Clarification on Pre Bid Queries

Name of Work: Expression of Interest for the work of "Removal of Deposited Sediments from Salal Dam Reservoir".

e-Tender ID: 2025_NHPC_868688_1

Date: 31-07-2025

Sl. No.	Applicant's Query	Reply
1	What is the original depth of the Salal Dam reservoir?	85 Mtr.
2	Current water level in the reservoir.	487.68 Mtr
3	We kindly request you to share the "Bathymetric Survey Report of the reservoir" at your earliest convenience.	Bathymetric Survey Report of the reservoir is enclosed.
4	Time for completion of work may be provided.	Time for completion may be assessed by applicants as per their proposed methodology and equipment deployment schedule.
5	Site for disposal of dredged material may be properly allocate.	The EOI condition shall prevail.
6	Approval of Govt. Authorities for muck disposal site and shifting of dragged material upto muck disposal site may be provided by NHPC.	NHPC shall provide all possible assistance to applicants / bidders to get required approvals from Govt. Authorities.
7	Please clarify whether the bathymetric and topographic surveys are to cover the entire 22 km stretch of the Salal Dam reservoir or only the identified sediment removal zones. Additionally, please confirm if any previous bathymetric or topographic surveys have been conducted by NHPC at Salal Dam, and if available, we request these to be shared to facilitate planning and cost estimation.	Bathymetric Survey has to cover full reservoir. Recent copy of Bathymetric Survey Report of the reservoir is enclosed.
8	Please confirm whether dredging operations will be permitted throughout the year, including the monsoon season. Kindly clarify if there are any restrictions on sediment removal during specific months due to high water levels or discharge conditions, and whether demobilization will be required during the monsoon period.	Dredging operations are permitted throughout the year.

Sl. No.	Applicant's Query	Reply
9	We request confirmation on whether any approved disposal sites are available for the disposal of dredged material. Additionally, please clarify if the contractor is required to develop or maintain access roads from the dredging points to the disposal sites and whether any further re-handling or shifting of material will be required after initial disposal.	EOI conditions are ample clear.
10	We request confirmation on whether a provisional financial statement for FY 2024-25, signed by the company's Director, will be acceptable for bid evaluation, as the audited financials for 2024-25 are under finalisation. The statutory due date for filing audited financials for FY 2024-25 is 30th September 2025. Please confirm if submission of provisional financials, along with audited financials for FY 2023-24 and FY 2022-23, will be acceptable for evaluation.	Audited financial statement may be provided upto previous year and provisional financial statements of current financial year certified by the CFO and CA may be provided.
11	We request the geotechnical report and related data available for the Salal Dam reservoir to assess the sediment characteristics, channel conditions, and site conditions for planning and execution of sediment removal operations.	EOI conditions are ample clear.
12	The FRL / MDDL level of the reservoir has been indicated. The minimum level during lean session has not been given.	MDDL is the minimum level during lean session.
13	Present bed level below lowest water level is required. The designed bed level, length & average width of reservoir is required.	EOI conditions are ample clear.
14	Whether any survey of the reservoir has been conducted recently? If so, please furnish copy of the same.	Copy of recently done Bathymetric Survey Report of the reservoir is enclosed.
15	Whether, any borehole data have been prepared to ascertain condition of bed material.	EOI conditions are ample clear.
16	Prospective contractor will require sufficient area near the periphery of the reservoir for the accommodation of staff, office, store & Godown purpose. Whether, the same is available near work site and can be provided by NHPC.	EOI conditions are ample clear. However, applicants are required to conduct site visit for their confirmation.
17	As per scope of work the contractor is required to obtain all requisite permissions for dumping from the	EOI conditions are ample clear. NHPC shall provide all possible assistance to

Sl. No.	Applicant's Query	Reply
	concerned agencies / departments of both the state Govt. and the central Govt. and any associated fees / charges applicable for their permissions and disposal will be entirely borne by the bidder. Please let us know what are the permissions are required and what is the fees for such permissions and whether NHPC will extend their co-operation and guide in obtaining such permissions which may require lot of time to fulfil their formalities.	applicants / bidders to get required approvals from Govt. Authorities.
18	The required minimum technical and experience qualifying criteria has not been indicated.	Applicants are requested to submit their best past experience / credentials in the formats enclosed with the EOI..
19	Who shall be the approving authority for disposal site selection? Are any pe-defined disposal zones available?	EOI conditions are ample clear.
20	Is Site visit mandatory?	No, but it is essential to carefully examine the complete site to get the realistic inputs to finalise the methodology, equipment planning etc.
21	Definition of Local supplier	It is as per DoE Circular dated 19-07-2024 read with MoP Circular dated 16-11-2024
22	Please provide format for undertaking of local content.	Format enclosed.
23	Will the bidder be allowed a post award period for detailed bathymetric / topographic survey before finalizing method and equipment.	Copy of recent bathymetric survey is enclosed.
24	Whether the uploaded EOI file size has any individual limit for PDF or folders. If yes, what is the maximum limit per file or overall.	Its as per rules of NIC, you are requested to go through the rules of CPP Portal. However, presently the maximum file size is limited to 40 MB.
25	Looking at the quantum of work it is envisaged that several Dredging Machines will be required to undertake the work. Therefore, the availability of Dredging Equipment is a critical factor for successful execution of the project. Thereby it is requested that Indian Bidder having experience of de-siltation in Hydro Projects may be allowed to	

Sl. No.	Applicant's Query	Reply
	have a technical tie-up with the reliable dredge machine manufacturer and the experience of such manufacturer may also be considered.	
27	In past the large scale dredging work in Dams have not been taken up, secondly the dam dredging is totally different from River or Sea Dredging as the depths involved in Dam Dredging is much higher and hence requires a completely different type of equipment. Therefore, the experience of shallow dredging in river or sea or lake is not a true representative. And since the deep dam dredging has not been undertaken in India at large scale therefore the Value of Orders with the firm/company having experience of deep dredging will not be much. Therefore it is requested that the capability of the firm must be judged on the basis of past experience of deep dredging and availability of deep dredging equipment and not only on the value of the past contract.	Applicants are requested to submit their best past experience / credentials. The bid conditions shall be finalised after evaluation of credentials and methodology submitted.
28	Startup Companies are promoted by Govt. of India to participate and develop new up-coming technologies. Deep Dredging of Dams is such a new technology. Therefore, the exemption regarding Financial Criteria may be allowed to the Startup company having requisite experience of deep dredging along with access to required dredging equipment. Also, the combined Financial and Technical strength of the bidder along with technical partner/dredge manufacturer may please be considered.	

NISVO MARINE SURVEYS LLP

PROJECT DOCUMENTATION

FOR POST-MONSOON HYDROGRAPHIC SURVEY OF SALAL DAM RESERVOIR AT DHYANGARH FOR YEAR 2024-25

Prepared By :

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POST-MONSOON HYDROGRAPHIC SURVEY OF SALAL DAM RESERVOIR AT DHYANGARH FOR YEAR 2024-25

Prepared by	
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Client	:	NHPC Limited
Project Title	:	To Carry Out Post-monsoon Hydrographic Survey of Salal Dam Reservoir at Dhyangarh For Year 2024-25
Project Code	:	202410_0346
References	:	\\Nisvoserver\2024\202410_0346 - BATHYMETRY AND TOPO - SALAL

ABSTRACT

NHPC LIMITED has intended to carry out Post-monsoon hydrographic survey of Salal Dam Reservoir at Dhyangarh for year 2024-25 to understand the bed-profile and present storage capacity of the reservoir. Subsequently the contract was awarded to NISVO MARINE SURVEYS LLP through Agreement No : NH/SPS/CD/NIT-27/2024-25/479- 491 dated: 24.08.2024. Accordingly, **NISVO MARINE SURVEYS LLP, Chennai** conducted the bathymetry and topographic surveys at Salal Dam Reservoir between 18.10.2024 and 17.11.2024.

This report presents various methodologies, techniques & specifications of equipment and results of the studies undertaken.

Date	Document Type		Originator	Checked by	Approved by
	Interim				
	Draft				
22.05.2025	Final	√	Dr. S. Balasingh	S.G. Singh	Dr. Mani
	Methodology				

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Annexure	Title
I	Detailed specification of survey equipment
II	Log sheets of echo-sounder calibration

1. EXECUTIVE SUMMARY

Single-beam bathymetry and topographic surveys at Salal Dam Reservoir at Dhyangarh for year 2024-25	
Introduction	
Agreement No.	LOA No. NH/SPS/CD/NIT-27/2024-25/479- 491 dated: 24.08.2024.
Survey Period	18.10.2024 to 17.11.2024
Equipment	SyQwest Hydrobox Echo-sounder, Trimble SPS 351 RTK, Ellipse-A MRU, and Geomax Zenith 35 PRO RTK
Software	Hypack 2022 Data Processing Software, Xpad Survey Software and Autoplotter Design Software

Post-Monsoon Hydrographic Survey of Salal Dam Reservoir at Dhyangarh for Year 2024-25

NHPC Limited has awarded a contract for the "Post-monsoon Hydrographic Survey of Salal Dam Reservoir at Dhyangarh for the Year 2024-25" under Agreement No: NH/SPS/CD/NIT-27/2024-25/479-491 dated 24.08.2024. In accordance with this agreement, NISVO MARINE SURVEYS LLP executed bathymetry and topographic surveys utilizing the cross-section method at the Salal Dam Reservoir. This was done to assess the bed profile and current storage capacity of the reservoir at various locations, as outlined in the Terms of Reference (TOR) provided by NHPC Limited.

The surveys were conducted from 18.10.2024 to 17.11.2024. Data collection involved the use of a SyQwest Hydrobox echo-sounder, Ellipse-A motion reference unit, Trimble SPS 351 DGPS system, Hypack hydrographic survey software, Geomax RTK systems, X-Pad survey software, and Autoplotter design software.

The topographic and bathymetry surveys serve as essential tools for creating detailed maps that illustrate both natural and artificial features of specific areas, including terrain elevation. This information is crucial for effective planning, design, and environmental assessment. In this study, the bathymetry survey was conducted in the water body up to the water spread area using an appropriate inflatable boat. The dry land area between the waterline and the elevation of 496.000m (MSL) was surveyed topographically using the RTK method.

Data was collected according to the planned chainages specified by NHPC Limited at various locations, including Red Nallah, upstream, downstream, and the pool area. The gathered data was processed and integrated using Hypack hydrographic software and plotted with Autoplotter. The current storage capacity was determined through cross-section volume calculations using Hypack software.

Based on the processed data, plan maps and sections were prepared at different scales in order to understand the bed-profiles of difference locations including upstream, downstream, red nallah and pool area. The current storage capacity of the reservoir up to the Full Reservoir Level (FRL) of 487.680m is calculated to be 13.480 MCM. Additionally, the storage capacity of the reservoir up to the elevation of 496.000m has also been calculated as 65.592 MCM.

2. SALAL DAM RESERVOIR

The Salal Dam Reservoir is located at 7km south of Reasi Town, which is about 95 km from Jammu with global co-ordinates of 33°08`43.5"N and 74°48`44.7"E in the basin of Chenab river.

Name of the Reservoir	Latitude	Longitude	Basin	FRL (m)	Gross Storage (MCM)
Salal Dam Reservoir	**33°08`43.5"**	**74°48`44.7"**	**Chenab**	**483.11**	**251 Mcum**

Table 3: *Features of Salal Dam Reservoir*

A preview of the location map is provided below, with the detailed location map displayed in Fig. 1. under the figures section.

Fig. 1.: *Location map of Salal DAM Reservoir.*

The satellite imagery of survey region, including the upstream section, the Red Nallah, the downstream section, and the pool area, are provided below, with detailed views illustrated in Figs. 2-6. under the figures section.

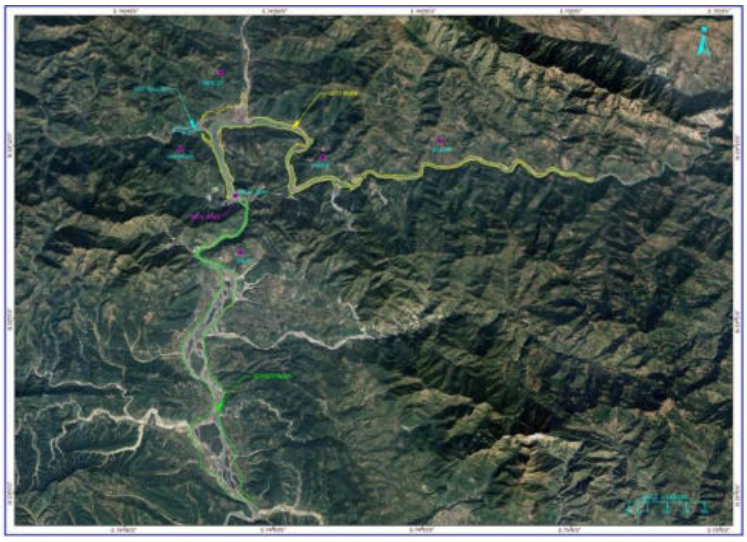


Fig. 2.: *Satellite Imagery of Survey Region, Salal DAM reservoir*

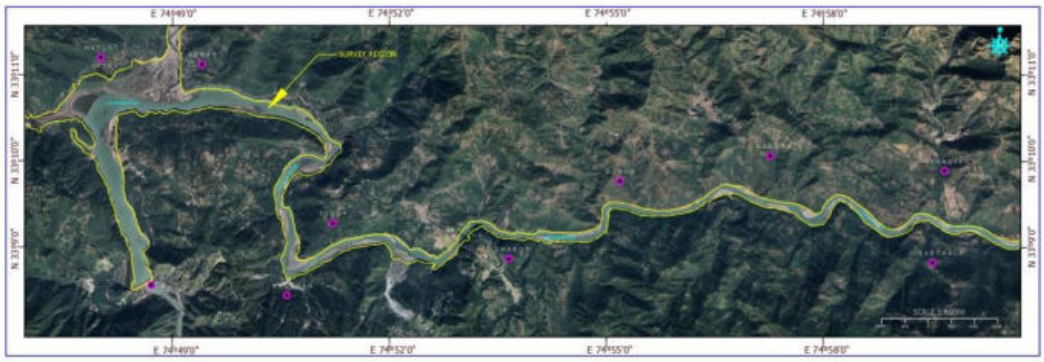


Fig. 3.: *Satellite imagery of survey region (Upstream)*

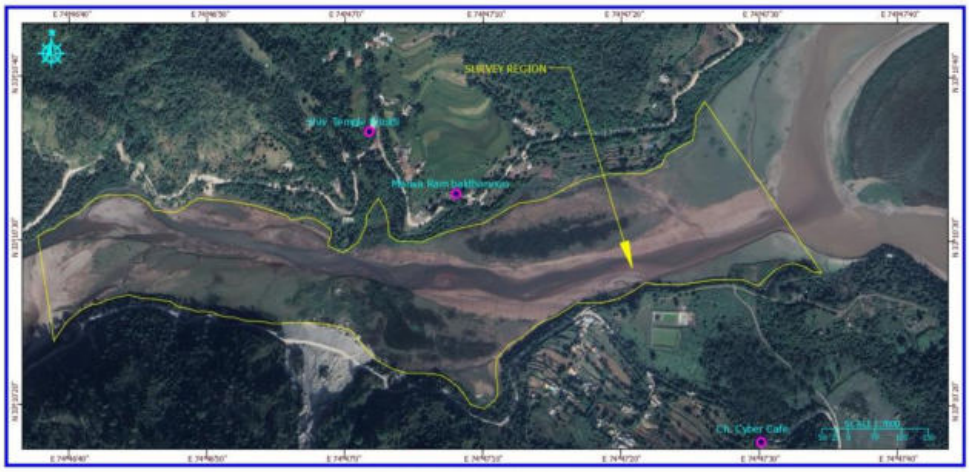


Fig. 4.: *Satellite imagery of survey region (Red Nallah)*

Fig. 5.: Satellite imagery of survey region (Downstream)

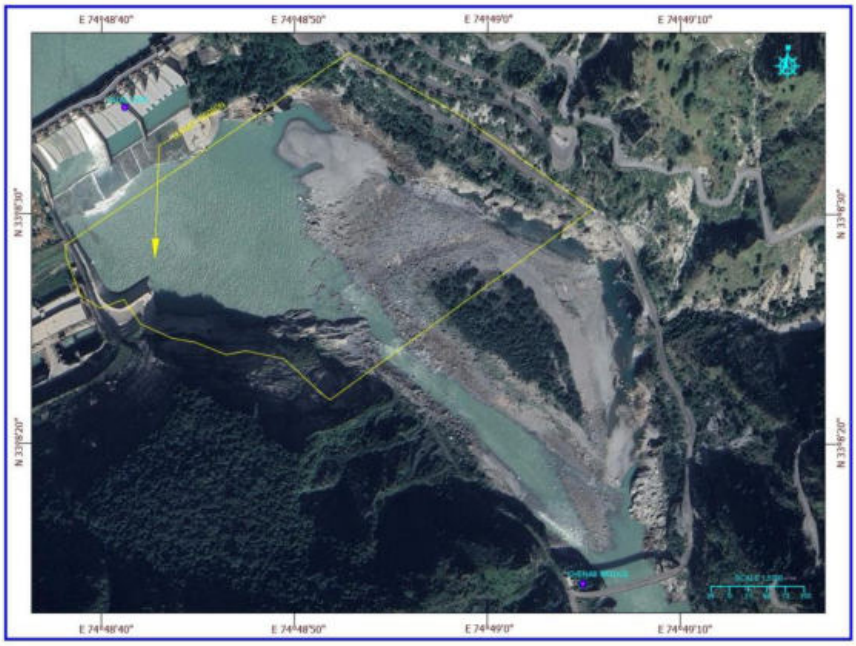


Fig. 6.: Satellite imagery of survey region (Pool Area)

In order to achieve the objective, an in-depth study of the sedimentation processes of the reservoir and estimation of accumulated sediment using sounding techniques have been performed.

3. CONTROL POINTS

A control point was established by NISVO Marine Surveys, utilizing the benchmark provided by NHPC Limited, and served as the vertical control for this project. The details are as follows:

Point ID	Geographical		UTM		RL (m)
	Latitude	Longitude	X (m)	Y (m)	
BM1	33°0`11.36”N	74°85`46.07”E	482447.003	3667232.717	495.886
BM2	33°14`20.40”N	74°82`11.67”E	482212.761	3667090.952	495.805
BM3	33°14`20.40”N	74°82`11.67”E	482151.502	3667062.085	
BM4	33°8`36.69”N	74°48`42.84”E	482457.161	3667214.683	496.937
BM5	33°8`34.77”N	74°48`39.18”E	482362.941	3667155.554	496.901
BM6	33°8`33.17”N	74°48`36.17”E	482284.677	3667106.589	496.845
BM7	33°8`36.49”N	74°48`20.03”E	481866.100	3667209.943	496.302
BM8	33°8`38.18”N	74°48`20.45”E	481877.259	3667261.677	496.316
BM9	33°8`41.46”N	74°48`20.98”E	481891.785	3667362.788	496.318

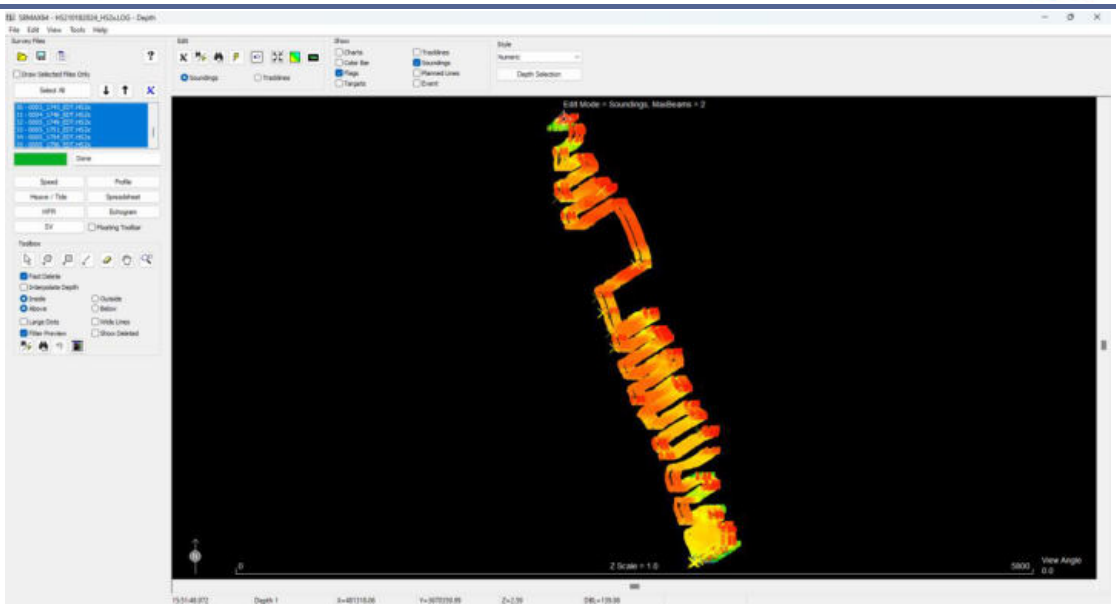
Table 6 : Control points

4. DATA ANALYSIS

The bathymetry data was processed using HYPACK 2022 hydrographic survey software. The spikes on raw data were filtered out and removed manually. At each line intersection, depths were checked carefully to ensure that they are allowable limit. The corrections and offsets were also applied on processed data in order to convert the data in to vertical reference datum . The water level during survey period which has been taken for data analysis is presented in the below table,

Water Levels - Upstream								
18.10.2024	8.00	487	**19.10.2024**	8.00	487.5	**25.10.2024**	8.00	487
	9.00	487		9.00	487.65		9.00	487.1
	10.00	487		10.00	487.2		10.00	487.1
	11.00	487		11.00	487.1		11.00	487.2
	12.00	487		12.00	487.25		12.00	487.4
	13.00	487		13.00	487.3		13.00	487.5
	14.00	487		14.00	487.3		14.00	487.4
	15.00	487.15		15.00	487.3		15.00	487.4
	16.00	487.25		16.00	487.25		16.00	487.5
	17.00	487.4		17.00	487.5		17.00	487.6
	18.00	487.5				**28.10.2024**	3.36	491.791
	19.00	487.6						
	20.00	487						
	21.00	487						
	22.00	487						

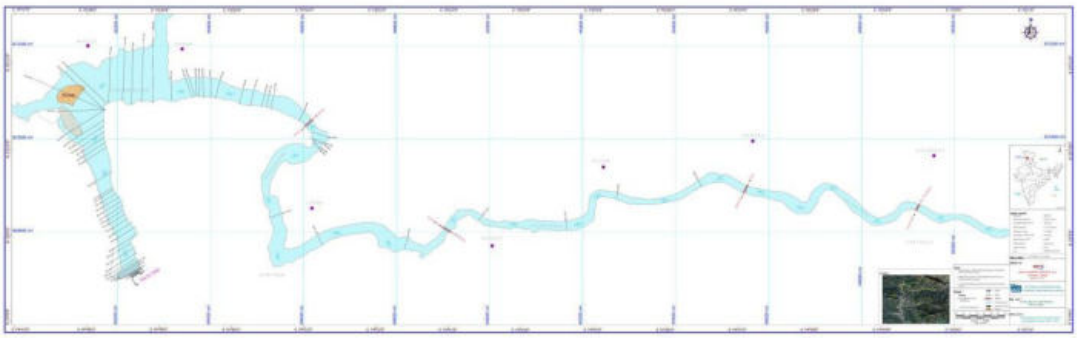
Water Levels - Downstream							
27.10.2024		**30.10.2024**		**01.11.2024**		**02.11.2024**	
TIME	**WL**	**TIME**	**WL**	**TIME**	**WL**	**TIME**	**WL**
02:02	395.806	11:57	391.22	11:55	388.906	11:40	385.865
02:14	395.68	12:07	391.188	12:05	388.927	11:49	385.836
02:29	395.684	09:46	391.273	12:24	388.82	11:49	386.042
02:38	395.682			12:36	388.828	11:55	385.795
03:02	395.718			12:58	388.77	12:05	385.741
03:20	395.634			01:14	388.771	12:13	385.676
03:34	395.735			01:20	388.747	12:38	385.638
03:56	395.643			01:26	388.697	12:50	385.486
04:26	395.577					01:43	385.474
05:06	395.682					02:04	385.164
						03:35	385.843
						03:55	385.774



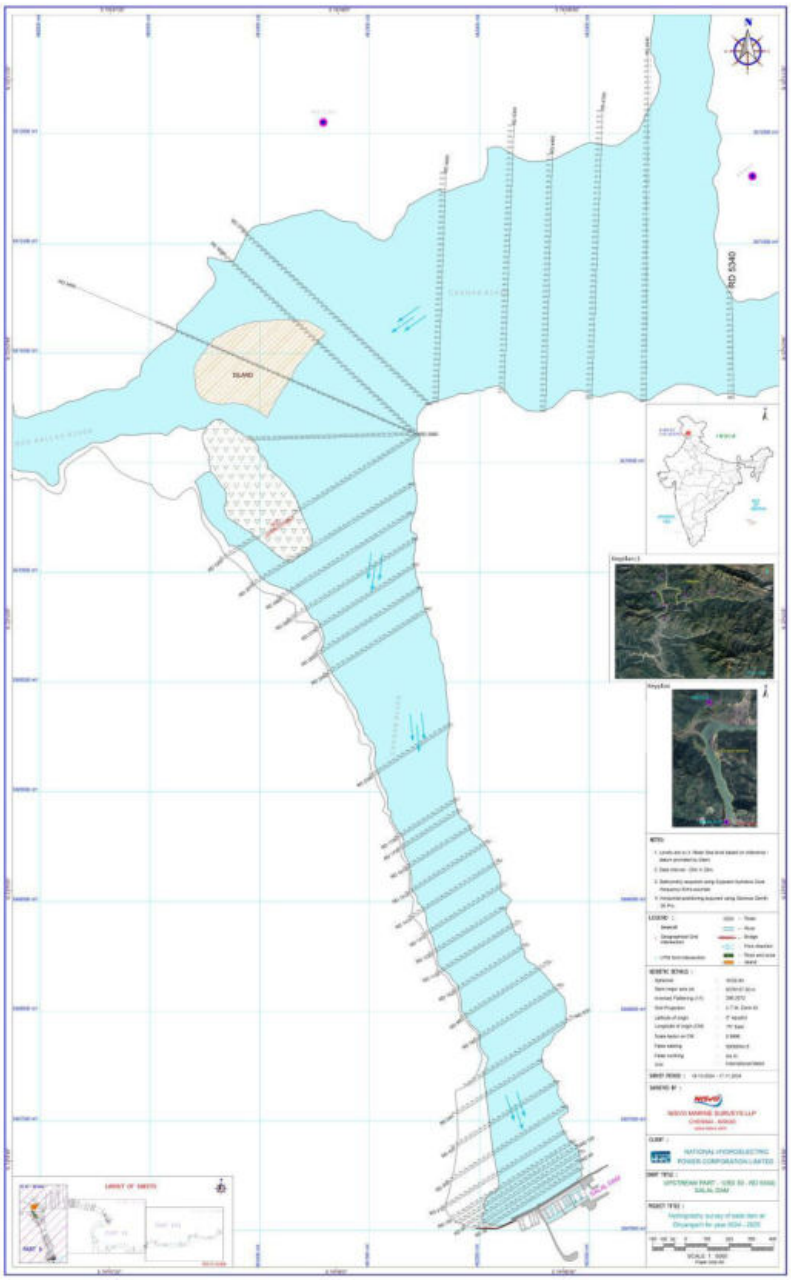
5. VISUAL DOCUMENTATION - SITE ACTIVITIES

6. RESULTS

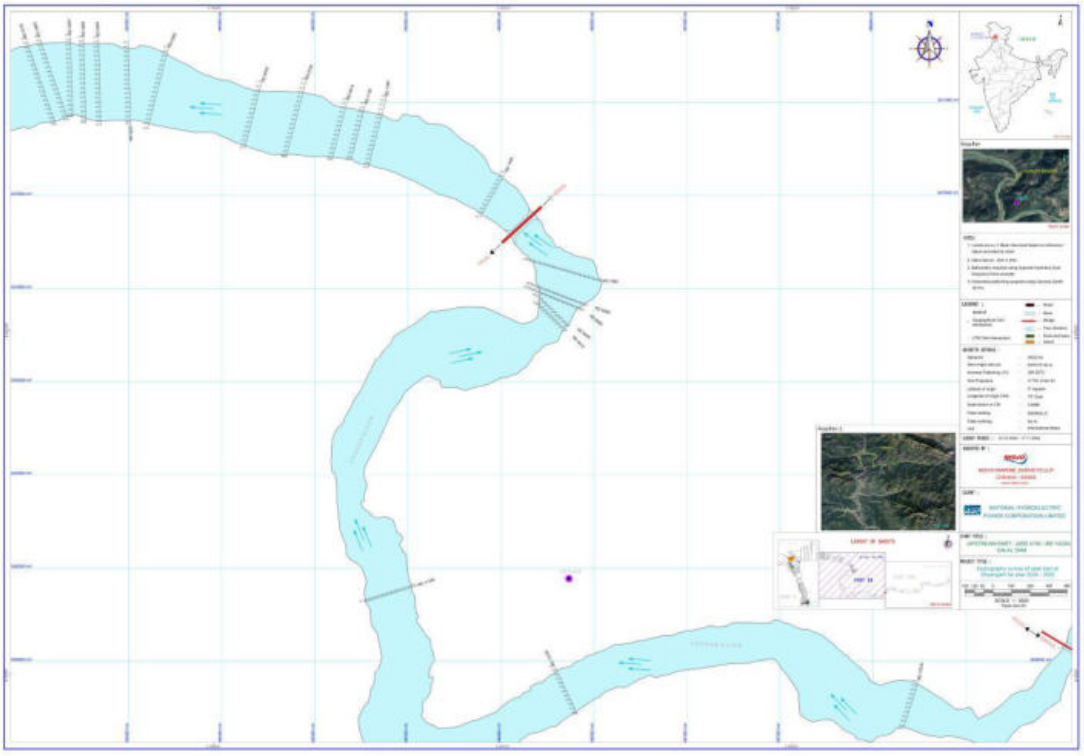
The charts are prepared in WGS 84 Spheroid with UTM coordinates supplemented by geographical coordinates indicating the latitude and longitude, the plan map of Salal Dam (upstream) prepared in 1:20000 scale is shown below and the detailed view available in Fig. 7 in the figures section.



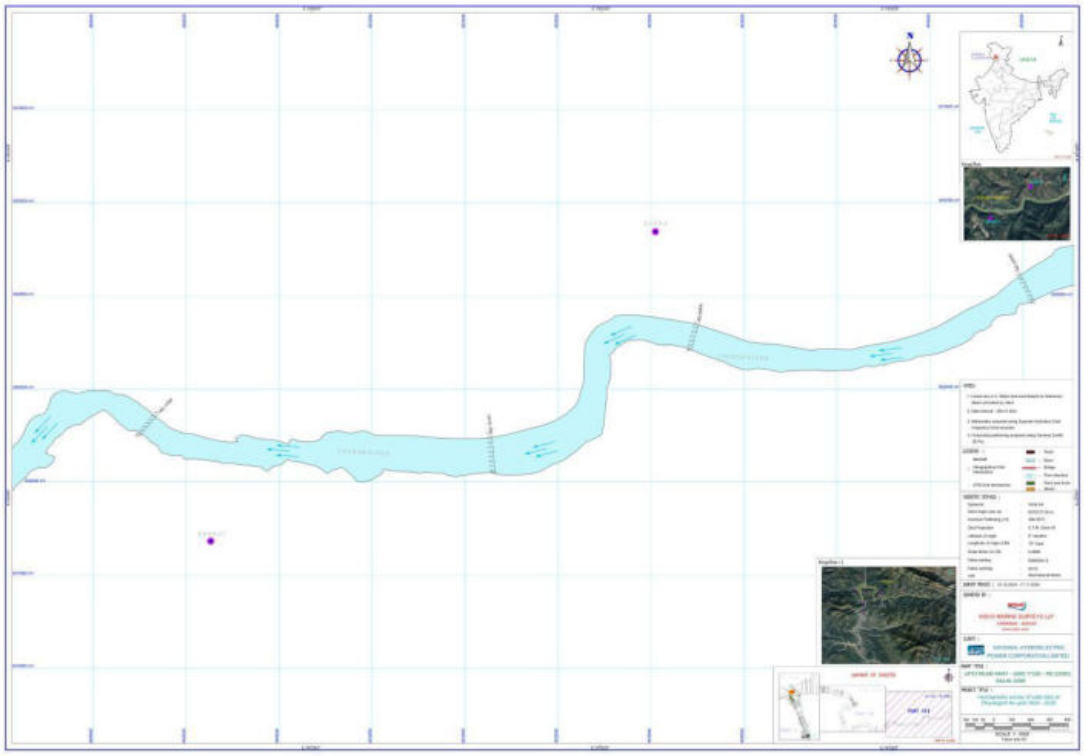
The upstream part-I (RD30 - RD5340) of Salal Dam prepared in 1:5000 scale is shown below and the detailed view available in Fig. 8. under figures section.



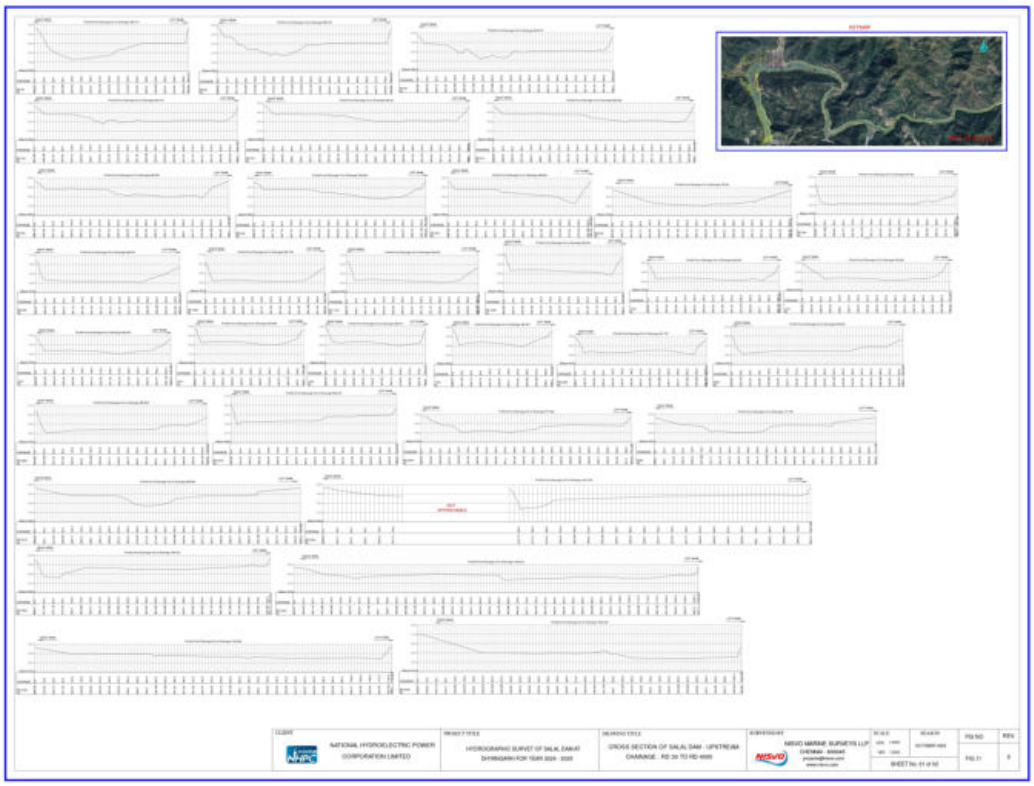
The upstream part-II (RD5750 - RD1523) of Salal Dam prepared in 1:5000 scale is shown below and the detailed view available in Fig. 9. under figures section.



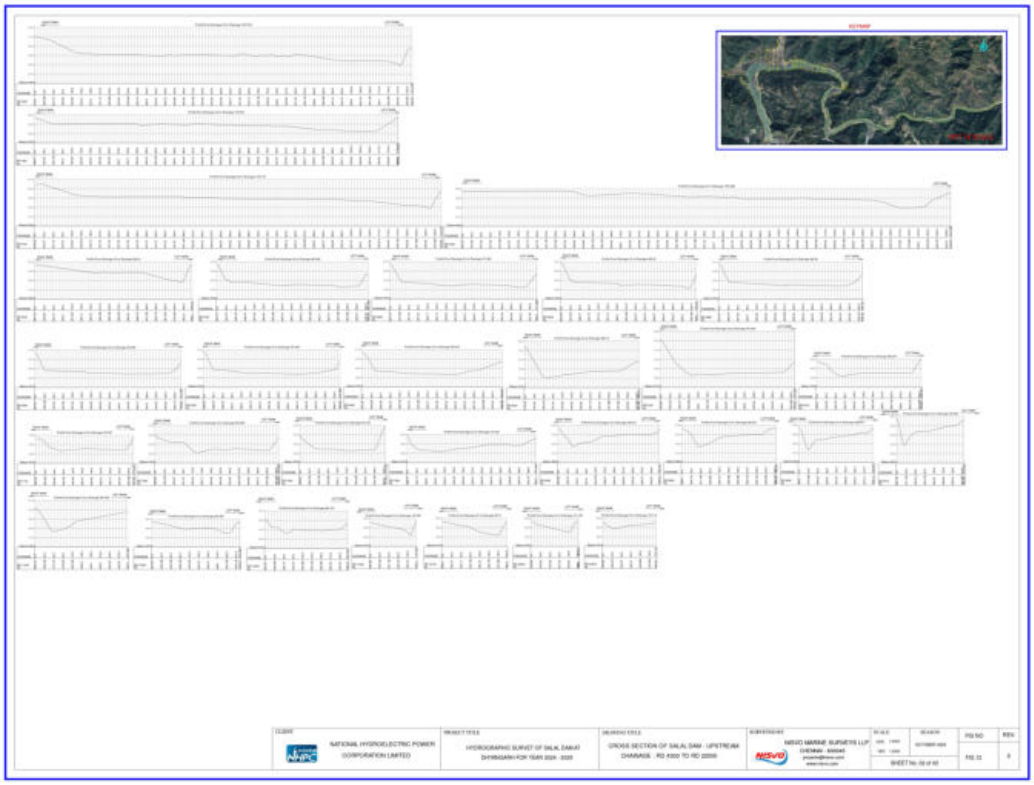
The upstream part-III (RD17220 - RD22500) of Salal Dam prepared in 1:5000 scale is shown below and the detailed view available in Fig. 10. under figures section.



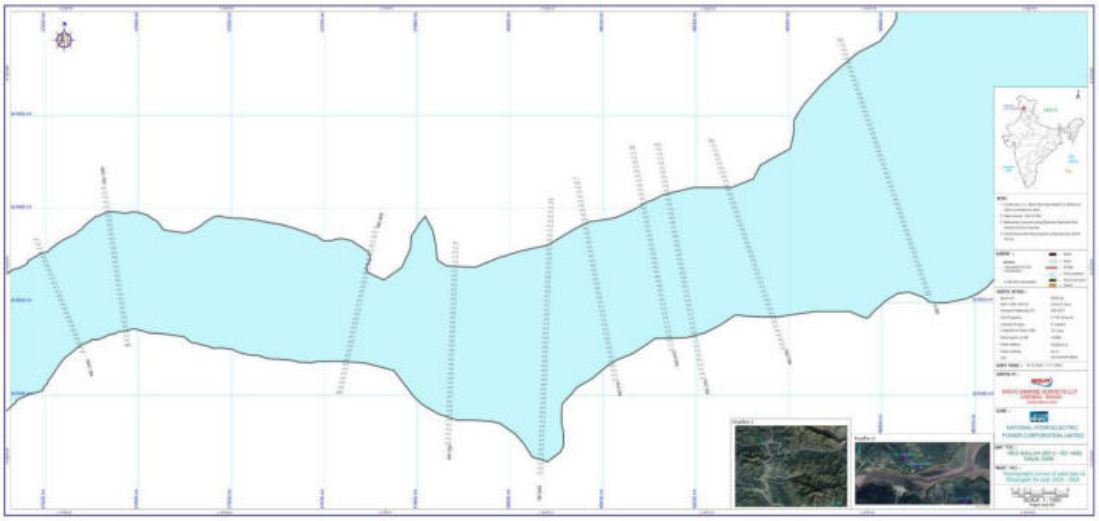
The cross-section (RD30 - RD4000) of Salal Dam (upstream) is shown below and the detailed view available in Fig. 11. under figures section.



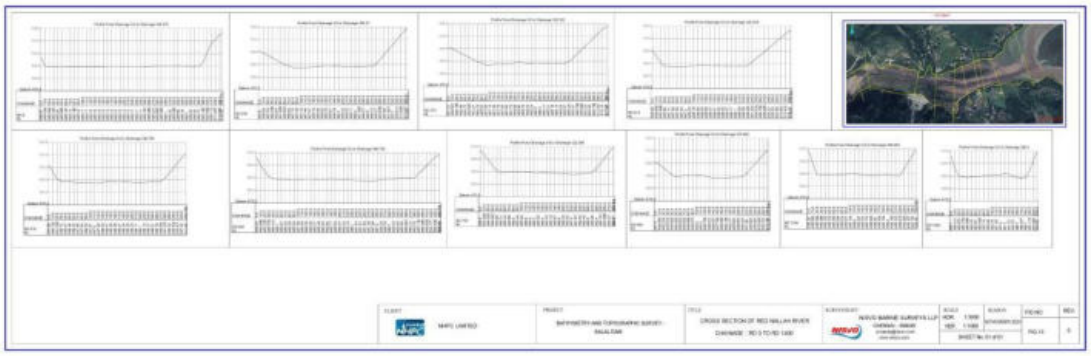
The cross-section (RD4300 - RD22500) of Salal Dam (Upstream) is shown below and the detailed view available in Fig. 12. under figures section.



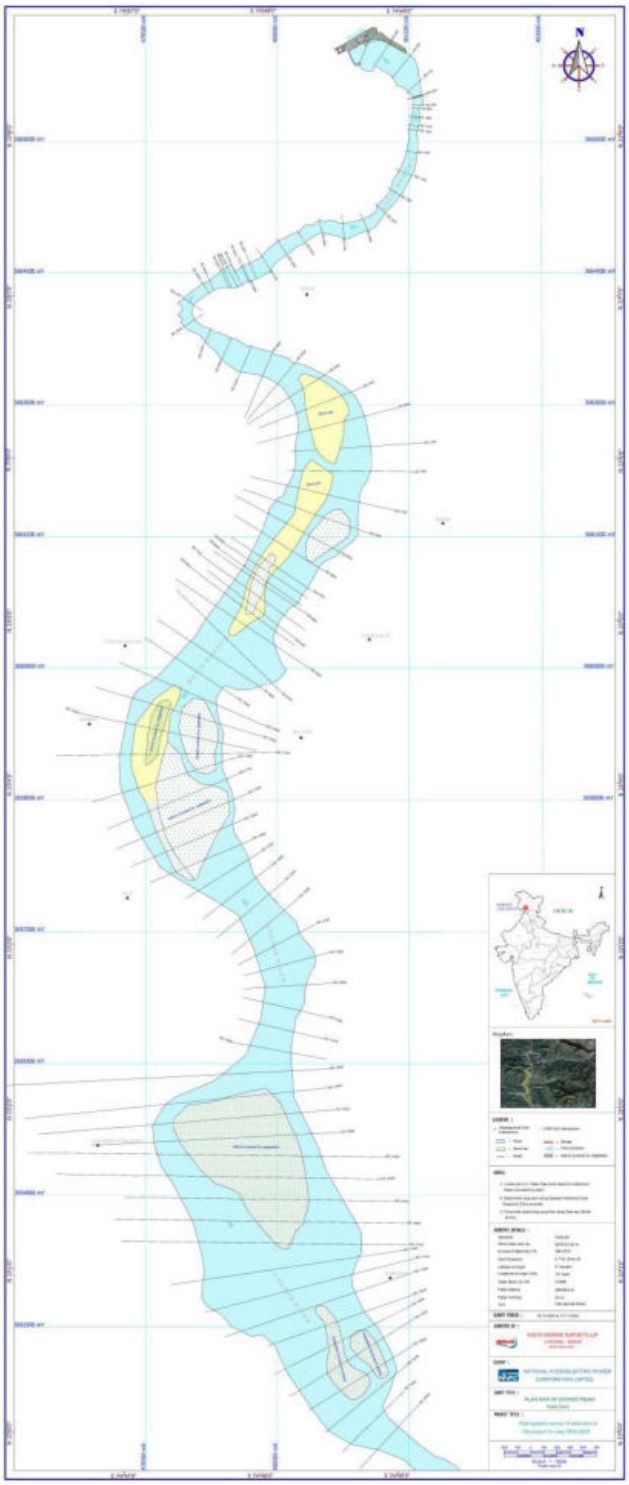
The survey chart of Red Nallah (RD0 - RD1400) prepared in 1:1500 scale is shown below and the detailed view available in Fig. 13. under figures section.



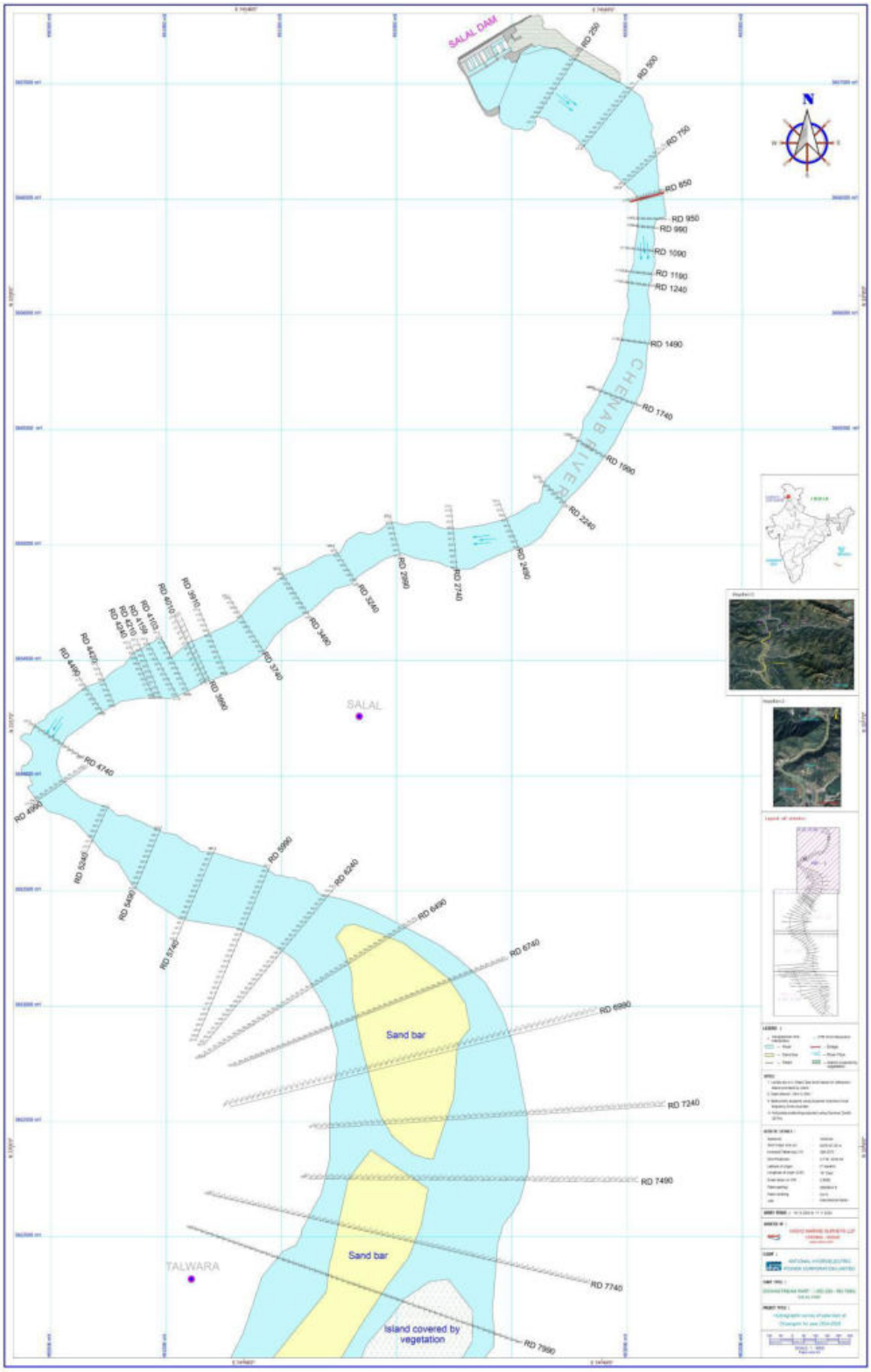
The cross-section (RD0 - RD1400) of Red Nallah river is shown below and the detailed available in Fig. 14. under figures section.



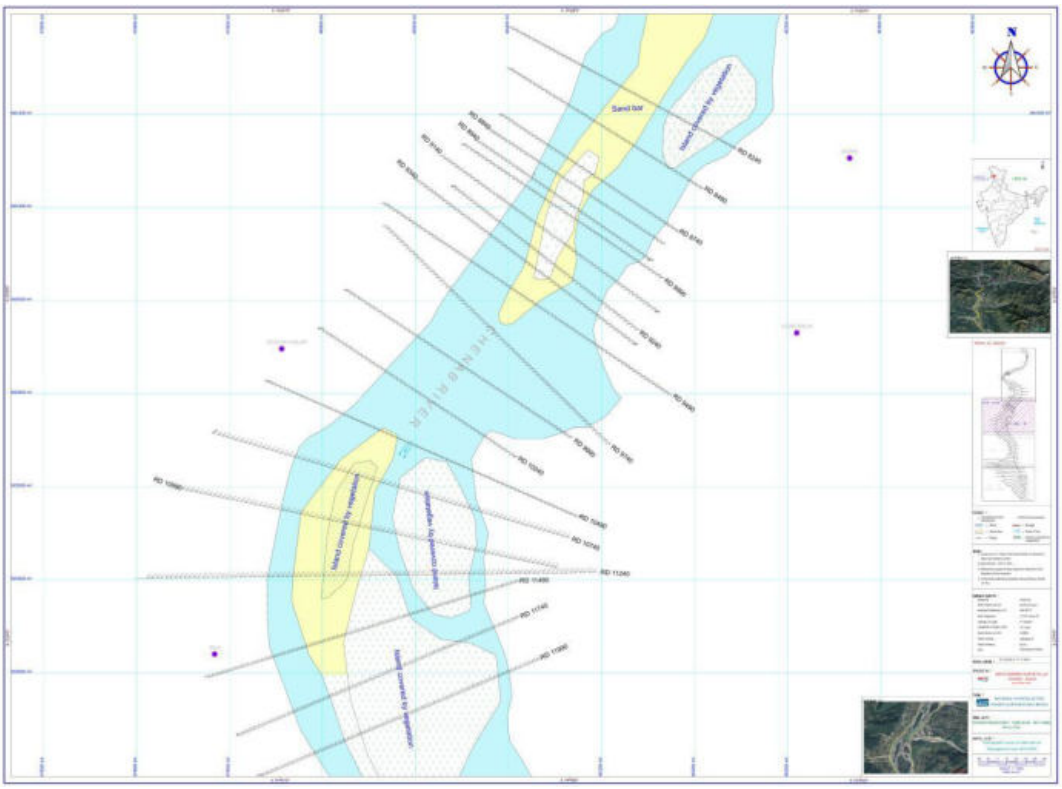
The plan map of Salal Dam (downstream) prepared in 1:15000 scale is shown below and the detailed view available in Fig. 15. under figures section.



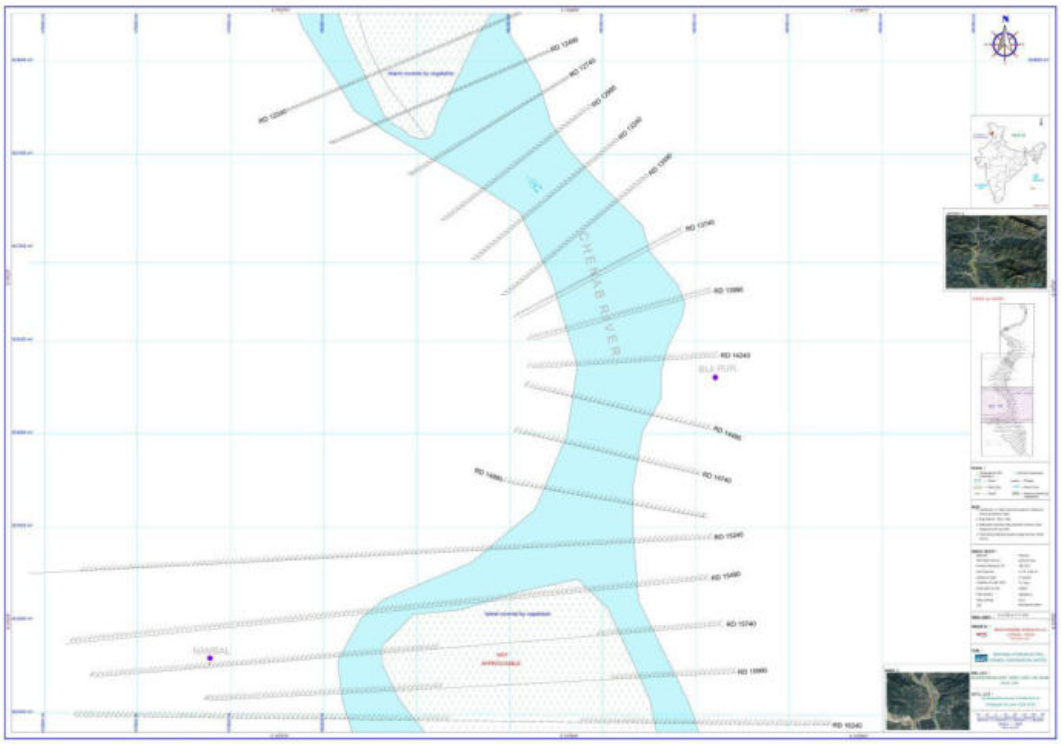
The downstream part-I (RD250 - RD7990) of Salal Dam prepared in 1:5000 scale is shown below and the detailed view available in Fig. 16. under figures section.



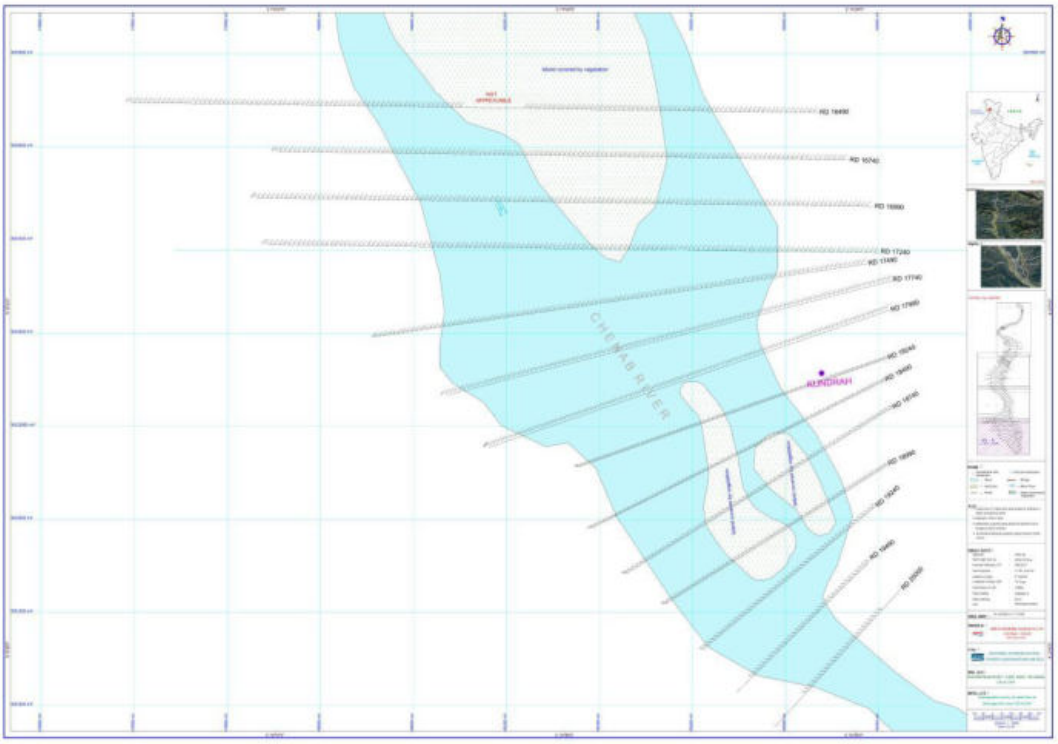
The downstream part-II (RD8240 - RD11990) of Salal Dam prepared in 1:5000 scale is shown below and the detailed view available in Fig. 17. under figures section.



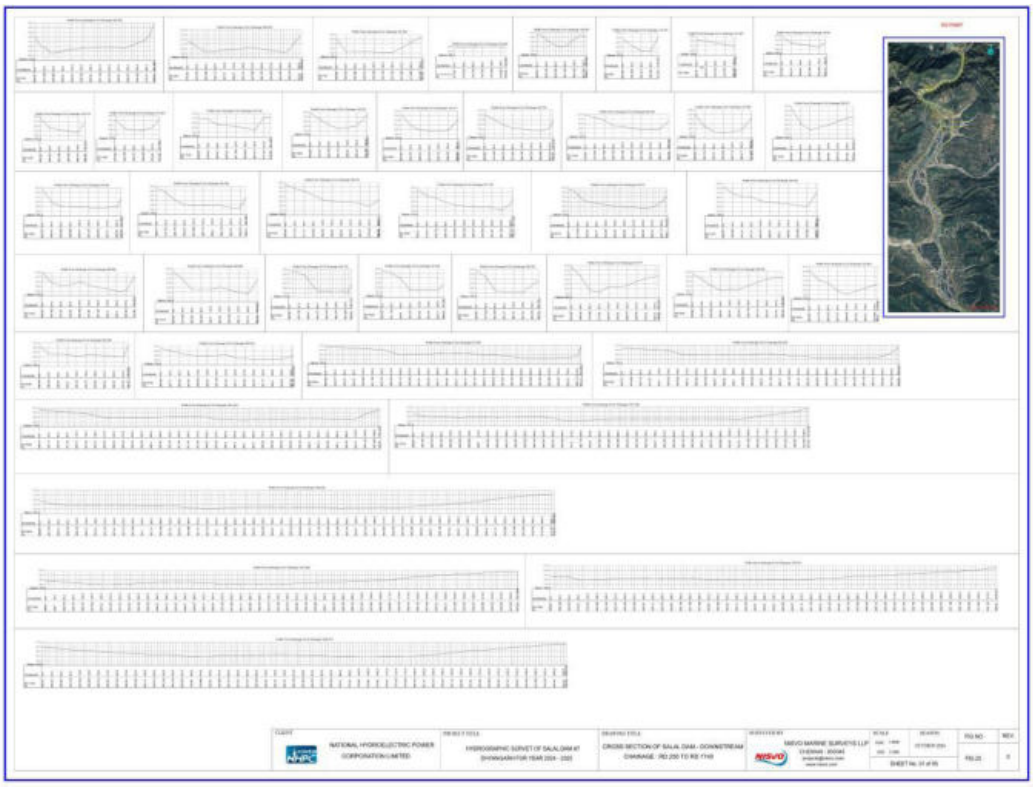
The downstream part-III (RD12240 - RD16240) of Salal Dam prepared in 1:5000 scale is shown below and the detailed view available in Fig. 18. under figures section.



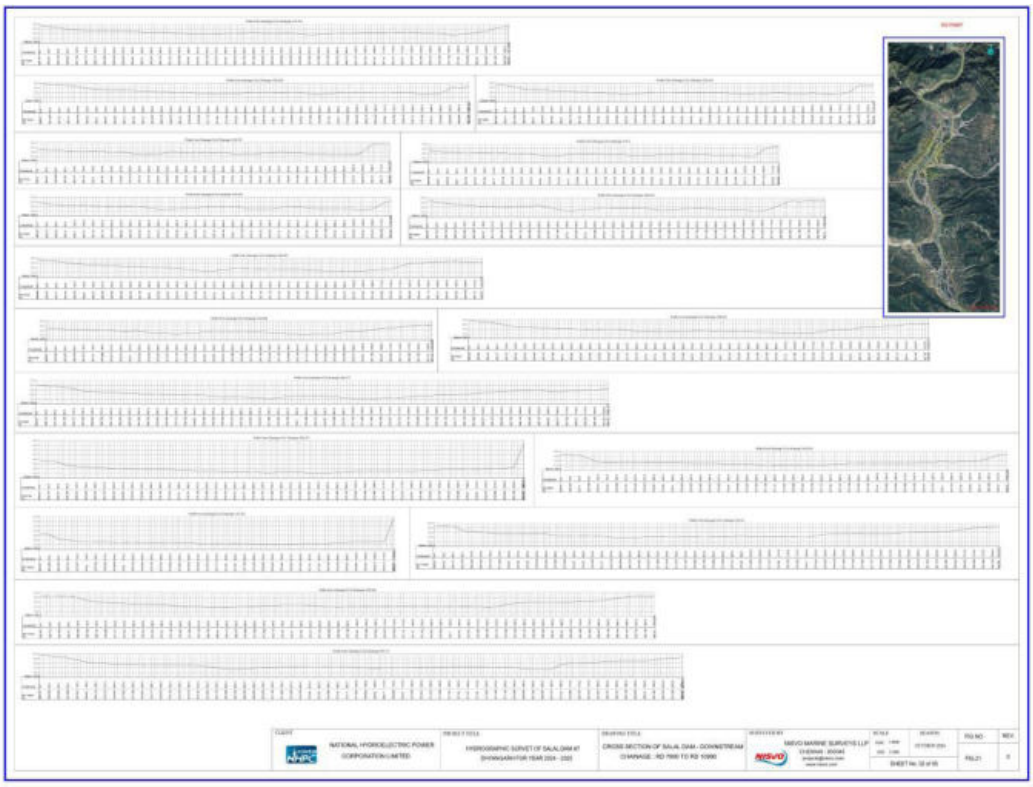
The downstream part-IV (RD16490 - RD20000) of Salal Dam prepared in 1:5000 scale is shown below and the detailed view available in Fig. 19. under figures section.



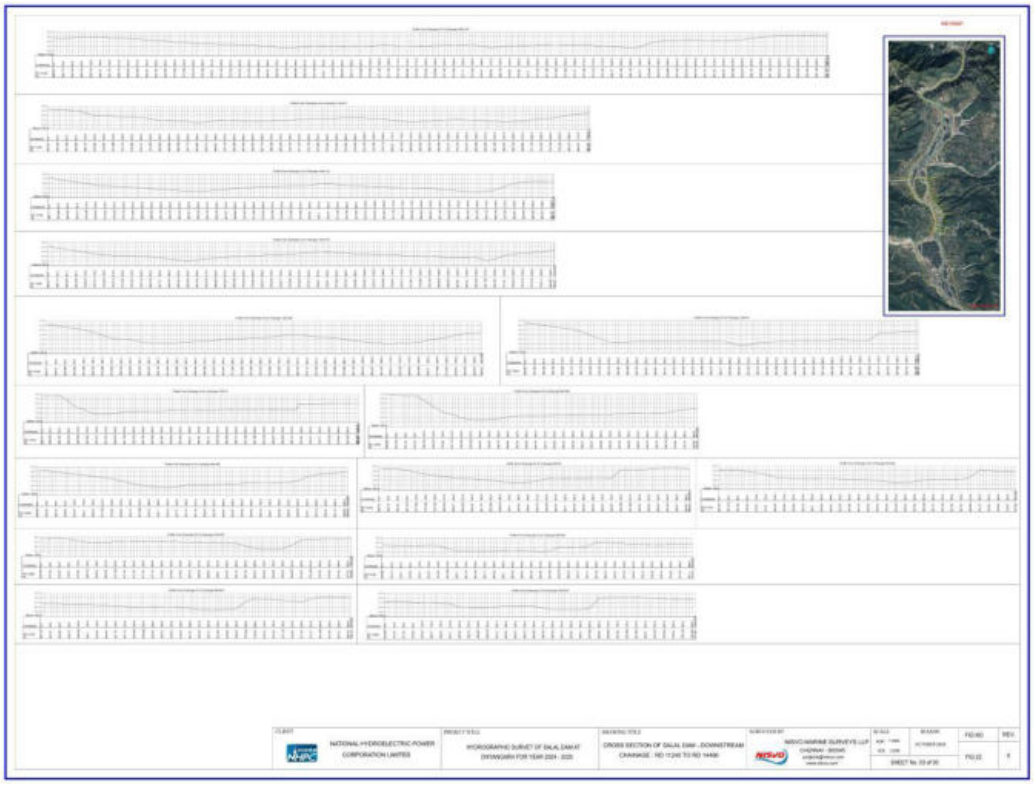
The cross-section (RD250 - RD7740) of Salal Dam (downstream) is shown below and the detailed view available in Fig. 20. under figures section.



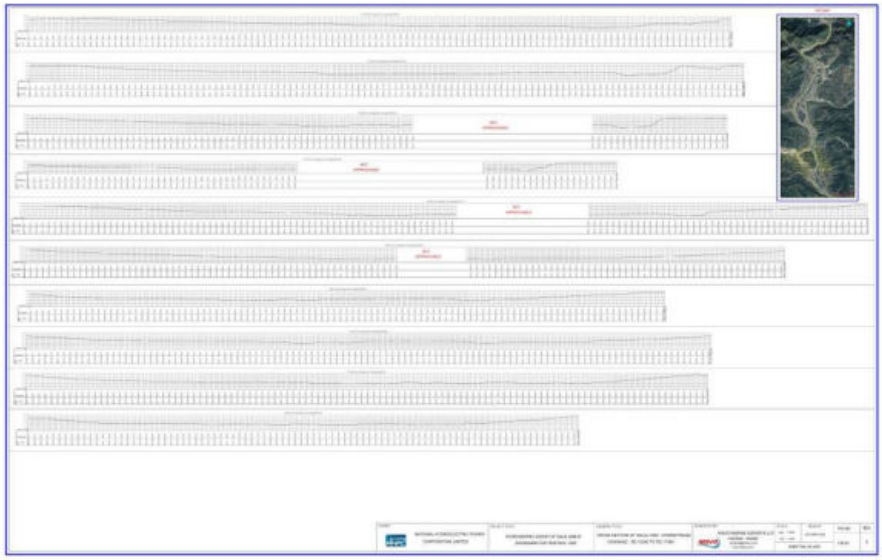
The cross-section (RD7990 - RD10990) of Salal Dam (downstream) is shown below and the detailed view available in Fig. 21. under figures section.



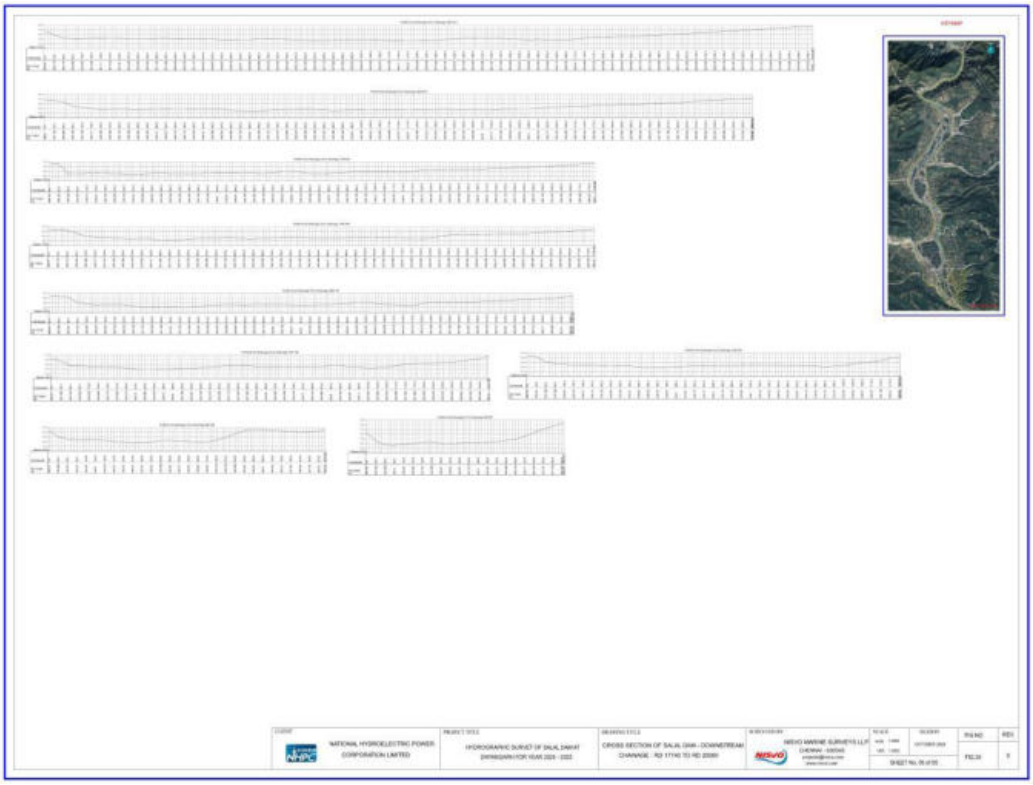
The cross-section (RD11240 - RD14490) of Salal Dam (downstream) is shown below and the detailed view available in Fig. 22. under figures section.



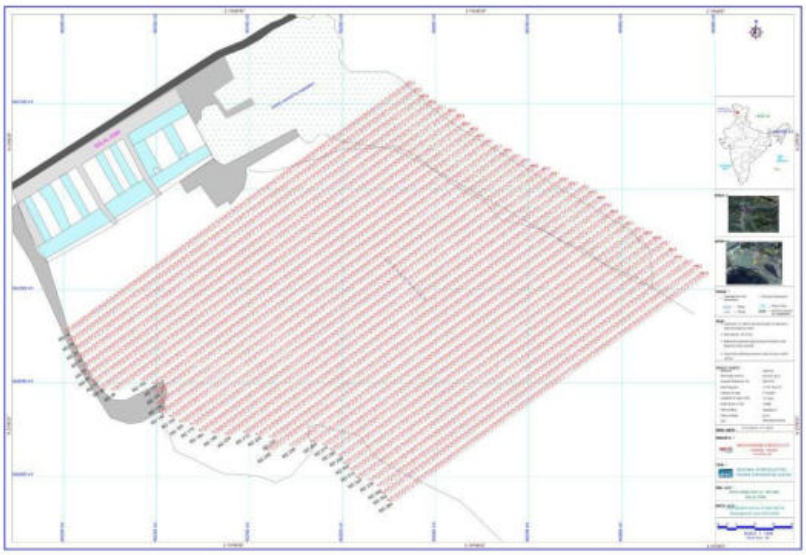
The cross-section (RD15240 - RD17490) of Salal Dam (downstream) is shown below and the detailed view available in Fig. 23. under figures section.



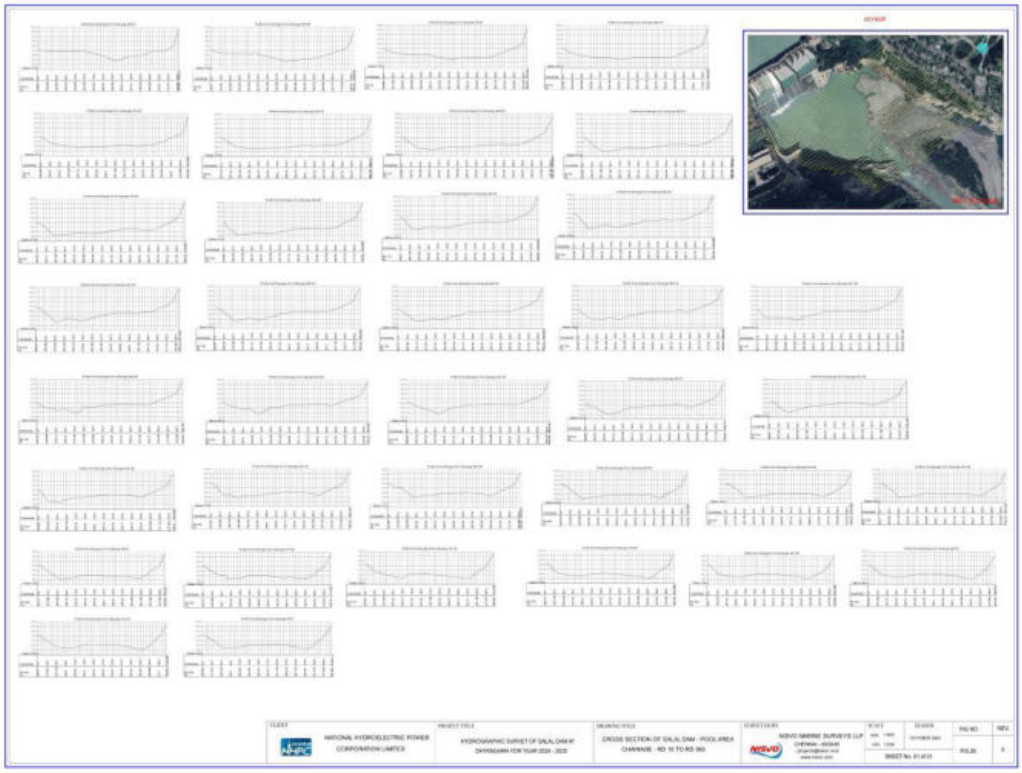
The cross-section (RD17740 - RD20000) of Salal Dam (downstream) is shown below and the detailed view available in Fig. 24. under figures section.



The survey chart of Pool Area (RD10 - RD360) prepared in 1:1000 scale is shown below and the detailed view available in Fig. 25. under figures section.



The cross-section of Pool Area (RD10 - RD360) is shown below and the detailed view available in Fig, 26. under figures section.



7. Present Storage Capacity : The present storage capacity of a water body, such as a reservoir or lake, was calculated using hydrographic and topographic survey data, which included detailed bathymetry and topographic measurements of the waterbed's shape and depth. These measurements were obtained using sonar systems or echo sounders and DGPS. The data was processed and combined with surface elevation levels to create a digital elevation model (DEM) of the area in order to generate the cross-section. Using this model, the volume of water that could be stored at various elevations was calculated by integrating the cross-sectional area at different depths. The total volume was then derived by summing the incremental storage volumes.

The following tables and graphical representations illustrate the calculation of the present storage capacity,

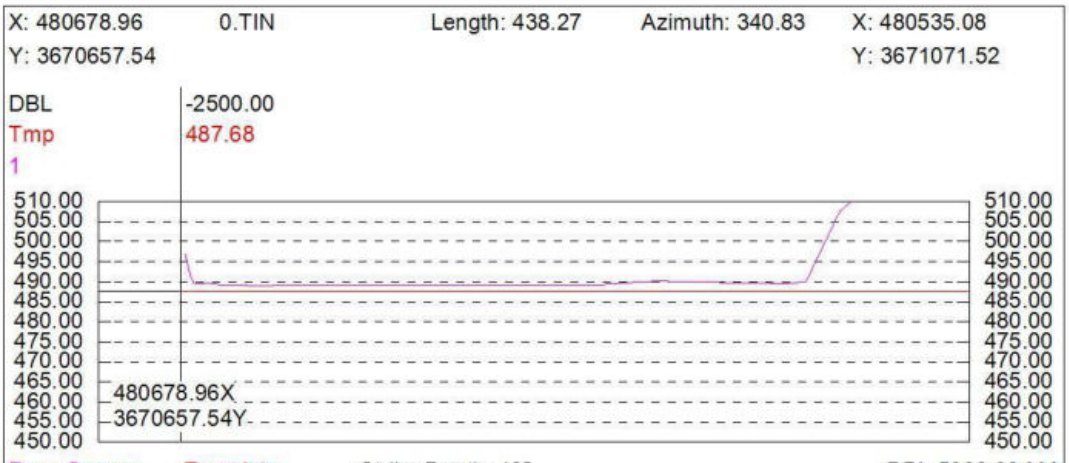
7.1. Present Storage Capacity of Reservoir Upto FRL (487.680m)

A) For Red Nallah

CHAINAGE	CROSS SECTION AREA	VOLUME	ACCUMULATED FILL VOLUME
(m)	(sq.m)	(cu.m)	(cu.m)
RD 0	0	0	0
RD 250	10.48	1307.03	1307.03
RD 370	14.22	1528.52	2835.55
RD 410	10.37	497.67	3333.22
RD 510	4.26	720.91	4054.13
RD 600	2.51	311.77	4365.9
RD 750	0	189.22	4555.12
RD 900	0.01	0.02	4555.14
RD 1300	0	1.3	4556.44
RD 1400	0	0	**4556.44**

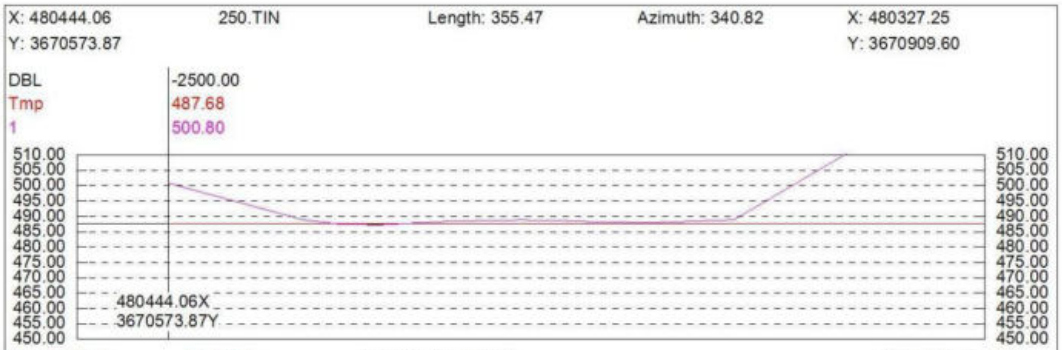
- **Graphical Representation of Red Nallah**

RD0



Seg	Design	Cut Area	Fill Area	Cut Vol	Fill Vol	OverDept	Cut Area	Fill Area	Cut Vol	Fill Vol
1		1564.12	0.00	0.00	0.00	All	0.00	0.00	0.00	0.00
Total		1564.12	0.00	0.00	0.00		0.00	0.00	0.00	0.00
Accum				0.00	0.00				0.00	0.00

RD250

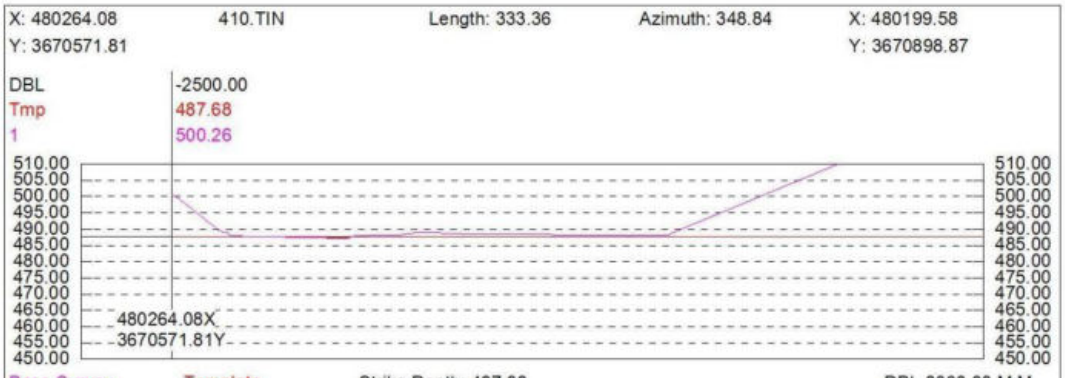


Seg	Design	Cut Area	Fill Area	Cut Vol	Fill Vol	OverDepth	Cut Area	Fill Area	Cut Vol	Fill Vol
1		1900.70	10.48	432138.32	1307.03	All	0.00	10.48	0.00	1307.03
Total		1900.70	10.48	432138.32	1307.03		0.00	10.48	0.00	1307.03
Accum				432138.32	1307.03				0.00	1307.03

RD370

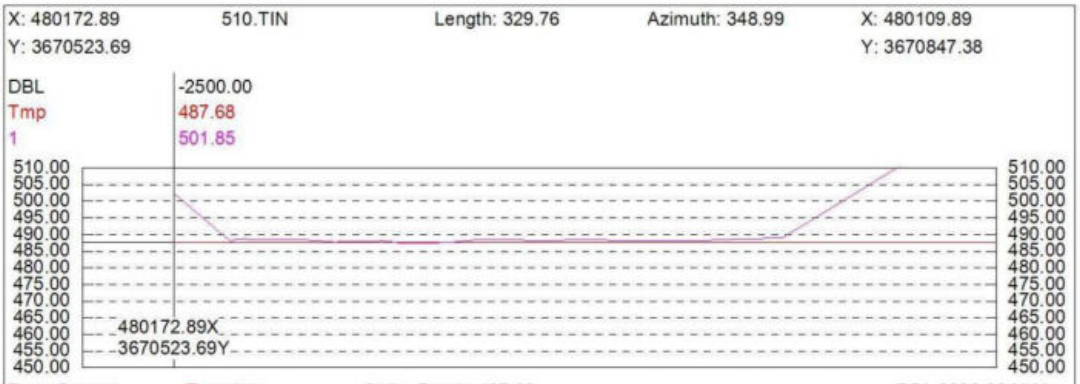
Seg	Design	Cut Area	Fill Area	Cut Vol	Fill Vol	OverDepth	Cut Area	Fill Area	Cut Vol	Fill Vol
1		2223.21	14.22	209461.82	1528.52	All	0.00	14.22	0.00	1528.52
Total		2223.21	14.22	209461.82	1528.52		0.00	14.22	0.00	1528.52
Accum				641600.14	2835.55				0.00	2835.55

RD410



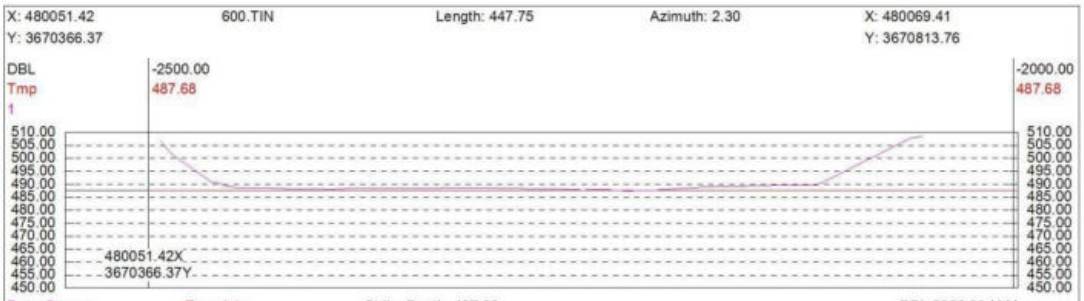
Seg	Design	Cut Area	Fill Area	Cut Vol	Fill Vol	OverDepth	Cut Area	Fill Area	Cut Vol	Fill Vol
1		1829.06	10.37	83166.11	497.67	All	0.00	10.37	0.00	497.67
Total		1829.06	10.37	83166.11	497.67		0.00	10.37	0.00	497.67
Accum				724766.25	3333.22				0.00	3333.22

RD510



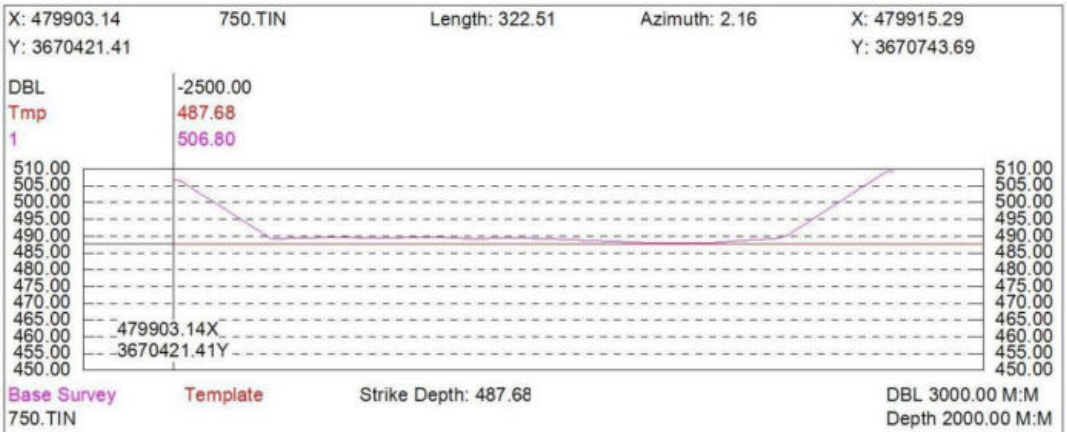
Seg	Design	Cut Area	Fill Area	Cut Vol	Fill Vol	OverDepth	Cut Area	Fill Area	Cut Vol	Fill Vol
1		1022.15	4.26	139869.64	720.91	All	0.00	4.26	0.00	720.91
Total		1022.15	4.26	139869.64	720.91		0.00	4.26	0.00	720.91
Accum				864635.89	4054.13				0.00	4054.13

RD600



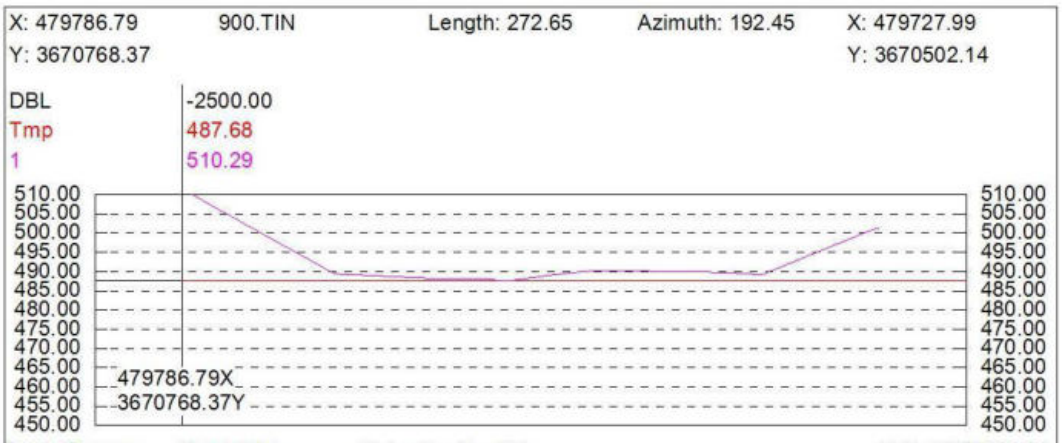
Seg	Design	Cut Area	Fill Area	Cut Vol	Fill Vol	OverDepth	Cut Area	Fill Area	Cut Vol	Fill Vol
1		1352.09	2.51	84257.20	311.77	All	0.00	2.51	0.00	311.77
Total		1352.09	2.51	84257.20	311.77		0.00	2.51	0.00	311.77
Accum				948893.08	4365.91				0.00	4365.91

RD750



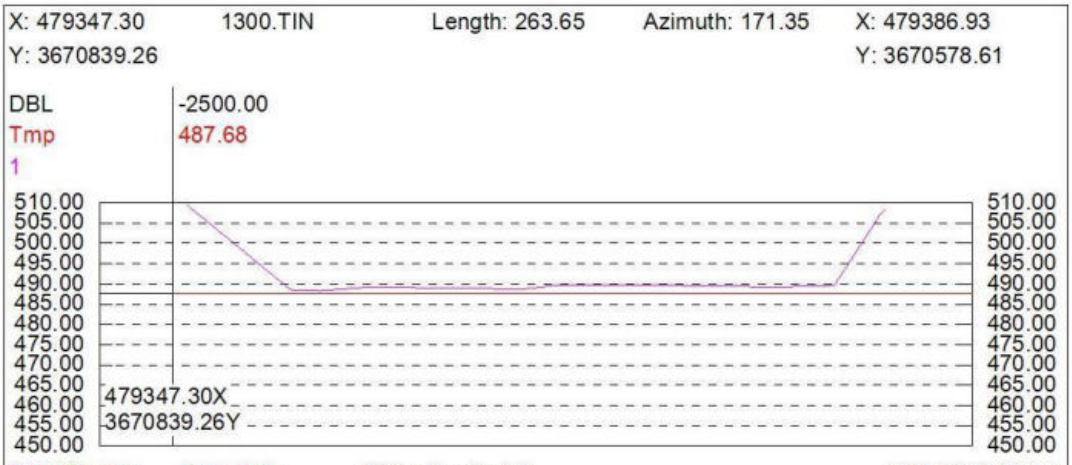
Seg	Design	Cut Area	Fill Area	Cut Vol	Fill Vol	OverDepth	Cut Area	Fill Area	Cut Vol	Fill Vol
1		1385.89	0.00	206556.66	189.22	All	0.00	0.00	0.00	189.22
Total		1385.89	0.00	206556.66	189.22		0.00	0.00	0.00	189.22
Accum				1155449.74	4555.13				0.00	4555.13

RD900



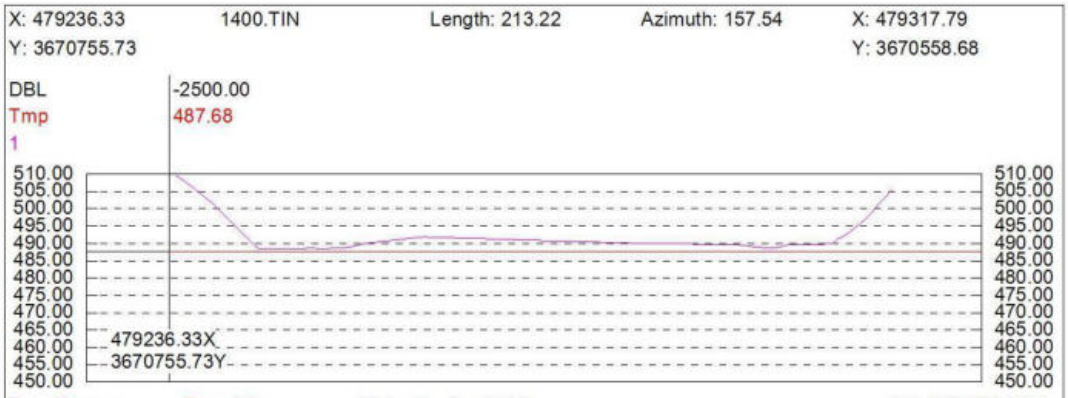
Seg	Design	Cut Area	Fill Area	Cut Vol	Fill Vol	OverDeptl	Cut Area	Fill Area	Cut Vol	Fill Vol
1		1356.54	0.01	28946.86	0.02	All	0.00	0.01	0.00	0.02
Total		1356.54	0.01	28946.86	0.02		0.00	0.01	0.00	0.02
Accum				1184396.61	4555.15				0.00	4555.15

RD1300



Seg	Design	Cut Area	Fill Area	Cut Vol	Fill Vol	OverDept	Cut Area	Fill Area	Cut Vol	Fill Vol
1		965.35	0.0	457569.21	1.30	All	0.00	0.00	0.00	1.30
Total		965.35	0.0	457569.21	1.30		0.00	0.00	0.00	1.30
Accum				1641965.82	4556.45				0.00	4556.45

RD1400



Seg	Design	Cut Area	Fill Area	Cut Vol	Fill Vol	OverDepth Cut Area	Fill Area	Cut Vol	Fill Vol
1		846.88	0.00	93522.50	0.00	All 0.00	0.00	0.00	0.00
Total		846.88	0.00	93522.50	0.00	0.00	0.00	0.00	0.00
Accum				1735488.33	4556.45			0.00	4556.45

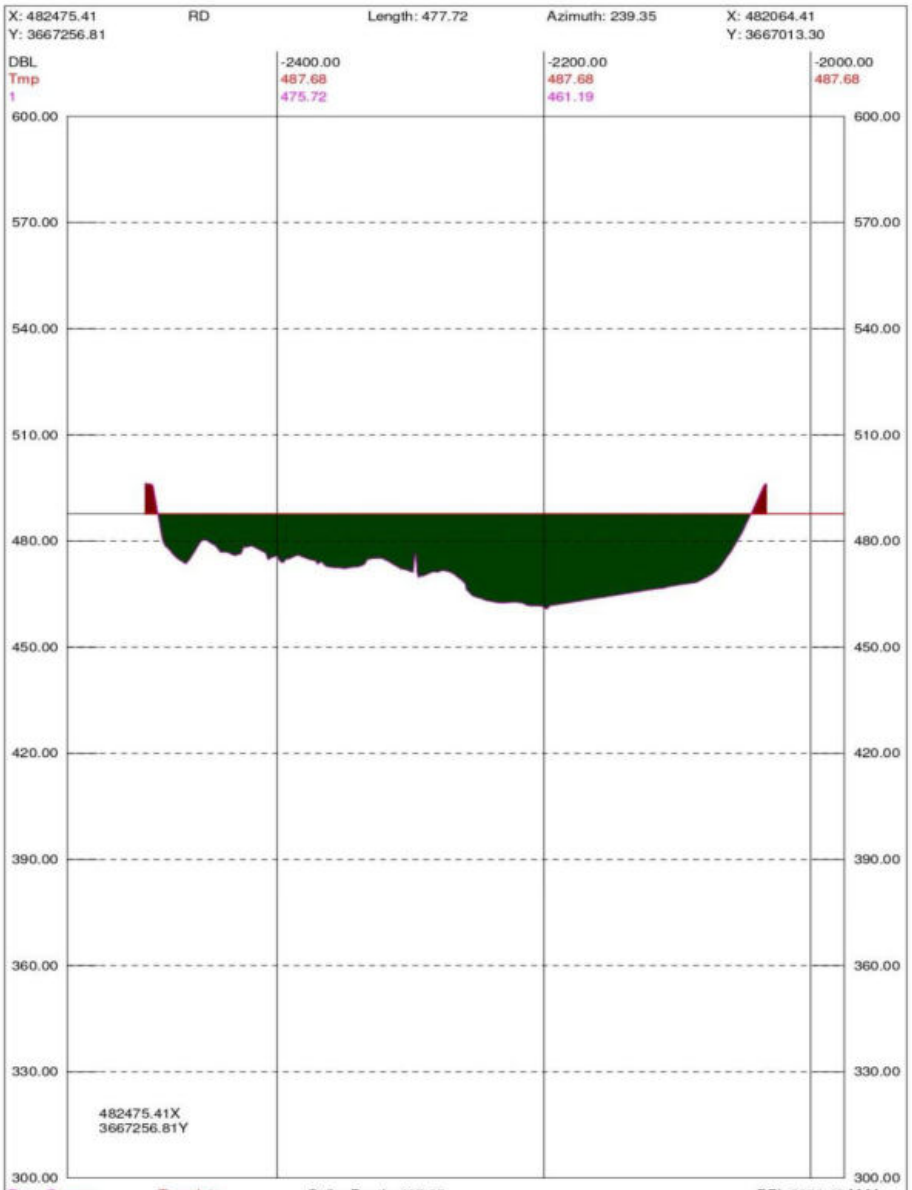
B) Final Upstream Storage Capacity (487.680m)

CHAINAGE	CROSS SECTION AREA	VOLUME	ACCUMULATED FILL VOLUME
(m)	(sq.m)	(cu.m)	(cu.m)
RD 15	7583.38	0	0
RD 30	29.04	15227699.6	15227699.6
RD 60	5405.06	3700503.45	18928203.05
RD 90	4220.87	144561.37	19072764.42
RD 120	3244.85	112565.69	19185330.11
RD 130	2404.04	83641.77	19268971.88
RD 210	2100.55	135561.27	19404533.15
RD 300	2055.71	189098.48	19593631.63
RD 420	2031.02	241994.14	19835625.77
RD 540	1871.52	235864.48	20071490.25
RD 630	1955.49	172706.38	20244196.63
RD 780	2203.62	313989.3	20558185.93
RD 900	2057.91	251243.07	20809429
RD 1020	1790.54	234585.39	21044014.39
RD 1130	1832.79	197586.62	21241601.01
RD 1220	1789.26	161310.68	21402911.69
RD 1310	1816.54	163618.99	21566530.68
RD 1410	1762.8	178905.76	21745436.44
RD 1510	1758.09	179496.66	21924933.1
RD 1610	1641.71	170253.12	22095186.22
RD 1700	1635.39	148156.09	22243342.31
RD 1750	1376.49	72391.97	22315734.28
RD 2050	1601.88	450815.64	22766549.92
RD 2550	1470.66	765956.61	23532506.53
RD 2650	1594.18	155988.23	23688494.76
RD 2750	1390.49	147835.75	23836330.51
RD 2850	1509.89	144073.17	23980403.68
RD 2960	1315.86	155368.15	24135771.83
RD 3070	1470.51	157415.9	24293187.73
RD 3250	1534.37	264973.16	24558160.89
RD 3360	2050.12	525681.86	25083842.75
RD 3490	1148.97	412793.83	25496636.58
RD 3750	1186.69	175299.18	25671935.76
RD 4000	1372.4	180076.94	25852012.7
RD 4300	1160.15	271728.35	26123741.05
RD 4480	969.76	319361.69	26443102.74
RD 4700	1057.79	191185.81	26634288.55
RD 4940	979.53	213724.91	26848013.46
RD 5340	976.52	238367.76	27086381.22

CHAINAGE	CROSS SECTION AREA	VOLUME	ACCUMULATED FILL VOLUME
(m)	(sq.m)	(cu.m)	(cu.m)
RD 5750	699.26	336074.07	27422455.29
RD 5825	918.93	333977.17	27756432.46
RD 5900	996.5	68142.95	27824575.41
RD 5980	755.02	62738.99	27887314.4
RD 6060	816.66	54920.69	27942235.09
RD 6220	773.08	63902.53	28006137.62
RD 6380	784.67	124288.02	28130425.64
RD 6540	833.2	122474.24	28252899.88
RD 6700	659.61	396915.02	28649814.9
RD 6910	883.06	176153.71	28825968.61
RD 7140	773.74	199373.15	29025341.76
RD 7380	715.76	73369.92	29098711.68
RD 7480	966.08	84625.08	29183336.76
RD 7580	754.83	591398.68	29774735.44
RD 8280	708.8	328433.04	30103168.48
RD 8880	627.32	95028.86	30198197.34
RD 9060	584.1	16969.38	30215166.72
RD 9510	505.2	49048.25	30264214.97
RD 11345	789.61	19681.09	30283896.06
RD 13230	686.06	1001710.38	31285606.44
RD 14990	76.69	251674.01	31537280.45
RD 15230	29.04	88727.22	31626007.67
RD 17220	85.7	63818.51	31689826.18
RD 19130	311.63	340404.8	32030230.98
RD 20600	64.42	183250.23	32213481.21
RD 22500	0	54602.86	**32268084.07**

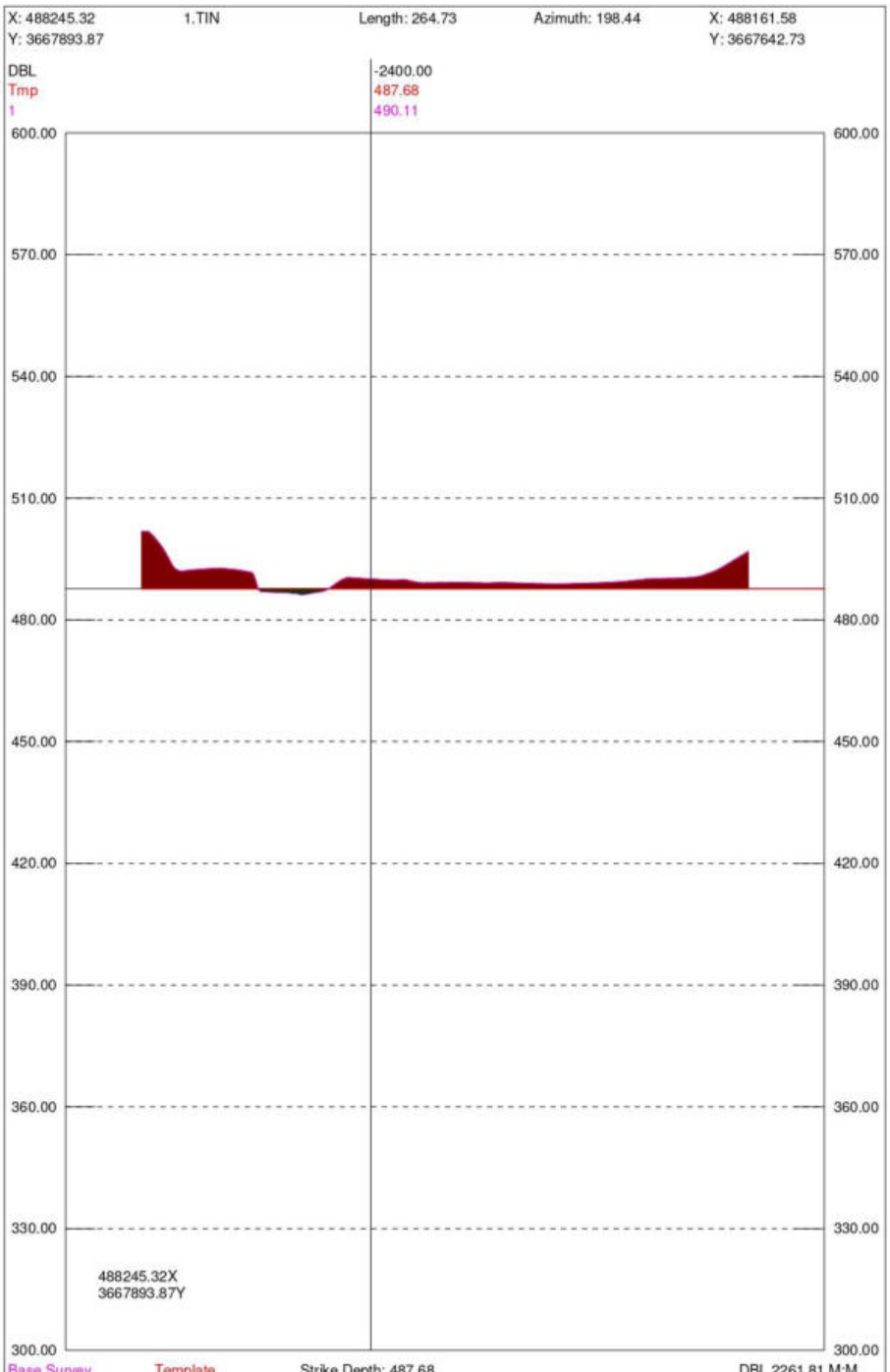
■ Graphical Representation of Upstream

RD15



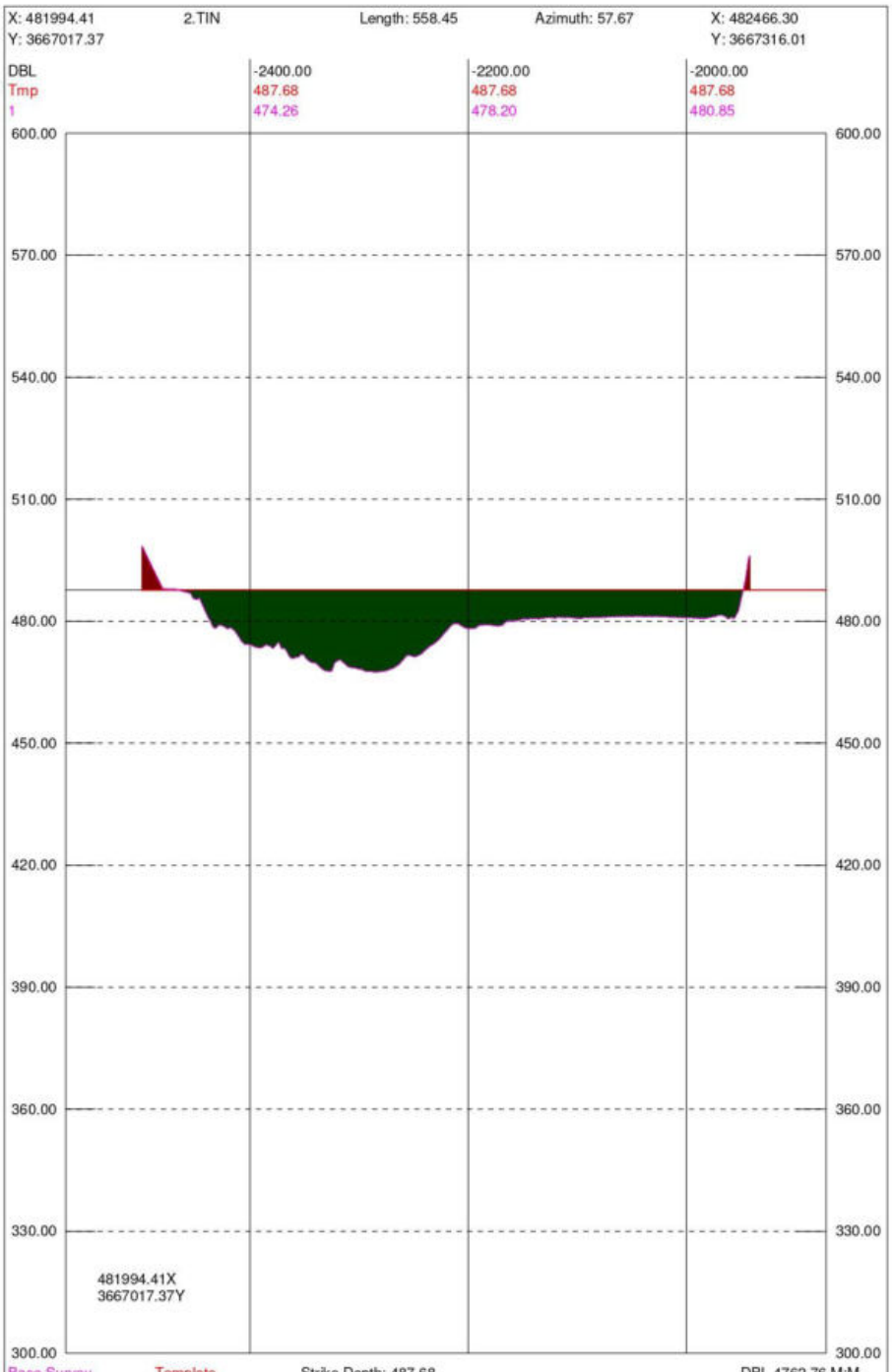
Seg	Design	Cut Area	Fill Area	Cut Vol	Fill Vol	OverDepth	Cut Area	Fill Area	Cut Vol	Fill Vol
1		119.34	7583.38	0.00	0.00	All	0.00	7583.38	0.00	0.00
Total		119.34	7583.38	0.00	0.00		0.00	7583.38	0.00	0.00
Accum				0.00	0.00				0.00	0.00

