

**CQA CONSTRUCTION VALIDATION
REPORT**

**FOR THE CONSTRUCTION OF PHASE 4 OF THE SNRHW CELL
at
TRECATTI LANDFILL SITE**



**Prepared for
BIFFA WASTE MANAGEMENT SERVICES LIMITED**



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**Project Quality Assurance
Information Sheet**

***CQA Validation Report for the Construction of Phase 4 of the SNRHW cell at
TRECATTI LANDFILL SITE***

***CQA Report
Reference*** : BF4858/07/04 Revision 1

Report Status : For Approval

Report Date : February 2016
Revision 1 May
2016

Prepared for : Biffa Waste Services Limited
Trecatti Landfill Site
Fochriw Road
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**TRECATTI LANDFILL SITE
CONSTRUCTION OF PHASE 4 OF THE SNRHW CELL
CQA VALIDATION REPORT**

1. INTRODUCTION

1.1 Biffa Waste Services Limited have constructed the fourth phase of a Stable Non-reactive Hazardous Waste (SNRHW) Cell at Trecatti Landfill Site.

1.2 The construction works were carried out in general accordance with the Construction and Operational Management Plan (Reference: **BF4858/01 Rev 1**) dated February 2015 prepared by Stratus Environmental Limited (Stratus).

A variation permit for the site (**EPR/RP3733PC**), incorporating the changes required for the operation of the SNRHW cell, was issued by Natural Resources Wales (NRW) on the 27th February 2015.

After the submission of the validation reports for the first two phases of works, NRW issued additional requirements for subsequent validation reports in an e-mail to the Biffa site manager, Simon Milford, dated 5th May 2015. The additional requirements were as follows:

- a pro-forma including a written background to the separation bund requirement indicating that it is not a conventional landfill engineering CQA Validation report;
- each report is to be accompanied by a topographic survey including the footprint of the starter lift, clearer labelling and point level data and a scaled section through the bund to include all previous lifts as well as the waste levels and profiles on both sides of the bund;
- the separation bund material type is identified for future reference; and
- Inclinator readings before and after each lift should also be reported in future CQA Validation reports

The pro-formas are presented in **Appendix B** to this report.

1.3 The Principal Contractor was J Davies, who undertook the construction work from July to November 2015. Inclinator meters were installed by SLR Consulting in January 2016

1.4 The construction works incorporated the following elements:

- (i) Placement of suitable material to construct the SNRHW cell separation bund;
- (ii) Installation of three inclinator meters within the bund;

1.7 Following on from the reports for the construction of Phases 1, 2 and 3 of the separation bund, this report details the works undertaken to add additional sections of the SNRHW cell separation bund as follows:

1. 50m and 22m sections of the second lift added in the west and east of the cell; and
2. A 107m long section of the third lift added in the centre of the cell.

The two sections of the second lift were added in stages during august and September 2015 as a 'mass fill' on order to allow construction of a longer section of bund for the third lift.

The extent of the Lift 2 construction areas is indicated on **Drawing BF4858/7/06** included in **Appendix A**. The extent of the Lift 3 construction is indicated on **Drawing BF4858/7/07** in **Appendix A**.

Cross sections showing the stages of filling and surveying of the Lift 2 and 3 construction are presented on **Drawing BF4858/7/08** to **Drawing BF4858/7/12** in **Appendix A**.

The location of the inclinometers and the final survey are indicated on **Drawing BF4858/7/13** included in **Appendix A**.

1.9 This CQA Validation Report represents a record of the works undertaken for the construction of the fourth phase of the construction of the SNRHW cell separation bund at Trecatti.

2. THE SITE

- 2.1 Trecatti Landfill Site is located around 3km east of Merthyr Tydfil. The site address is:

Trecatti Landfill Site
Fochriw Road
Merthyr Tydfil
CF48 4AB

3. SIDEWALL PROTECTION LAYER

- 3.1 The 300mm protection layer placed against the existing sidewall lining system has been progressively placed and supervised by Biffa throughout tipping works in the SNRHW cell.

4. SURFACE WATER DRAINAGE

4.1 General

- 4.1.1 No amendments or additions to the surface water control side-riser have been undertaken by Biffa during these works.

5. CONSTRUCTION OF THE SNRHW CELL SEPARATION BUND

5.1 Cell Separation Bund Construction

- 5.1.1 The construction of the separation bund was undertaken by placing suitable material in a progressive manner. The material used is the same material source which has been used for previous bund phases and was previously classified in accordance with the Specification for Highway Works; as Class 2B – dry cohesive material.
- 5.1.2 The width of the crest of the separation bund was measured by the surveyors who undertook the setting out and post construction surveys of the bund phases.
- 5.1.3 The separation bund was not constructed to its full extent. The remaining sections of the separation bund will be constructed as required dictated by waste inputs.

6. INCLINOMETER INSTALLATION AND MONITORING

6.1 Installation

6.1.1 All three proposed inclinometers were installed in January 2016 by SLR Consulting. The details of installation are contained in the installation report by SLR which is presented in **Appendix C**. The inclinometers were installed into Lift 3 of the bund. The locations and levels of the inclinometers are indicated on **Drawings BF4858/7/6 Rev 1, BF4858/7/7 Rev 1, BF4858/7/13 and BF4858/7/14**.

6.1.2 Selected photographs of the installed inclinometers are presented in **Appendix D**. As-built details for the inclinometers are presented in the **Table 1** below.

Table 1: Summary of Inclinometer Installation Details

Ref No.	Easting	Northing	Ground level (mAOD)	Top of pipe level (mAOD)	Length of casing installed below ground (m)*	Stick-up of casing above ground (m) #	Total Length of casing installed (m)
1	308059.724	207495.424	398.992	399.932	4.2	0.94	5.14
2	308104.571	207508.227	398.964	399.923	4.2	0.96	5.16
3	308154.449	207525.836	400.263	401.452	2.5	1.19	3.69

* From SLR Borehole Logs

From as-built survey

6.1.3 The details in **Table 1** for **Inclinometer 3** indicate that the casing was installed to 2.5m below ground level. This is in accordance with the SLR borehole log for the hole which indicates that the hole was drilled to 3.0mbgl and the casing installed to 2.5mbgl above 0.5m of collapsed arrisings. The text in the SLR report does not specifically state this detail.

6.1.4 Further to the installation report issue, SLR have confirmed that the boreholes were progressed using a machine-driven pin to the target depth and therefore no arisings were created during the process. The borehole logs have been created based on visual observations whilst on site alongside the knowledge that the lifts to present (at time of installation) were constructed of the same material from the same source.

7. TOPOGRAPHIC SURVEYS

7.1 General

7.1.1 Topographic surveys of the works were as follows:

- a Pre-construction survey was undertaken on the 24th June;
- intermediate surveys were undertaken on the 3rd of August and 17th September;
- an as-built survey of the completed third lift of the bund was undertaken on the 27th November 2015; and
- a survey of the completed bund and inclinometer locations undertaken on the 11th February 2016.

The above surveys, and all previous surveys are presented on the section **Drawings BF4858/7/08 to Drawing BF4858/7/12** included in **Appendix A**.

8. LIAISON WITH AUTHORITIES AND REPORTING

8.1 NRW have been kept informed by Biffa of the ongoing works to the bund.

8.2 A visual record of the finished bund and inclinometers has been provided by Biffa. The photographs are presented in **Appendix D**.

9. CONCLUSIONS

9.1 SIDEWALL PROTECTION LAYER – The sidewall protection layer has been placed by Biffa in accordance with existing agreed procedures.

9.2 SURFACE WATER DRAINAGE – No works undertaken during this phase.

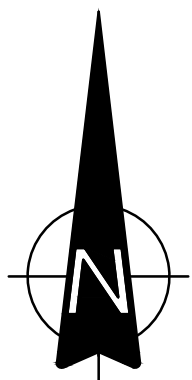
9.3 CONSTRUCTION OF SEPARATION BUND – The separation bund was installed in general accordance with the Construction and Operation Management Plan for the SNRHW cell.

9.4 INCLINOMETERS – Three inclinometers have been installed in the separation bund.

9.5 TOPOGRAPHIC SURVEY – Pre and post construction surveys have been undertaken in accordance with the Construction and Operation Management Plan for the SNRHW cell.

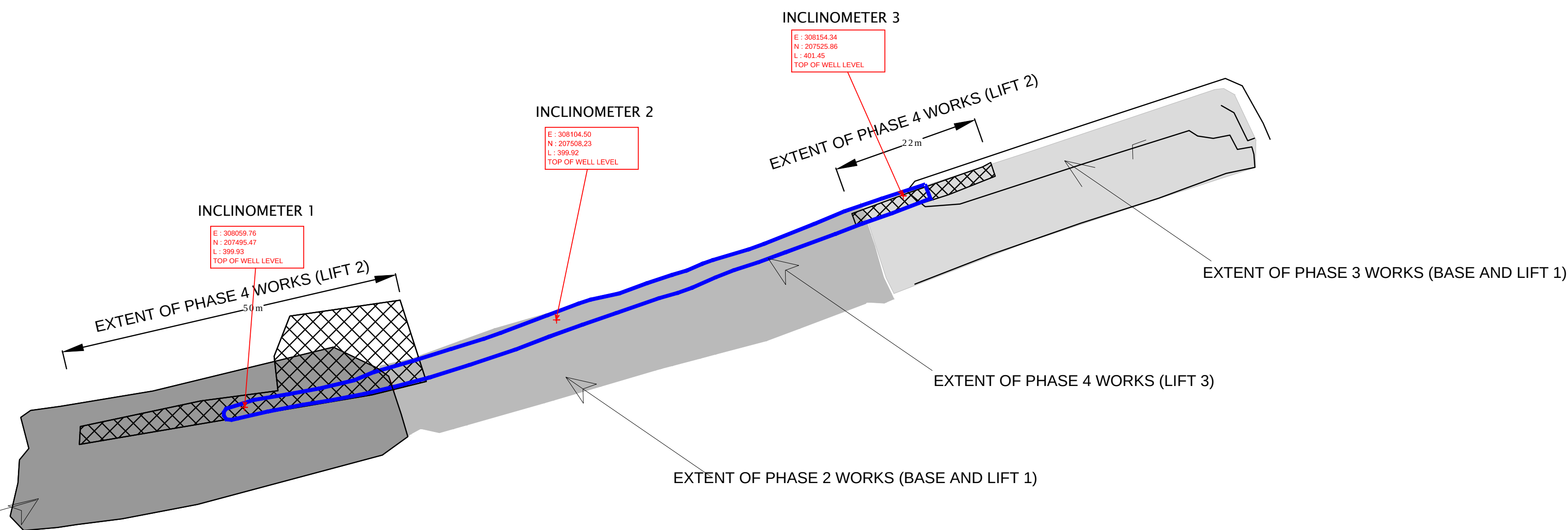
- 9.6 The construction of the fourth phase of the SNRHW cell separation bund at Trecatti Landfill Site, is complete and has been carried out by Biffa in general accordance with the Construction and Operation Management Plan (Reference: BF4858/01) and the PPC Permit for the Site.

APPENDIX A
AS-BUILT DRAWINGS

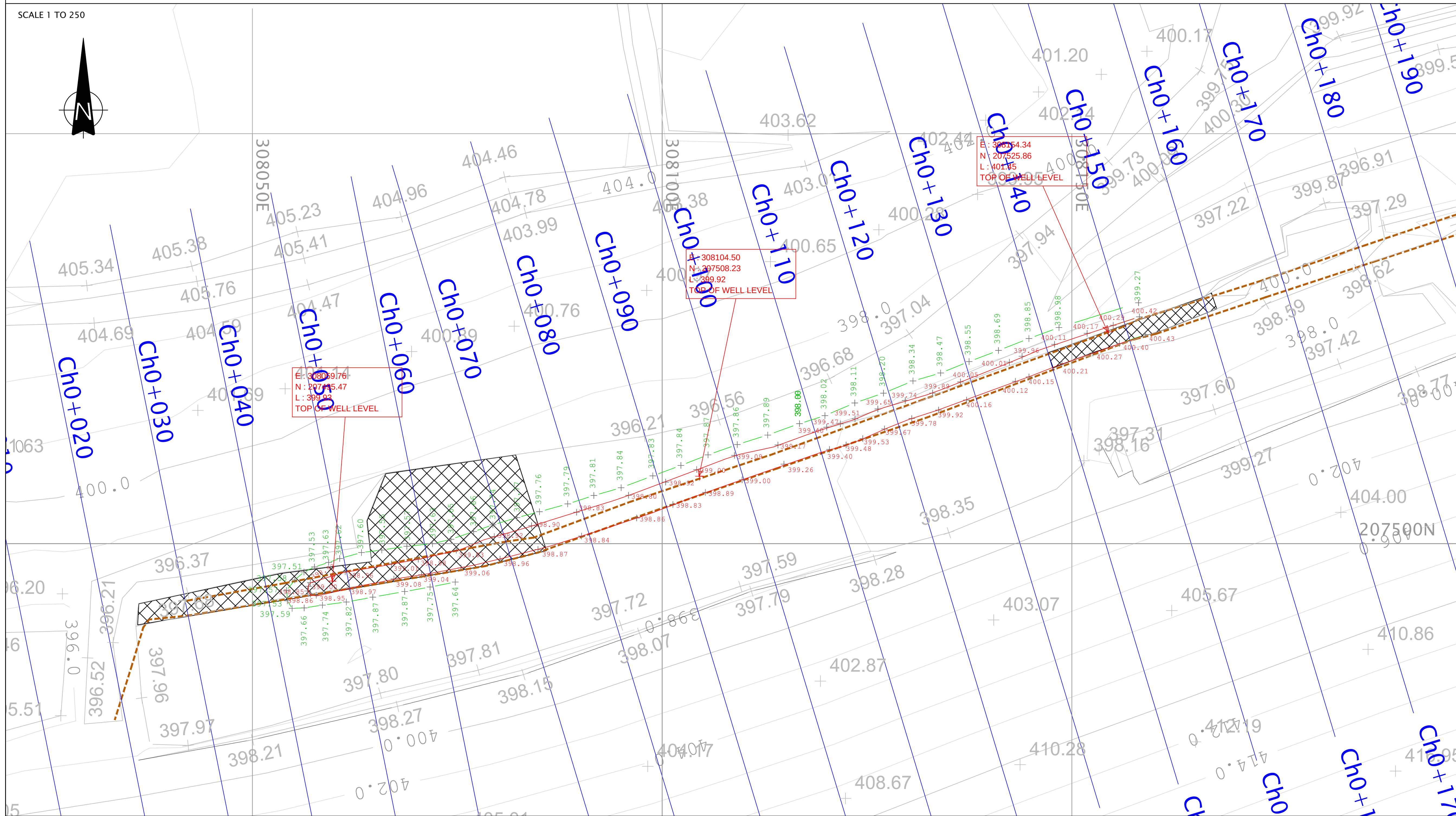
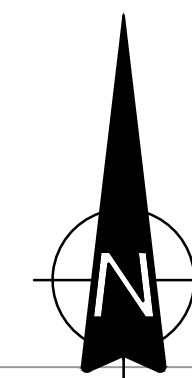


