Design Report For Dike D-CP5

Meliadine Gold Project, NU

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EXECUTIVE SUMMARY

Agnico Eagle Mines Limited (Agnico Eagle) is developing the Meliadine Gold Project (the project). The mine is located approximately 25 km north from Rankin Inlet, and 80 km southwest from Chesterfield Inlet in the Kivalliq Region of Nunavut. A new Type “A” Water Licence (No. 2AM-MEL1631) was recently awarded to Agnico Eagle for the development of the project. Agnico Eagle is developing the mine towards proposed production in 2020.

Agnico Eagle retained Tetra Tech EBA Inc. (Tetra Tech EBA) to conduct a detailed design of the water management infrastructures for the project. Several water retention dikes are required to manage the site contact water during pre-production, operation, and interim mine closure. Dike D-CP5 (D-CP5) is one of the water retention dikes and is required to be constructed before the spring freshet of 2017. This report presents the site conditions, design basis and considerations, engineering analyses, and construction drawings for the detail design of D-CP5.

The proposed D-CP5 dike will be located across the south portion of the existing shallow lake (A54) and the dike will be approximately 300 m long with a maximum dike height of 3.1 m. It is planned that Lake A54 will be dewatered in September 2016 for construction of D-CP5. After D-CP5 is constructed, the north portion of the former A54 will become a contact water collection pond, named CP5. The contact water will be temporarily collected in CP5 and pumped to the final water collection pond CP1, from where the water will be pumped to a water treatment plant for treatment and discharge.

An open pit (Tiri_1000_02) is proposed to be developed in Year 4 (2023), which is downstream of the proposed D-CP5.

Permafrost is anticipated beneath the footprint of the proposed D-CP5. Seepage control measures adopted for D-CP5 include using a geomembrane liner keyed into competent frozen ground (saturated inorganic permafrost) or bedrock. The design intent is to protect the original permafrost foundation beneath the liner in the key trench from thawing, thus limiting seepage through the dike and maintaining the integrity of its foundation.

Thermal, stability, and seepage analyses were conducted to evaluate the design concept and support the design.

The natural local depression (the south portion of the former Lake A54) downstream of D-CP5 will serve as a downstream sump to collect any seepage and runoff water from D-CP5. The collected water in the sump will be pumped back to CP5 on an as-need basis to regularly empty the sump.

Geotechnical instrumentation is proposed in the design of D-CP5 to monitor the dike performance during construction and operation of the dike. The instrumentation includes horizontal and vertical ground temperature cables, and settlement survey monitoring points.

Drawings for construction of D-CP5 are included in an appendix.

TABLE OF CONTENTS

FIGURES

TABLES

APPENDICES

ACRONYMS & ABBREVIATIONS

Acronyms/Abbreviations	Definition
AEP	Annual Exceedance Probability
CP	Collection Pond
IDF	Inflow Design Flood
km	Kilometres
mg/L	Milligrams per Litre
ML	Metal Leaching
MMER	Metal Mining Effluent Regulations
NPAG	Non-Potentially Acid Generating
ppt	parts per thousand
PGA	Peak Ground Acceleration
QA/QC	Quality Assurance and Quality Control
3D	Three-dimensional
TSS	Total Suspended Solids
WTP	Water Treatment Plant

1.0 INTRODUCTION

Agnico Eagle Mines Limited (Agnico Eagle) is developing the Meliadine Gold Project (the project). The mine is located approximately 25 km north from Rankin Inlet, Nunavut. Situated on the western shore of Hudson Bay, the proposed project site is located on the peninsula between the east, south, and west basins of Meliadine Lake (63°01'23.8"N, 92°13'6.42"W). A general location plan for the project is shown in Figure 1.

The current project focuses on the development of the Tiriganiaq gold deposit which will be mined using conventional open-pit and underground mining operations. Proposed site facilities will include: plant site and accommodation complex buildings, ore stockpiles, waste rock storage facilities, a dry stack tailings storage facility, and water management systems including collection ponds, water retention dikes, water diversion berms, channels, culverts, a water treatment plant (WTP), and many pipelines.

A new Type “A” Water Licence (No. 2AM-MEL1631) was recently awarded to Agnico Eagle for the development of the project. Agnico Eagle is now developing the mine towards proposed production in 2020.

Agnico Eagle retained Tetra Tech EBA Inc. (Tetra Tech EBA) to undertake the following tasks associated with Dike D-CP5 (D-CP5):

- Conduct the detailed design of D-CP5 to produce construction drawings; and
- Prepare the design report for D-CP5, in accordance with the requirements in Part D of the Type “A” Water License (No. 2AM-MEL1631).

The proposed D-CP5 dike will be located across the south portion of the existing shallow lake (A54 South) and the dike will be approximately 300 m long with a maximum dike height of 3.1 m.

This report summarizes the site conditions, design basis, considerations, criteria, analyses, and evaluations and presents the detailed design of D-CP5. In addition, construction drawings for D-CP5 are also presented.

2.0 GENERAL SITE CONDITIONS

2.1 Climate and Meteorology

The project site lies within the Southern Arctic Climatic Region where daylight reaches a minimum of 4 hours per day in winter and a maximum of 20 hours per day in summer. The nearest weather station is Rankin Inlet A (Station 2303401), located approximately 25 km south of the project site. The closest long-term regional evaporation station operated by Environment Canada is in Churchill, Manitoba.

The monthly mean air temperature is typically above 0°C for the months of June to September, and is below 0°C between October and May. July is typically the warmest month and January the coldest. Winters are typically long and cold, while summers are short and cool. Spring and autumn are short. The mean annual temperature for the period of record from 1981 to 2009 was -10.4°C.

The annual average total precipitation at the project site is 405 mm/year and falls almost equally as snow and rainfall (Golder, 2013a). Average annual evaporation for small waterbodies in the project area is estimated to be 323 mm between June and September. The average annual loss of snowpack to sublimation and snow redistribution is estimated to vary between 46% and 52% of the total precipitation for the winter period and occurs between October and May (Golder, 2013a).

Table 2.1 presents the estimated mean monthly precipitation, evaporation, and temperature characteristics of the site (Agnico Eagle, 2015).

Table 2.1: Estimated Mine Site Mean Monthly Climate Characteristics (Agnico Eagle, 2015)

Month	Monthly Air Temperature (°C)			Mean Monthly Precipitation (mm)			Lake Evaporation (mm)
	Minimum	Average	Maximum	Rainfall	Snowfall	Total	
January	-37.2	-30.9	-19.8	0.0	12.9	11.1	0
February	-35.3	-30.1	-24	0.0	13.1	11.1	0
March	-30.8	-25.1	-18.8	0.0	18.6	16.1	0
April	-20.2	-15.7	-10.4	1.4	28.8	26.4	0
May	-10.8	-5.9	-1.2	7.7	19.2	25.2	0
June	0.1	4.1	6.7	26.4	7.1	37.0	60.4
July	6.9	10.5	14.9	43.7	0.2	51.2	124.4
August	7.7	9.7	11.2	63.7	0.3	74.6	95.6
September	1.3	3.8	6.8	45.2	5.7	57.8	42.7
October	-9.9	-4.6	1.7	15.5	36.9	50.0	0
November	-23.6	-17.2	-10.2	0.3	33.3	28.5	0
December	-33.3	-25.9	-19.4	0.0	18.9	15.8	0
Annual	**-37.2**	**-10.4**	**14.9**	**203.9**	**195.0**	**404.8**	**323.1**

The region is known for high winds, which are due in part to the broad, flat, uninterrupted expanses offered to moving air masses. The wind blows from the north and north-northwest direction more than 30% of the time. The mean values for wind speed show that the north-northwest, together with north and northwest winds, have the highest speeds and tend to be the strongest. Mean monthly wind speeds are typically between 19 km/hour and 27 km/hour.

The climate in the project region is projected to be warmer for the 2020s, 2050s, and 2080s time horizons when compared to the observed historic values (Agnico Eagle and Golder, 2014). Precipitation shows an increase compared to historical values, but the majority of projections are not significantly different from the annual recorded precipitation values.

2.2 Topography and Lakes

The dominant terrain in the project area comprises glacial landforms such as drumlins (glacial till), eskers (gravel and sand), and lakes. A series of low relief ridges are composed of glacial deposits, oriented in a northwest-southeast direction, which control the regional surface drainage patterns. The property is about 60 metres above sea level (masl) in low-lying topography with numerous lakes. Surface waters are usually frozen by early October and remain frozen until early June.

The surveyed lake surface elevations in the project area range from about 51 masl at Meliadine Lake to about 74 masl for local small perched lakes. Lakes formed by glaciofluvial processes or glacial processes, are common throughout the project area. Most of the perched lakes at the project site are relatively shallow (less than 2 m water depth). Late-winter ice thicknesses on freshwater lakes in the project area range between 1.0 m and 2.3 m with an average thickness of 1.7 m. Ice cover usually appears by the end of October and is completely formed in early November. The spring freshet typically begins in mid-June and is complete by early July (Golder, 2012a).

2.3 Permafrost

The project site is located within the Southern Arctic terrestrial eco-zone, one of the coldest and driest regions of Canada, in a zone of continuous permafrost. Continuous permafrost to depths of between 360 m to 495 m is expected based on historical and recent ground temperature data from thermistors installed near Tiriganiaq, F-Zone, and Discovery deposits (Golder, 2012b). The measured ground temperature data indicates that the active layer is 1.0 m to 3.0 m in areas of shallow soils and areas away from the influence of lakes. It is anticipated that the active layer adjacent to lakes or below a body of moving water such as a stream could be deeper. The typical permafrost ground temperatures at the depths of zero annual amplitude (typically at a depth of below 15 m) are in the range of -5.0°C to -7.5°C in the areas away from lakes and streams. The geothermal gradient ranges from 0.012C°/m to 0.02C°/m (Golder, 2012b).

2.4 Groundwater

In areas of continuous permafrost, there are generally two groundwater flow regimes: a shallow groundwater flow regime located in the active layer near the ground surface, and a deep groundwater flow regime located beneath permafrost. From late spring to early autumn, when temperatures are above 0˚C, the active layer thaws. Within the active layer, the water table is expected to be a subdued replica of topography, and is expected to parallel the topographic surface. The project area groundwater in the active layer flows to local depressions and ponds that drain to larger lakes.

The permafrost in the rock in the project area would be virtually impermeable to groundwater flow. The shallow groundwater flow regime, therefore, has little to no hydraulic connection with the deep groundwater regime. A numerical hydrogeological model for the deep groundwater flow regime was developed (Golder, 2013b). The results of the hydrogeological model have indicated that the rock at the project site below the base of the permafrost or in taliks is generally of low hydraulic conductivity, on the order of 3 x 10^{-9} m/s (Golder, 2013c).

To a lesser degree, groundwater beneath the permafrost is influenced by density differences due to the upward diffusion of deep-seated brines (density-driven flow). In the Canadian Shield, concentrations of Total Dissolved Solids (TDS) in groundwater increase with depth, primarily in response to upward diffusion of deep-seated brines. Salinity can induce a freezing point depression, creating a cryopeg in permafrost where water can be unfrozen even though the temperature is below 0°C. At the project site, the freezing point depression was calculated to be equivalent to -3.3°C (Golder, 2012b). The portion of the permafrost, where groundwater may be partially or wholly unfrozen due to the freezing point depression, has been estimated to be at a depth of 350 m to 375 m (Golder, 2012b).

2.5 Subsurface Conditions

A number of site investigation programs were carried out at the project site in 1998, 1999, 2007, 2009, 2011, 2012, 2013, 2014, 2015, and 2016.

In general, the near surface stratigraphy comprises a veneer of organic material, underlain by non-cohesive soils (i.e. silty sand and sandy silt) with cobbles and boulders. The overburden thickness ranges between 1.5 m and 17.8 m and is underlain by greywacke, medium to strong with some fracturing and frost jacking of the upper bedrock surface. A layer of ice-rich overburden (silt or sand) has been observed in some of the drilled boreholes. Overburden soils with excess ice (Vc, Vs, Vx, and Vr) were observed in most of the boreholes. Massive icy beds up to 1.25 m thick were also encountered. The estimated percentage (by volume) of the excess visible ice ranged from 2% to more than 50% in the overburden soils. Limited soil porewater salinity tests (EBA, 2013) indicated that the overburden soils may have a porewater salinity of up to 4 parts per thousand (ppt) for shallow sandy soils, up to 7 ppt for shallow silty soils, and up to 12 ppt for deep silty soils.

2.6 Seismic Zone

The project site is situated in an area of low seismic risk. The peak ground acceleration (PGA) for the area was estimated from the 2015 National Building Code of Canada seismic hazard website (http://earthquakesscanada.nrcan.gc.ca). The estimated PGA is 0.022 g for a 5% in 50-year probability of exceedance (0.001 per annum or 1 in 1,000 year return) and 0.037 g for a 2% in 50-year probability of exceedance (0.000404 per annum or 1 in 2,475 year return) for the area.

2.7 Other Relevant Data

The raw land survey data, a 1-m contour digital map of the ground surface and 0.5 m contour lake bathymetric data for selected lakes at the project site were provided to Tetra Tech EBA by Agnico Eagle. Survey data for selected areas were recently provided to Tetra Tech EBA and were incorporated into the original digital map for the design in this Project.

3.0 DESIGN BASIS

3.1 CP5 Operation Plan

The water management plan for the project was presented to Agnico Eagle in 2015 (Agnico Eagle, 2015). Figure 2 presents a layout plan of the current site. Figure 3 presents a site layout plan during future mine operation (Year 7). A water collection pond, named CP5, will be formed after the construction of D-CP5. A brief summary of the CP5 operation plan is presented as follows:

- CP5 will serve as a seasonal water transfer and management pond with a limited water storage capacity. A water pumping system will be installed in CP5 to manage the CP5 water.
- The water collected in CP5 will be actively pumped to CP1 (the main site water collection pond) during the open water season each year so that the CP5 pond will be nearly empty most of the time, except for several early days (up to 3 days) during the annual spring freshet for preparing the pump system or during an extreme rainfall event.
- The design minimum operating water pumping rate for the CP5 pumping station is 16,700 m^3/day from Year -3 (2017) to Year 1 (2020) and 26,900 m^3/day in Year 2 (2021) and beyond, until the mine closure.
- CP5 will also serve as a water transfer pond to receive the contact water that is pumped from two proposed open pits (Tiri_1000_01 and Tiri_1000_02). However, the water from the two open pits will only be pumped to CP5 when the CP5 pumping station (pumping water from CP5 to CP1) is fully operable.
- Active open pits are normally kept dry most of the time except that short-term, temporary water ponding may occur early during the annual spring freshet while preparing the pump system or during extreme rainfall events.
- CP5 will become nearly empty (except for the remaining water left in the bottom of CP5 North upstream of the natural saddle that separates CP5 North and CP5 South) before the CP5 pumping station is shut down by the end of the water pumping season (around end of October) each year until closure of the mine.
- After final closure of the mine, water from the open pits will not be pumped to CP5. D-CP5 will be breached and not serve as a water retention dike after mine closure.

3.2 Lake Dewatering in 2016

A lake dewatering program will start in August 2016 to dewater Lakes H17 and H6 for construction of D-CP1. After dewatering of Lake H17, the water from Lake A54 will be pumped to dewatered lake H17 to facilitate construction of D-CP5. The pumping station in Lake A54 will remain in place in October to manage water during construction of D-CP5.

3.3 Precipitation, Surface Runoff, and Lake Surface Evaporation

Various parameters for surface runoff estimation for a mean precipitation year are presented in Table 3.1. Similar parameters for a wet precipitation year are presented in Table 3.2. The values in Tables 3.1 and 3.2 were adopted from the feasibility study (Tetra Tech EBA, 2014) and also presented in Appendix B of the Water Management Plan (Agnico Eagle, 2015). Some of the parameters in these tables were used in estimating the volumes of the runoff/run-on water from natural precipitation for water balance and management.

Table 3.1: Various Parameters for Surface Runoff Estimation for a Mean (1 in 2 return) Precipitation Year

Item	Value
Total adjusted annual precipitation for a mean precipitation year	412 mm
Total adjusted annual rainfall for a mean precipitation year	210 mm
Total adjusted annual water equivalent snowfall for a mean precipitation year	202 mm
Total estimated snow sublimation	99 mm
Estimated snow melt water equivalent in spring freshet	103 mm
Monthly rainfall distribution	16% in June, 21.2% in July 30.8% in August, 24.5% in September 7.5% in October
Annual net runoff on natural on-land surface for a mean precipitation year	215 mm (127 mm in June, 22 mm in July, 32 mm in August, 26 mm in September, and 8 mm in October)
Estimated monthly lake (non-saline water) surface evaporation	60 mm in June, 125 mm in July 96 mm in August, 42 mm in September
Annual net runoff on lake surface for a mean precipitation year	-10 mm (76 mm in June, -80 mm in July, -31 mm in August, 9 mm in September, and 16 mm in October)
Estimated monthly natural land surface evapotranspiration	6 mm in June, 14 mm in July 11 mm in August, 5 mm in September
Annual net runoff on disturbed land surface for a mean precipitation year	251 mm (133 mm in June, 36 mm in July, 43 mm in August, 31 mm in September, and 8 mm in October)

Table 3.2: Various Parameters for Surface Runoff Estimation for a 1 in 100 Return Extreme Wet Year and Extreme Rainfall

Item	Value
Total adjusted annual precipitation for a 1 in 100 wet precipitation year	594 mm
Total adjusted annual rainfall for a 1 in 100 wet precipitation year	324 mm
Total adjusted annual water equivalent snowfall for a 1 in 100 wet precipitation year	270 mm
Total estimated snow sublimation	99 mm
Estimated snow melt water equivalent in spring freshet for a 1 in 100 wet precipitation year	171 mm
Monthly rainfall distribution	16% in June, 21.2% in July 30.8% in August, 24.5% in September 7.5% in October
Annual net runoff on natural on-land surface for a 1 in 100 wet precipitation year	430 mm (213 mm in June, 55 mm in July, 80 mm in August, 63 mm in September, and 19 mm in October)
Estimated monthly lake surface (non-saline water) evaporation	60 mm in June, 125 mm in July 96 mm in August, 42 mm in September
Annual net runoff on lake surface for a 1 in 100 wet precipitation year	172 mm (163 mm in June, -56 mm in July, 4 mm in August, 37 mm in September, and 24 mm in October)
Estimated monthly natural land surface evapotranspiration	6 mm in June, 14 mm in July 11 mm in August, 5 mm in September
Annual net runoff on disturbed land surface for a 1 in 100 wet precipitation year	466 mm (219 mm in June, 69 mm in July, 91 mm in August, 68 mm in September, and 19 mm in October)
24-hour duration extreme rainfall with a 1 in 100 years of return period	65 mm
24-hour duration extreme rainfall with a 1 in 1000 years of return period	77 mm
24-hour duration PMP (probable maximum precipitation)	259 mm
Runoff coefficient for extreme rainfall	1.0

3.4 Geotechnical Conditions in D-CP5 Area

A total of three boreholes were drilled near the proposed footprint of D-CP5 during a site investigation in early 2016 (Tetra Tech EBA, 2016). The locations of boreholes are presented on Drawing 65-685-230-214 in Appendix A. The measured ground temperatures from two single-bead ground temperature cables on April 30, 2016 were about -11.5°C at a depth of 1.3 m below the A54 lakebed overlain by a lake ice layer of 0.4 m and about -2.9°C at a depth of 0.9 m below the A54 lakebed overlain by a lake ice layer of 1.1 m. Table 3.3 summarizes the overall overburden and bedrock conditions for the boreholes drilled in the proposed D-CP5 area. Drawing 65-685-230-216 in Appendix A presents the ground profiles through the three boreholes.

Table 3.3: Overburden and Bedrock Conditions for D-CP5 Area

Borehole No.	Lake Ice Thickness (m)	Organic Layer Thickness (m)	Major Overburden Soil Types	Ice Conditions	Depth to Bedrock from Top of Lakebed (m)	Bedrock Conditions
BH16-09	0.45	0.00	Cobble (fines washed away); Sandy Silt; Gravel (fines washed away)	Up to Vx 30%	1.65	Fresh to slightly weathered; Competent rock
BH16-10	1.10	0.00	Sandy Silt	No ground ice observed due to poor recovery	1.40	Slightly weathered; Competent rock
BH16-11	0.80	0.00	Silty Sand; Gravel (fines washed away)	No ground ice observed due to poor recovery	3.50	Slightly weathered; Competent rock

3.5 Geochemical Characteristics of Overburden and Rock

A baseline geochemical characterization program for the project was initiated in 2008 and consisted of static and kinetic testing methods to assess the chemical composition of the mine waste and overburden, its potential to generate acid rock drainage and its potential for metal leaching (ML) upon exposure to ambient conditions.

Golder (2012c) documented the waste geochemical characterization programs carried out from 1998 to 2011 for the project. The key findings included the following:

- The waste rock from the Tiriganiaq deposit area is considered to be non-potentially acid generating (NPAG) and has a low potential for ML. Kinetic tests at various scales indicate that drainage water quality will meet Metal Mining Effluent Regulations (MMER) monthly mean effluent limits.
- The overburden at the site will be NPAG, and that leachate concentrations are generally lower than waste rock and will meet MMER monthly mean effluent limits. Waste rock and overburden have compatible geochemical characteristics such that these materials can be managed together in the same disposal facilities.

Therefore, the waste rock from the mine development, fill materials sourced from the rock, and overburden materials will be NPAG and have low potential of ML.

3.6 Construction Materials

Based on previous preliminary design of D-CP5 and discussions with Agnico Eagle's internal technical team and the external reviewers retained by Agnico Eagle, the construction materials for D-CP5 include the following:

- The waste rock from underground development;
- The rock to be excavated from the proposed saline water storage pond during its construction in August and September 2016;
- Rockfill or esker sand;
- Geomembrane liner; and

- Bentonite powder for soil mixing.

During the design review process both Agnico Eagle's internal technical team and the external reviewers retained by Agnico Eagle recommended the use of Coletanche ES2 as the liner material for D-CP5, based on their past positive experience with the Coletanche geomembrane liner.

3.7 Construction and Operation Schedules

The following construction and operation schedules were assumed for the design of D-CP5:

- Construction
  - Start lake dewatering of A54 in late September to early October 2016;
  - Start the key trench excavation for D-CP5 in October 2016;
  - Complete key trench backfill by November 2016; and
  - Complete the remaining construction of D-CP5 by May 2017 before spring freshet of 2017.
- Operation
  - Start operation of the CP5 pond after D-CP5 is completed;
  - Pump the water collected in CP5 to CP1 and the pond will be nearly empty most of the time, except for several early days during the annual spring freshet while preparing the pump system or during extreme rainfall events; and
  - CP5 will become nearly empty (except for the remaining water left in the bottom of CP5 North upstream of the natural saddle that separates CP5 North and CP5 South) before the CP5 pumping station is shut down by the end of water pumping season (around end of October) each year until closure of the mine.
- Closure and Post-Closure
  - D-CP5 will be breached and not serve as a water retention dike after mine closure.

3.8 Water Storage Curve for CP5

The stage-storage capacity and water surface area with elevations for CP5 (after D-CP5 is constructed) are presented in Table 3.4. The capacity and water surface area values do not include the capacity/area to be occupied by the saline water storage pond that will be constructed in August and September 2016.

Table 3.4: Stage-Storage Capacity and Pond Surface Area with Elevations for CP5

Pond Elevation (m)	Pond Storage Volume (m^3)	Pond Surface Area (m^2)
66.8	97,997	91,152
66.6	80,315	85,630
66.4	63,755	80,009
66.2	48,304	54,510
66.0	33,984	54,510

Table 3.4: Stage-Storage Capacity and Pond Surface Area with Elevations for CP5

Pond Elevation (m)	Pond Storage Volume (m^3)	Pond Surface Area (m^2)
65.8	24,164	44,158
65.6	16,440	33,827
65.4	10,514	25,631
65.2	6,218	16,992
65.0	3,347	11,905
64.8	1,384	7,901
64.6	403	3,337
64.45	0	0

3.9 Catchment Areas

Table 3.5 presents the catchment areas for various facilities associated with CP5 for water management. Most of the catchment areas remain unchanged during mine operation while the CP5 catchment area changes with time and mine development.

Table 3.5: Catchment Areas for CP5 and Facilities Associated with CP5

Facility	Planned Schedule of Start Operation	Catchment Area (m^2)
P1/P2/P3 Containment Areas including Portal No1	May 2016	225,518
A54 before Construction of Saline Water Storage Pond/Berm and D-CP5 (not including P1/P2/P3 Containment Areas and Portal No1)	May 2016	239,787
Saline Water Storage Pond/Berm	October 2016	13,076
CP5 after D-CP5 is constructed in 2017 (not including P1/P2/P3 Containment Areas, Portal No1, Saline Water Storage Pond/Berm) but before Construction of Channel5 and Berm3	June 2017	140,568
CP5 after Channel5 and Berm3 are constructed in late 2017 or early 2018 (not including P1/P2/P3 Containment Areas, Portal No1, Saline Water Storage Pond/Berm) but before Mine Waste is Placed in WRSF1	June 2018	371,917
CP5 after Channel5 and Berm3 are Constructed (including P1/P2/P3 Containment Areas and Portal No1) but before Mine Waste is Placed in WRSF1	After the P1/P2/P3 water is allowed to flow into CP5	597,435
CP5 after Channel5 and Berm3 are Constructed and after Mine Waste is Placed in WRSF1 and WRSF2 (including P2/P3 Containment Areas and Portal No1)	After the P2/P3 water is allowed to flow into CP5	479,384

4.0 DESIGN OF D-CP5

4.1 Design Objectives

The water retention dike design criteria were adopted to meet the following objectives:

- Comply with the Canadian Dam Safety Guidelines (CDA, 2007 with 2013 revision);
- Minimize seepage through the dike while optimizing construction efficiency;
- Maximize the use of available construction materials at the site;
- Utilize permafrost as an effective seepage barrier; and
- Meet other applicable regulation, codes, guidelines, and standards.

4.2 Dike Classification and Consequence of Failure

Since the maximum design height (approximately 2.4 m) of the D-CP5 liner above the lowest natural lakebed of A54/CP5 along the proposed D-CP5 is less than 2.5 m, D-CP5 is not necessarily classified as a "Dam" based on its definition in CAD (2007). However, we have conservatively classified D-CP5 as a dam and followed CAD (2007). CDA (2007) provides recommendations and directions for dam/dike classification based on the consequences of failure. The consequences of dam/dike failure are evaluated in terms of loss of life, environmental and cultural values, and infrastructure and economics. The dike classification for D-CP5 is determined to be "Significant" due to the following consequences of failure:

- Loss of Life: Potentially flooding the open pit Tiri_1000_02 during the active pit development period from Years 4 (2023) to 7 (2026) but the consequence is relatively low due to a relatively small volume of contact water collected in the CP5 pond; low risk of loss of life for workers that temporarily work in the active pit downstream of D-CP5;
- Economic/Social Losses: This dike only; no temporary or permanent infrastructures downstream of D-CP5; and
- Environmental/Cultural Losses: Potential of temporary deterioration of fish habitat in Lake A8 in case of release of a relatively small volume of the contact water collected in the CP5 pond before the open pit Tiri_1000_02 is developed; any water from CP5 after the pit Tiri_1000_02 is developed in Year 4 (2023) will be collected in the pit.