RD30



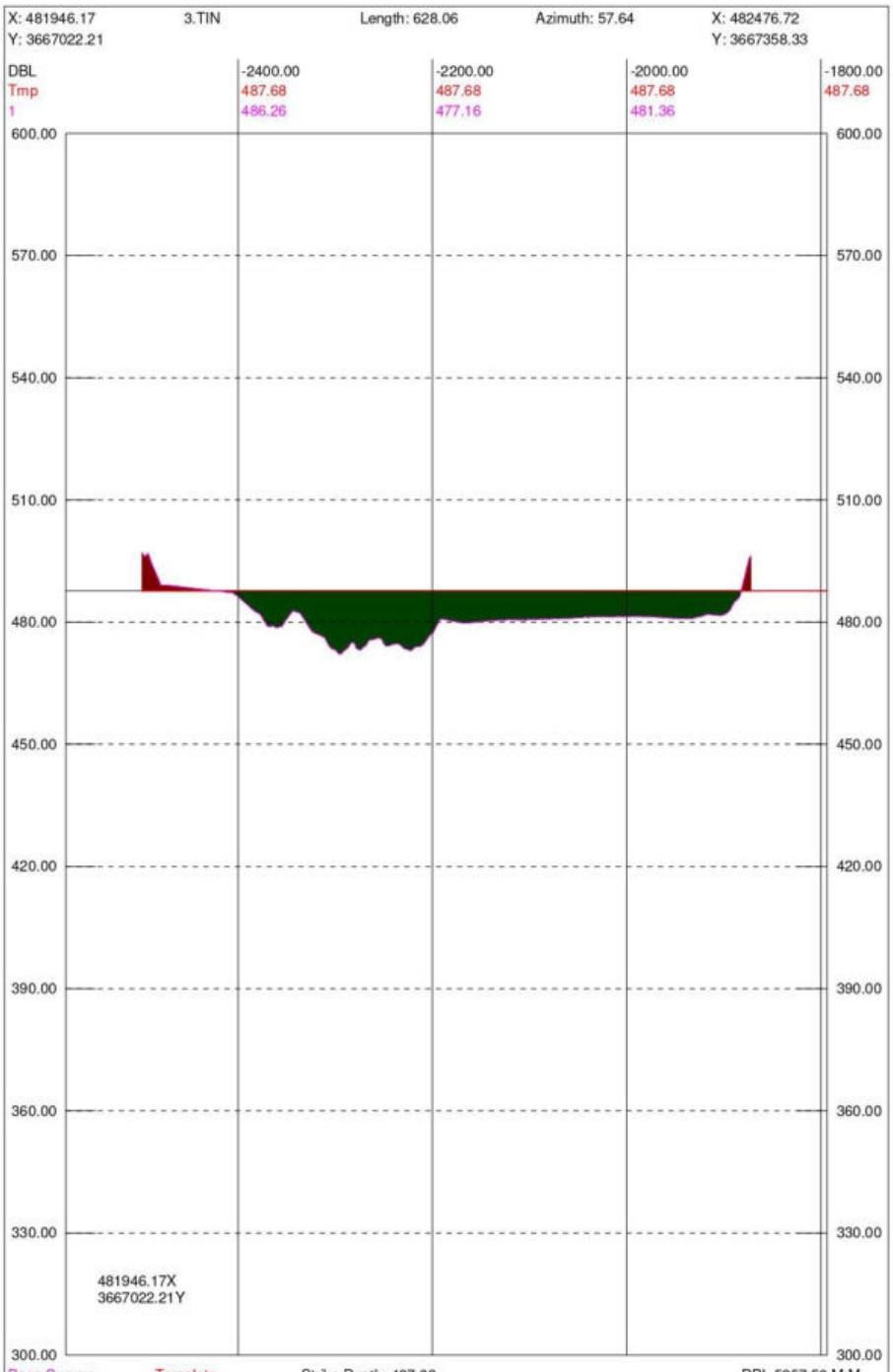
Seg	Design	Cut Area	Fill Area	Cut Vol	Fill Vol	OverDepth	Cut Area	Fill Area	Cut Vol	Fill Vol
1		740.36	29.04	1684048.82	15227699.60	All	0.00	29.04	0.00	15227699.60
Total		740.36	29.04	1684048.82	15227699.60		0.00	29.04	0.00	15227699.60
Accum				1684048.82	15227699.60				0.00	15227699.60

RD60



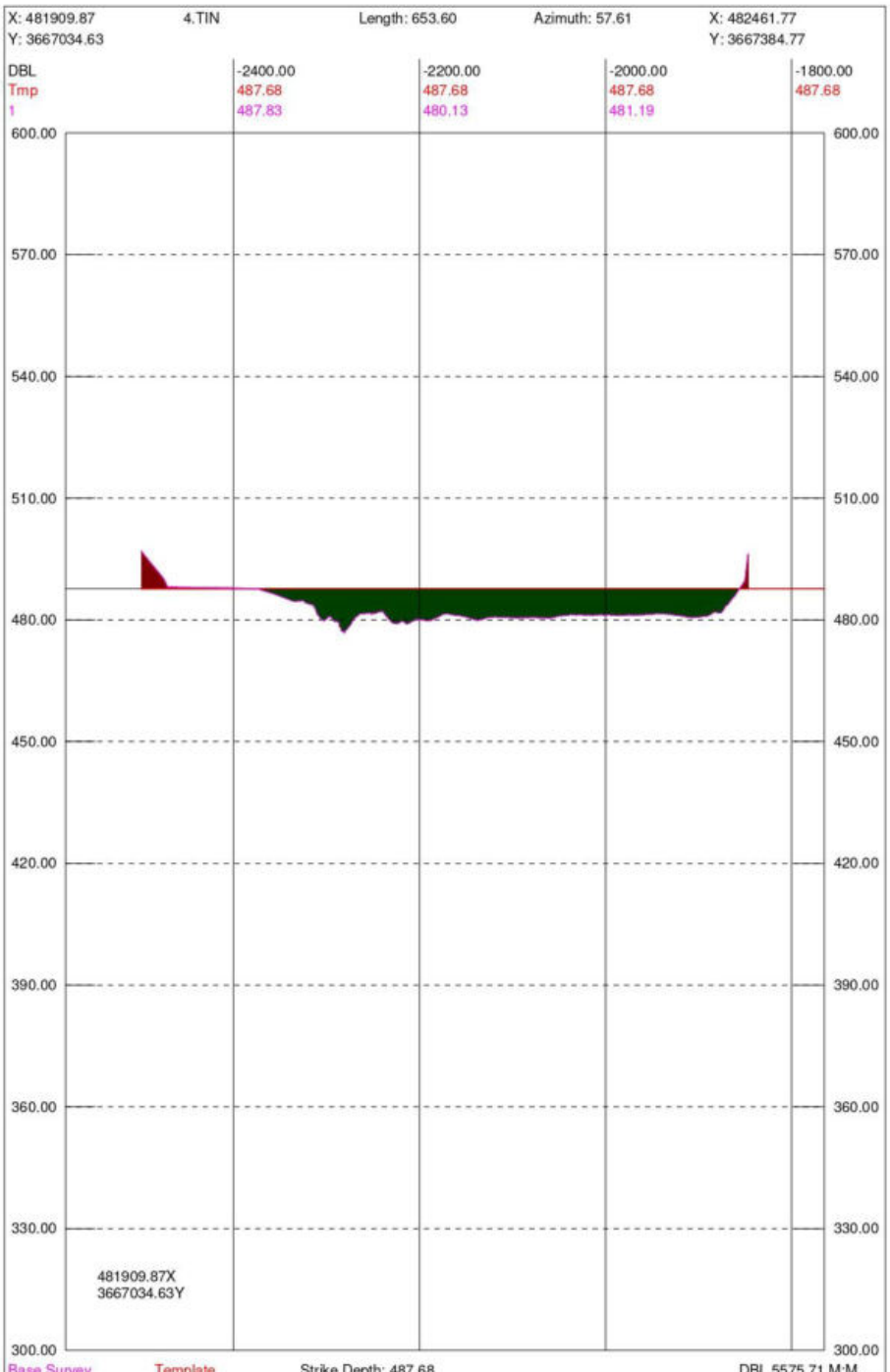
Seg	Design	Cut Area	Fill Area	Cut Vol	Fill Vol	OverDepth	Cut Area	Fill Area	Cut Vol	Fill Vol
1		137.62	5405.06	637257.59	3700503.45	All	0.00	5405.06	0.00	3700503.45
Total		137.62	5405.06	637257.59	3700503.45		0.00	5405.06	0.00	3700503.45
Accum				2321306.42	18928203.06				0.00	18928203.06

RD90



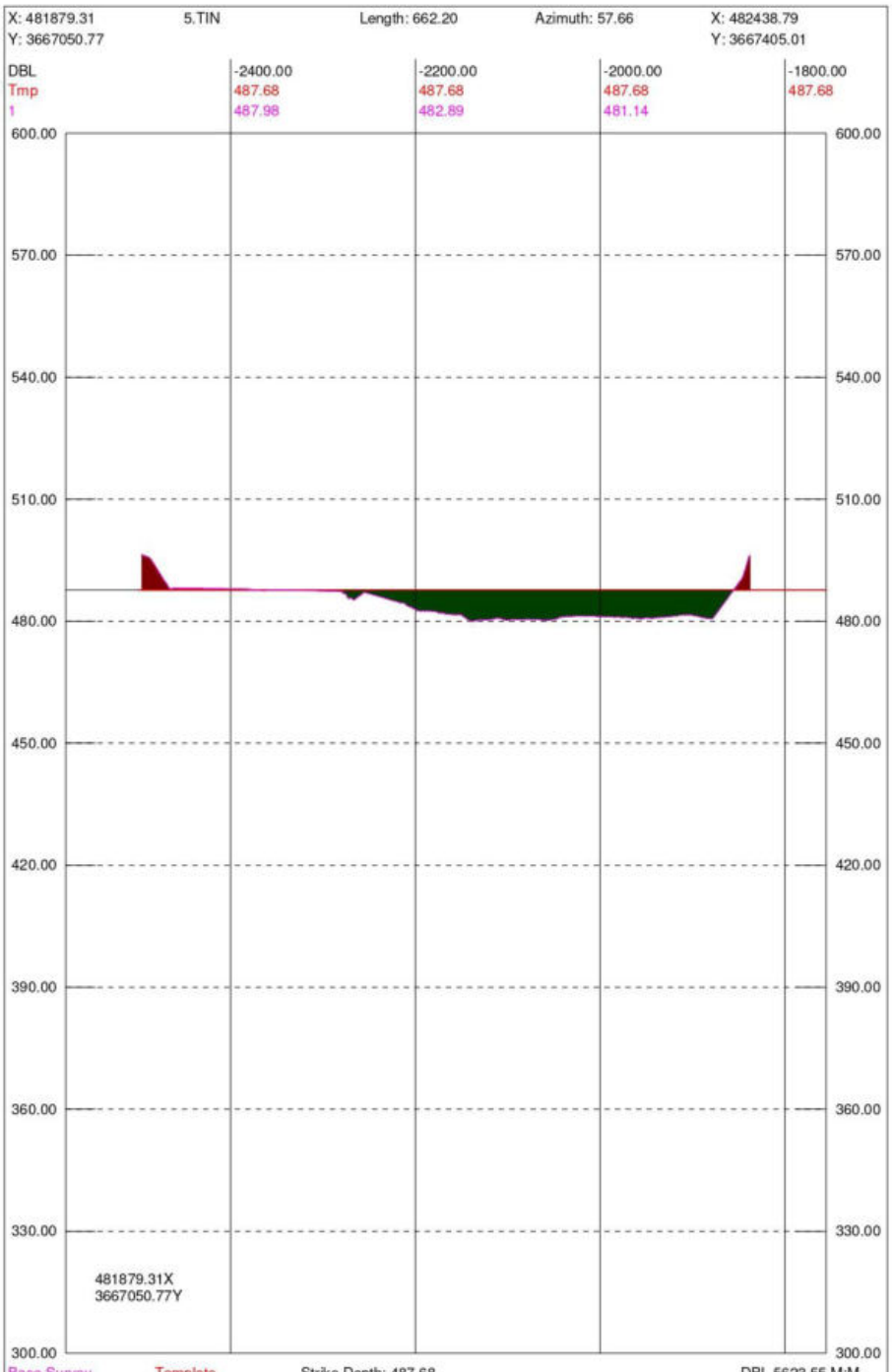
Seg	Design	Cut Area	Fill Area	Cut Vol	Fill Vol	OverDepth	Cut Area	Fill Area	Cut Vol	Fill Vol
1		212.47	4220.87	5244.64	144561.37	All	0.00	4220.87	0.00	144561.37
Total		212.47	4220.87	5244.64	144561.37		0.00	4220.87	0.00	144561.37
Accum				2326551.05	19072764.43				0.00	19072764.43

RD120



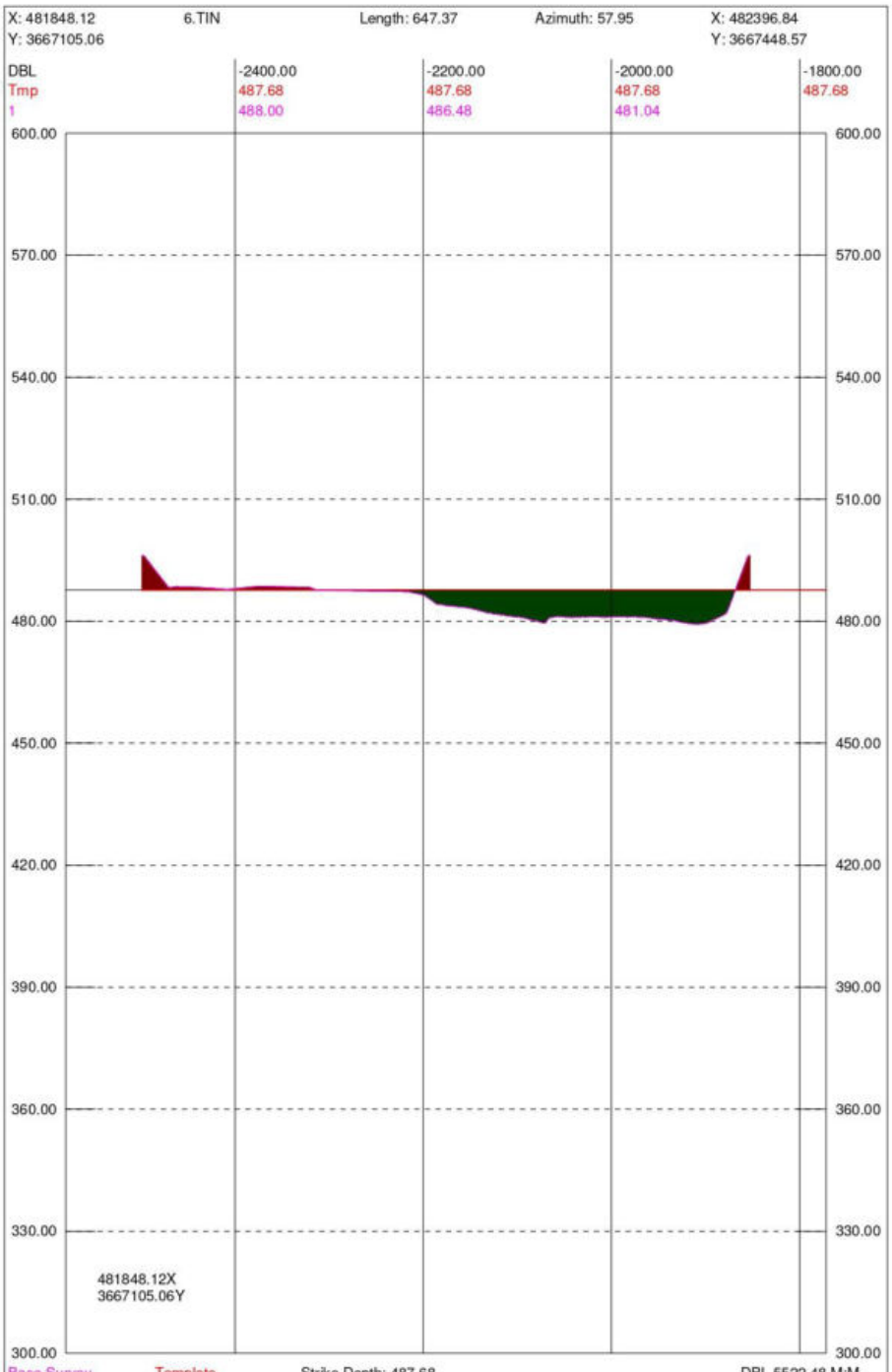
Seg	Design	Cut Area	Fill Area	Cut Vol	Fill Vol	OverDepth	Cut Area	Fill Area	Cut Vol	Fill Vol
1		193.23	3244.85	6087.27	112565.69	All	0.00	3244.85	0.00	112565.69
Total		193.23	3244.85	6087.27	112565.69		0.00	3244.85	0.00	112565.69
Accum				2332638.33	19185330.11				0.00	19185330.11

RD130



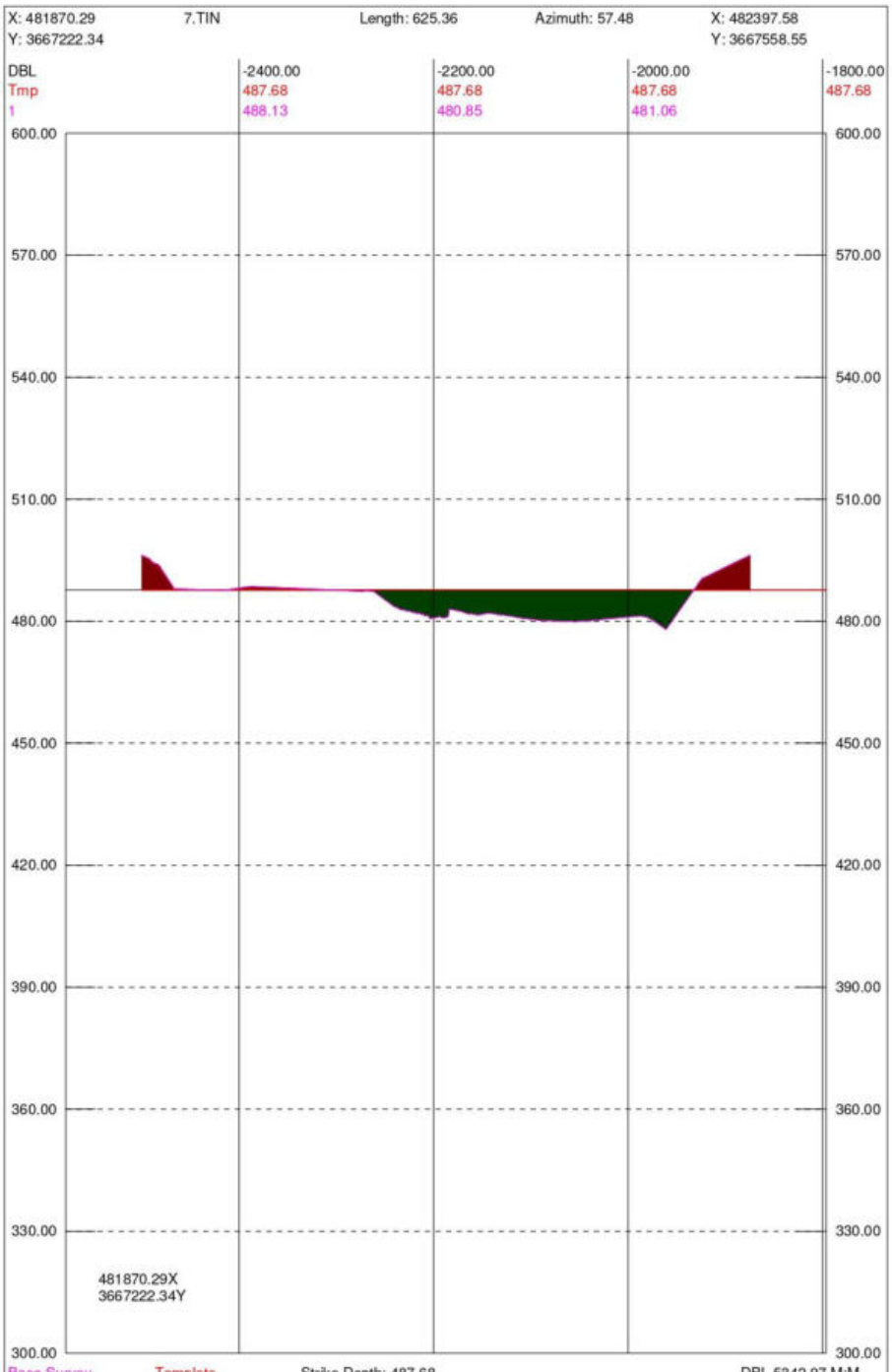
Seg	Design	Cut Area	Fill Area	Cut Vol	Fill Vol	OverDepth	Cut Area	Fill Area	Cut Vol	Fill Vol
1		253.16	2404.04	6664.23	83641.77	All	0.00	2404.04	0.00	83641.77
Total		253.16	2404.04	6664.23	83641.77		0.00	2404.04	0.00	83641.77
Accum				2339302.56	19268971.88				0.00	19268971.88

RD210



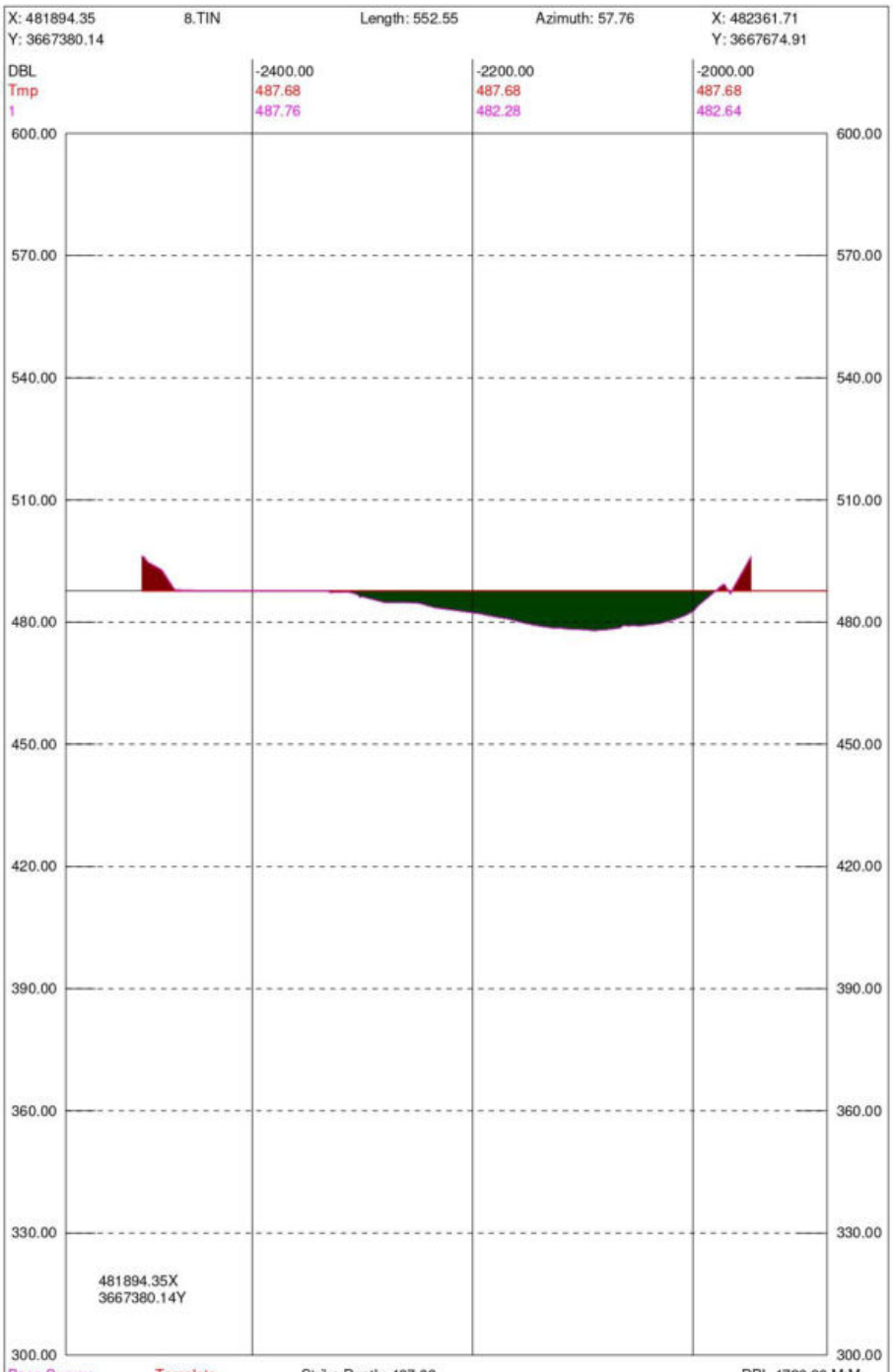
Seg	Design	Cut Area	Fill Area	Cut Vol	Fill Vol	OverDepth	Cut Area	Fill Area	Cut Vol	Fill Vol
1		312.07	2100.55	17408.23	135561.27	All	0.00	2100.55	0.00	135561.27
Total		312.07	2100.55	17408.23	135561.27		0.00	2100.55	0.00	135561.27
Accum				2356710.79	19404533.15				0.00	19404533.15

RD300



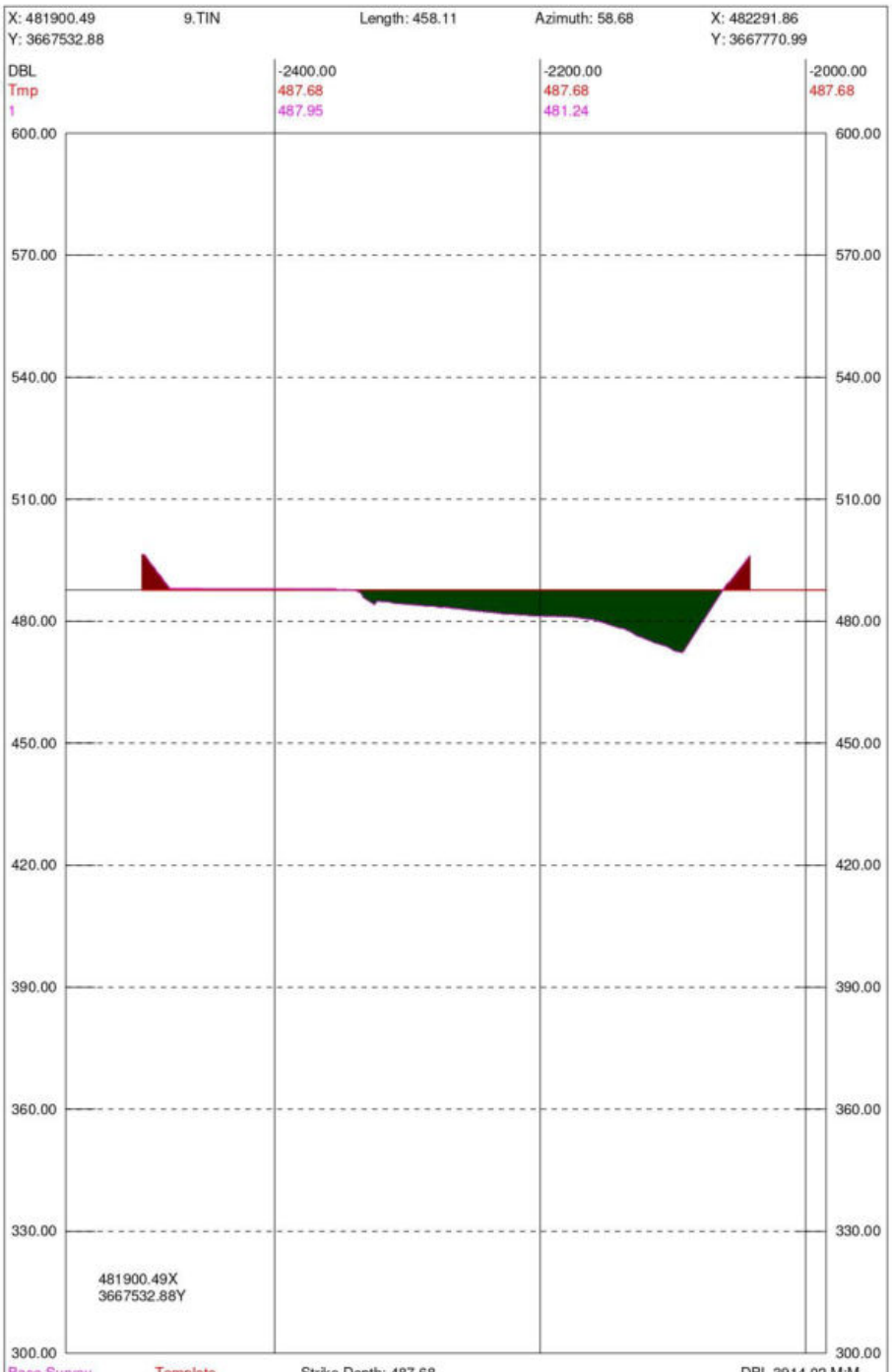
Seg	Design	Cut Area	Fill Area	Cut Vol	Fill Vol	OverDepth	Cut Area	Fill Area	Cut Vol	Fill Vol
1		524.10	2055.71	37520.93	189098.48	All	0.00	2055.71	0.00	189098.48
Total		524.10	2055.71	37520.93	189098.48		0.00	2055.71	0.00	189098.48
Accum				2394231.72	19593631.63				0.00	19593631.63

RD420



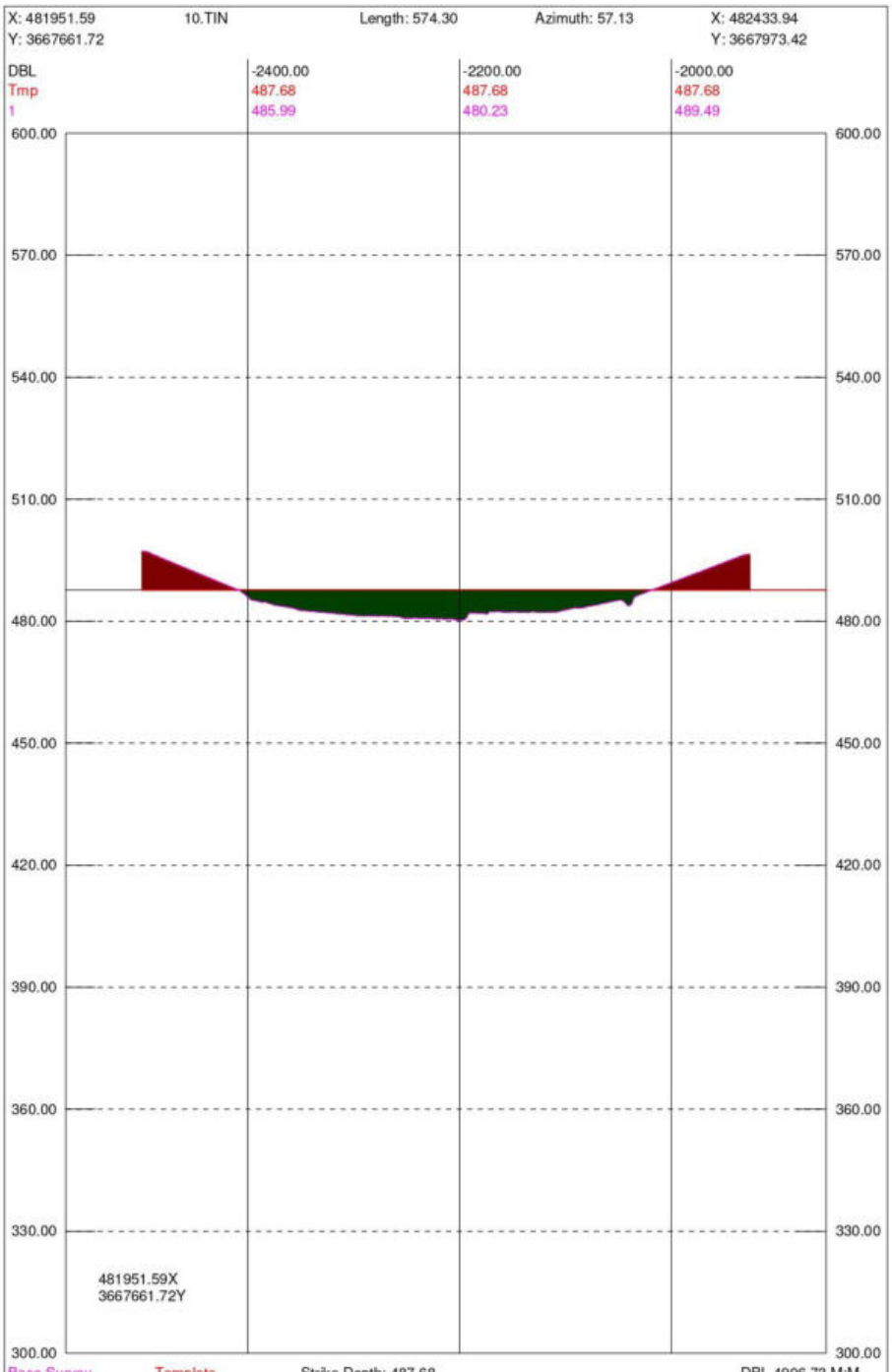
Seg	Design	Cut Area	Fill Area	Cut Vol	Fill Vol	OverDepth	Cut Area	Fill Area	Cut Vol	Fill Vol
1		244.61	2031.02	45693.17	241994.14	All	0.00	2031.02	0.00	241994.14
Total		244.61	2031.02	45693.17	241994.14		0.00	2031.02	0.00	241994.14
Accum				2439924.88	19835625.77				0.00	19835625.77

RD540



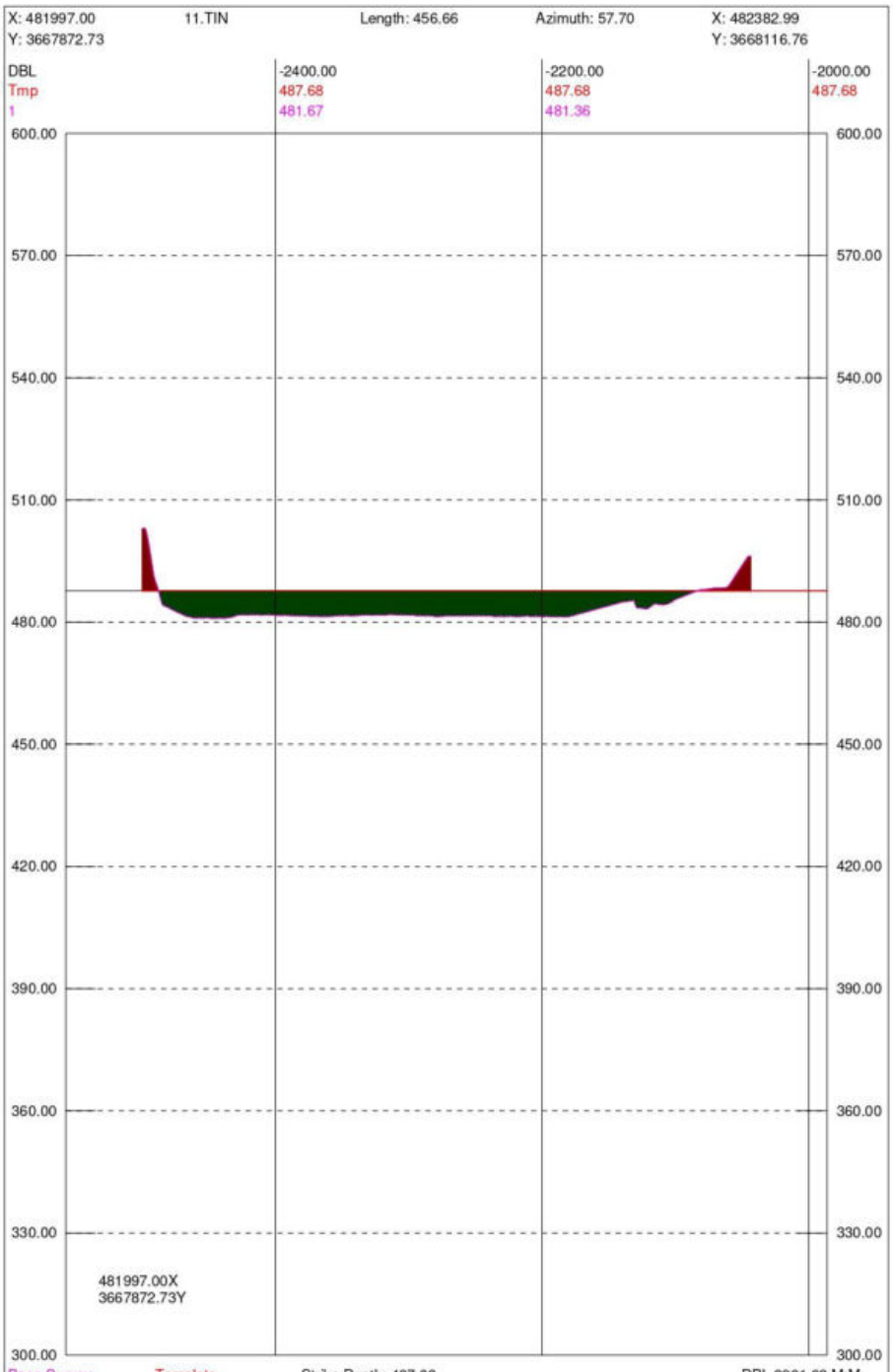
Seg	Design	Cut Area	Fill Area	Cut Vol	Fill Vol	OverDepth	Cut Area	Fill Area	Cut Vol	Fill Vol
1		225.60	1871.52	29035.47	235864.48	All	0.00	1871.52	0.00	235864.48
Total		225.60	1871.52	29035.47	235864.48		0.00	1871.52	0.00	235864.48
Accum				2468960.36	20071490.24				0.00	20071490.24

RD630



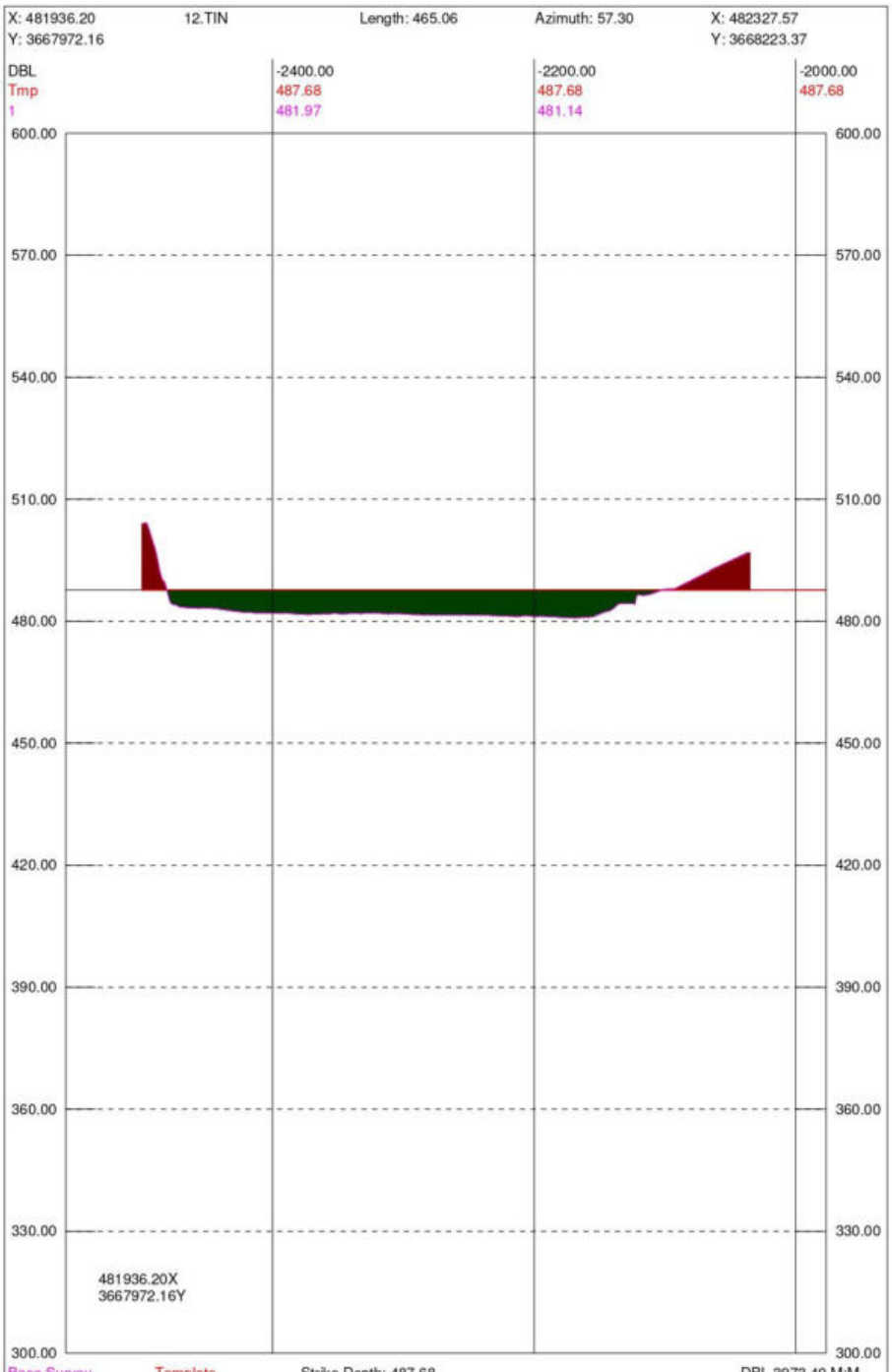
Seg	Design	Cut Area	Fill Area	Cut Vol	Fill Vol	OverDepth	Cut Area	Fill Area	Cut Vol	Fill Vol
1		874.04	1955.49	48971.66	172706.38	All	0.00	1955.49	0.00	172706.38
Total		874.04	1955.49	48971.66	172706.38		0.00	1955.49	0.00	172706.38
Accum				2517932.02	20244196.62				0.00	20244196.62

RD780



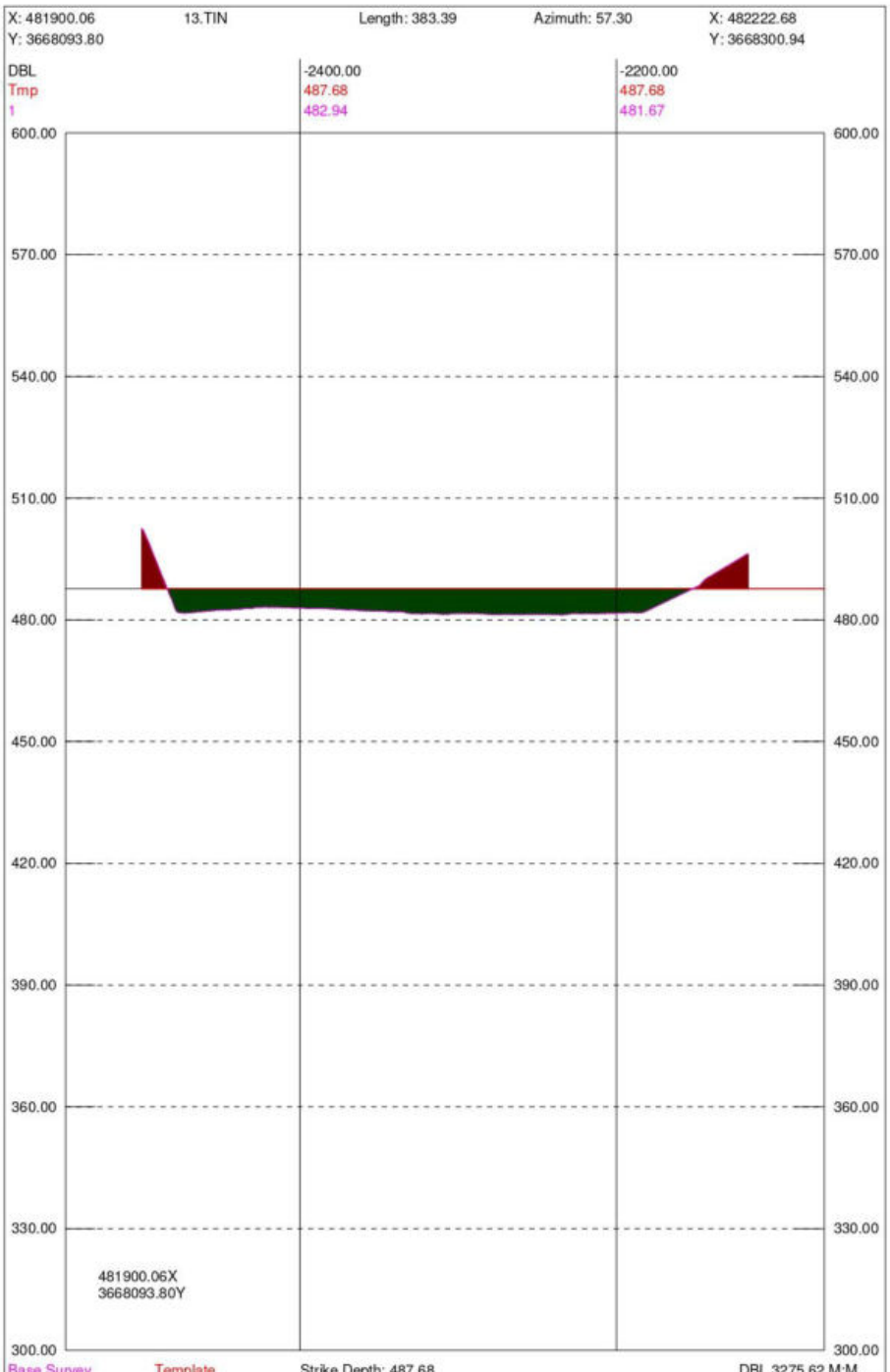
Seg	Design	Cut Area	Fill Area	Cut Vol	Fill Vol	OverDepth	Cut Area	Fill Area	Cut Vol	Fill Vol
1		210.70	2203.62	81722.82	313989.30	All	0.00	2203.62	0.00	313989.30
Total		210.70	2203.62	81722.82	313989.30		0.00	2203.62	0.00	313989.30
Accum				2599654.84	20558185.92				0.00	20558185.92

RD900



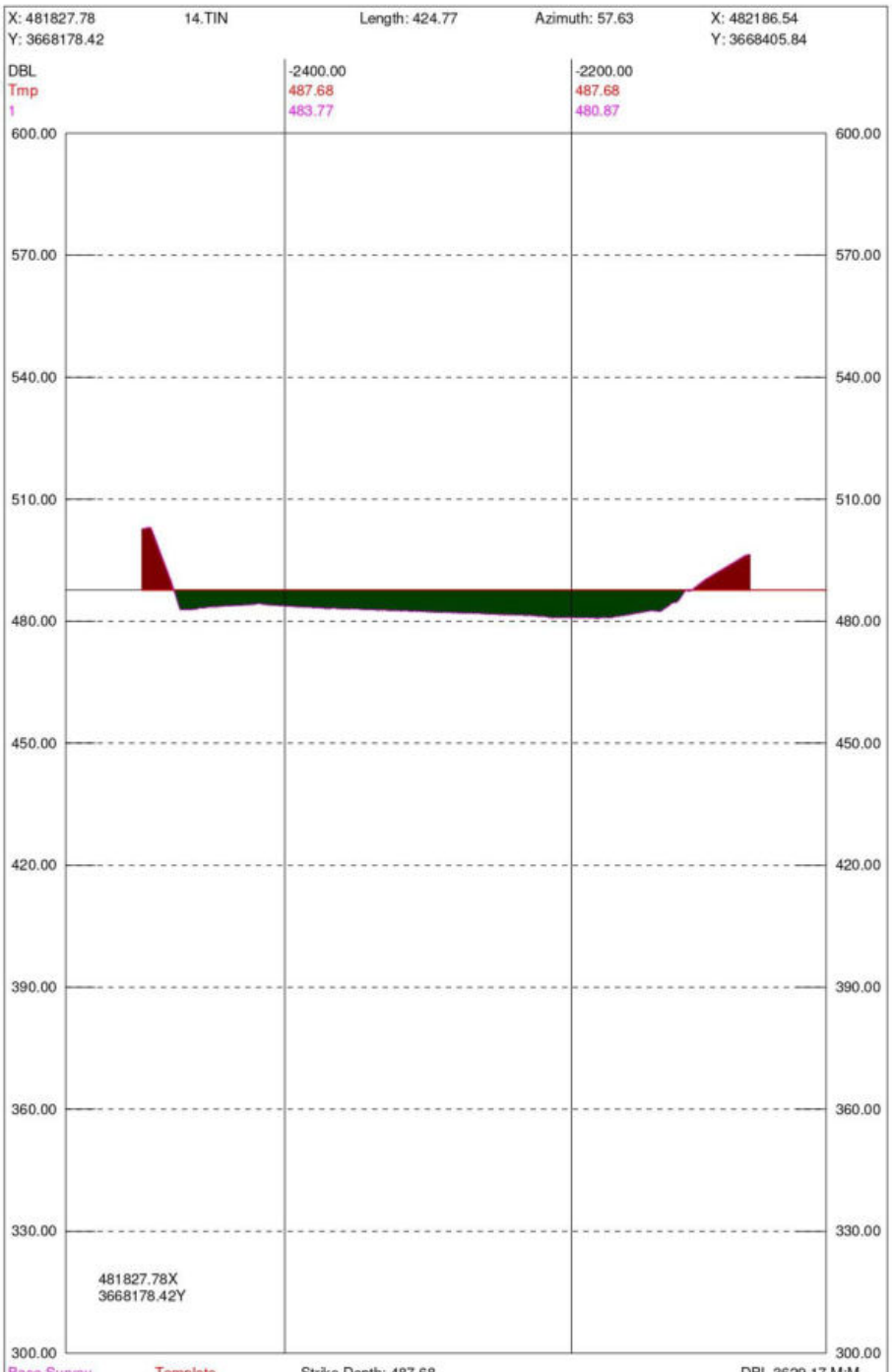
Seg	Design	Cut Area	Fill Area	Cut Vol	Fill Vol	OverDepth	Cut Area	Fill Area	Cut Vol	Fill Vol
1		474.31	2057.91	40512.94	251243.07	All	0.00	2057.91	0.00	251243.07
Total		474.31	2057.91	40512.94	251243.07		0.00	2057.91	0.00	251243.07
Accum				2640167.78	20809428.99				0.00	20809428.99

RD1020



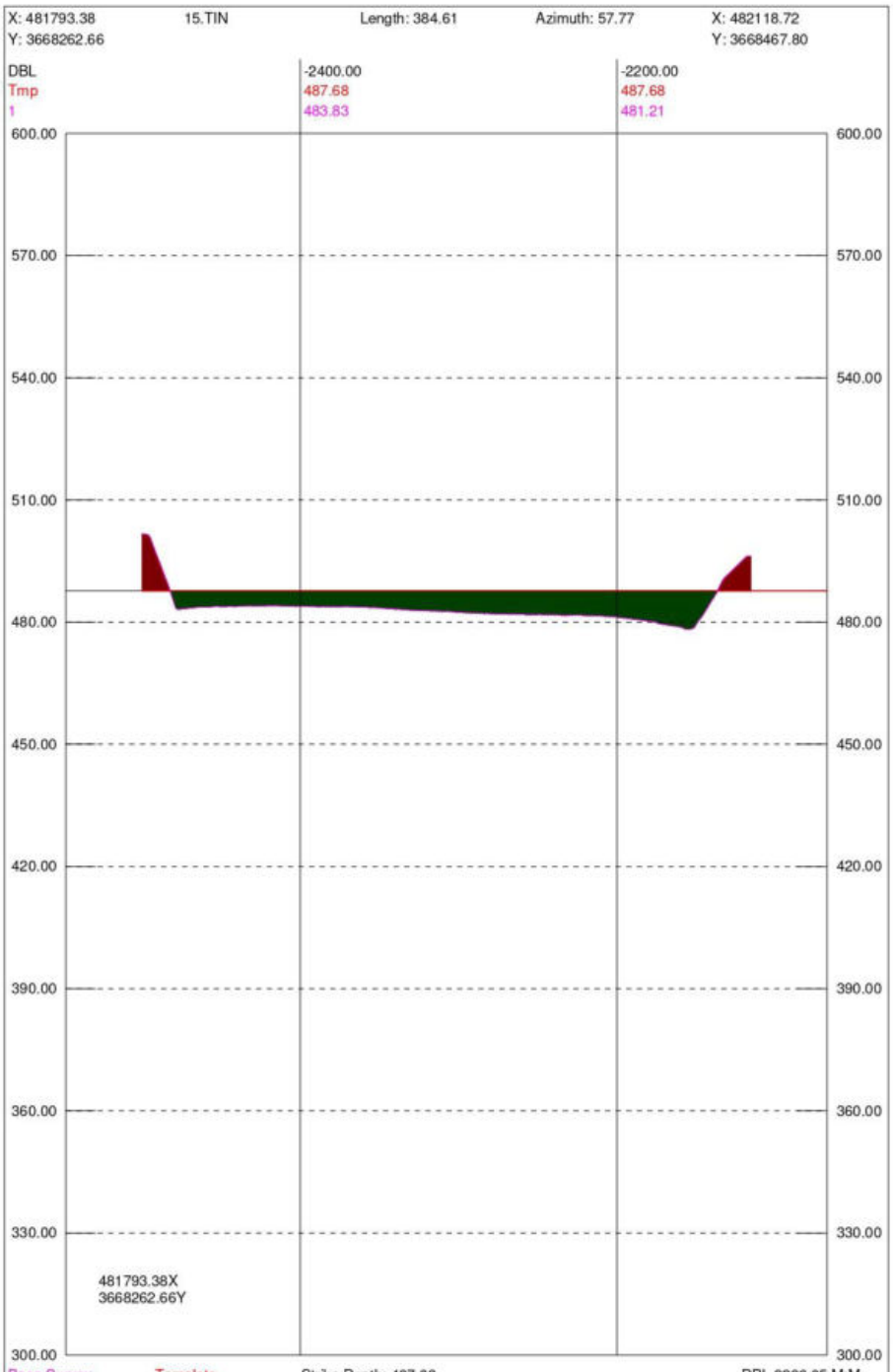
Seg	Design	Cut Area	Fill Area	Cut Vol	Fill Vol	OverDepth	Cut Area	Fill Area	Cut Vol	Fill Vol
1		285.68	1790.54	46328.53	234585.39	All	0.00	1790.54	0.00	234585.39
Total		285.68	1790.54	46328.53	234585.39		0.00	1790.54	0.00	234585.39
Accum				2686496.31	21044014.39				0.00	21044014.39

RD1130



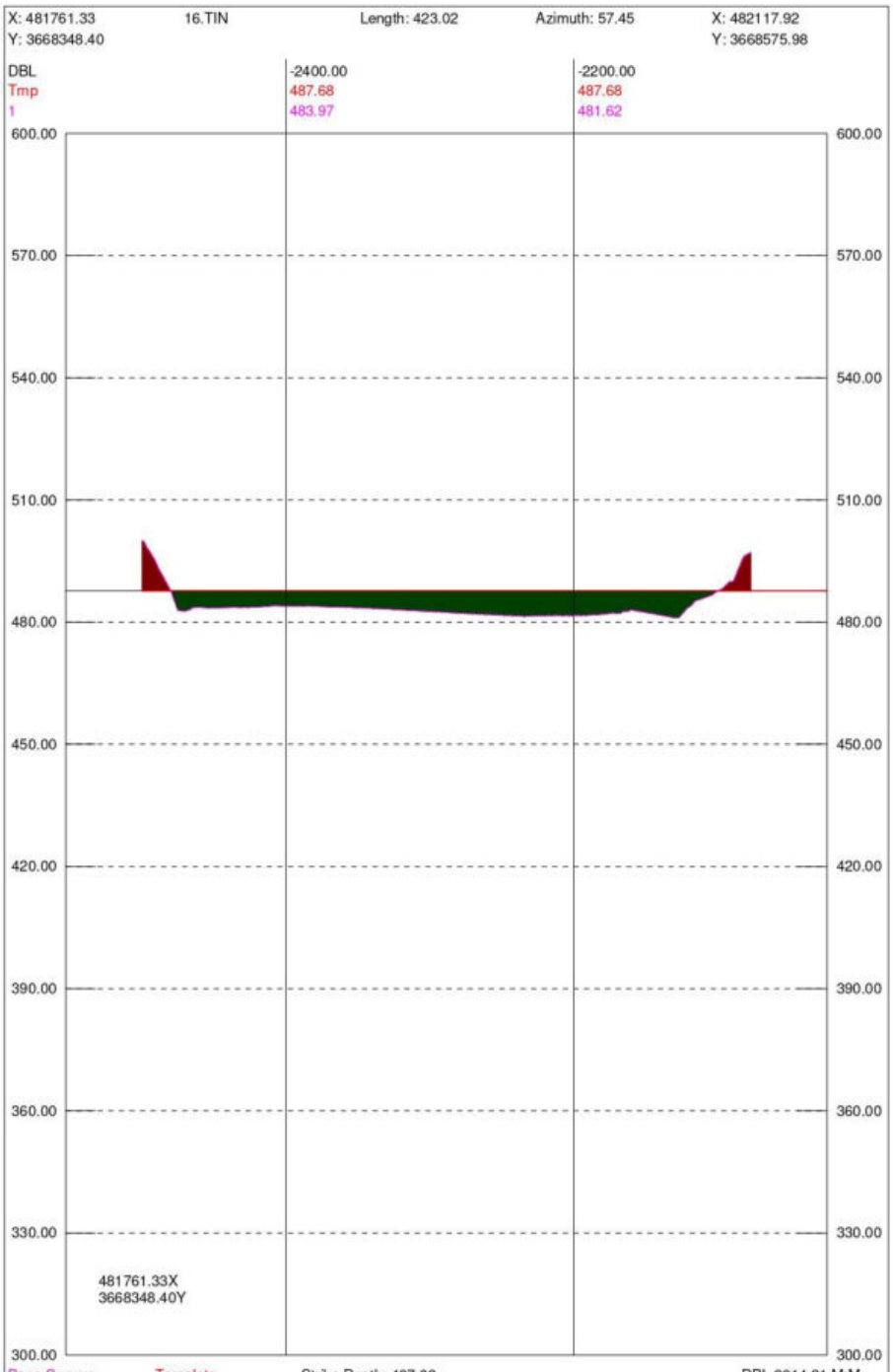
Seg	Design	Cut Area	Fill Area	Cut Vol	Fill Vol	OverDepth	Cut Area	Fill Area	Cut Vol	Fill Vol
1		418.03	1832.79	38368.78	197586.62	All	0.00	1832.79	0.00	197586.62
Total		418.03	1832.79	38368.78	197586.62		0.00	1832.79	0.00	197586.62
Accum				2724865.08	21241601.01				0.00	21241601.01

RD1220



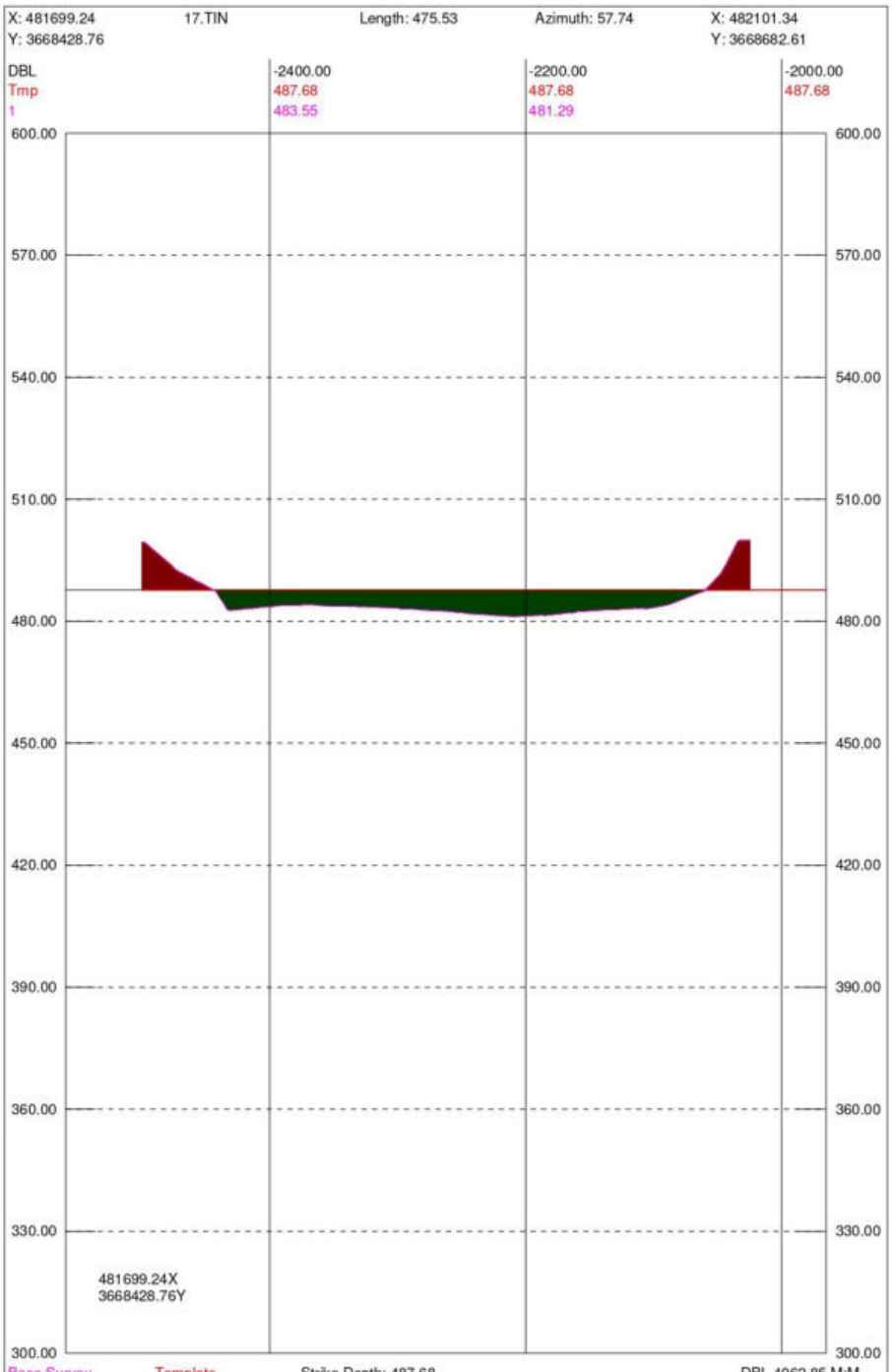
Seg	Design	Cut Area	Fill Area	Cut Vol	Fill Vol	OverDepth	Cut Area	Fill Area	Cut Vol	Fill Vol
1		266.40	1789.26	30506.78	161310.68	All	0.00	1789.26	0.00	161310.68
Total		266.40	1789.26	30506.78	161310.68		0.00	1789.26	0.00	161310.68
Accum				2755371.86	21402911.69				0.00	21402911.69

RD1310



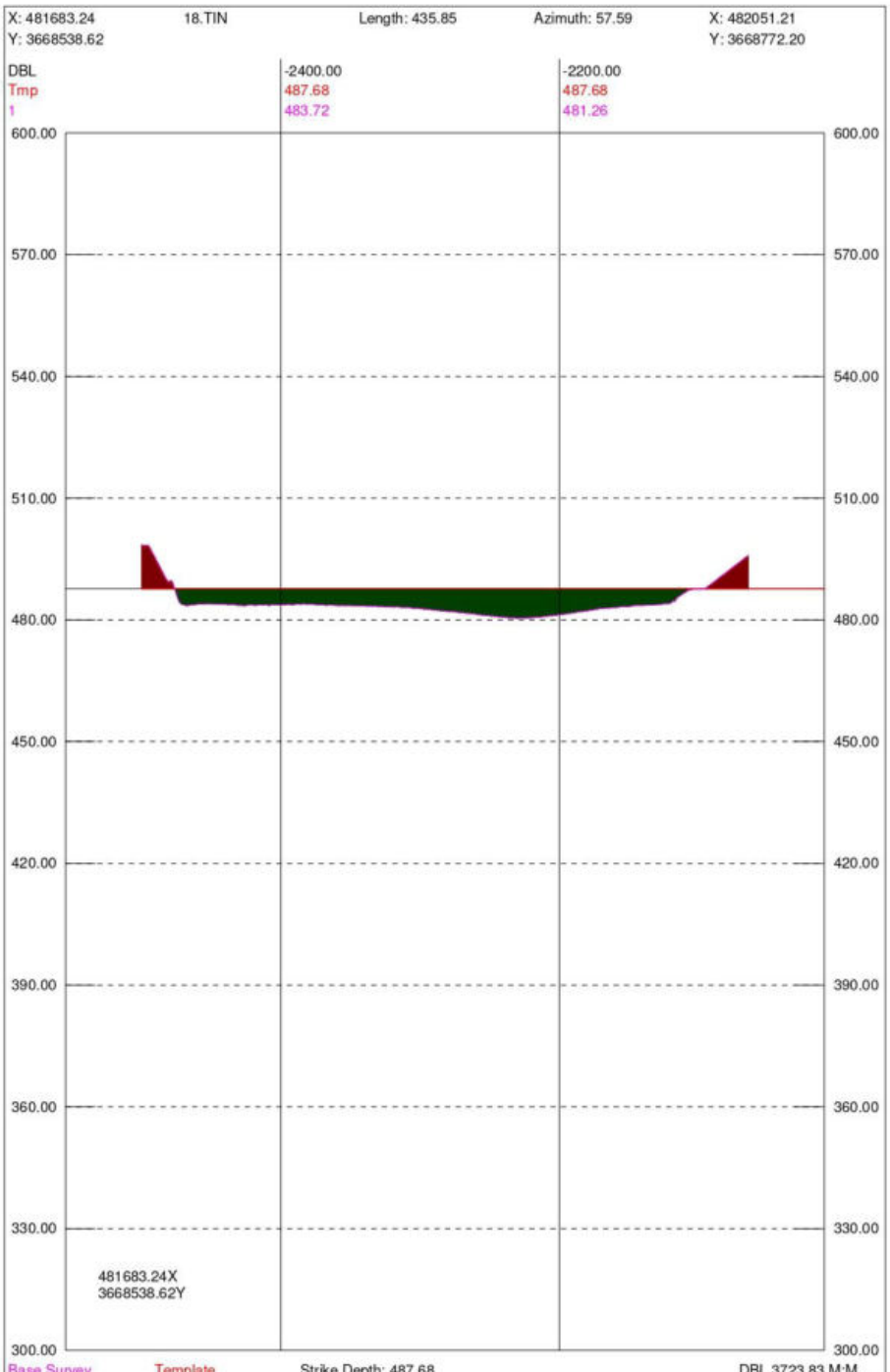
Seg	Design	Cut Area	Fill Area	Cut Vol	Fill Vol	OverDepth	Cut Area	Fill Area	Cut Vol	Fill Vol
1		227.94	1816.54	22369.96	163618.99	All	0.00	1816.54	0.00	163618.99
Total		227.94	1816.54	22369.96	163618.99		0.00	1816.54	0.00	163618.99
Accum				2777741.82	21566530.68				0.00	21566530.68

RD1410



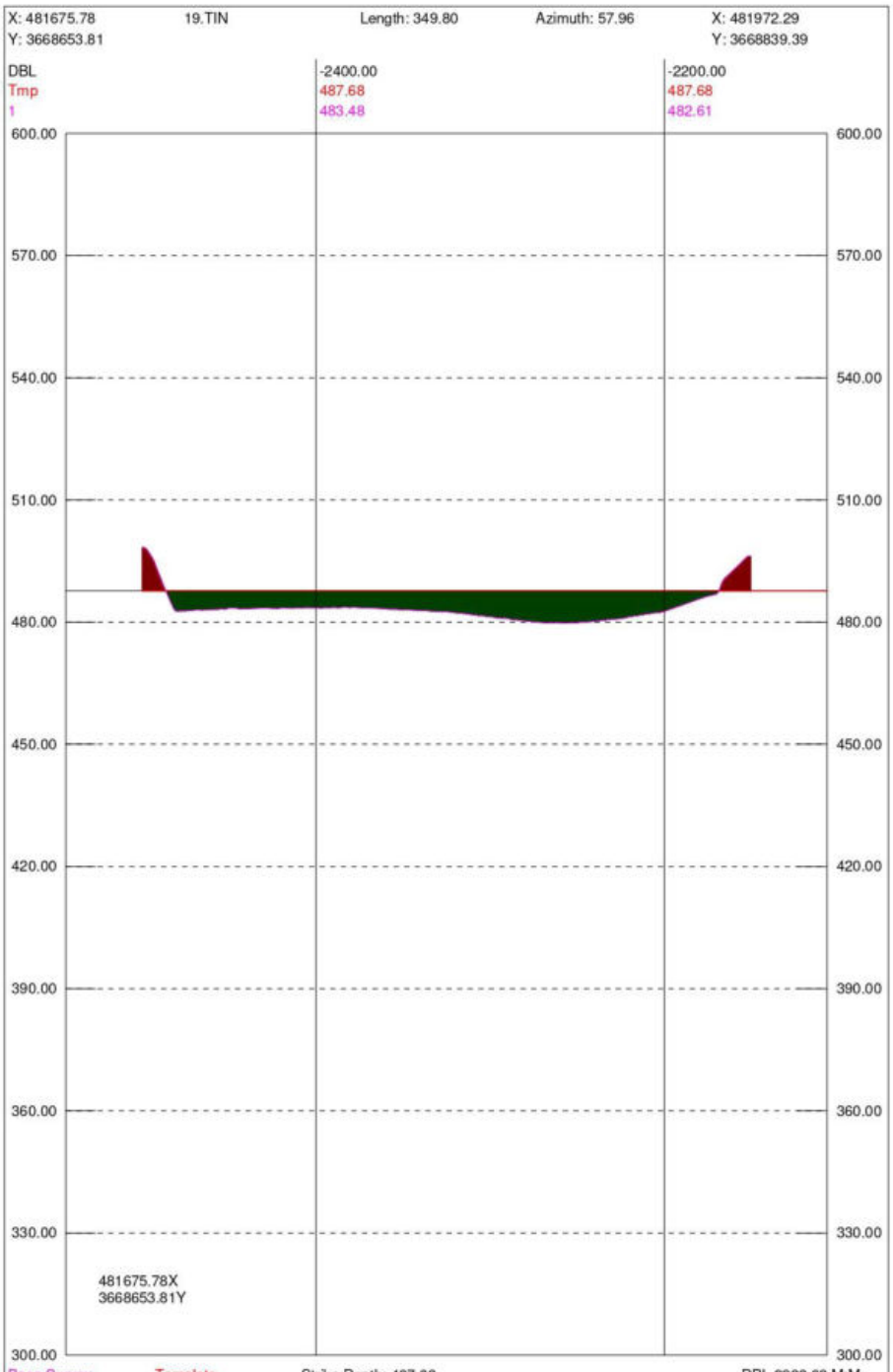
Seg	Design	Cut Area	Fill Area	Cut Vol	Fill Vol	OverDepth	Cut Area	Fill Area	Cut Vol	Fill Vol
1		551.09	1762.80	38991.93	178905.76	All	0.00	1762.80	0.00	178905.76
Total		551.09	1762.80	38991.93	178905.76		0.00	1762.80	0.00	178905.76
Accum				2816733.75	21745436.44				0.00	21745436.44

RD1510



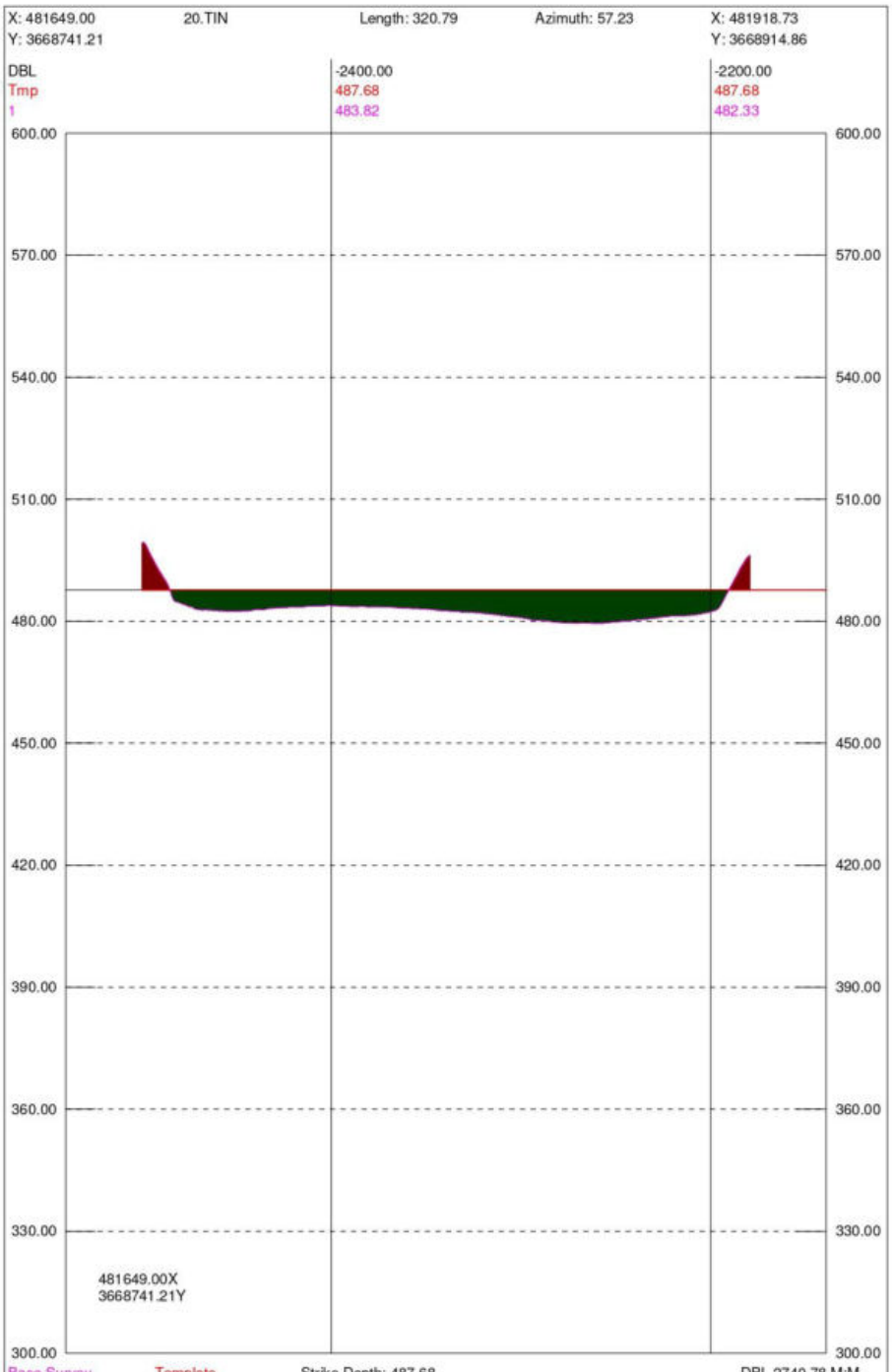
Seg	Design	Cut Area	Fill Area	Cut Vol	Fill Vol	OverDepth	Cut Area	Fill Area	Cut Vol	Fill Vol
1		275.12	1758.09	42098.85	179496.66	All	0.00	1758.09	0.00	179496.66
Total		275.12	1758.09	42098.85	179496.66		0.00	1758.09	0.00	179496.66
Accum				2858832.60	21924933.10				0.00	21924933.10

RD1610



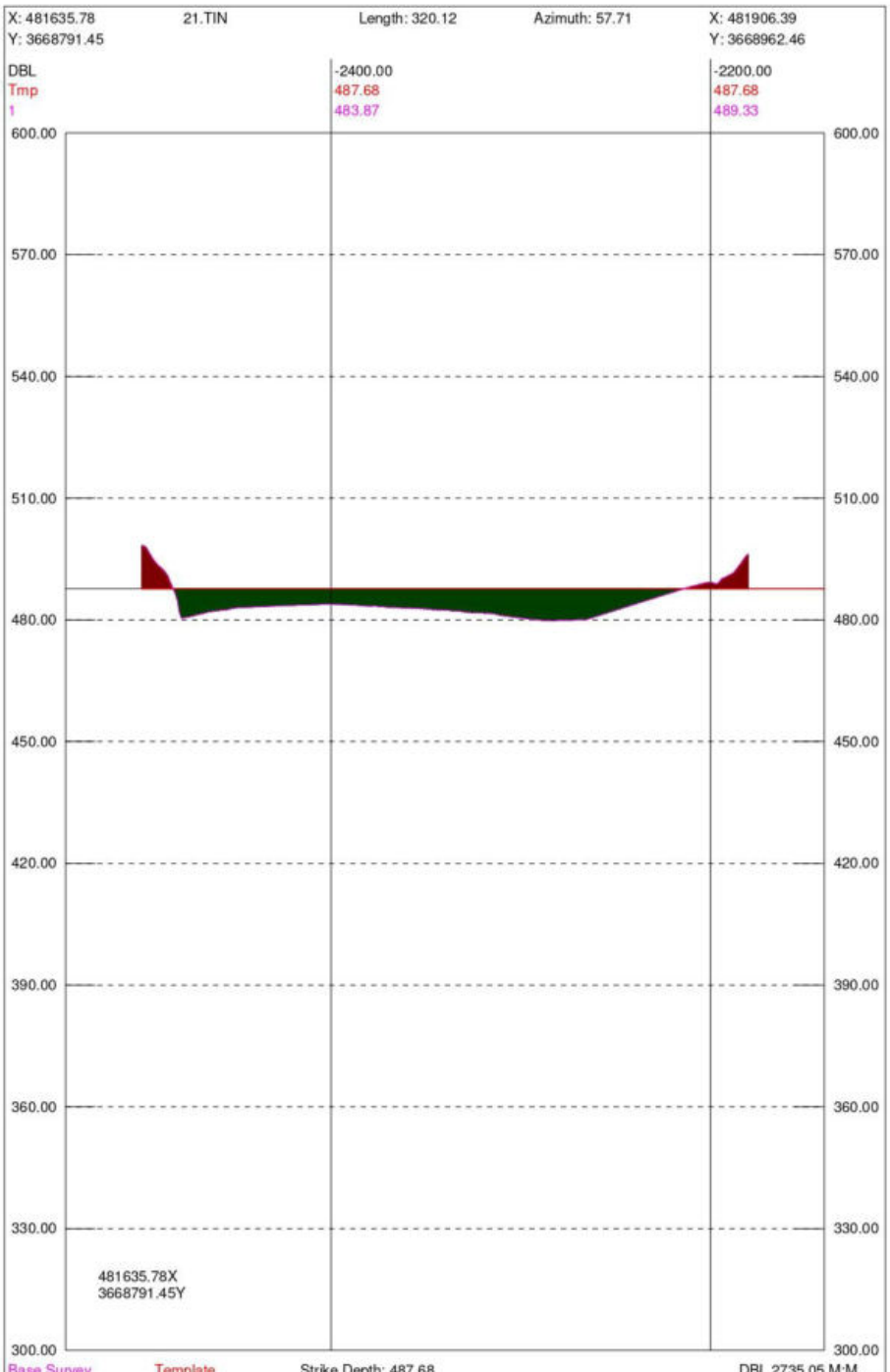
Seg	Design	Cut Area	Fill Area	Cut Vol	Fill Vol	OverDepth	Cut Area	Fill Area	Cut Vol	Fill Vol
1		187.69	1641.71	23184.97	170253.12	All	0.00	1641.71	0.00	170253.12
Total		187.69	1641.71	23184.97	170253.12		0.00	1641.71	0.00	170253.12
Accum				2882017.57	22095186.22				0.00	22095186.22

RD1700



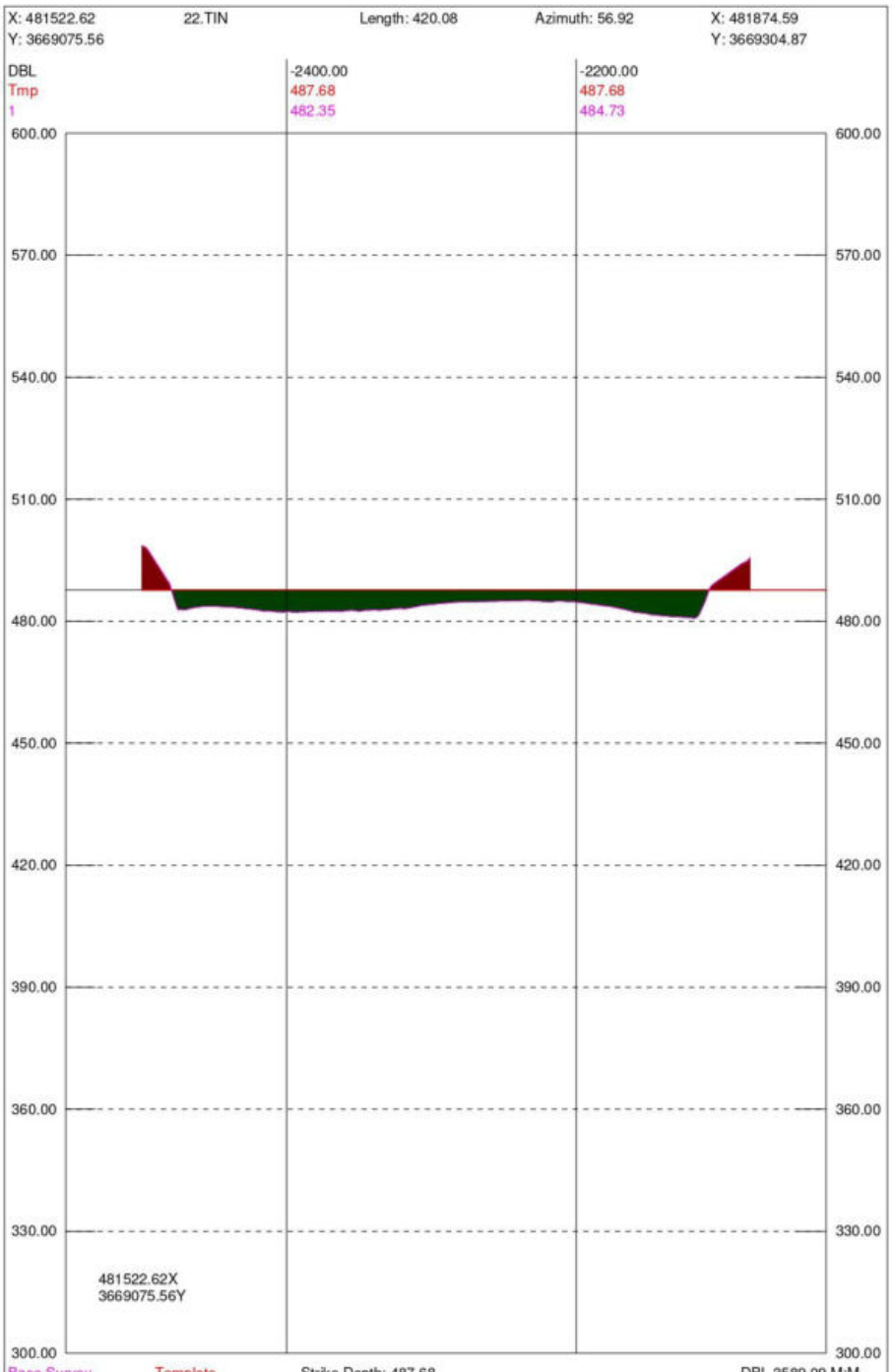
Seg	Design	Cut Area	Fill Area	Cut Vol	Fill Vol	OverDepth	Cut Area	Fill Area	Cut Vol	Fill Vol
1		147.31	1635.39	15089.72	148156.09	All	0.00	1635.39	0.00	148156.09
Total		147.31	1635.39	15089.72	148156.09		0.00	1635.39	0.00	148156.09
Accum				2897107.29	22243342.31				0.00	22243342.31

RD1750



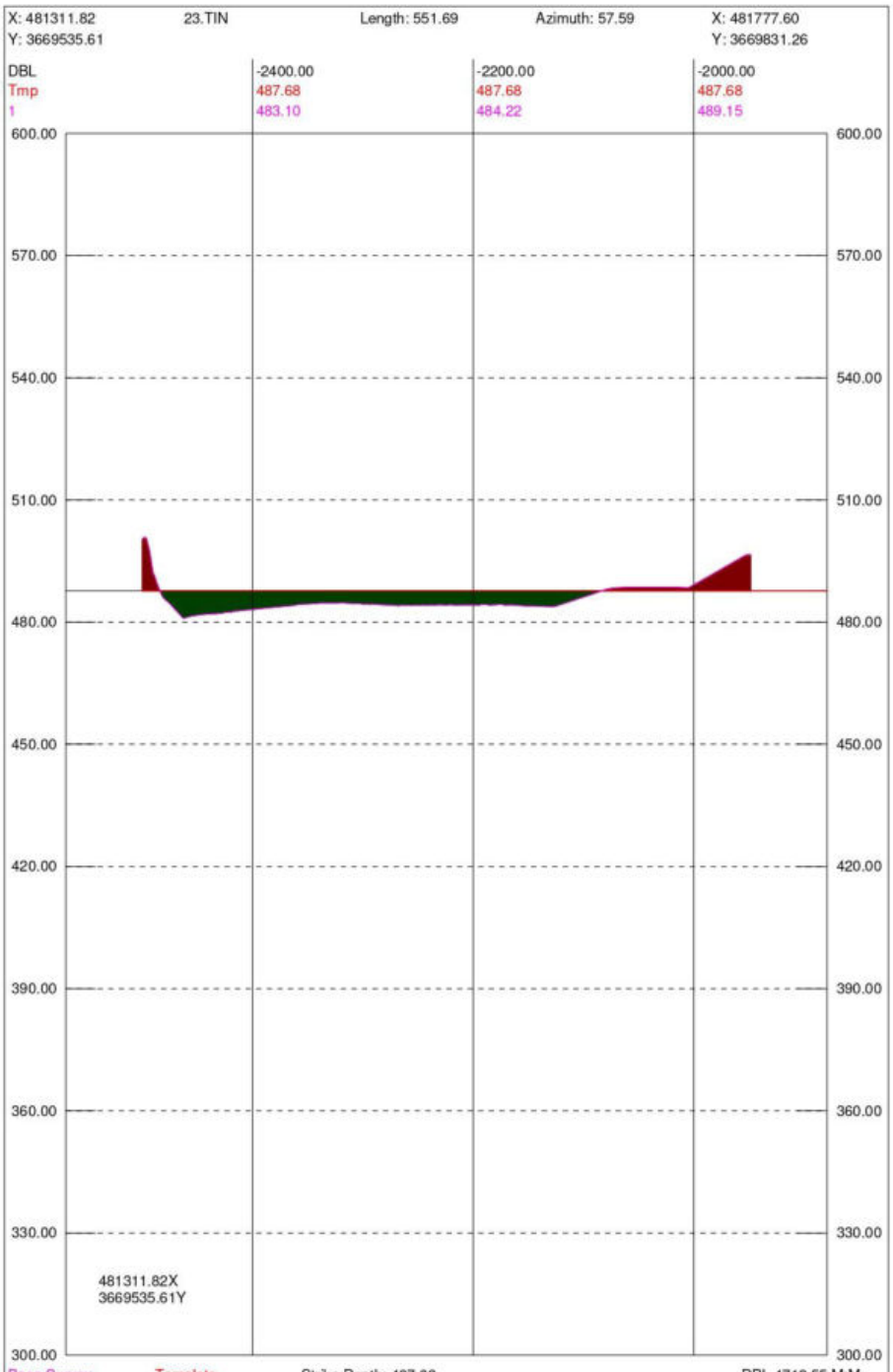
Seg	Design	Cut Area	Fill Area	Cut Vol	Fill Vol	OverDepth	Cut Area	Fill Area	Cut Vol	Fill Vol
1		194.71	1376.49	8264.16	72391.97	All	0.00	1376.49	0.00	72391.97
Total		194.71	1376.49	8264.16	72391.97		0.00	1376.49	0.00	72391.97
Accum				2905371.46	22315734.28				0.00	22315734.28

RD2050



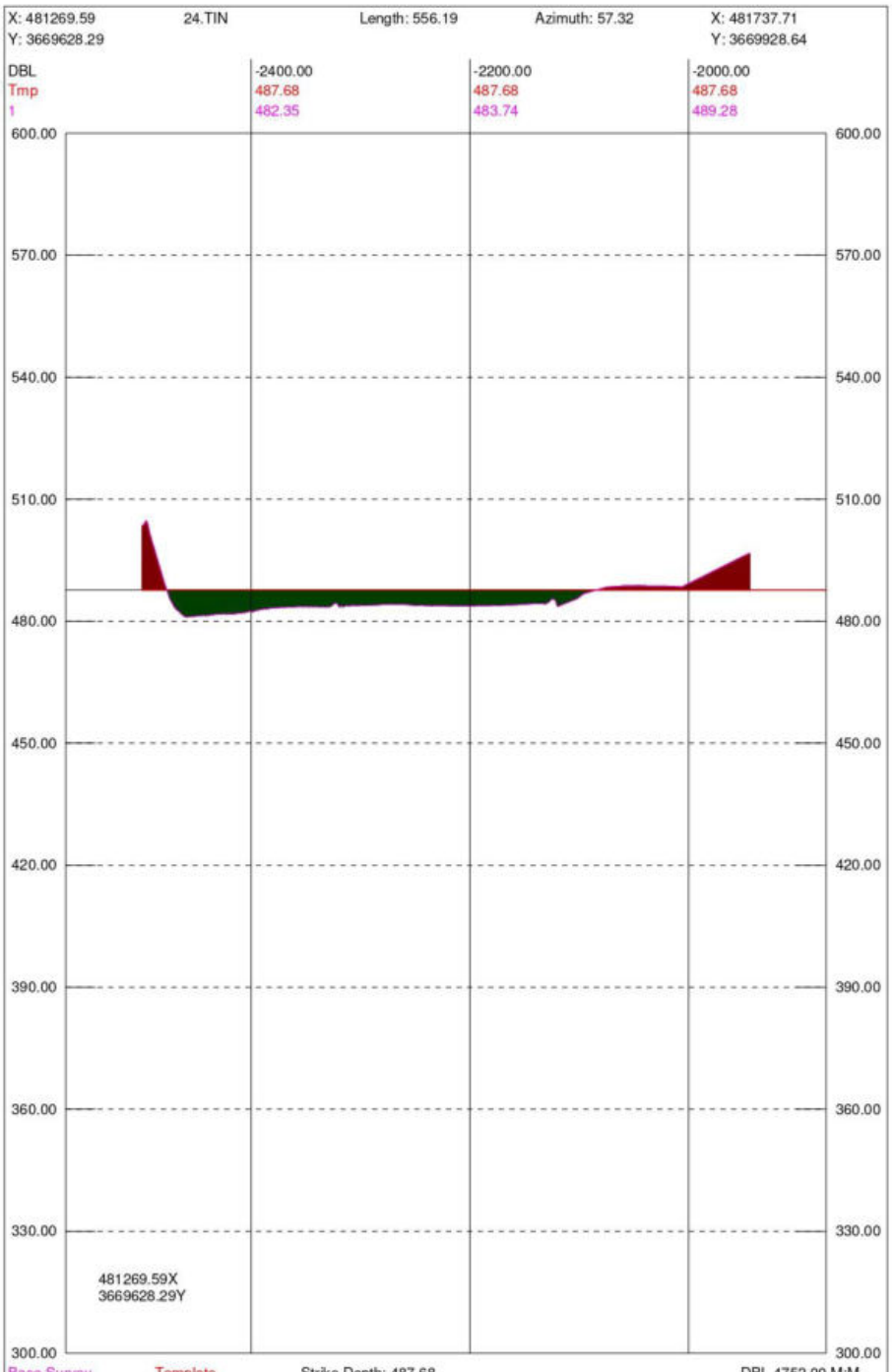
Seg	Design	Cut Area	Fill Area	Cut Vol	Fill Vol	OverDepth	Cut Area	Fill Area	Cut Vol	Fill Vol
1		250.83	1601.88	67430.48	450815.64	All	0.00	1601.88	0.00	450815.64
Total		250.83	1601.88	67430.48	450815.64		0.00	1601.88	0.00	450815.64
Accum				2972801.93	22766549.92				0.00	22766549.92

RD2550



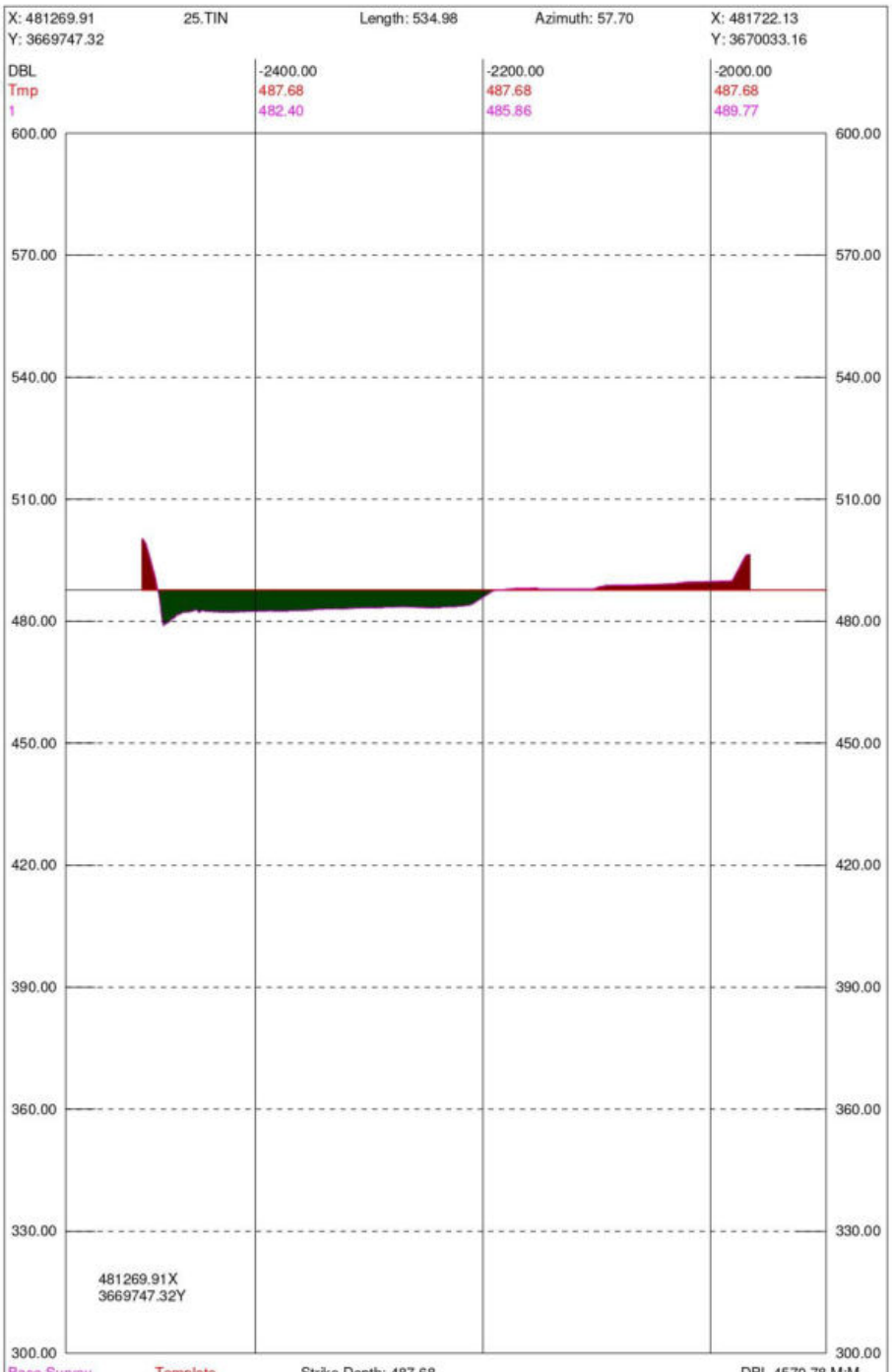
Seg	Design	Cut Area	Fill Area	Cut Vol	Fill Vol	OverDepth	Cut Area	Fill Area	Cut Vol	Fill Vol
1		473.66	1470.66	180082.80	765956.61	All	0.00	1470.66	0.00	765956.61
Total		473.66	1470.66	180082.80	765956.61		0.00	1470.66	0.00	765956.61
Accum				3152884.73	23532506.53				0.00	23532506.53

RD2650



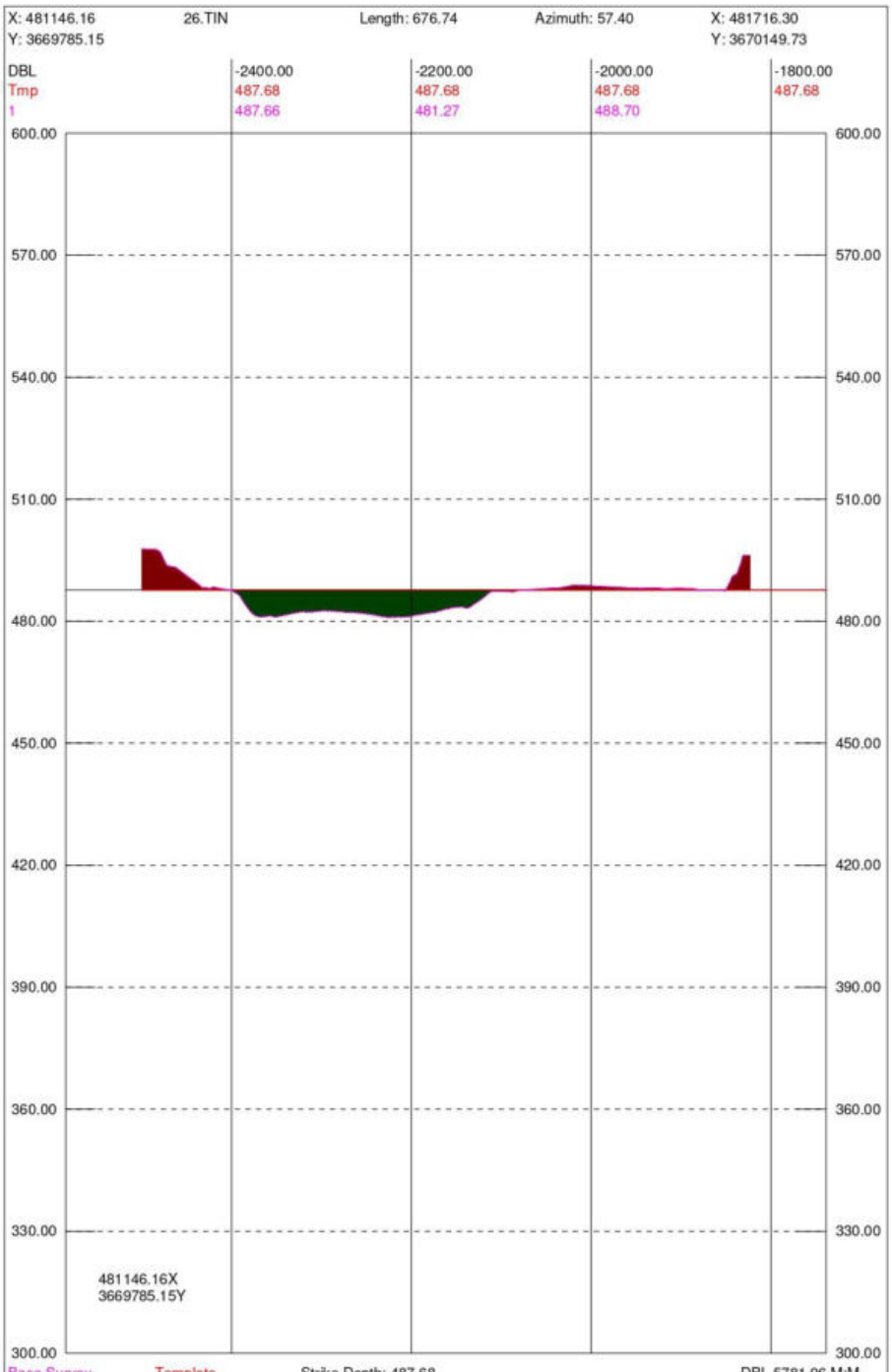
Seg	Design	Cut Area	Fill Area	Cut Vol	Fill Vol	OverDepth	Cut Area	Fill Area	Cut Vol	Fill Vol
1		603.39	1594.18	55239.27	155988.23	All	0.00	1594.18	0.00	155988.23
Total		603.39	1594.18	55239.27	155988.23		0.00	1594.18	0.00	155988.23
Accum				3208124.00	23688494.76				0.00	23688494.76

RD2750



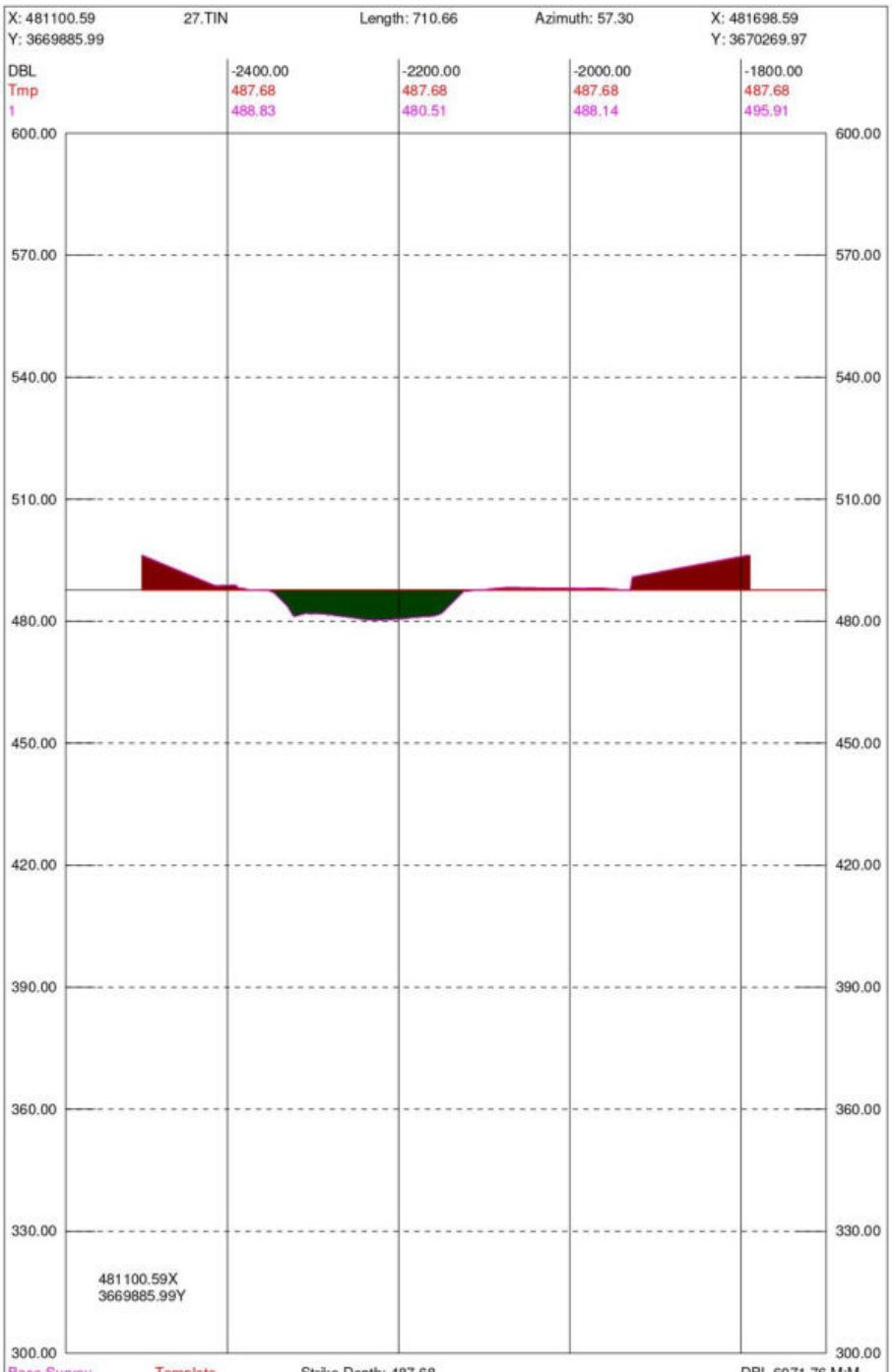
Seg	Design	Cut Area	Fill Area	Cut Vol	Fill Vol	OverDepth	Cut Area	Fill Area	Cut Vol	Fill Vol
1		416.26	1390.49	49922.05	147835.75	All	0.00	1390.49	0.00	147835.75
Total		416.26	1390.49	49922.05	147835.75		0.00	1390.49	0.00	147835.75
Accum				3258046.05	23836330.50				0.00	23836330.50

RD 2850



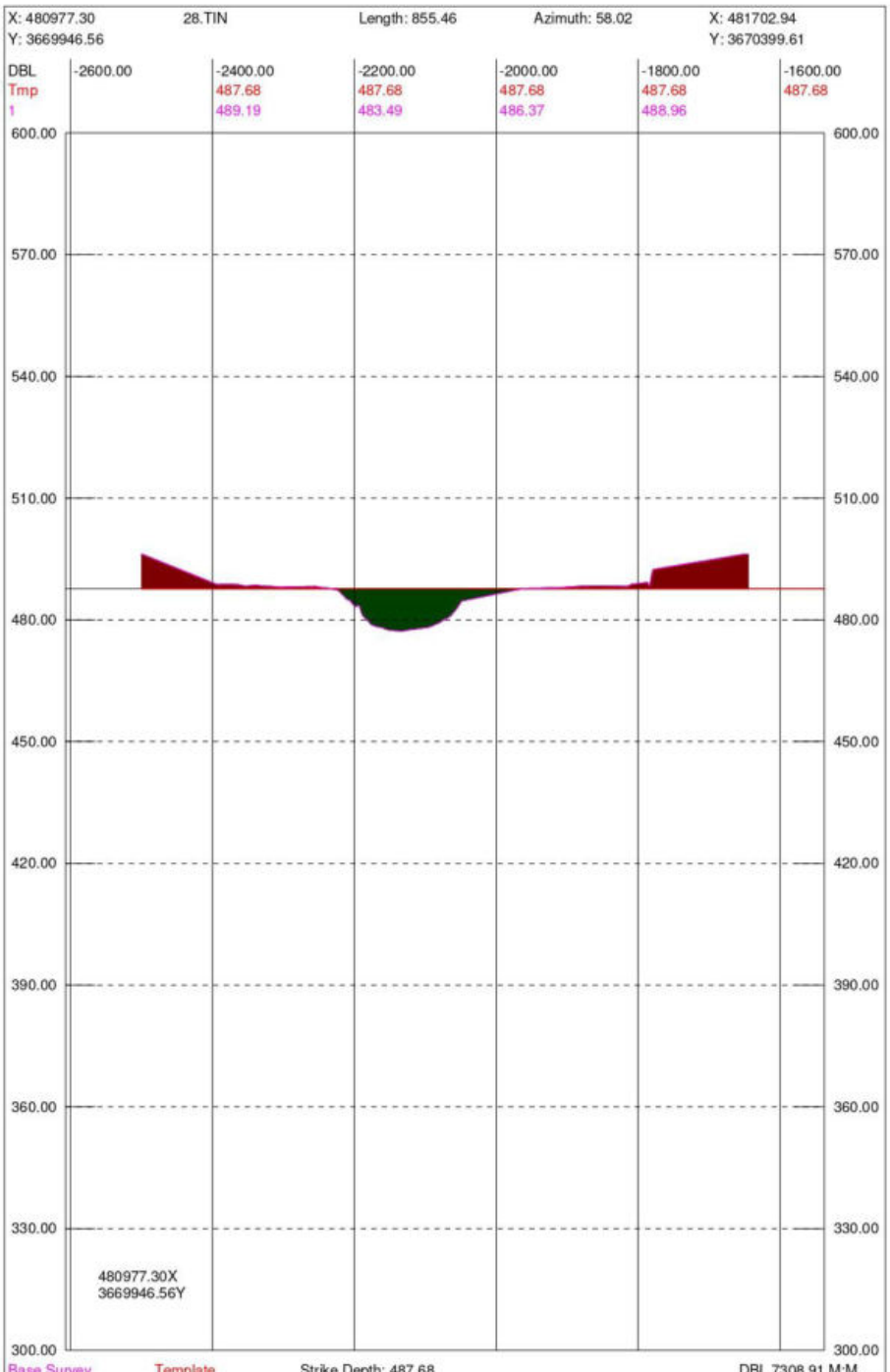
Seg	Design	Cut Area	Fill Area	Cut Vol	Fill Vol	OverDepth	Cut Area	Fill Area	Cut Vol	Fill Vol
1		666.18	1509.89	54018.19	144073.17	All	0.00	1509.89	0.00	144073.17
Total		666.18	1509.89	54018.19	144073.17		0.00	1509.89	0.00	144073.17
Accum				3312064.24	23980403.67				0.00	23980403.67