SCALE 1 TO 500

EXTENT OF PHASE 1 WORKS (BASE AND LIFT 1)



SCALE 1 TO 250



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NOTES

1. ALL LEVELS TO mAOD
2. DO NOT SCALE FROM THIS DRAWING
3. SECTIONS ARE PRESENTED ON DRAWING Nos. BF4858.7.08 TO BF4858.7.012

KEY FOR UPPER SECTION

- EXTENT OF PHASE 1 OF AS-BUILT SNRHW CELL WORKS
- EXTENT OF PHASE 2 OF AS-BUILT SNRHW CELL WORKS
- PHASE 3 AS-BUILT EXTENT OF TOP OF SEPARATION BUND CREST AND BASE
- PHASE 4 LIFT 2: AS-BUILT EXTENT OF TOP OF SEPARATION BUND CREST
- PHASE 4 LIFT 3: AS-BUILT EXTENT OF TOP OF SEPARATION BUND CREST

KEY FOR LOWER SECTION

- TOP OF ORIGINAL SEPARATION BUND CREST
- EXISTING CONTOURS
- SECTION LOCATION (SECTIONS SHOWN ON DRAWINGS BF4858.7.08 AND BF4858.7.09)
- AS-BUILT TOP OF BATTER (27.11.15)
- AS-BUILT BOTTOM OF BATTER (27.11.15)
- AS-BUILT TOP OF BATTER SPOT HEIGHT (27.11.15)
- AS-BUILT BOTTOM OF BATTER SPOT HEIGHT (27.11.15)

REV	DESCRIPTION	DATE	BY
1	ADDED LOCATION OF INCLINOMETERS	06.05.16	RW



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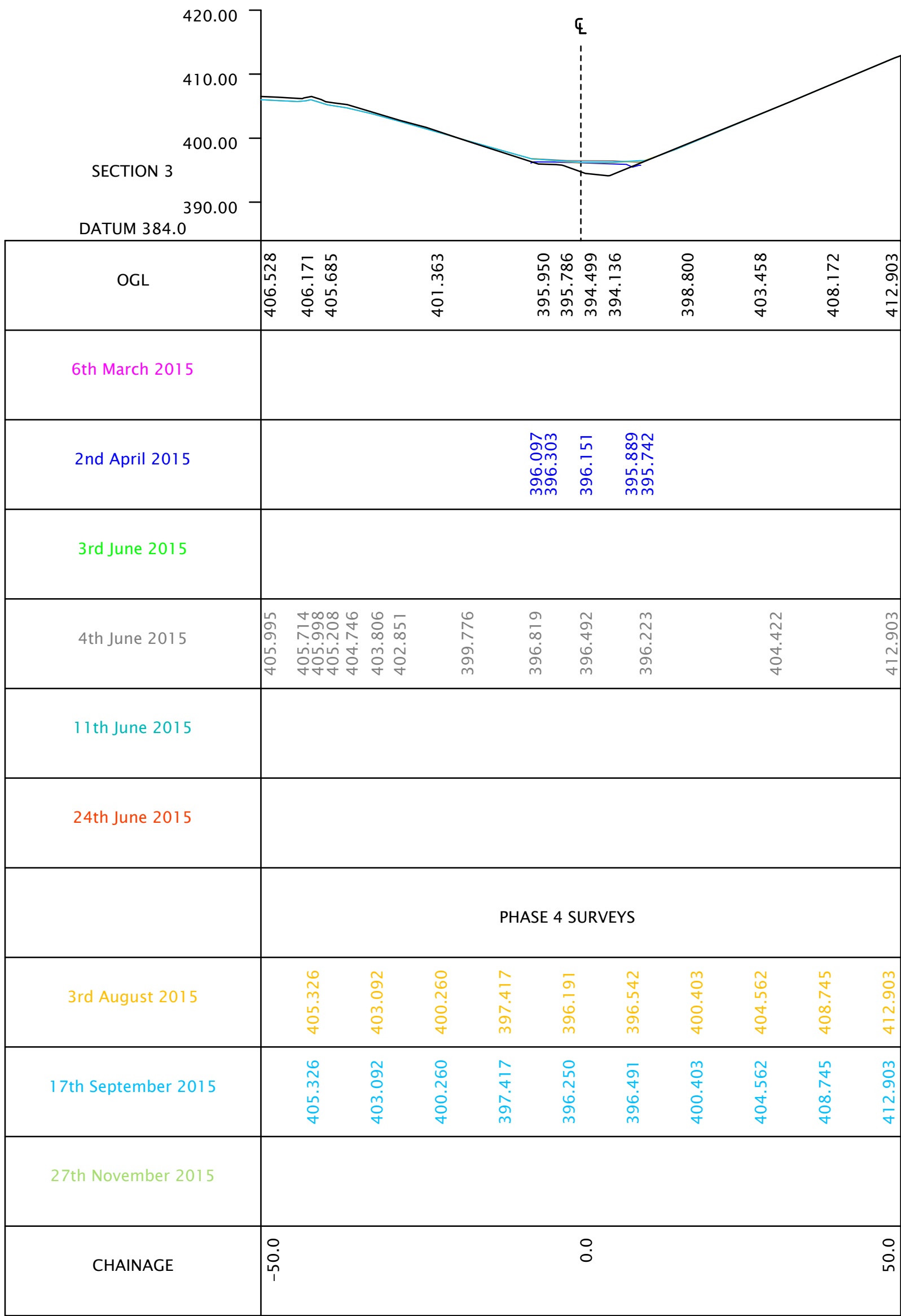
PROJECT

TRECATTI LANDFILL SITE
SNRHW CELL

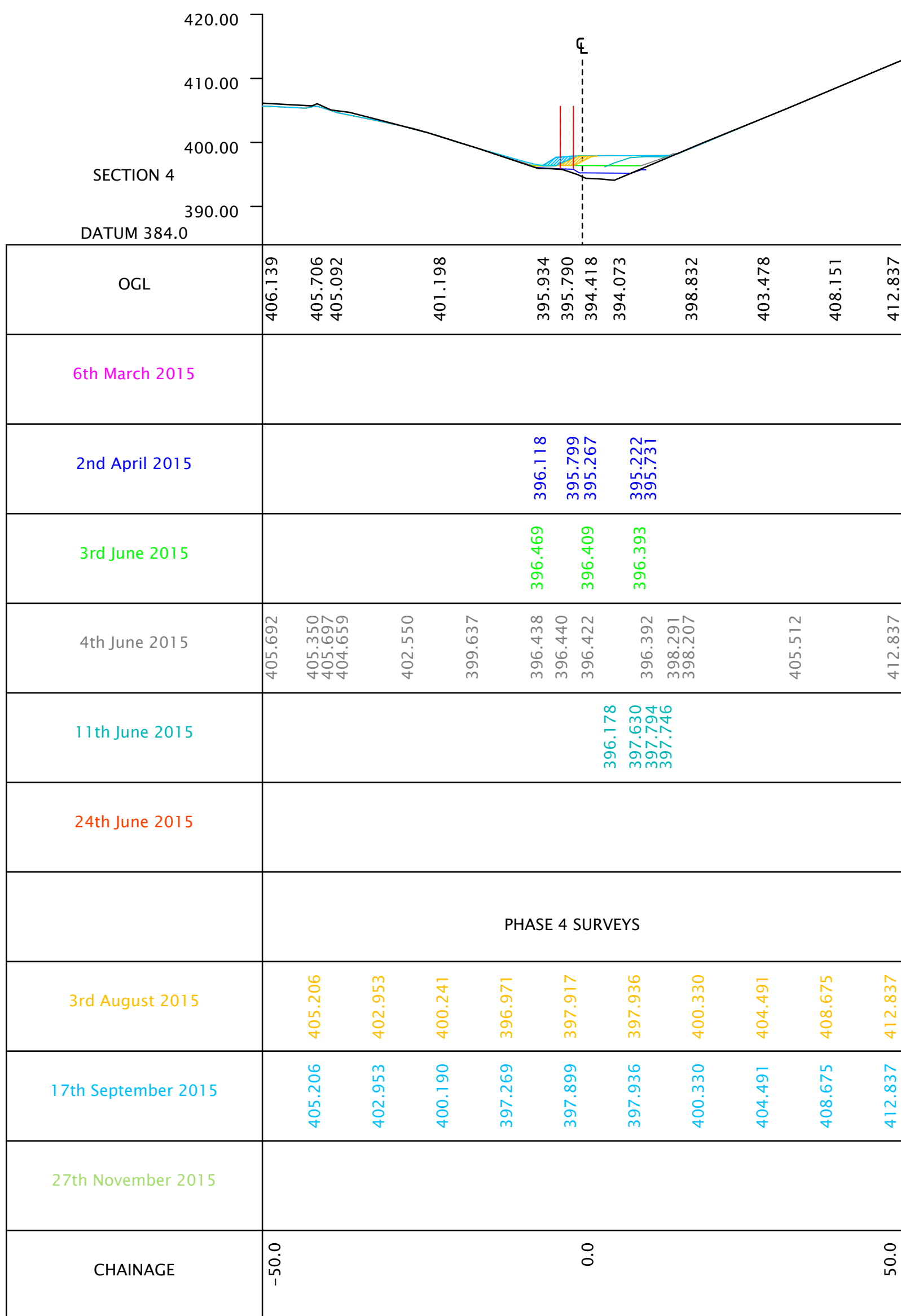
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PHASE 4 LIFT 3

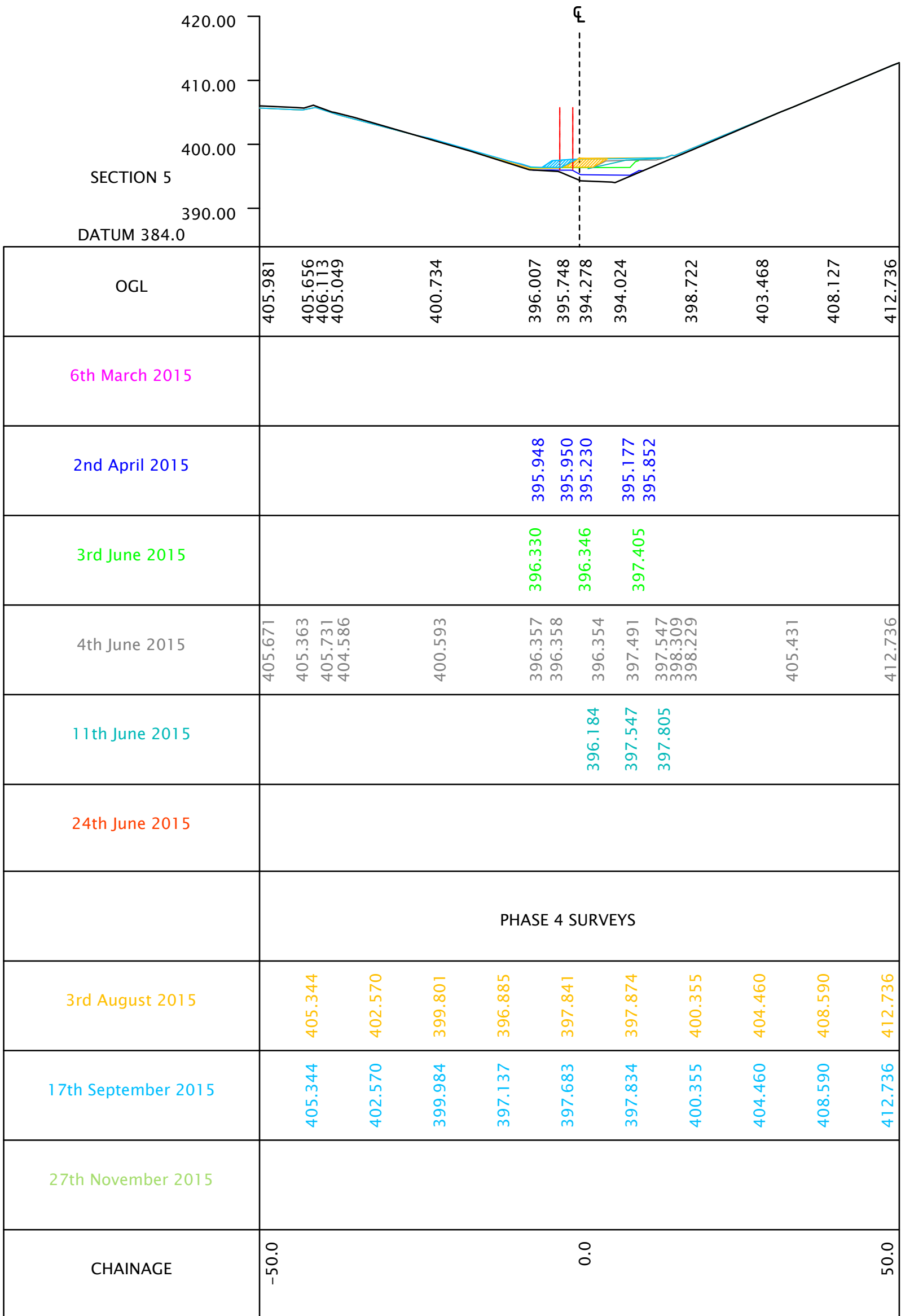
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CHAINAGE 30.0m (308042.4E 207489.8N)



CHAINAGE 40.0m (308052.2E 207491.8N)

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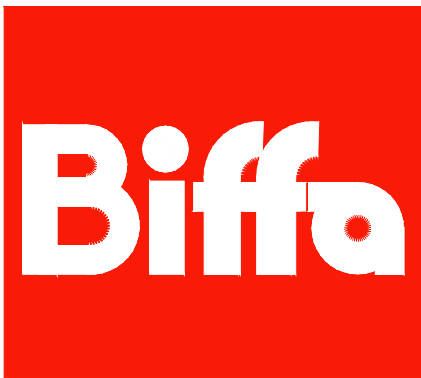
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- ||||| DENOTES SECTIONS OF FILLING FOR PHASE 4 LIFT 2 TO CREATE A PLATFORM FOR PHASE 4 LIFT 3
- ||||| DENOTES SECTIONS OF PHASE 3 FILLING

