Appendix E

Geotechnical Basis of Design

Report

Hospital Prince of Wales Reservoir Geotechnical Basis of Design

Prepared for Wellington City Council (Client)

By CH2M Beca Limited

1 February 2013

Revision History

Revision N°	Prepared By	Description	Date
A	Jerry Spinks	For Client Review	05/10/12
B	Simon Edmonds	Updated for CDOR	01/02/2013

Document Acceptance

Action	Name	Signed	Date
Prepared by	Jerry Spinks	J Spinks	01/02/2013
Reviewed by	Andrew Law	pp J Spinks	01/02/2013
Approved by	Brian Smith	B J Smith	01/02/2013
on behalf of	CH2M Beca Limited		

Table of Contents

1 Introduction

This document describes the basis of design for the geotechnical criteria for the **Hospital Prince of Wales Reservoir Project** located in upper Prince of Wales Park at Mount Cook, Wellington City.

The project includes a reservoir and the associated earthworks and pipelines. The reservoir is fully buried below ground level and will store 35,000m³ volume of fresh water. It will supply water to Wellington Hospital and to Central Business District (CBD). CH2M Beca (Beca) has been commissioned by Wellington City Council (WCC) to supply engineering services for the development of the new reservoir.

2 Objectives

The principal objective of this document is to establish a basis that shall be used for the design and documentation works of all aspects of the reservoir earthworks and foundations and earth pressure loading and to:

- Comply with client requirements
- Comply with statutory requirements
- Utilise the relevant experience and skills of the design team members
- Enable close coordination with other design disciplines
- Permit construction sequencing to be undertaken in accordance with the client's agreed programme

3 Definitions

Unless the context requires otherwise the following abbreviations and their meanings are used within this document:

CBD	Central Business District
Capacity	Capacity Infrastructure
Council	Wellington City Council
GW	Greater Wellington regional Council
HPOW	Hospital Prince of Wales
IL	Importance Level
RFT	Request for Tender
SLS	Serviceability Limit State
TBC	To Be Confirmed
TWL	Top Water Level
WCC	Wellington City Council

WE	Wellington Electricity

4 Scope of Geotechnical Basis of Design

The following items are addressed in the geotechnical basis of design:

- Geotechnical profile
- Groundwater
- Soil parameters
- Lateral seismic earth pressures
- Temporary cut slopes
- Engineered fill slopes
- Foundation bearing pressures
- Earthworks material classification

5 Reference Documents

The following documents are to be referred to in the design of the Hospital Prince of Wales Reservoir:

- Capacity Infrastructure Services Request for Tender for the Consultancy Services for the Hospital Prince of Wales Reservoir 1 February 2012
- NZS1170.5:2004 Earthquake Actions - New Zealand
- Hospital Prince of Wales Reservoir Geotechnical Report (Beca, Rev B 'Final' dated 3 October 2012)
- Hospital Prince of Wales Reservoir Geotechnical Report Addendum (Beca, Rev 1 dated 14 January 2013)
- O'Riley et al, Seismic Performance of the Terrace Tunnel Approach Walls, Wellington. 2006, NZSEE Conference
- MJ Pender, Some Properties of Weathered Greywacke, 1971 Aust NZ Conference in Geomechanics
- MJ Pender, Friction and Cohesion Parameters for Highly and Completely Weathered Wellington Greywacke, 1980, University of Auckland
- Read, S.A.L., Richards, L., and Perrin N.D.(2000): Assessment of New Zealand Greywacke Rock Masses with the Hoek-Brown Failure Criterion. In: C. Haberfield et al., (ed.) Proceedings GeoEng2000, International Conference on Geotechnical & Geological Engineering, Melbourne, 19-24 November 2000, paper SNES0868: Technomic Publishing Company, Lancaster.
- CH2M Beca Ltd, 2012: Seismic Hazard Assessment for the Hospital Prince of Wales Reservoir. Prepared for Capacity Infrastructure Services Limited.
- Duncan C. Wyllie, Foundations on Rock, First Edition (1992)
- BS8004:1986 Code of Practice for Foundations, 1986, British Standards Institute

6 Geotechnical Design Criteria

The new reservoir is expected to provide water for the Wellington Regional Hospital in Newton. This structure has a base isolation system and a design requirement that the building is fully operational within 6 hours after a major earthquake. The return period for this major earthquake has been selected as 1000 years. The propose HPOW reservoir is to match this design requirement by having a design SLS 2 (Operational Continuity) earthquake return period of 1000 years (HOLD – Seismic design standard to be confirmed by Capacity). The design is to meet or exceed the requirements of Importance level 4 (IL4) structures for facilities with a special post disaster function. The backfill around the reservoir does not have to meet the same SLS2 criteria provided slope failure does not affect the integrity of the reservoir.

6.1 Geotechnical Profile

Unit	Description	Depth to top (m)	Thickness (m)
Topsoil	Soft to firm clayey organic SILT; dark brown; medium to high plasticity	0	0.2
Residual soil/ completely weathered GREYWACKE/ ARGILLITE*	Stiff, clayey SILT; orange-brown; low to high plasticity.	0.2	0.2-1.6
	Extremely weak to very weak GREYWACKE/ ARGILLITE.	0.4-1.8	0.3-1.0
Highly weathered GREYWACKE/ ARGILLITE	Weak to very weak GREYWACKE/ ARGILLITE.	0.7-2.5	0.5-5.4
Moderately weathered GREYWACKE/ ARGILLITE	Weak to moderately strong GREYWACKE/ ARGILLITE.	1.2-8.0	1m+

*GREYWACKE/ARGILLITE is subsequently referred to as Greywacke.

6.2 Groundwater

Groundwater monitoring was undertaken within boreholes BH01 and BH02, recording average groundwater RLs of 86.5m and RL 85.8m respectively.

6.3 Soil Parameters

Unit	Bulk Density γ (kN/m^3)	Effective cohesion c' (kPa)	Effective Friction Φ (°)
Engineered Fill (reworked Greywacke)	19	0	36
Residual Soil/ Completely Weathered Greywacke	18	10	28
Highly Weathered Greywacke	22	100	45
Moderately Weathered Greywacke	24	100	45

6.4 Lateral Seismic Earth Pressures

Lateral earth pressures will be prepared during detailed design. We recommend that RRU 83 – 'Seismic Design of Bridge Abutments' is used for determination of seismic earth pressures on the reservoir wall. We anticipate that 'rigid' wall loading will be applicable; however this should be confirmed by the structural designers. This method is to be compared with the NZS 3106:2009 method for embedded tanks. Seismic accelerations will be as per the recommendations from the Hospital Prince of Wales Reservoir – Site Specific Seismic Hazard Assessment (Beca, Rev B 'Final' dated 21 December 2012).

6.5 Subgrade Stiffness

During detailed design, the interaction of the reservoir foundations and underlying subgrade will be modelled by providing 'spring stiffness' values for the weathered Greywacke. Representative values will be determined by calculating displacements across a range of foundations.

6.6 Temporary Cut Slopes

Temporary cuts in rock are recommended to be no steeper than 60°, with a 2m to 3m wide intermediate catch benches every 8-10m height, achieving an equivalent overall slope of 1:1V(45°), max slope height in the order of 12m. Should persistent unfavourable defects be identified during the logging of the cut as it progresses, this angle may need to be reduced.

Temporary cuts in the overlying residual soils and completely weathered rock should be cut no steeper than 2H:1V.

For temporary cuts in rock an acceptable alternative to 60º cut slopes is to use either a vertical tied back soldier pile wall or near vertical reinforces shot crete and soil nail wall. This approach is recommended for the pipe tunnel excavation below the reservoir. Backfill between the excavation and pipe tunnel structure should be low strength concrete.

For vertical earth pressure from backfill on top of the pipe tunnel assessment should be in accordance with AS/NZS 3725:2007 Design for Installation of Buried Concrete Pipes, assuming the arrangement acts as 'embankment fill', adopting the scenario of positive projection and a backfill unit weight of 19 KN/m3 for saturated fill.

6.7 Engineered Fill Slopes

For long term stability a fill slope no steeper than 2H:1V, formed of Engineered Fill comprising re-worked Greywacke, is expected to achieve a factor of safety under static conditions of 1.4. With a maximum slope height in the order of 8m.

6.8 Foundations

We recommend a geotechnical ultimate bearing capacity of 1MPa within the moderately weathered Greywacke rock. For limit state structural design (with code factored structural loads), a strength reduction factor of 0.5 shall be applied to this value.

The settlement of shallow footings supported on the weathered Greywacke under sustained loads (e.g. unfactored dead plus live loads) are expected to be in the order of 10mm to 25mm.

6.9 Earthworks

In accordance with TNZ/F1: 1997, Specification for Earthworks Construction, we recommend the majority of the cut material is classified as Type A. This is interpreted as material than can be won by a 16T machine excavator, fitted with a toothed bucket.

The excavation will likely intercept the groundwater table (from below around RL 86m). Therefore, drainage of the reservoir platform will be required during construction, and also in the longer term, including the backfill. Drainage provisions for groundwater around the outside of the reservoir will need to be separate from the reservoir under floor drainage system as per the client requirements.

The excavated material will predominantly comprise highly to moderately weathered, highly fractured greywacke rock. The re-worked material is anticipated to be favourable in terms of its drainage characteristics and resistance to breaking down during re-working and compaction. Compaction criteria, including insitu and laboratory verification testing, will be set during the subsequent phase of design.

Report

Hospital Prince of Wales Reservoir Conceptual Design Options

Prepared for Wellington City Council (Client)

By CH2M Beca Limited

01 February 2013 Final

Volume 2 of 2 – Drawings

Drawing List of Reservoir Options

6517439-CE-K20-RB – Plan of Reservoir Options R1.0, R1.1, R1.2 R2.0, R3.0 & R3.1

6517439-CE-K02-RD – Plan of Reservoir Option R1.0

6517439-CE-K03-RC – Sections of Reservoir Option R1.0

6517439-CE-K04-RC – Plan of Reservoir Option R1.1

6517439-CE-K05-RC – Sections of Reservoir Option R1.1

6517439-CE-K06-RD – Plan of Reservoir Option R2.0

6517439-CE-K07-RC – Sections of Reservoir Option R2.0

6517439-CE-K08-RD – Plan of Reservoir Option R3.0

6517439-CE-K09-RC – Sections of Reservoir Option R3.0

6517439-CE-K15-RB – Plan of Reservoir Option R3.1 Earthworks

6517439-CE-K16-RC – Sections of Reservoir Option R3.1

6517439-CE-K17-RB – Pipe Tunnel Cross Sections – Option R1.0

6517439-CE-K18-RB – Sections of Reservoir – Option R1.0

6517439-CE-K25-RB – Plan of Reservoir Option R1.0 Earthworks

6517439-CE-K30-RA – Existing Site Features

Drawing List of Pipe Tunnel and Piping

6517439-NM-K01-RA – Plan Tunnel Location Options

6517439-NM-K02-RA – Sections Tunnel Layout Options

6517439-NM-K03-RA – Tunnel Pipework Layout Option 1 Plan

6517439-NM-K04-RA – Tunnel Pipework Layout Option 1 Sections

6517439-NM-K05-RA – Tunnel Pipework Layout Option 2 Plans

6517439-NM-K06-RA – Tunnel Pipework Layout Option 2 Sections

6517439-NM-K07-RA – Tunnel Pipework Layout Option 3 Plan

6517439-NM-K08-RA – Tunnel Pipework Layout Option 3 Sections

6517439-NM-201-RB – Mechanical Site Layout Plan SHT1

6517439-NM-202-RB – Mechanical Site Layout Plan SHT2

6517439-NM-203-RB – Pipe Tunnel Layout Plan

6517439-NM-204-RB – Pipe Tunnel Sections SHT1

6517439-NM-205-RB – Pipe Tunnel Sections SHT2

P and ID

6517439-NR-001-RC – Piping and Instrumentation Legend

6517439-NR-002-RD – Piping and Instrumentation Diagram

Drawing Plotted: 01 Feb 2013 2:55 p.m.

OPTION R2.0

OPTION R1.1

EXISTING GULLEY

EXISTING ACCESS TRACK

1748259.760mN
5425829.930mE

15.5m BETWEEN CENTRES

1748275.149mN
5425827.870mE

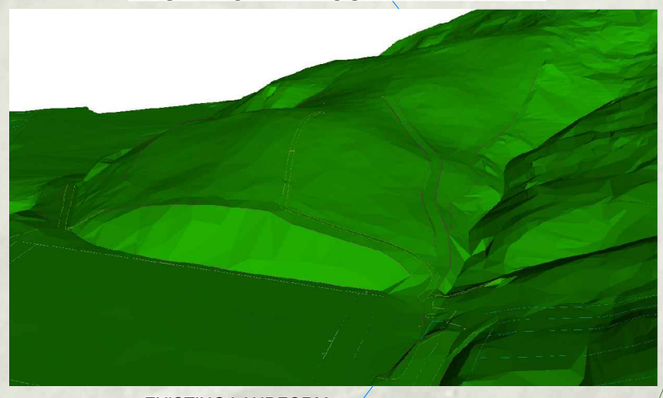
067500 ID

075000

OPTIONS R1.0, R1.2, R3.0 & R3.1

UPPER PARK

RL 81.0 CONTOUR MAXIMUM SITE AREA FOR RESERVOIR PLATFORM AROUND PERIMETER, BUT RESERVOIR EXPOSED.



EXISTING LANDFORM
N.T.S

75m ID MAXIMUM DIAMETER OR LENGTH / BREADTH WHERE RESERVOIR CAN STILL BE BURIED.

EXISTING CONTOURS - 1m INTERVALS

PRELIMINARY
NOT FOR CONSTRUCTION

No.	Revision	By	Chk	Appd	Date
B	UPDATE FINAL ISSUE CDOR	AJP	CJM	SAE	01.02.13
A	FOR CONCEPTUAL DESIGN OPTIONS REPORT	AJP	CJM	SAE	21.09.12

Drawing Originator: CH2M Beca; capacity infrastructure services

Original Scale (A1) 1:250(A1)
Reduced Scale (A3) 1:500(A3)

Designed	CJM	21.09.12	Approved For Construction*
Drawn	AJP	21.09.12	
Dsg Verifier	BS	21.09.12	
Dwg Check			Date

* Refer to Revision 1 for Original Signature

Client: Absolutely Positively Wellington City Council Me Heke Ki Pōneke

Project: HOSPITAL PRINCE OF WALES RESERVOIR

Title: PLAN OF RESERVOIR OPTIONS - R1.0, R1.1, R1.2, R2.0, R3.0 & R3.1

Discipline: CIVIL

Drawing No.: 6517439-CE-K20

Rev.: B

DO NOT SCALE

IF IN DOUBT ASK.

Document No.: 6517439-CE-K20.DWG

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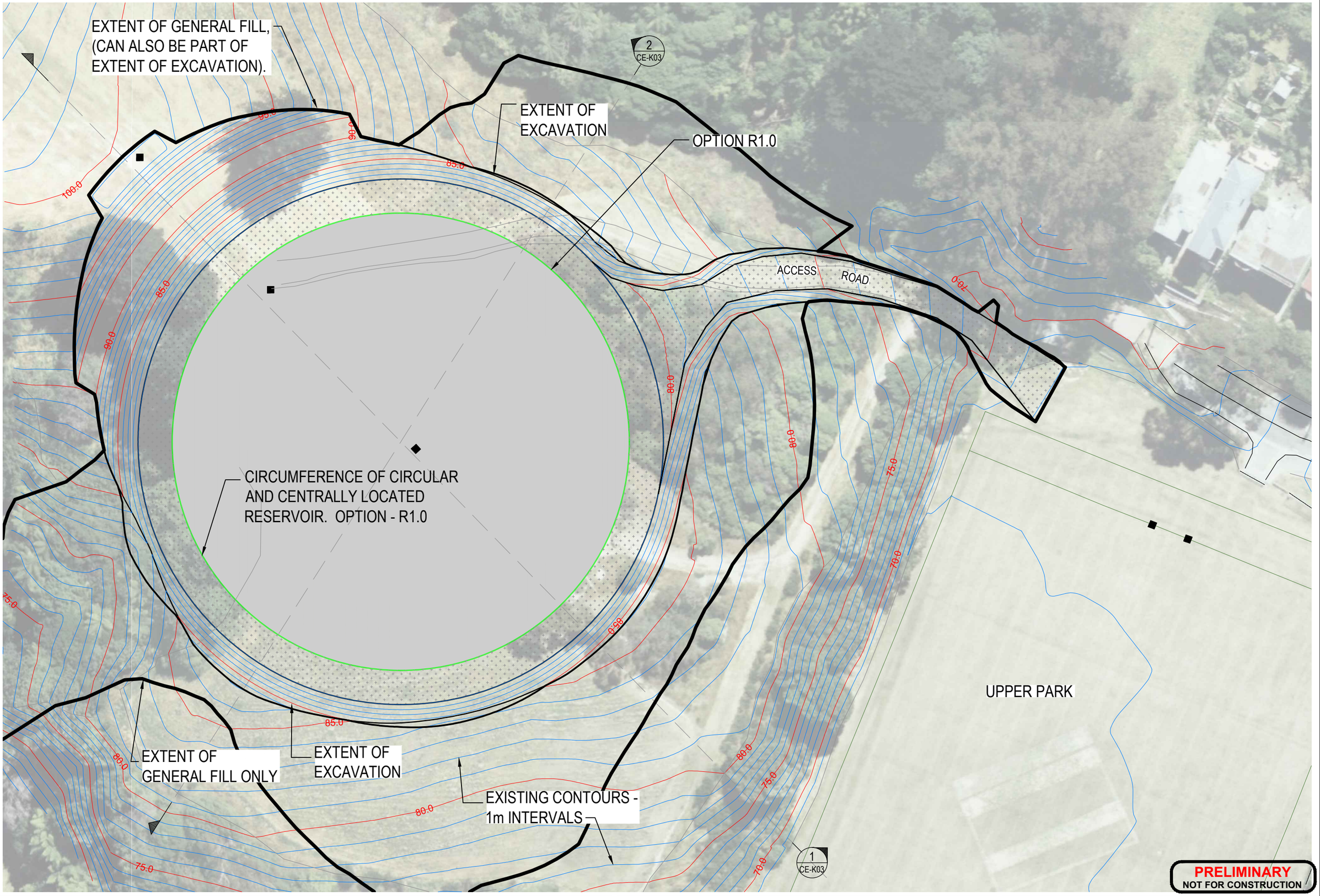

PRELIMINARY
NOT FOR CONSTRUCTION

No.	Revision	By	Chk	Appd	Date
D	UPDATE FINAL ISSUE CD0R	AJP	CJM	SAE	01.02.13
C	NOTES ADDED - FINAL P & S REPORT	AJP	CJM	SAE	14.09.12
B	DISTURBED GROUND EXTENTS ADDED	AJP	CJM	SAE	21.08.12
A	FOR PRELIMINARY DESIGN REPORT	AJP	CJM	SAE	31.07.12

Drawing Originator: CH2M Beca; capacity infrastructure services

Original Scale (A1) 1:250(A1)
Reduced Scale (A3) 1:500(A3)

Design	CJM	31.07.12	Approved For Construction*
Drawn	AJP	31.07.12	
Dsg Verifier	BS	31.07.12	
Dwg Check			Date

* Refer to Revision 1 for Original Signature

Client: Absolutely Positively Wellington — Me Heke Ki Pōneke — Wellington City Council

Project: HOSPITAL PRINCE OF WALES RESERVOIR

Title: PLAN OF RESERVOIR OPTION - R1.0

Discipline: CIVIL

Drawing No.: 6517439-CE-K02

Rev.: D

Document No.: 6517439-CE-K02.DWG

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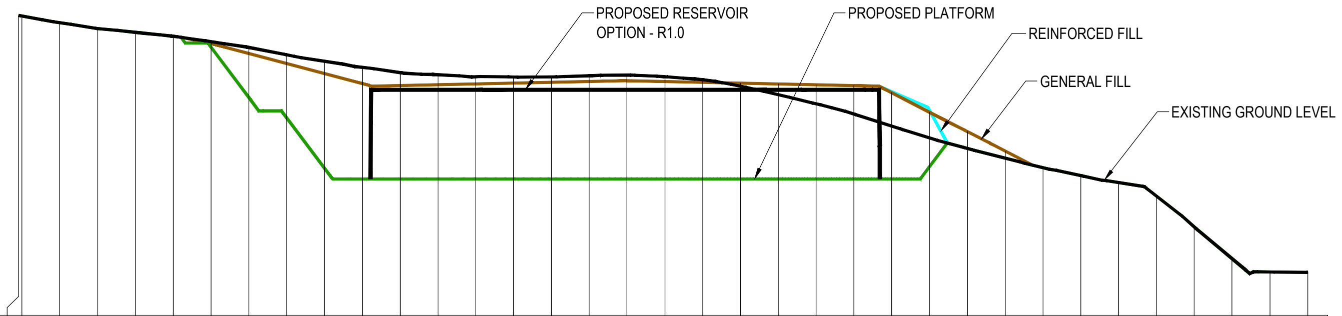
IF IN DOUBT ASK.