RD2960



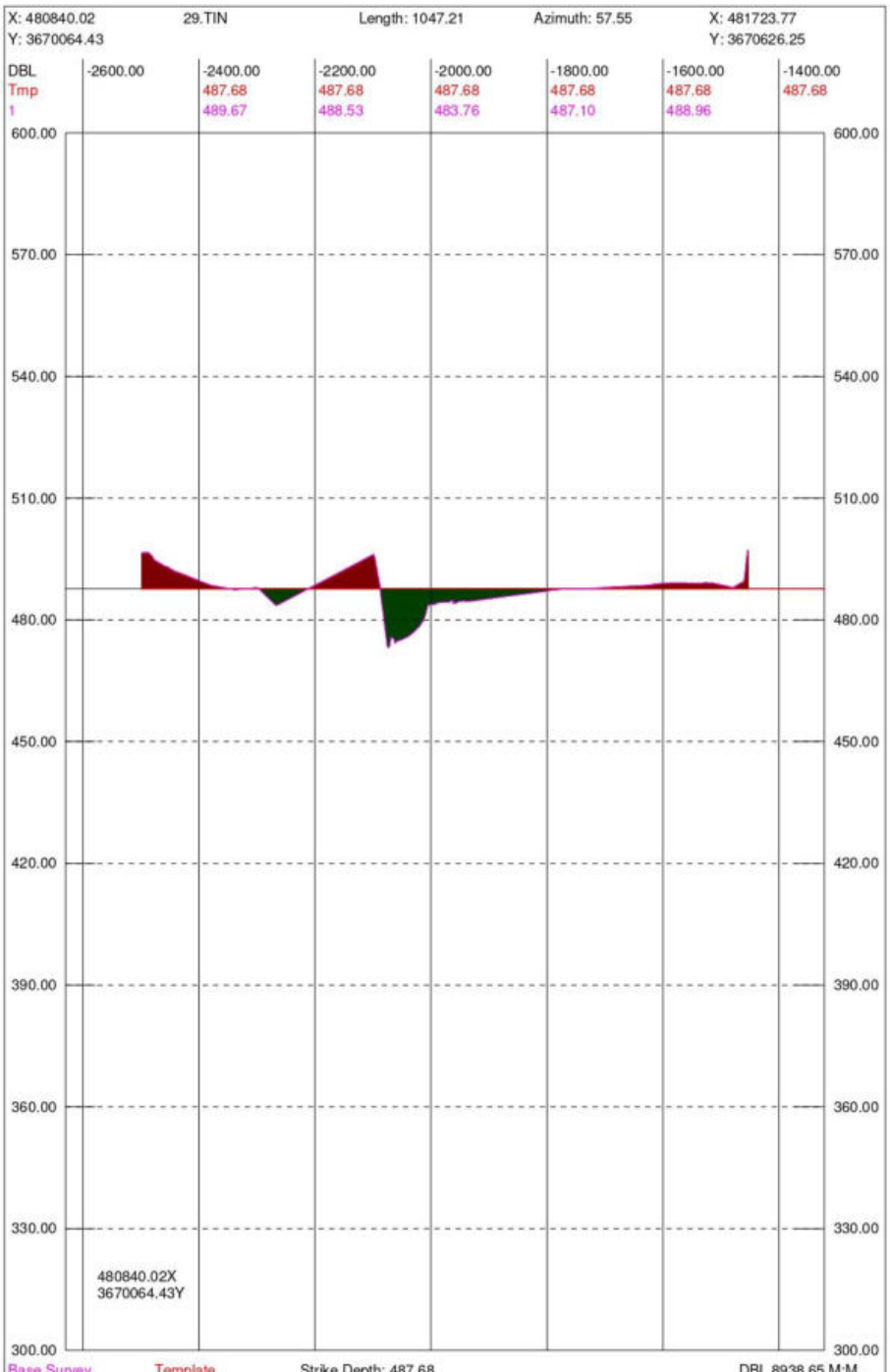
Seg	Design	Cut Area	Fill Area	Cut Vol	Fill Vol	OverDepth	Cut Area	Fill Area	Cut Vol	Fill Vol
1		1339.32	1315.86	110490.82	155368.15	All	0.00	1315.86	0.00	155368.15
Total		1339.32	1315.86	110490.82	155368.15		0.00	1315.86	0.00	155368.15
Accum				3422555.06	24135771.83				0.00	24135771.83

RD3070



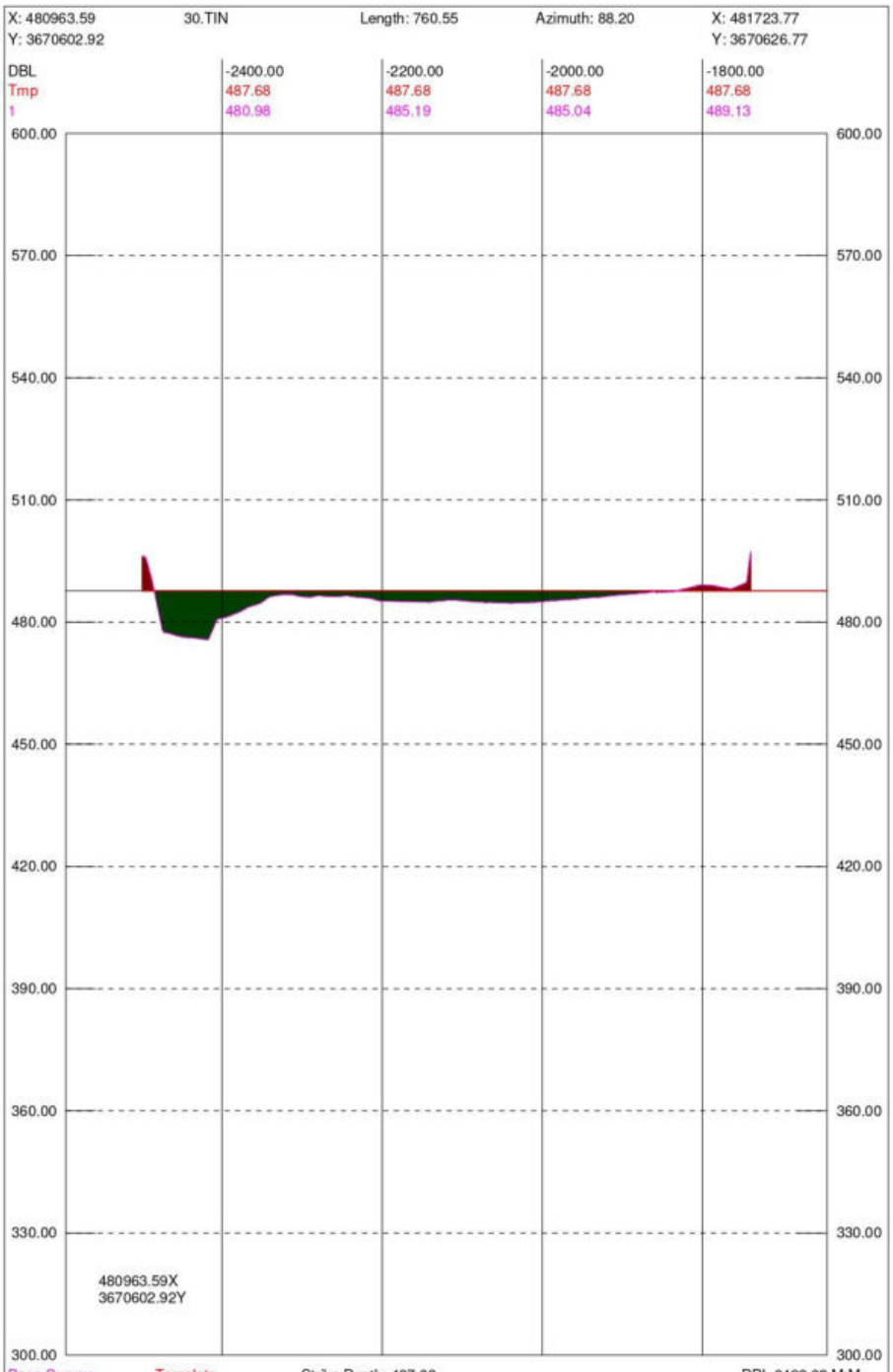
Seg	Design	Cut Area	Fill Area	Cut Vol	Fill Vol	OverDepth	Cut Area	Fill Area	Cut Vol	Fill Vol
1		1638.93	1470.51	165416.95	157415.90	All	0.00	1470.51	0.00	157415.90
Total		1638.93	1470.51	165416.95	157415.90		0.00	1470.51	0.00	157415.90
Accum				3587972.01	24293187.73				0.00	24293187.73

RD3250



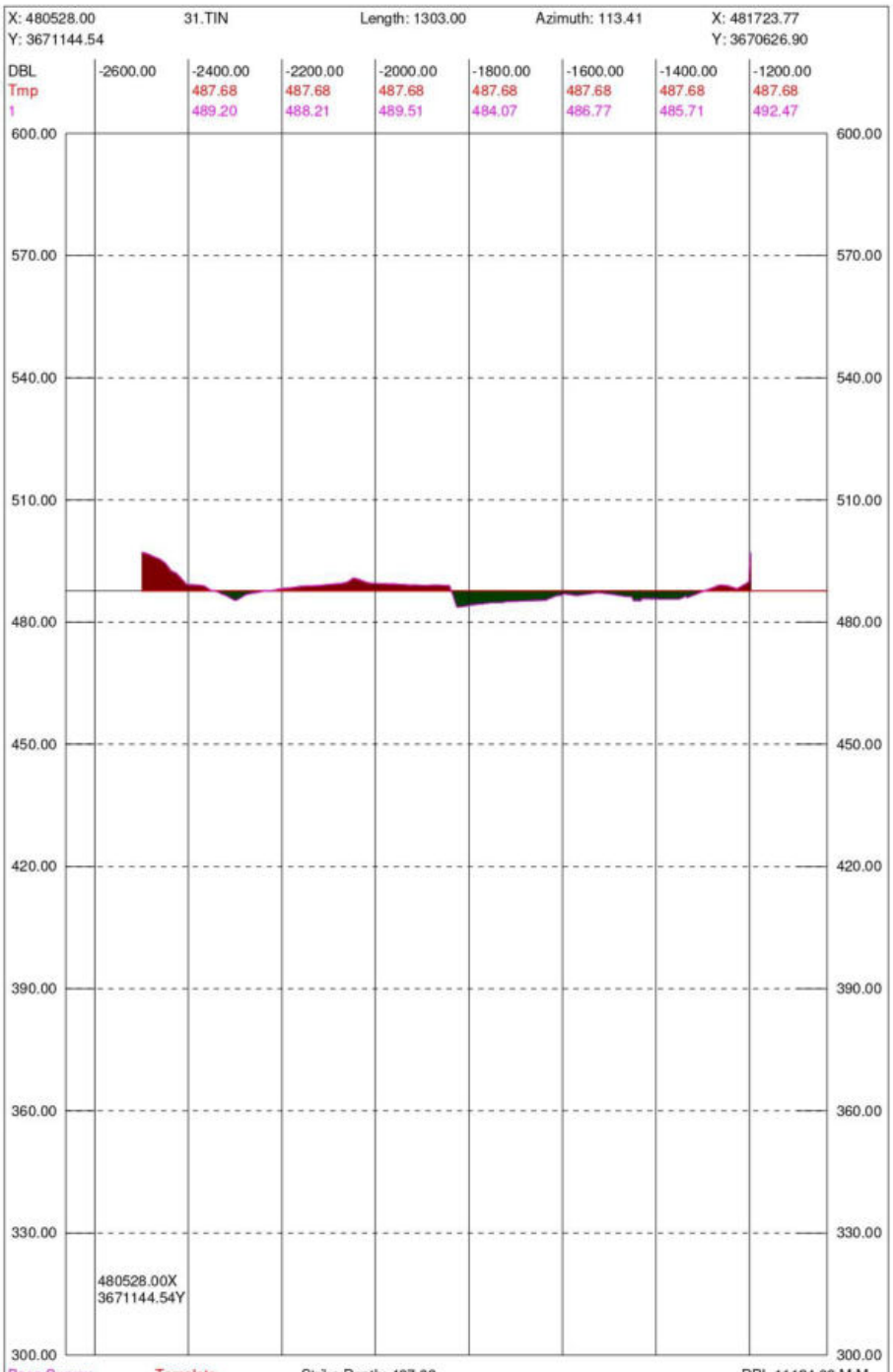
Seg	Design	Cut Area	Fill Area	Cut Vol	Fill Vol	OverDepth	Cut Area	Fill Area	Cut Vol	Fill Vol
1		1383.53	1534.37	266708.79	264973.16	All	0.00	1534.37	0.00	264973.16
Total		1383.53	1534.37	266708.79	264973.16		0.00	1534.37	0.00	264973.16
Accum				3854680.80	24558160.89				0.00	24558160.89

RD3360



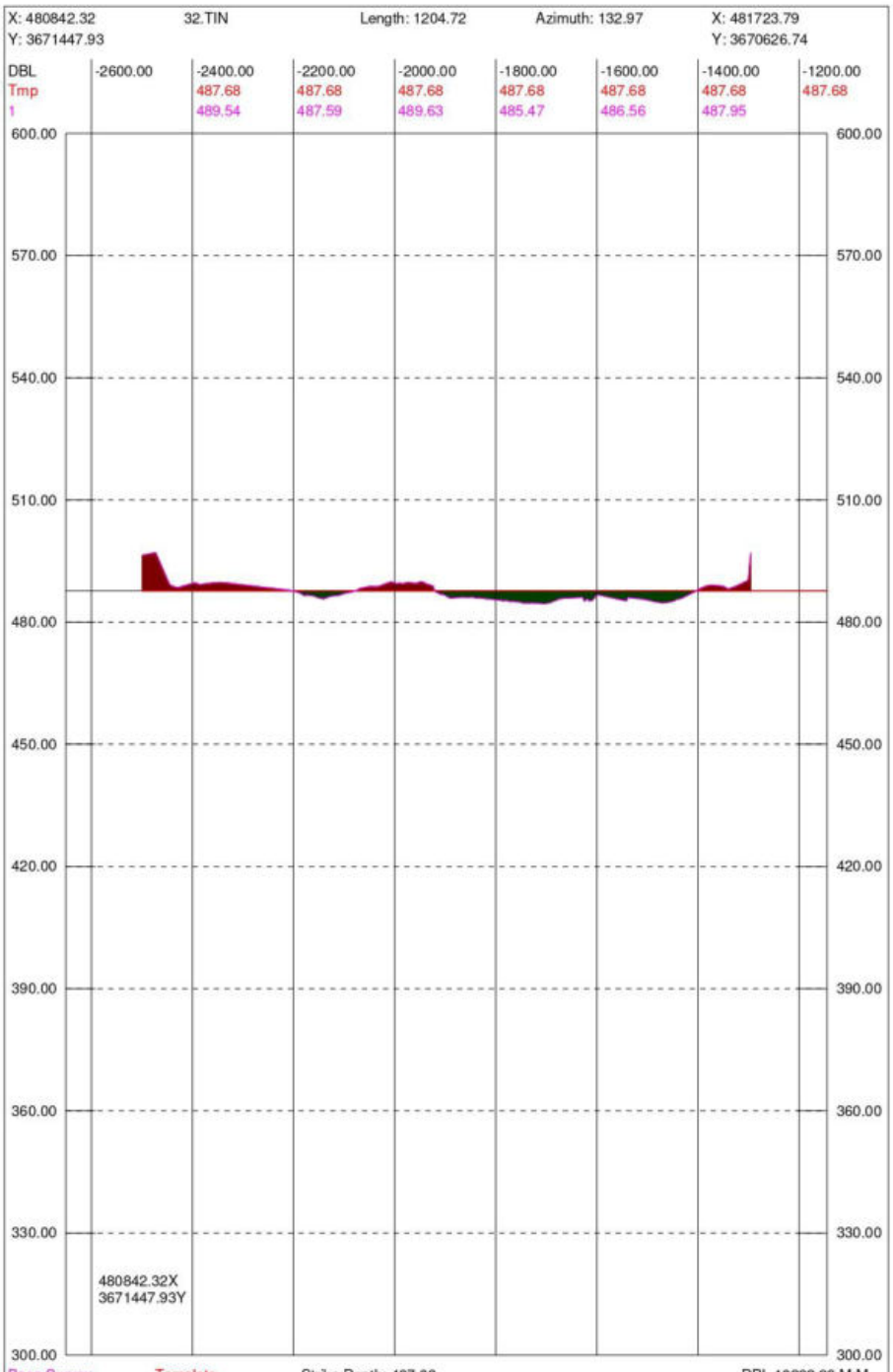
Seg	Design	Cut Area	Fill Area	Cut Vol	Fill Vol	OverDepth	Cut Area	Fill Area	Cut Vol	Fill Vol
1		201.11	2050.12	226004.53	525681.86	All	0.00	2050.12	0.00	525681.86
Total		201.11	2050.12	226004.53	525681.86		0.00	2050.12	0.00	525681.86
Accum				4080685.33	25083842.75				0.00	25083842.75

RD3490



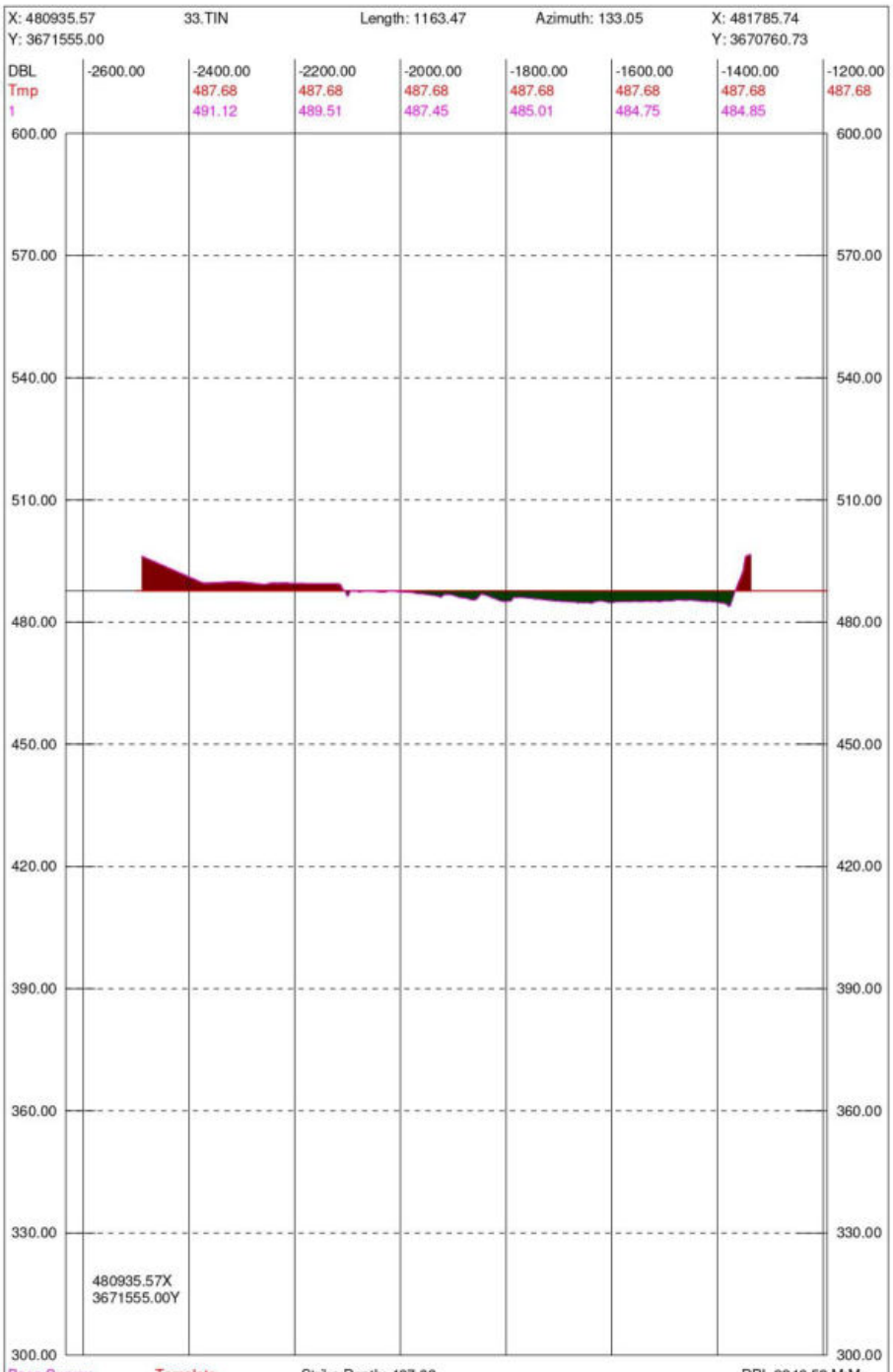
Seg	Design	Cut Area	Fill Area	Cut Vol	Fill Vol	OverDepth	Cut Area	Fill Area	Cut Vol	Fill Vol
1		1368.96	1148.97	239953.98	412793.83	All	0.00	1148.97	0.00	412793.83
Total		1368.96	1148.97	239953.98	412793.83		0.00	1148.97	0.00	412793.83
Accum				4320639.31	25496636.58				0.00	25496636.58

RD3750



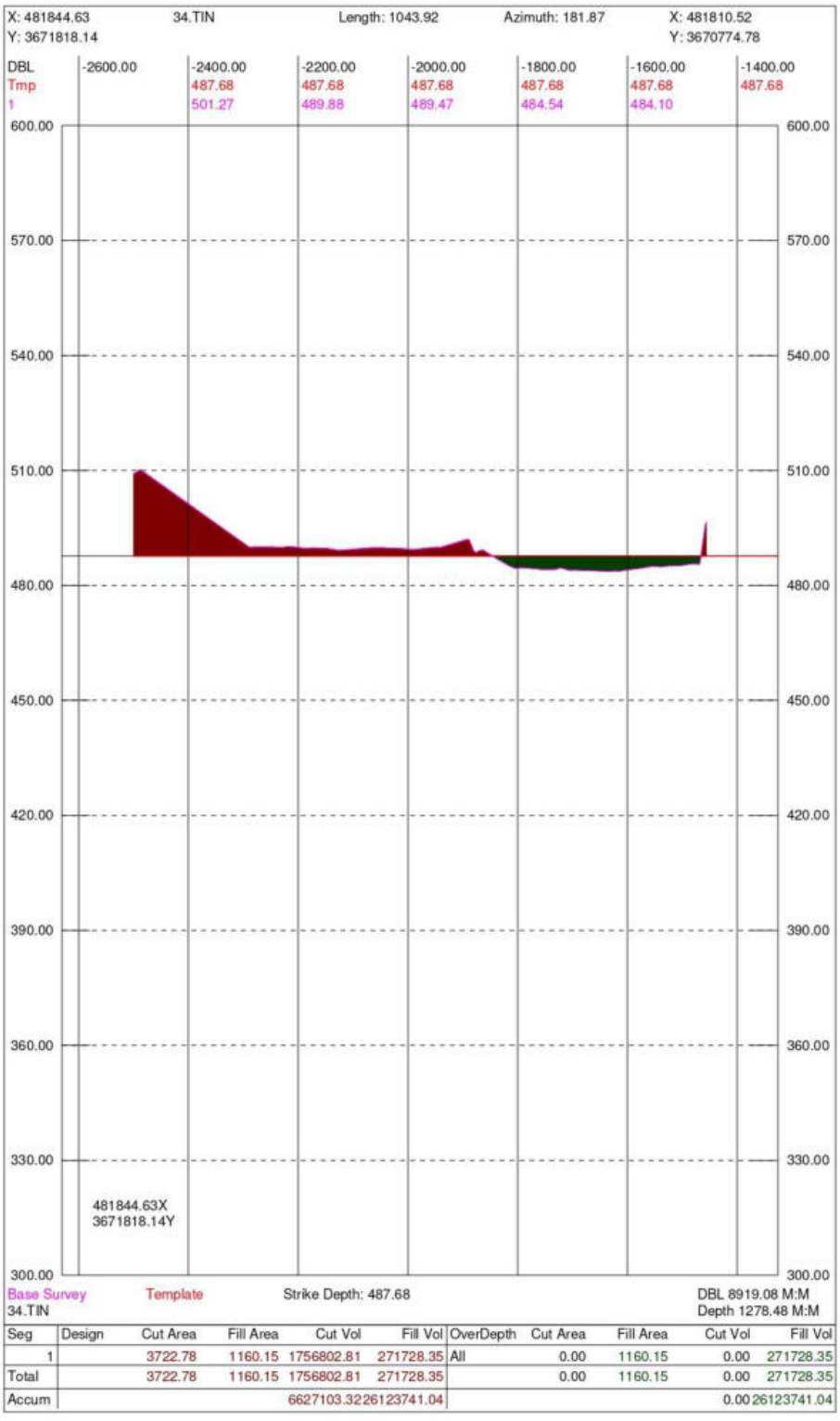
Seg	Design	Cut Area	Fill Area	Cut Vol	Fill Vol	OverDepth	Cut Area	Fill Area	Cut Vol	Fill Vol
1		1108.96	1186.69	381928.29	175299.18	All	0.00	1186.69	0.00	175299.18
Total		1108.96	1186.69	381928.29	175299.18		0.00	1186.69	0.00	175299.18
Accum				4702567.59	25671935.75				0.00	25671935.75

RD4000



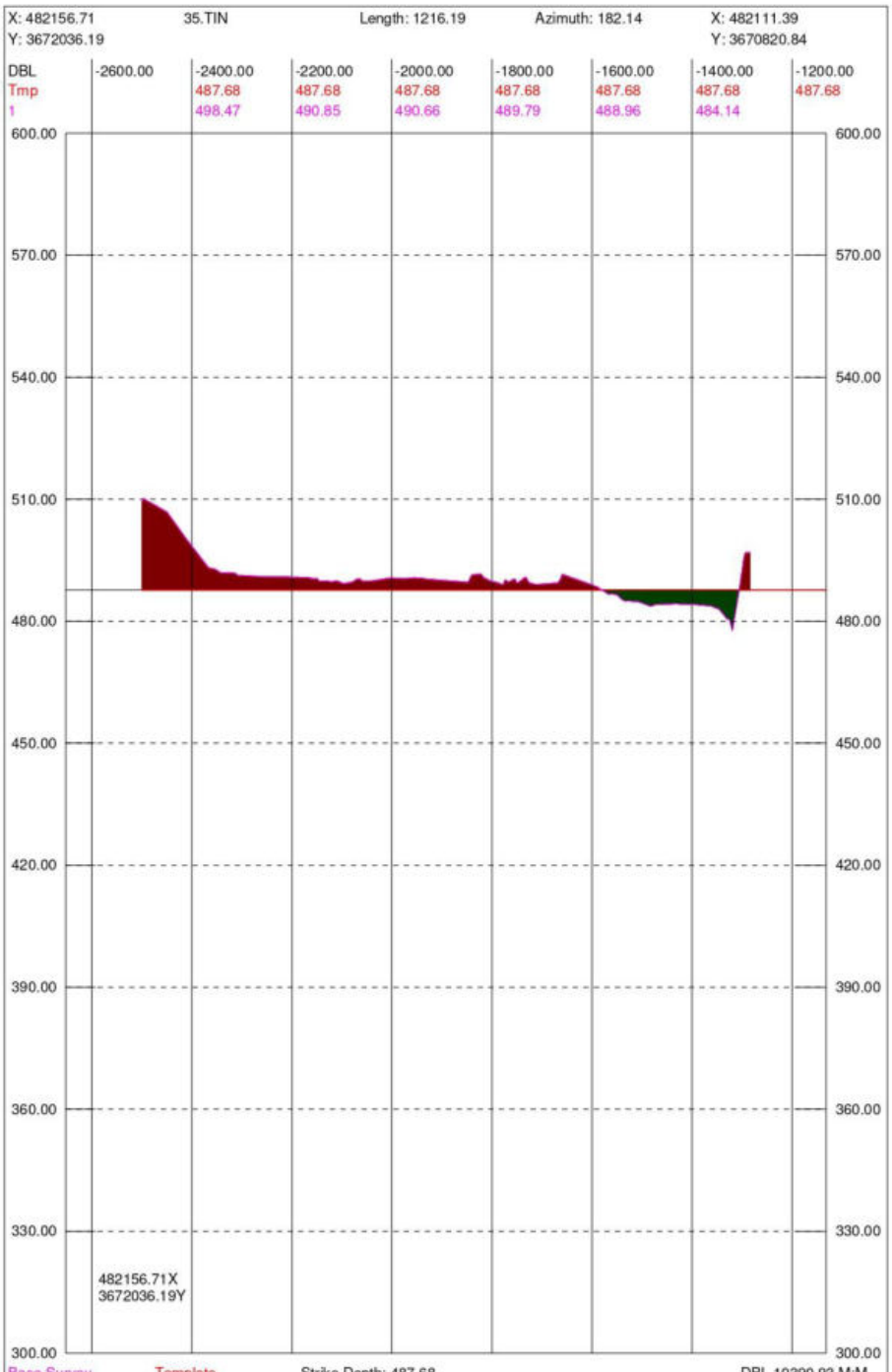
Seg	Design	Cut Area	Fill Area	Cut Vol	Fill Vol	OverDepth	Cut Area	Fill Area	Cut Vol	Fill Vol
1		1262.11	1372.40	167732.91	180076.94	All	0.00	1372.40	0.00	180076.94
Total		1262.11	1372.40	167732.91	180076.94		0.00	1372.40	0.00	180076.94
Accum				4870300.51	25852012.69				0.00	25852012.69

RD4300



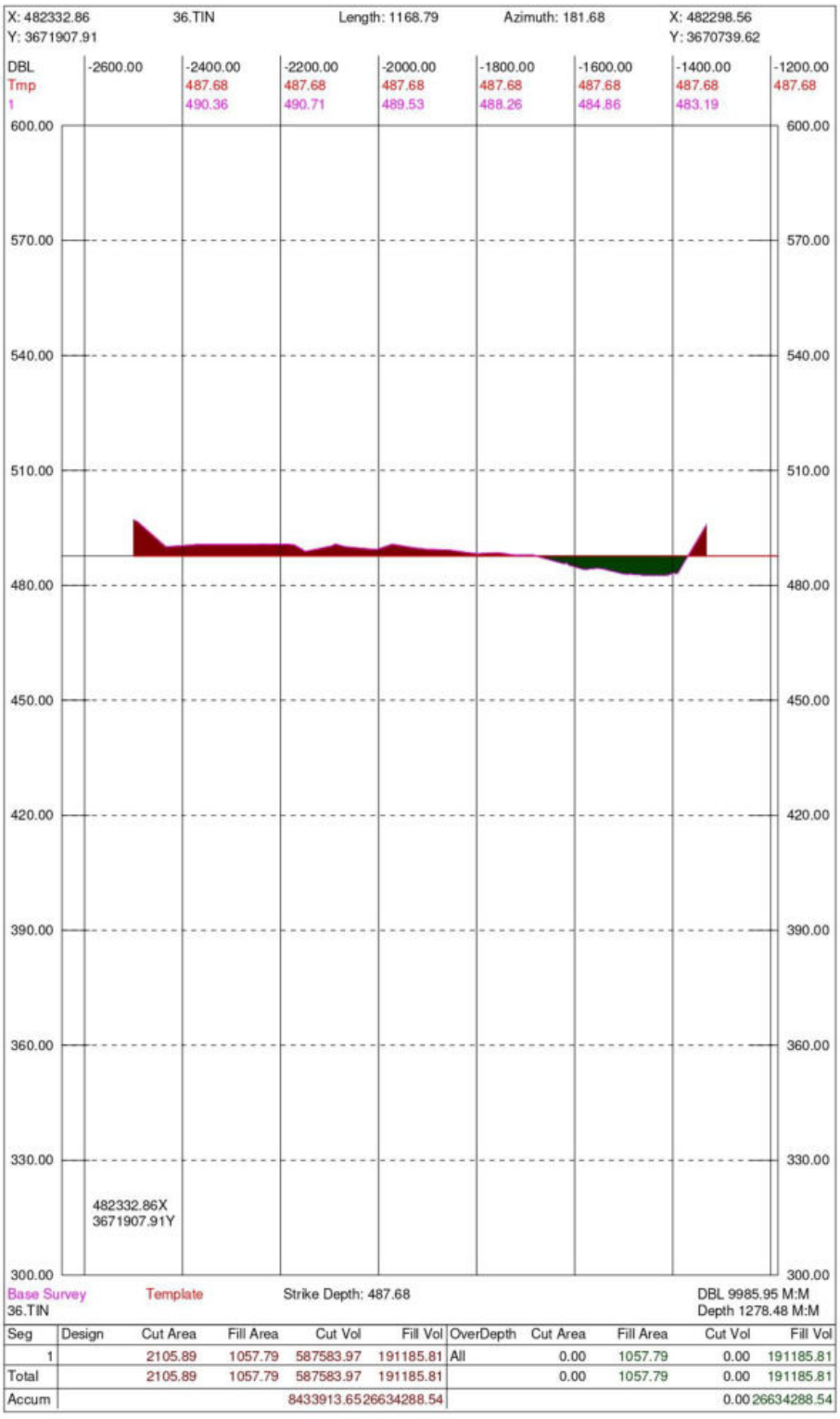
Seg	Design	Cut Area	Fill Area	Cut Vol	Fill Vol	OverDepth	Cut Area	Fill Area	Cut Vol	Fill Vol
1		3722.78	1160.15	1756802.81	271728.35	All	0.00	1160.15	0.00	271728.35
Total		3722.78	1160.15	1756802.81	271728.35		0.00	1160.15	0.00	271728.35
Accum				6627103.32	26123741.04				0.00	26123741.04

RD4480



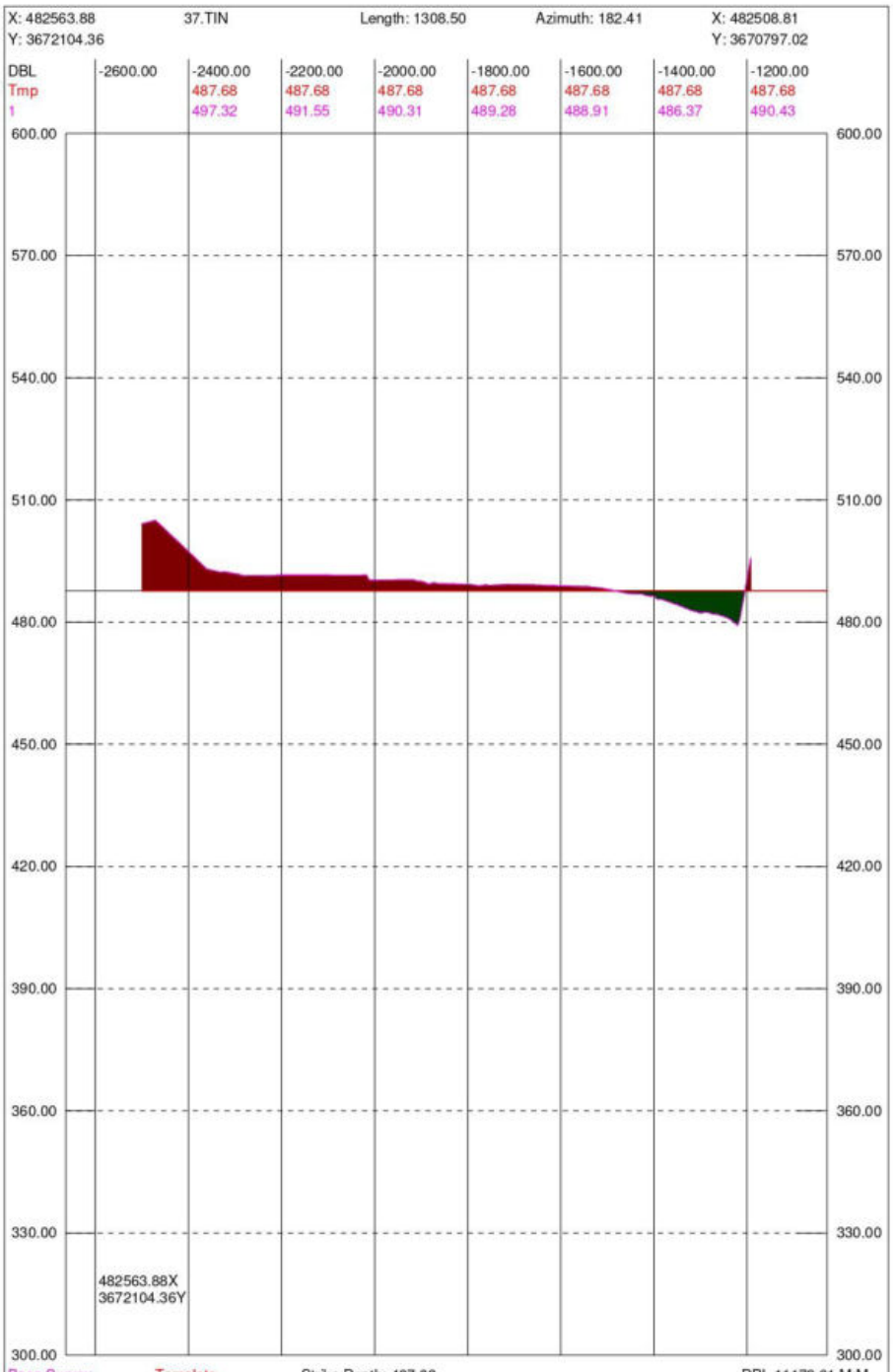
Seg	Design	Cut Area	Fill Area	Cut Vol	Fill Vol	OverDepth	Cut Area	Fill Area	Cut Vol	Fill Vol
1		4321.19	969.76	1219226.37	319361.69	All	0.00	969.76	0.00	319361.69
Total		4321.19	969.76	1219226.37	319361.69		0.00	969.76	0.00	319361.69
Accum				7846329.69	26443102.73				0.00	26443102.73

RD4700



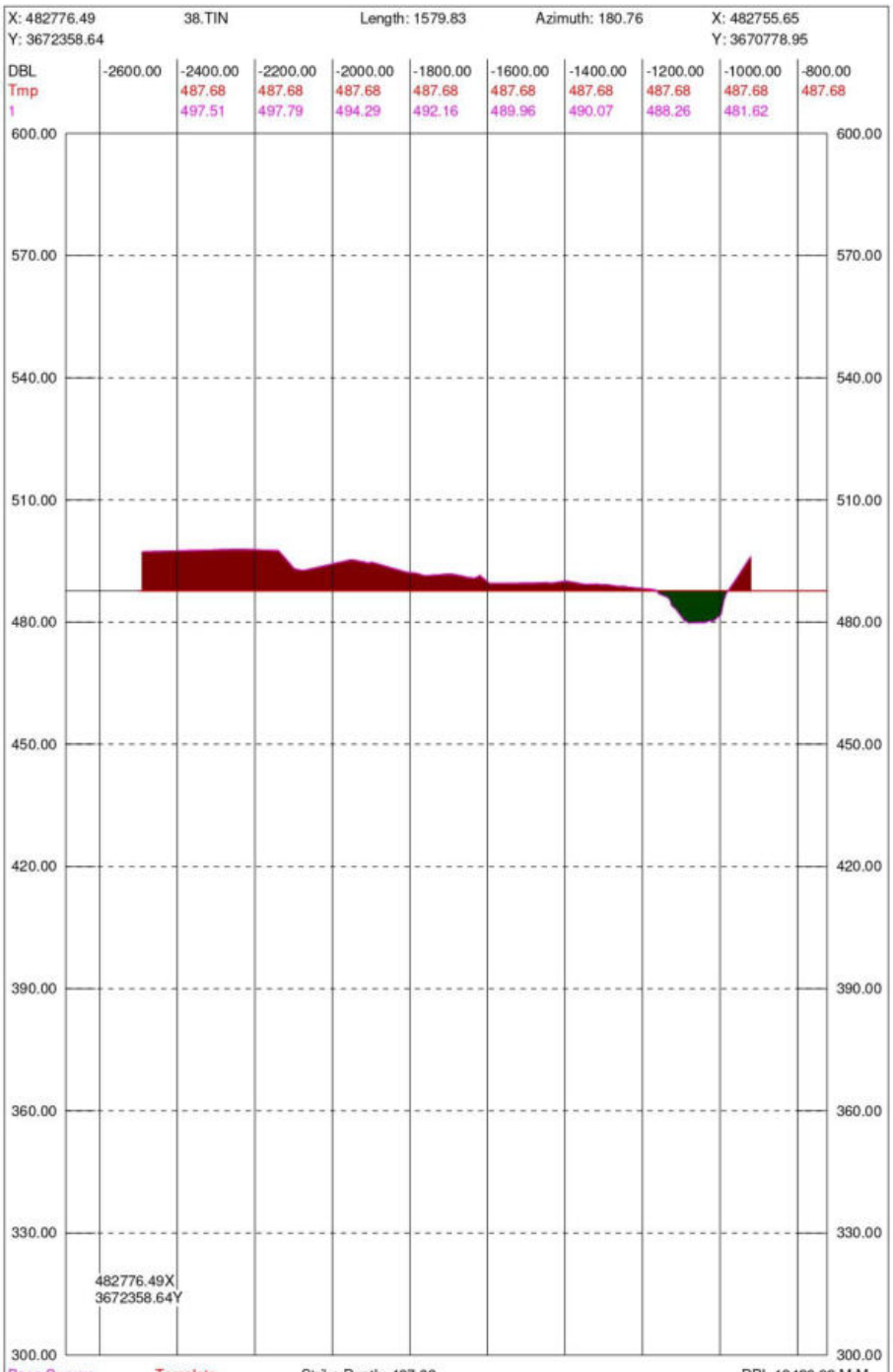
Seg	Design	Cut Area	Fill Area	Cut Vol	Fill Vol	OverDepth	Cut Area	Fill Area	Cut Vol	Fill Vol
1		2105.89	1057.79	587583.97	191185.81	All	0.00	1057.79	0.00	191185.81
Total		2105.89	1057.79	587583.97	191185.81		0.00	1057.79	0.00	191185.81
Accum				8433913.65	26634288.54				0.00	26634288.54

RD4940



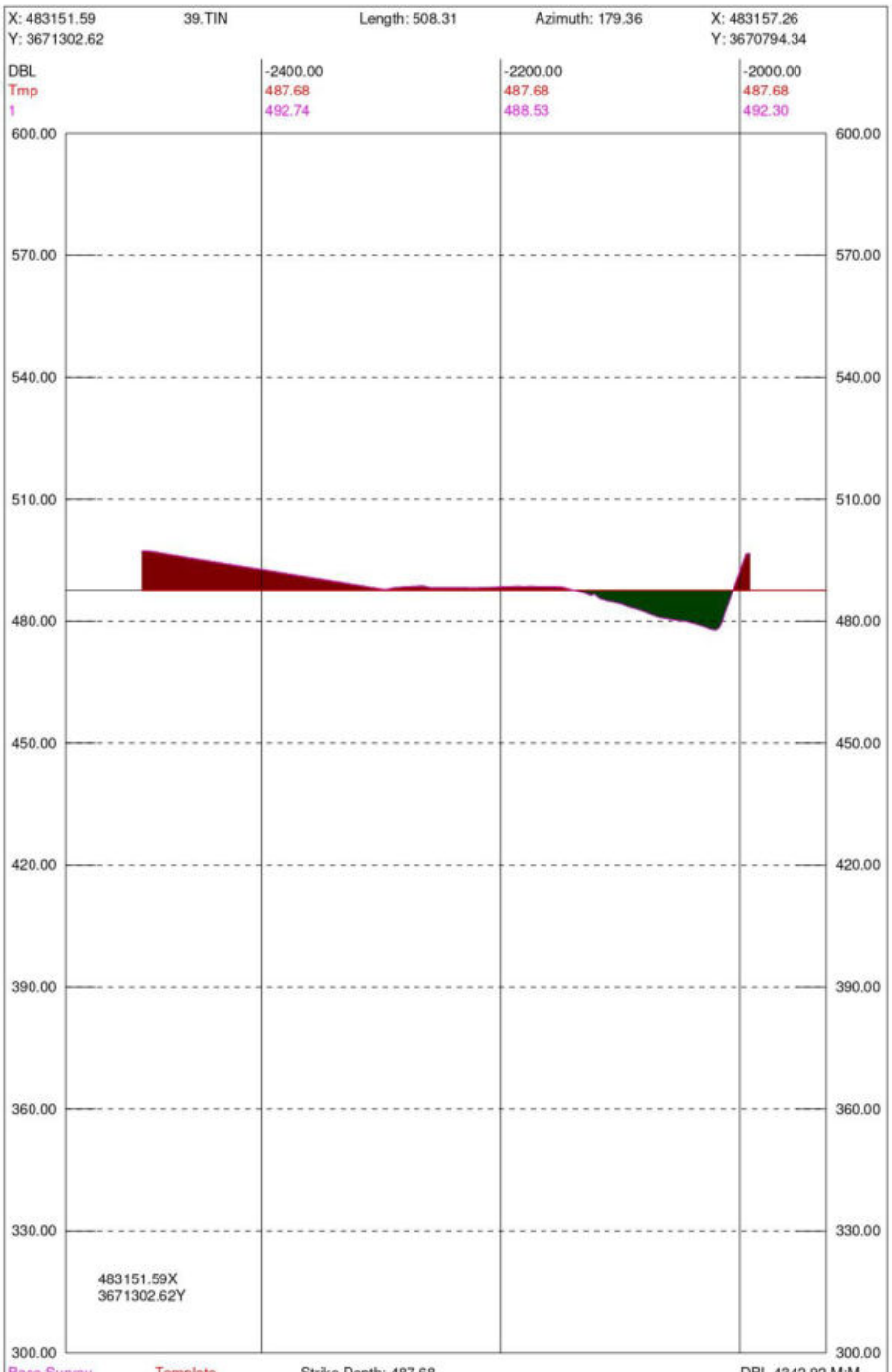
Seg	Design	Cut Area	Fill Area	Cut Vol	Fill Vol	OverDepth	Cut Area	Fill Area	Cut Vol	Fill Vol
1		4039.66	979.53	675470.23	213724.91	All	0.00	979.53	0.00	213724.91
Total		4039.66	979.53	675470.23	213724.91		0.00	979.53	0.00	213724.91
Accum				9109383.88	26848013.45				0.00	26848013.45

RD5340



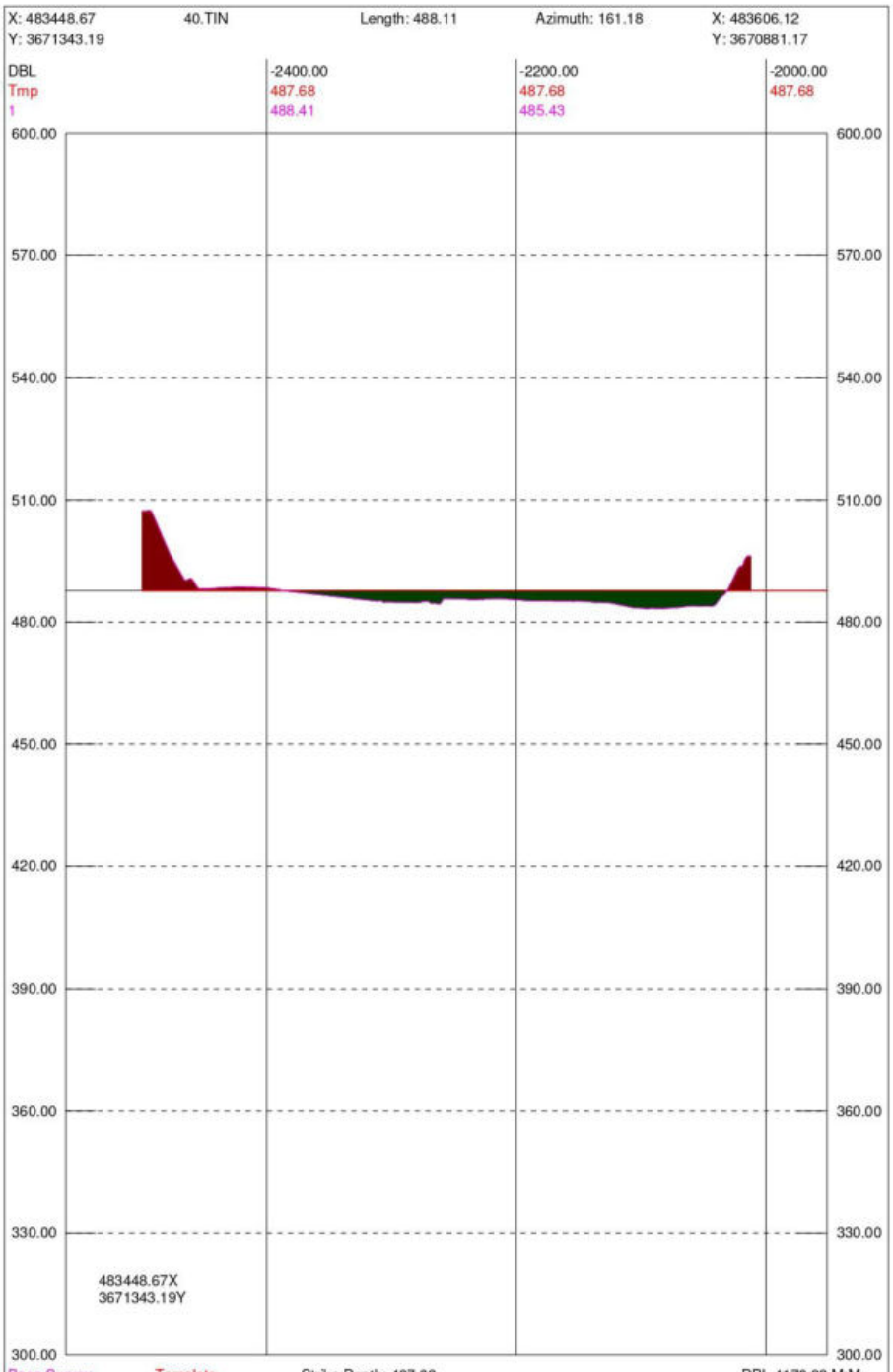
Seg	Design	Cut Area	Fill Area	Cut Vol	Fill Vol	OverDepth	Cut Area	Fill Area	Cut Vol	Fill Vol
1		7366.11	976.52	1240119.11	238367.76	All	0.00	976.52	0.00	238367.76
Total		7366.11	976.52	1240119.11	238367.76		0.00	976.52	0.00	238367.76
Accum				10349503.00	27086381.21				0.00	27086381.21

RD5750



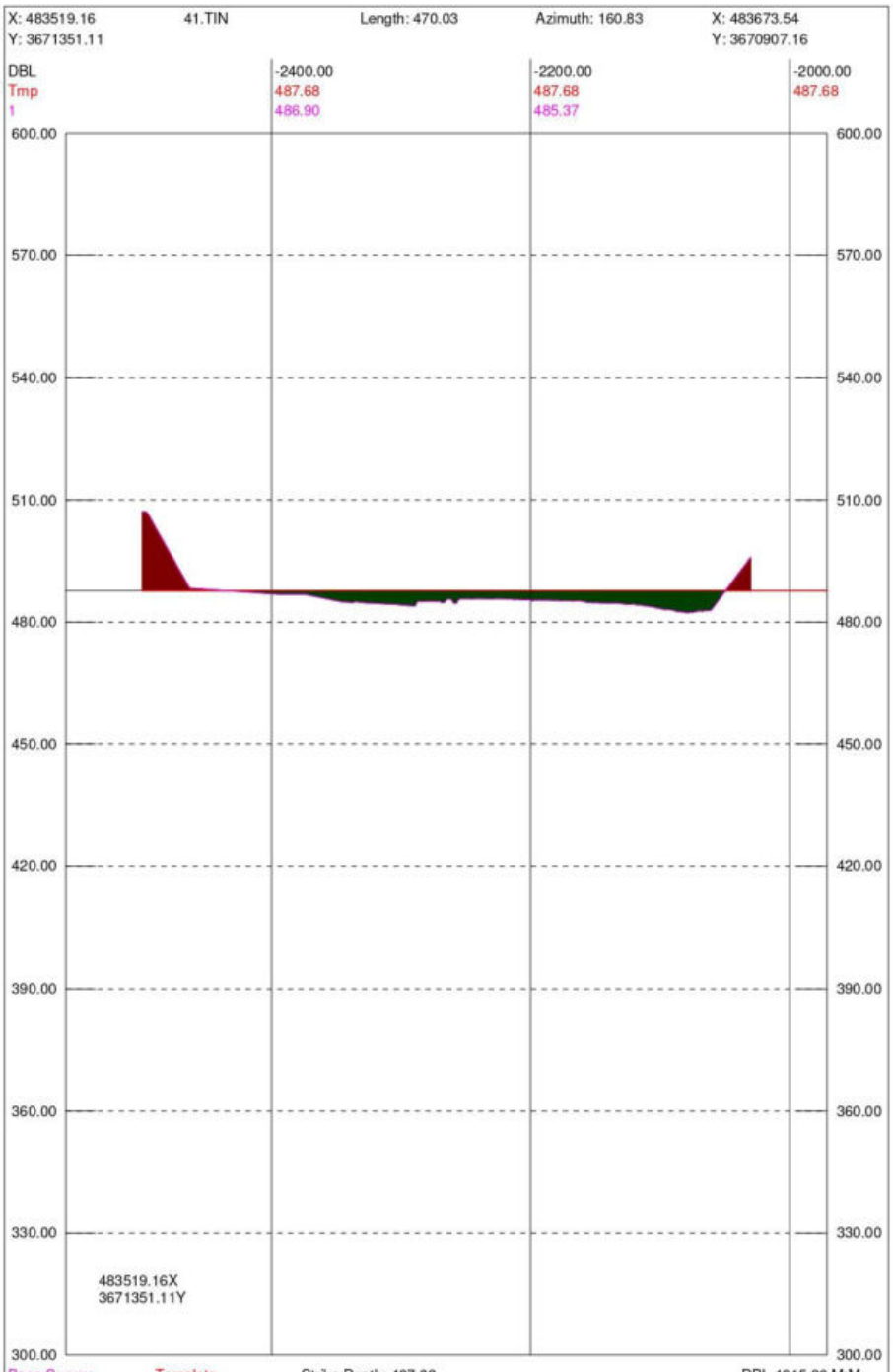
Seg	Design	Cut Area	Fill Area	Cut Vol	Fill Vol	OverDepth	Cut Area	Fill Area	Cut Vol	Fill Vol
1		1212.81	699.26	1658194.28	336074.07	All	0.00	699.26	0.00	336074.07
Total		1212.81	699.26	1658194.28	336074.07		0.00	699.26	0.00	336074.07
Accum				12007697.27	27422455.28				0.00	27422455.28

RD5825



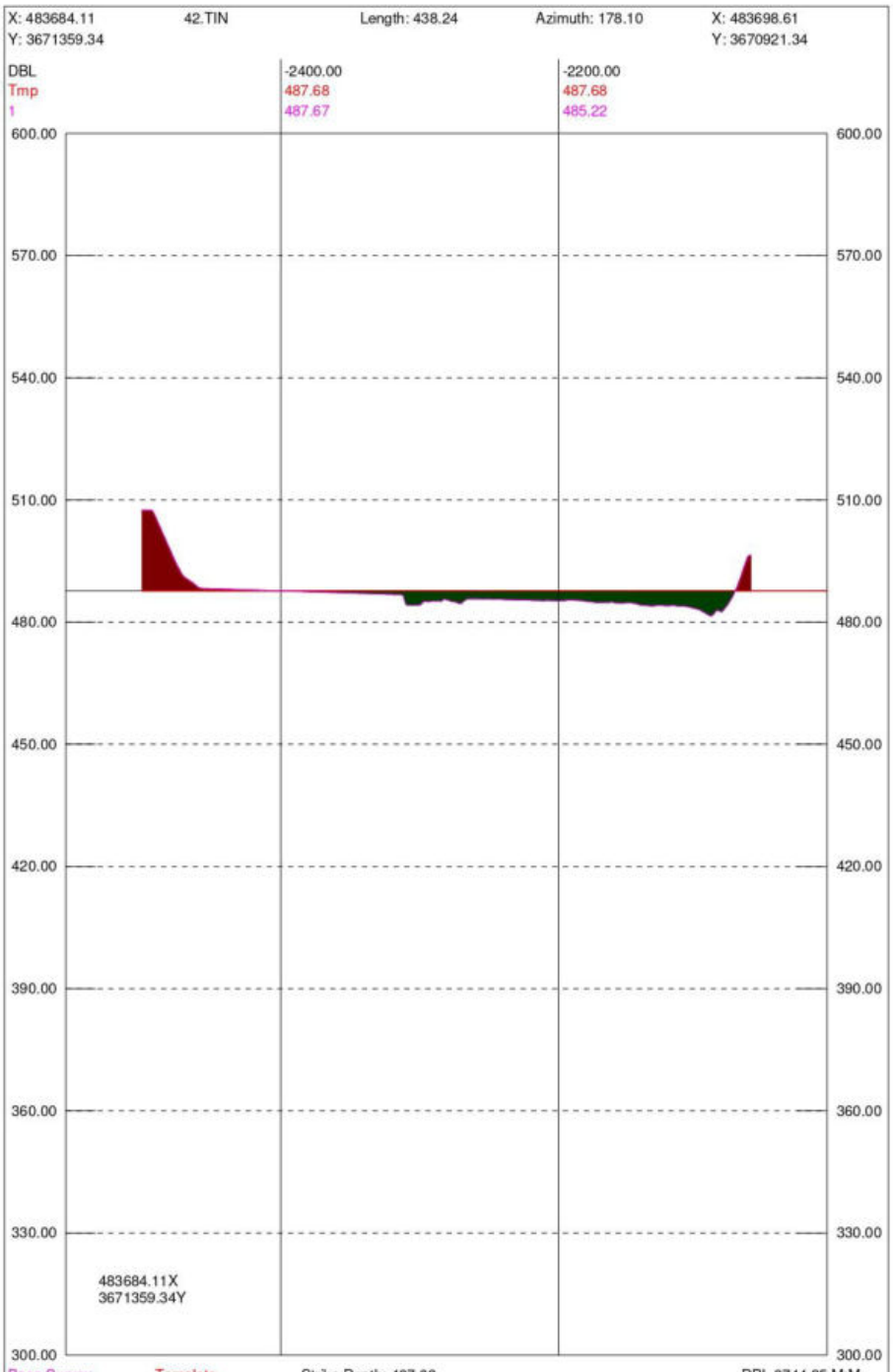
Seg	Design	Cut Area	Fill Area	Cut Vol	Fill Vol	OverDepth	Cut Area	Fill Area	Cut Vol	Fill Vol
1		597.74	918.93	299102.68	333977.17	All	0.00	918.93	0.00	333977.17
Total		597.74	918.93	299102.68	333977.17		0.00	918.93	0.00	333977.17
Accum				12306799.95	27756432.45				0.00	27756432.45

RD5900



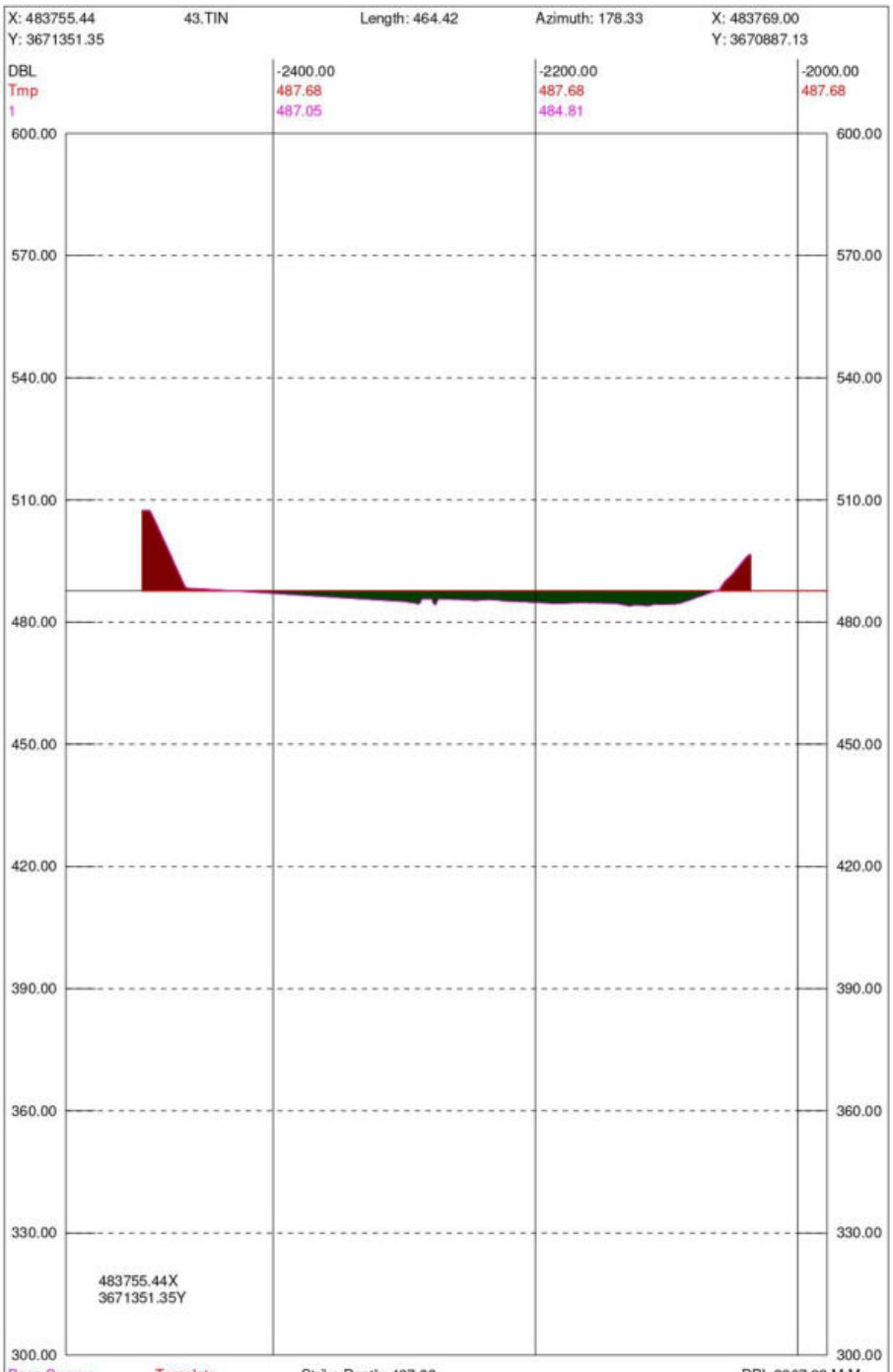
Seg	Design	Cut Area	Fill Area	Cut Vol	Fill Vol	OverDepth	Cut Area	Fill Area	Cut Vol	Fill Vol
1		495.55	996.50	38156.69	68142.95	All	0.00	996.50	0.00	68142.95
Total		495.55	996.50	38156.69	68142.95		0.00	996.50	0.00	68142.95
Accum				12344956.65	27824575.40				0.00	27824575.40

RD5980



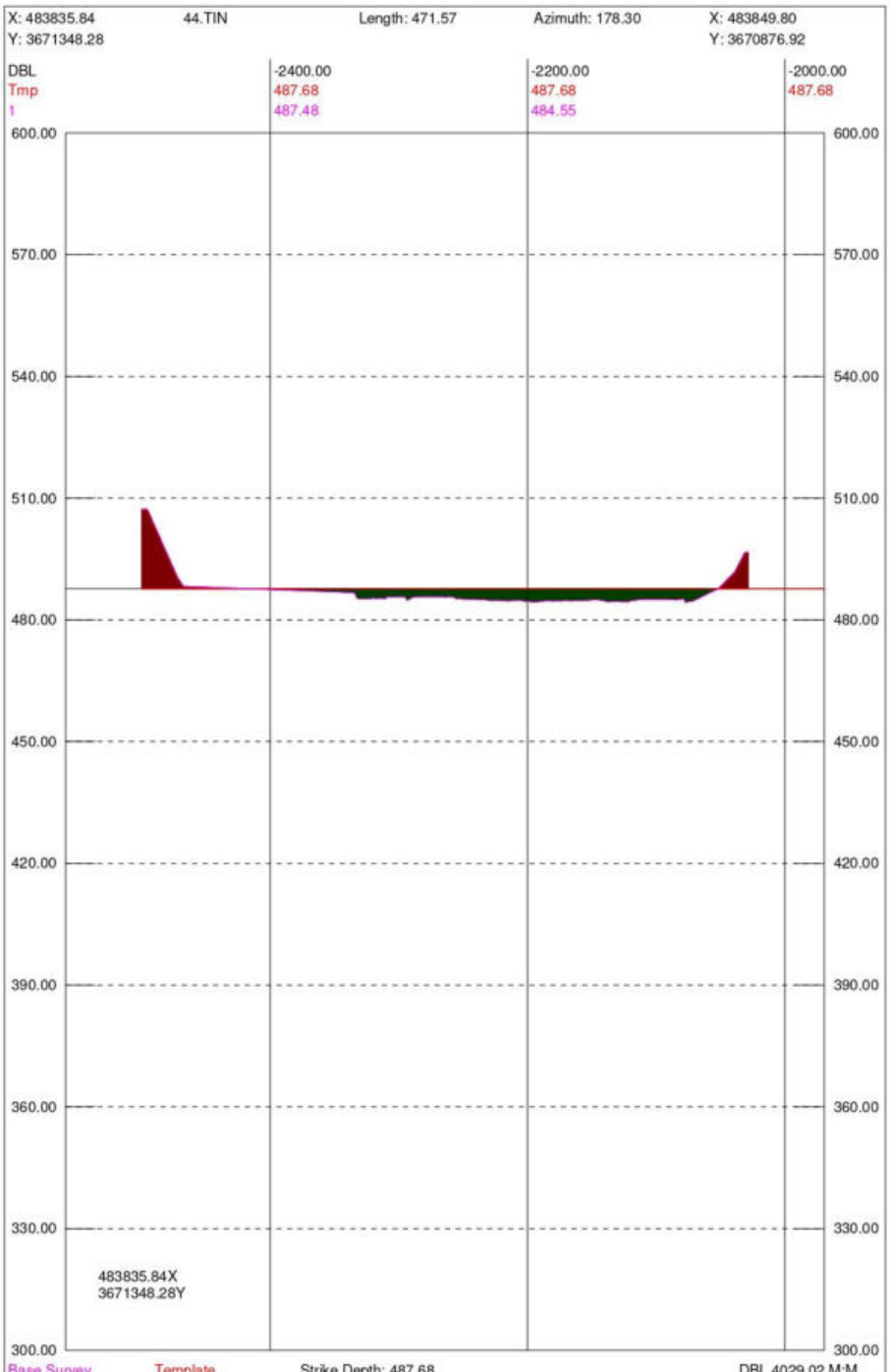
Seg	Design	Cut Area	Fill Area	Cut Vol	Fill Vol	OverDepth	Cut Area	Fill Area	Cut Vol	Fill Vol
1		501.83	755.02	69631.29	62738.99	All	0.00	755.02	0.00	62738.99
Total		501.83	755.02	69631.29	62738.99		0.00	755.02	0.00	62738.99
Accum				12414587.94	27887314.39				0.00	27887314.39

RD6060



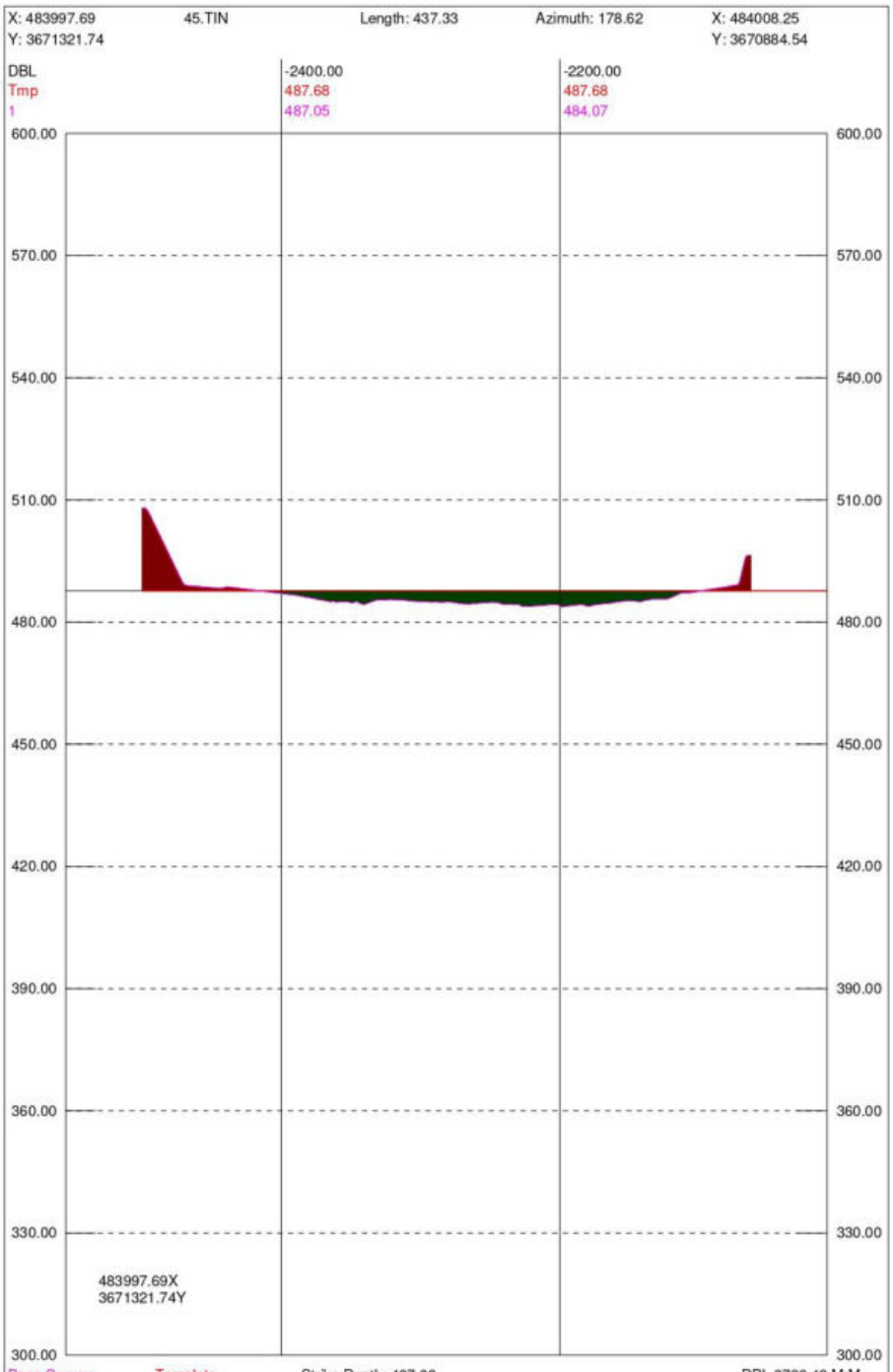
Seg	Design	Cut Area	Fill Area	Cut Vol	Fill Vol	OverDepth	Cut Area	Fill Area	Cut Vol	Fill Vol
1		534.41	816.66	36633.31	54920.69	All	0.00	816.66	0.00	54920.69
Total		534.41	816.66	36633.31	54920.69		0.00	816.66	0.00	54920.69
Accum				12451221.25	27942235.09				0.00	27942235.09

RD6220



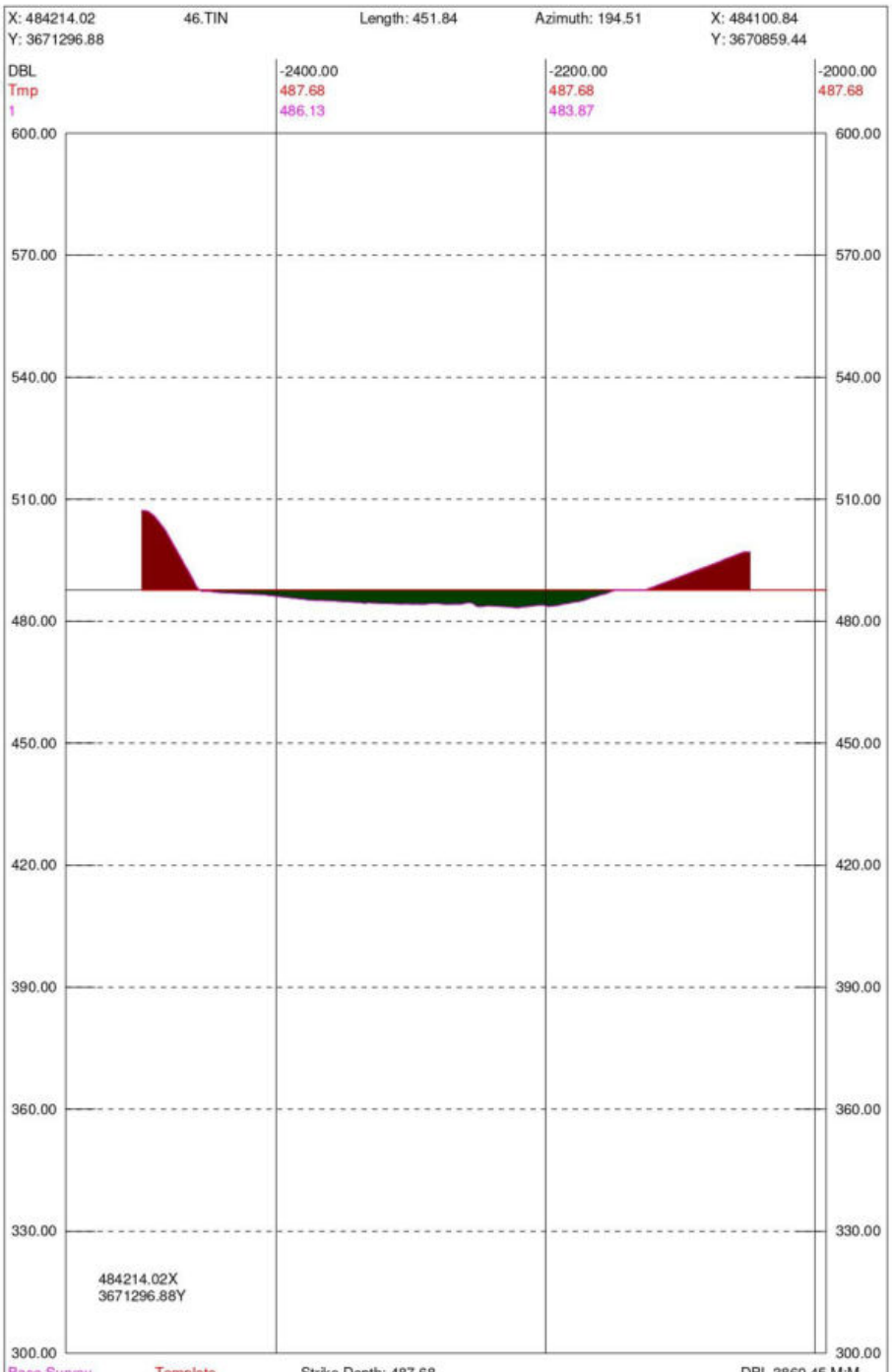
Seg	Design	Cut Area	Fill Area	Cut Vol	Fill Vol	OverDepth	Cut Area	Fill Area	Cut Vol	Fill Vol
1		477.55	773.08	40640.41	63902.53	All	0.00	773.08	0.00	63902.53
Total		477.55	773.08	40640.41	63902.53		0.00	773.08	0.00	63902.53
Accum				12491861.66	28006137.62				0.00	28006137.62

RD6380



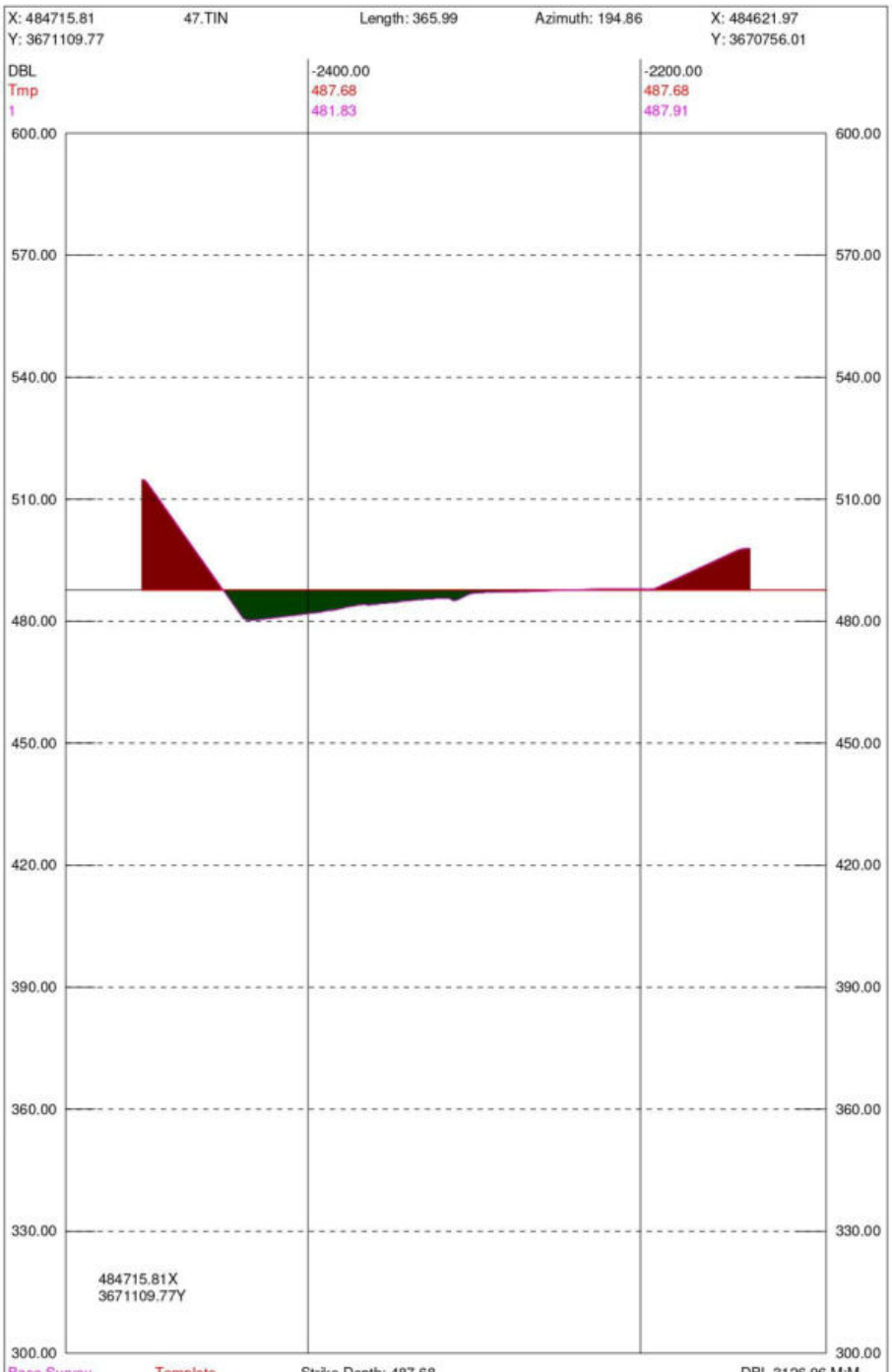
Seg	Design	Cut Area	Fill Area	Cut Vol	Fill Vol	OverDepth	Cut Area	Fill Area	Cut Vol	Fill Vol
1		475.70	784.67	76523.83	124288.02	All	0.00	784.67	0.00	124288.02
Total		475.70	784.67	76523.83	124288.02		0.00	784.67	0.00	124288.02
Accum				12568385.49	28130425.64				0.00	28130425.64

RD6540



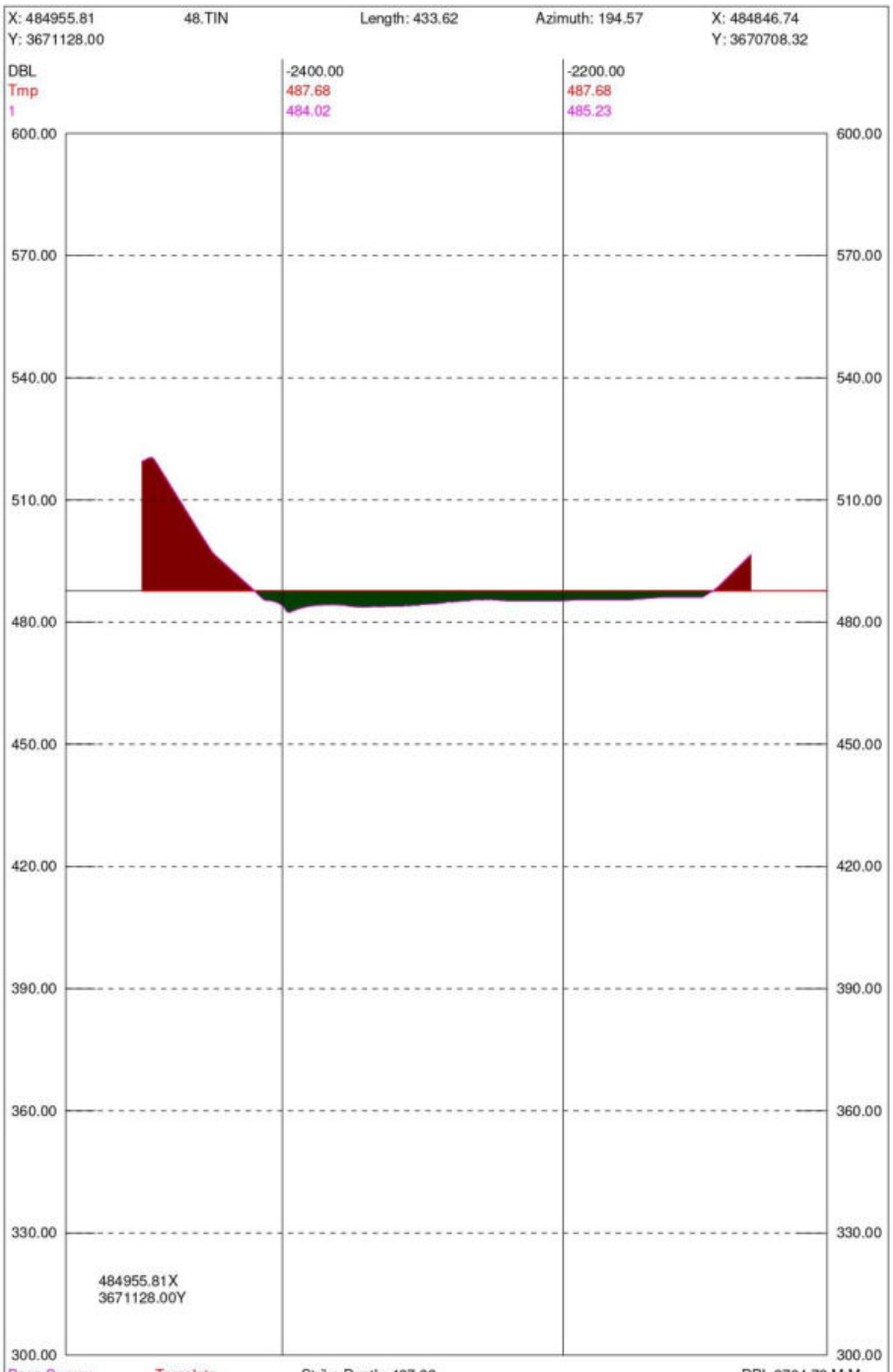
Seg	Design	Cut Area	Fill Area	Cut Vol	Fill Vol	OverDepth	Cut Area	Fill Area	Cut Vol	Fill Vol
1		881.44	833.20	117567.25	122474.24	All	0.00	833.20	0.00	122474.24
Total		881.44	833.20	117567.25	122474.24		0.00	833.20	0.00	122474.24
Accum				12685952.75	28252899.88				0.00	28252899.88

RD6700



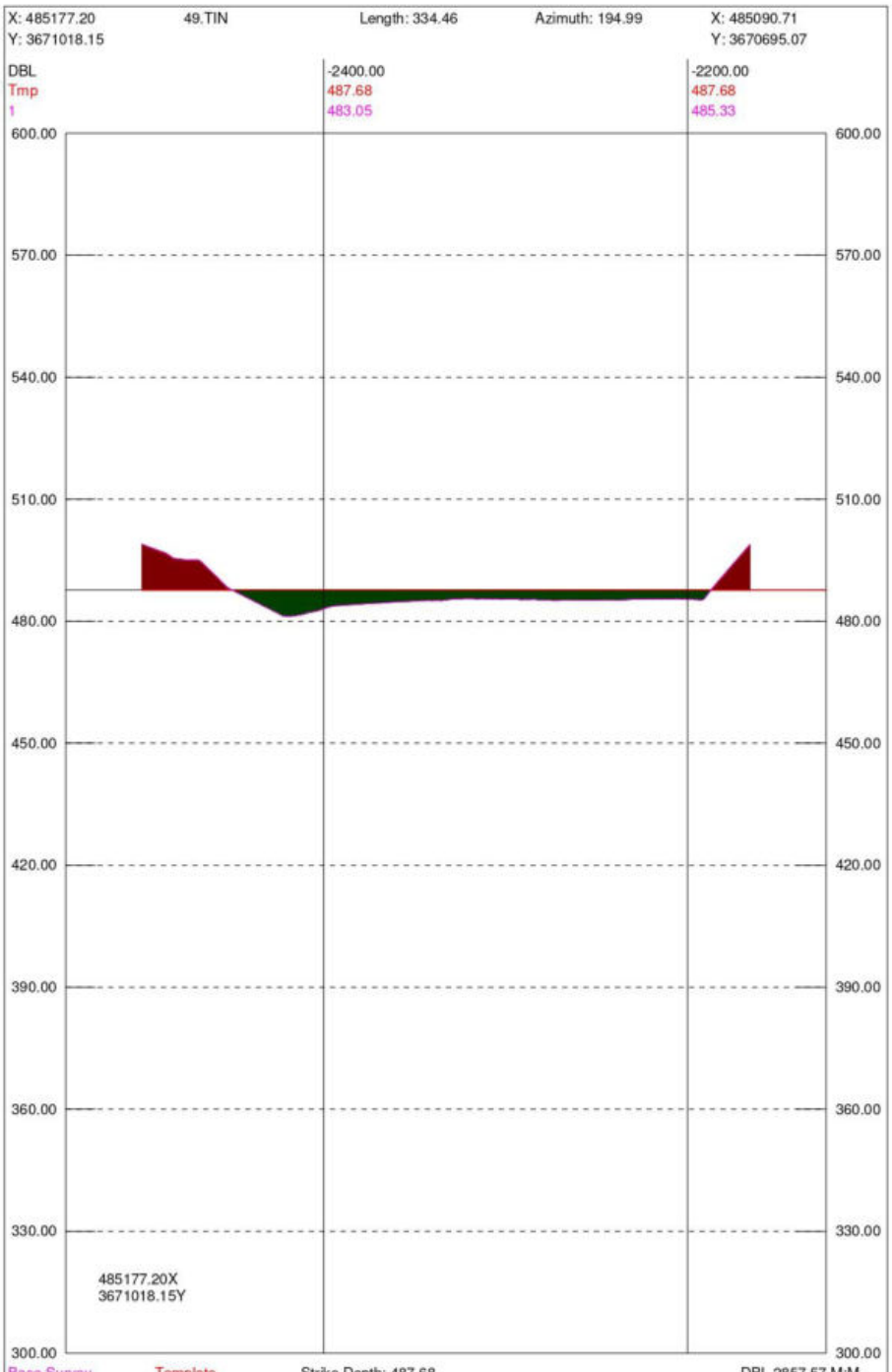
Seg	Design	Cut Area	Fill Area	Cut Vol	Fill Vol	OverDepth	Cut Area	Fill Area	Cut Vol	Fill Vol
1		1030.18	659.61	508363.19	396915.02	All	0.00	659.61	0.00	396915.02
Total		1030.18	659.61	508363.19	396915.02		0.00	659.61	0.00	396915.02
Accum				13194315.93	28649814.90				0.00	28649814.90

RD6910



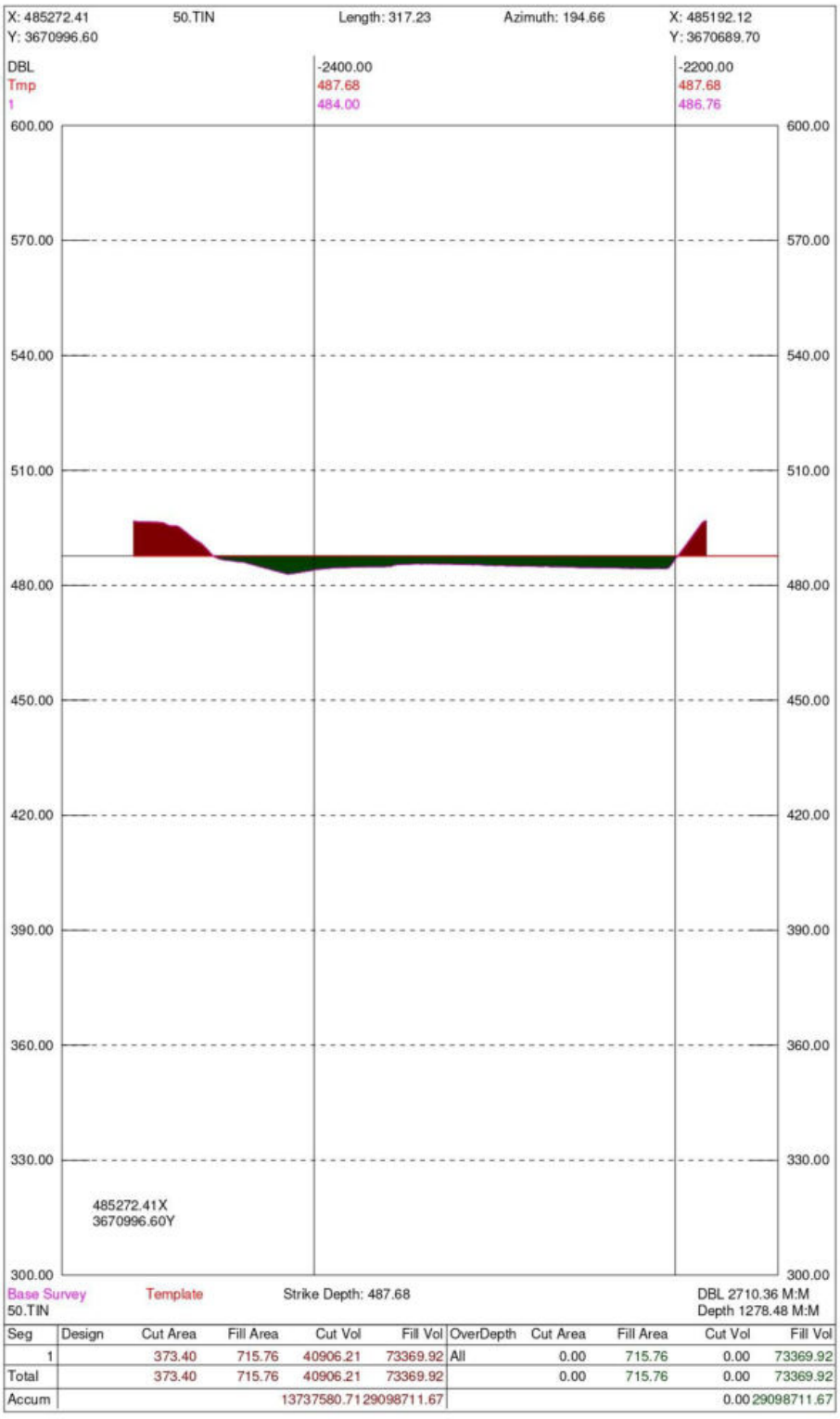
Seg	Design	Cut Area	Fill Area	Cut Vol	Fill Vol	OverDepth	Cut Area	Fill Area	Cut Vol	Fill Vol
1		1402.69	883.06	277266.23	176153.71	All	0.00	883.06	0.00	176153.71
Total		1402.69	883.06	277266.23	176153.71		0.00	883.06	0.00	176153.71
Accum				13471582.16	28825968.61				0.00	28825968.61

RD7140



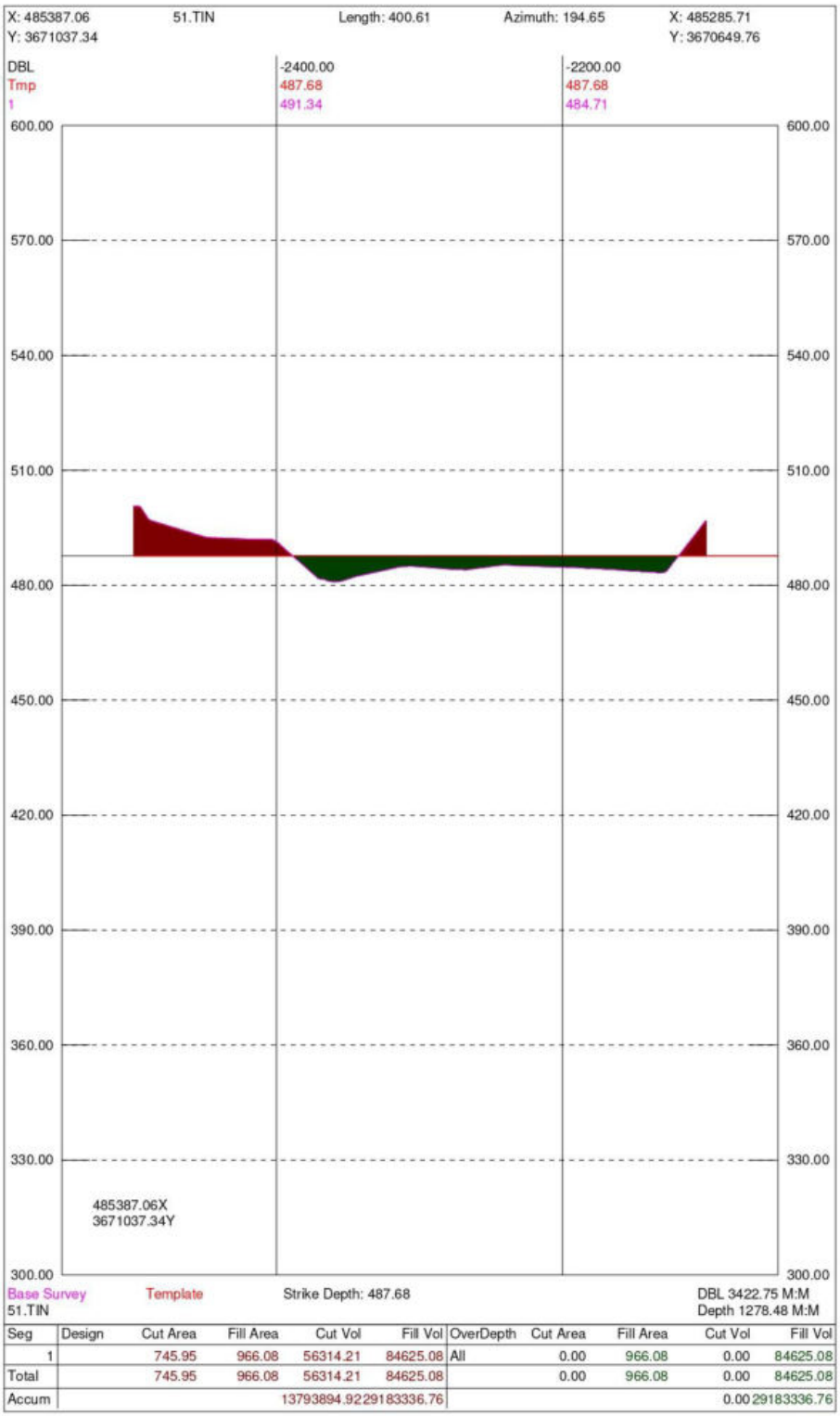
Seg	Design	Cut Area	Fill Area	Cut Vol	Fill Vol	OverDepth	Cut Area	Fill Area	Cut Vol	Fill Vol
1		460.79	773.74	225092.34	199373.15	All	0.00	773.74	0.00	199373.15
Total		460.79	773.74	225092.34	199373.15		0.00	773.74	0.00	199373.15
Accum				13696674.50	29025341.76				0.00	29025341.76

RD7380



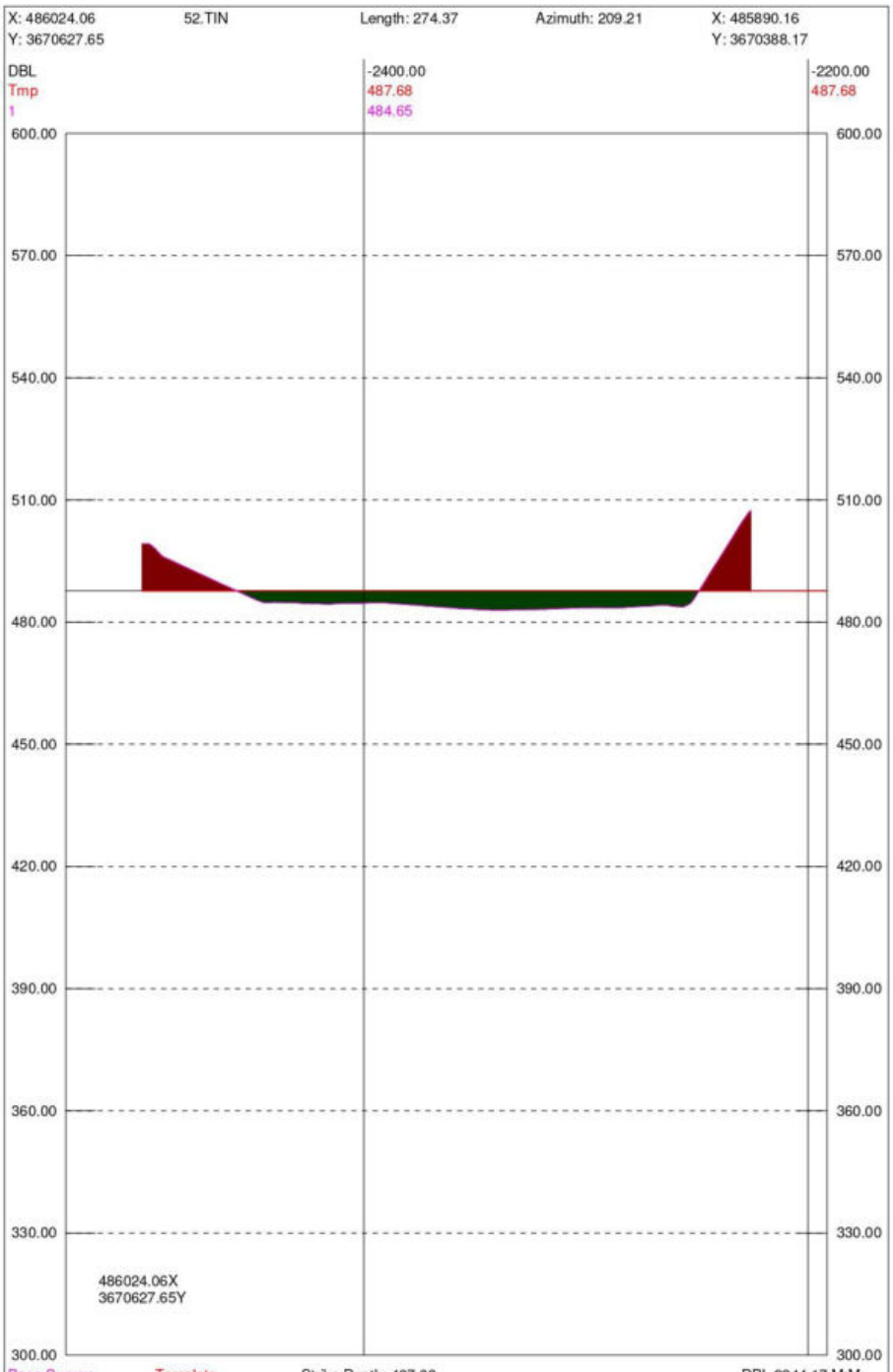
Seg	Design	Cut Area	Fill Area	Cut Vol	Fill Vol	OverDepth	Cut Area	Fill Area	Cut Vol	Fill Vol
1		373.40	715.76	40906.21	73369.92	All	0.00	715.76	0.00	73369.92
Total		373.40	715.76	40906.21	73369.92		0.00	715.76	0.00	73369.92
Accum				13737580.71	29098711.67				0.00	29098711.67

RD7480



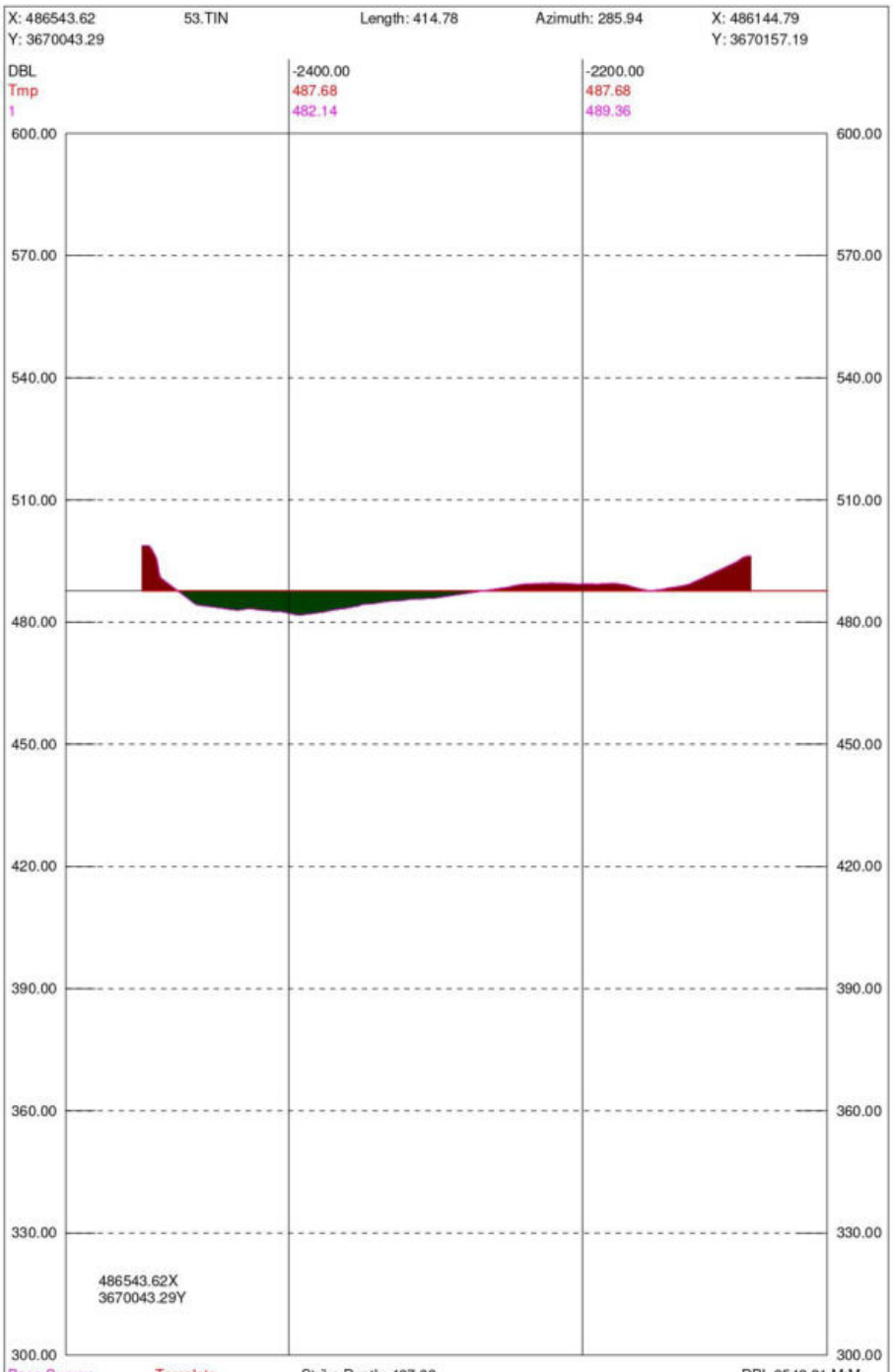
Seg	Design	Cut Area	Fill Area	Cut Vol	Fill Vol	OverDepth	Cut Area	Fill Area	Cut Vol	Fill Vol
1		745.95	966.08	56314.21	84625.08	All	0.00	966.08	0.00	84625.08
Total		745.95	966.08	56314.21	84625.08		0.00	966.08	0.00	84625.08
Accum				13793894.92	29183336.76				0.00	29183336.76

RD7580



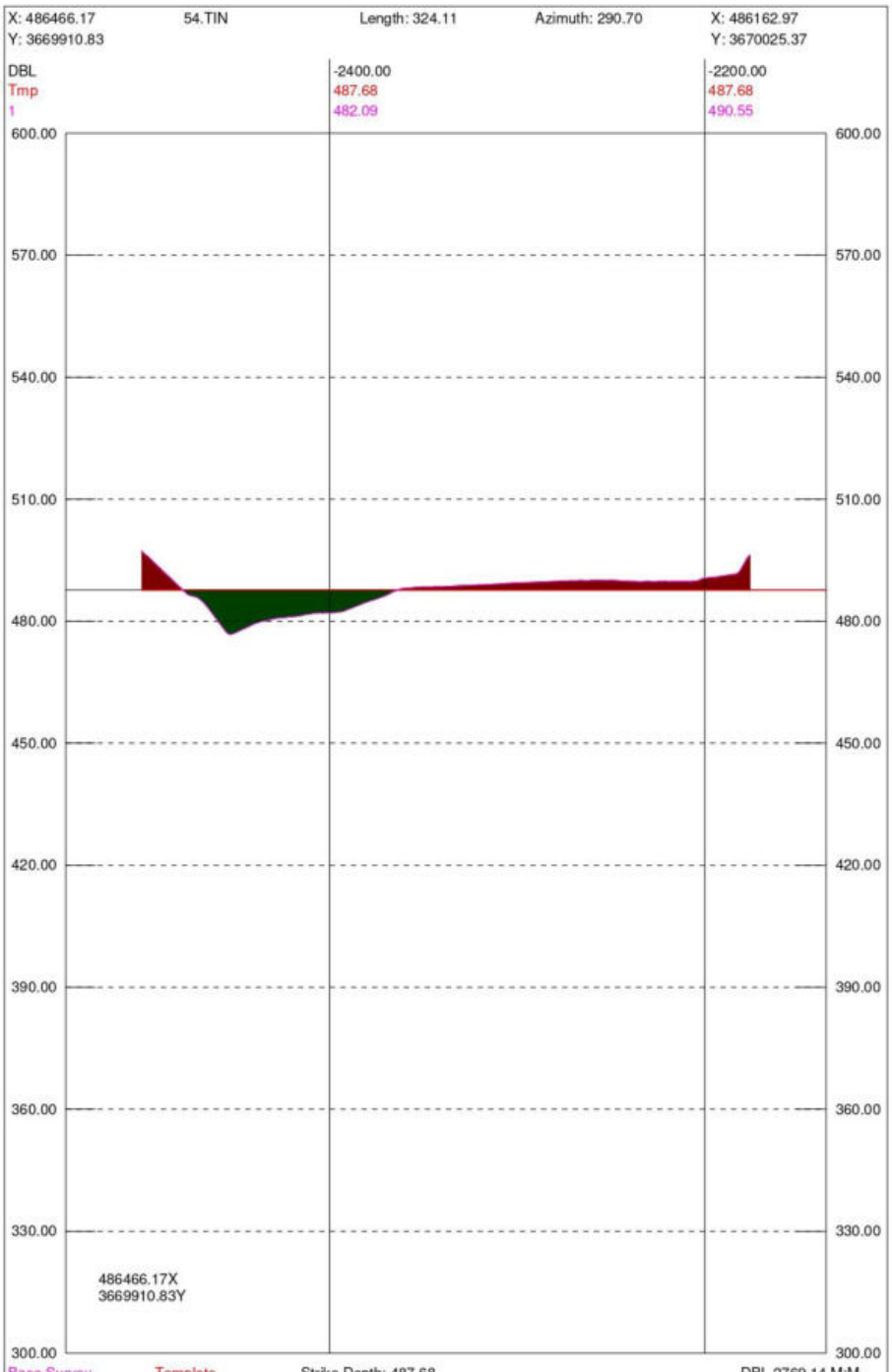
Seg	Design	Cut Area	Fill Area	Cut Vol	Fill Vol	OverDepth	Cut Area	Fill Area	Cut Vol	Fill Vol
1		476.71	754.83	434782.93	591398.68	All	0.00	754.83	0.00	591398.68
Total		476.71	754.83	434782.93	591398.68		0.00	754.83	0.00	591398.68
Accum				14228677.85	29774735.44				0.00	29774735.44