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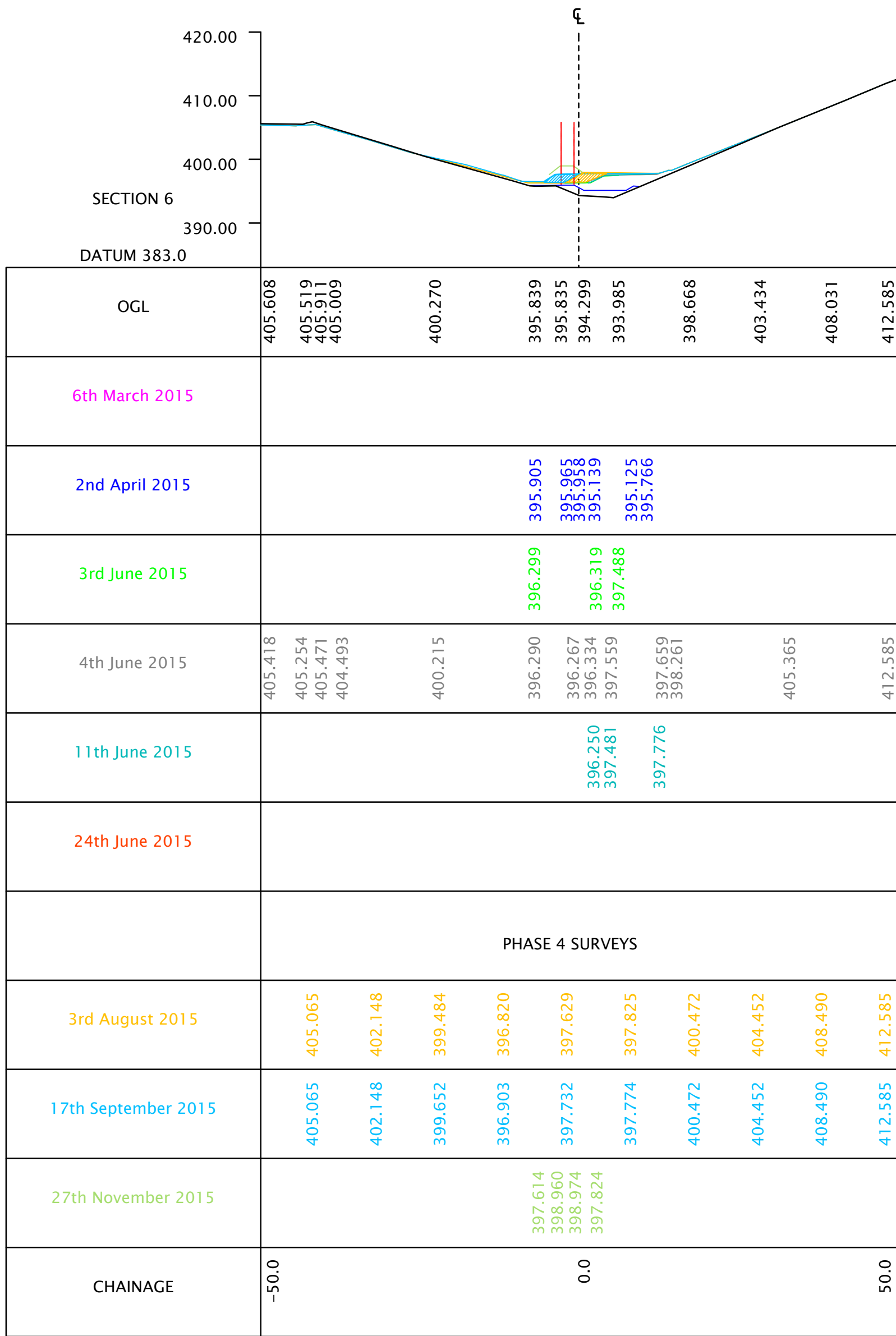
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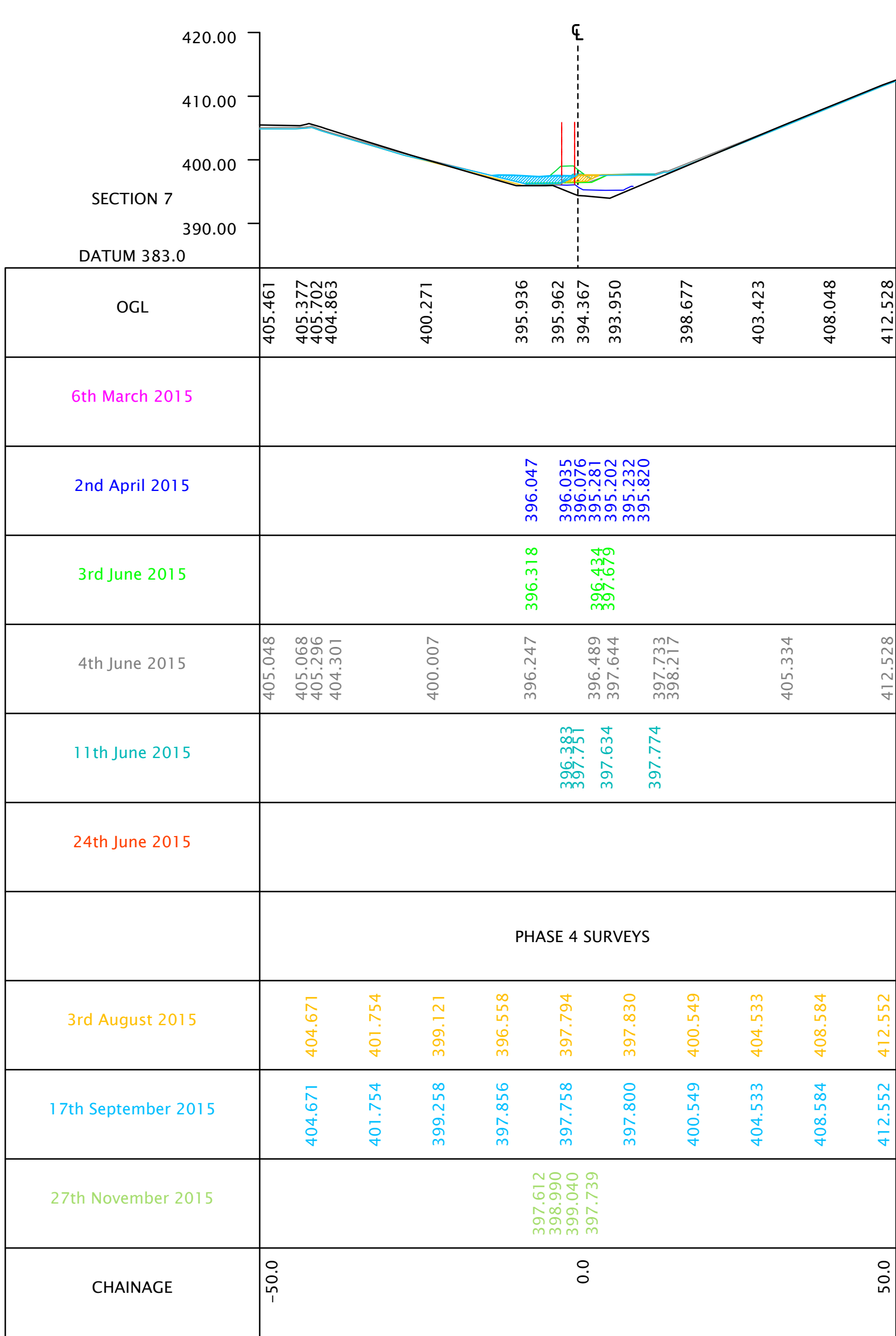
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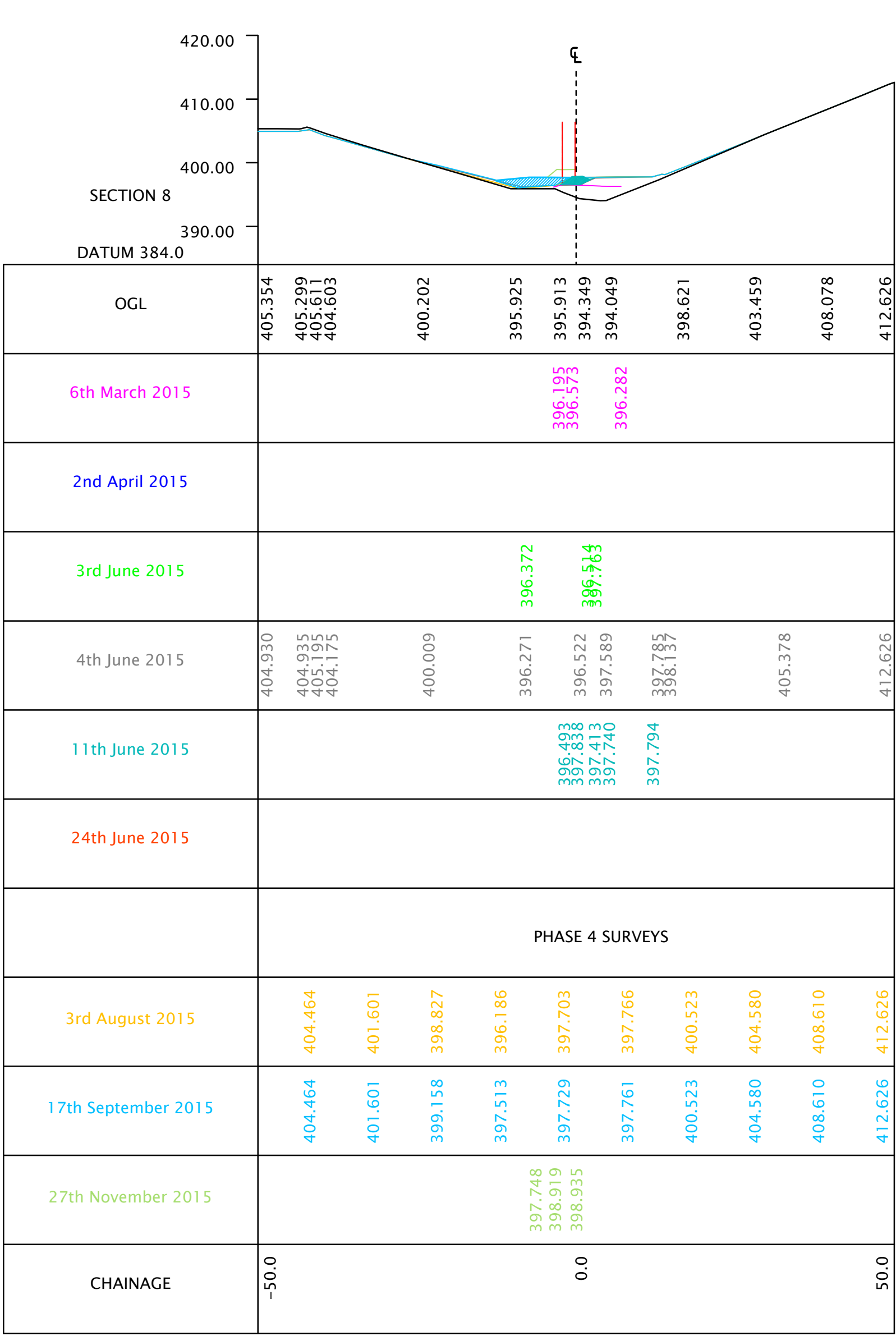
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CHAINAGE 60.0m (308071.8E 207495.7N)



CHAINAGE 70.0m (308081.5E 207498.2N)

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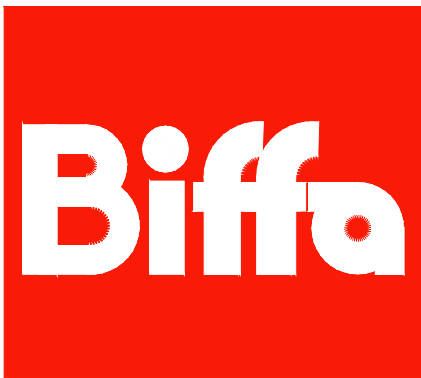
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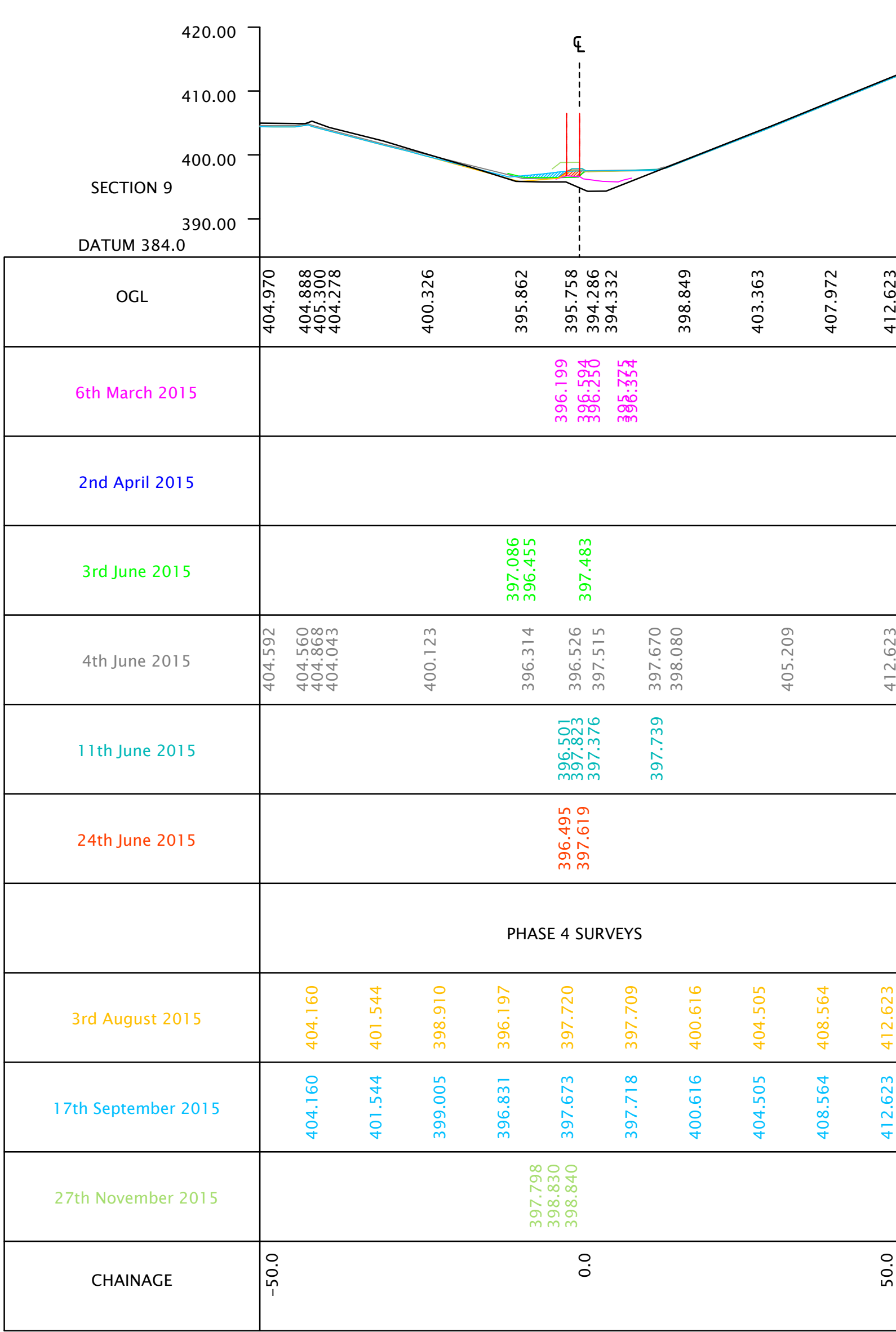
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TRECATTI LANDFILL SITE
SNRHW CELL

