

MUNICIPALITY OF ARCTIC BAY

**Operation & Maintenance Plan for
Municipal Water Licence Sewage
Disposal Facilities**

November 2024

Document Control

Date	Document Title	Author	Details
July 2012	Arctic Bay Waste Water Facility Operations and Maintenance Manual Volumes 1 and 2	exp Services Inc.	Previous manual
November 2024	Municipality of Arctic Bay Operation & Maintenance Plan for Municipal Water License: Sewage Disposal Facilities	GN-CGS and Dillon Consulting Ltd.	Consolidation of information and update of information and previous manual into standardized template

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1.0 Site Description

Date this plan was prepared: 2024-Nov-16

1.1 Location of the Sewage Disposal Facility (SDF)

Municipality: Arctic Bay
Latitude: 73°02'28"N
Longitude: 85°05'28"W
Proximity to Town: 1.5km East



Figure 1: Arctic Bay Sewage Disposal Facility from Google Earth, 2024

1.2 SDF Site Summary

Year of commissioning the SDF: 2013

Design life of the SDF: 2033

1.2.1 Site History

The sewage treatment facility is located approximately 1.5 km East of the community. The facility was commissioned in 2013 and is comprised of a single cell lagoon, two truck discharge areas, and a wetland treatment area. Effluent flows approximately 700 metres through the wetland from the sewage detention cell to the marine environment of Victor Bay.

The sewage lagoon was constructed in a small valley overlooking the decommissioned lagoons and Admiralty Inlet to the south and Victor Bay to the north. A new access road was constructed from the existing sewage lagoons to the new lagoon.

1.2.2 Ground Conditions

Permafrost is present in the soil; it recedes to approximately 1 metre below the surface in the summertime.

1.2.3 Treatment System

The Hamlet uses a single cell Sewage Lagoon system, which receives trucked wastewater, to treat Sewage generated by the community. The Lagoon system, which was constructed in 2013 and has a projected lifespan of 20 years, is complemented by a wetland area (a vegetative filter strip) that is used to further treat wastewater from the Sewage Lagoon system. The treated sewage effluent is pumped from the sewage disposal facility to the wetland area beginning mid-August and continuing until mid to late September. The end of the Vegetated Filter Strip Wetland Area is located approximately 700 metres from the discharge point of the sewage disposal facility, at Victor Bay.

2.0 Staff

2.1 Chief Administrative Officer

Name: Andre Larabie
Phone: 867-438-9917
Email: cao@arcticbay.ca

Responsibilities:

The CAO manages the municipal staff to ensure that:

- Proper operation of the SDF is carried out
- Sampling and inspections are completed
- Information under the water licence monitoring program is provided to the Government of Nunavut Department of Community and Government Services (GN-CGS) for Annual Report preparation
- Submission of the Annual Report for the Nunavut Water Board (NWB)

2.2 Foreman

Name: Sam Willie
Phone: 867-439-8260
Email: foreman@arcticbay.ca

Responsibilities:

- Daily operations and maintenance of the SDF.
- The sampling program at the monitoring stations
- Maintaining signage at the SDF and monitoring stations
- Annual decanting of the lagoon effluent into the adjacent wetland treatment area

2.3 Solid Waste Truck Drivers

Name: Various
Phone: N/A
Email: N/A

Responsibilities: The sewage vacuum truck drivers collect sewage from holding tanks within the municipality. Sewage is transported to the lagoon where it is deposited.

3.0 Health and Safety

All personnel working within the SDF must follow the Nunavut Safety Act and be made aware of potential health hazards associated with working around sewage and wastewater. This is imperative so individuals make a conscious effort to perform all necessary safety procedures to protect themselves, their co-workers and family members at home. Safety precautions include:

- Ensure all equipment is kept as clean as possible;
- Assume anything touched by sewage is contaminated;
- Protective clothing such as coveralls, gloves, boots, and safety glasses are to be provided to personnel and always worn when working around sewage;
- Workers must always wear protective gloves
- Work clothing is not worn home
- Workers must wash their hands with soap and water on a regular basis, especially before delivering drinking water, eating and before going home;
- Workers are prohibited from eating or drinking in and around the sewage vacuum trunks; and
- Workers must keep their vaccinations up to date.

4.0 Security and Control

Access Control of to the facility:

- Perimeter fencing around the SDF
- Signage
- 450 m restricted land use development setback surrounding the SDF

5.0 Wastewater Conveyance

Wastewater transportation:	Vacuum Truck
Annual volume of sewage collected:	Reported in Annual Report
Number of days per week sewage is collected:	5

5.1 Operations

- Sewage is collected Monday through Friday from holding tanks in residences and other buildings in the community. Sewage is collected using sewage vacuum trucks.
- The vacuum trucks pump out sewage from the building holding tanks and transport it to the detention cell.
- Sewage is deposited into the lagoon from the vacuum trucks using one of three offload chutes and concrete splash pads, located on the east side of the offload truck pad. The sewage truck backs up to one of the offload chutes and the release valve of the truck is opened. Bollards with railings have been placed in front of each offload chute for safety precautions. Sewage should be disposed in the south cell first until filled, then the smaller north cell.
- The volume of sewage discharged into the lagoon is estimated from the municipal water delivery records

5.2 Influent Volume

Table 1: Wastewater Generation Estimates

Year	Estimated Wastewater Volume (m ³)	Difference (%)
2015	29,072	0
2016	29,401	1.12
2017	29,696	0.99
2018	29,992	0.98
2019	30,288	0.97
2020	30,551	0.86
2021	30,818	0.87
2022	31,109	0.94
2023	31,405	0.94

6.0 SDF Design

Lagoon Capacity:	59,900 m ³
Lagoon Dimensions:	700m x 150m
Wetland Treatment Area:	11.2 Hectares
Wetland Hydraulic Retention Time:	Unknown
Effluent Path Length:	700 m
Discharge Method:	Decant
Final Receiving Body:	Victor Bay
Type of Receiving Environment:	Marine

An overview of the wastewater treatment process:

Sewage is discharged into the detention cell year-round. The detention cell provides primary treatment of sewage as effluent is held in the impervious cell for a period of time. In August, the filter strip wetlands are ice-free and considered active. The lagoon is decanted during this stage to provide a continuous release of effluent over the wetland during the optimal period for treatment. Sewage trucks will continue discharging to the lagoon throughout the decanting process. The natural wetland provides the post-lagoon final treatment prior to the release into Victor Bay.



Figure 2: Seasonal Effluent Flow Through the Wetland Treatment Area

Description of the Final Receiving Environment:

Victor Bay is a marine environment located approximately 700 metres away from the lagoon. Victor Bay extends from Admiralty Inlet, which sustains a large population of narwhals. Caribou, polar bears, and walrus frequent the area.

7.0 Effluent Discharge

Discharge Method:	Decant
Time of Decant:	August to September
Duration of Decant:	1 month
Average Discharge Flowrate:	Unknown

Description of Effluent Sampling Procedures:

Per water license 3BM-ARC1924, the Municipality is required to measure and record, in cubic metres, the monthly and annual quantities of raw sewage offloaded from trucks and the number of days of use for the Sewage Disposal Facilities. The Municipality is also required to measure and record, in cubic metres, the monthly and annual quantities of effluent pumped from Monitoring Program Station ARC-4, as well as sample, measure the quantity, and analyze the quality of any sludge removed from the Wastewater Treatment Facility in accordance with procedures developed for the approved Operations and Maintenance Plan. The results must be reported within the Annual Report. All sampling, sample preservation, and analyses must be conducted in accordance with methods prescribed in the current edition of Standard Methods for the Examination of Water and Wastewater, or by such other methods approved by the Board in writing. All analyses must be performed by a laboratory accredited according to ISO/IEC Standard 17025. The accreditation should be current and in good standing.

Description of Operations:

Daily operational duties include:

- Collection of municipal wastewater from holding tanks and delivery to the sewage lagoon system.
- Minimize spills, and immediately clean up when they occur.
- Repairs to equipment when breakdowns occur.
- Maintain road, discharge point, and truck turning pads free of snow.
- Record Operation and Maintenance information as required.

Weekly operational duties include:

- Remove non-sewage materials from the lagoon. Floating materials such as plastic bags should be removed, and solid waste items disposed at the solid waste site adjacent to the lagoon.
- Assess truck discharge location and containment berms for erosion.

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- Record Operation and Maintenance information as required.

Monthly operational duties include:

- Preventative measures and maintenance on sewage trucks.
- Assess inventory of parts for truck maintenance.
- Grade and maintain the access road as required.
- Conduct monitoring program as required.
- Record Operation and Maintenance information as required.

Yearly operational duties include:

- Carry out decanting process during the designated timeframe.
- Conduct annual monitoring program.
- Decanting pump maintenance.
- Review the operation and maintenance records to evaluate the effectiveness of the sewage treatment system and plan for the upcoming year.

8.0 Maintenance

Overview of Maintenance Activities:

- Annual inspections will be undertaken by Crown Indigenous Relations and Northern Affairs Canada (CIRNAC) accompanied by a licensee from the Municipality of Arctic Bay and/or a licensee representative from GN-CGS. The inspection report and recommendations will be reviewed by a GN-CGS municipal engineer and submitted in the Annual Report submitted to the Nunavut Water Board (NWB).
- Regular visual inspections by municipal staff of the:
 - Offload chutes
 - Lagoon berms
 - Signage

Any issues identified by municipal staff must be reported to the regional municipal engineer. Follow-up actions will be undertaken by the municipality with support from the GN-CGS.

Sludge Management:

It is anticipated that the sewage lagoon will not require desludging during its 20-year design life, the available storage for sludge is greater than the quantity estimated to be generated.

The effluent quality will guide the Hamlet if or when a sludge management program is implemented. Monitoring of the effluent from the lagoon will indicate when the performance of the lagoon starts to degrade. Degradation of the performance of a lagoon is normally caused by sludge accumulation and will be the indicator to desludge the lagoon.

Prior to disposal, the sludge must be tested to ensure the disposal method chosen is safe and environmentally responsible. Evaluating the analytical results obtained by sludge sampling, the Government of Nunavut defaults to criteria established by the Canadian Council of Ministers of the Environment (CCME). For soil, the CCME Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health (updated September 2007) is used to compare the metals and VOC analytical results. The CCME has also established the Canada-Wide Standards (CWS) for Petroleum Hydrocarbons (PHC) in Soil (April 2001), which is the federal remedial standard for petroleum impacted soils. The CCME and CWS criteria are based on four land use categories: i) agricultural; ii) residential/parkland; iii) commercial; and iv) industrial. As the

sludge is to be disposed of at the landfill site, the industrial land use category is utilized for assessing the sludge management.

Surface Water Management:

Runoff from the Sewage Disposal Facility is monitored on an annual basis so that grading directs surface water away from the lagoon berms.

At some point, for a variety of reasons, impacted surface water may accumulate in the SDF. The water may or may not be impacted by contaminants from sewage. In the event this occurs, the following procedures will be followed:

1. Collect samples from the water licence monitoring program at stations as outlined in the Environmental Monitoring Program and QA/QC Plan. It is recognized that it may take some time for results to be received from the accredited laboratory.
2. Analyze samples for parameters of concern and compare the results to the relevant Canadian Water Quality Guidelines.
3. Water should be inspected for odours, stain, or signs of visible impact (sheens, floating scum).
4. Consult with the GN-CGS municipal engineer and CIRNAC on discharge options.

9.0 Monitoring

Regulatory Inspection: The annual CIRNAC inspection will take place accompanied by the licensee from the Municipality and/or with a licensee representative from GN-CGS. The inspection report will be reviewed by a GN-CGS municipal engineer and submitted with the annual report.

Table 2: License Requirements Related to O&M of the SDF

Requirements	Reported
Monthly and annual quantities of wastewater disposal	Annual report submitted to NWB
Notice of commencement of monitoring program and observed flow	Notice given to the CIRNAC inspector
A summary of modifications and/or major maintenance work carried out on the SDF	Proposal submitted to NWB 60 days prior
A list of spills and unauthorized discharges.	Annual report submitted to NWB
A summary of any studies requested for the SDF and future planned studies planned	Annual report submitted to NWB
Monitoring Program Station ARC-4 shall not exceed the effluent quality limits: 120 mg/L BOD ₅ 180 mg/L TSS 1x10 ⁶ CFU/dl Fecal Coliform No visible sheen of Oil and grease 6-9 pH	Annual report submitted to NWB
A freeboard of 1.0 m in the lagoon must be maintained	Annual report submitted to NWB

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Table 3: Monitoring Program Station Location and Description

Station	Description	Latitude	Longitude
ARC-3	Raw Wastewater Discharge (South Berm)	73°02'25"	85°05'36"
ARC-4	Lagoon Pump Discharge (North Berm)	73°02'31"	85°06'02"
ARC-6b	Surface Water at the end of Wetland area	73°02'52"	85°07'21"
ARC-8	Sewage Sludge	73°02'28"	85°05'22"

10.0 Modifications and Upgrades

Planned modifications or upgrades:

There are no planned modifications or upgrades at this time.

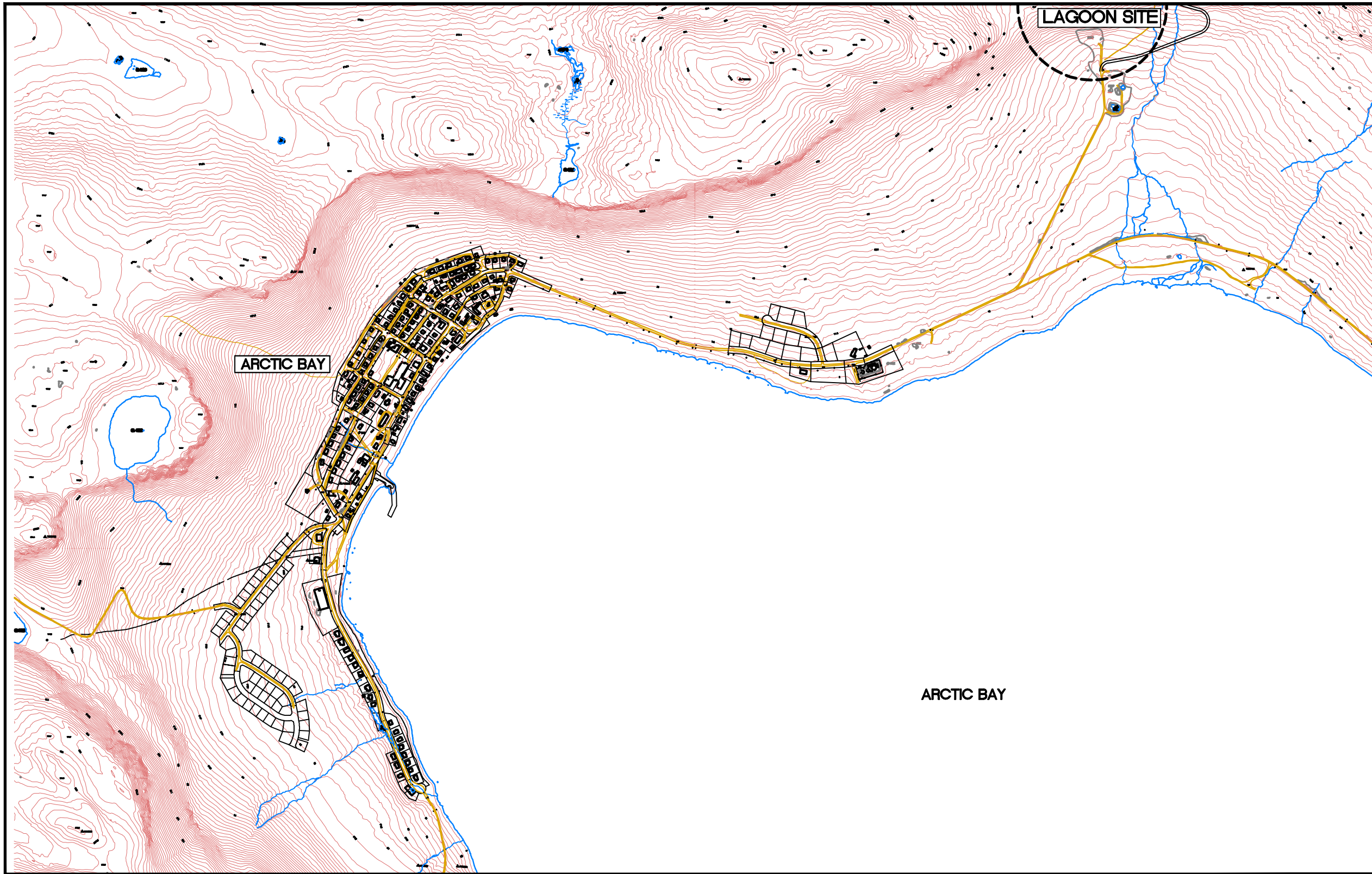
11.0 Previous Reports

- Arctic Bay Waste Water Facility Operations and Maintenance Manual Volumes 1 and 2, exp Services Inc., 2012

Appendix A

As-Built Drawings

GOVERNMENT OF NUNAVUT



INDEX OF INCLUDED DRAWINGS

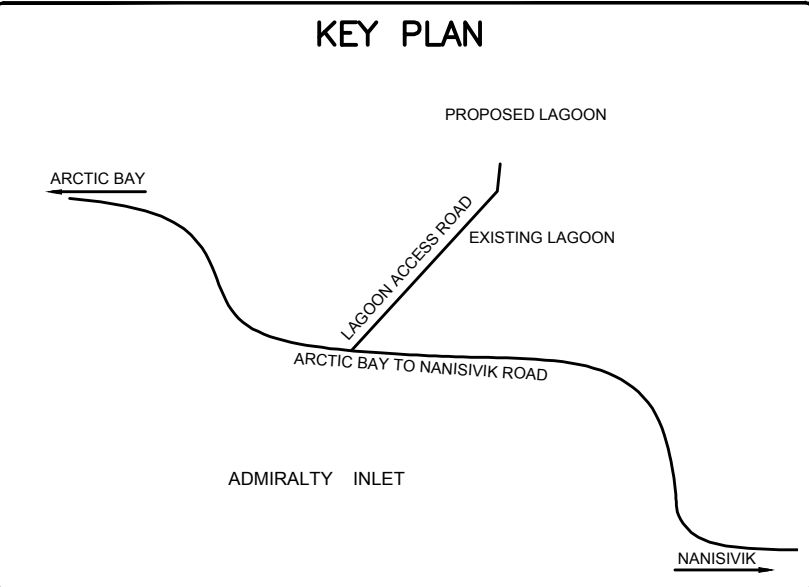
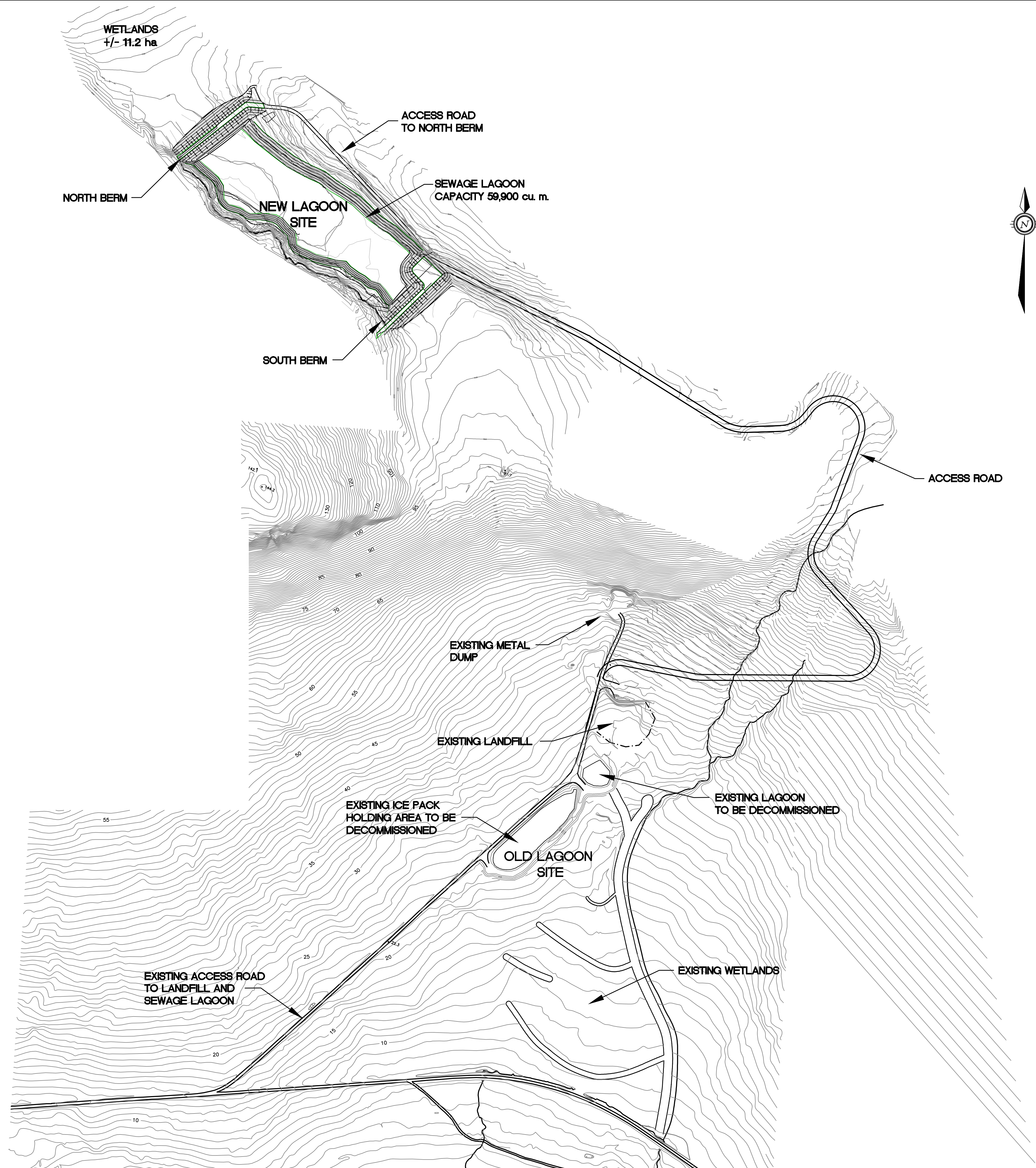
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OTCD00019054A-L1	REV 4	PROPOSED LAGOON
OTCD00019054A-TD1	REV 4	TRUCK DISCHARGE PLAN
OTCD00019054A-DE1	REV 4	DETAILS
OTCD00019054A-DE2	REV 4	DETAILS
OTCD00019054A-SLP1	REV 4	SIGNAGE LOCATION PLAN
OTCD00019054A-CS1	REV 4	CROSS SECTIONS

ARCTIC BAY WASTEWATER LAGOON

 **Trow** Associates Inc.
154 COLONNADE ROAD SOUTH PHONE (613) 225-9940
OTTAWA, ONTARIO K2E 7J5 FAX (613) 225-7337

AS-BUILT INFORMATION PROVIDED BY KUDLIK CONSTRUCTION LTD. NOVEMBER 2011

AS-BUILT
DATE: NOVEMBER 30, 2011



LEGEND

AS-BUILT

DATE: NOVEMBER 30, 2011

BENCH MARK

BM 1 ELEV. = 59.12

CONTOUR ELEVATIONS WERE DREIVED FROM NAD 83 CONTROL MONUMENT 7038914 LOCATED NORTH OF THE ARCTIC BAY AIRPORT UNDER CONSTRUCTION.

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3	AS-CONSTRUCTED	17/11/11	MEB	SLB
2	TENDER SET	27/04/09	MMR	SLB
1	ISSUED FOR APPROVAL	24/04/08	MMR	SLB
No.	DESCRIPTION	DATE	BY	APP'D
R E V I S I O N S				

DRAWINGS ORIGINALLY SEALED BY S.L.BURDEN, P.eng. OF exp. SERVICES Inc. APRIL 27TH, 2009

Trow Associates Inc.
154 Colonnade Road South
Ottawa, Ont. K2E 7J5
Tel:(613)225-9940
Fax:(613)225-7337

CLIENT

GOVERNMENT OF NUNAVUT

PROJECT

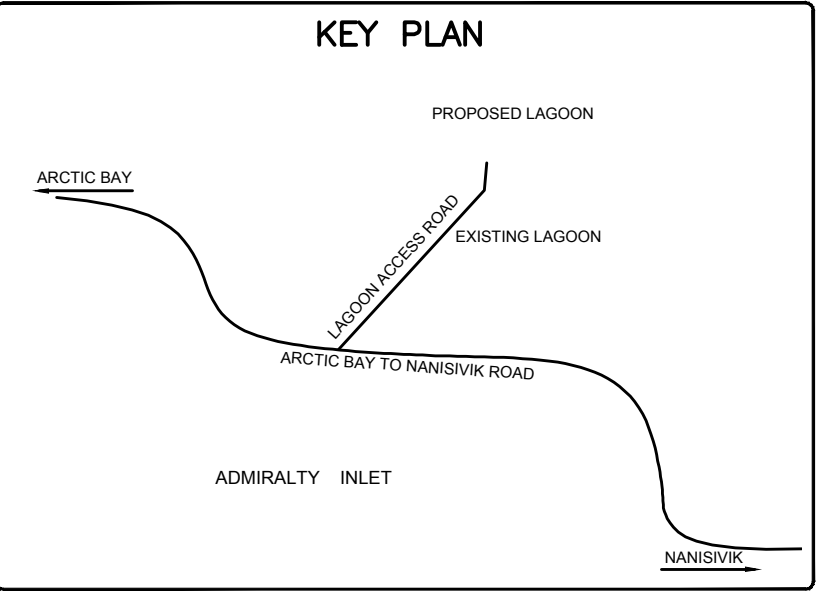
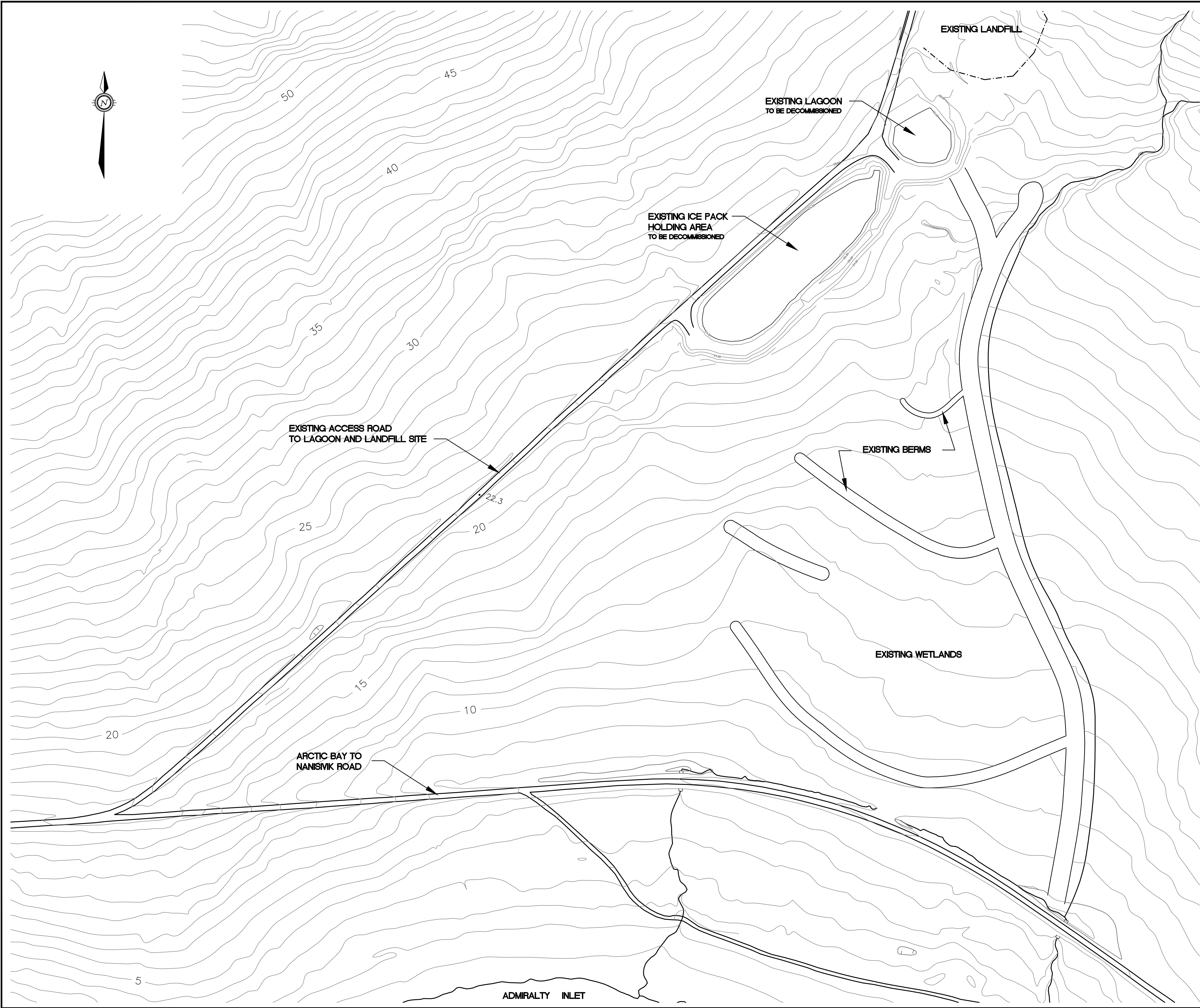
ARCTIC BAY WASTEWATER LAGOON