RD8280



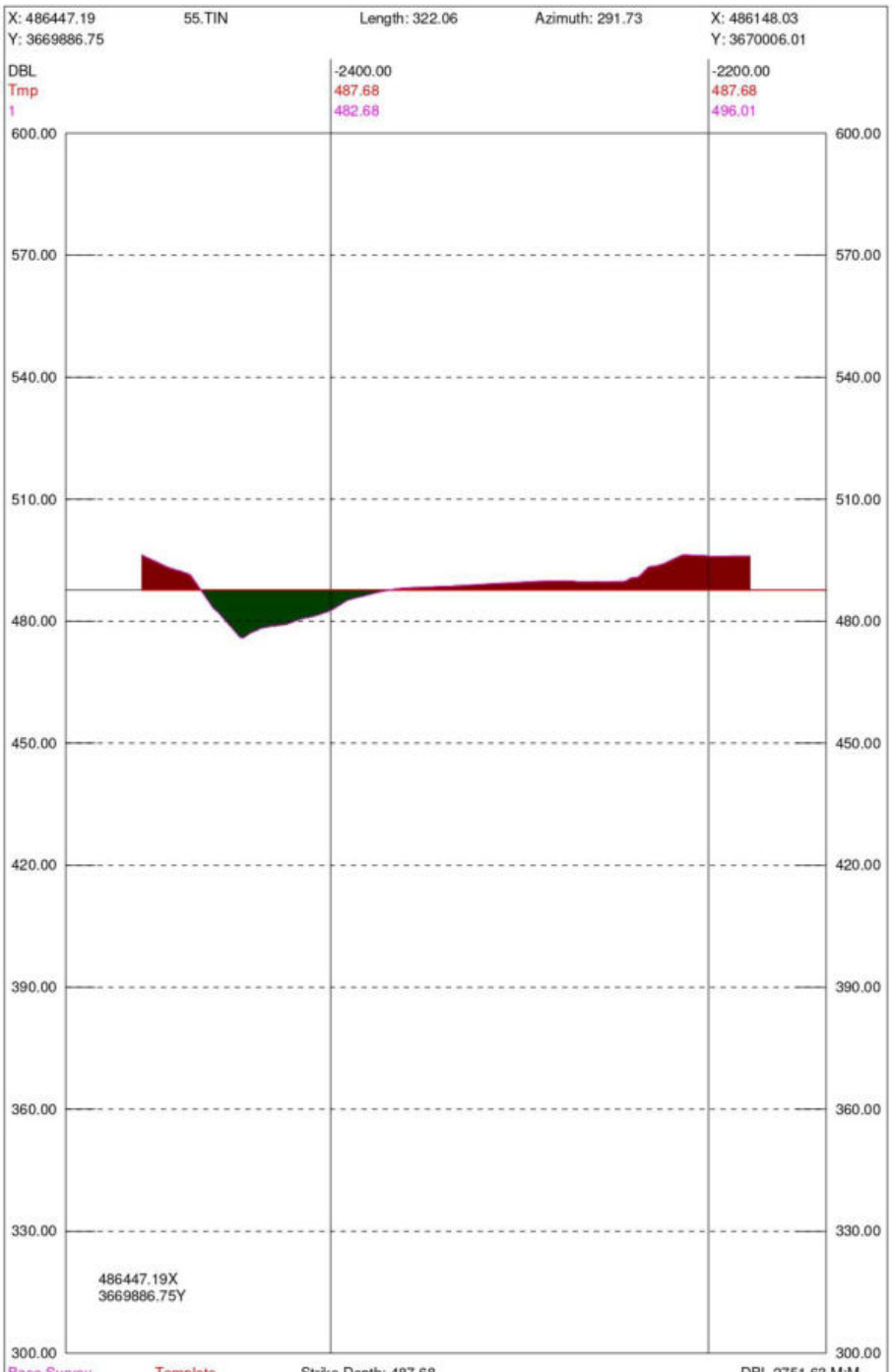
Seg	Design	Cut Area	Fill Area	Cut Vol	Fill Vol	OverDepth	Cut Area	Fill Area	Cut Vol	Fill Vol
1		530.07	708.80	190569.64	328433.04	All	0.00	708.80	0.00	328433.04
Total		530.07	708.80	190569.64	328433.04		0.00	708.80	0.00	328433.04
Accum				14419247.49	30103168.47				0.00	30103168.47

RD8880



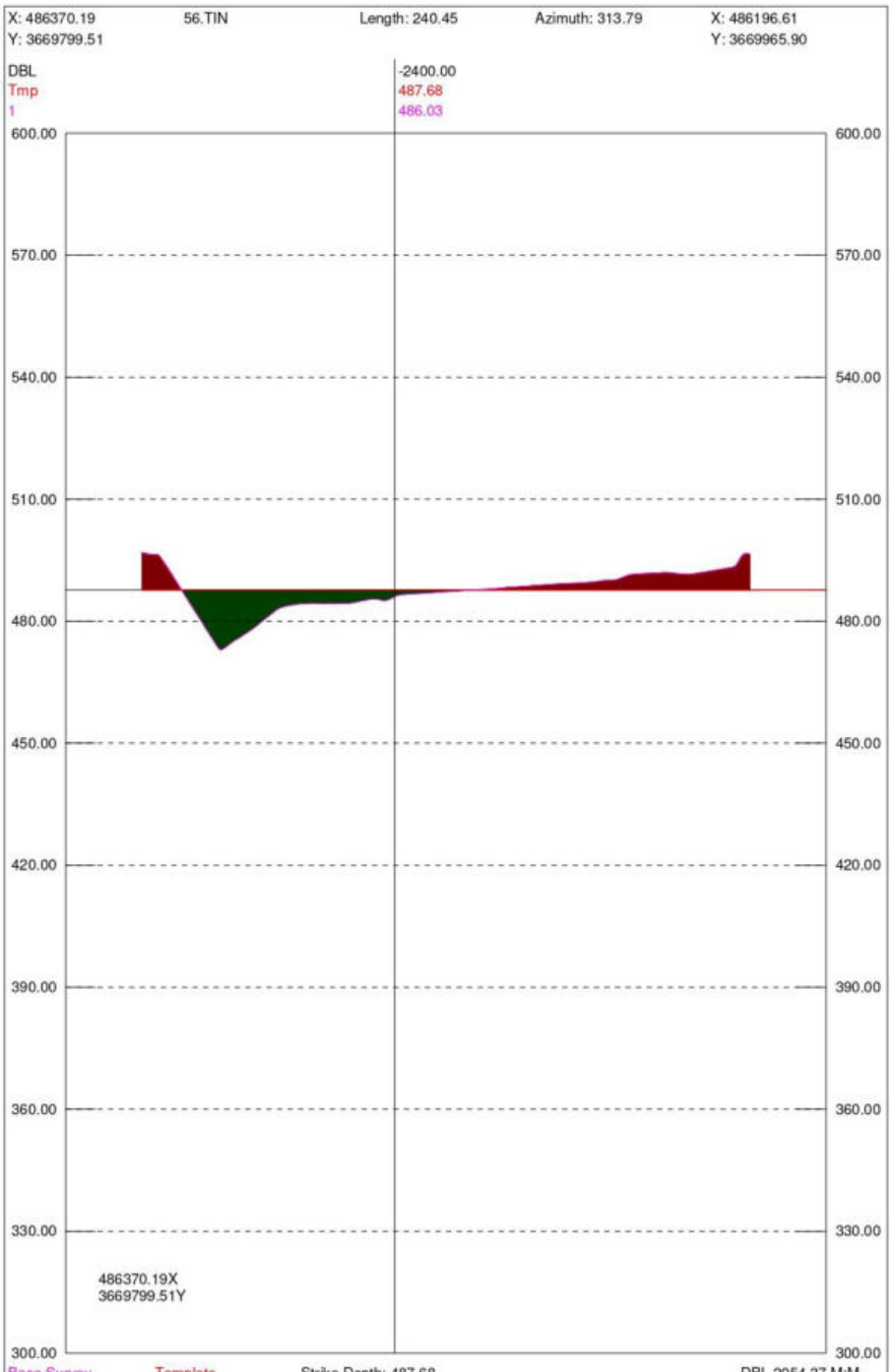
Seg	Design	Cut Area	Fill Area	Cut Vol	Fill Vol	OverDepth	Cut Area	Fill Area	Cut Vol	Fill Vol
1		491.23	627.32	66637.78	95028.86	All	0.00	627.32	0.00	95028.86
Total		491.23	627.32	66637.78	95028.86		0.00	627.32	0.00	95028.86
Accum				14485885.27	30198197.33				0.00	30198197.33

RD9060



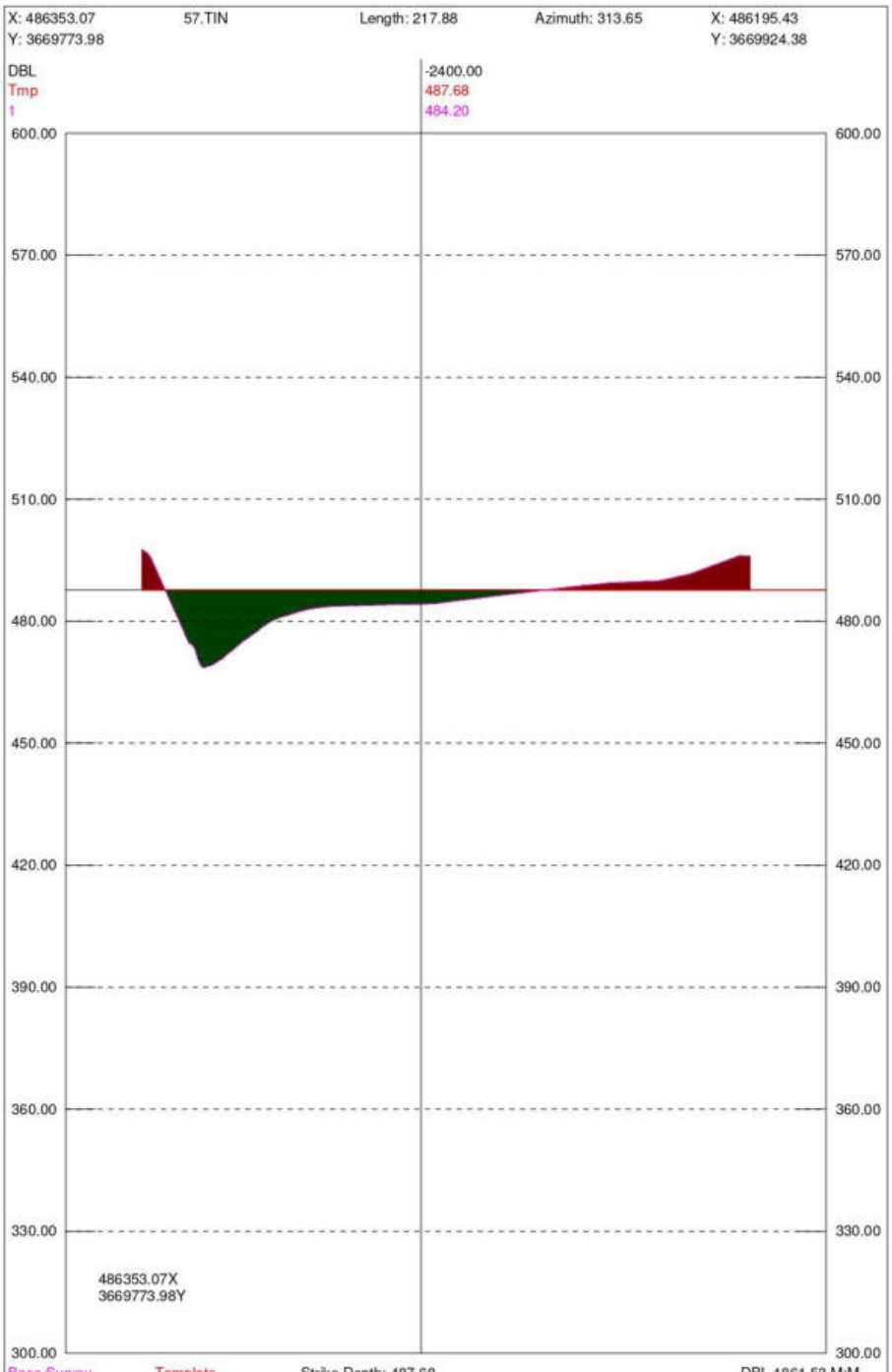
Seg	Design	Cut Area	Fill Area	Cut Vol	Fill Vol	OverDepth	Cut Area	Fill Area	Cut Vol	Fill Vol
1		820.55	584.10	16711.79	16969.38	All	0.00	584.10	0.00	16969.38
Total		820.55	584.10	16711.79	16969.38		0.00	584.10	0.00	16969.38
Accum				14502597.06	30215166.71				0.00	30215166.71

RD9510



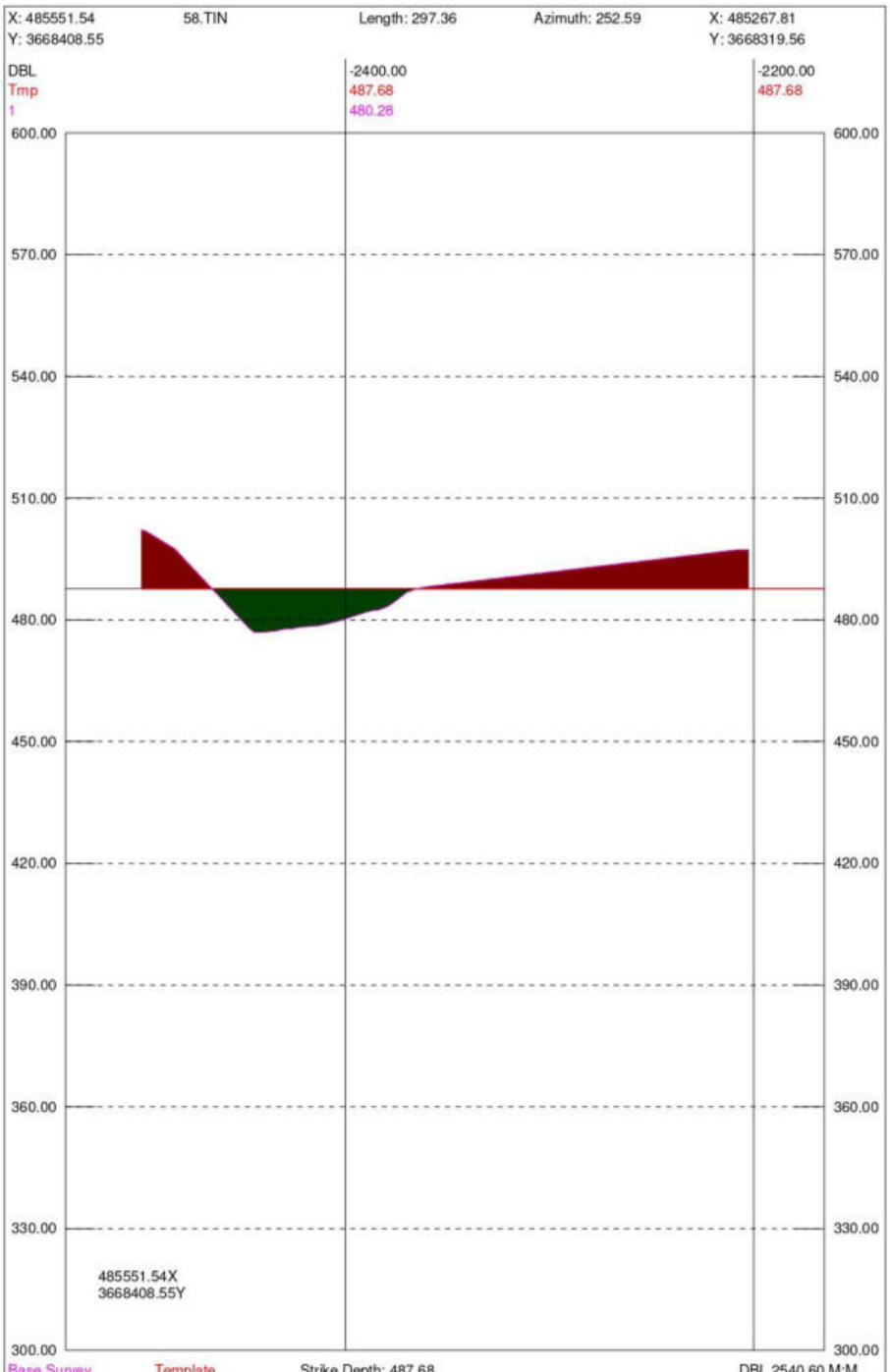
Seg	Design	Cut Area	Fill Area	Cut Vol	Fill Vol	OverDepth	Cut Area	Fill Area	Cut Vol	Fill Vol
1		414.67	505.20	24620.03	49048.25	All	0.00	505.20	0.00	49048.25
Total		414.67	505.20	24620.03	49048.25		0.00	505.20	0.00	49048.25
Accum				14527217.09	30264214.96				0.00	30264214.96

RD11345



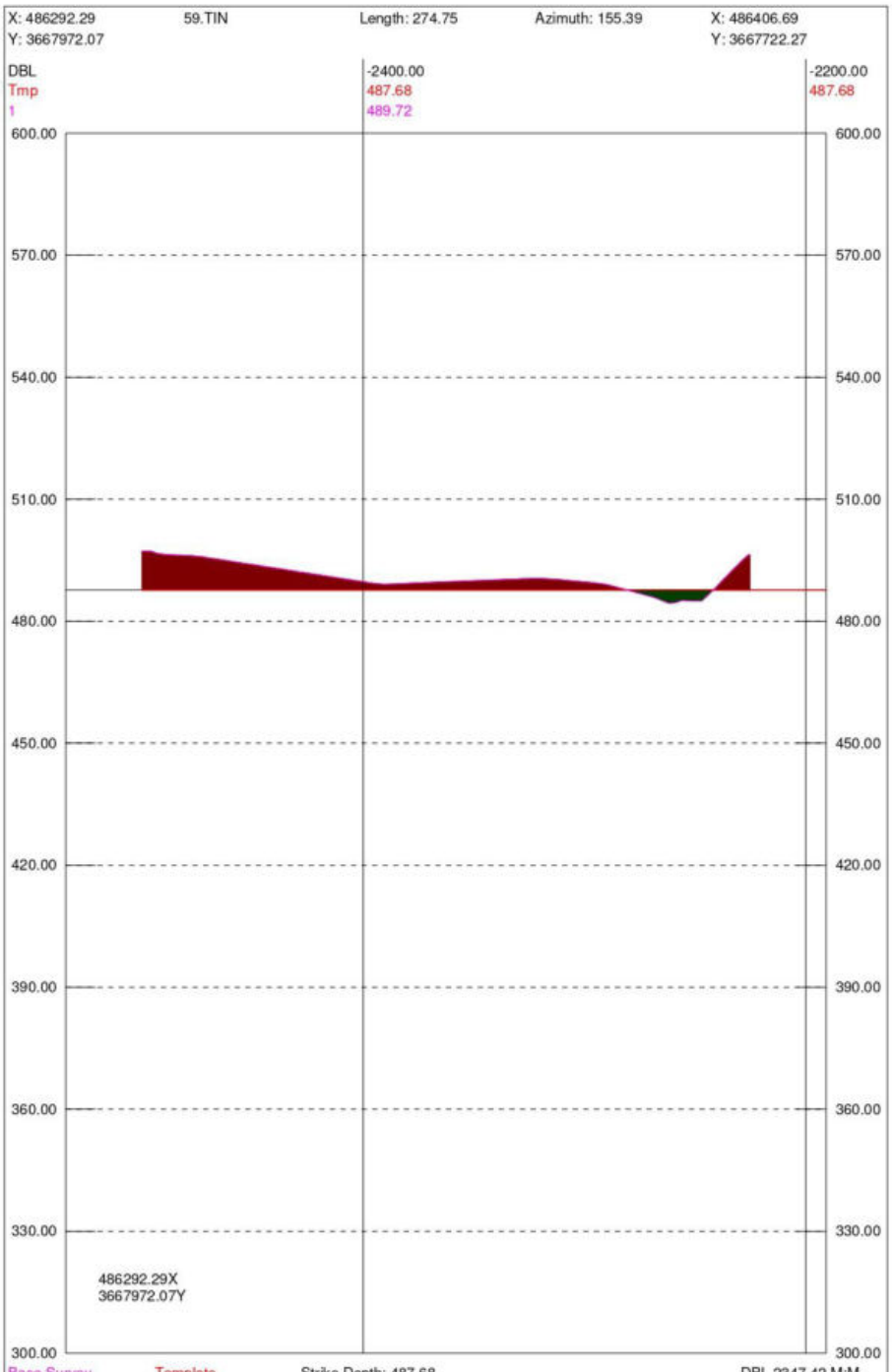
Seg	Design	Cut Area	Fill Area	Cut Vol	Fill Vol	OverDepth	Cut Area	Fill Area	Cut Vol	Fill Vol
1		280.52	789.61	10657.36	19681.09	All	0.00	789.61	0.00	19681.09
Total		280.52	789.61	10657.36	19681.09		0.00	789.61	0.00	19681.09
Accum				14537874.45	30283896.05				0.00	30283896.05

RD13230



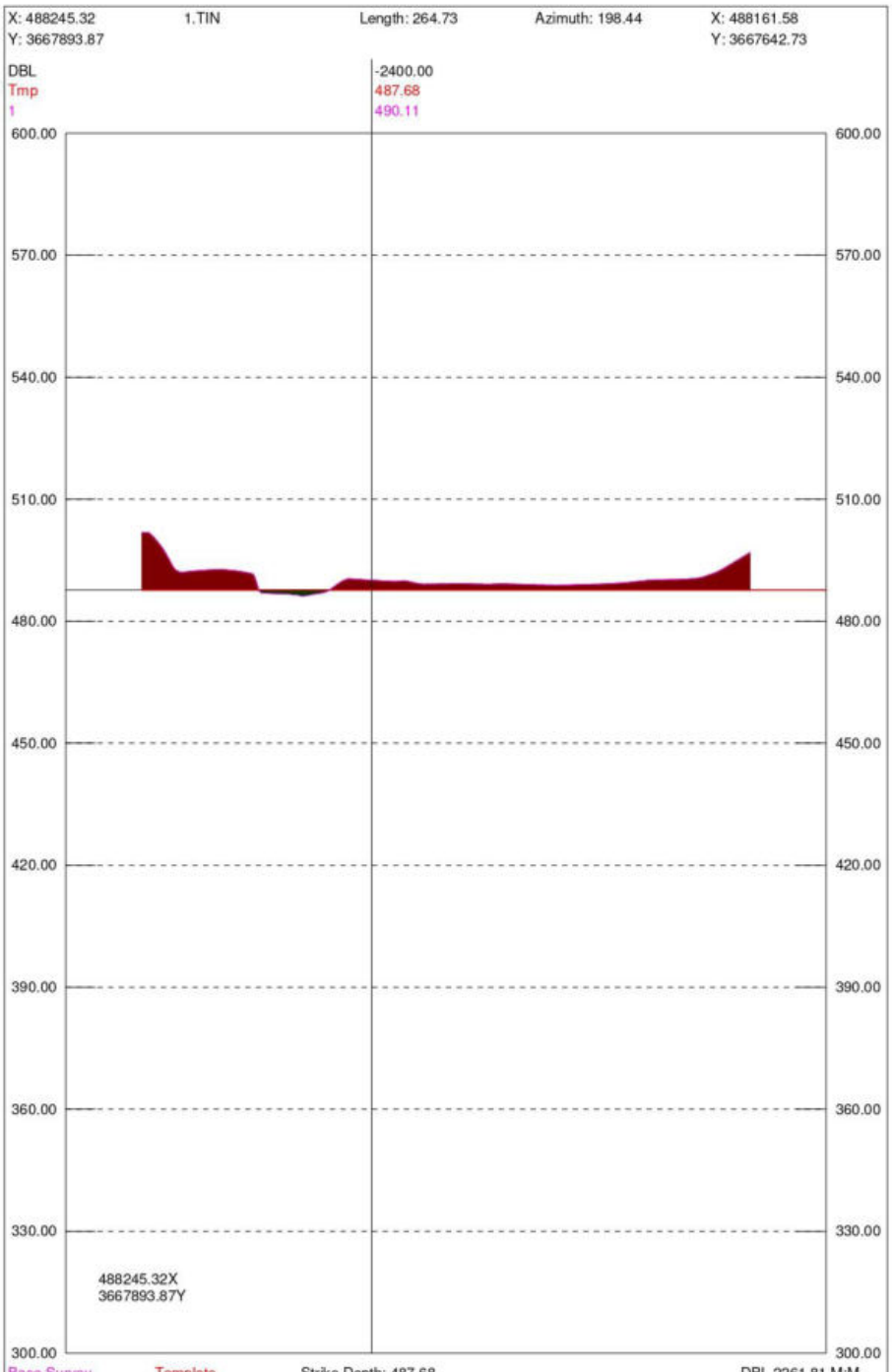
Seg	Design	Cut Area	Fill Area	Cut Vol	Fill Vol	OverDepth	Cut Area	Fill Area	Cut Vol	Fill Vol
1		1106.57	686.06	1011088.15	1001710.38	All	0.00	686.06	0.00	1001710.38
Total		1106.57	686.06	1011088.15	1001710.38		0.00	686.06	0.00	1001710.38
Accum				15548962.60	31285606.44				0.00	31285606.44

RD14990



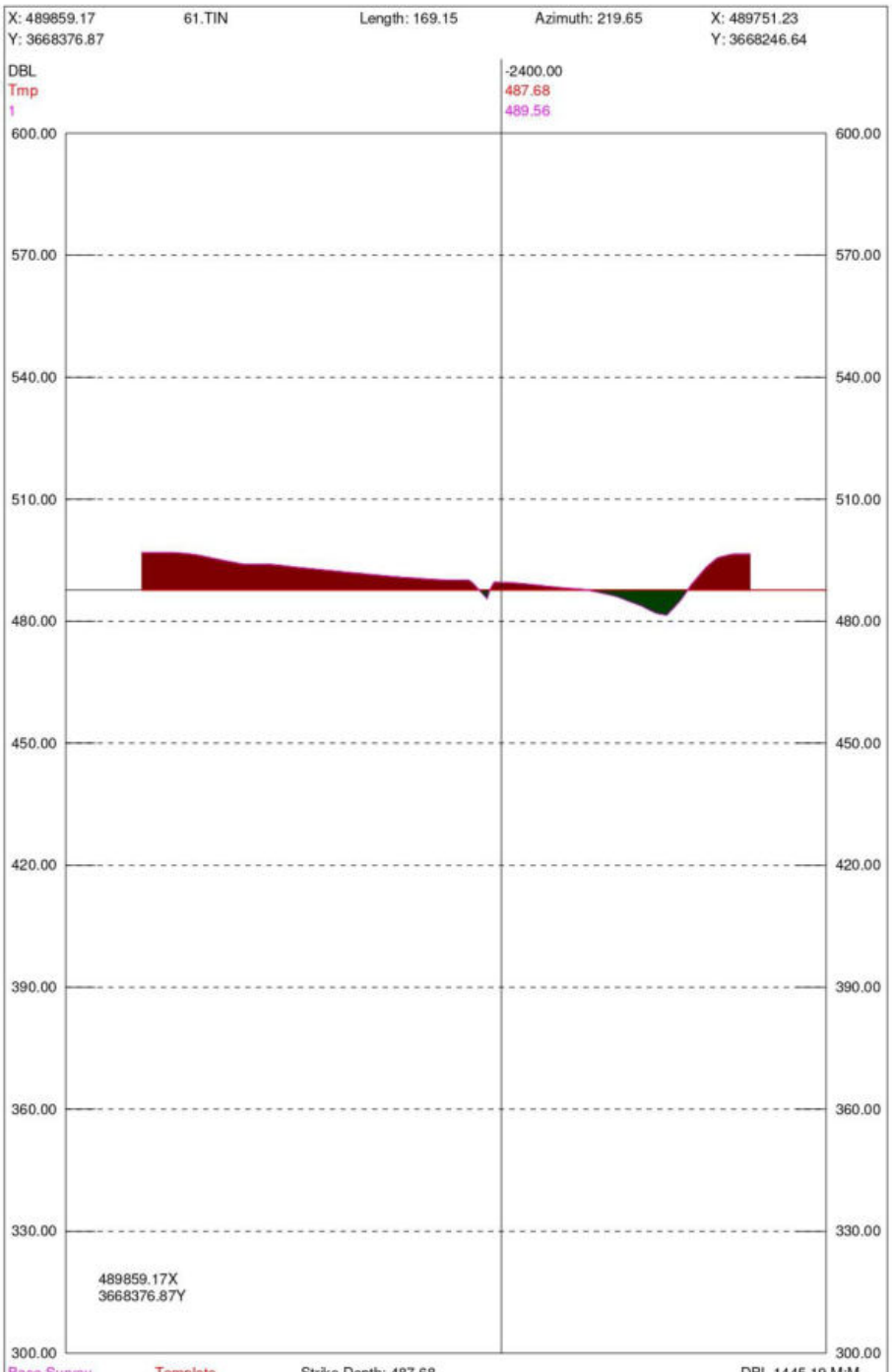
Seg	Design	Cut Area	Fill Area	Cut Vol	Fill Vol	OverDepth	Cut Area	Fill Area	Cut Vol	Fill Vol
1		929.85	76.69	716512.76	251674.01	All	0.00	76.69	0.00	251674.01
Total		929.85	76.69	716512.76	251674.01		0.00	76.69	0.00	251674.01
Accum				16265475.36	31537280.44				0.00	31537280.44

RD15230



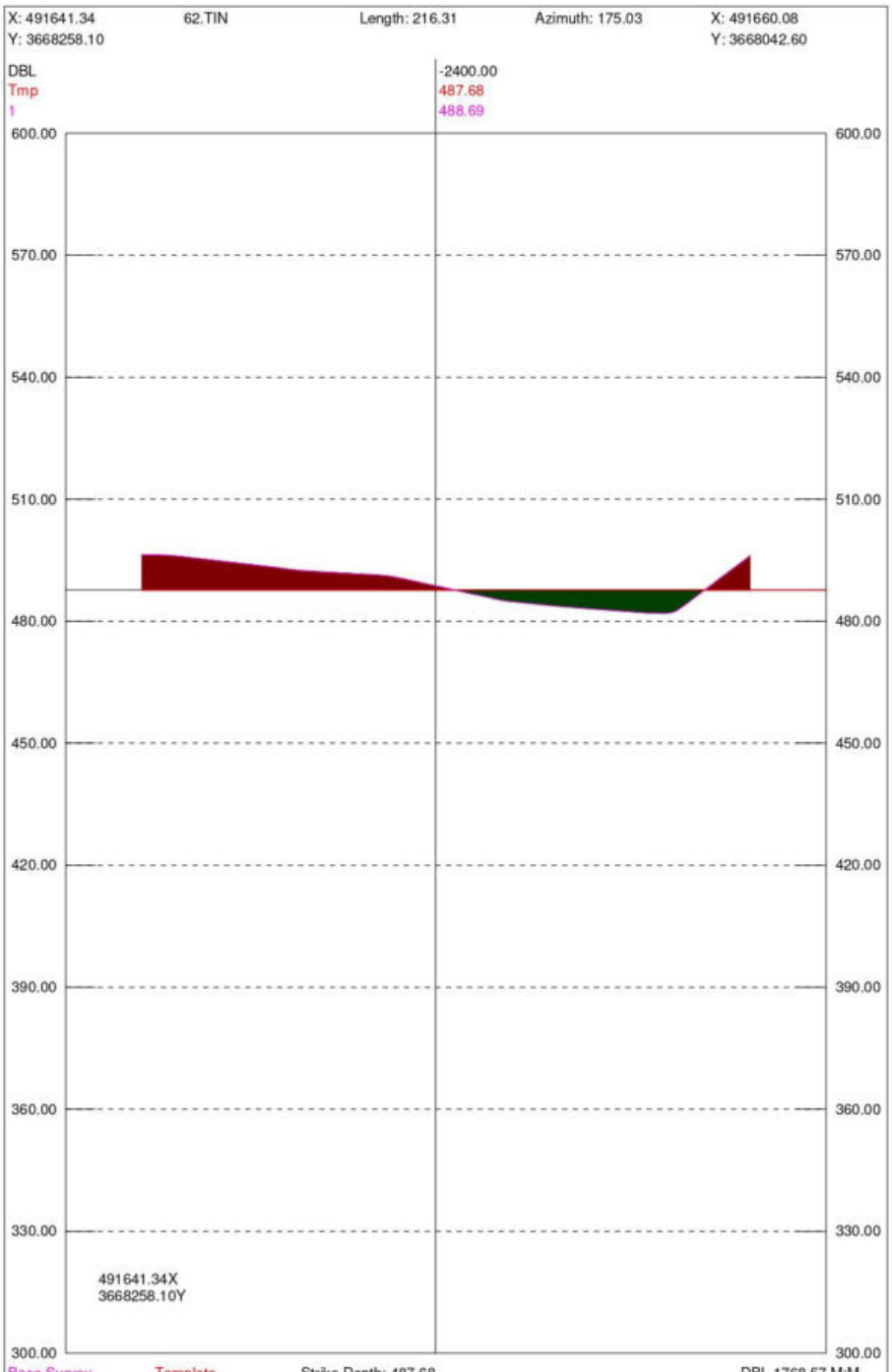
Seg	Design	Cut Area	Fill Area	Cut Vol	Fill Vol	OverDepth	Cut Area	Fill Area	Cut Vol	Fill Vol
1		740.36	29.04	1453932.40	88727.22	All	0.00	29.04	0.00	88727.22
Total		740.36	29.04	1453932.40	88727.22		0.00	29.04	0.00	88727.22
Accum				17719407.75	31626007.66				0.00	31626007.66

RD17220



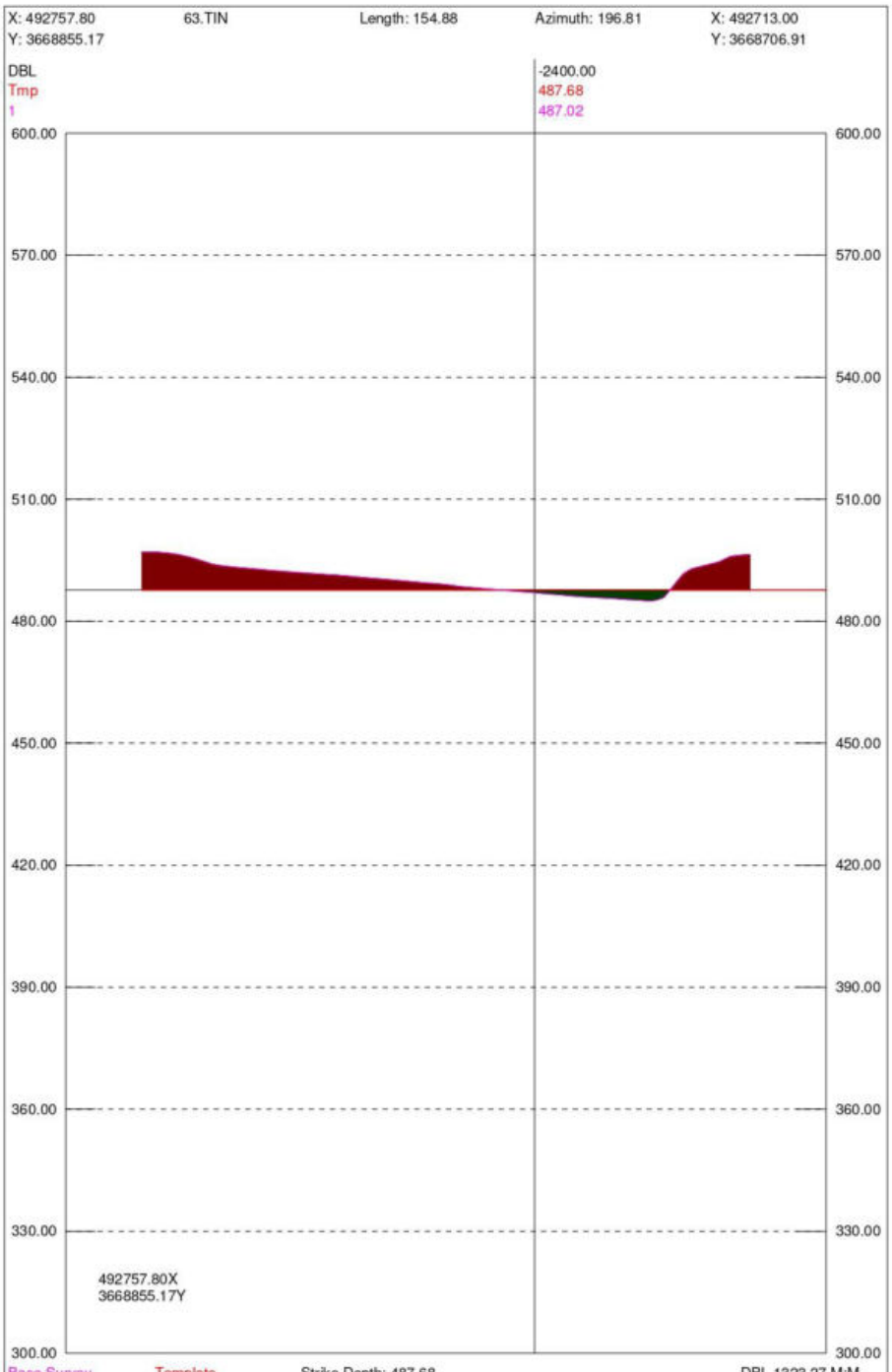
Seg	Design	Cut Area	Fill Area	Cut Vol	Fill Vol	OverDepth	Cut Area	Fill Area	Cut Vol	Fill Vol
1		651.16	85.70	781753.39	63818.51	All	0.00	85.70	0.00	63818.51
Total		651.16	85.70	781753.39	63818.51		0.00	85.70	0.00	63818.51
Accum				18501161.14	31689826.17				0.00	31689826.17

RD19130



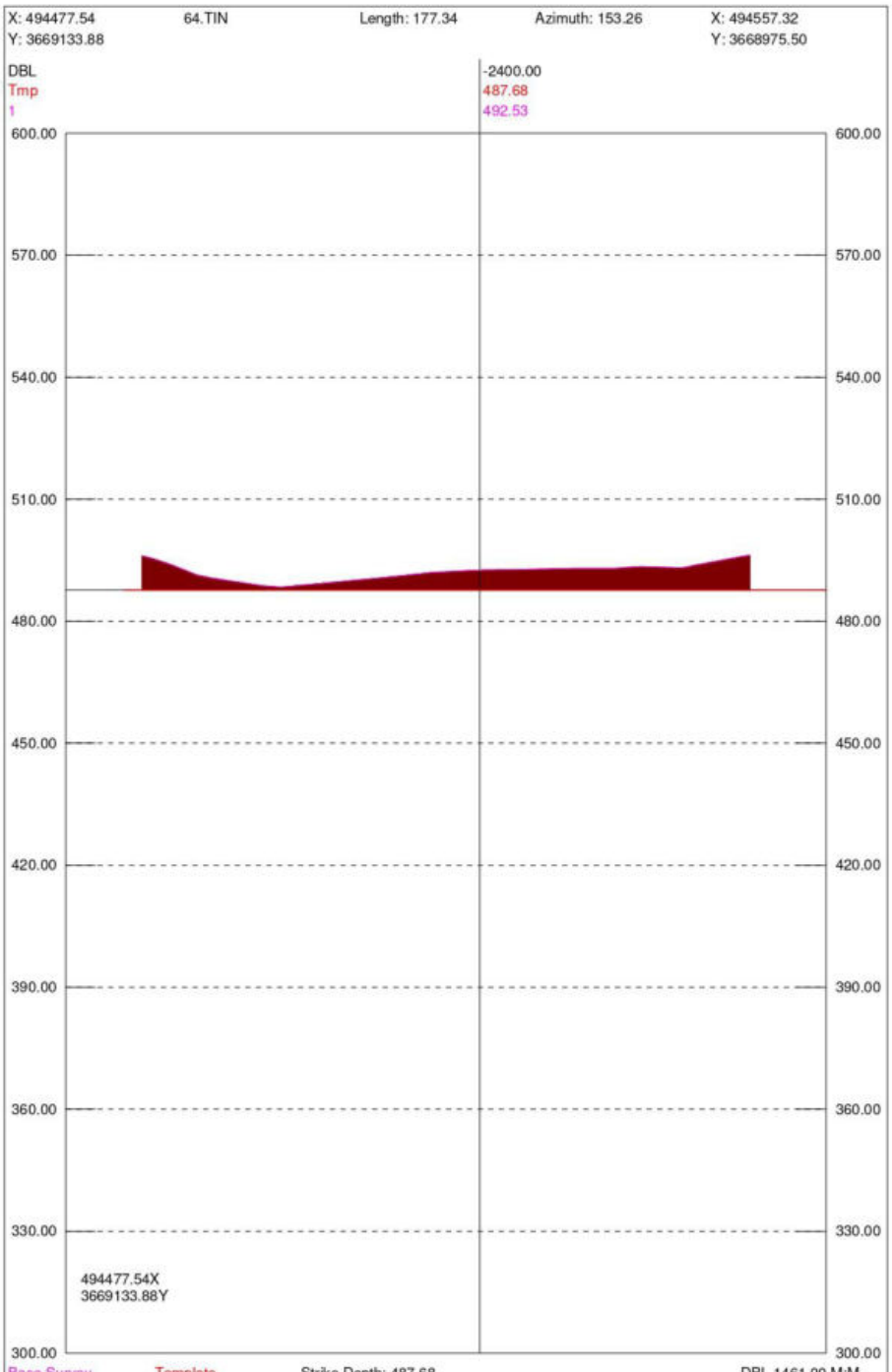
Seg	Design	Cut Area	Fill Area	Cut Vol	Fill Vol	OverDepth	Cut Area	Fill Area	Cut Vol	Fill Vol
1		608.63	311.63	1037964.76	340404.80	All	0.00	311.63	0.00	340404.80
Total		608.63	311.63	1037964.76	340404.80		0.00	311.63	0.00	340404.80
Accum				19539125.90	32030230.97				0.00	32030230.97

RD20600



Seg	Design	Cut Area	Fill Area	Cut Vol	Fill Vol	OverDepth	Cut Area	Fill Area	Cut Vol	Fill Vol
1		505.59	64.42	561989.53	183250.23	All	0.00	64.42	0.00	183250.23
Total		505.59	64.42	561989.53	183250.23		0.00	64.42	0.00	183250.23
Accum				20101115.43	32213481.20				0.00	32213481.20

RD22500



Seg	Design	Cut Area	Fill Area	Cut Vol	Fill Vol	OverDepth	Cut Area	Fill Area	Cut Vol	Fill Vol
1		746.93	0.00	1047118.19	54602.86	All	0.00	0.00	0.00	54602.86
Total		746.93	0.00	1047118.19	54602.86		0.00	0.00	0.00	54602.86
Accum				21148233.63	32268084.05				0.00	32268084.05

C) Total storage capacity of reservoir upto FRL (487.680m) C = A + B,

Row. No.	Values
1	0.00455 MCM (A) - Red Nallah
2	32.26808407 MCM (B) - Upstream
3	C = A + B
4	*0.00455 MCM + 32.26808407 MCM = 32.27263407 MCM (C)*

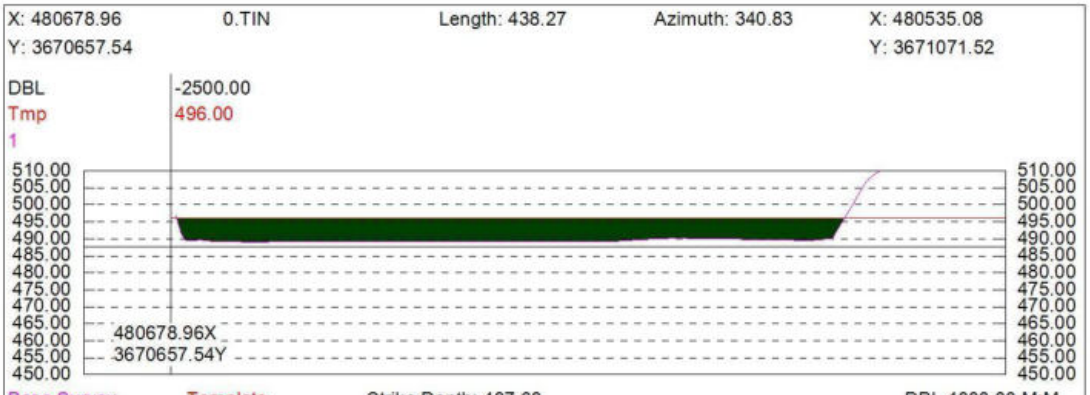
7.2. Present Storage Capacity of Reservoir upto Elevation (496.000m)

A) For Red Nallah

CHAINAGE	CROSS SECTION AREA	VOLUME	ACCUMULATED FILL VOLUME
(m)	(sq.m)	(cu.m)	(cu.m)
RD 0	2569.37	0	0
RD 250	1842.09	550132.05	550132.05
RD 370	1917.82	213109.02	763241.07
RD 410	1780.69	75243.25	838484.32
RD 510	2056.35	188769.07	1027253.39
RD 600	2695.79	212893.16	1240146.55
RD 750	1707.79	332014.3	1572160.85
RD 900	1290.54	15188.65	1587349.5
RD 1300	1435.4	522664.64	2110014.14
RD 1400	1035.75	121265.26	**2231279.4**

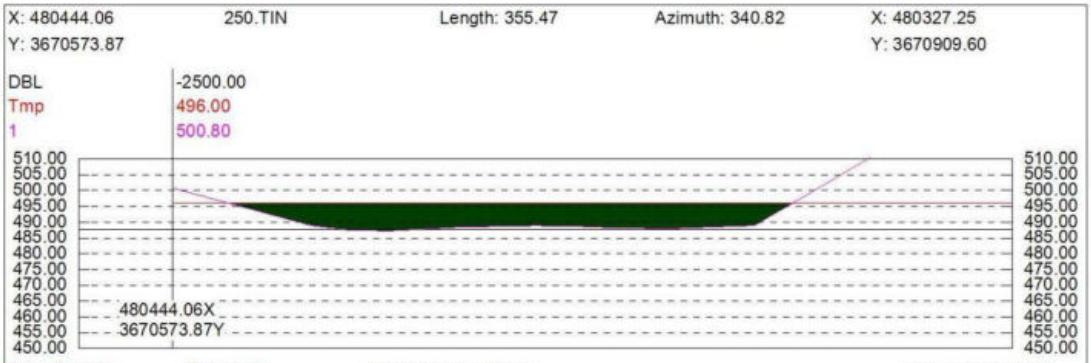
■ Graphical Representation of Red Nallah

RD0



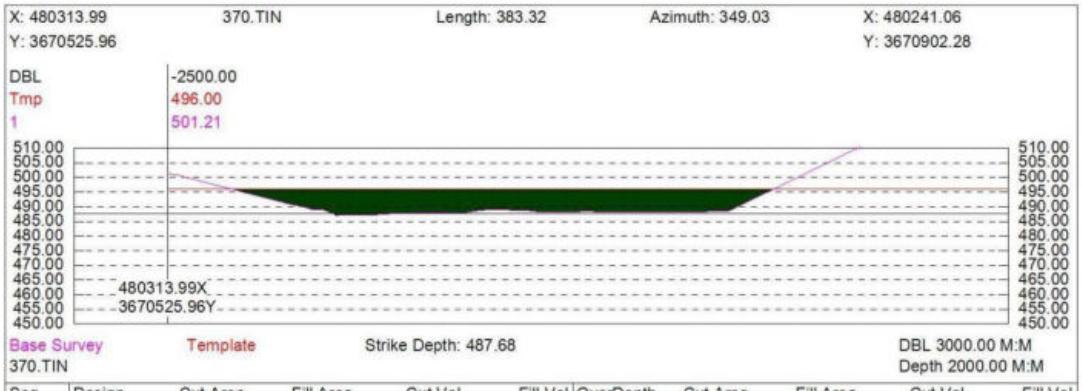
Seg	Design	Cut Area	Fill Area	Cut Vol	Fill Vol	OverDepth	Cut Area	Fill Area	Cut Vol	Fill Vol
1		512.04	2569.37	0.00	0.00	All	0.00	2569.37	0.00	0.00
Total		512.04	2569.37	0.00	0.00		0.00	2569.37	0.00	0.00
Accum				0.00	0.00				0.00	0.00

RD250



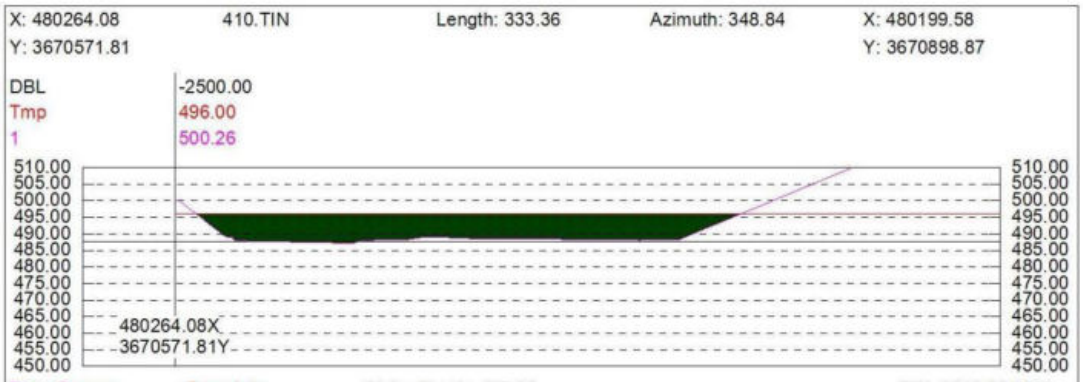
Seg	Design	Cut Area	Fill Area	Cut Vol	Fill Vol	OverDepth	Cut Area	Fill Area	Cut Vol	Fill Vol
1		774.79	1842.09	160511.83	550132.05	All	0.00	1842.09	0.00	550132.05
Total		774.79	1842.09	160511.83	550132.05		0.00	1842.09	0.00	550132.05
Accum				160511.83	550132.05				0.00	550132.05

RD370



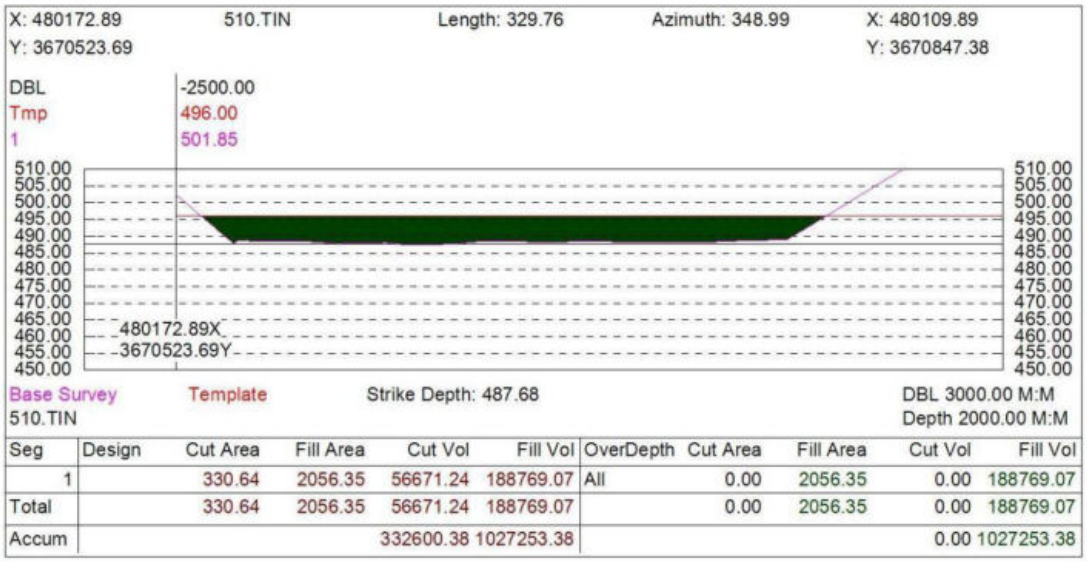
Seg	Design	Cut Area	Fill Area	Cut Vol	Fill Vol	OverDepth	Cut Area	Fill Area	Cut Vol	Fill Vol
1		937.59	1917.82	79078.53	213109.02	All	0.00	1917.82	0.00	213109.02
Total		937.59	1917.82	79078.53	213109.02		0.00	1917.82	0.00	213109.02
Accum				239590.36	763241.07				0.00	763241.07

RD410



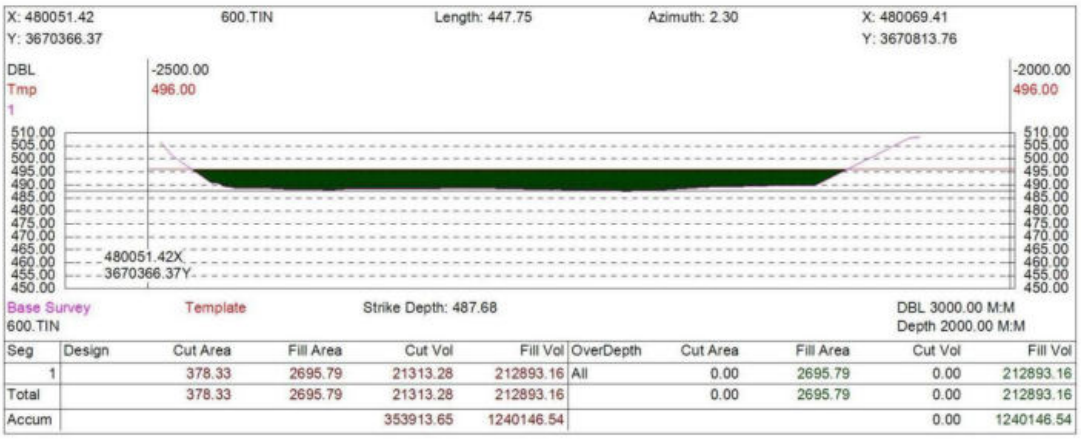
Seg	Design	Cut Area	Fill Area	Cut Vol	Fill Vol	OverDepth	Cut Area	Fill Area	Cut Vol	Fill Vol
1		825.82	1780.69	36338.78	75243.25	All	0.00	1780.69	0.00	75243.25
Total		825.82	1780.69	36338.78	75243.25		0.00	1780.69	0.00	75243.25
Accum				275929.13	838484.32				0.00	838484.32

RD510



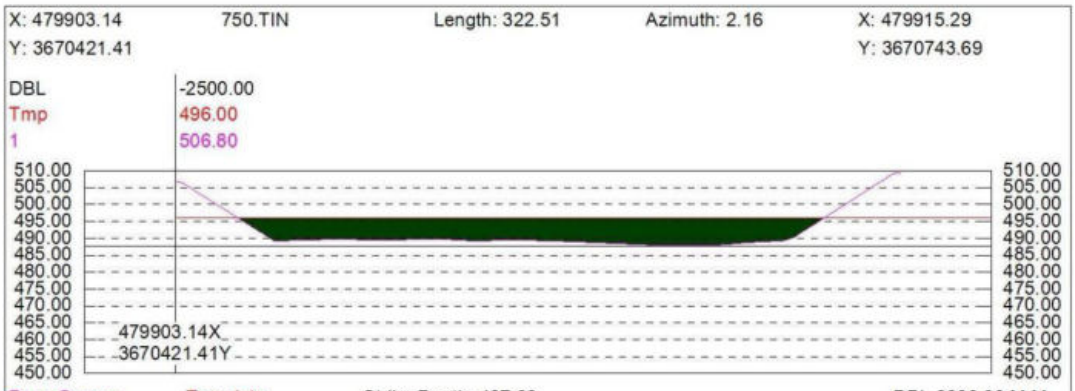
Seg	Design	Cut Area	Fill Area	Cut Vol	Fill Vol	OverDepth	Cut Area	Fill Area	Cut Vol	Fill Vol
1		330.64	2056.35	56671.24	188769.07	All	0.00	2056.35	0.00	188769.07
Total		330.64	2056.35	56671.24	188769.07		0.00	2056.35	0.00	188769.07
Accum				332600.38	1027253.38				0.00	1027253.38

RD600



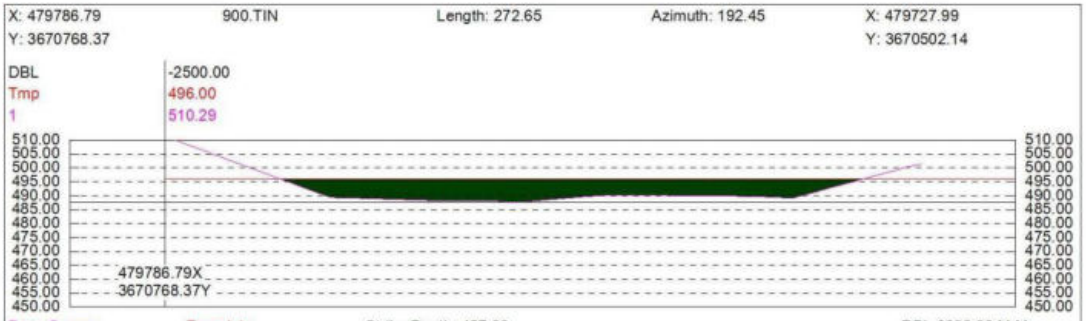
Seg	Design	Cut Area	Fill Area	Cut Vol	Fill Vol	OverDepth	Cut Area	Fill Area	Cut Vol	Fill Vol
1		378.33	2695.79	21313.28	212893.16	All	0.00	2695.79	0.00	212893.16
Total		378.33	2695.79	21313.28	212893.16		0.00	2695.79	0.00	212893.16
Accum				353913.65	1240146.54				0.00	1240146.54

RD750



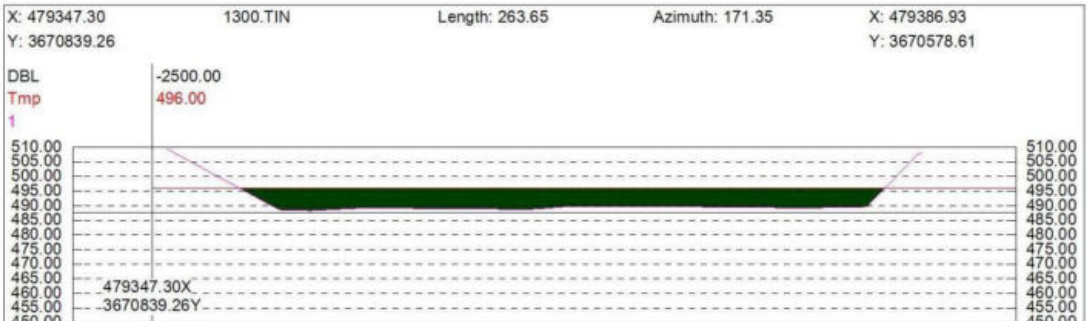
Seg	Design	Cut Area	Fill Area	Cut Vol	Fill Vol	OverDepth	Cut Area	Fill Area	Cut Vol	Fill Vol
1		410.39	1707.79	59535.67	332014.30	All	0.00	1707.79	0.00	332014.30
Total		410.39	1707.79	59535.67	332014.30		0.00	1707.79	0.00	332014.30
Accum				413449.32	1572160.85				0.00	1572160.85

RD900



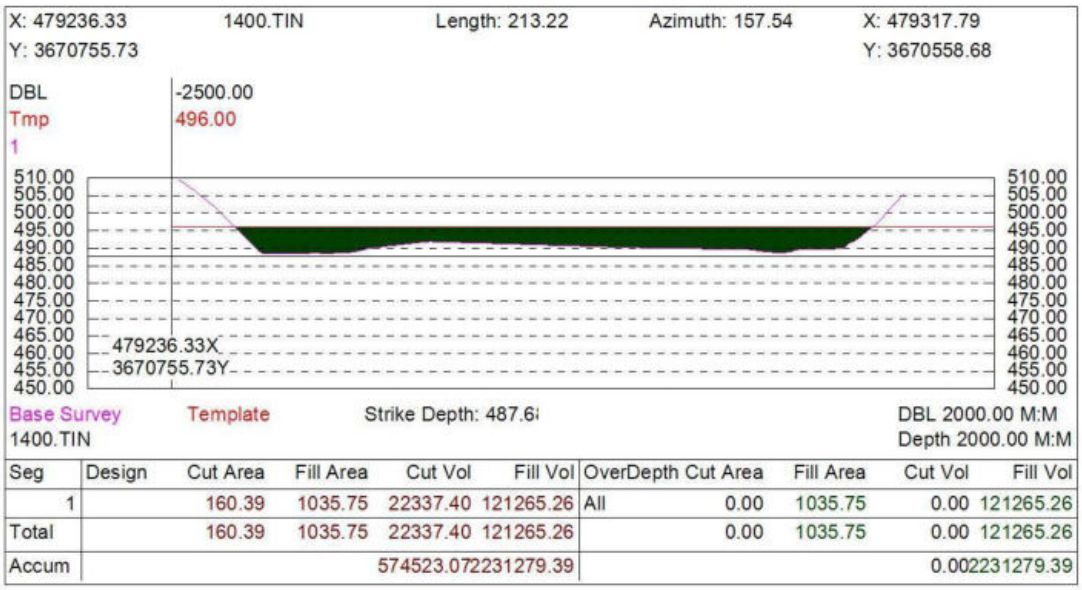
Seg	Design	Cut Area	Fill Area	Cut Vol	Fill Vol	OverDepth	Cut Area	Fill Area	Cut Vol	Fill Vol
1		378.63	1290.54	10346.73	15188.65	All	0.00	1290.54	0.00	15188.65
Total		378.63	1290.54	10346.73	15188.65		0.00	1290.54	0.00	15188.65
Accum				423796.05	1587349.50				0.00	1587349.50

RD1300



Seg	Design	Cut Area	Fill Area	Cut Vol	Fill Vol	OverDepth	Cut Area	Fill Area	Cut Vol	Fill Vol
1		248.78	1435.40	128389.62	522664.64	All	0.00	1435.40	0.00	522664.64
Total		248.78	1435.40	128389.62	522664.64		0.00	1435.40	0.00	522664.64
Accum				552185.67	2110014.13				0.00	2110014.13

RD1400



Seg	Design	Cut Area	Fill Area	Cut Vol	Fill Vol	OverDepth Cut Area	Fill Area	Cut Vol	Fill Vol
1		160.39	1035.75	22337.40	121265.26	All 0.00	1035.75	0.00	121265.26
Total		160.39	1035.75	22337.40	121265.26	0.00	1035.75	0.00	121265.26
Accum				574523.07	2231279.39			0.00	2231279.39

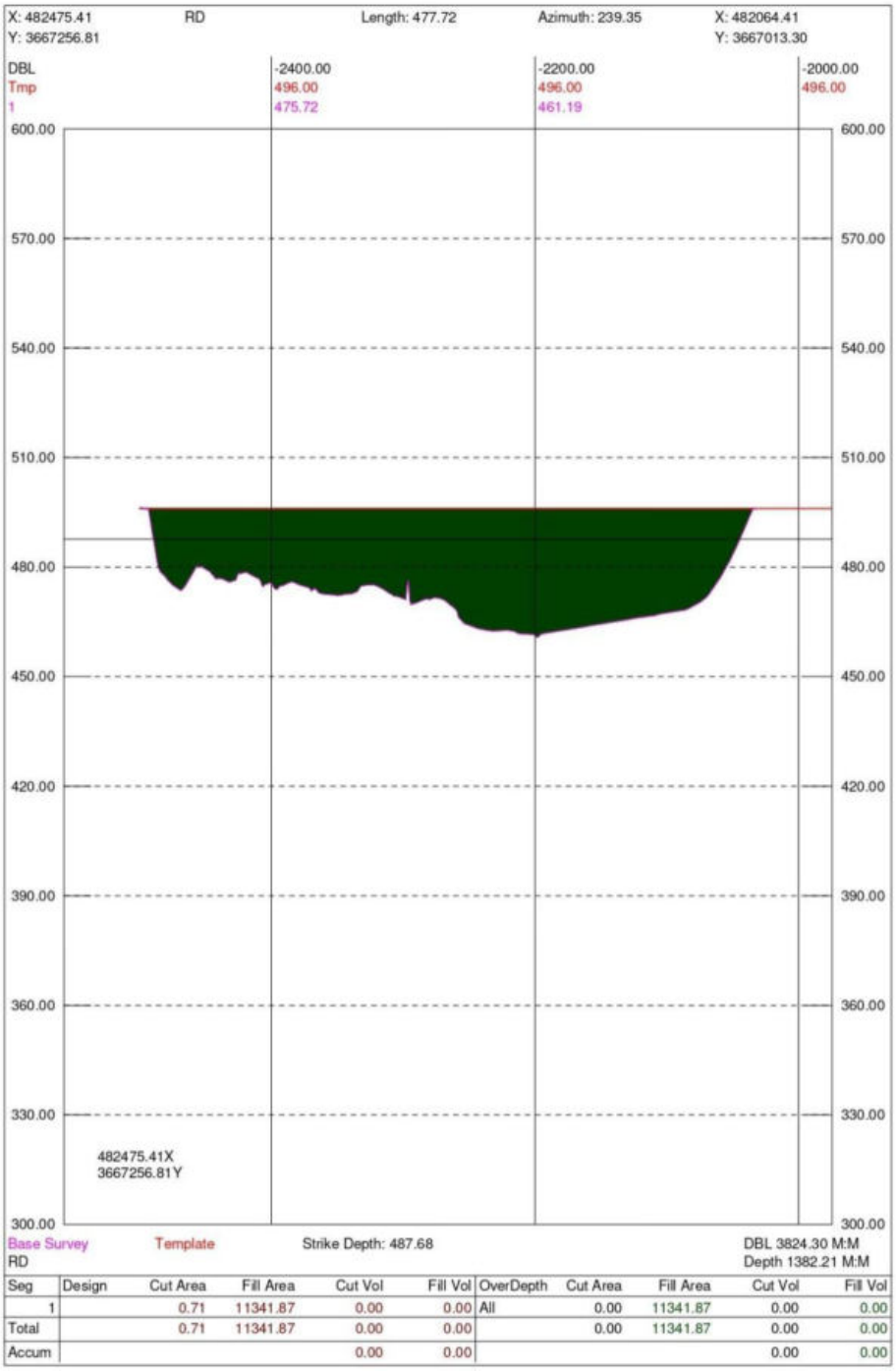
B) FINAL UPSTREAM STORAGE CAPACITY (496m)

CHAINAGE	FILL AREA	FILL VOLUME	ACCUMULATED FILL VOLUME
(m)	(sq.m)	(cu.m)	(cu.m)
RD 15	11341.87	0	0
RD 30	1536.35	25674602.23	25674602.23
RD 60	9911.53	7816560.88	33491163.11
RD 90	9229.37	287484.64	33778647.75
RD 120	8482.72	266957.51	34045605.26
RD 130	7627.84	238928.23	34284533.49
RD 210	7166.69	448585.09	34733118.58
RD 300	6735.01	627468.66	35360587.24
RD 420	6383.74	779057.49	36139644.73
RD 540	5458.28	721909.37	36861554.1
RD 630	5873.42	506961.64	37368515.74
RD 780	5826.34	882418.38	38250934.12
RD 900	5520.81	669545.7	38920479.82
RD 1020	4722.63	624401.29	39544881.11
RD 1130	5020.17	531272.58	40076153.69
RD 1220	4762.52	435771.32	40511925.01
RD 1310	5127.75	448558.3	40960483.31
RD 1410	5245.21	518585.1	41479068.41
RD 1510	5125.56	528678.56	42007746.97
RD 1610	4373.64	475714.65	42483461.62
RD 1700	4168	385817.32	42869278.94
RD 1750	3852.88	192875.83	43062154.77
RD 2050	4857.38	1318720.14	44380874.91
RD 2550	5617.96	2609705.99	46990580.9
RD 2650	5695.24	577193.21	47567774.11
RD 2750	5445.61	549341.85	48117115.96
RD 2850	6510.39	596566.46	48713682.42
RD 2960	5890.76	682641.15	49396323.57
RD 3070	6951.44	722693.19	50119016.76
RD 3250	8865.11	1398142.86	51517159.62
RD 3360	8177.83	2035305.13	53552464.75
RD 3490	10630.38	2061588.33	55614053.08
RD 3750	10124.37	1988819.82	57602872.9
RD 4000	9703.12	1397556.07	59000428.97
RD 4300	7281.53	2991106.15	61991535.12
RD 4480	7758.75	2263163.96	64254699.08
RD 4700	8684.7	1529924.94	65784624.02
RD 4940	8449.19	1834015.67	67618639.69
RD 5340	7268.4	1838928.29	69457567.98
RD 5750	3740.66	2187577.78	71645145.76

CHAINAGE	FILL AREA	FILL VOLUME	ACCUMULATED FILL VOLUME
(m)	(sq.m)	(cu.m)	(cu.m)
RD 5825	4558.02	1613892.74	73259038.5
RD 5900	4561.55	323145.05	73582183.55
RD 5980	4073.1	375134.62	73957318.17
RD 6060	4312.52	293843.75	74251161.92
RD 6220	4361.4	348591.21	74599753.13
RD 6380	4090.08	675044.35	75274797.48
RD 6540	3922.22	614552.78	75889350.26
RD 6700	3037.26	1849871.96	77739222.22
RD 6910	3817.52	783308.66	78522530.88
RD 7140	3129.1	835514.39	79358045.27
RD 7380	2993.07	301646.59	79659691.86
RD 7480	3598.34	331657.14	79991349
RD 7580	2664.77	2157490.96	82148839.96
RD 8280	3650.61	1321998.86	83470838.82
RD 8880	2834.5	443229.85	83914068.67
RD 9060	2446.58	71248.71	83985317.38
RD 9510	2096.43	163428.31	84148745.69
RD 11345	2324.81	67405.33	84216151.02
RD 13230	2140.37	3090103.65	87306254.67
RD 14990	1446.07	1249413.83	88555668.5
RD 15230	1536.35	2543508.81	91099177.31
RD 17220	857.36	1329609.55	92428786.86
RD 19130	1428.21	1935803.53	94364590.39
RD 20600	856.8	1126577.79	95491168.18
RD 22500	676.03	1281318.48	**96772486.66**

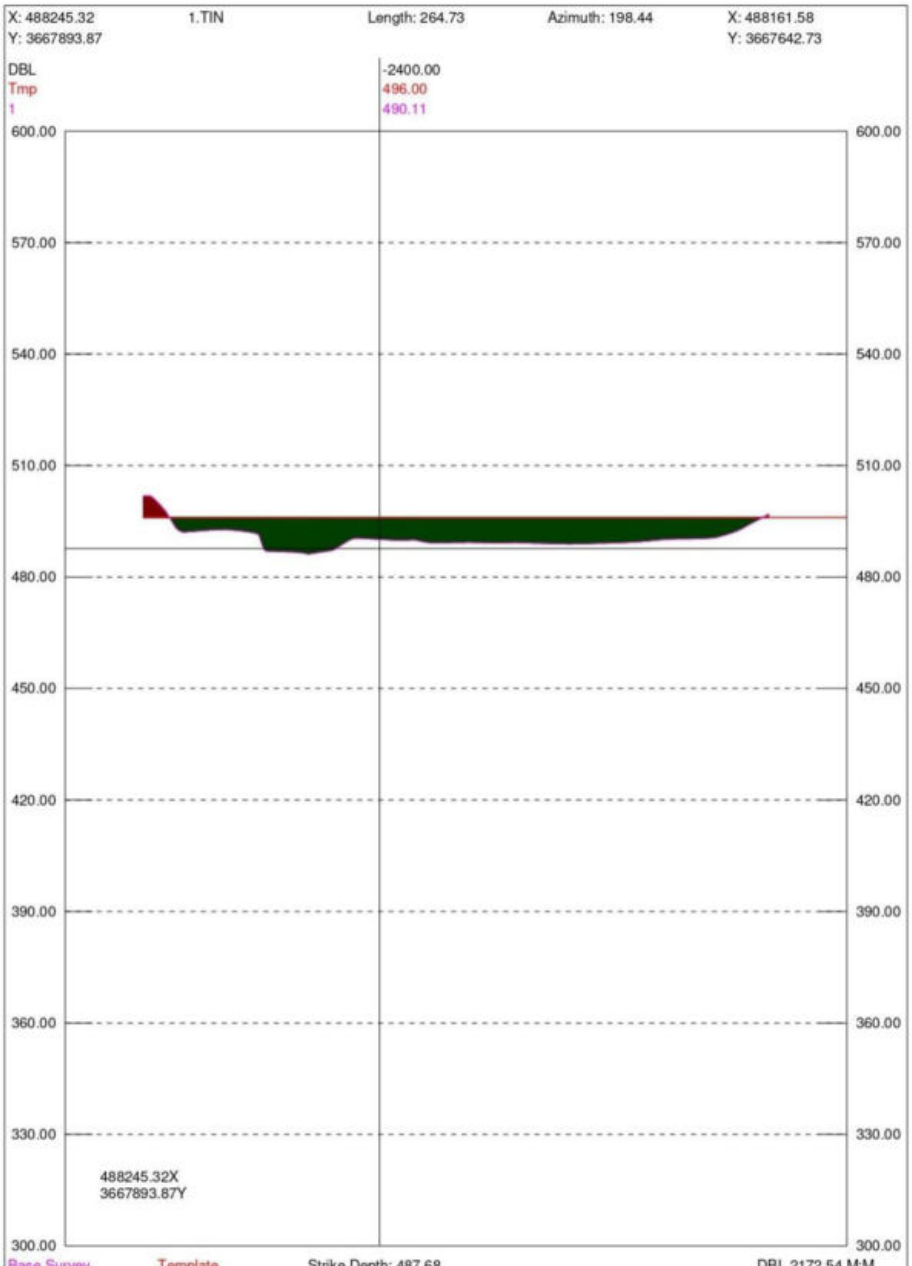
■ Graphical Representation of Upstreams

RD15



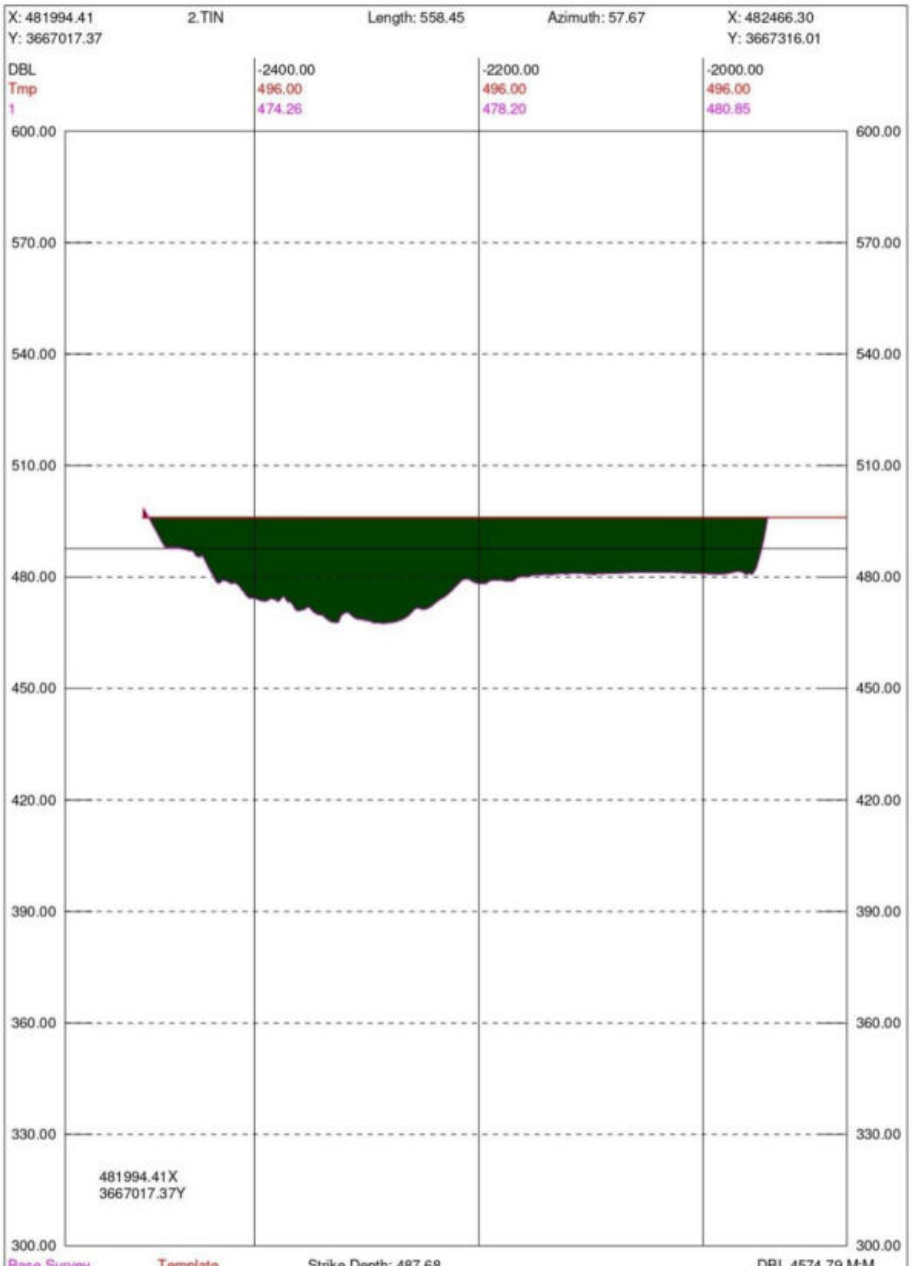
Seg	Design	Cut Area	Fill Area	Cut Vol	Fill Vol	OverDepth	Cut Area	Fill Area	Cut Vol	Fill Vol
1		0.71	11341.87	0.00	0.00	All	0.00	11341.87	0.00	0.00
Total		0.71	11341.87	0.00	0.00		0.00	11341.87	0.00	0.00
Accum				0.00	0.00				0.00	0.00

RD30



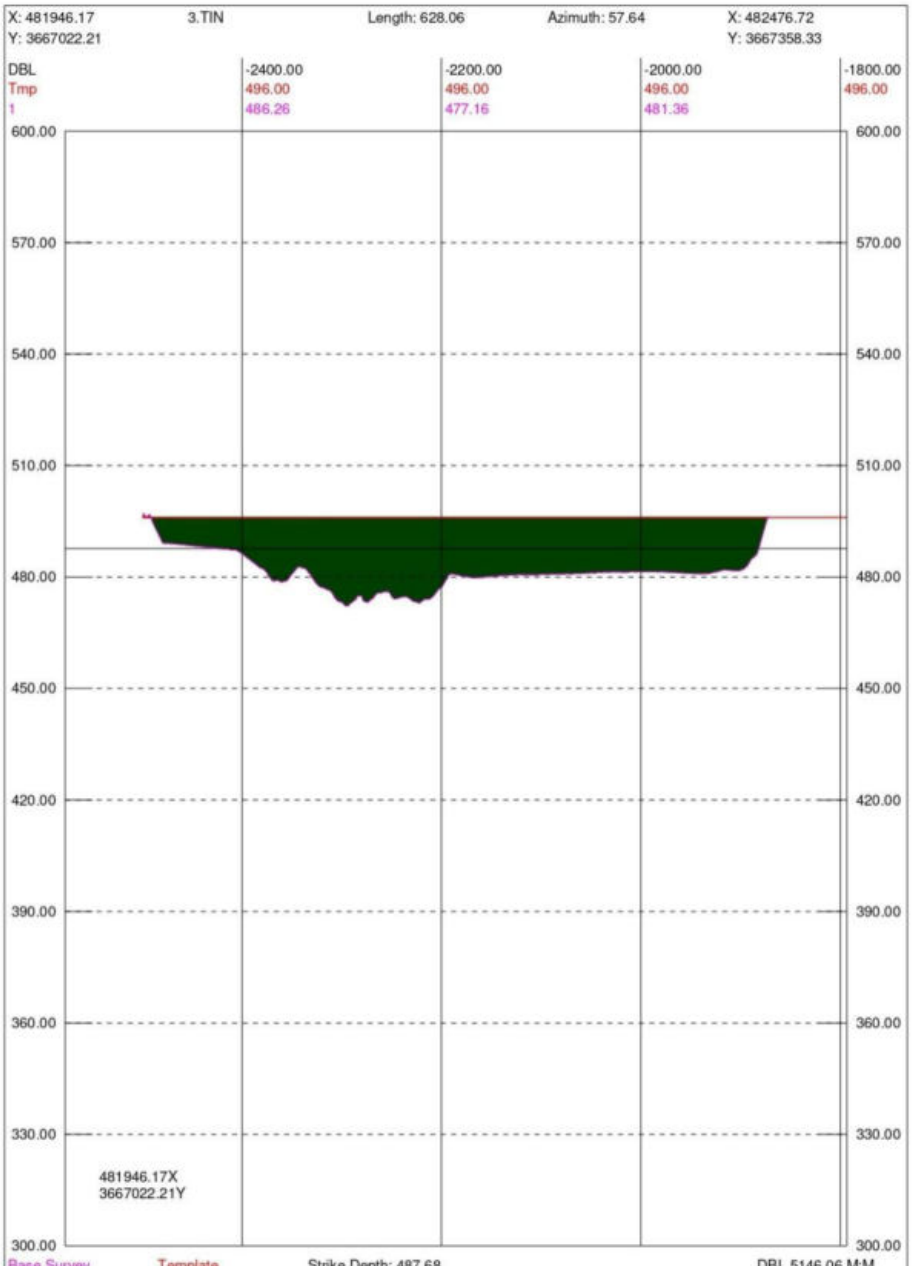
Seg	Design	Cut Area	Fill Area	Cut Vol	Fill Vol	OverDepth	Cut Area	Fill Area	Cut Vol	Fill Vol
1		45.12	1536.35	87991.26	25674602.23	All	0.00	1536.35	0.00	25674602.23
Total		45.12	1536.35	87991.26	25674602.23		0.00	1536.35	0.00	25674602.23
Accum				87991.26	25674602.23				0.00	25674602.23

RD60



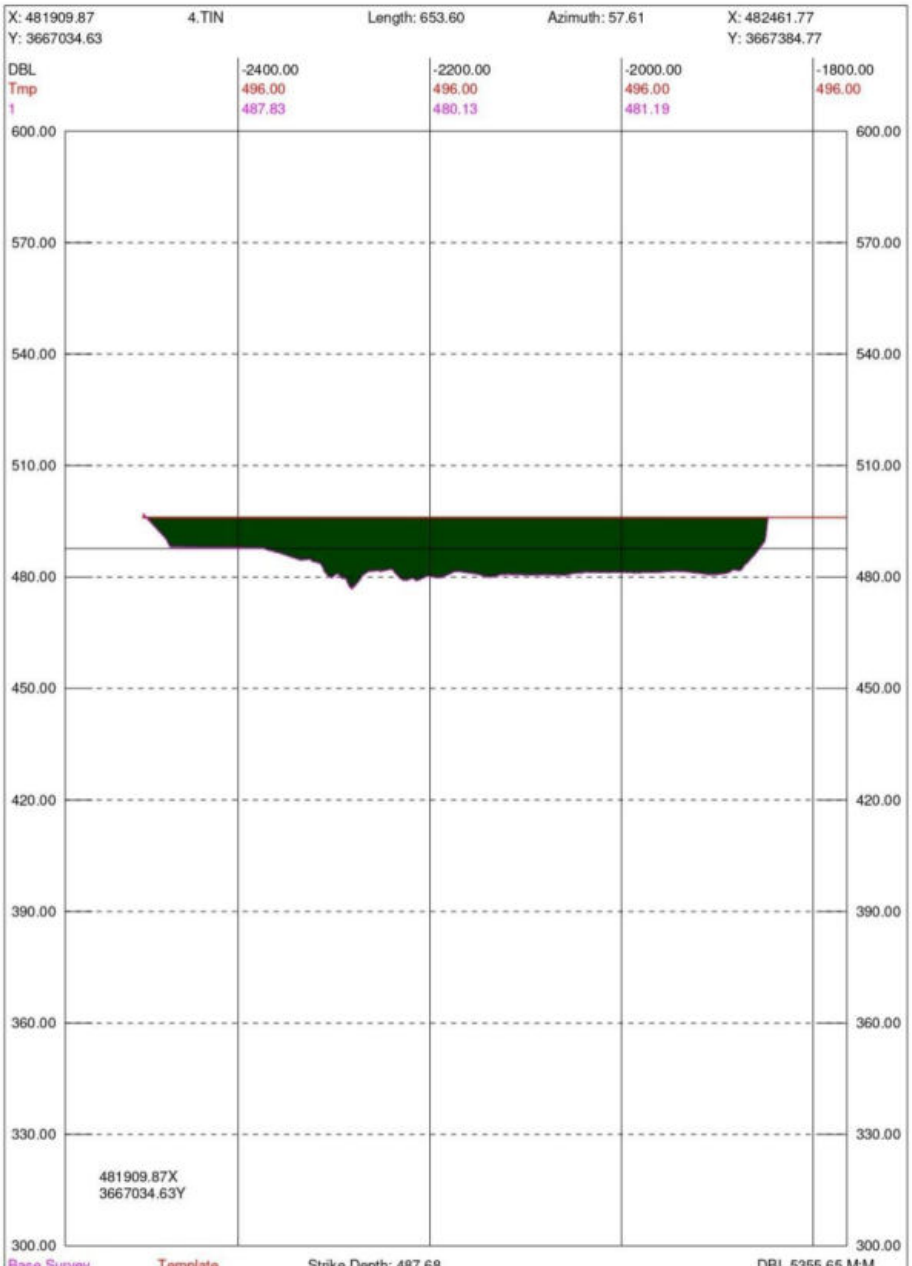
Seg	Design	Cut Area	Fill Area	Cut Vol	Fill Vol	OverDepth	Cut Area	Fill Area	Cut Vol	Fill Vol
1		6.10	9911.53	38903.65	7816560.88	All	0.00	9911.53	0.00	7816560.88
Total		6.10	9911.53	38903.65	7816560.88		0.00	9911.53	0.00	7816560.88
Accum				126894.91	33491163.11				0.00	33491163.11

RD90



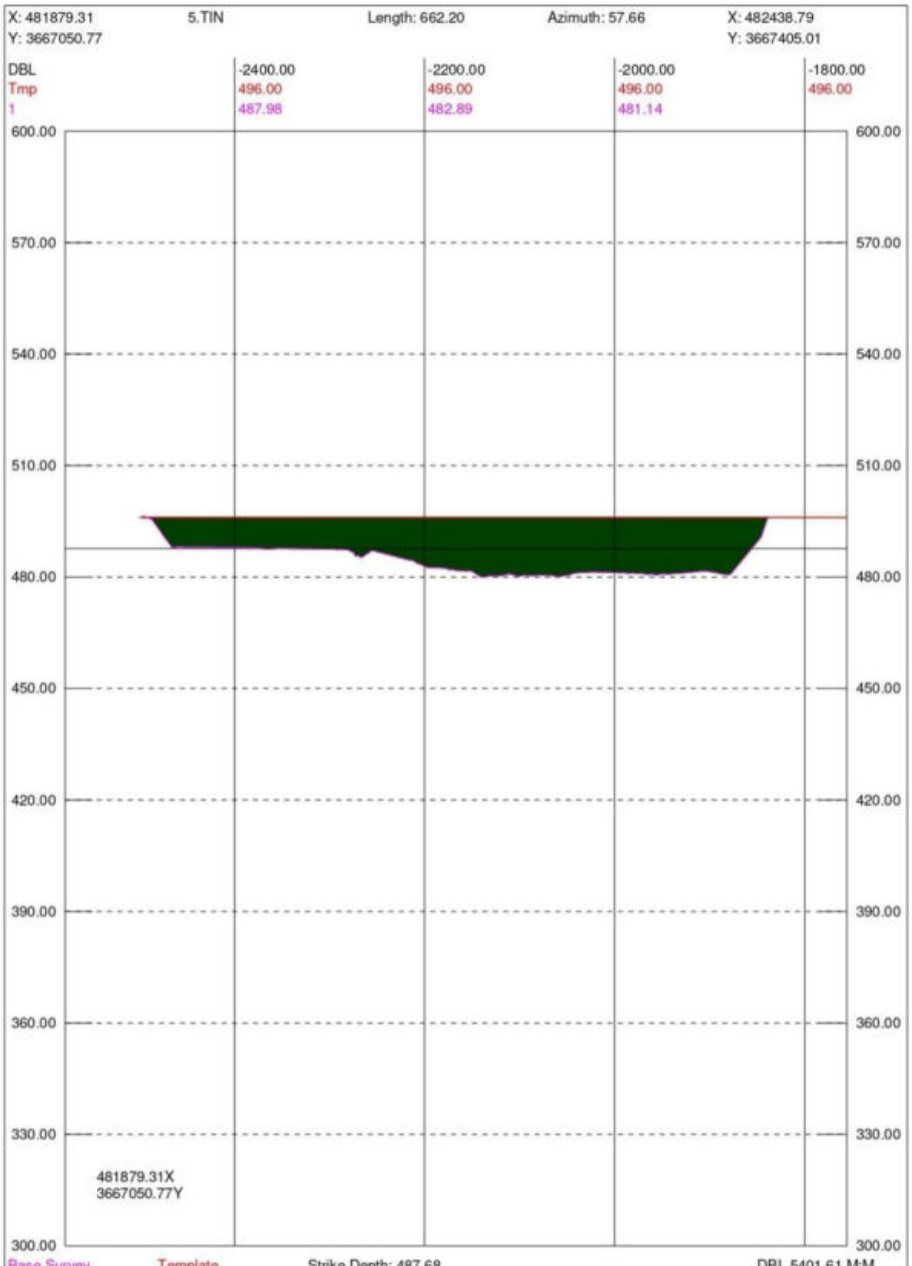
Seg	Design	Cut Area	Fill Area	Cut Vol	Fill Vol	OverDepth	Cut Area	Fill Area	Cut Vol	Fill Vol
1		3.83	9229.37	148.55	287484.64	All	0.00	9229.37	0.00	287484.64
Total		3.83	9229.37	148.55	287484.64		0.00	9229.37	0.00	287484.64
Accum				127043.46	33778647.75				0.00	33778647.75

RD120



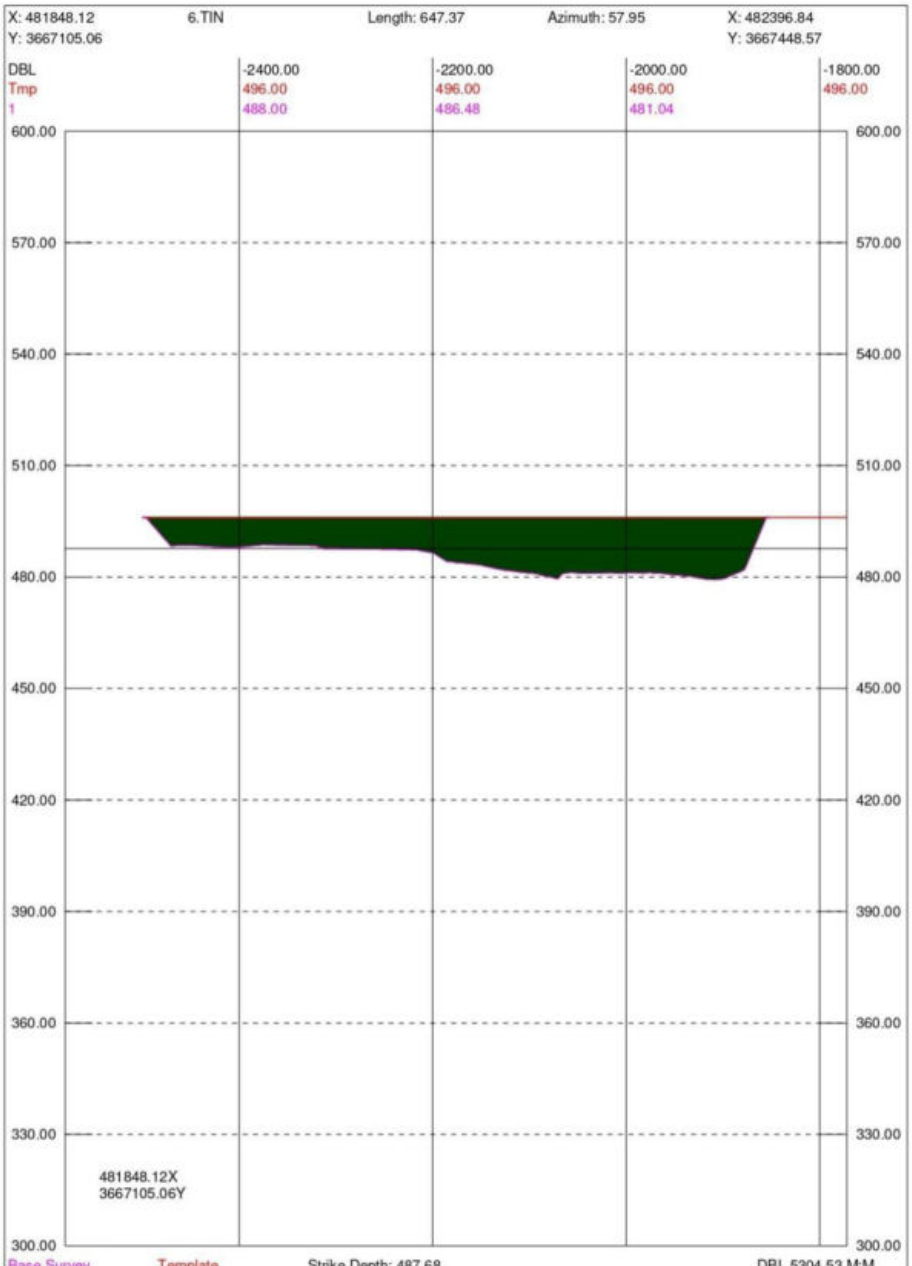
Seg	Design	Cut Area	Fill Area	Cut Vol	Fill Vol	OverDepth	Cut Area	Fill Area	Cut Vol	Fill Vol
1		1.48	8482.72	79.51	266957.51	All	0.00	8482.72	0.00	266957.51
Total		1.48	8482.72	79.51	266957.51		0.00	8482.72	0.00	266957.51
Accum				127122.98	34045605.26				0.00	34045605.26

RD130



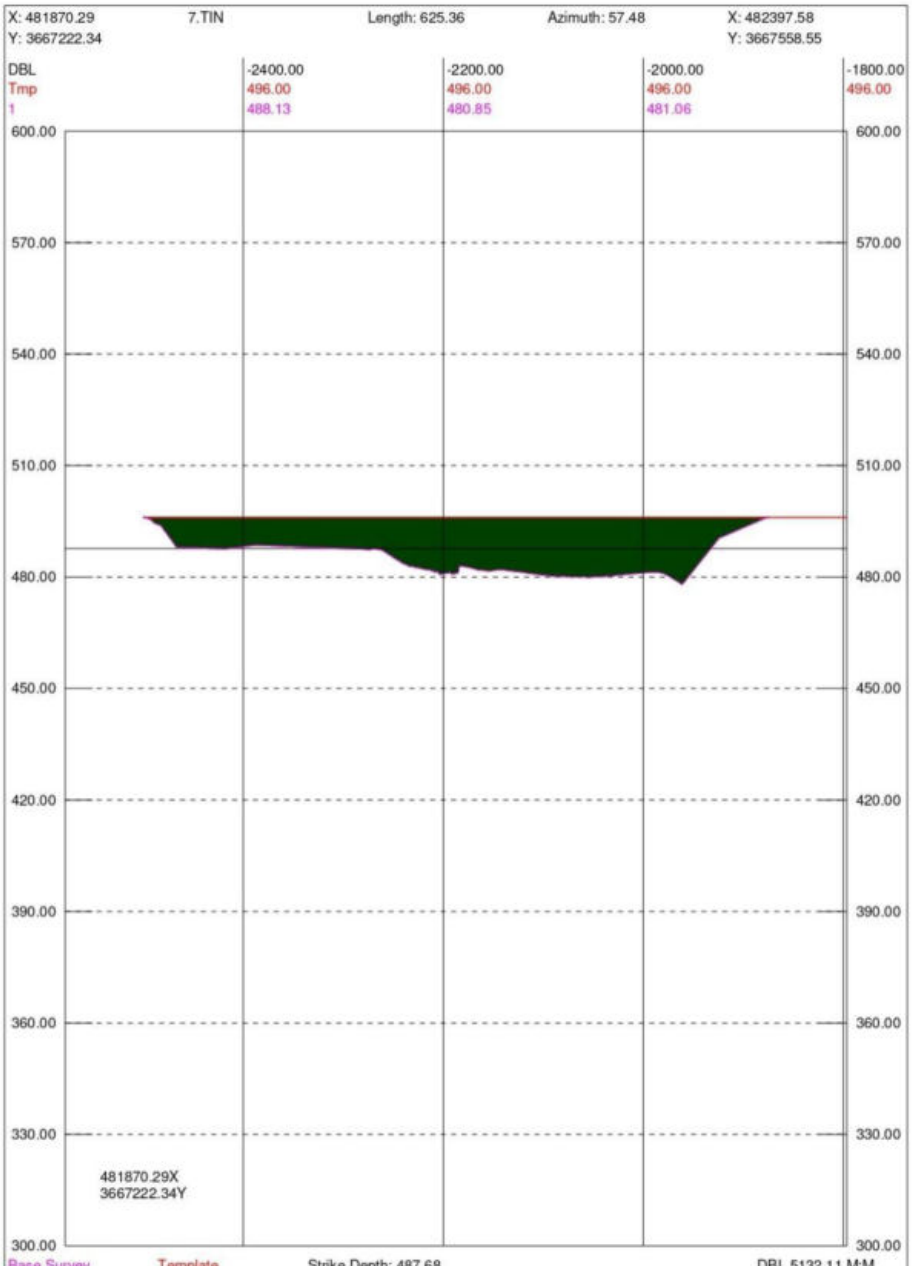
Seg	Design	Cut Area	Fill Area	Cut Vol	Fill Vol	OverDepth	Cut Area	Fill Area	Cut Vol	Fill Vol
1		0.74	7627.84	33.19	238928.23	All	0.00	7627.84	0.00	238928.23
Total		0.74	7627.84	33.19	238928.23		0.00	7627.84	0.00	238928.23
Accum				127156.17	34284533.48				0.00	34284533.48

RD210



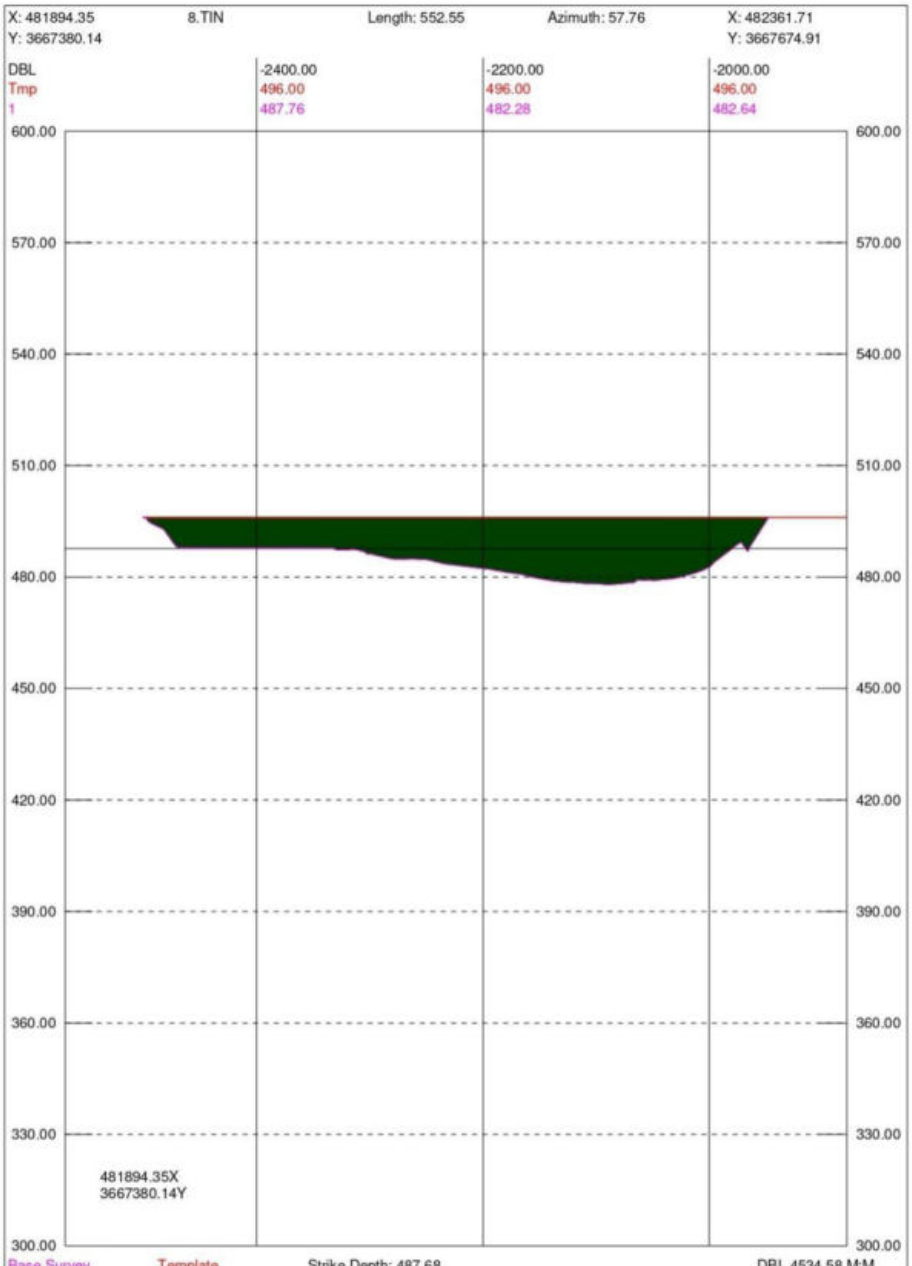
Seg	Design	Cut Area	Fill Area	Cut Vol	Fill Vol	OverDepth	Cut Area	Fill Area	Cut Vol	Fill Vol
1		0.42	7166.69	35.78	448585.09	All	0.00	7166.69	0.00	448585.09
Total		0.42	7166.69	35.78	448585.09		0.00	7166.69	0.00	448585.09
Accum				127191.95	34733118.58				0.00	34733118.58

RD300



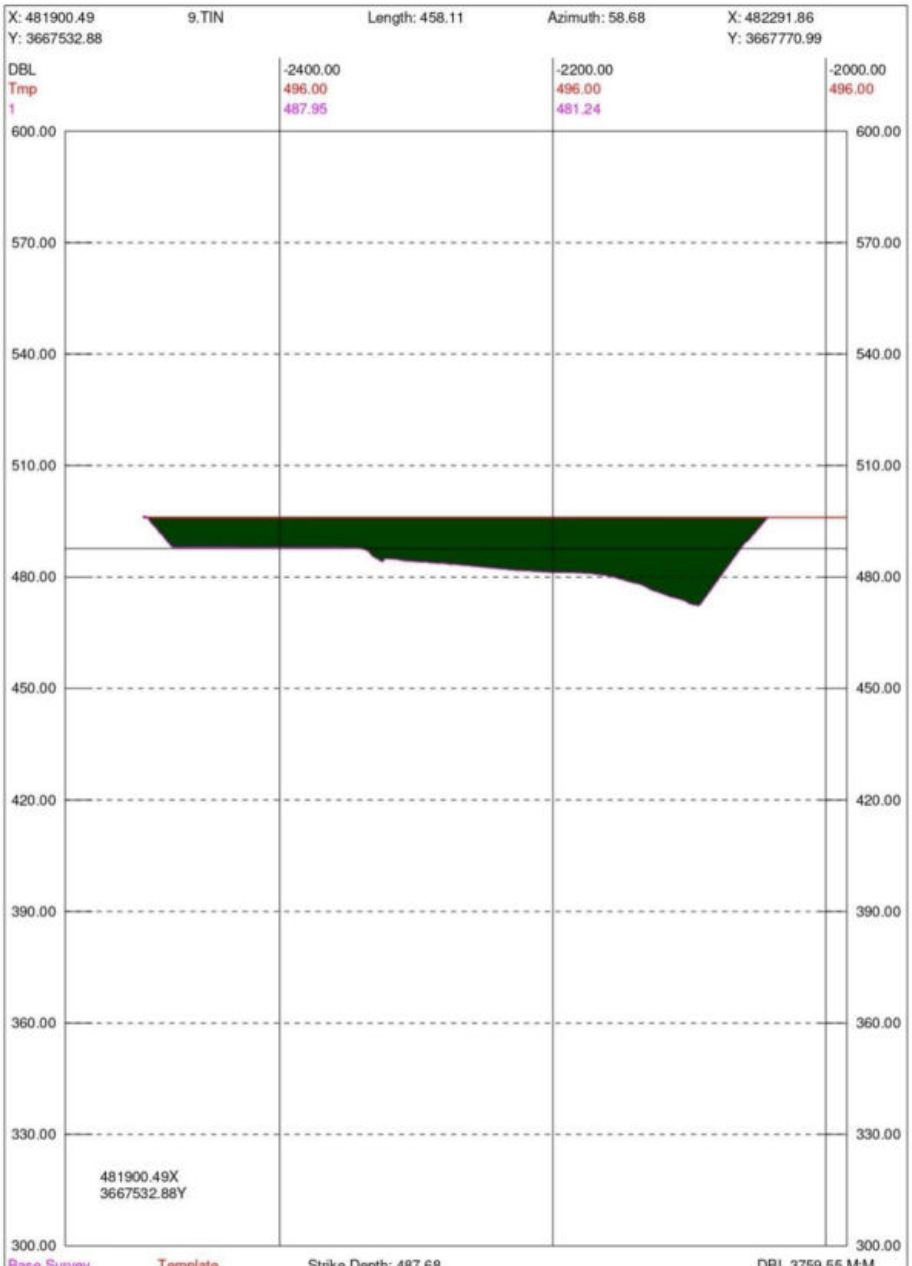
Seg	Design	Cut Area	Fill Area	Cut Vol	Fill Vol	OverDepth	Cut Area	Fill Area	Cut Vol	Fill Vol
1		0.40	6735.01	37.09	627468.66	All	0.00	6735.01	0.00	627468.66
Total		0.40	6735.01	37.09	627468.66		0.00	6735.01	0.00	627468.66
Accum				127229.04	35360587.24				0.00	35360587.24

