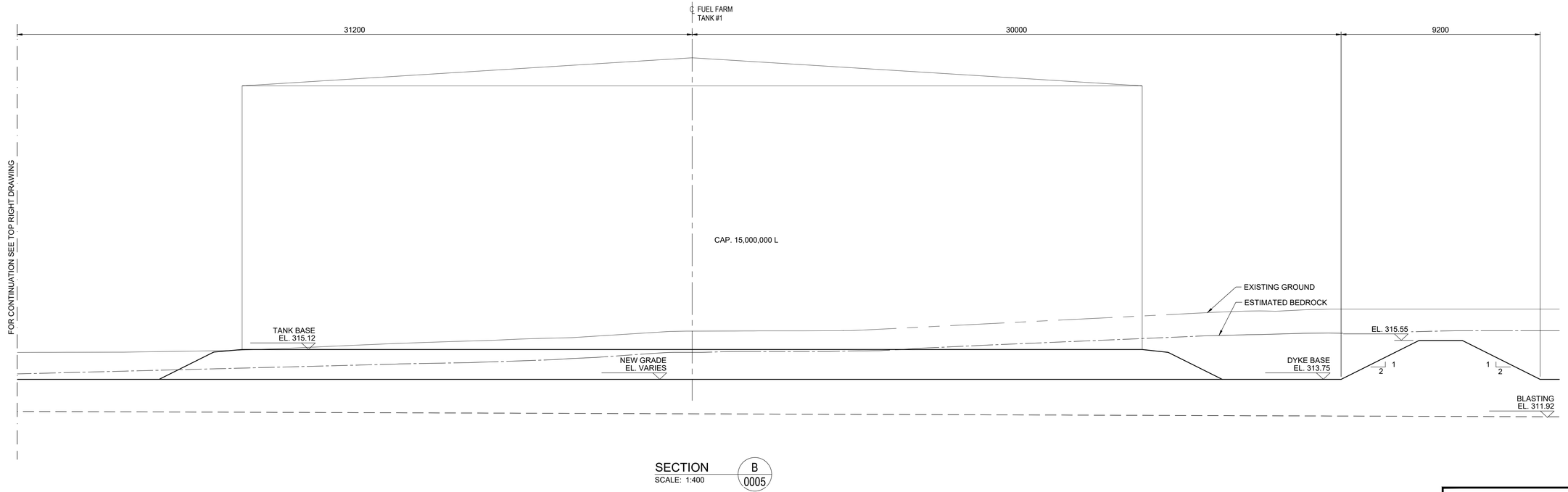

SECTION B 0005
SCALE: 1:400

PERMIT TO PRACTICE
SACRE-DAVEY ENGINEERING INC.
PERMIT NUMBER: P551
THE ASSOCIATION OF PROFESSIONAL ENGINEERS, GEOLOGISTS AND GEOPHYSICISTS NWT/NU

ISSUED FOR CONSTRUCTION

DWG. NO.	REFERENCE DRAWINGS
53-C-DET-0011	FUEL FARM – SECTIONS SH.2 – (STORAGE CAPACITY: 55M LITRES)
53-C-PLN-0005	FUEL FARM – PLAN VIEW – (STORAGE CAPACITY 55M LITRES)

REGISTERED PROFESSIONAL ENGINEER
K.A. SAVAGE
LICENSEE
NT/NU
2021-08-17

REV. No.	ISSUE No.	DESCRIPTION	DATE	BY
0		ISSUED FOR COSNTRUCTION	29JUL21	TM

CLIENT / PROJMAN / PRDLDNG / PROCESS / ELECTR. / INSTR. / PIPING / MECH. / STRUCT. / SERVICES / ARCH. / LAYOUT

		DATE
DISCIPLINE:	CIVIL	
SCALE:	NOTED	
DESIGNED BY:	K.S.A	29JUL21
DRAWN BY:	T.M.U	29JUL21
CHECKED BY:	D.T.H	29JUL21
APPROVED BY:		

Sabina GOLD & SILVER CORP.

FILENAME: SBR6SDE-53-C-DET-0012_DWG

Sacré-Davey ENGINEERING INC.
315 MOUNTAIN HIGHWAY
NORTH VANCOUVER, BC
SACRE-DAVEY.COM

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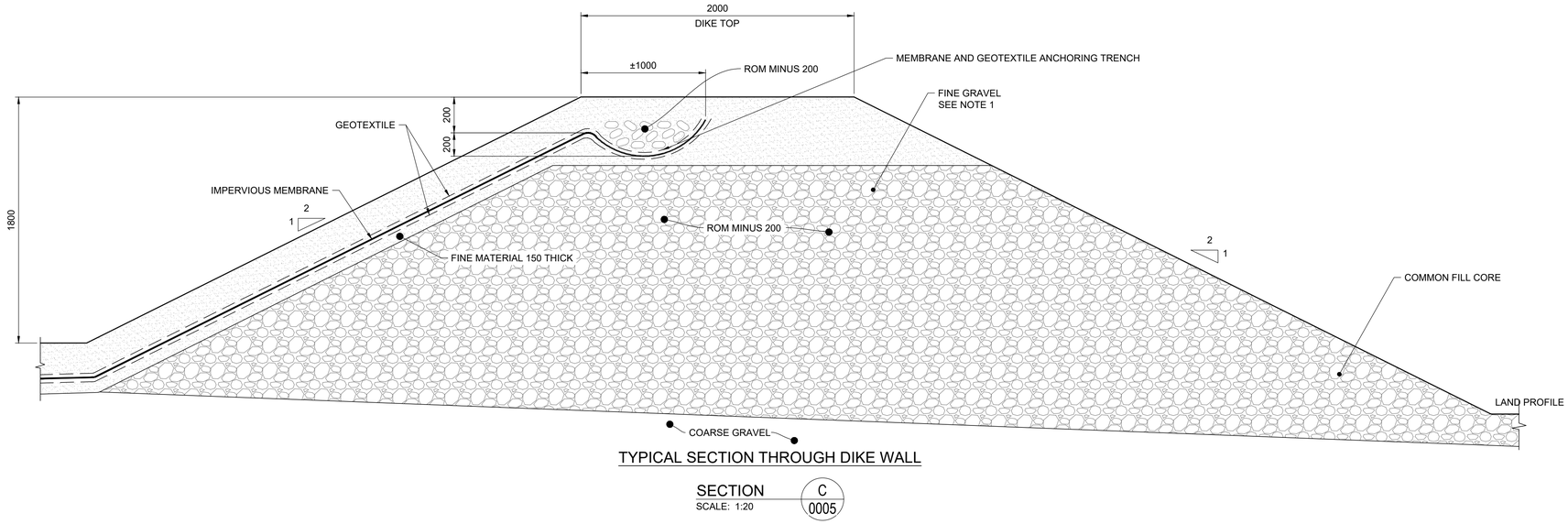
GOOSE PROJECT

BACK RIVER GOLD DISTRICT NUNAVUT
FUEL FARM
SECTIONS SH.3
(STORAGE CAPACITY: 55M LITRES)

PROJECT NUMBER	DRAWING NUMBER	REV.
SBR6SDE	SBR6SDE-53-C-DET-0012	0

ORIGINAL SHEET SIZE D 22"x34" [559x864] – PLOTTED: 7/29/2021 10:04:56 AM, BY: TAMIM MUNIR

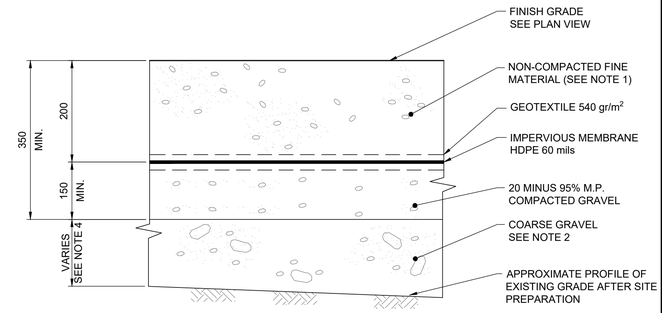


TYPICAL SECTION THROUGH DIKE WALL

SECTION C
SCALE: 1:20 0005

NOTES:

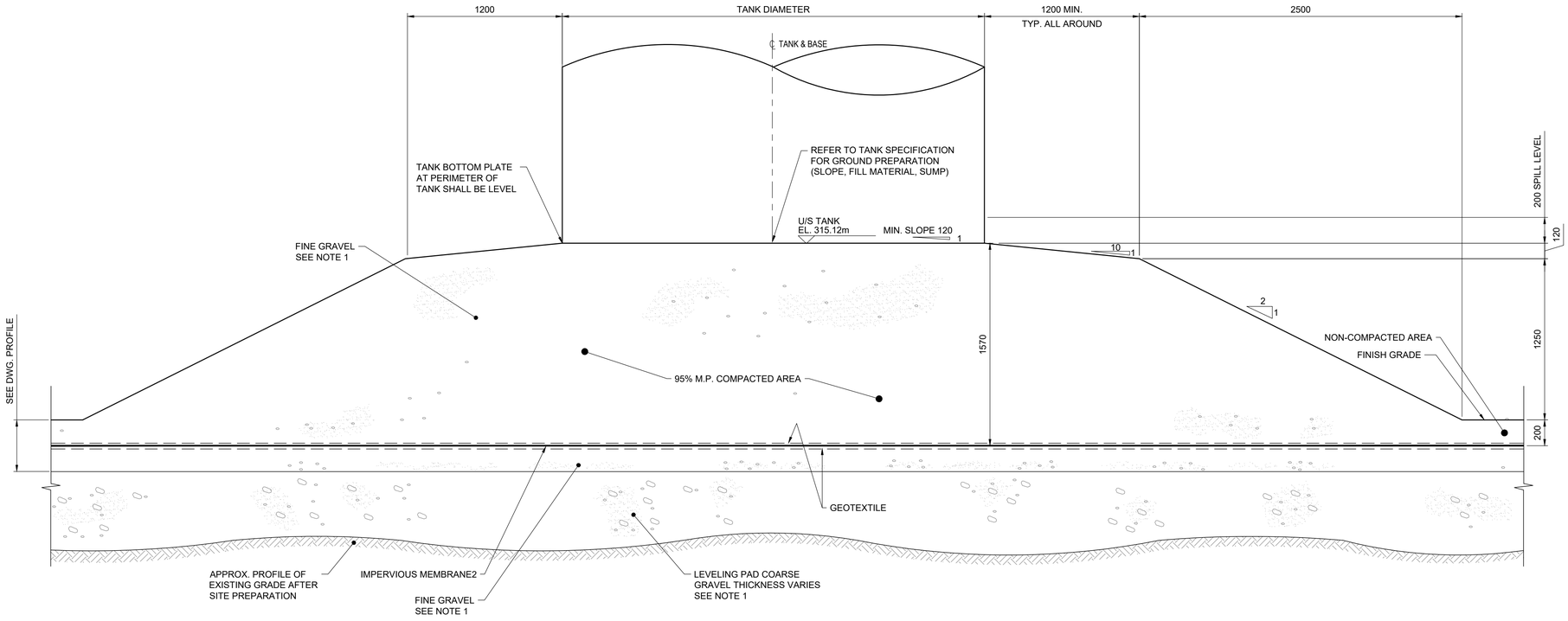
1. FOR FINE MATERIAL SEE GENERAL SPECIFICATIONS SECTION 5.2.7
2. FOR COARSE GRAVEL MATERIAL, SEE SPECIFICATION SECTION 5.2.8
3. MIN. SLOPES AT EDGES OF GRANULAR BASE SHALL BE MAINTAINED AS SHOWN.
4. THICKNESS OF COARSE GRAVEL TO PREPARE PAD SHOULD BE THE MINIMUM REQUIRED TO OBTAIN FINAL GARDE AND SLOPES.



PROFILE - INSIDE DIKE AREAS

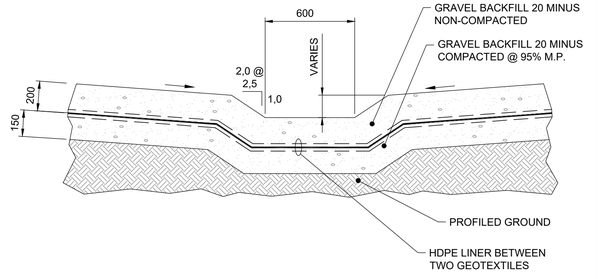
SECTION D
SCALE: 1:10 -

(EXCEPT AT TANK BASE)



TYPICAL GRANULAR BASE FOR VERTICAL TANKS

SECTION E
SCALE: 1 : 20 0005



TYPICAL SECTION OF TANK FARM DITCH

SECTION F
SCALE: N.T.S. 0005

PERMIT TO PRACTICE
SACRE-DAVEY ENGINEERING INC.
PERMIT NUMBER: P551
THE ASSOCIATION OF PROFESSIONAL ENGINEERS, GEOLOGISTS AND GEOPHYSICISTS NWT/NU

ISSUED FOR CONSTRUCTION

53-C-PLN-0005 | FUEL FARM – PLAN VIEW – (STORAGE CAPACITY 55M LITRES)
DWG. NO. | REFERENCE DRAWINGS

REGISTERED PROFESSIONAL ENGINEER
K.A. SAVAGE
LICENSEE
NT/NU
2021-08-17

REV. No.	ISSUE No.	DESCRIPTION	DATE	BY
0		ISSUED FOR CONSTRUCTION	29JUL21	TM

CLIENT, PROJ.MNG., PROJ.ENG., PROCESS, ELECTR., INSTR., PIPING, MECH., STRUCT., SERVICES, ARCH., LAYOUT

DISCIPLINE: CIVIL

SCALE: AS SHOWN	DATE
DESIGNED BY: K.S.A	29JUL21
DRAWN BY: T.M.U	29JUL21
CHECKED BY: D.T.H	29JUL21
APPROVED BY:	

Sacré-Davey ENGINEERING INC.
315 MOUNTAIN HIGHWAY
NORTH VANCOUVER, BC
SACRE-DAVEY.COM

Sabina GOLD & SILVER CORP.

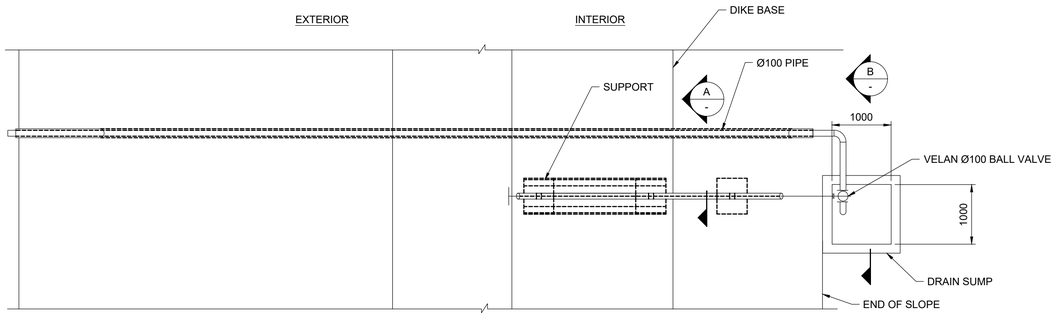
GOOSE PROJECT

BACK RIVER GOLD DISTRICT NUNAVUT

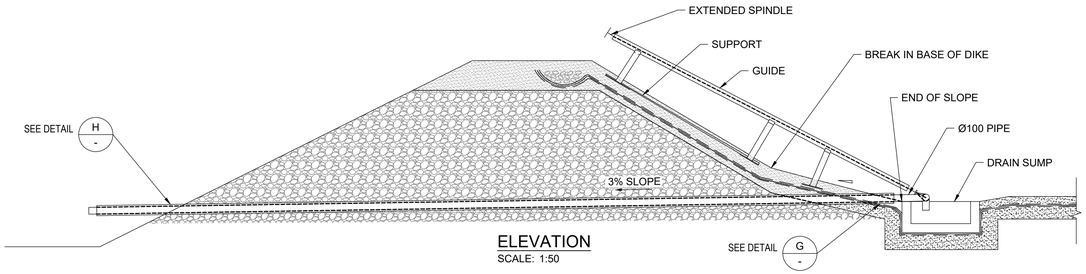
FUEL FARM
TYPICAL SECTIONS & DETAILS SH.1

FILENAME	PROJECT NUMBER	DRAWING NUMBER	REV.
SBR6SDE-53-C-DET-0013_DWG	SBR6SDE	SBR6SDE-53-C-DET-0013	0

ORIGINAL SHEET SIZE D 22"x34" [559x864] – PLOTTED: 7/29/2021 10:04:50 AM, BY: TAMIM MUNIR



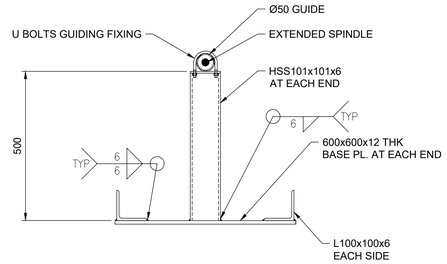
PLAN VIEW
SCALE: 1:50



ELEVATION
SCALE: 1:50

TYPICAL SECTION THROUGH DIKE WALL & DRAIN SUMP

DETAIL 1 / 0005
SCALE: 1:20



SECTION A / -
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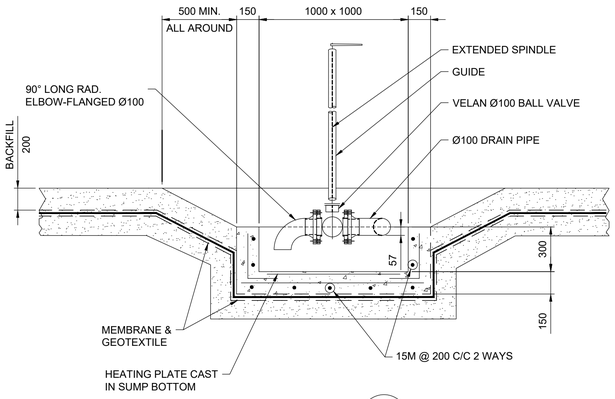