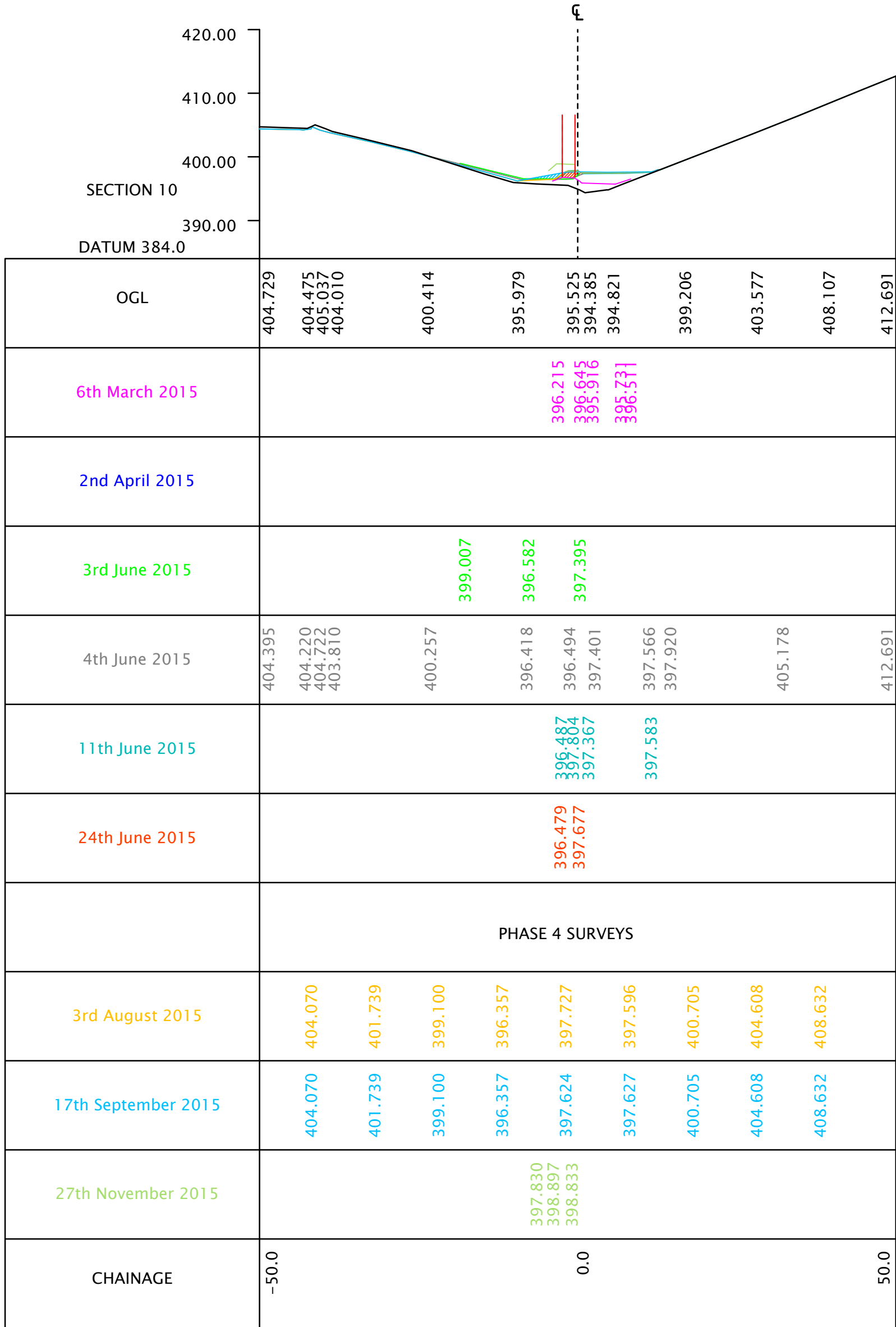
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SECTIONS PHASE 4

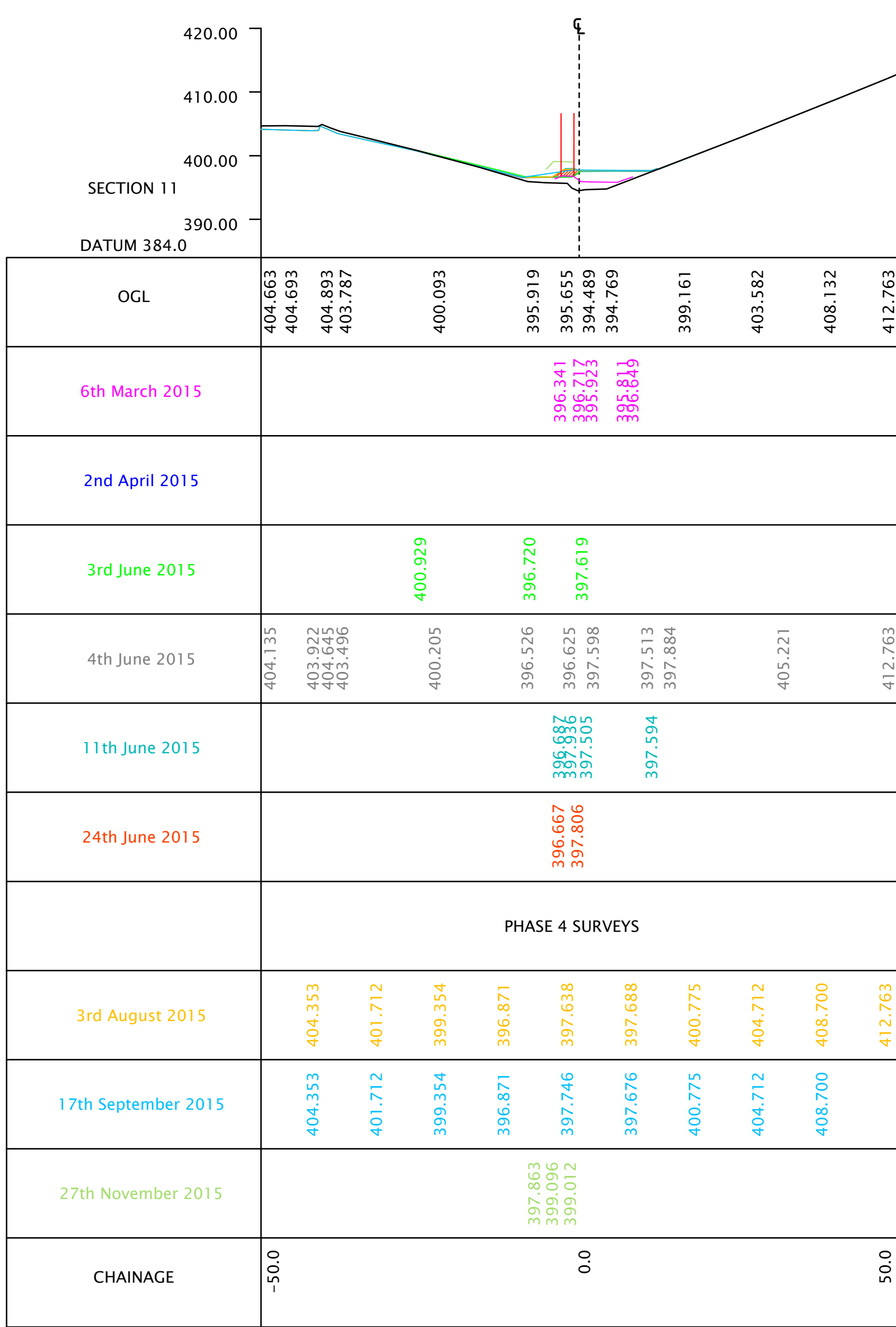
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CHAINAGE 100.0m (308110.2E 207506.9N)

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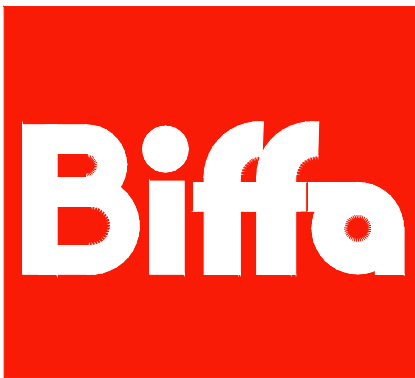
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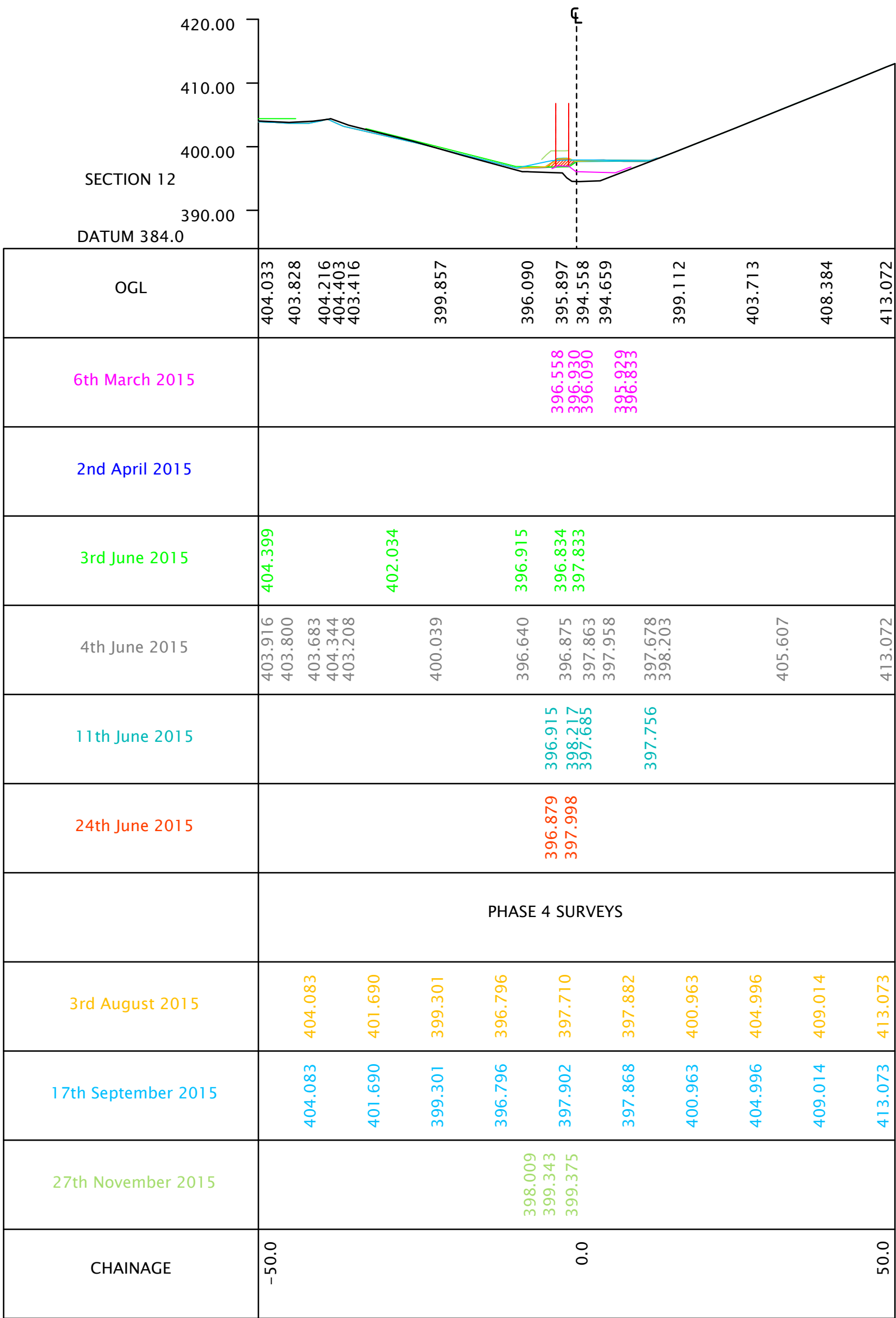
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SNRHW CELL