TITLE

OVERALL SITE PLAN

design by	SAD	project no.	OTCD000190544
drawn by	MEB	drawing no.	
checked by	SLB		
date	15/01/2008		
scale	HORIZ 1:2500		

OSP-1



LEGEND

AS-BUILT

DATE: NOVEMBER 30, 2011


BENCH MARK

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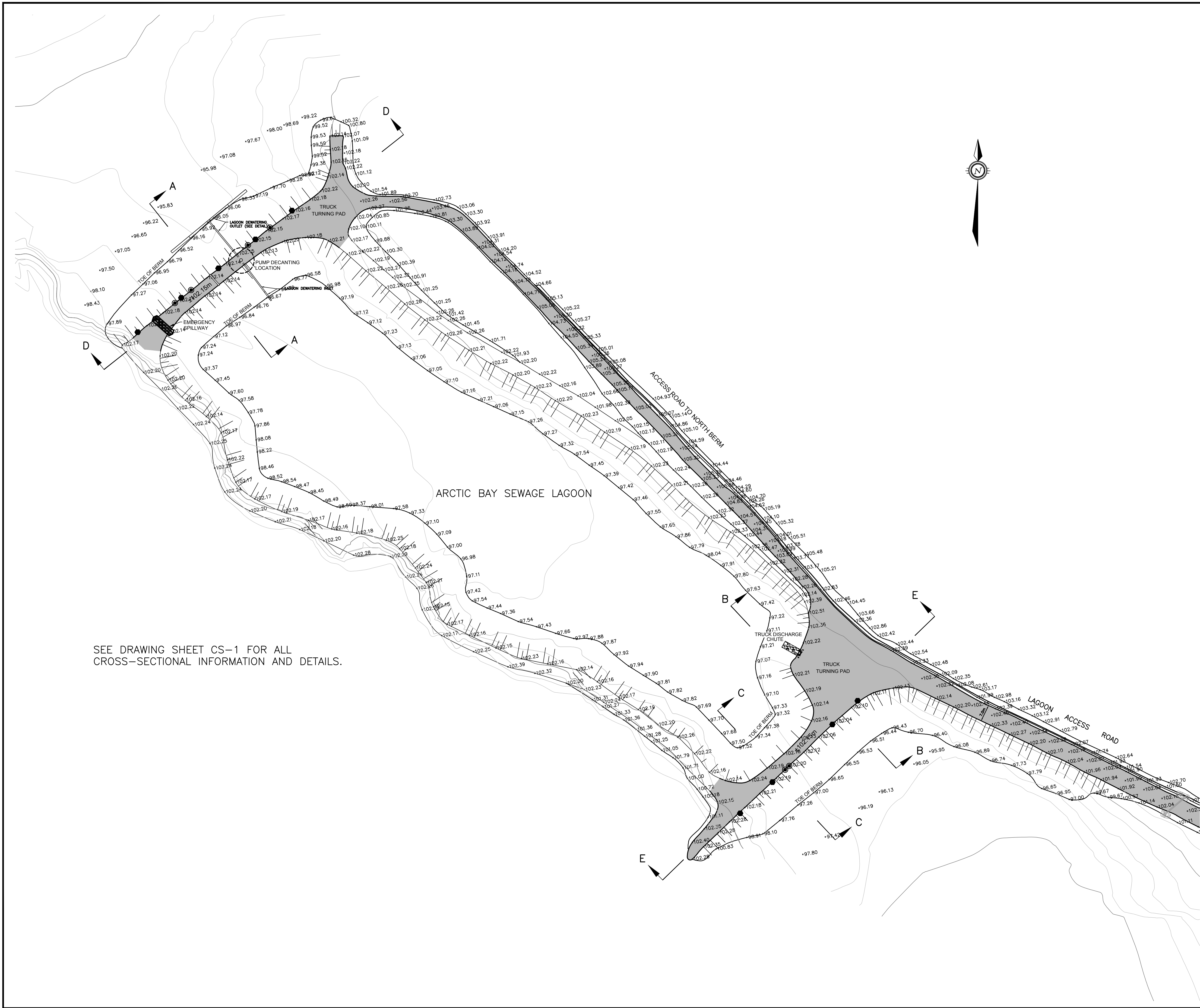
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GOVERNMENT OF NUNAVUT

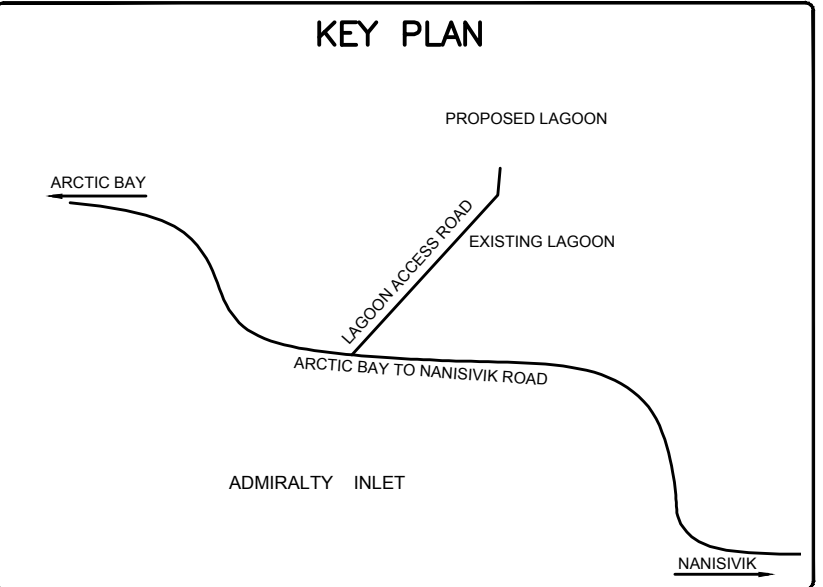
PROJECT

ARCTIC BAY WASTEWATER LAGOON

EXISTING SITE			
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drawn by	MEB	drawing no.	ES-1
checked by	SLB		
date	15/01/2008		
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SEE DRAWING SHEET CS-1 FOR ALL
CROSS-SECTIONAL INFORMATION AND DETAILS.



LEGEND

- BERM CORE DETECTION - THERMISTOR CASING GW THERMISTOR STRING AND DATA LOGGER CONNECTION
- SAMPLING POINT

AS-BUILT

DATE: NOVEMBER 30, 2011

BENCH MARK

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1	ISSUED FOR APPROVAL	24/04/08	MMR	SLB
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CLIENT

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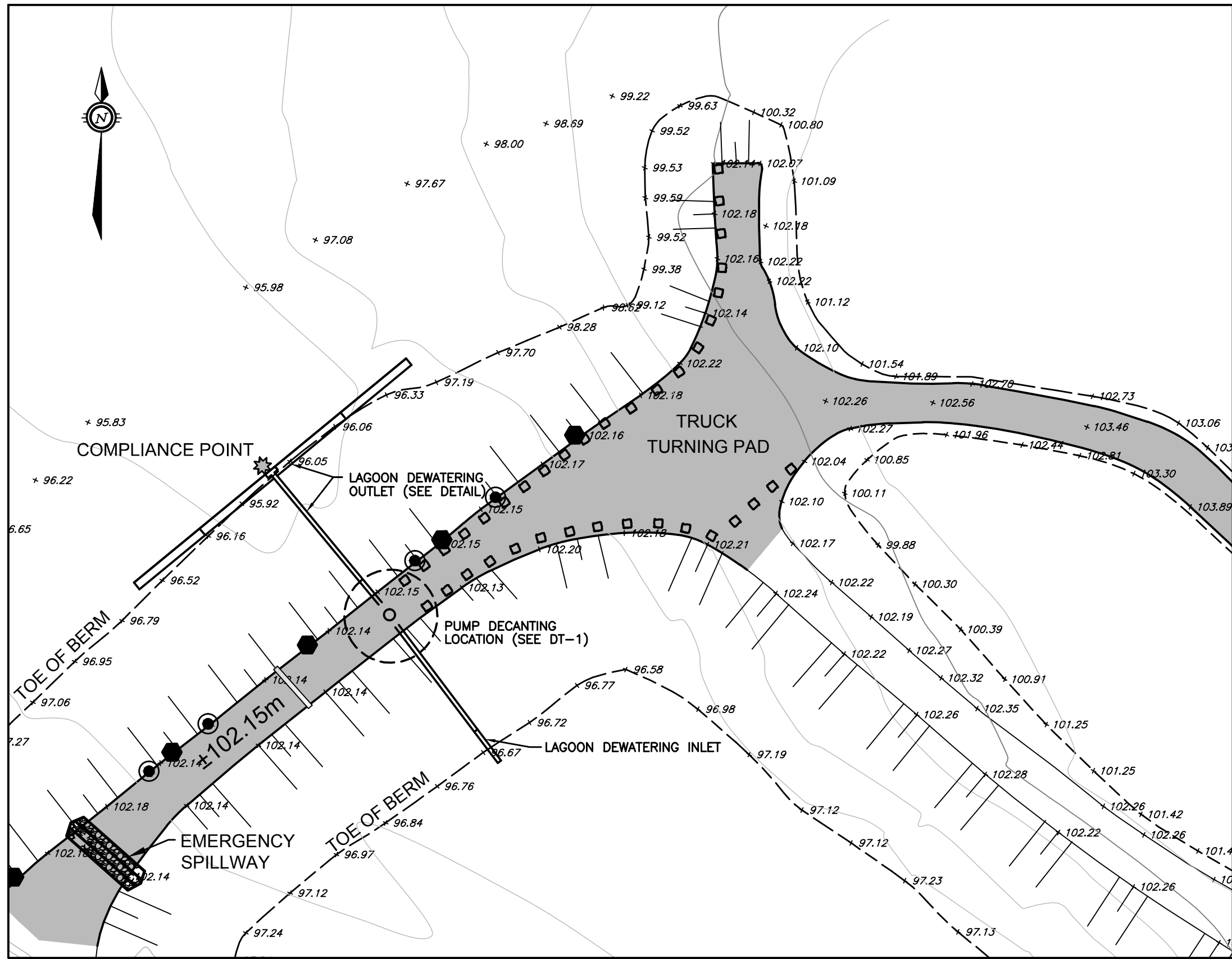
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ARCTIC BAY WASTEWATER LAGOON

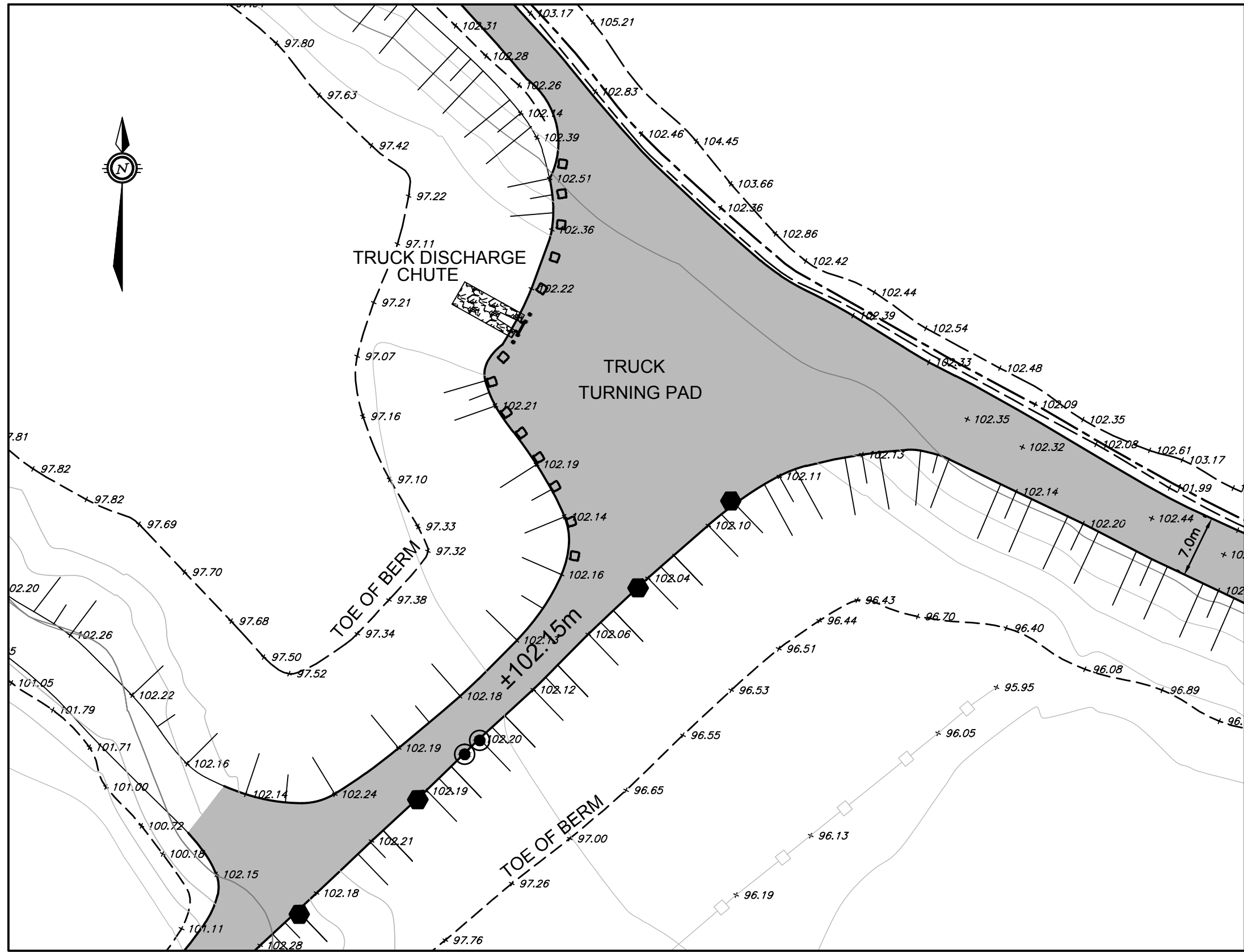
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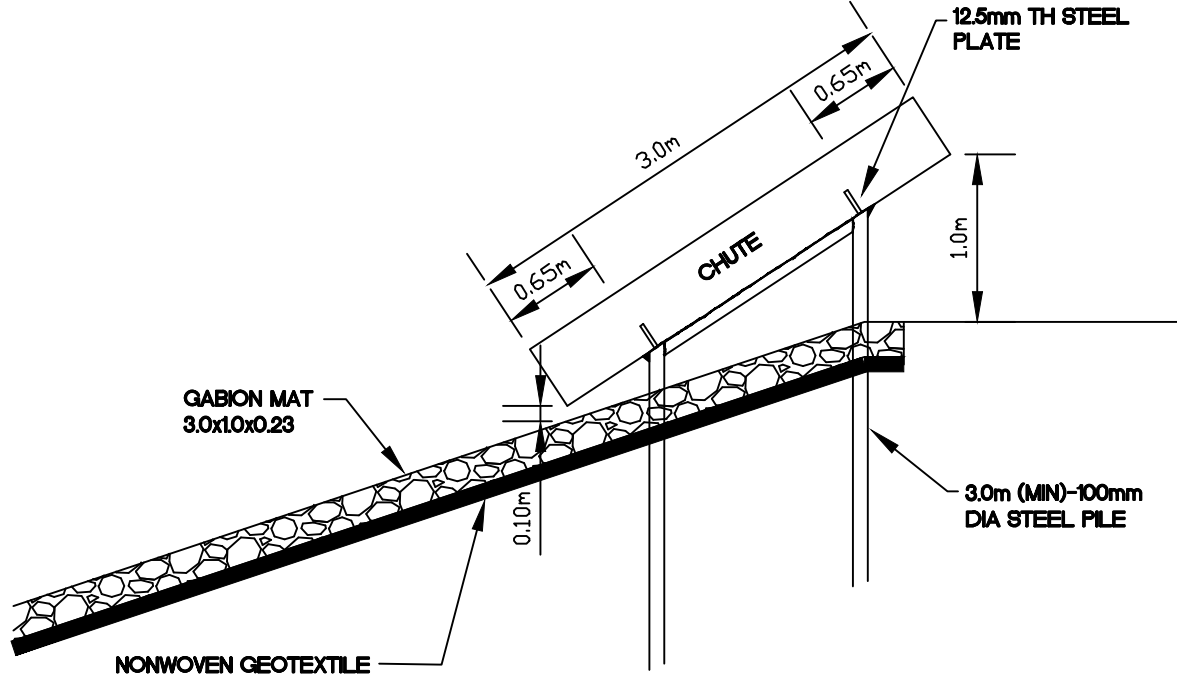
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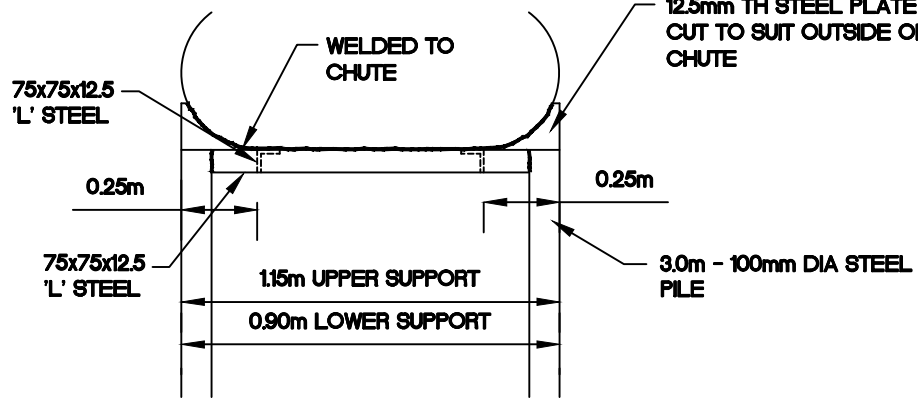
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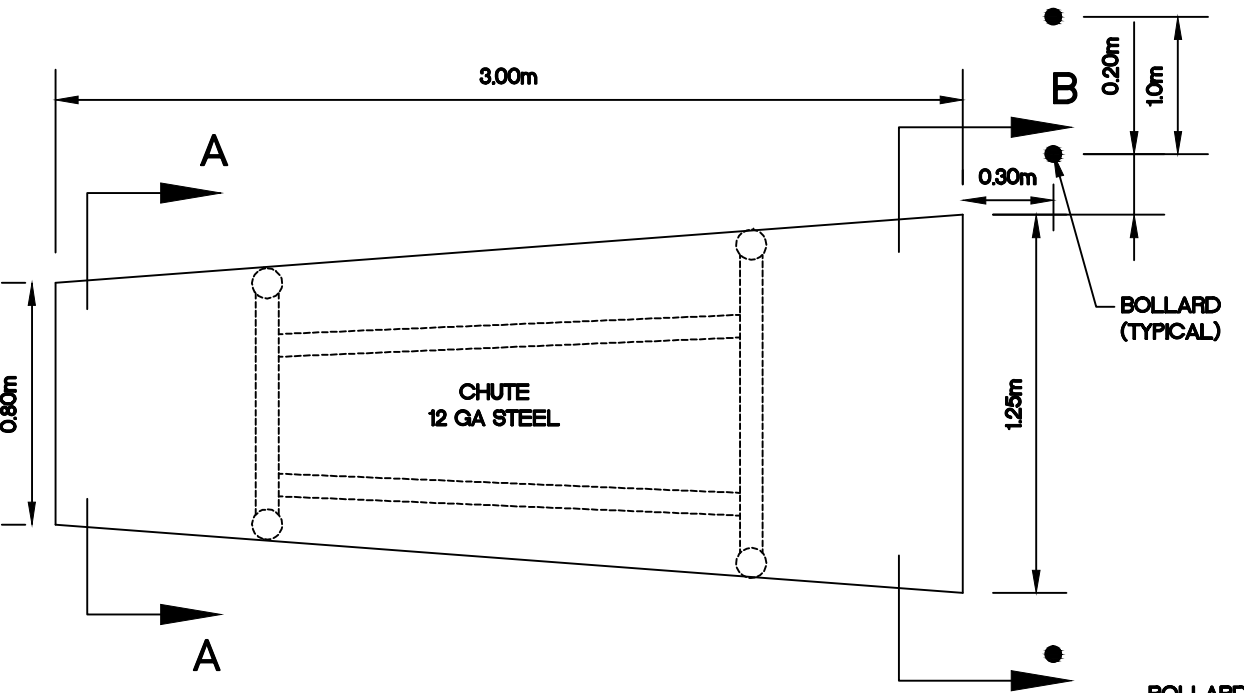
SOUTH BERM TRUCK DISCHARGE
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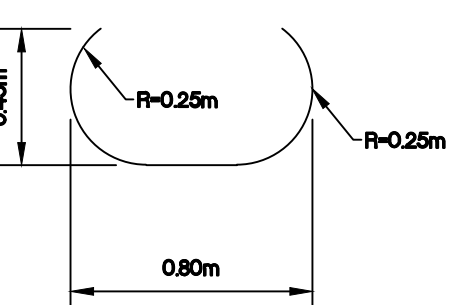
TRUCK DISCHARGE CHUTE
SECTION VIEW
SCALE 1:50



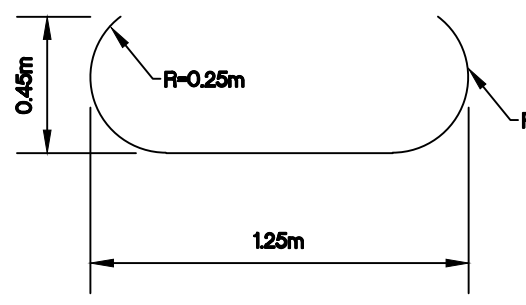
TRUCK DISCHARGE CHUTE
END VIEW
SCALE 1:25