RD420



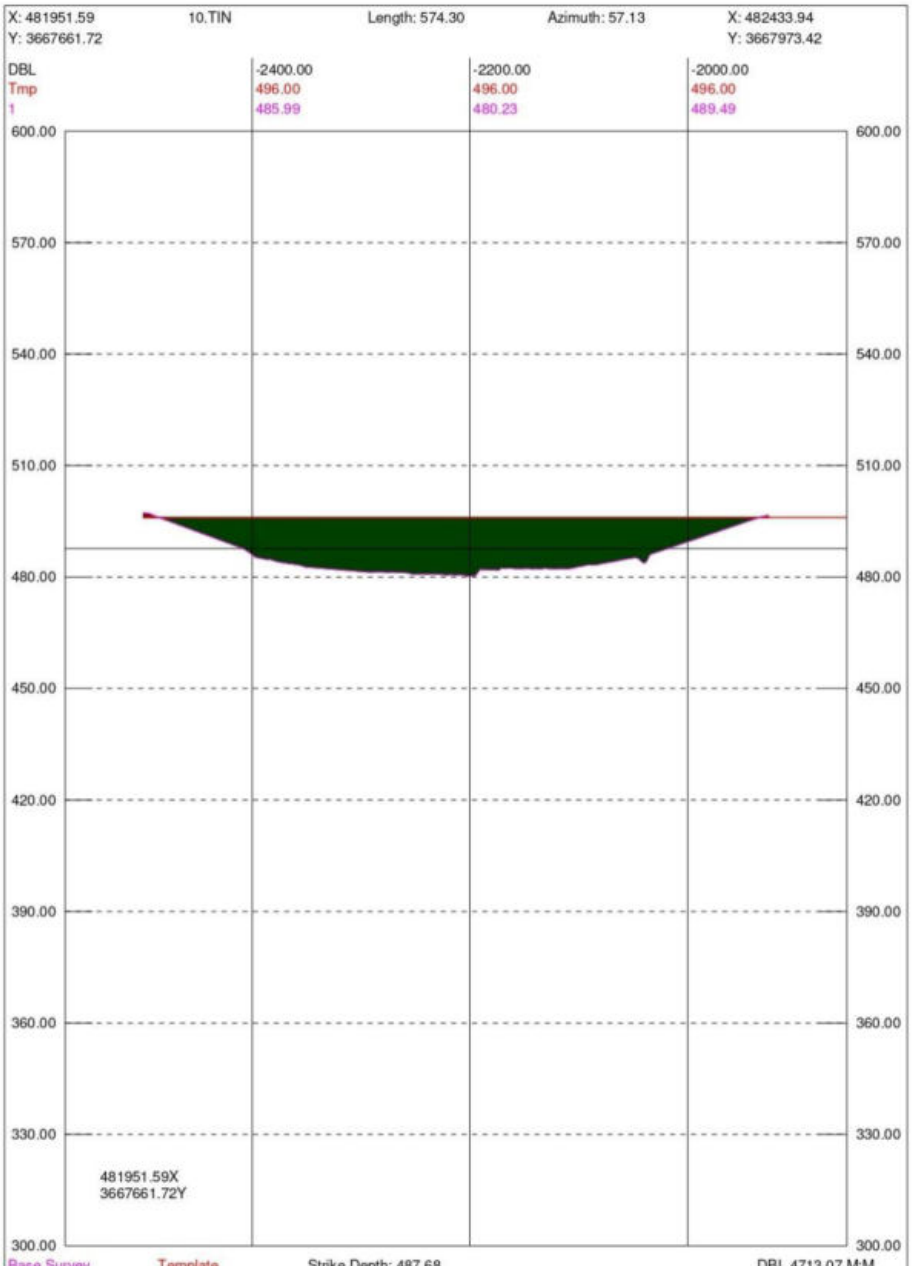
Seg	Design	Cut Area	Fill Area	Cut Vol	Fill Vol	OverDepth	Cut Area	Fill Area	Cut Vol	Fill Vol
1		0.12	6383.74	30.96	779057.49	All	0.00	6383.74	0.00	779057.49
Total		0.12	6383.74	30.96	779057.49		0.00	6383.74	0.00	779057.49
Accum				127260.00	36139644.74				0.00	36139644.74

RD540



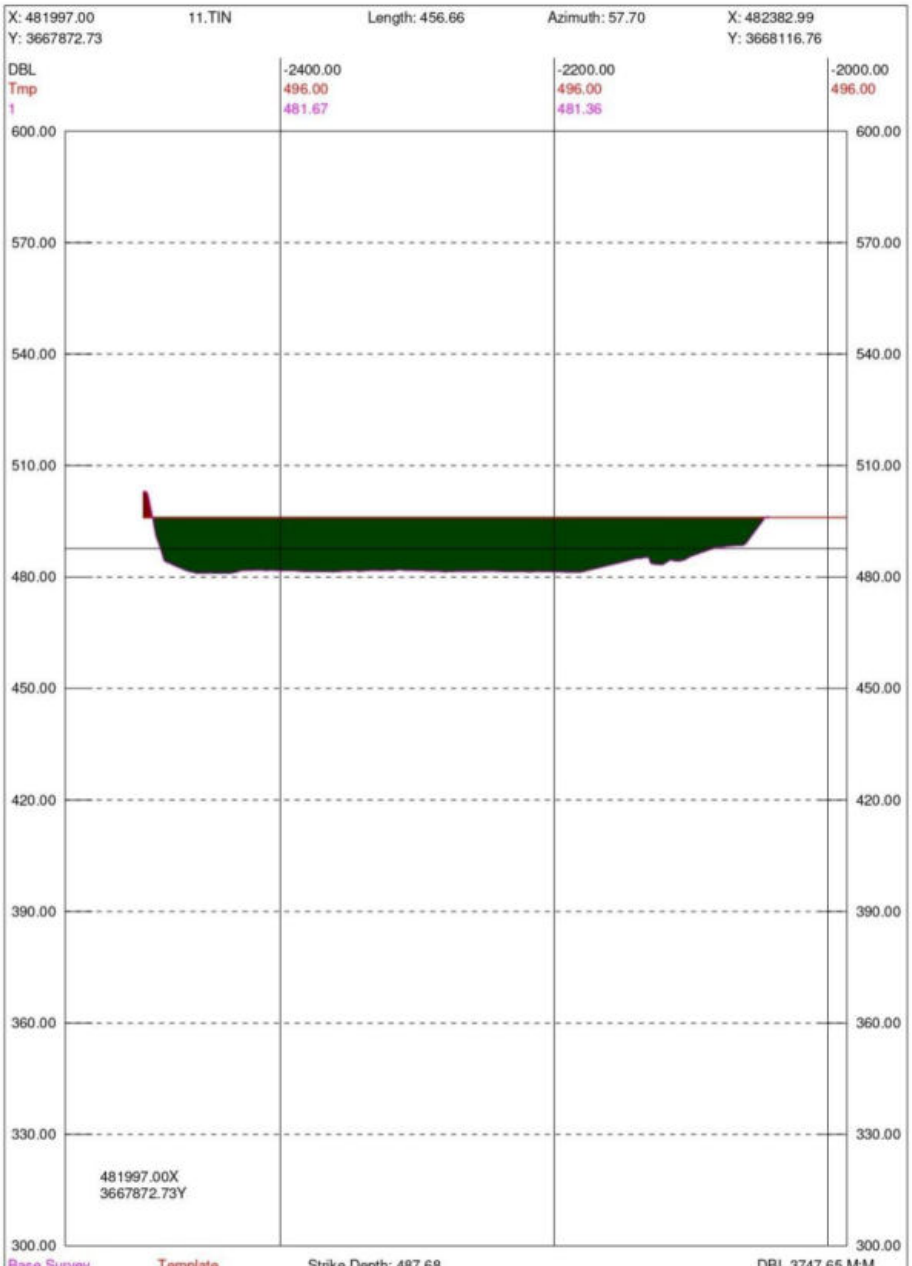
Seg	Design	Cut Area	Fill Area	Cut Vol	Fill Vol	OverDepth	Cut Area	Fill Area	Cut Vol	Fill Vol
1		0.88	5458.28	63.24	721909.37	All	0.00	5458.28	0.00	721909.37
Total		0.88	5458.28	63.24	721909.37		0.00	5458.28	0.00	721909.37
Accum				127323.25	36861554.11				0.00	36861554.11

RD630



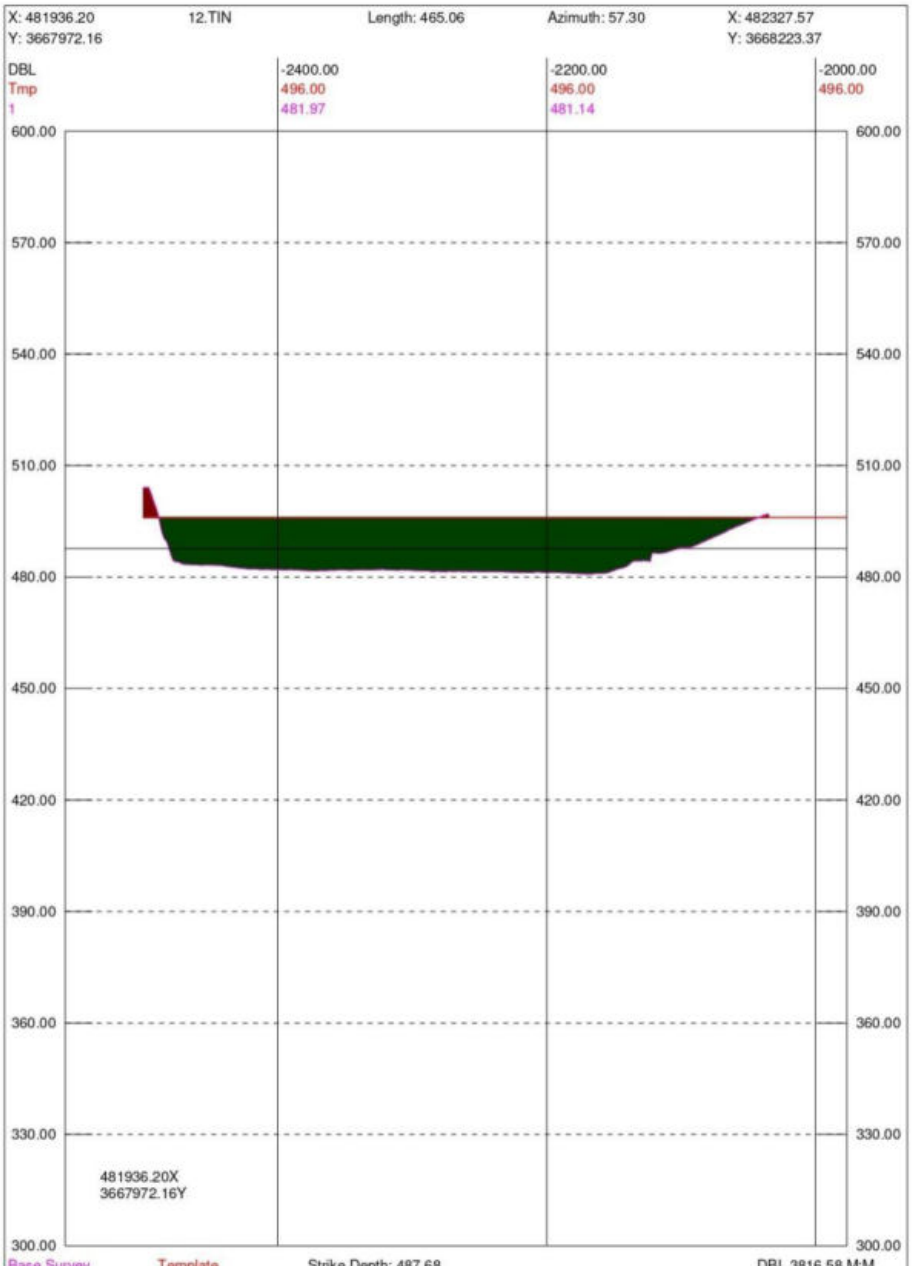
Seg	Design	Cut Area	Fill Area	Cut Vol	Fill Vol	OverDepth	Cut Area	Fill Area	Cut Vol	Fill Vol
1		13.80	5873.42	624.76	506961.64	All	0.00	5873.42	0.00	506961.64
Total		13.80	5873.42	624.76	506961.64		0.00	5873.42	0.00	506961.64
Accum				127948.01	37368515.75				0.00	37368515.75

RD780



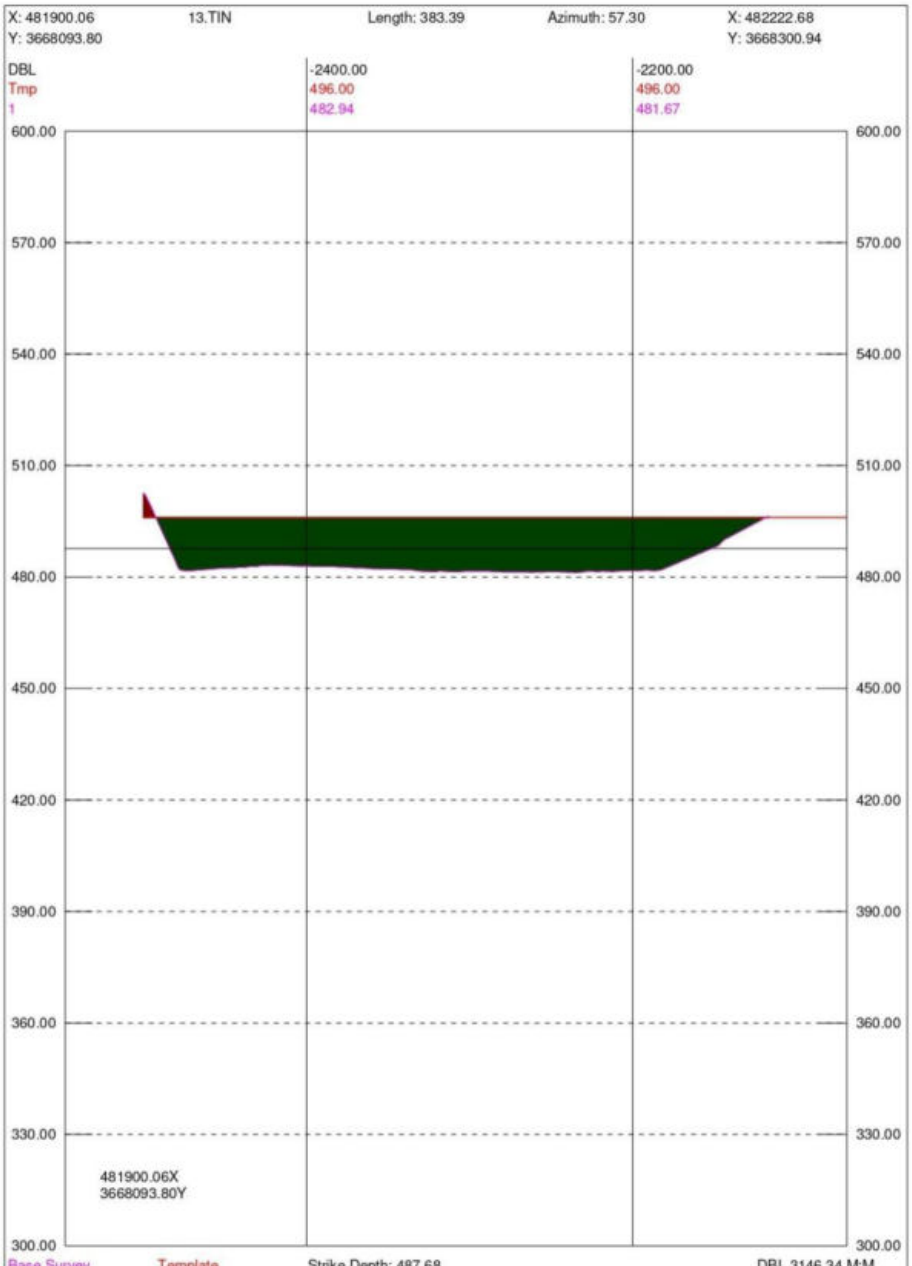
Seg	Design	Cut Area	Fill Area	Cut Vol	Fill Vol	OverDepth	Cut Area	Fill Area	Cut Vol	Fill Vol
1		34.01	5826.34	3655.82	882418.38	All	0.00	5826.34	0.00	882418.38
Total		34.01	5826.34	3655.82	882418.38		0.00	5826.34	0.00	882418.38
Accum				131603.83	38250934.13				0.00	38250934.13

RD900



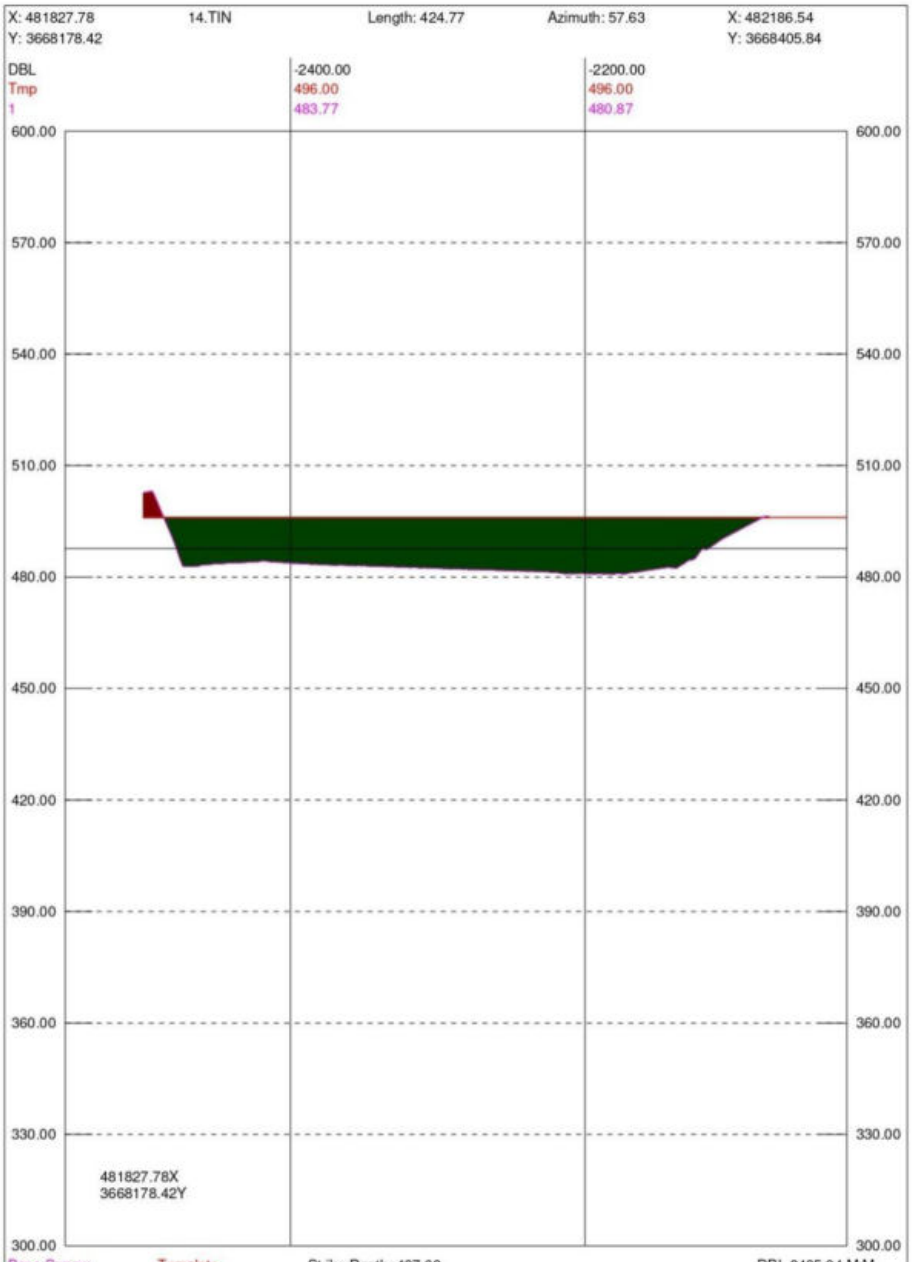
Seg	Design	Cut Area	Fill Area	Cut Vol	Fill Vol	OverDepth	Cut Area	Fill Area	Cut Vol	Fill Vol
1		67.91	5520.81	5946.53	669545.70	All	0.00	5520.81	0.00	669545.70
Total		67.91	5520.81	5946.53	669545.70		0.00	5520.81	0.00	669545.70
Accum				137550.36	38920479.83				0.00	38920479.83

RD1020



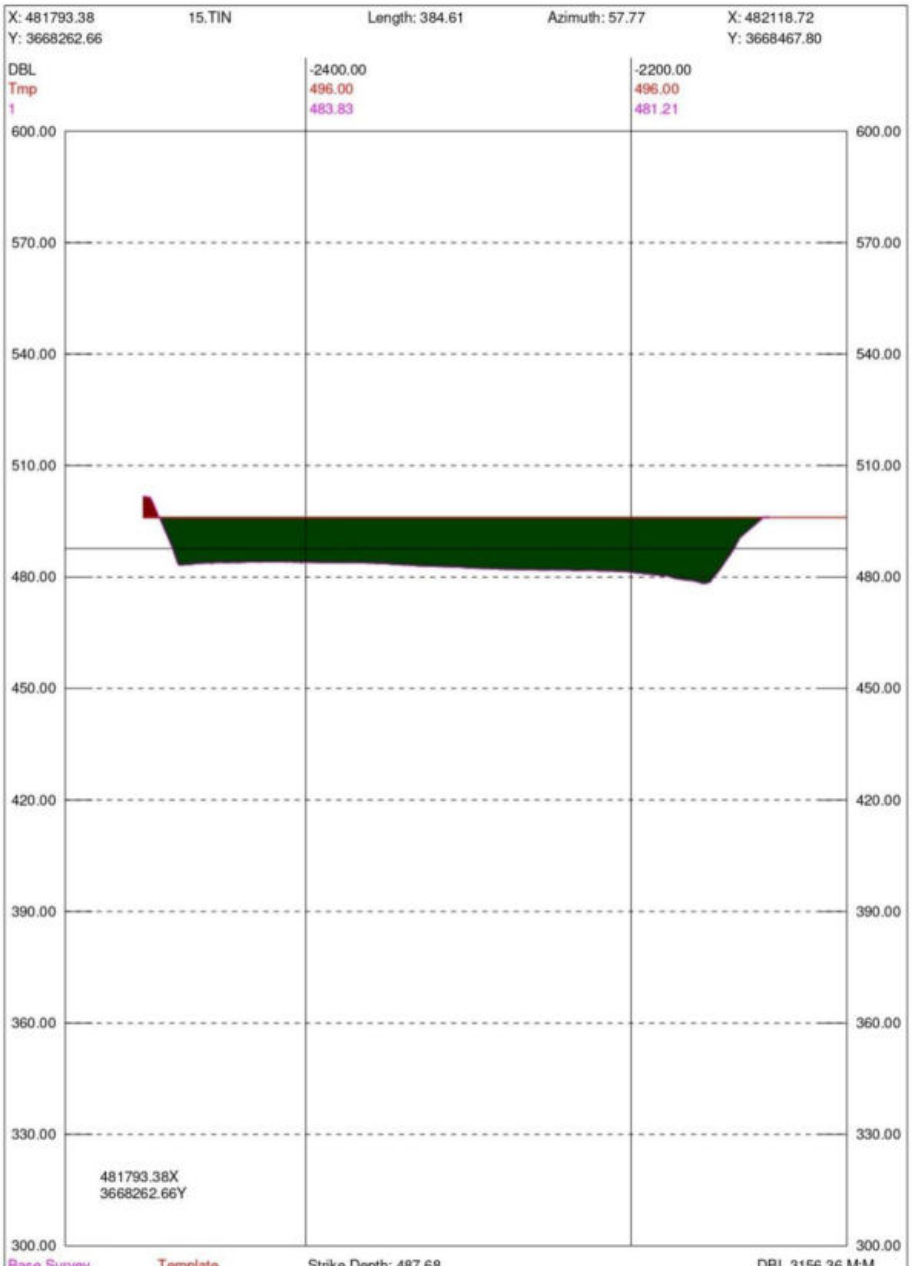
Seg	Design	Cut Area	Fill Area	Cut Vol	Fill Vol	OverDepth	Cut Area	Fill Area	Cut Vol	Fill Vol
1		27.97	4722.63	5843.02	624401.29	All	0.00	4722.63	0.00	624401.29
Total		27.97	4722.63	5843.02	624401.29		0.00	4722.63	0.00	624401.29
Accum				143393.38	39544881.12				0.00	39544881.12

RD1130



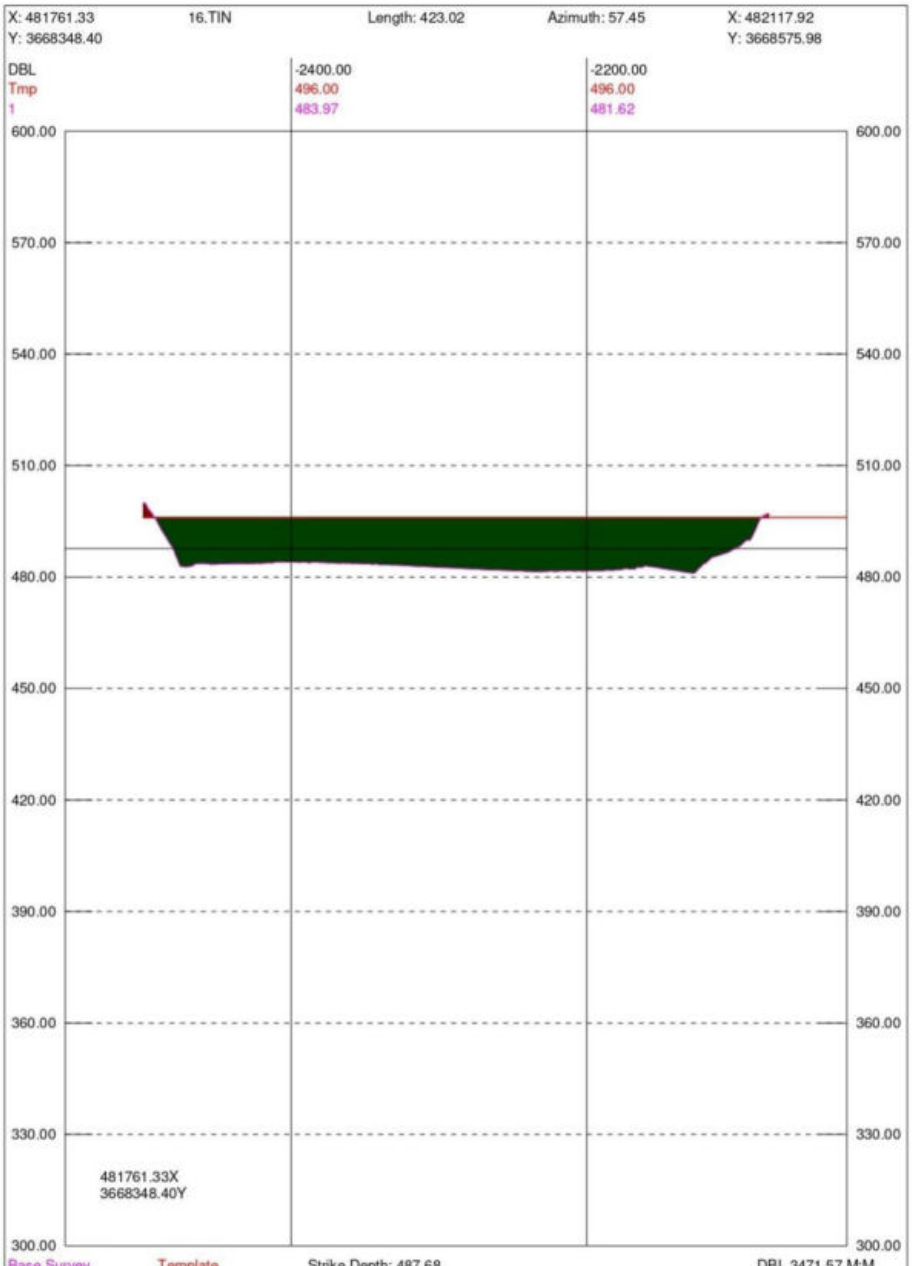
Seg	Design	Cut Area	Fill Area	Cut Vol	Fill Vol	OverDepth	Cut Area	Fill Area	Cut Vol	Fill Vol
1		71.32	5020.17	5468.50	531272.58	All	0.00	5020.17	0.00	531272.58
Total		71.32	5020.17	5468.50	531272.58		0.00	5020.17	0.00	531272.58
Accum				148861.88	40076153.69				0.00	40076153.69

RD1220



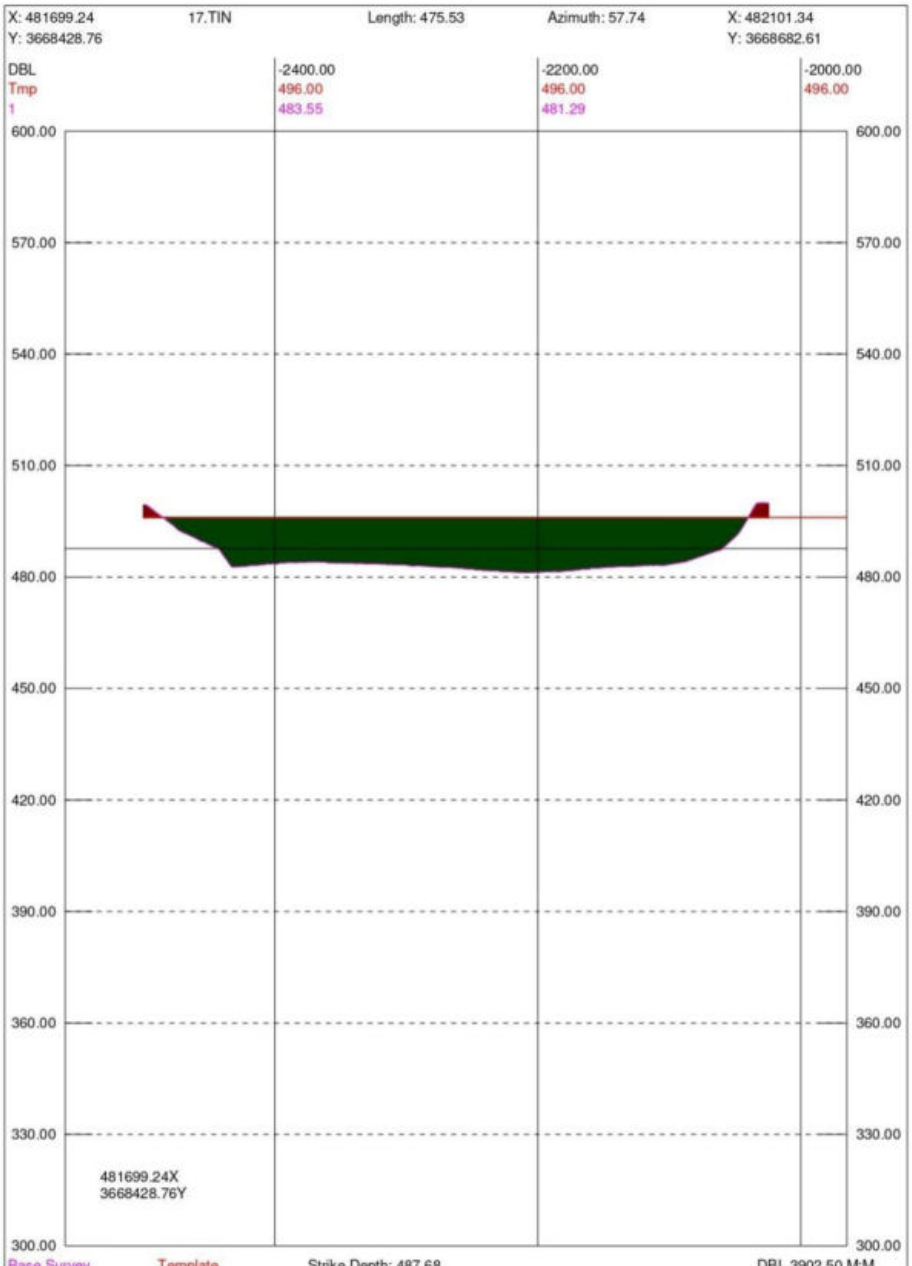
Seg	Design	Cut Area	Fill Area	Cut Vol	Fill Vol	OverDepth	Cut Area	Fill Area	Cut Vol	Fill Vol
1		39.70	4762.52	4971.69	435771.32	All	0.00	4762.52	0.00	435771.32
Total		39.70	4762.52	4971.69	435771.32		0.00	4762.52	0.00	435771.32
Accum				153833.57	40511925.01				0.00	40511925.01

RD1310



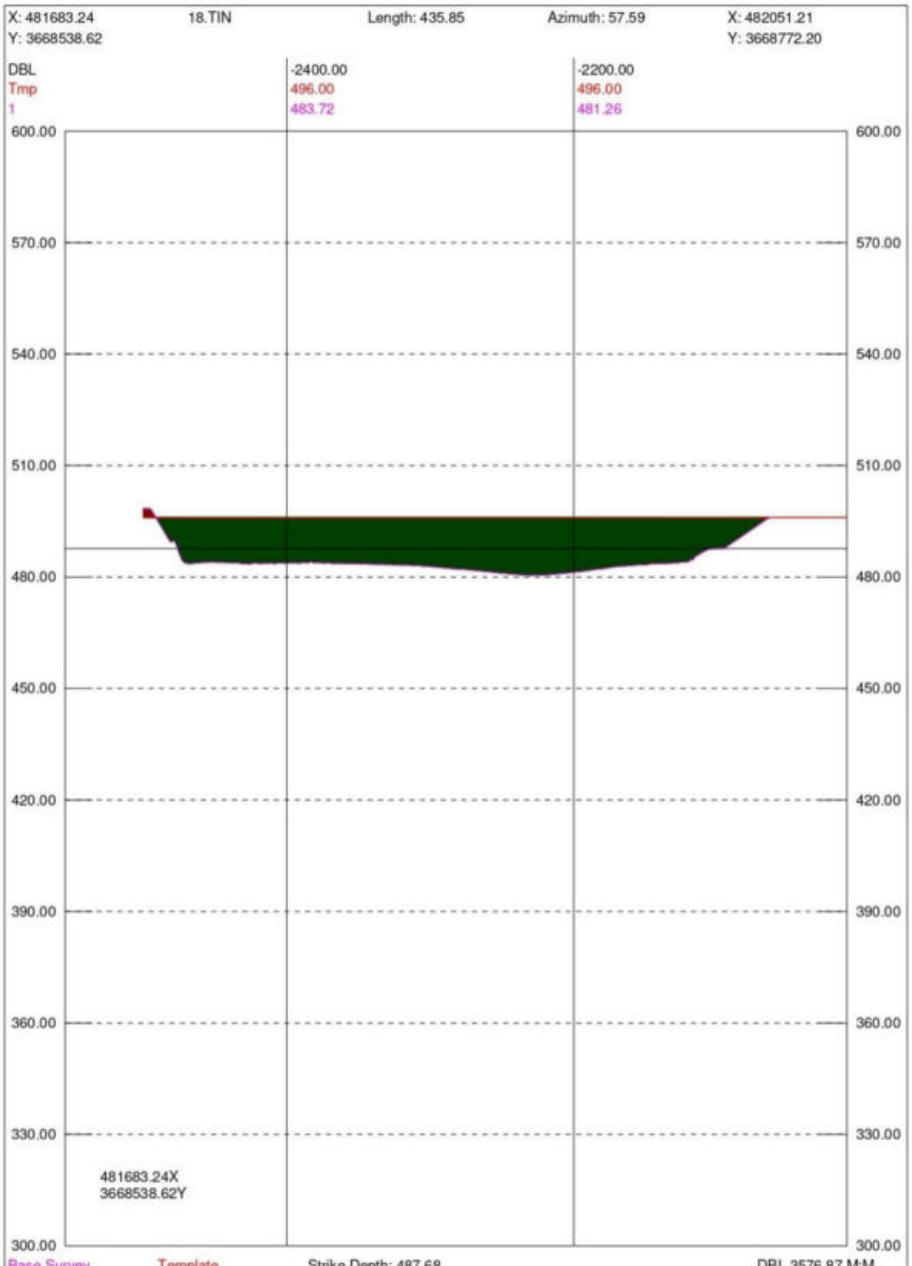
Seg	Design	Cut Area	Fill Area	Cut Vol	Fill Vol	OverDepth	Cut Area	Fill Area	Cut Vol	Fill Vol
1		19.63	5127.75	2661.68	448558.30	All	0.00	5127.75	0.00	448558.30
Total		19.63	5127.75	2661.68	448558.30		0.00	5127.75	0.00	448558.30
Accum				156495.25	40960483.31				0.00	40960483.31

RD1410



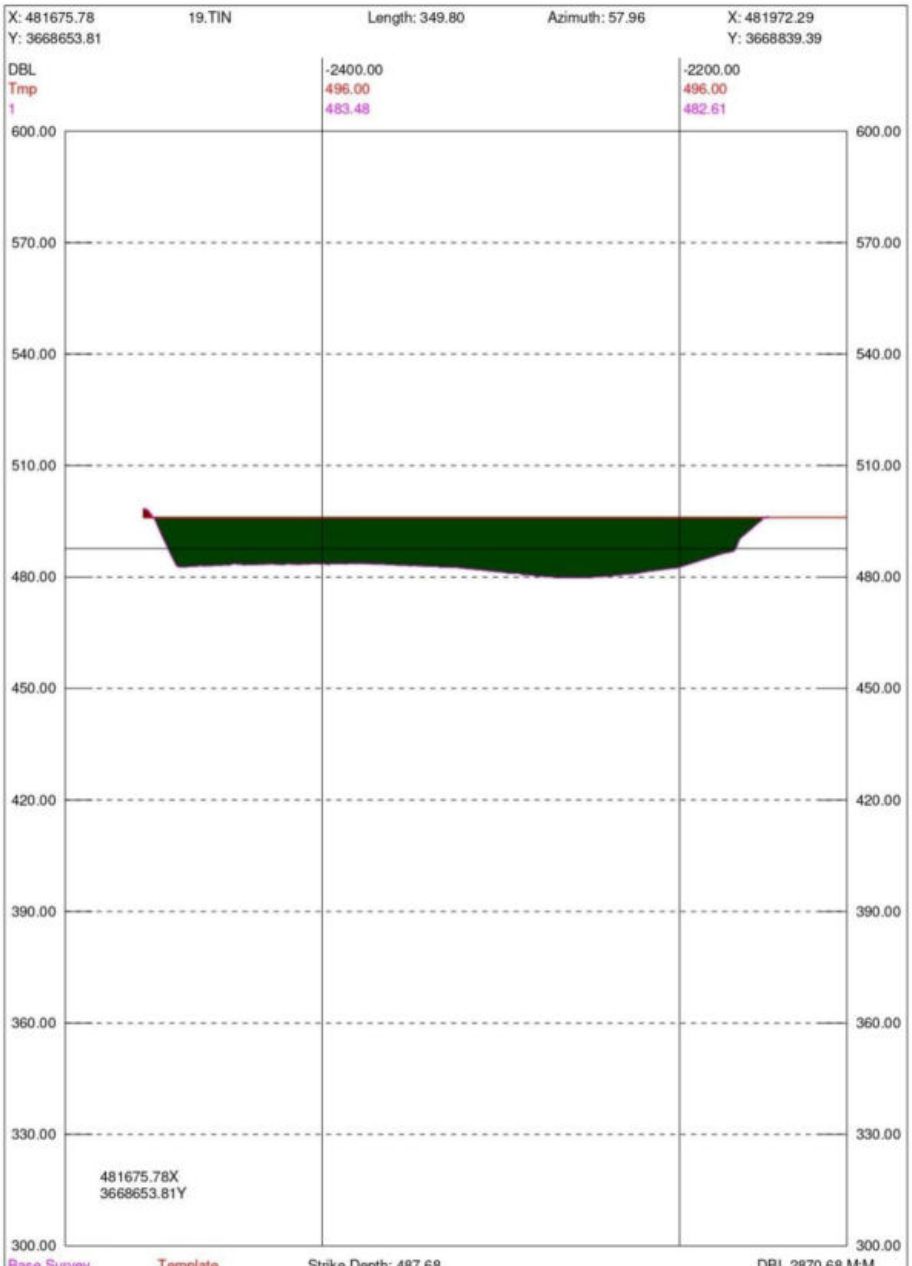
Seg	Design	Cut Area	Fill Area	Cut Vol	Fill Vol	OverDepth	Cut Area	Fill Area	Cut Vol	Fill Vol
1		77.10	5245.21	4831.61	518585.10	All	0.00	5245.21	0.00	518585.10
Total		77.10	5245.21	4831.61	518585.10		0.00	5245.21	0.00	518585.10
Accum				161326.86	41479068.41				0.00	41479068.41

RD1510



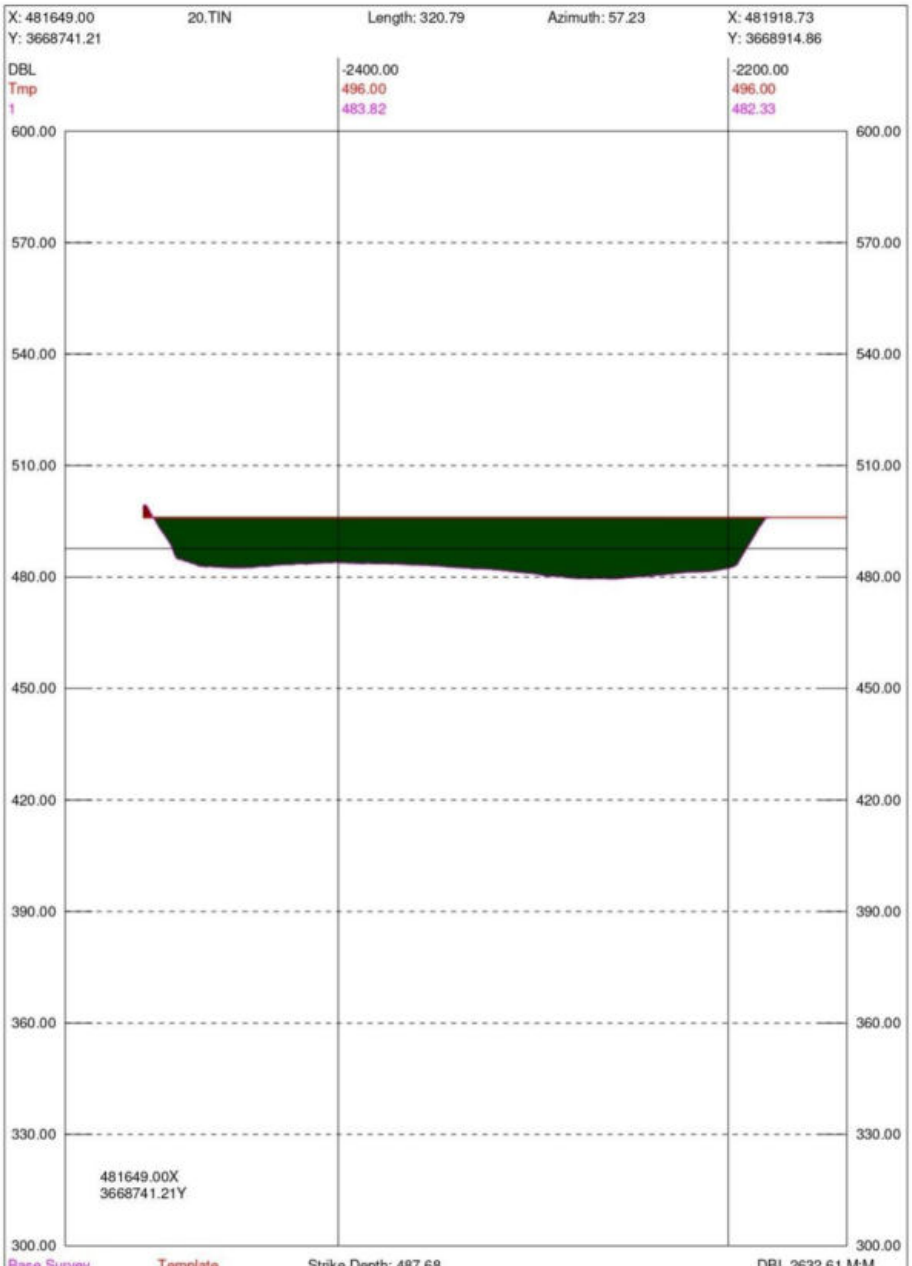
Seg	Design	Cut Area	Fill Area	Cut Vol	Fill Vol	OverDepth	Cut Area	Fill Area	Cut Vol	Fill Vol
1		16.32	5125.56	4763.70	528678.56	All	0.00	5125.56	0.00	528678.56
Total		16.32	5125.56	4763.70	528678.56		0.00	5125.56	0.00	528678.56
Accum				166090.56	42007746.97				0.00	42007746.97

RD1610



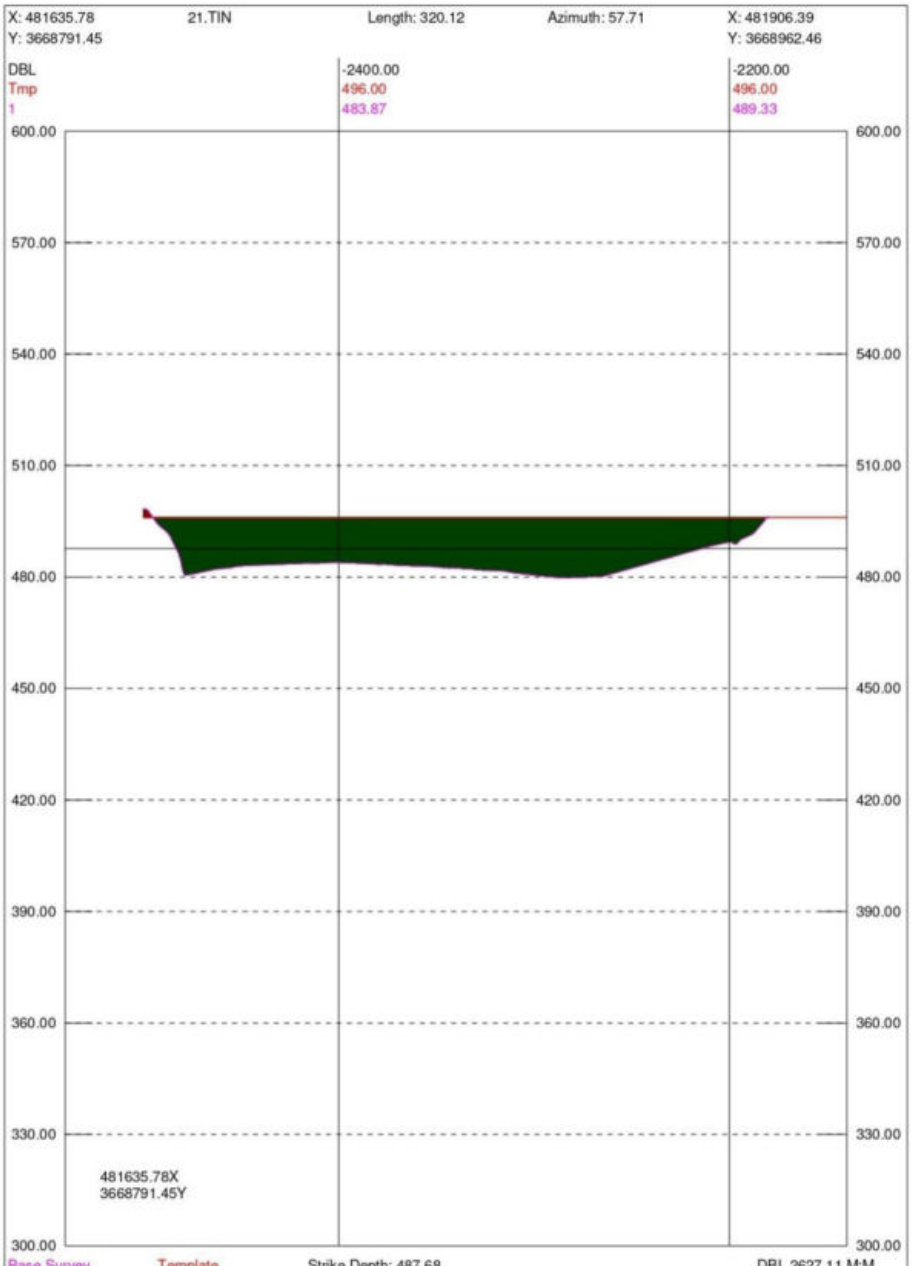
Seg	Design	Cut Area	Fill Area	Cut Vol	Fill Vol	OverDepth	Cut Area	Fill Area	Cut Vol	Fill Vol
1		9.28	4373.64	1297.49	475714.65	All	0.00	4373.64	0.00	475714.65
Total		9.28	4373.64	1297.49	475714.65		0.00	4373.64	0.00	475714.65
Accum				167388.05	42483461.62				0.00	42483461.62

RD1700



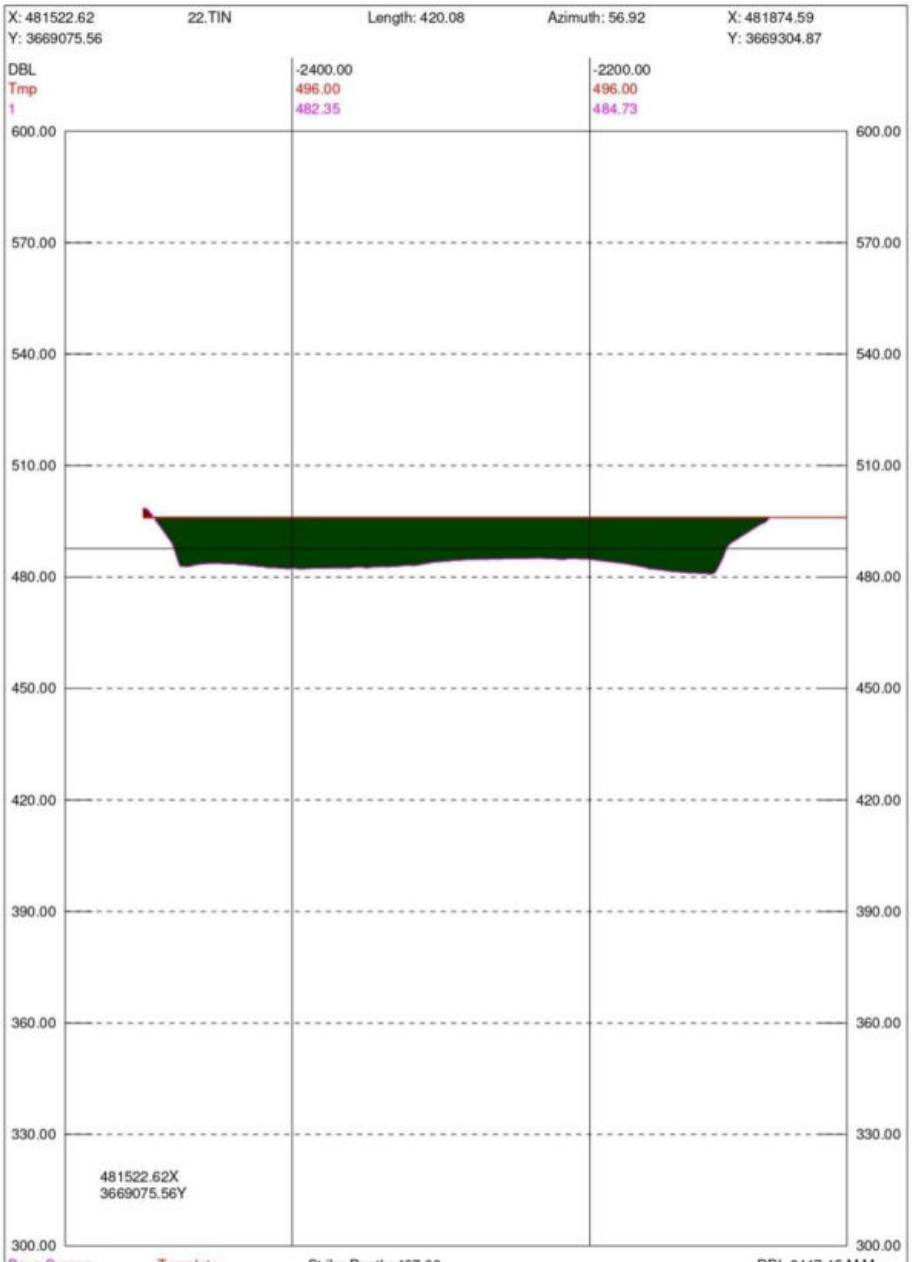
Seg	Design	Cut Area	Fill Area	Cut Vol	Fill Vol	OverDepth	Cut Area	Fill Area	Cut Vol	Fill Vol
1		10.95	4168.00	892.82	385817.32	All	0.00	4168.00	0.00	385817.32
Total		10.95	4168.00	892.82	385817.32		0.00	4168.00	0.00	385817.32
Accum				168280.87	42869278.94				0.00	42869278.94

RD1750



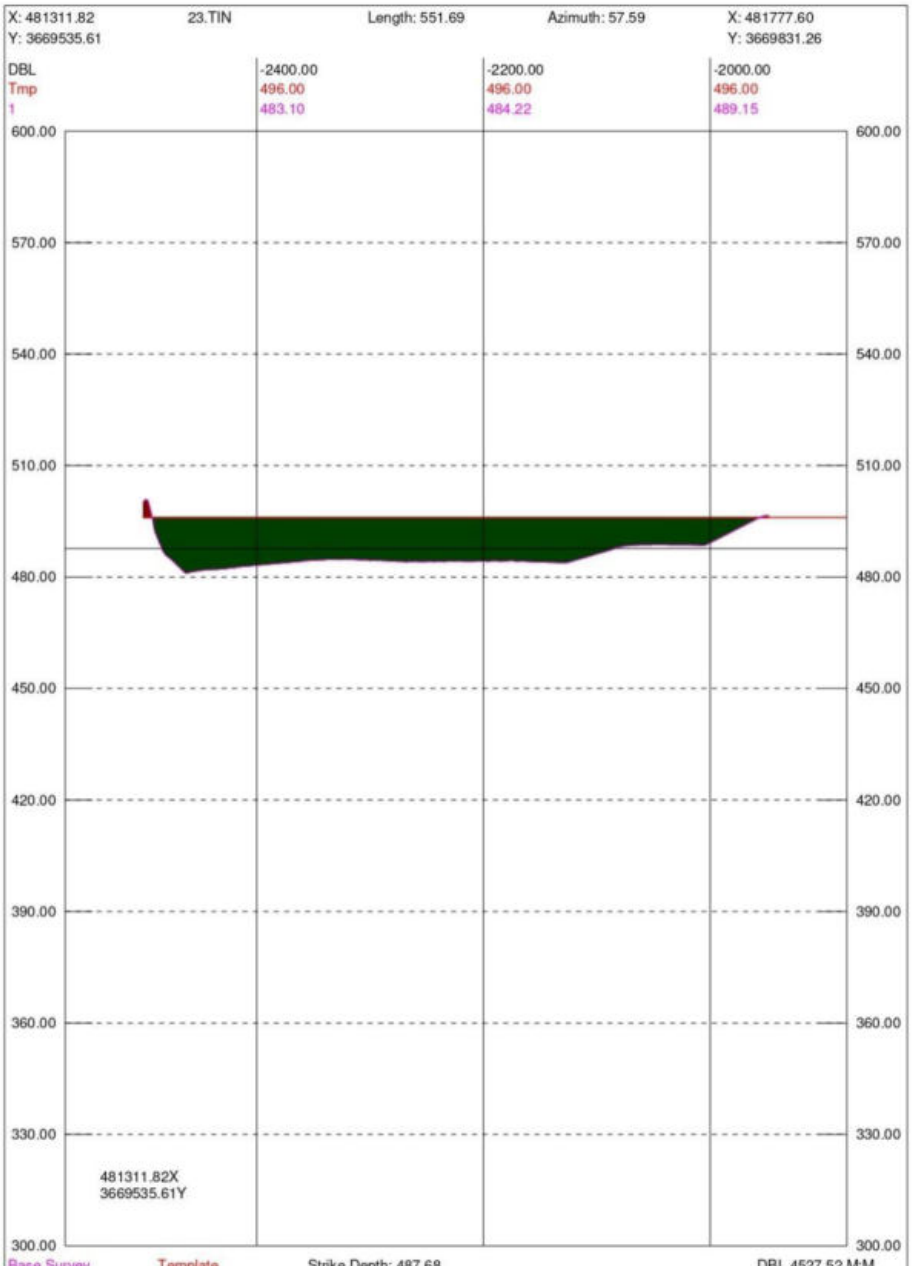
Seg	Design	Cut Area	Fill Area	Cut Vol	Fill Vol	OverDepth	Cut Area	Fill Area	Cut Vol	Fill Vol
1		7.70	3852.88	460.90	192875.83	All	0.00	3852.88	0.00	192875.83
Total		7.70	3852.88	460.90	192875.83		0.00	3852.88	0.00	192875.83
Accum				168741.77	43062154.77				0.00	43062154.77

RD2050



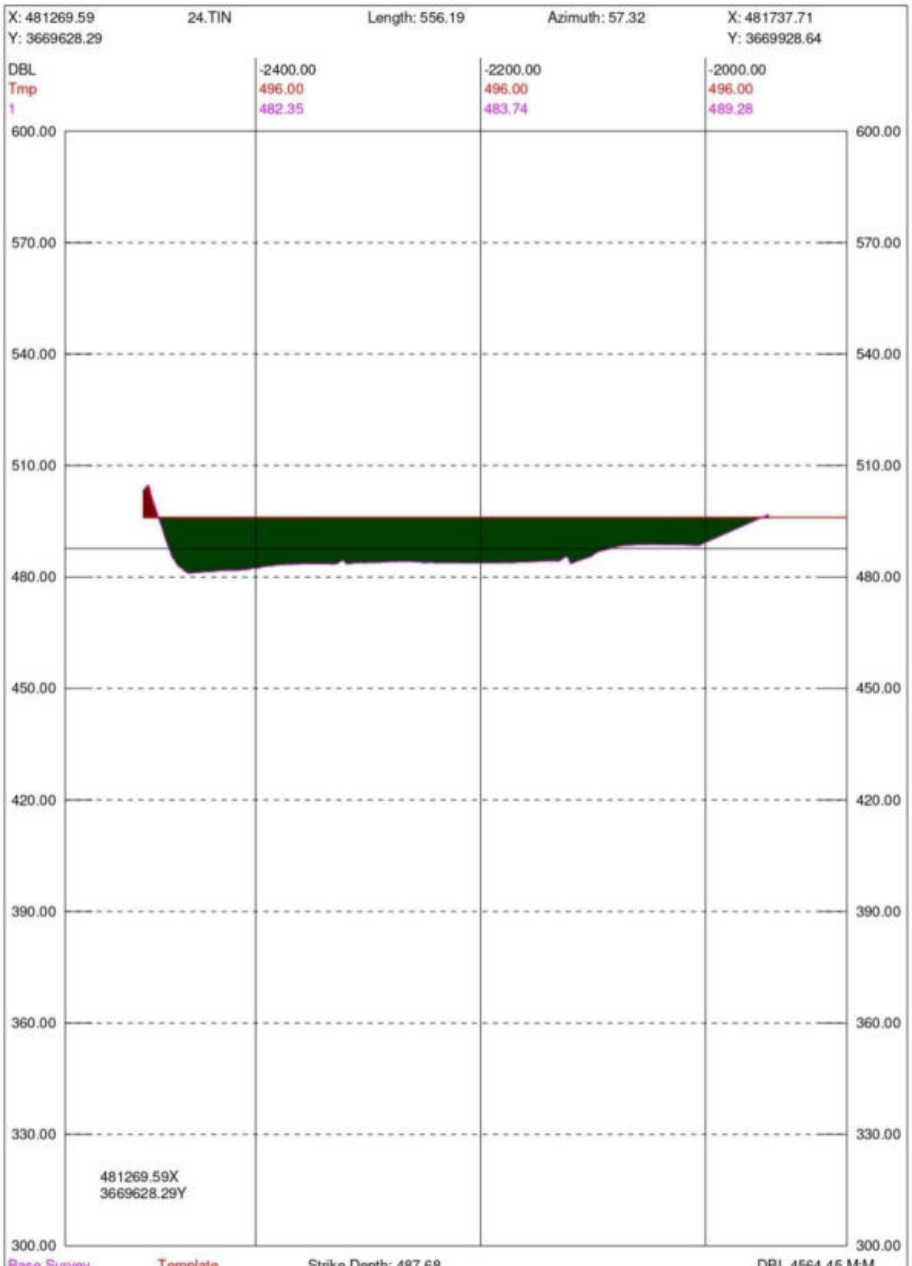
Seg	Design	Cut Area	Fill Area	Cut Vol	Fill Vol	OverDepth	Cut Area	Fill Area	Cut Vol	Fill Vol
1		11.26	4857.38	2846.71	1318720.14	All	0.00	4857.38	0.00	1318720.14
Total		11.26	4857.38	2846.71	1318720.14		0.00	4857.38	0.00	1318720.14
Accum				171588.48	44380874.91				0.00	44380874.91

RD2550



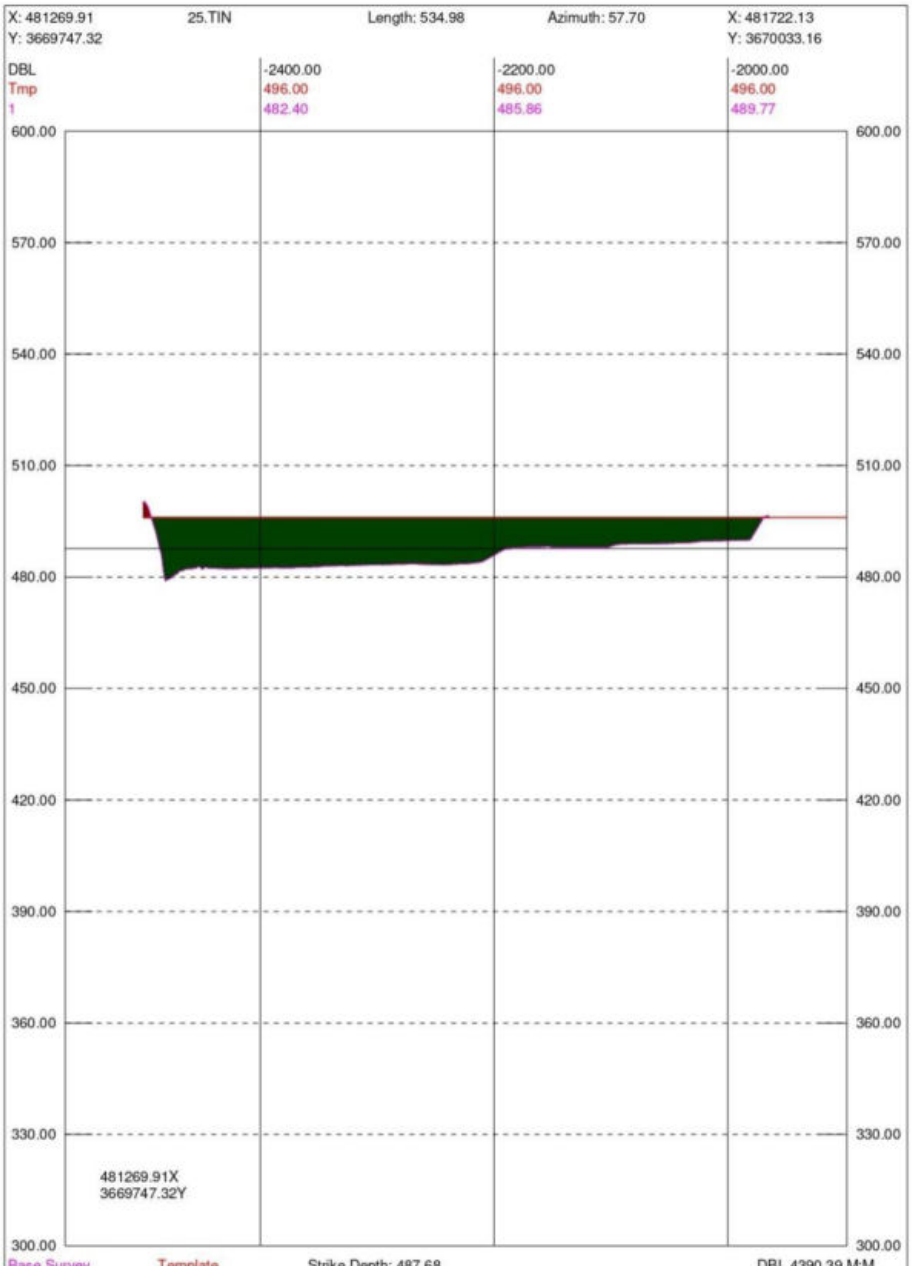
Seg	Design	Cut Area	Fill Area	Cut Vol	Fill Vol	OverDepth	Cut Area	Fill Area	Cut Vol	Fill Vol
1		30.89	5617.96	10548.36	2609705.99	All	0.00	5617.96	0.00	2609705.99
Total		30.89	5617.96	10548.36	2609705.99		0.00	5617.96	0.00	2609705.99
Accum				182136.84	46990580.90				0.00	46990580.90

RD2650



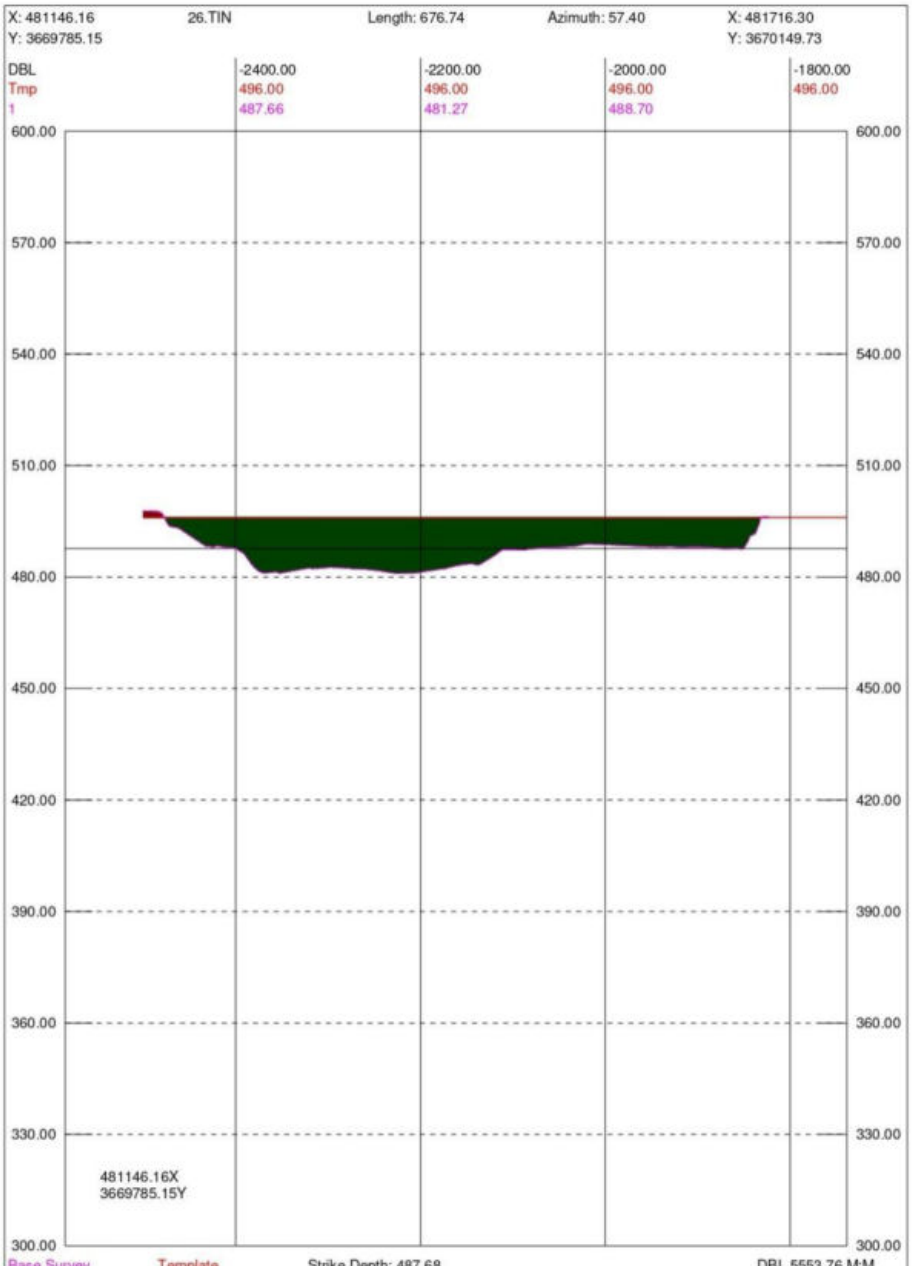
Seg	Design	Cut Area	Fill Area	Cut Vol	Fill Vol	OverDepth	Cut Area	Fill Area	Cut Vol	Fill Vol
1		76.95	5695.24	5445.95	577193.21	All	0.00	5695.24	0.00	577193.21
Total		76.95	5695.24	5445.95	577193.21		0.00	5695.24	0.00	577193.21
Accum				187582.79	47567774.11				0.00	47567774.11

RD2750



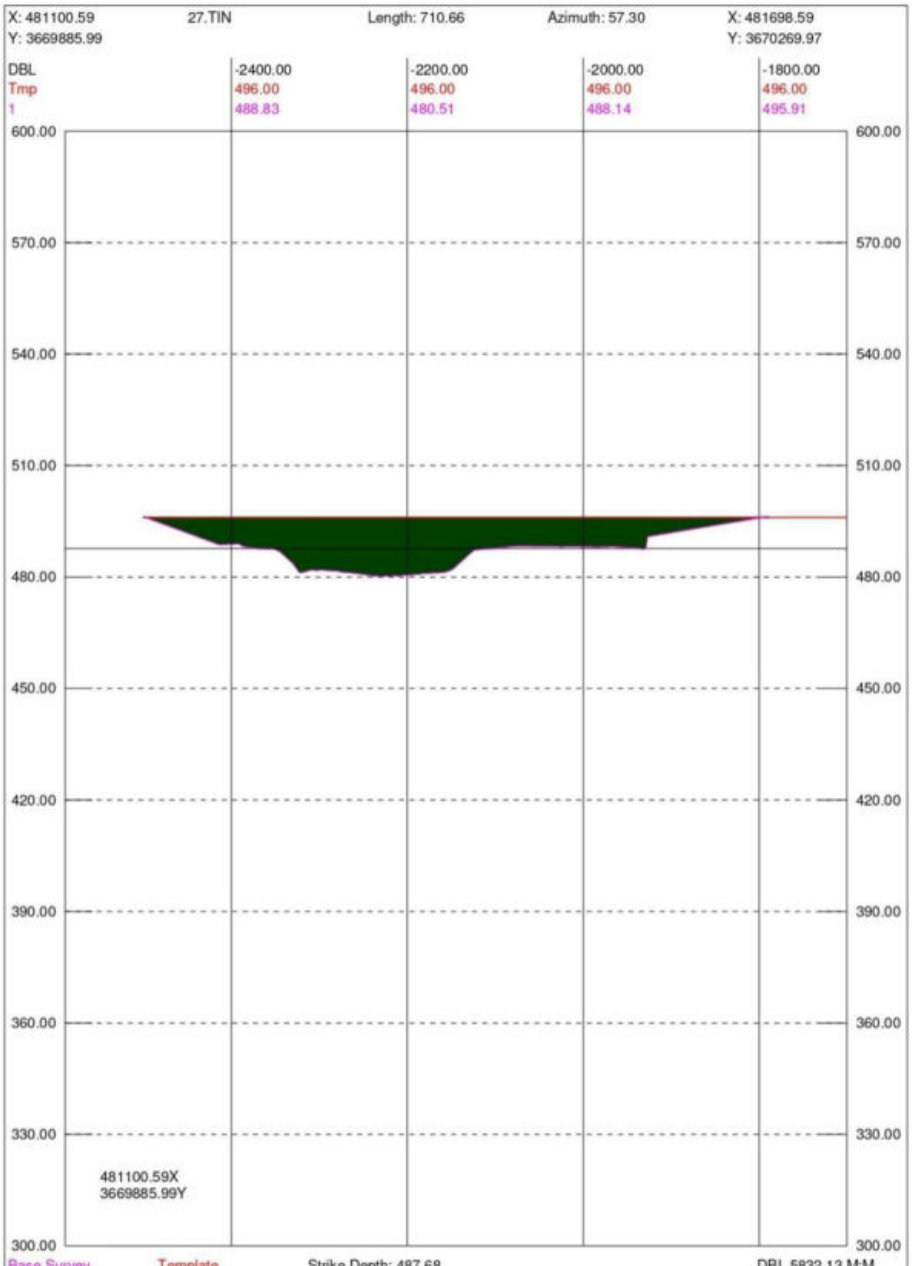
Seg	Design	Cut Area	Fill Area	Cut Vol	Fill Vol	OverDepth	Cut Area	Fill Area	Cut Vol	Fill Vol
1		20.35	5445.61	4866.91	549341.85	All	0.00	5445.61	0.00	549341.85
Total		20.35	5445.61	4866.91	549341.85		0.00	5445.61	0.00	549341.85
Accum				192449.70	48117115.96				0.00	48117115.96

RD2850



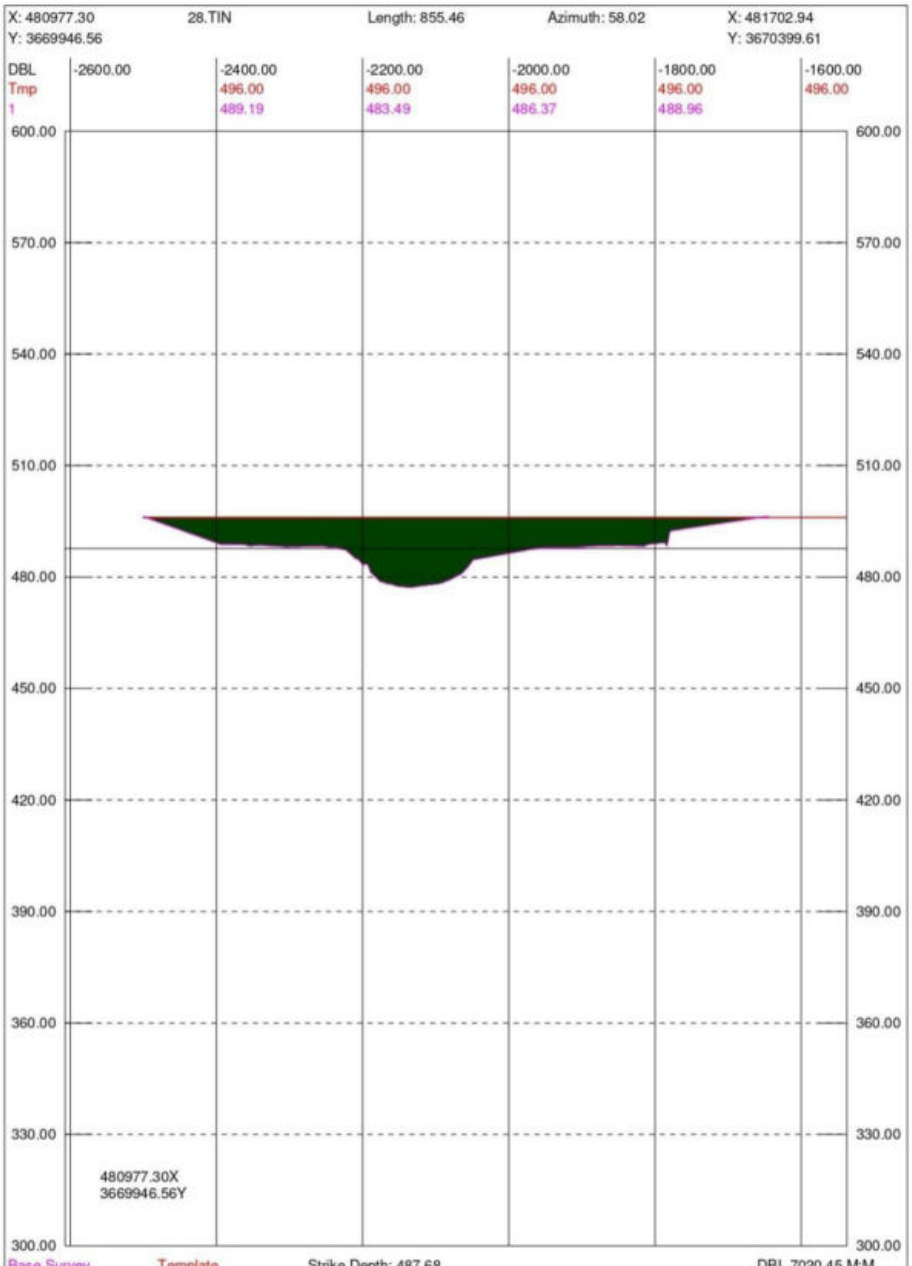
Seg	Design	Cut Area	Fill Area	Cut Vol	Fill Vol	OverDepth	Cut Area	Fill Area	Cut Vol	Fill Vol
1		36.20	6510.39	2785.79	596566.46	All	0.00	6510.39	0.00	596566.46
Total		36.20	6510.39	2785.79	596566.46		0.00	6510.39	0.00	596566.46
Accum				195235.50	48713682.42				0.00	48713682.42

RD2960



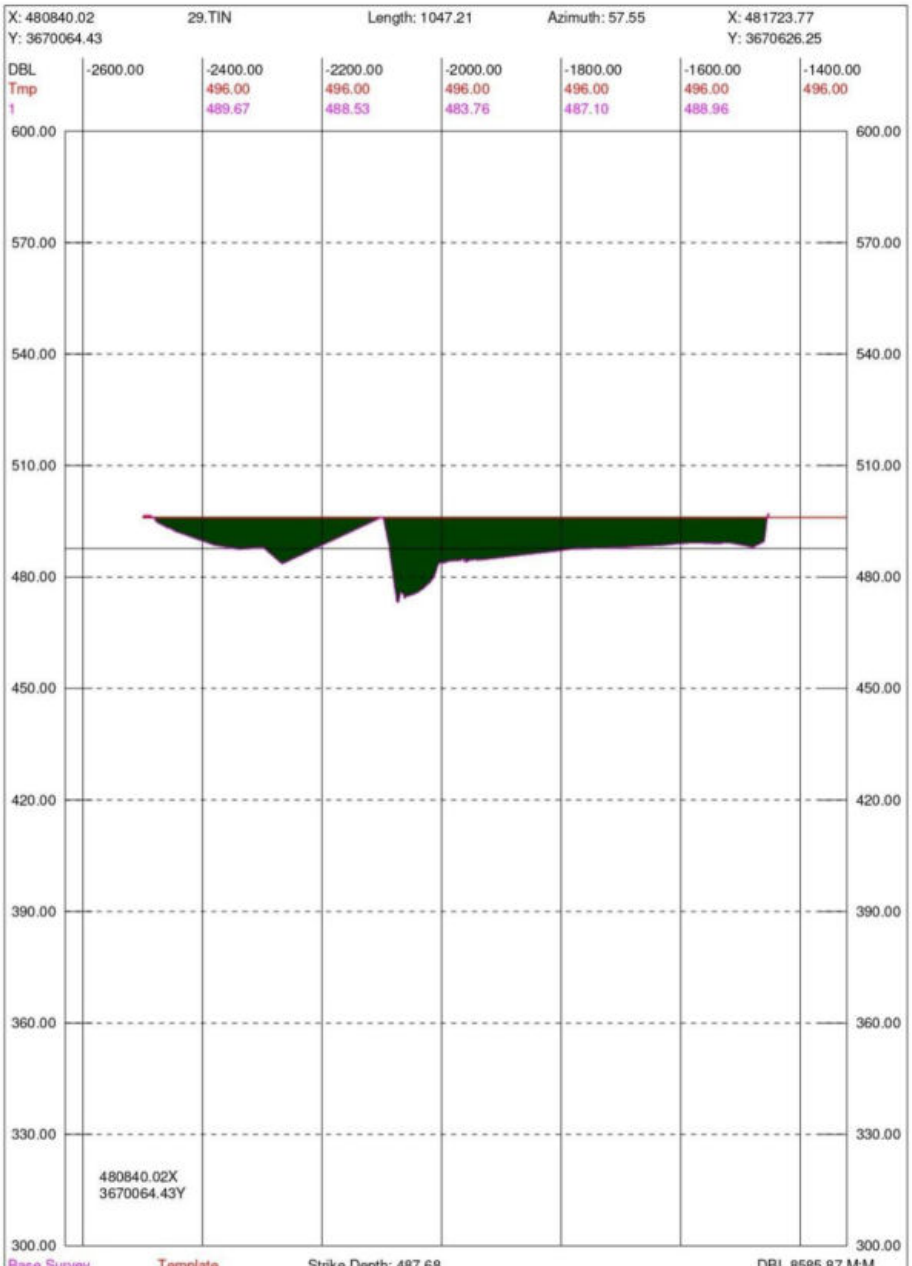
Seg	Design	Cut Area	Fill Area	Cut Vol	Fill Vol	OverDepth	Cut Area	Fill Area	Cut Vol	Fill Vol
1		1.53	5890.76	2067.63	682641.15	All	0.00	5890.76	0.00	682641.15
Total		1.53	5890.76	2067.63	682641.15		0.00	5890.76	0.00	682641.15
Accum				197303.13	49396323.57				0.00	49396323.57

RD3070



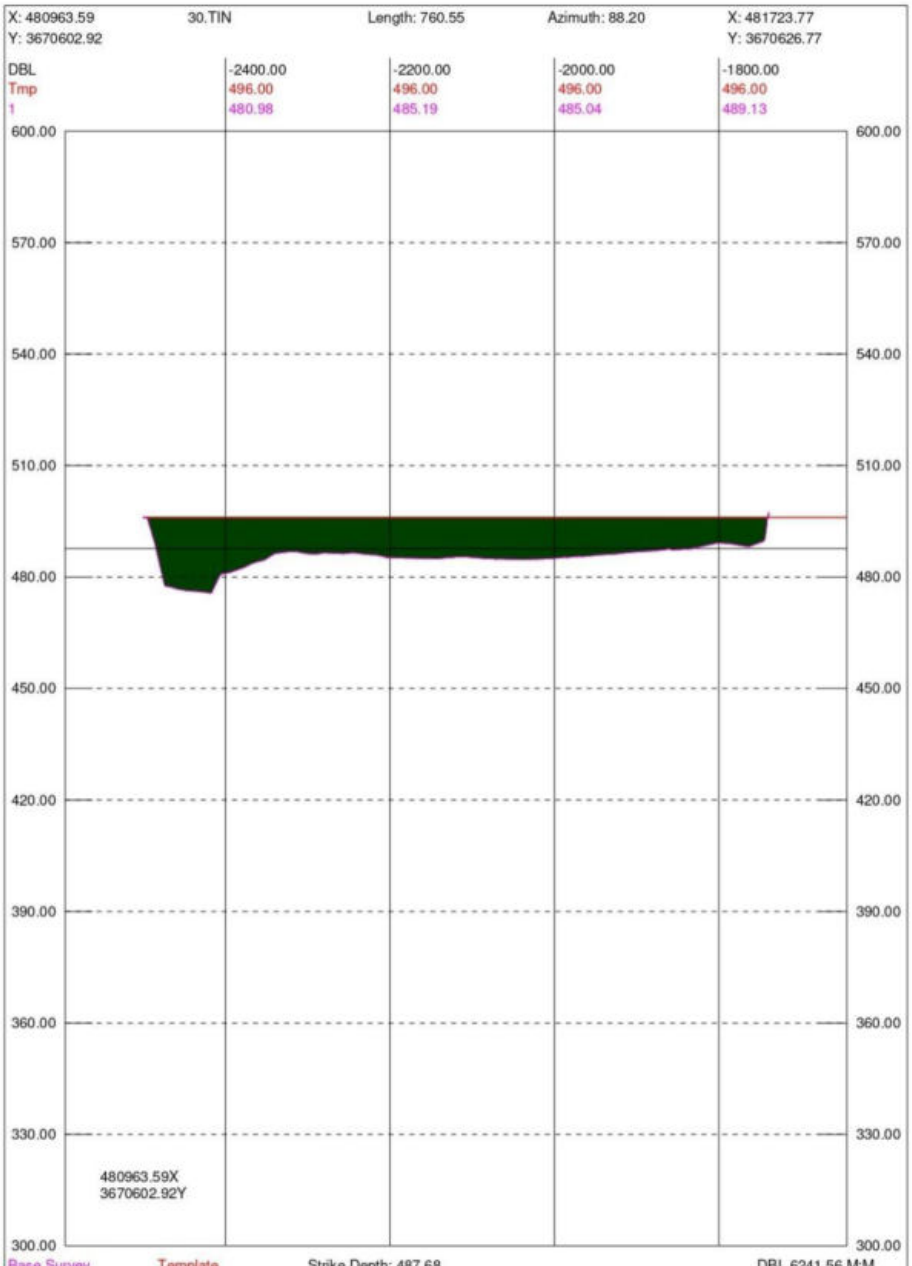
Seg	Design	Cut Area	Fill Area	Cut Vol	Fill Vol	OverDepth	Cut Area	Fill Area	Cut Vol	Fill Vol
1		2.44	6951.44	216.33	722693.19	All	0.00	6951.44	0.00	722693.19
Total		2.44	6951.44	216.33	722693.19		0.00	6951.44	0.00	722693.19
Accum				197519.45	50119016.75				0.00	50119016.75

RD3250



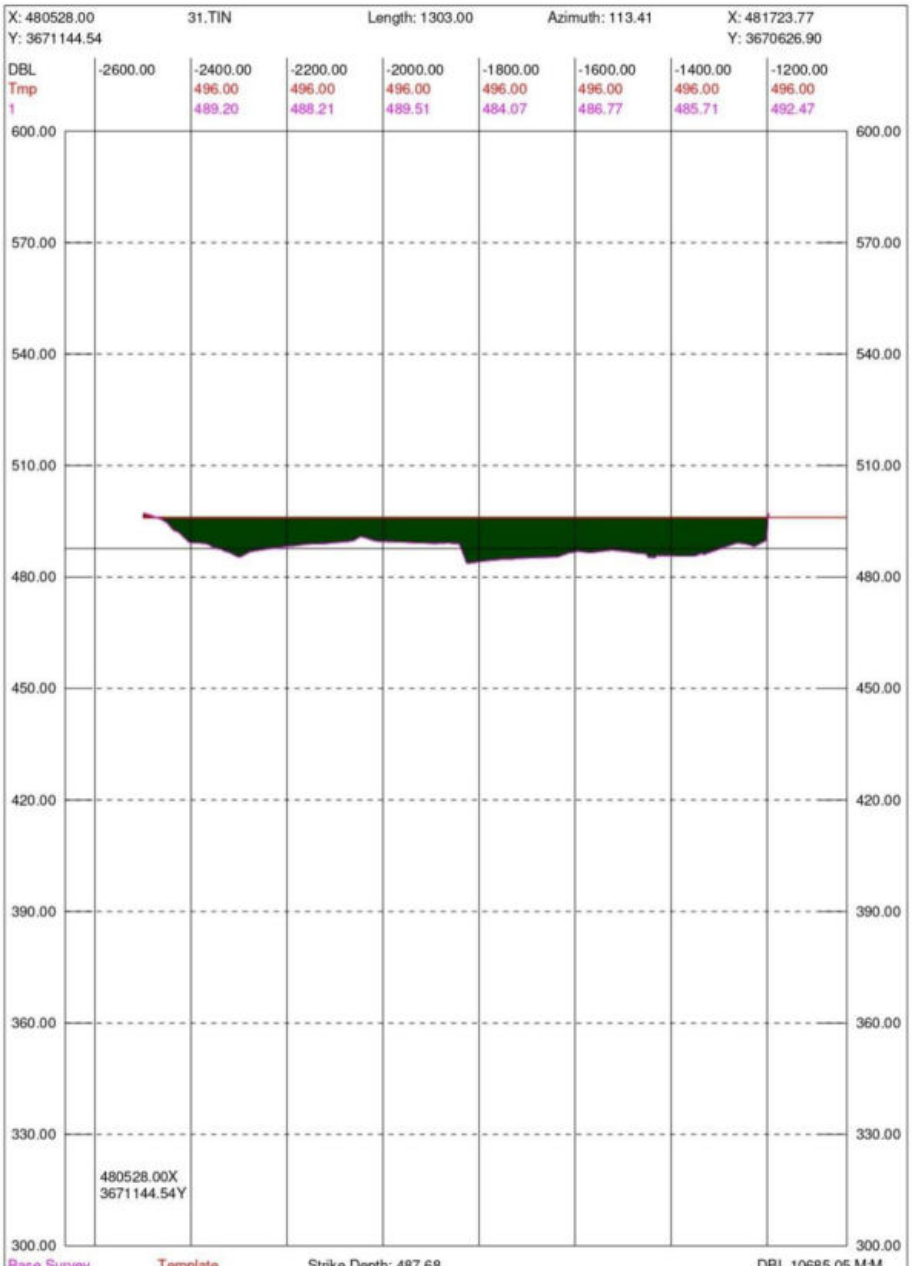
Seg	Design	Cut Area	Fill Area	Cut Vol	Fill Vol	OverDepth	Cut Area	Fill Area	Cut Vol	Fill Vol
1		9.80	8865.11	1073.08	1398142.86	All	0.00	8865.11	0.00	1398142.86
Total		9.80	8865.11	1073.08	1398142.86		0.00	8865.11	0.00	1398142.86
Accum				198592.54	51517159.61				0.00	51517159.61

RD3360



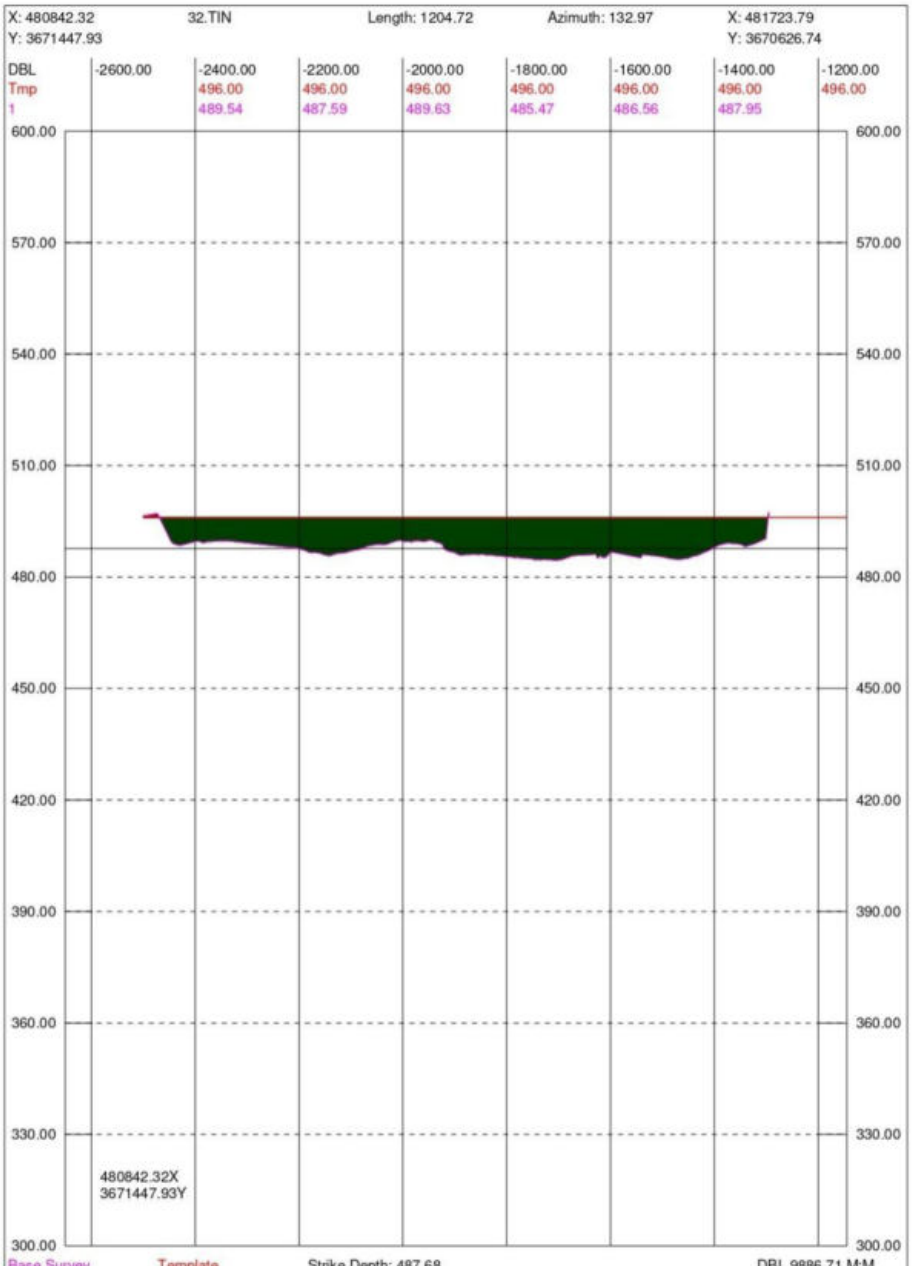
Seg	Design	Cut Area	Fill Area	Cut Vol	Fill Vol	OverDepth	Cut Area	Fill Area	Cut Vol	Fill Vol
1		1.03	8177.83	1959.84	2035305.13	All	0.00	8177.83	0.00	2035305.13
Total		1.03	8177.83	1959.84	2035305.13		0.00	8177.83	0.00	2035305.13
Accum				200552.38	53552464.74				0.00	53552464.74

RD3490



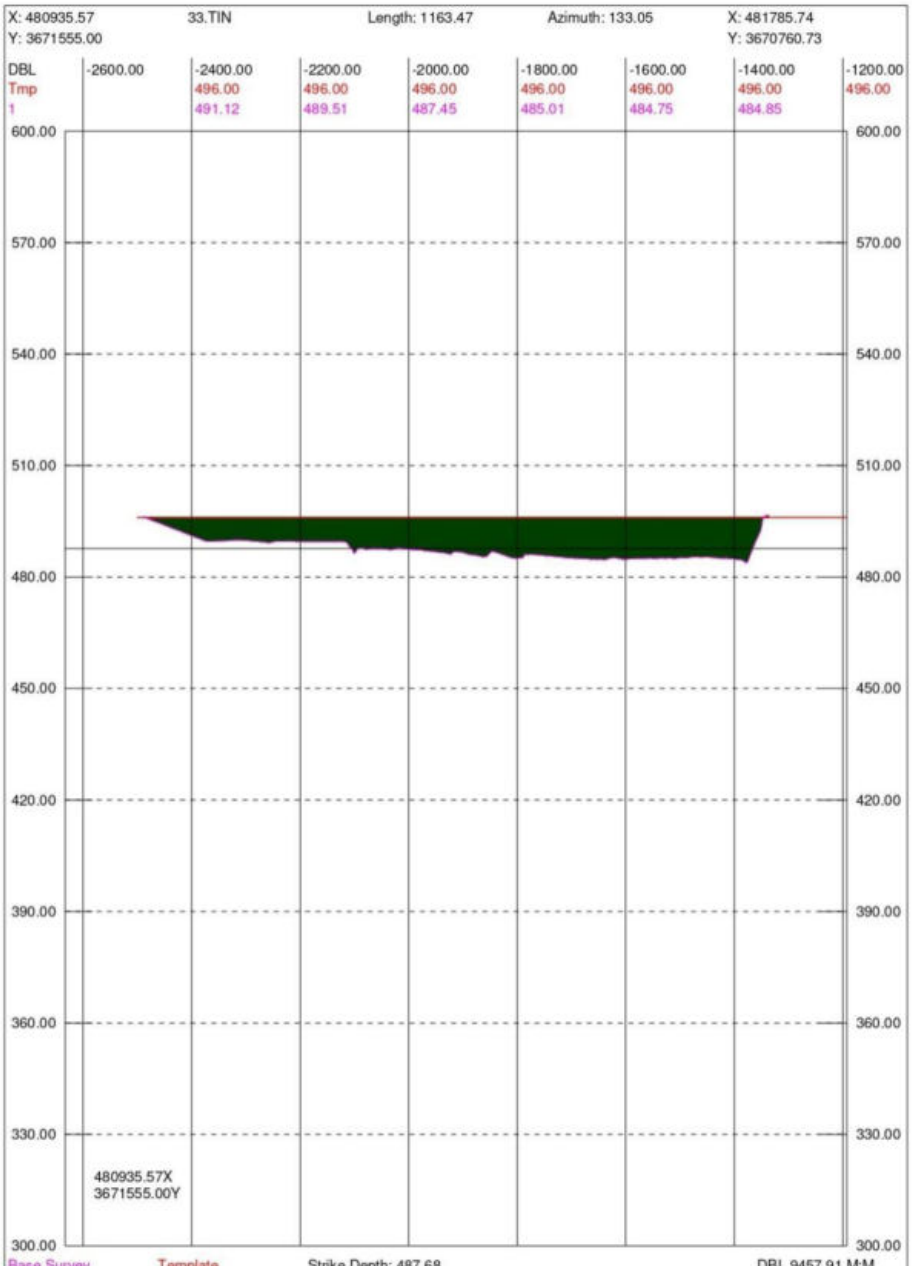
Seg	Design	Cut Area	Fill Area	Cut Vol	Fill Vol	OverDepth	Cut Area	Fill Area	Cut Vol	Fill Vol
1		17.73	10630.38	3873.99	2061588.33	All	0.00	10630.38	0.00	2061588.33
Total		17.73	10630.38	3873.99	2061588.33		0.00	10630.38	0.00	2061588.33
Accum				204426.37	55614053.07				0.00	55614053.07

RD3750



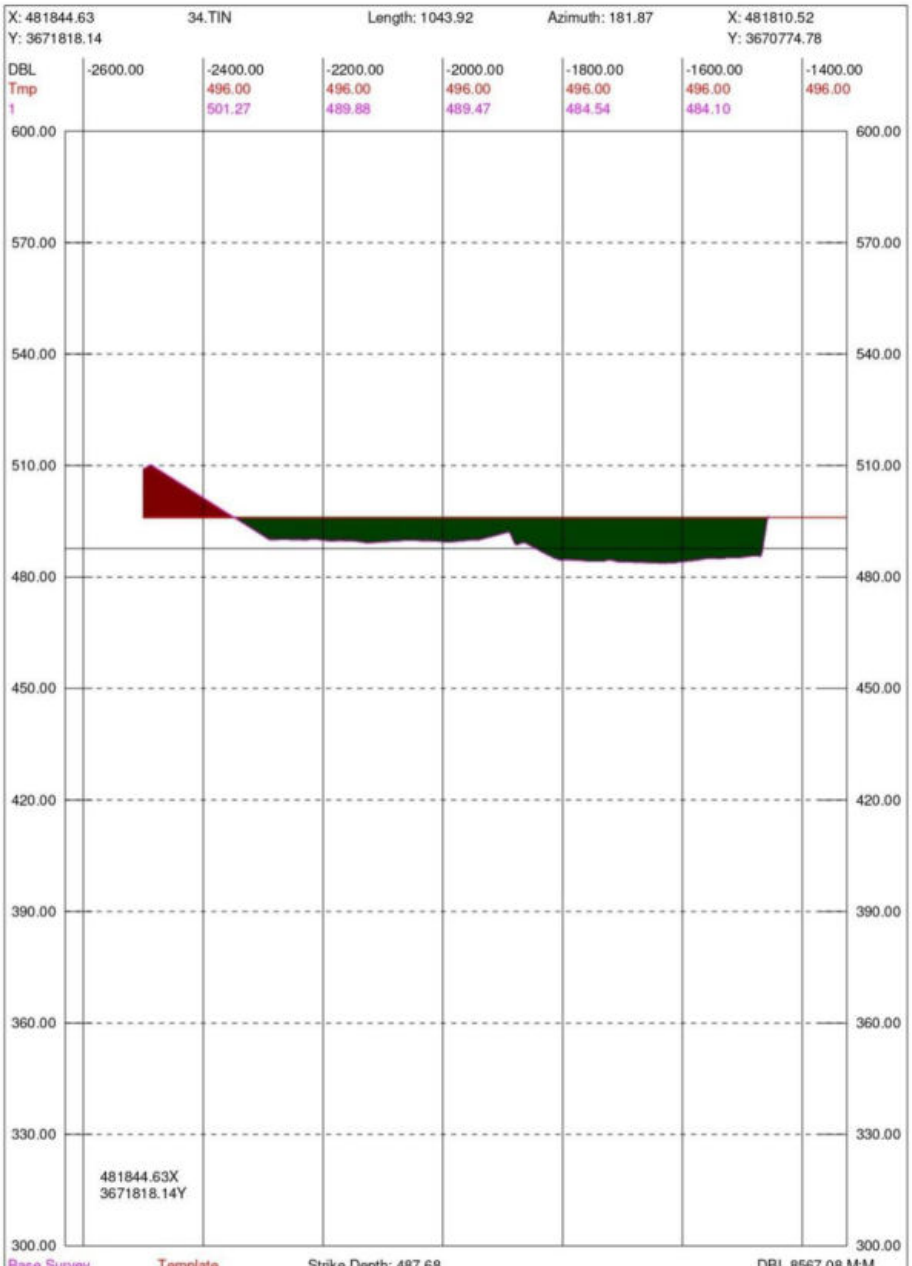
Seg	Design	Cut Area	Fill Area	Cut Vol	Fill Vol	OverDepth	Cut Area	Fill Area	Cut Vol	Fill Vol
1		23.37	10124.37	8256.49	1988819.82	All	0.00	10124.37	0.00	1988819.82
Total		23.37	10124.37	8256.49	1988819.82		0.00	10124.37	0.00	1988819.82
Accum				212682.86	57602872.88				0.00	57602872.88

RD4000



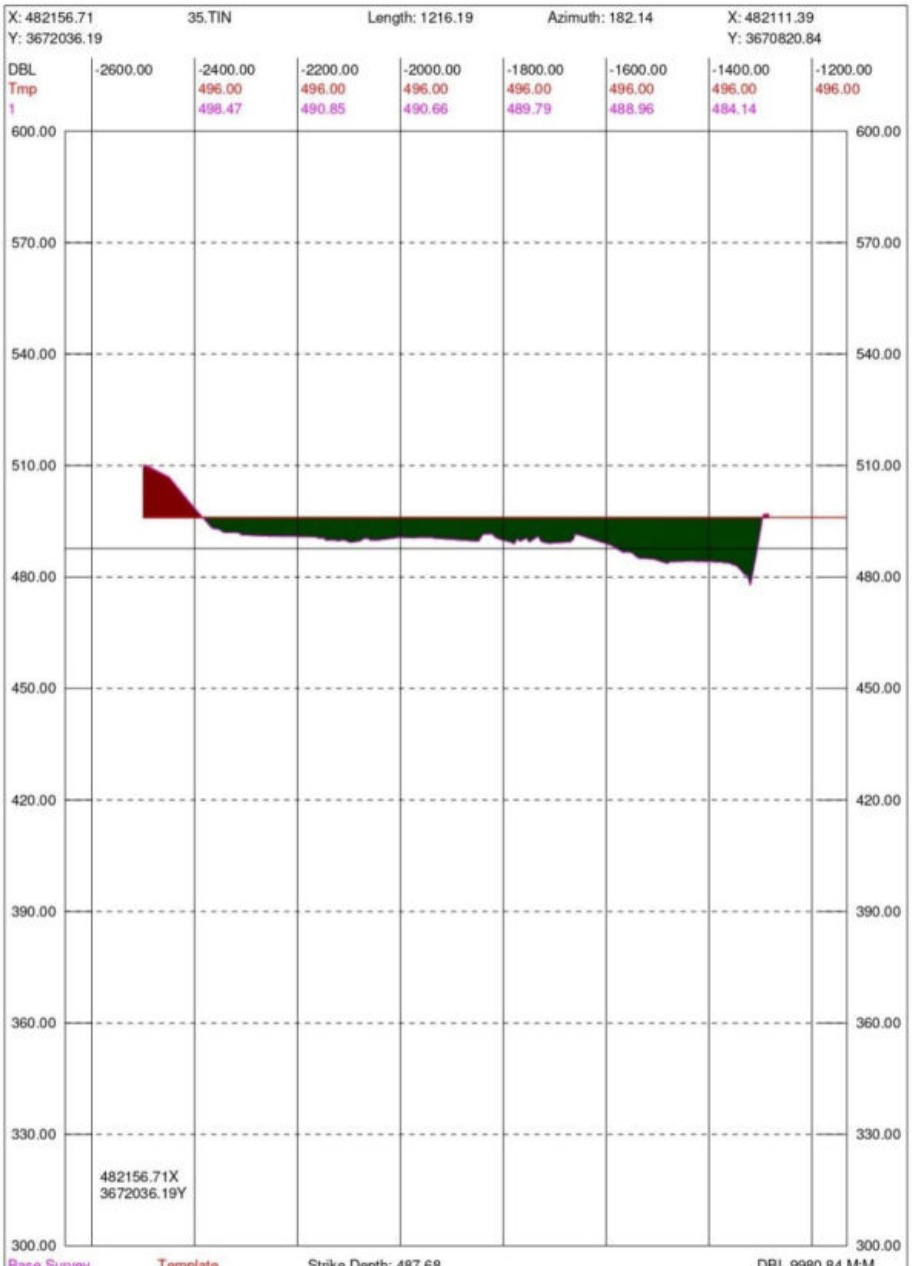
Seg	Design	Cut Area	Fill Area	Cut Vol	Fill Vol	OverDepth	Cut Area	Fill Area	Cut Vol	Fill Vol
1		4.28	9703.12	1957.65	1397556.07	All	0.00	9703.12	0.00	1397556.07
Total		4.28	9703.12	1957.65	1397556.07		0.00	9703.12	0.00	1397556.07
Accum				214640.51	59000428.95				0.00	59000428.95