SECTION B / -
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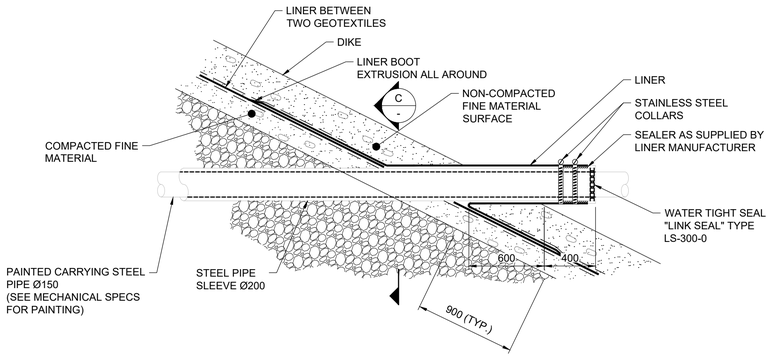
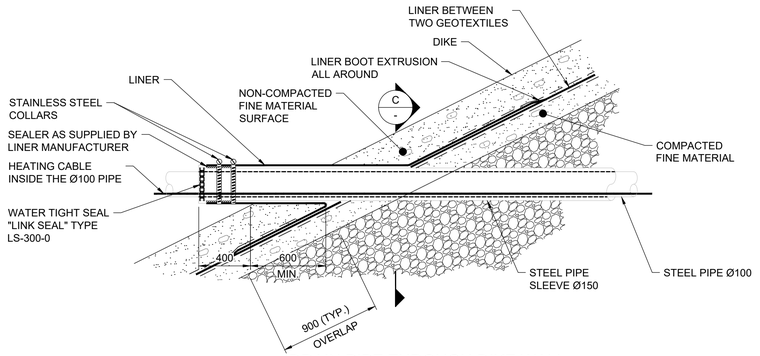


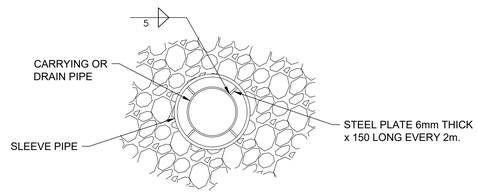
TYPICAL SECTION PIPE THROUGH DIKE WALL

SECTION G / -
SCALE: N.T.S.



DRAIN PIPE THROUGH DIKE WALL

SECTION H / -
SCALE: N.T.S.



SECTION C / -
SCALE: N.T.S.

PERMIT TO PRACTICE
SACRE-DAVEY ENGINEERING INC.
PERMIT NUMBER: P551
THE ASSOCIATION OF PROFESSIONAL ENGINEERS, GEOLOGISTS AND GEOPHYSICISTS NWT/NU

ISSUED FOR CONSTRUCTION

Sacré-Davey ENGINEERING INC.
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NORTH VANCOUVER, BC
SACRE-DAVEY.COM

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DWG. NO.	REFERENCE DRAWINGS
53-C-PLN-0005	FUEL FARM – PLAN VIEW – (STORAGE CAPACITY 55M LITRES)

REGISTERED PROFESSIONAL ENGINEER
K.A. SAVAGE
LICENSEE
NT/NU
2021-08-17

REV. No.	ISSUE No.	DESCRIPTION	DATE	BY
0		ISSUED FOR CONSTRUCTION	29JUL21	TM

CLIENT / PROJMAN. / PRELDNG. / PROCESS / ELECTR. / INSTR. / PIPING / MECH. / STRUCT. / SERVICES / ARCH. / LAYOUT

DISCIPLINE:	CIVIL	
SCALE:	AS SHOWN	DATE
DESIGNED BY:	K.S.A	29JUL21
DRAWN BY:	T.M.U	29JUL21
CHECKED BY:	D.T.H	29JUL21
APPROVED BY:		

Sabina GOLD & SILVER CORP.

GOOSE PROJECT
BACK RIVER GOLD DISTRICT NUNAVUT
FUEL FARM
TYPICAL SECTIONS & DETAILS SH.2

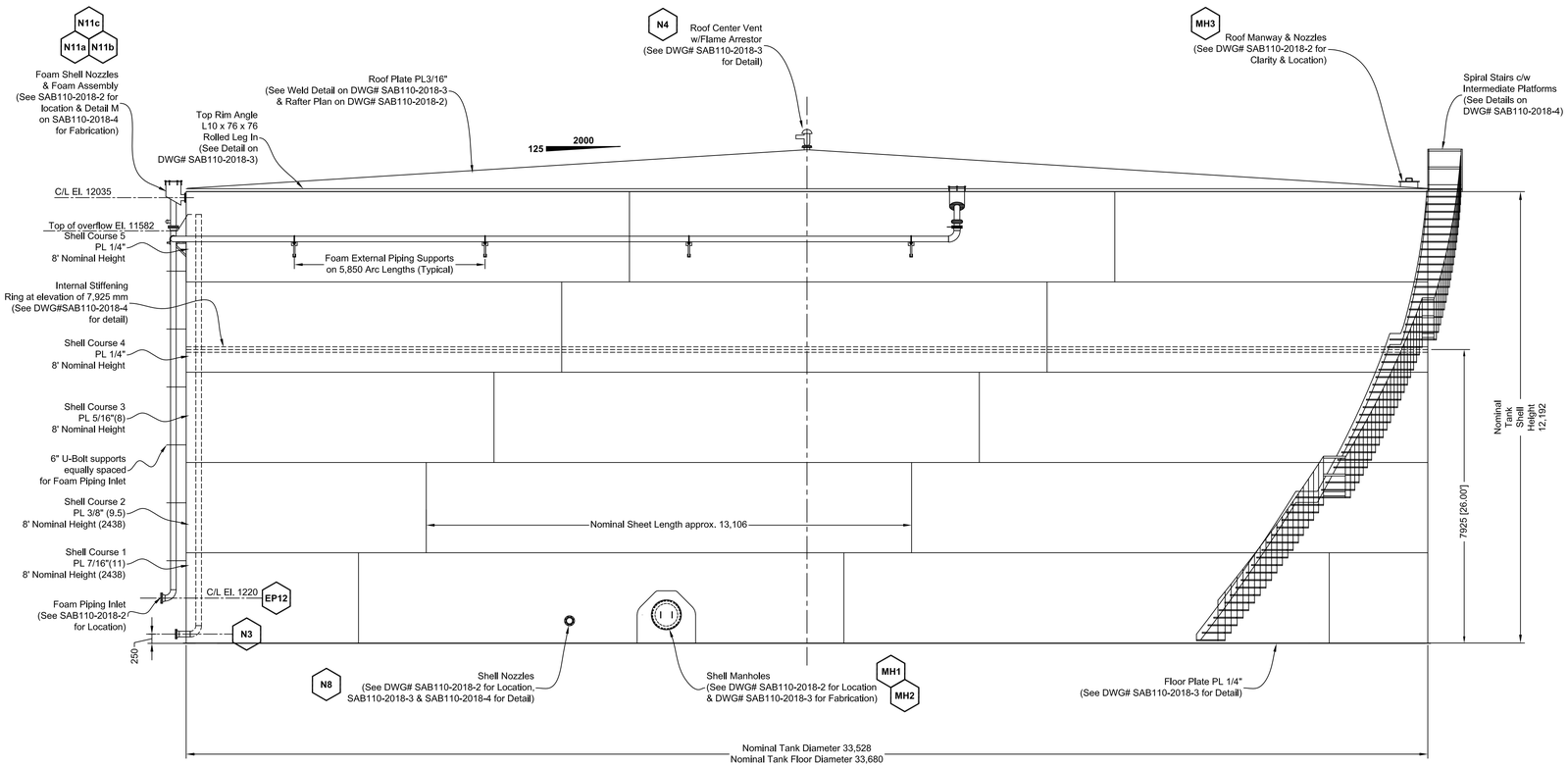
FILENAME	PROJECT NUMBER	DRAWING NUMBER	REV.
SBR6SDE-53-C-DET-0014_DWG	SBR6SDE	SBR6SDE-53-C-DET-0014	0

ORIGINAL SHEET SIZE D 22"x34" [559x864] – PLOTTED: 7/29/2021 10:04:42 AM, BY: TAMIM MUNIR

Appendix D - Tank Drawings by Gem Steel Edmonton Ltd.