Datum 63 UNIT (m)

EXISTING GROUND	102.64	102.56	101.67	100.91	100.40	99.88	99.18	98.40	97.42	96.57	95.77	95.07	94.79	94.52	94.49	94.50	94.66	94.74	94.52	94.14	93.26	92.16	90.95	89.58	88.01	86.43	85.06	83.76	82.51	81.47	80.55	78.75	74.65	70.47	68.70	68.65
PLATFORM	102.64	102.56	101.67	100.91	100.40	99.88	98.43	91.76	89.10	82.43	81.00	81.00	81.00	81.00	81.00	81.00	81.00	81.00	81.00	81.00	81.00	81.00	81.00	81.00	81.00	82.64	85.06	83.76	82.51	81.47	80.55	78.75	74.65	70.47	68.70	68.65
COVERED							98.93	97.61	96.27	94.94	93.61	93.38	93.48	93.59	93.69	93.79	93.90	94.00	93.89	93.79	93.68	93.58	93.47	93.37	92.43	89.83	87.27	84.70								
CHAINAGE	0	1	11	16	21	26	31	36	41	46	51	56	61	66	71	76	81	86	91	96	101	106	111	116	121	126	131	136	141	146	151	156	161	166	171	176

1 LONG SECTION
CE-K02

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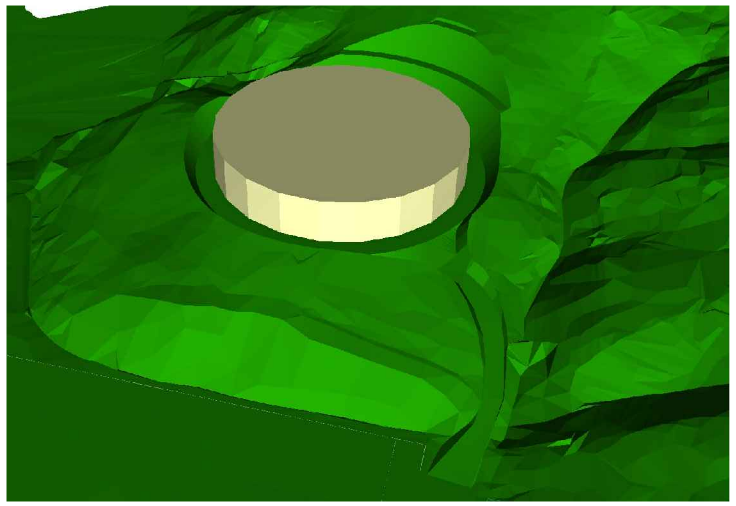
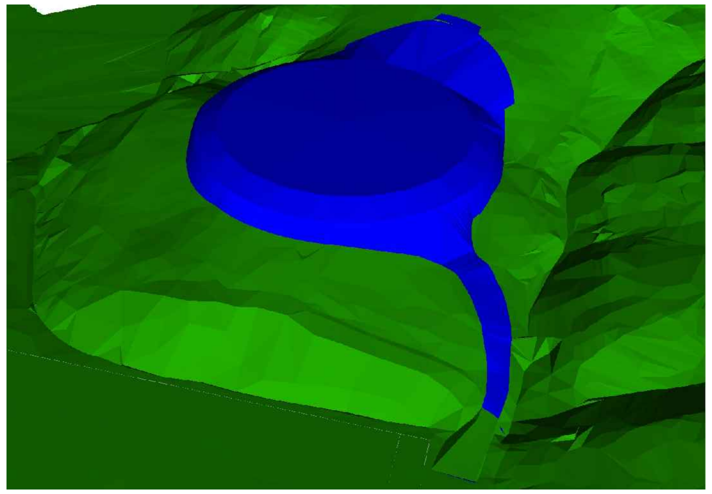


OPTION R1.0 - PLATFORM

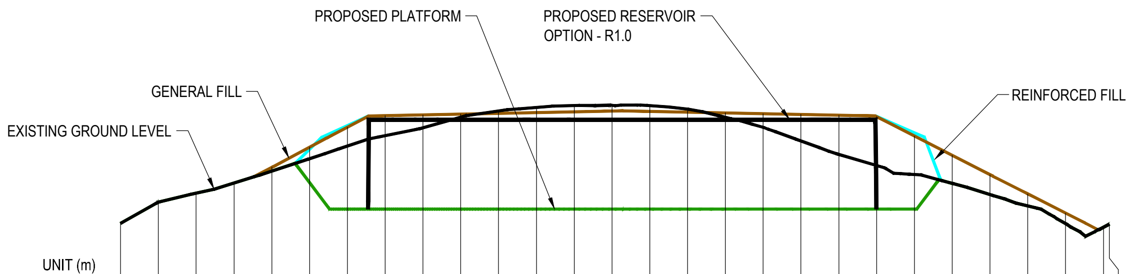
OPTION R1.0 - COVERED

(FILL SLOPE 1V : 2H)



OPTION R1.0 - REINFORCED COVER

(FILL SLOPE 1V : 0.36H)



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EXISTING GROUND	79.09	81.90	83.11	84.44	86.02	87.66	89.33	90.71	91.74	93.16	93.96	94.44	94.68	94.71	94.69	94.20	93.13	91.81	90.00	88.23	86.76	85.57	84.40	82.93	81.40	79.06	78.57	78.99
PLATFORM	79.09	81.90	83.11	84.44	86.02	84.49	81.00	81.00	81.00	81.00	81.00	81.00	81.00	81.00	81.00	81.00	81.00	81.00	81.00	81.00	81.00	81.00	84.40	82.93	81.40	79.06	78.57	78.99
COVERED					86.52	89.18	91.82	93.34	93.45	93.55	93.66	93.76	93.87	93.97	93.93	93.82	93.72	93.61	93.51	93.40	93.22	90.66	88.09	85.53	83.00	80.45		
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2 CROSS SECTION
CE-K02

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PRELIMINARY
NOT FOR CONSTRUCTION

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B	FINAL P & S REPORT REPORT	AJP	CJM	SAE	14.09.12
A	FOR PRELIMINARY DESIGN REPORT	AJP	CJM	SAE	31.07.12

Drawing Originator: CH2M Beca / capacity infrastructure services

Original Scale (A1) 1:500
Reduced Scale (A3) 1:1000

Designed	CJM	31.07.12
Drawn	AJP	31.07.12
Dsg Verifier	BS	31.07.12
Dwg Check		

Approved For Construction*

Date

* Refer to Revision 1 for Original Signature

Client: Absolutely Positively Wellington — Me Heke ki Pōneke Wellington City Council

Project: HOSPITAL PRINCE OF WALES RESERVOIR

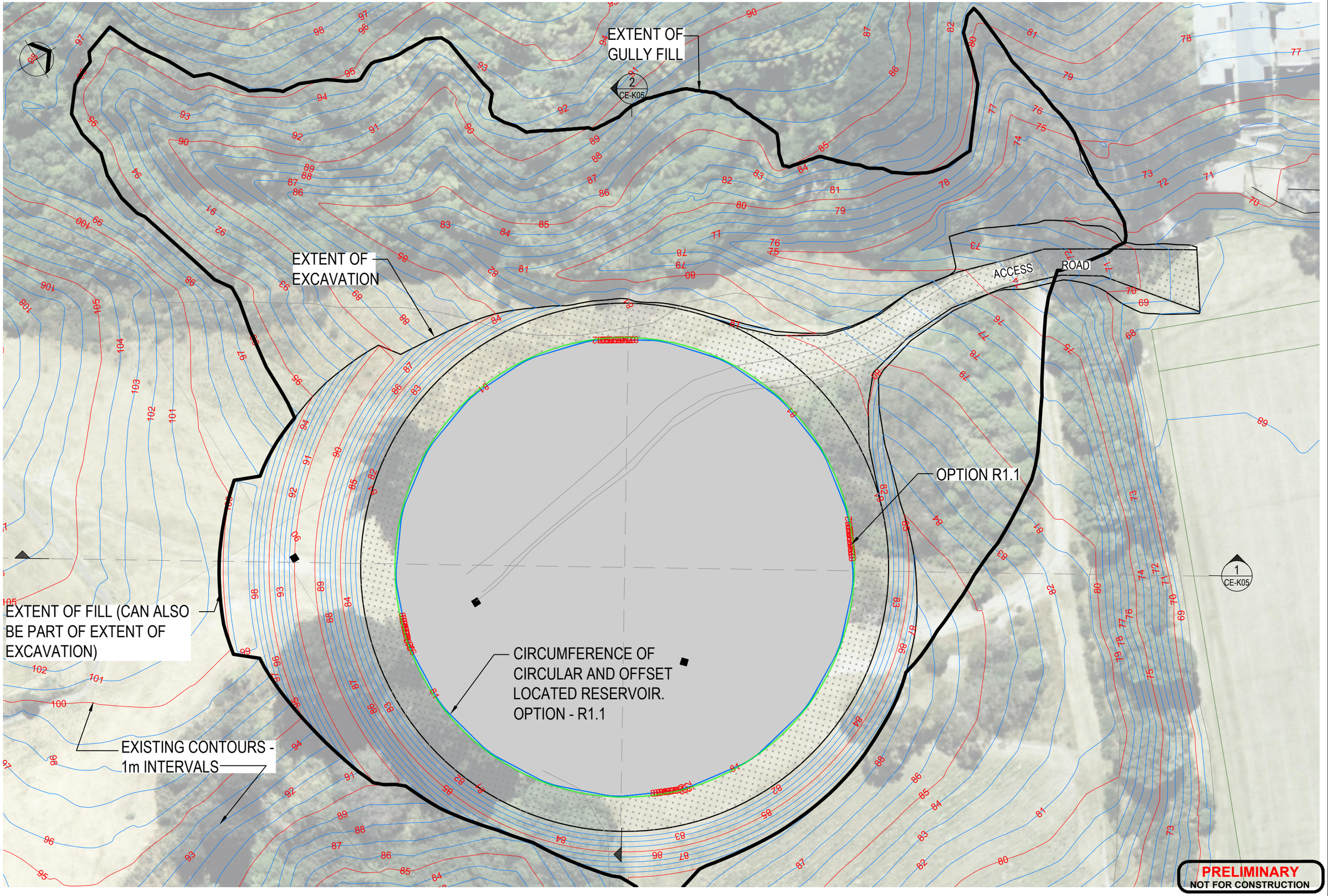
Title: SECTIONS OF RESERVOIR OPTION - R1.0

Discipline: CIVIL

Drawing No. 6517439-CE-K03

Rev. C

Drawing Plotted: 01 Feb 2013 3:30 p.m.



PRELIMINARY
NOT FOR CONSTRUCTION

No.	Revision	By	Chk	Appd	Date
C	UPDATE FINAL ISSUE CDOR	AJP	CJM	SAE	01.02.13
B	DISTURBED GROUND EXTENTS ADDED	AJP	CJM	SAE	21.08.12
A	FOR PRELIMINARY DESIGN REPORT	AJP	CJM	SAE	31.07.12

Drawing Originator: CH2M Beca / capacity infrastructure services

Original Scale (A1) 1:250(A1)
Reduced Scale (A3) 1:500(A3)

~~Designed~~	CJM	31.07.12	Approved For Construction*
Drawn	AJP	31.07.12	
Dsg Verifier	BS	31.07.12	
Dwg Check			Date

* Refer to Revision 1 for Original Signature

Client: Absolutely Positively Wellington City Council Me Heke Ki Pōneke

Project: HOSPITAL PRINCE OF WALES RESERVOIR

Title: PLAN OF RESERVOIR OPTION - R1.1

Discipline: CIVIL

Drawing No.: 6517439-CE-K04

Rev.: C

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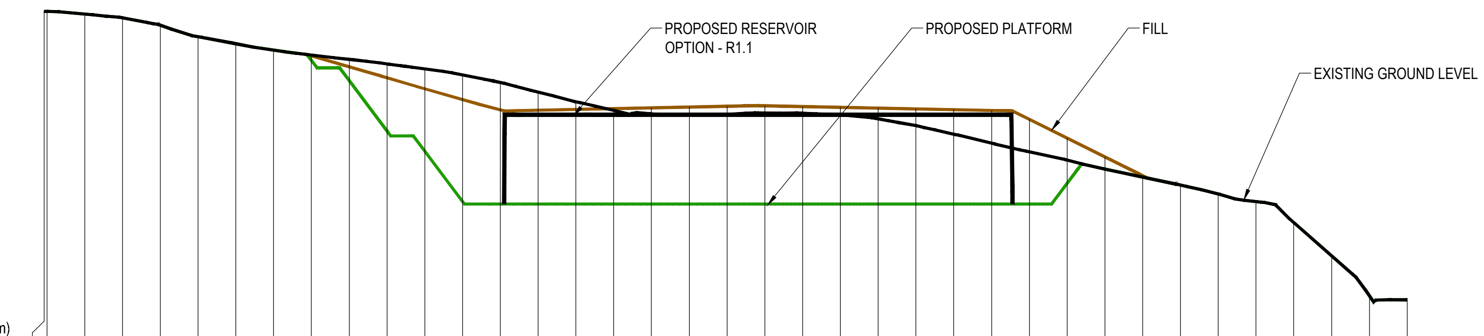

Datum 63 UNIT (m)

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1	106.47	106.47	
11	106.11	106.11	
16	105.63	105.63	
21	104.65	104.65	
26	103.11	103.11	
31	102.19	102.19	
36	101.33	101.36	
41	100.70	99.99	100.59
46	100.13	97.32	99.14
51	99.51	90.66	97.69
56	98.86	87.99	96.23
61	98.05	81.32	94.81
66	97.06	81.00	93.44
71	95.78	81.00	93.39
76	94.52	81.00	93.50
81	93.38	81.00	93.60
86	92.93	81.00	93.71
91	92.78	81.00	93.81
96	92.86	81.00	93.91
101	93.05	81.00	93.98
106	93.02	81.00	93.88
111	92.77	81.00	93.77
116	92.26	81.00	93.67
121	91.38	81.00	93.57
126	90.24	81.00	93.46
131	89.06	81.00	93.36
136	87.89	81.00	92.20
141	86.83	83.75	89.71
146	85.63	85.64	87.23
151	84.56	84.57	84.75
156	83.51	83.51	
161	82.31	82.31	
166	81.31	81.31	
171	78.56	78.56	
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181	68.86	68.86	
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1 / CE-K04 **LONG SECTION**
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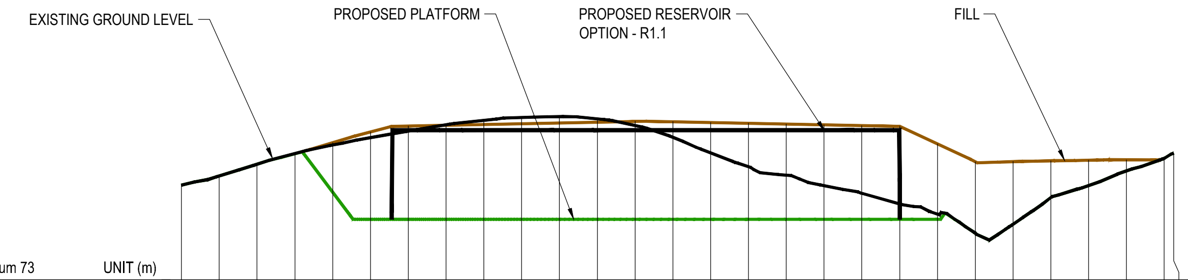

Datum 73 UNIT (m)

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5	86.77	86.77	
10	88.30	88.30	
15	89.70	89.69	
20	90.85	84.60	91.15
25	91.81	81.00	92.57
30	92.70	81.00	93.35
35	93.52	81.00	93.45
40	94.11	81.00	93.55
45	94.49	81.00	93.66
50	94.60	81.00	93.76
55	94.29	81.00	93.86
60	93.42	81.00	93.97
65	91.86	81.00	93.93
70	89.80	81.00	93.82
75	87.97	81.00	93.72
80	86.84	81.00	93.61
85	85.44	81.00	93.51
90	84.45	81.00	93.41
95	83.03	81.00	93.30
100	81.70	81.00	90.98
105	79.19	79.19	88.61
110	80.36	80.36	88.64
115	83.89	83.89	88.76
120	85.47	85.47	88.83
125	87.41	87.41	88.88
130	89.10	89.10	
131	89.75	89.75	

2 / CE-K04 **CROSS SECTION**
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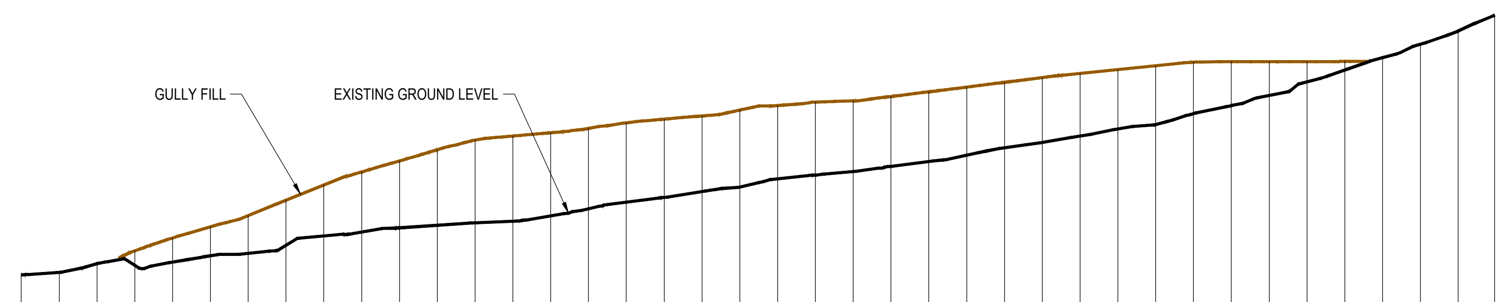
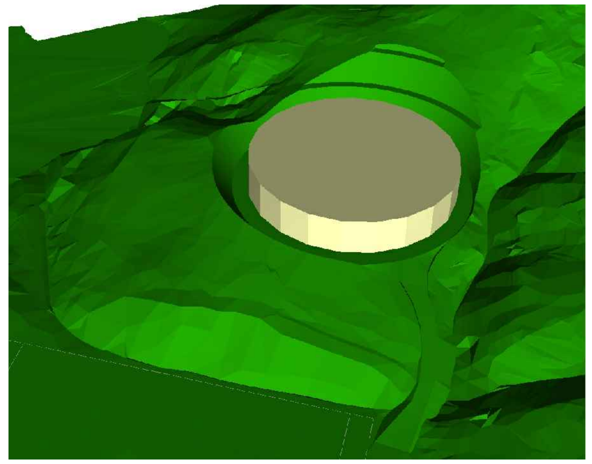


Datum 62 UNIT (m)

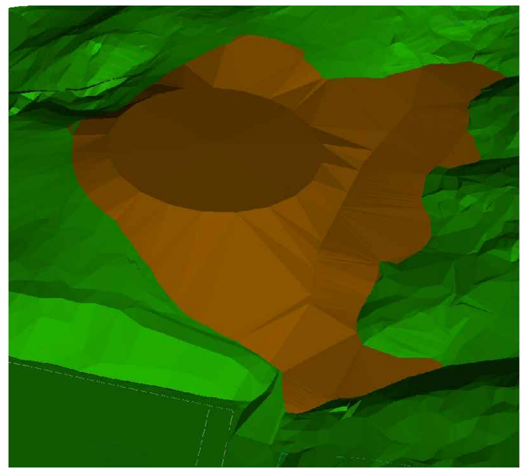
CHAINAGE	EXISTING GROUND	GULLY FILL
0	67.84	
5	68.14	
10	69.31	
15	69.09	71.00
20	69.51	72.70
25	70.35	74.17
30	70.68	75.65
35	71.75	77.69
40	72.97	79.70
45	73.48	81.41
50	74.03	82.87
55	74.38	84.35
60	74.71	85.62
65	74.92	86.16
70	75.61	86.59
75	76.55	87.16
80	77.42	87.89
85	78.05	88.39
90	78.83	88.81
95	79.41	89.59
100	80.51	90.18
105	81.00	90.64
110	81.48	90.80
115	82.14	91.38
120	82.78	91.99
125	83.63	92.61
130	84.61	93.24
135	85.31	93.88
140	86.17	94.41
145	87.09	94.92
150	87.68	95.43
155	89.11	95.91
160	90.18	95.98
165	91.51	95.98
170	93.30	95.98
175	94.87	96.00
180	96.50	
185	98.28	
190	100.02	
195	102.10	

- / CE-K04 **GULLY LONG SECTION**
SCALE 1:500



OPTION R1.1 - PLATFORM

OPTION R1.1 - PLATFORM WORKING
(GULLY FILL)



OPTION R1.1 - COVERED

PRELIMINARY
NOT FOR CONSTRUCTION

No.	Revision	By	Chk	Appd	Date
C	UPDATE FINAL ISSUE CDOR	AJP	CJM	SAE	01.02.13
B	FINAL P & S REPORT	AJP	CJM	SAE	14.09.12
A	ISSUED FOR INFORMATION	AJP	CJM	SAE	31.07.12

Drawing Originator: CH2M Beca — capacity infrastructure services

Original Scale (A1) 1:500
Reduced Scale (A3) 1:1000

Designed	CJM	31.07.12
Drawn	AJP	31.07.12
Dsg Verifier	BS	31.07.12
Dwg Check		

Approved For Construction* — Date
* Refer to Revision 1 for Original Signature

Client: Absolutely Positively Wellington — Me Heke ki Pōneke, Wellington City Council