RD4300



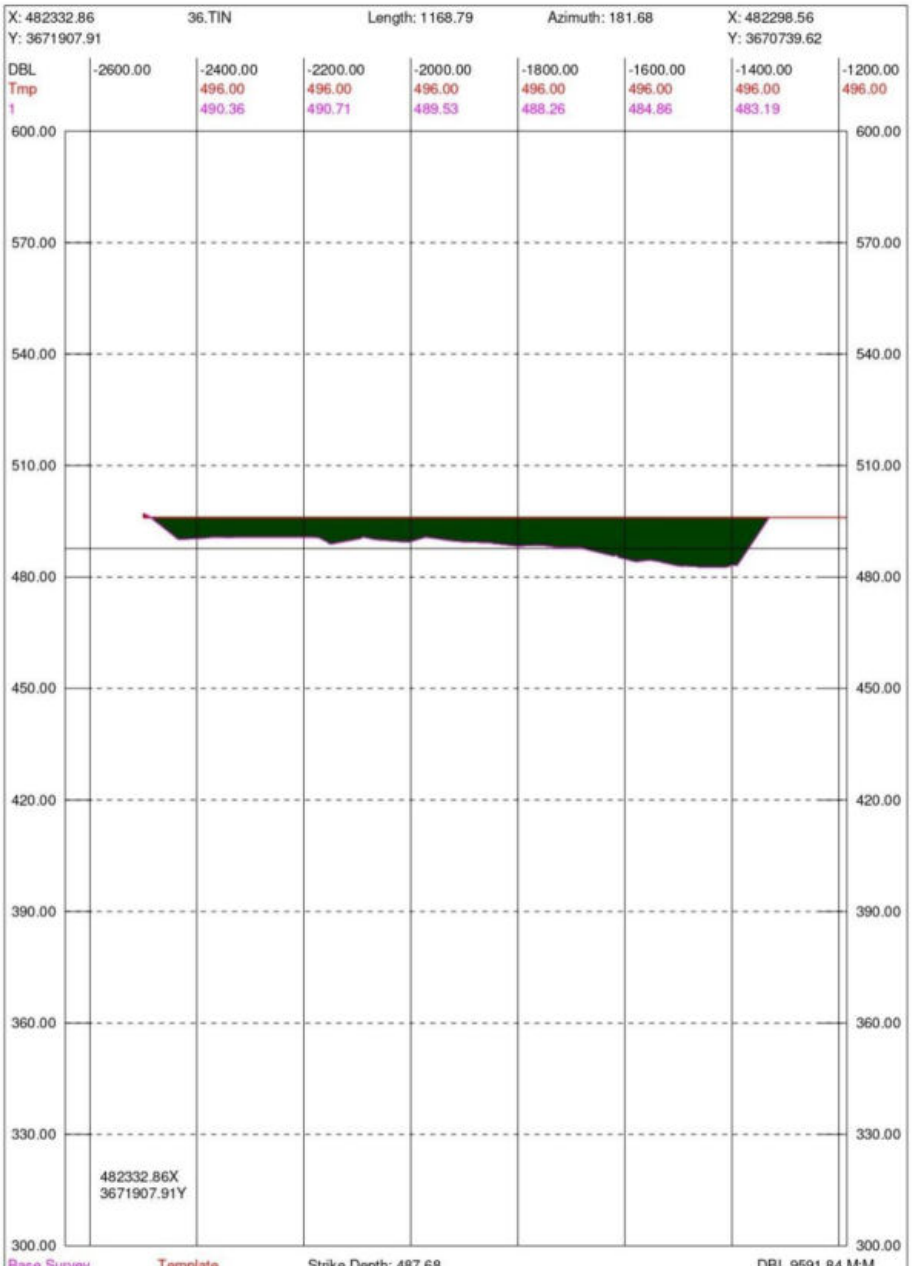
Seg	Design	Cut Area	Fill Area	Cut Vol	Fill Vol	OverDepth	Cut Area	Fill Area	Cut Vol	Fill Vol
1		1158.74	7281.53	473955.96	2991106.15	All	0.00	7281.53	0.00	2991106.15
Total		1158.74	7281.53	473955.96	2991106.15		0.00	7281.53	0.00	2991106.15
Accum				688596.47	61991535.10				0.00	61991535.10

RD4480



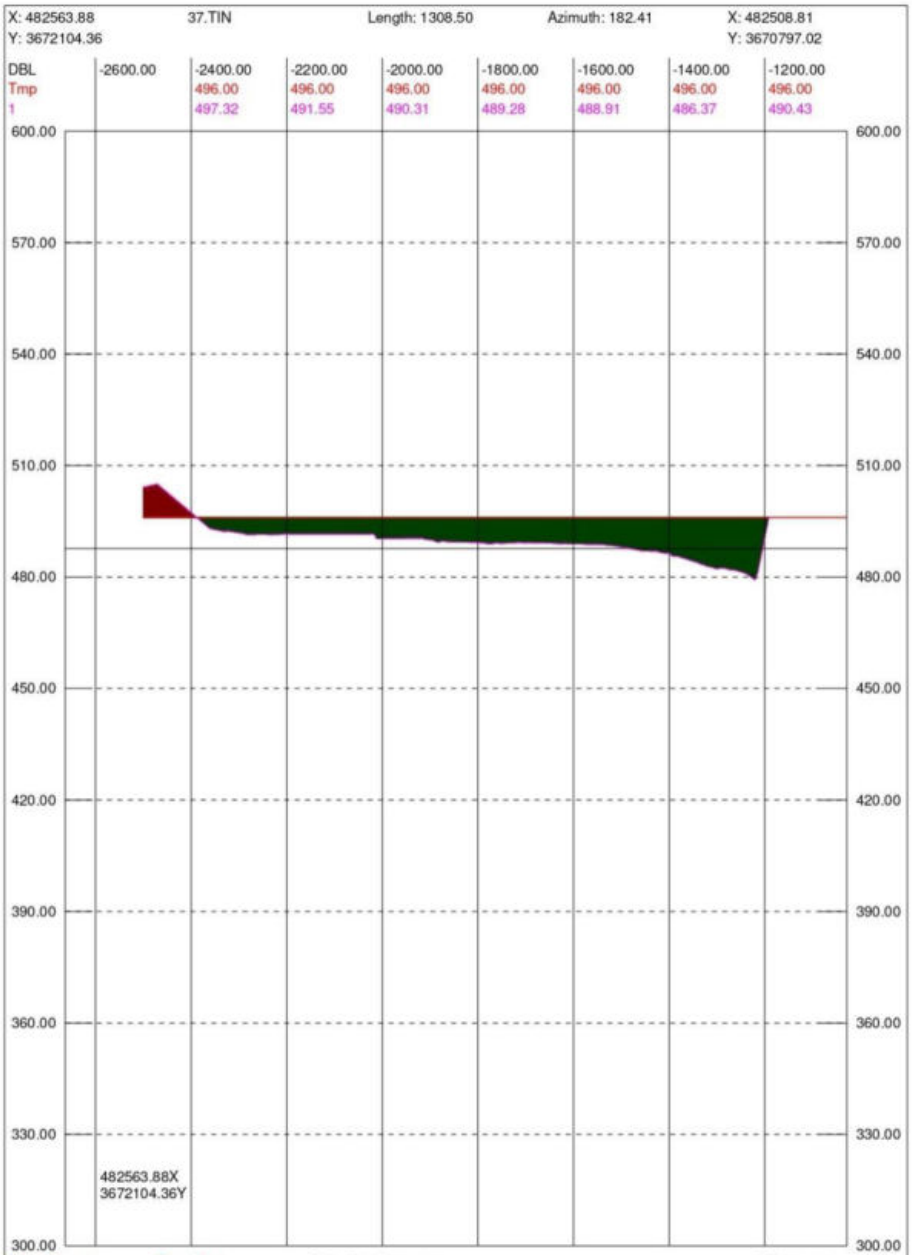
Seg	Design	Cut Area	Fill Area	Cut Vol	Fill Vol	OverDepth	Cut Area	Fill Area	Cut Vol	Fill Vol
1		991.48	7758.75	326862.29	2263163.96	All	0.00	7758.75	0.00	2263163.96
Total		991.48	7758.75	326862.29	2263163.96		0.00	7758.75	0.00	2263163.96
Accum				1015458.76	64254699.06				0.00	64254699.06

RD4700



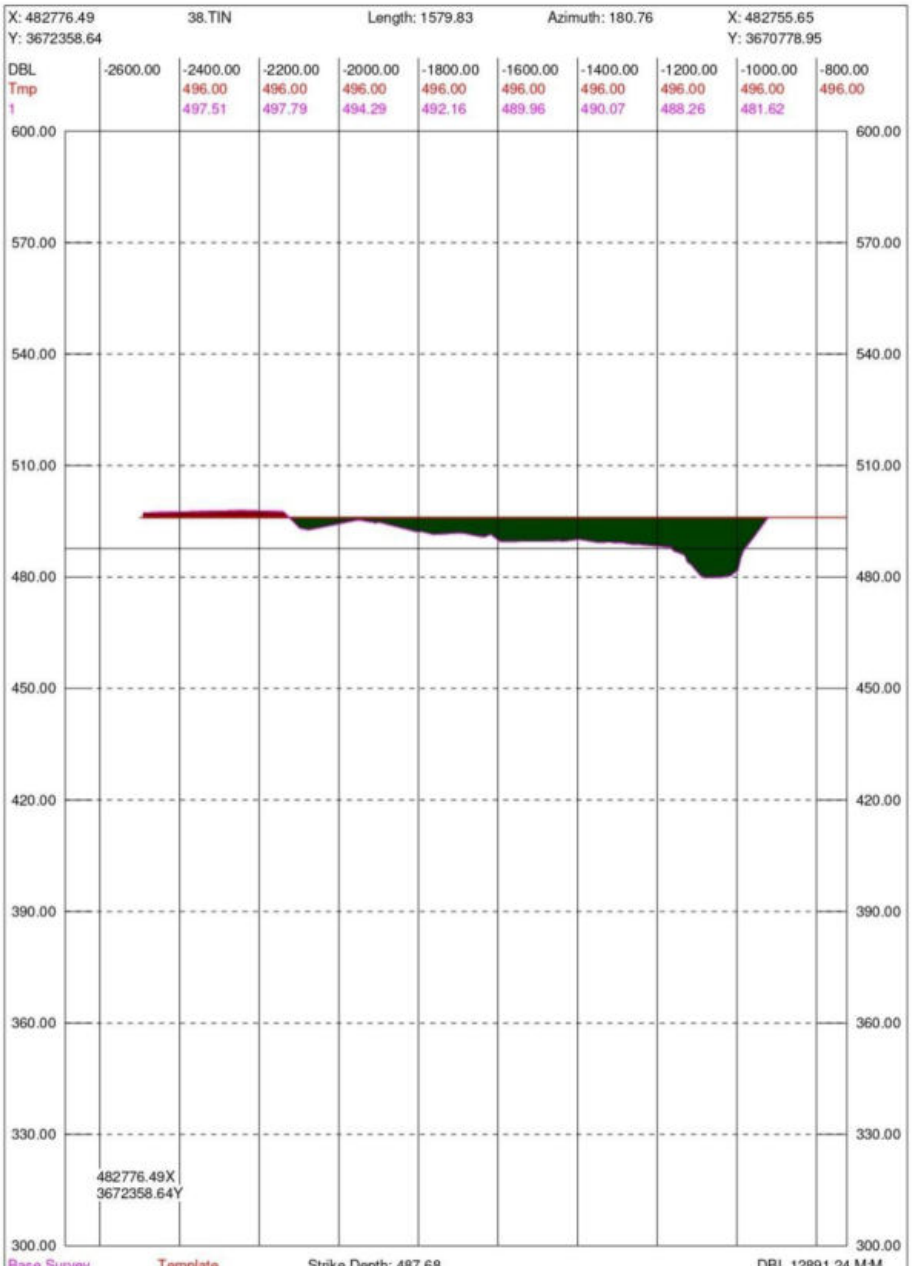
Seg	Design	Cut Area	Fill Area	Cut Vol	Fill Vol	OverDepth	Cut Area	Fill Area	Cut Vol	Fill Vol
1		8.48	8684.70	90362.72	1529924.94	All	0.00	8684.70	0.00	1529924.94
Total		8.48	8684.70	90362.72	1529924.94		0.00	8684.70	0.00	1529924.94
Accum				1105821.48	65784624.01				0.00	65784624.01

RD4940



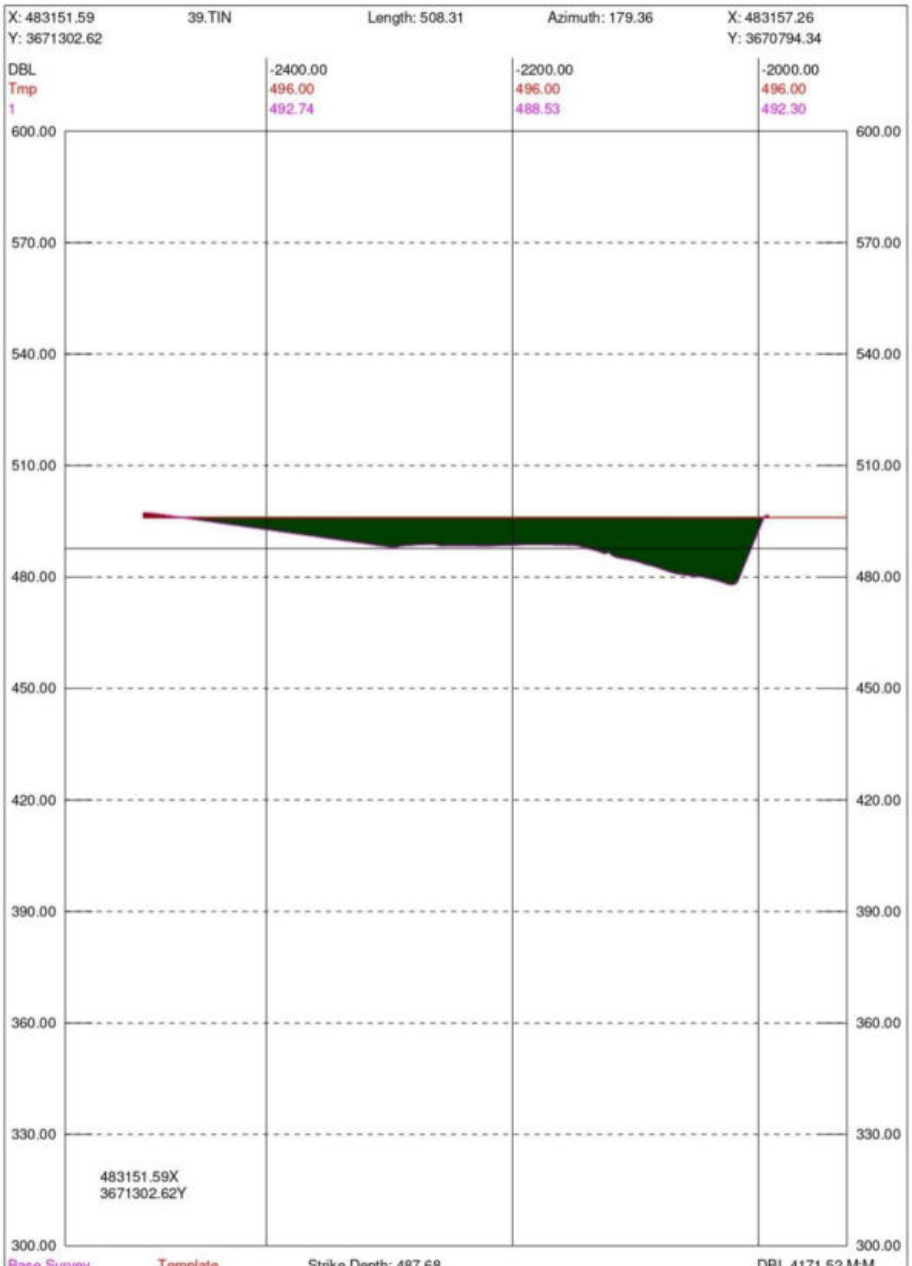
Seg	Design	Cut Area	Fill Area	Cut Vol	Fill Vol	OverDepth	Cut Area	Fill Area	Cut Vol	Fill Vol
1		622.60	8449.19	70474.95	1834015.67	All	0.00	8449.19	0.00	1834015.67
Total		622.60	8449.19	70474.95	1834015.67		0.00	8449.19	0.00	1834015.67
Accum				1176296.43	67618639.67				0.00	67618639.67

RD5340



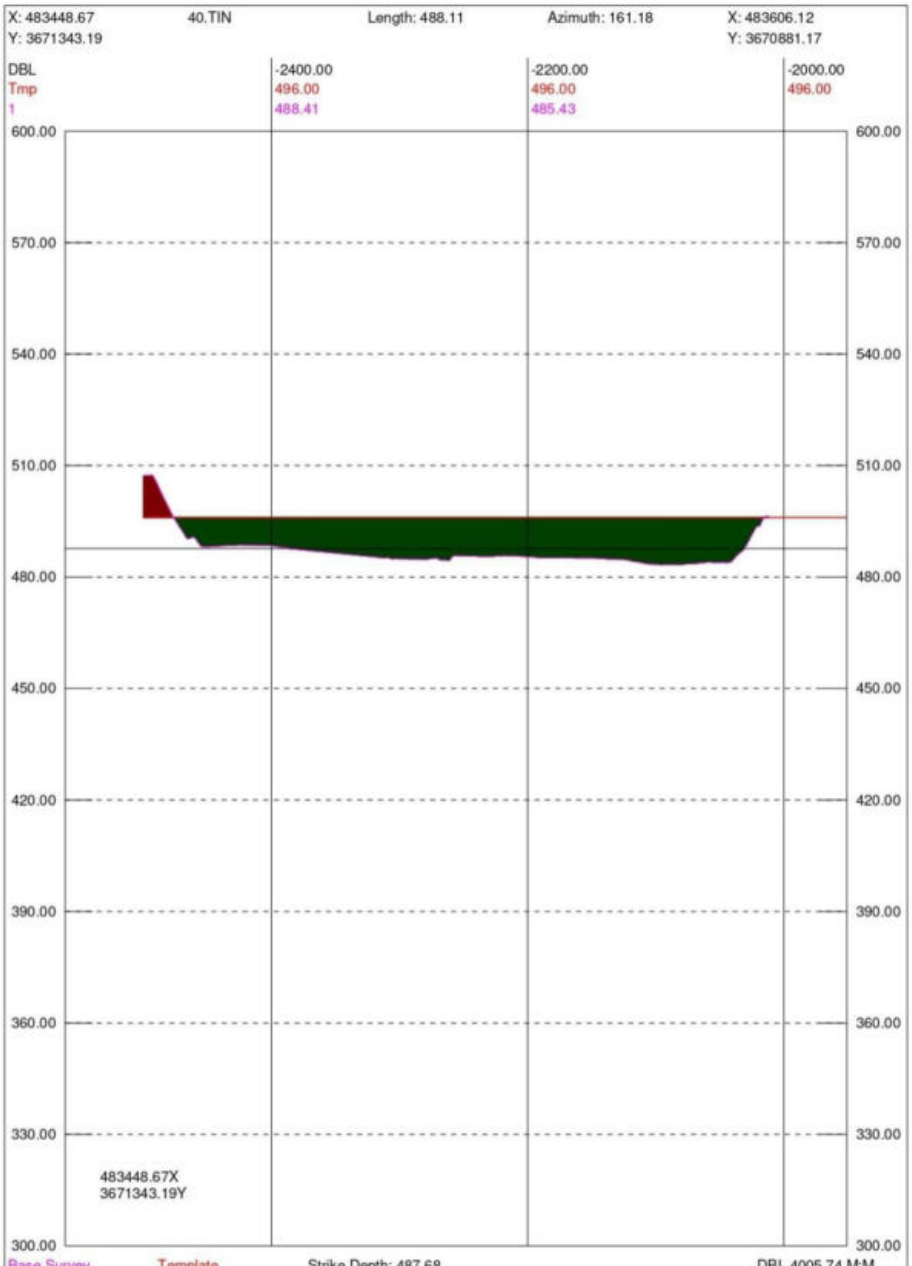
Seg	Design	Cut Area	Fill Area	Cut Vol	Fill Vol	OverDepth	Cut Area	Fill Area	Cut Vol	Fill Vol
1		588.68	7268.40	126479.28	1838928.29	All	0.00	7268.40	0.00	1838928.29
Total		588.68	7268.40	126479.28	1838928.29		0.00	7268.40	0.00	1838928.29
Accum				1302775.71	69457567.96				0.00	69457567.96

RD5750



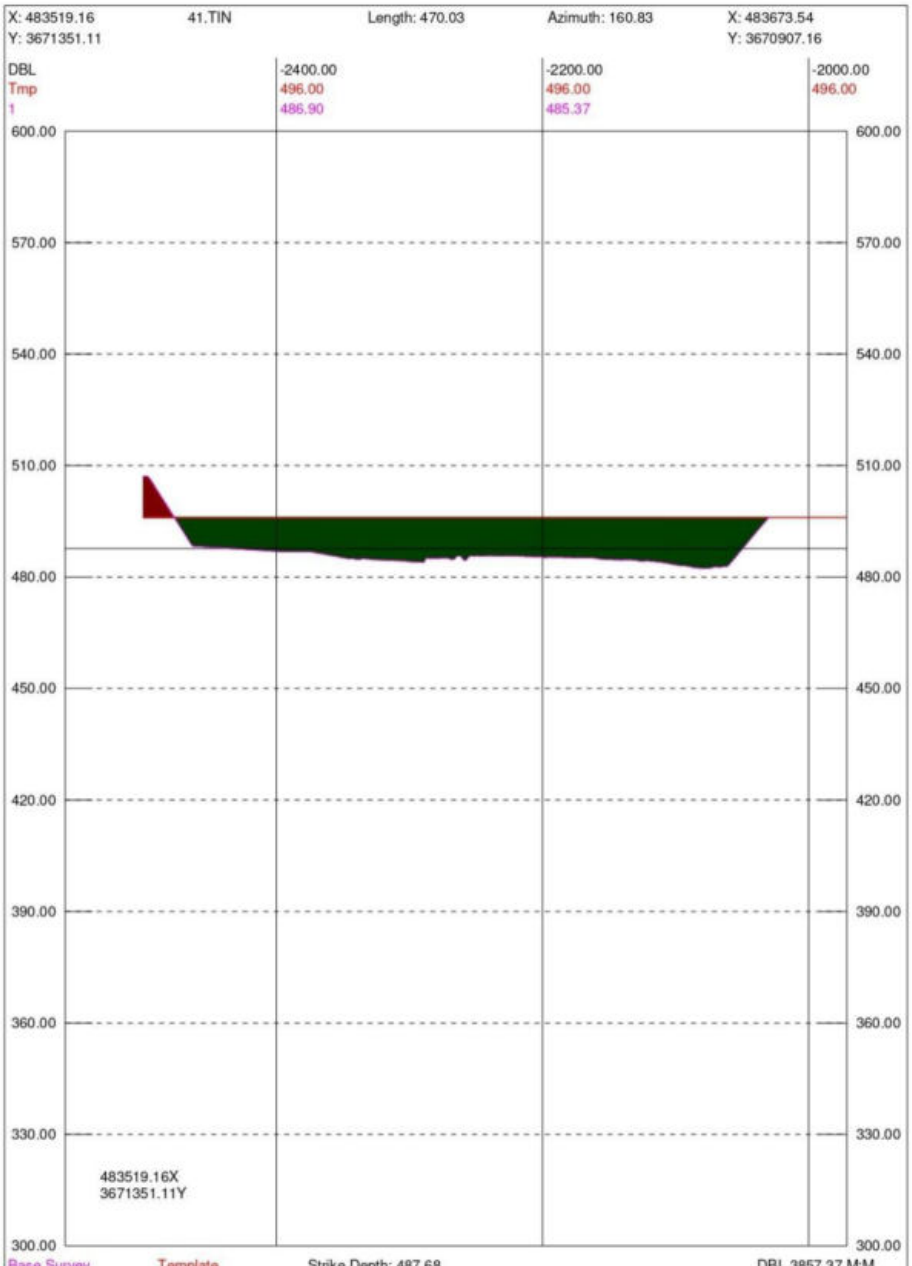
Seg	Design	Cut Area	Fill Area	Cut Vol	Fill Vol	OverDepth	Cut Area	Fill Area	Cut Vol	Fill Vol
1		25.08	3740.66	116856.26	2187577.78	All	0.00	3740.66	0.00	2187577.78
Total		25.08	3740.66	116856.26	2187577.78		0.00	3740.66	0.00	2187577.78
Accum				1419631.97	71645145.74				0.00	71645145.74

RD5825



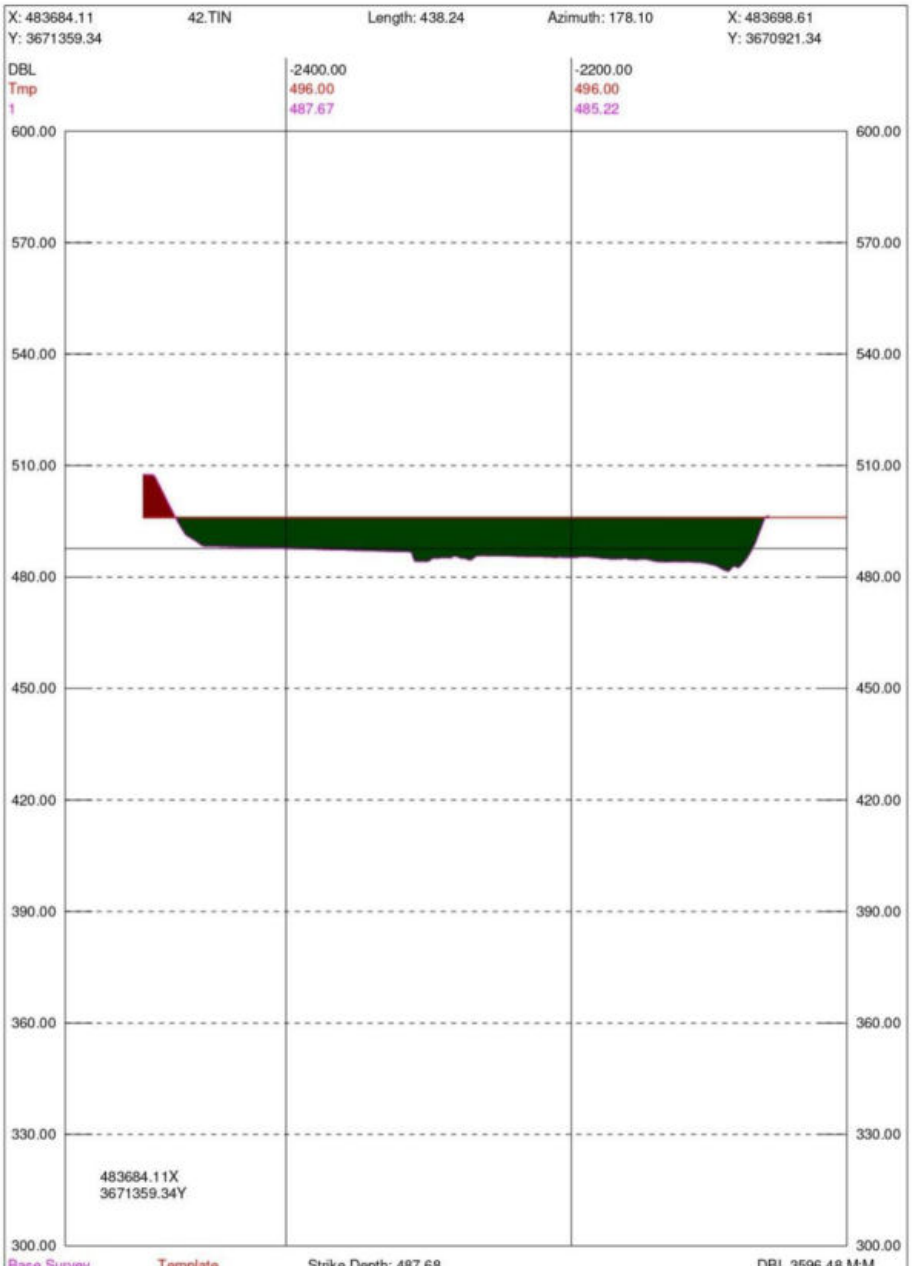
Seg	Design	Cut Area	Fill Area	Cut Vol	Fill Vol	OverDepth	Cut Area	Fill Area	Cut Vol	Fill Vol
1		175.75	4558.02	30195.70	1613892.74	All	0.00	4558.02	0.00	1613892.74
Total		175.75	4558.02	30195.70	1613892.74		0.00	4558.02	0.00	1613892.74
Accum				1449827.68	73259038.47				0.00	73259038.47

RD5900



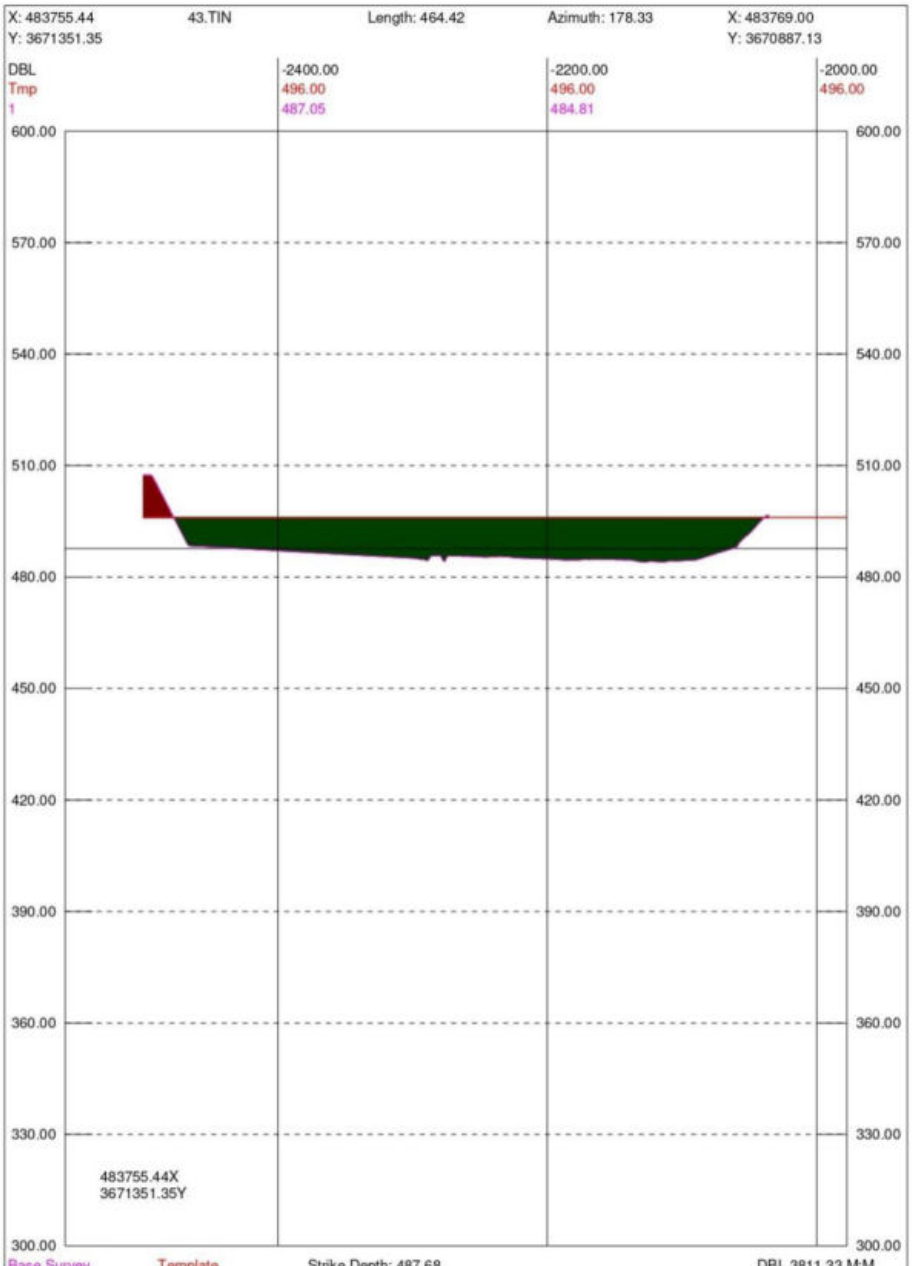
Seg	Design	Cut Area	Fill Area	Cut Vol	Fill Vol	OverDepth	Cut Area	Fill Area	Cut Vol	Fill Vol
1		149.95	4561.55	11283.31	323145.05	All	0.00	4561.55	0.00	323145.05
Total		149.95	4561.55	11283.31	323145.05		0.00	4561.55	0.00	323145.05
Accum				1461110.98	73582183.52				0.00	73582183.52

RD5980



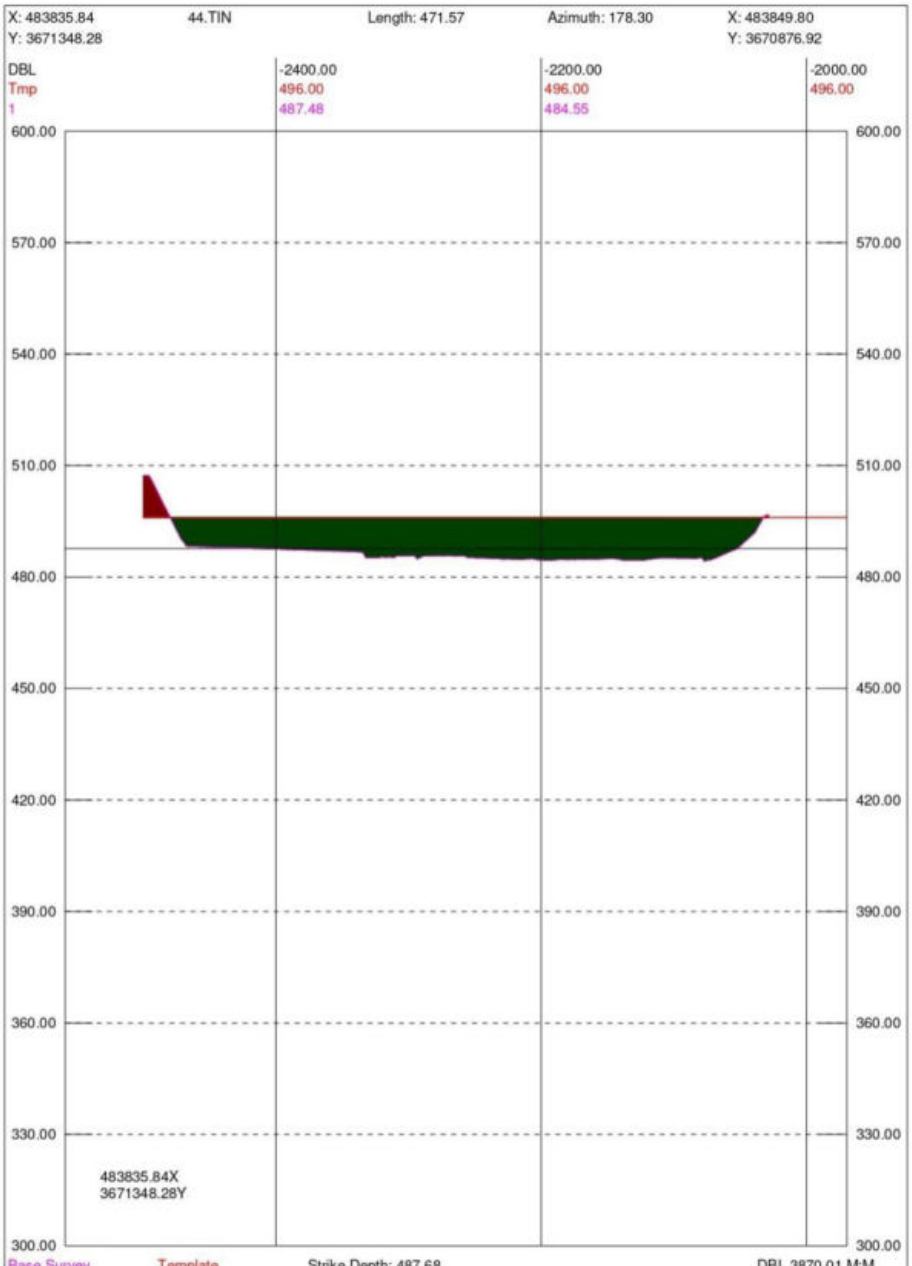
Seg	Design	Cut Area	Fill Area	Cut Vol	Fill Vol	OverDepth	Cut Area	Fill Area	Cut Vol	Fill Vol
1		173.74	4073.10	25757.16	375134.62	All	0.00	4073.10	0.00	375134.62
Total		173.74	4073.10	25757.16	375134.62		0.00	4073.10	0.00	375134.62
Accum				1486868.14	73957318.14				0.00	73957318.14

RD6060



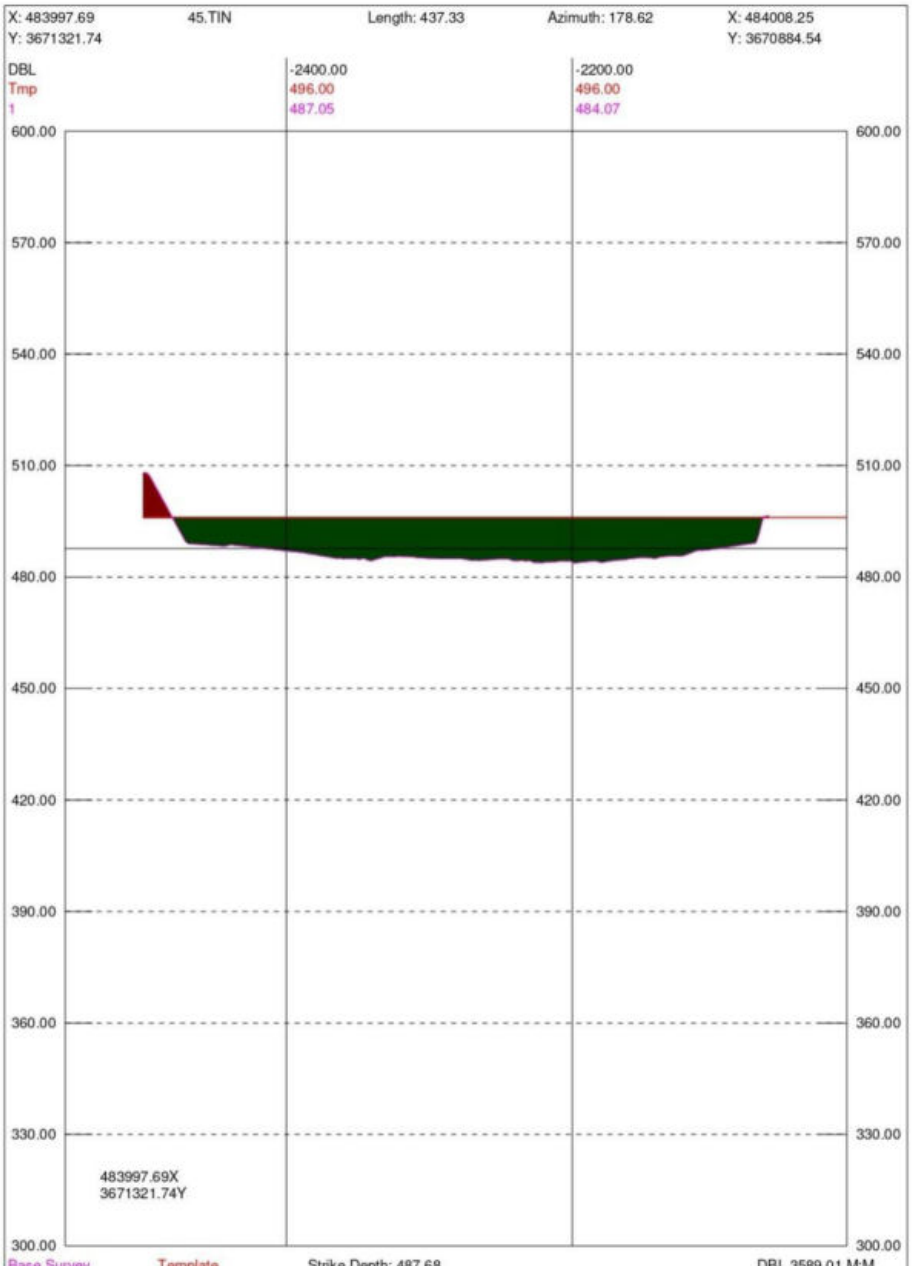
Seg	Design	Cut Area	Fill Area	Cut Vol	Fill Vol	OverDepth	Cut Area	Fill Area	Cut Vol	Fill Vol
1		166.30	4312.52	12072.24	293843.75	All	0.00	4312.52	0.00	293843.75
Total		166.30	4312.52	12072.24	293843.75		0.00	4312.52	0.00	293843.75
Accum				1498940.39	74251161.89				0.00	74251161.89

RD6220



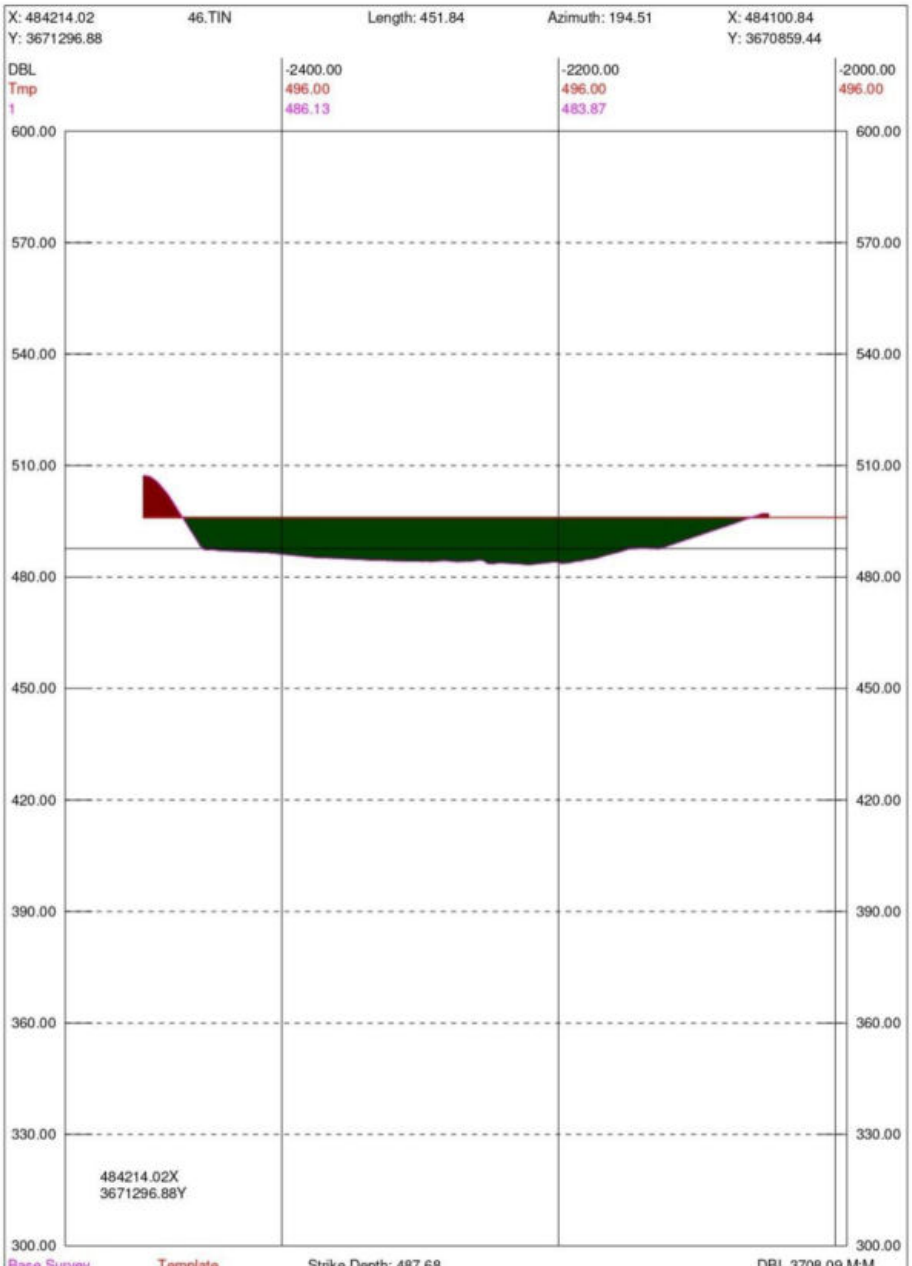
Seg	Design	Cut Area	Fill Area	Cut Vol	Fill Vol	OverDepth	Cut Area	Fill Area	Cut Vol	Fill Vol
1		142.40	4361.40	12391.17	348591.21	All	0.00	4361.40	0.00	348591.21
Total		142.40	4361.40	12391.17	348591.21		0.00	4361.40	0.00	348591.21
Accum				1511331.56	74599753.10				0.00	74599753.10

RD6380



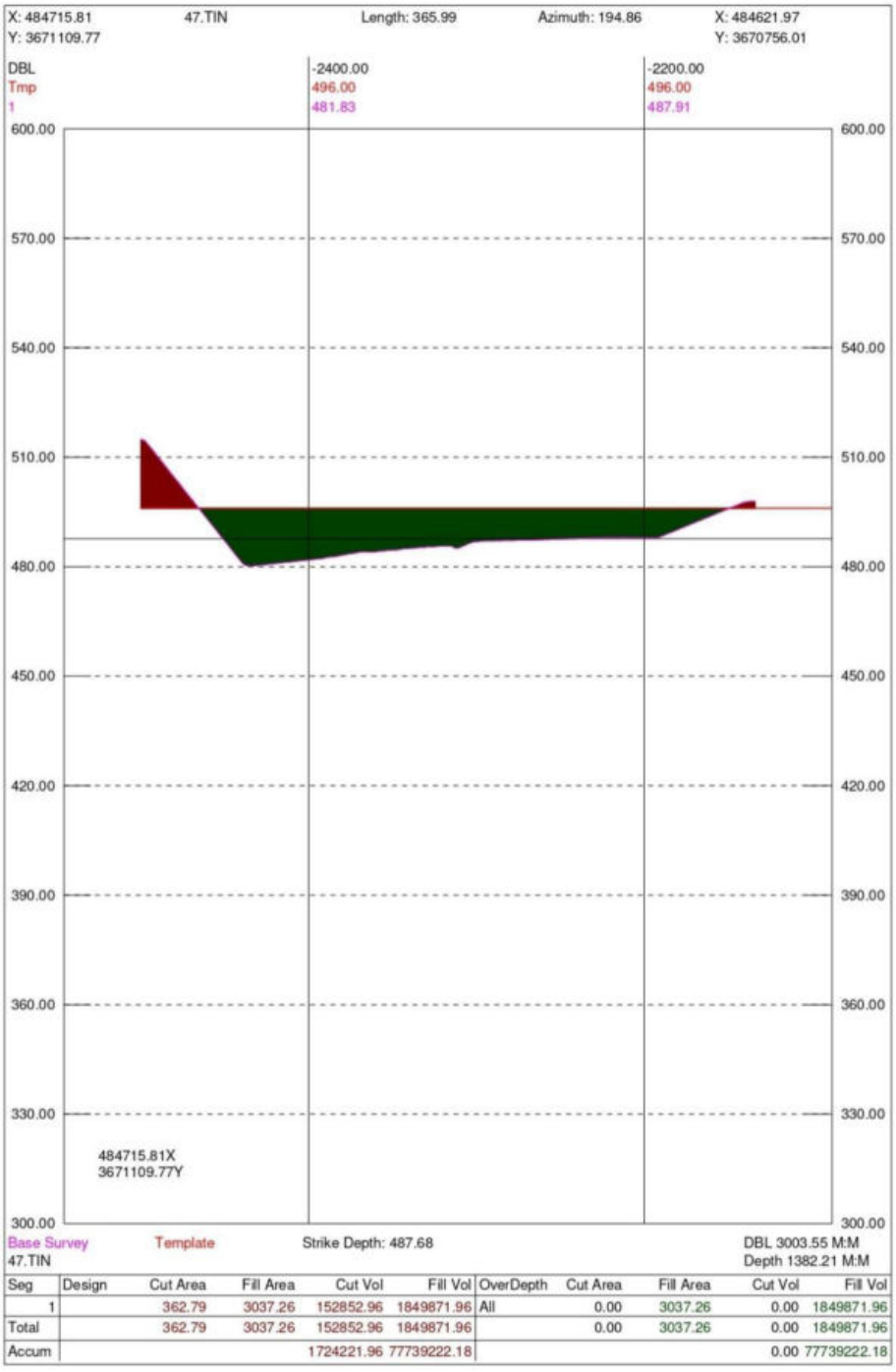
Seg	Design	Cut Area	Fill Area	Cut Vol	Fill Vol	OverDepth	Cut Area	Fill Area	Cut Vol	Fill Vol
1		142.52	4090.08	22938.10	675044.35	All	0.00	4090.08	0.00	675044.35
Total		142.52	4090.08	22938.10	675044.35		0.00	4090.08	0.00	675044.35
Accum				1534269.65	75274797.45				0.00	75274797.45

RD6540



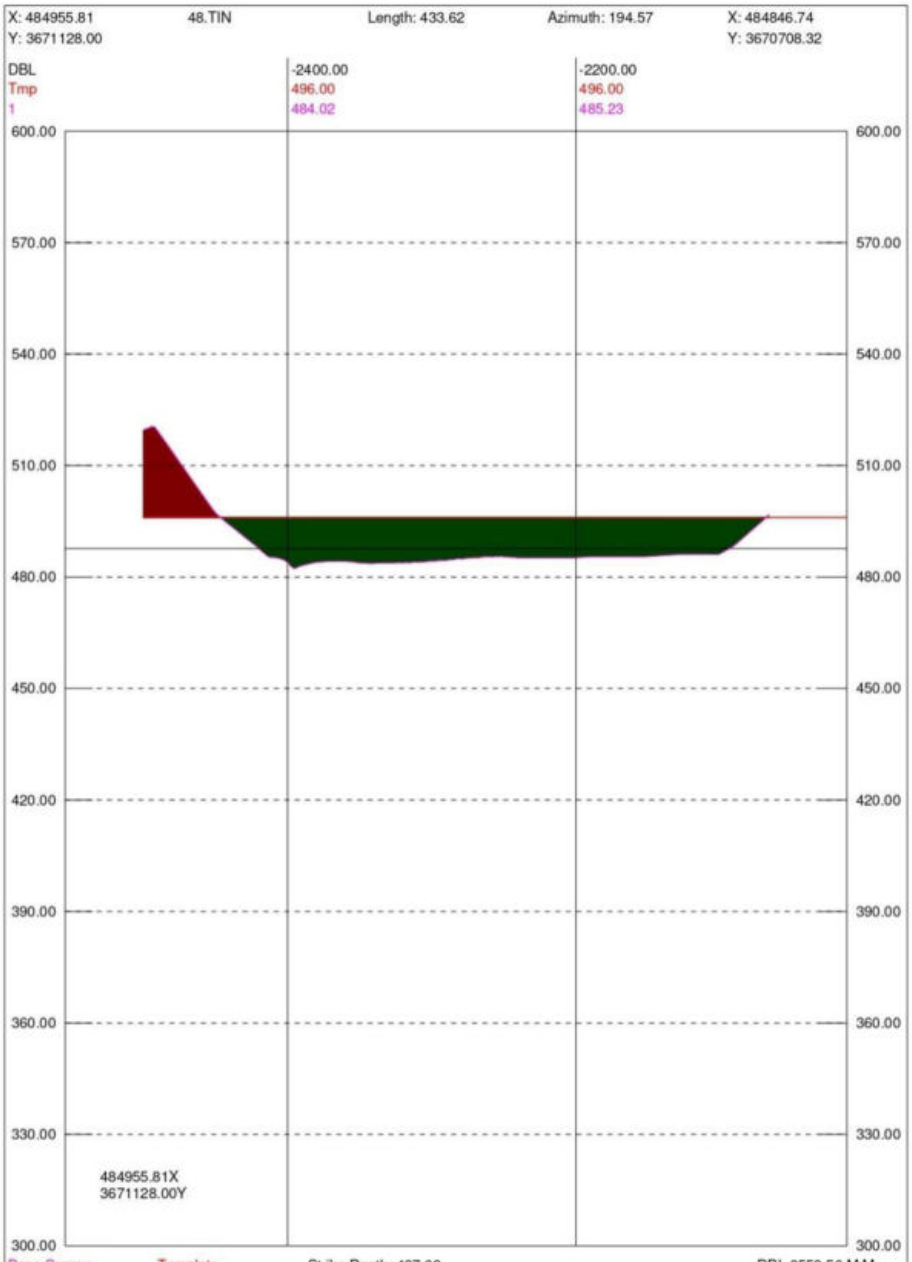
Seg	Design	Cut Area	Fill Area	Cut Vol	Fill Vol	OverDepth	Cut Area	Fill Area	Cut Vol	Fill Vol
1		211.15	3922.22	37099.35	614552.78	All	0.00	3922.22	0.00	614552.78
Total		211.15	3922.22	37099.35	614552.78		0.00	3922.22	0.00	614552.78
Accum				1571369.00	75889350.23				0.00	75889350.23

RD6700



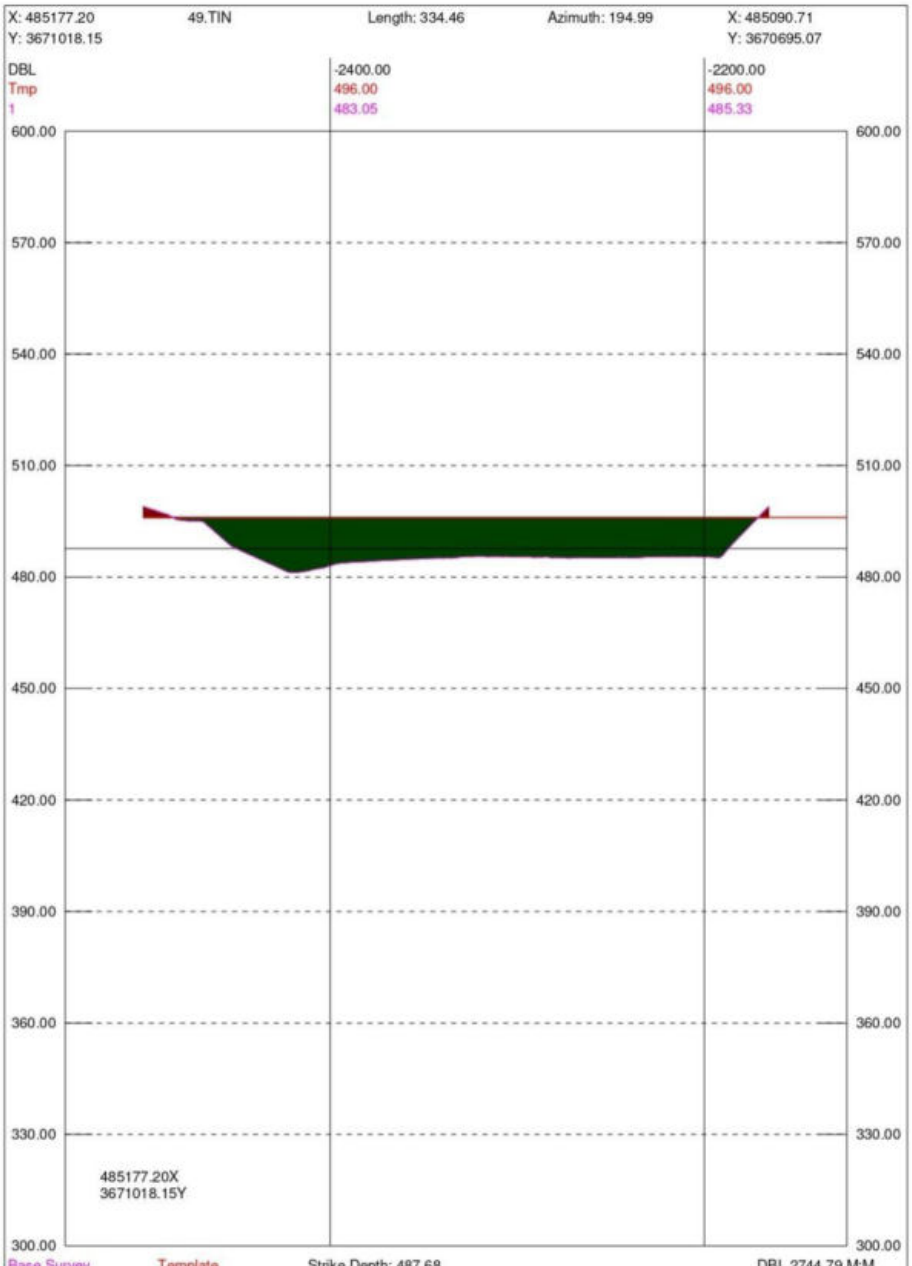
Seg	Design	Cut Area	Fill Area	Cut Vol	Fill Vol	OverDepth	Cut Area	Fill Area	Cut Vol	Fill Vol
1		362.79	3037.26	152852.96	1849871.96	All	0.00	3037.26	0.00	1849871.96
Total		362.79	3037.26	152852.96	1849871.96		0.00	3037.26	0.00	1849871.96
Accum				1724221.96	77739222.18				0.00	77739222.18

RD6910



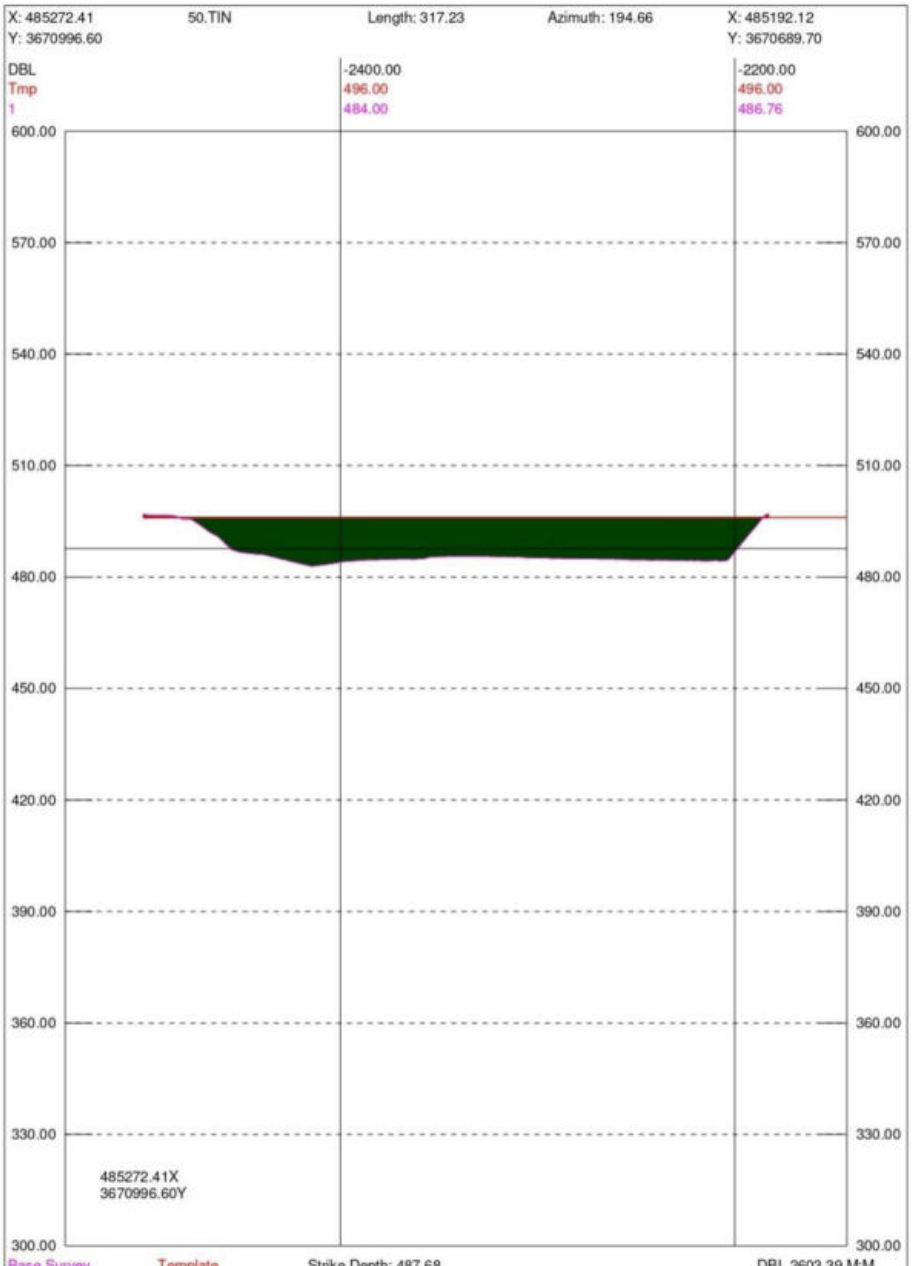
Seg	Design	Cut Area	Fill Area	Cut Vol	Fill Vol	OverDepth	Cut Area	Fill Area	Cut Vol	Fill Vol
1		729.42	3817.52	124299.92	783308.66	All	0.00	3817.52	0.00	783308.66
Total		729.42	3817.52	124299.92	783308.66		0.00	3817.52	0.00	783308.66
Accum				1848521.88	78522530.84				0.00	78522530.84

RD7140



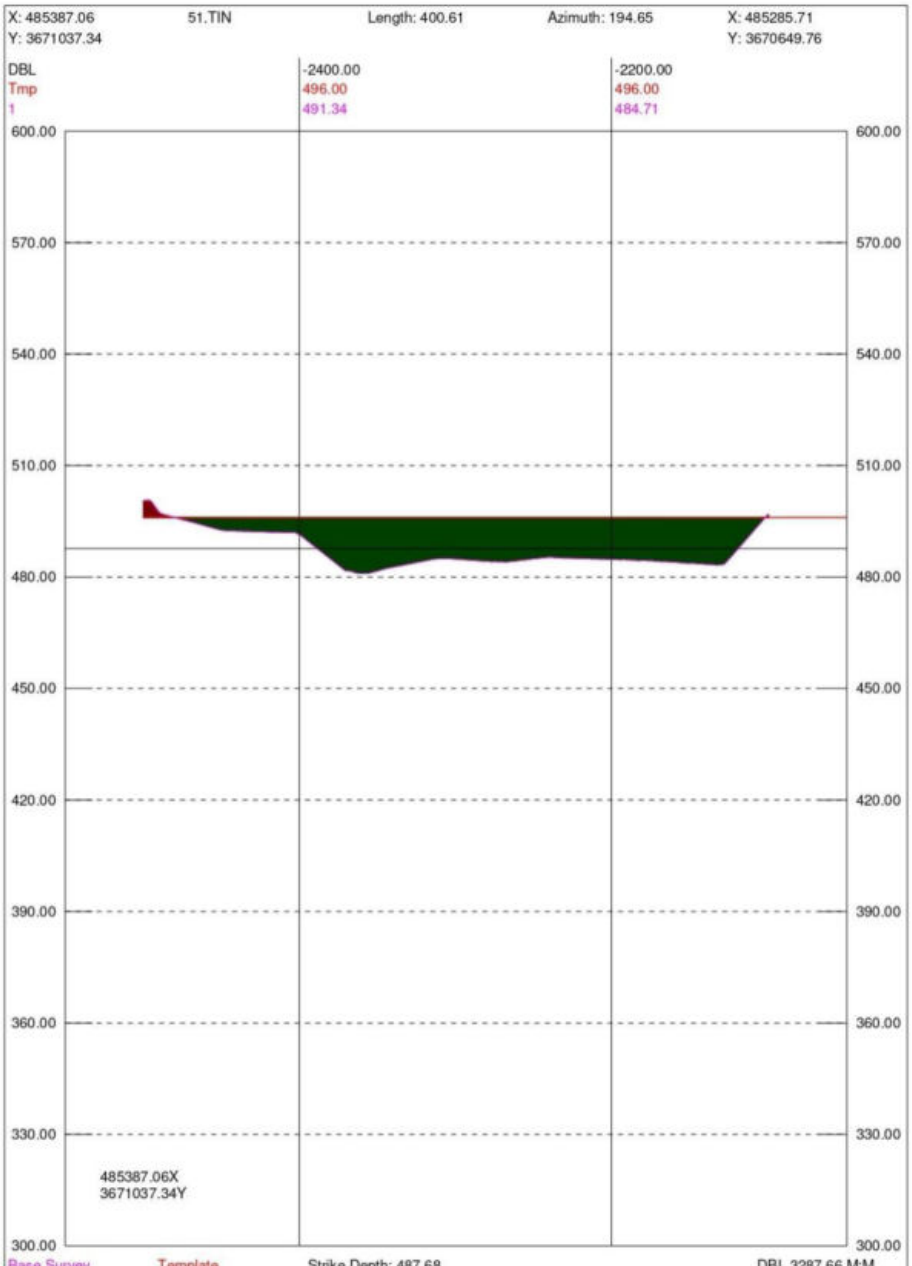
Seg	Design	Cut Area	Fill Area	Cut Vol	Fill Vol	OverDepth	Cut Area	Fill Area	Cut Vol	Fill Vol
1		33.44	3129.10	92279.71	835514.39	All	0.00	3129.10	0.00	835514.39
Total		33.44	3129.10	92279.71	835514.39		0.00	3129.10	0.00	835514.39
Accum				1940801.60	79358045.23				0.00	79358045.23

RD7380



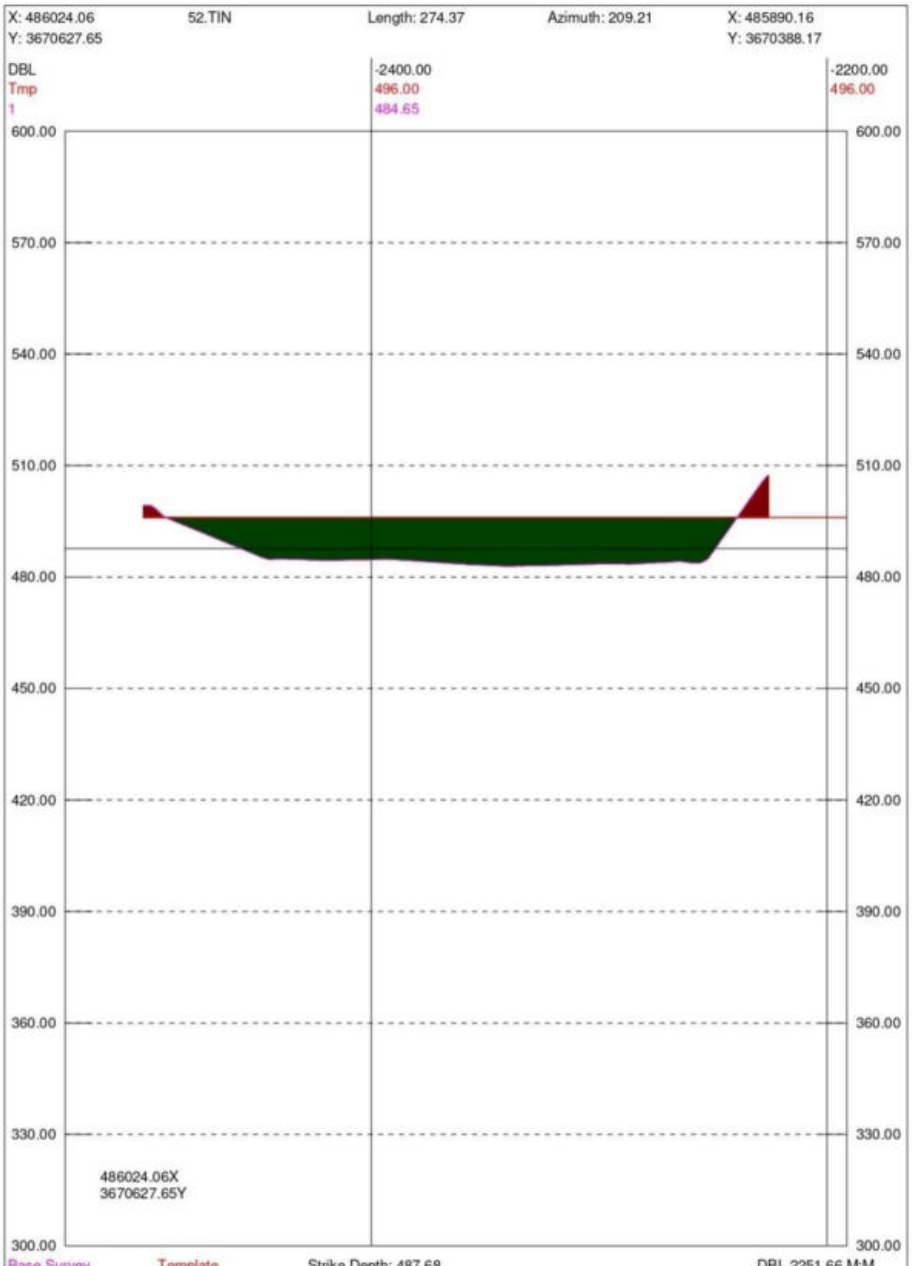
Seg	Design	Cut Area	Fill Area	Cut Vol	Fill Vol	OverDepth	Cut Area	Fill Area	Cut Vol	Fill Vol
1		11.37	2993.07	2195.45	301646.59	All	0.00	2993.07	0.00	301646.59
Total		11.37	2993.07	2195.45	301646.59		0.00	2993.07	0.00	301646.59
Accum				1942997.04	79659691.83				0.00	79659691.83

RD7480



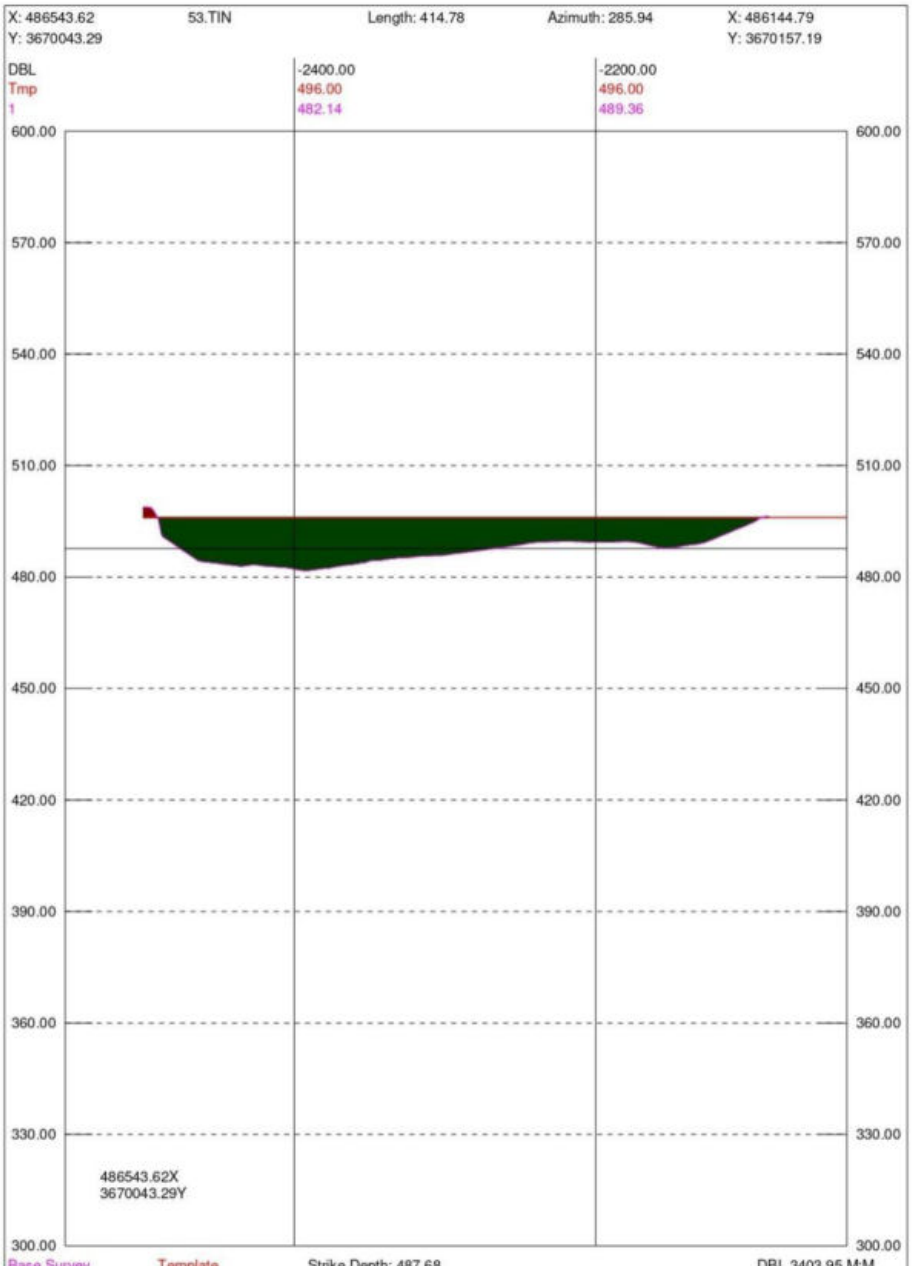
Seg	Design	Cut Area	Fill Area	Cut Vol	Fill Vol	OverDepth	Cut Area	Fill Area	Cut Vol	Fill Vol
1		45.13	3598.34	2842.09	331657.14	All	0.00	3598.34	0.00	331657.14
Total		45.13	3598.34	2842.09	331657.14		0.00	3598.34	0.00	331657.14
Accum				1945839.13	79991348.96				0.00	79991348.96

RD7580



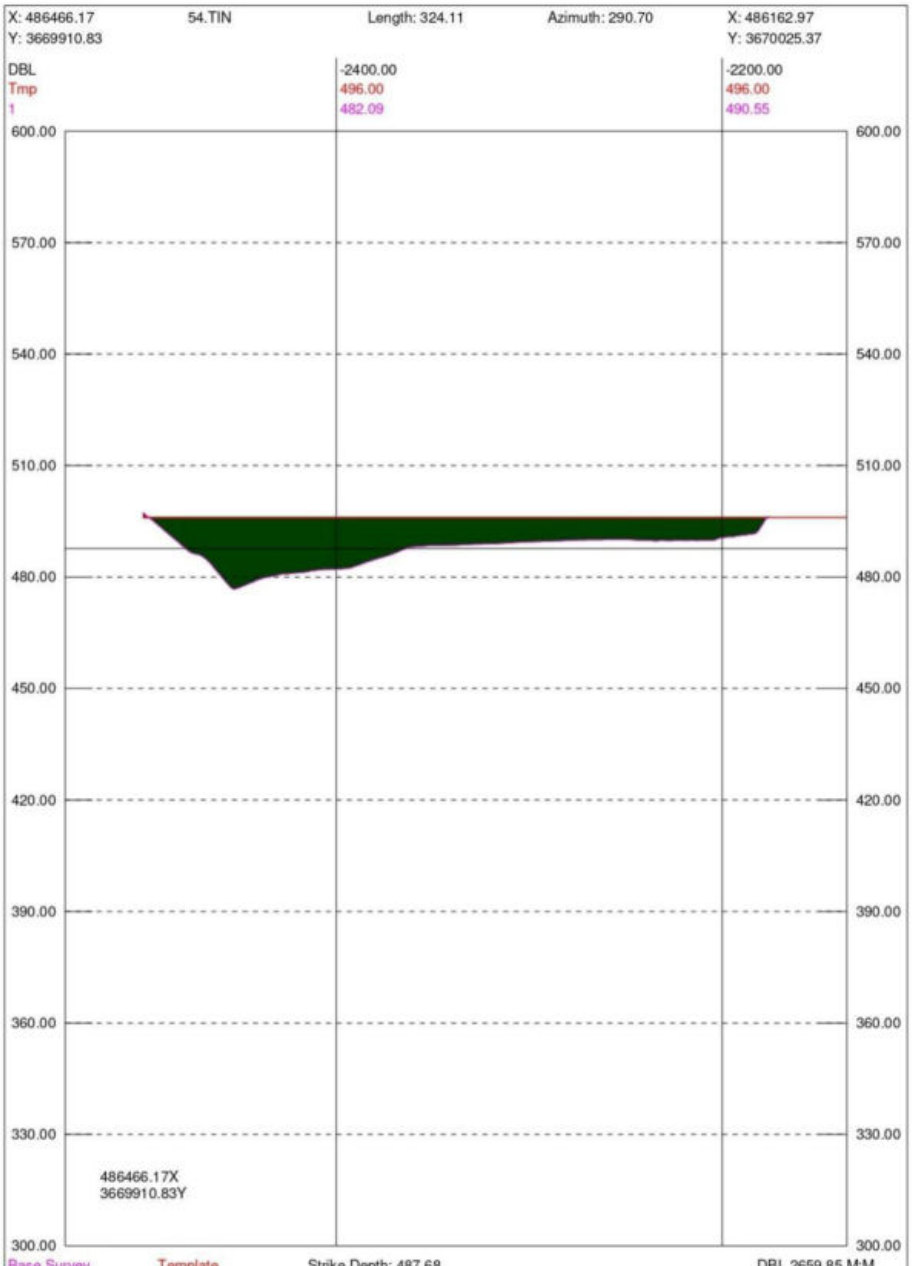
Seg	Design	Cut Area	Fill Area	Cut Vol	Fill Vol	OverDepth	Cut Area	Fill Area	Cut Vol	Fill Vol
1		103.89	2664.77	52087.32	2157490.96	All	0.00	2664.77	0.00	2157490.96
Total		103.89	2664.77	52087.32	2157490.96		0.00	2664.77	0.00	2157490.96
Accum				1997926.45	82148839.93				0.00	82148839.93

RD8280



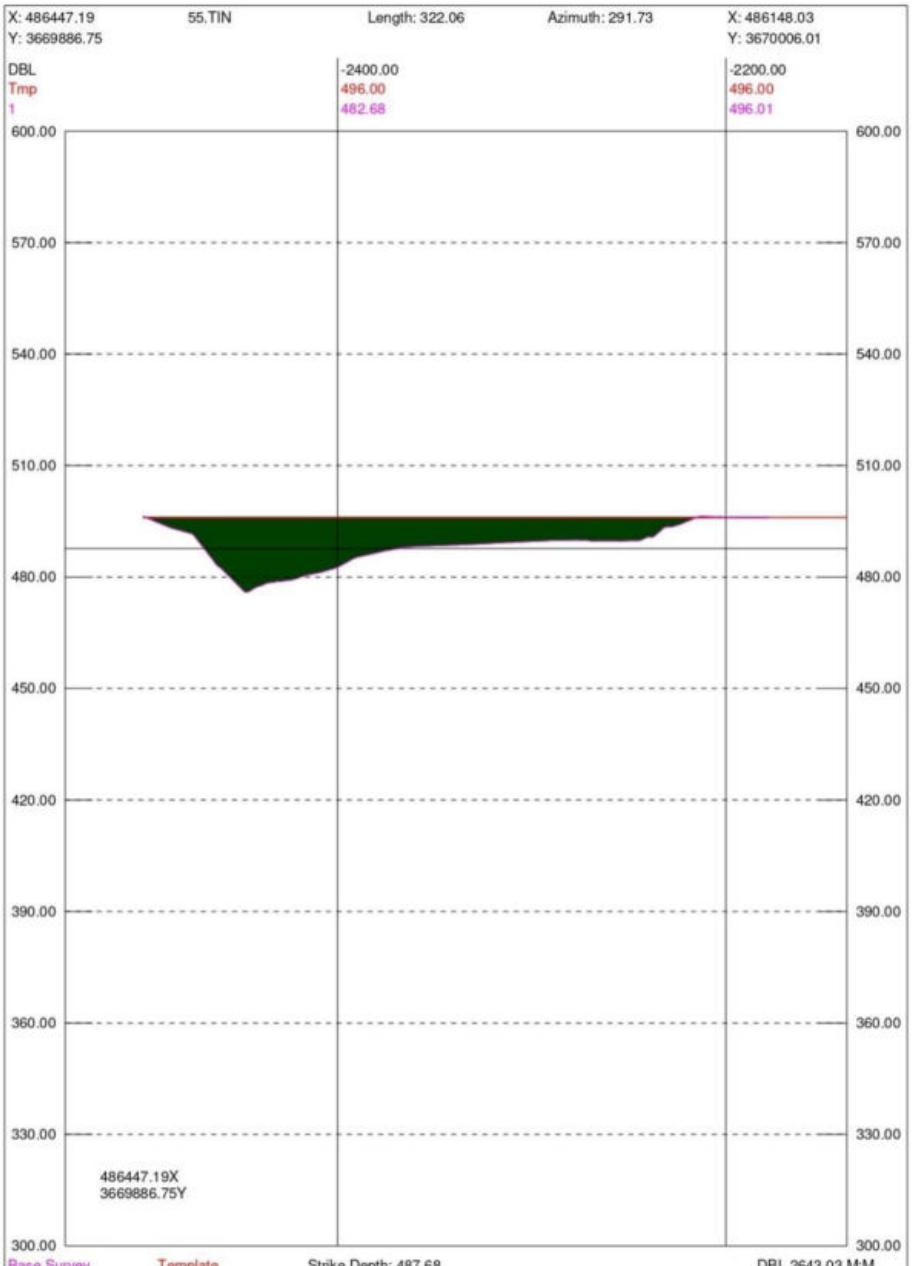
Seg	Design	Cut Area	Fill Area	Cut Vol	Fill Vol	OverDepth	Cut Area	Fill Area	Cut Vol	Fill Vol
1		20.92	3650.61	25066.95	1321998.86	All	0.00	3650.61	0.00	1321998.86
Total		20.92	3650.61	25066.95	1321998.86		0.00	3650.61	0.00	1321998.86
Accum				2022993.40	83470838.78				0.00	83470838.78

RD8880



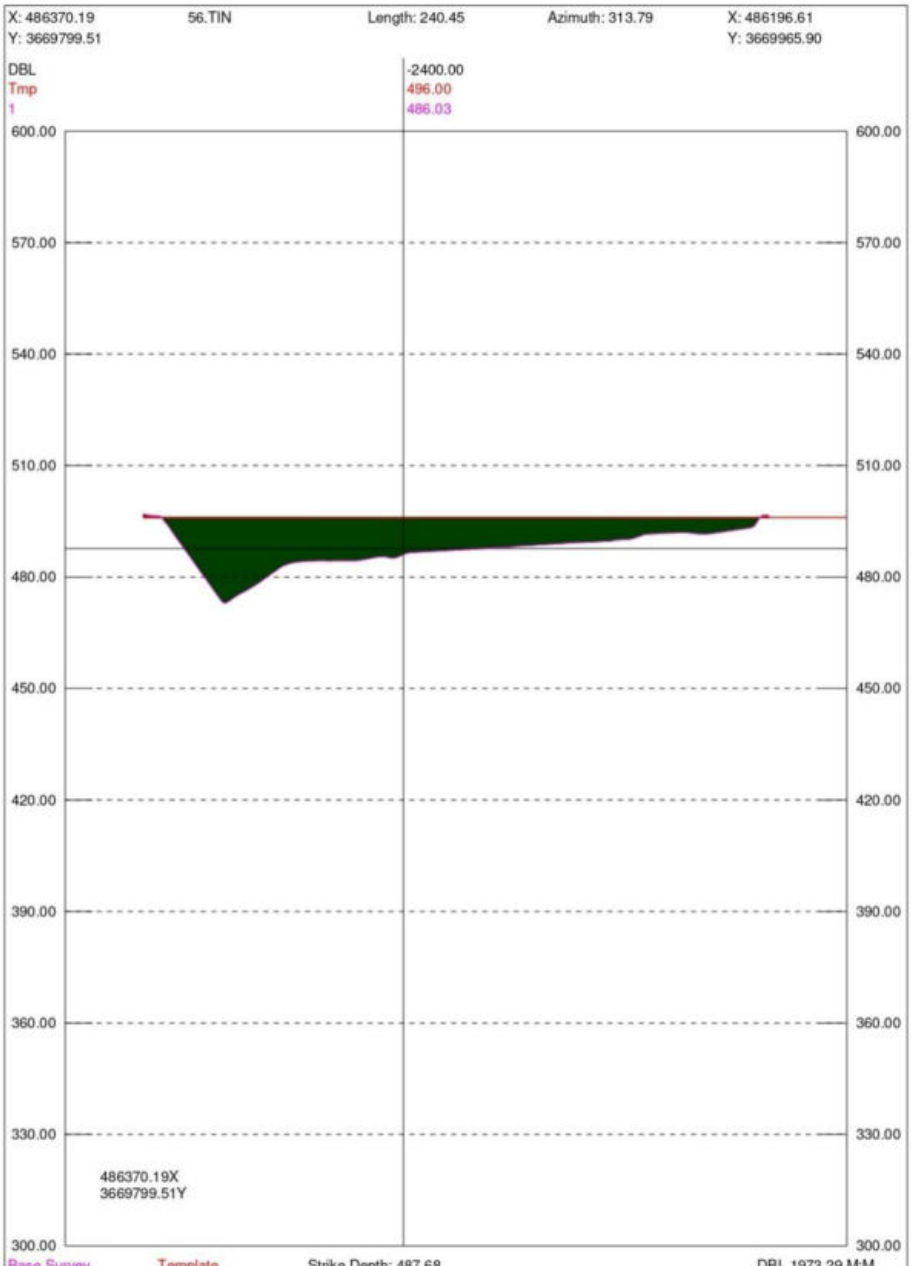
Seg	Design	Cut Area	Fill Area	Cut Vol	Fill Vol	OverDepth	Cut Area	Fill Area	Cut Vol	Fill Vol
1		1.81	2834.50	1686.83	443229.85	All	0.00	2834.50	0.00	443229.85
Total		1.81	2834.50	1686.83	443229.85		0.00	2834.50	0.00	443229.85
Accum				2024680.23	83914068.63				0.00	83914068.63

RD9060



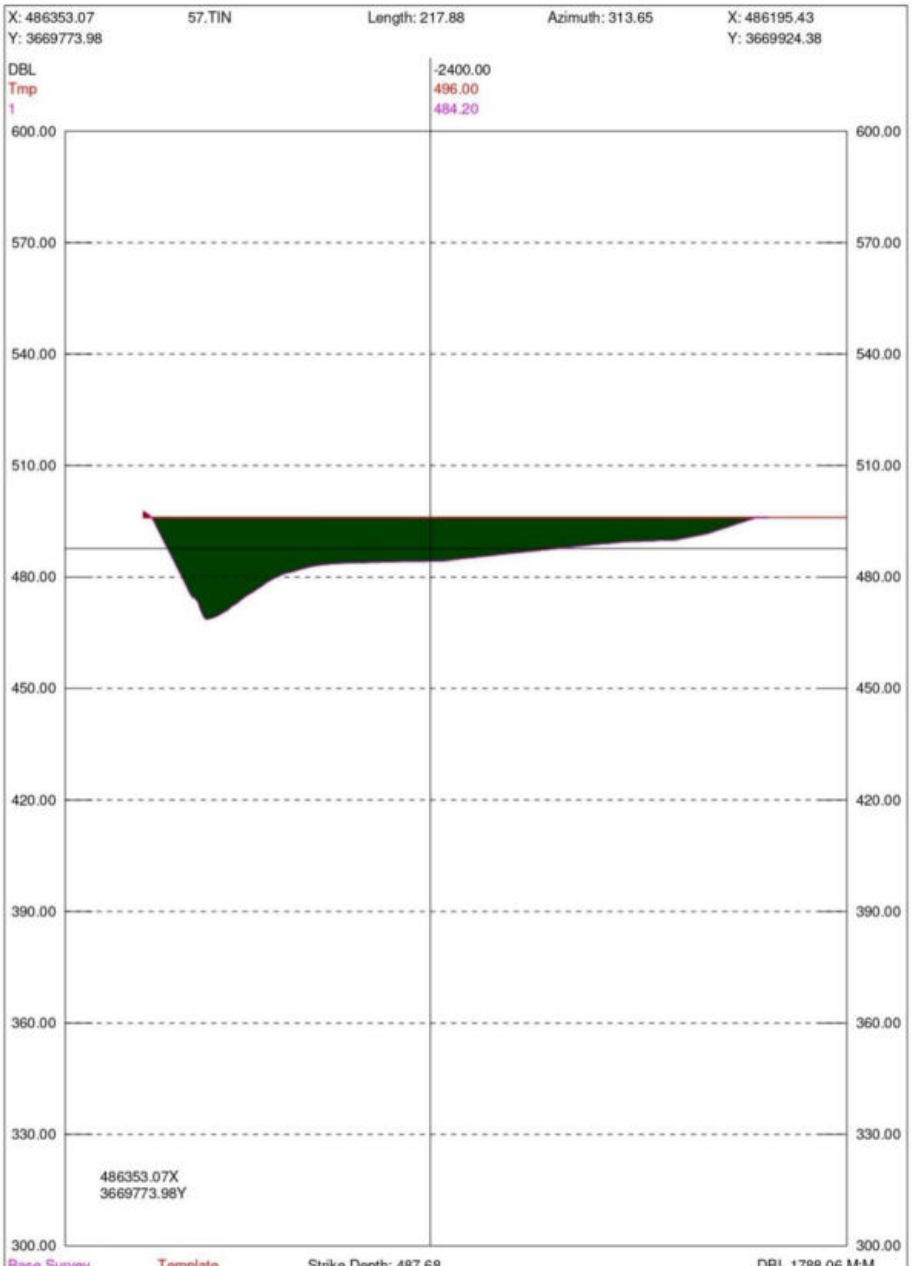
Seg	Design	Cut Area	Fill Area	Cut Vol	Fill Vol	OverDepth	Cut Area	Fill Area	Cut Vol	Fill Vol
1		3.50	2446.58	68.70	71248.71	All	0.00	2446.58	0.00	71248.71
Total		3.50	2446.58	68.70	71248.71		0.00	2446.58	0.00	71248.71
Accum				2024748.93	83985317.34				0.00	83985317.34

RD9510



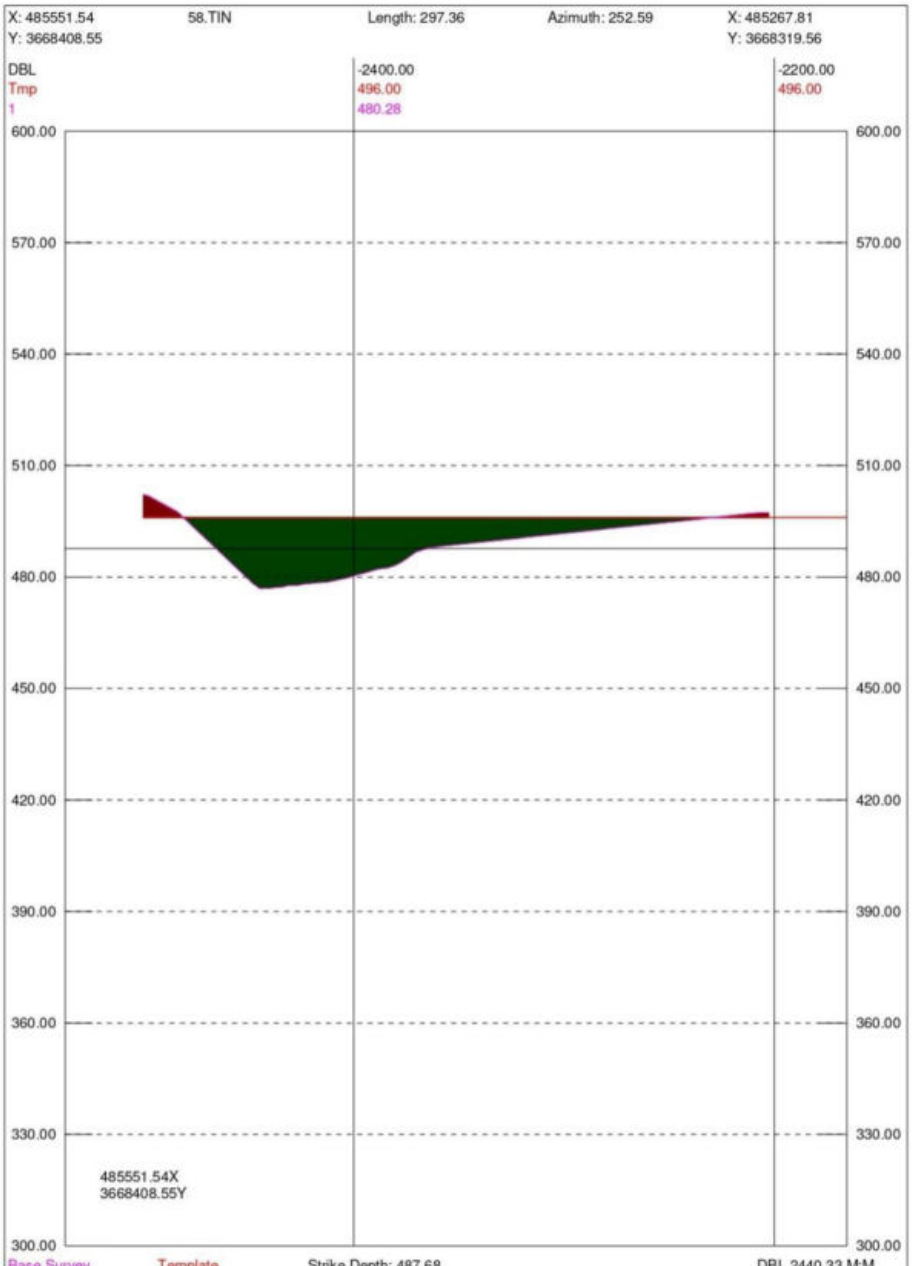
Seg	Design	Cut Area	Fill Area	Cut Vol	Fill Vol	OverDepth	Cut Area	Fill Area	Cut Vol	Fill Vol
1		5.35	2096.43	240.93	163428.31	All	0.00	2096.43	0.00	163428.31
Total		5.35	2096.43	240.93	163428.31		0.00	2096.43	0.00	163428.31
Accum				2024989.86	84148745.65				0.00	84148745.65

RD11345



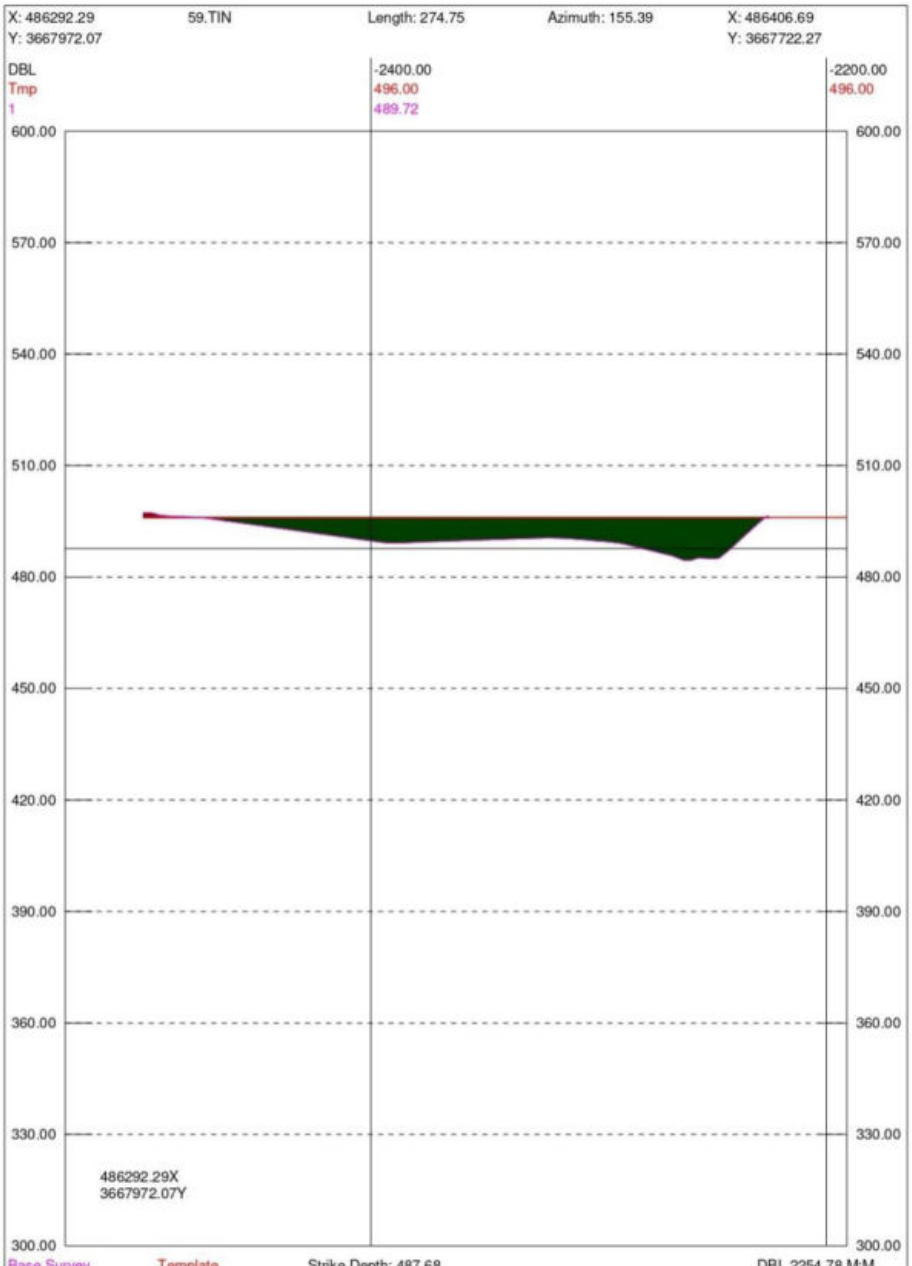
Seg	Design	Cut Area	Fill Area	Cut Vol	Fill Vol	OverDepth	Cut Area	Fill Area	Cut Vol	Fill Vol
1		2.97	2324.81	126.48	67405.33	All	0.00	2324.81	0.00	67405.33
Total		2.97	2324.81	126.48	67405.33		0.00	2324.81	0.00	67405.33
Accum				2025116.34	84216150.99				0.00	84216150.99

RD13230



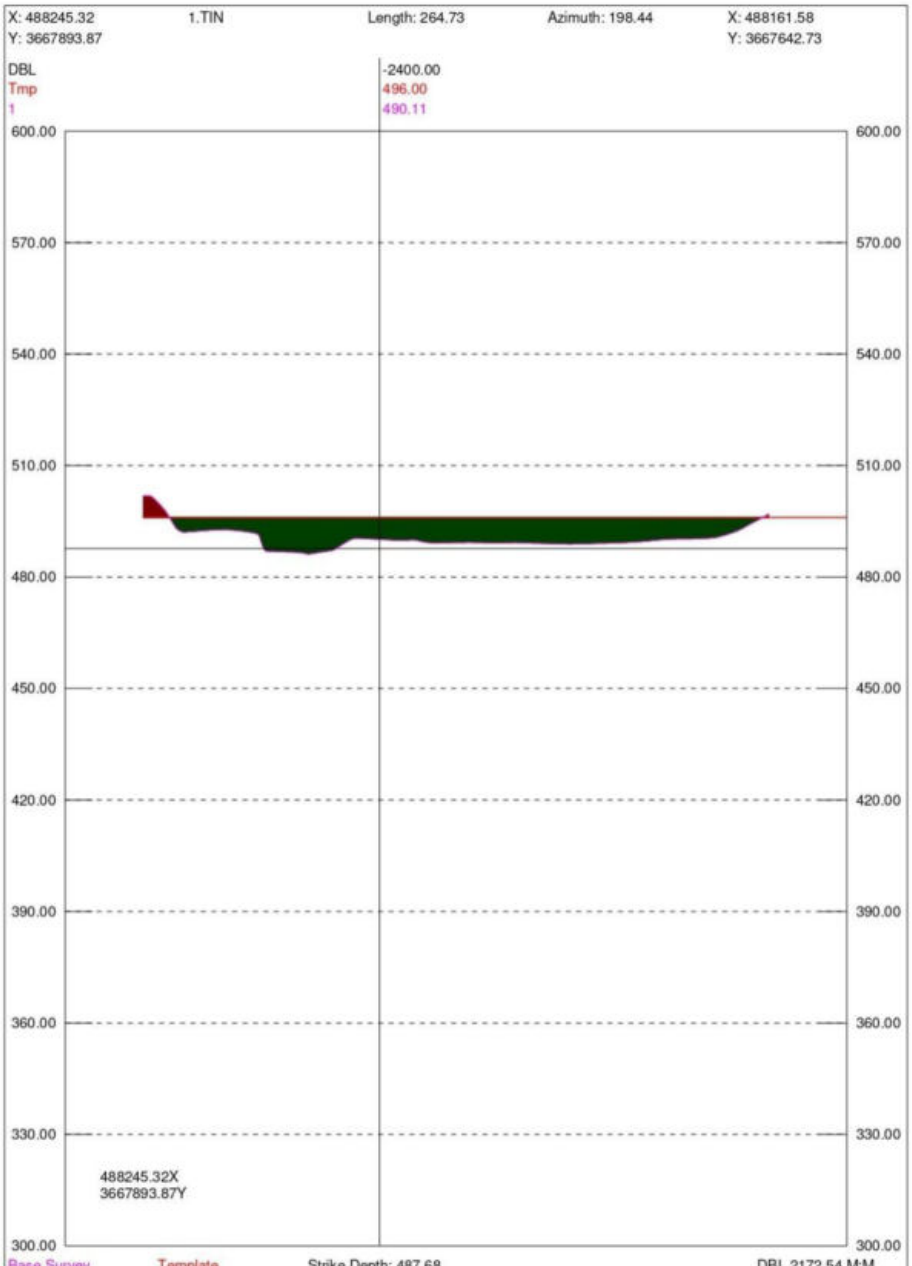
Seg	Design	Cut Area	Fill Area	Cut Vol	Fill Vol	OverDepth	Cut Area	Fill Area	Cut Vol	Fill Vol
1		86.84	2140.37	61184.87	3090103.65	All	0.00	2140.37	0.00	3090103.65
Total		86.84	2140.37	61184.87	3090103.65		0.00	2140.37	0.00	3090103.65
Accum				2086301.21	87306254.64				0.00	87306254.64

RD14990



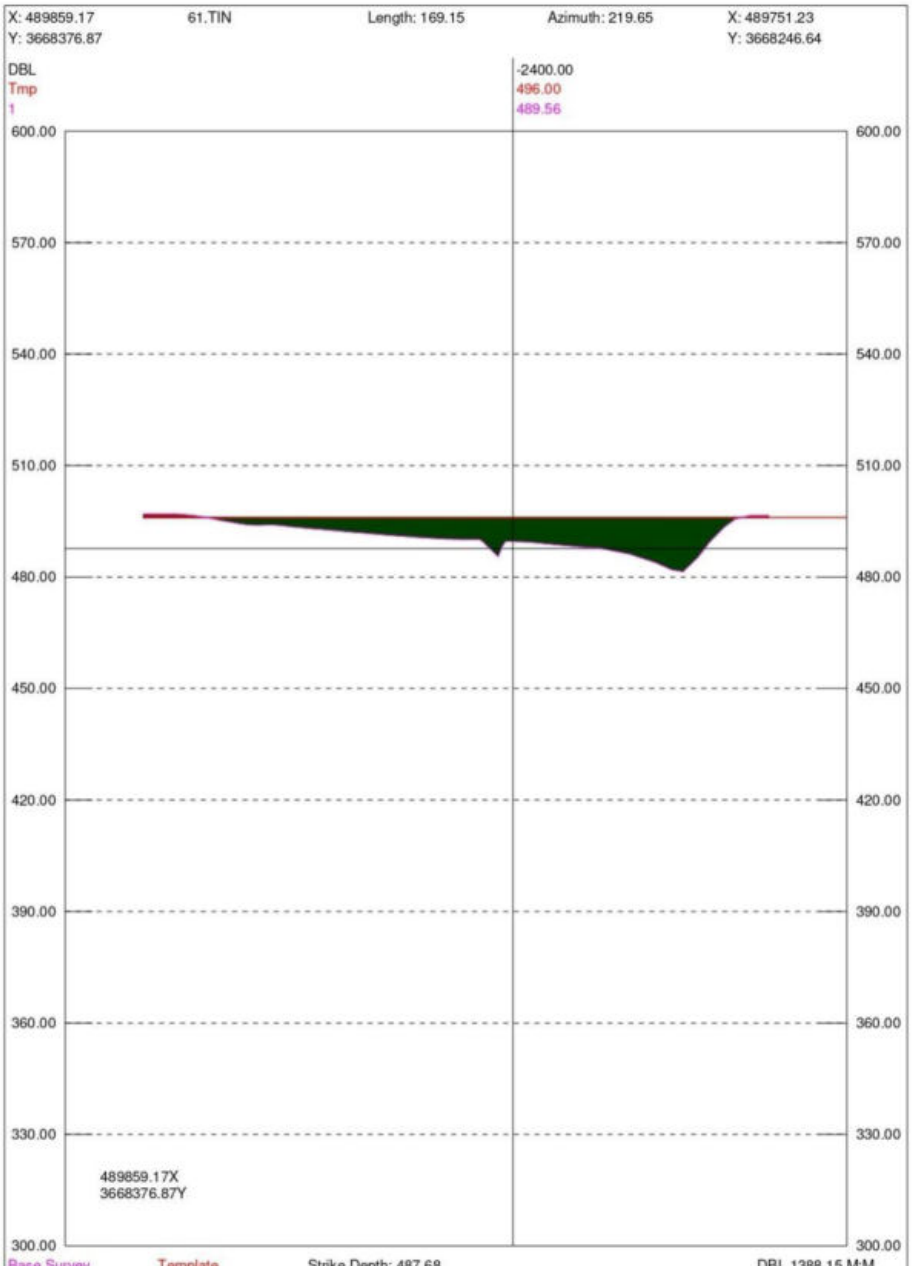
Seg	Design	Cut Area	Fill Area	Cut Vol	Fill Vol	OverDepth	Cut Area	Fill Area	Cut Vol	Fill Vol
1		13.30	1446.07	31431.77	1249413.83	All	0.00	1446.07	0.00	1249413.83
Total		13.30	1446.07	31431.77	1249413.83		0.00	1446.07	0.00	1249413.83
Accum				2117732.98	88555668.47				0.00	88555668.47

RD15230



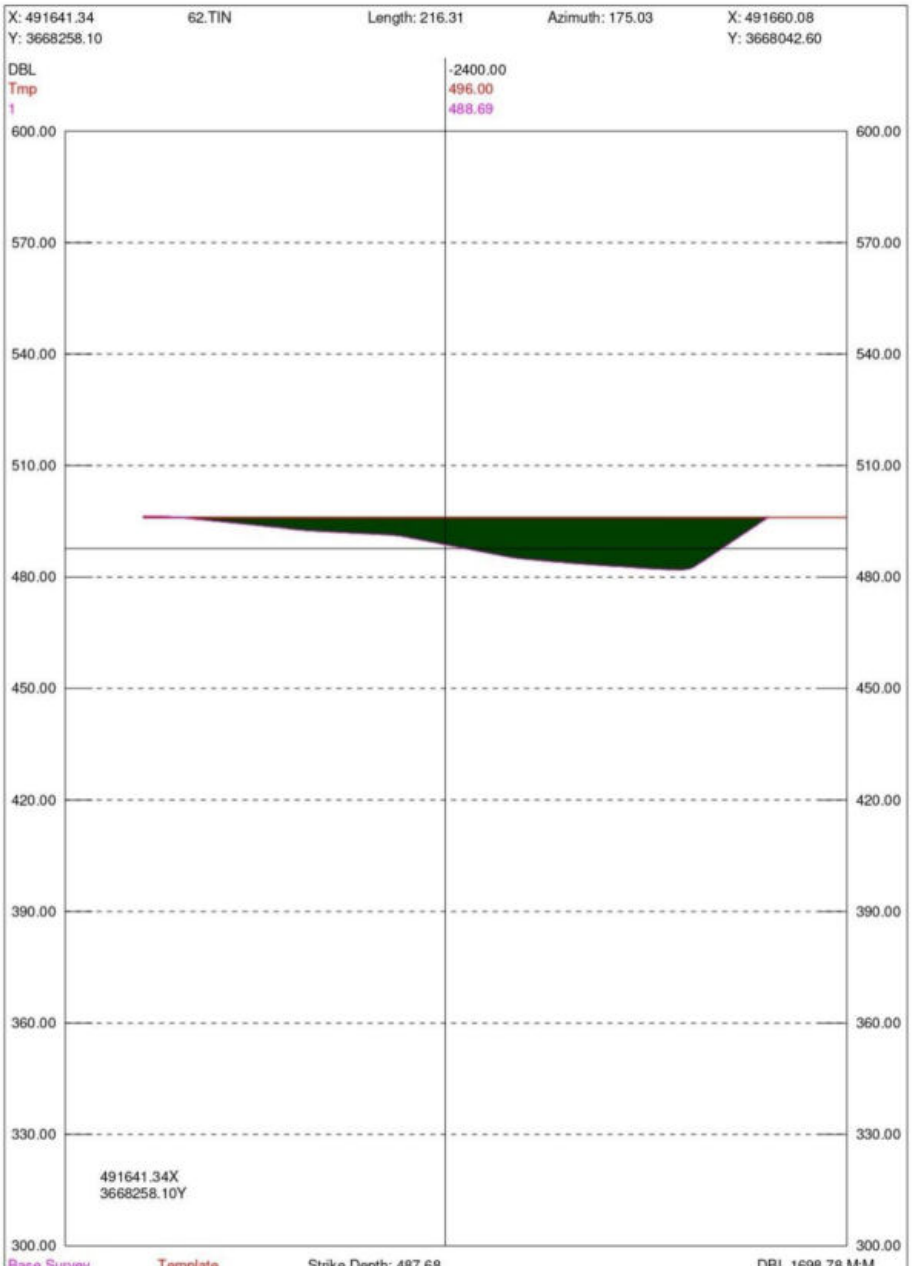
Seg	Design	Cut Area	Fill Area	Cut Vol	Fill Vol	OverDepth	Cut Area	Fill Area	Cut Vol	Fill Vol
1		45.12	1536.35	52649.95	2543508.81	All	0.00	1536.35	0.00	2543508.81
Total		45.12	1536.35	52649.95	2543508.81		0.00	1536.35	0.00	2543508.81
Accum				2170382.93	91099177.28				0.00	91099177.28

RD17220



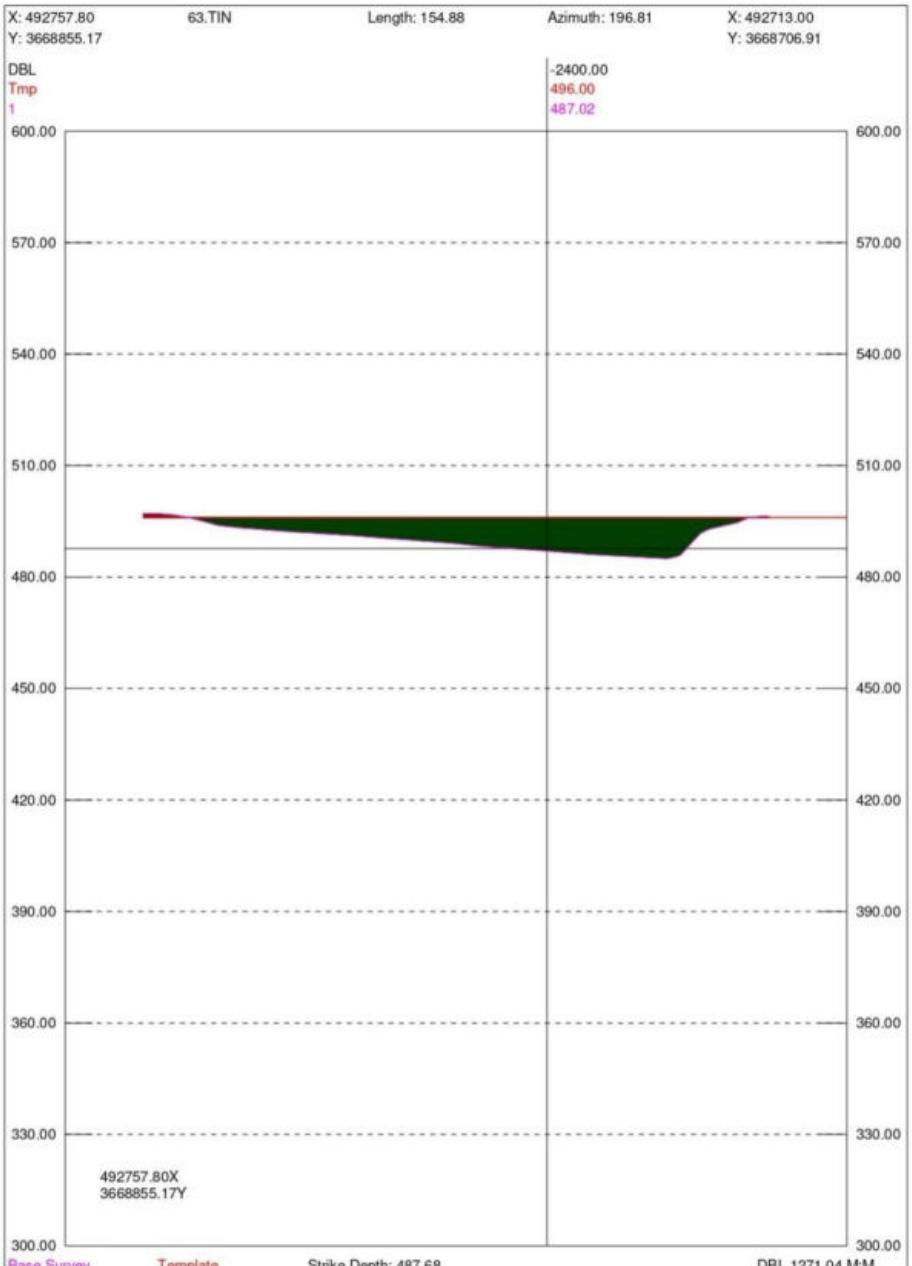
Seg	Design	Cut Area	Fill Area	Cut Vol	Fill Vol	OverDepth	Cut Area	Fill Area	Cut Vol	Fill Vol
1		15.50	857.36	34847.14	1329609.55	All	0.00	857.36	0.00	1329609.55
Total		15.50	857.36	34847.14	1329609.55		0.00	857.36	0.00	1329609.55
Accum				2205230.06	92428786.83				0.00	92428786.83

RD19130



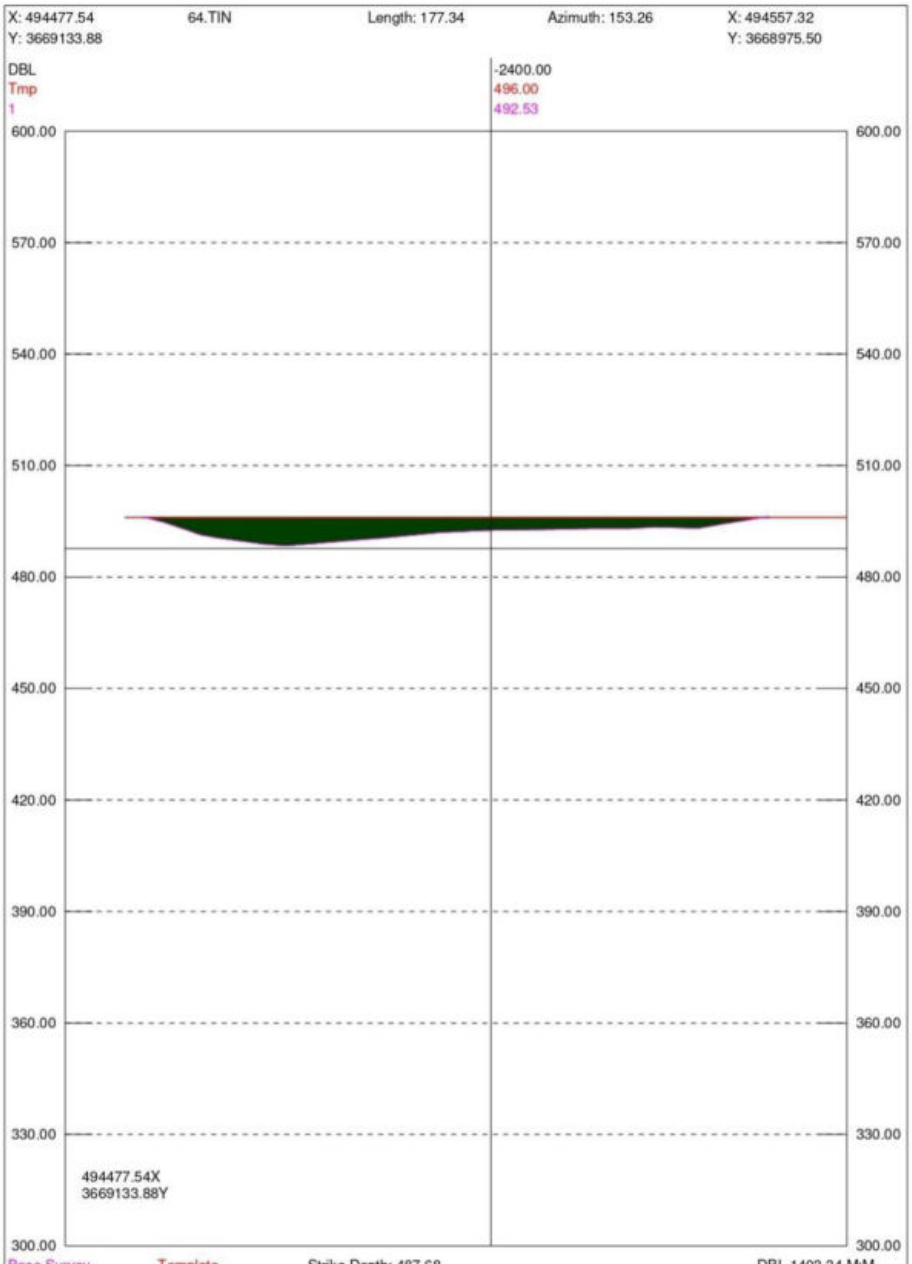
Seg	Design	Cut Area	Fill Area	Cut Vol	Fill Vol	OverDepth	Cut Area	Fill Area	Cut Vol	Fill Vol
1		2.97	1428.21	15050.30	1935803.53	All	0.00	1428.21	0.00	1935803.53
Total		2.97	1428.21	15050.30	1935803.53		0.00	1428.21	0.00	1935803.53
Accum				2220280.37	94364590.36				0.00	94364590.36

RD20600



Seg	Design	Cut Area	Fill Area	Cut Vol	Fill Vol	OverDepth	Cut Area	Fill Area	Cut Vol	Fill Vol
1		9.36	856.80	6310.92	1126577.79	All	0.00	856.80	0.00	1126577.79
Total		9.36	856.80	6310.92	1126577.79		0.00	856.80	0.00	1126577.79
Accum				2226591.29	95491168.15				0.00	95491168.15

RD 22500



Seg	Design	Cut Area	Fill Area	Cut Vol	Fill Vol	OverDepth	Cut Area	Fill Area	Cut Vol	Fill Vol
1		0.23	676.03	7827.15	1281318.48	All	0.00	676.03	0.00	1281318.48
Total		0.23	676.03	7827.15	1281318.48		0.00	676.03	0.00	1281318.48
Accum				2234418.44	96772486.63				0.00	96772486.63

C) Total storage capacity of reservoir upto elevation (496.000m) C = A + B

Row. No.	Values
1	2.2312794 MCM (A) - Red Nallah
2	96.77248666 MCM (B) - Upstream
3	C = A + B
4	*2.2312794 MCM + 96.77248666 MCM = 99.00376606 MCM (C)*

- **Note :** The present storage capacity has been calculated based on cross-section method. The calculated presented storage capacity may not be accurate due to coarse interval of chainages at some locations especially in the river meander depth (eg. The maximum chainage distance given is 22550m). It is strongly recommended to carryout the survey at least 100m interval in order to calculate the present storage capacity in accurate manner, as the geology and geomorphology of river creates a significant variation in the meanders.