BILL OF MATERIALS (Quantity Per Tank)

MARK	DESCRIPTION	QTY.
BM1	Floor Plate (PL 1/4")	1
BM2	Shell Course 1 (PL 7/16")	1
BM3	Shell Course 2 (PL 3/8")	1
BM4	Shell Course 3 (PL 5/16")	1
BM5	Shell Course 4 (PL 1/4")	1
BM6	Shell Course 5 (PL 1/4")	1
BM7	Roof Plate (PL 3/16")	1
BM8	Outer Roof Support Column Assemblies (12"Ø STD Pipe) (Structural Grade) 40'-8" lg c/w 3/4" Cap Plate	8
BM9	Center Pole Assembly (12"Ø STD Pipe) (Structural Grade) Length to be field cut & capped	1
BM10	Girders (W410 x 54 x 6,400 Long)	8
BM11	Internal Roof Rafters (W250 x 22 x 9,144 Long)	80
BM12	Spiral Staircase c/w Intermediate & Top Platforms (3 Sections total)	1
BM13	Foam External Piping Assembly (3"Ø STD Pipe & Fittings)	1



ELEVATION

(SEE DWG. SAB110-2018-2 FOR TRUE ORIENTATION)

GENERAL NOTES

Design

1 Code of Construction: API-650, 12 Edition March 2013
2. All dimensions are in mm unless noted otherwise.
3. Product Stored: Diesel Fuel
4. Diameter: 33,528 mm Ø
5. Height: 12,192 mm
6. Nominal Capacity: 10,760,000 litres
7. Working Capacity: 10,000,000 litres
8. Design Metal Temp: -50° C
9. Product Specific Gravity: 0.9 @ 15 °C

Materials

1. Bolts: A-325
2. Pipe Nozzles: A333 Gr. 6
3. Forged Flanges & Couplings: A350M, Gr. LF 2 & ANSI B16.5 LF2 Class D
4. Pipe Fittings: A420 Gr. WPG-6
5. Structural Steel: G40.21-300W
6. Shell Steel Plate: G40.21M-260WT, Killed and Fine-Grain Practice, Impact Energy 20 ft./lbs @ -50° F
7. Floor & Roof Steel Plate: G40.21M-260WT
8. Tank Manways: Structural Grade Pipe or better.

Inspection

1. Vacuum Testing: Floor
2. Radiography: Vertical Shell Welds - Spot as per API 650
3. Air Test: Re-pads
4. Vacuum and Diesel Test: Shell Welds

TANK ID 53-TK-01 - Goose Site
TANK ID 73-TK-01 - MLA Site 2019

AS BUILT

#	REVISION DESCRIPTION	DATE	BY
1	Issued As-Built	Sept 10 2019	JOC
C	Re-issued for Review	July 30 2019	JOC
B	Re-issued for Review	Aug 7 2018	JOC
A	Issued for Review	Feb 25 2018	JOC

GEM STEEL
9060 - 24 Street
Edmonton, Alberta
Canada T6P1X8
Ph. (780) 449-0000
Fax. (780) 449-0001

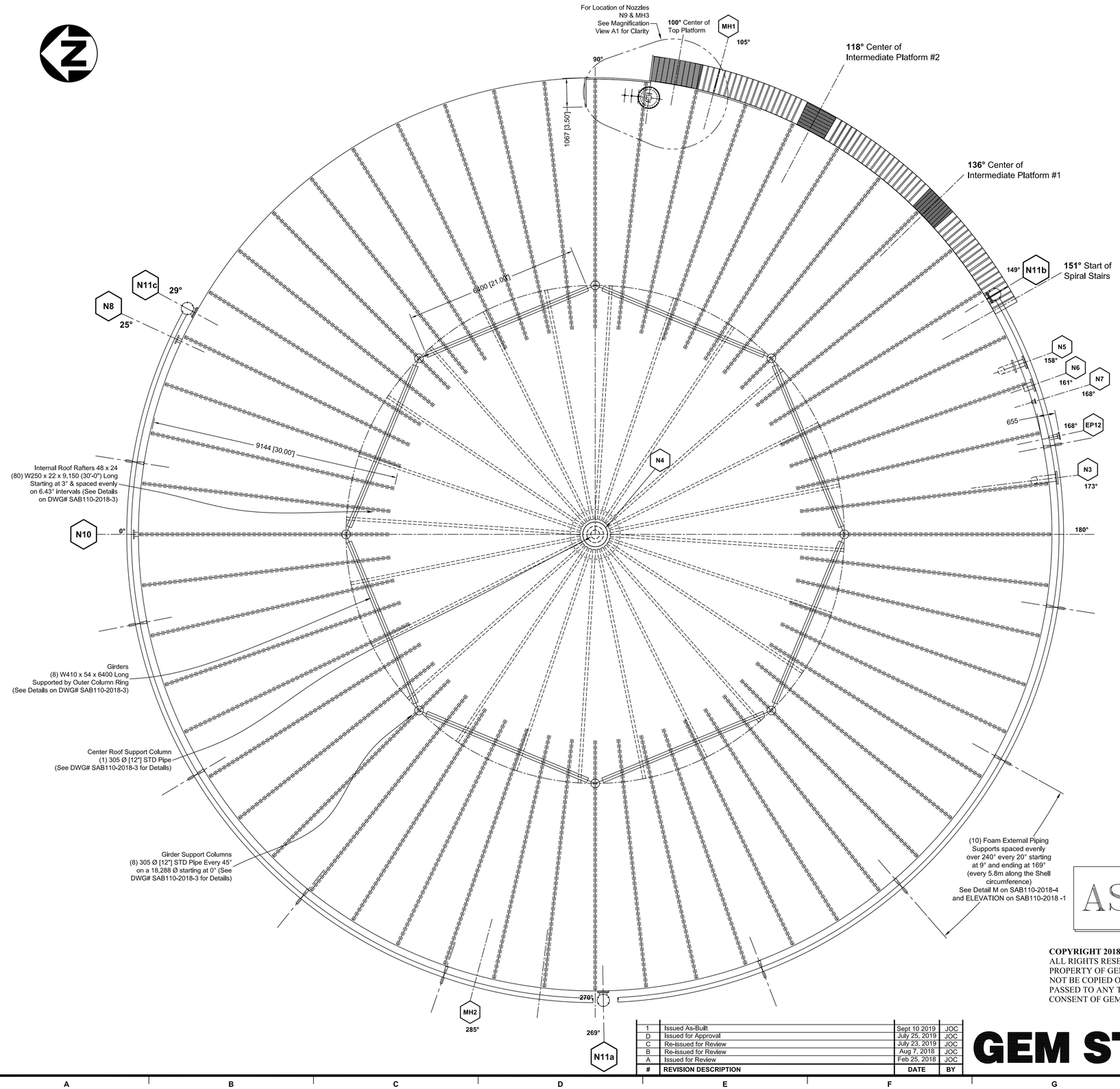
ENGINEER:

TITLE: **GENERAL TANK ELEVATION**

PROJECT: **Tanks 1 & 2, 110' Ø x 40' High Diesel Fuel Storage Tanks**

CLIENT: **Sabina Gold and Silver Corp.**
Back River Project, Bathhurst Inlet, Nunavut

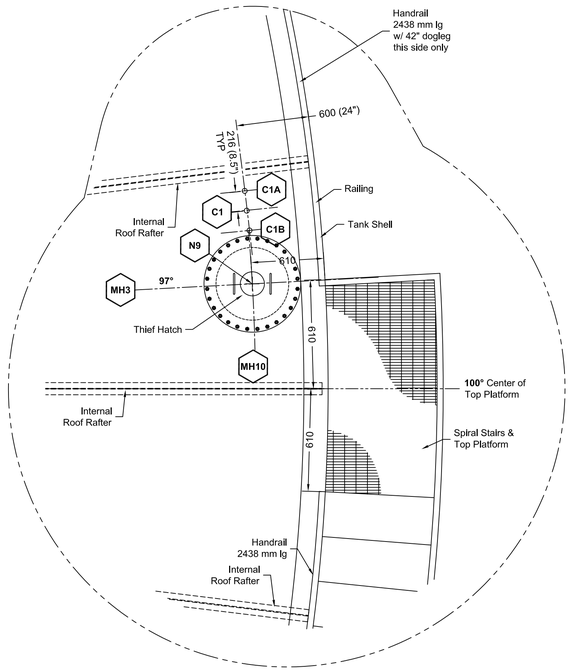
CHK'D BY:	DATE:	CADFILE:
B.K.G.	Aug 2019	1
DRAWN BY:	APP'D BY:	SCALE:
J.O.C.	-	N.T.S.
DRAWING #		REVISION #
SAB110-2018-1		1