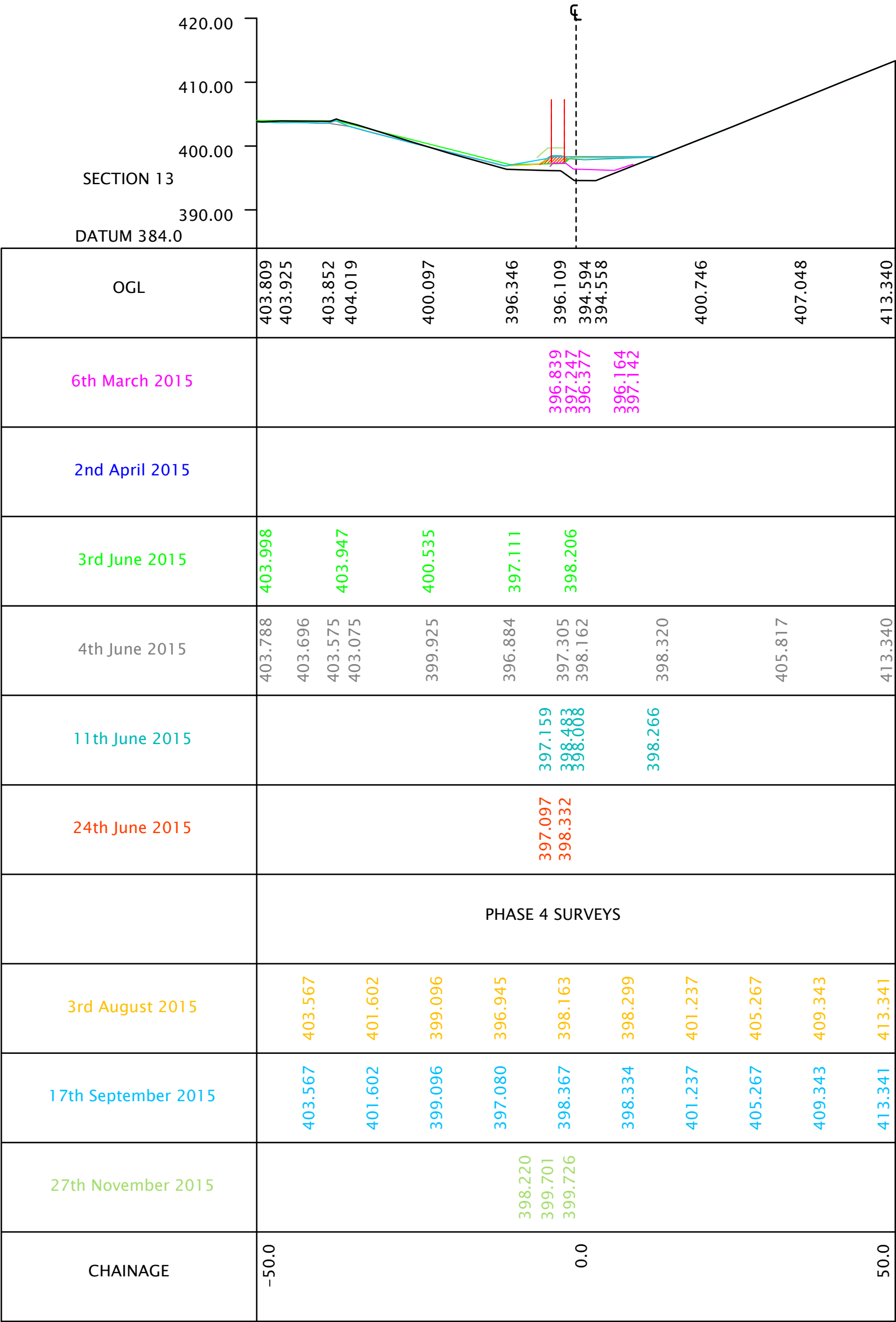
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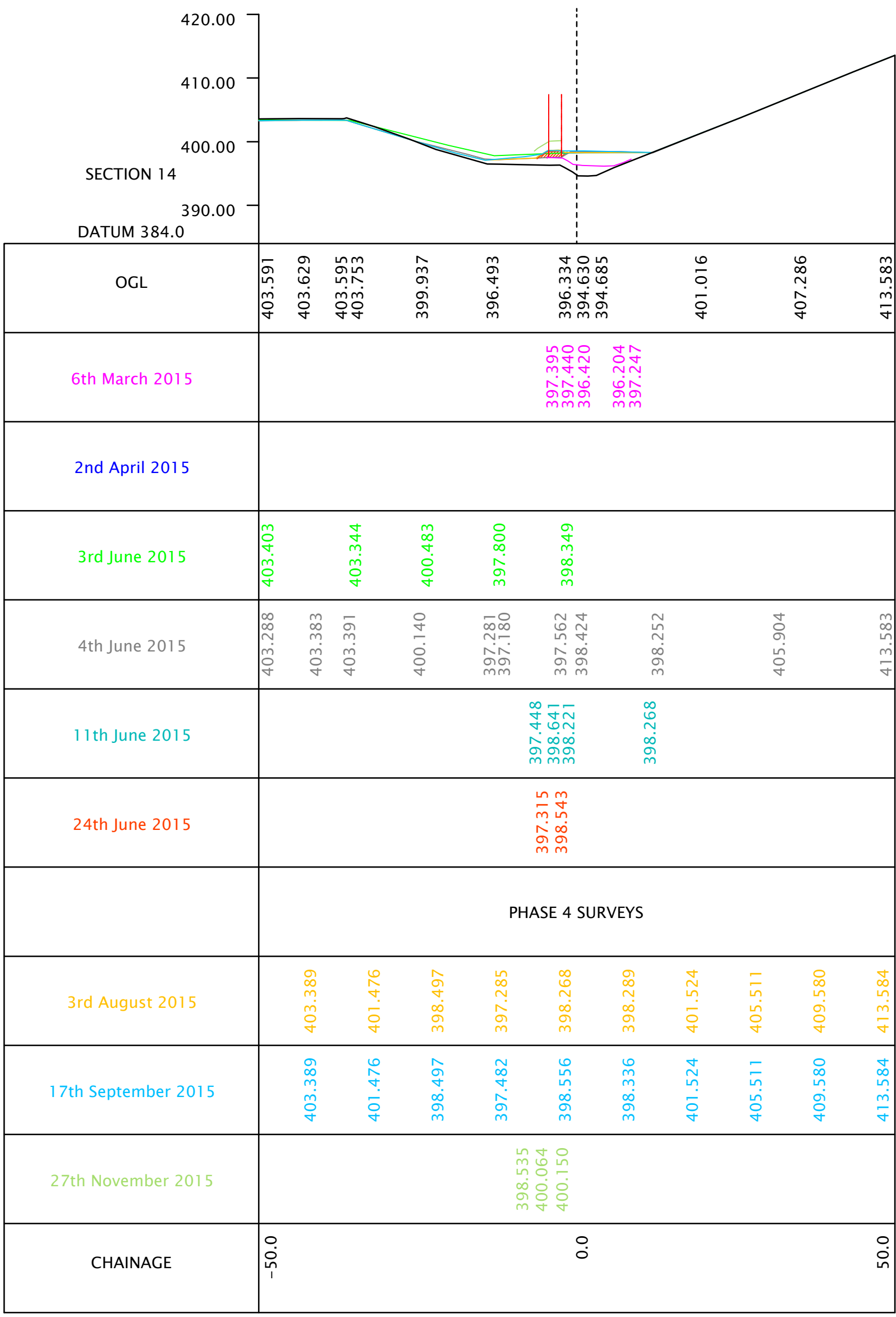
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CHAINAGE 130.0m (308138.9E 207515.6N)

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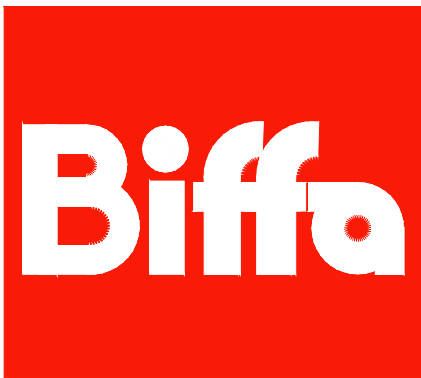
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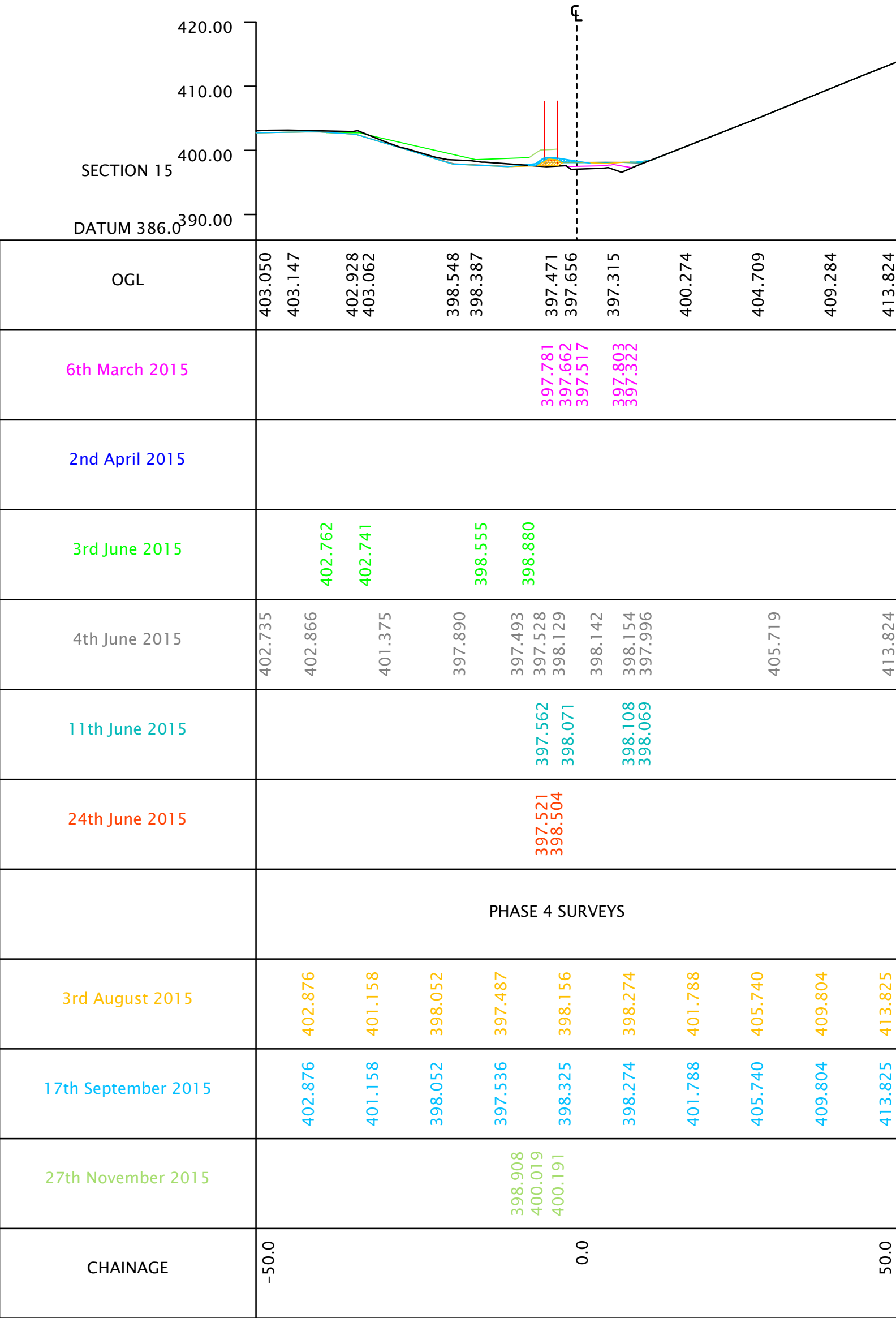
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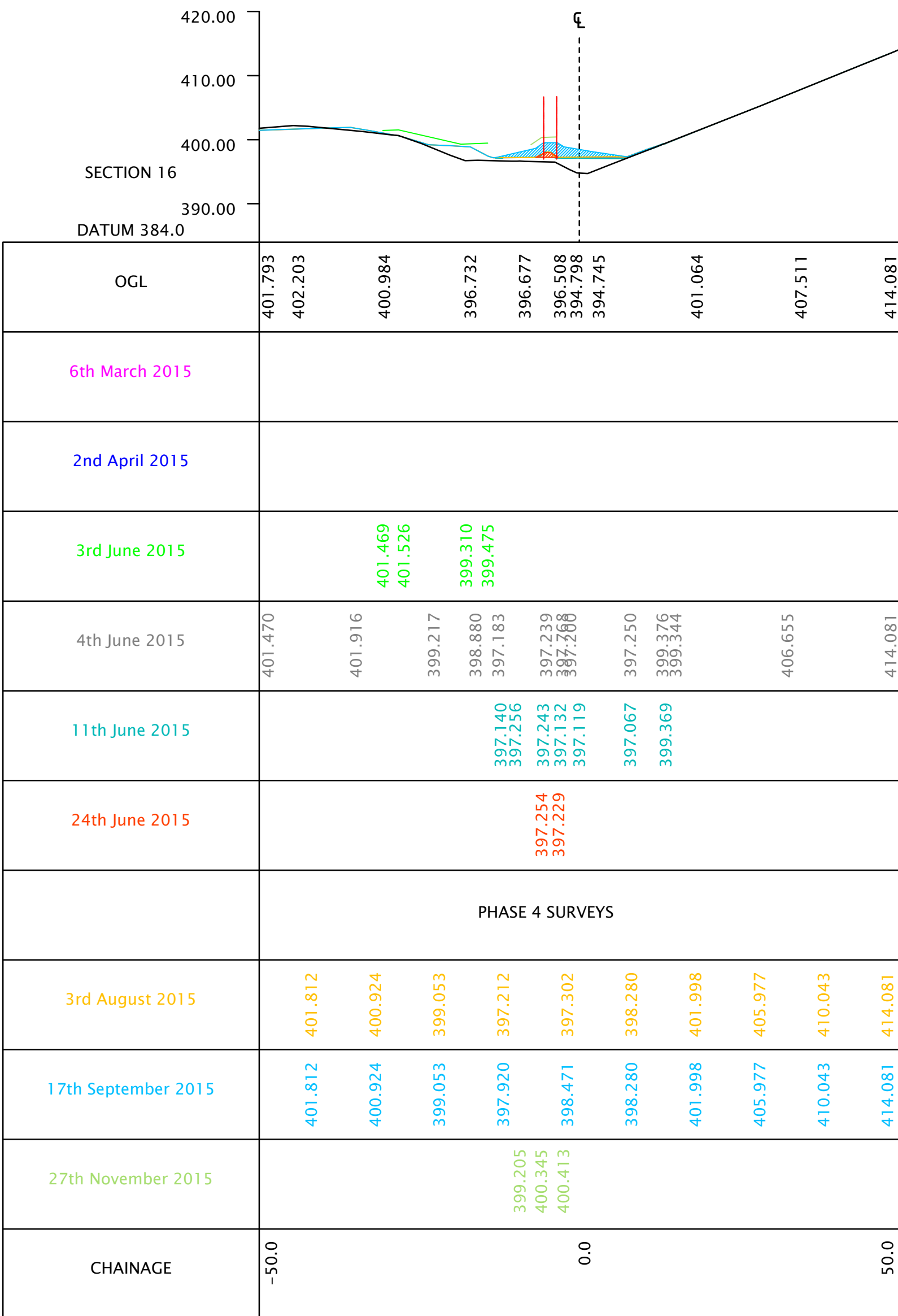
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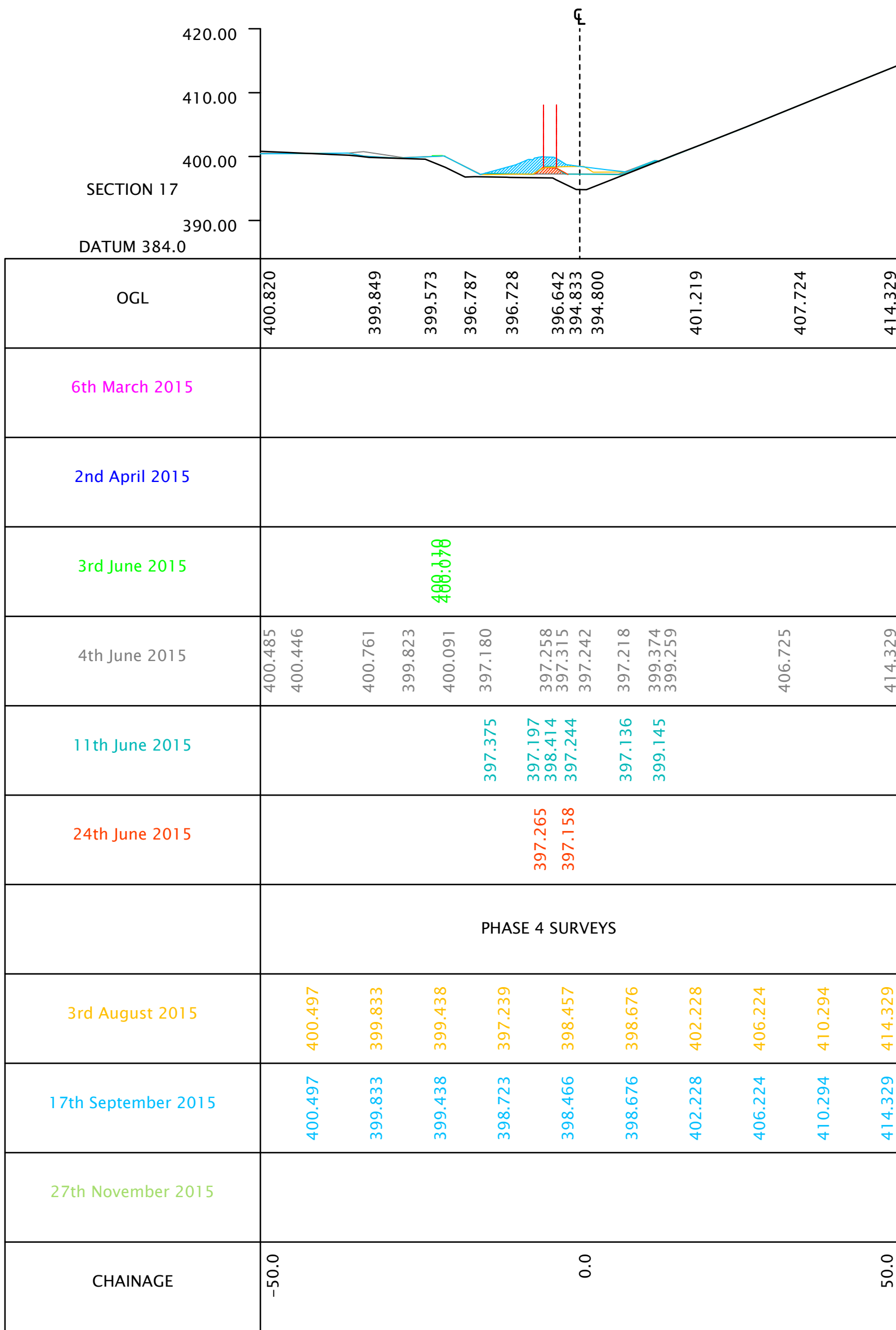
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- NOTES
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KEY