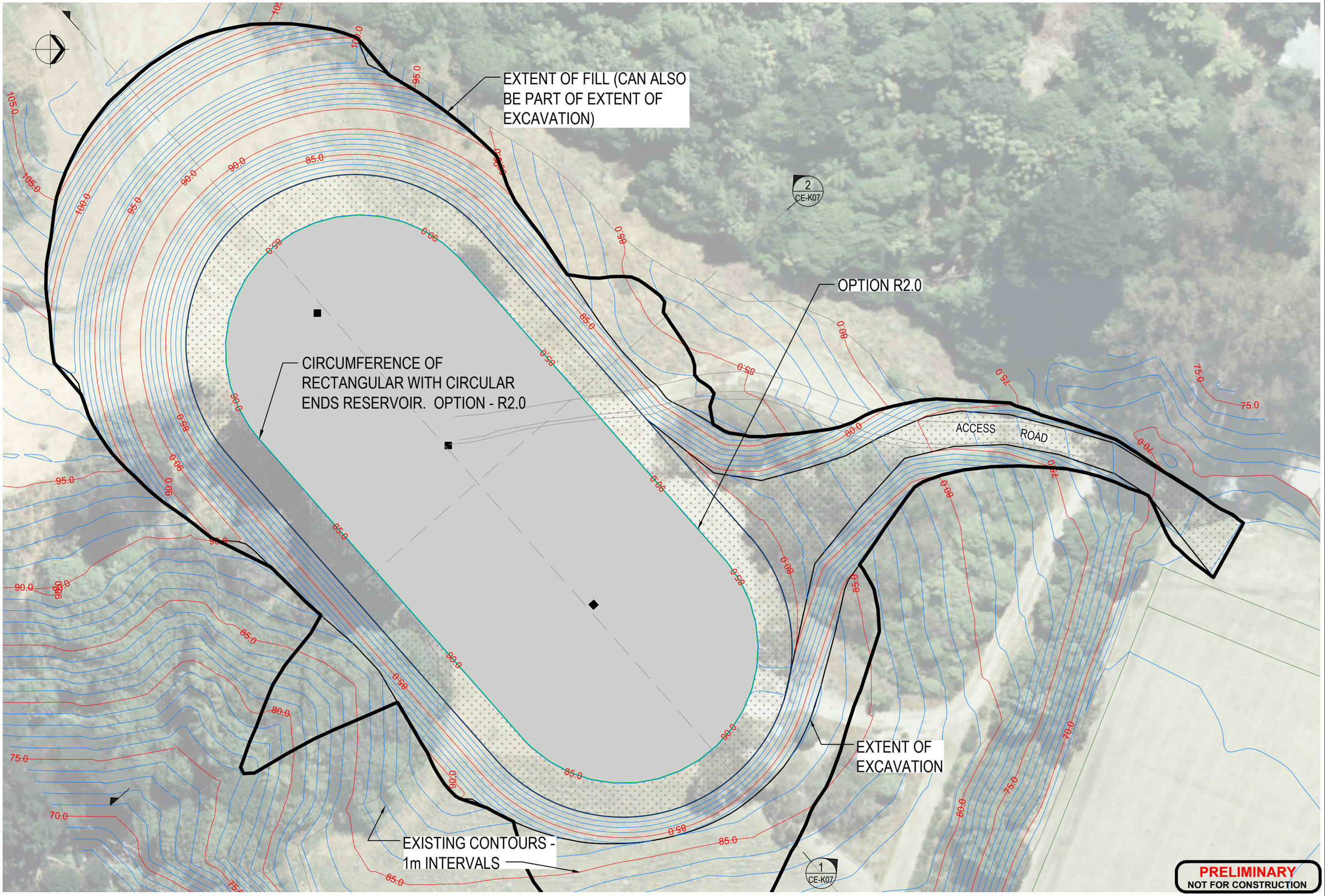
Project: HOSPITAL PRINCE OF WALES RESERVOIR

Title: SECTIONS OF RESERVOIR OPTION - R1.1

Discipline: CIVIL

Drawing No. 6517439-CE-K05 — Rev. C

Drawing Plotted: 01 Feb 2013 3:32 p.m.



PRELIMINARY
NOT FOR CONSTRUCTION

No.	Revision	By	Chk	Appd	Date
D	UPDATE FINAL ISSUE CDOR	AJP	CJM	SAE	01.02.13
C	FINAL P & S REPORT	AJP	CJM	SAE	14.09.12
B	DISTURBED GROUND EXTENTS ADDED	AJP	CJM	SAE	21.08.12
A	FOR PRELIMINARY DESIGN REPORT	AJP	CJM	SAE	31.07.12

Drawing Originator: CH2M Beca; capacity infrastructure services

Original Scale (A1) 1:250 (A1)
Reduced Scale (A3) 1:500 (A3)

Designed	CJM	31.07.12	Approved For Construction*
Drawn	AJP	31.07.12	
Dsg Verifier	BS	31.07.12	
Dwg Check			Date

* Refer to Revision 1 for Original Signature

Client: Absolutely Positively Wellington — Me Heke Ki Pōneke — Wellington City Council

Project: HOSPITAL PRINCE OF WALES RESERVOIR

Title: PLAN OF RESERVOIR OPTION - R2.0

Discipline: CIVIL

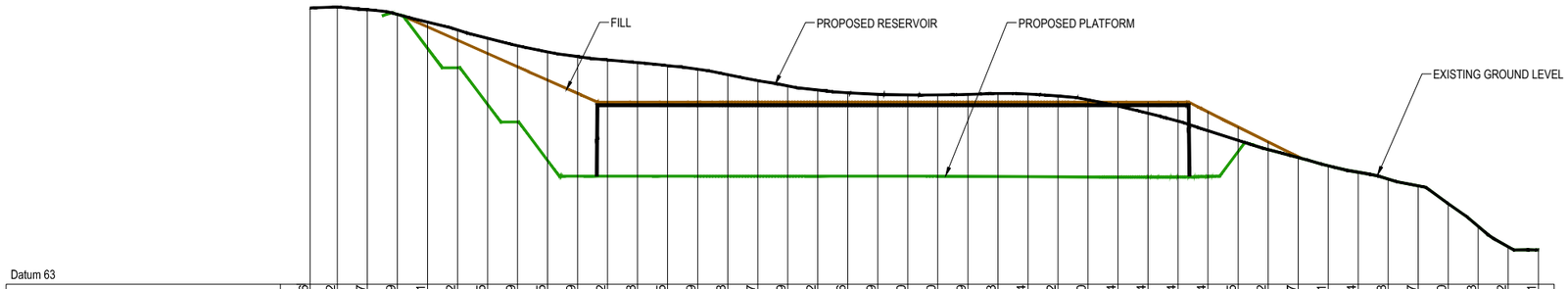
Drawing No.: 6517439-CE-K06

Rev.: D

Document No.: 6517439-PC-DWG-0001

DO NOT SCALE

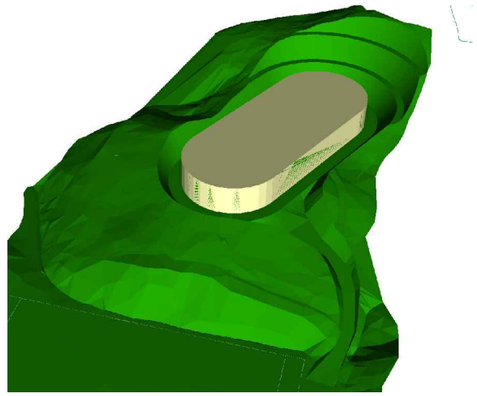
IF IN DOUBT ASK.



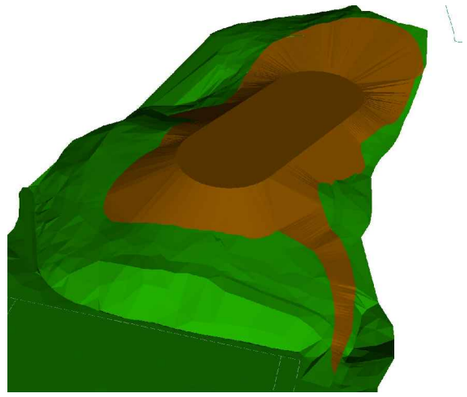
Datum 63

CHAINAGE	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	105	110	115	120	125	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205
EXISTING GROUND	108.96	109.12	108.67	107.89	106.61	105.32	103.95	102.69	101.65	100.89	100.32	99.88	99.35	98.79	97.88	96.87	95.99	95.32	94.86	94.59	94.50	94.50	94.59	94.73	94.64	94.32	93.70	92.64	91.44	90.14	88.54	86.95	85.42	84.07	82.71	81.64	80.48	79.37	76.40	72.63	69.22	68.71
PLATFORM				107.89	102.26	99.00	92.93	90.00	83.60	81.00	81.00	81.00	81.00	81.00	81.00	81.00	81.00	81.00	81.00	81.00	81.00	81.00	80.97	80.94	80.91	80.88	80.85	80.83	80.83	80.85	80.92	85.09	85.42	84.07	82.71	81.64	80.48	79.37	76.40	72.63	69.22	68.71
COVERED					105.84	103.62	101.40	99.18	96.97	94.76	93.30	93.30	93.30	93.30	93.30	93.30	93.30	93.30	93.30	93.30	93.30	93.30	93.30	93.30	93.30	93.30	93.30	93.30	93.30	93.30	91.67	89.17	86.68	84.20									

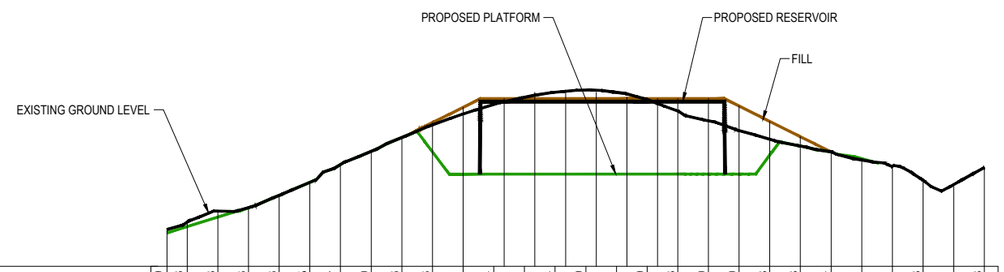
1 CE-K06 LONG SECTION
SCALE 1:500



OPTION R2.0 - PLATFORM



OPTION R2.0 - COVERED



Datum 66

CHAINAGE	0	3	13	18	23	28	33	38	43	48	53	58	63	68	73	78	83	88	93	98	103	108	113	118	123	128	133	138
EXISTING GROUND	71.99	73.18	74.98	75.53	77.53	79.65	82.57	84.70	86.96	89.03	90.81	92.34	93.51	94.34	94.69	94.31	93.19	91.28	89.70	88.10	86.68	85.58	84.64	83.31	82.31	79.98	79.31	82.06
PLATFORM	71.44	72.45	73.99	75.50	77.53	79.65	82.57	84.70	86.98	84.63	81.00	81.00	81.00	81.00	81.00	81.00	81.00	81.00	81.00	81.00	84.08	85.58	84.64	83.53				
COVERED										89.39	91.89	93.30	93.30	93.30	93.30	93.30	93.30	93.30	93.30	92.10	89.60	87.10						

2 CE-K06 CROSS SECTION
SCALE 1:500

PRELIMINARY
NOT FOR CONSTRUCTION

No.	Revision	By	Chk	Appd	Date
C	UPDATE FINAL ISSUE CDOR	AJP	CJM	SAE	01.02.13
B	FINAL P & S REPORT	AJP	CJM	SAE	14.09.12
A	FOR PRELIMINARY DESIGN REPORT	AJP	CJM	SAE	07.12

Drawing Originator: CH2M Beca; capacity infrastructure services

Original Scale (A1) 1:500
Reduced Scale (A3) 1:1000

Designed	CJM	31.07.12	Approved For Construction*
Drawn	AJP	31.07.12	
Dsg Verifier	BS	31.07.12	
Dwg Check			Date

* Refer to Revision 1 for Original Signature

Client: Absolutely Positively Wellington (Me Heke Ki Pōneke, Wellington City Council)

Project: HOSPITAL PRINCE OF WALES RESERVOIR

Title: SECTIONS OF RESERVOIR OPTION - R2.0

Discipline: CIVIL

Drawing No.: 6517439-CE-K07

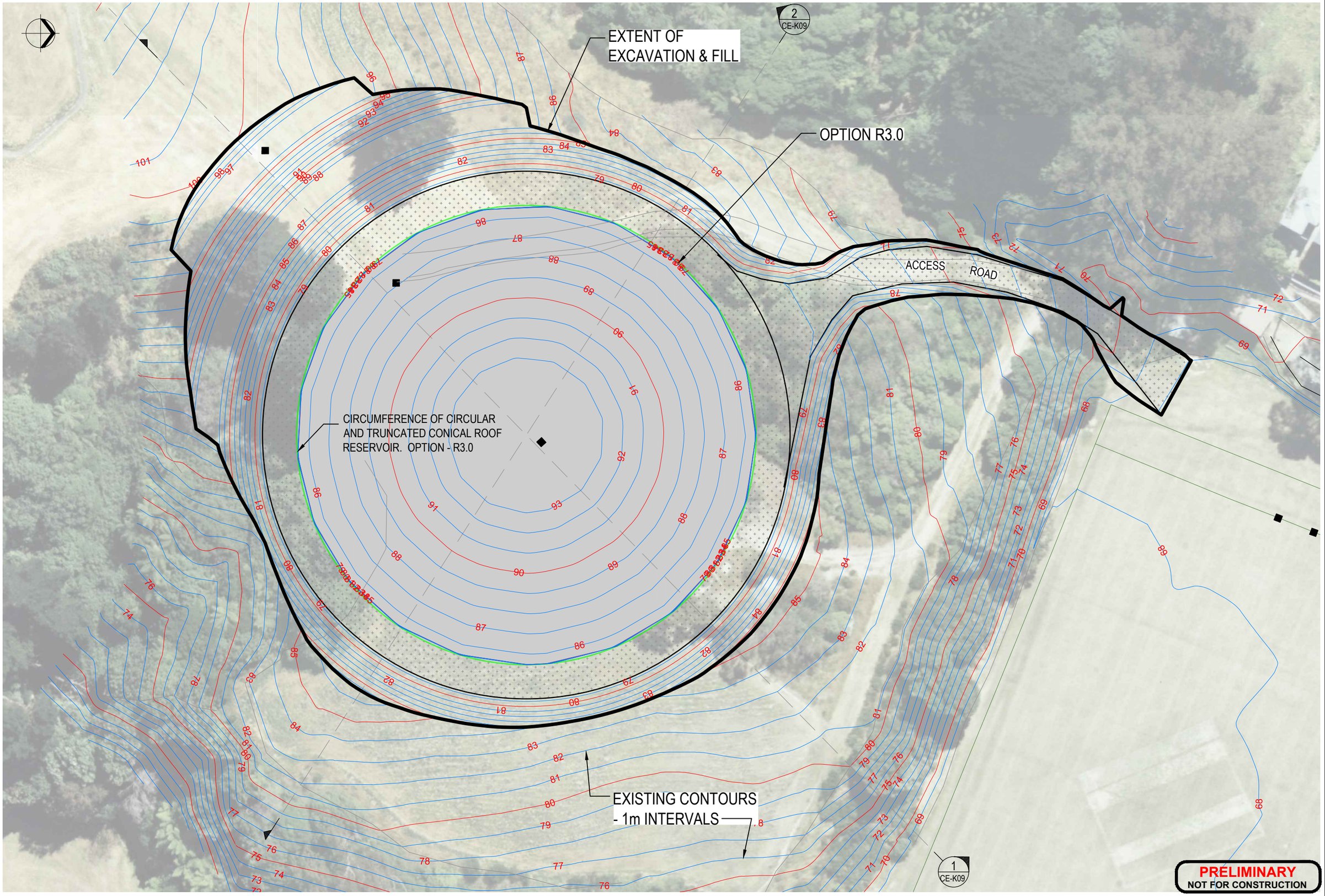
Rev.: C

Document No.: 6517439-CE-K07.DWG

DO NOT SCALE

IF IN DOUBT ASK.

Drawing Plotted: 01 Feb 2013 3:35 p.m.



PRELIMINARY
NOT FOR CONSTRUCTION

No.	Revision	By	Chk	Appd	Date
D	UPDATE FINAL ISSUE CDOR	AJP	CJM	SAE	01.02.13
C	FINAL P & S REPORT	AJP	CJM	SAE	14.09.12
B	DISTURBED GROUND EXTENTS ADDED	AJP	CJM	SAE	21.08.12
A	FOR PRELIMINARY DESIGN REPORT	AJP	CJM	SAE	31.07.12

Drawing Originator: CH2M Beca / capacity infrastructure services

Original Scale (A1) 1:250 (A1)
Reduced Scale (A3) 1:500 (A3)

~~Designed~~	CJM	31.07.12	Approved For Construction*
Drawn	AJP	31.07.12	
Dsg Verifier	BS	31.07.12	
Dwg Check			Date

* Refer to Revision 1 for Original Signature

Client: Absolutely Positively Wellington — Me Heke Ki Pōneke — Wellington City Council

Project: HOSPITAL
PRINCE OF WALES
RESERVOIR

Title: PLAN OF RESERVOIR
OPTION - R3.0

Discipline: CIVIL

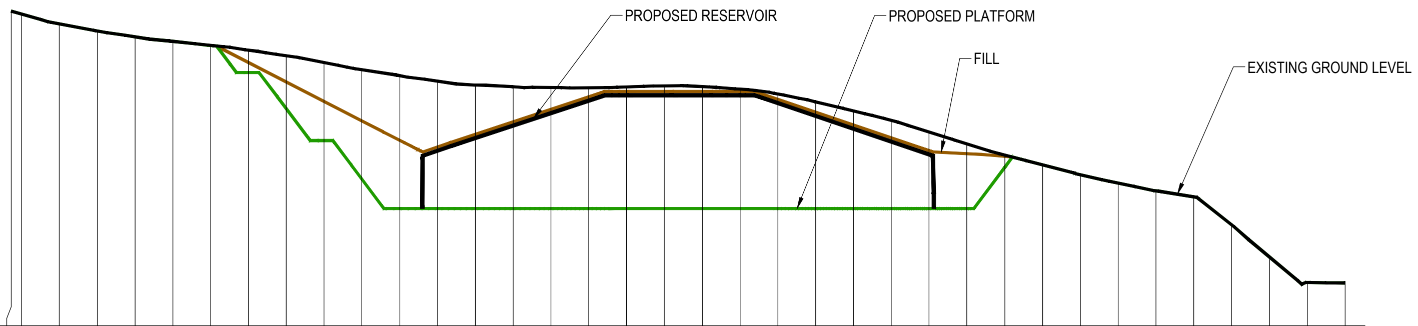
Drawing No.: 6517439-CE-K08

Rev.: D

Document No.: 6517439-CE-K08.DWG

DO NOT SCALE

IF IN DOUBT ASK.