4.3 Inflow Design Flood and Earthquake Levels

Extreme wet year spring freshet from snow-melt or high-intensity short-term rainfall events are normally critical to the design of a dike with a limited short-term discharge capability, which is the case for CP5 and D-CP5. The resulting water level rise in the pond from a short-term flood event tends to be greater than that under a longer precipitation event. The longer event allows time for excess water to be pumped from CP5 to CP1 from where the water is treated and discharged.

The inflow design flood (IDF) for a given classification is suggested in CDA (2007). Based on a classification of "Significant", the annual exceedance probability (AEP) of between 1/100 and 1/1,000 is recommended in CDA (2007). For the design of D-CP5, it has been assumed that no water would flow or be pumped out from the CP5 pond during the first three days of the assumed seven-day spring freshet or during an extreme rainfall event. The IDF adopted for D-CP5 meets the most critical of the following cases:

- 3/7 of the equivalent unit runoff during spring freshet for a 1 in 100 return wet year; or
- One 1 in 1,000 return 24-hour extreme rainfall event.

Table 4.1 summarizes the IDF values for D-CP5 and an adopted design IDF value of the equivalent unit runoff of 77 mm.

Table 4.1: Value for IDF Adopted for D-CP5 Design

Dike	Cases of IDF Considered	Value for IDF (mm)
D-CP5	3/7 of equivalent unit runoff during spring freshet for 1 in 100 return wet year	73.3
	Equivalent unit area runoff for one 1 in 1,000 return 24-hour extreme rainfall	**77**

For a structure with a "Significant" classification, CAD (2007) suggested that the AEP for the design earthquake is 1/1,000. In this study, since the site is located in a low seismic zone and the seismic loading is not a controlling factor, a conservative AEP value of 1/2,475 was adopted for seismic loading in stability evaluations. The estimated PGA is 0.037 g for a 1 in 2,475 year return for the site area.

4.4 Design Criteria for Water Containment Element

The top elevation of the water containment element (e.g., geomembrane liner) for D-CP5 has been selected to have a minimum freeboard that meets or exceeds that required by CDA (2007). The top elevation of the dike water containment element has been designed to be higher than the maximum pond operating water level during the IDF plus wind set-up plus settlement due to consolidation of foundation and embankment materials after construction. The projected water elevations, minimum freeboard, and adopted design crest elevation of the water containment element are presented below:

- Estimated maximum water elevation during IDF: 66.3 m;
- Minimum freeboard (wind set-up and potential settlement after construction) required by CDA (2007): 0.2 m;
- Required minimum water containment element elevation of D-CP5: 66.5 m; and
- Adopted design crest elevation of water containment element (liner system) of D-CP5: 66.8 m.

4.5 Design Criteria for Crest Elevation

The top elevation of the dike crest has been designed to be higher than the maximum pond operating water level during the IDF plus wind set-up plus wave run-up plus settlement due to consolidation of foundation and embankment materials after dike construction. These design criteria meet the requirements suggested in CDA (2007). The projected water elevation, minimum freeboard, and adopted design elevation against overtopping for D-CP5 are summarized below:

- Estimated maximum water elevation during IDF: 66.3 m;
- Minimum freeboard (wind set-up, wave run-up, and potential settlement after construction) required by CDA (2007): 0.8 m;

- Required minimum dike crest elevation against overtopping of D-CP5: 67.1 m; and
- Adopted design dike crest elevation against overtopping: 67.8 m.

Other considerations, such as thermal cover to protect the dike's permafrost foundation, have been taken into account in determining the top elevation of the dike crest elevation. In the dike abutments, the dike crest elevations are higher due to the thermal protection required.

4.6 Design Concept, Typical Section, and Key Parameters

Permafrost is anticipated beneath the footprint of the proposed D-CP5. Seepage control measures adopted for D-CP5 include using a geomembrane liner keyed into competent frozen ground (saturated inorganic permafrost) or bedrock. The design intent is to protect the original permafrost foundation beneath the liner in the key trench from thawing and to limit seepage through the dike and its foundation.

The key design parameters for D-CP5 are summarized below:

- Design crest elevation of water containment element (liner system): 66.8 m;
- Design crest elevation against overtopping: 67.8 m;
- Design maximum operating water elevation by end of October each year: 65.2 m (approximately elevation of the natural saddle that separates CP5 North and CP5 South) in CP5 North and 64.5 m (near empty) in CP5 South;
- Design maximum operating water elevation before and after each spring freshet: 64.8 m (in CP5 South);
- Design maximum water elevation under IDF: 66.3 m;
- Estimated maximum pond operating water elevation during mean spring freshet (assumed to store 3/7 of mean spring freshet water): 66.0 m;
- Total dike length including thermal cover at abutments: approximately 300 m;
- Maximum dike height: 3.1 m;
- Maximum liner height above the existing lakebed: 2.4 m and;
- Maximum water head under IDF: 1.9 m.

The drawings for construction of D-CP5 are presented in Appendix A.

4.7 CP5 Storage Capacity with Construction of D-CP5

Table 4.2 summarizes the key information and design parameters for CP5.

Table 4.2: Key Information and Design Parameters for CP5

Pond Operation Condition	CP5 South Pond Elevation (m)	Water Volume in CP5 Pond (Both CP5 South and North) (m^3)
Maximum Operating Water Elevation by End of October Each Year	64.5	2,550
Design Maximum Operating Water Elevation before and after Each Spring Freshet	64.8	3,800
Estimated Maximum Pond Operating Water Elevation under Normal Operating Conditions and Mean Precipitation Years (m)	66.0	34,000
Estimated Maximum Water Elevation during IDF (m)	66.3	56,030
Design Effective Crest Elevation of Dike Containment Element (liner system) after Assumed Post-construction Settlement (m)	66.6	80,320

4.8 Thermal Analyses

Permafrost is expected to exist beneath the footprint of D-CP5. The design intent is to maintain the original permafrost foundation beneath the liner in the key trench in a frozen condition over the life of the dike.

Thermal analyses for D-CP5 were conducted to assist in the thermal design of D-CP5. The thermal analyses simulated the dike construction and operation conditions and considered the effects of water ponding and various climatic conditions including potential extreme warm years on the thermal performance of the dike.

The thermal analyses were conducted for the typical section and abutment section of D-CP5. The thermal analysis results indicate the following:

- The ground temperatures beneath the key trench are the warmest after first water impoundment and tend to get colder with time after the first water impoundment under mean climatic conditions.
- Under the mean climatic and normal operation conditions, the predicted ground temperatures along the liner at the bottom of the key trench are colder than -1.2°C during first water impoundment and colder than -1.5°C after the first year of operation.
- Under an extreme (1 in 100 return) warm year, the predicted ground temperatures along the liner at the bottom of the key trench are colder than -1.2°C.
- Under the mean climatic and normal operation conditions, the predicted ground temperatures along the liner at the bottom of the key trench range from -4.0°C to -7.0°C during the assumed water impoundment period (June to July).
- Under an extreme (1 in 100 return) warm year, the predicted ground temperatures along the liner at the bottom of the key trench range from -3.5°C to -6.0°C during the assumed water impoundment period (June to July).

The findings from the thermal analyses suggest that the design intent can be met for both the typical section and the abutment section of D-CP5.

4.9 Stability Analyses

A series of slope stability analyses were carried out to evaluate the stability of the typical design section of D-CP5. The analyses involved several scenarios including short-term construction, long-term (after construction), and other sensitivity cases. Both static and seismic loading conditions were evaluated.

The minimum design factors of safety adopted for D-CP5 are presented in Table 4.3. The factors meet or exceed the minimum factors suggested in CAD (2007, 2013 Edition).

Table 4.3: Design Minimum Factors of Safety for D-CP5

Loading Conditions	Minimum Factor of Safety	Slope
Static loading, short-term, end of construction before reservoir filling	1.3	Upstream and Downstream
Static loading, long-term, normal operating	1.5	Upstream and Downstream
Seismic loading (pseudo-static), long-term, normal operating	1.1	Upstream and Downstream

The stability analysis results indicate that all of the calculated minimum factors of safety for D-CP5 exceed the adopted minimum factors of safety.

4.10 Seepage Evaluations

The design intent of D-CP5 is to protect the original permafrost foundation below the key trench from thawing and limit the seepage through the liner system and its foundation. The seepage control measures adopted for D-CP5 include a geomembrane liner that is keyed into competent frozen ground or bedrock. If suitably investigated, designed, and constructed, an ice-saturated permafrost foundation will provide a nearly impervious barrier to seepage through the dike foundation.

Potential leakage through the geomembrane liner, in the event of damage including small holes in parts of the liner, was estimated based on some literature publications. The leakage rate through the liner will depend on how many holes exist in the liner, damaged area per hole, water head, and bedding material hydraulic conductivities. Based on typical ranges of these parameters assumed, the calculated potential leakage rate through the liner system in D-CP5 ranges from 1 m^3/day to 10 m^3/day.

Two seepage sensitivity analyses were conducted to estimate potential seepage rates through the dike foundation for an upset scenario if a 0.5 m thick layer of the permafrost soils beneath the bottom of the key trench is assumed to be thawed. The seepage rates will depend on the water level in CP5 and hydraulic conductivity values assumed for various materials. From the sensitivity analysis conducted using reasonably typical hydraulic conductivity values for thawed foundation soils, the estimated seepage rates through the dike foundation range from 0.1 m^3/day to 0.7 m^3/day. For the sensitivity analysis that assumed high limits of hydraulic conductivity values for thawed foundation soils, the estimated seepage rates through the dike foundation range from 3 m^3/day to 17 m^3/day.

The natural local depression (the south portion of the former Lake A54) in the downstream of D-CP5 will serve as a downstream sump to collect any seepage and runoff water from D-CP5. The collected water that does not meet the direct discharge criteria will be pumped back to CP5.

4.11 Deformation Considerations

The majority of potential deformations of the rockfill used for D-CP5 construction are expected to occur during the construction stage. Small deformation (mainly settlement) may occur when the upper rockfill is first thawed during the summer following construction (summer thaw depth of around 2.5 m to 3 m). The current design has considered a potential settlement of approximately 0.1 m in the dike central area close to the crest of the liner.

The intent of the current design is to maintain the original permafrost below the liner system along the key trench in a frozen condition. This is supported by the thermal analysis results. For this reason, thaw-induced ground deformation below the liner system in the key trench is not expected.

It is expected that some thaw-induced ground settlement may occur in the upstream area away from the key trench when some of the original overburden permafrost is thawed in summer when water is stored in CP5. It is expected that the settlement will not have detrimental effects on the critical area around the liner system located in the dike's central zone. Maintenance (placing additional fill) during dike operation may be required to level off any settlement and maintain the design elevations. Similarly, it is expected that localized thaw-induced ground deformation may occur in the area close to the toe of the D-CP5 downstream slope. This is acceptable and will not have detrimental effects on the critical central area around the liner system.

Ice-rich foundation soils were encountered during site investigations. Limited creep-induced deformations may occur at these locations. The dike design has adopted wide dike crests to limit the potential deformations within the critical areas around the liner system. Considering the design concept and low dike heights, the consequence of the potential creep-induced deformation of the dike is low.

4.12 Downstream Water Collection Sump

The natural local depression (the south portion of the former Lake A54) downstream of D-CP5 will serve as a downstream sump to collect any seepage and runoff water from D-CP5. The storage capacities of the natural sump are summarized in Table 4.4.

Table 4.4: D-CP5 Downstream Sump Storage Capacity

Conditions	Water Elevation (m)	D-CP5 Downstream Sump Storage Capacity (m^3)
Maximum Water Elevation before Overflowing Downstream (before development of Tiri_1000_02 open pit)	65.75	8,060
Maximum Operating Water Elevation with 0.3 m Freeboard (before development of Tiri_1000_02 open pit)	65.45	5,225

After the development of Open Pit Tiri_1000_02, a portion of the sump (on the south rim) will be excavated. In addition, during the development of the pit Tiri_1000_02, a haul road will be constructed immediately downstream of D-CP5 to facilitate hauling the waste rock from the pit Tiri_1000_02 to the Waste Rock Storage Facility 3 (WRSF3). This haul road will pass through the sump area and occupy some of the sump water storage capacity. Therefore, the water storage capacity of the sump will be greatly reduced once the road is constructed. As a result, the potential seepage water from D-CP5 may flow into the pit Tiri_1000_02, from where the water will be pumped back to CP5.

4.13 Instrumentation

Instrumentation is proposed in the design of D-CP5 and includes the following:

- Two horizontal ground temperature cables to be installed in the dike key trench immediately above the bottom liner to monitor the ground temperatures in the key trench area;
- One vertical ground temperature cable to be installed through the dike, downstream of the liner system and key trench, to monitor temperatures in the downstream portion of the dike and its foundation;
- Two vertical ground temperature cables to be installed through the dike, upstream of the liner system and key trench, to monitor temperatures in the upstream portion of the dike and its foundation; and
- Three settlement survey monitoring points to be installed in the central area of the dike and located immediately above the liner crest to monitor any settlements of the liner crest.

The drawings for the dike instrumentation are presented in Appendix A.

5.0 CONSTRUCTION OF D-CP5

5.1 Construction Drawings

The construction drawings for D-CP5 are attached in Appendix A of this report.

5.2 Key Trench Excavation

The geomembrane liner for D-CP5 will be keyed into a trench in the dike foundation. The key trench must be excavated into ice-saturated (with a water saturation of above 90%), permanently frozen soil, or competent rock. The base of the excavation must have no natural or excavation related open voids or joints. It is currently planned that the key trench of D-CP5 will be excavated in mid-October 2016 when the natural active layer at the site is at its deepest. It is expected that the typical active layer thickness at the site ranges from 1.4 m to 1.8 m, which is the expected typical depth of the key trench excavation. The minimum design key trench depth is 1.4 m. Any thawed natural ground below the bottom of the key trench should be completely excavated before the key trench is backfilled.

Ice-rich soils were encountered in one of the three boreholes drilled in the D-CP5 area. Shallow holes can be drilled into the base of the key trench to take core samples and verify the soil conditions below the key trench. Ice-rich soils can be visually identified by a qualified geotechnical engineer and are normally defined to have excess pore water after the soils are thawed. If ice-rich soils are identified in the key trench bottom during key trench excavation, the ice-rich soils should be excavated out to a minimum depth of 1.0 m below the bottom of the liner. The lower portion of the over-excavated zone shall be backfilled with compacted, wet 0 to 20 mm granular soil or esker sand with a water saturation of nearly 90%. The remaining upper 0.5 m thick zone below the liner along the bottom of the key trench should be backfilled with the compacted, bentonite-augmented material (mixture of bentonite powder and 0 to 20 mm granular fill or esker sand).

Based on two of the three boreholes drilled in the D-CP5 area, the trench excavation will likely encounter bedrock. If shallow bedrock is encountered, rock excavation shall be conducted in a manner that avoids excessive fracturing of underlying rock. Final cleaning of the key trench must be conducted with hand excavation, brooms, and compressed air or other appropriate equipment such as rippers, jack hammers, etc. to remove all loose, broken, or altered material from the base of the key trench. Snow and ice must be removed from the key trench prior to fill placement. Bentonite-augmented material will be placed to fill in local depressions or open bedrock joints before a liner is keyed into the trench. If determined to be required by the Engineer, grout or concrete or pure bentonite may be used to fill in open bedrock joints that are difficult to be filled in with the bentonite-augmented material.

5.3 Construction Materials and Estimated Quantities for D-CP5

Table 5.1 presents the estimated in-place quantities of the construction materials for D-CP5.

Table 5.1: Estimated In-Place Material Quantities for Construction of D-CP5

Item	Estimated In-Place Quantity after Compaction and Installation	Material Source
Type A: Run-of-Mine Rockfill (600 mm minus) in Dike Upstream and for Thermal Cover	9,890 m^3	Stockpiles or underground operation
Type A1: Run-of-Mine Rockfill (600 mm minus) in Dike Downstream	3,080 m^3	Rock excavated from the proposed saline water storage pond to be constructed in August and September 2016; rock or fill from other sources may be used if approved by the Design Engineer
Type B: Transition Rockfill (150 mm minus)	3,580 m^3	To be sourced from the rock excavated from the proposed saline water storage pond or other sources approved by the Design Engineer
Type C: Granular Fill or Esker Sand (20 mm minus)	3,100 m^3	To be sourced from the rock excavated from the proposed saline water storage pond or natural esker sand with fines content of less 10% or other sources approved by the Design Engineer
Type F: Bentonite-Augmented Material (20 mm minus)	890 m^3 to 1,252 m^3	Mixture of bentonite powder (design bentonite content of 10% by mass of Type F Material) and Type C Material; bentonite powder ordered by Agnico Eagle; the source for Type C Material is the same source above
Geomembrane Liner (Coletanche ES2)	3,955 m^2	Ordered by Agnico Eagle
Key Trench Excavation	4,515 m^3	Natural overburden or bedrock
Dry Bentonite Powder for Type F Material	196 metric tons to 275 metric tons	Ordered by Agnico Eagle

These quantities were estimated based on the available geotechnical/topographic data and the following assumptions:

- Average depth of key trench excavation of 1.8 m;
- Key trench excavation sideslope of 1.5H:1V; and
- Additional Type F Material required for liner bedding over the key trench to infill local depressions and over-excavation zones in ice-rich areas.

It should be noted that the actual quantities could be different from those estimated due to the following reasons:

- The actual depth of key trench could vary and be different from the assumed;
- The key trench excavation sideslope will depend on the actual site conditions and excavation method adopted by the Contractor and could be different from the assumed;
- The required Type F Material quantities will depend on the actual site conditions and could be different from the assumed; and
- The field observations during construction may lead to design and construction related modifications, which may in turn affect the quantities.

5.4 Overall Construction Management Plan

The construction and operation schedules for D-CP5 are presented in Section 3.7.

Based on the current construction plan, the supply of the construction materials is as follows:

- The on-site preparation/processing of the fill materials for D-CP5 construction is under a separate package and contract. Therefore, the Contractor for D-CP5 construction will use the stockpiled fill materials without further processing or quarrying; and
- Geomembrane liner and bentonite powder have been ordered by Agnico Eagle and will be supplied to the Contractor for D-CP5 construction.

5.5 Water Management and Erosion Control during Construction

Seepage water from unfrozen overburden soils into the excavated area are expected. The Contractor will need to take proper measures to manage the water and protect the excavated slopes from erosion. It is difficult to provide an accurate estimate of the seepage water volume into the excavated area because of unknown hydraulic conductivities of the overburden soils. The water collected during excavation will either need to be pumped to the dewatered H17 for storage or treated through a mobile water treatment plant (TSS only) before being discharged downstream, as directed by Agnico Eagle.

Under a rainfall event, the runoff from the catchment of A54 will flow into A54. The water will be pumped to the dewatered H17 through a pumping system that would be installed during the lake dewatering stage in September 2016 and remain at the site during the construction of D-CP5.

5.6 Quality Assurance and Quality Control

A quality control/quality assurance (QA/QC) program is required during construction of D-CP5 to ensure that construction-sensitive features of the design are achieved.

Soil testing for the construction QA/QC program and associated documentation will be carried out by either the Engineer or a separate contractor hired by the Owner. The Contractor for construction of D-CP5 may have their own QC team, if required.

During dike construction, a daily field report will be prepared to outline the construction activities inside and outside of the work area. The daily report should be prepared by the on-site construction QA/QC team. The daily report will include, but not be limited to, the following:

- Up to date information of daily construction activities including a list of equipment on-site and weather conditions;
- A summary of visual inspections and observations from inside and outside the work area;
- Records of any construction deficiency and appropriate actions taken, if any;
- Records of QA/QC results and monitoring data; and
- Report on construction and design changes made during construction.

Upon the completion of the construction activities, an as-built construction report will be prepared and submitted to the regulators within 90 days after construction is completed. The construction report should provide all relevant supporting documentation compiled during implementation of the QA/QC plan. The construction report will include, but not be limited to the following:

- Construction drawings based on the as-built survey information of the surface of all material placed;
- Actual construction quantities;
- All testing records, a summary of all test sample location, collection methods, and test results;
- Summary of the construction issues and resolution applied;
- Report on construction and design changes made during construction; and
- Installation details of any required instrumentation or monitoring devices, if any.

5.7 Surveying Requirements

A Survey Contractor will be hired directly by the Owner to carry out as-built surveying and documentation, verify quantities, and produce as-built drawings for D-CP5.

The survey contractor should carry out the following tasks, but not be limited to:

- Survey the original ground within the D-CP5 footprint prior to the commencement of construction, additional detailed high-resolution contour data are required to produce elevation contours to an accuracy of approximately 0.1 m, including additional spot elevations to confirm nearby lake/pond water levels.
- During and after construction, the following tasks should be performed:
  - Provide staking to guide construction;
  - Survey the as-built conditions of excavations and fills including different material boundaries as required;
  - Survey any measurement for payment items;
  - Survey the locations and elevation of each thermistor bead in each of the horizontal ground temperature cables;
  - Survey the locations of each of vertical ground temperature cables and settlement survey monitoring points;
  - Provide quantities of excavations and fill materials on critical stages or as required;

  - Provide the Engineer with AutoCAD drawings showing three-dimensional (3D) lines and surfaces of the excavations and fill materials at critical stages of construction or as required; and
  - Provide the as-built AutoCAD drawings showing 3D lines and surfaces of the excavations and fill materials after the completion of each structure.
- During the operation of the dike, the water elevation in the CP5 pond should be regularly surveyed and documented.

5.8 Instrumentation Installation

As summarized in Section 4.13, instrumentation will be installed in D-CP5 to monitor the performance of the dike during construction and operation. The Contractor will be responsible for installing the instrumentation and taking the first three sets of readings to confirm the instrumentation is functioning as specified. Some instrumentation installations will require a drill rig to install instrumentation through the dike and into the dike foundation.

Regular readings, as directed by Tetra Tech EBA, should be made during the remaining construction stage and the dike operation stage. The instrumentation records should be regularly sent to Tetra Tech EBA for review and evaluation. The reading frequency can be adjusted by the Design Engineer.

6.0 MONITORING, INSPECTION, AND REPORTING

Performance monitoring is an integral part of the operation of any water retention structure, particularly in an arctic environment. The performance of D-CP5 will need to be monitored throughout construction and operating life.

Regular readings of the instrumentation installed in D-CP5 should be made during the construction and operation of the dike. The instrumentation records should be regularly sent to the Design Engineer for review. The reading frequency can be adjusted by the Design Engineer.

Visual inspection and monitoring can provide early warning of many conditions that can contribute to dike failures and incidents. Monitoring and inspection during construction and operation may include, but not be limited to, monitoring of cracks, settlement/movement, seepage, and pond water level. Agnico Eagle should regularly undertake a visual inspection of the dike, especially during spring and summer periods. Agnico Eagle should note any water seepage through the dike, unusual settlement/deformation, cracks and should contact Tetra Tech EBA. Any monitoring data should be sent to Tetra Tech EBA for review and evaluation.

An annual site inspection will be carried out by a qualified geotechnical engineer to evaluate the continual performance of the dike. The annual inspection report can be included in Meliadine's global annual report or submitted to the regulators as a separate report.

7.0 LIMITATIONS OF REPORT

This report and its contents are intended for the sole use of Agnico Eagle Mines Limited and their agents. Tetra Tech EBA Inc. does not accept any responsibility for the accuracy of any of the data, the analysis, or the recommendations contained or referenced in the report when the report is used or relied upon by any Party other than Agnico Eagle Mines Limited, or for any project other than the proposed development at the subject site. Any such unauthorized use of this report is at the sole risk of the user. Use of this report is subject to the terms and conditions stated in Tetra Tech EBA Inc.'s Services Agreement. Tetra Tech EBA Inc.'s General Conditions are provided in Appendix B of this report.

8.0 CLOSURE

We trust this report meets your present requirements. If you have any questions or comments, please contact the undersigned.

Respectfully submitted,
Tetra Tech EBA Inc.