NOZZLE SCHEDULE

MARK	DESCRIPTION	SIZE	PROJ.	INT. PROJ.	TYPE	RATING	RPD.	LOC.	ELEV.
MH1	Shell Manway	24"	Det.		RFSO	API650	Det.	105°	762
MH2	Shell Manway	24"	Det.		RFSO	API650	Det.	285°	762
MH3	Roof Manway	24"	Det.		RFSO	API650	Det.	Det.	N/A
N3	Overflow	6"	200		RFSO	150#	15 3/4"	173°	11582
N4	Vent c/w Flame Arrestor as per API 2000 Emergency Venting	6"	200		RFSO	150#	N/A	Roof	N/A
N5	Fill	10"	200		RFSO	150#	23"	158°	350
N6	Draw	10"	200		RFSO	150#	23"	161°	350
N7	Thermal Relief	1"	150		RFSO	150#	N/A	163°	250
N8	Water Draw-off	3"	150		RFSO	150#	10 1/2"	25°	250
N9	Jayco JT8 Thief Hatch	8"	200		Fab	150#	15 3/4"	173°	N/A
N10	Spare	4"	200		RFSO	150#	12"	0°	350
N11a	Foam	3"					N/A	269°	See Det.
N11b	Foam	3"					N/A	149°	See Det.
N11c	Foam	3"					N/A	29°	See Det.
EP12	External Foam Piping Inlet c/w blind flg	6"	N/A		RFSO	150#	N/A	98°	1500
C1	Varec 2500 Level Indicator	1 1/2"	Det.		CPLG	1500#	N/A	N/A	N/A
C1A/B	Varec Wire Guides	1 1/4"	Det.						

Note: Install N6 Flange face parallel to N5



View A1

Magnification 3x

TANK ID 53-TK-01 - Goose Site
TANK ID 73-TK-01 - MLA Site 2019

AS BUILT

#	REVISION DESCRIPTION	DATE	BY
1	Issued As-Built	Sept 10 2019	JOC
D	Issued for Approval	July 25, 2019	JOC
C	Re-issued for Review	July 23, 2019	JOC
B	Re-issued for Review	Aug 7, 2018	JOC
A	Issued for Review	Feb 25, 2018	JOC

GEM STEEL
9060 - 24 Street
Edmonton, Alberta
Canada T6P1X8
Ph. (780) 449-0000
Fax. (780) 449-0001

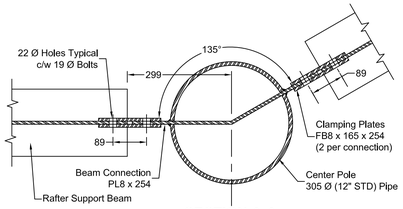
ENGINEER:

TITLE: **ROOF & NOZZLE PLAN**

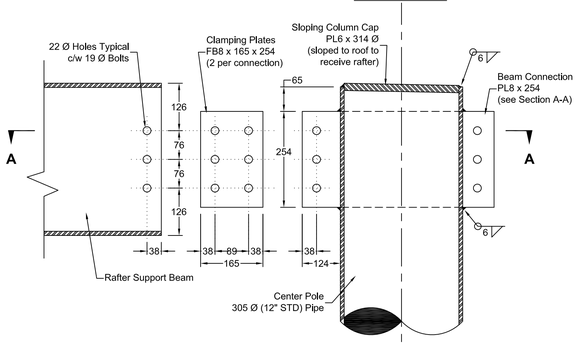
PROJECT: **Tanks 1 & 2, 110' Ø x 40' High Diesel Fuel Storage Tanks**

CLIENT: **Sabina Gold and Silver Corp.**
Back River Project, Bathhurst Inlet, Nunavut

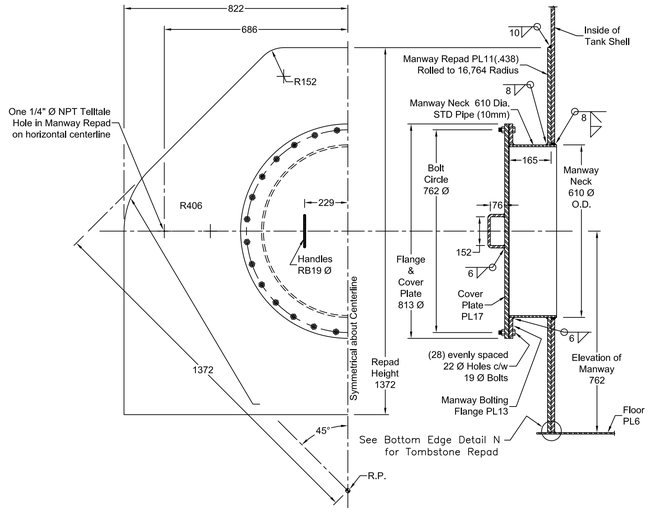
CHK'D BY:	DATE:	CADFILE:
B.K.G.	Aug 2019	2
DRAWN BY:	APP'D BY:	SCALE:
J.O.C.	-	N.T.S.
DRAWING #		REVISION #
SAB110-2018-2		1