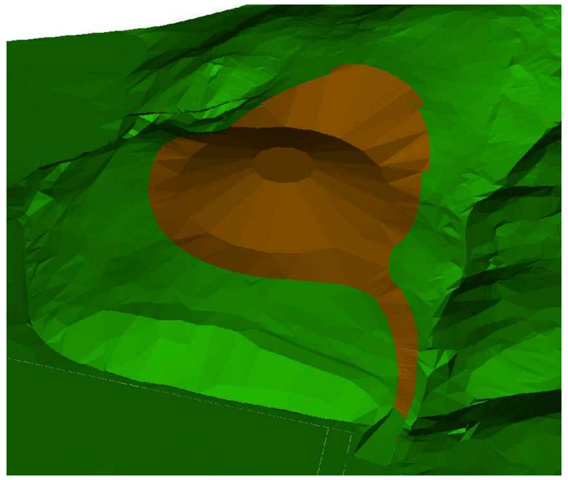
Datum 63 UNIT (m)

EXISTING GROUND	104.61	104.22	102.93	101.99	101.21	100.62	100.09	99.46	98.70	97.81	96.87	96.08	95.37	94.84	94.63	94.53	94.49	94.59
PLATFORM	104.61	104.22	102.93	101.99	101.21	100.62	100.08	96.50	91.71	87.50	82.38	78.50	78.50	78.50	78.50	78.50	78.50	78.50
COVERED								97.84	95.26	92.69	90.11	87.54	86.66	88.32	89.98	91.63	93.29	94.00
CHAINAGE	0	1	11	16	21	26	31	36	41	46	51	56	61	66	71	76	81	86

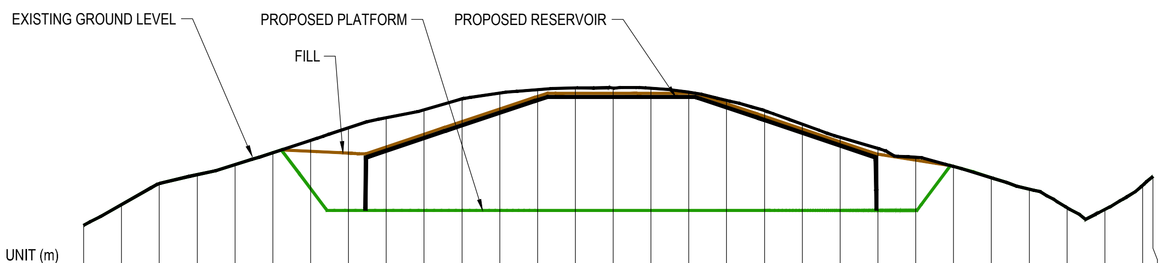
EXISTING GROUND	94.73	94.64	94.30	93.65	92.63	91.43	90.19	88.63	87.05	85.58	84.27	82.99	81.89	80.84	80.07	76.38	72.11	68.72	68.67
PLATFORM	78.50	78.50	78.50	78.50	78.50	78.50	78.50	78.50	78.50	83.96	84.27	82.99	81.89	80.84	80.07	76.38	72.11	68.72	68.67
COVERED	94.00	94.00	94.00	92.95	91.25	89.56	87.86	86.16	85.77	85.41									
CHAINAGE	91	96	101	106	111	116	121	126	131	136	141	146	151	156	161	166	171	176	181

1 CE-K08 LONG SECTION
SCALE 1:500

OPTION R3.0 - PLATFORM



OPTION R3.0 - COVERED



Datum 71 UNIT (m)

EXISTING GROUND	76.54	79.28	82.04	83.24	84.56	86.13	87.77	89.42	90.75	91.82	93.24	94.01	94.46	94.68
PLATFORM	76.54	79.28	82.04	83.24	84.56	86.13	81.37	78.50	78.50	78.50	78.50	78.50	78.50	78.50
COVERED							86.33	86.08	86.90	88.58	90.26	91.91	93.57	94.00
CHAINAGE	0	5	10	15	20	25	30	35	40	45	50	55	60	65

EXISTING GROUND	94.67	94.66	94.15	93.04	91.69	89.90	88.16	86.70	85.52	84.32	82.81	81.31	78.87	78.63	81.82	83.00
PLATFORM	78.50	78.50	78.50	78.50	78.50	78.50	78.50	78.50	78.50	84.32	82.81	81.31	78.87	78.63	81.82	83.00
COVERED	94.00	94.00	94.00	92.62	90.96	89.27	87.58	85.95	85.14							
CHAINAGE	70	75	80	85	90	95	100	105	110	115	120	125	130	135	140	141

2 CE-K08 CROSS SECTION
SCALE 1:500

PRELIMINARY
NOT FOR CONSTRUCTION

No.	Revision	By	Chk	Appd	Date
C	UPDATE FINAL ISSUE CDOR	AJP	CJM	SAE	01.02.13
B	FINAL P & S REPORT	AJP	CJM	SAE	14.09.12
A	FOR PRELIMINARY DESIGN REPORT	AJP	CJM	SAE	31.07.12

Drawing Originator: CH2M Beca / capacity infrastructure services

Original Scale (A1) 1:500
Reduced Scale (A3) 1:1000

Designed	CJM	31.07.12
Drawn	AJP	31.07.12
Dsg Verifier	BS	31.07.12
Dwg Check		

Approved For Construction*
Date
* Refer to Revision 1 for Original Signature

Client: Absolutely Positively Wellington — Me Heke ki Pōneke, Wellington City Council

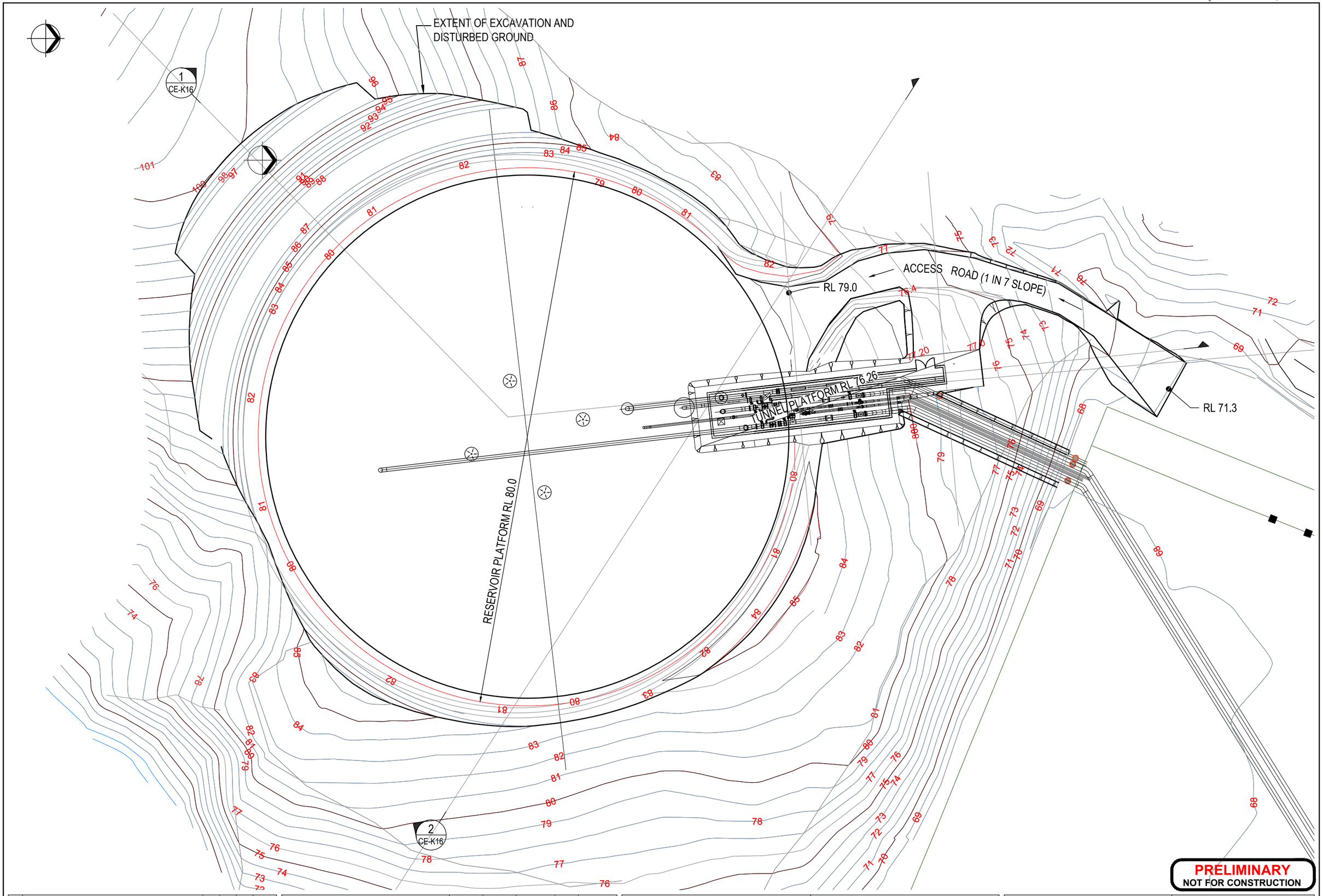
Project: HOSPITAL PRINCE OF WALES RESERVOIR

Title: SECTIONS OF RESERVOIR OPTION - R3.0

Discipline: CIVIL

Drawing No. 6517439-CE-K09 Rev. C

Drawing Plotted: 04 Feb 2013 1:45 p.m.



PRELIMINARY
NOT FOR CONSTRUCTION

No.	Revision	By	Chk	Appd	Date
B	UPDATE FINAL ISSUE CDOR	AJP	CJM	SAE	01.02.13
A	FOR CLIENT REVIEW	AJP	CJM	SAE	20.09.12

Drawing Originator: CH2M Beca / capacity infrastructure services

Original Scale (A1) 1:250 (A1)
Reduced Scale (A3) 1:500 (A3)

Designed	CJM		Approved For Construction*
Drawn	AJP	09.12	
Dsg Verifier	SAE		
Dwg Check	SAE		Date

* Refer to Revision 1 for Original Signature

Client: Absolutely Positively Wellington — Me Heke Ki Pōneke, Wellington City Council

Project: HOSPITAL PRINCE OF WALES RESERVOIR

Title: PLAN OF RESERVOIR OPTION - R3.1 EARTHWORKS

Discipline: CIVIL

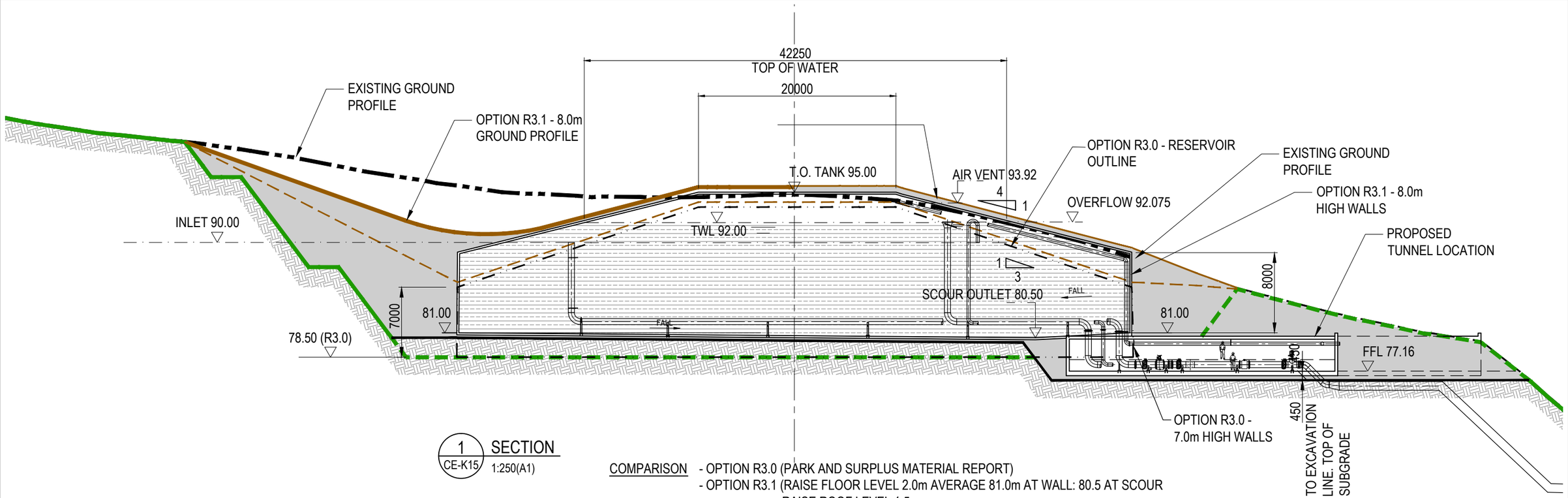
Drawing No.: 6517439-CE-K15

Rev.: B

DO NOT SCALE

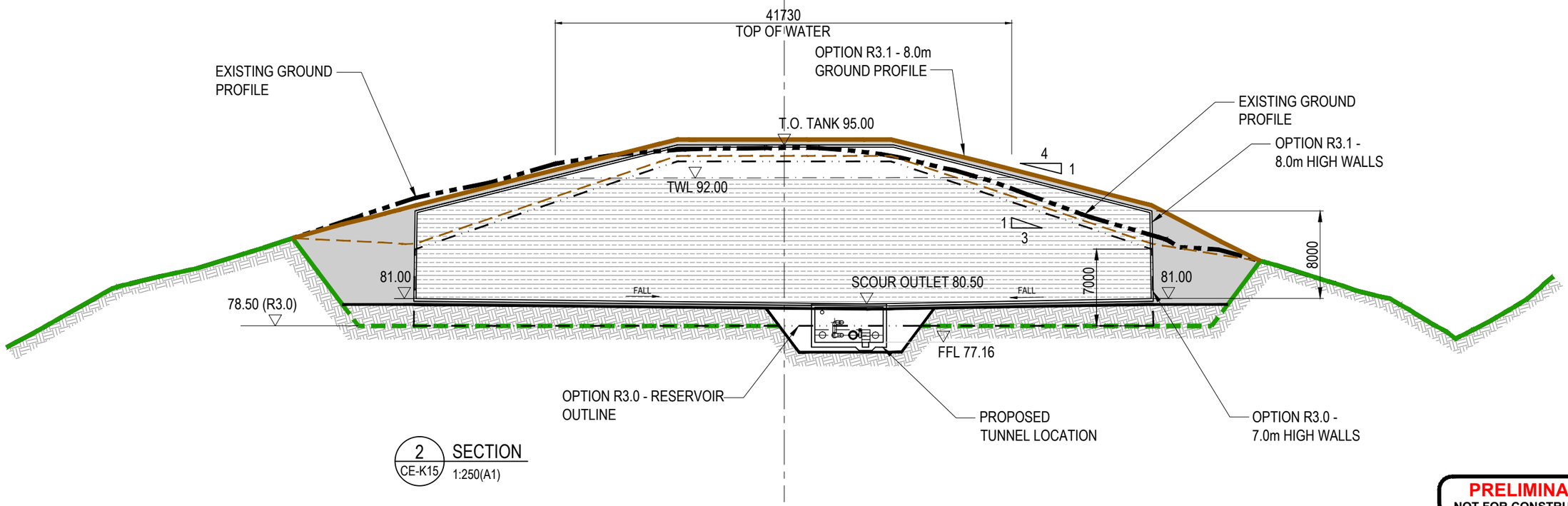
IF IN DOUBT ASK.

Document No. 6517439-CE-K15



1 CE-K15 SECTION
1:250(A1)

COMPARISON
- OPTION R3.0 (PARK AND SURPLUS MATERIAL REPORT)
- OPTION R3.1 (RAISE FLOOR LEVEL 2.0m AVERAGE 81.0m AT WALL: 80.5 AT SCOUR
  RAISE ROOF LEVEL 1.5m
  ROOF SLOPE FLATTENED TO 1v TO 4h
  TWL 92.00)
- REDUCTION IN EXCAVATION DEPTH AND QUANTITY
- SMALL INCREASE IN BACKFILL VOLUME



2 CE-K15 SECTION
1:250(A1)

PRELIMINARY
NOT FOR CONSTRUCTION

No.	Revision	By	Chk	Appd	Date
C	UPDATE FINAL ISSUE CDOR	AJP		SAE	01.02.13
B	FOR CLIENT REVIEW	AJP		SAE	20.09.12
A	SKETCH FOR INFORMATION ONLY	AJP			15.08.12

Drawing Originator: CH2M Beca / capacity infrastructure services

Original Scale (A1) 1:250 (A1)
Reduced Scale (A3) 1:500 (A3)

Designed	SAE	09.12	Approved For Construction*
Drawn	AJP	09.12	
Dsg Verifier			
Dwg Check			Date

* Refer to Revision 1 for Original Signature

Client: Absolutely Positively Wellington City Council / Me Heke Ki Pōneke

Project: HOSPITAL PRINCE OF WALES RESERVOIR

Title: SECTIONS OF RESERVOIR OPTION - R3.1

Discipline: CIVIL

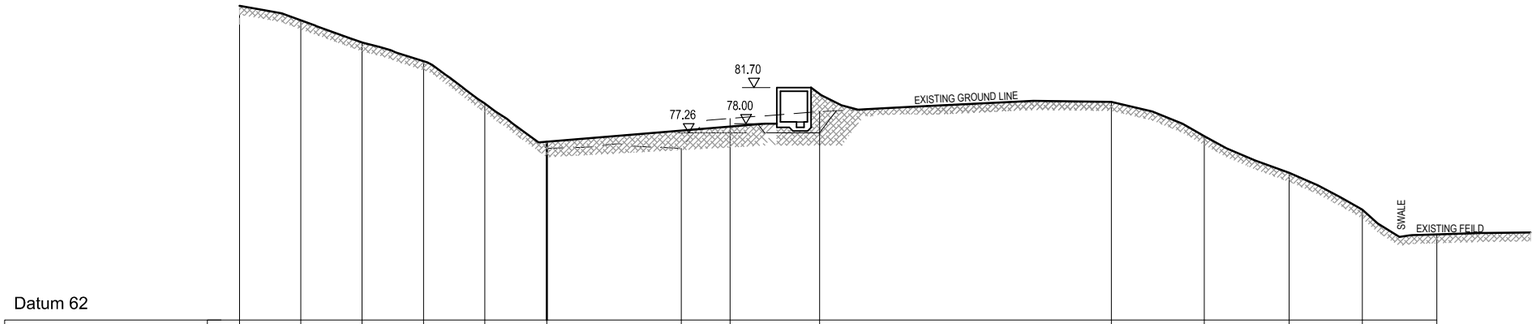
Drawing No.: 6517439-CE-K16

Rev.: C

Document No.: 6517439 (CAD FILE)

DO NOT SCALE

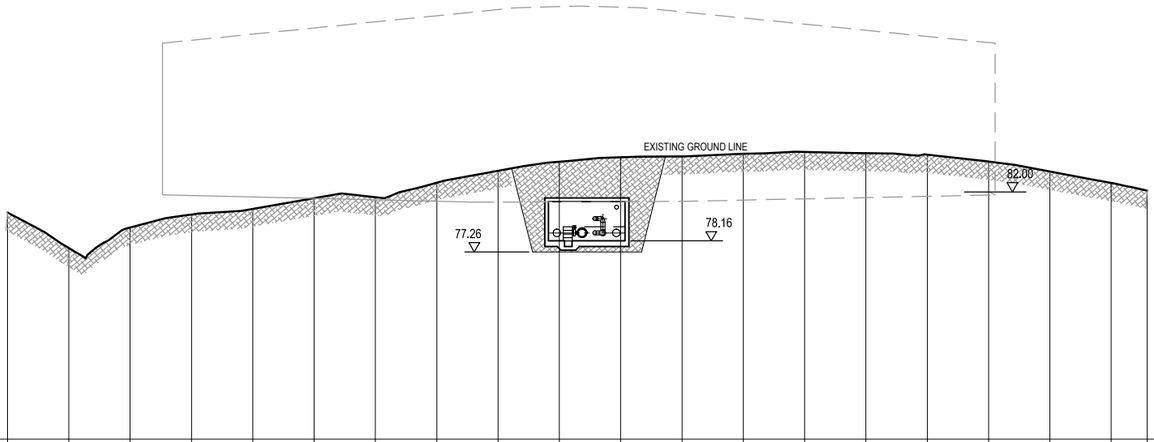
IF IN DOUBT ASK.



Datum 62

EXISTING GROUND	87.61	86.43	84.63	83.10	79.66	76.00	76.00	78.43	80.73	79.80	77.00	74.00	71.00	68.99	
CHAINAGE	0	5	10	15	20	25	36	40	47	71	79	85	91	98	

4 / CE-K25 SECTION
1:250(A1)



Datum 62

EXISTING GROUND	89.48	86.58	88.25	89.31	89.77	90.64	90.72	91.90	92.87	93.60	93.97	94.05	94.26	94.41	94.31	94.18	93.62	92.81	91.89	91.26		
CHAINAGE	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	93		

3 / CE-K25 SECTION
1:250(A1)

PRELIMINARY
NOT FOR CONSTRUCTION

No.	Revision	By	Chk	Appd	Date
B	UPDATE FINAL ISSUE CDOR	AJP	CJM	SAE	01.02.13
A	FOR CLIENT REVIEW	AJP	CJM	SAE	20.09.12

Drawing Originator: CH2M Beca / capacity infrastructure services

Original Scale (A1) 1:250 (A1)
Reduced Scale (A3) 1:500 (A3)

~~Designed~~	CJM		Approved For Construction*
Drawn	AJP	09.12	
Dsg Verifier			
Dwg Check	SAE		Date

* Refer to Revision 1 for Original Signature

Client: Absolutely Positively Wellington (Me Heke Ki Pōneke, Wellington City Council)

Project: HOSPITAL PRINCE OF WALES RESERVOIR

Title: PIPE TUNNEL CROSS SECTION OPTION - R1.0

Discipline: CIVIL

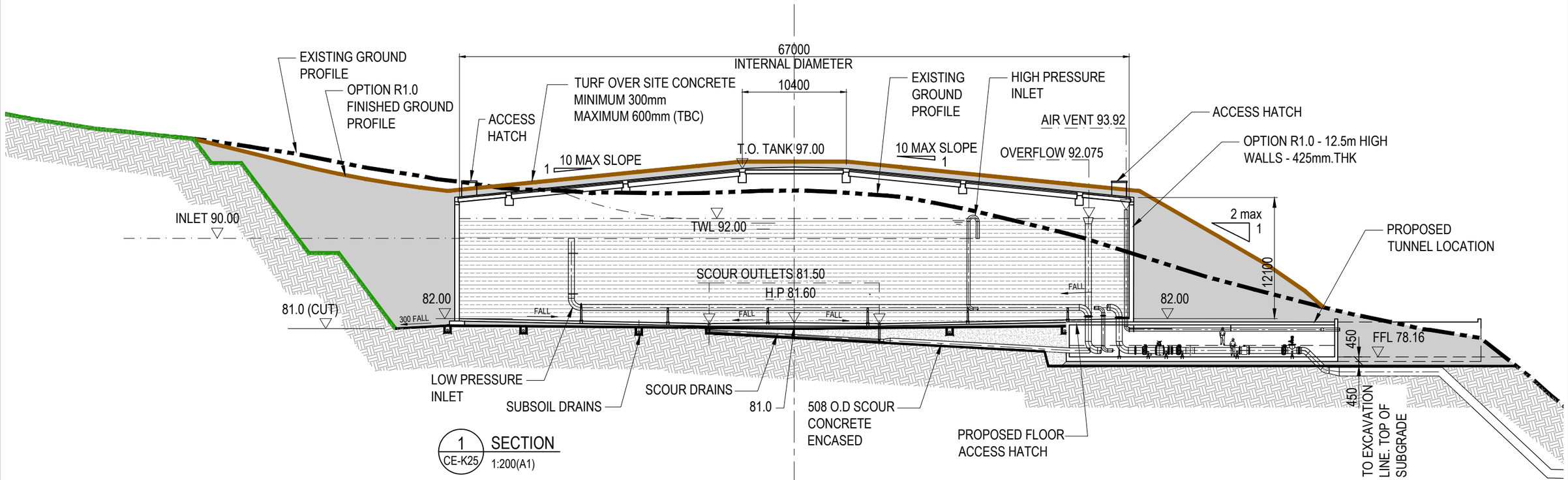
Drawing No.: 6517439-CE-K17

Rev.: B

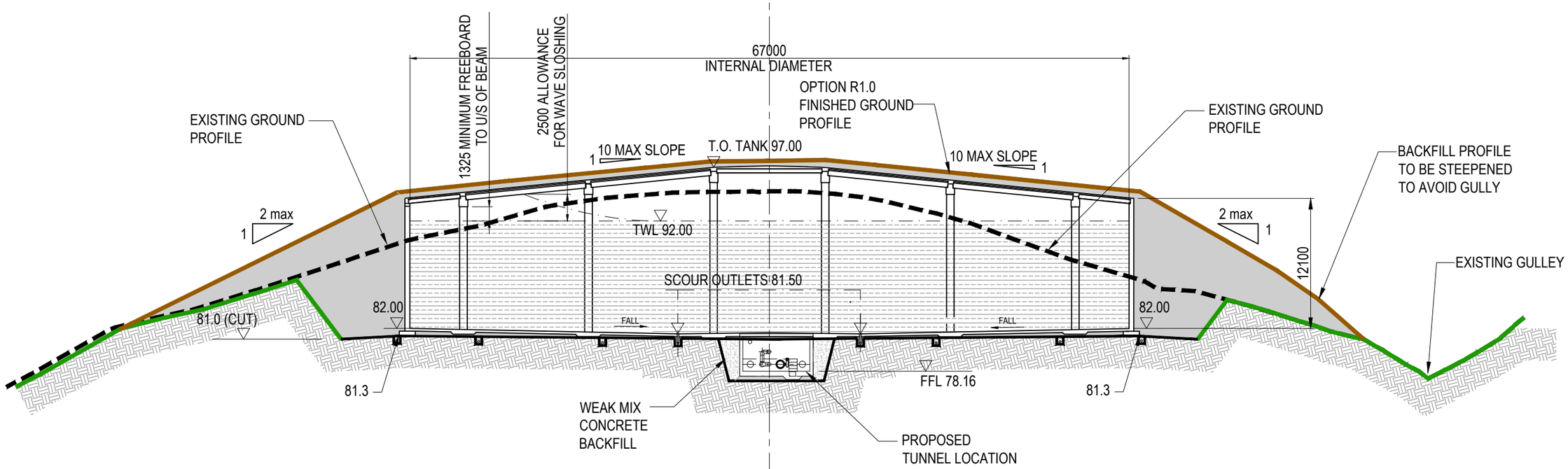
Document No.: 6517439-CE-K17.DWG

DO NOT SCALE

IF IN DOUBT ASK.