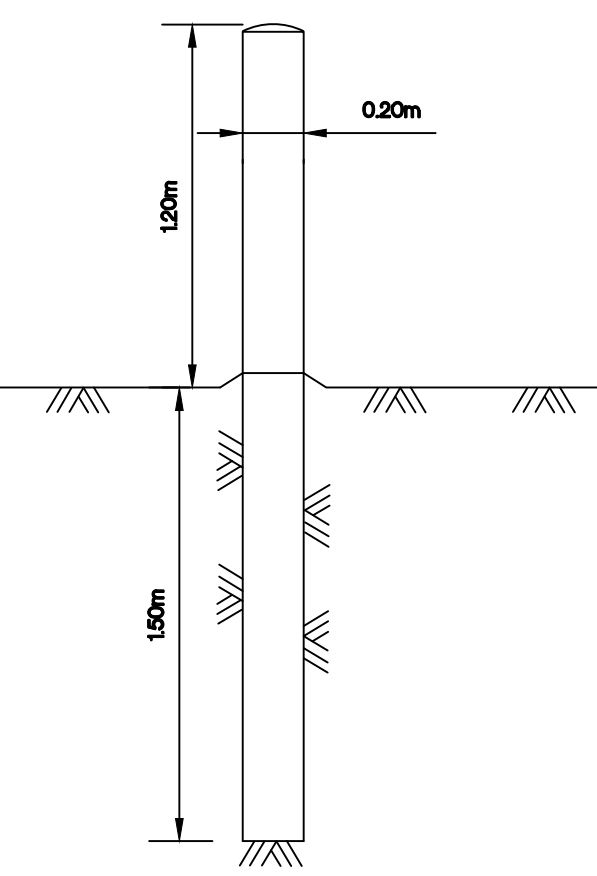
DISCHARGE CHUTE
PLAN VIEW
SCALE 1:25



SECTION A-A
SCALE 1:25

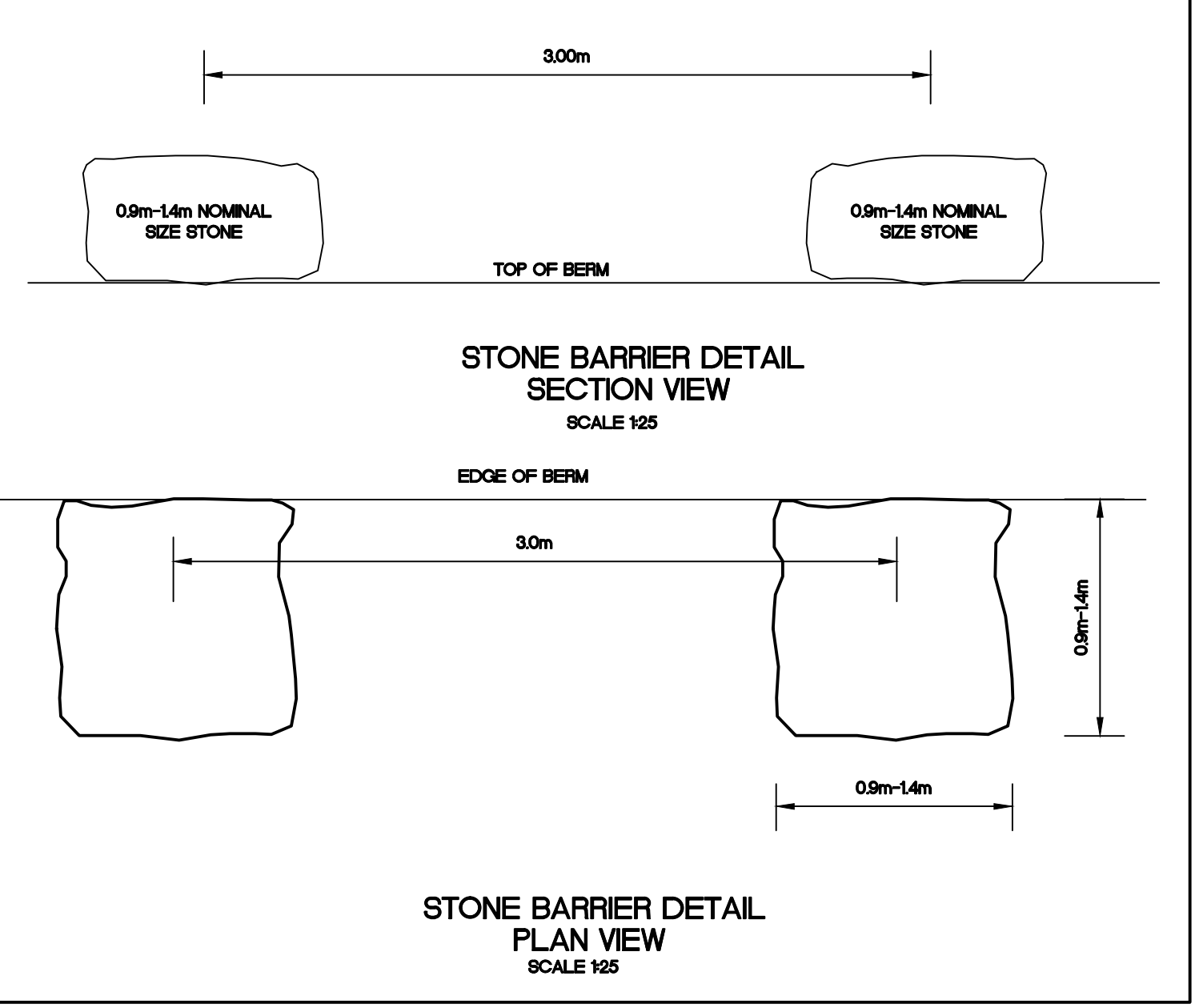


SECTION B-B
SCALE 1:25



BOLLARD DETAIL
SCALE 1:25

TRUCK DISCHARGE CHUTE DETAIL



STONE BARRIER DETAIL
PLAN VIEW
SCALE 1:25

KEY PLAN

LEGEND

AS-BUILT

DATE: NOVEMBER 30, 2011

BENCH MARK

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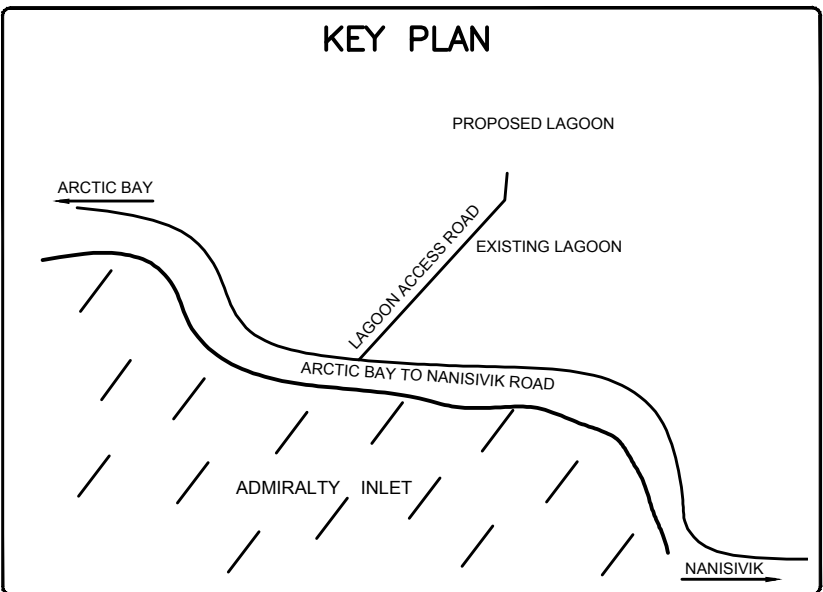
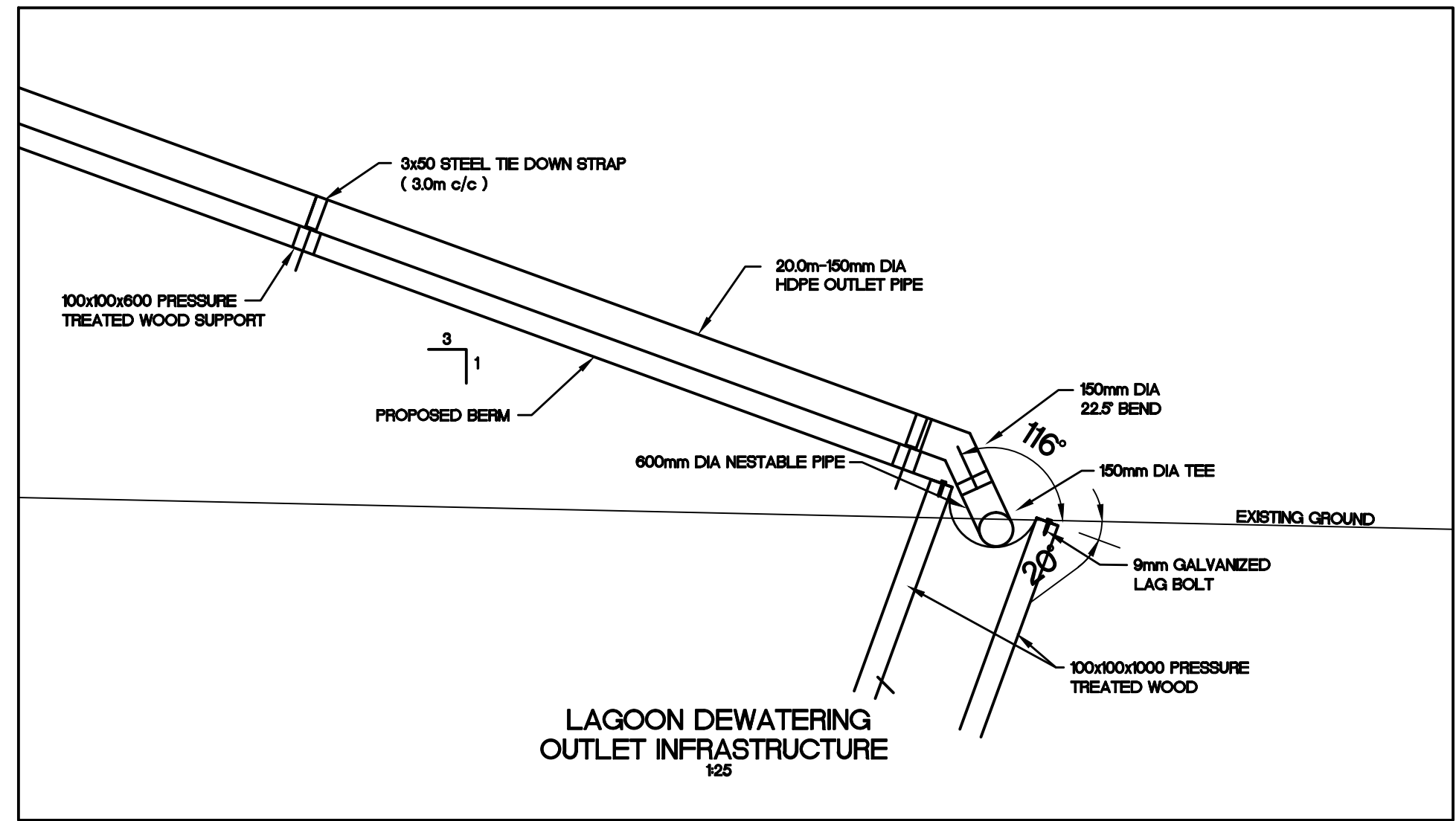
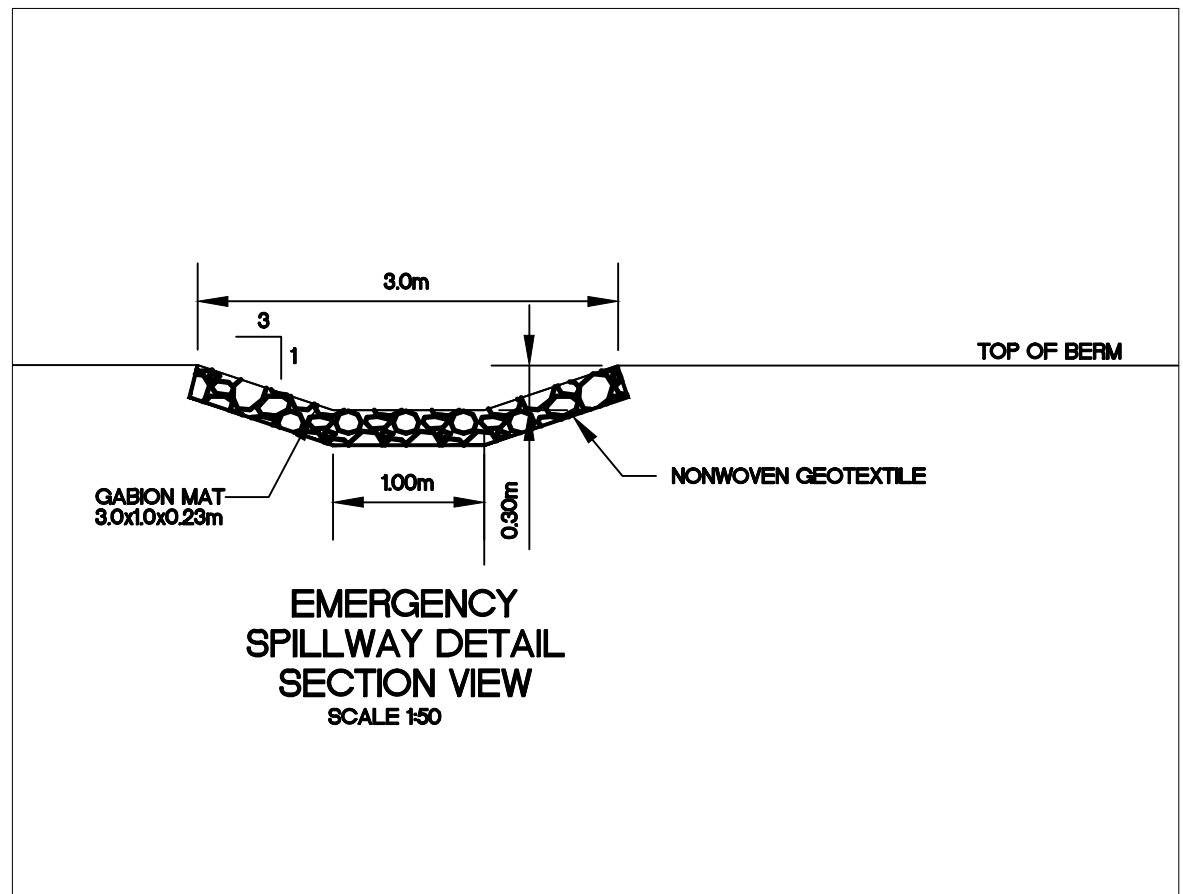
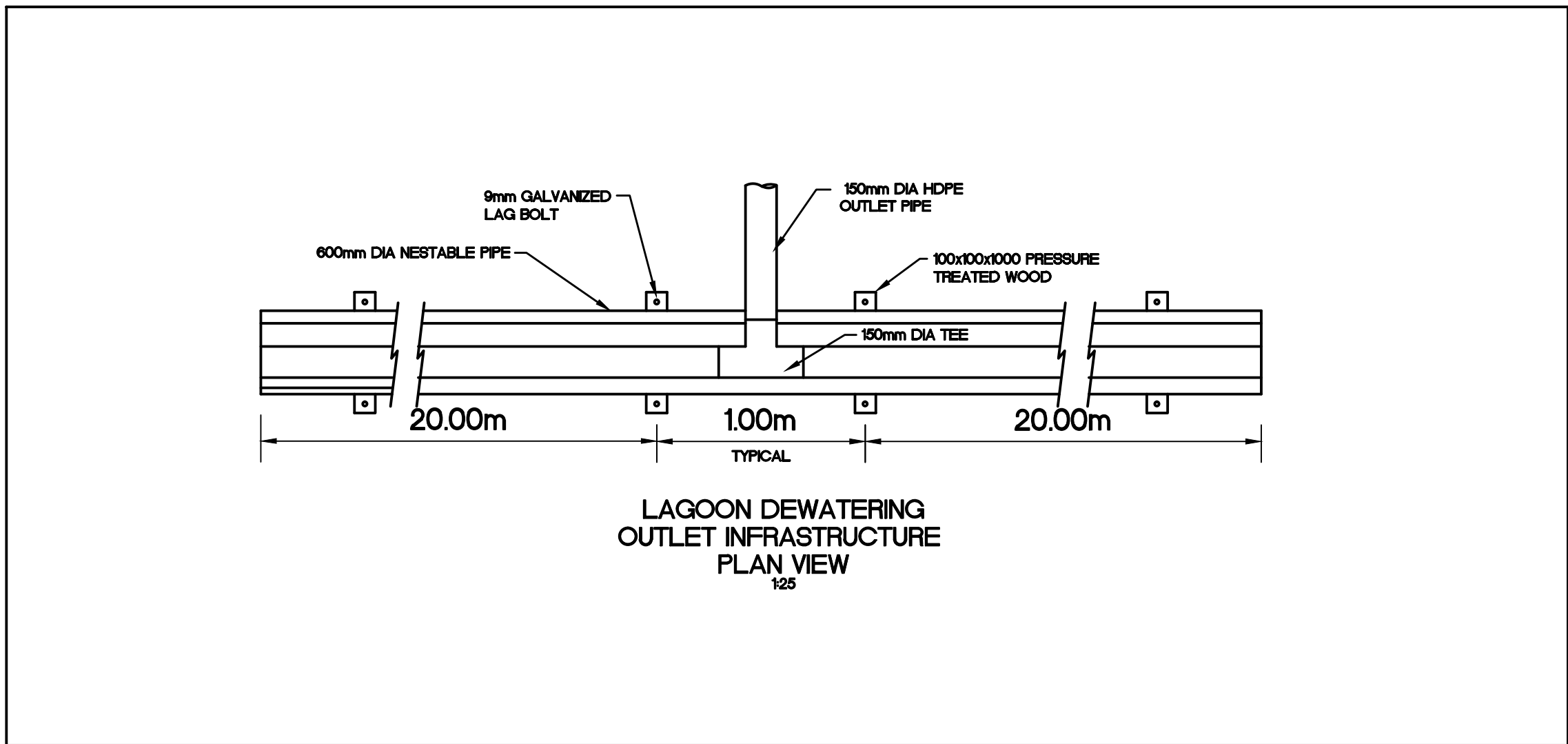
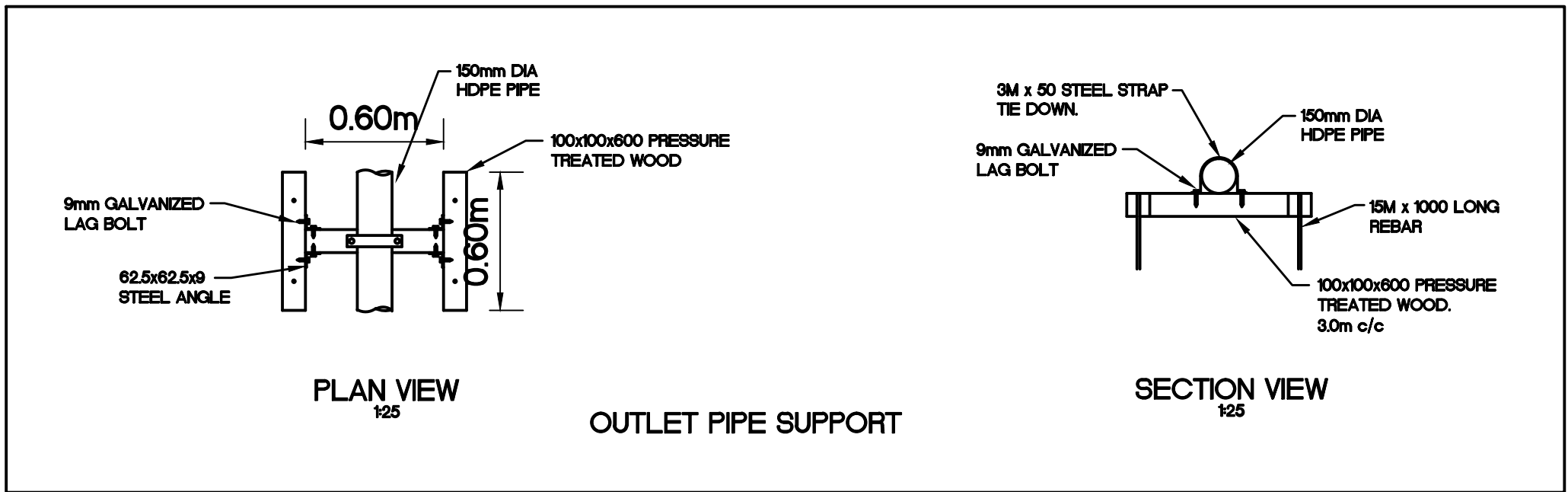
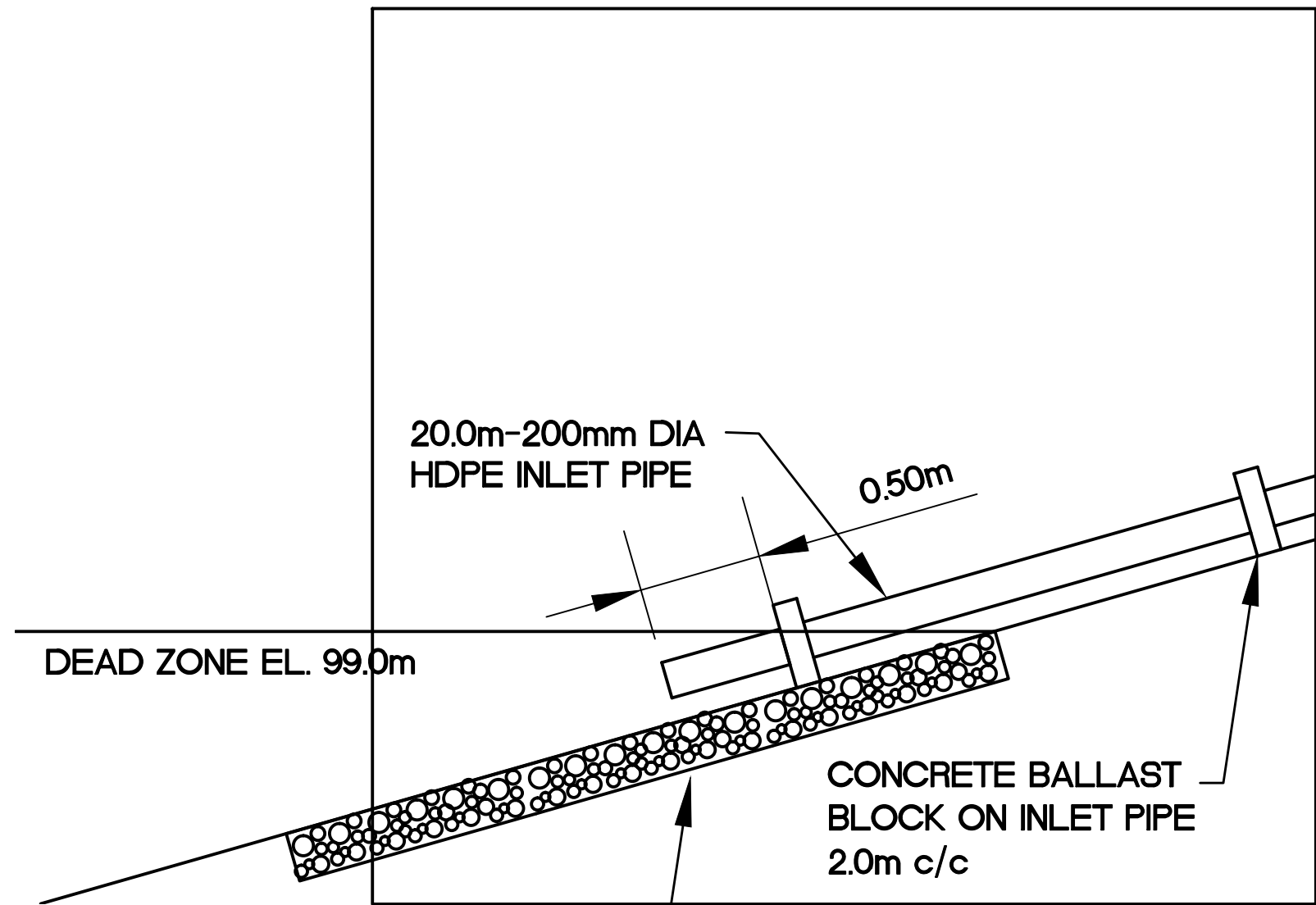
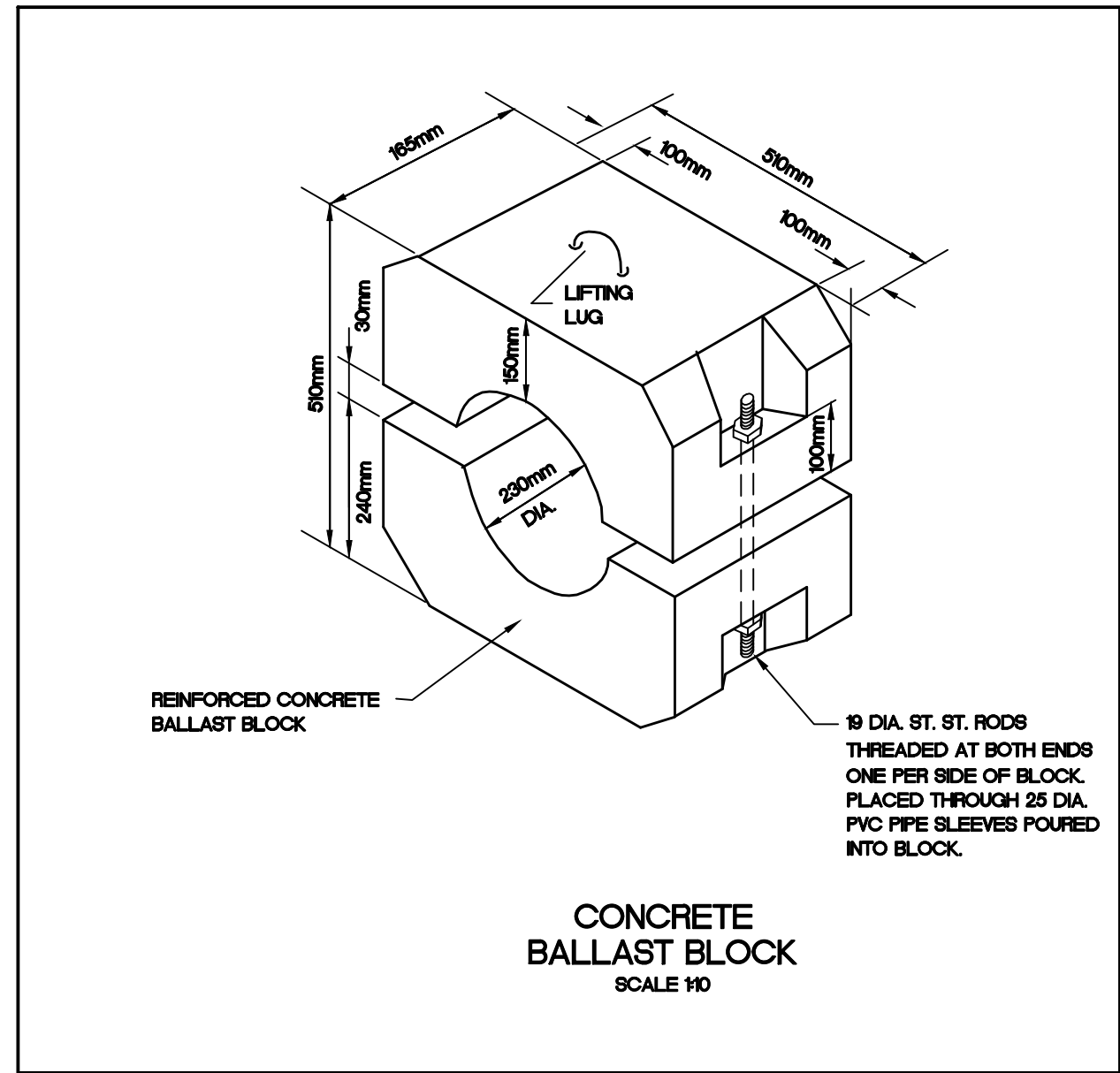
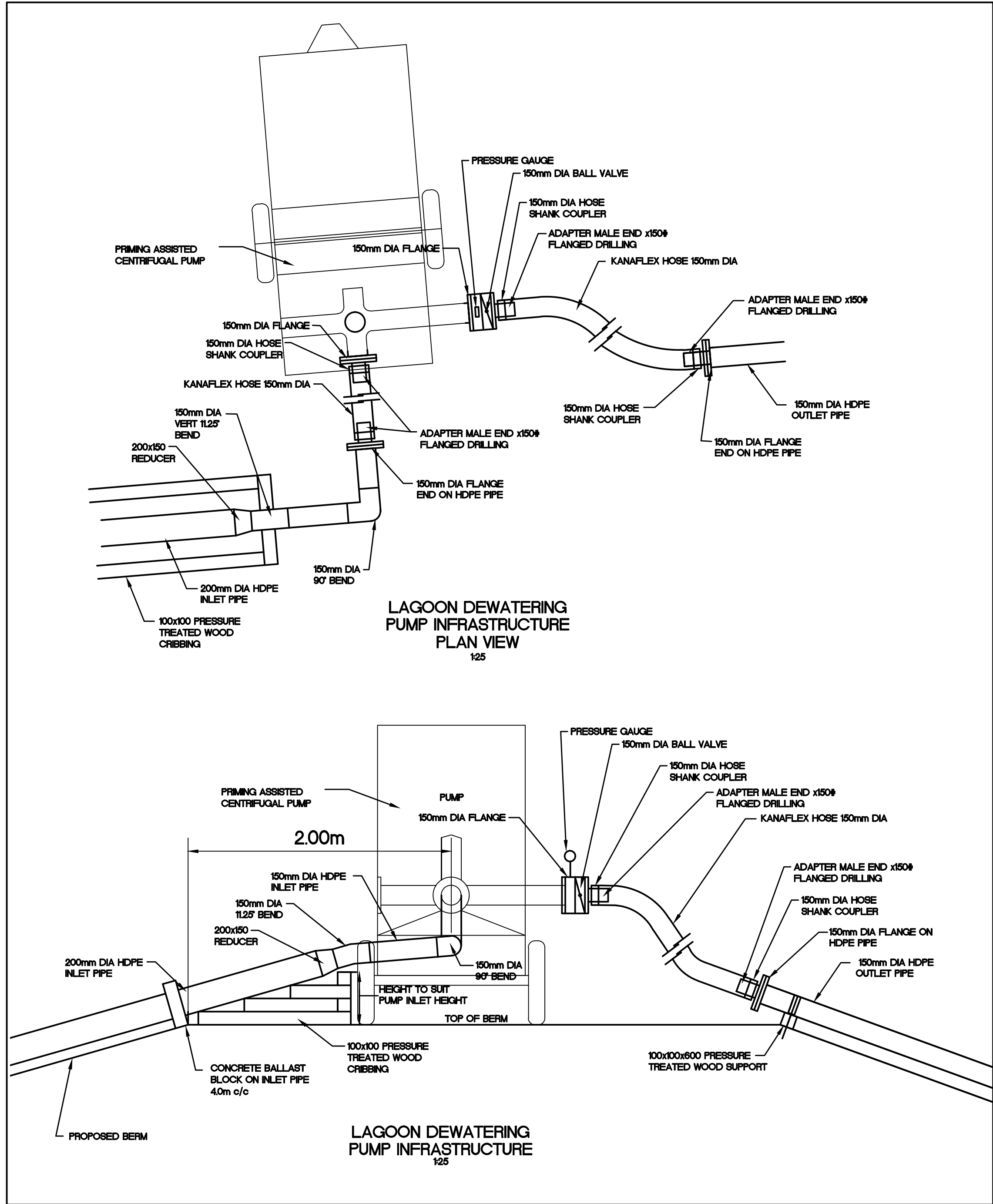
GOVERNMENT OF NUNAVUT

PROJECT
ARCTIC BAY WASTEWATER LAGOON

TITLE
LOCATION PLAN FOR TRUCK DISCHARGE AND DEWATERING

design by	SAD	project no.	OTCD000190544
drawn by	MEB	drawing no.	
checked by	SLB		
date	15/01/2008		
scale	HORIZ 1:500		

TD-1



LEGEND

AS-BUILT

DATE: NOVEMBER 30, 2011

BENCH MARK

BM 1 ELEV. = 59.12

CONTOUR ELEVATIONS WERE DRENED FROM NAD 83 CONTROL MONUMENT 7038914 LOCATED NORTH OF THE ARCTIC BAY AIRPORT UNDER CONSTRUCTION.