DENOTES THE 2m SECTION OF THE PROPOSED CORE OF THE BUND ABOVE THE FIRST LIFT OF CONSTRUCTION



DENOTES SECTIONS OF FILLING FOR PHASE 4 LIFT 2 TO CREATE A PLATFORM FOR PHASE 4 LIFT 3



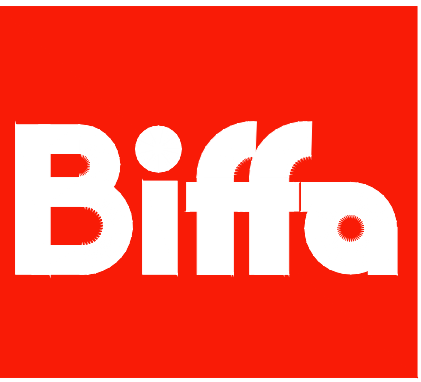
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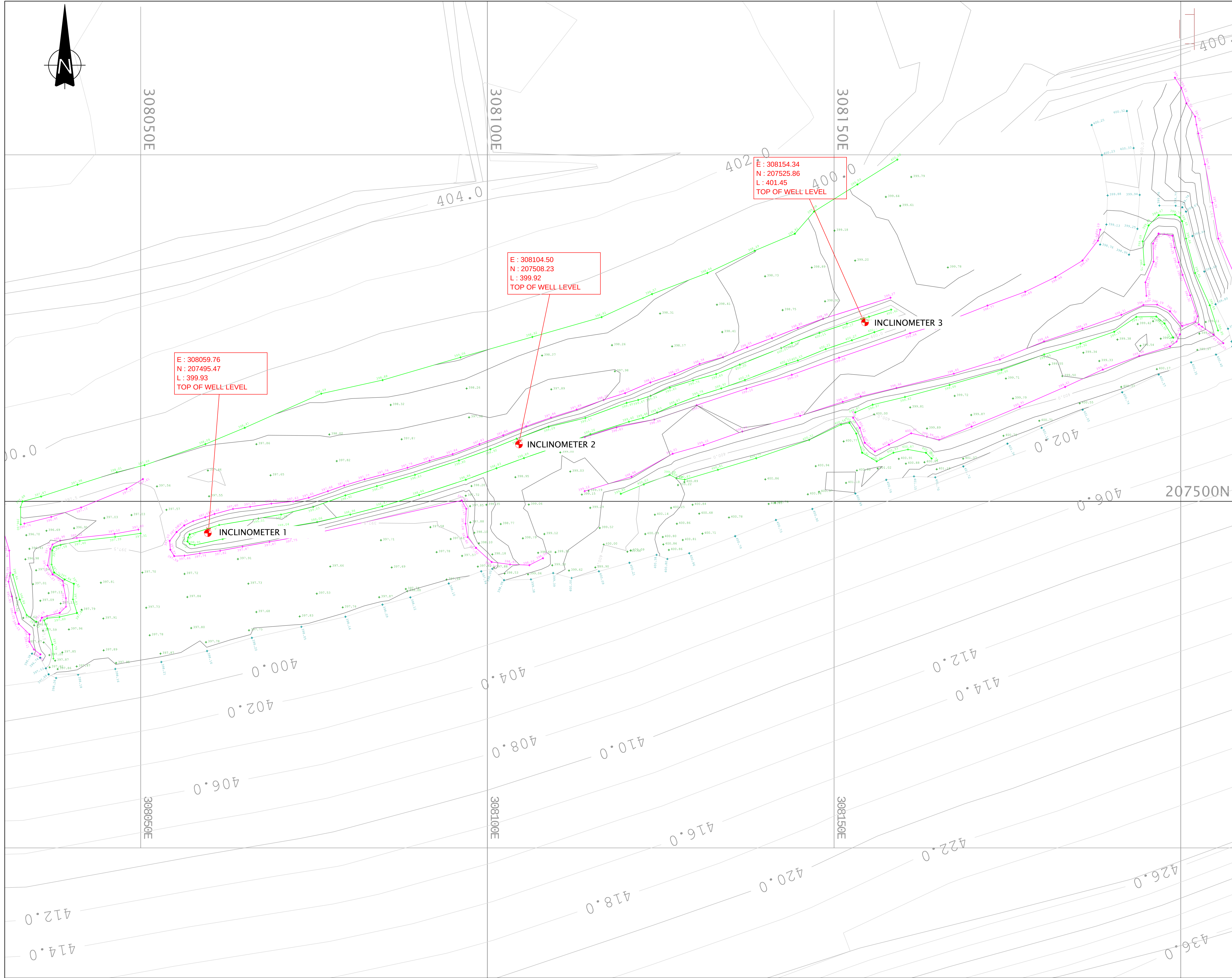
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TRECATTI LANDFILL SITE
SNRHW CELL

DRAWING TITLE

AS-BUILT CONSTRUCTION
SECTIONS PHASE 4

DRAWN	DATE	APPROVED	DATE
R.W.	28/01/2015	A.C.	28/01/2016
SCALE	SHEET	DRAWING NUMBER	REVISION
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1. ALL LEVELS TO mAOD
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3. DRAWING BASED ON CENTRE POINT SURVEYS DRAWING No. BIFFA/2015/ 11-02-16 DATED 11th FEBRUARY 2016

KEY

- 99 ——— EXISTING CONTOURS
- LOCATION OF INCLINOMETER
- AS-BUILT TOP OF BATTER (27.11.15)
- AS-BUILT BOTTOM OF BATTER (27.11.15)
- 398.43 AS-BUILT TOP OF BATTER SPOT HEIGHT (27.11.15)
- 397.27 AS-BUILT BOTTOM OF BATTER SPOT HEIGHT (27.11.15)

REV	DESCRIPTION	DATE	BY



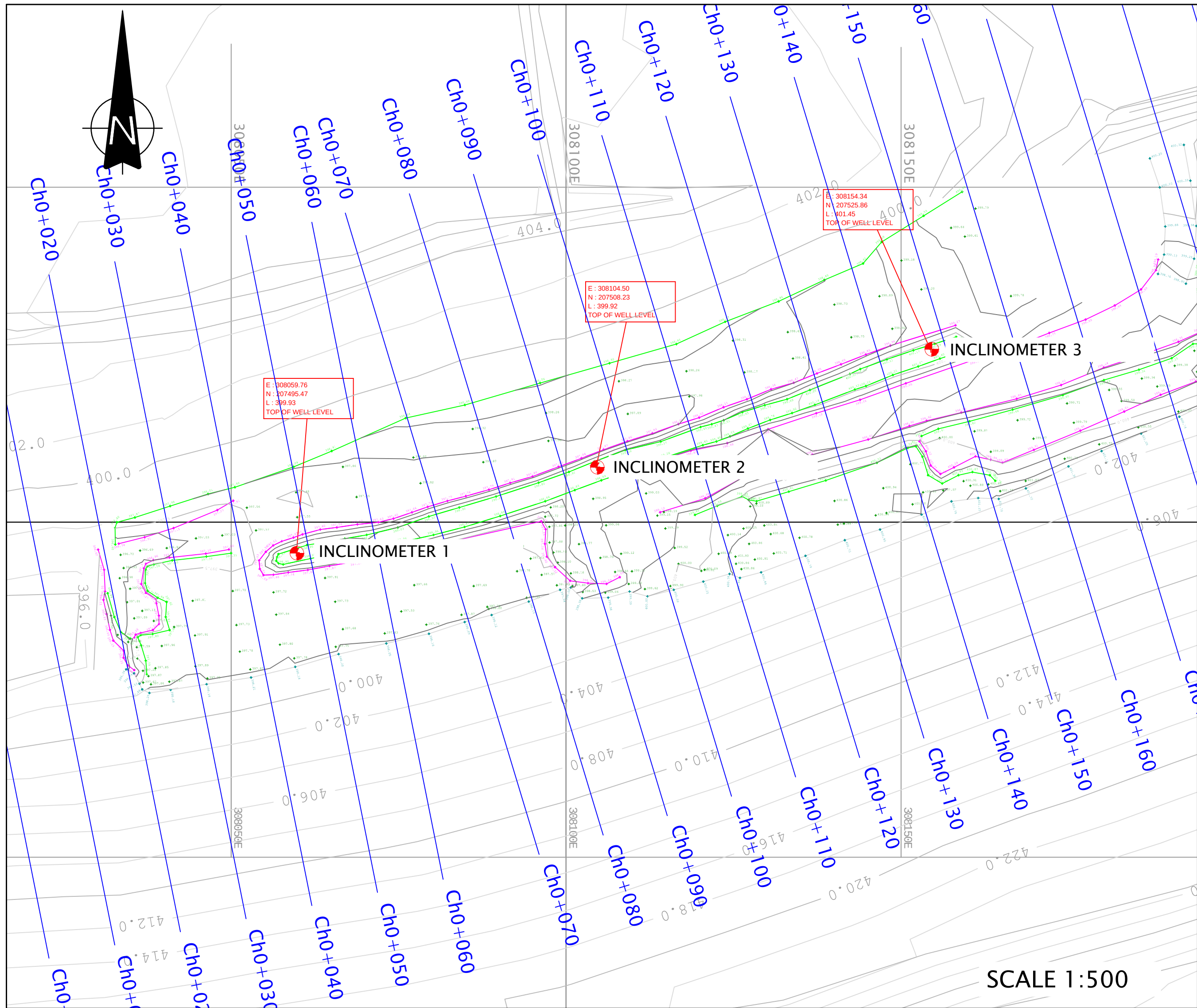
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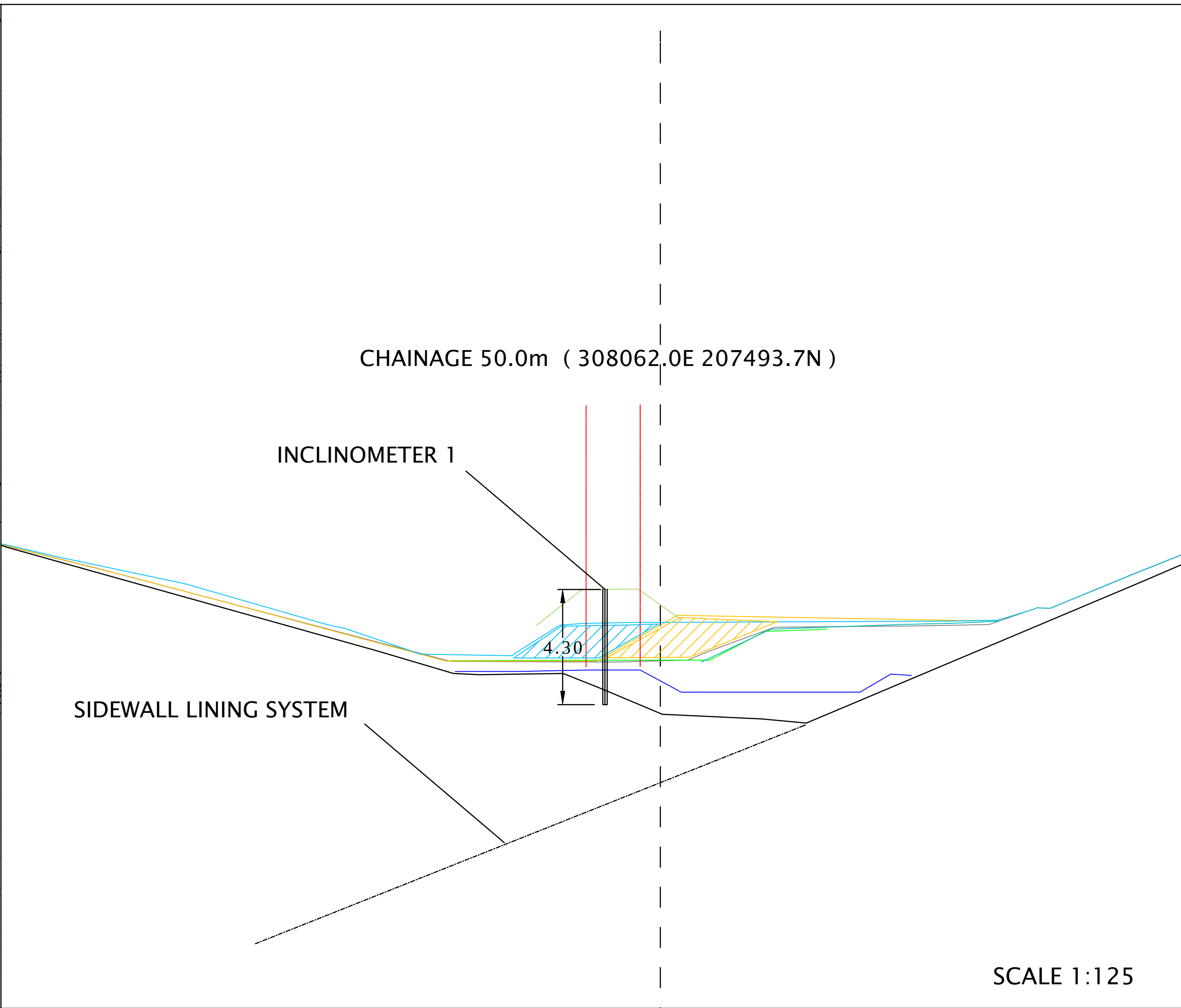
PROJECT
**TRECATTI LANDFILL SITE
SNRHW CELL**