1 CE-K25 SECTION
1:200(A1)



2 CE-K25 SECTION
1:200(A1)

PRELIMINARY
NOT FOR CONSTRUCTION

No.	Revision	By	Chk	Appd	Date
B	UPDATE FINAL ISSUE CDOR	AJP	SAE	SAE	01.02.13
A	FOR GEOTECH REPORT ADDENDUM	AJP	SAE	SAE	18.01.13

Drawing Originator: CH2M Beca; capacity infrastructure services

Original Scale (A1) 1:250 (A1)
Reduced Scale (A3) 1:500 (A3)

Designed	SAE	01.13	Approved For Construction*
Drawn	AJP	01.13	
Dsg Verifier	JVP	01.13	
Dwg Check	SAE	01.13	Date

* Refer to Revision 1 for Original Signature

Client: Absolutely Positively Wellington — Me Heke Ki Pōneke — Wellington City Council

Project: HOSPITAL PRINCE OF WALES RESERVOIR

Title: SECTIONS OF RESERVOIR OPTION - R1.0

Discipline: CIVIL

Drawing No.: 6517439-CE-K18

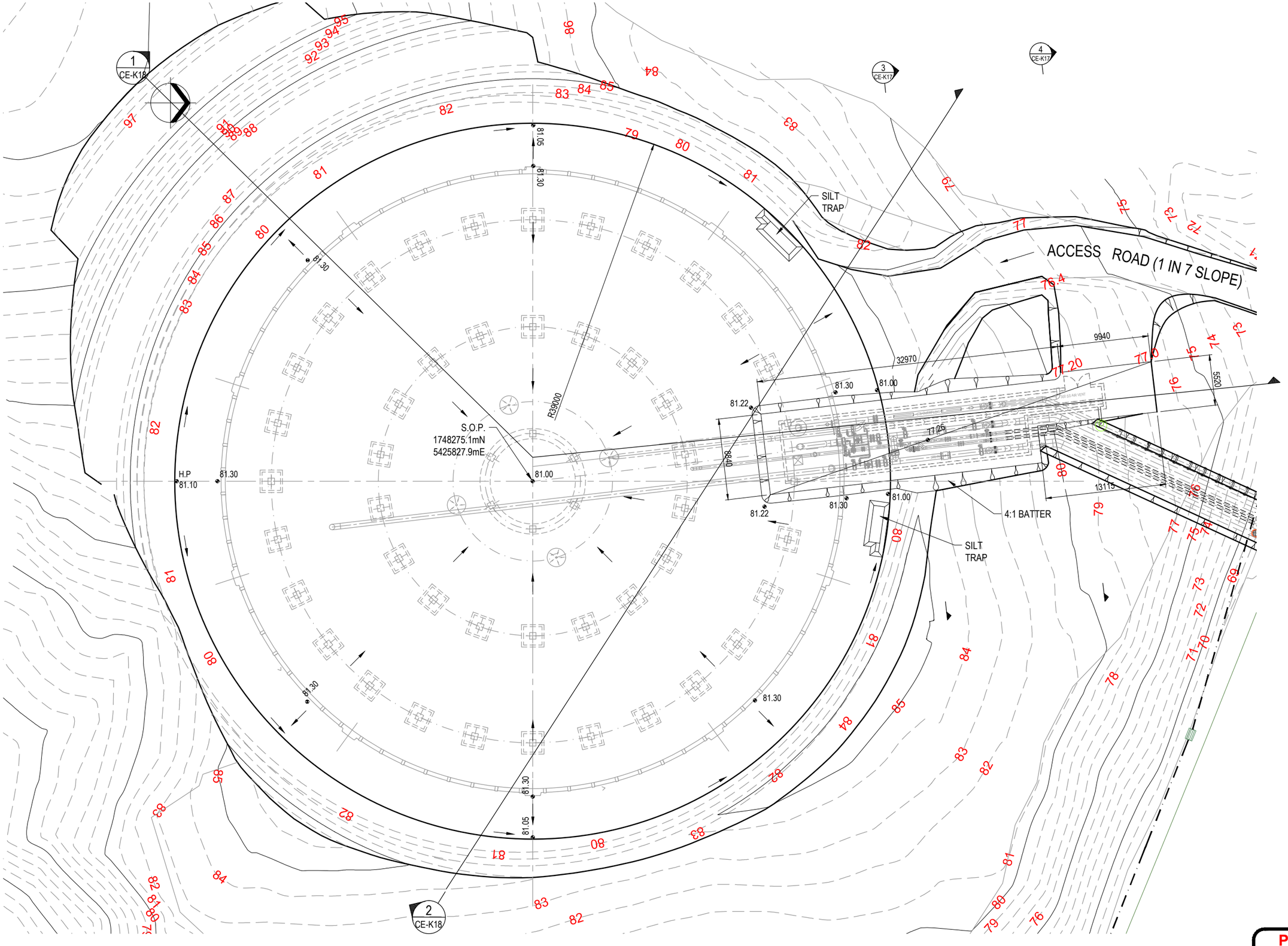
Rev.: B

Document No.: 6517439-CE-K18.DWG

DO NOT SCALE

IF IN DOUBT ASK.

Drawing Plotted: 05 Feb 2013 10:38 a.m.



PRELIMINARY
NOT FOR CONSTRUCTION

No.	Revision	By	Chk	Appd	Date
B	UPDATE FINAL ISSUE CDOR	AJP	SAE	SAE	01.02.13
A	FOR GEOTECH REPORT ADDENDUM	AJP	SAE	SAE	18.01.13

Drawing Originator: CH2M Beca / capacity infrastructure services

Original Scale (A1) 1:250 (A1)
Reduced Scale (A3) 1:500 (A3)

~~Designed~~	SAE		Approved For Construction*
Drawn	AJP	01.13	
Dsg Verifier			
Dwg Check			Date

* Refer to Revision 1 for Original Signature

Client: Absolutely Positively Wellington (He Hiere ki Pōneke Wellington City Council)

Project: HOSPITAL PRINCE OF WALES RESERVOIR

Title: PLAN OF RESERVOIR OPTION - R1.0 EARTHWORKS

Discipline: CIVIL

Drawing No.: 6517439-CE-K25

Rev.: B

Document No.: 6517439-CE-K25.DWG

DO NOT SCALE

IF IN DOUBT ASK.

Drawing Plotted: 01 Feb 2013 1:08 p.m.

EXISTING ACCESS TRACK

TUNNEL FOOTPRINT

RESERVOIR FOOTPRINT

METER HUT

RUGBY PITCH MARKING

(UPPER PLAYING FIELD)

LEGEND

- HIGH VALUE REGENERATING NATIVE
- MODERATE VALUE MIXED EXOTIC AND NATIVE
- LOW VALUE EXOTIC PLANTING
- RECENT PLANTING
- EXISTING FORMED WALKING TRACKS
- EXISTING UNFORMED WALKING TRACKS

PRELIMINARY
NOT FOR CONSTRUCTION

No.	Revision	By	Chk	Appd	Date
A	ISSUED FOR CDOR	HLY	SRW	SAE	01.02.13

Drawing Originator: CH2M Beca / capacity infrastructure services

Original Scale (A1): 500
Reduced Scale (A3): 1000

Design	JDB		Approved For Issue*
Drawn	HLY	26.07.12	
Checked	JDB	26.06.12	
Dwg Check	SAE	27.06.12	Date

* Refer to Revision 1 for Original Signature

Client: Absolutely Positively Wellington (Me Heke Ki Pōneke, Wellington City Council)

Project: HOSPITAL PRINCE OF WALES RESERVOIR

Title: EXISTING SITE FEATURES

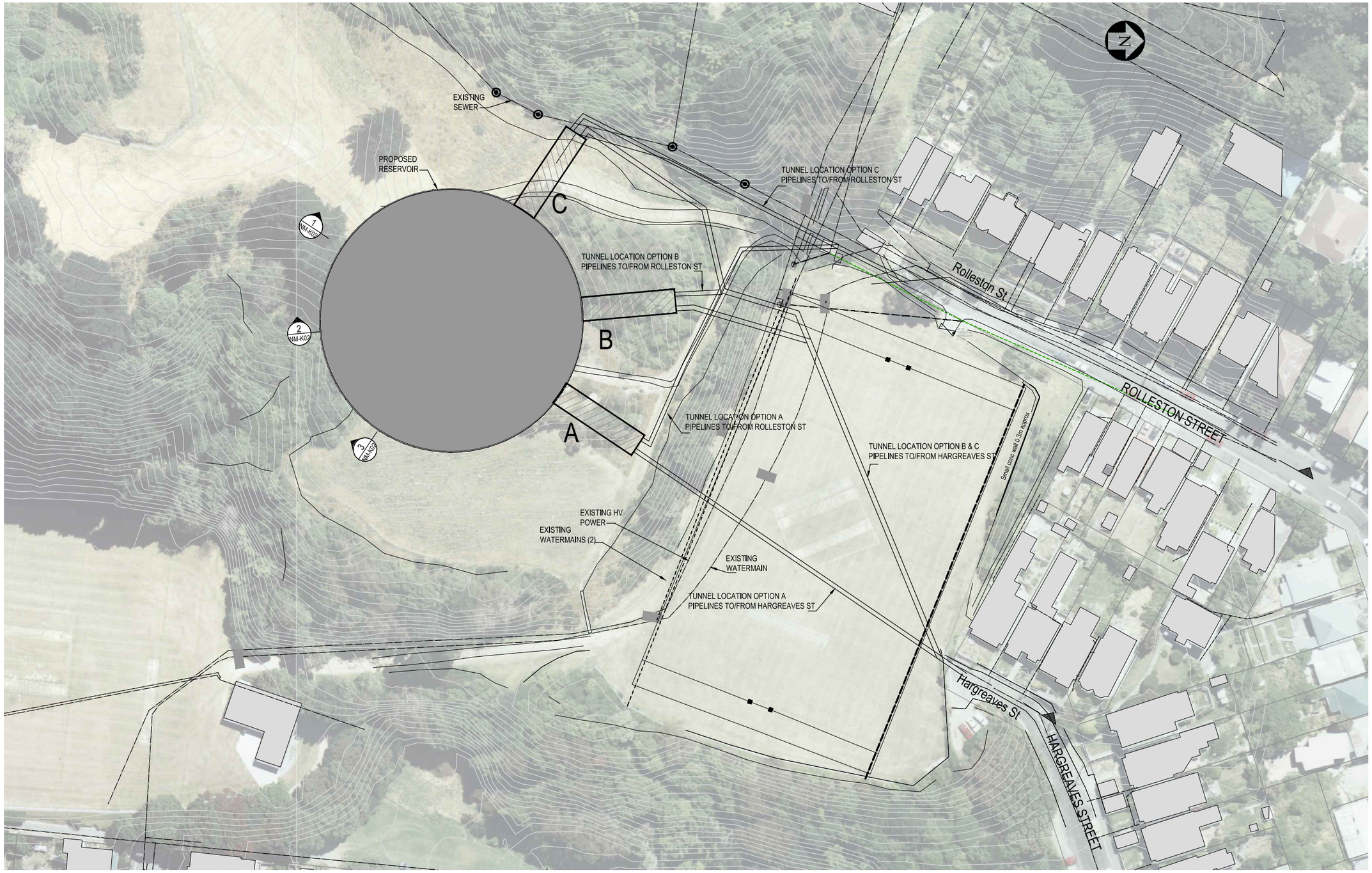
Discipline: CIVIL

Drawing No.: 6517439-CE-K30

Rev.: A

DO NOT SCALE

IF IN DOUBT ASK.



NOTES

A, B, C = OPTIONAL POSITIONS FOR PIPE TUNNEL OPTIONS 1, 2, 3

PLAN
1:500

PRELIMINARY
NOT FOR CONSTRUCTION

No.	Revision	By	Chk	Appd	Date
A	FOR INFORMATION	GW	DRH	SAE	15.06.12

Drawing Originator: CH2M Beca / capacity infrastructure services

Original Scale (A1) 1:500
Reduced Scale (A3)

Designed	GAI, MY	15.06.12	Approved For Construction*
Drawn	GW GAI	15.06.12	
Dsg Verifier	SE	15.06.12	
Dwg Check	DRH	15.06.12	Date

* Refer to Revision 1 for Original Signature

Client: Absolutely Positively Wellington City Council / Me Heke Ki Pōneke

Project: HOSPITAL PRINCE OF WALES RESERVOIR

Title: PLAN TUNNEL LOCATION OPTIONS

Discipline: MECHANICAL

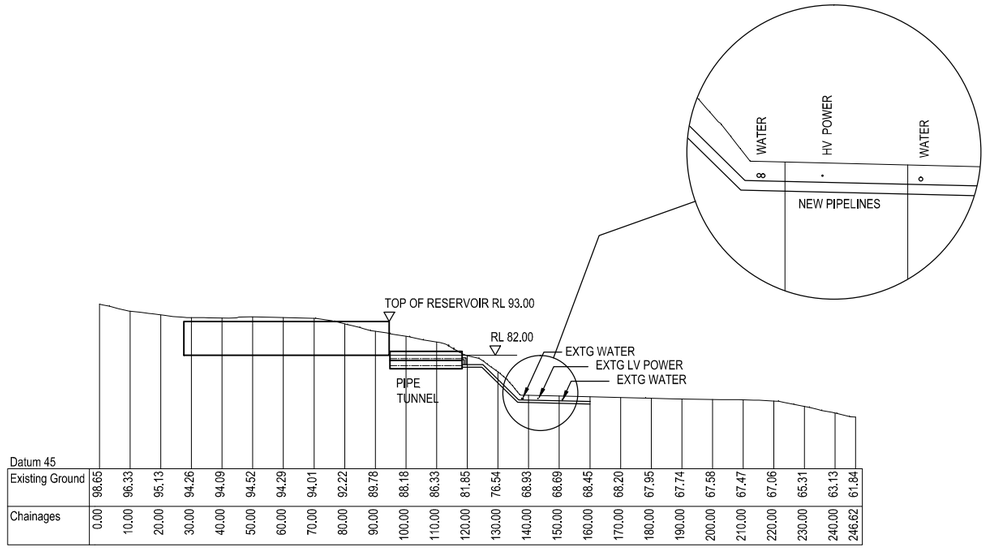
Drawing No.: 6517439-NM-K01

Rev.: A

DO NOT SCALE

IF IN DOUBT ASK.

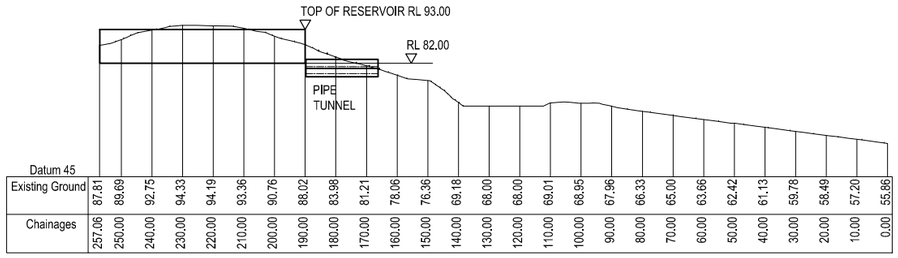
Document No. 6517439 NM K01



Datum 45																									
Existing Ground	98.65	96.33	95.13	94.26	94.09	94.52	94.29	94.01	92.22	89.78	88.18	86.33	81.85	76.54	68.93	68.69	68.45	68.20	67.95	67.74	67.58	67.47	67.06	65.31	63.13	61.84
Chainages	0.00	10.00	20.00	30.00	40.00	50.00	60.00	70.00	80.00	90.00	100.00	110.00	120.00	130.00	140.00	150.00	160.00	170.00	180.00	190.00	200.00	210.00	220.00	230.00	240.00	246.62

Horizontal Scale1:1000
Vertical Scale 1:1000

1 NM-K01 SECTION 1:1000



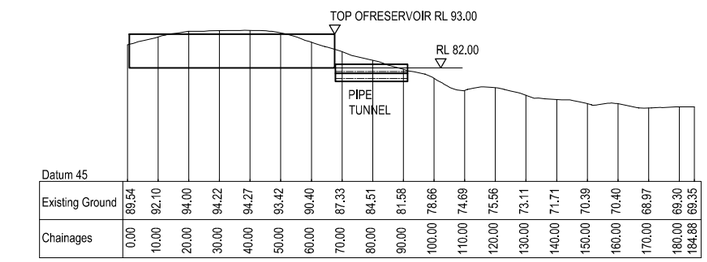
Datum 45																									
Existing Ground	87.61	89.69	92.75	94.33	94.19	93.36	90.76	88.02	83.98	81.21	78.06	76.36	69.18	68.00	68.00	69.01	68.95	67.96	66.33	65.00	63.66	62.42	61.13	59.78	58.49	57.20	55.66
Chainages	257.06	250.00	240.00	230.00	220.00	210.00	200.00	190.00	180.00	170.00	160.00	150.00	140.00	130.00	120.00	110.00	100.00	90.00	80.00	70.00	60.00	50.00	40.00	30.00	20.00	10.00	0.00

Horizontal Scale1:1000
Vertical Scale 1:1000

2 NM-K01 SECTION 1:1000

NOTES

1. TUNNEL OPTION 2 (TWO LEVEL) SHOWN
2. TUNNEL MAY BE SET TO LOWER LEVEL TO BE LESS VISIBLE



Datum 45																				
Existing Ground	89.54	92.10	94.00	94.22	94.27	93.42	90.40	87.33	84.51	81.58	78.66	74.69	75.56	73.11	71.71	70.39	70.40	68.97	69.30	69.35
Chainages	0.00	10.00	20.00	30.00	40.00	50.00	60.00	70.00	80.00	90.00	100.00	110.00	120.00	130.00	140.00	150.00	160.00	170.00	180.00	184.88

Horizontal Scale1:1000
Vertical Scale 1:1000

3 NM-K01 SECTION 1:1000

PRELIMINARY
NOT FOR CONSTRUCTION

No.	Revision	By	Chk	Appd	Date
A	FOR ONFORMATION	GW	DRH	SAE	15.06.12

Drawing Originator: CH2M Beca / capacity infrastructure services

Original Scale (A1) 1:1000
Reduced Scale (A3)

~~Designed~~	GAI, MY	15.06.12	Approved For Construction*
Drawn	GW, GAI	15.06.12	
Dsg Verifier	SE	15.06.12	
Dwg Check	DRH	15.06.12	Date

* Refer to Revision 1 for Original Signature

Client: Absolutely Positively Wellington — Me Heke Ki Pōneke — Wellington City Council