No.	DESCRIPTION	DATE	BY	APP'D
4	AS-BUILT	30/11/11	SAB	SLB
3	AS-CONSTRUCTED	17/11/11	MEB	SLB
2	TENDER SET	27/04/09	MMR	SLB
1	ISSUED FOR APPROVAL	24/04/08	MMR	SLB
REVISIONS				

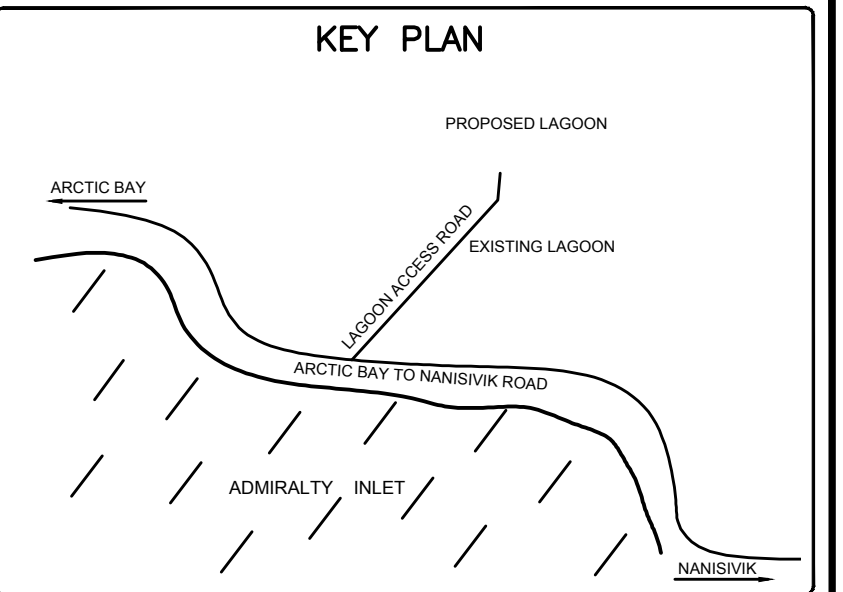
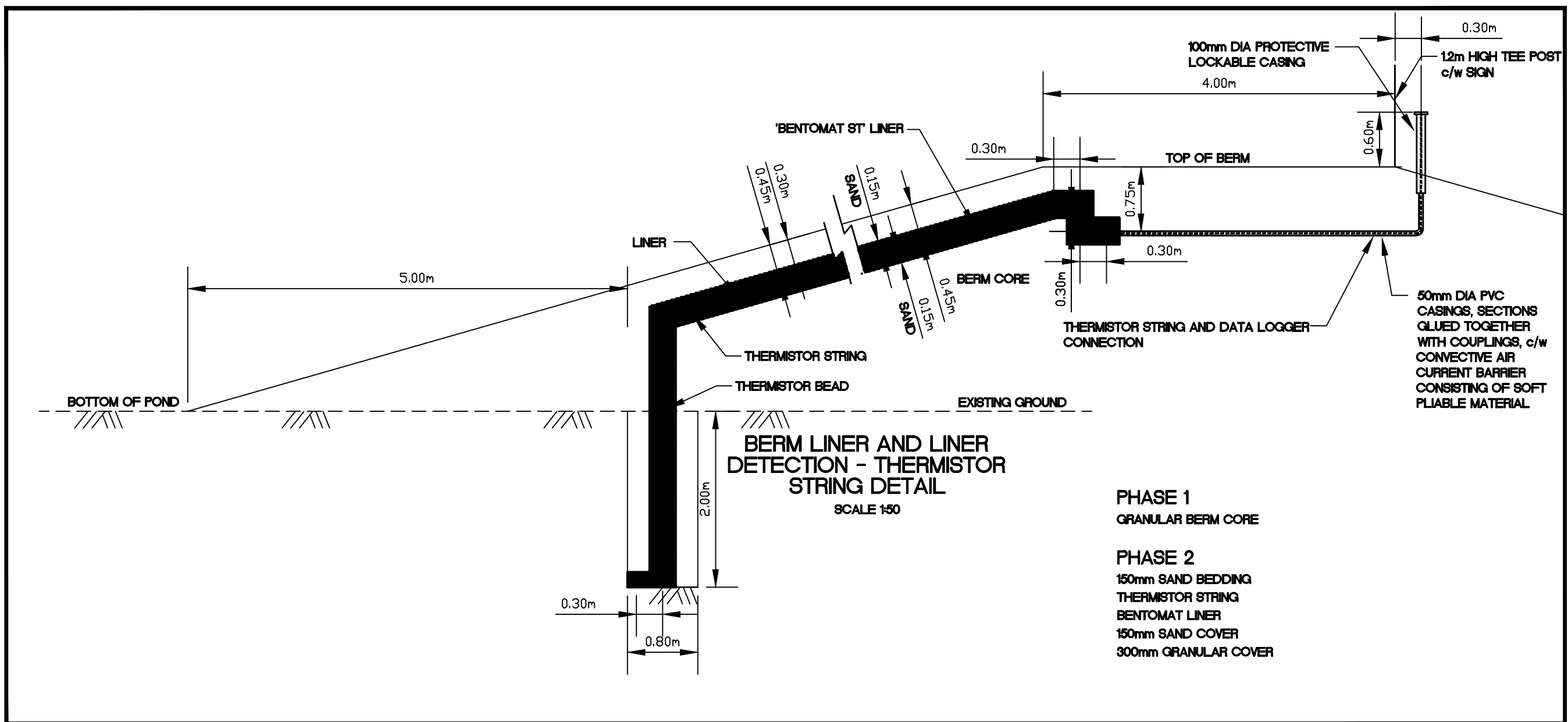
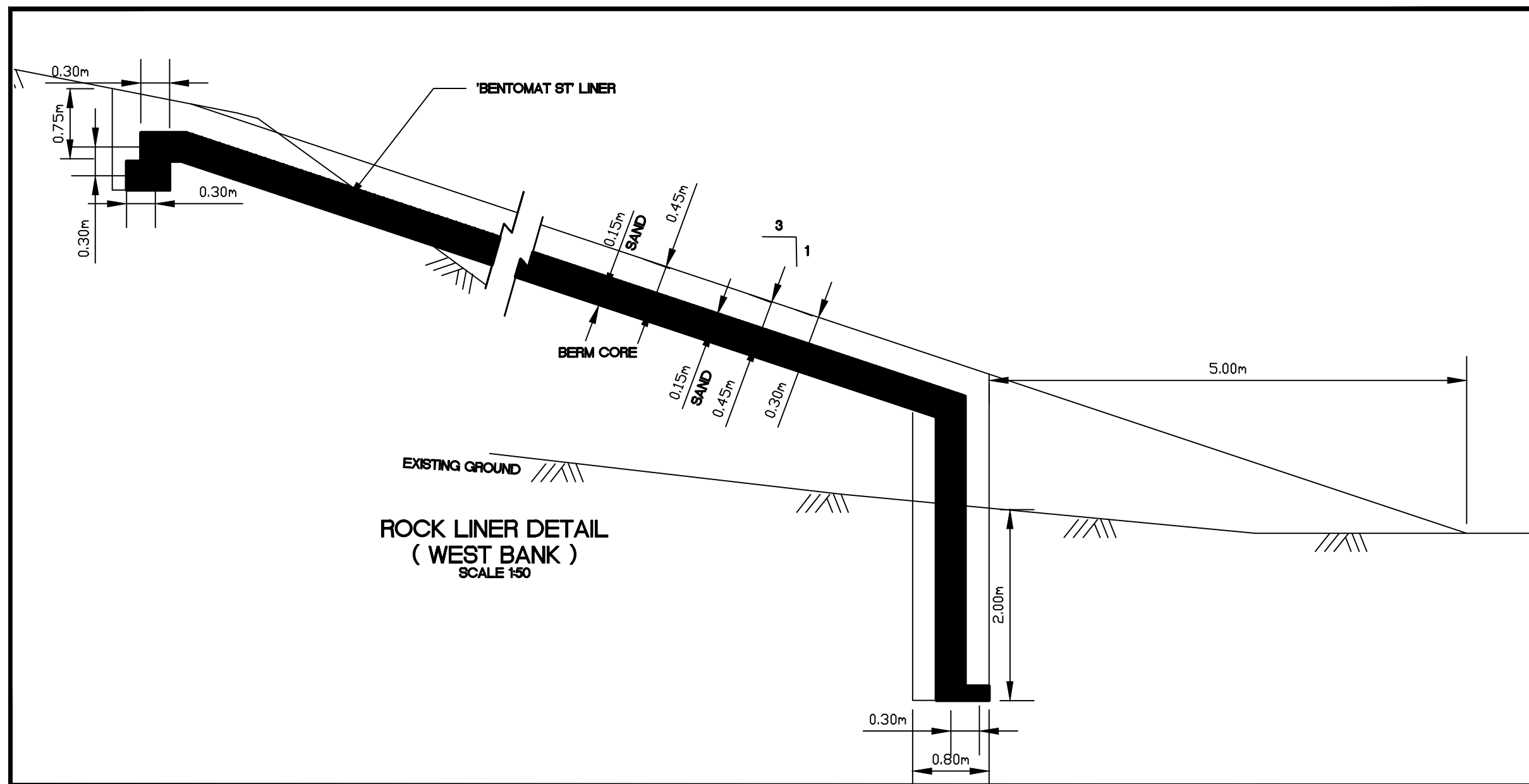
DRAWINGS ORIGINALLY SEALED BY S.L.BURDEN, P.eng. OF exp. SERVICES Inc. APRIL 27TH, 2009

Trow Associates Inc.
154 Colonnade Road South
Ottawa, Ont. K2E 7J5
Tel: (613) 225-9940
Fax: (613) 225-7337

CLIENT
GOVERNMENT OF NUNAVUT

PROJECT
ARCTIC BAY WASTEWATER LAGOON

DETAILS	
design by	SAD
drawn by	MEB
checked by	SLB
date	15/01/2008
scale	
project no.	OTCD000190544
drawing no.	DE-1



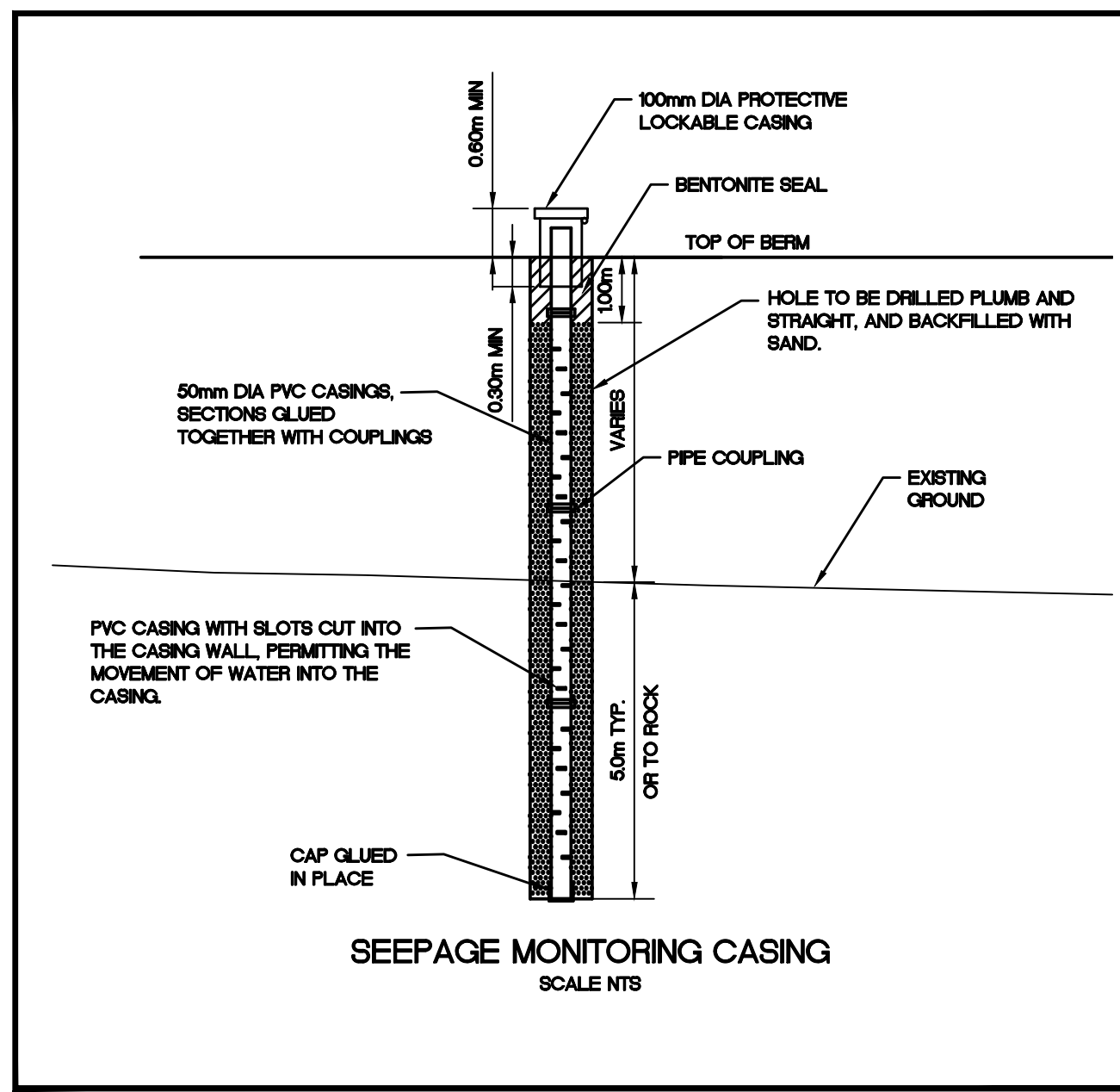
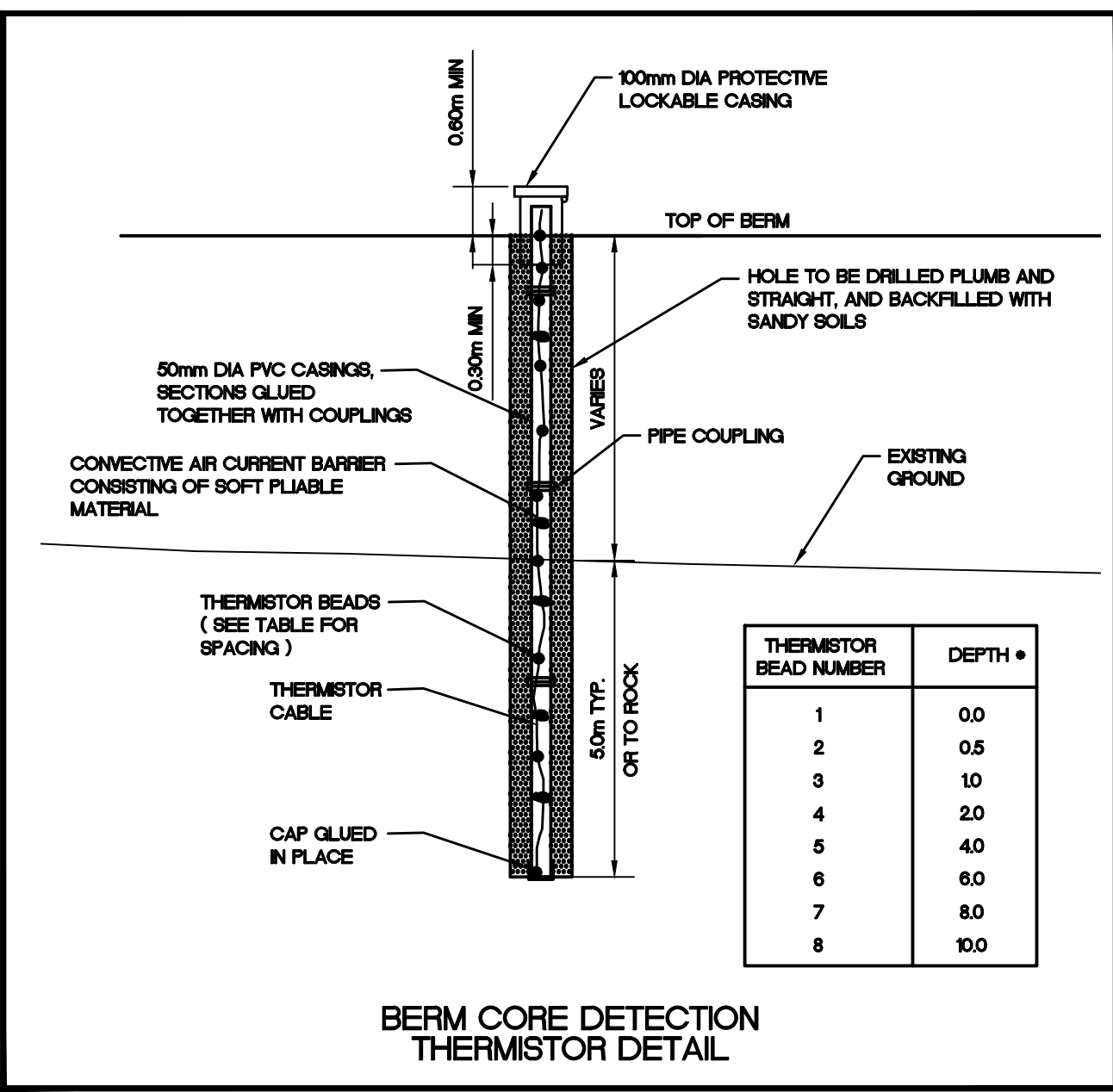
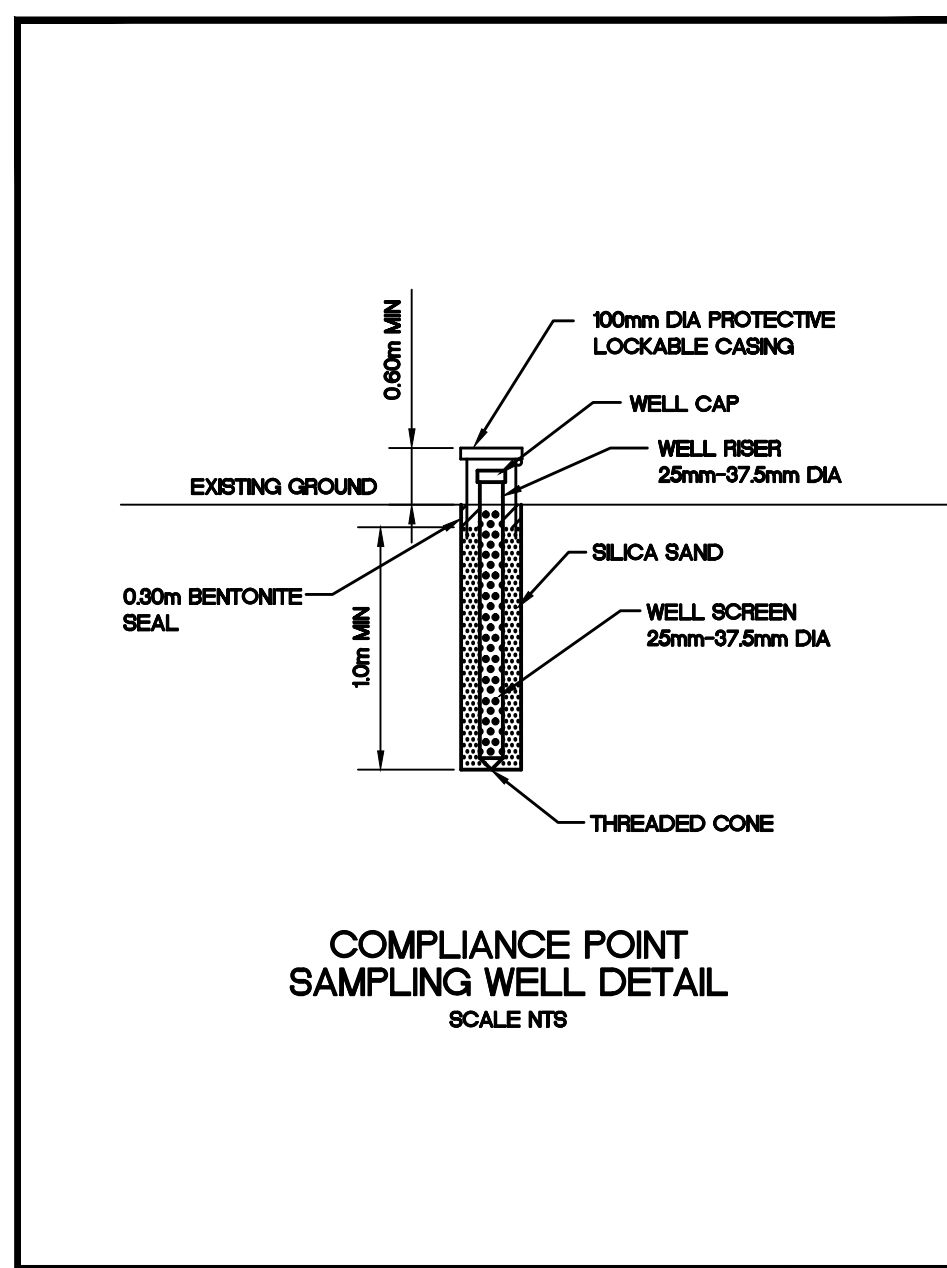
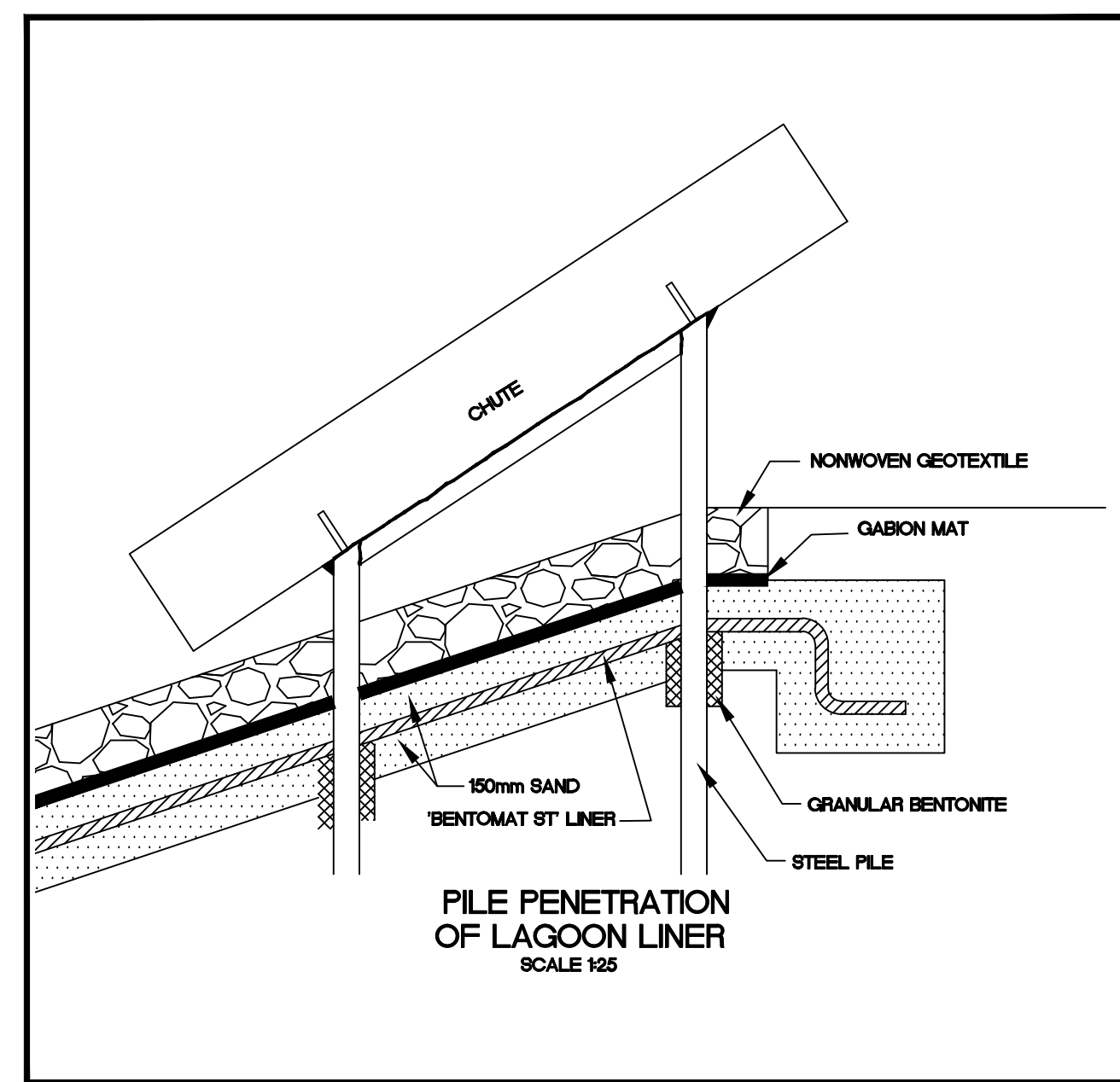
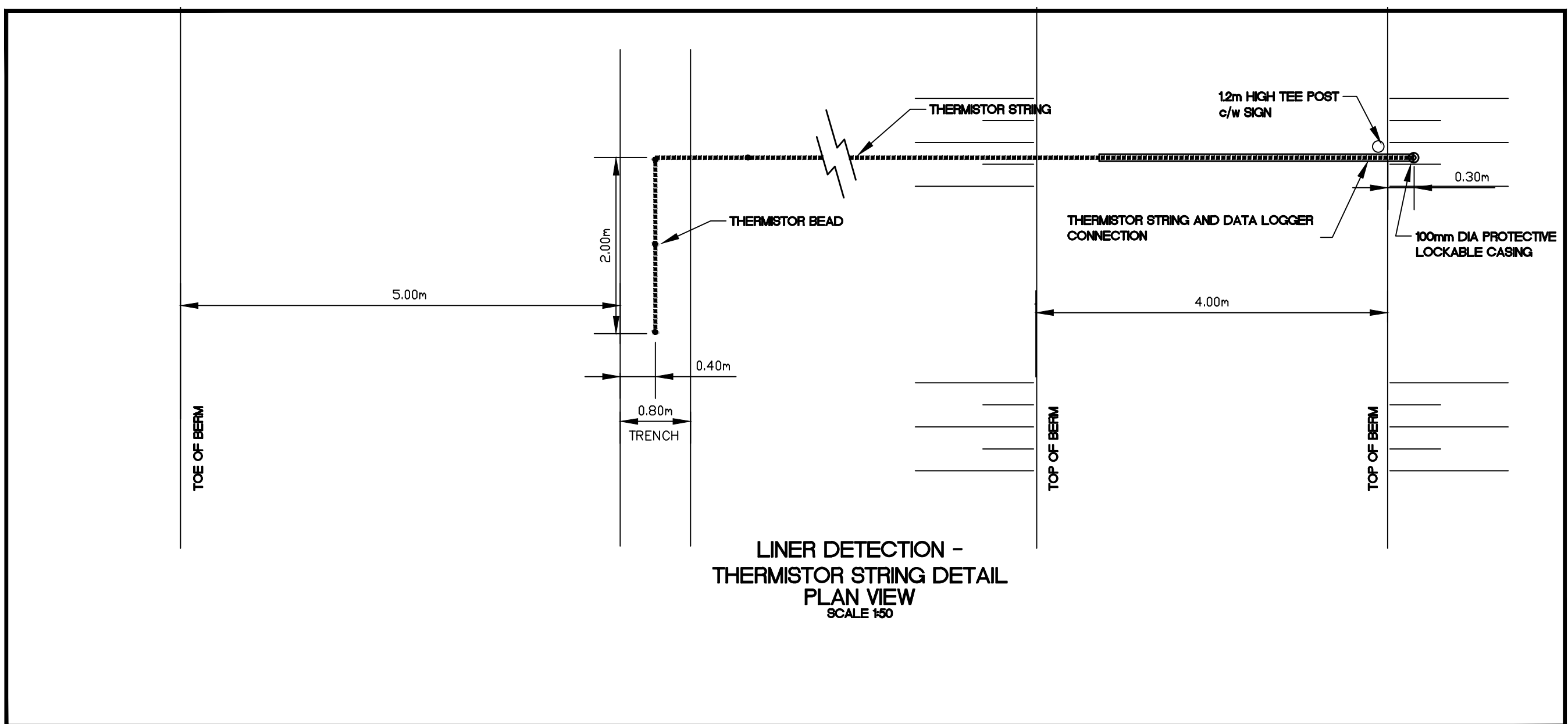
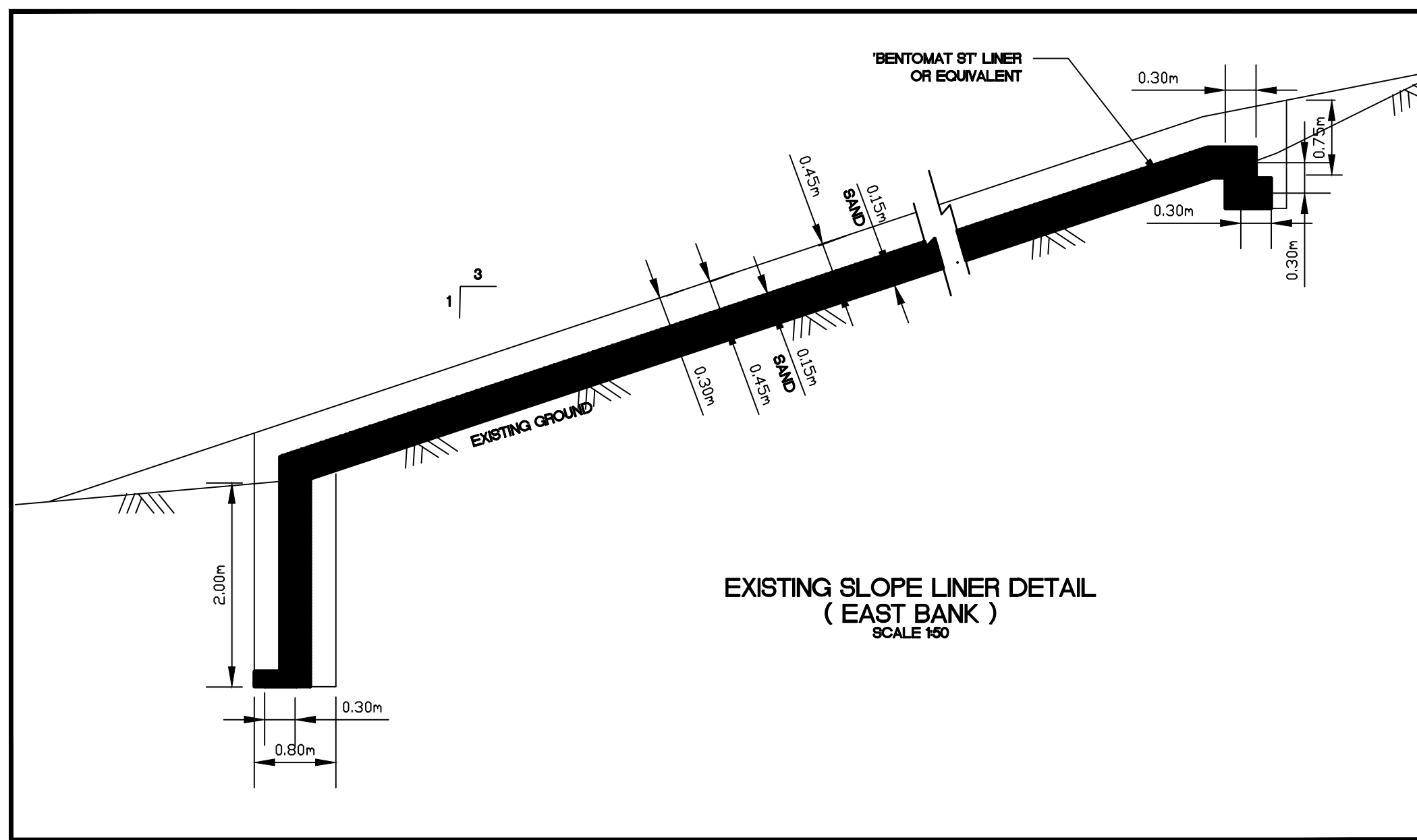
LEGEND

AS-BUILT
DATE: NOVEMBER 30, 2011

BENCH MARK
BM 1 ELEV. = 59.12
CONTOUR ELEVATIONS WERE DREIVED FROM NAD 83 CONTROL MONUMENT 7038914 LOCATED NORTH OF THE ARCTIC BAY AIRPORT UNDER CONSTRUCTION.