PERMIT TO PRACTICE
TETRA TECH EBA INC.
Signature
Date Aug. 15, 2016
PERMIT NUMBER: P 018
NT/NU Association of Professional Engineers and Geoscientists

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FIGURES

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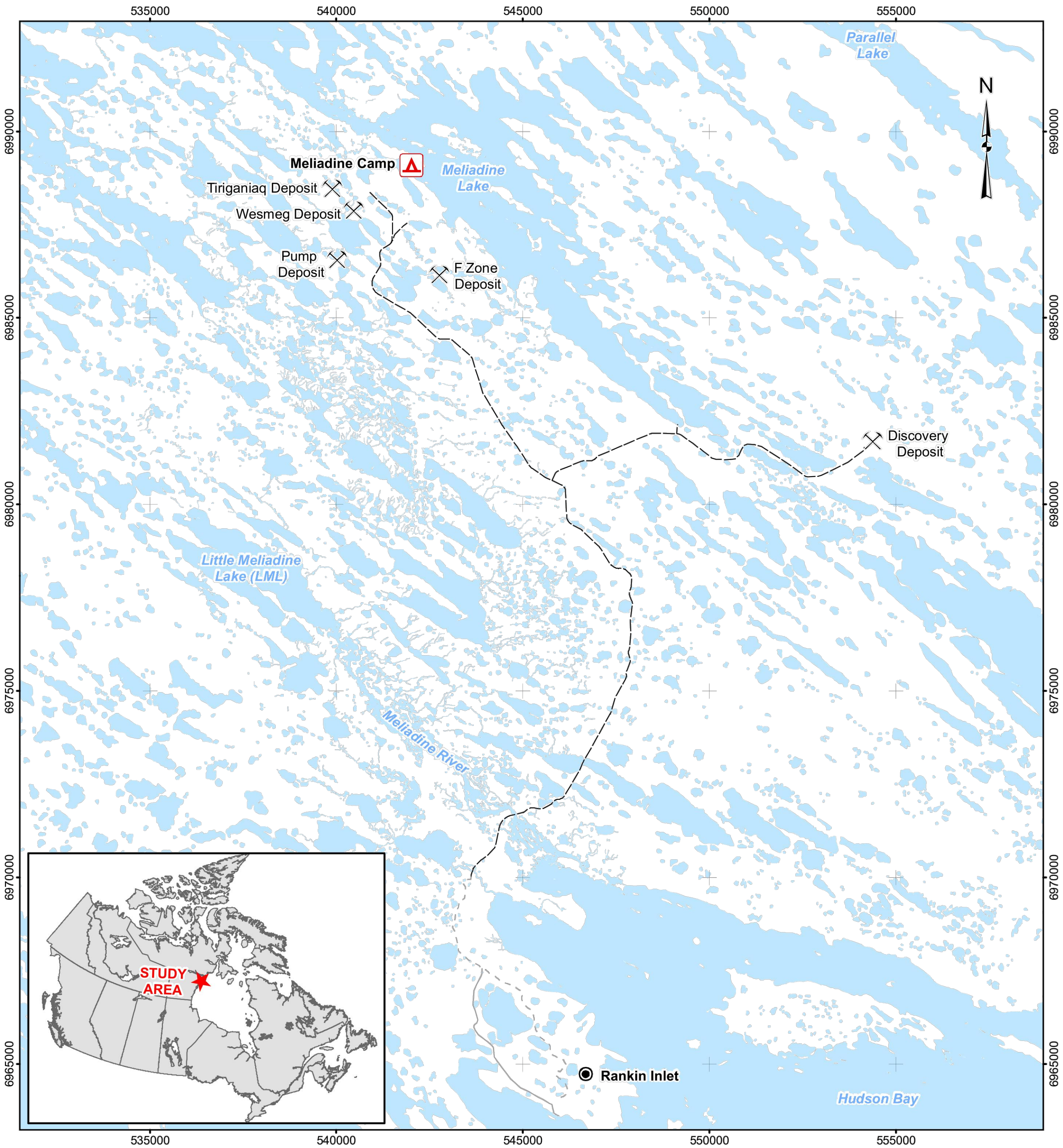

LEGEND

- Camp
- Proposed Mine Site
- All-weather Access Road (AWAR)
- Road - New
- Road - Existing
- Watercourse
- Waterbody

AGNICO EAGLE – MELIADINE DIVISION

AGNICO EAGLE

TETRA TECH EBA

AGNICO EAGLE – MELIADINE DIVISION

FIGURE 1 GENERAL PROJECT LOCATION PLAN

No. PROJET / PROJECT No.		DATE	08–15–2016
DESSINÉ PAR / DRAWN BY	EP	FEUILLE/SHT	1 / 1
APPROUVÉ PAR / APPROVED BY	GZ		
NO. DESSIN / DRAWING NO.		REVISION	0

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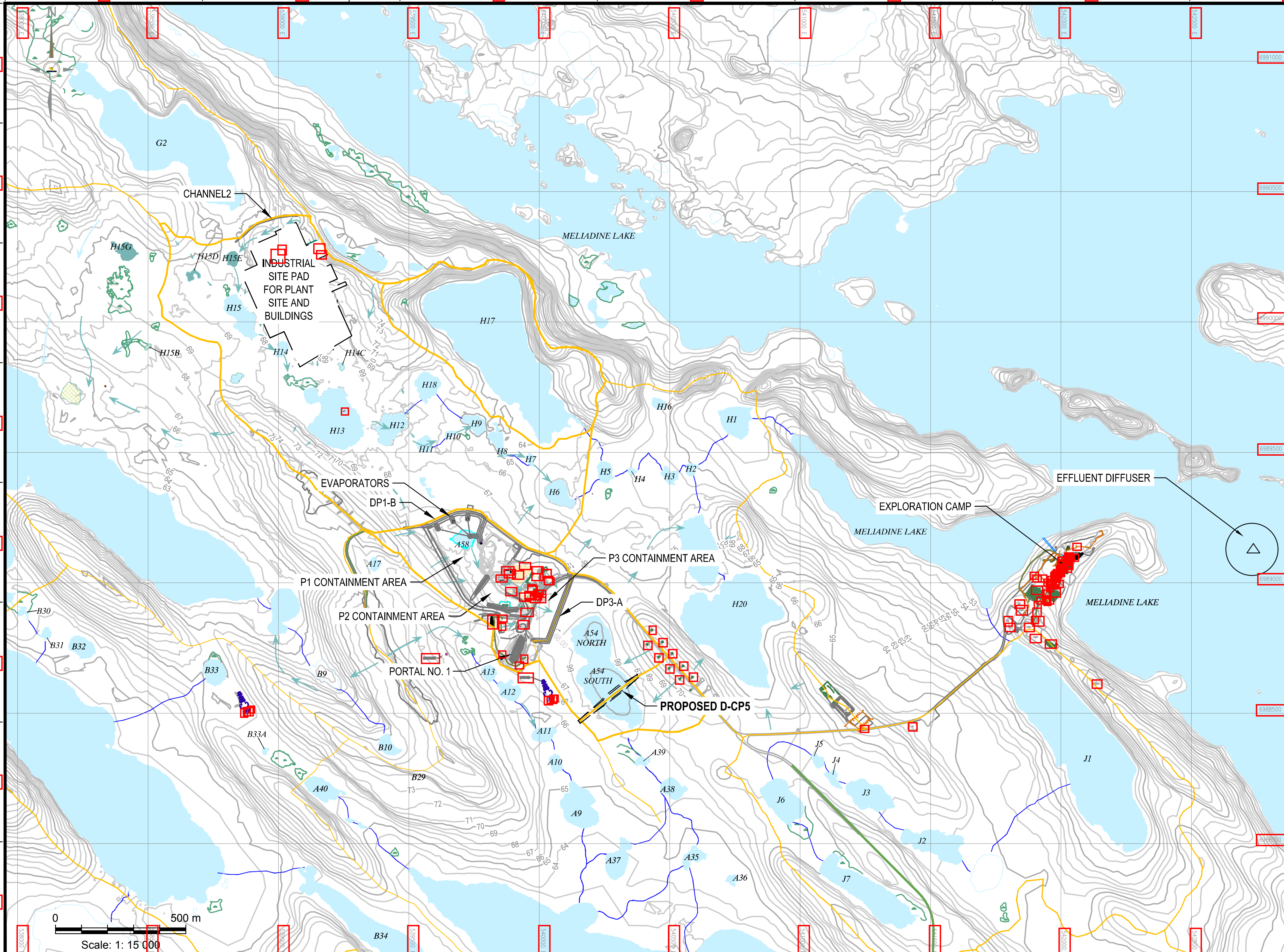
NO. DESSIN
DRAWING NO.

FORMAT ANSI B–11x17



LEGEND

- CATCHMENT BOUNDARY (EXISTING GROUND)
- WATERBODY
- WATER FLOW DIRECTION
- STREAM
- INDUSTRIAL SITE PAD

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TITRE / TITLE	# DWG

DESSINS EN RÉFÉRENCE/REFERENCE DRAWINGS

REV	DESCRIPTION	DATE	PAR BY
0	ISSUED FOR REVIEW	08-15-2016	GZ
A	ISSUED FOR REVIEW	08-09-2016	GZ

REVISIONS

DESSINÉ PAR DRAWN BY	EP	DATE	08-15-2016
VÉRIFIÉ PAR CHECKED BY	GZ		08-15-2016
APPROUVÉ PAR APPROVED BY			
No. PROJET PROJECT NO.	6515		
DATE			

TITRE / TITLE

AGNICO EAGLE MELIADINE GOLD PROJECT
FIGURE 2
GENERAL SITE LAYOUT PLAN
FOR CURRENT CONDITION

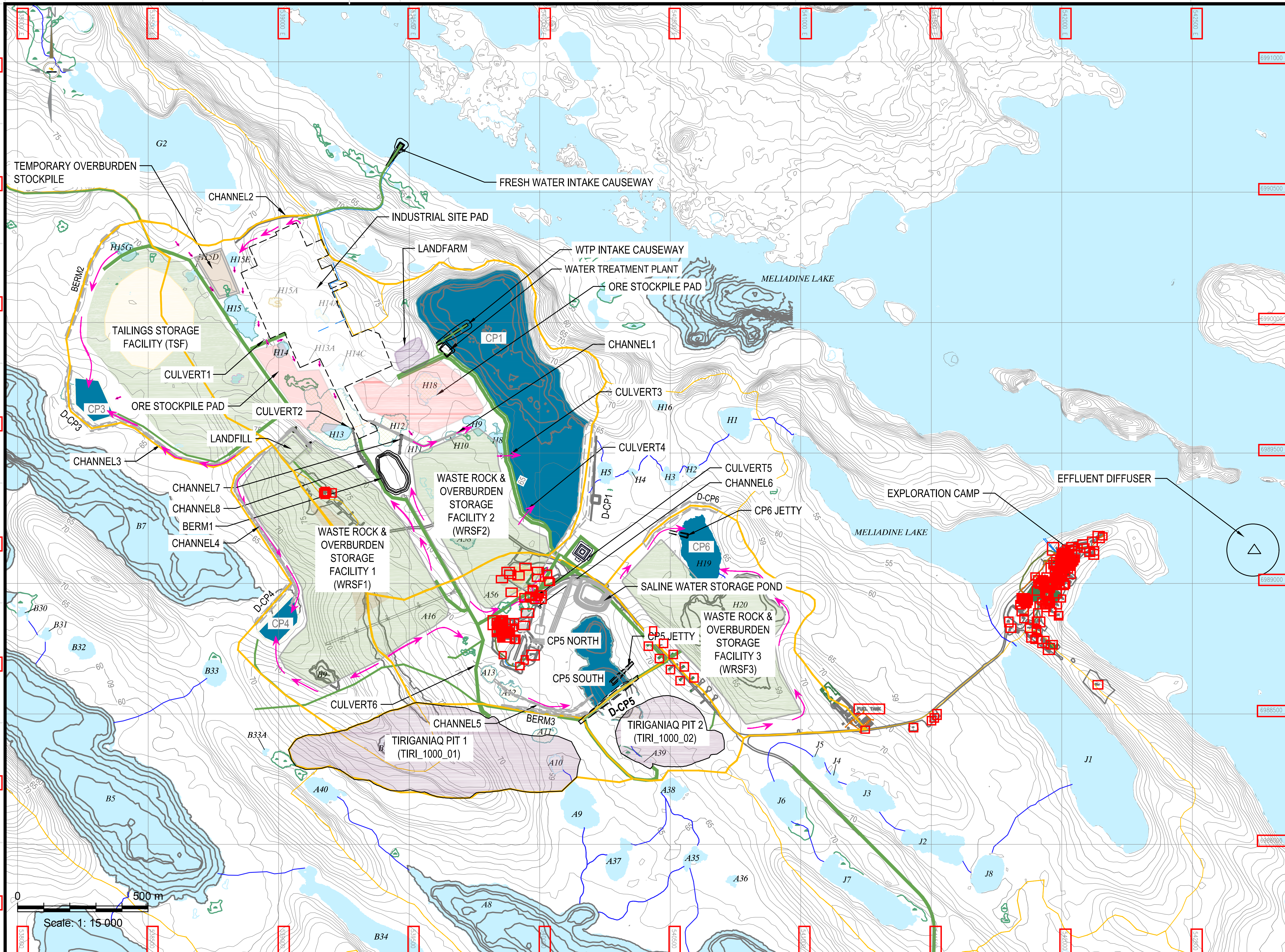
ÉCHELLE/SCALE
FICHIER FILE
No. DESSIN/DRAWING NO.
REVISION 0
FEUILLE/SHT 1 / 1

AE–CART–ANSI B

Q:\Edmonton\Engineering\E141\Projects\E14103230_Block007_Meliadine Detail Design\Modelling\Production Drawings\D-CP5\Figures for Design Report\Figure 2 IFU.dwg

NO. DESSIN
DRAWING NO.

FORMAT ANSI B–11x17



LEGEND

- CATCHMENT BOUNDARY
- SERVICE ROAD
- HAUL ROAD
- WATERBODY
- WATER COLLECTION POND
- DRAINED POND AREA
- OPEN PIT
- OVERBURDEN
- WASTE ROCK
- ORE
- TAILINGS
- INDUSTRIAL SITE PAD
- CONTACT WATER FLOW DIRECTION

AGNICO EAGLE

TETRA TECH EBA

TITRE / TITLE	# DWG
–	–
–	–
–	–
–	–
–	–

DESSINS EN RÉFÉRENCE/REFERENCE DRAWINGS

REV	DESCRIPTION	DATE	PAR BY
0	ISSUED FOR USE	08–15–2016	GZ
A	ISSUED FOR REVIEW	08–09–2016	GZ

REVISIONS

DESSINÉ PAR / DRAWN BY	EP	DATE	08–15–2016
VÉRIFIÉ PAR / CHECKED BY	GZ		08–15–2016
APPROUVÉ PAR / APPROVED BY			
No. PROJET / PROJECT NO.	6515		
DATE			

TITRE / TITLE

AGNICO EAGLE – MELIADINE GOLD PROJECT
FIGURE 3 GENERAL SITE LAYOUT PLAN
FOR PROPOSED INFRASTRUCTURE
DURING MINE OPERATION (YEAR 7)

ÉCHELLE / SCALE	1:15000	FICHIER / FILE	.DWG
No. DESSIN / DRAWING NO.		REVISION	FEUILLE/SHT
		0	1 / 1

AE–CART–ANSI B

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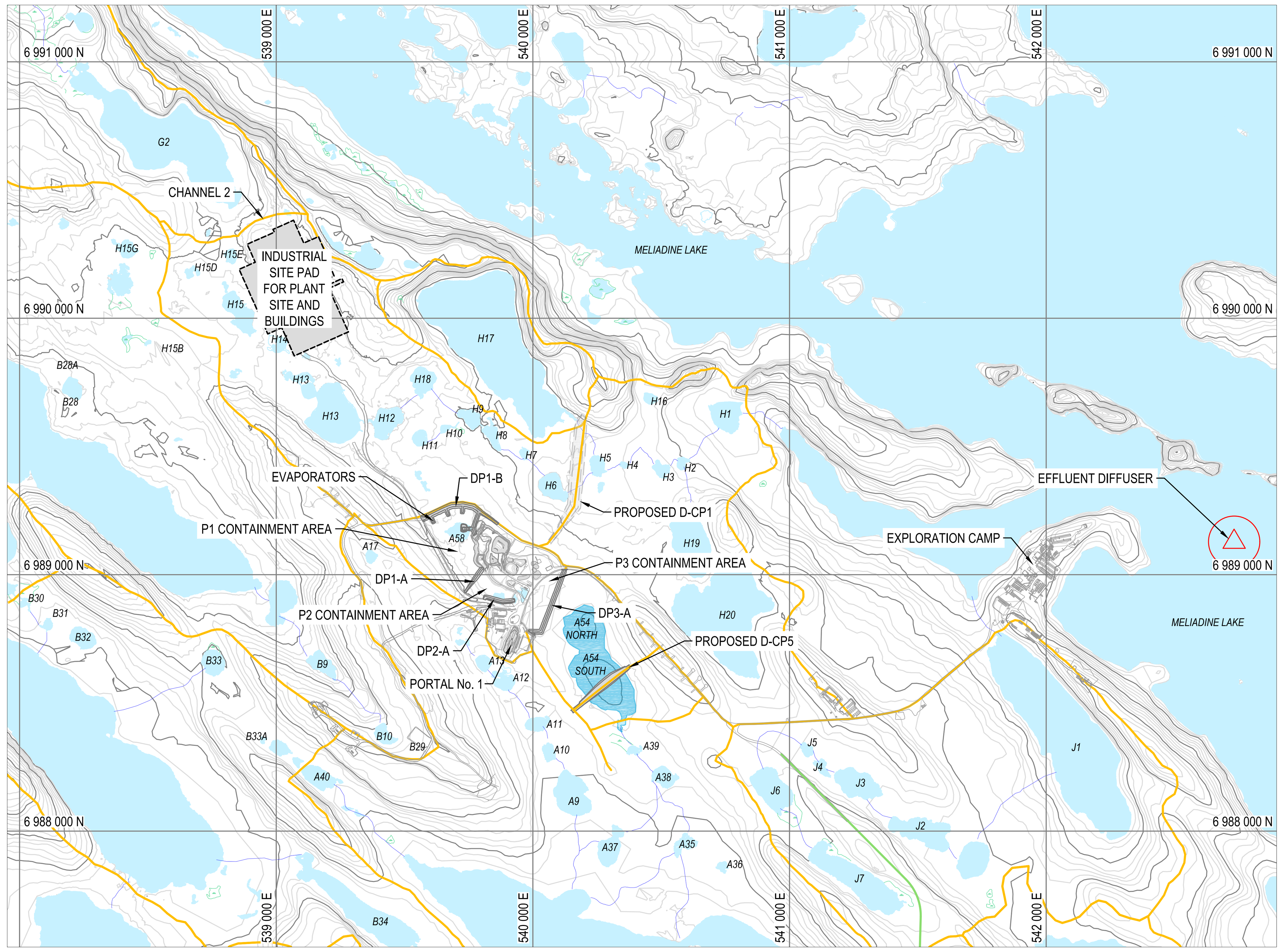
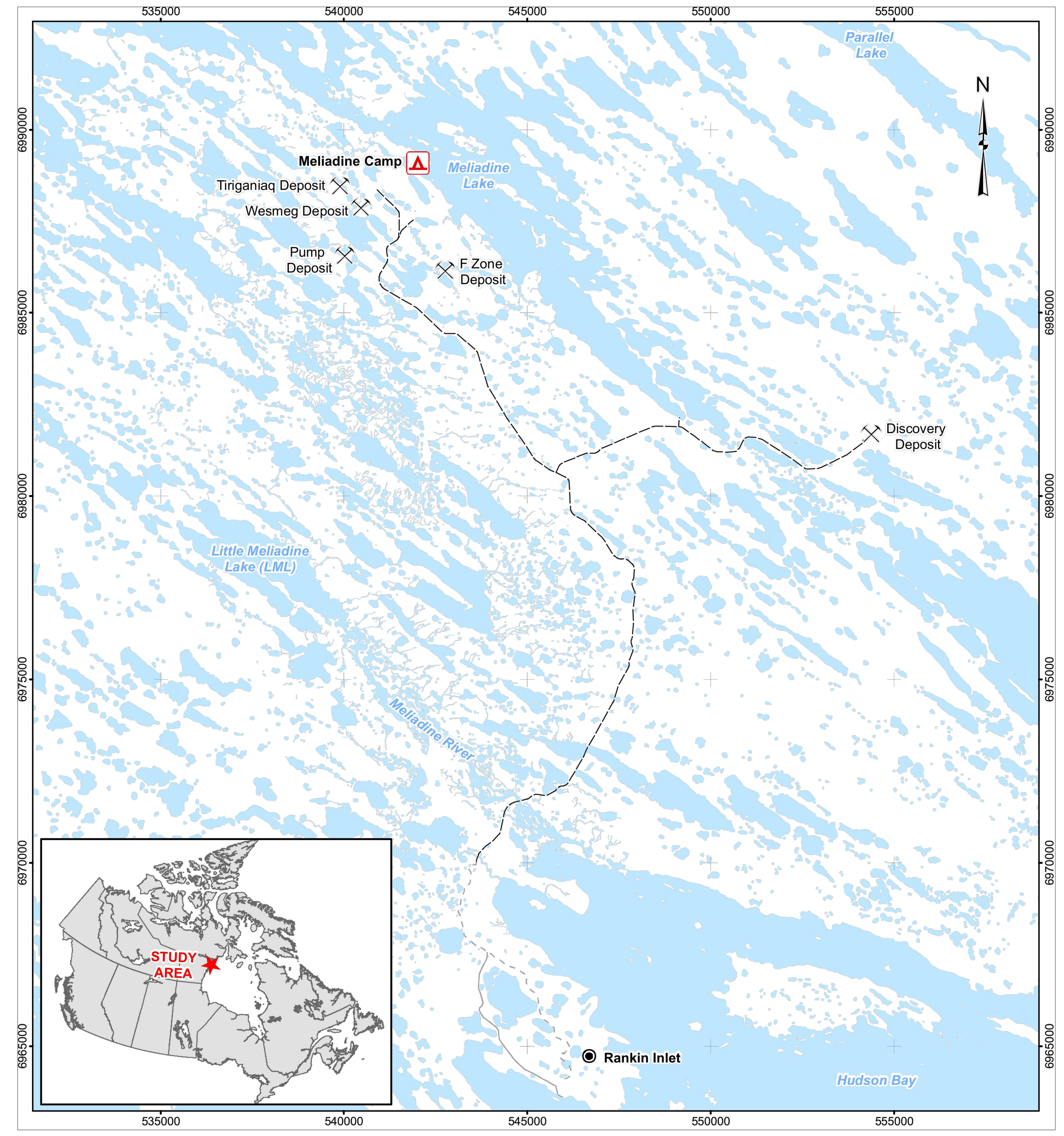
APPENDIX A
CONSTRUCTION DRAWINGS FOR D-CP5

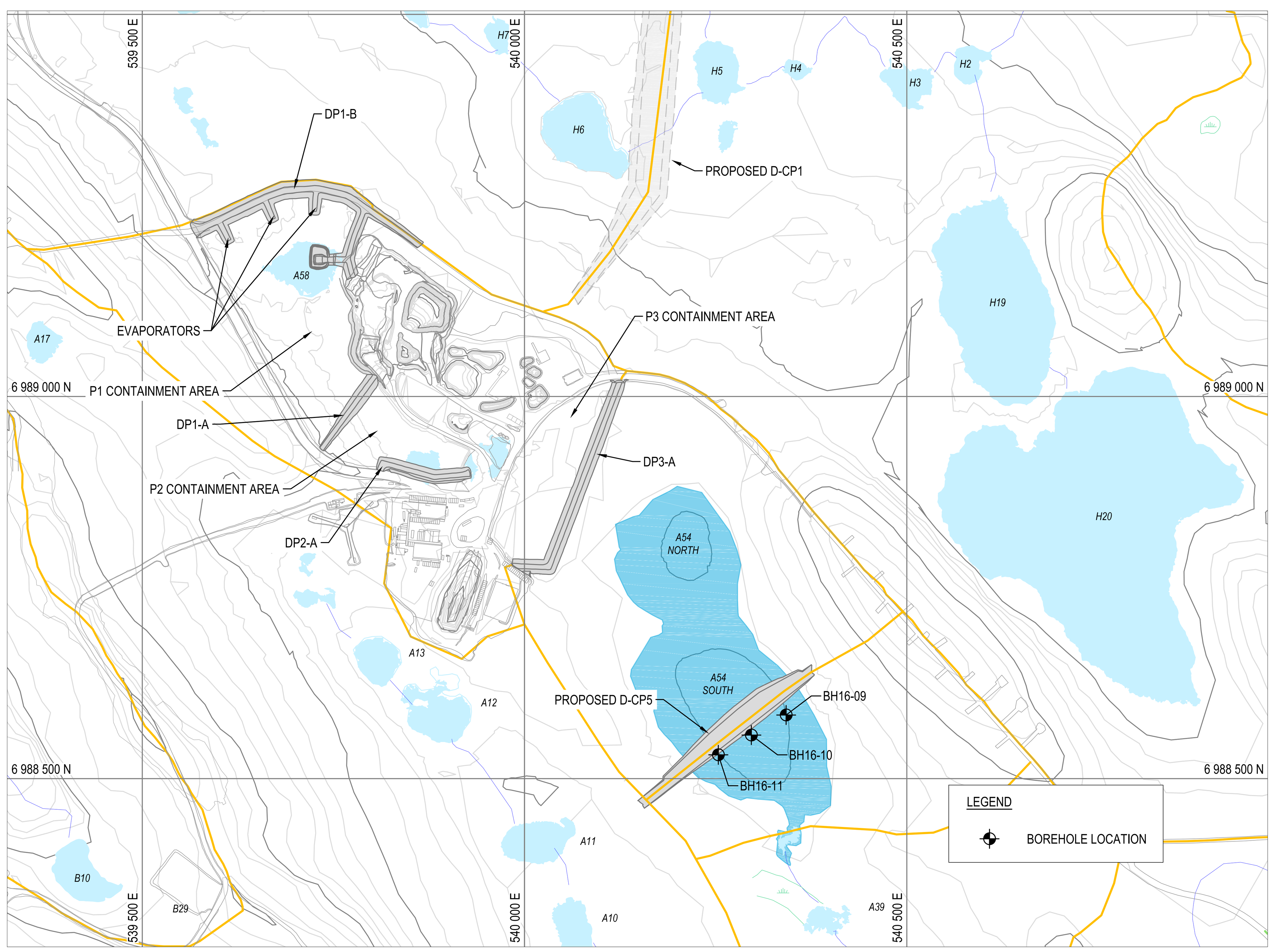
NO. DESSIN DRAWING NO. 65-685-230-214



GENERAL SITE LOCATION
SCALE: 1:15,000



LOCATION MAP
SCALE: N.T.S.



D-CP5 SITE LOCATION
SCALE: 1:5,000

D-CP5 CONSTRUCTION DRAWING INDEX

DRAWING NUMBER	DRAWING TITLE
65-685-230-214	D-CP5 GENERAL LOCATION PLAN
65-685-230-215	D-CP5 KEY TRENCH AND DIKE LAYOUT PLAN
65-685-230-216	D-CP5 PROFILES
65-685-230-217	D-CP5 THERMAL COVER LAYOUT PLAN AND PROFILES
65-685-230-218	D-CP5 TYPICAL SECTIONS AND QUANTITIES
65-685-230-219-001	D-CP5 SECTIONS STATION 0+030 TO 0+170
65-685-230-219-002	D-CP5 SECTIONS STATION 0+180 TO 0+310
65-685-230-220	D-CP5 INSTRUMENTATION PLAN AND DETAILS FOR GROUND TEMPERATURE CABLES
65-685-230-221	D-CP5 INSTRUMENTATION PLAN AND DETAILS FOR GROUND TEMPERATURE CABLES AND SETTLEMENT SURVEY MONUMENT POINTS
65-685-230-222	D-CP5 TYPICAL DETAILS

TETRA TECH EBA

NOTES GÉNÉRALES / GENERAL NOTES

PERMIT TO PRACTICE
TETRA TECH EBA INC.
Signature
Date Aug 15, 2016
PERMIT NUMBER: P 018
NT/NU Association of Professional Engineers and Geoscientists

POUR CONSTRUCTION
FOR CONSTRUCTION
DATE: 2016-08-15
AGNICO EAGLE

DESSINS EN RÉFÉRENCE / REFERENCE DRAWINGS

TITRE / TITLE	# DWG

AGNICO EAGLE

REV.	DATE	DESCRIPTION	PAR/BY	APP.	CLIENT
0	2016-08-15	ISSUED FOR CONSTRUCTION	GZ	KJ	
A	2016-08-10	ISSUED FOR REVIEW	GZ	KJ	

REVISIONS

REGISTERED PROFESSIONAL ENGINEER G. ZHANG LICENSEE NWT/NU Aug. 15, 2016
REGISTERED PROFESSIONAL ENGINEER KEVIN W. JONES Aug. 15, 2016 LICENSEE N.W.T.