DRAWING TITLE
**PHASE 4 INCLINOMETER
INSTALLATION SURVEY DRAWING**

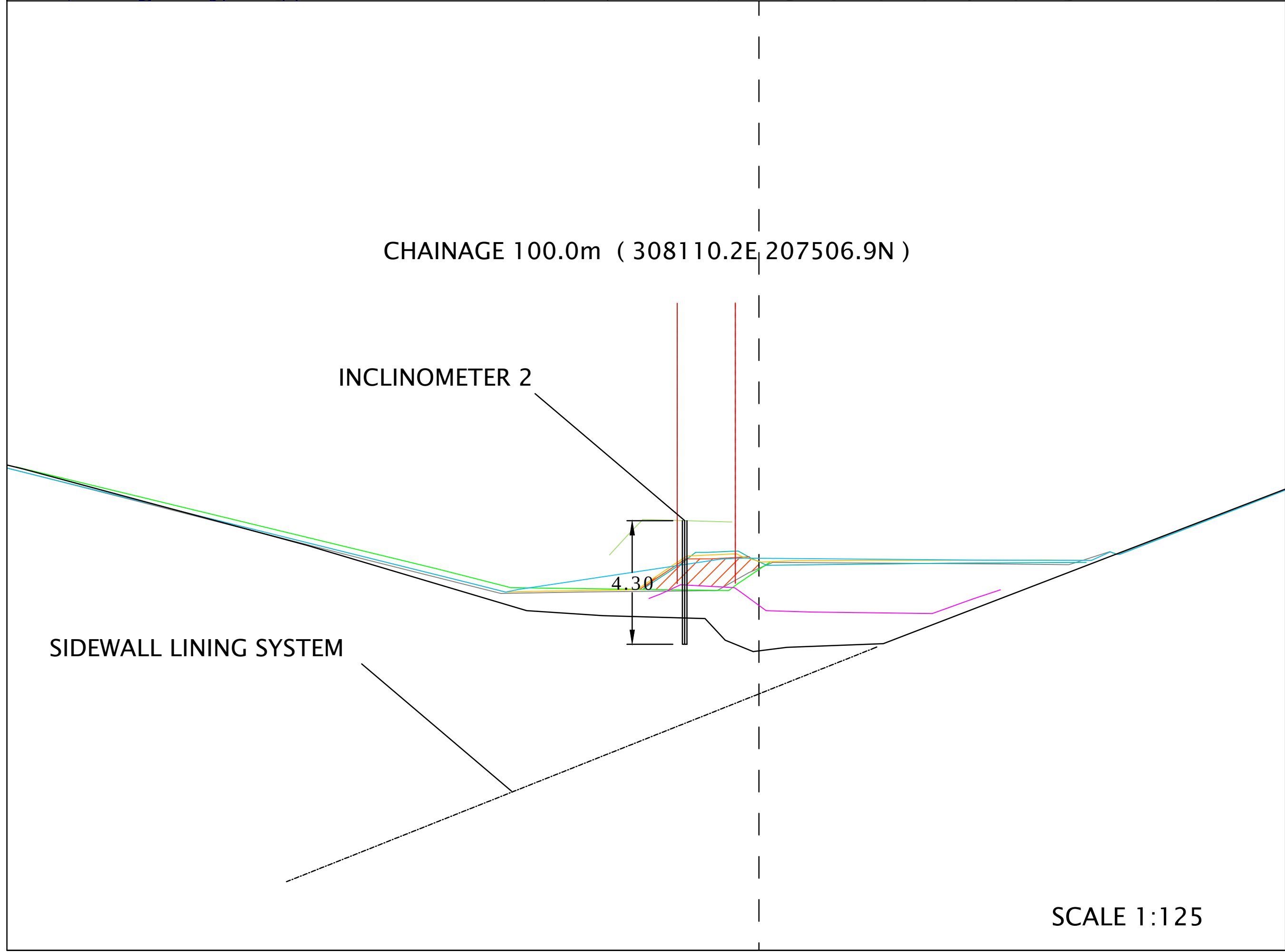
DRAWN	DATE	APPROVED	DATE
R.W.	1/03/2016	A.C.	01/03/2016
SCALE	SHEET	DRAWING NUMBER	REVISION
1:250	A1	BF4858/7/13	0



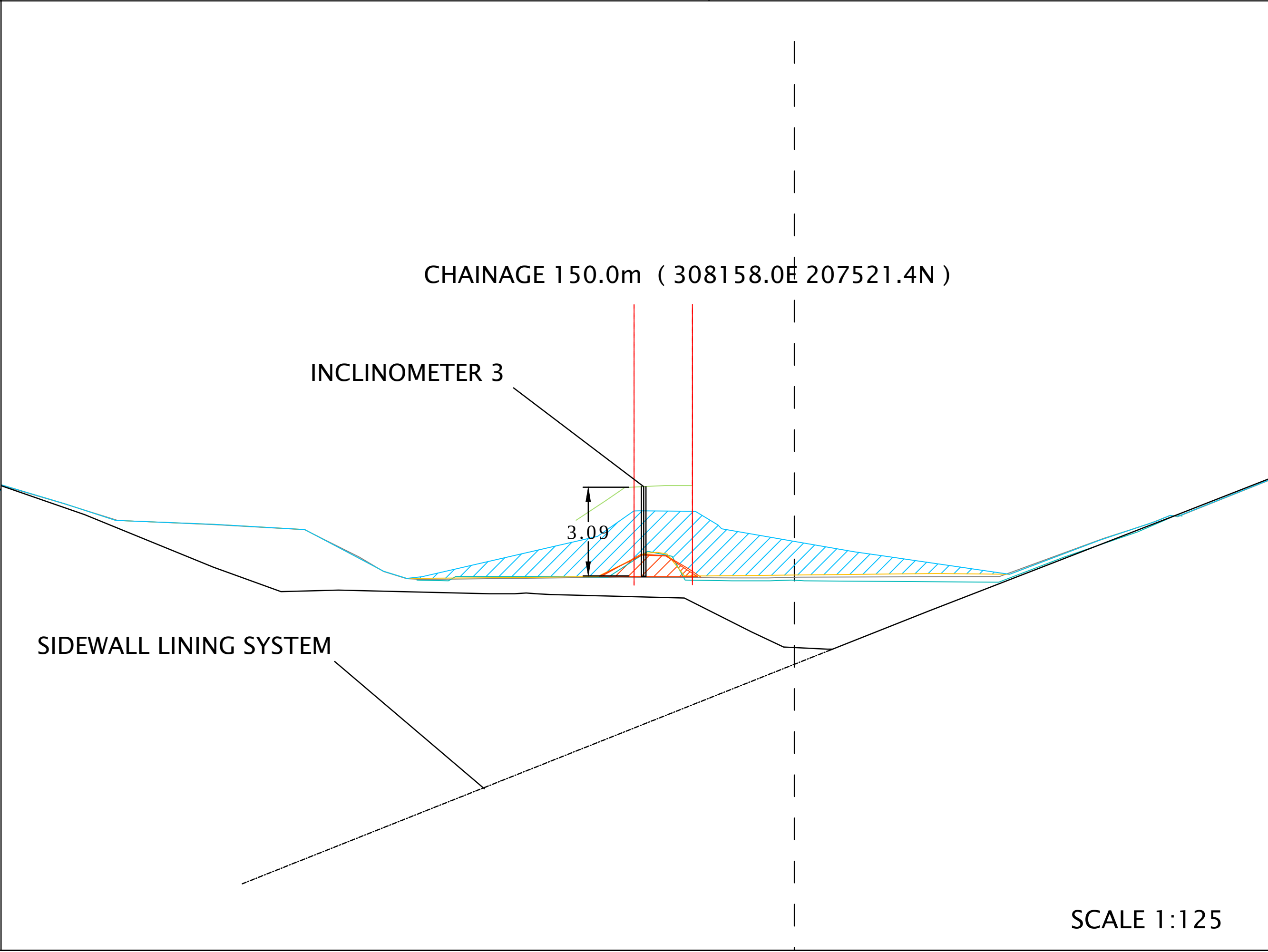
SCALE 1:500



SCALE 1:125



SCALE 1:125



SCALE 1:125

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- NOTES
1. ALL LEVELS TO mAOD
 2. DO NOT SCALE FROM THIS DRAWING
 3. DRAWING BASED ON CENTRE POINT SURVEYS DRAWING No. BIFFA/2015/ 11-02-16 DATED 11th FEBRUARY 2016

- KEY
- 99 — EXISTING CONTOURS
 - LOCATION OF INCLINOMETER
 - AS-BUILT TOP OF BATTER (27.11.15)
 - AS-BUILT BOTTOM OF BATTER (27.11.15)
 - AS-BUILT TOP OF BATTER SPOT HEIGHT (27.11.15)
 - AS-BUILT BOTTOM OF BATTER SPOT HEIGHT (27.11.15)
 - DENOTES THE 2m SECTION OF THE PROPOSED CORE OF THE BUND ABOVE THE FIRST LIFT OF CONSTRUCTION
 - DENOTES SECTIONS OF FILLING FOR PHASE 4 LIFT 2 TO CREATE A PLATFORM FOR PHASE 4 LIFT 3
 - DENOTES SECTIONS OF PHASE 3 FILLING

REV	DESCRIPTION	DATE	BY



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PROJECT
**TRECATTI LANDFILL SITE
SNRHW CELL**

DRAWING TITLE
**PHASE 4 INCLINOMETER
INSTALLATION SURVEY DRAWING**

DRAWN	DATE	APPROVED	DATE
R.W.	6/05/2016	A.C.	06/05/2016
SCALE	SHEET	DRAWING NUMBER	REVISION
AS SHOWN	A1	BF4858/7/14	0

APPENDIX B
SEPARATION BUND PHASE TRACKERS

Preamble: This Pro-forma records the necessary actions required to be undertaken by Biffa Waste Management Services Limited (Biffa) to meet the requirements of the site Permit (EPR/RP3733PC) and Natural Resources Wales (NRW) for the staged construction of the **Separation Bund** between the non-hazardous waste and the stable non-reactive hazardous waste (SNRHW) cell at Trecatti Landfill Site.

A stability risk assessment has been undertaken which indicates that, as the separation bund height increases between the two different waste types, the bund may tend to bend over towards the side of the non-hazardous waste. To assess the amount of actual movement, NRW has incorporated requirements for the installation of inclinometers and topographic surveys into the site Permit.

The separation bund must be constructed to provide a minimum 2.0m of separation between the non-hazardous waste and the SNRHW. Each vertical bund lift should be a maximum of 1.4m high and may be constructed in several Phases. There is no requirement for compaction of the bund materials to an engineering specification however greater compaction during construction may help to prevent excessive movement of the bund as more vertical lifts are constructed.

In addition to the **Permit EPR/RP3733PC**, the following reports should be consulted for further information and bund construction details: Stability Risk Assessment Ref. **BF4857/SRA Rev 1**; and the Construction and Operational Management plan Ref. **BF4858/01 Rev 1**.