No.	DESCRIPTION	DATE	BY	APP'D
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1	ISSUED FOR APPROVAL	24/04/08	MMR	SLB

REVISIONS



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APRIL 27TH, 2009

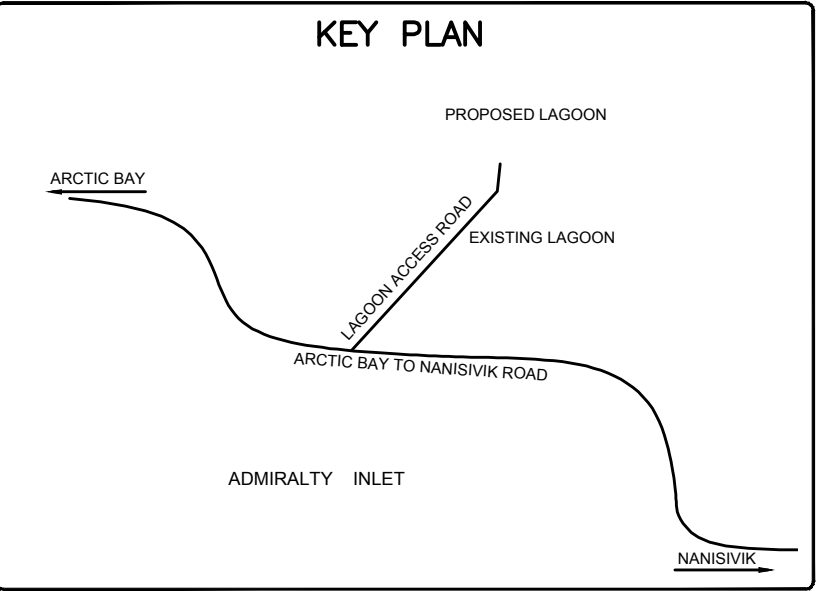
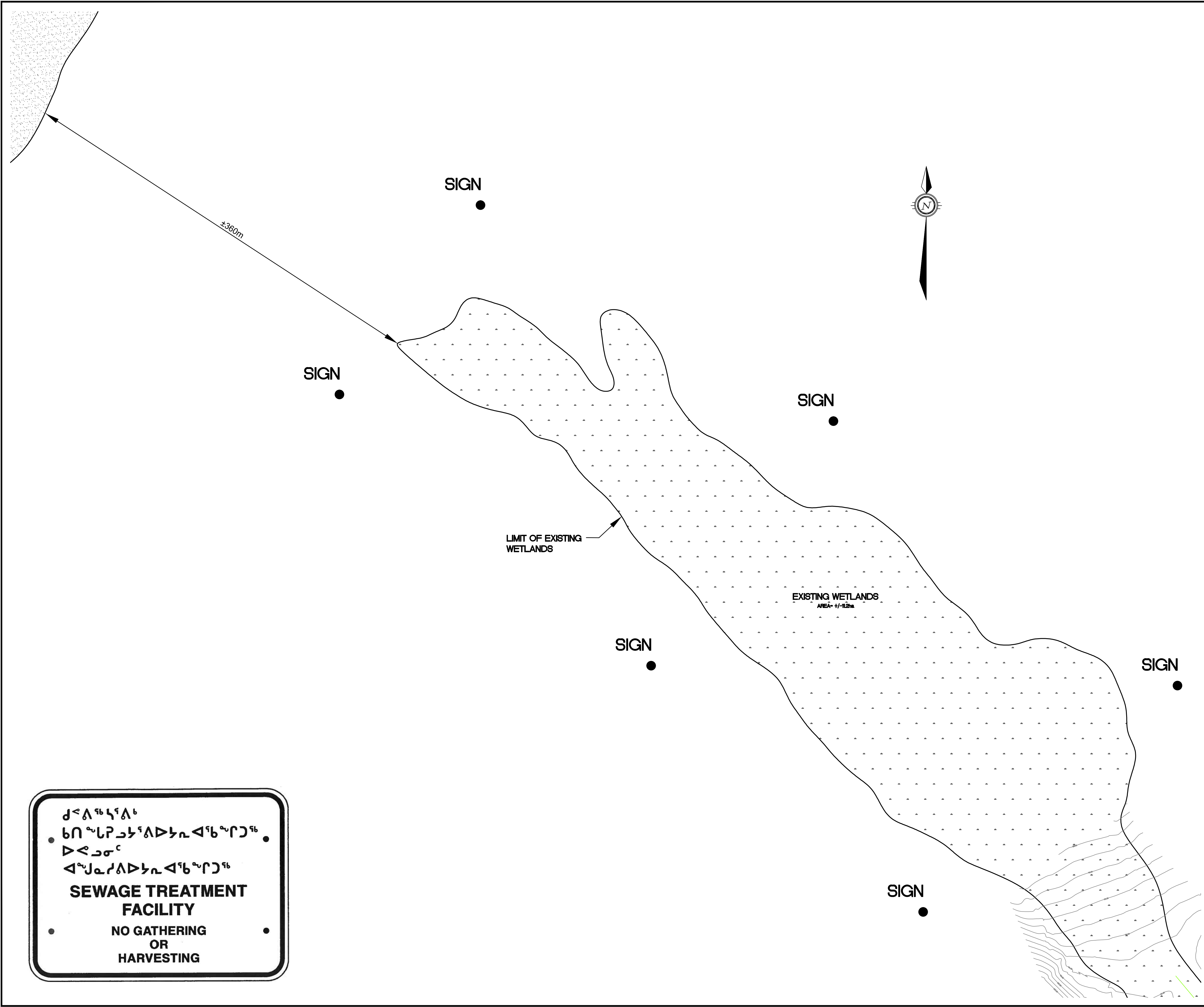
Trow Associates Inc.
154 Colonnade Road South
Ottawa, Ont. K2E 7J5
Tel: (613) 225-9940
Fax: (613) 225-7337

CLIENT
GOVERNMENT OF NUNAVUT

PROJECT
ARCTIC BAY WASTEWATER LAGOON

TITLE
DETAILS

design by	SAD	project no.	OTCD000190544
drawn by	MEB	drawing no.	DE-2
checked by	SLB		
date	15/01/2008		
scale			



LEGEND

AS-BUILT

DATE: NOVEMBER 30, 2011


BENCH MARK

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1	ISSUED FOR APPROVAL	24/04/08	MMR	SLB
No.	DESCRIPTION	DATE	BY	APP'D
R E V I S I O N S				

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exp. SERVICES Inc.
APRIL 27TH, 2009

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Ottawa, Ont. K2E 7J5
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CLIENT

GOVERNMENT OF NUNAVUT

PROJECT

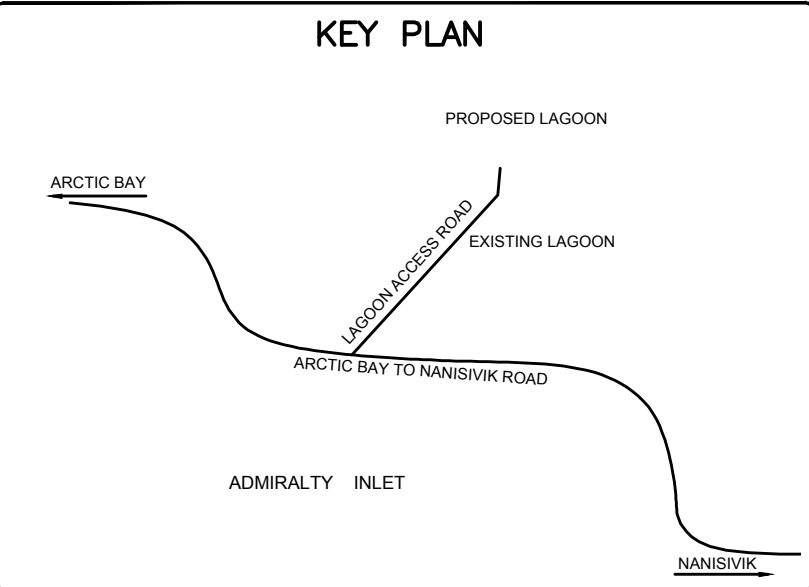
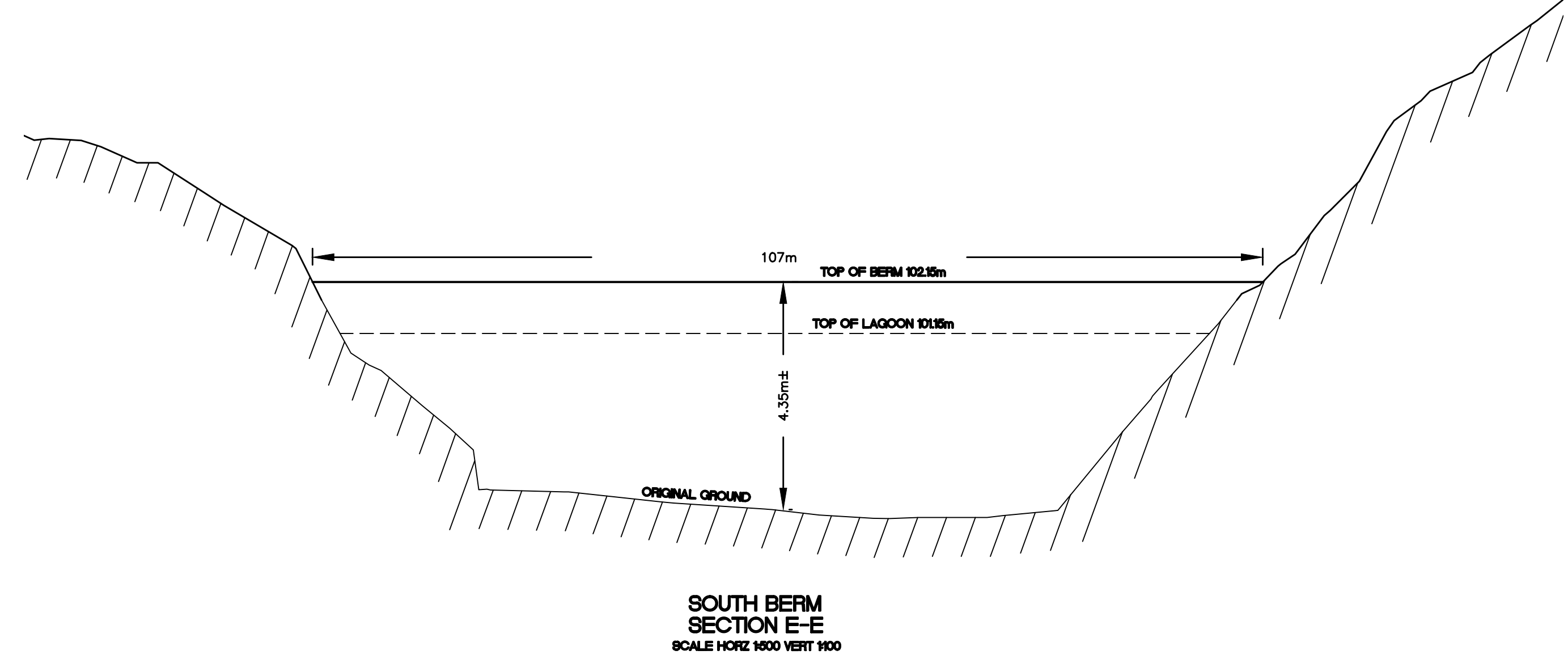
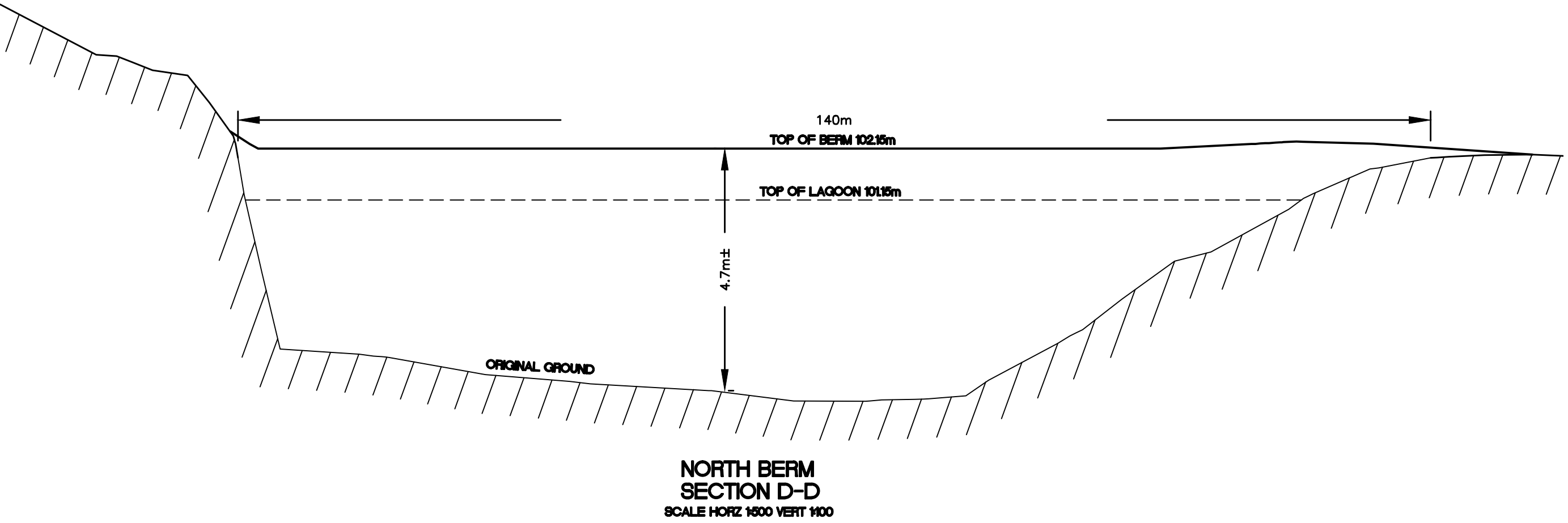
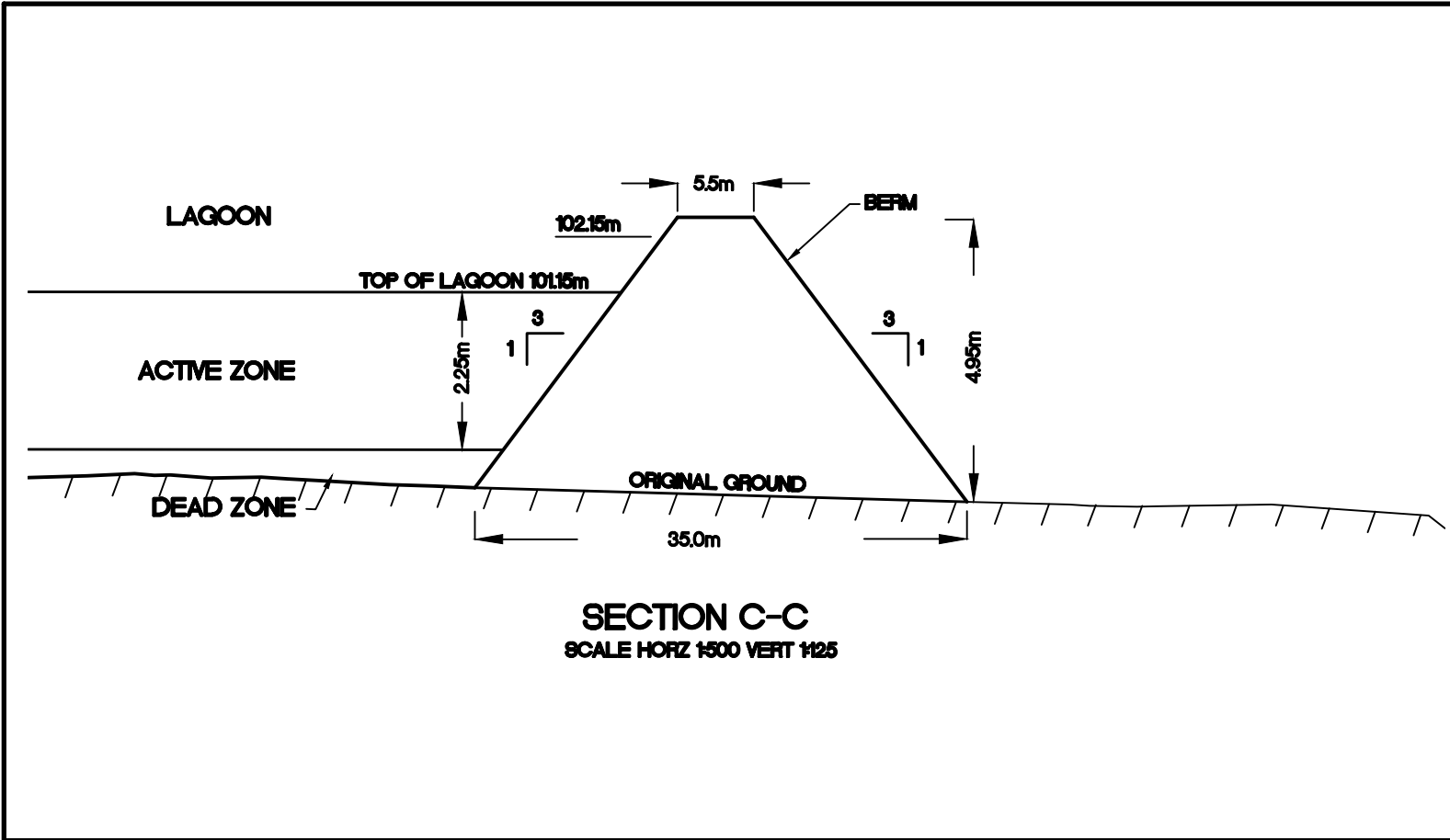
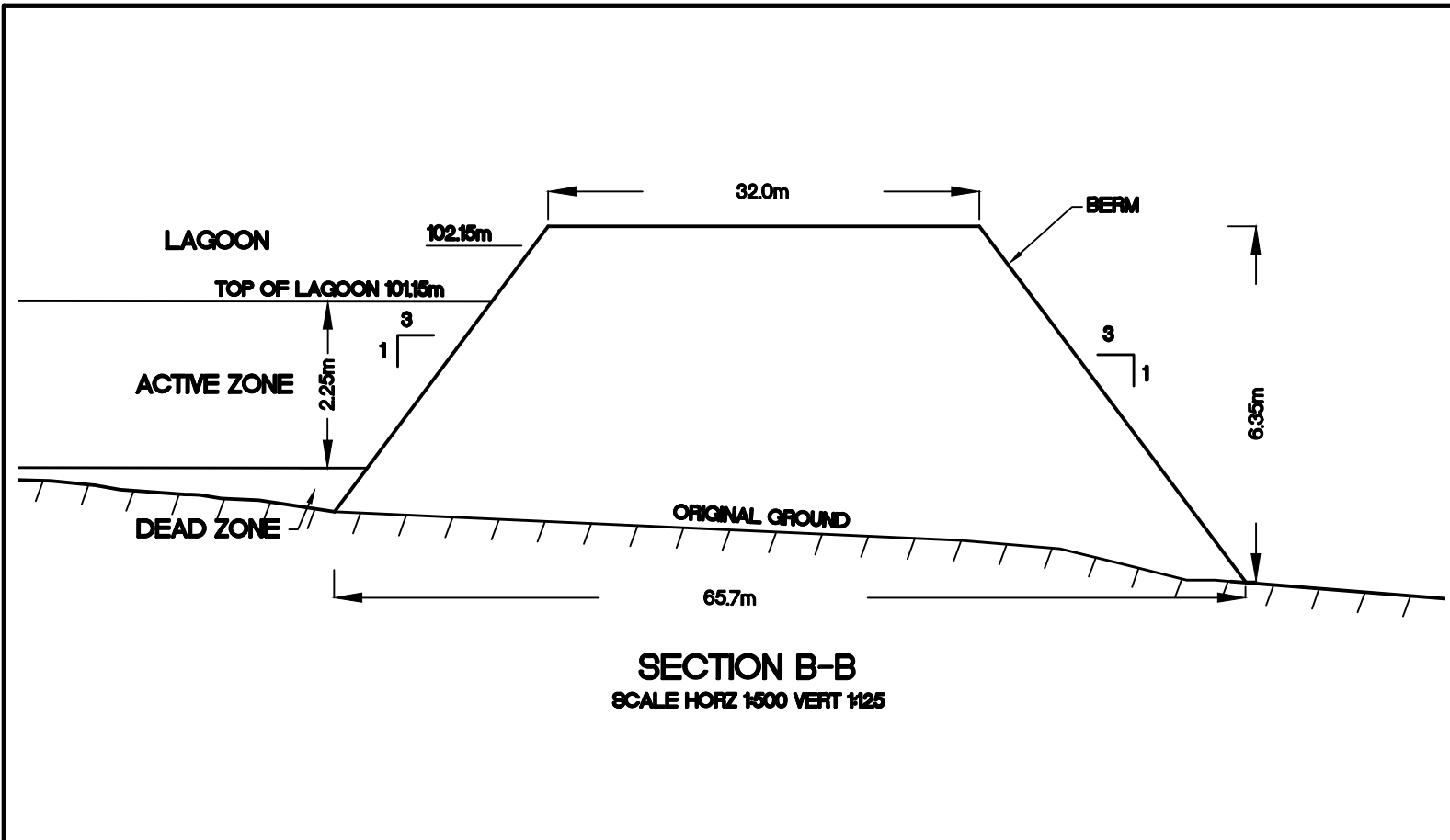
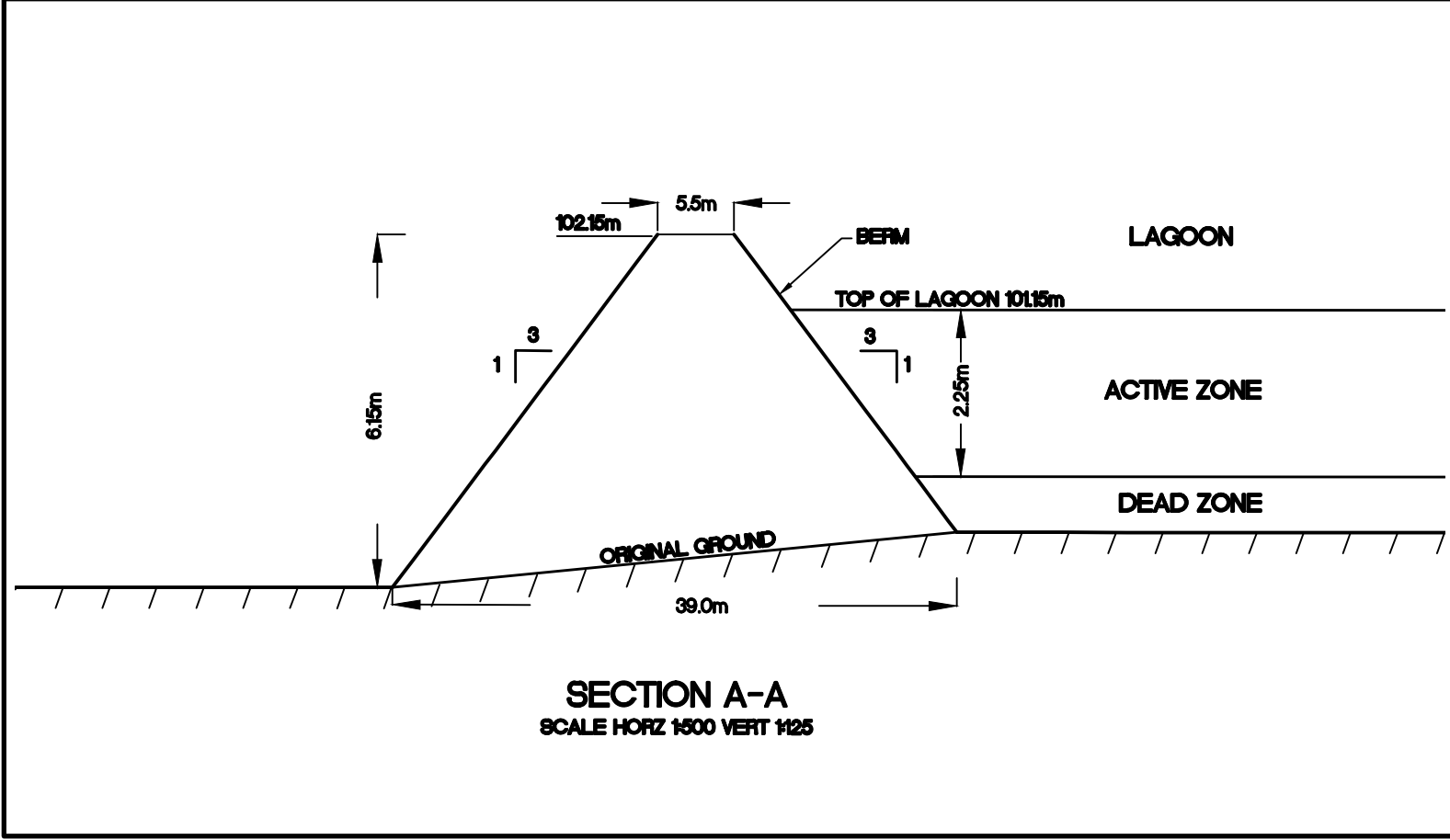
ARCTIC BAY WASTEWATER LAGOON

TITLE

SIGNAGE LOCATION PLAN

design by	SAD	project no.	OTCD000190544
drawn by	MEB	drawing no.	
checked by	SLB		
date	15/01/2008		
scale	HORIZ 1:1500		

SLP-1



LEGEND

AS-BUILT

DATE: NOVEMBER 30, 2011

BENCH MARK

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DRAWINGS ORIGINALLY SEALED BY S.L.BURDEN, P.eng. OF exp. SERVICES Inc. APRIL 27TH, 2009

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154 Colonnade Road South
Ottawa, Ont. K2E 7J5
Tel: (613) 225-9940
Fax: (613) 225-7337

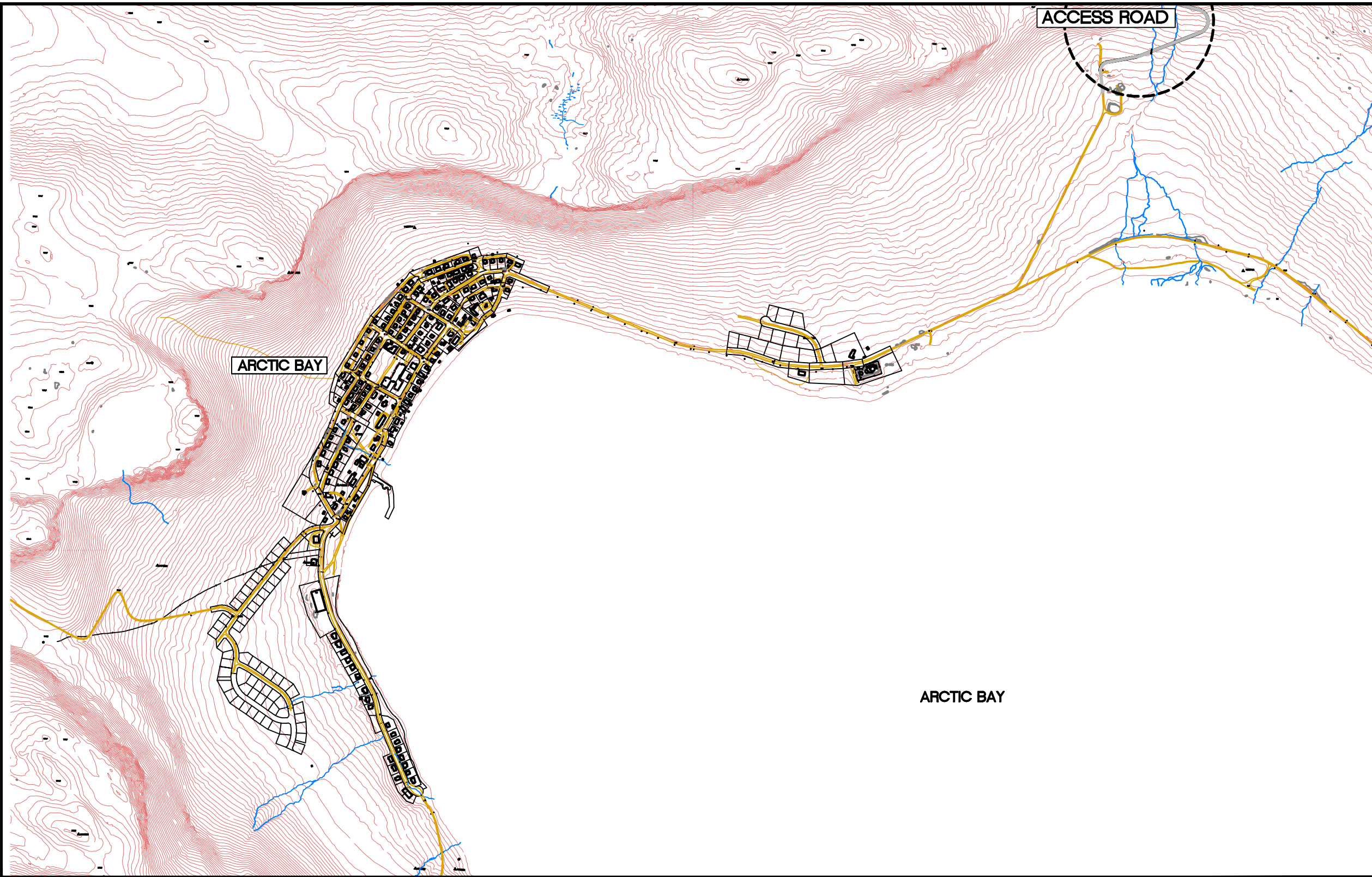
CLIENT
GOVERNMENT OF NUNAVUT

PROJECT
ARCTIC BAY WASTEWATER LAGOON

TITLE
CROSS SECTIONS

design by	SAD	project no.	OTCD000190544
drawn by	MEB	drawing no.	CS-1
checked by	SLB		
date	15/01/2008		
scale			

GOVERNMENT OF NUNAVUT



INDEX OF INCLUDED DRAWINGS

DRAWING NO.	REVISION	DESCRIPTION
OTCD00019054A-SP1	REV 5	SITE PLAN
OTCD00019054A-PP1	REV 5	ACCESS ROAD PLAN & PROFILE
OTCD00019054A-PP2	REV 5	ACCESS ROAD PLAN & PROFILE
OTCD00019054A-PP3	REV 5	ACCESS ROAD PLAN & PROFILE
OTCD00019054A-PP4	REV 5	ACCESS ROAD PLAN & PROFILE
OTCD00019054A-PP5	REV 5	ACCESS ROAD PLAN & PROFILE
OTCD00019054A-PP6	REV 5	ACCESS ROAD SECOND BERM PLAN & PROFILE
OTCD00019054A-PP7	REV 5	ACCESS ROAD SECOND BERM PLAN & PROFILE
OTCD00019054A-DE1	REV 6	ROAD DETAILS

ARCTIC BAY WASTEWATER LAGOON ROAD

Trow Associates Inc.