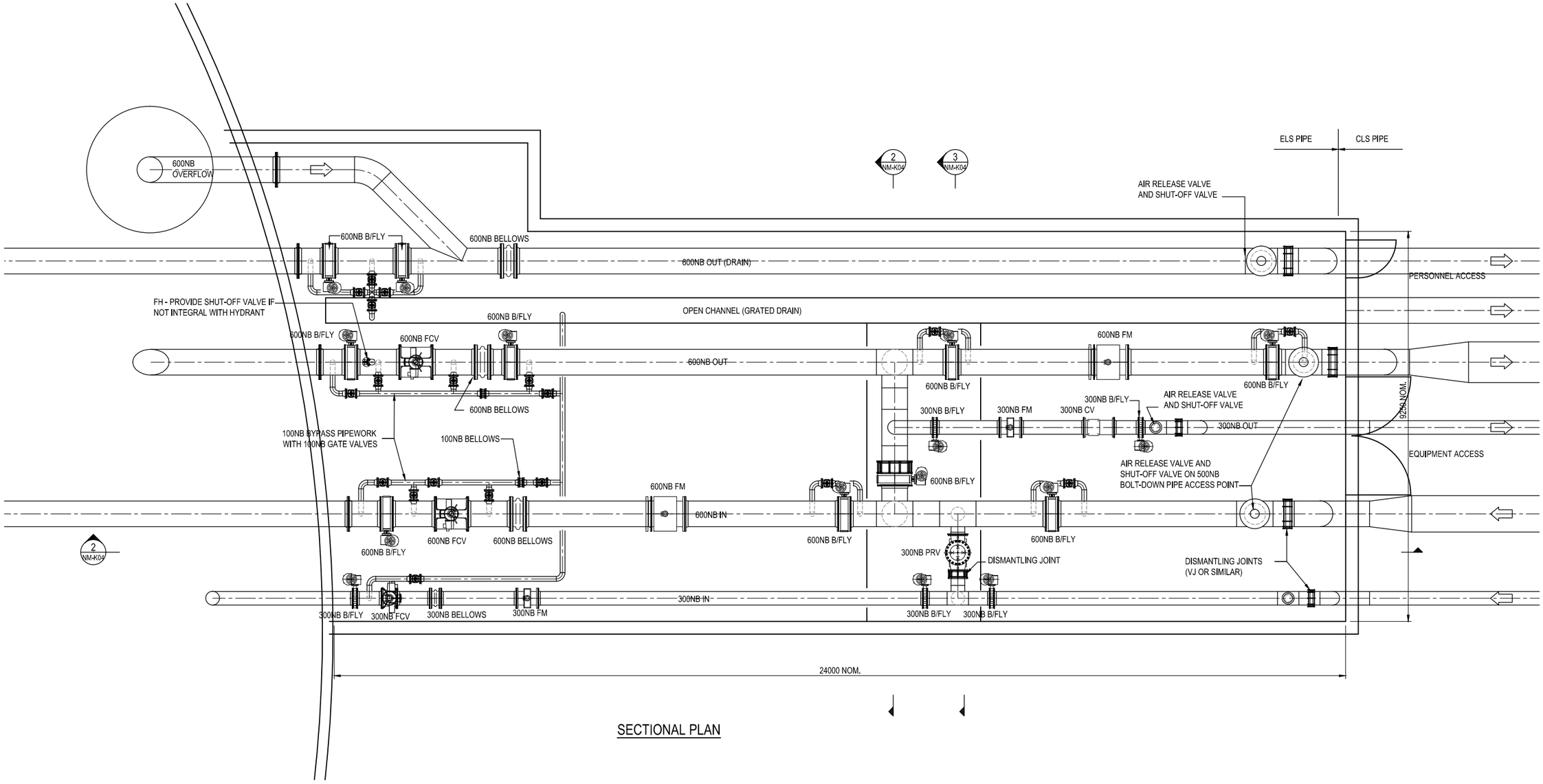
Project: HOSPITAL PRINCE OF WALES RESERVOIR

Title: SECTIONS TUNNEL LAYOUT OPTIONS

Discipline: MECHANICAL

Drawing No.: 6517439-NM-K02

Rev.: A



SECTIONAL PLAN

LEGEND

B/FLY	BUTTERFLY VALVE
CV	CHECK VALVE
FCV	FLOW CONTROL VALVE
FH	FIRE HYDRANT
FM	FLOW METER

PRELIMINARY
NOT FOR CONSTRUCTION

No.	Revision	By	Chk	Appd	Date
A	FOR INFORMATION	GAI	DRH	SAE	15.06.12

Drawing Originator: CH2M Beca / capacity infrastructure services

Original Scale (A1) 1:50
Reduced Scale (A3)

~~Designed~~	GAI, MY	15.06.12	Approved For Construction*
Drawn	GAI	15.06.12	
Dsg Verifier	SE	15.06.12	
Dwg Check	DRH	15.06.12	Date

* Refer to Revision 1 for Original Signature

Client: Absolutely Positively Wellington / He Hiko Ki Pōneke / Wellington City Council

Project: HOSPITAL PRINCE OF WALES RESERVOIR

Title: TUNNEL PIPEWORK LAYOUT OPTION 1.0 PLAN

Discipline: MECHANICAL

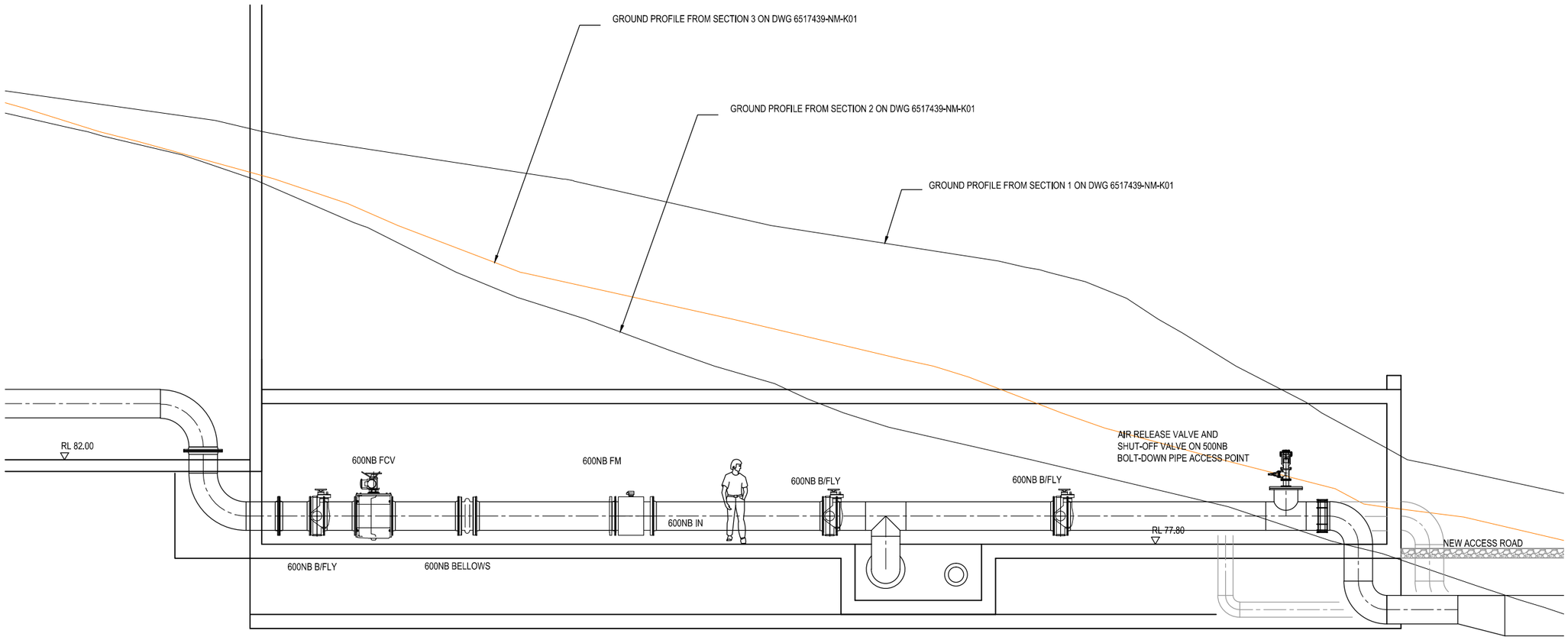
Drawing No.: 6517439-NM-K03

Rev.: A

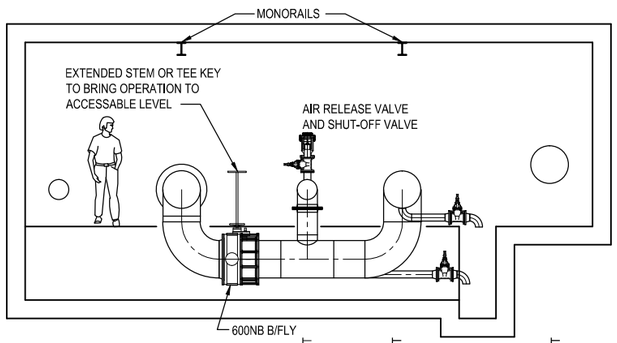
Document No.: 6517439-NM-K03.DWG

DO NOT SCALE

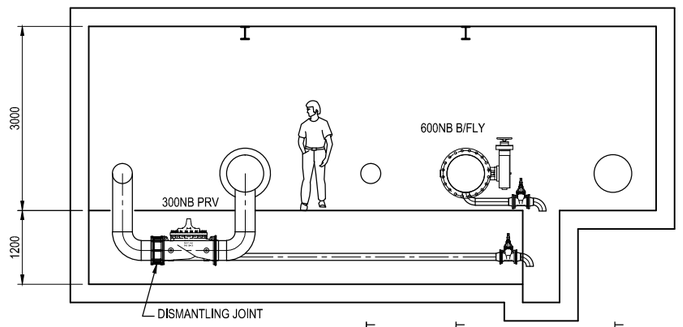
IF IN DOUBT ASK.



1 SECTION
NM-K03



2 SECTION
NM-K03



3 SECTION
NM-K03

LEGEND

B/FLY	BUTTERFLY VALVE
CV	CHECK VALVE
FCV	FLOW CONTROL VALVE
FH	FIRE HYDRANT
FM	FLOW METER

PRELIMINARY
NOT FOR CONSTRUCTION

No.	Revision	By	Chk	Appd	Date
A	FOR INFORMATION	GAI	DRH	SAE	15.06.12

Drawing Originator: CH2M Beca / capacity infrastructure services

Original Scale (A1) 1:50	Designed	GAI, MY	15.06.12
	Drawn	GAI	15.06.12
Reduced Scale (A3)	Dsg Verifier	SE	15.06.12
	Dwg Check	DRH	15.06.12

Approved For Construction* Date
* Refer to Revision 1 for Original Signature

Client: Absolutely Positively Wellington — He Hiere ki Pōneke Wellington City Council

Project: HOSPITAL
PRINCE OF WALES
RESERVOIR

Title: TUNNEL PIPEWORK LAYOUT
OPTION 1.0
SECTIONS

Discipline: MECHANICAL
Drawing No.: 6517439-NM-K04
Rev.: A

DO NOT SCALE

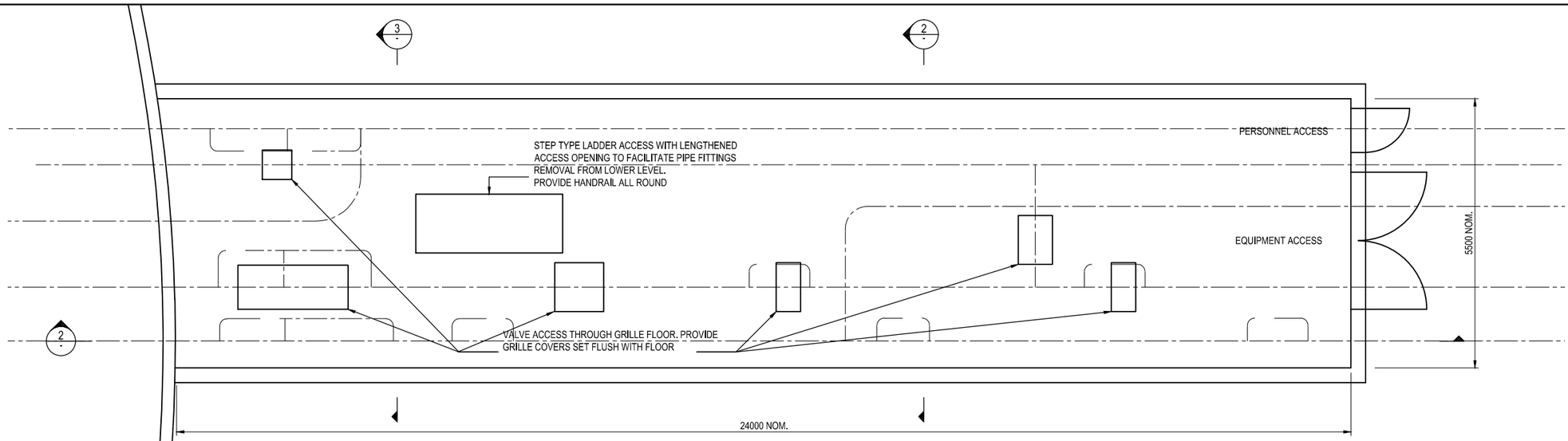
IF IN DOUBT ASK.

Document No. 6517439 VER PRINT

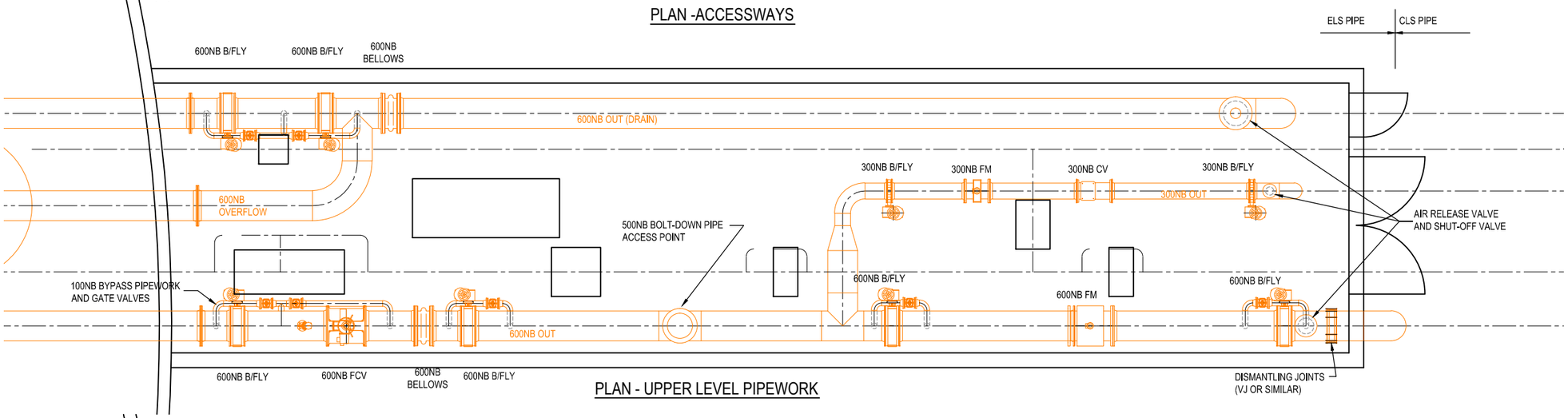
Drawing Plotted: 01 Feb 2013 4:25 p.m.

LEGEND

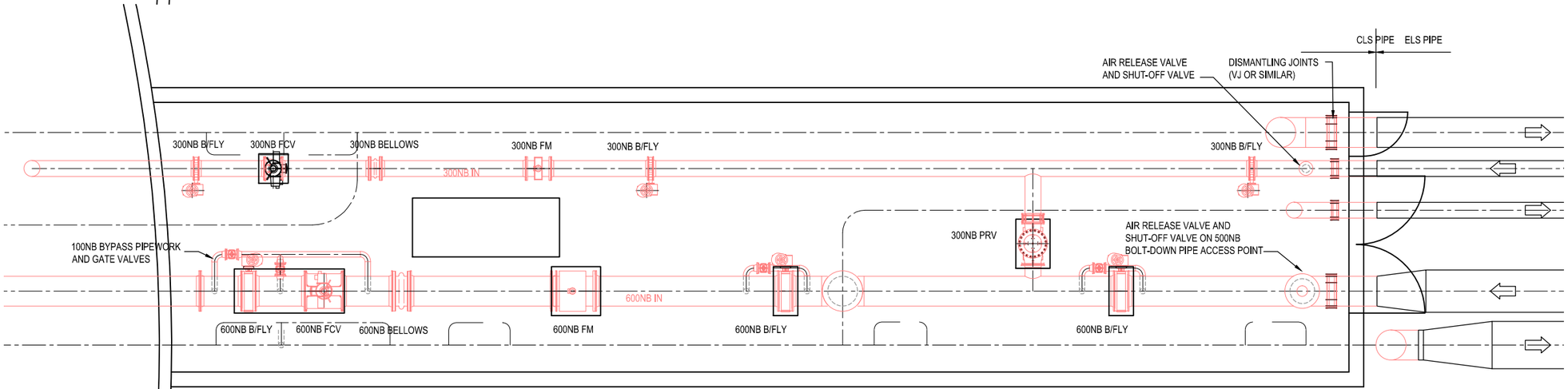
B/FLY	BUTTERFLY VALVE
CV	CHECK VALVE
FCV	FLOW CONTROL VALVE
FH	FIRE HYDRANT
FM	FLOW METER



PLAN -ACCESSWAYS



PLAN - UPPER LEVEL PIPEWORK



PLAN - LOWER LEVEL PIPEWORK

PRELIMINARY
NOT FOR CONSTRUCTION

No.	Revision	By	Chk	Appd	Date
A	FOR INFORMATION	GAI	DRH	SAE	15.06.12

Drawing Originator: CH2M Beca / capacity infrastructure services

Original Scale (A1) 1:50
Reduced Scale (A3)

Designed	GAI, MY	15.06.12	Approved For Construction*
Drawn	GAI	15.06.12	
Dsg Verifier	SE	15.06.12	
Dwg Check	DRH	15.06.12	Date

* Refer to Revision 1 for Original Signature

Client: Absolutely Positively Wellington City Council — Me Heke Ki Pōneke

Project: HOSPITAL PRINCE OF WALES RESERVOIR

Title: TUNNEL PIPEWORK LAYOUT OPTION 2.0 PLANS

Discipline: MECHANICAL

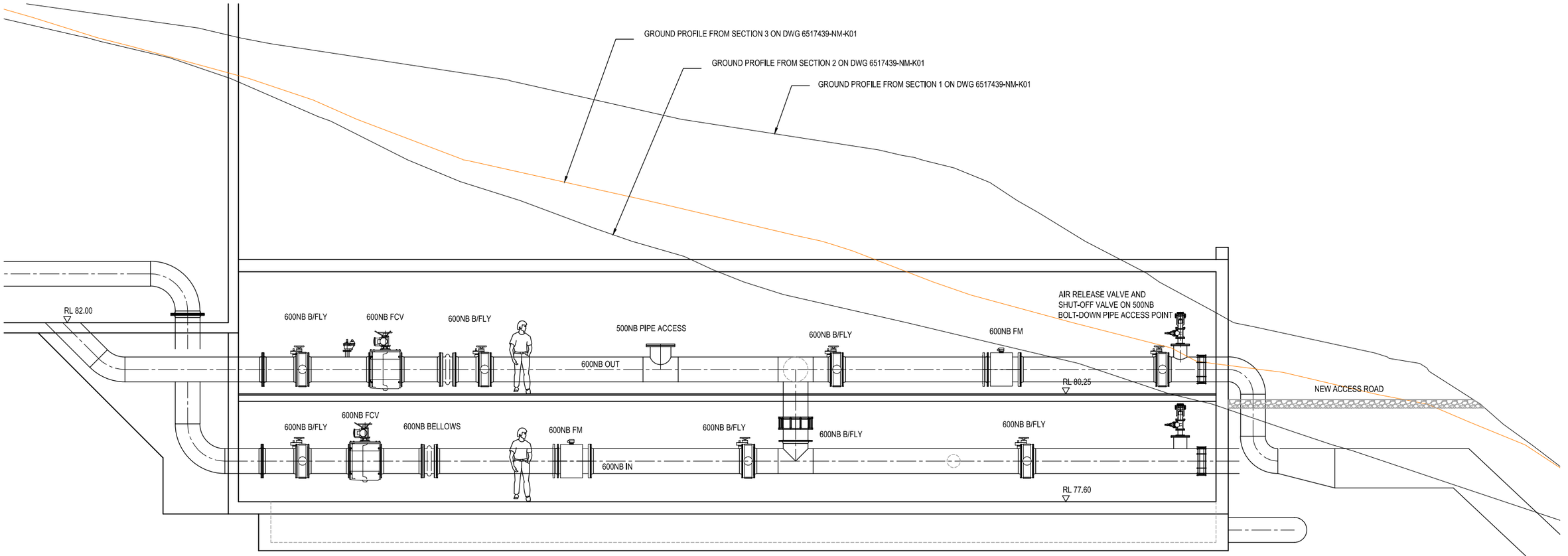
Drawing No.: 6517439-NM-K05

Rev.: A

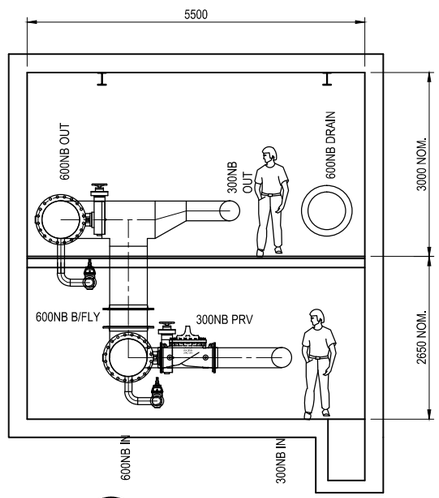
DO NOT SCALE

IF IN DOUBT ASK.