TITRE / TITLE
AGNICO EAGLE MELIADINE GOLD PROJECT

D-CP5
GENERAL LOCATION PLAN

DESSINÉ PAR DRAWN BY	EL	DATE	2016-08-15
VERIFIÉ PAR CHECKED BY	GZ		2016-08-15
APPROUVÉ PAR APPROVED BY	GZ		2016-08-15
ÉCHELLE SCALE	AS SHOWN	DATE	2016-08-15
NO. DESSIN DRAWING NO.	65-685-230-214		
NO. PROJET PROJECT NO.	6515	REVISION 0	FEUILLE / SHT 1 / 10

FORMAT ARCHD

AE-CART-ARCH D

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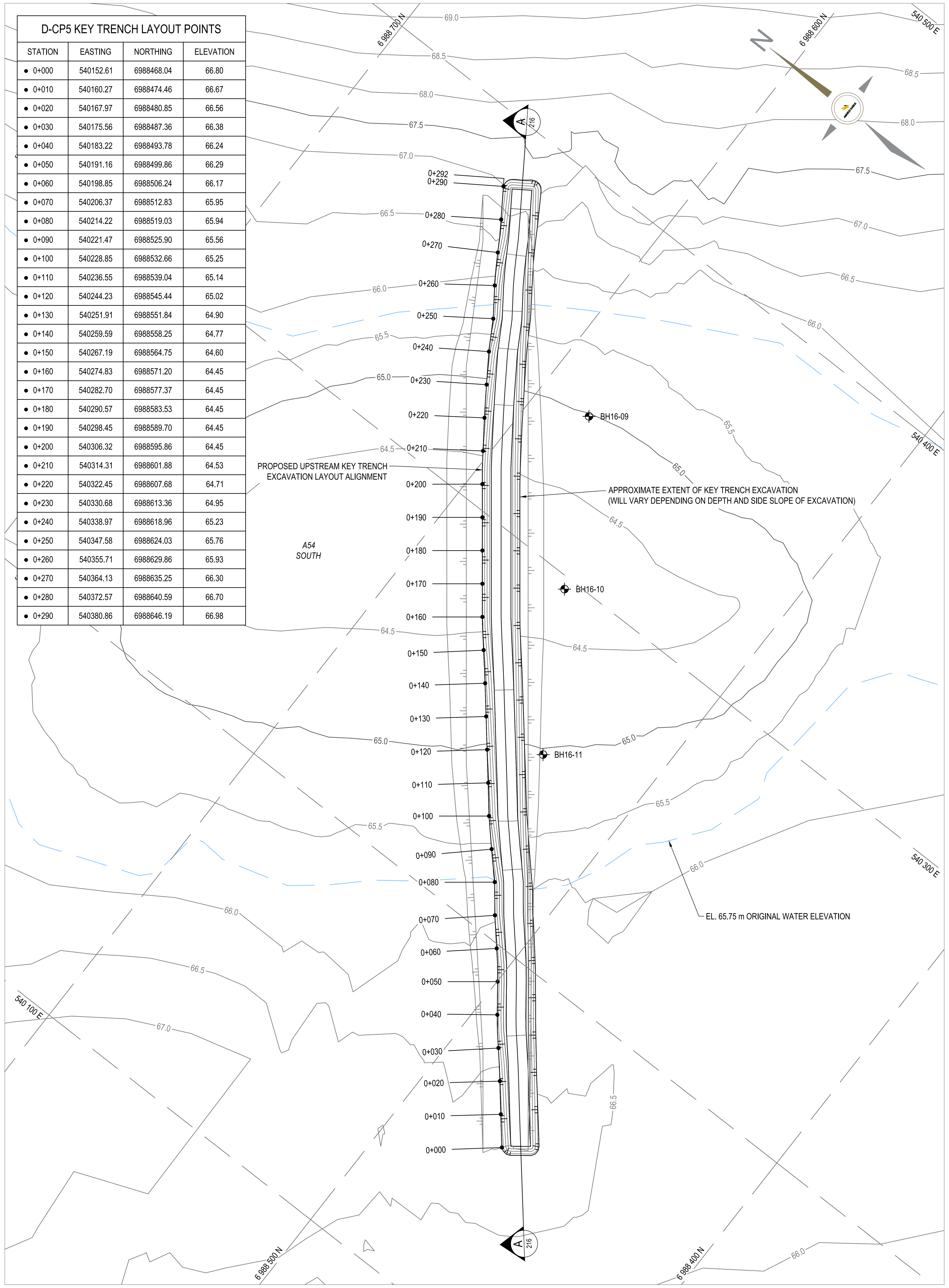
FILE NO. 65-685-230-214.dwg

NO. DESSIN / DRAWING NO. 65-685-230-215

FORMAT ARCHD

D-CP5 KEY TRENCH LAYOUT POINTS

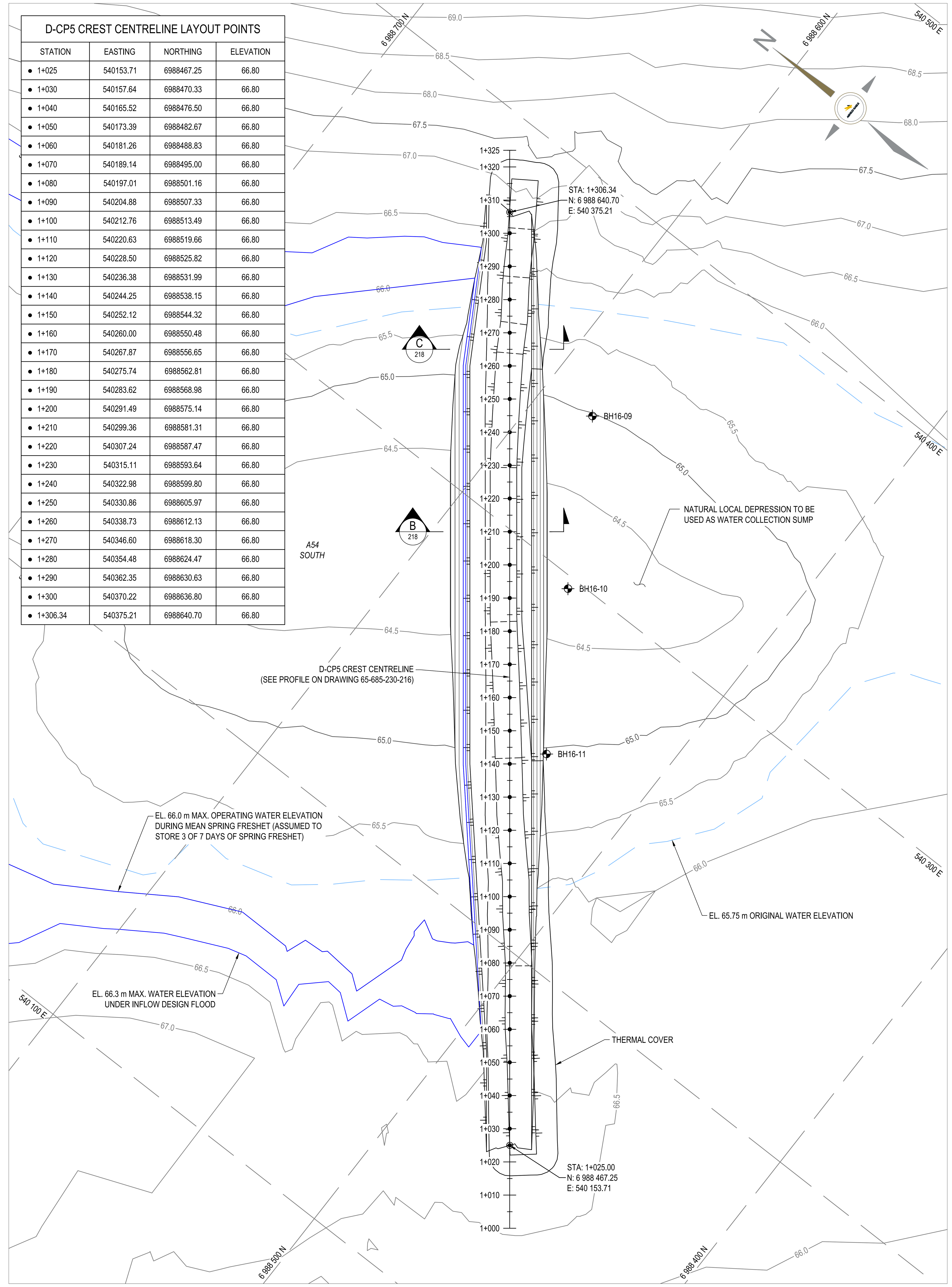
STATION	EASTING	NORTHING	ELEVATION
• 0+000	540152.61	6988468.04	66.80
• 0+010	540160.27	6988474.46	66.67
• 0+020	540167.97	6988480.85	66.56
• 0+030	540175.56	6988487.36	66.38
• 0+040	540183.22	6988493.78	66.24
• 0+050	540191.16	6988499.86	66.29
• 0+060	540198.85	6988506.24	66.17
• 0+070	540206.37	6988512.83	65.95
• 0+080	540214.22	6988519.03	65.94
• 0+090	540221.47	6988525.90	65.56
• 0+100	540228.85	6988532.66	65.25
• 0+110	540236.55	6988539.04	65.14
• 0+120	540244.23	6988545.44	65.02
• 0+130	540251.91	6988551.84	64.90
• 0+140	540259.59	6988558.25	64.77
• 0+150	540267.19	6988564.75	64.60
• 0+160	540274.83	6988571.20	64.45
• 0+170	540282.70	6988577.37	64.45
• 0+180	540290.57	6988583.53	64.45
• 0+190	540298.45	6988589.70	64.45
• 0+200	540306.32	6988595.86	64.45
• 0+210	540314.31	6988601.88	64.53
• 0+220	540322.45	6988607.68	64.71
• 0+230	540330.68	6988613.36	64.95
• 0+240	540338.97	6988618.96	65.23
• 0+250	540347.58	6988624.03	65.76
• 0+260	540355.71	6988629.86	65.93
• 0+270	540364.13	6988635.25	66.30
• 0+280	540372.57	6988640.59	66.70
• 0+290	540380.86	6988646.19	66.98



D-CP5 KEY TRENCH PLAN VIEW
SCALE: 1:750

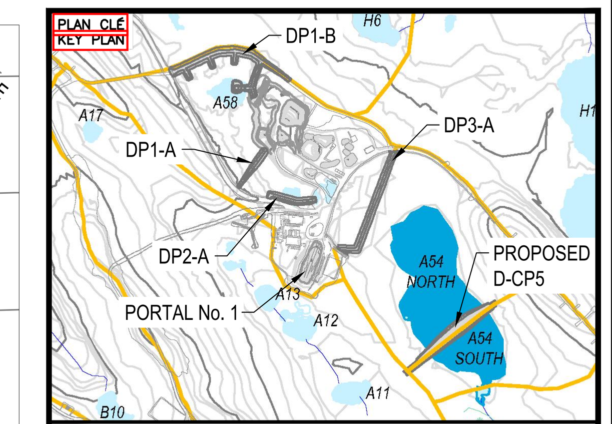
D-CP5 CREST CENTRELINE LAYOUT POINTS

STATION	EASTING	NORTHING	ELEVATION
• 1+025	540153.71	6988467.25	66.80
• 1+030	540157.64	6988470.33	66.80
• 1+040	540165.52	6988476.50	66.80
• 1+050	540173.39	6988482.67	66.80
• 1+060	540181.26	6988488.83	66.80
• 1+070	540189.14	6988495.00	66.80
• 1+080	540197.01	6988501.16	66.80
• 1+090	540204.88	6988507.33	66.80
• 1+100	540212.76	6988513.49	66.80
• 1+110	540220.63	6988519.66	66.80
• 1+120	540228.50	6988525.82	66.80
• 1+130	540236.38	6988531.99	66.80
• 1+140	540244.25	6988538.15	66.80
• 1+150	540252.12	6988544.32	66.80
• 1+160	540260.00	6988550.48	66.80
• 1+170	540267.87	6988556.65	66.80
• 1+180	540275.74	6988562.81	66.80
• 1+190	540283.62	6988568.98	66.80
• 1+200	540291.49	6988575.14	66.80
• 1+210	540299.36	6988581.31	66.80
• 1+220	540307.24	6988587.47	66.80
• 1+230	540315.11	6988593.64	66.80
• 1+240	540322.98	6988599.80	66.80
• 1+250	540330.86	6988605.97	66.80
• 1+260	540338.73	6988612.13	66.80
• 1+270	540346.60	6988618.30	66.80
• 1+280	540354.48	6988624.47	66.80
• 1+290	540362.35	6988630.63	66.80
• 1+300	540370.22	6988636.80	66.80
• 1+306.34	540375.21	6988640.70	66.80



D-CP5 PLAN VIEW
SCALE: 1:750

PLAN CLÉ / KEY PLAN



TETRA TECH EBA

NOTES GÉNÉRALES / GENERAL NOTES

LEGEND

BOREHOLE

PERMIT TO PRACTICE
TETRA TECH EBA INC.
Signature
Date Aug.15, 2016
PERMIT NUMBER: P 018
NT/NU Association of Professional Engineers and Geoscientists

0 25m
Scale: 1:750

POUR CONSTRUCTION
FOR CONSTRUCTION
AGNICO EAGLE
DATE : 2016-08-15

DESSINS EN RÉFÉRENCE / REFERENCE DRAWINGS

TITRE / TITLE	# DWG
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AGNICO EAGLE

REV.	DATE	DESCRIPTION	PAR/BY	APP.	CLIENT
0	2016-08-15	ISSUED FOR CONSTRUCTION	GZ	KJ	
A	2016-08-10	ISSUED FOR REVIEW	GZ	KJ	

REVISIONS

REGISTERED PROFESSIONAL ENGINEER G. ZHANG LICENSEE NWT/NU Aug. 15, 2016

REGISTERED PROFESSIONAL ENGINEER KEVIN W. JONES Aug.15, 2016 LICENSEE NWT

TITRE / TITLE
AGNICO EAGLE MELIADINE GOLD PROJECT

D-CP5
KEY TRENCH AND DIKE LAYOUT PLAN

DESSINÉ PAR / DRAWN BY	EL	DATE	2016-08-15
VERIFIÉ PAR / CHECKED BY	GZ		2016-08-15
APPROUVÉ PAR / APPROVED BY	GZ		2016-08-15
ÉCHELLE / SCALE	1:750	DATE	2016-08-15

NO. DESSIN / DRAWING NO. 65-685-230-215

NO. PROJET / PROJECT NO.	REVISION	FEUILLE / SHT
6515	0	2 / 10

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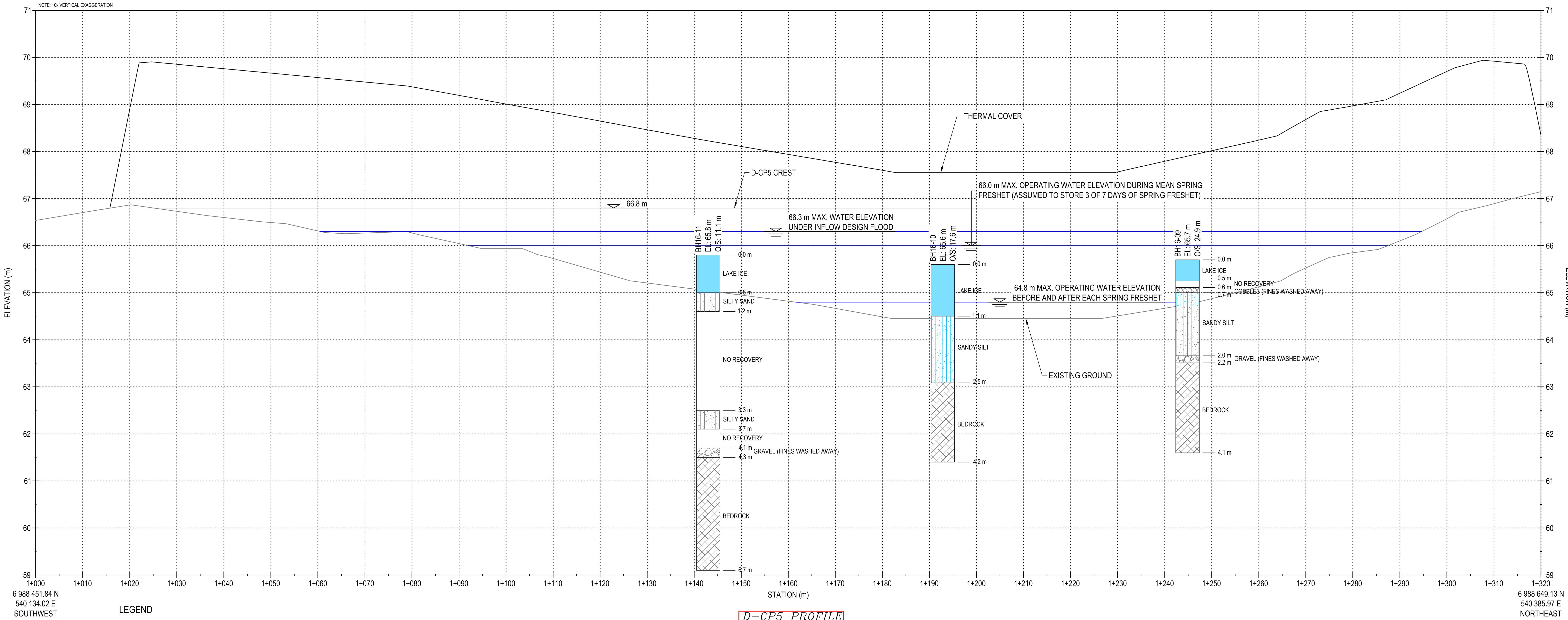
FILE NO. 65-685-230-215.dwg

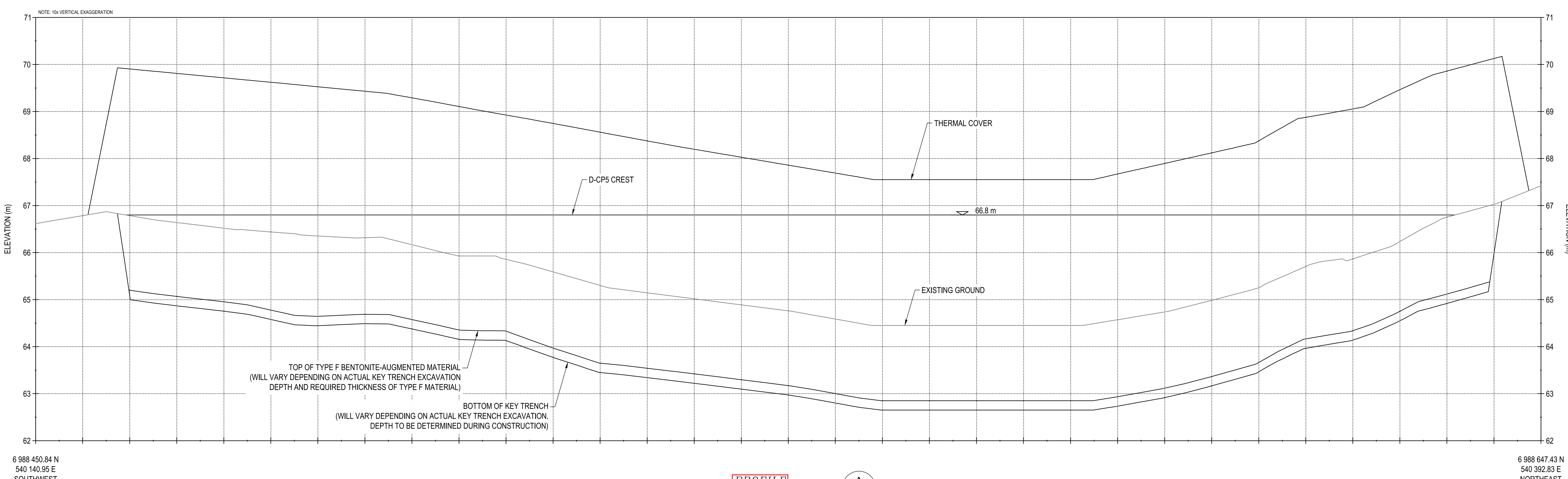
NO. DESSIN / DRAWING NO. 65-685-230-216



D-CP5 PROFILE
SCALE: H-1:500 V-1:50

LEGEND

LAKE ICE	GRAVEL AND SAND	COBBLES	NO RECOVERY
PEAT	GRAVEL	BOULDERS	
SAND / ICE RICH SAND	SILT / ICE RICH SILT	BEDROCK	



PROFILE (A / 215)
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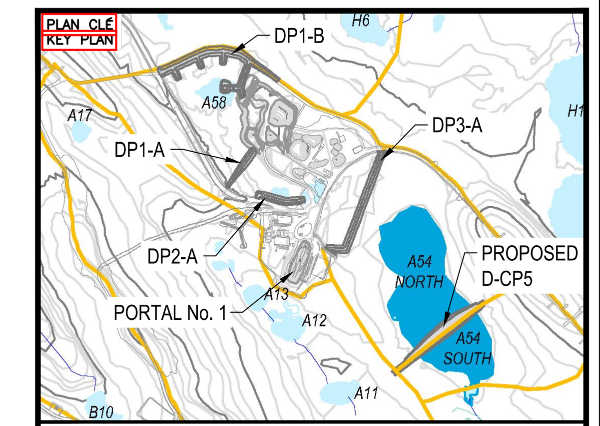
PLAN CLÉ / KEY PLAN



TETRA TECH EBA

NOTES GÉNÉRALES / GENERAL NOTES

PERMIT TO PRACTICE
TETRA TECH EBA INC.
Signature
Date Aug 15, 2016
PERMIT NUMBER: P 018
NT/NU Association of Professional Engineers and Geoscientists

Scale: 1:500

POUR CONSTRUCTION / FOR CONSTRUCTION
AGNICO EAGLE
DATE: 2016-08-15

DESSINS EN RÉFÉRENCE / REFERENCE DRAWINGS

TITRE / TITLE	# DWG

AGNICO EAGLE

REV.	DATE	DESCRIPTION	PAR/BY	APP.	CLIENT
0	2016-08-15	ISSUED FOR CONSTRUCTION	GZ	KJ	
A	2016-08-10	ISSUED FOR REVIEW	GZ	KJ	

REVISIONS

TITRE / TITLE
AGNICO EAGLE MELIADINE GOLD PROJECT
D-CP5
PROFILES

DESSINÉ PAR / DRAWN BY	EL	DATE	2016-08-15
VERIFIÉ PAR / CHECKED BY	GZ		2016-08-15
APPROUVÉ PAR / APPROVED BY	GZ		2016-08-15
ÉCHELLE / SCALE	1:500	DATE	2016-08-15

NO. DESSIN / DRAWING NO. 65-685-230-216

NO. PROJET / PROJECT NO. 6515 | REVISION 0 | FEUILLE / SHT 3 / 10

FORMAT ARCHD

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FILE NO. 65-685-230-216.dwg

NO. DESSIN / DRAWING NO. 65-685-230-217

FORMAT ARCHD

D-CP5 THERMAL COVER LAYOUT POINTS

STATION	EASTING	NORTHING	ELEVATION
• 2+017.39	540154.03	6988462.31	69.93
• 2+020	540156.02	6988463.99	69.90
• 2+030	540163.69	6988470.41	69.81
• 2+040	540171.38	6988476.79	69.72
• 2+050	540178.97	6988483.30	69.62
• 2+055	540182.73	6988486.60	69.57
• 2+060	540186.64	6988489.72	69.53
• 2+070	540194.58	6988495.80	69.43
• 2+074.36	540198.00	6988498.50	69.39
• 2+080	540202.27	6988502.19	69.29
• 2+090	540209.80	6988508.79	69.11

D-CP5 THERMAL COVER LAYOUT POINTS

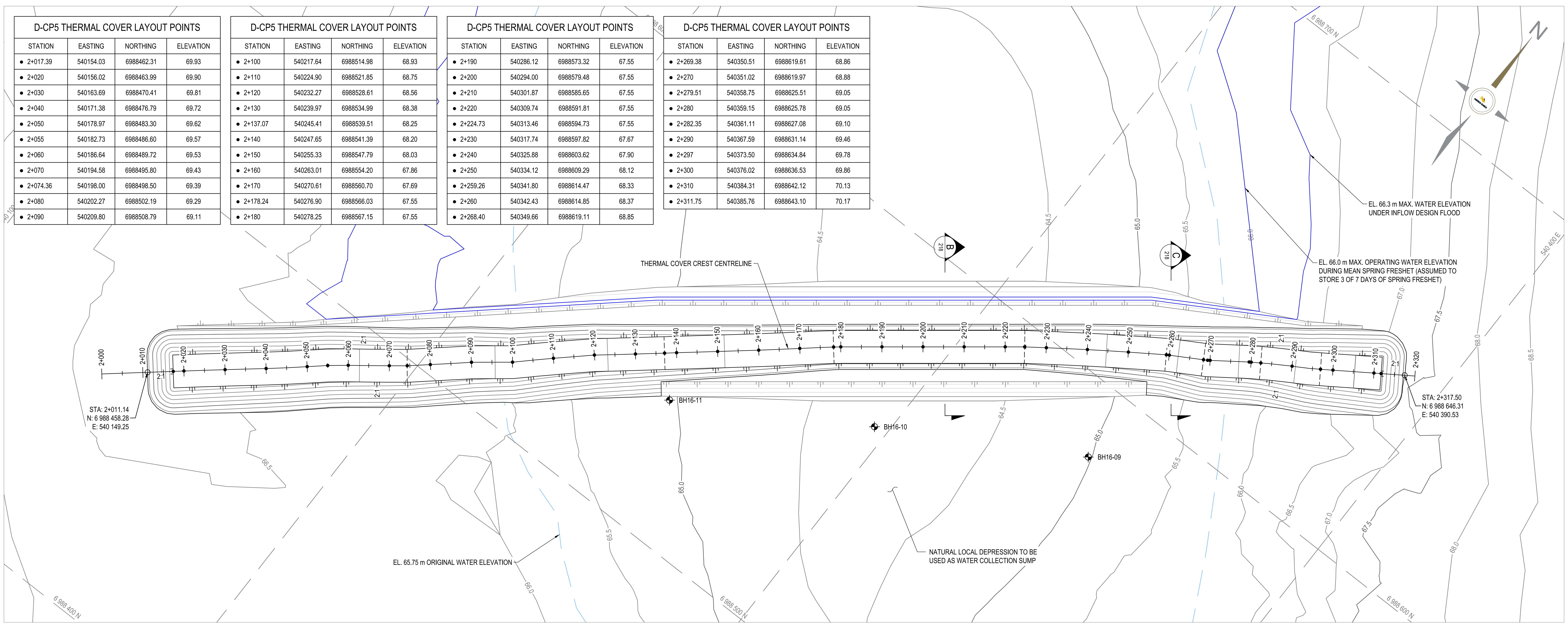
STATION	EASTING	NORTHING	ELEVATION
• 2+100	540217.64	6988514.98	68.93
• 2+110	540224.90	6988521.85	68.75
• 2+120	540232.27	6988528.61	68.56
• 2+130	540239.97	6988534.99	68.38
• 2+137.07	540245.41	6988539.51	68.25
• 2+140	540247.65	6988541.39	68.20
• 2+150	540255.33	6988547.79	68.03
• 2+160	540263.01	6988554.20	67.86
• 2+170	540270.61	6988560.70	67.69
• 2+178.24	540276.90	6988566.03	67.55
• 2+180	540278.25	6988567.15	67.55