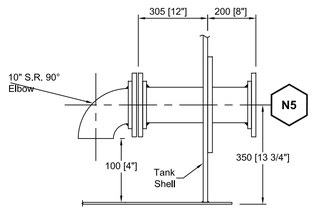
SECTION A-A



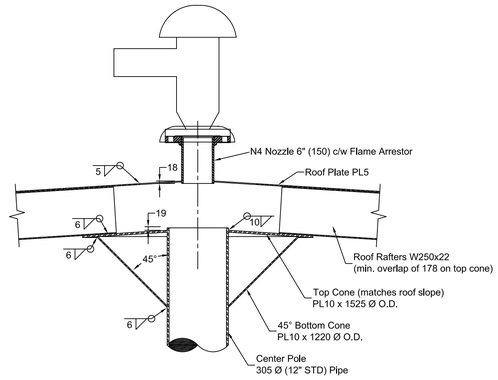
A/2 COLUMN TO ROOF BEAM DET. NTS



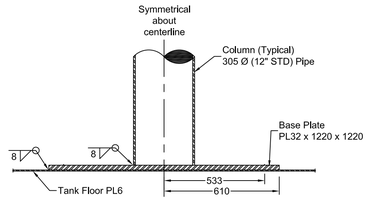
B/1 610 Ø SHELL MANWAY DETAIL NTS



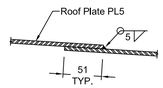
P/1 SHELL NOZZLE N5 DETAIL NTS



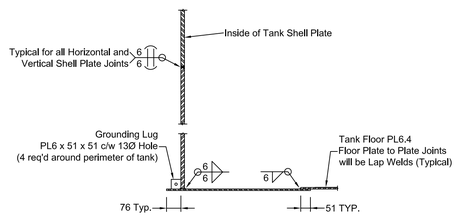
C/2 CENTER SUPPORT & VENT DET. NTS



D/2 COLUMN BASE PLATE DET. NTS

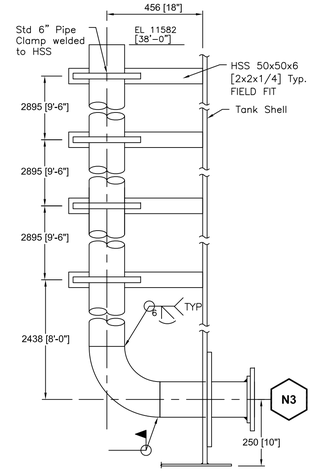


E/1 ROOF PLATE WELD DET. NTS

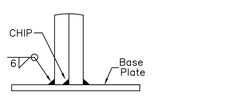


F/1 FLOOR, SHELL WELD DET. NTS

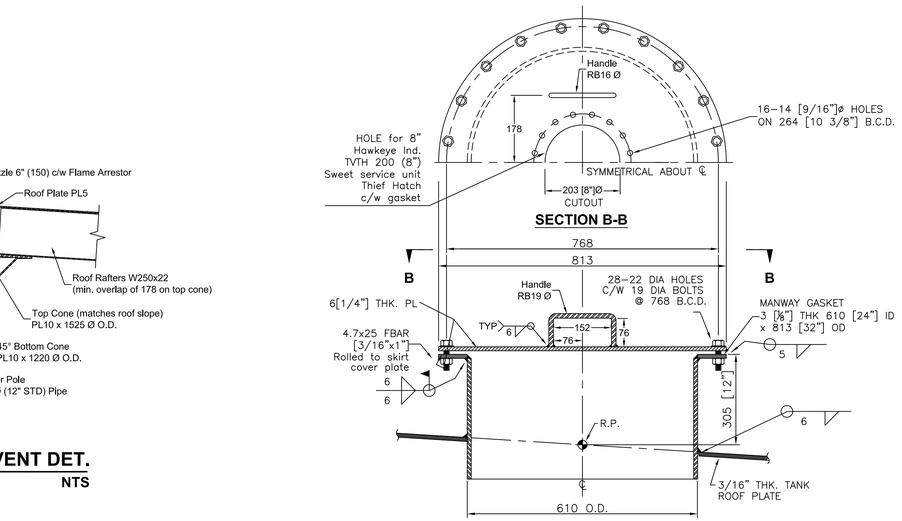
AS BUILT



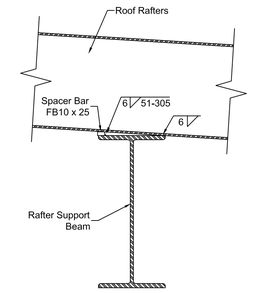
N/1 SHELL NOZZLE N3 DETAIL NTS



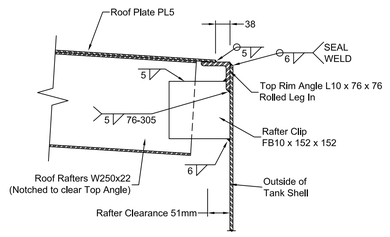
K/- BOTTOM EDGE DETAILS TOMBSTONE REPAD



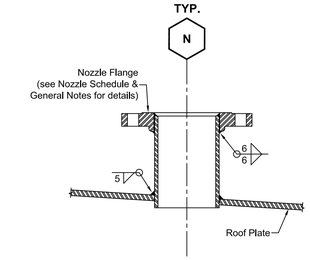
G/1 ROOF MANWAY DET. NTS



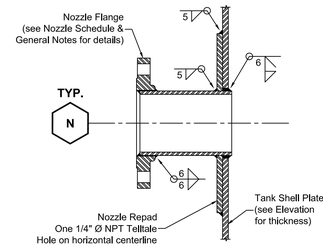
H/2 RAFTER-SUPPORT BEAM DET. NTS



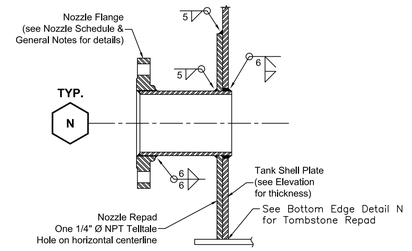
I/2 ROOF-RAFTER-RIM DETAIL NTS



J/1 TYP. ROOF NOZZLE DET. NTS



L/1 TYP. SHELL NOZZLE DETAIL ABOVE 300 EL. NTS



M/1 TYP. SHELL NOZZLE DETAIL 300 EL. AND BELOW NTS

TANK ID 53-TK-01 - Goose Site
TANK ID 73-TK-01 - MLA Site 2019

#	REVISION DESCRIPTION	DATE	BY
1	Issued As-Built	Sept 10 2019	JOC
C	Re-issued for Review	July 23, 2019	JOC
B	Re-issued for Review	Aug 7, 2018	JOC
A	Issued for Review	Feb 25, 2018	JOC

GEM STEEL
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Edmonton, Alberta
Canada T6P1X8
Ph. (780) 449-0000
Fax. (780) 449-0001

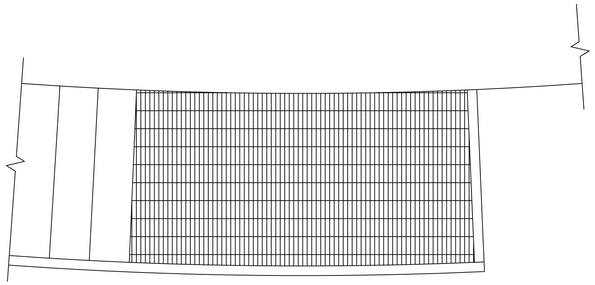
ENGINEER:

TITLE: **GENERAL TANK DETAILS**

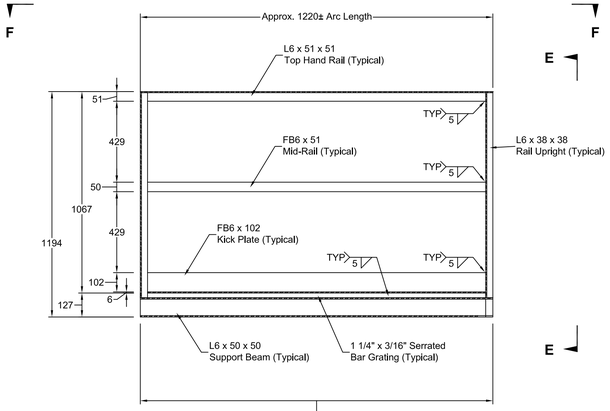
PROJECT: **Tanks 1 & 2, 110' Ø x 40' High Diesel Fuel Storage Tanks**

CLIENT: **Sabina Gold and Silver Corp.**
Back River Project, Bathhurst Inlet, Nunavut

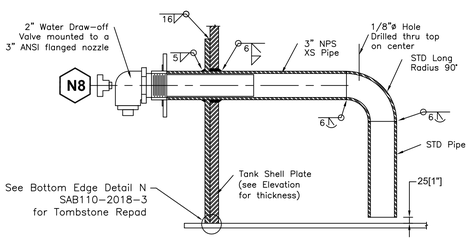
CHK'D BY:	DATE:	CADFILE:
B.K.G.	Aug 2019	3
DRAWN BY:	APP'D BY:	SCALE:
J.O.C.	-	N.T.S.
DRAWING #		REVISION #
SAB110-2018-3		1