Trecatti SNRHW Cell - Separation Bund Phased Construction Tracker																					
Phase of Works	Bund Vertical Lift Number	Pre-Construction Inclinometer Monitoring Completed (date) ⁴	Pre-Construction Topographic Survey of Separation Bund and Inclinometers Completed ¹ (date)	Start of Construction Period (date)	Material Used to Construct Separation Bund		Inclinometer Installation ⁴							Post-Construction Inclinometer Monitoring Completed ⁴	Post Construction Topographic Survey of Separation Bund, Inclinometers and Surrounding Wastes Completed ³	Minimum 2m Bund Width Checked (and 5m corner fillet where applicable)	Photograph of Completed Phase Taken	End of Construction Period	Validation Report Submitted to NRW	Validation Report Approved by NRW	
					Material Source	Material Classification ²	Ref No. of Inclinometer Installed (and date)	Length of Casing Installed for Each Inclinometer in This Phase of Works (m)			Total Length of Casing Installed for each Inclinometer to Date (m)										
								I1	I2	I3	I1	I2	I3								(date)
1	Lift 1	n/a	n/a	23/02/2015			n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	06/03/2015	yes	06/03/2015	06/03/2015	10/03/2015	09/04/2015	
2	Lift 1	n/a	n/a	30/03/2015			n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	02/04/2015	yes	01/04/2015	01/04/2015	14/04/2015		
3	Lift 1	n/a	03/06/2015	01/06/2015	Derwan Construction	Cass 2B	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	24/06/2015	yes	12/06/2015	12/06/2015	03/07/2015		
3	Lift 2	n/a	03/06/2015				n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a				12/06/2015			
4	Lift 2	n/a	24/06/2015	Jul-15	Derwan Construction	Cass 2B	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	17/09/2015	yes	16/02/2016	17/09/2015	03/03/2016		
4	Lift 3	n/a	17/09/2015	Nov-15			1, 2, and 3	5.14	5.16	3.69	5.14	5.16	3.69	n/a	27/11/2015			27/11/2015			
5																					
6																					
7																					
8																					
9																					
10																					
11																					
12																					
13																					
14																					
15																					
16																					
17																					
18																					

- Notes:**
1. Pre-construction topographic survey not required for the construction of the 1st Lift but will be required prior to the construction of the 2nd Lift.
 2. Classification of material type to be in accordance with Series 600 of the Specification for Highway Works
 3. Post-construction topographic survey to include a survey of the levels of the Non-hazardous Waste to a minimum distance of 40m away from the separation bund as well as the SNRHW levels
 4. Inclinometers are to be installed only once the 2nd lift of the separation bund has been completed

Trecatti SNRHW Cell - Individual Phase Construction Record							
Preamble							
This Pro-forma records the necessary actions required to be undertaken by Biffa Waste Management Services Limited (Biffa) to meet the requirements of the site Permit (EPR/RP3733PC) and Natural Resources Wales (NRW) for the staged construction of the Separation Bund between the non-hazardous waste and the stable non-reactive hazardous waste (SNRHW) cell at Trecatti Landfill Site. Additional Proformas to be filled in are the Separation Bund Construction Assessment Sheet and the 'Sidewall Liner Protection Layer Assessment Sheet' A stability risk assessment has been undertaken which indicates that, as the separation bund height increases between the two different waste types, the bund may tend to bend over towards the side of the non-hazardous waste. To assess the amount of actual movement, NRW has incorporated requirements for the installation of inclinometers and topographic surveys into the site Permit. The separation bund must be constructed to provide a minimum 2.0m of separation between the non-hazardous waste and the SNRHW. Each vertical bund lift should be a maximum of 1.4m high and may be constructed in several Phases. There is no requirement for compaction of the bund materials to an engineering specification however greater compaction during construction may help to prevent excessive movement of the bund as more vertical lifts are constructed. In addition to the Permit EPR/RP3733PC, the following reports should be consulted for further information and bund construction details: Stability Risk Assessment Ref. BF4857/SRA Rev 1; and the Construction and Operational Management plan Ref. BF4858/01 Rev 1.							
Phase of Works:	4	Bund Vertical Lift Number:	2 and 3	Start of Construction Period (date):	Jul-15	End of Construction Period (date):	November 2015
Pre Construction Tasks							
Pre-Construction Inclinometer Monitoring Completed (date) ⁴	n/a			Pre-Construction Topographic Survey of Separation Bund and Inclinometers Completed ¹ (date)	24th June 2015 to February 2016		
Construction of Separation Bund							
Bund Construction Material Source:	Derwan Construction			Material Classification: ²	Class 2 B - dry cohesive material		
Separation Bund Proforma Completed by (name):	P Warman			Photographs of Construction Works Taken by (name):	S Milford		
Additional Notes on Construction:							
Inclinometer Installation ⁴							
Ref No. of Inclinometer Installed	Date of Installation	Length of Casing Installed for Each Inclinometer in This Phase of Works (m)			Total Length of Casing Installed for each Inclinometer to Date (m)		
		I1	I2	I3	I1	I2	I3
1	12th and 13th January 2016	5.14	5.16	3.69	5.14	5.16	3.69
Post Construction Tasks							
Post-Construction Inclinometer Monitoring Completed on (Date) ⁴	n/a			Post Construction Topographic Survey of Separation Bund, Inclinometers and Surrounding Wastes Completed on (Date) ³	11th February 2016		
Validation Reporting							
Validation Report Submitted to NRW on (Date)	3rd March 2016			Validation Report Approved by NRW on (Date)			

Notes:

1. Pre-construction topographic survey not required for the construction of the 1st Lift but will be required prior to the construction of the 2nd Lift.
2. Classification of material type to be in accordance with Series 600 of the Specification for Highway Works
3. Post-construction topographic survey to include a survey of the levels of the Non-hazardous Waste to a minimum distance of 40m away from the separation bund as well as the SNRHW levels.
4. Inclinometers are to be installed only once the 2nd lift of the separation bund has been completed.

APPENDIX C
INCLINOMETER INSTALLATION REPORT

2nd February 2016

Simon Milford
Biffa Waste Services
Via Email

Our Ref: 403.00034.00538
Your Ref:

Dear Simon,

***RE: TRECATTI LANDFILL SEPARATION BUND INCLINOMETER INSTALLATION
REPORT***

Biffa Waste Services (Biffa) have commissioned SLR Consulting Limited (SLR) to provide geotechnical consultancy services in connection with the installation and subsequent ongoing monitoring of three inclinometers within a separation bund at their Trecatti Landfill site, Merthyr Tydfil.

This letter report contains a summary of the recent inclinometer installation.

Please don't hesitate to contact myself, or any of my colleagues, if you require any further information.

Yours sincerely
SLR Consulting Limited

Sophie Wilson
Geotechnical Engineer

1.0 INTRODUCTION

The Trecatti site (Merthyr Tydfil, South Wales) is currently an active landfill site, accepting both non-hazardous and hazardous waste. The separation bund is progressively being constructed in 1.4m high lifts, between the stable non-reactive hazardous waste (asbestos) and the non-hazardous waste.

The Stability Risk Assessment (SRA) Review undertaken by Stratus Environmental Ltd¹ in September 2014 indicated that the bund shall be constructed such that each lift is 1.4m high with a 2m wide crest and a 1V:1H gradient.

The SRA concluded that the cell will experience a maximum of 320mm lateral movement towards the North due to the differential settlement between the non-hazardous waste and the hazardous waste. For this reason, it was recommended that 3No. vertical inclinometers were installed into the separation bund, and extended with each lift, to monitor the rate of any movement present.

Subsequent monitoring will be carried out before each lift of the bund and inclinometer casing is constructed, as well as after each lift is completed.

Appendix A presents the borehole logs.

¹ Stratus Environmental Ltd 'Stability Risk Assessment Review for Trecatti Landfill Site, SNRHW Cell'. September 2014. Ref. BF4857/SRA Revision 1.

2.0 SITE WORK

2.1 General

The site works were undertaken between 12th and 13th January 2016. An SLR engineer was present for the duration of the installation works. The various aspects of the works are described in more detail below.

2.2 Installation

Three inclinometers were installed within a separation bund between stable non-reactive hazardous waste and non-hazardous waste using a pin (~160mm diameter) to create the holes required for the inclinometer casing.

Inclinometers 1 and 2 (furthest from the haul road into the asbestos cell and the central inclinometer) were installed to 4.20m below the level of the 3rd lift of the bund. Inclinometer 3 (closest to the haul road) was installed to 3m below the bund level, due to the hole collapsing quicker than the casing could be installed.

The annulus surrounding the inclinometer casing was grouted using a premixed grout, comprising cement and bentonite powder combined at the correct ratio. All inclinometers were fully installed and grouted to surface by 21st January 2016.

It is understood by SLR that Biffa shall provide the coordinate locations of the inclinometers following their next survey.

2.3 Monitoring

The initial monitoring visit was carried out on 28th January 2016, to establish a set of base readings for the inclinometers. Data from subsequent monitoring visits shall be plotted alongside the base readings to give an indication of movement within the bund.

3.0 BOREHOLE SUMMARY

3.1 Geology

The investigation has confirmed that underlying geology was broadly as expected; a summary of the encountered material is provided below.

3.1.1 *Made Ground*

Made ground was encountered in all localities during the installations and comprised firm greyish brown clay. Logs can be found presented within Appendix A.

3.1.2 *Superficial Deposits*

No superficial deposits were encountered during the intrusive site investigation.

3.1.3 *Solid Geology*

No solid geology was encountered during the intrusive site investigation.

3.2 Groundwater

Groundwater was present within inclinometer 1; inclinometers 2 and 3 were dry during installation.

4.0 CLOSURE

This report has been prepared by SLR Consulting Limited with all reasonable skill, care and diligence, and taking account of the manpower and resources devoted to it by agreement with the client. Information reported herein is based on the interpretation of data collected and has been accepted in good faith as being accurate and valid.

This report is for the exclusive use of Biffa Waste Services; no warranties or guarantees are expressed or should be inferred by any third parties. This report may not be relied upon by other parties without written consent from SLR.

SLR disclaims any responsibility to the client and others in respect of any matters outside the agreed scope of the work.

APPENDIX A

BOREHOLE LOG				BOREHOLE No 11
Client: BIFFA WASTE SERVICES				
Project No: 403.00034.00538	Date: 14/01/16	Ground Level:	Co-ordinates:	
Project: SEPARATION BUND INCLINOMETER INSTALLATION				
				Sheet: 1 of 1

SAMPLES & TESTS								Water	STRATA				Instrument/ Backfill
Depth	Type No	Test Type	Test Result	SPT N Value 10 20 30 40					Reduced Level	Legend	Depth (Thickness)	DESCRIPTION	
1										(4.30)		INERT FILL comprising firm greyish brown clay.	
2													
3													
4										4.30			
5												Borehole complete at 4.20m	
6													
7													

Boring Progress and Water Observations						Chiselling			Water Added		General Remarks
Date	Time	Depth	Casing Depth	Dia. mm	Water Dpt	From	To	Hours	From	To	

All dimensions in metres Scale 1:50	Contractor : Plant:	Method: Hole Size: 160mm	Logged By: SW	Approved By:
--	------------------------	-----------------------------	------------------	--------------

BOREHOLE LOG				BOREHOLE No 12	
Client: BIFFA WASTE SERVICES					
Project No: 403.00034.00538	Date: 14/01/16	Ground Level:	Co-ordinates:		
Project: SEPARATION BUND INCLINOMETER INSTALLATION				Sheet: 1 of 1	

SAMPLES & TESTS					Water	STRATA				Instrument/ Backfill		
Depth	Type No	Test Type	Test Result	SPT N Value 10 20 30 40				Reduced Level	Legend		Depth (Thick- ness)	DESCRIPTION
1											INERT FILL comprising firm greyish brown clay.	
2										(4.30)		
3												
4										4.30		
5											Borehole complete at 4.20m	
6												
7												

Boring Progress and Water Observations						Chiselling			Water Added		General Remarks
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water Dpt	From	To	Hours	From	To	

All dimensions in metres Scale 1:50	Contractor : Plant:	Method: Hole Size: 160mm	Logged By: SW	Approved By:
--	------------------------	-----------------------------	------------------	--------------

BOREHOLE LOG				BOREHOLE No I3			
Client: BIFFA WASTE SERVICES							
Project No: 403.00034.00538		Date: 14/01/16				Ground Level:	
Project: SEPARATION BUND INCLINOMETER INSTALLATION				Sheet: 1 of 1			

SAMPLES & TESTS								Water	STRATA				Instrument/ Backfill
Depth	Type No	Test Type	Test Result	SPT N Value 10 20 30 40					Reduced Level	Legend	Depth (Thick- ness)	DESCRIPTION	
1										(3.00)	INERT FILL comprising soft to firm greyish brown slightly gravelly clay.		
2													
3										3.00			
4											Borehole complete at 3.00m		
5													
6													
7													

Boring Progress and Water Observations						Chiselling			Water Added		General Remarks
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water Dpt	From	To	Hours	From	To	

All dimensions in metres Scale 1:50	Contractor : Plant:	Method: Hole Size: 160mm	Logged By: SW	Approved By:
--	------------------------	-----------------------------	------------------	--------------

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APPENDIX D
PHOTOGRAPHIC RECORD

PHOTOGRAPHS



Photograph 1 – Looking west along the completed Lift 3 with Inclinator 3 in the foreground



Photograph 2 – Inclinator 3



Job Title Trecatti SNRHW Separation Bund		Client Biffa Waste Management Services	
Approved ASC	Signature 	Date Jan-15	Appendix D

PHOTOGRAPHS



Photograph 3 – Looking west along the completed Lift 3 section of bund



Photograph 4 – Inclinometer 2



Job Title Trecatti SNRHW Separation Bund		Client Biffa Waste Management Services	
Approved ASC	Signature 	Date Jan-15	Appendix D

PHOTOGRAPHS



Photograph 5 – Inclinometer 1



Photograph 6 – Western end of separation bund Lift 3 looking east. Non-haz waste side



Job Title Trecatti SNRHW Separation Bund		Client Biffa Waste Management Services	
Approved ASC	Signature 	Date Jan-15	Appendix D

PHOTOGRAPHS



Photograph 7 – Western end of separation bund Lift 3 looking east. SNRHW side



Photograph 8 – Inclinator 1 location looking east.



Job Title Trecatti SNRHW Separation Bund		Client Biffa Waste Management Services	
Approved ASC	Signature 	Date Jan-15	Appendix D