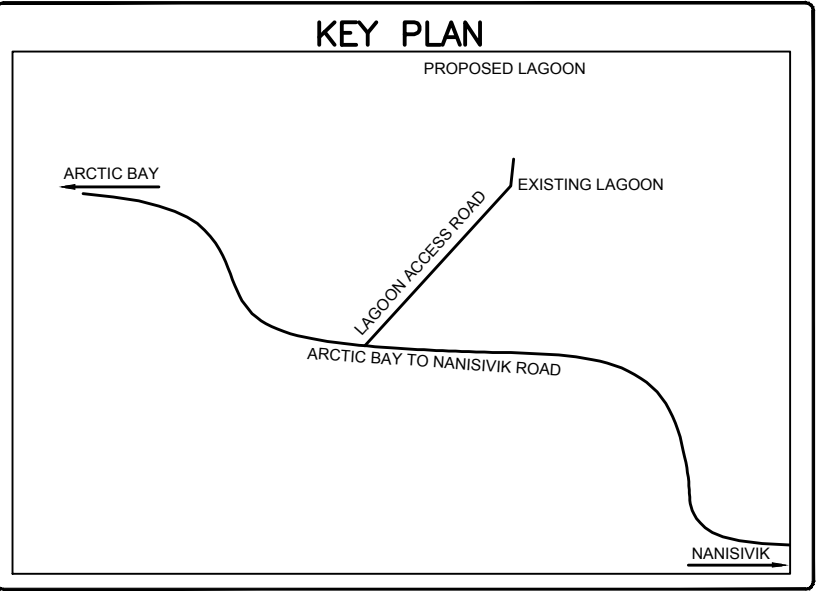
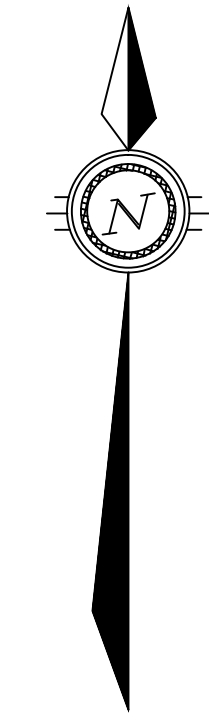
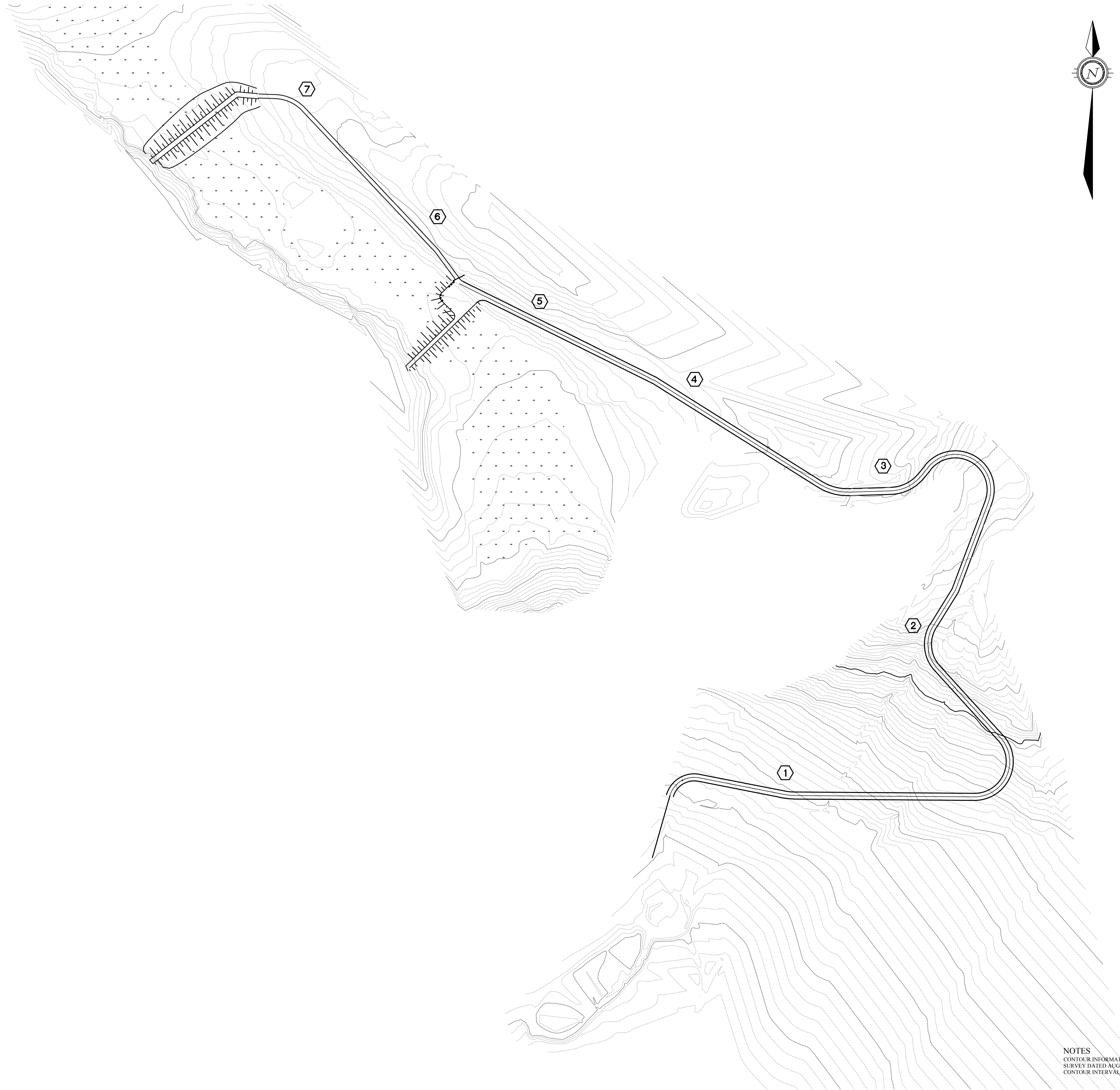
154 COLONNADE ROAD SOUTH
OTTAWA, ONTARIO K2E 7J5

PHONE (613) 225-9940
FAX (613) 225-7337

AS-BUILT INFORMATION PROVIDED BY KUDLIK CONSTRUCTION LTD. NOVEMBER 2011

AS-BUILT

DATE: NOVEMBER 30, 2011



LEGEND

AS-BUILT

DATE: NOVEMBER 30, 2011

BENCH MARK	
BM 1	ELEV. = 000.00
DESCRIPTION HERE	

No.	DESCRIPTION	DATE	BY	APP'D
5	AS-BUILT	30/11/11	SAB	SLB
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1	ISSUED FOR APPROVAL	24/04/08	MMR	SLB
R E V I S I O N S				

DRAWINGS ORIGINALLY SEALED BY S.L.BURDEN, P.eng. OF exp. SERVICES Inc. APRIL 27TH, 2009

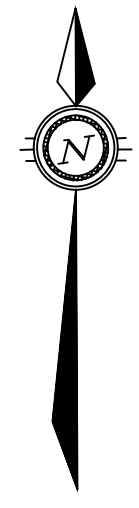
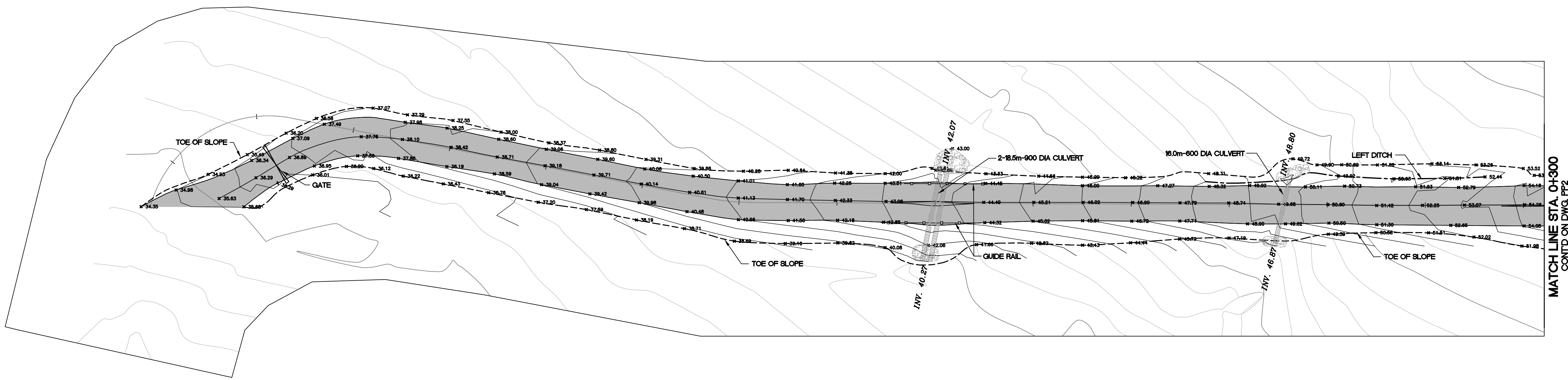
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CLIENT
GOVERNMENT OF NUNAVUT

PROJECT
ARCTIC BAY
WASTE WATER LAGOON
ROAD

TITLE		
SITE PLAN		
design by	S.A.D.	project no. OTC000190544
drawn by	M.M.R.	drawing no.
checked by	S.L.B.	SP1
date	10/09/2007	
scale	HORIZ 1:2000	

NOTES
CONTOUR INFORMATION WAS DERIVED BY TROW ASSOCIATES INC.
SURVEY DATED AUGUST 23, 2007.
CONTOUR INTERVALS ARE SET AT 1.00m



KEY PLAN

LEGEND

AS-BUILT

DATE: NOVEMBER 30, 2011

BENCH MARK

BM 1 ELEV. = 000.00
DESCRIPTION HERE

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5	AS-BUILT	30/11/11	SAB	SLB
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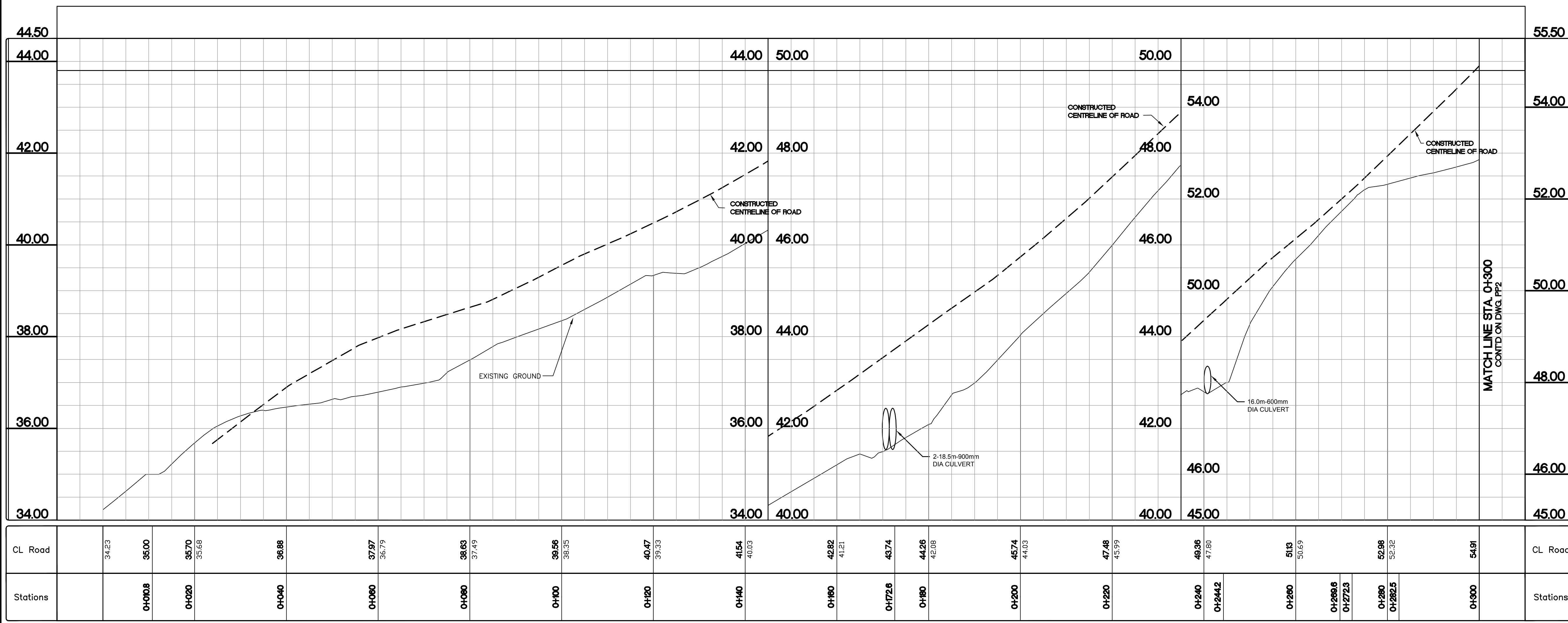
DRAWINGS ORIGINALLY SEALED BY
S.L.BURDEN, P.eng. OF
exp. SERVICES Inc.
APRIL 27TH, 2009

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154 Colonnade Road South
Ottawa, Ont. K2E 7J5
Tel:(613)225-9940
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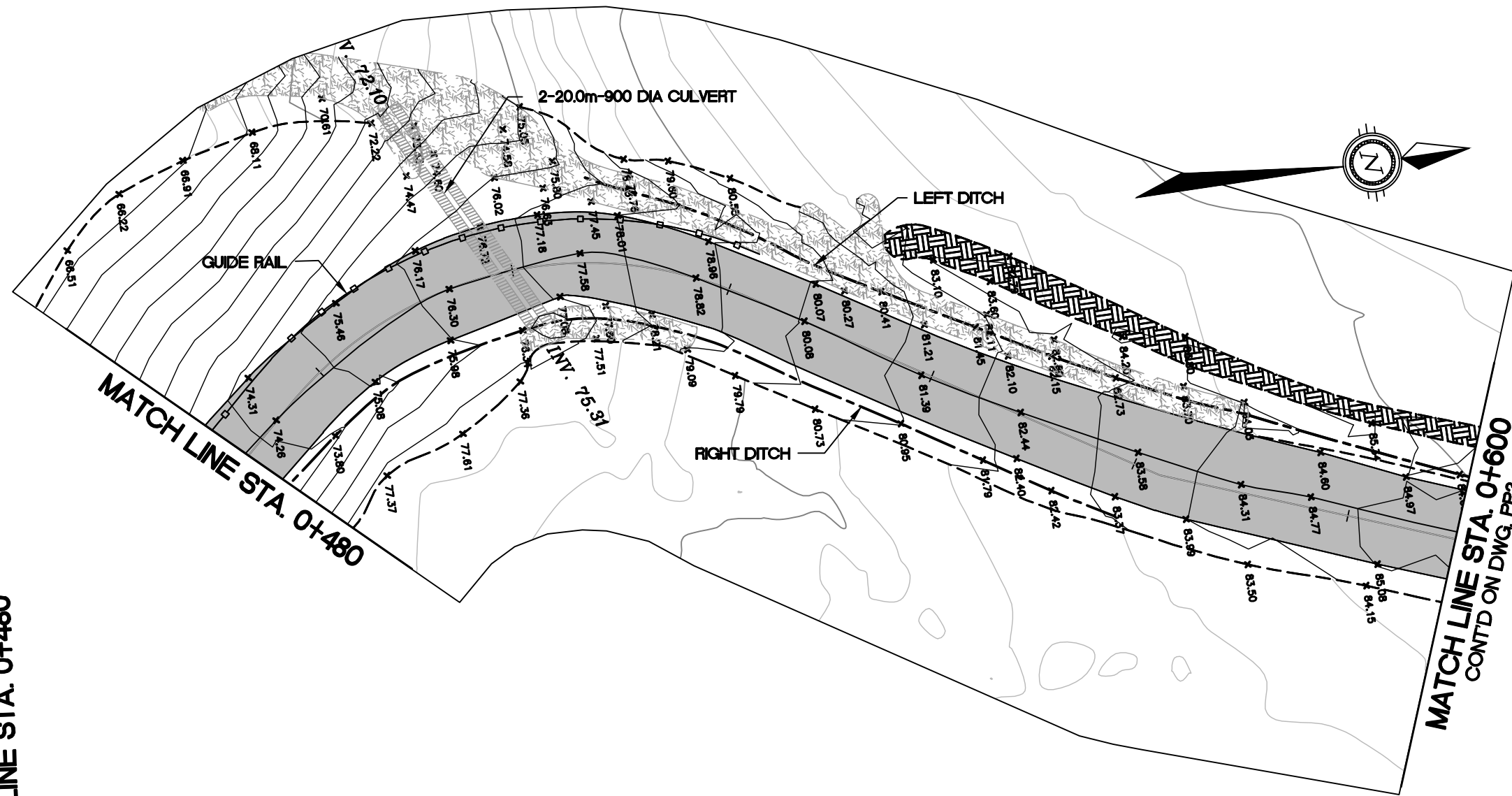
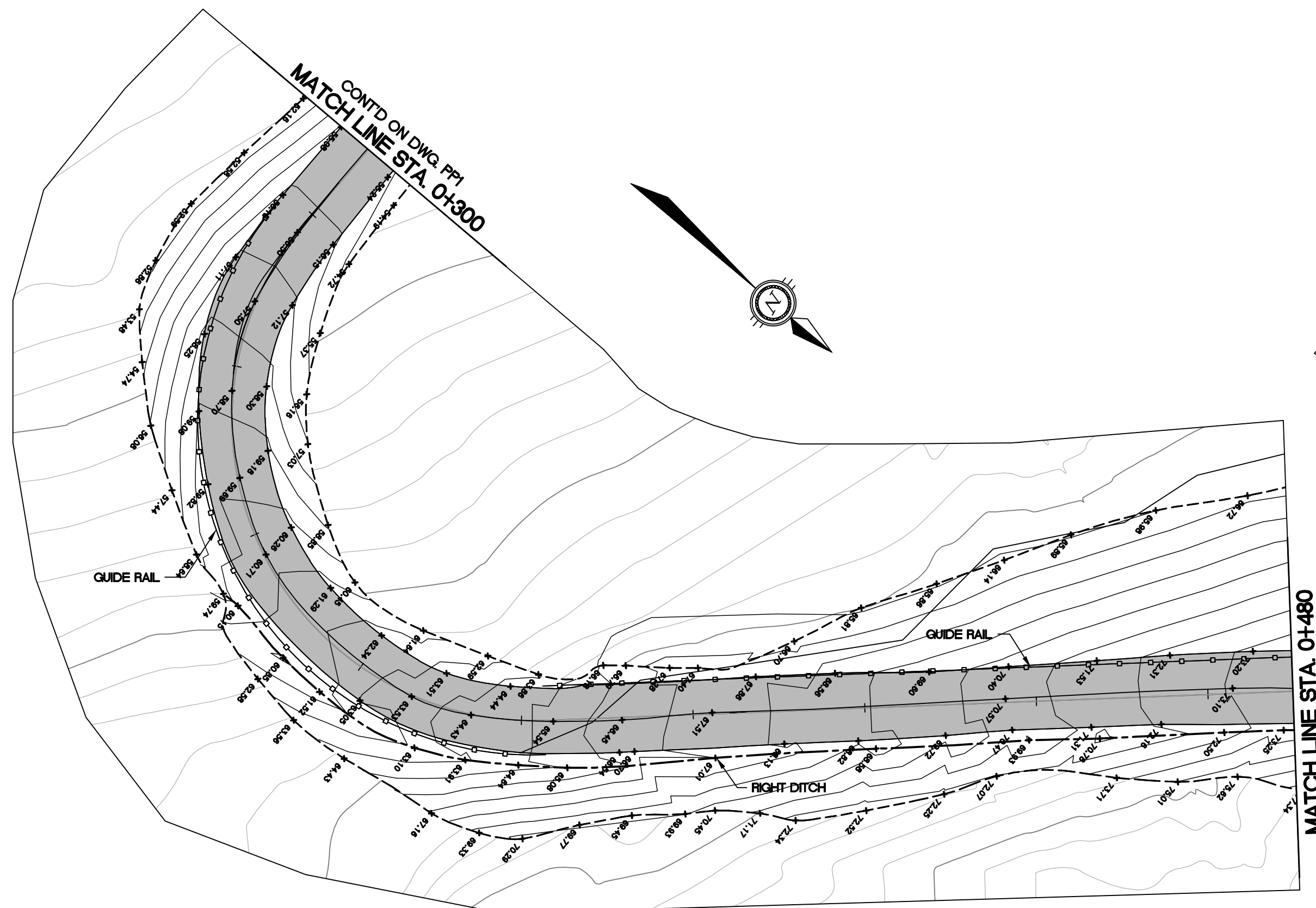
GOVERNMENT OF NUNAVUT

PROJECT
ARCTIC BAY
WASTE WATER
LAGOON ROAD

TITLE ACCESS ROAD PLAN & PROFILE STA. 0+000 TO STA. 0+300	
design by S.A.D.	project no. OTCD19054A
drawn by M.M.R.	drawing no. PP1
checked by S.L.B.	
date 21/04/08	
scale HORIZ 1:500 VERT 1:50	



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KEY PLAN

LEGEND

AS-BUILT

DATE: NOVEMBER 30, 2011

BENCH MARK

BM 1 ELEV. = 000.00
DESCRIPTION HERE

No.	DESCRIPTION	DATE	BY	APP'D
5	AS-BUILT	30/11/11	SAB	SLB
4	AS-CONSTRUCTED	17/11/11	MEB	SLB
3	ISSUED FOR CONSTRUCTION	14/09/09	MMR	SLB
2	TENDER SET	27/04/09	MMR	SLB
1	ISSUED FOR APPROVAL	24/04/08	MMR	SLB
R E V I S I O N S				

DRAWINGS ORIGINALLY
SEALED BY
S.L.BURDEN, P.eng. OF
exp. SERVICES Inc.
APRIL 27TH, 2009

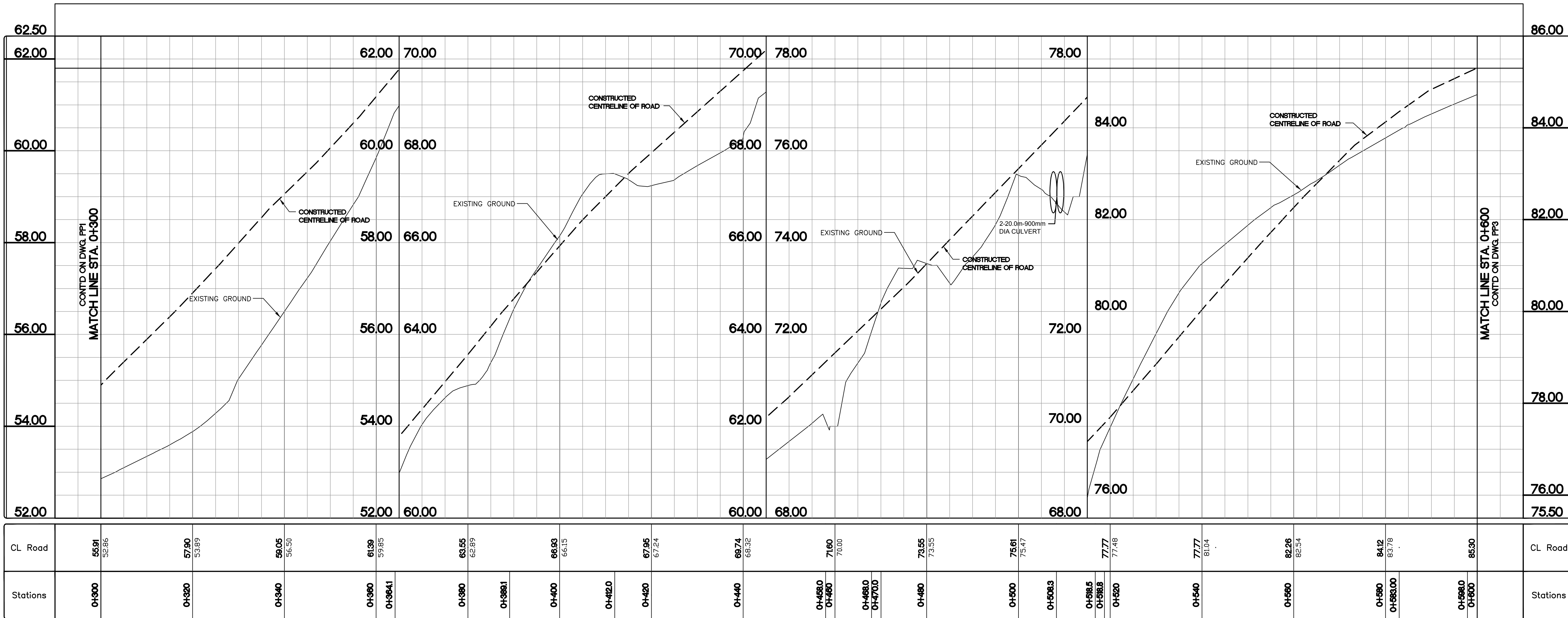
Trow Associates Inc.
154 Colonnade Road South
Ottawa, Ont. K2E 7J5
Tel: (613) 225-9940
Fax: (613) 225-7337

CLIENT
GOVERNMENT OF NUNAVUT

PROJECT
ARCTIC BAY
WASTE WATER
LAGOON ROAD

TITLE
ACCESS ROAD
PLAN & PROFILE
STA. 0+300 TO STA. 0+600

design by	S.A.D.	project no.	OTCD19054A
drawn by	M.M.R.	drawing no.	PP2
checked by	S.L.B.		
date	21/04/08		
scale	HORIZ 1:500 VERT 1:50		



KEY PLAN

LEGEND

AS-BUILT

DATE: NOVEMBER 30, 2011

BENCH MARK

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5	AS-BUILT	30/11/11	SAB	SLB
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R E V I S I O N S				

DRAWINGS ORIGINALLY
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S.L.BURDEN, P.eng. OF
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APRIL 27TH, 2009