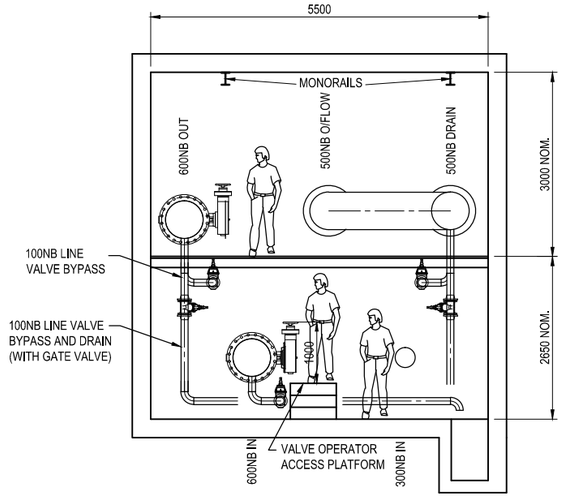
Document Set ID: 2672331 Version: 1



1 NM-K05 SECTION



2 NM-K05 SECTION 1:50



3 NM-K05 SECTION 1:50

LEGEND

B/FLY	BUTTERFLY VALVE
CV	CHECK VALVE
FCV	FLOW CONTROL VALVE
FH	FIRE HYDRANT
FM	FLOW METER

PRELIMINARY
NOT FOR CONSTRUCTION

No.	Revision	By	Chk	Appd	Date
A	FOR INFORMATION	GAI	DRH	SAE	15.06.12

Drawing Originator: CH2M Beca / capacity infrastructure services

Original Scale (A1) 1:50
Reduced Scale (A3)

Designed	GAI, MY	15.06.12	Approved For Construction*
Drawn	GAI	15.06.12	
Dsg Verifier	SE	15.06.12	
Dwg Check	DRH	15.06.12	Date

* Refer to Revision 1 for Original Signature

Client: Absolutely Positively Wellington City Council Me Heke Ki Pōneke Wellington

Project: HOSPITAL PRINCE OF WALES RESERVOIR

Title: TUNNEL PIPEWORK LAYOUT OPTION 2.0 SECTIONS

Discipline: MECHANICAL

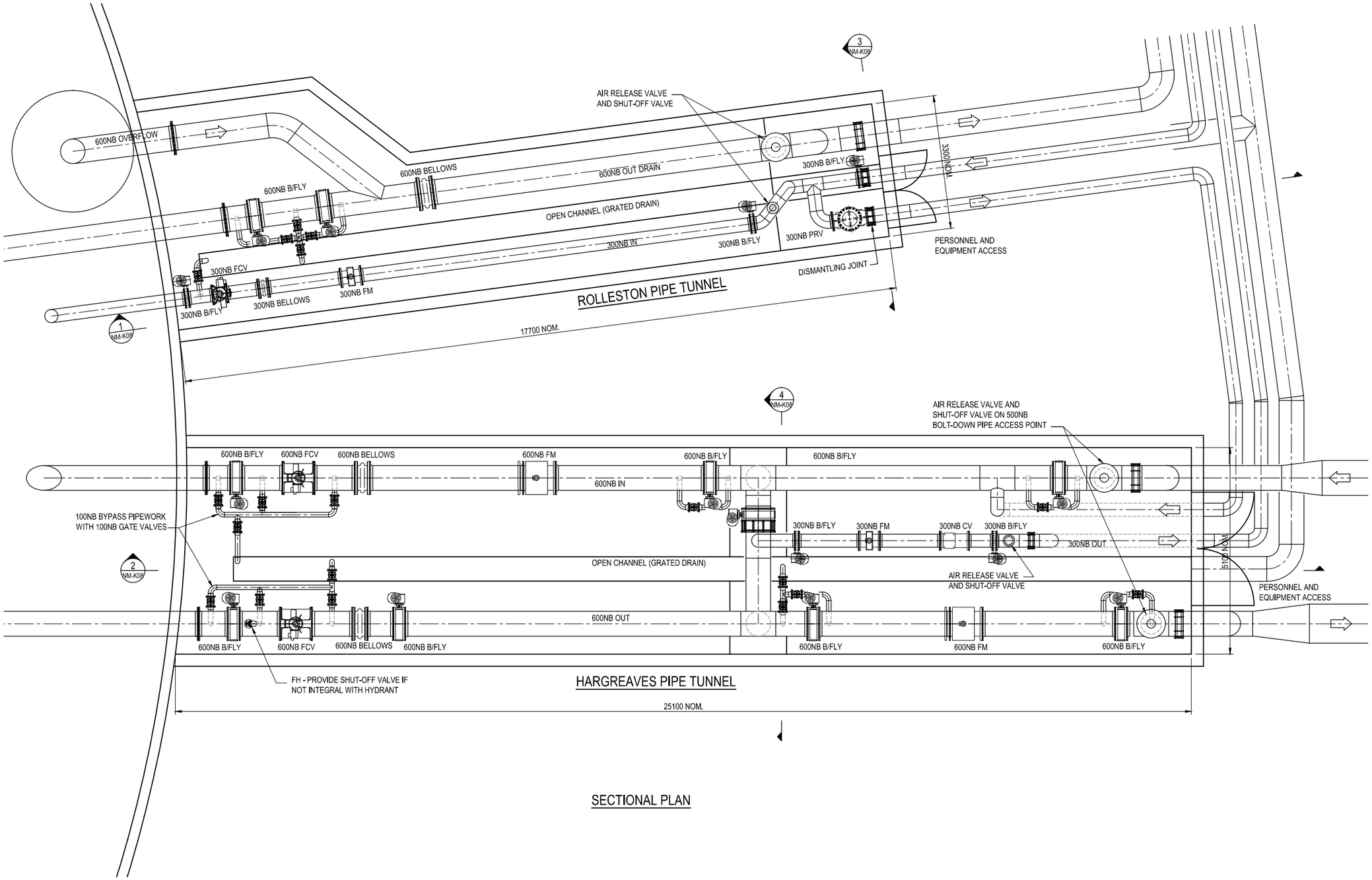
Drawing No.: 6517439-NM-K06

Rev.: A

DO NOT SCALE

IF IN DOUBT ASK.

Document Set ID: 6517439 Version: 1



SECTIONAL PLAN

LEGEND

B/FLY	BUTTERFLY VALVE
CV	CHECK VALVE
FCV	FLOW CONTROL VALVE
FH	FIRE HYDRANT
FM	FLOW METER

PRELIMINARY
NOT FOR CONSTRUCTION

No.	Revision	By	Chk	Appd	Date
A	FOR INFORMATION	GAI	DRH	SAE	15.06.12

Drawing Originator: CH2M Beca / capacity infrastructure services

Original Scale (A1) 1:50
Reduced Scale (A3)

Designed	GAI, MY	15.06.12	Approved For Construction*
Drawn	GAI	15.06.12	
Dsg Verifier	SE	15.06.12	
Dwg Check	DRH	15.06.12	Date

* Refer to Revision 1 for Original Signature

Client: Absolutely Positively Wellington City Council Me Heke Ki Pōneke

Project: HOSPITAL
PRINCE OF WALES
RESERVOIR

Title: TUNNEL PIPEWORK LAYOUT
OPTION 3.0
PLAN

Discipline: MECHANICAL

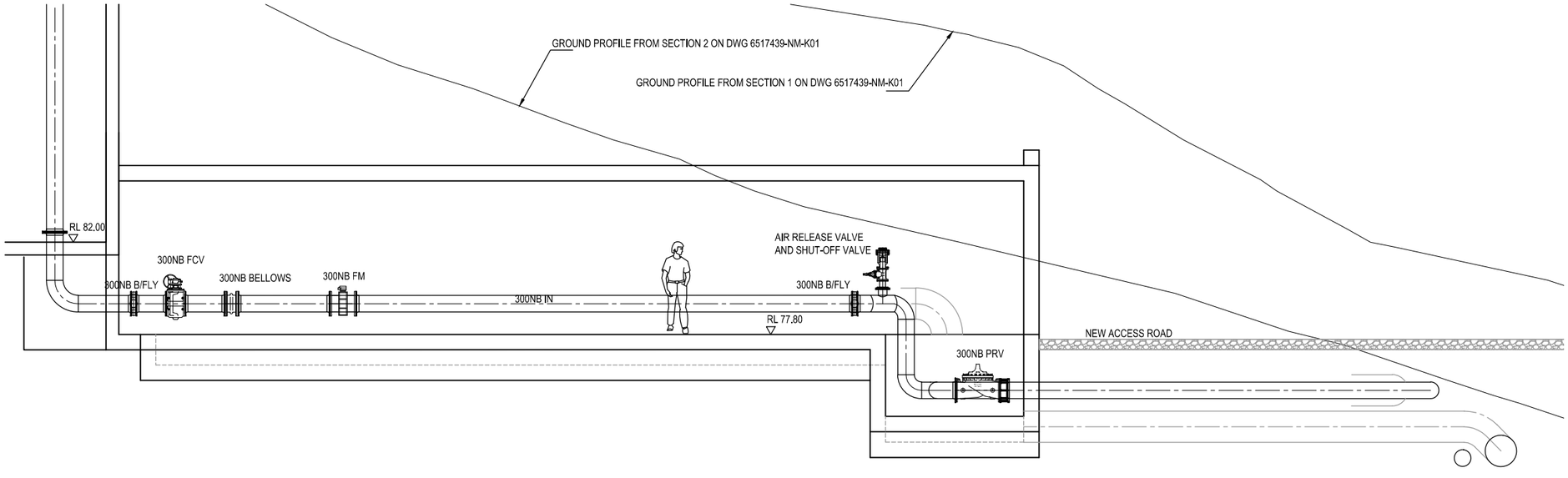
Drawing No.: 6517439-NM-K07

Rev.: A

DO NOT SCALE

IF IN DOUBT ASK.

Document No. 6517439 MM K07



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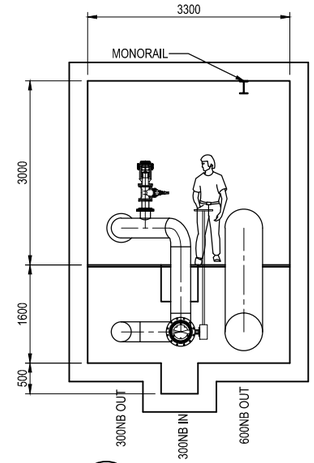

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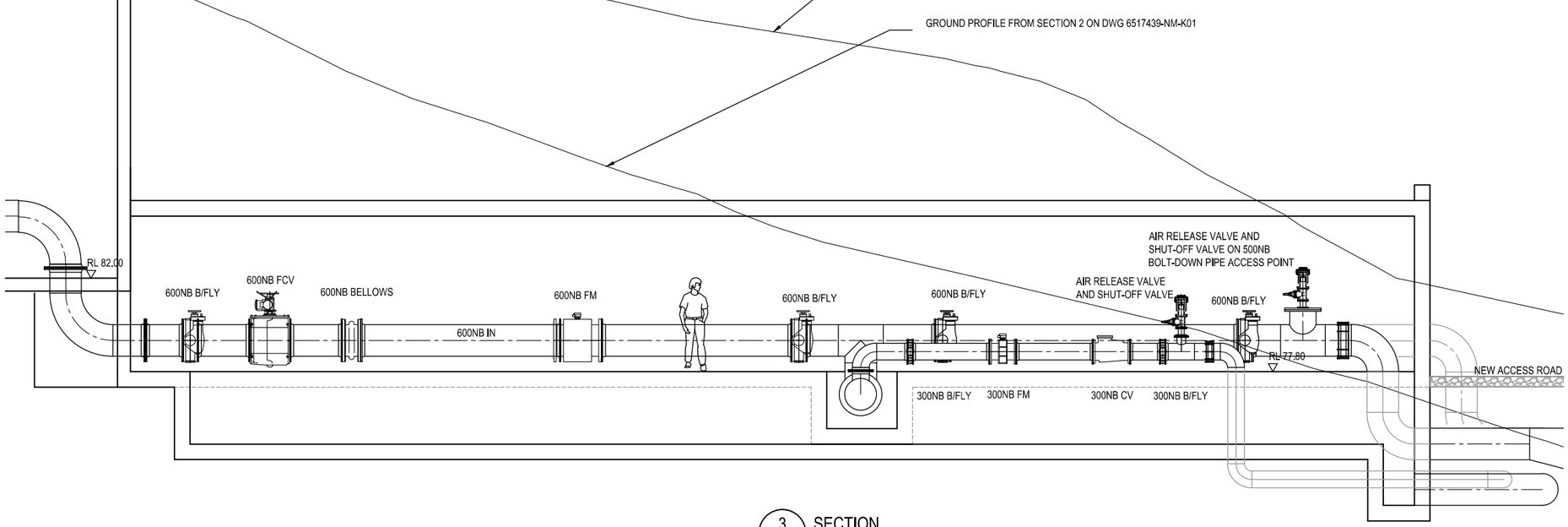

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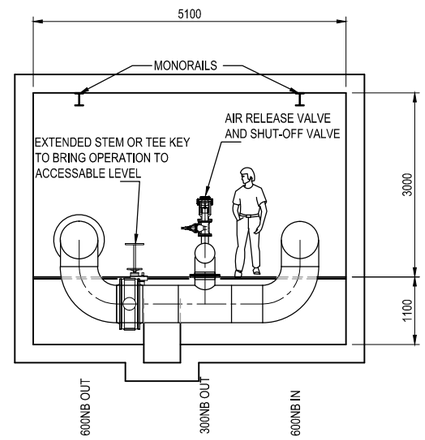


4 NM-K07 SECTION

LEGEND

B/FLY BUTTERFLY VALVE
CV CHECK VALVE
FCV FLOW CONTROL VALVE
FH FIRE HYDRANT
FM FLOW METER

PRELIMINARY
NOT FOR CONSTRUCTION

No.	Revision	By	Chk	Appd	Date
A	FOR INFORMATION	GAI	DRH	SAE	15.06.12

Drawing Originator: CH2M Beca / capacity infrastructure services

Original Scale (A1) 1:50
Reduced Scale (A3)

Designed	GAI, MY	15.06.12	Approved For Construction*
Drawn	GAI	15.06.12	
Dsg Verifier	SE	15.06.12	
Dwg Check	DRH	15.06.12	Date

* Refer to Revision 1 for Original Signature

Client: Absolutely Positively Wellington (Me Heke Ki Pōneke Wellington City Council)

Project: HOSPITAL PRINCE OF WALES RESERVOIR

Title: TUNNEL PIPEWORK LAYOUT OPTION 3.0 SECTIONS

Discipline: MECHANICAL

Drawing No.: 6517439-NM-K08

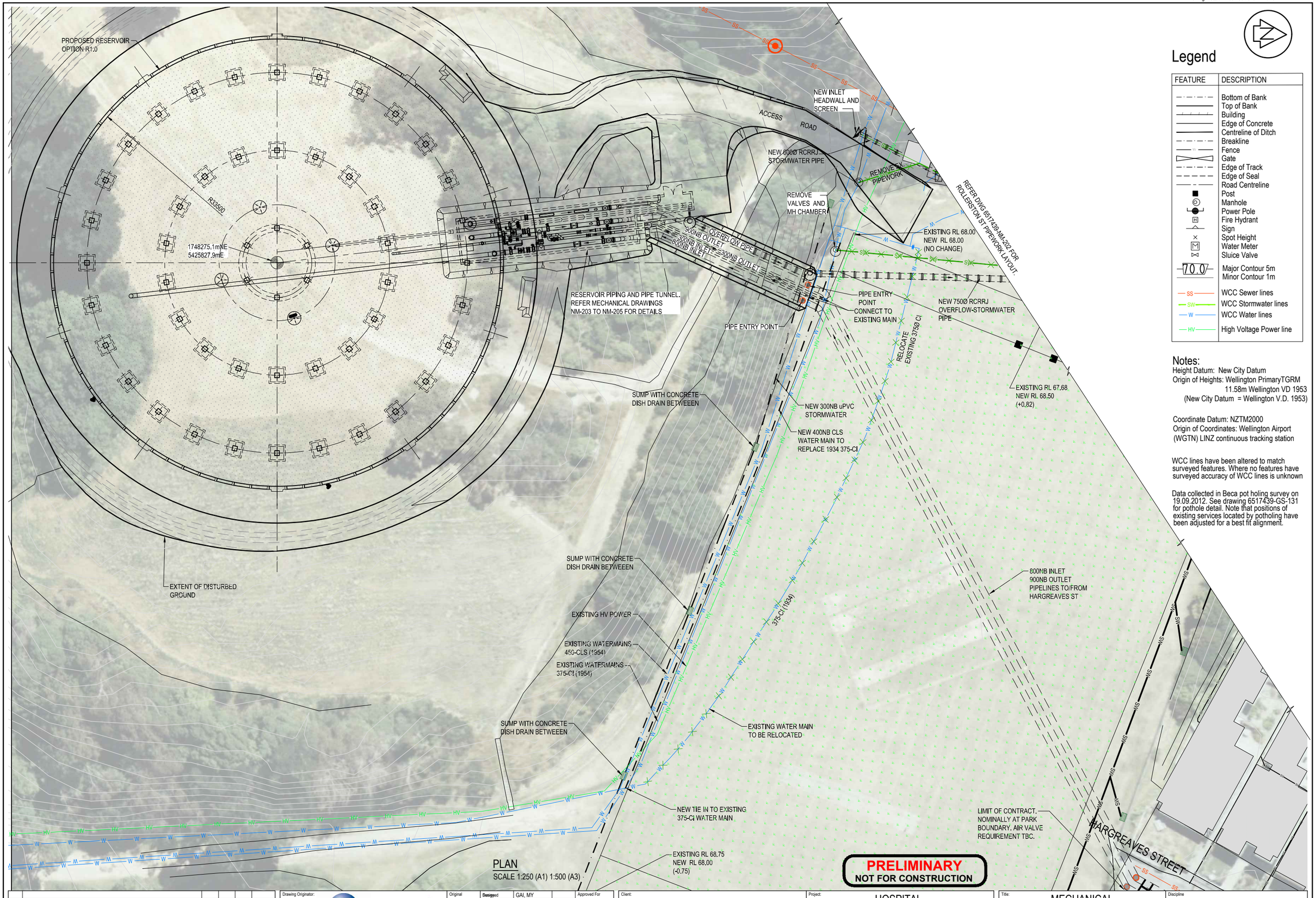
Rev.: A

DO NOT SCALE

IF IN DOUBT ASK.

Document No. 6517439 WIP DWG

Drawing Plotted: 05 Feb 2013 11:37 a.m.



PLAN
SCALE 1:250 (A1) 1:500 (A3)

Legend

FEATURE	DESCRIPTION
	Bottom of Bank
	Top of Bank
	Building
	Edge of Concrete
	Centreline of Ditch
	Breakline
	Fence
	Gate
	Edge of Track
	Edge of Seal
	Road Centreline
	Post
	Manhole
	Power Pole
	Fire Hydrant
	Sign
	Spot Height
	Water Meter
	Sluice Valve
70.0	Major Contour 5m Minor Contour 1m
SS	WCC Sewer lines
SW	WCC Stormwater lines
W	WCC Water lines
HV	High Voltage Power line

Notes:

Height Datum: New City Datum
Origin of Heights: Wellington PrimaryTGRM
11.58m Wellington VD 1953
(New City Datum = Wellington V.D. 1953)

Coordinate Datum: NZTM2000
Origin of Coordinates: Wellington Airport
(WGTN) LINZ continuous tracking station

WCC lines have been altered to match surveyed features. Where no features have surveyed accuracy of WCC lines is unknown

Data collected in Beca pot holing survey on 19.09.2012. See drawing 6517439-GS-131 for pothole detail. Note that positions of existing services located by potholing have been adjusted for a best fit alignment.