D-CP5 THERMAL COVER LAYOUT POINTS

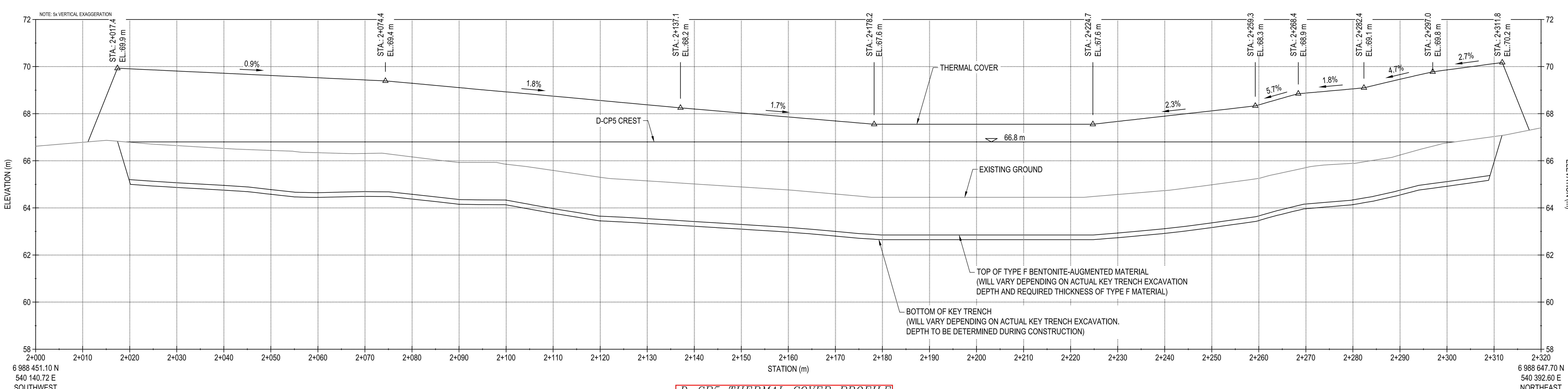
STATION	EASTING	NORTHING	ELEVATION
• 2+190	540286.12	6988573.32	67.55
• 2+200	540294.00	6988579.48	67.55
• 2+210	540301.87	6988585.65	67.55
• 2+220	540309.74	6988591.81	67.55
• 2+224.73	540313.46	6988594.73	67.55
• 2+230	540317.74	6988597.82	67.67
• 2+240	540325.88	6988603.62	67.90
• 2+250	540334.12	6988609.29	68.12
• 2+259.26	540341.80	6988614.47	68.33
• 2+260	540342.43	6988614.85	68.37
• 2+268.40	540349.66	6988619.11	68.85

D-CP5 THERMAL COVER LAYOUT POINTS

STATION	EASTING	NORTHING	ELEVATION
• 2+269.38	540350.51	6988619.61	68.86
• 2+270	540351.02	6988619.97	68.88
• 2+279.51	540358.75	6988625.51	69.05
• 2+280	540359.15	6988625.78	69.05
• 2+282.35	540361.11	6988627.08	69.10
• 2+290	540367.59	6988631.14	69.46
• 2+297	540373.50	6988634.84	69.78
• 2+300	540376.02	6988636.53	69.86
• 2+310	540384.31	6988642.12	70.13
• 2+311.75	540385.76	6988643.10	70.17

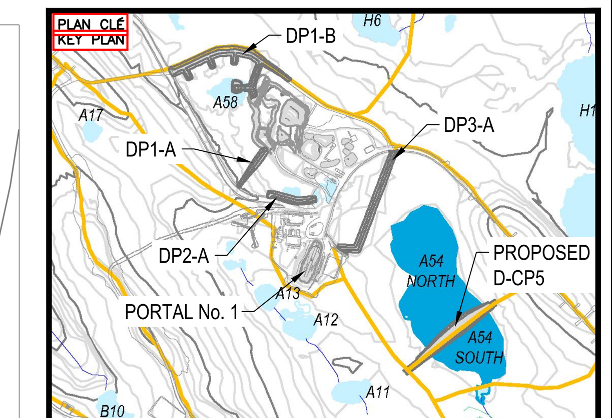


D-CP5 THERMAL COVER PLAN
SCALE: H-1:500



D-CP5 THERMAL COVER PROFILE
SCALE: H-1:500 V-1:100

PLAN CLÉ / KEY PLAN



TETRA TECH EBA

NOTES GÉNÉRALES / GENERAL NOTES

LEGEND

BOREHOLE

PERMIT TO PRACTICE
TETRA TECH EBA INC.
Signature
Date Aug. 15, 2016
PERMIT NUMBER: P 018
NT/NU Association of Professional Engineers and Geoscientists

Scale: 1:500

POUR CONSTRUCTION / FOR CONSTRUCTION
DATE: 2016-08-15
AGNICO EAGLE

DESSINS EN RÉFÉRENCE / REFERENCE DRAWINGS

TITRE / TITLE	# DWG

AGNICO EAGLE

REV.	DATE	DESCRIPTION	PAR/BY	APP.	CLIENT
0	2016-08-15	ISSUED FOR CONSTRUCTION	GZ	KJ	
A	2016-08-10	ISSUED FOR REVIEW	GZ	KJ	

REVISIONS

REGISTERED PROFESSIONAL ENGINEER — G. ZHANG — LICENSEE — NWT/NU — Aug. 15, 2016

REGISTERED PROFESSIONAL ENGINEER — KEVIN W. JONES — AUG. 15, 2016 — LICENSEE — N.W.T.

TITRE / TITLE
AGNICO EAGLE MELIADINE GOLD PROJECT

D-CP5 THERMAL COVER
LAYOUT PLAN AND PROFILES

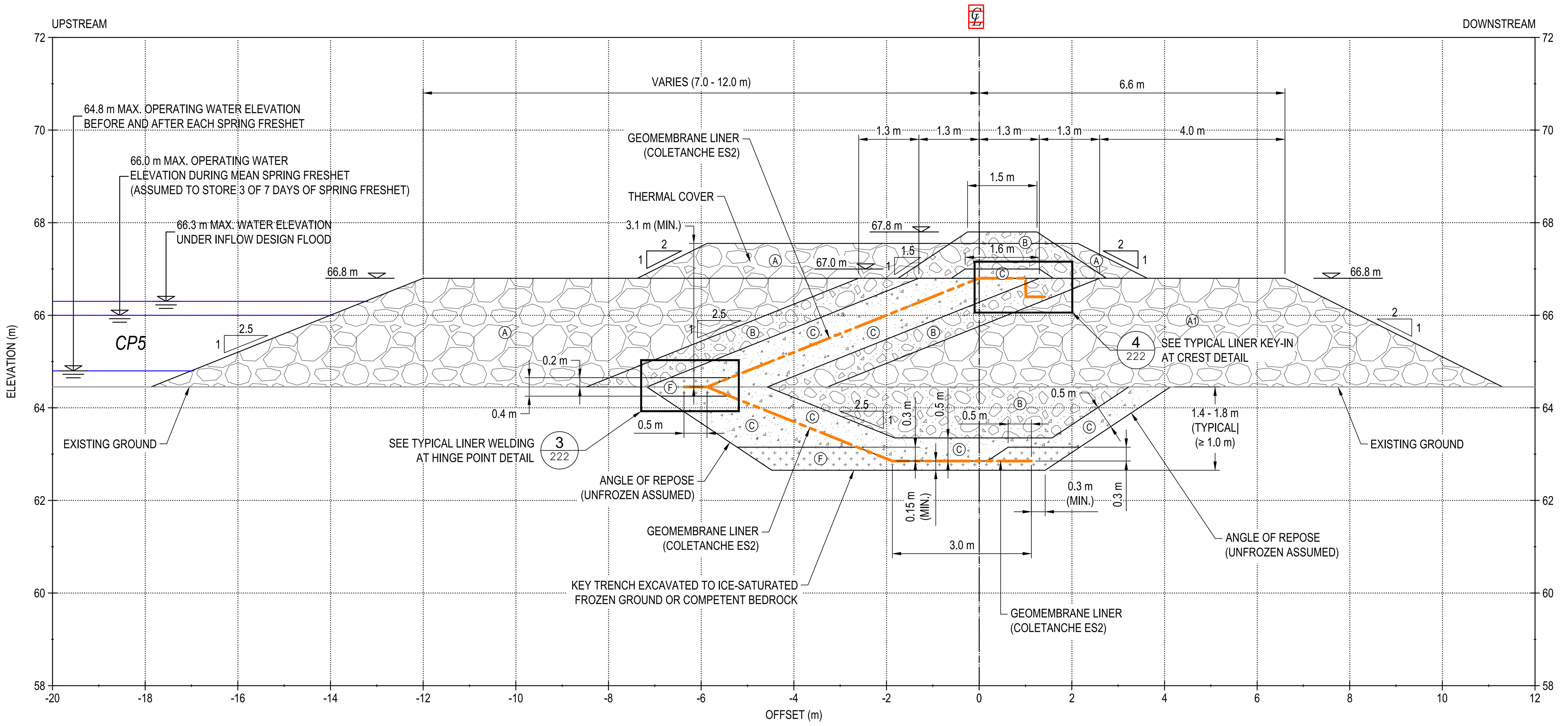
DESSINÉ PAR / DRAWN BY	EL	DATE	2016-08-15
VERIFIÉ PAR / CHECKED BY	GZ		2016-08-15
APPROUVÉ PAR / APPROVED BY	GZ		2016-08-15
ÉCHELLE / SCALE	1:500	DATE	2016-08-15

NO. DESSIN / DRAWING NO. 65-685-230-217

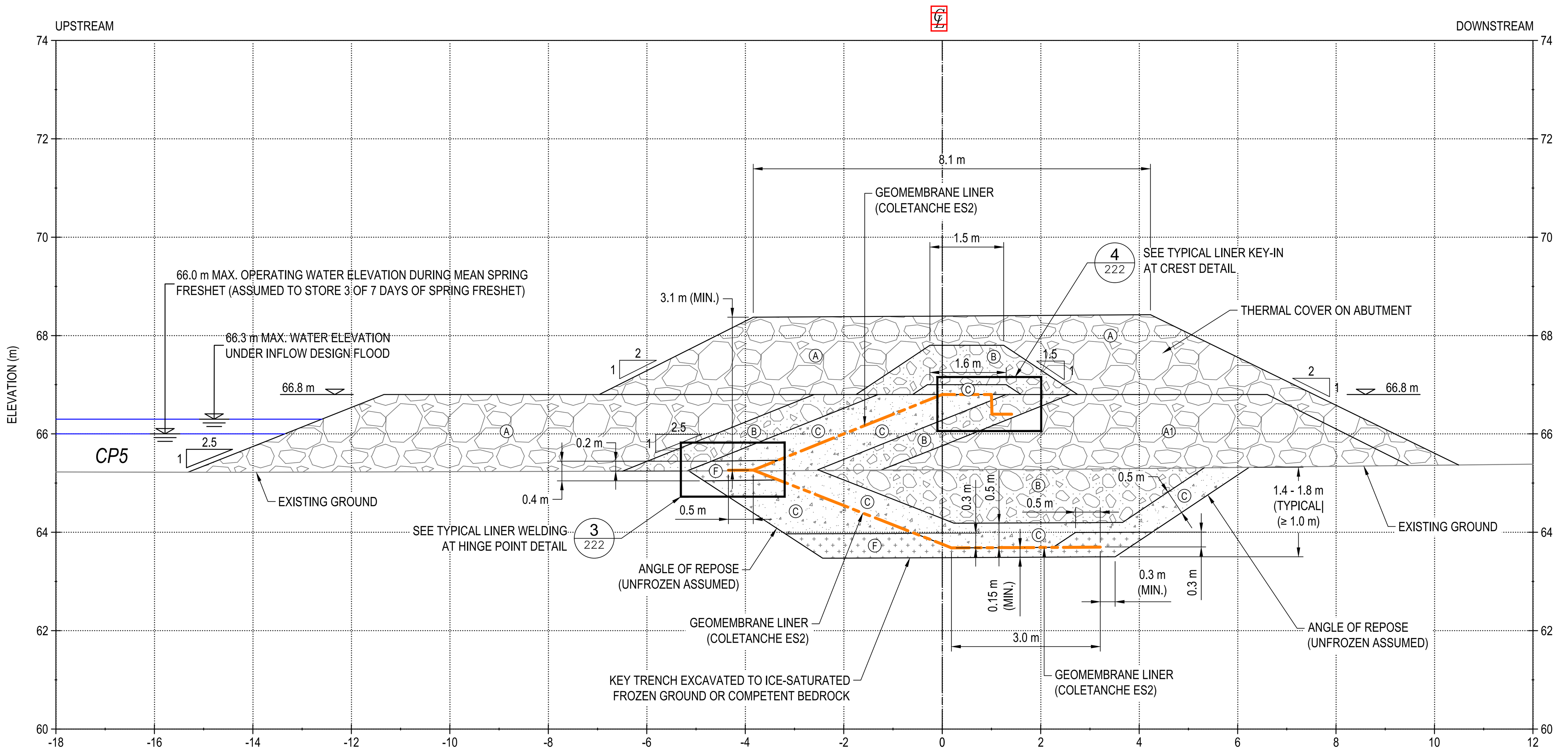
NO. PROJET / PROJECT NO. 6515 | REVISION 0 | FEUILLE / SHT 4 / 10

NO. DESSIN / DRAWING NO. 65-685-230-218

FORMAT ARCHD



STATION 1+210 (B / 215)
SCALE: 1:75



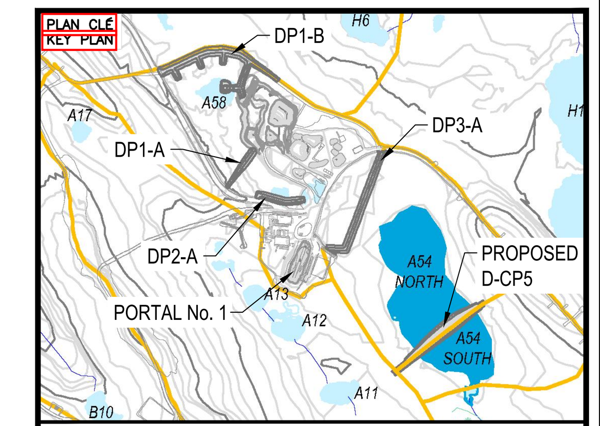
STATION 1+265 (C / 215)
SCALE: 1:75

ESTIMATED IN-PLACE MATERIAL QUANTITIES FOR CONSTRUCTION OF D-CP5				
ITEM		UNIT	ESTIMATED IN-PLACE QUANTITY AFTER COMPACTION AND INSTALLATION	MATERIAL SOURCE
(A)	RUN-OF-MINE ROCKFILL (600 mm MINUS) IN DIKE UPSTREAM AND FOR THERMAL COVER	m³	9,890	STOCKPILES OR UNDERGROUND OPERATION
(A1)	RUN-OF-MINE ROCKFILL (600 mm MINUS) IN DIKE DOWNSTREAM	m³	3,080	ROCK EXCAVATED FROM THE PROPOSED SALINE WATER STORAGE POND TO BE CONSTRUCTED IN AUGUST AND SEPTEMBER 2016; ROCK OR FILL FROM OTHER SOURCES MAY BE USED IF APPROVED BY THE DESIGN ENGINEER.
(B)	TRANSITION ROCKFILL (150 mm MINUS)	m³	3,580	TO BE SOURCED FROM ROCK EXCAVATED FROM THE PROPOSED SALINE WATER STORAGE POND OR OTHER SOURCES APPROVED BY THE DESIGN ENGINEER.
(C)	GRANULAR FILL OR ESKER SAND (20 mm MINUS)	m³	3,100	TO BE SOURCED FROM ROCK EXCAVATED FROM THE PROPOSED SALINE WATER STORAGE POND OR NATURAL ESKER SAND WITH FINES CONTENT OF LESS THAN 10% OR OTHER SOURCES APPROVED BY THE DESIGN ENGINEER.
(F)	BENTONITE-AUGMENTED MATERIAL	m³	890 to 1252	MIXTURE OF BENTONITE POWDER AND TYPE C MATERIAL; BENTONITE POWDER ORDERED BY AGNICO EAGLE; THE SOURCE FOR TYPE C MATERIAL IS THE SAME SOURCE ABOVE.
	GEOMEMBRANE LINER (COLETANCHE ES2)	m²	3,955	ORDERED BY AGNICO EAGLE
	KEY TRENCH EXCAVATION	m³	4,515 (SEE NOTE)	NATURAL OVERBURDEN OR BEDROCK
	DRY BENTONITE POWDER FOR TYPE F MATERIAL	Metric Ton	196 to 275	ORDERED BY AGNICO EAGLE

QUANTITIES WERE ESTIMATED BASED ON THE AVAILABLE GEOTECHNICAL / TOPOGRAPHIC DATA AND THE FOLLOWING ASSUMPTIONS:
- AVERAGE DEPTH OF KEY TRENCH EXCAVATION OF 1.8 m;
- KEY TRENCH EXCAVATION SIDE SLOPE OF 1.5H:1V; AND
- ADDITIONAL TYPE F MATERIAL REQUIRED FOR LINER BEDDING OVER THE KEY TRENCH TO INFILL LOCAL DEPRESSIONS AND OVER EXCAVATION ZONES IN ICE-RICH AREAS.

IT SHOULD BE NOTED THAT THE ACTUAL QUANTITIES COULD BE DIFFERENT FROM THE ESTIMATED DUE TO THE FOLLOWING REASONS:
- THE ACTUAL DEPTH OF KEY TRENCH COULD VARY AND BE DIFFERENT FROM THE ASSUMED;
- THE KEY TRENCH EXCAVATION SIDE SLOPE WILL DEPEND ON THE ACTUAL SITE CONDITIONS AND EXCAVATION METHOD ADOPTED BY THE CONTRACTOR AND COULD BE DIFFERENT FROM THE ASSUMED;
- THE REQUIRED TYPE F MATERIAL QUANTITIES WILL DEPEND ON THE ACTUAL SITE CONDITIONS AND BE DIFFERENT FROM THE ASSUMED; AND
- THE FIELD OBSERVATIONS DURING CONSTRUCTION MAY LEAD TO DESIGN AND CONSTRUCTION RELATED MODIFICATIONS, WHICH MAY IN TURN AFFECT THE QUANTITIES.

PLAN CLÉ / KEY PLAN



TETRA TECH EBA

NOTES GÉNÉRALES / GENERAL NOTES

PERMIT TO PRACTICE
TETRA TECH EBA INC.
Signature
Date Aug 15, 2016
PERMIT NUMBER: P 018
NT/NU Association of Professional Engineers and Geoscientists

Scale: 1:75

POUR CONSTRUCTION
FOR CONSTRUCTION
DATE: 2016-08-15
AGNICO EAGLE

DESSINS EN RÉFÉRENCE / REFERENCE DRAWINGS

TITRE / TITLE	# DWG

AGNICO EAGLE

REV.	DATE	DESCRIPTION	PAR/BY	APP.	CLIENT
0	2016-08-15	ISSUED FOR CONSTRUCTION	GZ	KJ	
A	2016-08-10	ISSUED FOR REVIEW	GZ	KJ	

REVISIONS

TITRE / TITLE
AGNICO EAGLE MELIADINE GOLD PROJECT

D-CP5
TYPICAL SECTIONS AND QUANTITIES

DESSINÉ PAR / DRAWN BY	EL	DATE	2016-08-15
VERIFIÉ PAR / CHECKED BY	GZ		2016-08-15
APPROUVÉ PAR / APPROVED BY	GZ		2016-08-15
ÉCHELLE / SCALE	1:75	DATE	2016-08-15

NO. DESSIN / DRAWING NO. 65-685-230-218

NO. PROJET / PROJECT NO. 6515 | REVISION 0 | FEUILLE / SHT 5 / 10

AE-CART-ARCH D

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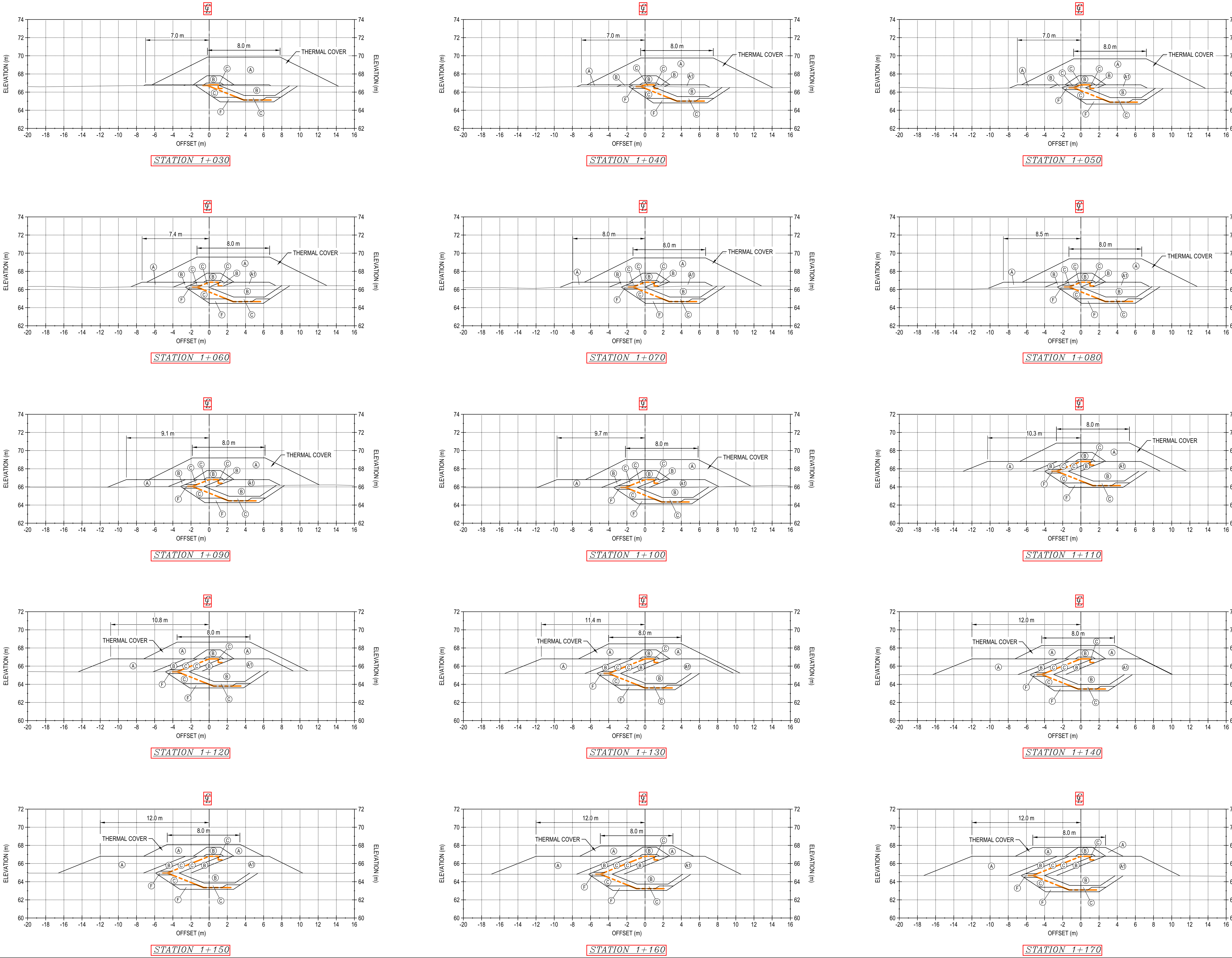
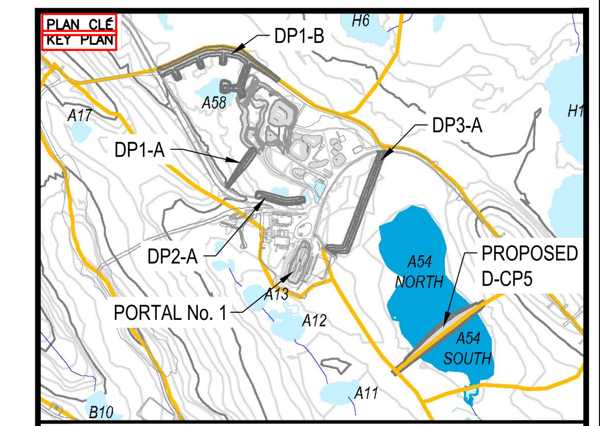
NO. DESSIN DRAWING NO. 65-685-230-219





TETRA TECH EBA

NOTES GÉNÉRALES / GENERAL NOTES

LEGEND

- (A) RUN-OF-MINE ROCKFILL (600 mm MINUS) IN DIKE UPSTREAM AND FOR THERMAL COVER
- (A1) RUN-OF-MINE ROCKFILL (600 mm MINUS) IN DIKE DOWNSTREAM
- (B) TRANSITION ROCKFILL (150 mm MINUS)
- (C) GRANULAR FILL OR ESKER SAND (20 mm MINUS)
- (F) BENTONITE-AUGMENTED MATERIAL (MIXTURE OF BENTONITE AND TYPE C MATERIAL)

PERMIT TO PRACTICE
TETRA TECH EBA INC.
Signature
Date Aug 15, 2016
PERMIT NUMBER: P 018
NT/NU Association of Professional Engineers and Geoscientists

POUR CONSTRUCTION
FOR CONSTRUCTION
AGNICO EAGLE
DATE : 2016-08-15

DESSINS EN RÉFÉRENCE / REFERENCE DRAWINGS

TITRE / TITLE	# DWG

AGNICO EAGLE

REV.	DATE	DESCRIPTION	PAR/BY	APP.	CLIENT
0	2016-08-15	ISSUED FOR CONSTRUCTION	GZ	KJ	
A	2016-08-10	ISSUED FOR REVIEW	GZ	KJ	

REVISIONS

REGISTERED PROFESSIONAL ENGINEER G. ZHANG LICENSEE Aug. 15, 2016 NWT/NU

REGISTERED PROFESSIONAL ENGINEER KEVIN W. JONES Aug. 15, 2016 LICENSEE N.W.T.