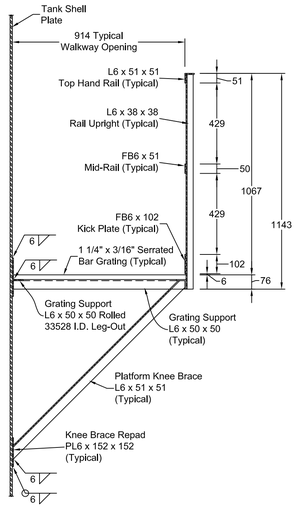
SECTION F-F



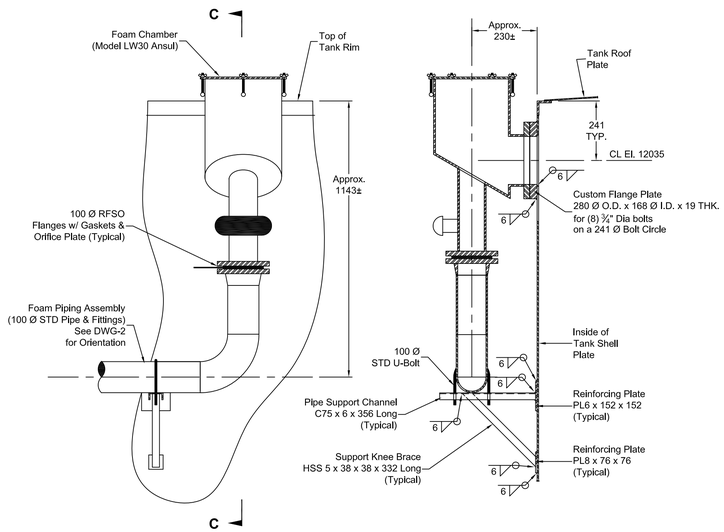
Q 1 ROOF LANDING NTS



P 1 WATER DRAW OFF AND DRAIN DET. NTS

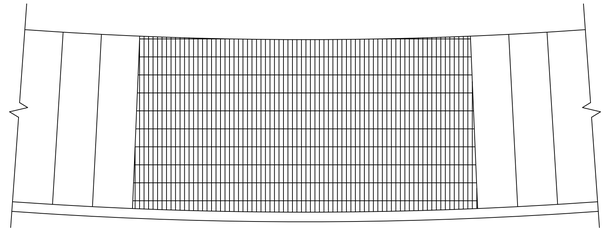


SECTION E-E
STAIRS REMOVED

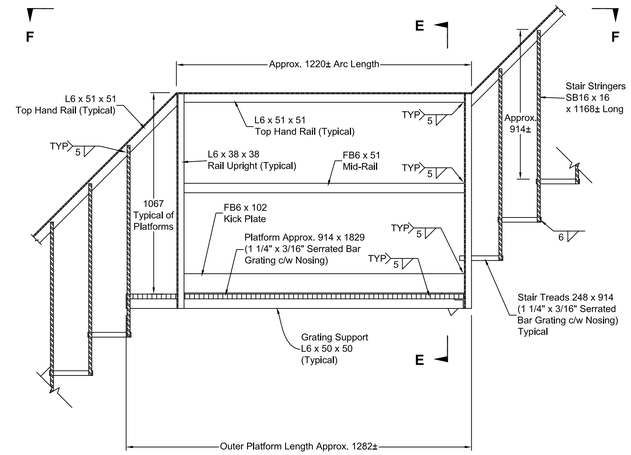


SECTION C-C

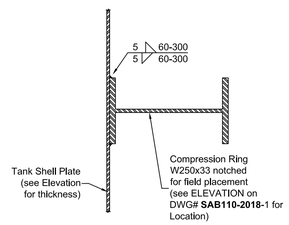
M 1 FOAM OUTLET DET. NTS



SECTION F-F



R 1 SPIRAL STAIRS & INTERMEDIATE PLATFORM DET. NTS



T 1 INTERNAL COMPRESSION RING NTS

AS BUILT

TANK ID 53-TK-01 - Goose Site
TANK ID 73-TK-01 - MLA Site 2019

#	REVISION DESCRIPTION	DATE	BY
1	Issued As-Built	Sept 10 2019	JOC
B	Re-issued for Review	Aug 7, 2018	JOC
A	Issued for Review	Feb 25, 2018	JOC

GEM STEEL
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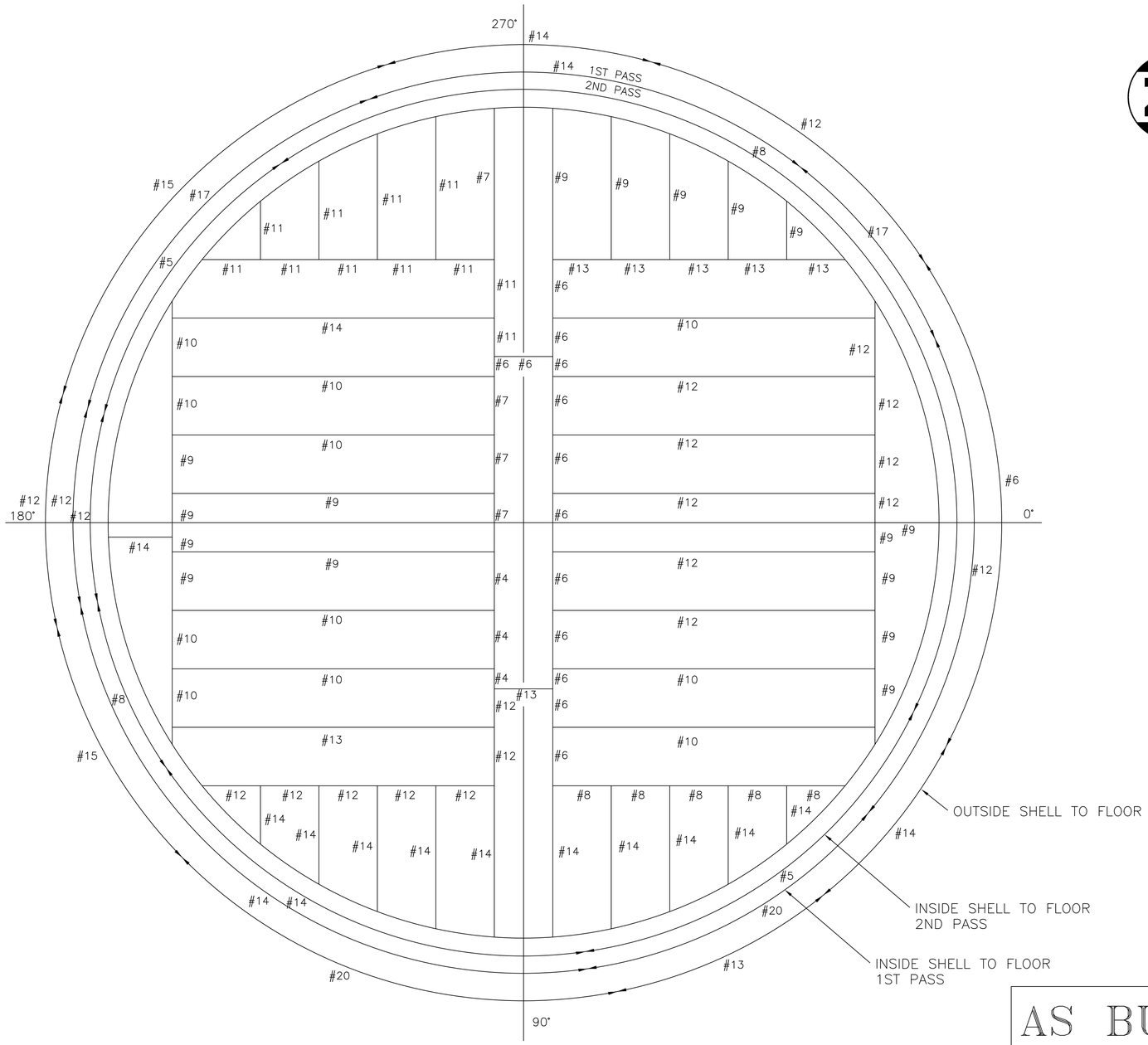
ENGINEER:

TITLE: **GENERAL TANK DETAILS**

PROJECT: **Tanks 1 & 2, 110' Ø x 40' High Diesel Fuel Storage Tanks**

CLIENT: **Sabina Gold and Silver Corp.**
Back River Project, Bathhurst Inlet, Nunavut

CHK'D BY:	DATE:	CADFILE:
B.K.G.	Aug 2019	4
DRAWN BY:	APP'D BY:	SCALE:
J.O.C.	-	N.T.S.
DRAWING #		REVISION #
SAB110-2018-4		1



FLOOR WELD MAP

AS BUILT

Welder's I.D. Numbers Schedule

Jesse Duncalfe	#5
Tyler Boutilier	#7
Chris Gauthier	#8
Kyle Potter	#9
Kyle Fehr	#10
Chris Gaudet	#11
Dayton Tymchuck	#12
Byron Oulton	#13
Jesse Hayes	#14
Kory Andrusiak	#15
Glen Cosby	#17
Justin Harris	#20

TANK ID 53-TK-01 - Goose Site
TANK ID 73-TK-01 - MLA Site 2019

#	REVISION DESCRIPTION	DATE	BY
A	ISSUED AS-BUILT	SEP 12/19	JOC

GEM STEEL
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Edmonton, Alberta
Canada T6P1X8
Ph. (780) 449-0000
Fax. (780) 449-0001

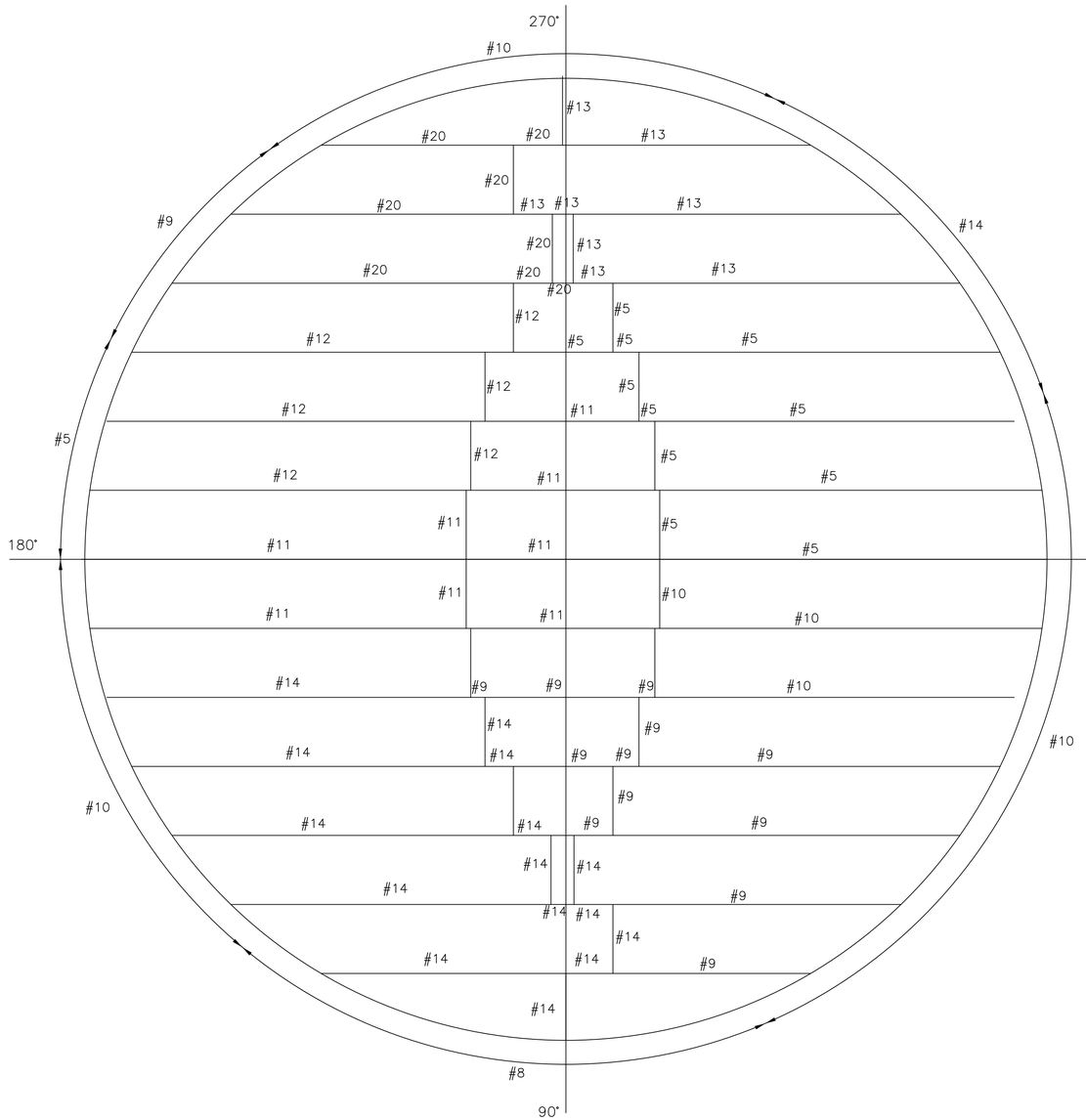
ENGINEER:

TITLE: **FLOOR PLATE LAYOUT AND WELD MAP**

PROJECT: **Tanks 1 & 2, 110' Ø x 40' High Diesel Fuel Storage Tanks**

CLIENT: **Sabina Gold and Silver Corp.**
Back River Project, Bathhurst Inlet, Nunavut

CHK'D BY:	DATE:	CADFILE:
B.K.G.	Aug 2019	5
DRAWN BY:	APP'D BY:	SCALE:
J.O.C.	-	N.T.S.
DRAWING #		REVISION #
SAB110-2018-5		1



ROOF WELD MAP

AS BUILT

Welder's I.D. Numbers Schedule

Jesse Duncalfe	#5
Chris Gauthier	#8
Kyle Potter	#9
Kyle Fehr	#10
Chris Gaudet	#11
Dayton Tymchuck	#12
Byron Oulton	#13
Jesse Hayes	#14
Justin Harris	#20

TANK ID 53-TK-01 - Goose Site
TANK ID 73-TK-01 - MLA Site 2019

#	REVISION DESCRIPTION	DATE	BY
A	ISSUED AS-BUILT	SEP 12/19	JOC

GEM STEEL
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Edmonton, Alberta
Canada T6P1X8
Ph. (780) 449-0000
Fax. (780) 449-0001

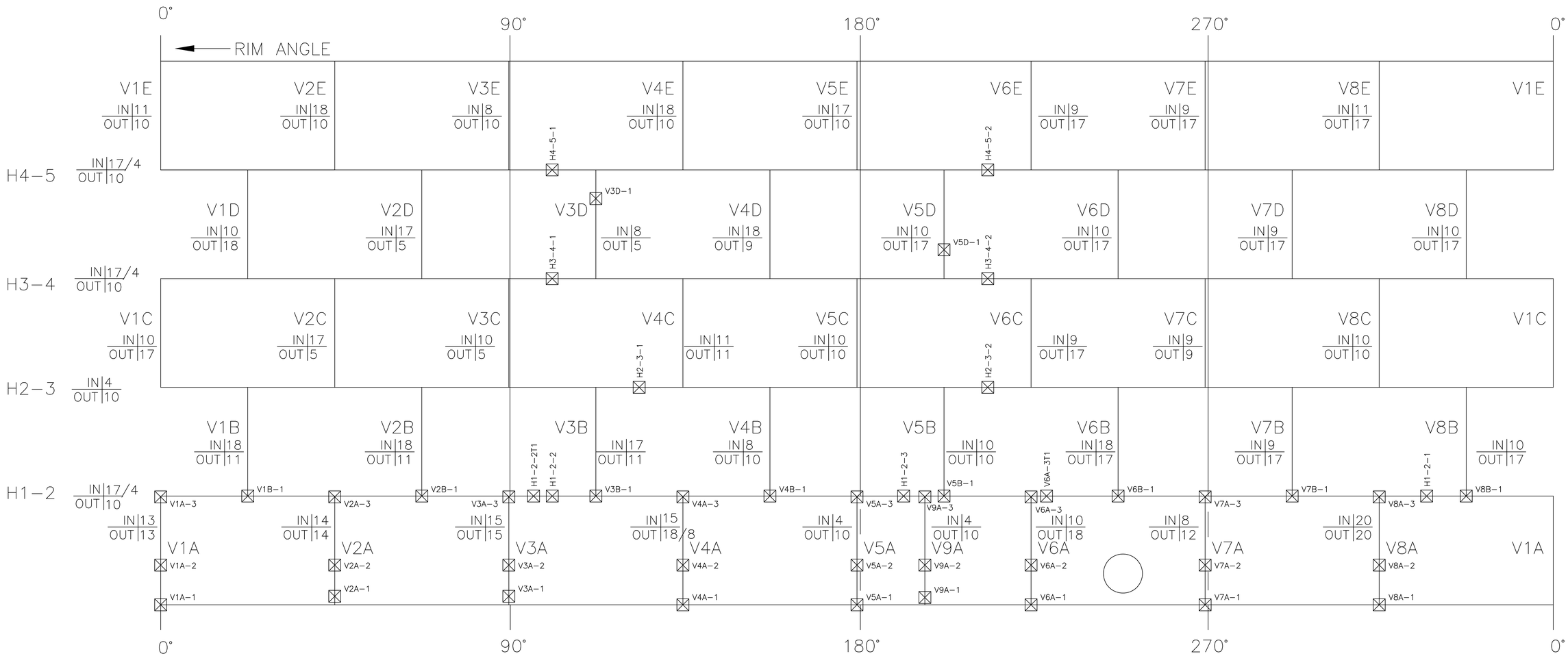
ENGINEER:

TITLE: **ROOF PLATE LAYOUT AND WELD MAP**

PROJECT: **Tanks 1 & 2, 110' Ø x 40' High Diesel Fuel Storage Tanks**

CLIENT: **Sabina Gold and Silver Corp. Back River Project, Bathhurst Inlet, Nunavut**

CHK'D BY:	DATE:	CADFILE:
B.K.G.	Aug 2019	6
DRAWN BY:	APP'D BY:	SCALE:
J.O.C.	-	N.T.S.
DRAWING #		REVISION #
SAB110-2018-6		1



Welder's I.D. Numbers Schedule

Mark Kinzel	#4
Jesse Duncalfe	#5
Chris Gauthier	#8
Kyle Potter	#9
Kyle Fehr	#10
Chris Gaudet	#11
Dayton Tymchuck	#12
Byron Oulton	#13
Jesse Hayes	#14
Kory Andrusiak	#15
Glen Cosby	#17
Alex Hoy	#18
Justin Harris	#20

SHELL WELD MAP
VIEWED FROM INSIDE

LEGEND

IN|8 / OUT|8 WELDED BY

1A-2 X-RAY TAKEN

[ ] NEW WELD BETWEEN

AS BUILT

#	REVISION DESCRIPTION	DATE	BY
1	ISSUED AS-BUILT	SEP 12/19	JOC

GEM STEEL

9060 - 24 Street
Edmonton, Alberta
Canada T6P1X8
Ph. (780) 449-0000
Fax. (780) 449-0001

TANK ID 53-TK-01 - Goose Site
TANK ID 73-TK-01 - MLA Site 2019

ENGINEER:

TITLE: SHELL WELD MAP & RADIOGRAPH TEST MAP

PROJECT: **Tanks 1 & 2, 110' Ø x 40' High Diesel Fuel Storage Tanks**

CLIENT: **Sabina Gold and Silver Corp.**
Back River Project, Bathhurst Inlet, Nunavut

CHK'D BY:	DATE:	CADFILE:
B.K.G.	Aug 2019	7
DRAWN BY:	APP'D BY:	SCALE:
J.O.C.	-	N.T.S.
DRAWING #		REVISION #
SAB110-2018-7		1