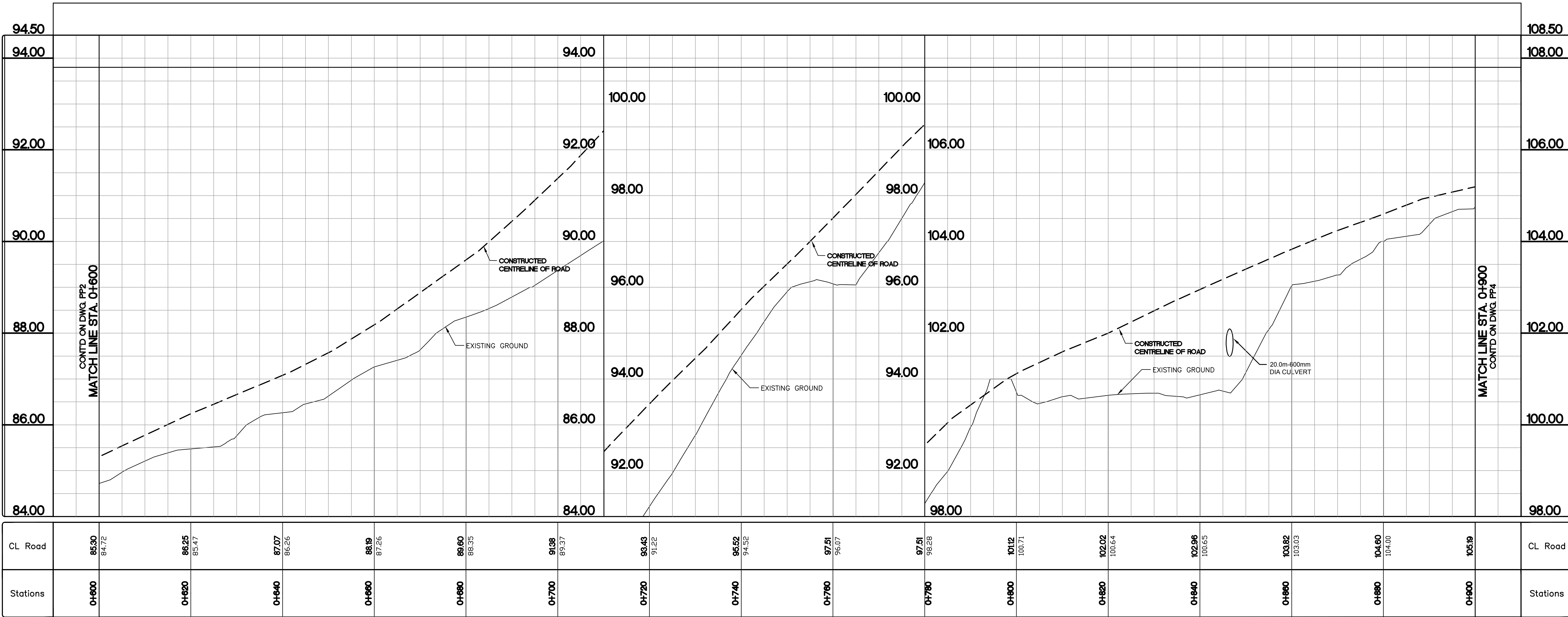
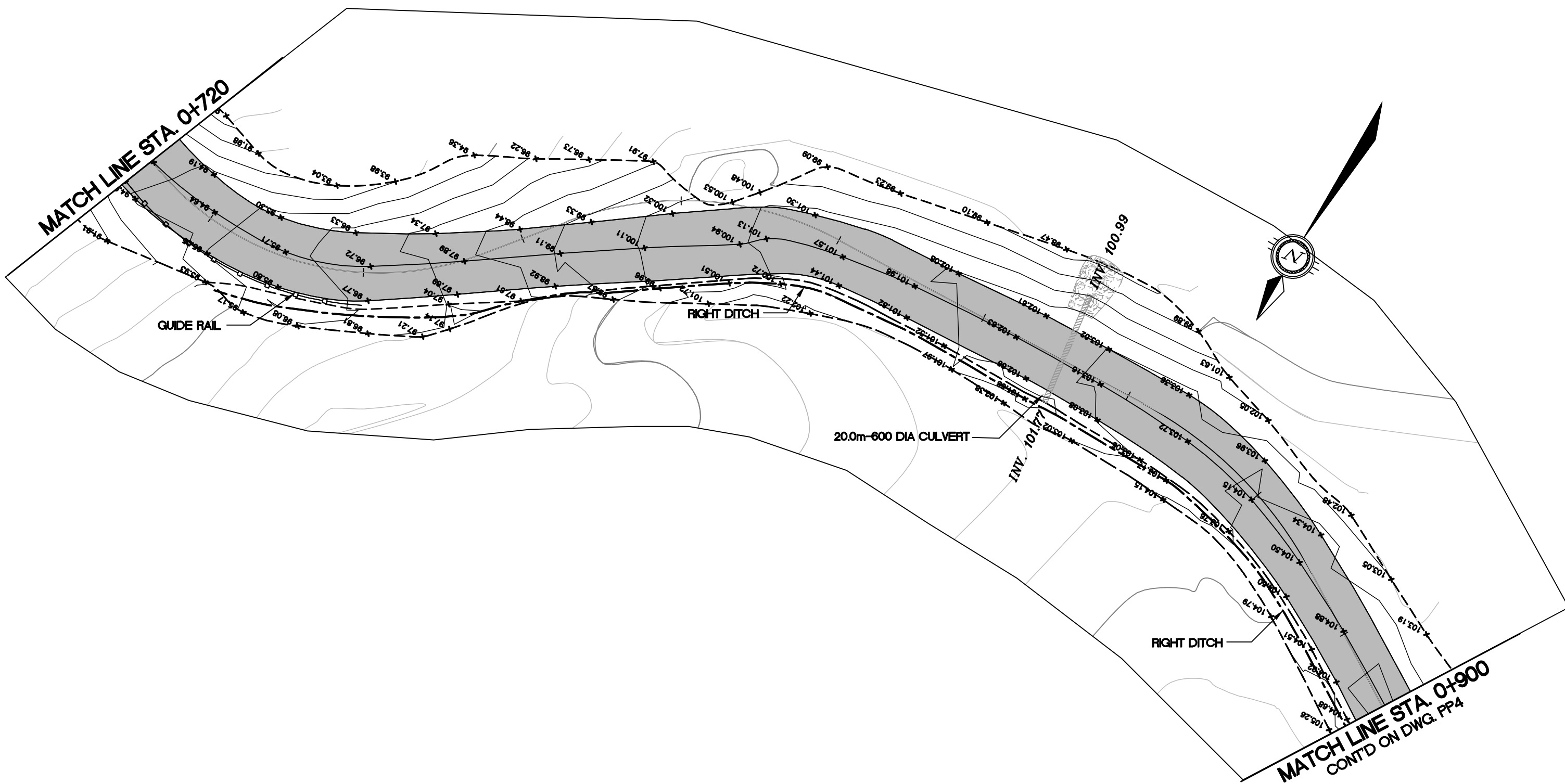
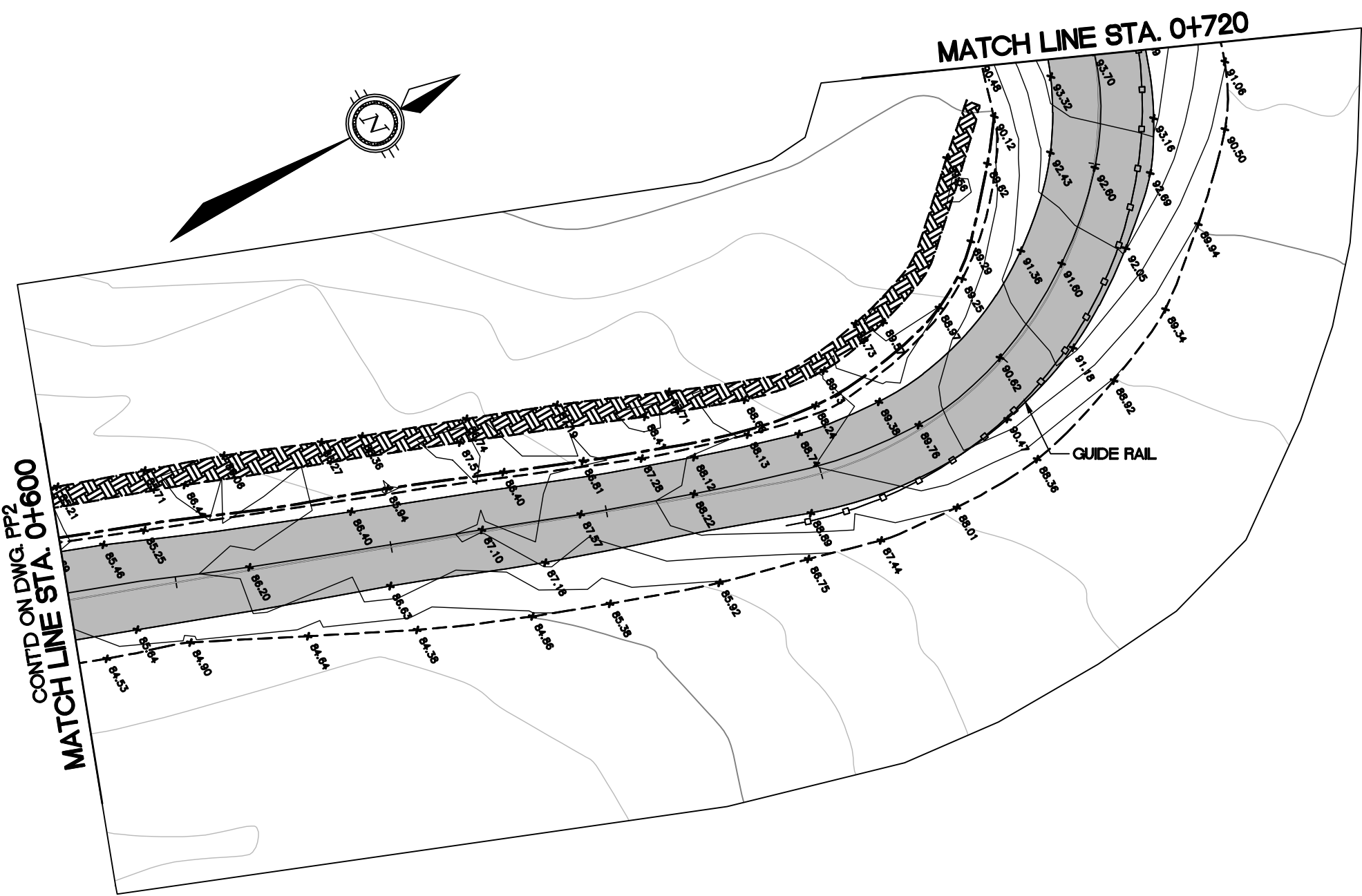
Trow Associates Inc.
154 Colonnade Road South
Ottawa, Ont. K2E 7J5
Tel: (613) 225-9940
Fax: (613) 225-7337

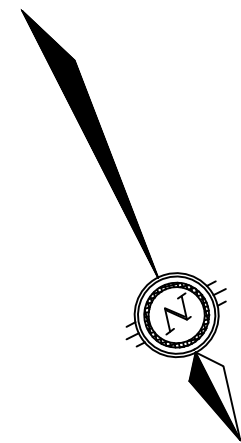
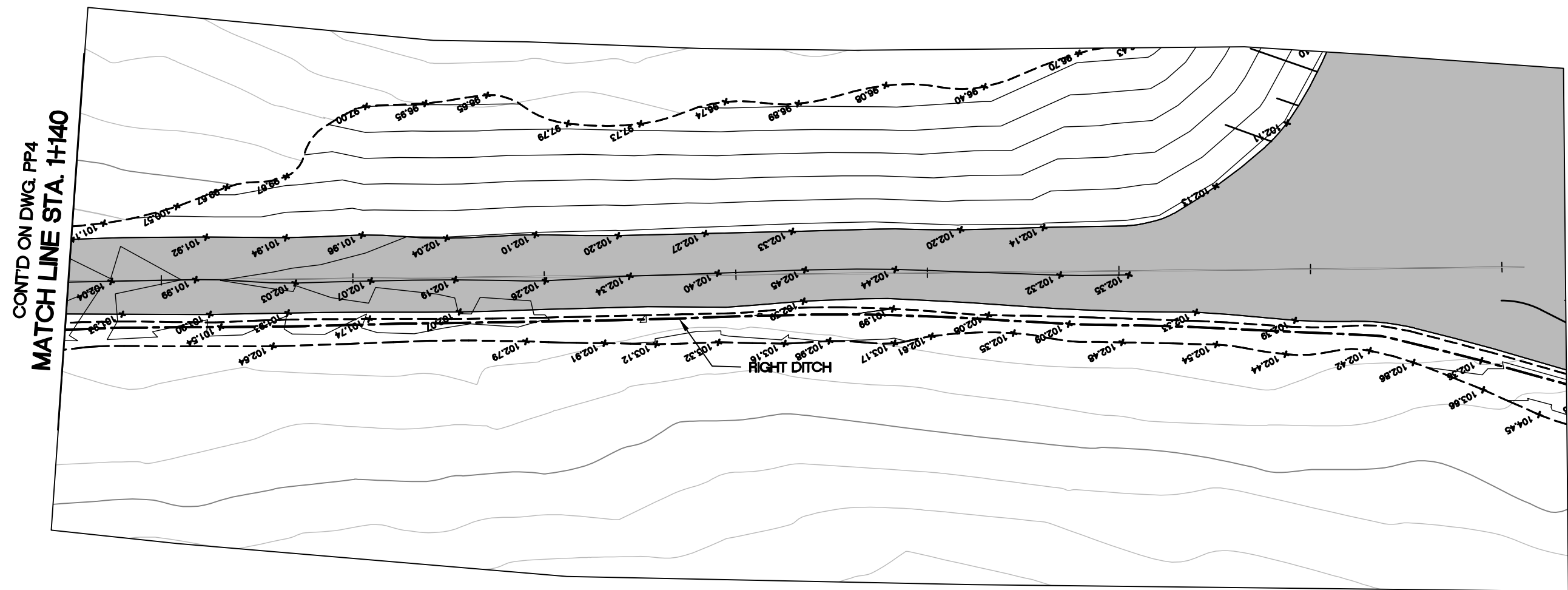
CLIENT
GOVERNMENT OF NUNAVUT

PROJECT
ARCTIC BAY
WASTE WATER
LAGOON ROAD

TITLE
ACCESS ROAD
PLAN & PROFILE
STA. 0+600 TO STA. 0+900

design by	S.A.D.	project no.	OTCD19054A
drawn by	M.M.R.	drawing no.	PP3
checked by	S.L.B.		
date	21/04/08		
scale	HORIZ 1:500 VERT 1:50		





KEY PLAN

LEGEND

AS-BUILT

DATE: NOVEMBER 30, 2011

BENCH MARK

BM 1
DESCRIPTION HERE
ELEV. = 000.00

No.	DESCRIPTION	DATE	BY	APP'D
5	AS-BUILT	30/11/11	SAB	SLB
4	AS-CONSTRUCTED	17/11/11	MEB	SLB
3	ISSUED FOR CONSTRUCTION	14/09/09	MMR	SLB
2	TENDER SET	27/04/09	MMR	SLB
1	ISSUED FOR APPROVAL	24/04/08	MMR	SLB
R E V I S I O N S				

DRAWINGS ORIGINALLY
SEALED BY
S.L.BURDEN, P.eng. OF
exp. SERVICES Inc.
APRIL 27TH, 2009

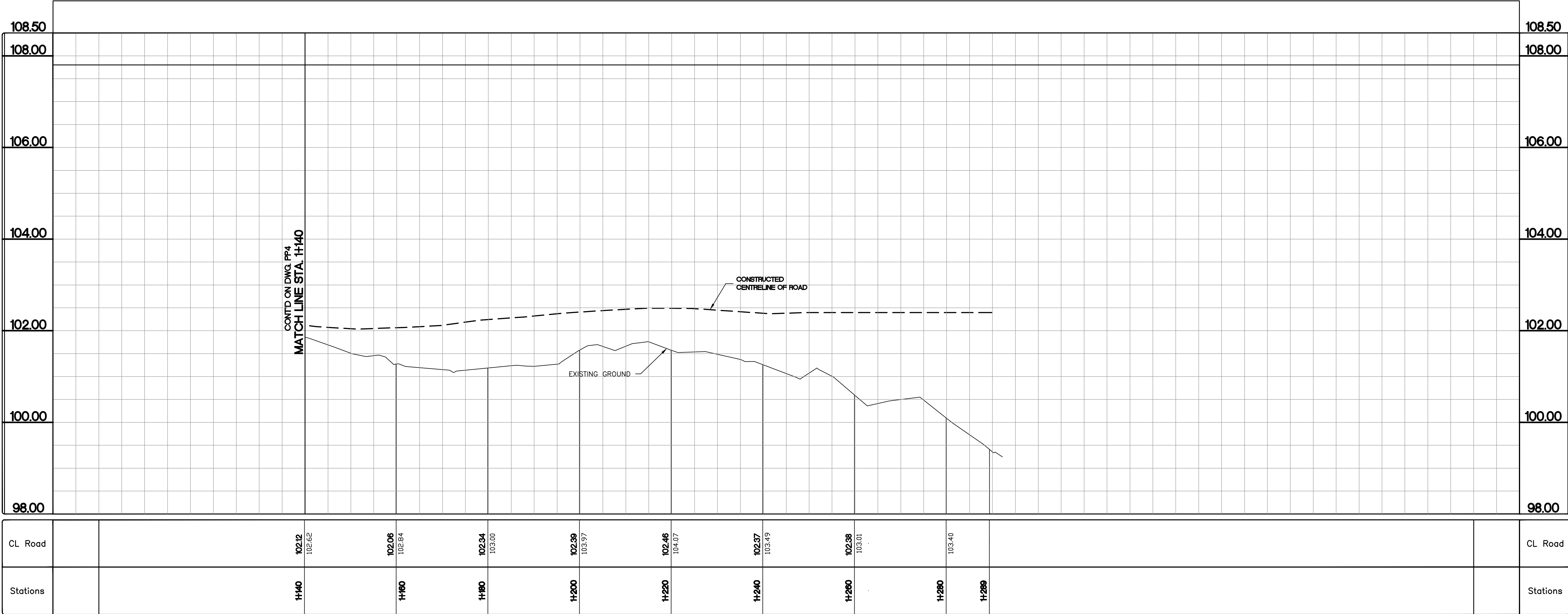
Trow Associates Inc.
154 Colonnade Road South
Ottawa, Ont. K2E 7J5
Tel: (613) 225-9940
Fax: (613) 225-7337

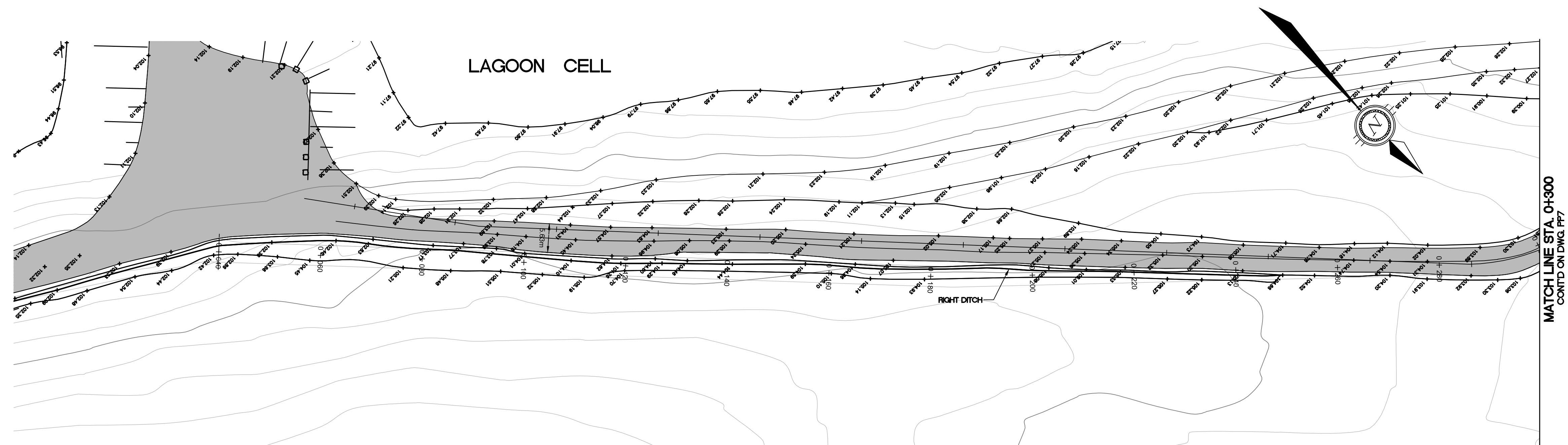
CLIENT
GOVERNMENT OF NUNAVUT

PROJECT
ARCTIC BAY
WASTE WATER
LAGOON ROAD

TITLE
ACCESS ROAD
PLAN & PROFILE
STA. 1+140 TO STA. 1+245

design by	S.A.D.	project no.	OTCD19054A
drawn by	M.M.R.	drawing no.	PP5
checked by	S.L.B.		
date	21/04/08		
scale	HORIZ 1:500 VERT 1:50		





KEY PLAN

LEGEND

AS-BUILT

DATE: NOVEMBER 30, 2011

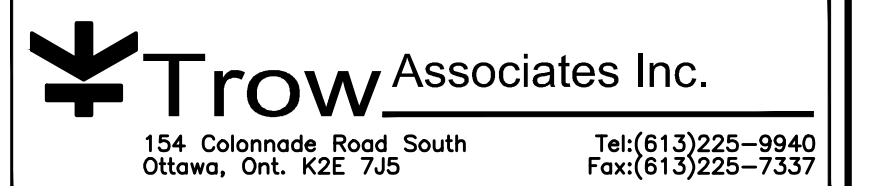
BENCH MARK

BM	DESCRIPTION
BM 1	DESCRIPTION HERE

ELEV. = 000.00

5	AS-BUILT	30/11/11	SAB	SLB
4	AS-CONSTRUCTED	17/11/11	MEB	SLB
3	ISSUED FOR CONSTRUCTION	14/09/09	MMR	SLB
2	TENDER SET	27/04/09	MMR	SLB
1	ISSUED FOR APPROVAL	24/04/08	MMR	SLB
No.	DESCRIPTION	DATE	BY	APP'D
R E V I S I O N S				

DRAWINGS ORIGINALLY
SEALED BY
S.L.BURDEN, P.eng. OF
exp. SERVICES Inc.
APRIL 27TH, 2009



CLIENT

GOVERNMENT OF NUNAVUT

PROJECT

ARCTIC BAY
WASTE WATER LAGOON

TITLE

ACCESS ROAD
SECOND BERM
PLAN & PROFILE

design by

S.A.D.

project no.	OTCD19054A
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drawn by

M.M.R.

drawing no.

checked by	
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S.L.B.

date	
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07/12/07

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HORIZ 1:500 VERT 1:50

PP6

Appendix B

Photographs

Appendix C

Thermistor Data Collection

Quickstart for Installation Validation of the Thermistor String

1.0 Installation Validation Steps

- Installation of the loggernet software on the computer
- Connect the thermistor string to the test box (using the rectangular-shaped connector)
- Turn the power on with the terminal block blade
- Start the computer and the LoggerNet Software (setup the connection)
- Monitor data
- Collect data

2.0 LoggerNet Software

2.1 Description

The LoggerNet is a fully featured Windows-based software package that allows direct communication with the test box using a RS-232 connection. A “Connect” screen provides real-time tools to set the datalogger clock in order to send the program to the datalogger and manually collect data using a computer. In addition, data can also be retrieved automatically, based on a predefined schedule. Measurements can be viewed in real-time on both numeric and graphical displays. In addition to these basic tools, the software package includes a datalogger program editor, a report generation tool and a data viewer with basic plotting capabilities.

This application note is intended to give the user a quickstart in getting the datalogger powered up and running. However, we strongly recommend that the user read the LoggerNet manual in order to get familiar with its features.

2.2 Software Installation

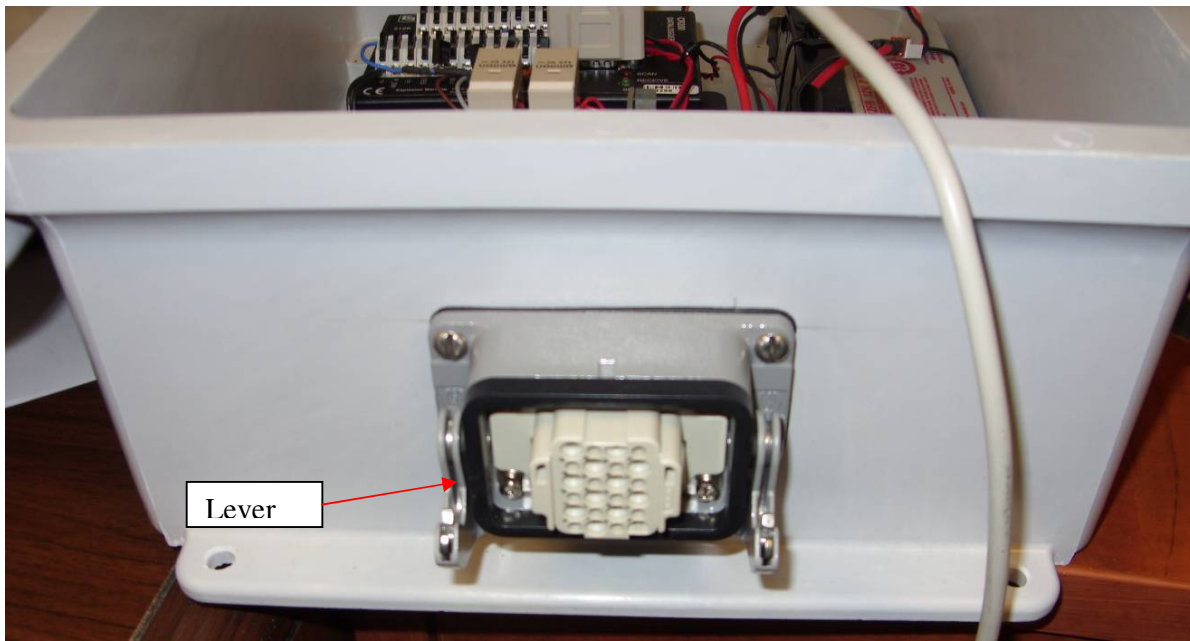
The LoggerNet is a collection of 32-bit programs designed for Intel-based computers running Microsoft Windows 2000, Windows XP or Vista.

As with all softwares, we strongly recommend that a back-up of critical files be performed before software installation. Place the installation disk in your computer's CD/DVD drive. If autorun is enabled, LoggerNet installation will start. If it does not start, select START > RUN from the Windows's START menu. Locate the SETUP.EXE file on the CD/DVD drive and click OK. Follow the instructions on the screen. Refer to the LoggerNet manual for further details.

When the installation is done, a LoggerNet icon will be placed on your desktop.

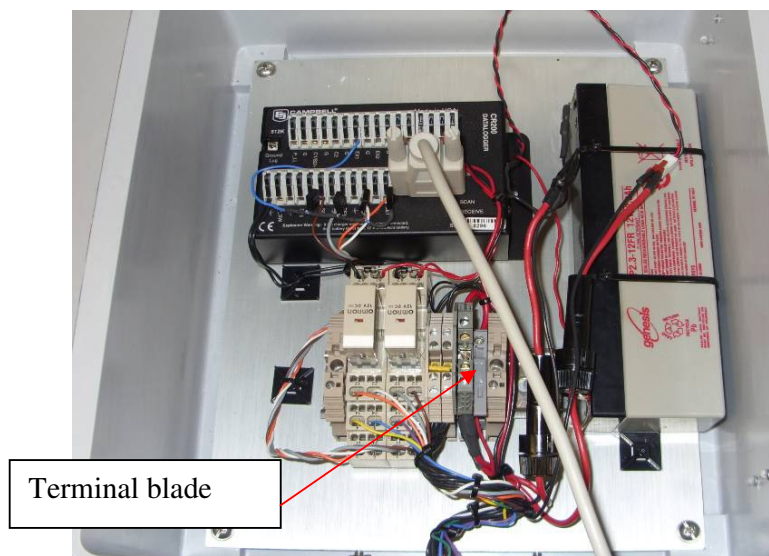


3.0 Connection of the Thermistor String to the Test Box



Connect the connector to the mating on the test box and lift up the lever to secure the connector in place. *NOTE: make sure to seal back the connector of the thermistor string to avoid any water infiltration in the connector before the final installation.*

4.0 Turn the Power On on the Test Box



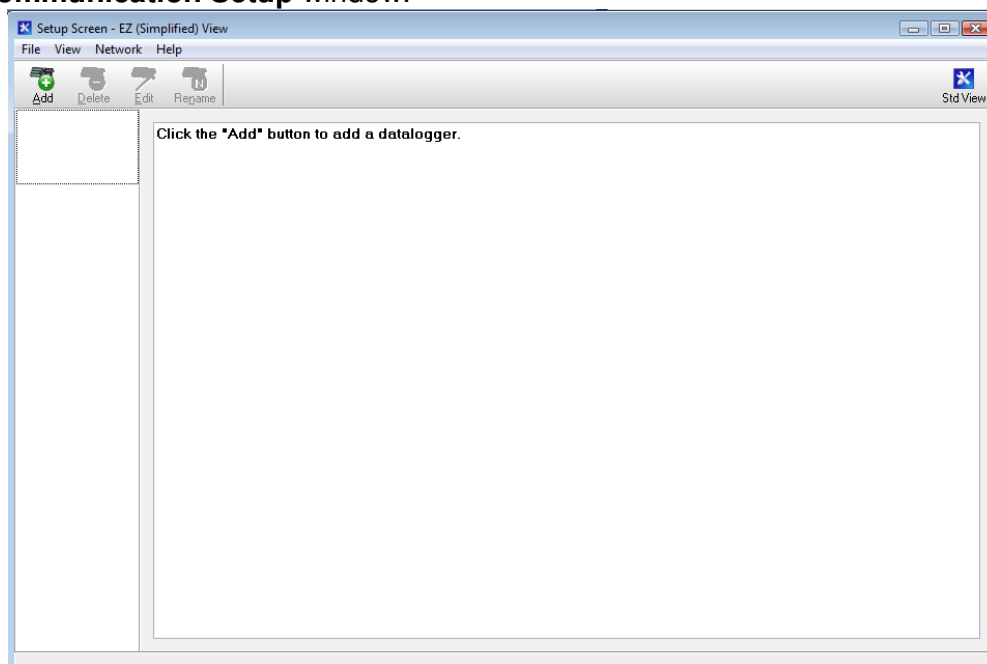
The terminal blade is used to turn the power OFF. Lower the blade to turn the unit ON. Make sure to raise the blade at the end of the test to avoid any battery drainage.