FIGURES

Fig 1. Location map

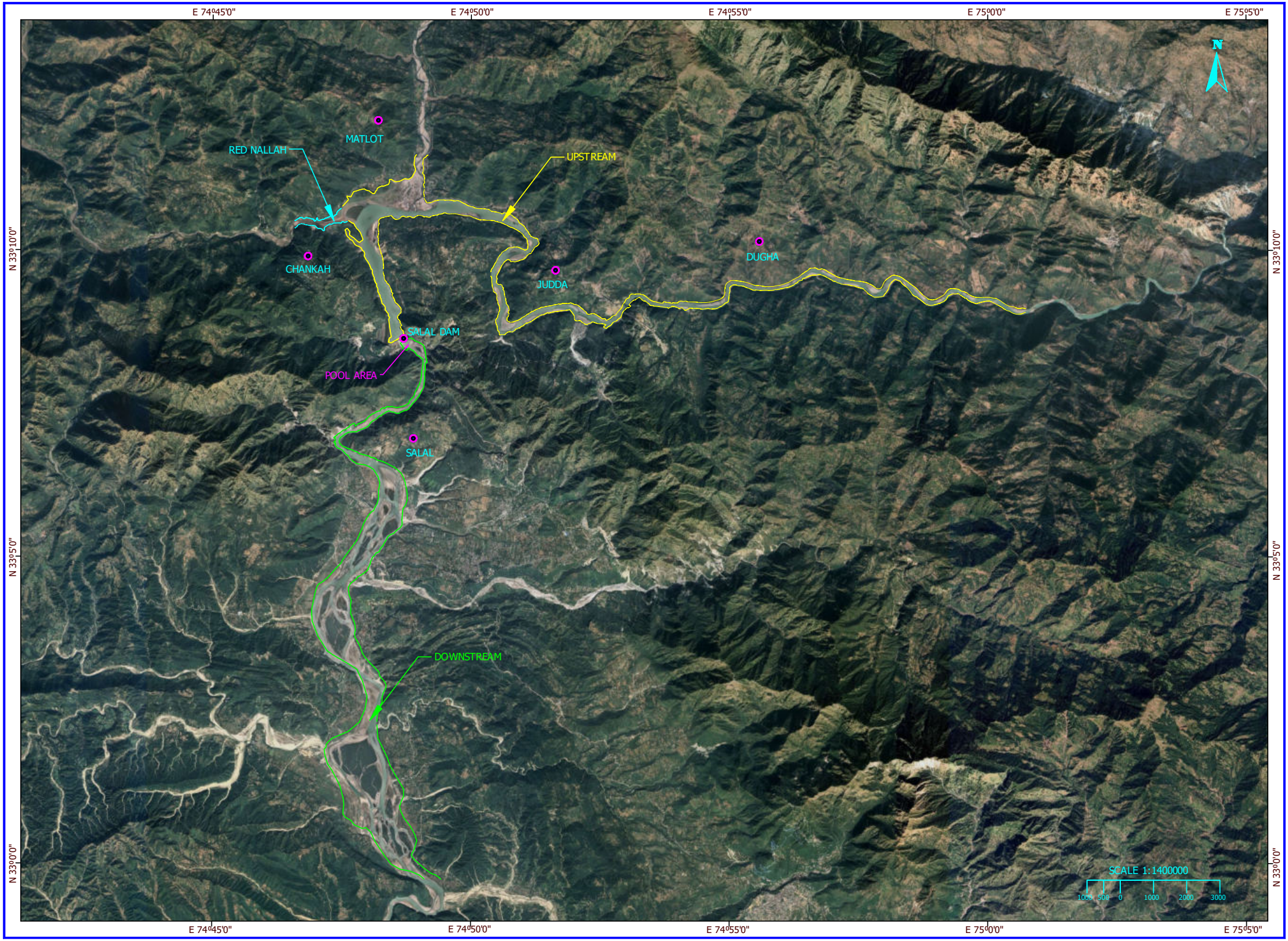


Fig. 2. Satellite imagery of survey region

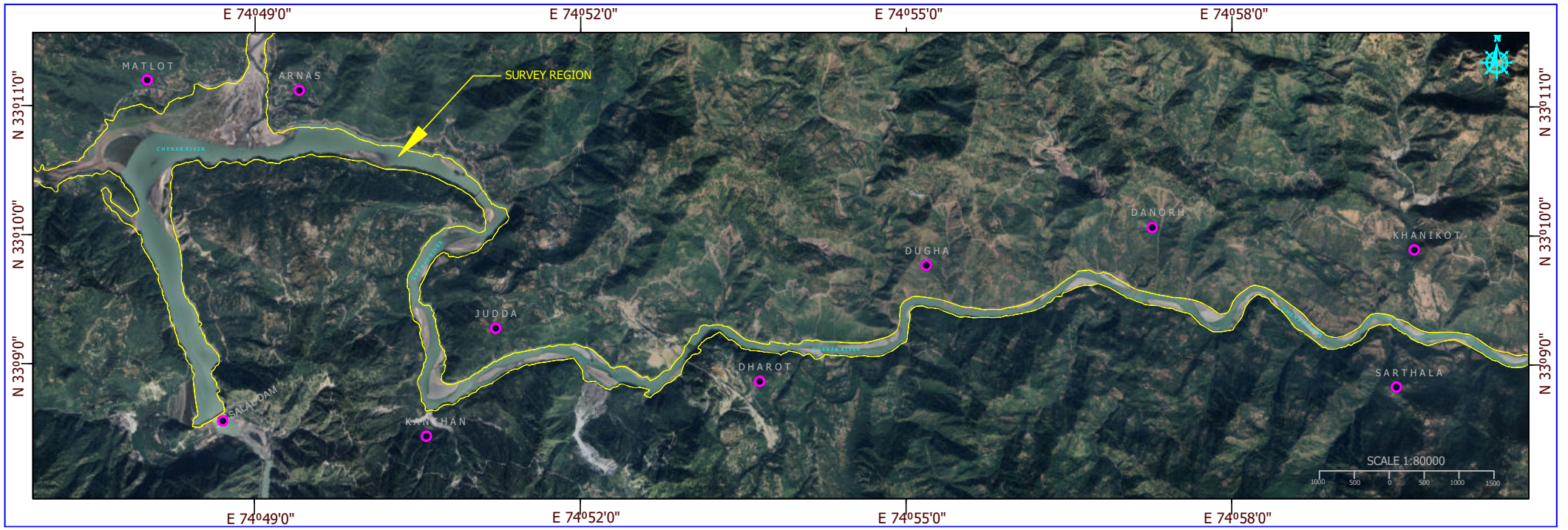


Fig. 3. Satellite imagery of survey region - UPSTREAM

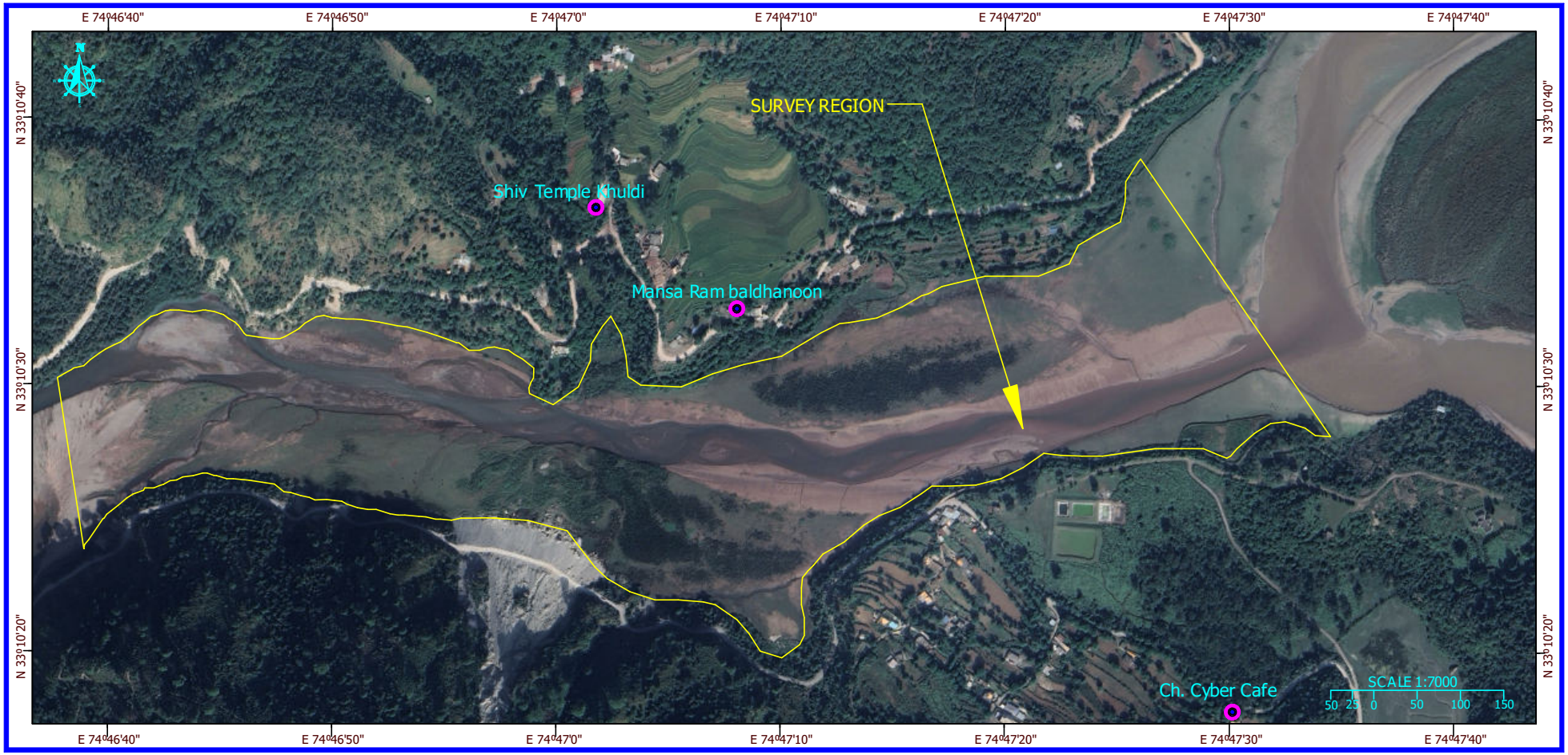


Fig 4. Satellite imagery of survey region - Red nallah

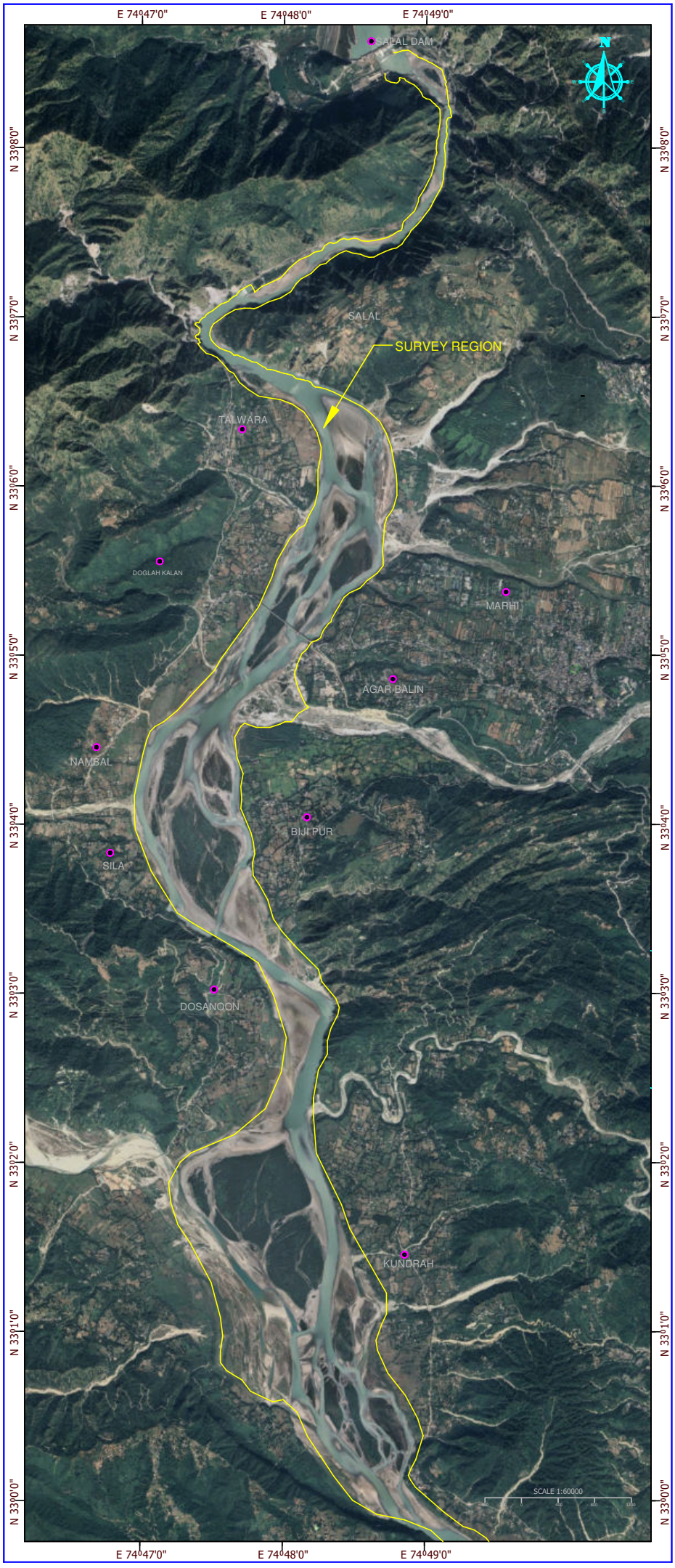
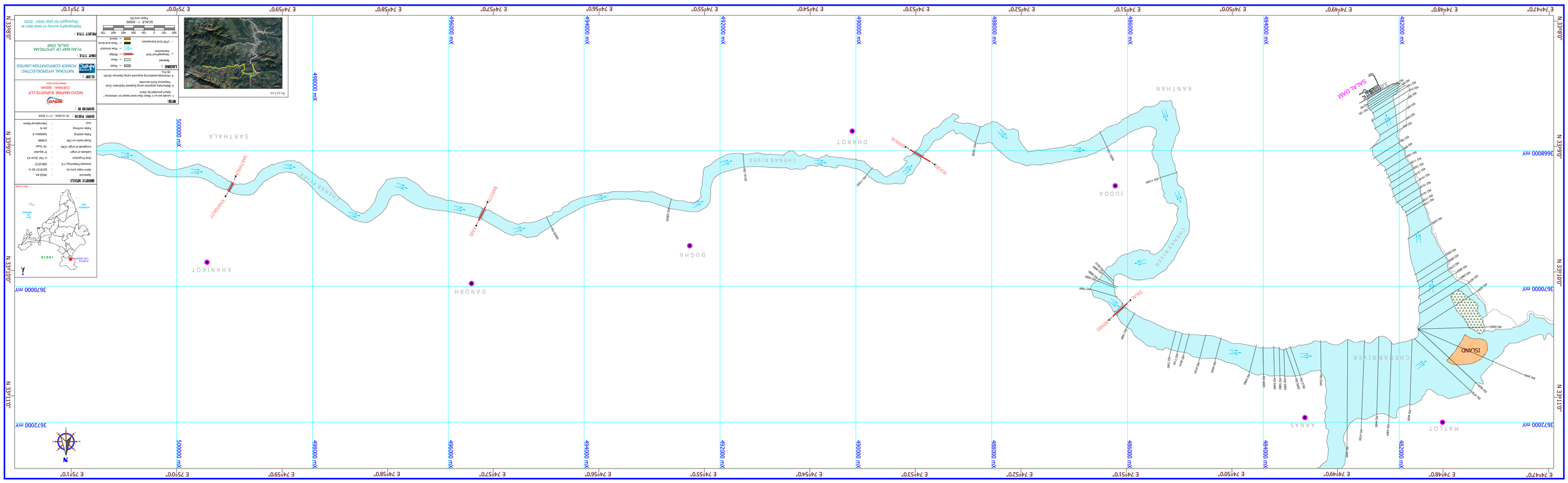


Fig 5. Satellite imagery of survey region-Downstream

Fig 6. Satellite imagery of survey region - Pool area


E 744847.0"
E 744848.0"
E 744849.0"
E 744850.0"
E 744851.0"
E 744852.0"
E 744853.0"
E 744854.0"
E 744855.0"
E 744856.0"
E 744857.0"
E 744858.0"
E 744859.0"
E 745000.0"
E 745001.0"
N 339'39.0"
N 339'40.0"
N 339'41.0"
482000 mX
484000 mX
486000 mX
488000 mX
490000 mX
492000 mX
494000 mX
496000 mX
498000 mX
500000 mX
3668000 mY
3670000 mY
3672000 mY
SALAL DAM
ISLAND
CHENAB RIVER
KANTHAN
JUDDA
ARNAS
MATLOT
SARTHALA
DHAROT
DUGHA
DANORH
KHANIKOT
SARTHALA
KHANIKOT
DHAROT
KOHLER
DANORH
SUKA
ARNAS
INDIA
JAMMU & KASHMIR
RIVER
CHENAB
SCALE : 1:20000
300 150 0 150 300 450 600 750
Flyer size A0
NOTE:
1. Levels are w.r.t Main Dial level based on reference / Bathymetry survey.
2. Bathymetry acquired using Dynamic Position Dual Frequency Echo-sounder.
3. Horizontal positioning acquired using Geomax Zenith 35 Pro.
Legend :
Channel
Flyer
Flow direction
Longitudinal Dyke
Riprap
Spur
River
Dyke and dams
Rock and dunes
Gravel
Sand
Project Title :
Hydrography survey of salal dam at Dhyangarh for year 2024 - 2025
Client :
NHPC
POWER CORPORATION LIMITED
Chart Title :
PLAN MAP OF UPSTREAM
SALAL DAM
Survey By :
NISVO MARINE SURVEYS LLP
CHENNAI - 600045
www.nisvo.com
Survey Period :
16.10.2024 - 17.11.2024
Geodetic Details :
Datum : WGS 84
Users map/ grid : 43°03'37.09 m
Survey/ Reference : 256.2572
Projection : Transverse Mercator
Zone : UTM Zone 43
Spheroid : WGS 84
Ellipsoid : Everest Ellipsoid (1)
Units of measurement : Metric
Origin : 0° 0'.0E
Origin Latitude : 0°
Origin Longitude (CM) : 0.9996
False Easting : 0500000 E
False Northing : 0m N
Units : Universal Metre
N

E 74°47'20" E 74°48'0" E 74°48'40"

N 33°11'20" N 33°10'40" N 33°10'0" N 33°9'20" N 33°8'40"

480000 mX 480500 mX 481000 mX 481500 mX 482000 mX 482500 mX

3672000 mY 3671500 mY 3671000 mY 3670500 mY 3670000 mY 3669500 mY 3669000 mY 3668500 mY 3668000 mY 3667500 mY 3667000 mY

MATLOT

ARNAS

CHENAB RIVER

RED NALLAH RIVER

ISLAND

NOT APPROCHABLE

RD 3490 RD 3620 RD 3750 RD 3360 RD 4000 RD 4300 RD 4480 RD 4700 RD 4940 RD 5340

RD 3250 RD 3070 RD 2960 RD 2850 RD 2750 RD 2650 RD 2550 RD 2050 RD 1750 RD 1700 RD 1610 RD 1510 RD 1410 RD 1310 RD 1220 RD 1130 RD 1020 RD 900 RD 780 RD 630 RD 540 RD 420 RD 300 RD 210 RD 150 RD 90 RD 30 RD 120 RD 60

SALAL DAM

N

NW NE W E SW SE S

SURVEY LOCATION

INDIA

BAY OF BENGAL

ARABIAN SEA

Keyplan:1

RED NALLAH UPSTREAM CHENAB SALAL DAM POOL AREA DOWNSTREAM

Not in scale

Keyplan

MATLOT SURVEY REGION SALAL DAM

Not in scale

NOTES:

1. Levels are w.r.t. Mean Sea level based on reference / datum provided by client.
2. Data interval - 25m X 25m.
3. Bathymetry acquired using Syqwest Hydrobox Dual frequency Echo-sounder.
4. Horizontal positioning acquired using Geomax Zenith 35 Pro.

LEGEND :

General

Geographical Grid Intersection

UTM Grid Intersection

Road
River
Bridge
Flow direction
Rock and dune
Island

GEODETIC DETAILS :

Spheroid	:	WGS 84
Semi major axis (a)	:	6378137.00 m
Inversed Flattening (1/f)	:	298.2572
Grid Projection	:	U.T.M. Zone 43
Latitude of origin	:	0° equator
Longitude of origin (CM)	:	75° East
Scale factor on CM	:	0.9996
False easting	:	500000m E
False northing	:	0m N
Unit	:	International Metre

SURVEY PERIOD : 18.10.2024 - 17.11.2024

SURVEYED BY :

NISVO MARINE SURVEYS LLP
CHENNAI - 600045
www.nisvo.com

CLIENT :

NATIONAL HYDROELECTRIC POWER CORPORATION LIMITED

CHART TITLE :

UPSTREAM PART - 1(RD 30 - RD 5340)
SALAL DAM

PROJECT TITLE :

Hydrography survey of salal dam at Dhyangarh for year 2024 - 2025

150 100 50 0 100 200 300 400

SCALE 1 : 5000
Paper size A0

LAYOUT OF SHEETS

RD 30 - RD 5340 RD 5750 - RD 16250 RD 17250 - RD 22500

PART I PART II PART III

Not in scale

E 74°50'0"
E 74°51'0"
E 74°52'0"
N 33°10'0"
N 33°9'0"
484000 mX
484500 mX
485000 mX
485500 mX
486000 mX
486500 mX
487000 mX
487500 mX
488000 mX
3671000 mY
3670500 mY
3670000 mY
3669500 mY
3669000 mY
3668500 mY
3668000 mY

RD 5750
RD 5825
RD 5900
RD 5980
RD 6060
RD 6220
RD 6380
RD 6540
RD 6700
RD 6910
RD 7140
RD 7380
RD 7480
RD 7580
RD 8280
RD 8380
RD 9060
RD 9510
RD 11345
RD 13230
RD 15230

ARNAS
SALAL
KOURI
BAKKAL
JUDDA
CHENAB RIVER
CHENAB RIVER

N
NNE
NE
ENE
E
ESE
SE
SSE
S
SSW
SW
WSW
W
WNW
NW
NNW

SURVEY LOCATION
INDIA
BAY OF BENGAL
ARABIAN SEA
Not in scale

Keyplan
SURVEY REGION
JUDDA
Not in scale

NOTES:

1. Levels are w.r.t. Mean Sea level based on reference / datum provided by client.
2. Data interval - 25m X 25m.
3. Bathymetry acquired using Syqwest Hydrobox Dual frequency Echo-sounder.
4. Horizontal positioning acquired using Geomax Zenith 35 Pro.

LEGEND :

General
Geographical Grid Intersection
UTM Grid Intersection
Road
River
Bridge
Flow direction
Rock and dune
Island

GEODETIC DETAILS :

Spheroid	:	WGS 84
Semi major axis (a)	:	6378137.00 m
Inversed Flattening (1/f)	:	298.2572
Grid Projection	:	U.T.M. Zone 43
Latitude of origin	:	0° equator
Longitude of origin (CM)	:	75° East
Scale factor on CM	:	0.9996
False easting	:	500000m E
False northing	:	0m N
Unit	:	International Metre

SURVEY PERIOD : 18.10.2024 - 17.11.2024

SURVEYED BY :

NISVO MARINE SURVEYS LLP
CHENNAI - 600045
www.nisvo.com

CLIENT :

NATIONAL HYDROELECTRIC POWER CORPORATION LIMITED

Keyplan:1
RSD SALDAM
UPSTREAM
POOL WATER
DOWNSTREAM
Not in scale

LAYOUT OF SHEETS
RD 5750 - RD 15230
PART I
PART II
PART III
Not in scale

CHART TITLE :
UPSTREAM PART - 2(RD 5750 - RD 15230)
SALAL DAM

PROJECT TITLE :
Hydrography survey of salal dam at Dhyangarh for year 2024 - 2025

150 100 50 0 100 200 300 400
SCALE 1 : 5000
Paper size A0

E 74°54'0" E 74°55'0" E 74°56'0"

N 33°19'0" N 33°19'0"

4895000X 4900000X 4905000X 4910000X 4915000X 4920000X 4925000X 4930000X 4935000X 4940000X 4945000X

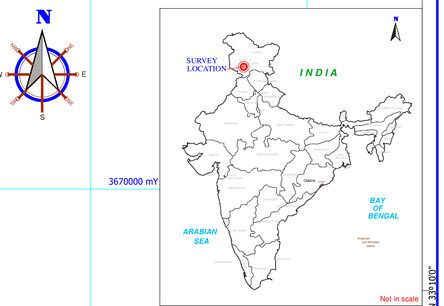
3670000 mY 3669500 mY 3669000 mY 3668500 mY 3668000 mY 3675000 mY 3670000 mY

DUGHA

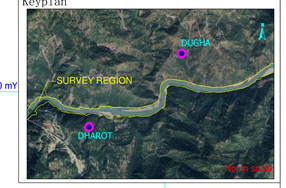
DHAROT

CHENAB RIVER

RD 17220 RD 19130 RD 20600 RD 22500



Keyplan



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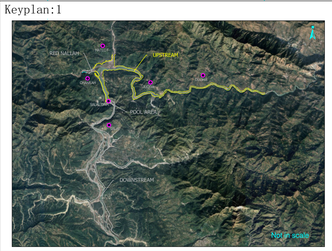
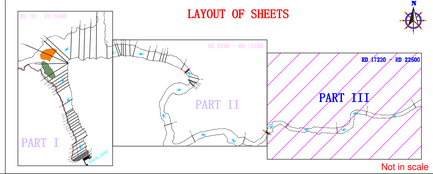


LAYOUT OF SHEETS



NOTES:

1. Levels are w.r.t. Mean Sea level based on reference / datum provided by client.
2. Data interval - 25m X 25m.
3. Bathymetry acquired using Syqwest Hydrobox Dual frequency Echo-sounder.
4. Horizontal positioning acquired using Geomax Zenith 35 Pro.

LEGEND :

General
- Geographical Grid Intersection
- UTM Grid Intersection
- Road
- River
- Bridge
- Flow direction
- Rock and dune
- Island

GEODETIC DETAILS :

Spheroid	:	WGS 84
Semi major axis (a)	:	6378137.00 m
Inversed Flattening (1/f)	:	298.2572
Grid Projection	:	U.T.M. Zone 43
Latitude of origin	:	0° equator
Longitude of origin (CM)	:	75° East
Scale factor on CM	:	0.9996
False easting	:	500000m E
False northing	:	0m N
Unit	:	International Metre

SURVEY PERIOD : 18.10.2024 - 17.11.2024

SURVEYED BY :

NISVO MARINE SURVEYS LLP
CHENNAI - 600045
www.nisvo.com

CLIENT :

NATIONAL HYDROELECTRIC POWER CORPORATION LIMITED

CHART TITLE :

UPSTREAM PART - 3(RD 17220 - RD 22500)
SALAL DAM

PROJECT TITLE :

Hydrography survey of salal dam at Dhyangarh for year 2024 - 2025

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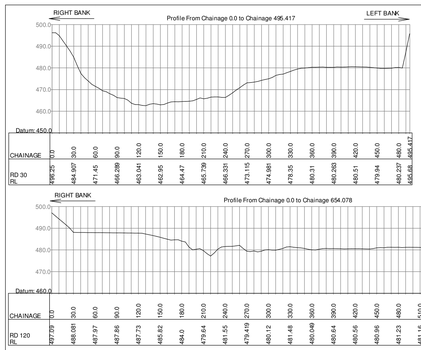
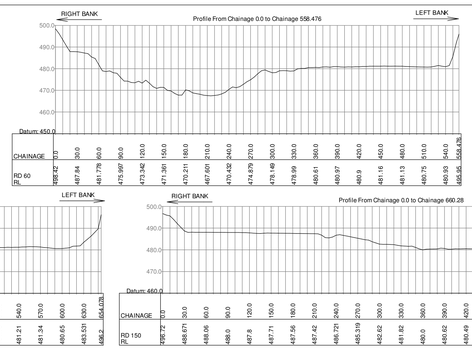
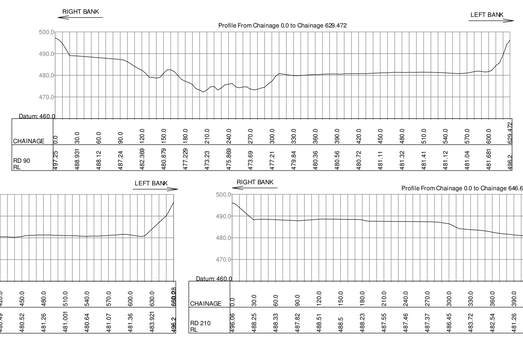
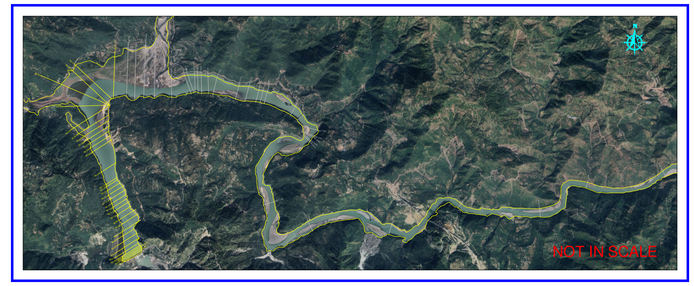
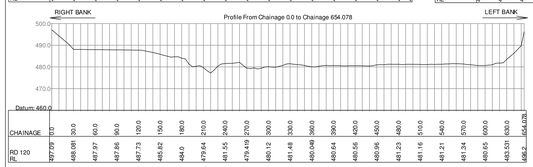
SCALE 1 : 5000
Paper size A0

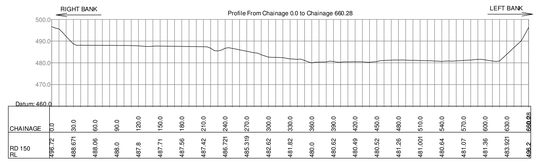


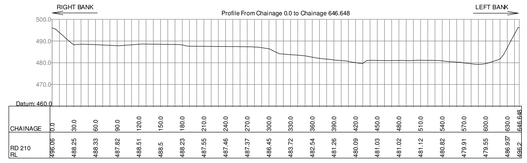


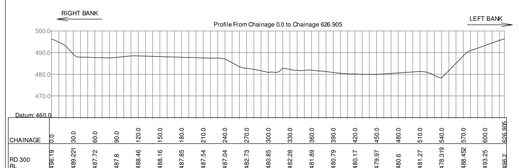


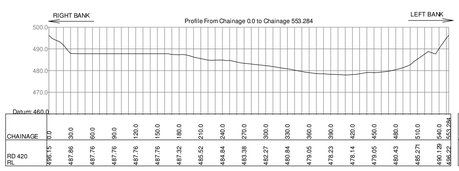


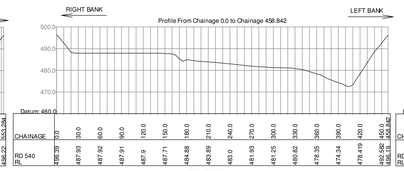


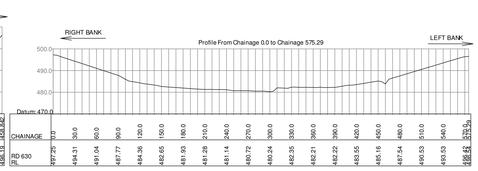


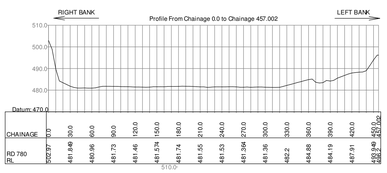


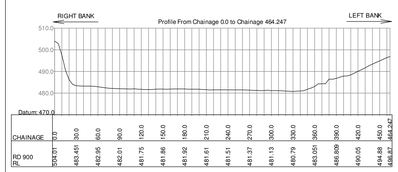


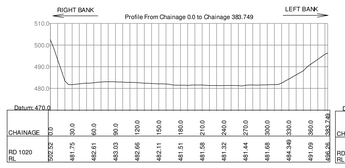


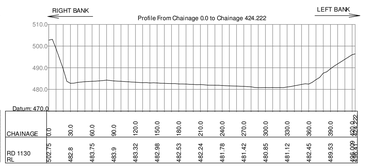


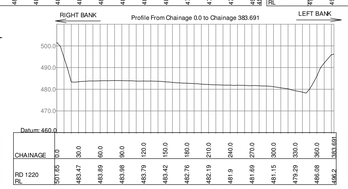


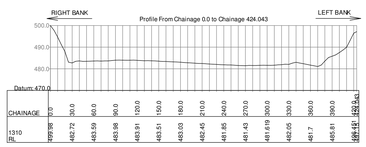


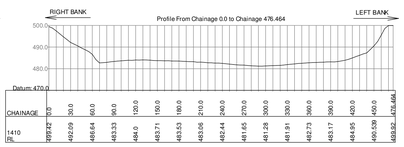


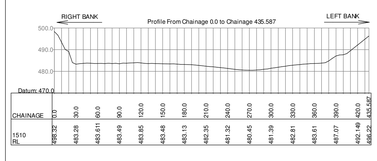


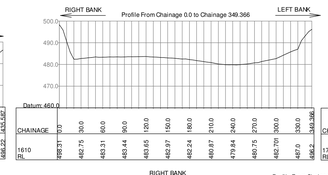


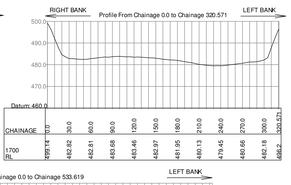


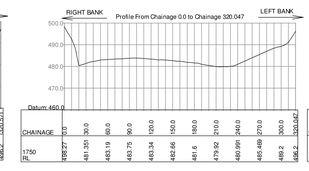


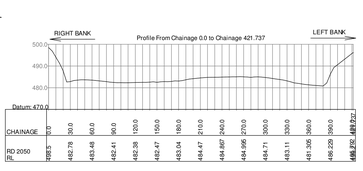


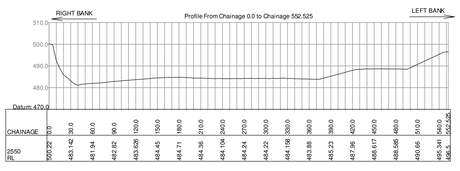


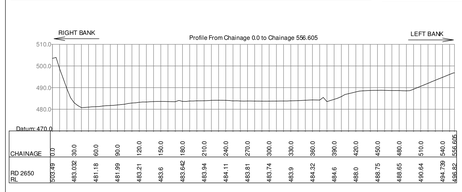


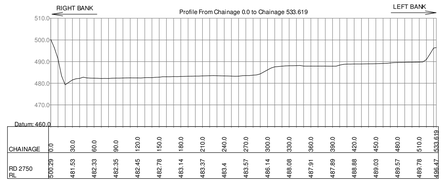


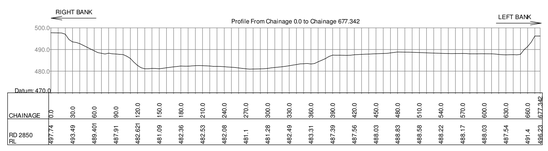


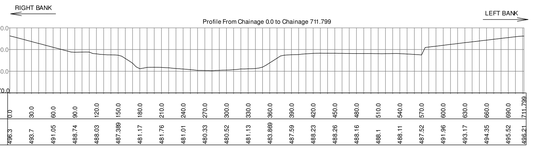


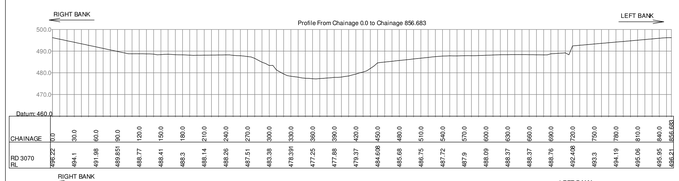


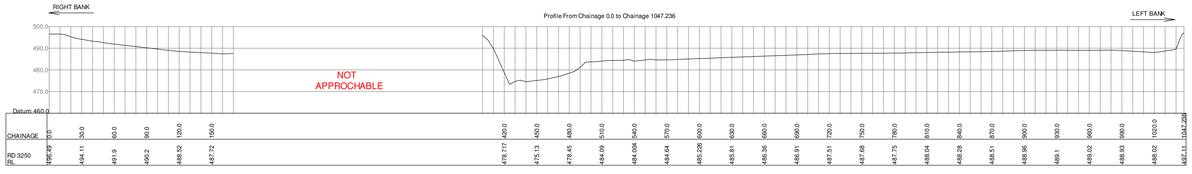


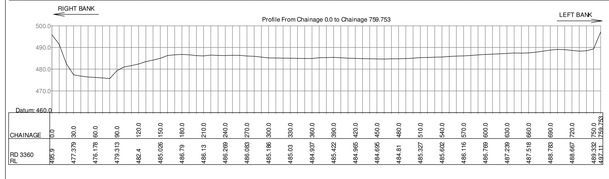


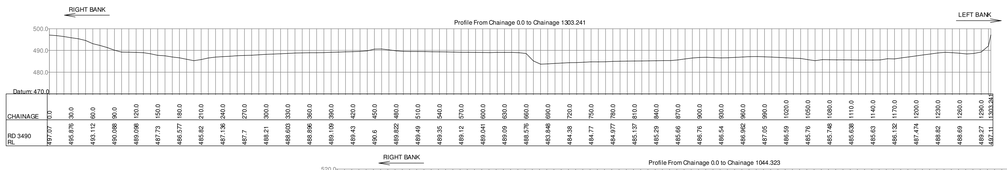


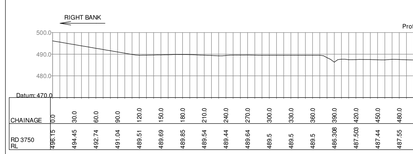


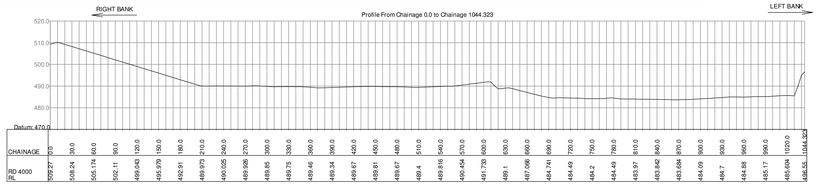






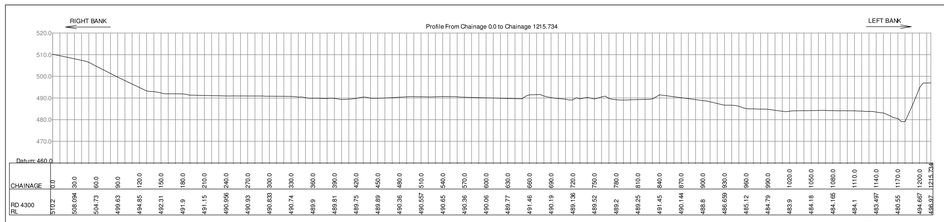


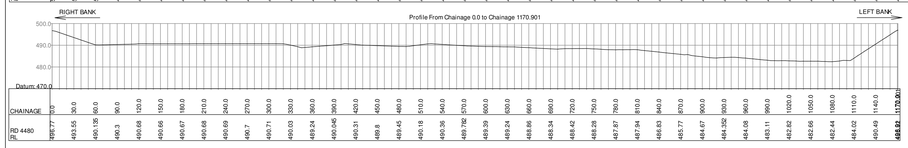


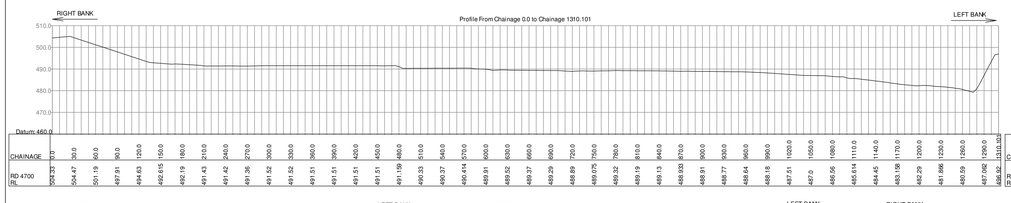


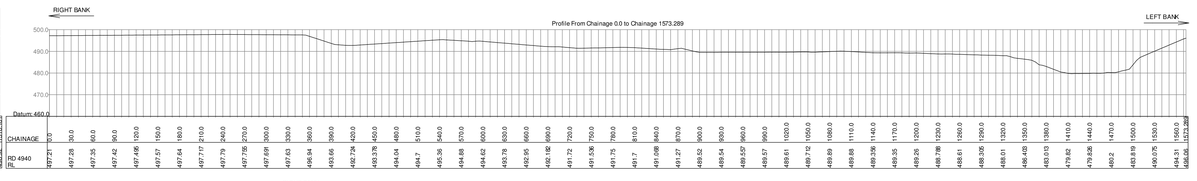
CLIENT NATIONAL HYDROELECTRIC POWER CORPORATION LIMITED	PROJECT TITLE HYDROGRAPHIC SURVET OF SALAL DAM AT DHYANGARH FOR YEAR 2024 - 2025	DRAWING TITLE CROSS SECTION OF SALAL DAM - UPSTREAM CHAINAGE : RD 30 TO RD 4000	SURVEYED BY NISVO MARINE SURVEYS LLP CHENNAI - 600045 projects@nisvo.com www.nisvo.com

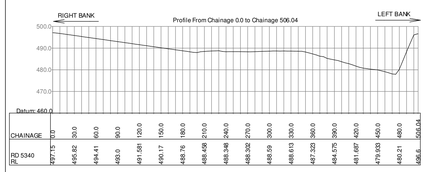
SCALE	SEASON	FIG NO	REV.
HOR. 1:3000 VER. 1:2000	OCTOBER 2024	FIG.11	0
SHEET No. 01 of 02			

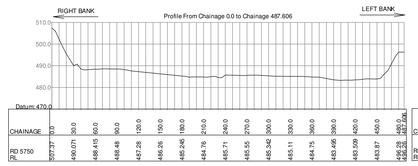


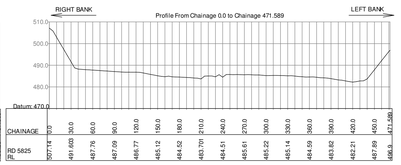


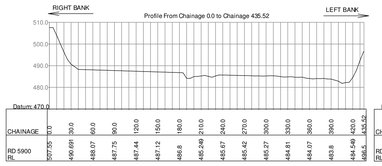


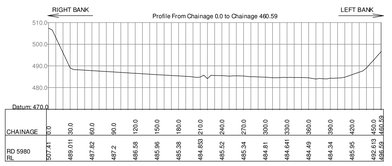


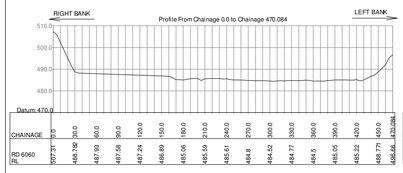


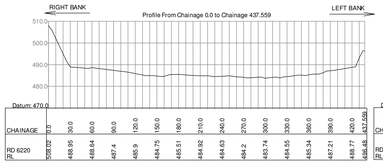


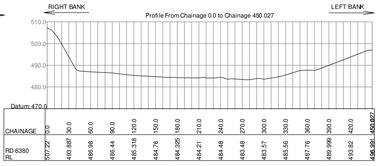


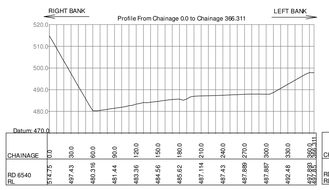


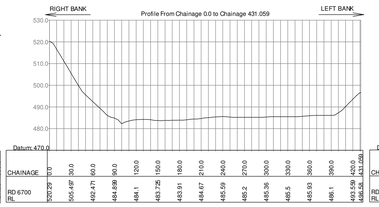


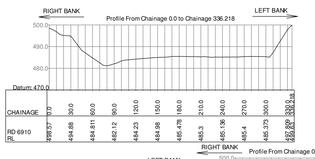


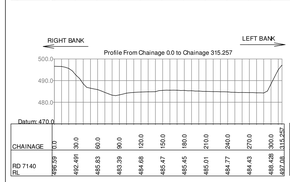


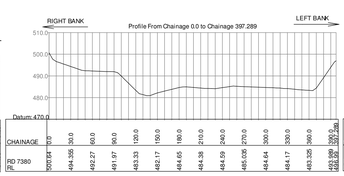


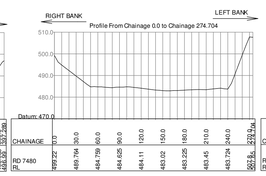


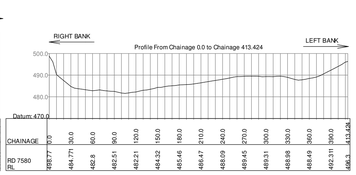


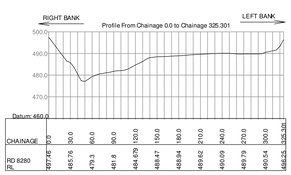


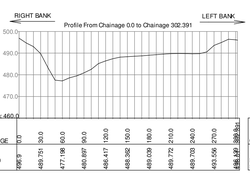


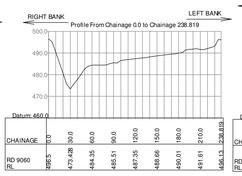


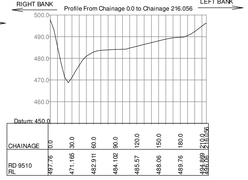


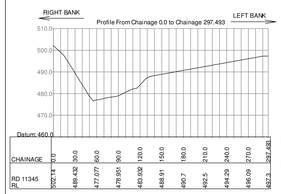


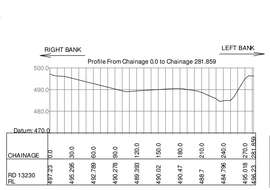


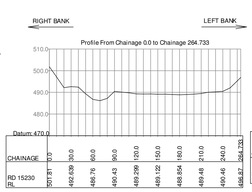


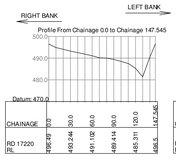


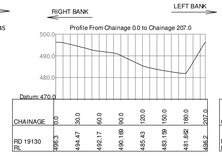


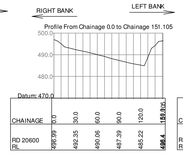


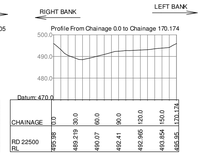






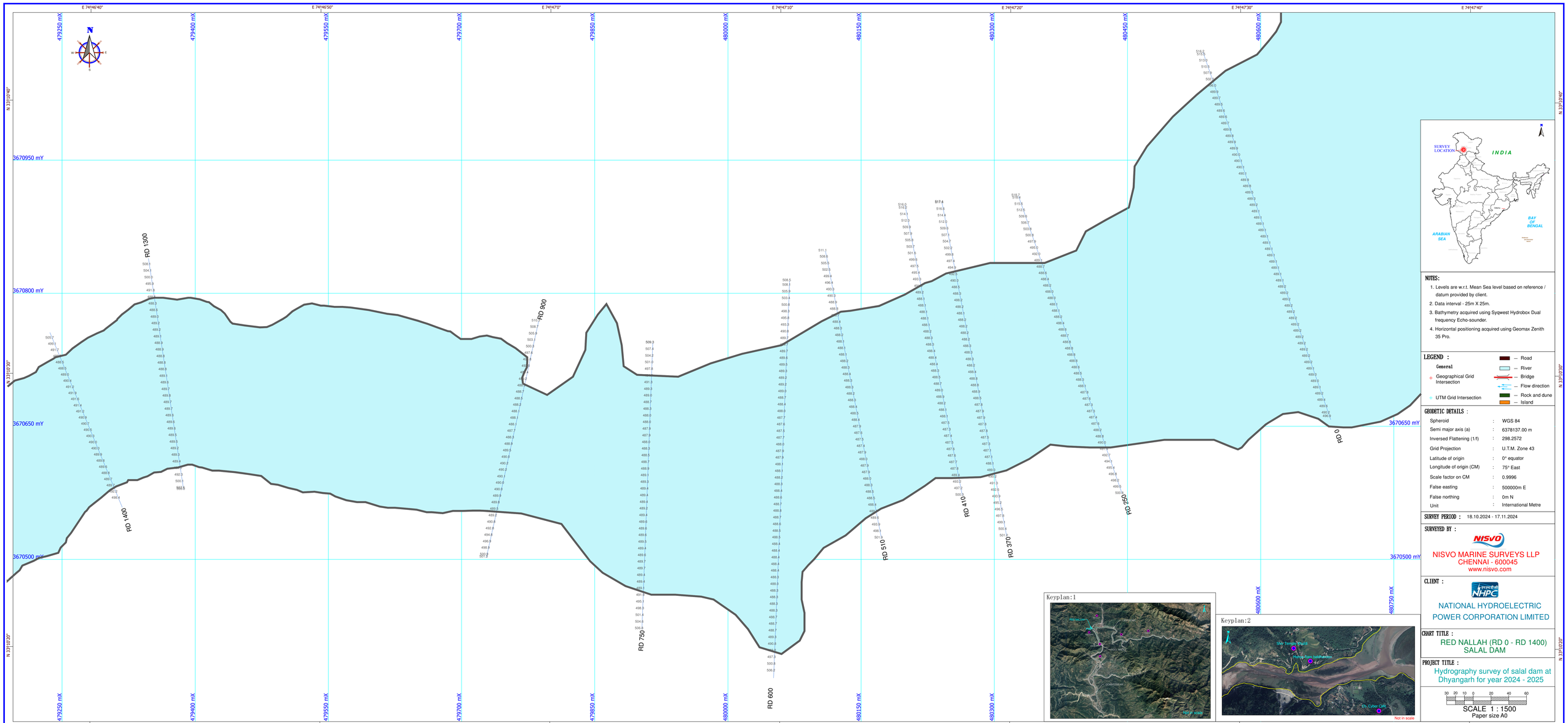






KEYMAP

CLIENT: NATIONAL HYDROELECTRIC POWER CORPORATION LIMITED	PROJECT TITLE: HYDROGRAPHIC SURVET OF SALAL DAM AT DHYANGARH FOR YEAR 2024 - 2025	DRAWING TITLE: CROSS SECTION OF SALAL DAM - UPSTREAM CHAINAGE : RD 4300 TO RD 22500	SURVEYED BY: NISVO MARINE SURVEYS LLP, CHENNAI - 600045, projects@nisvo.com, www.nisvo.com	SCALE: HOR. 1:3000, VER. 1:2000	SEASON: OCTOBER 2024	FIG NO: FIG.12 / REV.: 0
					SHEET No. 02 of 02	



NOTES:

1. Levels are w.r.t. Mean Sea level based on reference / datum provided by client.
2. Data interval - 25m X 25m.
3. Bathymetry acquired using Syqwest Hydrobox Dual frequency Echo-sounder.
4. Horizontal positioning acquired using Geomax Zenith 35 Pro.

LEGEND :

General

- Geographical Grid Intersection
- UTM Grid Intersection
- Road
- River
- Bridge
- Flow direction
- Rock and dune
- Island

GEODETIC DETAILS :

Spheroid	:	WGS 84
Semi major axis (a)	:	6378137.00 m
Inversed Flattening (1/f)	:	298.2572
Grid Projection	:	U.T.M. Zone 43
Latitude of origin	:	0° equator
Longitude of origin (CM)	:	75° East
Scale factor on CM	:	0.9996
False easting	:	500000m E
False northing	:	0m N
Unit	:	International Metre

SURVEY PERIOD : 18.10.2024 - 17.11.2024

SURVEYED BY :

NISVO MARINE SURVEYS LLP
CHENNAI - 600045
www.nisvo.com

CLIENT :

NATIONAL HYDROELECTRIC POWER CORPORATION LIMITED

CHART TITLE :

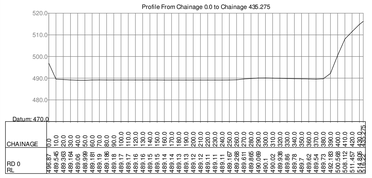
RED NALLAH (RD 0 - RD 1400)
SALAL DAM

PROJECT TITLE :

Hydrography survey of salal dam at Dhyangarh for year 2024 - 2025

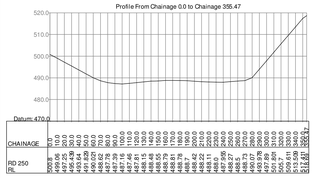
SCALE 1 : 1500
Paper size A0

Profile From Chainage 0.0 to Chainage 435.275



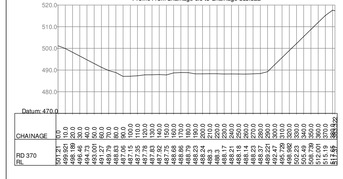
CHAINAGE	0.0	10.0	20.0	30.0	40.0	50.0	60.0	70.0	80.0	90.0	100.0	110.0	120.0	130.0	140.0	150.0	160.0	170.0	180.0	190.0	200.0	210.0	220.0	230.0	240.0	250.0	260.0	270.0	280.0	290.0	300.0	310.0	320.0	330.0	340.0	350.0	360.0	370.0	380.0	390.0	400.0	410.0	420.0	430.275
RD 0 FL	485.47	489.582	489.377	489.09	488.96	488.47	488.32	488.18	487.84	487.57	487.56	488.29	488.47	488.34	488.23	488.13	488.11	488.27	488.27	488.24	488.76	491.272	492.26	495.23	502.471	511.06	529.754																		

Profile From Chainage 0.0 to Chainage 355.47



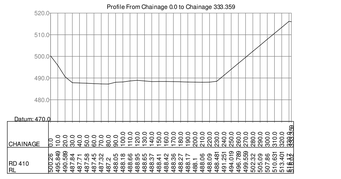
CHAINAGE	0.0	10.0	20.0	30.0	40.0	50.0	60.0	70.0	80.0	90.0	100.0	110.0	120.0	130.0	140.0	150.0	160.0	170.0	180.0	190.0	200.0	210.0	220.0	230.0	240.0	250.0	260.0	270.0	280.0	290.0	300.0	310.0	320.0	330.0	340.0	350.0	355.47
RD 250 FL	509.8	497.25	494.64	492.02	490.02	487.78	487.39	487.16	487.41	487.81	488.04	488.48	488.79	488.78	488.42	488.22	488.21	488.20	488.27	488.27	488.73	489.378	490.07	492.89	503.618	514.67	526.52										

Profile From Chainage 0.0 to Chainage 383.322



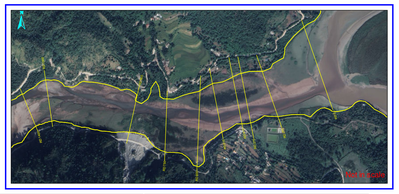
CHAINAGE	0.0	10.0	20.0	30.0	40.0	50.0	60.0	70.0	80.0	90.0	100.0	110.0	120.0	130.0	140.0	150.0	160.0	170.0	180.0	190.0	200.0	210.0	220.0	230.0	240.0	250.0	260.0	270.0	280.0	290.0	300.0	310.0	320.0	330.0	340.0	350.0	360.0	370.0	380.0	383.322
RD 370 FL	501.75	499.59	496.46	493.82	492.05	489.79	488.79	487.56	487.03	487.16	487.75	487.78	488.04	488.29	488.23	488.31	488.17	488.21	488.14	488.23	488.27	489.24	490.07	492.89	503.618	514.67	517.69	517.69

Profile From Chainage 0.0 to Chainage 333.359

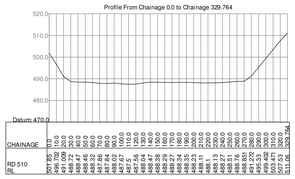


CHAINAGE	0.0	10.0	20.0	30.0	40.0	50.0	60.0	70.0	80.0	90.0	100.0	110.0	120.0	130.0	140.0	150.0	160.0	170.0	180.0	190.0	200.0	210.0	220.0	230.0	240.0	250.0	260.0	270.0	280.0	290.0	300.0	310.0	320.0	330.0	333.359
RD 410 FL	505.67	499.648	497.048	494.44	491.73	489.45	487.745	487.2	486.9	486.818	486.855	486.837	486.824	486.642	486.277	486.1	486.1	486.09	486.09	486.1	486.27	486.78	487.06	488.37	491.291	496.41	496.788	500.705	503.329	507.09	513.401	518.62	518.62

KEYMAP

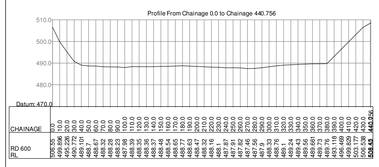


Profile From Chainage 0.0 to Chainage 329.764



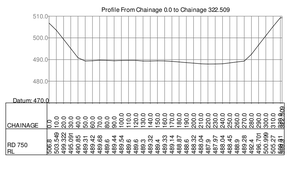
CHAINAGE	0.0	10.0	20.0	30.0	40.0	50.0	60.0	70.0	80.0	90.0	100.0	110.0	120.0	130.0	140.0	150.0	160.0	170.0	180.0	190.0	200.0	210.0	220.0	230.0	240.0	250.0	260.0	270.0	280.0	290.0	300.0	310.0	320.0	329.764
RD 510 FL	495.782	491.039	488.77	488.47	488.32	488.18	487.84	487.57	487.56	488.29	488.47	488.34	488.23	488.13	488.11	488.11	488.27	488.27	488.24	488.76	491.272	492.26	495.23	502.471	511.06	529.754								

Profile From Chainage 0.0 to Chainage 440.756



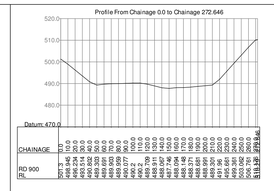
CHAINAGE	0.0	10.0	20.0	30.0	40.0	50.0	60.0	70.0	80.0	90.0	100.0	110.0	120.0	130.0	140.0	150.0	160.0	170.0	180.0	190.0	200.0	210.0	220.0	230.0	240.0	250.0	260.0	270.0	280.0	290.0	300.0	310.0	320.0	330.0	340.0	350.0	360.0	370.0	380.0	390.0	400.0	410.0	420.0	430.0	440.756
RD 600 FL	505.55	499.996	497.25	494.772	492.04	490.77	490.032	489.28	488.36	488.39	488.37	488.54	488.47	488.27	488.16	488.16	487.87	487.56	487.82	488.05	488.33	488.1	488.43	488.54	488.61	488.76	488.76	490.148	493.177	503.177	514.67	526.52	526.52

Profile From Chainage 0.0 to Chainage 322.509



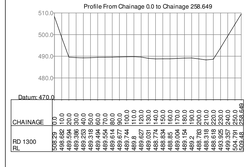
CHAINAGE	0.0	10.0	20.0	30.0	40.0	50.0	60.0	70.0	80.0	90.0	100.0	110.0	120.0	130.0	140.0	150.0	160.0	170.0	180.0	190.0	200.0	210.0	220.0	230.0	240.0	250.0	260.0	270.0	280.0	290.0	300.0	310.0	320.0	322.509
RD 750 FL	509.8	503.548	495.099	493.21	491.31	489.66	489.44	489.44	489.6	489.3	489.4	489.12	489.14	488.87	488.87	488.34	488.04	487.97	487.97	488.45	488.3	488.4	488.7	488.7	488.7	488.7	488.7	488.7	488.7	488.7	488.7	488.7	488.7	488.7

Profile From Chainage 0.0 to Chainage 272.646



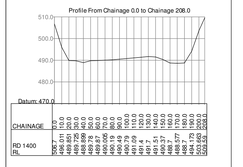
CHAINAGE	0.0	10.0	20.0	30.0	40.0	50.0	60.0	70.0	80.0	90.0	100.0	110.0	120.0	130.0	140.0	150.0	160.0	170.0	180.0	190.0	200.0	210.0	220.0	230.0	240.0	250.0	260.0	270.0	272.646
RD 900 FL	504.4	498.44	496.234	493.932	492.05	489.691	489.959	489.77	489.77	490.027	490.027	490.739	488.597	488.597	487.796	488.146	488.146	488.665	488.665	489.391	489.391	495.661	496.788	500.705	503.329	507.09	513.401	518.62	518.62

Profile From Chainage 0.0 to Chainage 258.649



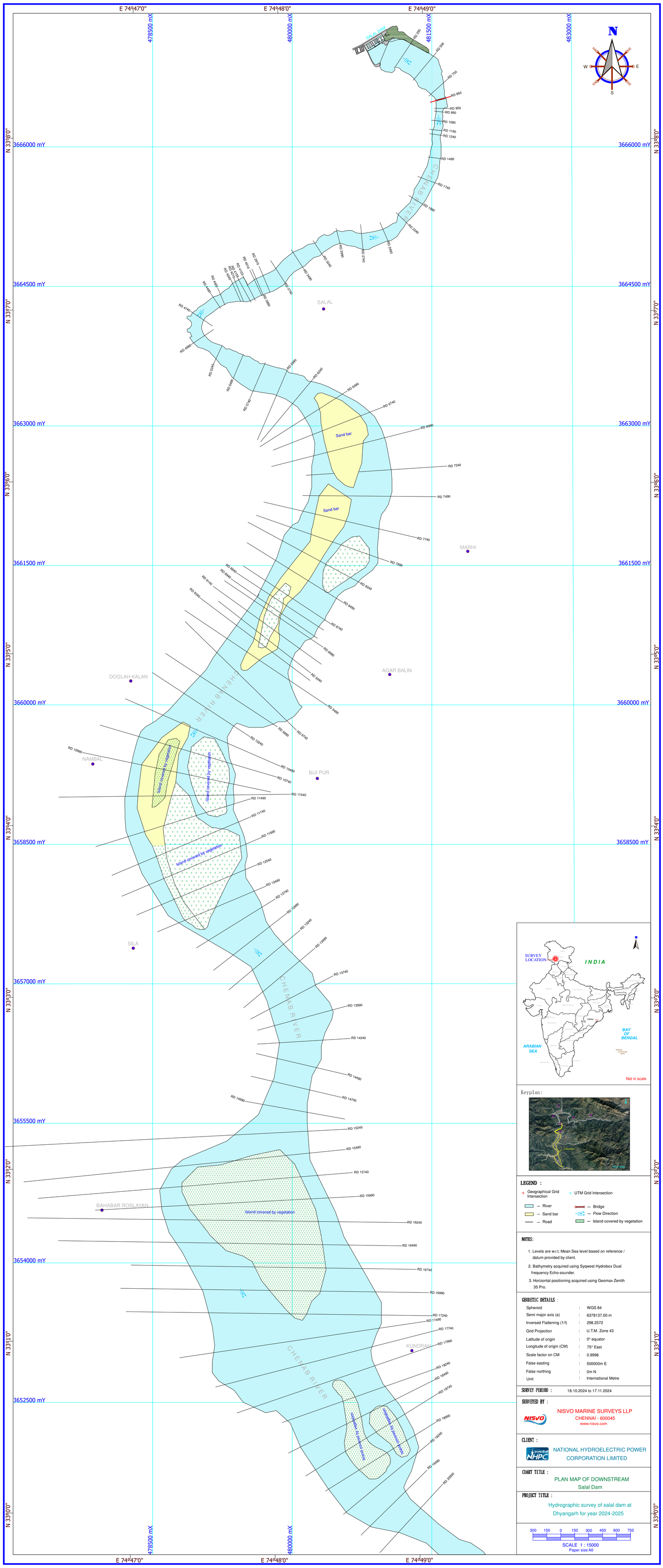
CHAINAGE	0.0	10.0	20.0	30.0	40.0	50.0	60.0	70.0	80.0	90.0	100.0	110.0	120.0	130.0	140.0	150.0	160.0	170.0	180.0	190.0	200.0	210.0	220.0	230.0	240.0	250.0	258.649
RD 1300 FL	508.29	504.37	499.54	495.595	493.254	489.691	489.691	489.691	489.691	489.691	489.691	489.691	489.691	489.691	489.691	489.691	489.691	489.691	489.691	489.691	489.691	489.691	489.691	489.691	489.691	489.691	489.691

Profile From Chainage 0.0 to Chainage 208.0



CHAINAGE	0.0	10.0	20.0	30.0	40.0	50.0	60.0	70.0	80.0	90.0	100.0	110.0	120.0	130.0	140.0	150.0	160.0	170.0	180.0	190.0	200.0	208.0
RD 1400 FL	496.071	492.211	489.255	489.255	489.255	489.255	489.255	489.255	489.255	489.255	489.255	489.255	489.255	489.255	489.255	489.255	489.255	489.255	489.255	489.255	489.255	489.255

CLIENT	NHPC LIMITED	PROJECT	BATHYMETRY AND TOPOGRAPHIC SURVEY - SALAL DAM	TITLE	CROSS SECTION OF RED NALLAH RIVER CHAINAGE : RD 0 TO RD 1400
SURVEYED BY	NISVO MARINE SURVEYS LLP CHENNAI - 600045 projects@nisvo.com www.nisvo.com	SCALE	HOR. 1:3000 VER. 1:1000	SEASON	NOVEMBER 2024
FIG NO	FIG.13	REV.	0	SHEET No. 01 of 01	



SURVEY LOCATION

INDIA

BAY OF BENGAL

ARABIAN SEA

Not in scale

Keyplan:

LEGEND :

- Geographical Grid Intersection
- UTM Grid Intersection
- River
- Sand bar
- Road
- Bridge
- Flow Direction
- Island covered by vegetation

NOTES:

1. Levels are w.r.t. Mean Sea level based on reference / datum provided by client.
2. Bathymetry acquired using Syqwest Hydrobox Dual frequency Echo-sounder.
3. Horizontal positioning acquired using Geomax Zenith 35 Pro.

GEODETIC DETAILS :

Spheroid	:	WGS 84
Semi major axis (a)	:	6378137.00 m
Inversed Flattening (1/f)	:	298.2572
Grid Projection	:	U.T.M. Zone 43
Latitude of origin	:	0° equator
Longitude of origin (CM)	:	75° East
Scale factor on CM	:	0.9996
False easting	:	500000m E
False northing	:	0m N
Unit	:	International Metre

SURVEY PERIOD : 18.10.2024 to 17.11.2024

SURVEYED BY :

NISVO MARINE SURVEYS LLP
CHENNAI - 600045
www.nisvo.com

CLIENT :

NATIONAL HYDROELECTRIC POWER CORPORATION LIMITED

CHART TITLE :

PLAN MAP OF DOWNSTREAM
Salal Dam

PROJECT TITLE :

Hydrographic survey of salal dam at Dhyangarh for year 2024-2025

300 150 0 150 300 450 600 750

SCALE 1 : 15000
Paper size A0

E 74°48'0"

E 74°49'0"

480500 mX

481000 mX

481500 mX

482000 mX

483000 mX

483500 mX

3667000 mY

3666500 mY

3666000 mY

3665500 mY

3665000 mY

3664500 mY

3664000 mY

3663500 mY

3663000 mY

3662500 mY

3662000 mY

N 33°80'0"

N 33°70'0"

N 33°60'0"

SALAL DAM

RD 250

RD 500

RD 750

RD 850

RD 950

RD 990

RD 1090

RD 1190

RD 1240

RD 1490

RD 1740

RD 1990

RD 2240

RD 2490

RD 2740

RD 2990

RD 3240

RD 3490

RD 3740

RD 3910

RD 3990

RD 4010

RD 4103

RD 4159

RD 4210

RD 4240

RD 4420

RD 4490

RD 4740

RD 4990

RD 5240

RD 5490

RD 5740

RD 5990

RD 6240

RD 6490

RD 6740

RD 6990

RD 7240

RD 7490

RD 7740

RD 7990

CHENAB RIVER

SALAL

TALWARA

Sand bar

Sand bar

Island covered by vegetation

N

NW

NE

W

E

SW

SE

S

SURVEY LOCATION

INDIA

BAY OF BENGAL

ARABIAN SEA

Keyplan:1

Keyplan:2

SALAL DAM

SALAL

TALWARA

Layout of sheets:

PART - I

PART - II

PART - III

PART - IV

LEGEND :

- Geographical Grid Intersection
- UTM Grid Intersection
- River
- Bridge
- Sand bar
- River Flow
- Road
- Island covered by vegetation

NOTES:

1. Levels are w.r.t. Mean Sea level based on reference / datum provided by client.
2. Data interval - 25m X 25m.
3. Bathymetry acquired using Syqwest Hydrobox Dual frequency Echo-sounder.
4. Horizontal positioning acquired using Geomax Zenith 35 Pro.

GEODETIC DETAILS :

Spheroid	:	WGS 84
Semi major axis (a)	:	6378137.00 m
Inversed Flattening (1/f)	:	298.2572
Grid Projection	:	U.T.M. Zone 43
Latitude of origin	:	0° equator
Longitude of origin (CM)	:	75° East
Scale factor on CM	:	0.9996
False easting	:	500000m E
False northing	:	0m N
Unit	:	International Metre

SURVEY PERIOD : 18.10.2024 to 17.11.2024

SURVEYED BY :

NISVO MARINE SURVEYS LLP
CHENNAI - 600045
www.nisvo.com

CLIENT :

NATIONAL HYDROELECTRIC POWER CORPORATION LIMITED

CHART TITLE :

DOWNSTREAM PART - I (RD 250 - RD 7990)
SALAL DAM

PROJECT TITLE :

Hydrographic survey of salal dam at Dhyangarh for year 2024-2025

100 50 0 50 100 150 200 250

SCALE 1 : 5000
Paper size A0

E 74°47'0" E 74°48'0" E 74°49'0"

N 33°5'0" N 33°4'0"

478500 mX 479000 mX 479500 mX 480000 mX 480500 mX 481000 mX 481500 mX 482000 mX 482500 mX 483000 mX 483500 mX

3661500 mY 3661000 mY 3660500 mY 3660000 mY 3659500 mY 3659000 mY 3658500 mY

N

W E

NW NE SW SE

S

Sand bar

Island covered by vegetation

RD 8240 RD 8490 RD 8740 RD 8990 RD 9240 RD 9490 RD 9740 RD 9990 RD 10240 RD 10490 RD 10740 RD 10990 RD 11240 RD 11490 RD 11740 RD 11990

Island covered by vegetation Island covered by vegetation Island covered by vegetation

CHENAB RIVER

MARHI

AGAR BALIN

DOGLAH KALAN

SILA

SURVEY LOCATION

INDIA

ARABIAN SEA

BAY OF BENGAL

Not in scale

Keyplan:1

Layout of sheets:

PART - I

PART - II

PART - III

Keyplan 2:

LEGEND :

- Geographical Grid Intersection
- UTM Grid Intersection
- River
- Bridge
- Sand bar
- River Flow
- Road
- Island covered by vegetation

NOTES:

1. Levels are w.r.t. Mean Sea level based on reference / datum provided by client.
2. Data interval - 25m X 25m.
3. Bathymetry acquired using Sygwest Hydrobox Dual frequency Echo-sounder.
4. Horizontal positioning acquired using Geomax Zenith 35 Pro.

GEODETIC DETAILS :

Spheroid	:	WGS 84
Semi major axis (a)	:	6378137.00 m
Inversed Flattening (1/f)	:	298.2572
Grid Projection	:	U.T.M. Zone 43
Latitude of origin	:	0° equator
Longitude of origin (CM)	:	75° East
Scale factor on CM	:	0.9996
False easting	:	500000m E
False northing	:	0m N
Unit	:	International Metre

SURVEY PERIOD : 18.10.2024 to 17.11.2024

SURVEYED BY :

NISVO MARINE SURVEYS LLP
CHENNAI - 600045
www.nisvo.com

CLIENT :

NATIONAL HYDROELECTRIC POWER CORPORATION LIMITED

CHART TITLE :

DOWNSTREAM PART - II(RD 8240 - RD 11990)
SALAL DAM

PROJECT TITLE :

Hydrographic survey of salal dam at Dhyangarh for year 2024-2025

100 50 0 50 100 150 200 250

SCALE 1 : 5000
Paper size A0

E 74°47'0" E 74°48'0" E 74°49'0"

478500 mX 479000 mX 479500 mX 480000 mX 480500 mX 481000 mX 481500 mX 482000 mX 482500 mX 483000 mX 483500 mX

3658000 mY 3657500 mY 3657000 mY 3656500 mY 3656000 mY 3655500 mY 3655000 mY 3654500 mY

N 33°3'0"

RD 12240 RD 12490 RD 12740 RD 12990 RD 13240 RD 13490 RD 13740 RD 13990 RD 14240 RD 14490 RD 14740 RD 14990 RD 15240 RD 15490 RD 15740 RD 15990 RD 16240

Island covered by vegetation

CHENAB RIVER

BIJI PUR

NAMBAL

NOT APPROCHABLE

Island covered by vegetation

N

W E

S

Keyplan:1

SURVEY LOCATION

INDIA

BAY OF BENGAL

ARABIAN SEA

Not in scale

Layout of sheets:

DWT - I

DWT - II

DWT - III

Keyplan 2:

JAMMU

BIJIPUR

LEGEND :

- Geographical Grid Intersection
- UTM Grid Intersection
- River
- Bridge
- Sand bar
- River Flow
- Road
- Island covered by vegetation

NOTES:

1. Levels are w.r.t. Mean Sea level based on reference / datum provided by client.
2. Data interval - 25m X 25m.
3. Bathymetry acquired using Sygwest Hydrobox Dual frequency Echo-sounder.
4. Horizontal positioning acquired using Geomax Zenith 35 Pro.

GEODETIC DETAILS :

Spheroid	:	WGS 84
Semi major axis (a)	:	6378137.00 m
Inversed Flattening (1/f)	:	298.2572
Grid Projection	:	U.T.M. Zone 43
Latitude of origin	:	0° equator
Longitude of origin (CM)	:	75° East
Scale factor on CM	:	0.9996
False easting	:	500000m E
False northing	:	0m N
Unit	:	International Metre

SURVEY PERIOD : 18.10.2024 to 17.11.2024

SURVEYED BY :

NISVO MARINE SURVEYS LLP
CHENNAI - 600045
www.nisvo.com

CLIENT :

NATIONAL HYDROELECTRIC POWER CORPORATION LIMITED

CHART TITLE :

DOWNSTREAM PART- III(RD 12240 - RD 16240)
SALAL DAM

PROJECT TITLE :

Hydrographic survey of salal dam at Dhyangarh for year 2024-2025

100 50 0 50 100 150 200 250

SCALE 1 : 5000
Paper size A0

E 74°47'0" E 74°48'0" E 74°49'0"

478500 mX 479000 mX 479500 mX 480000 mX 480500 mX 481000 mX 481500 mX 482000 mX 482500 mX 483000 mX 483500 mX

3654500 mY

3654000 mY

3653500 mY

3653000 mY

3652500 mY

3652000 mY

3651500 mY

3651000 mY

N 33°1'0"

Island covered by vegetation

NOT APPROCABLE

RD 16490

RD 16740

RD 16990

RD 17240

RD 17490

RD 17740

RD 17990

RD 18240

RD 18490

RD 18740

RD 18990

RD 19240

RD 19490

RD 20000

CHEABRIVER

KUNDRAH

Island covered by vegetation

Island covered by vegetation

SURVEY LOCATION

INDIA

BAY OF BENGAL

ARABIAN SEA

Not in scale

Keyplan:1

Keyplan: 2

Layout of sheets:

PART - II

PART - III

PART - IV

LEGEND :

- Geographical Grid Intersection
- UTM Grid Intersection
- River
- Bridge
- Sand bar
- River Flow
- Road
- Island covered by vegetation

NOTES:

1. Levels are w.r.t. Mean Sea level based on reference / datum provided by client.
2. Data grid - 25m X 25m.
3. Bathymetry acquired using Sygwest Hydrobox Dual frequency Echo-sounder.
4. Horizontal positioning acquired using Geomax Zenith 35 Pro.

GEODETIC DETAILS :

Spheroid	:	WGS 84
Semi major axis (a)	:	6378137.00 m
Inversed Flattening (1/f)	:	298.2572
Grid Projection	:	U.T.M. Zone 43
Latitude of origin	:	0° equator
Longitude of origin (CM)	:	75° East
Scale factor on CM	:	0.9996
False easting	:	500000m E
False northing	:	0m N
Unit	:	International Metre

SURVEY PERIOD : 18.10.2024 to 17.11.2024

SURVEYED BY :

NISVO MARINE SURVEYS LLP
CHENNAI - 600045
www.nisvo.com

CLIENT :

NATIONAL HYDROELECTRIC POWER CORPORATION LIMITED

CHART TITLE :

DOWNSTREAM PART - IV(RD 16490 - RD 20000)
SALAL DAM

PROJECT TITLE :

Hydrographic survey of salal dam at Dhyangarh for year 2024-2025

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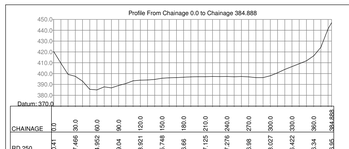
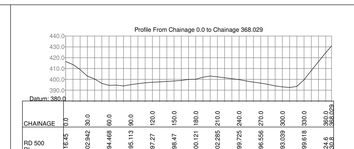
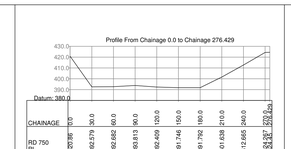
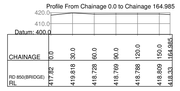
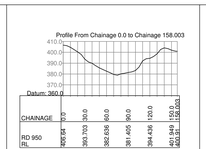
SCALE 1 : 5000
Paper size A0

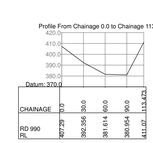


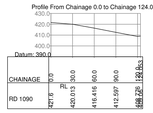


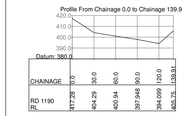




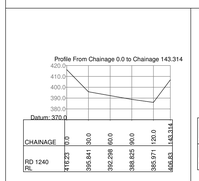


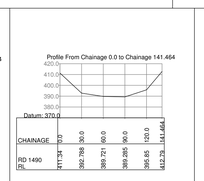


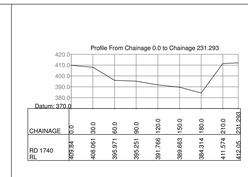


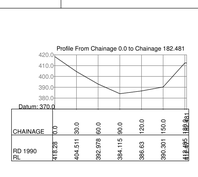


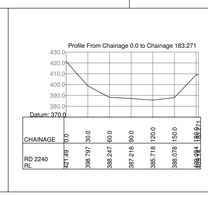
KEYMAP

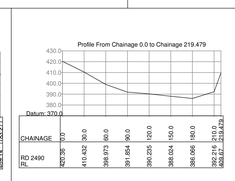


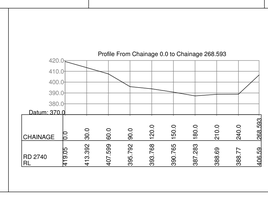


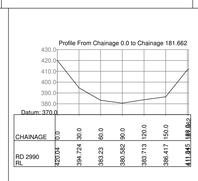


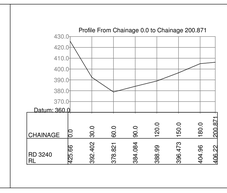


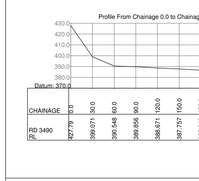


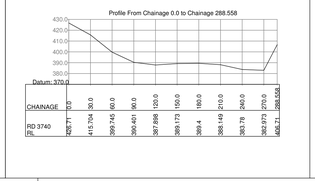


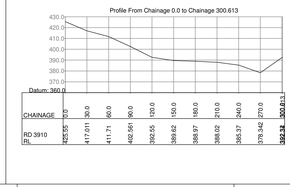


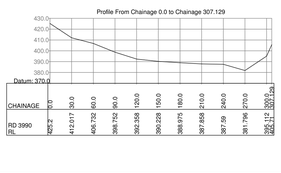


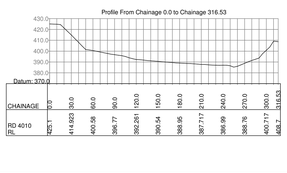


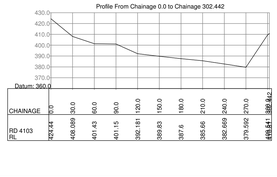


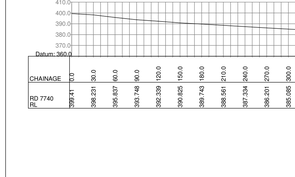


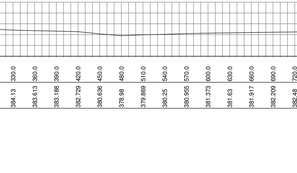


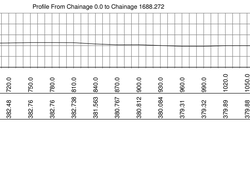


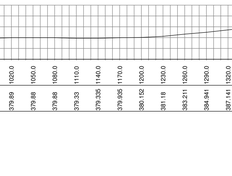


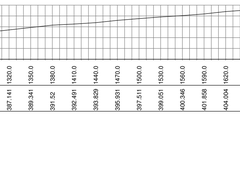


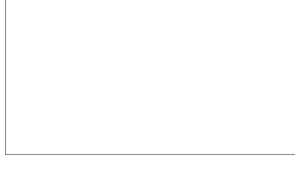


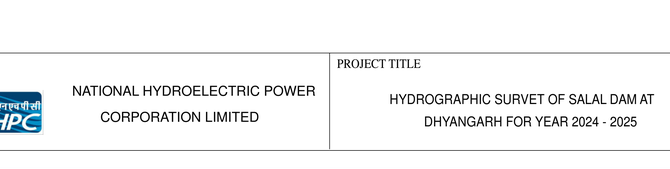


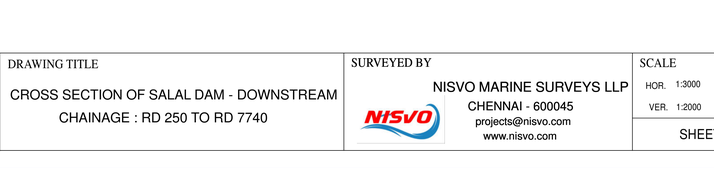








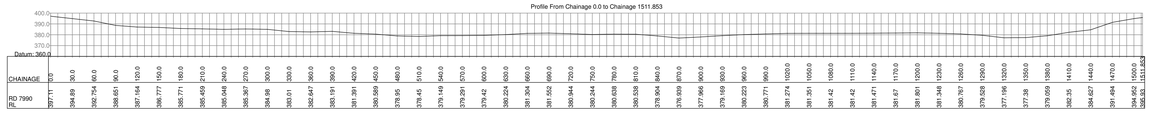




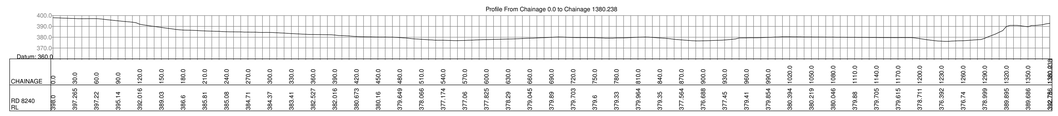
CLIENT NATIONAL HYDROELECTRIC POWER CORPORATION LIMITED	PROJECT TITLE HYDROGRAPHIC SURVET OF SALAL DAM AT DHYANGARH FOR YEAR 2024 - 2025	DRAWING TITLE CROSS SECTION OF SALAL DAM - DOWNSTREAM CHAINAGE : RD 250 TO RD 7740	SURVEYED BY NISVO MARINE SURVEYS LLP CHENNAI - 600045 projects@nisvo.com www.nisvo.com

SCALE	SEASON	FIG NO	REV.
HOR. 1:3000 VER. 1:2000	OCTOBER 2024	FIG.20	0
SHEET No. 01 of 05			

Profile From Chainage 0.0 to Chainage 1511.853



Profile From Chainage 0.0 to Chainage 1380.238



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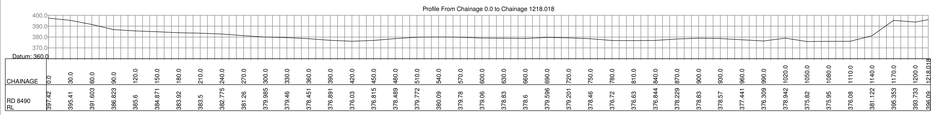
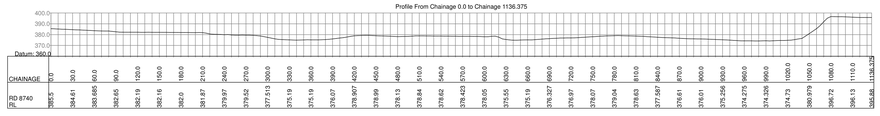
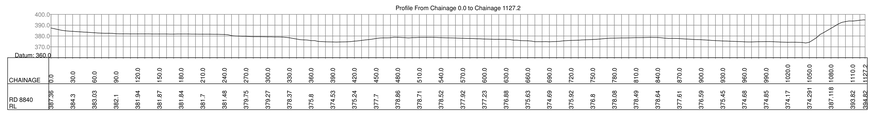


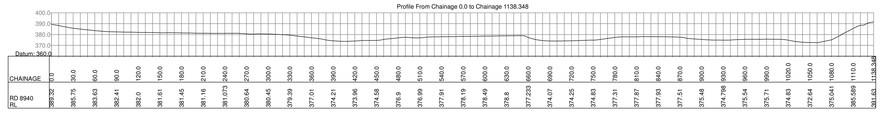
Profile From Chainage 0.0 to Chainage 1136.375



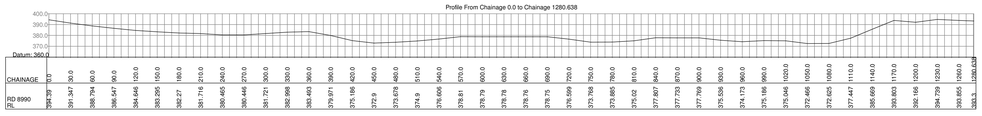
Profile From Chainage 0.0 to Chainage 1127.2



Profile From Chainage 0.0 to Chainage 1138.348



Profile From Chainage 0.0 to Chainage 1280.638



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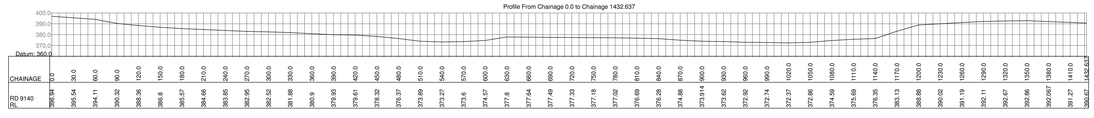

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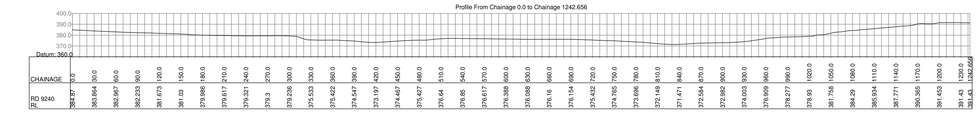

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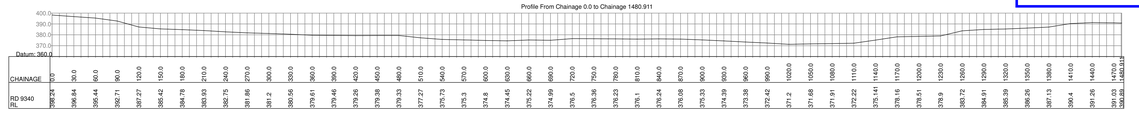
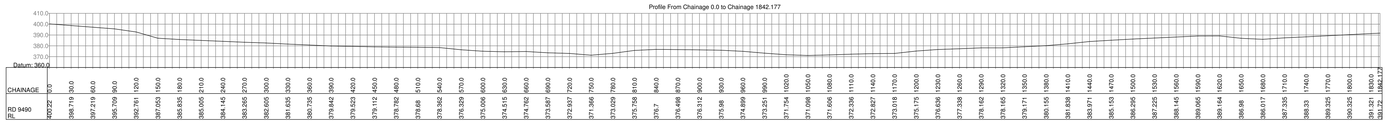
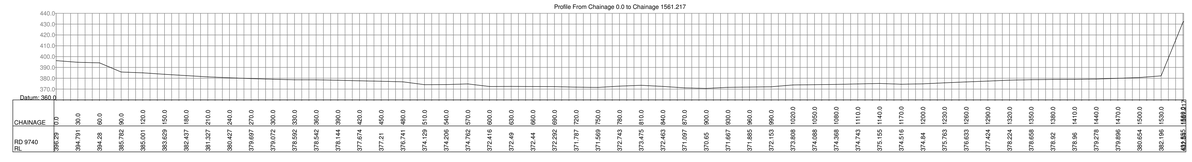


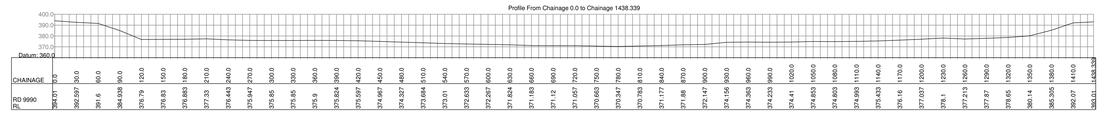
Profile From Chainage 0.0 to Chainage 1842.177



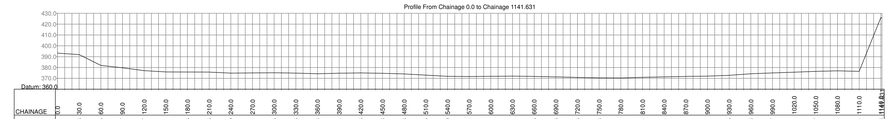
Profile From Chainage 0.0 to Chainage 1561.217



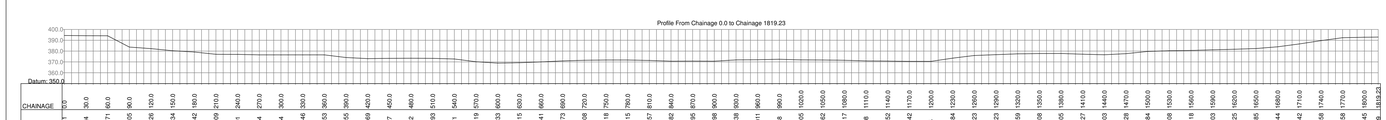
Profile From Chainage 0.0 to Chainage 1438.339



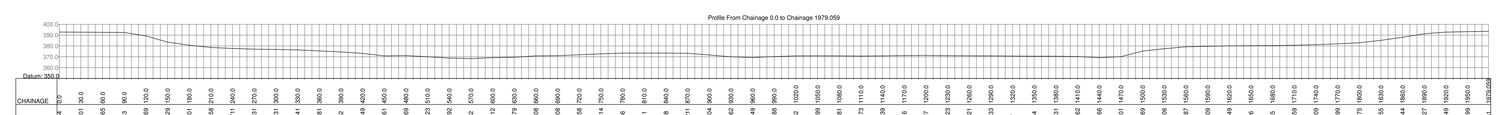
Profile From Chainage 0.0 to Chainage 1141.631



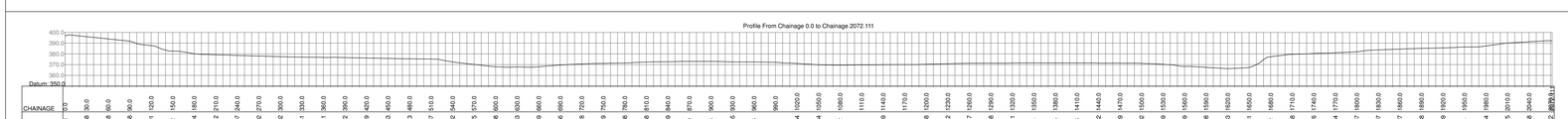
Profile From Chainage 0.0 to Chainage 1819.23



Profile From Chainage 0.0 to Chainage 1979.059

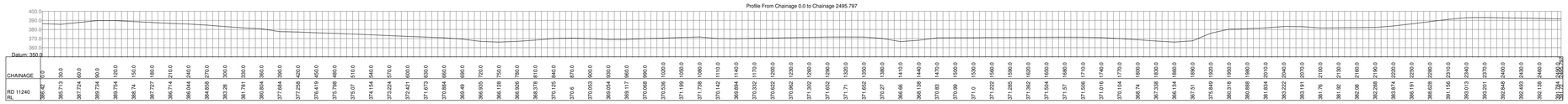


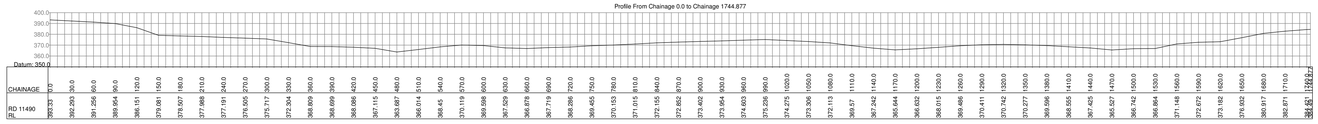
Profile From Chainage 0.0 to Chainage 2072.111

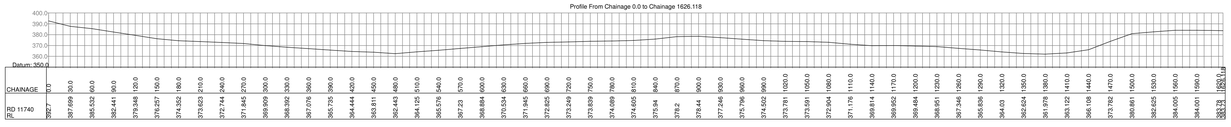


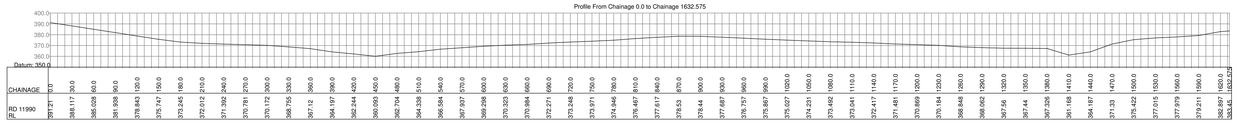
KEYMAP

CLIENT: NATIONAL HYDROELECTRIC POWER CORPORATION LIMITED	PROJECT TITLE: HYDROGRAPHIC SURVET OF SALAL DAM AT DHYANGARH FOR YEAR 2024 - 2025	DRAWING TITLE: CROSS SECTION OF SALAL DAM - DOWNSTREAM CHAINAGE : RD 7990 TO RD 10990	SURVEYED BY: NISVO MARINE SURVEYS LLP CHENNAI - 600045 projects@nisvo.com www.nisvo.com	SCALE HOR. 1:3000 VER. 1:2000	SEASON OCTOBER 2024	FIG NO FIG.21	REV. 0
					SHEET No. 02 of 05		