TITRE / TITLE
AGNICO EAGLE MELIADINE GOLD PROJECT

D-CP5 SECTIONS
STATION 1+030 TO 1+170

DESSINÉ PAR / DRAWN BY	EL	DATE	2016-08-15
VERIFIÉ PAR / CHECKED BY	GZ		2016-08-15
APPROUVÉ PAR / APPROVED BY	GZ		2016-08-15
ÉCHELLE / SCALE	1:200	DATE	2016-08-15

NO. DESSIN / DRAWING NO. 65-685-230-219-001

NO. PROJET / PROJECT NO.	REVISION	FEUILLE / SHT
6515	0	6 / 10

FORMAT ARCHD

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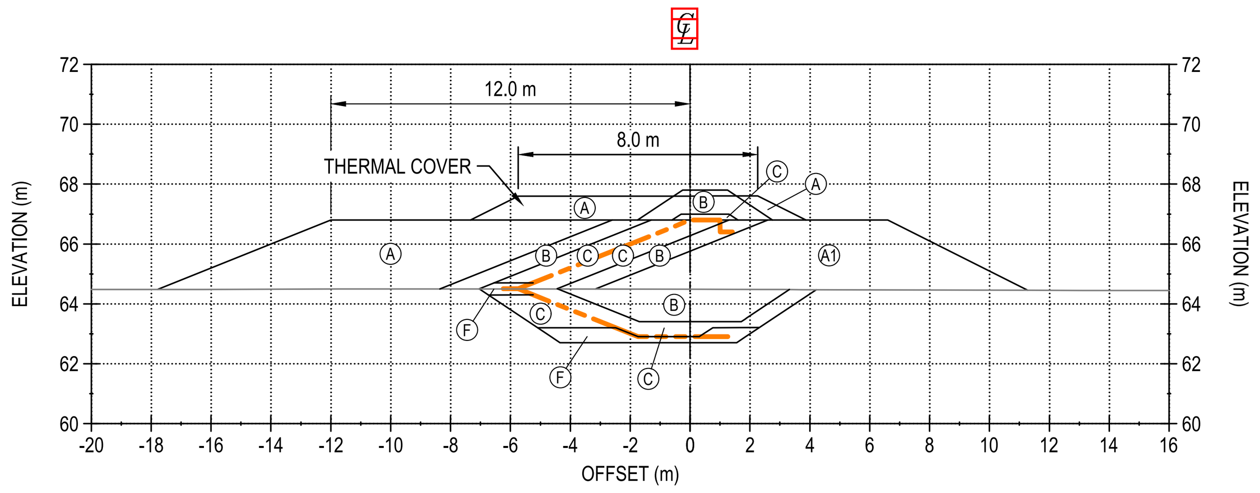
FILE NO. 65-685-230-219.dwg

NO. DESSIN / DRAWING NO. 65-685-230-219

FORMAT ARCHD



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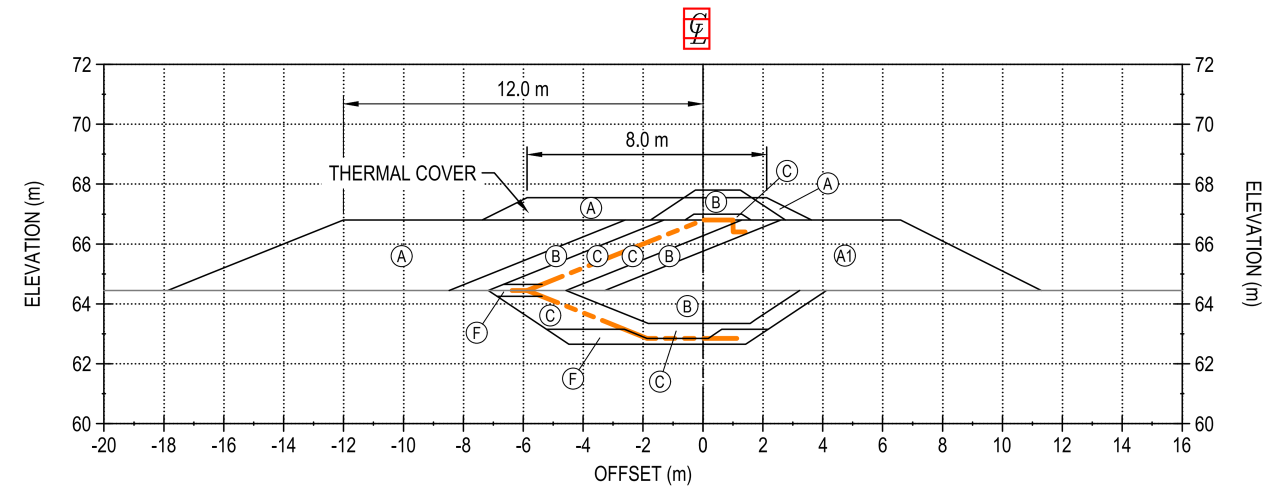

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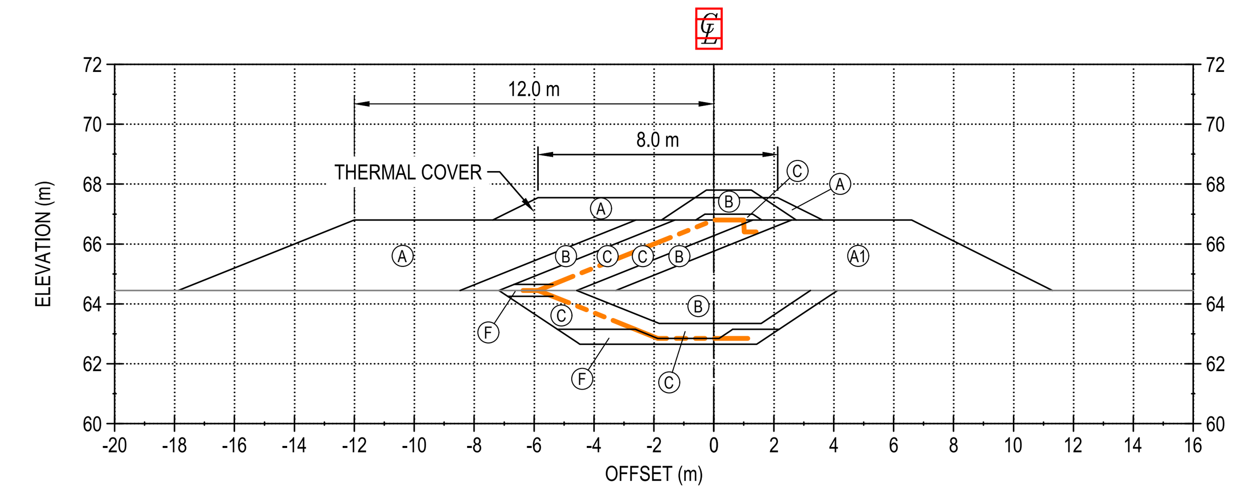

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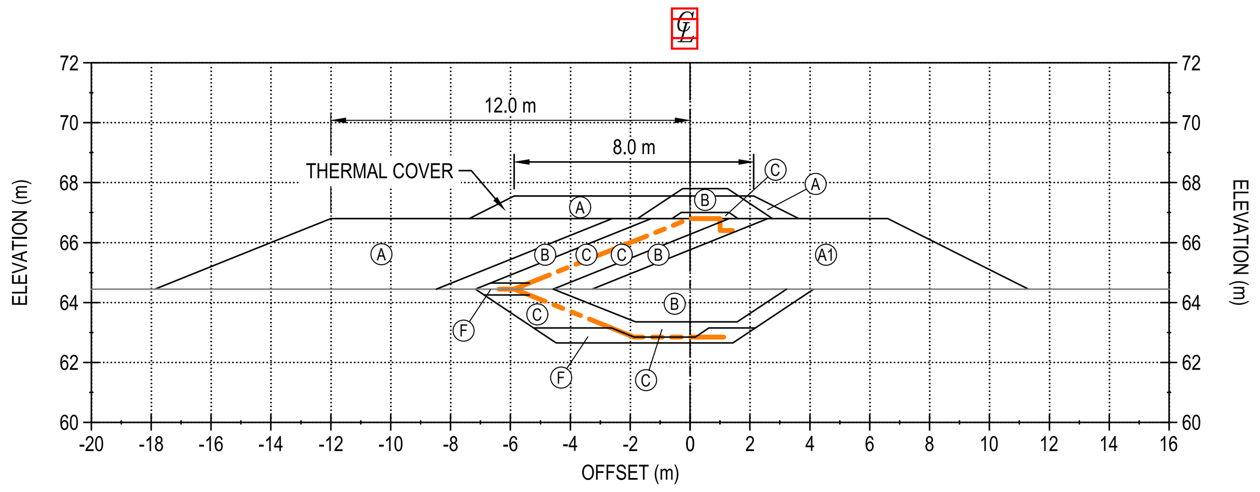

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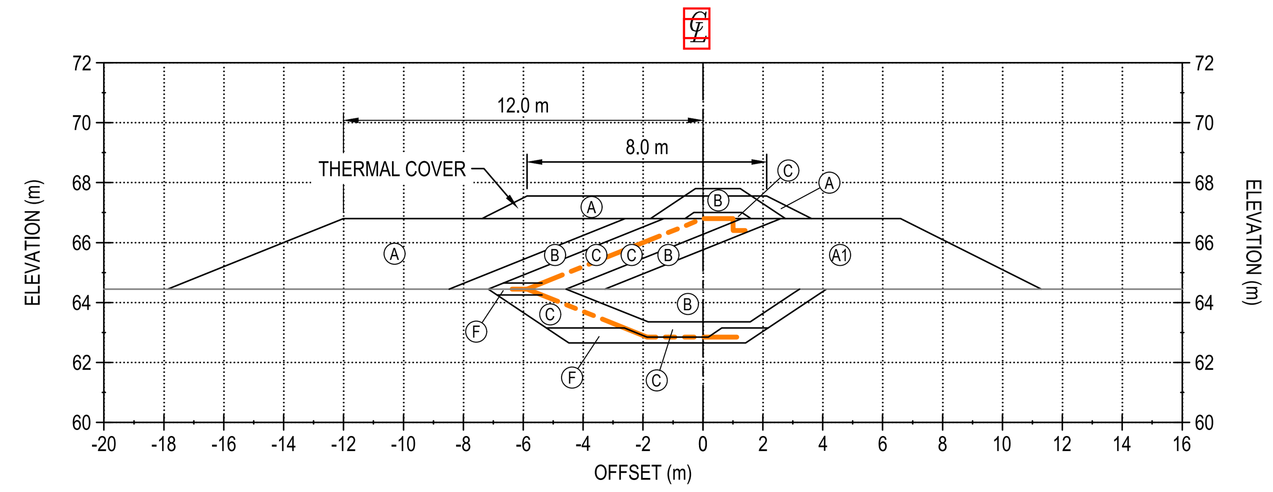

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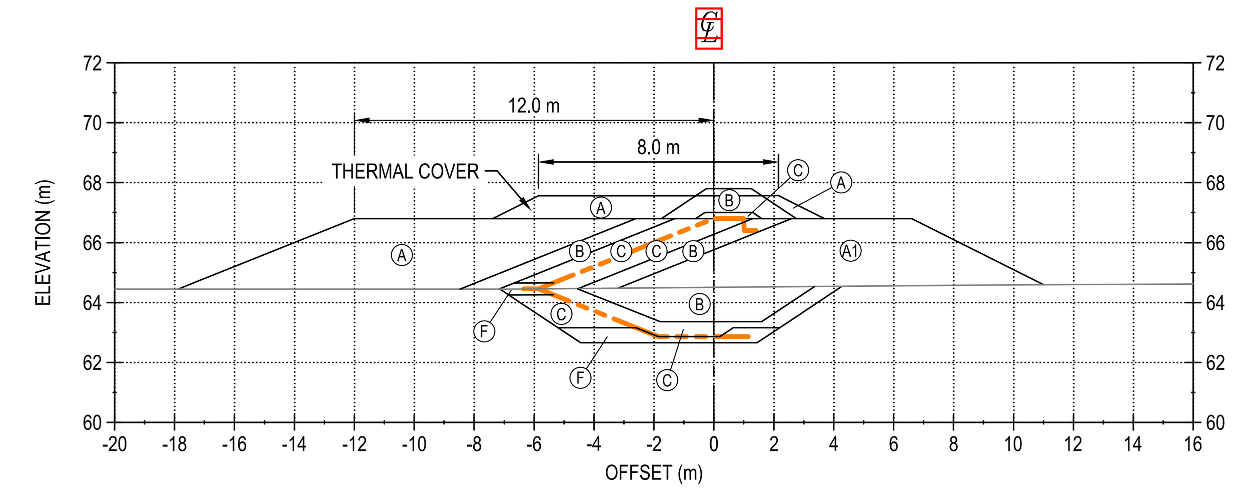

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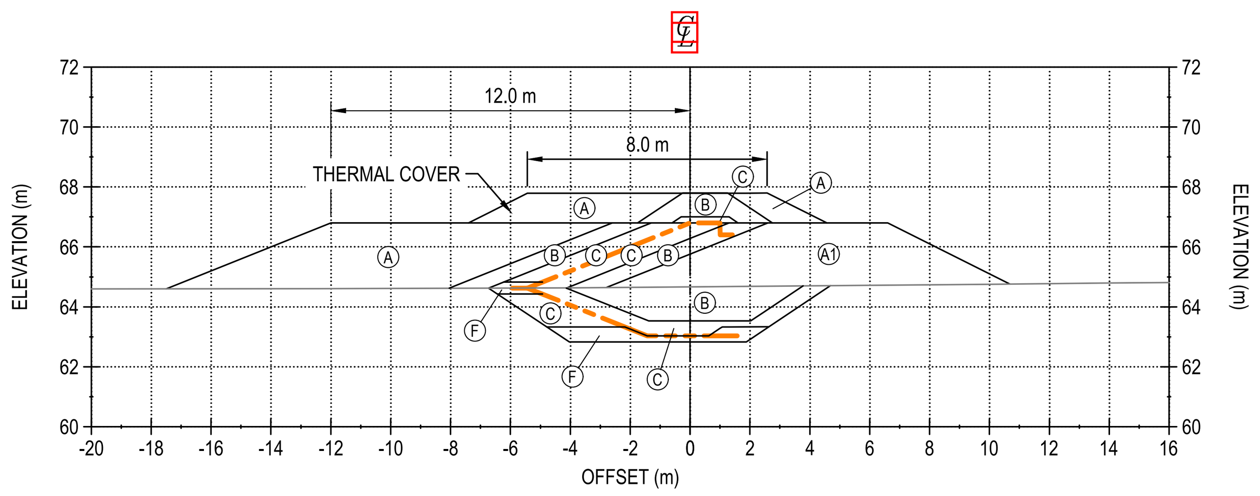

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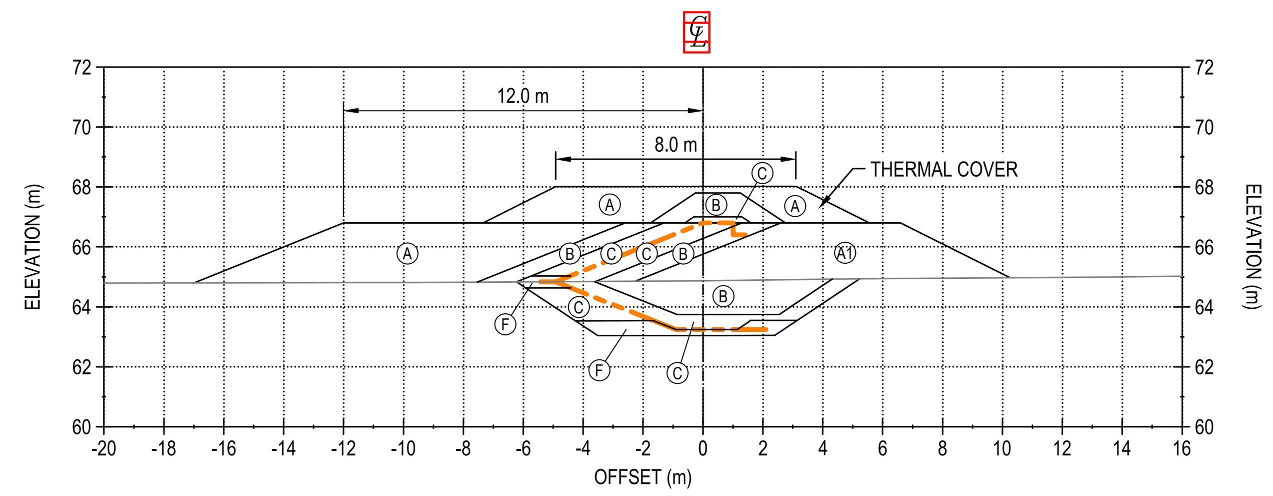

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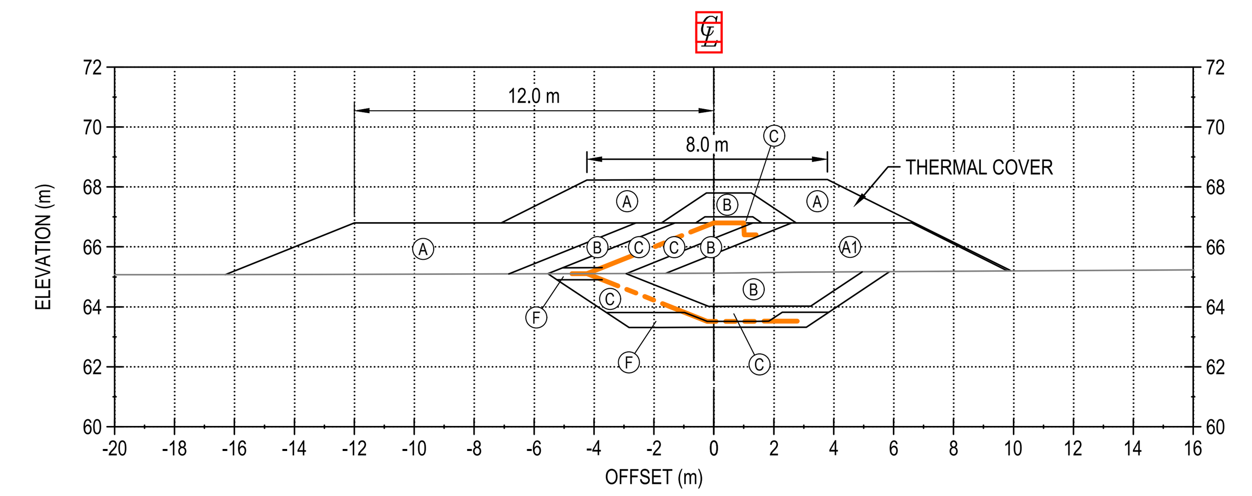

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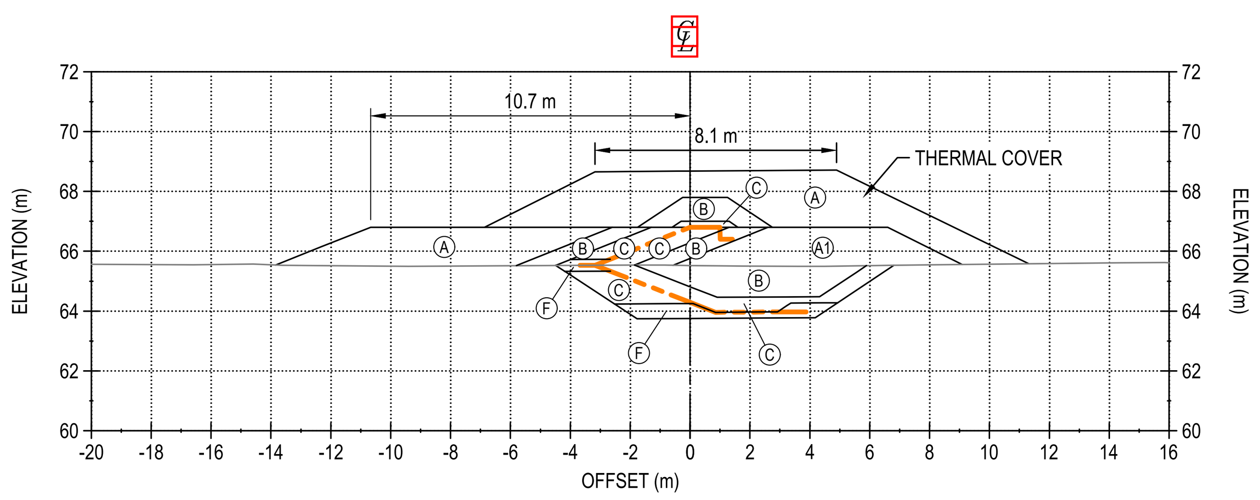

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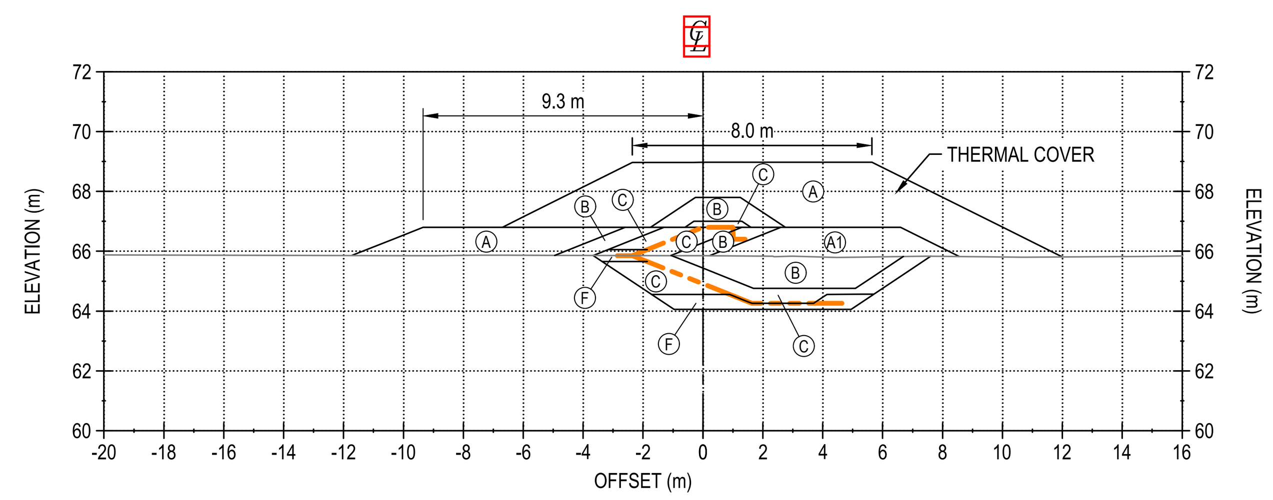

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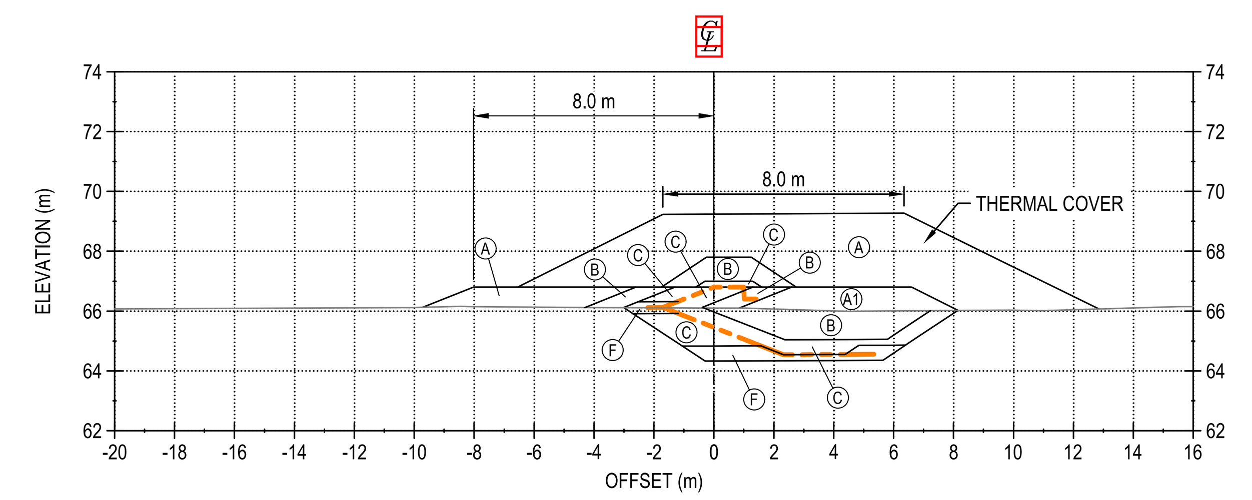

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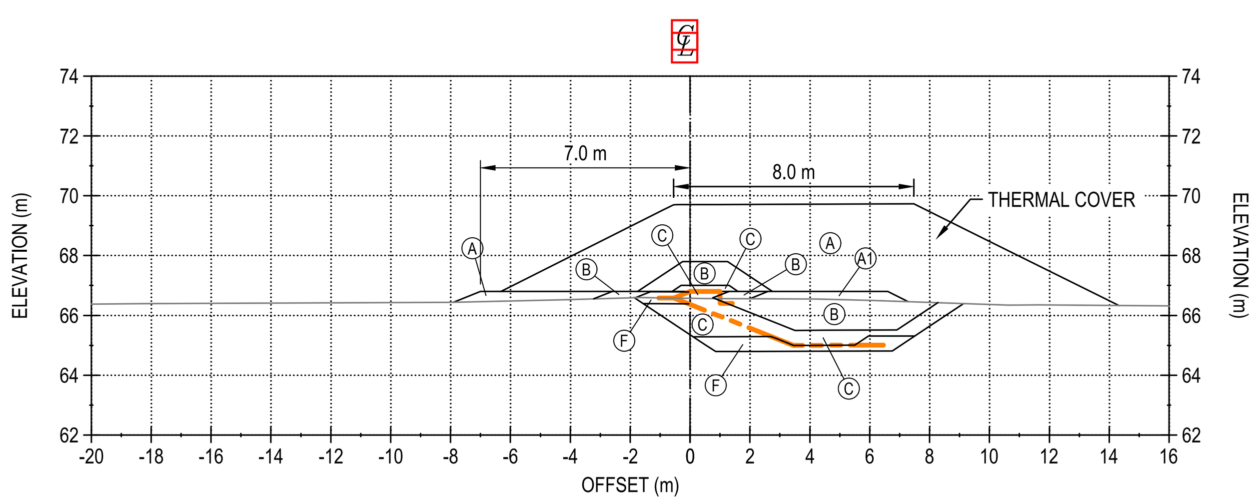

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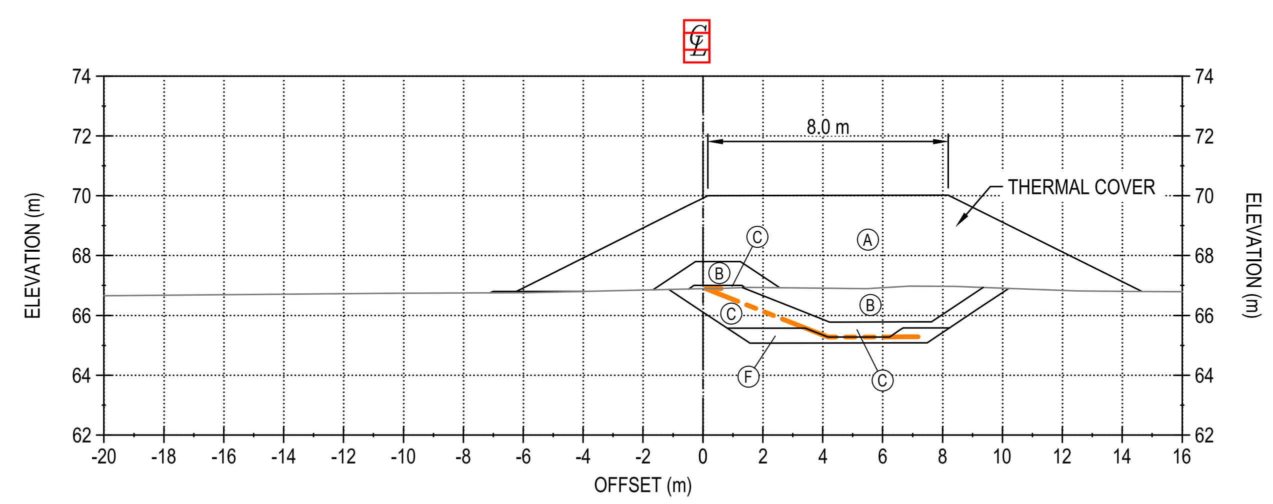
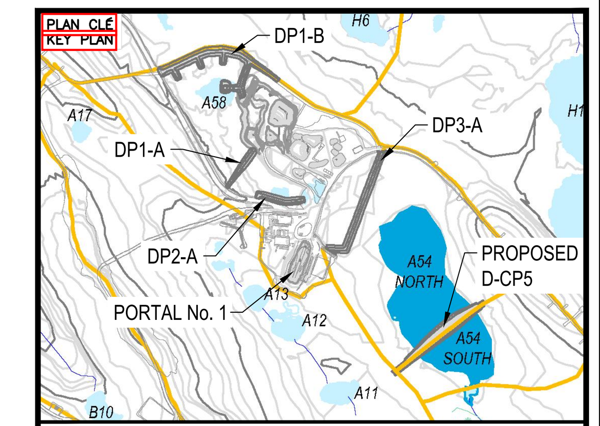