5.0 Setup the Connection

The hardware and software setups are done. The following steps describe the instructions to connect the datalogger, to collect or monitor data

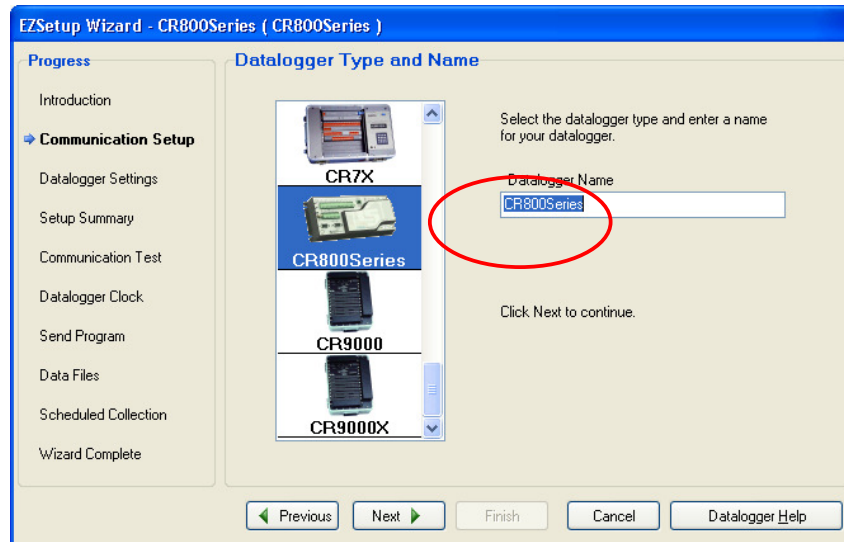
To start the LoggerNet, double click on the LoggerNet desktop icon.

- From the **MAIN / SETUP**, click **Add** and then click **Next**, which will get you to the **Communication Setup** window.

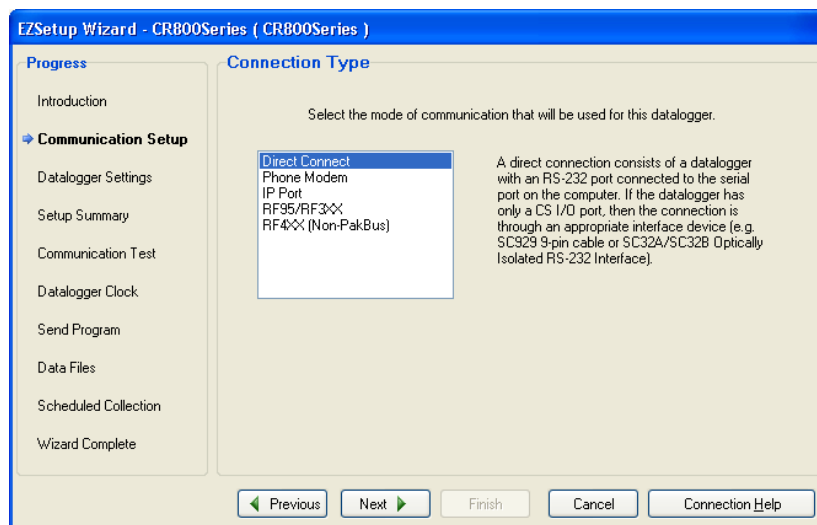


- Wait at least 15 seconds after powering up the unit before attempting to communicate with it.

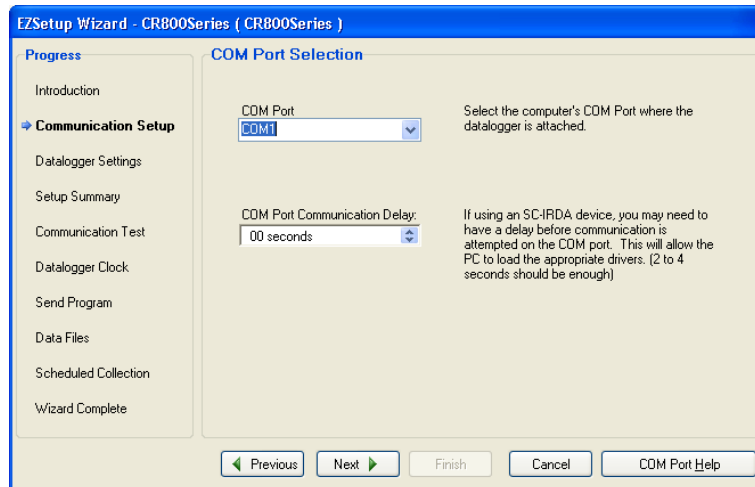
- Under **Datalogger Type and Name**, select **CR200 Series**, and next under **Datalogger Name**, choose a name that best represents your application. For example, type **Thermistor** and click **Next**. This datalogger name will be used later to connect to the Thermistor datalogger.



- Select **Direct Connect** and click **Next**.

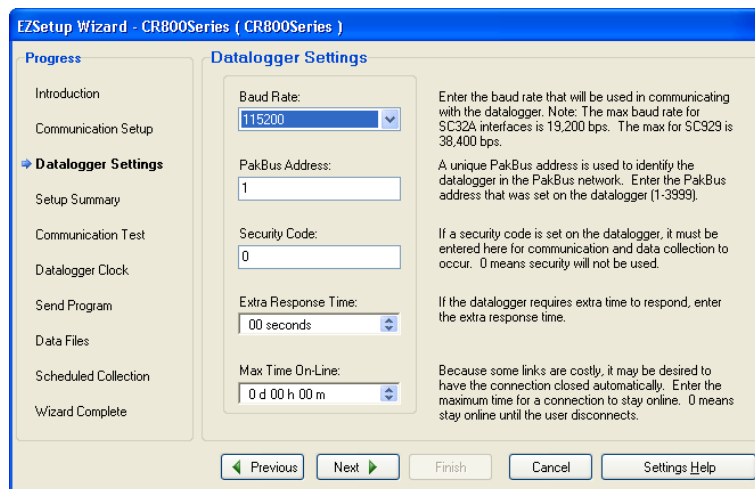


- Select the appropriate **COM port** on your computer. Usually, if you have a serial port on your computer, **COM 1** will be available. However, if you use a USB Serial adaptor, a virtual port will be created and a new COM port number will be assigned. Click **Next** when done.

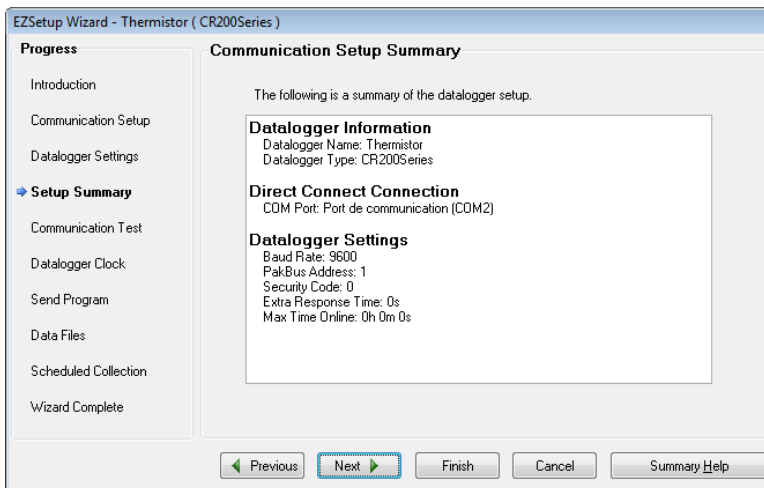


- Use the default parameters and click **Next**.

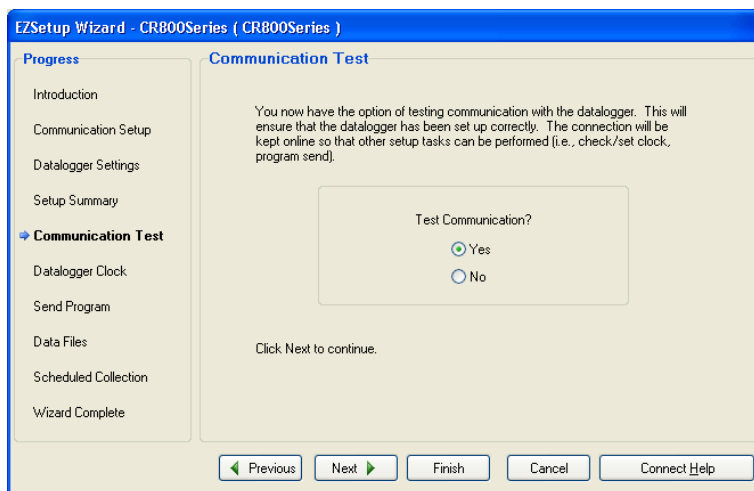
Note: If you use a USB Serial adapter you may need to lower the Baud Rate, in general **9600** works fine with the adapter.



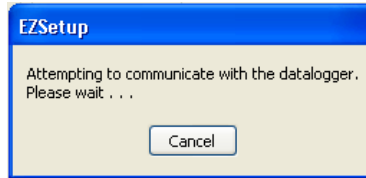
- The following window displays the Communication Setup Summary. Click **Next**.



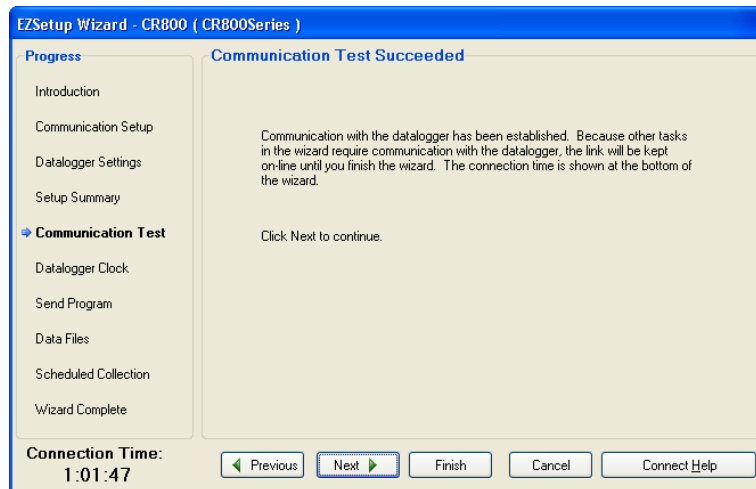
- To test the communication, select **Yes** and click **Next**.



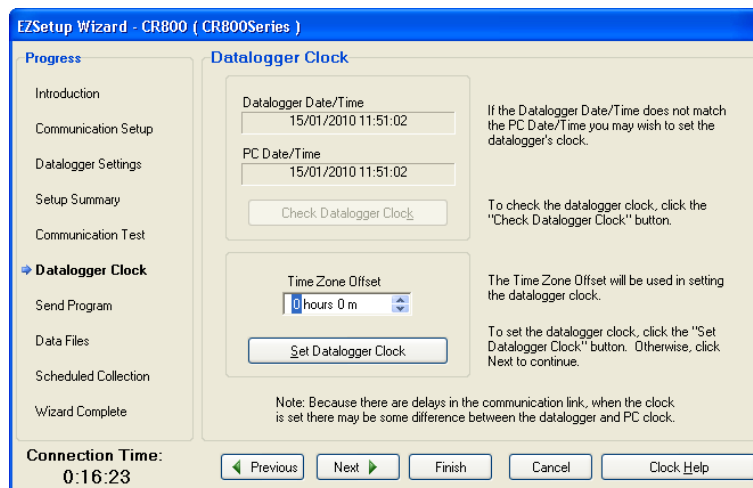
The following message will appear on the screen while your computer is attempting to communicate with the Thermistor datalogger.



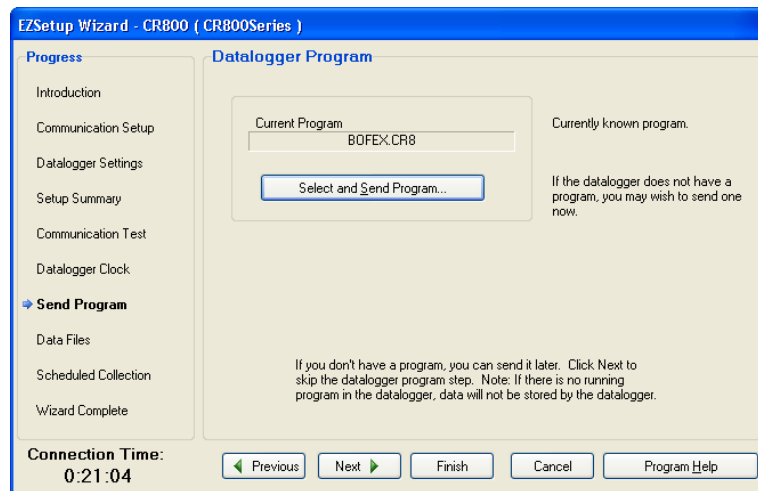
- The next windows will indicate if communication is successful. Click **Next**.



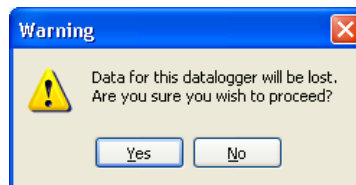
- Adjust the clock to set it at your local time zone. Make sure your computer is adjusted to your local time, then click **Set Datalogger Clock**. When done, click **Next**.



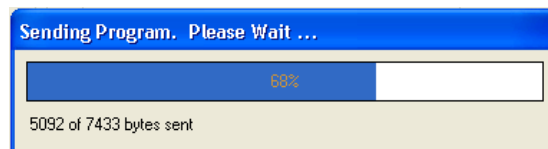
- The datalogger is usually shipped with the Application Program pre-loaded in the datalogger. The program will be displayed under **Current Program**. If it shows **no program** or if the program name shown is not for your application, you will need to upload your Application Program in the datalogger. Click **Finish** to save your settings. At this point, the datalogger setup is completed. To quit the **EZSetup** wizard, select **File** from the menu and click **Exit**. Proceed to section 4.2.



- To download your application program, click **Select and Send Program**. Locate the program on your computer's HD drive or on the one supplied by email, and click **Open**. The following warning message will be displayed on your screen. Click **Yes**.

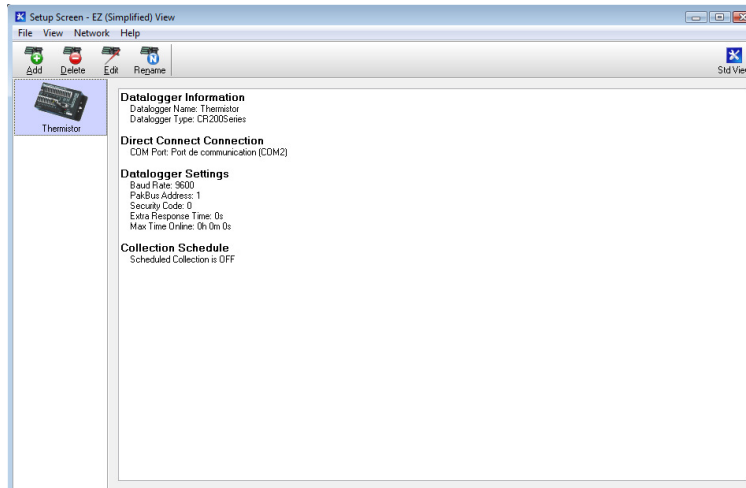


- A progress bar will display the download progress. If successful, a message will indicate it.



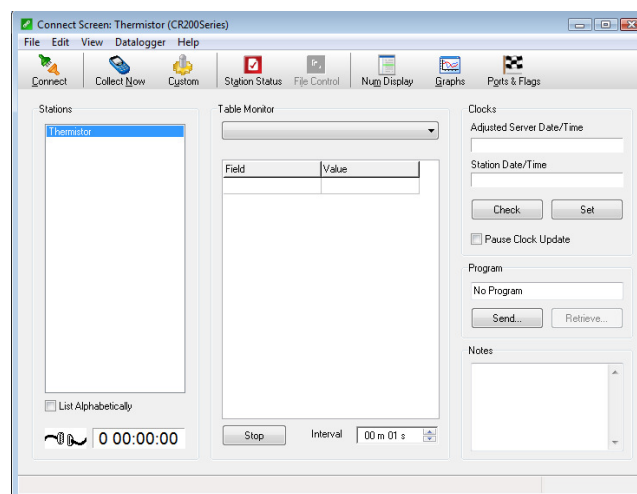
- Click **Finish** to save your settings. This completes the datalogger setup using the **EZSetup** wizard.

- To quit the **EZSetup**, select **File** from the **Menu**, and click **Exit**.

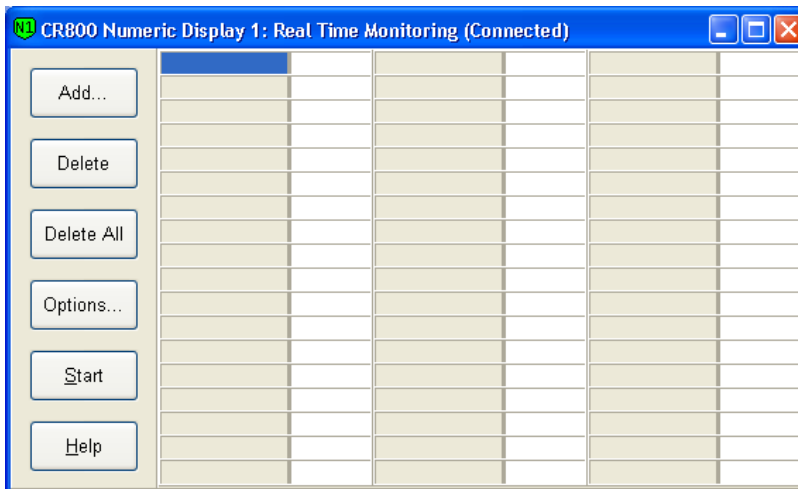


6.0 Monitoring Data With a Computer

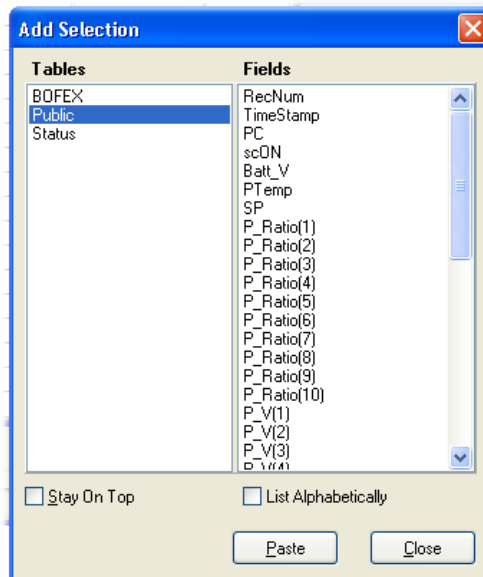
- Connect the supplied Serial Cable between the RS232 Input on the CR200 datalogger and your computer's serial port or USB Serial Adapter.
- Start the LoggerNet by double clicking on the LoggerNet desktop icon.
- From the **MAIN/CONNECT**, click on the station **Thermistor**, then **Connect**



- The cable at the bottom of the screen will be connected when the link will be established. Click **Num.Display/Display 1**. The following window should appear.



- Click the **Add** button and under **Tables**, highlight **Public**. The following window should appear.

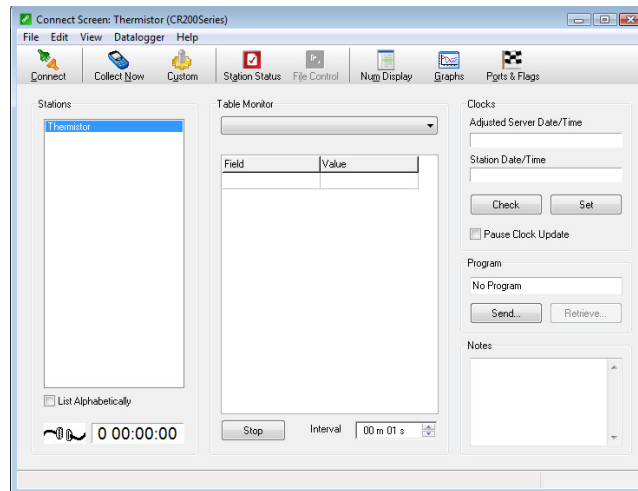


- Under **Fields**, select (highlight) the sensors (labels) you wish to view during the Test. You can use a combination of Shift & Ctrl keys on the computer's keyboard to select multiple labels. Next, on the **Display 1** window, highlight the location where you want to place the labels and finally, from the **Add Selection** window, click **Paste**. We recommend you to monitor the entire content in **Public**. The variable **Thermistor** represents the temperature and the value **Resistor** represents the resistor value of the thermistor.

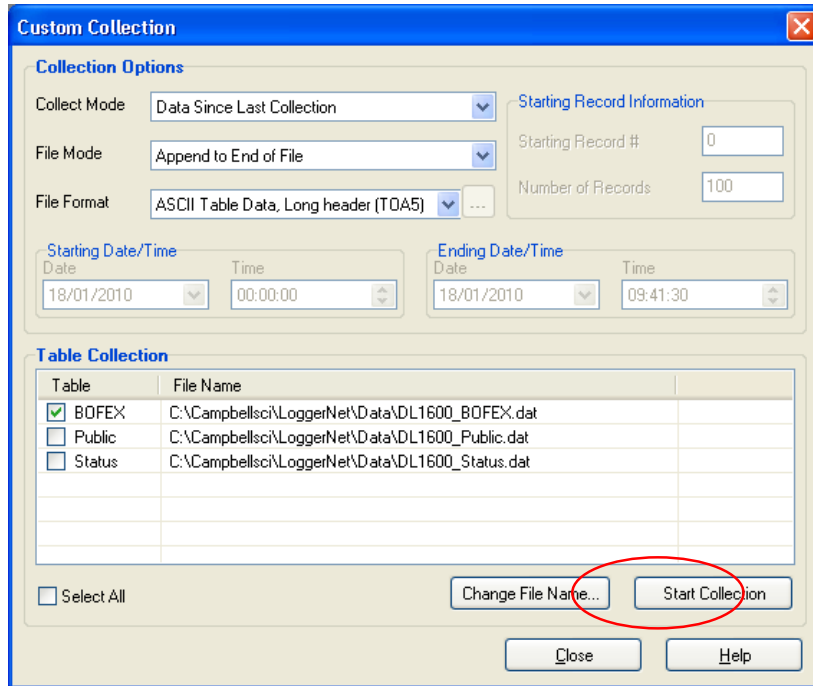
7.0 Collect Data

When a Test is completed, readings should be collected immediately. The following steps assume that the computer is already connected and that the LoggerNet is already running.

- From the **Connect Screen**, click the **Collect Now** button.



- Click on the Data_X.dat file to see the content. The records are displayed in a table.
- To modify the data output, click **Custom** in the connect screen. The following screen will appear.

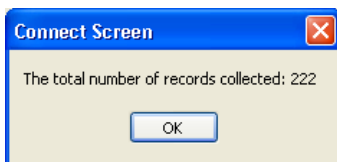


- Under **Collection Options**, make sure the following options are selected:
 - **Data Since Last Collection**
 - **Append to End of File**
 - **ASCII Table Data, Long header (TOA5)**
- Under **Table Collection**, make sure that **Data_X** is checked and that the file path where to save the file is defined. You do not need to check the **Public** and **Status** boxes.

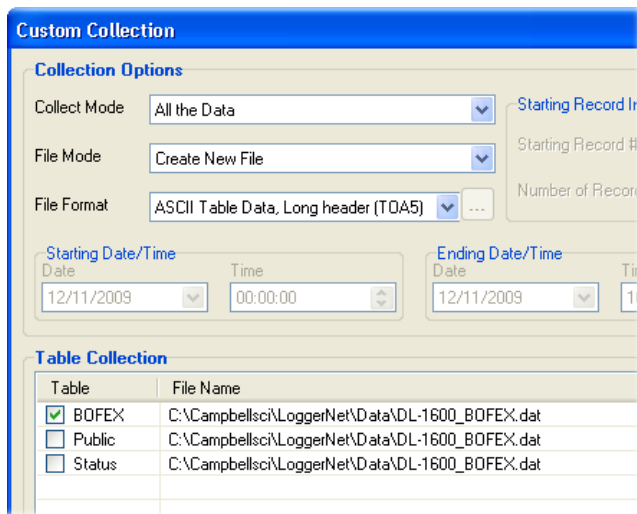
When collecting readings for the first time, you may need to collect all the data from the test box. This will set all memory pointers so that the next time you collect readings, the datalogger will know what readings were previously collected, and only new readings will be collected. All new readings will be appended to the previously collected file, or a new file will be created.

- Click **Start Collection**. The following message will appear, showing the collection progress and total records collected.

Note: A single record includes the timestamp, the record number, all sensors readings in Celcius degrees, and finally, the datalogger's battery voltage.



If the message window shows zero records collected, set the **Collection Options** as follow and do the **Start Collection** again.



Custom Collection

Collection Options

Collect Mode: All the Data

File Mode: Create New File

File Format: ASCII Table Data, Long header (TOA5)

Starting Date/Time: 12/11/2009 00:00:00

Ending Date/Time: 12/11/2009 10:00:00

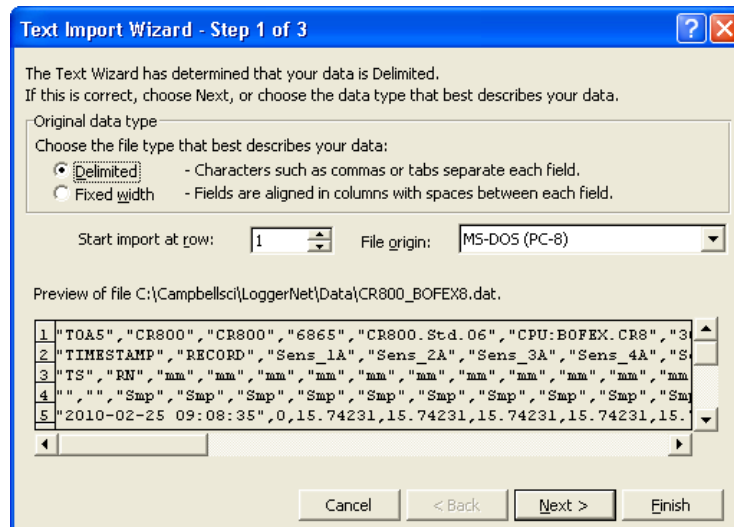
Table Collection

Table	File Name
<input checked="" type="checkbox"/> BOFEX	C:\Campbellsci\LoggerNet\Data\DL-1600_BOFEX.dat
<input type="checkbox"/> Public	C:\Campbellsci\LoggerNet\Data\DL-1600_BOFEX.dat
<input type="checkbox"/> Status	C:\Campbellsci\LoggerNet\Data\DL-1600_BOFEX.dat

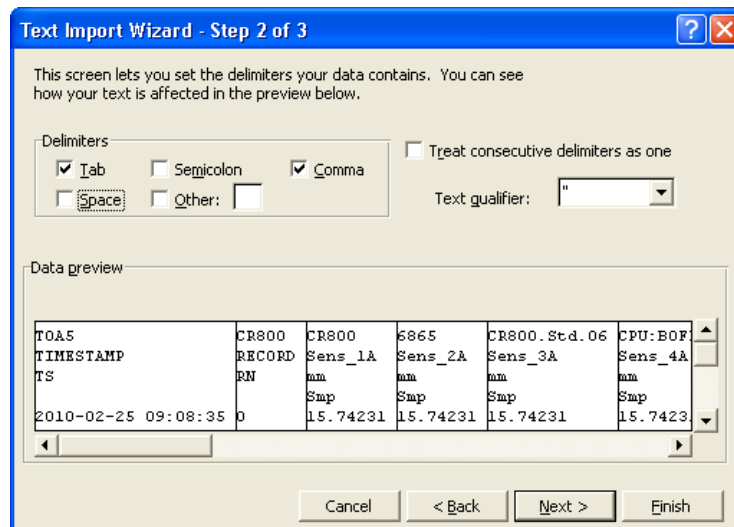
All collected readings are saved in the file specified under Table Collection. The readings saved with the file format **ASCII Table Data, Long header (TOA5)** are separated by commas (CSV) and can be imported into Microsoft Excel for data reduction.

7.1 Import Readings Into Excel

- Start Excel, go to **File > Open**, in the **Files of type** field, then select **All Files (*)**.
- Locate and select the file to import and click **Open**. The Text Import Wizard will open.



- Select **Delimited** and click **Next**.



- Select **Tab**, **Comma** and click **Finish**.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	TOA5	CR800	CR800	6865	CR800	Stc	CPU:BOF	3022	BOFEX					
2	TIMESTAMP	RECORD	Sens_1A	Sens_2A	Sens_3A	Sens_4A	Sens_5A	Sens_1B	Sens_2B	Sens_3B	Sens_4B	Sens_5B	S_Range	Load
3	TS	RN	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	
4			Smp	Smp	Smp	Smp	Smp	Smp	Smp	Smp	Smp	Smp	Smp	Smp
5	25/09/2009 09:08	0	15.74231	15.74231	15.74231	15.74231	15.74231	15.74231	15.74231	15.74231	15.74231	15.74231	50	0
6	25/09/2009 09:08	1	15.74231	15.74231	15.74231	15.74231	15.74231	15.74231	15.74231	15.74231	15.74231	15.74231	50	0
7	25/09/2009 09:08	2	15.74231	15.74231	15.74231	15.74231	15.74231	15.74231	15.74231	15.74231	15.74231	15.74231	50	0
8	25/09/2009 09:08	3	15.74231	15.74231	15.74231	15.74231	15.74231	15.74231	15.74231	15.74231	15.74231	15.74231	50	0
9	25/09/2009 09:08	4	15.74231	15.74231	15.74231	15.74231	15.74231	15.74231	15.74231	15.74231	15.74231	15.74231	50	0
10														