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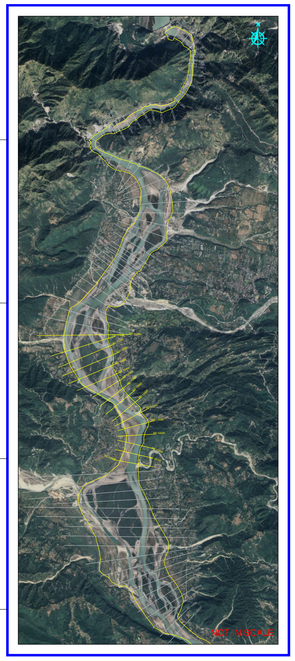
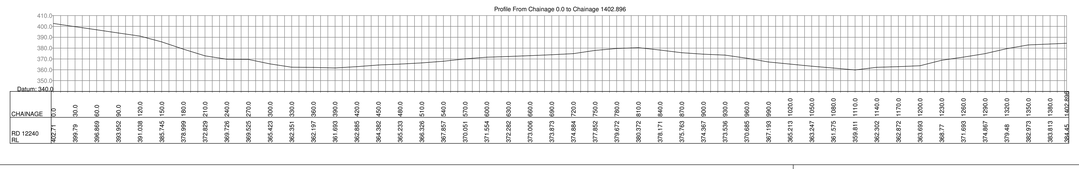
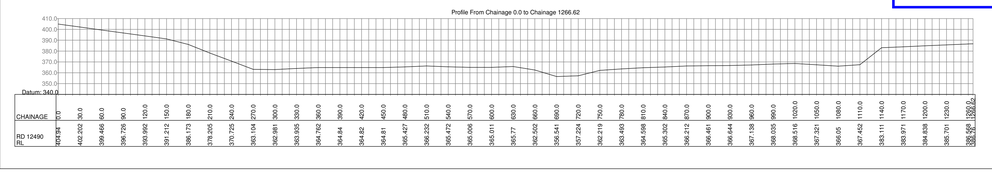
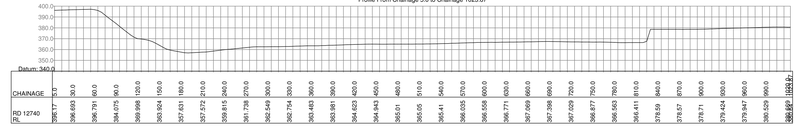
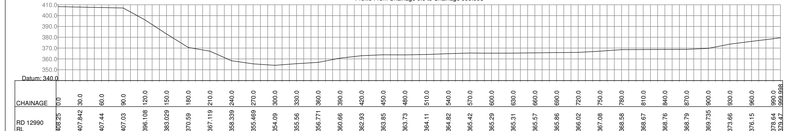
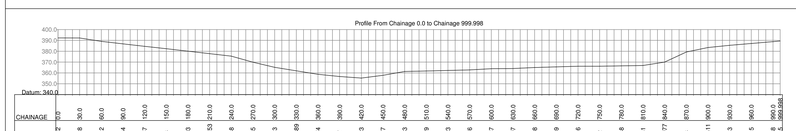


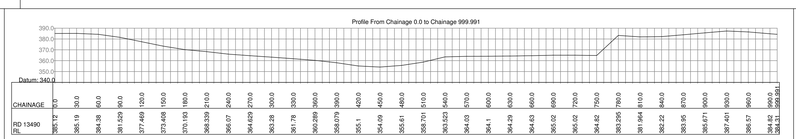


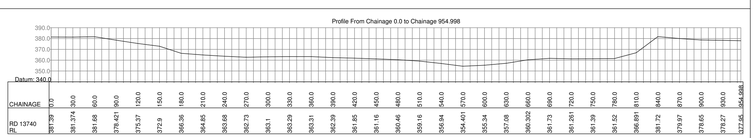


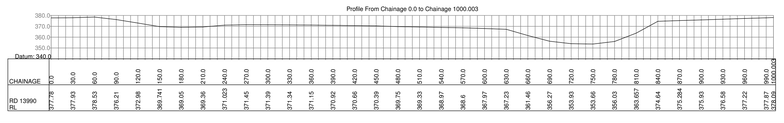


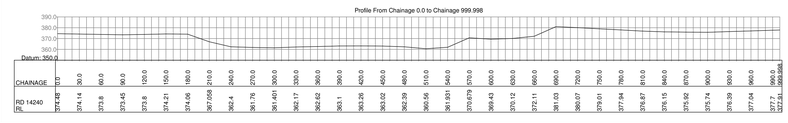


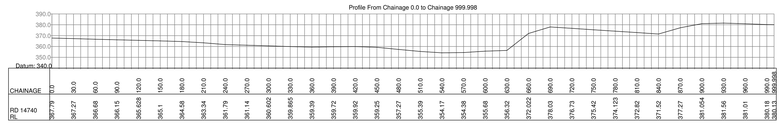


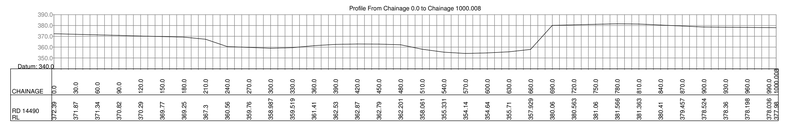






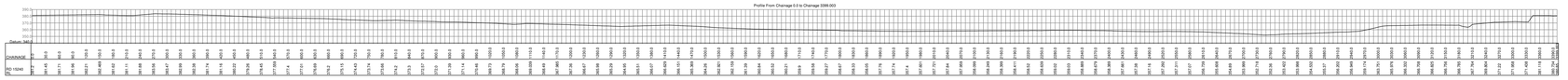




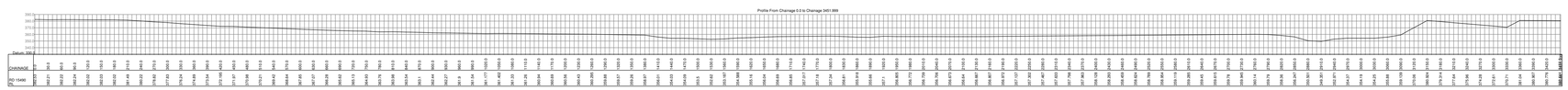


CLIENT: NATIONAL HYDROELECTRIC POWER CORPORATION LIMITED	PROJECT TITLE: HYDROGRAPHIC SURVET OF SALAL DAM AT DHYANGARH FOR YEAR 2024 - 2025	DRAWING TITLE: CROSS SECTION OF SALAL DAM - DOWNSTREAM CHAINAGE : RD 11240 TO RD 14490	SURVEYED BY: NISVO MARINE SURVEYS LLP, CHENNAI - 600045, projects@nisvo.com, www.nisvo.com	SCALE: HOR. 1:3000, VER. 1:2000 / SEASON: OCTOBER 2024 / SHEET No. 03 of 05	FIG NO: FIG.22 / REV.: 0

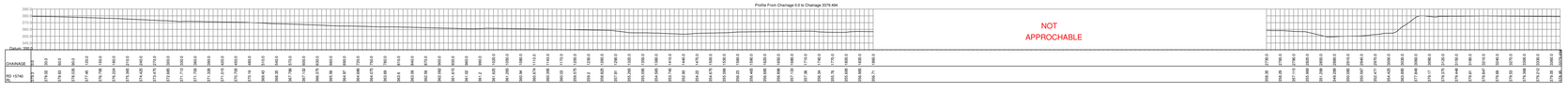
Profile From Chainage 0.0 to Chainage 3399.003



Profile From Chainage 0.0 to Chainage 3451.999

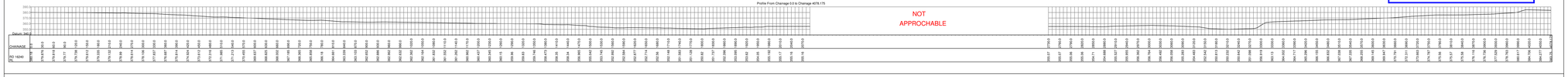


Profile From Chainage 0.0 to Chainage 3379.494

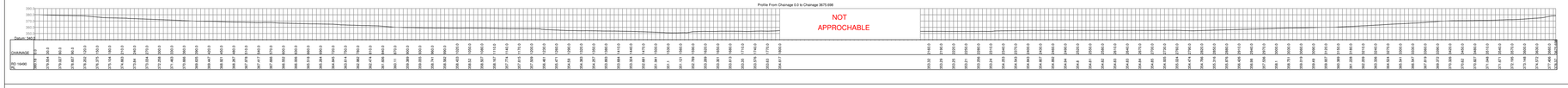


Profile From Chainage 0.0 to Chainage 3945.496

Profile From Chainage 0.0 to Chainage 4078.175

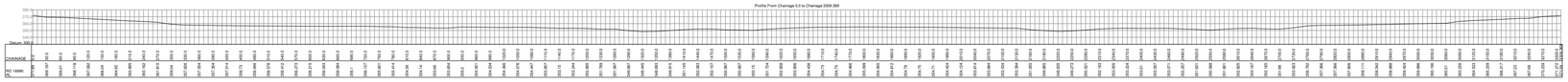


Profile From Chainage 0.0 to Chainage 3675.698

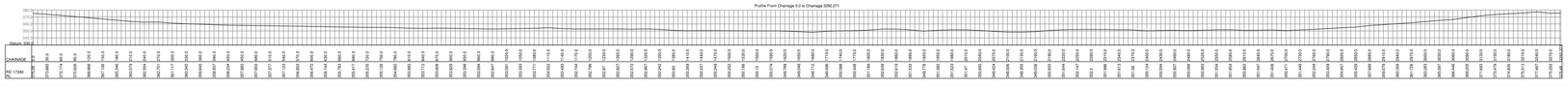


Profile From Chainage 0.0 to Chainage 3068.044

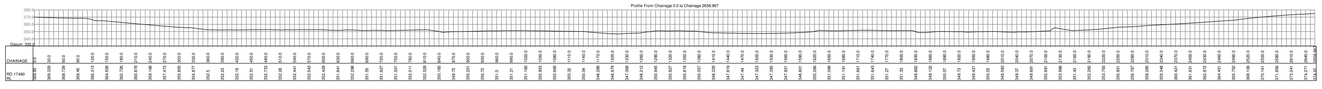
Profile From Chainage 0.0 to Chainage 3099.369



Profile From Chainage 0.0 to Chainage 3250.271



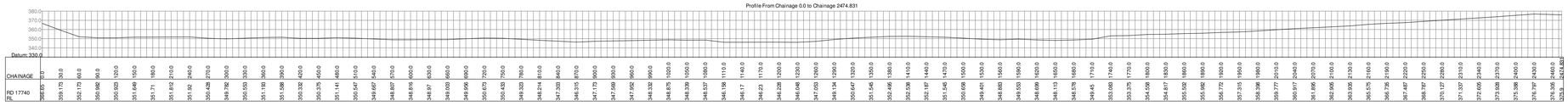
Profile From Chainage 0.0 to Chainage 2838.967



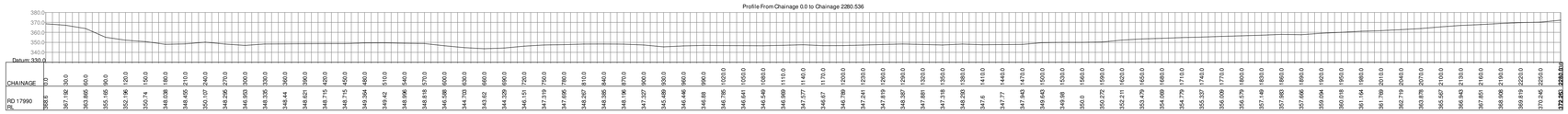
KEYMAP

CLIENT: NATIONAL HYDROELECTRIC POWER CORPORATION LIMITED	PROJECT TITLE: HYDROGRAPHIC SURVET OF SALAL DAM AT DHYANGARH FOR YEAR 2024 - 2025	DRAWING TITLE: CROSS SECTION OF SALAL DAM - DOWNSTREAM CHAINAGE : RD 15240 TO RD 17490	SURVEYED BY: NISVO MARINE SURVEYS LLP CHENNAI - 600045 projects@nisvo.com www.nisvo.com	SCALE: HOR. 1:3000 VER. 1:2000	SEASON: OCTOBER 2024	FIG NO: FIG.23	REV.: 0
				SHEET No. 04 of 05			

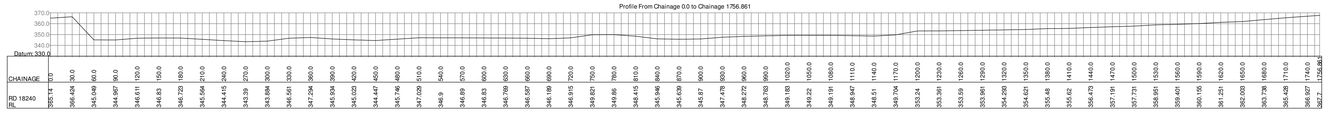
Profile From Chainage 0.0 to Chainage 2474.831



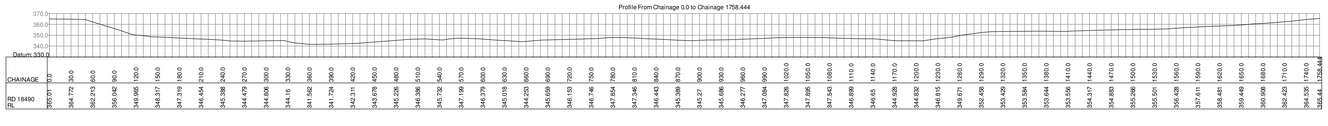
Profile From Chainage 0.0 to Chainage 2280.536



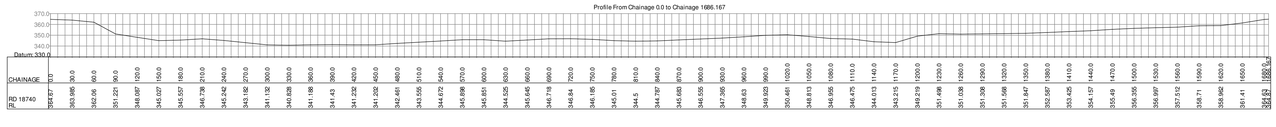
Profile From Chainage 0.0 to Chainage 1756.861



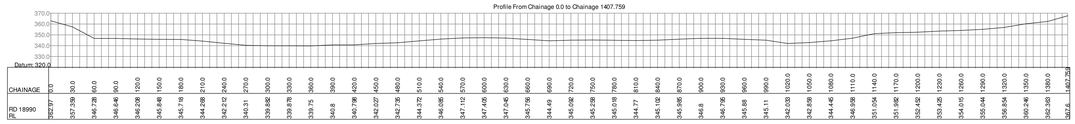
Profile From Chainage 0.0 to Chainage 1758.444



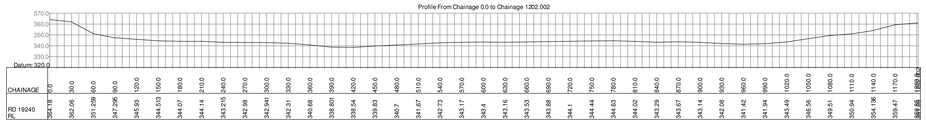
Profile From Chainage 0.0 to Chainage 1686.167



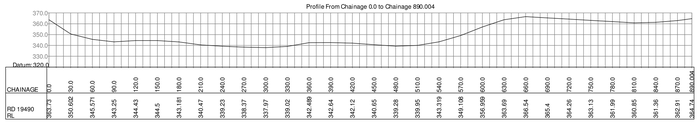
Profile From Chainage 0.0 to Chainage 1407.759



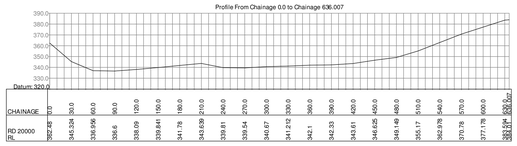
Profile From Chainage 0.0 to Chainage 1202.002



Profile From Chainage 0.0 to Chainage 890.004

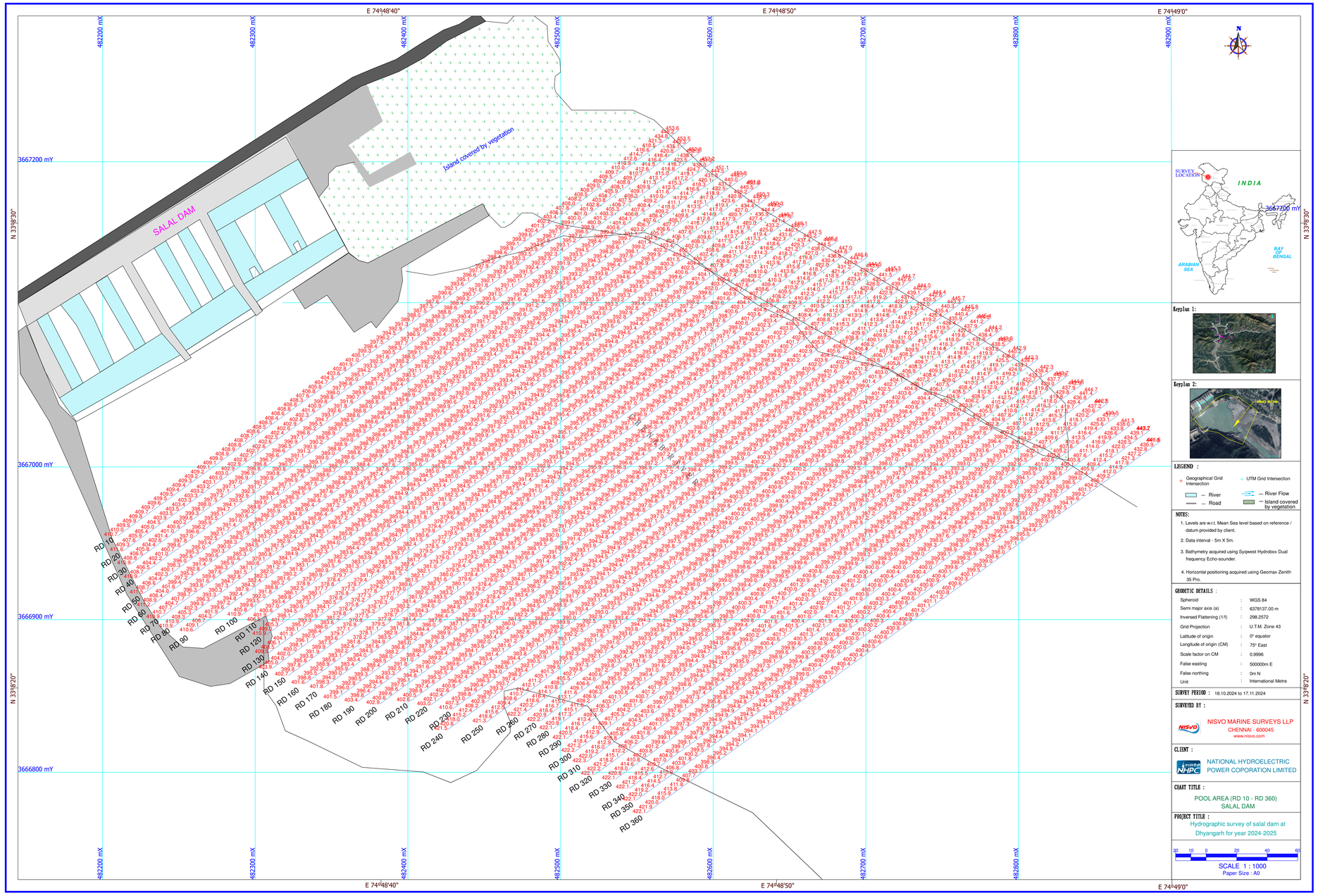


Profile From Chainage 0.0 to Chainage 636.007

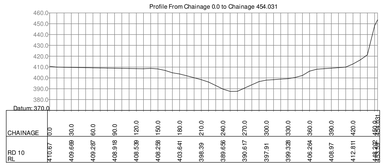


KEYMAP

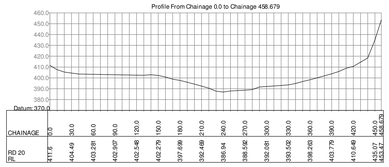
CLIENT: NATIONAL HYDROELECTRIC POWER CORPORATION LIMITED	PROJECT TITLE: HYDROGRAPHIC SURVET OF SALAL DAM AT DHYANGARH FOR YEAR 2024 - 2025	DRAWING TITLE: CROSS SECTION OF SALAL DAM - DOWNSTREAM CHAINAGE : RD 17740 TO RD 20000	SURVEYED BY: NISVO MARINE SURVEYS LLP, CHENNAI - 600045, projects@nisvo.com, www.nisvo.com	SCALE: HOR. 1:3000, VER. 1:2000	SEASON: OCTOBER 2024	FIG NO: FIG.24	REV.: 0
					SHEET No. 05 of 05		


E 74°48'40"
E 74°48'50"
E 74°49'0"
N 33°8'30"
N 33°8'20"
482200 mX
482300 mX
482400 mX
482500 mX
482600 mX
482700 mX
482800 mX
482900 mX
3667200 mY
3667000 mY
3666900 mY
3666800 mY
SALAL DAM
Island covered by vegetation
RD 10
RD 20
RD 30
RD 40
RD 50
RD 60
RD 70
RD 80
RD 90
RD 100
RD 110
RD 120
RD 130
RD 140
RD 150
RD 160
RD 170
RD 180
RD 190
RD 200
RD 210
RD 220
RD 230
RD 240
RD 250
RD 260
RD 270
RD 280
RD 290
RD 300
RD 310
RD 320
RD 330
RD 340
RD 350
RD 360
N
SURVEY LOCATION
INDIA
ARABIAN SEA
BAY OF BENGAL
Keyplan 1:
Keyplan 2:
LEGEND :
Geographical Grid Intersection
UTM Grid Intersection
River
River Flow
Road
Island covered by vegetation
NOTES:
1. Levels are w.r.t. Mean Sea level based on reference / datum provided by client.
2. Data interval - 5m X 5m.
3. Bathymetry acquired using Sygwest Hydrobox Dual frequency Echo-sounder.
4. Horizontal positioning acquired using Geomax Zenith 35 Pro.
GEODETIC DETAILS :
Spheroid : WGS 84
Semi major axis (a) : 6378137.00 m
Inversed Flattening (1/f) : 298.2572
Grid Projection : U.T.M. Zone 43
Latitude of origin : 0° equator
Longitude of origin (CM) : 75° East
Scale factor on CM : 0.9996
False easting : 500000m E
False northing : 0m N
Unit : International Metre
SURVEY PERIOD : 18.10.2024 to 17.11.2024
SURVEYED BY :
NISVO MARINE SURVEYS LLP
CHENNAI - 600045
www.nisvo.com
CLIENT :
NATIONAL HYDROELECTRIC POWER COPORATION LIMITED
CHART TITLE :
POOL AREA (RD 10 - RD 360)
SALAL DAM
PROJECT TITLE :
Hydrographic survey of salal dam at Dhyangarh for year 2024-2025
20 10 0 20 40 60
SCALE 1 : 1000
Paper Size : A0

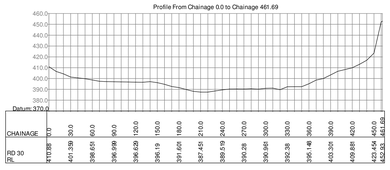
Profile From Chainage 0.0 to Chainage 454.031



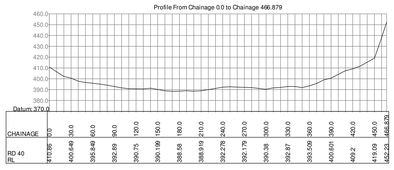
Profile From Chainage 0.0 to Chainage 458.679



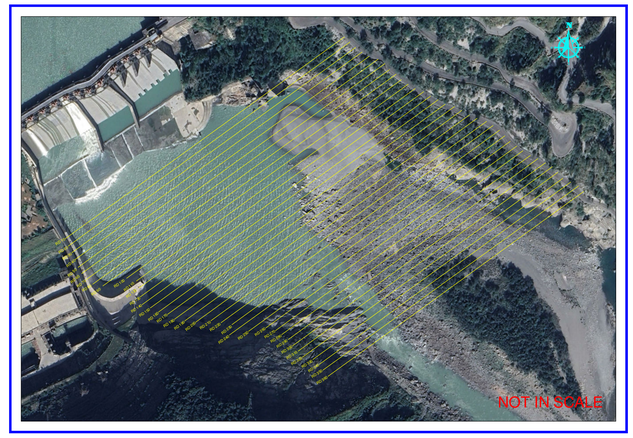
Profile From Chainage 0.0 to Chainage 461.69



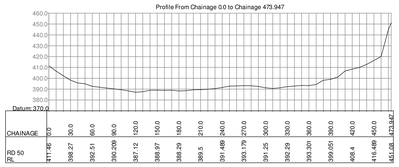
Profile From Chainage 0.0 to Chainage 466.879



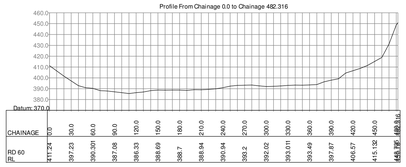
KEYMAP



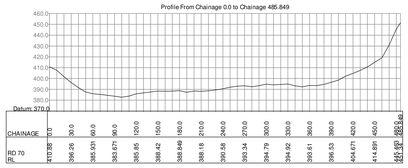
Profile From Chainage 0.0 to Chainage 473.947



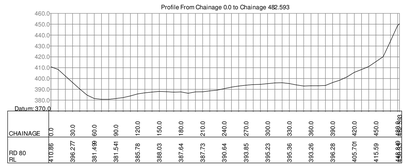
Profile From Chainage 0.0 to Chainage 482.316



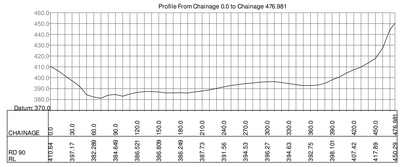
Profile From Chainage 0.0 to Chainage 485.849



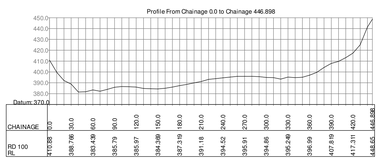
Profile From Chainage 0.0 to Chainage 482.593



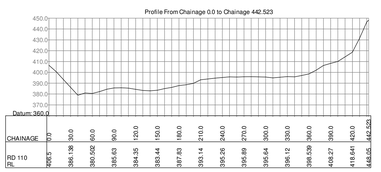
Profile From Chainage 0.0 to Chainage 476.981



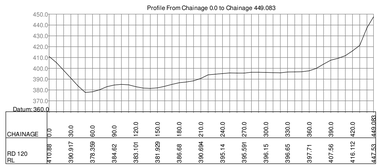
Profile From Chainage 0.0 to Chainage 446.898



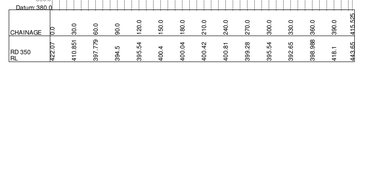
Profile From Chainage 0.0 to Chainage 442.523



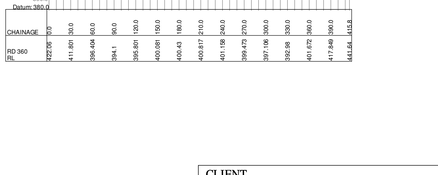
Profile From Chainage 0.0 to Chainage 449.083



Profile From Chainage 0.0 to Chainage 461.253



Profile From Chainage 0.0 to Chainage 469.049

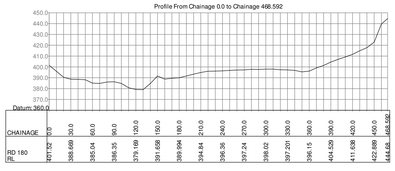


Profile From Chainage 0.0 to Chainage 468.576

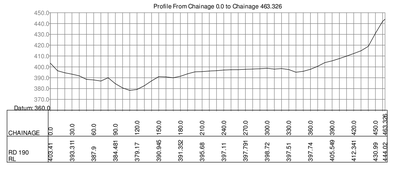
Profile From Chainage 0.0 to Chainage 466.816

Profile From Chainage 0.0 to Chainage 467.126

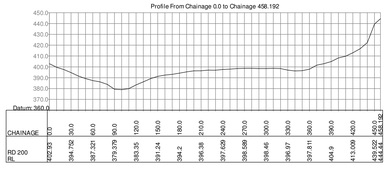
Profile From Chainage 0.0 to Chainage 468.592



Profile From Chainage 0.0 to Chainage 463.326



Profile From Chainage 0.0 to Chainage 458.192



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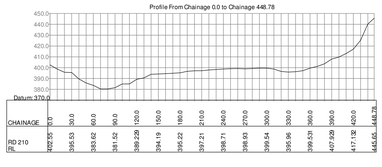
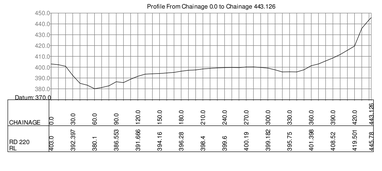
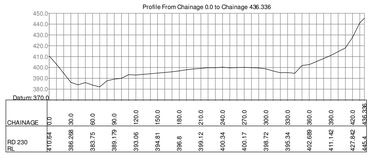


Profile From Chainage 0.0 to Chainage 443.126



Profile From Chainage 0.0 to Chainage 436.336



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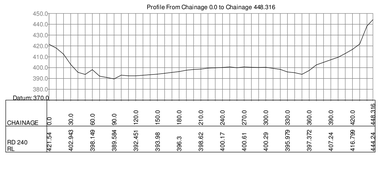

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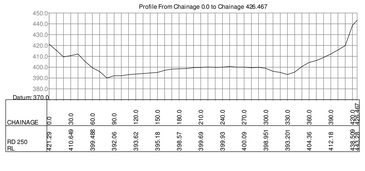

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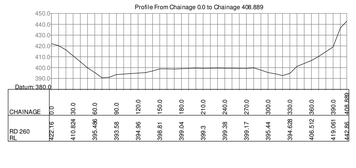

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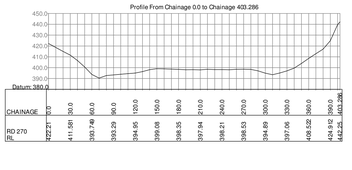

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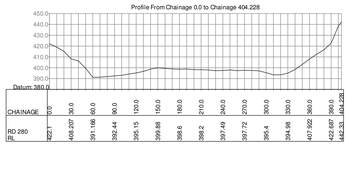

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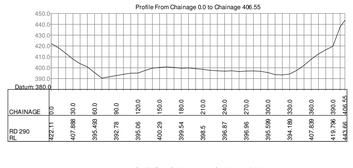

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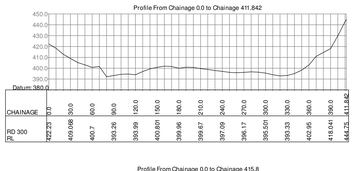

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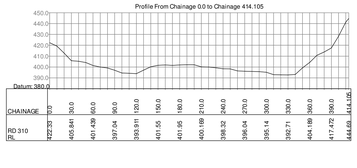

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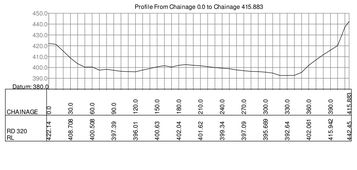

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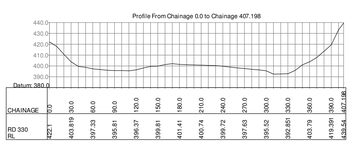

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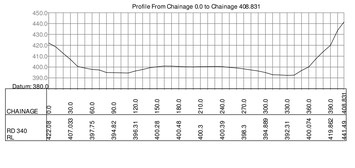

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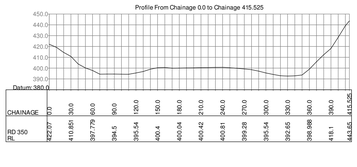

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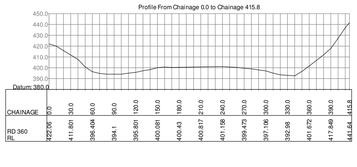


CLIENT: NATIONAL HYDROELECTRIC POWER CORPORATION LIMITED	PROJECT TITLE: HYDROGRAPHIC SURVET OF SALAL DAM AT DHYANGARH FOR YEAR 2024 - 2025	DRAWING TITLE: CROSS SECTION OF SALAL DAM - POOL AREA CHAINAGE : RD 10 TO RD 360	SURVEYED BY: NISVO MARINE SURVEYS LLP, CHENNAI - 600045, projects@nisvo.com, www.nisvo.com	SCALE: HOR. 1:3000, VER. 1:2000	SEASON: OCTOBER 2024	FIG NO: FIG.26	REV.: 0
				SHEET No. 01 of 01			

ANNEXURES

ANNEXURE I

(Detailed Specification of Survey Equipment)

SyQwest Incorporated

HydroBox HD™

Hydrographic Echo Sounder

The HydroBox HD™ is a portable high-resolution, shallow water echo sounder. It is designed exclusively for inshore and coastal hydrographic marine surveys up to 1000 meters of water depth. Available in single frequency or simultaneous dual frequency models

Extreme ease of use, portability, and cost efficiency make this device a perfect choice for shallow water hydrography.

The sensor unit is extremely compact, interfaces directly to a standard laptop PC and comes complete with sensor unit and Windows ® PC software.

NEW FEATURES!!!

- Ethernet Link to PC
- CW & FM Chirp
- High Definition Data Storage (16 bit , 96kHz, SEG-Y Format)
- UDP Interface to Survey Software
- Internal Memory Storage (32 GB SD Flash Card)

- *Centimeter Resolution*
- *Heave Input Capable*
- *GPS Input, NMEA Compatible*
- *Hypack & HydroPro Compatible*
- *Data Storage & Playback*
- *Zoom Modes*
- *Single or Dual Frequency*
- *Low Power (12 watts)*
- *Sound Velocity*

SyQwest inc

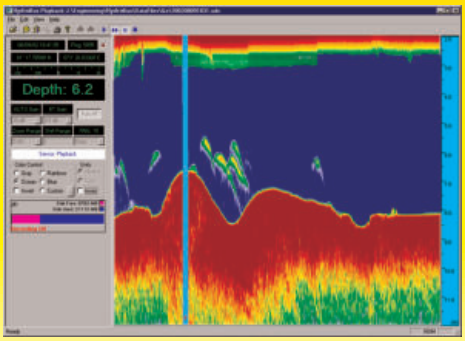
30 Kenney Drive / Cranston, RI 02920

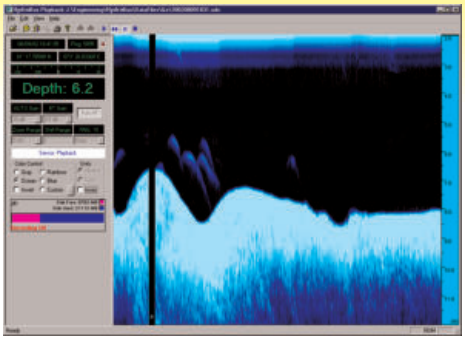
Tel: (401) 432-7129 Fax: (401) 432-7029

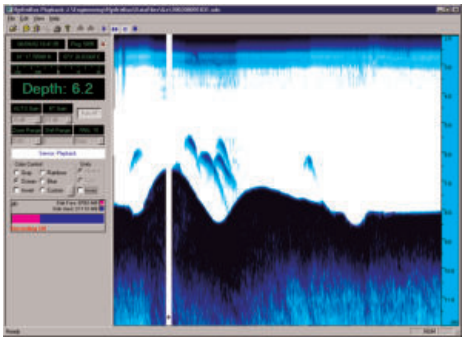
Email: sales@syqwestinc.com Web: www.syqwestinc.com

SyQwest Incorporated

HydroBox HD™





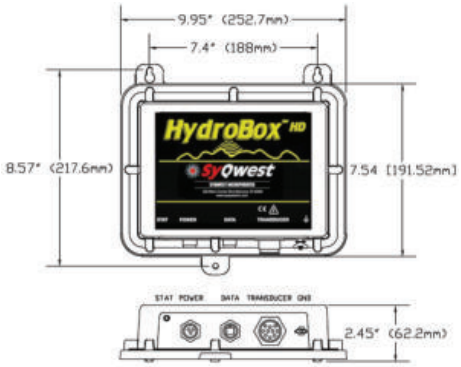


SPECIFICATIONS

Units:	Feet or Meters
Depth Ranges:	0-15, 30, 60, 120,240,450, 900,1500, 2400, 3000 Ft. 0-5, 10, 20, 40, 80, 150, 300, 500, 800, 1000 Meters. Auto-ranging Modes in all units.
Draft Offset:	0 to 30 feet (0 to10 meters)
Manual Gates:	Shallow & Deep, (rounded to one decimal place)
Shift Range:	1 foot increments in depths to 100 feet 10 foot increments in depths greater than 100 feet
Zoom Range:	15, 30, 60, 120, 240 feet 5, 10, 20, 40, 80 meters
Zoom Modes:	Bottom Zoom, Bottom Lock, Marker Zoom, Center Lock, Zoom (Playback Only)
Display:	Normal Data, Zoom Data, Selectable Color Palette
Sound Velocity:	4600 - 5250 ft/sec (1400 - 1600 mt/sec) 1 mt/sec int.
Depth Resolution:	0.01 feet, (in less than 120 ft) 0.01 meters. (in less than 150 mts)
Depth Accuracy:	1cm @ 200khz; 5cm @ 50Khz; 7cm @ 33Khz
Navigation Input:	NMEA 0183, GLL, GGA, RMC, VTG, VHW, HDT. Selectable Baud Rate, RS-232 .
Data Output:	NMEA 0183; DPT, DBT, PMC; ODEC
HydroBox HD I/F:	Ethernet via RJ-45
Printer Output:	(Parallel Port) interface to TDU Series Thermal
Heave Input:	TSS1 Format, 9600 Baud Rate
Shallow Water Operation:	.31 mt or 1 ft; frequency dependant
Data File Storage:	External-ODEC Format(8 bit, 800 pixel), SEG-Y Format envelope (16 bit, 96kHz rate), Internal-32GB SD Flash
Transmit Rate:	Up to 10 Hz, range mode dependent.
Data File Playback:	Files played back and printed at Normal or Rapid Advance Speed, with Pause, Scroll, and Zoom
Frequency Output:	210 Khz (nominal), 33Khz, *50Khz (*optional)
Transmit Output Power:	600 Watts (nominal) matched to transducer (1000 Watts capable)
Input Power:	10-30 Volts DC, Nominal Power 12 watts, Reverse Polarity and Over Voltage Protected.
Dimensions:	25.4 cm (10") Length, 15.876 cm (6.25") Width, and 6.25 cm (2.5") Height.
Weight:	1.1 kg (2.3 lbs). (sensor unit only)
Eventing:	Manual and Periodic Event Marks
Environmental:	25°C to +60°C Operating Temperature (-55°C to +90°C Storage) Water Resistant to EN60529 IP65 EMC meets EN60945 Emissions, CE Compliant

Options:

- 210Khz Transducer
- 50Khz Transducer
- 33Khz transducer
- 50/210Khz transducer
- 33/210Khz Transducer
- TDU-850 Thermal Printer
- TDU-1200 Thermal Printer
- SonarWiz
- Hypack
- HydroPro



SyQwest inc
Cranston, RI 02920 USA Tel: (401) 432-7129 Fax: (401) 432-7029
web: http://www.syqwestinc.com | email: sales@syqwestinc.com

ver 0417

Ellipse Series

MINIATURE
HIGH PERFORMANCE
Inertial Sensors

ITAR Free

0.1° RMS

IMU
AHRS
MRU
INS
VG

Navigation, Motion & Heave Sensing

ELLIPSE SERIES sets up new standard for miniature and cost-effective inertial systems with an extremely rugged design, cutting-edge sensors, enhanced capabilities, and advanced algorithms.

SBG SYSTEMS

Ellipse Series - The Most Advanced Miniature Inertial Sensors

ACCURACY

- Up to 0.1° real-time attitude
- Up to 2 cm RTK GNSS Position
- 10 cm Auto-Adaptative Heave

KEY FEATURES

- Very low noise gyroscopes
- GNSS receiver
- DGPS corrections
- IP 68 enclosure
- 200 Hz output rate

Ellipse inertial sensors provide outstanding orientation and position data in a small, light-weight, and rugged enclosure. Incredibly versatile, you can connect your own GPS/GNSS receiver or use the internal one, connect an odometer, receive differential GPS corrections, etc.

Extreme Flexibility for High Demanding Applications

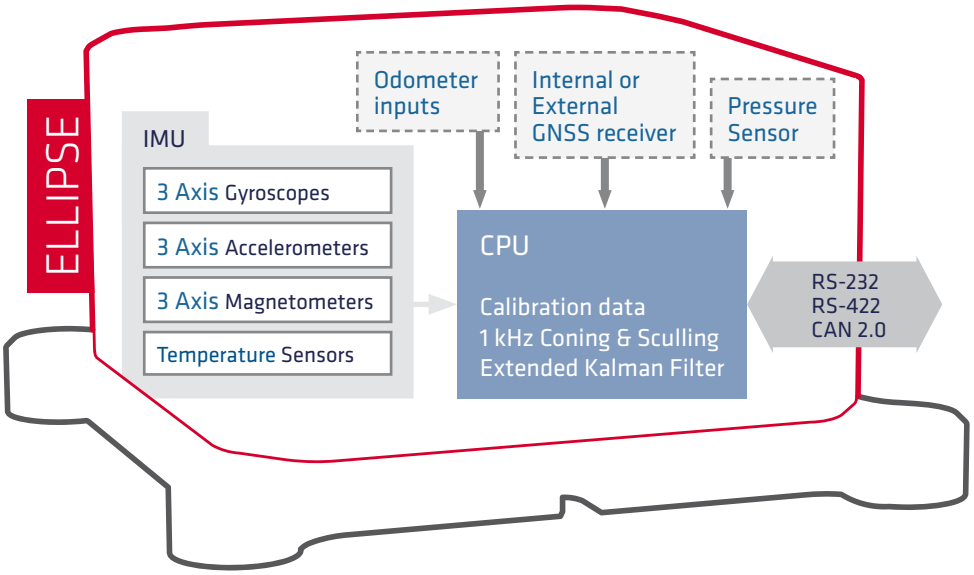
	Ellipse-A	Ellipse-E	Ellipse-N	Ellipse-D
Roll, Pitch	0.2 °	0.2 °	0.2 °	0.1 °
Heading	1 °	0.5 °	0.5 °	0.2 ° (Dual-antenna)
Heave: 10 cm or 10 %	●	●	●	●
Odometer aiding		●	●	●
DGPS corrections			●	●
Navigation		Navigation with external GPS / GNSS receiver	Internal GNSS receiver 2 m GNSS accuracy	Survey-grade L1/L2 GNSS receiver 2 cm RTK GNSS Accuracy
Post-Processing				●

Motion & Heave Monitoring

Payload Orientation & Positioning

Data Georeferencing

Features Inherited from High End INS/GNSS



Depending on the model

Ellipse Series comes with features inspired from high end inertial systems such as GNSS receiver, FIR and rejection filtering, extensive temperature calibration, and motion profiles that adjust the sensor to the application constraints.

OEM version available

Advanced Filtering

- Efficient vibration rejection
- Real time fusion of inertial, GNSS, and aiding data (DMI, RTCM, etc.)
- False GPS measurements rejection

Calibration

- Extensive test and calibration from -40 to 85°C
- Easy hard and soft magnetic disturbances compensation

Motion Profiles

Select your motion profile (helicopter, car, etc.) and Kalman Filter, vibration level, dynamics, magnetic disturbance immunity are automatically adjusted.

Ellipse-D, the Most Powerful Model

- Immune to magnetic disturbances
- Accurate heading even under low dynamics
- L1/L2 GNSS receiver

Ellipse-D integrates a Survey-grade GNSS receiver with two antennas for unmatched heading, attitude, and position accuracy in real-time and post-processing.

This is the ideal sensor for antenna tracking, payload orientation, and cost-effective survey.

Dead Reckoning

Pointing & Stabilization

Orientation & Navigation

Development Kit, all-in-one package for easy integration

Development Kit

Hardware

The Development kit comes with your Ellipse.

It contains:

» A quick start guide and the user manual,
» The calibration report,
» A USB cable,
» A USB Key including software and tools

sbgCenter

Software

The windows-based sbgCenter software allows:

» Real-time data visualization
» Easy configuration through motion profiles
» Data Analysis by zooming through time
» Export into Excel, Matlab, Google Earth formats

A C library, and some code source examples are provided.

Support Center

Support

As expert of inertial navigation, we are at your side, helping you to get the most of your sensor:

» Free technical support by phone and email
» Unlimited firmware updates
» Dedicated support platform (Knowledge center, support answers archive, documentation, etc.)
» Custom Training on demand

Navigation

Dynamics Analysis

Avionics

Specifications

Preliminary

ACCURACY (RMS)

360 ° sensing in all axes, no mounting limitation

Model	A	E/N	D
Roll / Pitch	0.2 °	0.2 °	0.1 ° / 0.05 ° (PPK)
Heading	0.8 ° Magnetometers*	< 0.5 ° GPS**	< 0.2 ° Dual GPS*** (> 1 m baseline)
Velocity* **	-	0.1 m/s	0.03 m/s
Position* **	-	2 m	Single point L1/L2: 1.2 m
			SBAS: 0.6 m
			DGPS: 0.4 m
			RTK: 2 cm + 2 ppm (option)
			PPK: 1 cm (option)
Heave accuracy	10 cm or 10%		
Heave period	Up to 15 s	Automatically adjusts to the wave period	

**Under homogenous magnetic field*
*** Under regular acceleration, or automotive motion*
**** Under good GNSS availability*
PPK = Post-processing Kinematic. Post-processing with Inertial Explorer®.

All parameters apply to full specified temperature range, unless otherwise stated. Full specifications can be found in the Ellipse User Manual available upon request.

PRODUCT CODE

▪ *standard product options*

ELLIPSE-#-G#A#-##

MODEL
A: AHRS
E: Externally Aided INS
N: INS with integrated GNSS
D: INS with integrated dual antenna GNSS

GYROSCOPE
2: 100 °/s
3: 200 °/s
4: 450 °/s ▪
5: 1,000 °/s

PACKAGING
B1 *Box* ▪ RS-232/422
B2 *Box* RS-232 + CAN
L1 *OEM* TTL
L2 *OEM* RS-232/422 + CAN

ACCELEROMETER
2: 8 g ▪
3: 16 g

INTERFACES

Available data	Euler angles, quaternion, velocity, position, heave, calibrated sensor data, delta angles & velocity, barometric data, status, GPS data, UTC time, GPS raw data (Post-processing), etc.
Aiding sensors	GNSS, Odometer (DMI), RTCM
Output rate	Up to 200 Hz
Main Serial Interface	RS-232, RS-422, USB - up to 921,600 bps
Serial protocols	Binary eCom protocol, NMEA, ASCII, TSS
CAN interface	CAN 2.0A/B - up to 1 Mbit/s
Pulses	Inputs: Events, PPS, DMI (Direction or quadrature)
	Outputs: Synchronization (PPS), Virtual DMI
	Model A & N: 2 inputs / 1 output
	Model E: 4 inputs / 2 outputs
	Model D: 3 inputs / 2 outputs

INTERNAL GNSS

Engine, update rate	Model N: 72-channel, 10 Hz, L1 C/A GPS, GLONASS, QZSS, BeiDou, SBAS
	Model D: 120-channel, 5 Hz STD: GPS L1/L2/L2C, SBAS, QZSS Option: GLONASS, Galileo, Beidou
Cold start / Hot start	Model N: 26 s / < 1 s
	Model D: < 50 s / < 35 s

MECHANICAL

		Box	OEM model
Size	**models A/E/N:**	46 x 45 x 24 mm 1.8 x 1.77 x 0.9 ”	34 x 34 x 13 mm 1.34 x 1.34 x 0.51 ”
	model D:	87 x 67 x 31.5 mm 3.43 x 2.64 x 1.24 ‘’	- -
Weight		A: 45 g / 0.1 lb N: 47 g / 0.1 lb E: 49 g / 0.1 lb D: 180 g / 0.4 lb	12 g / 0.02 lb 12 g / 0.02 lb 12 g / 0.02 lb -
IP Rating		IP68	-

SENSORS

	Accelerometers	Gyroscopes	Magnetometers
Range	± 8 g	± 450 °/s	± 8 Gauss
Gain stability	< 0.1 %	< 0.05 %	< 0.5 %
Non-linearity	< 0.2 % FS	< 0.05 % FS	< 0.1 % FS
Bias stability	± 5 mg	± 0.2 °/s	± 0.5 mGauss
Random walk/ Noise density	100 µg/√Hz (X,Y) 150 µg/√Hz (Z)	0.18 °/√hr	200 µg/√Hz
Bias in-run instability*	20 µg	8 °/h	-
VRE	7 mg/g² RMS	0.001 °/s/g² RMS	-
Alignment error	< 0.05 °	< 0.05 °	< 0.1 °
Bandwidth	250 Hz	133 Hz	110 Hz

** Allan Variance, @ 25 °C*

PRESSURE SENSOR (models N & E)

Resolution	1.2 Pa / 10 cm / 0.3 ft	
Pressure accuracy	± 50 Pa / ± 200 Pa	Relative / Absolute

ELECTRICAL & ENVIRONMENTAL

Input voltage	Model A/E/N: 5 - 36 V
	Model D: 9 - 36 V
Power consumption	Model A/E: < 460 mW
	Model N: < 650 mW
	Model D: < 2,500 mW
Specified temperature	Model A/E/N: -40 to 85 °C, -40 to 185 °F
	Model D: -40 to 75 °C, -40 to 167 °F
Shock limit	2,000 g
Operating vibration	3 g RMS (20 Hz to 2 k Hz per MIL-STD 810G)
MTBF	50,000 hours

SBG SYSTEMS

SBG Systems is a leading supplier of MEMS-based inertial motion sensing solutions. The company provides a wide range of inertial solutions from miniature to high accuracy. Combined with cutting-edge calibration techniques and advanced embedded algorithms, SBG Systems products are ideal solutions for industrial & research projects such as unmanned vehicle control, antenna tracking, camera stabilization, and surveying applications.

TEST RESULTS

Marine

Automotive

VIDEO

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www.sbg-systems.com

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DATASHEET

TRIMBLE SPS551 AND SPS551H LOCATION GPS RECEIVERS

KEY FEATURES

- Rugged, weatherproof modular receiver design
- GPS L1/L2, SBAS and OmniSTAR VBS/XP/HP capable
- Keypad and display for easy configuration and status monitoring
- Bluetooth®, Ethernet, Serial, and USB communications
- Integrated battery that also acts as a UPS power supply
- Optional integrated 450M Hz UHF or 900 MHz radios for easy configuration
- Industry standard NMEA, RTCM, and CMR™ inputs and outputs
- 1PPS output for time synchronization with other devices
- Upgrades available to track GPS L2C and GLONASS

SPS551H HEADING ADD-ON RECEIVER FEATURES

- Provides precise heading capability when combined with any SPSx51 receiver
- Upgrade available to track L2C and GLONASS

FLEXIBLE GPS RECEIVERS FOR LOCATION GPS POSITIONING IN LAND AND MARINE ENVIRONMENTS

The Trimble® SPS551 Modular GPS receiver provides a range of Location GPS[1] positioning techniques ideal for system integrators, OEMs, and land or marine contractors who require real-time positions. The Trimble SPS551 receiver can also be combined with either the Trimble SCS900 Site Controller Software for land-based rover applications or Trimble HYDROpro™ software for marine positioning solutions.

The SPS551 receiver can operate in all Location GPS modes, including operation with Satellite Based Augmentation Systems (SBAS), Differential GPS (DGPS), OmniSTAR (VBS, XP, and HP services), and Location RTK mode for decimeter level positioning. When combined with the Trimble SPS551H Heading Add-on receiver, the SPS551 receiver delivers both Location GPS position and precise GPS heading capabilities suitable for rapid real time positioning and orientation of vessels, barges and vehicles.

Location RTK Accuracy to 10 Centimeters

Location RTK mode delivers a horizontal and vertical positioning accuracy of 10 cm. Location RTK operations can be accomplished using CMR+™ correction outputs from any available Trimble RTK (Real-time Kinematic) base, CORS station or Trimble VRS™ network through radio, cell phone, or an Internet connection.

For DGPS and Location RTK operations, the receiver can be used with an external radio modem, or be equipped with either a 450 MHz (UHF) or 900 MHz internal radio capable of both transmit and receive operations.

Flexible Options to Suit Changing Job Site Requirements

Modularity provides the flexibility to mount the receiver and GPS antenna in a variety of ways, allowing for operation on a pole, backpack, site vehicle, on light machinery, or on a marine vessel. The receiver can be mounted in an accessible location where it is easy to configure and is secure from theft and from the weather, while the antennas can be mounted in a location that provides clear line of sight to the sky and reduces the potential for multipath.

The SPS551 receiver provides reliable real-time GPS positioning for offshore, near shore and land-based applications including: Offshore drilling platforms, barges, ports, marine channels, and land reclamation.

The Trimble SPS551 receiver can be upgraded with GLONASS and GPS L2C signals to provide better positioning solutions in harsh GPS conditions such as areas where job site obstructions create sky visibility issues or during times of limited GPS-only availability.

1 *Location GPS receivers provide GPS positioning techniques including Satellite Based Augmentation Systems (SBAS), DGPS, OmniSTAR (VBS, XP and HP services), and Location RTK (decimeter-level RTK positioning) for up to decimeter-level (0.3-ft) positions.*

Trimble®

TRIMBLE SPS551 AND SPS551H LOCATION GPS RECEIVERS

GENERAL

Keyboard and display . . . .VFD display 16 characters by 2 rows
On/Off key for one button start up
Escape and Enter key for menu navigation
4 arrow keys (up, down, left, right)
for option scrolls and data entry

Dimensions (L × W × D) . . . . . .24 cm × 12 cm × 5 cm
(9.4 in x 4.7 in x 1.9 in)
including connectors

Weight . . . . . 1.65 kg (3.64 lb) receiver
with internal battery and radio
1.55 kg (3.42 lb) receiver
with internal battery and no radio

Antenna options

L1/L2/L2C GPS operation . . . GA510* or Zephyr™ Model 2**
GLONASS operation . . . . . .Zephyr Model 2**
DGPS Base Station . . . . . .Zephyr Geodetic™ Model 2**
OmniSTAR operation . . . . . .GA510* or Zephyr Model 2**

* GA510 is included in the SPS551H receiver kits and provides superior OmniSTAR tracking.

** Zephyr Model 2 antenna is included in the SPS551H GLN receiver kit

Supports legacy
Trimble antennas. . . Single frequency antenna for DGPS use
Dual frequency antenna such
as Z+, Zephyr, Zephyr Geodetic, and
Micro-Centered™ for heading applications

Temperature[1]

Operating . . . . . .–40 °C to +65 °C (–40 °F to +149 °F)
Storage . . . . . .–40 °C to +80 °C (–40 °F to +176 °F)
Humidity . . . . . .MIL-STD 810F, Method 507.4
Waterproof . . . . . IP67 for submersion to depth
of 1 m (3.3 ft), dustproof

Shock and vibration

Designed to survive a 1 m (3.3 ft) pole drop onto a hard surface

Shock: non-operating . . . . . To 75 g, 6 ms
Shock: operating . . . . . To 40 g, 10 ms, saw-tooth
Vibration . . . . . .Tested to Trimble ATV profile (4.5 gRMS):
10 Hz–300 Hz: 0.04 g^2/Hz;
300 Hz–1,000 Hz; –6 dB/octave

Measurements

- Advanced Trimble Maxwell™ 5 Custom GPS chip
- High-precision multiple correlator for L1/L2 pseudo-range measurements
- Unfiltered, unsmoothed pseudo-range measurements data for low noise, low multipath error, low time domain correlation, and high dynamic response
- Very low noise carrier phase measurements with <1 mm precision in a 1 Hz bandwidth
- L1/L2 signal-to-noise ratios reported in dB-Hz
- Proven Trimble low elevation tracking technology
- 72-channel L1 C/A code, L1/L2 Full Cycle Carrier. Upgradable to L2C and GLONASS L1/L2 Full Cycle Carrier.
- Trimble EVEREST™ multipath signal rejection
- 4-channel SBAS (WAAS/EGNOS/MSAS)

Code differential GPS positioning[2]

Horizontal accuracy . . . . . 0.25 m + 1 ppm RMS
(0.8 ft + 1 ppm RMS)
Vertical accuracy . . . . . 0.50 m + 1 ppm RMS
(1.6 ft + 1 ppm RMS)

SBAS (WAAS/EGNOS/MSAS)[3] positioning

Horizontal accuracy . . . . . .Typically <1 m (3.3 ft)
Vertical accuracy . . . . . .Typically <5 m (16.4 ft)

OmniSTAR positioning

VBS service accuracy . . . . . .Horizontal <1 m (3.3 ft)
XP service accuracy . . . . . .Horizontal 0.2 m (0.66 ft),
Vertical 0.3 m (1.0 ft)
HP service accuracy . . . . . .Horizontal 0.1 m (0.33 ft),
Vertical 0.15 m (0.5 ft)

Location RTK positioning[2]

Horizontal accuracy . . . . . 0.07 m + 1 ppm RMS
(0.23 ft + 1 ppm) RMS
Vertical accuracy . . . . . 0.07 m + 1 ppm RMS
(0.23 ft + 1 ppm) RMS

Heading accuracy with
SPS551H or additional SPSx5x . . . . . .0.05° RMS
(10 m antenna separation)
Does not require shore-based
corrections for heading solution

POWER

Internal

- Integrated internal battery 7.2 V, 7800 mA-hr, Lithium-ion
- Internal battery operates as a UPS in the event of external power source failure
- Internal battery will charge from external power source when input voltage is >15 V
- Integrated charging circuitry

External

- Power input on 7-pin 0-shell Lemo connector is optimized for lead acid batteries with a cut-off threshold of 10.5 V
- Power input on the 26-pin D-sub connector is optimized for Trimble Lithium-ion battery input with a cut-off threshold of 9.5 V
- Power source supply (Internal/External) is hot-swap capable in the event of power source removal or cut off
- 9.5 V to 28 V DC external power input with over-voltage protection
- Receiver will automatically turn on when connected to external power

Power consumption . . . . . 6.0 W in rover mode
with internal receive radio
8.0 W in base mode
with internal transmit radio

Base station operation times on internal battery

External radio . . . . . 15 hours;
varies with temperature
Internal radio (450 MHz, 0.5 W) . . . . . 11 hours;
varies with temperature

Rover operation times on internal battery

450 MHz systems . . . . . 13 hours; varies with temperature
900 MHz systems . . . . . 13 hours; varies with temperature

Regulatory approvals

- FCC: Part 15 Subpart B (Class B Device) and Subpart C, Part 90
- Industry Canada: ICES-003 (Class B Device), RSS-210, RSS-Gen, RSS-310, RSS-119
- R&TTE Directive: EN 301 489-1/-5/-17, EN 300 440, EN 300 328, EN 300 113, EN 60950, EN 50371
- ACMA: AS/NZS 4295 approval
- CE mark compliance;
- C-tick mark compliance
- UN ST/SG/AC.10.11/Rev. 3, Amend. 1 (Lithium-ion Battery)
- UN ST/SG/AC. 10/27/Add. 2 (Lithium-ion Battery)
- RoHS compliant (excludes those with an internal 900 MHz radio)
- WEEE compliant

Communications

Port 1 (7 pin 0S Lemo)
Serial 1 . . . . . 3 wire RS232
Port 2 (26 pin D-sub)
Serial 2 . . . . . Full 9 wire RS-232
Serial 3 . . . . . 3 wire RS232
1PPS (pulse per second) . . . . . via adapter cable
USB (On the Go) . . . . . via multi-port adapter
Ethernet . . . . . via multi-port adapter
Bluetooth . . . . . Fully-integrated, fully-sealed 2.4 GHz Bluetooth[5] module

Integrated radios (optional) . . . . Fully integrated, fully sealed internal 450 MHz (UHF) Tx/Rx; Internal 900 MHz Tx/Rx
Channel spacing (450 MHz) . . . . . 12.5 KHz or 25 KHz spacing available End-user configurable
450 MHz output power . . . . . 0.5 W, 2.0 W (2.0 W available only in certain countries)
Frequency approvals (900 MHz). . . . . USA/Canada (-10) New Zealand/Australia (-20) Australia (-30)
Receiver position update rate . . . . . 1 Hz, 2 Hz, 5 Hz, and 10 Hz positioning
Correction data input (SPS551) . . . . . CMR, CMR+, RTCM 3, RTCM 2.x
Correction data output (SPS551) . . . . . CMR/CMR+ (for Moving Baseline), RTCM 2.x (DGPS only)
Data outputs . . . . . NMEA, GSOF, 1PPS Time Tags

Receiver options and upgrades

SPS551 GLONASS . . . . . Uses GLONASS L1/L2 satellite signals
450 MHz Radio 2.0 W. . . . . Available only in certain countries
SPS551 L2C (upgrade only). . . . . Uses GPS L2C satellite signals

Receiver operations capability

SPS551 . . . . . SBAS, OmniSTAR services, DGPS Base or Rover, Moving Base or Heading, Location RTK Rover
SPS551H . . . . . Heading add-on only

1 Receiver will operate normally to –40°C. Bluetooth module and internal batteries are rated to –20°C.
2 Accuracy and reliability may be subject to anomalies such as multipath, obstructions, satellite geometry, and atmospheric conditions. Always follow recommended practices.
3 Depends on SBAS system performance.
4 If your receiver has the 2.0 W upgrade, you will experience reduced battery performance compared to the 0.5 W solution.
5 Bluetooth type approvals are country-specific. For more information, contact your local Trimble office or representative.

Specifications subject to change without notice.

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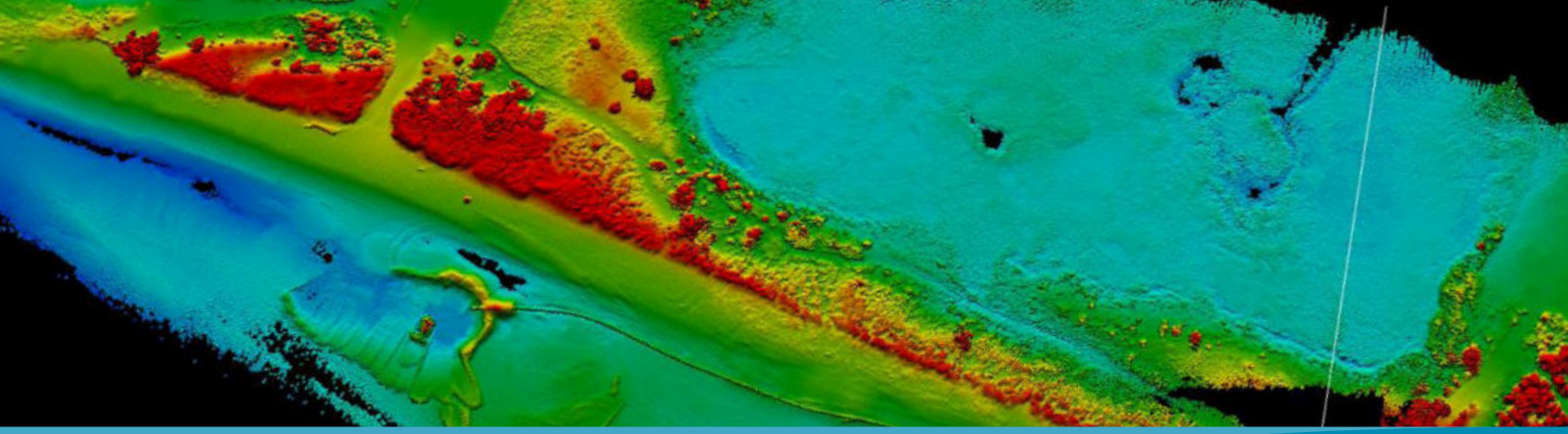
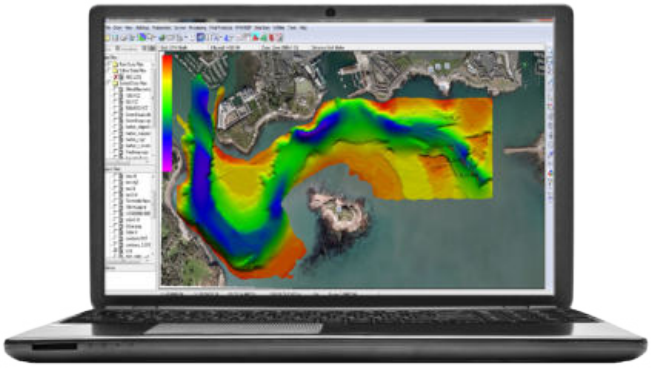
+65 6348 2232 Fax

www.trimble.com



HYPACK®

SOFTWARE FOR HYDROGRAPHIC DATA COLLECTION, PROCESSING AND FINAL PRODUCTS



About HYPACK®

HYPACK® is one of the most widely used hydrographic software packages in use today. It is designed to assist you in all of the hydrographic operations, with software that is straightforward and simple to use. The software package provides the tools needed to design, acquire and process your survey data, and create the final products needed. Tools for creating contours, computing volumes, creating sidescan mosaic and create electronic charts (ENC) are part of the package. Over two hundred sensor inputs provide the connection for all types of GPS, Inertial systems, echo sounders, sidescan and sub bottom, magnatometers, velocity sensors and more. HYPACK® is more than a navigation software; it's your complete hydrographic package from planning to deliverable.

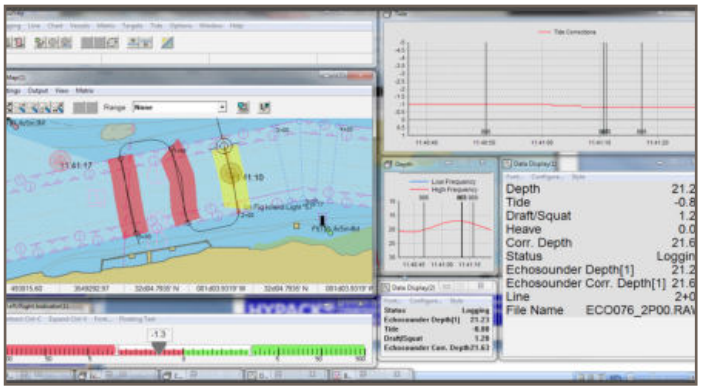
Benefits

- HYPACK® is a standard package for many hydrographic organizations
- Effective solution to meet your survey needs
- Online and phone support provided by our experienced support team
- It is easy to set-up, user configurable, and allows you to connect to virtually any sensor on the market today

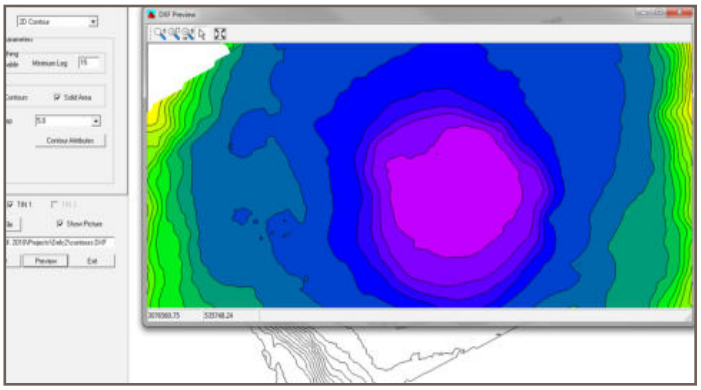
Features

- Simple to use survey planning for line creation, with support for worldwide geodesy models
- Real time navigation display, support for remote helmsman and survey view
- Processing tools allow for simple to use data cleaning, with both manual and automatic filters
- HYPACK® data files are easily exported to XYZ, CAD, DXF and dozens of other formats

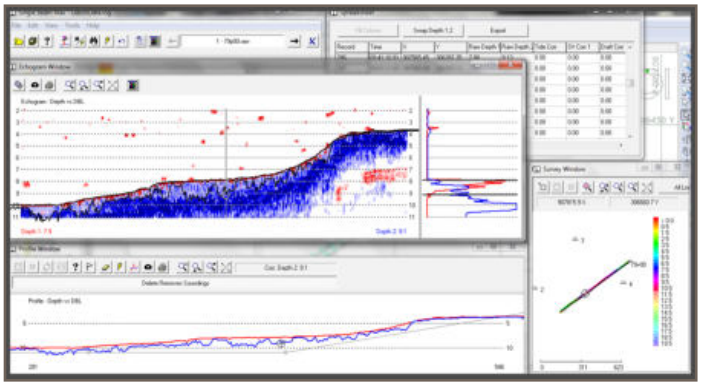
Included in HYPACK®



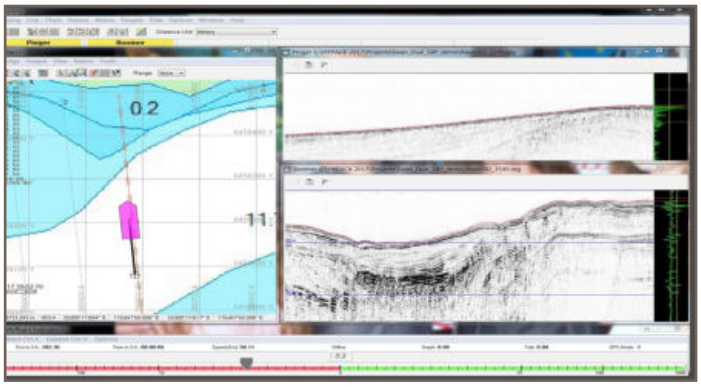
The HYPACK® SURVEY program provides you with the visual feedback needed to get your survey job done right.



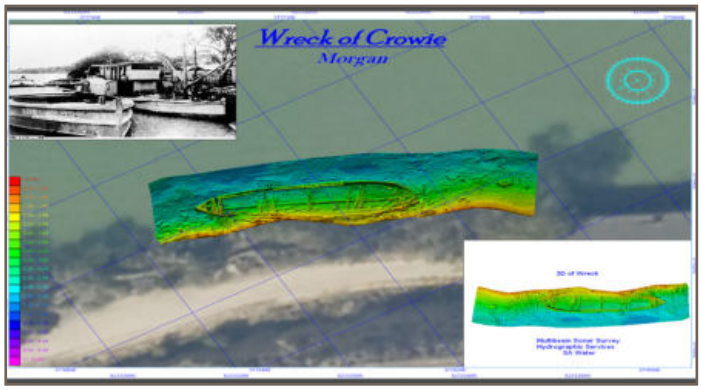
The TIN MODEL program creates surface models, generates DXF contours and computes volume quantities. Export gridded XYZ or BAG surfaces.



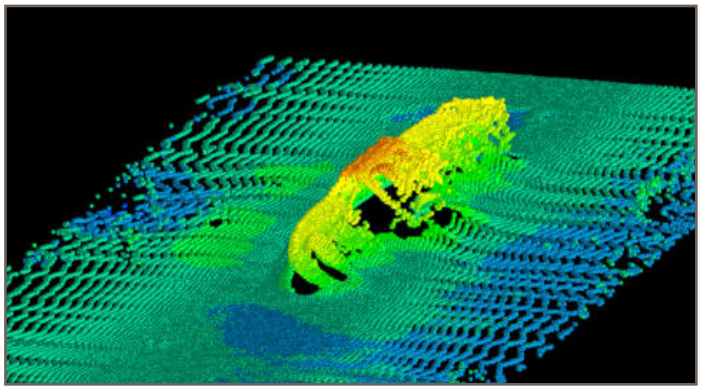
The SURVEY program handles input from over 200 devices: GPS, inertial systems, sub-bottom systems, single and dual frequency echosounders and magnetometers.



HYPACK® supports both analog and digital sub-bottom systems. It saves your data to industry standard SEG-Y. It's a standard feature in HYPACK®.



HYPLOT lets you output smooth sheets to your printer or plotter, or save them to PDF or DXF. Choose from an array of borders and sheet options. Design your own title block.



The CLOUD program can be used for data review. It accepts HYPACK® data, XYZ data, or LAS files.

HYPACK
a xylem brand

HYPACK
56 Bradley Street
Middletown, CT 45387

1-860-635-1500
sales@hypack.com
HYPACK.com

GNSS Receiver

Zenith35 Pro Series

555 CHANNELS

- All satellite systems and frequencies supported
- NovAtel® technology
- Selectable RTK modes

EASY TILT & GO

- Reach and measure hidden points with tilted pole
- Check and track pole verticality
- Precise electronic bubble

COMPACT & RUGGED

- Compact size
- IP68 water and dust proof
- Shock protected

ZENITH35 PRO

PART OF HEXAGON

GEOMAX

works when you do

ERASING BOUNDARIES
RAISING PERFORMANCE

Full spectrum of satellite signals, full connectivity and the unique Tilt&Go functionality all in a compact GNSS make the Zenith35 Pro series the GNSS that *works when you do*.

Tilt&Go

Full freedom

A corner of a building or even a gully under a parked car? The unique Zenith35 Pro Tilt&Go functionality allows you to measure points where a vertical placement of the pole is not possible such as house corners.

No longer worry about keeping your pole strictly vertical, just Tilt & Go! Seamlessly integrated into the field software, the Zenith35 Pro TAG offers two modes perfectly adapting to the measurement situation.

- **TAG Single** - *when the highest efficiency is needed*

  Measure points with pole tilted up to 15° with only one press of a button. Perfectly suited for all your standard tasks, such as topographical surveys and stakeouts.

- **TAG Dual** - *when working under difficult situations*

  Independent from discrepancies caused by metal objects (or those generating magnetic fields). With pole tilt up to 30°.

When you do have to be sure your pole is vertical, the Zenith35 Pro TAG alerts you when you are outside of the defined centering accuracy, documenting the quality of your measurement.

Full sky

- 555 channels multi constellation and multi frequency, ready for all todays and tomorrows GNSS systems, including Galileo and BeiDou.
- NovAtel onboard - Cutting-edge technology from leading provider of high precision GNSS.
- Zenith35 Pro ExtraSafe mode - Working under heavy canopy or when most reliable results are required, this feature adapts to different working conditions.
- 20 Hz position output as default.

Full connectivity

- Access from any device connected to the internet, independent of your location
- Connect up to 10 rovers simultaneously via GSM with Zenith35 Pro DynDNS technology
- Bluetooth and WiFi connection
- 3.75 G GSM for NTRIP connections
- Powerful UHF for base-rover setups
- USB port for data transfer
- Serial port for data output

Zenith35 Pro Series

555 channels

Integrated 3.75 G GSM and UHF modules

Dual mode: up to 30 ° tilt
Single mode: up to 15° tilt

Tilt&Go

ExtraSafe quality mode

NovAtel ON BOARD

4 GB internal memory

Quick removable SIM and microSD card

Port for external power and radio

Integrated Wi-Fi® module

	GSM - UHF	Tilt&Go
GeoMax Zenith35 Pro	✓	
GeoMax Zenith35 Pro TAG	✓	✓

RECEIVER SPECIFICATIONS

AdVance® technology	High fix availability + reliability
Channels	555, multi-frequency
GPS tracking	L1, L2, L2C, L5
GLONASS tracking	L1, L2, L3*
BeiDou tracking	B1, B2, B3** (optional)
Galileo tracking	E1, E5a,E5b, AltBOC, E6** (optional)
Positioning rate	20 Hz
SBAS	EGNOS, WAAS, MSAS, GAGAN, QZSS***

RECEIVER ACCURACY****

Static horizontal	3 mm ± 0.5 ppm (rms)
Static vertical	5 mm ± 0.5 ppm (rms)
Kinematic horizontal	8 mm ± 1 ppm (rms)
Kinematic vertical	15 mm ± 1 ppm (rms)
Static long horizontal	3 mm + 0.1 ppm (rms)
Static long vertical	3.5 mm + 0.4 ppm (rms)

QUALITY MODE

RTK modes	Selectable; ExtraSafe, Standard
Tilt&Go modes	Selectable; Single/Dual

* Glonass L3 will be provided through future firmware upgrade.
** Believe to comply. Subject to ICD description availability.
*** Support of QZSS is incorporated and will be provided through future firmware upgrade when QZSS will be operational.
**** Measurement accuracy and reliability are dependent on various factors including satellite geometry, obstructions, observation time, ionospheric conditions, multipath, etc.
Figures quoted assume normal to favourable conditions.

INTERFACES

Keyboard	On/off and function key
LED status indicators	Position, battery, Bluetooth®, Wi-Fi®, RTK receive, RTK transmit, data storage
LED mode indicators	Rover, base, static
Data recording	Dual; microSD card and 4 GB internal memory
GSM/TCP/IP	Removable SIM card

COMMUNICATION

GSM/GPRS module	Quad-Band GSM & Penta-Band UMTS 800 / 850 / 900 / 1900 / 2100 MHz
UHF radio module	500mW, 1000 mW transceiver, 403 – 473 MHz
Bluetooth®	Device class II
TNC connector	UHF antenna, UMTS/GSM antenna
Communication port	USB, serial & power

PHYSICAL SPECIFICATIONS

Dimensions	Height 131 mm, ø 161 mm
Weight	1.17 kg without battery
Operating temp.	– 40°C to 65°C
Protection class	IP68 dust and waterproof
Humidity	100%, condensing
Vibration	ASAE EP455 Section 5.15.1 Random, MIL-STD-810G, method 514.6E-I
Shock	Withstands 2 m drop onto hard surface

POWER SUPPLY

Internal battery	Removable, Li-Ion 3.4 Ah / 11.1 V
Operating time	8 h in static / 6 h in rover mode
External power	9 V to 18 V, LEMO® plug

0916 - 849552 enus Copyright GeoMax AG. Illustrations, colours, descriptions and technical specifications are not binding and may change. All trademarks and trade names are those of their respective owners.

GEOMAX

Learn more at:
geomax-positioning.com

GEOMAX AUTHORISED DISTRIBUTION PARTNER

Works when you do

Works when you do

GeoMax X-PAD Suite

The complete hub for integrated software

The GeoMax X-PAD Software Suite was specifically designed to give you the efficient, affordable, and easy-to-use solutions you have been looking for to meet your multiple surveying and construction layout needs.

As a full-service software ecosystem, the X-PAD Suite is made of individual software modules for everyday use. Get each module separately or maximise your value by using them together.

X-PAD

Scan to find the entire **GeoMax X-PAD Software Suite**

geomax-positioning.com

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One Suite For All Your Needs

Find the X-PAD solution that works for you

At GeoMax, listening to our customers and applying their feedback to enhance our products is in our company DNA. It is the best way for our customers to succeed.

X-PAD is no exception. The X-PAD Software Suite was built, and continues to improve, based on input from those who use it every day for projects that require accurately capturing data in the field, transferring it quickly and securely to the office, storing and managing file types in a single platform, and more.

Our software suite can be categorized into three groups.

Field Apps

Data collection | Measurements | Stakeout | Check

X-PAD ULTIMATE SURVEY | X-PAD ULTIMATE BUILD | X-PAD ULTIMATE GO | X-PAD MASTERPLAN

Cloud Services (Connects the field and office)

Data storage | File exchange | User & asset management | Collaboration | Backup & restore | GeoMax Virtual Academy

X-PAD 365

Office Packages

Calculations | Analysis | As-built | Design | Layout | Calibration

X-PAD FUSION | X-PAD CALMASTER

X-PAD Software was developed only for GeoMax, to help us meet the growing demands of surveyors worldwide.

"Everything started when we introduced the first professional application for surveyors running on Android. This was a big success because it was exactly what customers were waiting for. Then the desktop application offered a solution to process and prepare data in the office. With X-PAD 365 we now offer a complete ecosystem of software that can work independently or seamlessly integrated, connecting Field and Office thanks to the support of the Cloud component."

Keven Corazza
X-PAD Software
Technology Director

Keep reading to see which products best fit your needs.

Bonus Tip

Your first year of **X-PERT** service is free of charge when purchasing an **X-PAD Ultimate** license.

Not only do we provide all the software solutions you need to do your job quicker, easier, and more efficiently, but we also give you the service and support you need to succeed, with X-PERT.

X-PERT

Your annual X-PERT license includes ongoing maintenance, access to new service pack releases, software upgrades, and custom workflows to meet to your needs.

Thank you for all the fantastic technical support recently with my X-PAD application.Your timely communications were the best. Your knowledge and professionalism in what you do is surpassed by none other. So glad my TPS, GNSS, and data collection are now all GeoMax.

If I could rate your performance on a scale of 1-5, you deserve a 10! Thank you so much again!

Rich Leaver
Leaver Land Surveying, LLC
Wisconsin, USA

X-PAD Ultimate Survey

Software that thinks like a surveyor

Perfect For:

- Land surveyors
- Topographic surveyors
- Civil engineers
- Project surveyors
- Survey managers
- Survey engineers

X-PAD Ultimate is our easy-to-use, reliable field software for total stations, GNSS, locators and levels. It comes in three different versions: X-PAD Ultimate Survey and X-PAD Ultimate Build, X-PAD Ultimate GO.

X-PAD Ultimate Survey is specifically designed for professional surveyors. Built to run on Android devices, it delivers all the tools you need right on your data collector, tablet or phone. With the familiarity of the Android interface and the intuitive workflow of X-PAD, you will be functioning at high efficiency in no time, with very little training required.

> *X-PAD is efficient, accurate, reliable, and logical software. It thinks like a surveyor. I would absolutely recommend X-PAD to others.*

Matt Filus
Land Surveyor &
Certified Floodplain Manager
The Excelsior Group
Wisconsin, USA

Selecting a saved job in X-PAD

TPS point stakeout

A variety of localisation options makes it easy to integrate your data with multiple map types and switch background coordinate systems with no effort.

Capture data in the field and transfer it to the office in real time with X-PAD Ultimate Survey's cloud enabled features.

X-PAD Ultimate Survey

Software that improves productivity

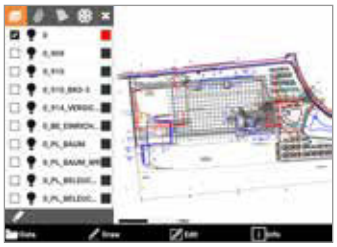
X-PAD has probably increased productivity by 15-20%, just because of how much easier it is to use. I'm not jumping from different sections of the software to different sections to do certain things. Everything is always just right there.

Kevin Reinhart
Party Chief, Baseline Surveying
South Dakota, USA

X-PAD Ultimate Survey has the right features and intuitive workflows to meet the demands of any job. Get started with our main modules, then add any one or more of our additional options to customise our solutions to meet your needs.

Main modules: GNSS, Manual TPS, Premium, Super Premium

Additional modules: Robotic TPS, Volume, Bathymetry, Road, X-POLE, GIS, Locator, Build Extension



CAD drawing

TPS Survey

TPS BIM Check

Bathymetry module

GIS data

Scan to learn more about
X-PAD Ultimate Survey

X-PAD Ultimate Build

A simple solution for construction crews

Perfect For:

- General Contractors
- Hardscape Foremen
- Superintendents
- Building Operator
- Construction Site Civil Engineers
- Concrete Subcontractors
- Home Builders

Discover X-PAD Ultimate Build, the ideal, user-friendly field software for your construction measuring and layout needs. It combines data from total stations or GNSS receivers, allowing you to perform measurements, stakeout and as-built with simple and functional procedures. The different mode of the TPS as a reference axis, intersection of two axes and batter boards, make it possible to proceed with tracking operations even in difficult conditions and with few reference points.

TPS Stakeout in X-PAD Build

The GeoMax software training was very good. The user-friendly software means you can't really go wrong. I think anyone can learn how to use the software.

Thomas Kamlage
Kamlage Excavation
Senden, Germany

X-PAD Ultimate Build ensures productivity in the field and provides perfect integration, even with data from different measuring instruments. Start your set-up with the main modules and add options to customise our solutions to your needs.

Main modules: GNSS, Manual TPS, Premium

Additional modules: Robotic TPS, Volume, X-POLE, GIS

Scan to learn more about
X-PAD Ultimate Build

X-PAD Ultimate GO

Simple and flexible field software

Bonus Tip

Combined with our Zoom10 manual total station, you get a user friendly and cost-effective package for the best price-to-performance ratio.

*X-PAD GO is currently only available in some countries.

X-PAD Ultimate GO is the solution for those who need a simple and flexible field software to be used in all surveying and tracking applications with GNSS receivers and total stations.

Run surveys and stakeouts, add points, use lines and arcs while surveying.

X-PAD Ultimate GO includes several COGO features that help determine new points or execute various calculations.

It also provides the Reference Line procedure, giving you more information related to your position with respect to an element chosen as a reference (line, arc, drawing element).

Open and import any file, even from the cloud. Thanks to X-PAD Ultimate GO, you can save your data on X-PAD 365 and other popular cloud platforms like Google Drive, Microsoft OneDrive and Dropbox. It is easy to get access to your data from the field or from your office.

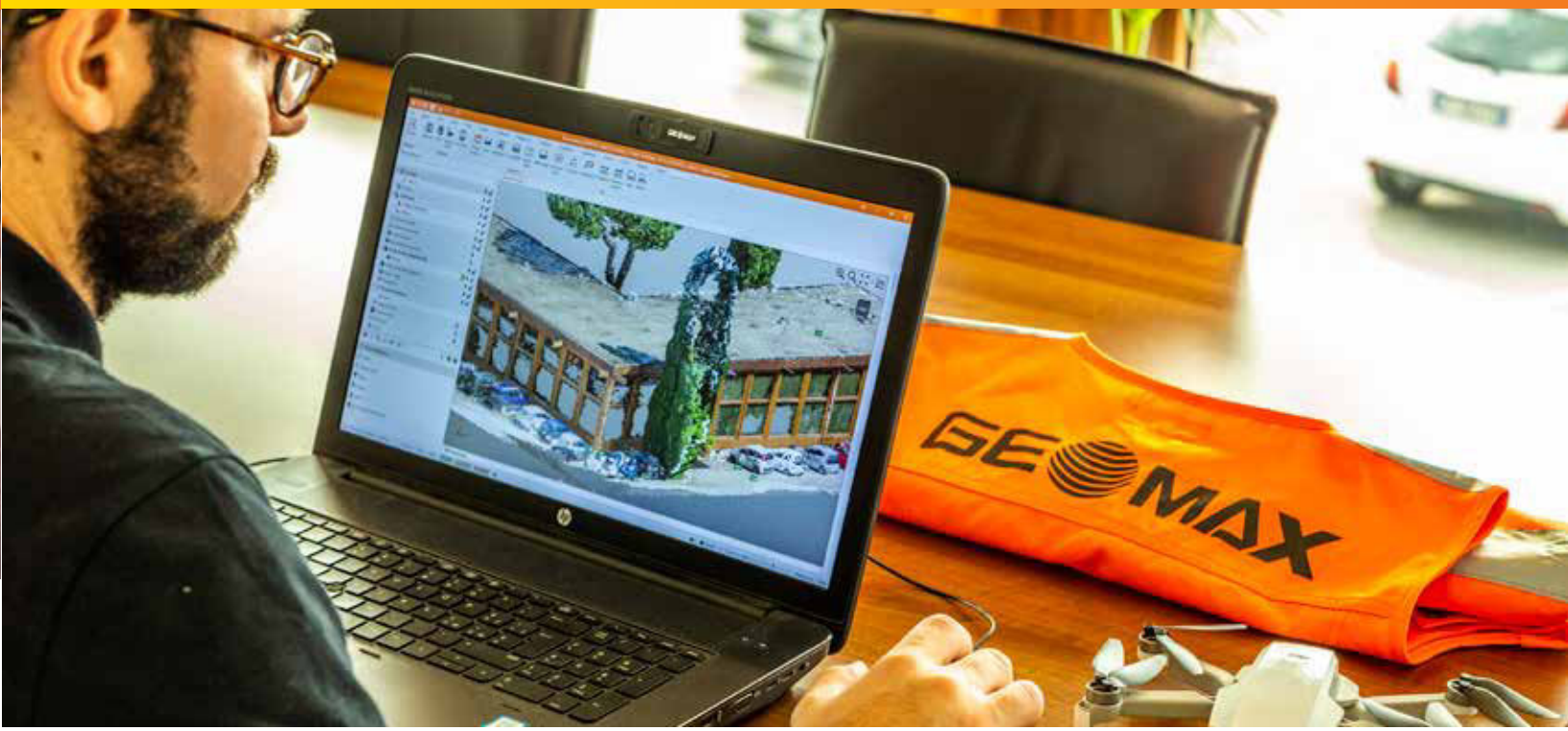
Scan to learn more about
X-PAD Ultimate Go

Working with the Zoom10 and the X-PAD Ultimate GO software, we can customise layers, blocks, lines and various geometries in our field surveys. After finishing the data collection, we export our DWG survey directly from our smartphone to the computer via the internet. Leaving the field, the survey is already fully organized. We only have to add our footer and subtitles for the final delivery.

Bruno Krenski
Surveyor and Entrepreneur
Brasil

X-PAD Fusion

All your geospatial data in one place



X-PAD Fusion is the GeoMax desktop software integrating geospatial data from TPS, GNSS, scanners and other sensors in a single environment.

Different from other software in the market, X-PAD Fusion offers customers a single solution that manages measurements, coordinates, drawings, point clouds and other types of data in ONE platform in a simple and intuitive way.

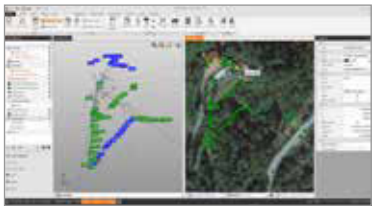
Available modules

X-TOPO: Topographic Module, GNSS Post Processing, X-SCAN: Point Clouds Module, X-PHOTO: Image Processing Module (aerial and ground images), BIM Connect Module

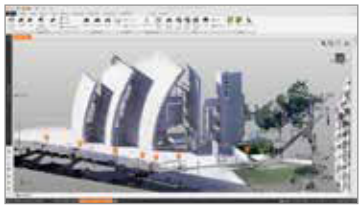
We help you get started immediately with our interactive tutorials that guide you through the whole workflow to create even more ease of use.

By far, X-PAD is head and shoulders above everyone else right now.

Christian Medders
Owner and Surveyor
Medders Surveying
Tennessee, USA



Topographic Survey Points

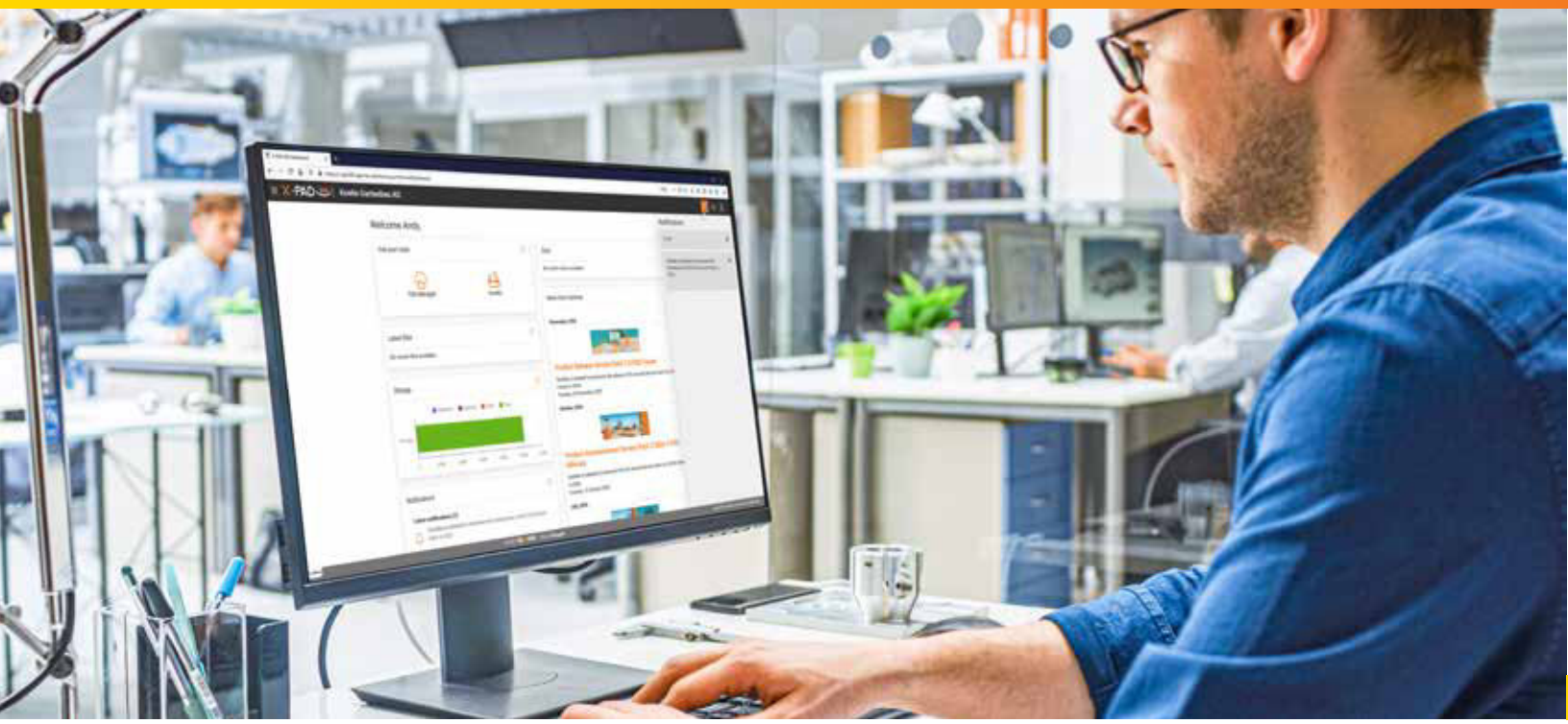


Point Clouds

Scan to learn more about
X-PAD Fusion

X-PAD 365

One platform, endless services



X-PAD 365 is the versatile, web-based platform by GeoMax, designed to improve data storage, asset management and communication for surveyors, construction professionals and equipment distributors.

Be more productive with X-PAD 365's industry-leading tools, including:

- **File Manager** – store, share, edit and access data anytime and anywhere
- **X-CHAT** – share project details and files and make informed decisions with your team in real-time
- **Secure Backups** – save and restore data automatically or manually
- **Asset Management** – register your equipment and receive automatic notifications for product updates, software releases, firmware updates, warranty renewals and more
- **Collaborative Survey and Stakeout** – work on the same project with multiple people, in real-time, to finish jobs faster and more efficiently
- **GeoMax Academy** – access our library of training materials, webinars and support documents all in one place

Back up and restore files in X-PAD 365

X-PAD 365 personalised dashboard

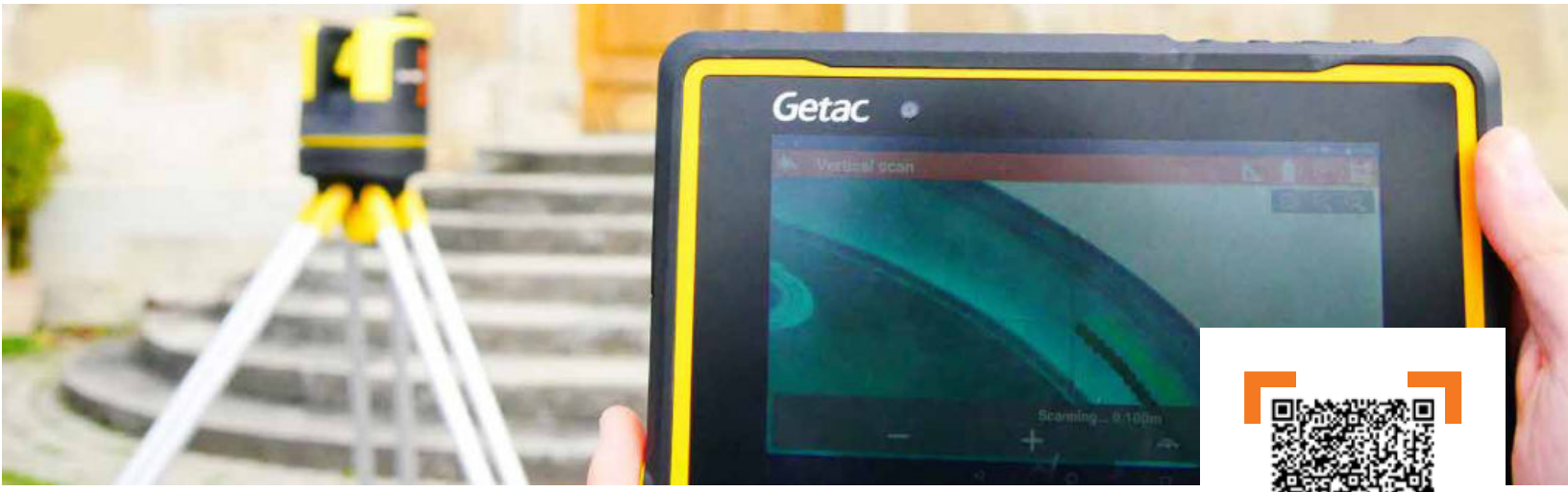
> *The platform, the versatility, the functionality of X-PAD is far superior than any other software we have used in the past.*

William Shepherd
Director of Planning & Surveying
Grant Shepherd & Associates
Georgia, USA

Scan to learn more about **X-PAD 365**

X-PAD MasterPlan

3D measuring system for indoor and outoor applications



X-PAD MasterPlan is a dedicated software for the GeoMax 3D Measuring system for indoor and outdoor applications. Unlike other offerings in the market, the GeoMax X-PAD MasterPlan is a smart, straightforward measuring and layout software that creates the plan in the field on your android device.

Scan to learn more about
X-PAD MasterPlan

X-PAD CalMaster

The Master of Calibration

Perfect For:

- Civil Engineers
- Architects
- Dealers
- Laser Calibration Experts

X-PAD CalMaster is an easy-to-use checking and calibration system for construction lasers. Measurement tools are subject to all types of environments including harsh conditions. X-PAD CalMaster ensures your lasers are ready for the toughest jobs at any time.

Scan to learn more about
X-PAD CalMaster

X-PAD Use Cases

Matching your role with the right software

Type of Work	Version(s) of X-PAD	Equipment to use with X-PAD
Concrete/Masonry	X-PAD Ultimate Survey/Build/GO X-PAD 365	Robotic/Manual total station; GNSS antenna
Excavation & Earthwork	X-PAD Ultimate Survey/Build/GO X-PAD Fusion X-PAD 365	Full range of GeoMax instruments
Roads/Highways	X-PAD Ultimate Survey X-PAD 365	Robotic total station; GNSS antenna
Layout & Foundation	X-PAD Ultimate Survey/Build/GO X-PAD 365	Robotic/Manual total station; GNSS antenna
MEP Networks	X-PAD Ultimate Survey/Build X-PAD 365	GNSS or Robotic total station
Drilling & Boring	X-PAD Ultimate Survey X-PAD 365	GNSS antenna
Building Structures	X-PAD Ultimate Survey/Build X-PAD Fusion X-PAD 365	Robotic/Manual total station
Boundary Survey	X-PAD Ultimate Survey X-PAD 365	Robotic/Manual total station; GNSS antenna
Drone Survey	X-PAD Ultimate Survey X-PAD Fusion X-PAD 365	GNSS antenna
Topographic Survey	X-PAD Ultimate Survey X-PAD 365	Robotic/Manual total station; GNSS antenna
Topographic Survey With Object's Attributes	X-PAD Ultimate Survey X-PAD 365	Robotic/Manual total station; GNSS antenna + GIS module
Land Survey	X-PAD Ultimate Survey X-PAD 365	Robotic/Manual total station; GNSS antenna
As-Built Verification	X-PAD Ultimate Survey/Build X-PAD 365	Robotic total station

Experience the full lineup

Add more value with our integrated hardware solutions

GeoMax offers more than just industry-leading software

We deliver an entire portfolio of construction and surveying solutions, designed to meet your daily needs. Level-up your productivity by making the X-PAD Software Suite just a portion of your full GeoMax solution portfolio.

Transform your next project plans into reality using GeoMax equipment for levelling, grading, layout, concrete work, as-built and more.

If you are a surveyor, our high-quality instruments can deliver the results you need for topographic surveys, boundary surveys, site planning, road work and a lot more.

Take a closer look at any, or all, of the products in our full lineup and discover how they will make a difference on your next job, today.

GEOMAX

GeoMax additional offerings

Providing more for your success

Equipment Accessories

GeoMax offers interchangeable accessories to accommodate your unique job requirements. Ask about available packages.

Hexagon - Guaranteed reliability

Hexagon is known for driving innovation and technological progress. As part of this group, GeoMax can guarantee its solutions work when you do.

Total Care SHIELD

Worldwide GeoMax technical & training services

The GeoMax global support team is located around the world - support is available 24 hours a day. With the Total Care Shield Warranty, GeoMax helps you keep your costs under control and reduce the downtime of your GeoMax instruments to a minimum.

GeoMax service centers are at your disposal worldwide.

https://geomax-positioning.com/contact-us/find-a-distributor

GeoMax Academy offers regular technical online webinars. Watch them on demand:

https://geomax-positioning.com/services-and-support/webinars

GEOMAX Authorised Distribution Partner

09/22 en

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Illustrations, descriptions and technical specifications are not binding and may change.

ANNEXURE II

(Technical Log Sheets)

NISVO

NISVO MARINE SURVEYS

BATHYMETRY - ECHOSOUNDER CALIBRATION

Date : 18/10/2024

Project : Bathymetry and Topography survey in Salal dam

Project Code : 20241O-0546

Client Name : NHPC

Surveyor Name : MR. Anto

Survey Location : Salal dam

Echo-sounder : Hydro bar

Low Frequency : 33 KHZ

High Frequence : 210 KHZ

Draft : 0.55

SV : —

Bar Depth (m)	Observed (m)				Bar Depth (m)	Observed (m)			
	Downward		Upward			Downward		Upward	
	Measured Depth	Index	Measured Depth	Index		Measured Depth	Index	Measured Depth	Index
1					8				
2	1.99				9				
3	3.00				10				
4	4.01				11				
5	5.00				12				
6					13				
7					14				

Final Index	

SIGNED & CERTIFIED BY

Surveyor	Contractor	Client Representative
Y. Anto		

NISVO

NISVO MARINE SURVEYS

BATHYMETRY - ECHOSOUNDER CALIBRATION

Date : 19/10/2024

Project : Bathymetry and Topography Survey in Subsi dam

Project Code : 2024-10-036

Client Name : NHPC

Surveyor Name : MR. Anto

Survey Location : Subsi dam

Echo-sounder : Hydrotech

Low Frequency : 33 KHz

High Frequence : 210 KHz

Draft : 0.59

SV : -

Bar Depth (m)	Observed (m)					Bar Depth (m)	Observed (m)			
	Downward		Upward				Downward		Upward	
	Measured Depth	Index	Measured Depth	Index			Measured Depth	Index	Measured Depth	Index
1						8				
2	2.00					9				
3	3.01					10				
4	4.00					11				
5	5.00					12				
6						13				
7						14				

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Surveyor	Contractor	Client Representative
M. Anto		

NISVO MARINE SURVEYS

BATHYMETRY - ECHOSOUNDER CALIBRATION

Date : 25/10/2024

Project : Bathymetry and topography Survey in Sahal dam

Project Code :

Client Name : NHPC

Surveyor Name : MR. ANIO

Survey Location : Sahal dam

Echo-sounder : Hydrobox

Low Frequency : 33 KHz

High Frequence : 210 KHz

Draft : 0.52

SV : —

Bar Depth (m)	Observed (m)				Bar Depth (m)	Observed (m)			
	Downward		Upward			Downward		Upward	
	Measured Depth	Index	Measured Depth	Index		Measured Depth	Index	Measured Depth	Index
1					8				
2	2.01				9				
3	3.00				10				
4	3.99				11				
5	5.00				12				
6					13				
7					14				

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Surveyor	Contractor	Client Representative

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NISVO MARINE SURVEYS

BATHYMETRY - ECHOSOUNDER CALIBRATION

Date : 27/10/2024

Project : Bathymetry and topography survey in Solai dam

Project Code : 2024-10-0346

Client Name : NHPC

Surveyor Name : MR. Anto

Survey Location : Solai dam

Echo-sounder : Hydrobox

Low Frequency : 33 KHZ

High Frequence : 210 KHZ

Draft : 0.3

SV : -

Bar Depth (m)	Observed (m)					Bar Depth (m)	Observed (m)			
	Downward		Upward				Downward		Upward	
	Measured Depth	Index	Measured Depth	Index			Measured Depth	Index	Measured Depth	Index
1						8				
2	2.01					9				
3	2.99					10				
4	4.01					11				
5	5.00					12				
6						13				
7						14				

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Surveyor	Contractor	Client Representative
My. Anto		

NISVO MARINE SURVEYS

BATHYMETRY - ECHOSOUNDER CALIBRATION

Date : 26/10/2024

Project : Bathymetry and Topographic Survey in Salal dam

Project Code : 202410-0346

Client Name : NHPC

Surveyor Name : MR. Anto

Survey Location : Salal dam

Echo-sounder : Hydro60x

Low Frequency : 33 kHz

High Frequence : 210 kHz

Draft : 0.3

SV : —

Bar Depth (m)	Observed (m)					Bar Depth (m)	Observed (m)			
	Downward		Upward				Downward		Upward	
	Measured Depth	Index	Measured Depth	Index			Measured Depth	Index	Measured Depth	Index
1						8				
2	2.00					9				
3	3.01					10				
4	3.99					11				
5	5.00					12				
6						13				
7						14				

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Surveyor	Contractor	Client Representative
Y. Anto		

NISVO MARINE SURVEYS

BATHYMETRY - ECHOSOUNDER CALIBRATION

Date	: 30/10/2024	**Echo-sounder**	: Hydrobox
Project	: Bathymetry and Topography Surveys in Salal dam	**Low Frequency**	: 33 KHz
Project Code	: 202410-0346	**High Frequence**	: 210 KHz
Client Name	: NHPC	**Draft**	: 0.3
Surveyor Name	: MR. Anto	**SV**	: -
Survey Location	: Salal dam		

Bar Depth (m)	Observed (m)					Bar Depth (m)	Observed (m)			
	Downward		Upward				Downward		Upward	
	Measured Depth	Index	Measured Depth	Index			Measured Depth	Index	Measured Depth	Index
1						8				
2	1.99					9				
3	2.01					10				
4	3.99					11				
5	5.01					12				
6						13				
7						14				

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Surveyor	Contractor	Client Representative
Y. Anto		

NISVO

NISVO MARINE SURVEYS

BATHYMETRY - ECHOSOUNDER CALIBRATION

Date	: 1/11/2024	**Echo-sounder**	: Hydrobox
Project	: Bathymetry and topographic survey Salal dam	**Low Frequency**	: 33 KHz
Project Code	: 202410-0346	**High Frequence**	: 210 KHz
Client Name	: NHPC	**Draft**	: 0-3
Surveyor Name	: MR. ANTO	**SV**	: —
Survey Location	: Salal dam		

Bar Depth (m)	Observed (m)				Bar Depth (m)	Observed (m)			
	Downward		Upward			Downward		Upward	
	Measured Depth	Index	Measured Depth	Index		Measured Depth	Index	Measured Depth	Index
1					8				
2	2.00				9				
3	3.01				10				
4	4.00				11				
5	5.00				12				
6					13				
7					14				

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Surveyor	Contractor	Client Representative
Y. Anto		

NISVO

NISVO MARINE SURVEYS

BATHYMETRY - ECHOSOUNDER CALIBRATION

Date : 02/11/2024

Project : Bathymetric and Topographic Surveys in Salal dam

Project Code : 202410-0346

Client Name : NHPC

Surveyor Name : MR. Anto

Survey Location : Salal dam

Echo-sounder : Hydrobox

Low Frequency : 33 KHz

High Frequence : 210 KHz

Draft : 0.3

SV : -

Bar Depth (m)	Observed (m)				Bar Depth (m)	Observed (m)			
	Downward		Upward			Downward		Upward	
	Measured Depth	Index	Measured Depth	Index		Measured Depth	Index	Measured Depth	Index
1					8				
2	1.99				9				
3	3.00				10				
4	4.00				11				
5	5.01				12				
6					13				
7					14				

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Surveyor	Contractor	Client Representative
M. Anto		