STATION 1+310

PLAN CLÉ / KEY PLAN



TETRA TECH EBA

NOTES GÉNÉRALES / GENERAL NOTES

LEGEND

- Ⓐ RUN-OF-MINE ROCKFILL (600 mm MINUS) IN DIKE UPSTREAM AND FOR THERMAL COVER
- Ⓐ1 RUN-OF-MINE ROCKFILL (600 mm MINUS) IN DIKE DOWNSTREAM
- Ⓑ TRANSITION ROCKFILL (150 mm MINUS)
- Ⓒ GRANULAR FILL OR ESKER SAND (20 mm MINUS)
- Ⓕ BENTONITE-AUGMENTED MATERIAL (MIXTURE OF BENTONITE AND TYPE C MATERIAL)

PERMIT TO PRACTICE
TETRA TECH EBA INC.
Signature
Date Aug 15, 2016
PERMIT NUMBER: P 018
NT/NU Association of Professional Engineers and Geoscientists

POUR CONSTRUCTION
FOR CONSTRUCTION
DATE : 2016-08-15
AGNICO EAGLE

DESSINS EN RÉFÉRENCE / REFERENCE DRAWINGS

TITRE / TITLE	# DWG

AGNICO EAGLE

REV.	DATE	DESCRIPTION	PAR/BY	APP.	CLIENT
0	2016-08-15	ISSUED FOR CONSTRUCTION	GZ	KJ	
A	2016-08-10	ISSUED FOR REVIEW	GZ	KJ	

REVISIONS

TITRE / TITLE
AGNICO EAGLE MELIADINE GOLD PROJECT

D-CP5 SECTIONS
STATION 1+180 TO 1+310

DESSINÉ PAR / DRAWN BY	EL	DATE	2016-08-15
VÉRIFIÉ PAR / CHECKED BY	GZ		2016-08-15
APPROUVÉ PAR / APPROVED BY	GZ		2016-08-15
ÉCHELLE / SCALE	1:200	DATE	2016-08-15

NO. DESSIN / DRAWING NO. 65-685-230-219-002

NO. PROJET / PROJECT NO.	REVISION	FEUILLE / SHT
6515	0	7 / 10

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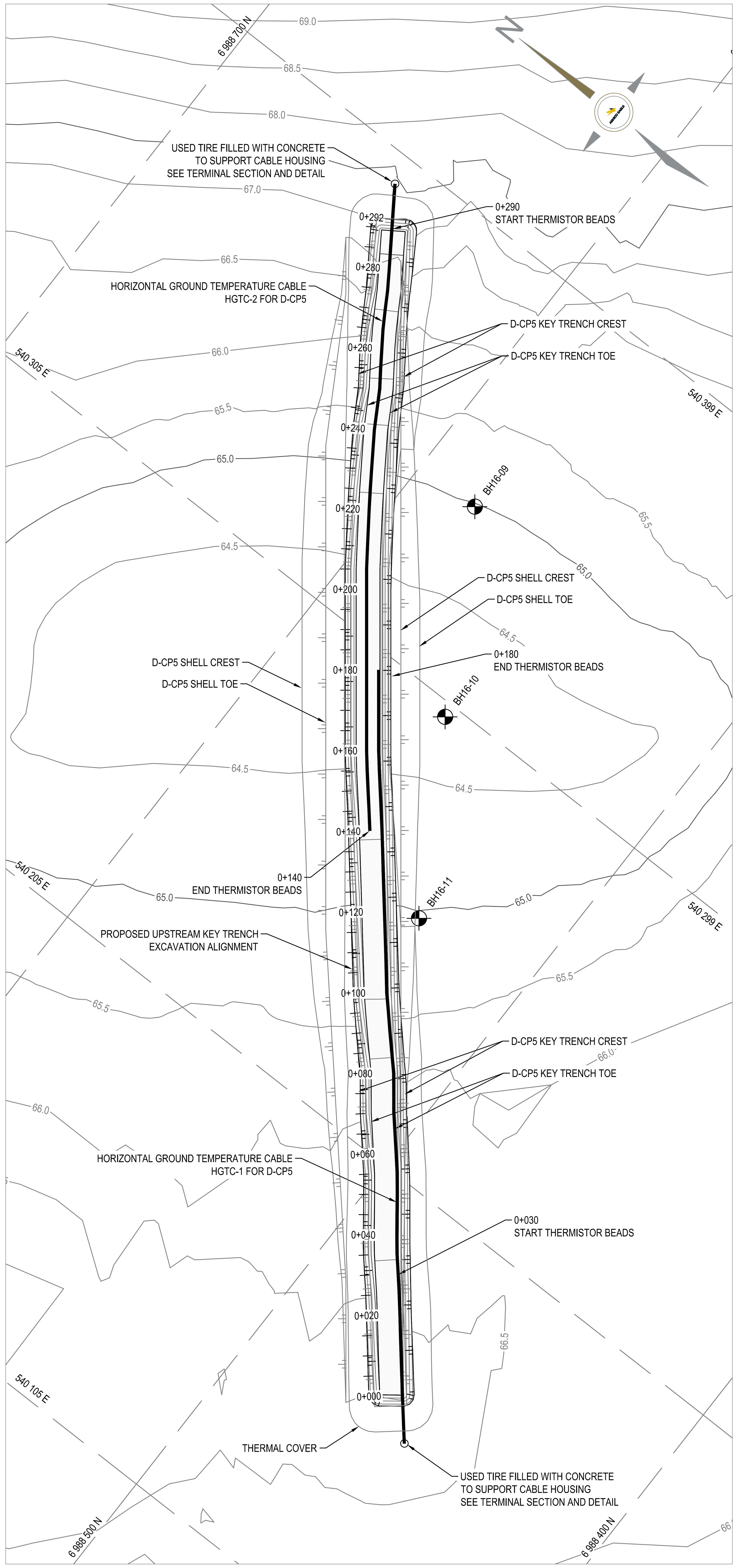
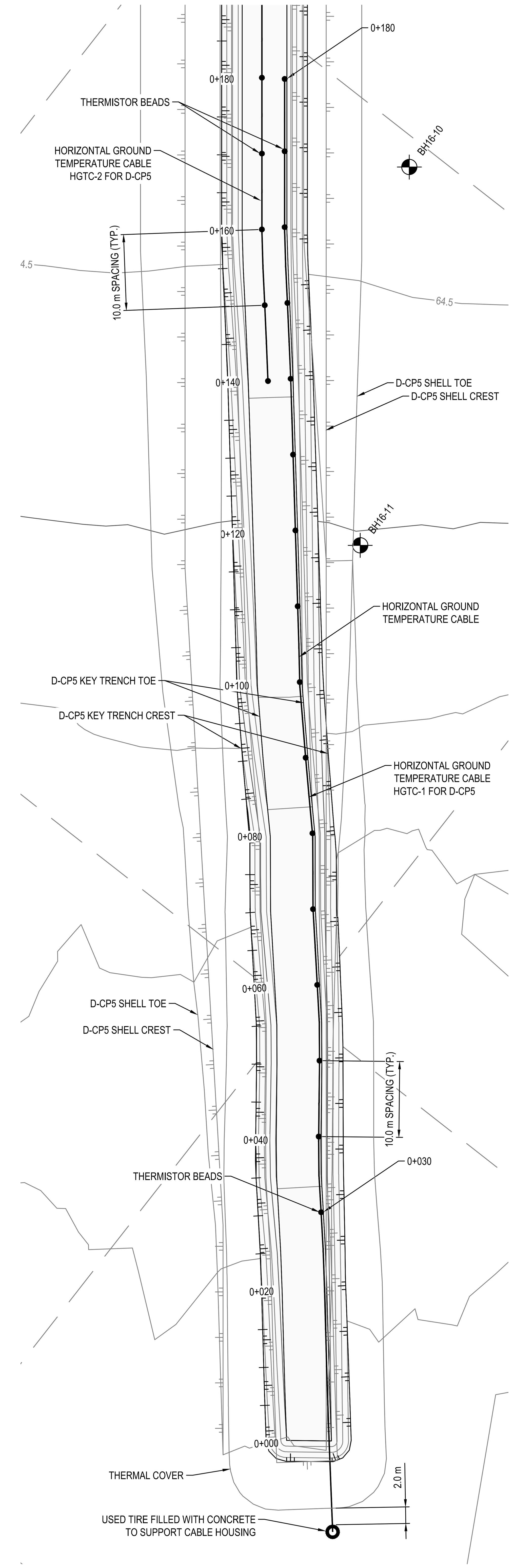
FILE NO. 65-685-230-219.dwg

NO. DESSIN / DRAWING NO. 65-685-230-220

FORMAT ARCHD



D-CP5 HORIZONTAL GROUND TEMPERATURE CABLE LAYOUT
SCALE: 1:750



D-CP5 HORIZONTAL GROUND TEMPERATURE CABLE LAYOUT – DETAIL
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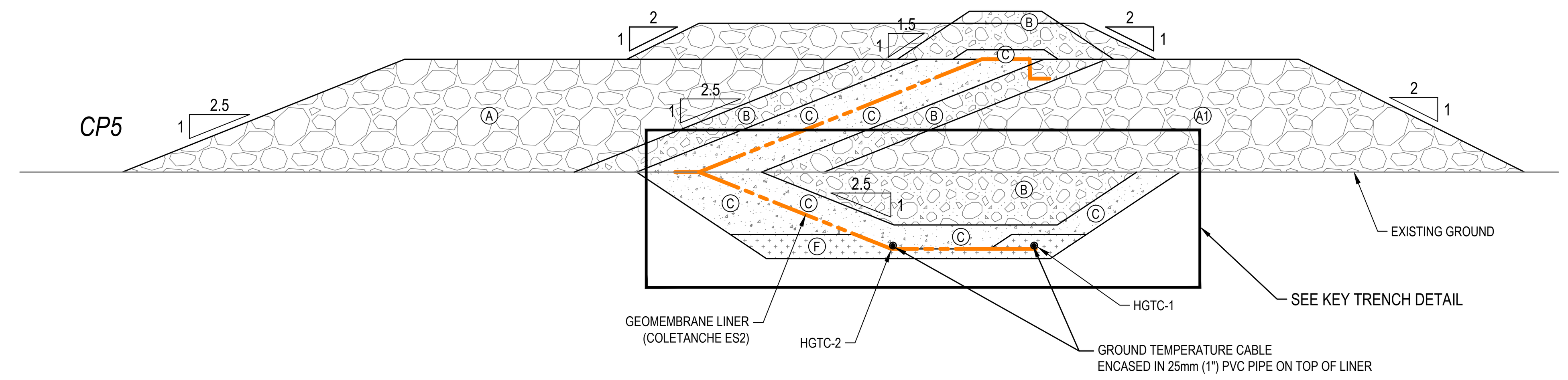
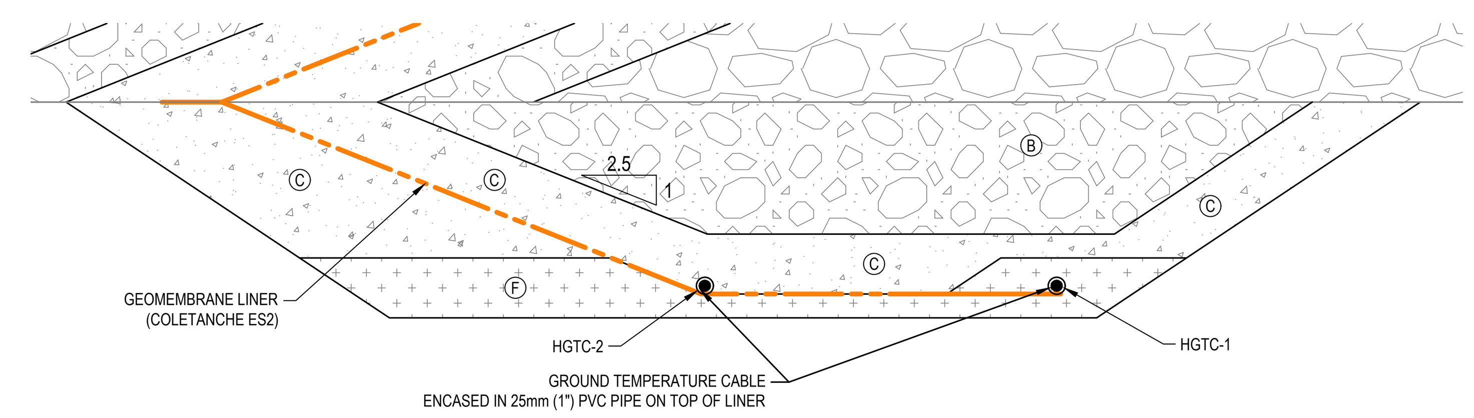
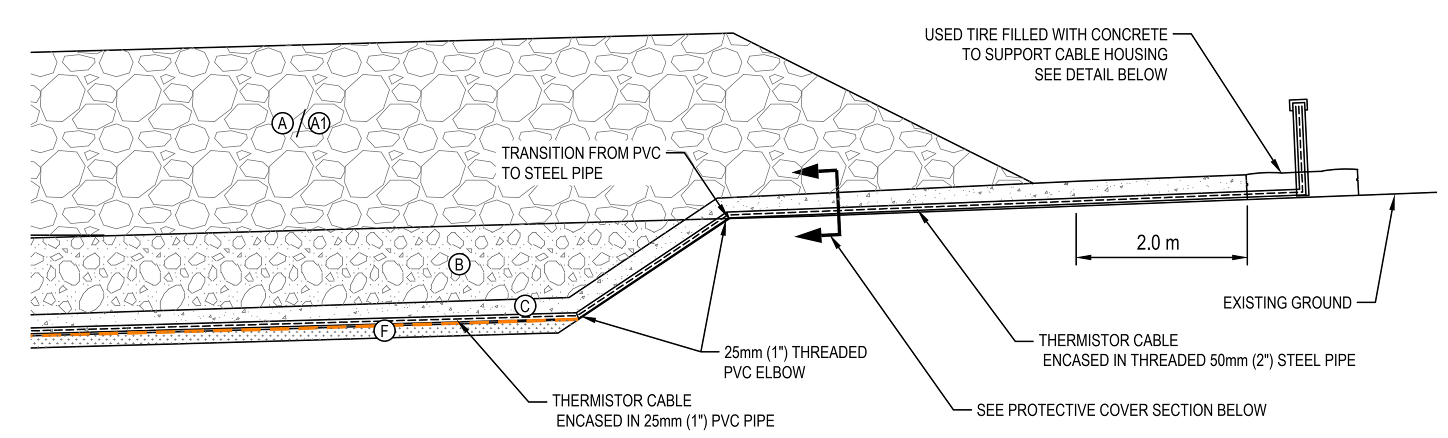


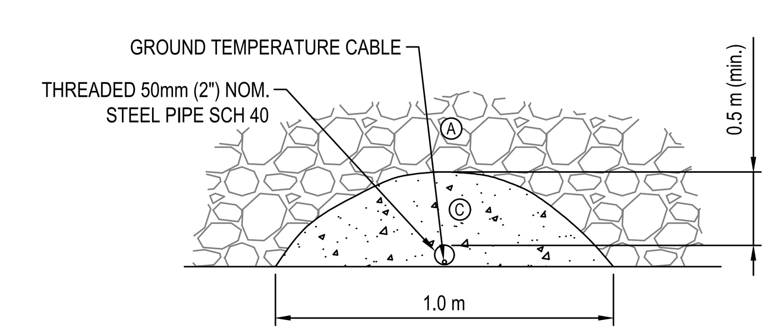
D-CP5 HORIZONTAL GROUND TEMPERATURE CABLE – SECTION 0+160
SCALE: 1:100



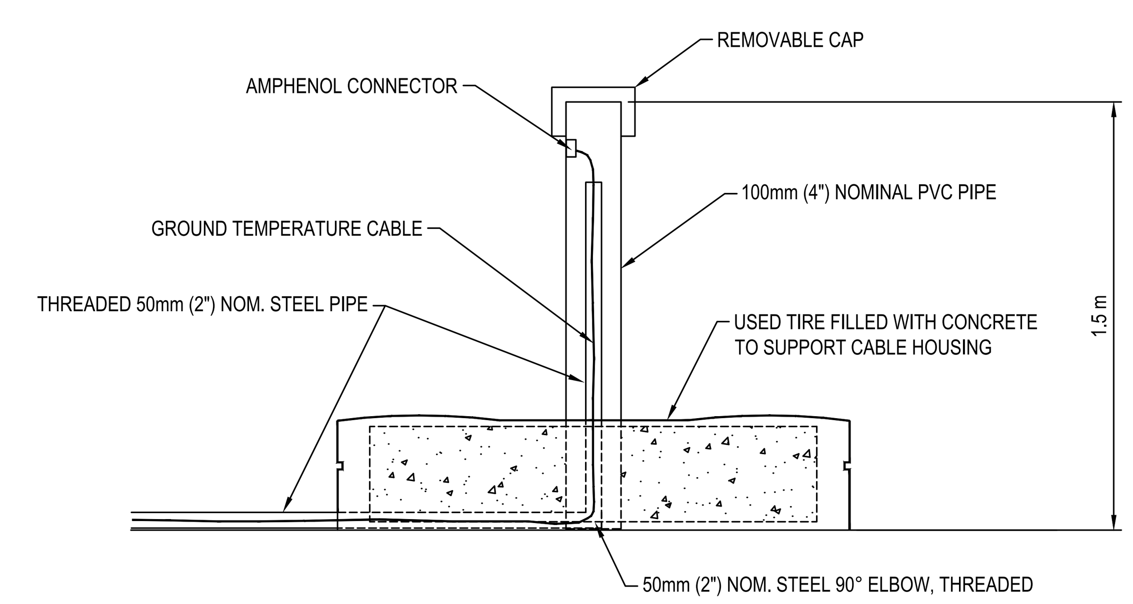
D-CP5 HORIZONTAL GROUND TEMPERATURE CABLE – KEY TRENCH DETAIL
SCALE: 1:50



D-CP5 HORIZONTAL GROUND TEMPERATURE CABLE – TERMINAL SECTION
SCALE: 1:100

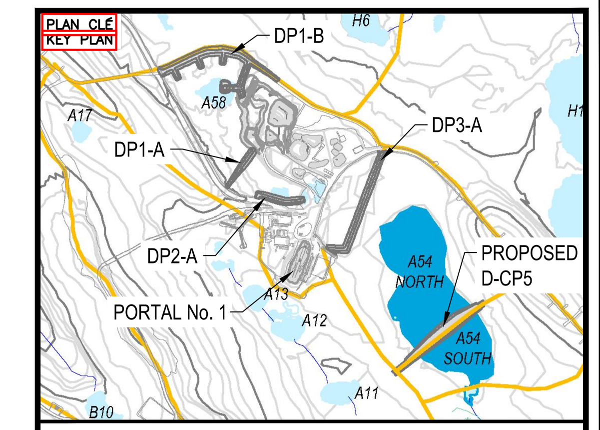


TEMPERATURE CABLE – PROTECTIVE COVER SECTION
SCALE: NTS



TEMPERATURE CABLE – TERMINAL SUPPORT DETAIL
SCALE: NTS

PLAN CLÉ / KEY PLAN



TETRA TECH EBA

NOTES GÉNÉRALES / GENERAL NOTES

PERMIT TO PRACTICE
TETRA TECH EBA INC.
Signature
Date Aug 15, 2016
PERMIT NUMBER: P 018
NT/NU Association of Professional Engineers and Geoscientists

POUR CONSTRUCTION / FOR CONSTRUCTION
DATE: 2016-08-15
AGNICO EAGLE

DESSINS EN RÉFÉRENCE / REFERENCE DRAWINGS

TITRE / TITLE	# DWG
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AGNICO EAGLE

REV.	DATE	DESCRIPTION	PAR/BY	APP.	CLIENT
0	2016-08-15	ISSUED FOR CONSTRUCTION	GZ	KJ	
A	2016-08-10	ISSUED FOR REVIEW	GZ	KJ	

REVISIONS

REGISTERED PROFESSIONAL ENGINEER G. ZHANG LICENSEE NWT/NU Aug. 15, 2016
REGISTERED PROFESSIONAL ENGINEER KEVIN W. JONES Aug. 15, 2016 LICENSEE NWT

TITRE / TITLE
AGNICO EAGLE MELIADINE GOLD PROJECT

D-CP5
INSTRUMENTATION PLAN AND DETAILS
FOR GROUND TEMPERATURE CABLES

DESSINÉ PAR / DRAWN BY	DRG	DATE 2016-08-08
VERIFIÉ PAR / CHECKED BY	GZ	2016-08-15
APPROUVÉ PAR / APPROVED BY	KJ	2016-08-15
ÉCHELLE / SCALE	AS SHOWN	DATE 2016-08-08

NO. DESSIN / DRAWING NO. 65-685-230-220

NO. PROJET / PROJECT NO.	REVISION	FEUILLE / SHT
6515	0	8 / 10

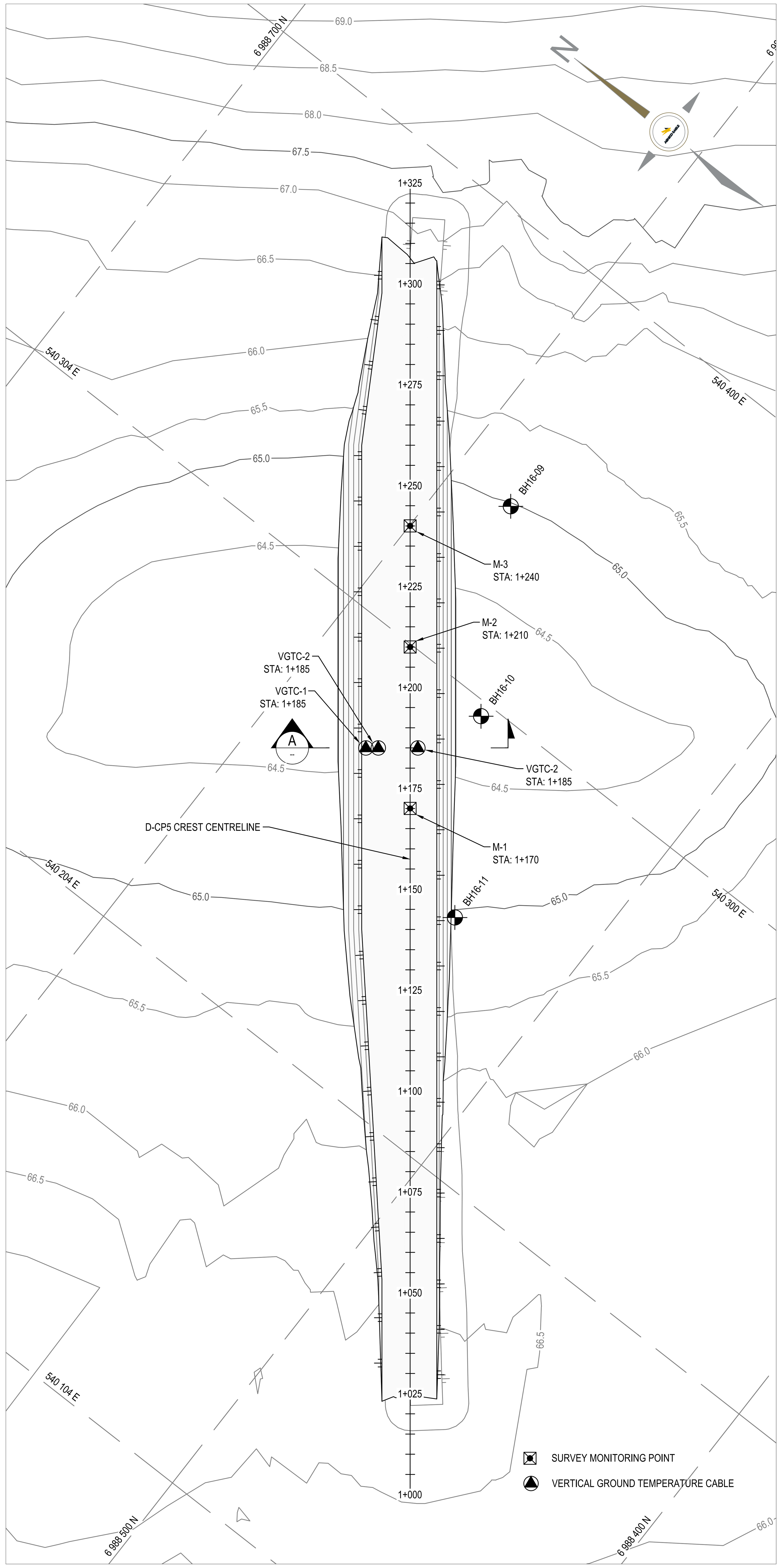
AE-CART-ARCH D

G:\Edmonton\Engineering\E141\Projects\E14103230_Block007_Meliadine Detail Design\Modelling\Production Drawings\D-CP5\Issued for Construction_Rev0\65-685-230-220.dwg-2016-08-15 14:00:31

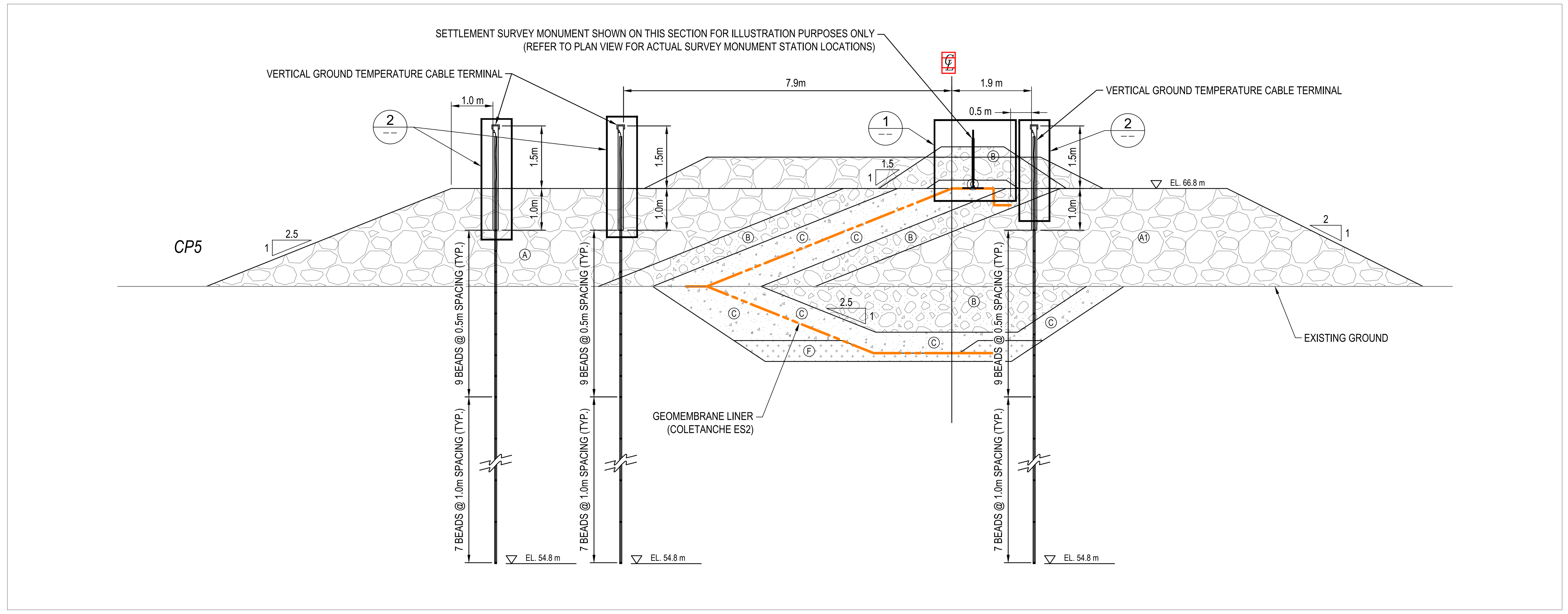
FILE NO. 65-685-230-220.dwg

NO. DESSIN / DRAWING NO. 65-685-230-221

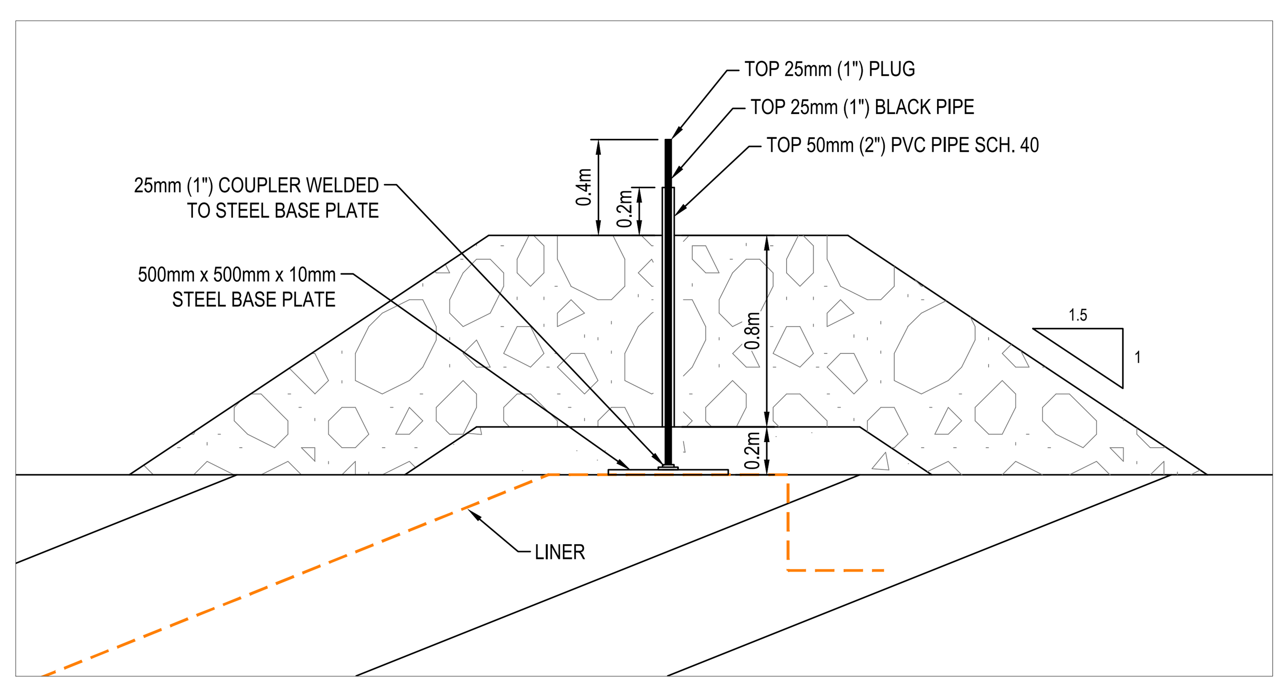
FORMAT ARCHD



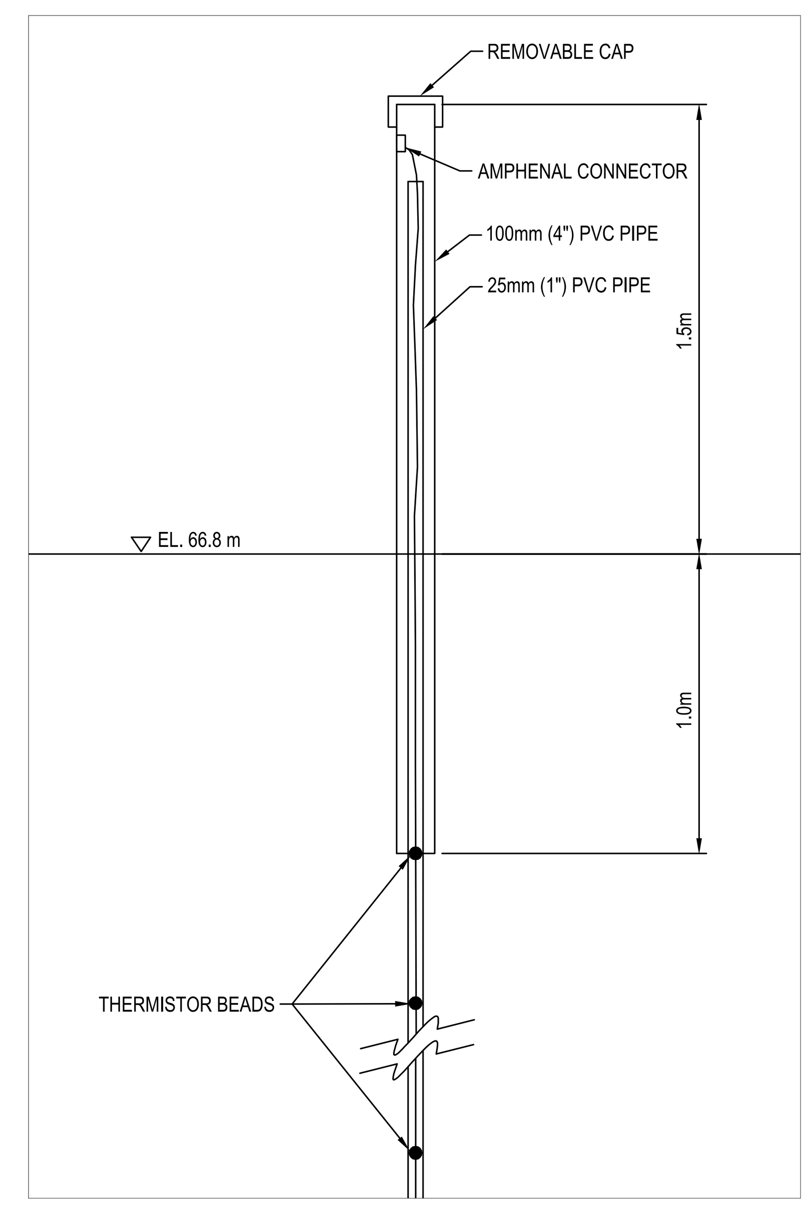
D-CP5 SURVEY MONUMENT AND VERTICAL GROUND TEMPERATURE CABLE LAYOUT
SCALE: 1:750



D-CP5 – SECTION A – VERTICAL GROUND TEMPERATURE CABLE – STATION 1+185
SCALE: 1:75

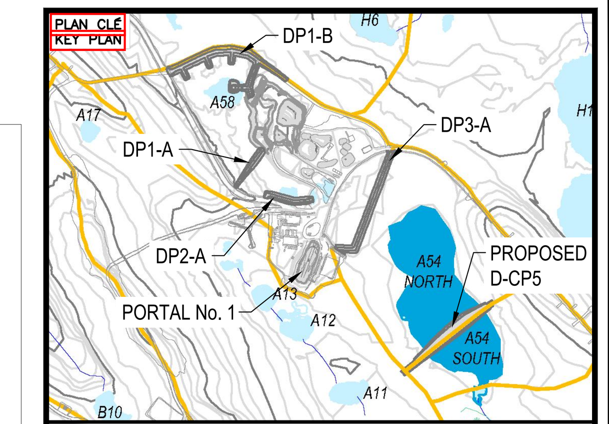


D-CP1 TYPICAL SETTLEMENT SURVEY MONUMENT DETAIL 1
SCALE: 1:25



D-CP1 TYPICAL VERTICAL GROUND TEMPERATURE CABLE TERMINAL DETAIL 2
SCALE: 1:20

PLAN CLÉ / KEY PLAN



TETRA TECH EBA

NOTES GÉNÉRALES / GENERAL NOTES

PERMIT TO PRACTICE
TETRA TECH EBA INC.
Signature
Date Aug. 15, 2016
PERMIT NUMBER: P 018
NT/NU Association of Professional Engineers and Geoscientists

POUR CONSTRUCTION
FOR CONSTRUCTION
DATE: 2016-08-15

DESSINS EN RÉFÉRENCE / REFERENCE DRAWINGS

TITRE / TITLE	# DWG

AGNICO EAGLE

REV.	DATE	DESCRIPTION	PAR/BY	APP.	CLIENT
0	2016-08-15	ISSUED FOR CONSTRUCTION	GZ	KJ	
A	2016-08-10	ISSUED FOR REVIEW	GZ	KJ	

REVISIONS

REGISTERED PROFESSIONAL ENGINEER G. ZHANG LICENSEE NWT/NU Aug. 15, 2016
REGISTERED PROFESSIONAL ENGINEER KEVIN W. JONES LICENSEE N.W.T. Aug. 15, 2016

TITRE / TITLE
AGNICO EAGLE MELIADINE GOLD PROJECT

D-CP5 – INSTRUMENTATION PLAN AND DETAILS
FOR GROUND TEMPERATURE CABLES
AND SETTLEMENT SURVEY MONUMENT POINTS

DESSINÉ PAR / DRAWN BY	DRG	DATE 2016-08-08
VERIFIÉ PAR / CHECKED BY	GZ	2016-08-15
APPROUVÉ PAR / APPROVED BY	KJ	2016-08-15
ÉCHELLE / SCALE	AS SHOWN	DATE 2016-08-08

NO. DESSIN / DRAWING NO. 65-685-230-221

NO. PROJET / PROJECT NO. 6515 | REVISION 0 | FEUILLE / SHT 9 / 10

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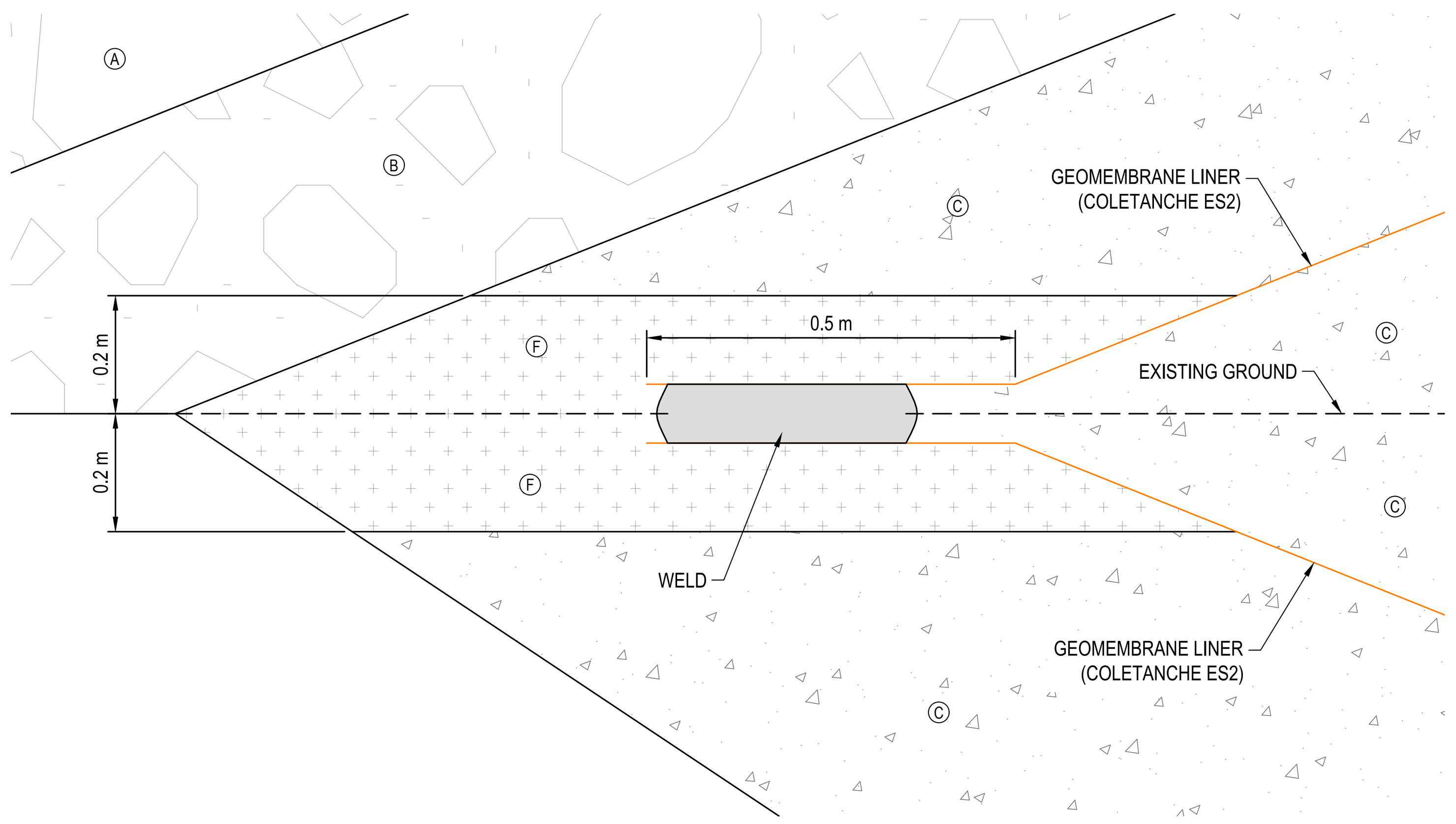
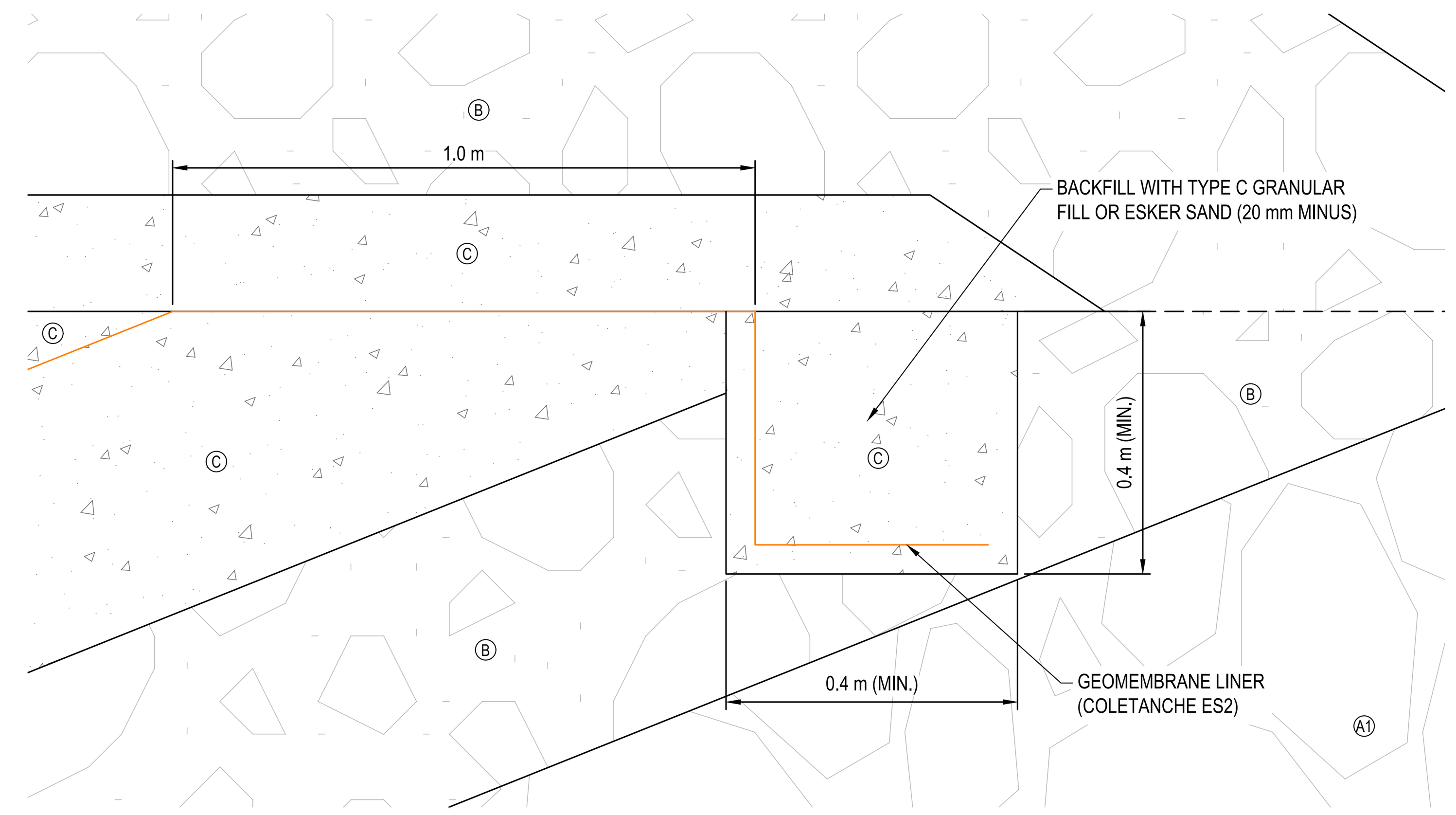
FILE NO. 65-685-230-221.dwg

NO. DESSIN / DRAWING NO. 65-685-230-222

FORMAT ARCHD

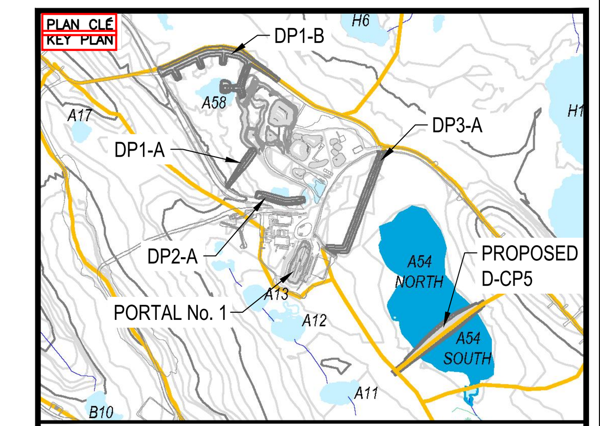


TYPICAL LINER WELDING AT HINGE POINT (3 / 218)
NOT TO SCALE



TYPICAL LINER KEY-IN AT CREST (4 / 218)
NOT TO SCALE

PLAN CLÉ / KEY PLAN



TETRA TECH EBA

NOTES GÉNÉRALES / GENERAL NOTES

LEGEND

- (A) RUN-OF-MINE ROCKFILL (600 mm MINUS) IN DIKE UPSTREAM AND FOR THERMAL COVER
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PERMIT TO PRACTICE
TETRA TECH EBA INC.
Signature [signature]
Date Aug 15, 2016
PERMIT NUMBER: P 018
NT/NU Association of Professional Engineers and Geoscientists

POUR CONSTRUCTION
FOR CONSTRUCTION
DATE : 2016-08-15
AGNICO EAGLE

DESSINS EN RÉFÉRENCE / REFERENCE DRAWINGS

TITRE / TITLE	# DWG

AGNICO EAGLE

REV.	DATE	DESCRIPTION	PAR/BY	APP.	CLIENT
0	2016-08-15	ISSUED FOR CONSTRUCTION	GZ	KJ	
A	2016-08-10	ISSUED FOR REVIEW	GZ	KJ	

REVISIONS

TITRE / TITLE
AGNICO EAGLE MELIADINE GOLD PROJECT

D-CP5
TYPICAL DETAILS

DESSINÉ PAR / DRAWN BY	EL	DATE	2016-08-15
VÉRIFIÉ PAR / CHECKED BY	GZ		2016-08-15
APPROUVÉ PAR / APPROVED BY	GZ		2016-08-15
ÉCHELLE / SCALE	N.T.S.	DATE	2016-08-15

NO. DESSIN / DRAWING NO. 65-685-230-222

NO. PROJET / PROJECT NO. 6515 | REVISION 0 | FEUILLE / SHT 10/10

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APPENDIX B

TETRA TECH EBA'S GENERAL CONDITIONS

GENERAL CONDITIONS

GEOTECHNICAL REPORT

This report incorporates and is subject to these "General Conditions".

1.0 USE OF REPORT AND OWNERSHIP

This geotechnical report pertains to a specific site, a specific development and a specific scope of work. It is not applicable to any other sites nor should it be relied upon for types of development other than that to which it refers. Any variation from the site or development would necessitate a supplementary geotechnical assessment.

This report and the recommendations contained in it are intended for the sole use of Tetra Tech EBA's Client. Tetra Tech EBA does not accept any responsibility for the accuracy of any of the data, the analyses or the recommendations contained or referenced in the report when the report is used or relied upon by any party other than Tetra Tech EBA's Client unless otherwise authorized in writing by Tetra Tech EBA. Any unauthorized use of the report is at the sole risk of the user.

This report is subject to copyright and shall not be reproduced either wholly or in part without the prior, written permission of Tetra Tech EBA. Additional copies of the report, if required, may be obtained upon request.

2.0 ALTERNATE REPORT FORMAT

Where Tetra Tech EBA submits both electronic file and hard copy versions of reports, drawings and other project-related documents and deliverables (collectively termed Tetra Tech EBA's instruments of professional service), only the signed and/or sealed versions shall be considered final and legally binding. The original signed and/or sealed version archived by Tetra Tech EBA shall be deemed to be the original for the Project.

Both electronic file and hard copy versions of Tetra Tech EBA's instruments of professional service shall not, under any circumstances, no matter who owns or uses them, be altered by any party except Tetra Tech EBA. Tetra Tech EBA's instruments of professional service will be used only and exactly as submitted by Tetra Tech EBA.

Electronic files submitted by Tetra Tech EBA have been prepared and submitted using specific software and hardware systems. Tetra Tech EBA makes no representation about the compatibility of these files with the Client's current or future software and hardware systems.

3.0 ENVIRONMENTAL AND REGULATORY ISSUES

Unless stipulated in the report, Tetra Tech EBA has not been retained to investigate, address or consider and has not investigated, addressed or considered any environmental or regulatory issues associated with development on the subject site.

4.0 NATURE AND EXACTNESS OF SOIL AND ROCK DESCRIPTIONS

Classification and identification of soils and rocks are based upon commonly accepted systems and methods employed in professional geotechnical practice. This report contains descriptions of the systems and methods used. Where deviations from the system or method prevail, they are specifically mentioned.

Classification and identification of geological units are judgmental in nature as to both type and condition. Tetra Tech EBA does not warrant conditions represented herein as exact, but infers accuracy only to the extent that is common in practice.

Where subsurface conditions encountered during development are different from those described in this report, qualified geotechnical personnel should revisit the site and review recommendations in light of the actual conditions encountered.

5.0 LOGS OF TESTHOLES

The testhole logs are a compilation of conditions and classification of soils and rocks as obtained from field observations and laboratory testing of selected samples. Soil and rock zones have been interpreted. Change from one geological zone to the other, indicated on the logs as a distinct line, can be, in fact, transitional. The extent of transition is interpretive. Any circumstance which requires precise definition of soil or rock zone transition elevations may require further investigation and review.

6.0 STRATIGRAPHIC AND GEOLOGICAL INFORMATION

The stratigraphic and geological information indicated on drawings contained in this report are inferred from logs of testholes and/or soil/rock exposures. Stratigraphy is known only at the locations of the testhole or exposure. Actual geology and stratigraphy between testholes and/or exposures may vary from that shown on these drawings. Natural variations in geological conditions are inherent and are a function of the historic environment. Tetra Tech EBA does not represent the conditions illustrated as exact but recognizes that variations will exist. Where knowledge of more precise locations of geological units is necessary, additional investigation and review may be necessary.

7.0 PROTECTION OF EXPOSED GROUND

Excavation and construction operations expose geological materials to climatic elements (freeze/thaw, wet/dry) and/or mechanical disturbance which can cause severe deterioration. Unless otherwise specifically indicated in this report, the walls and floors of excavations must be protected from the elements, particularly moisture, desiccation, frost action and construction traffic.

8.0 SUPPORT OF ADJACENT GROUND AND STRUCTURES

Unless otherwise specifically advised, support of ground and structures adjacent to the anticipated construction and preservation of adjacent ground and structures from the adverse impact of construction activity is required.

9.0 INFLUENCE OF CONSTRUCTION ACTIVITY

There is a direct correlation between construction activity and structural performance of adjacent buildings and other installations. The influence of all anticipated construction activities should be considered by the contractor, owner, architect and prime engineer in consultation with a geotechnical engineer when the final design and construction techniques are known.

10.0 OBSERVATIONS DURING CONSTRUCTION

Because of the nature of geological deposits, the judgmental nature of geotechnical engineering, as well as the potential of adverse circumstances arising from construction activity, observations during site preparation, excavation and construction should be carried out by a geotechnical engineer. These observations may then serve as the basis for confirmation and/or alteration of geotechnical recommendations or design guidelines presented herein.

11.0 DRAINAGE SYSTEMS

Where temporary or permanent drainage systems are installed within or around a structure, the systems which will be installed must protect the structure from loss of ground due to internal erosion and must be designed so as to assure continued performance of the drains. Specific design detail of such systems should be developed or reviewed by the geotechnical engineer. Unless otherwise specified, it is a condition of this report that effective temporary and permanent drainage systems are required and that they must be considered in relation to project purpose and function.

12.0 BEARING CAPACITY

Design bearing capacities, loads and allowable stresses quoted in this report relate to a specific soil or rock type and condition. Construction activity and environmental circumstances can materially change the condition of soil or rock. The elevation at which a soil or rock type occurs is variable. It is a requirement of this report that structural elements be founded in and/or upon geological materials of the type and in the condition assumed. Sufficient observations should be made by qualified geotechnical personnel during construction to assure that the soil and/or rock conditions assumed in this report in fact exist at the site.

13.0 SAMPLES

Tetra Tech EBA will retain all soil and rock samples for 30 days after this report is issued. Further storage or transfer of samples can be made at the Client’s expense upon written request, otherwise samples will be discarded.

14.0 INFORMATION PROVIDED TO TETRA TECH EBA BY OTHERS

During the performance of the work and the preparation of the report, Tetra Tech EBA may rely on information provided by persons other than the Client. While Tetra Tech EBA endeavours to verify the accuracy of such information when instructed to do so by the Client, Tetra Tech EBA accepts no responsibility for the accuracy or the reliability of such information which may affect the report.