PRELIMINARY
NOT FOR CONSTRUCTION

No.	Revision	By	Chk	Appd	Date
B	UPDATE FINAL ISSUE CDOR	AJP	DRH	SAE	01.02.13
A	FOR CLIENT REVIEW	AJP	DRH	SAE	03.10.12

Drawing Originator: CH2M Beca / capacity infrastructure services

Original Scale (A1) 1:250
Reduced Scale (A3) 1:500

Designed	GAI, MY		Approved For Construction*
Drawn	AJP		
Dsg Verifier	SAE		
Dwg Check	DRH		Date

* Refer to Revision 1 for Original Signature

Client: Absolutely Positively Wellington — Me Heke Ki Pōneke — Wellington City Council

Project: HOSPITAL
PRINCE OF WALES
RESERVOIR

Title: MECHANICAL
SITE LAYOUT PLAN
SHEET 1

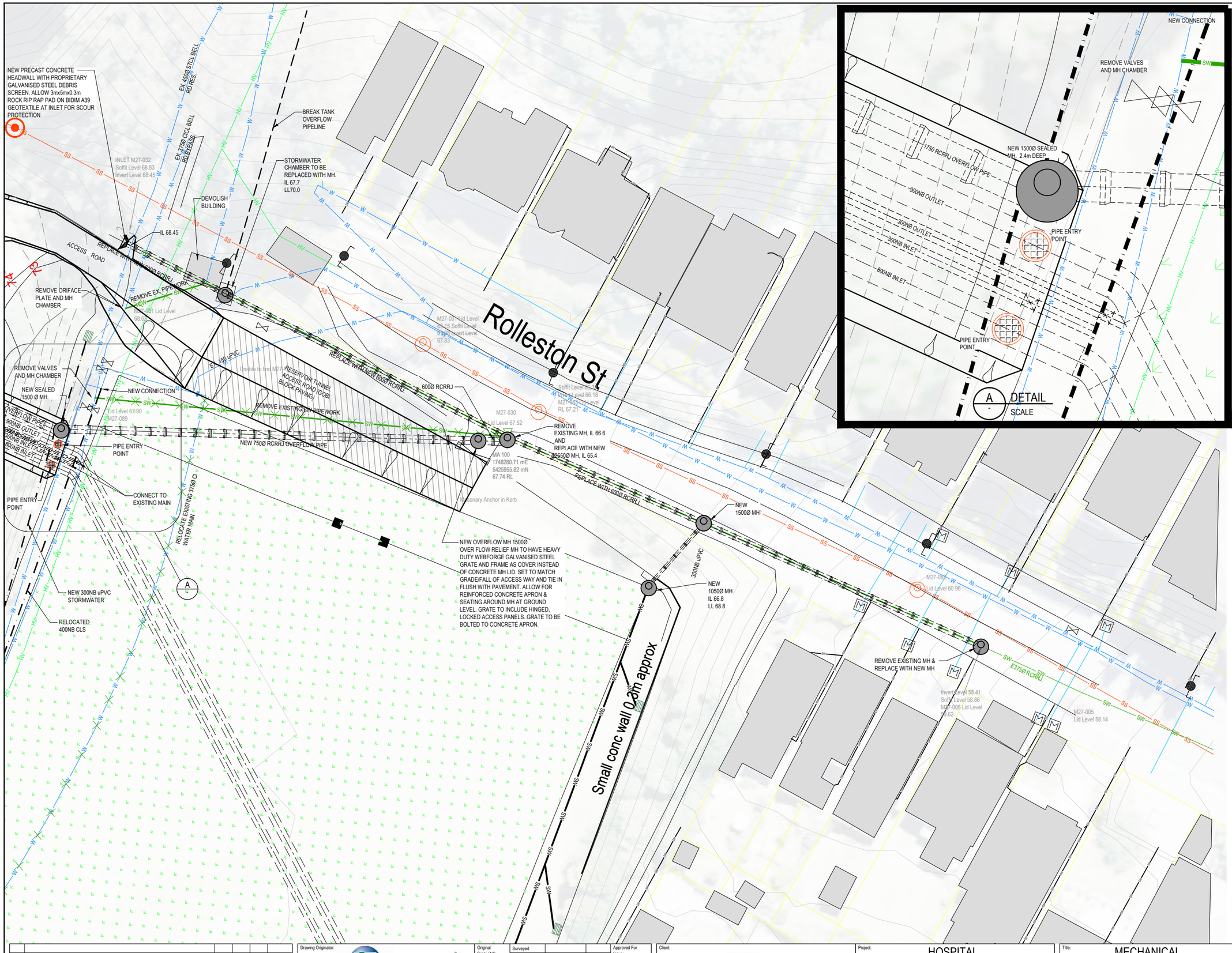
Discipline: MECHANICAL
Drawing No.: 6517439-NM-201
Rev.: B

Document No. 6517439-NM-201.DWG

DO NOT SCALE

IF IN DOUBT ASK.

Drawing Plotted: 05 Feb 2013 11:56 a.m.



Legend

FEATURE	DESCRIPTION
	Bottom of Bank
	Top of Bank
	Building
	Edge of Concrete
	Centreline of Ditch
	Breakline
	Fence
	Gate
	Edge of Track
	Edge of Seal
	Road Centreline
	Post
	Manhole
	Power Pole
	Fire Hydrant
	Sign
	Spot Height
	Water Meter
	Sluice Valve
70.0	Major Contour 5m
	Minor Contour 1m
SS	WCC Sewer lines
SW	WCC Stormwater lines
W	WCC Water lines
HV	High Voltage Power line

Notes:

Height Datum: New City Datum
Origin of Heights: Wellington PrimaryTGRM 11.58m Wellington VD 1953 (New City Datum = Wellington V.D. 1953)

Coordinate Datum: NZTM2000
Origin of Coordinates: Wellington Airport (WGTN) LINZ continuous tracking station

WCC lines have been altered to match surveyed features. Where no features have surveyed accuracy of WCC lines is unknown

Pot holing survey data from Beca survey on 19.09.2012 incorporates.

SW Notes:

1. For costing purposes, all manholes to be 1200mmØ and 2.0m deep unless noted otherwise.
2. Manhole lids buried if located in sports field. Allow full height for costing purposes.
3. New SW pipes to have water stops at every 7.5m in accordance with WCC standard detail DR03.
4. SW trench backfill and surrounds in accordance with WCC standard detail DR03.
4. SW manholes to WCC standard detail DR01. All manholes 1200Ø unless noted otherwise.
5. All SW pipes to be RCRRJ class 4.

PRELIMINARY
NOT FOR CONSTRUCTION

No.	Revision	By	Chk	Appd	Date
B	UPDATE FINAL ISSUE CDOR	AJP	DRH	SAE	01.02.13
A	FOR CLIENT REVIEW	AJP	DRH	SAE	03.10.12

Drawing Originator: CH2M Beca; capacity infrastructure services

Original Scale (A1) 200
Reduced Scale (A3) 400

			Approved For Issue:
Surveyed			
Drawn	AJP	09.12	
Check			
Dwg Check			Date

* Refer to Revision 1 for Original Signature

Client: Absolutely Positively Wellington City Council Me Heke Ki Pōneke

Project: HOSPITAL PRINCE OF WALES RESERVOIR

Title: MECHANICAL SITE LAYOUT PLAN SHEET 2

Discipline: MECHANICAL

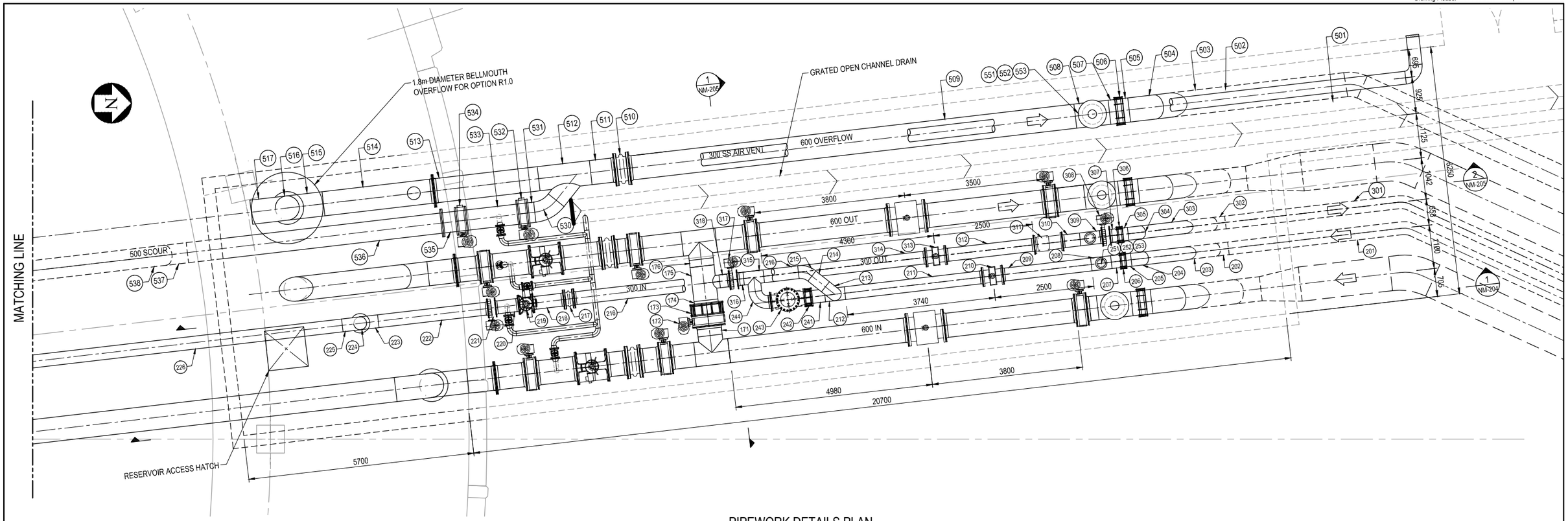
Drawing No.: 6517439-NM-202

Rev.: B

DO NOT SCALE

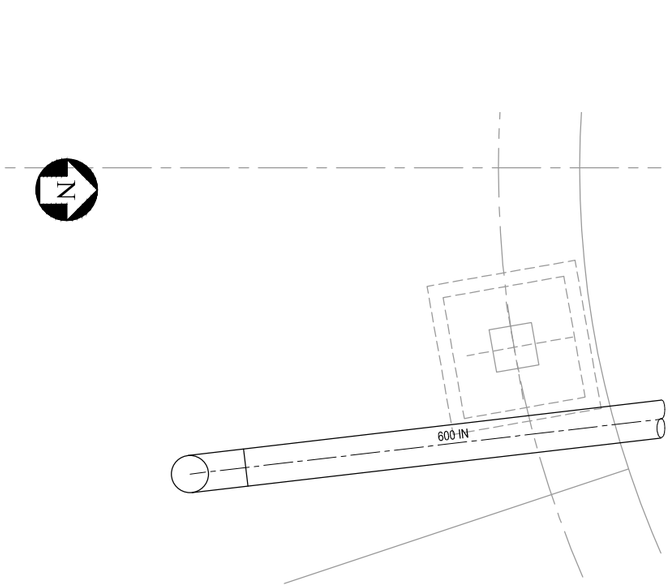
IF IN DOUBT ASK.

Drawing Plotted: 01 Feb 2013 4:40 p.m.



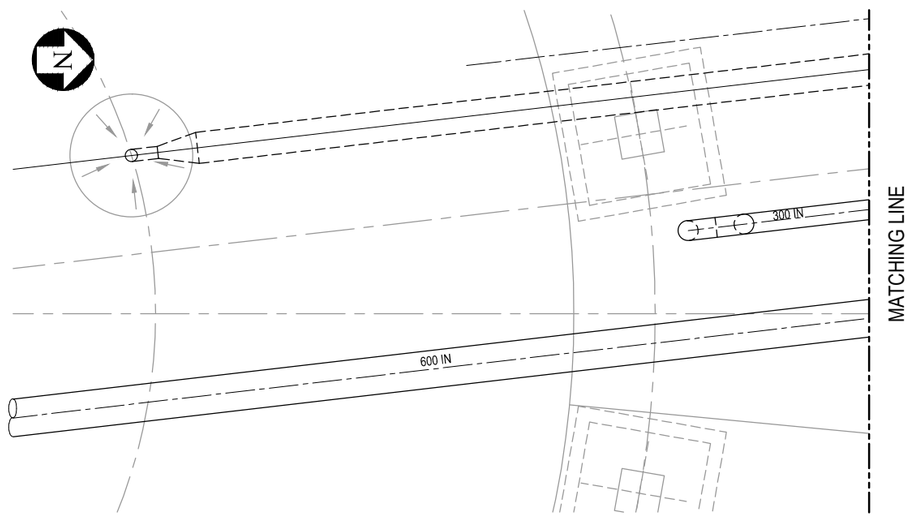
PIPEWORK DETAILS PLAN

SCALE 1:50 (A1) 1:100 (A3)



PIPEWORK DETAILS PLAN

SCALE 1:50 (A1) 1:100 (A3)



PIPEWORK DETAILS PLAN

SCALE 1:50 (A1) 1:100 (A3)

PRELIMINARY
NOT FOR CONSTRUCTION

No.	Revision	By	Chk	Appd	Date
B	UPDATE FINAL ISSUE CDOR	GW	DRH	SAE	01.02.13
A	FOR CLIENT REVIEW	GW	DRH	SAE	03.10.12

Drawing Originator: CH2M Beca / capacity infrastructure services

Original Scale (A1) 1:50
Reduced Scale (A3) 1:100

~~Designed~~	GAI, MY	09.12	Approved For Construction*
Drawn	GW GAI	09.12	
Dsg Verifier	SE	09.12	
Dwg Check	DRH	09.12	Date

* Refer to Revision 1 for Original Signature

Client: Absolutely Positively Wellington — Me Heke Ki Pōneke — Wellington City Council

Project: HOSPITAL PRINCE OF WALES RESERVOIR

Title: PIPE TUNNEL LAYOUT PLAN

Discipline: MECHANICAL

Drawing No.: 6517439-NM-203

Rev.: B

DO NOT SCALE

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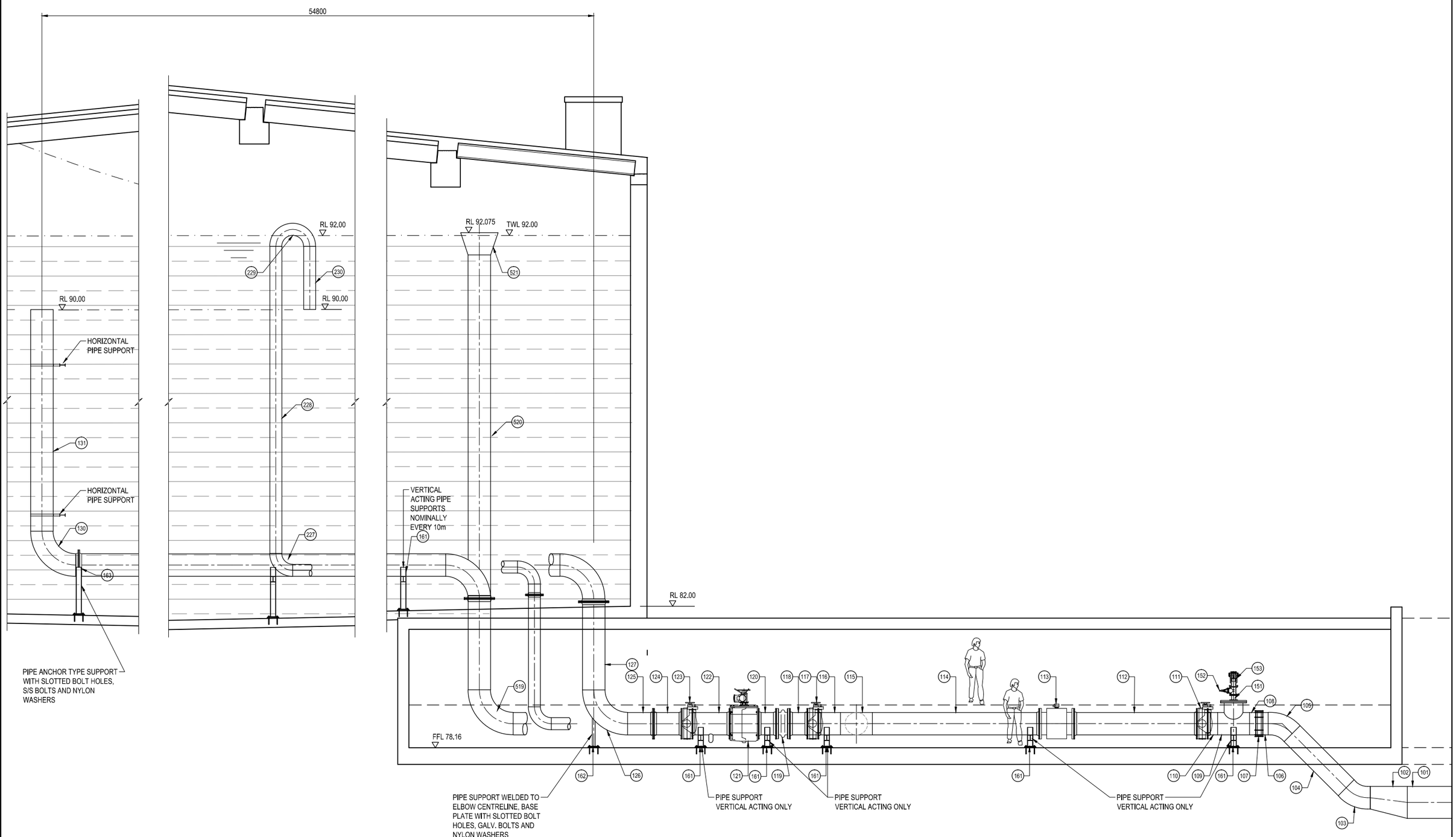
Document No.: 6517439 MM 000 [illegible]



1 / NM-203 SECTION
SCALE 1:50 (A1) 1:100 (A3)

PRELIMINARY
NOT FOR CONSTRUCTION

No.	Revision	By	Chk	Appd	Date
B	UPDATE FINAL ISSUE CDOR	GW	DRH	SAE	01.02.13
A	FOR CLIENT REVIEW	GW	DRH	SAE	03.10.12

Drawing Originator: CH2M Beca / capacity infrastructure services

Original Scale (A1) 1:50
Reduced Scale (A3) 1:100

Designed	GAI, MY	09.12	Approved For Construction* Date
Drawn	GW GAI	09.12	
Dsg Verifier	SE	09.12	
Dwg Check	DRH	09.12	

* Refer to Revision 1 for Original Signature

Client: Absolutely Positively Wellington — Me Heke Ki Pōneke — Wellington City Council

Project: HOSPITAL PRINCE OF WALES RESERVOIR

Title: PIPE TUNNEL SECTIONS SHEET 1

Discipline: MECHANICAL

Drawing No.: 6517439-NM-204

Rev.: B

Document No.: 6517439.111.PWD

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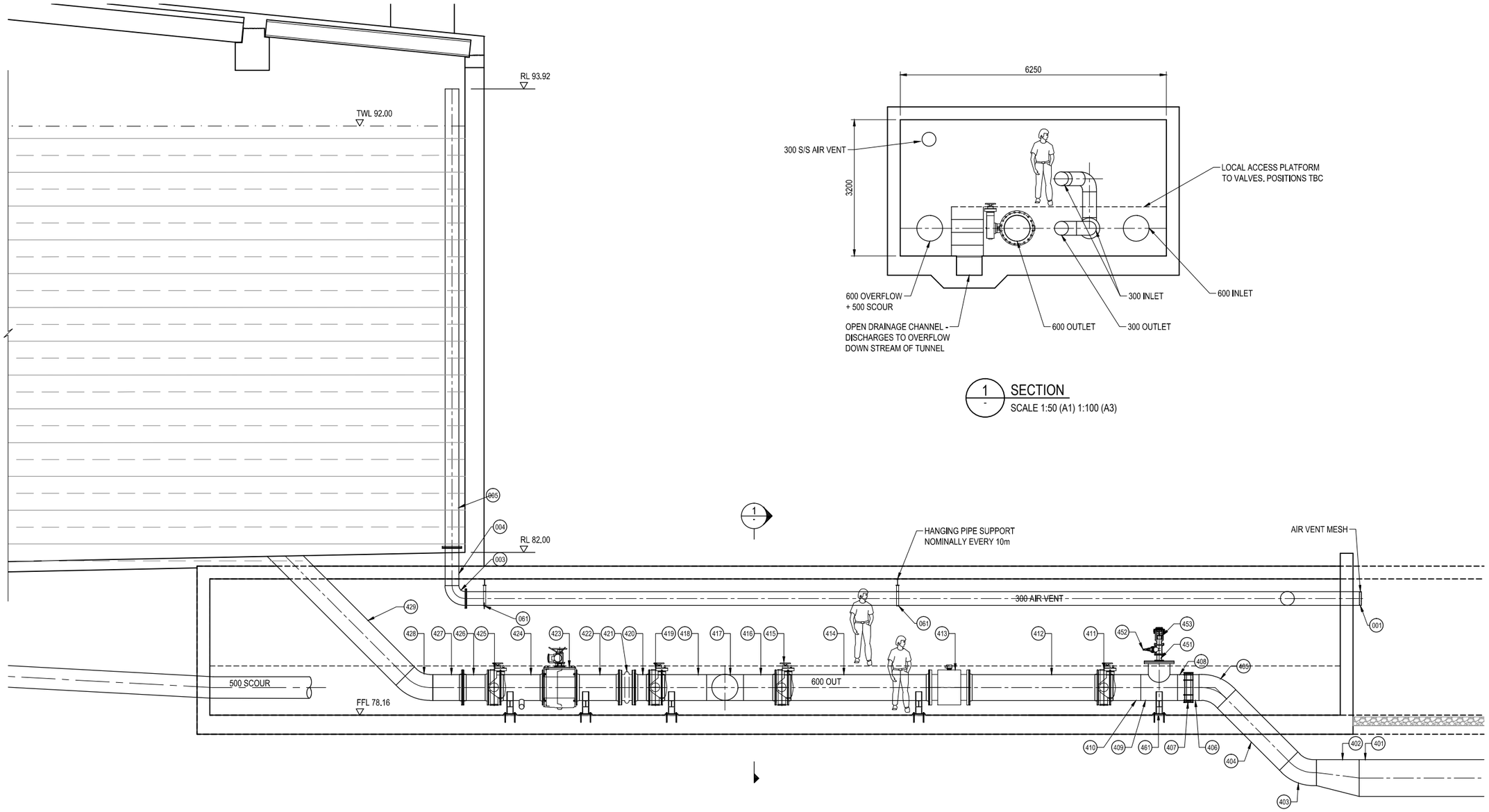


1 / - SECTION
SCALE 1:50 (A1) 1:100 (A3)

2 / NM-203 SECTION
SCALE 1:50 (A1) 1:100 (A3)

PRELIMINARY
NOT FOR CONSTRUCTION

No.	Revision	By	Chk	Appd	Date
B	UPDATE FINAL ISSUE CDOR	GW	DRH	SAE	01.02.13
A	FOR CLIENT REVIEW	GW	DRH	SAE	03.10.12

Drawing Originator: CH2M Beca; capacity infrastructure services

Original Scale (A1) 1:50
Reduced Scale (A3) 1:100

~~Designed~~	GAI, MY	09.12	Approved For Construction*
Drawn	GW GAI	09.12	
Dsg Verifier	SE	09.12	
Dwg Check	DRH	09.12	Date

* Refer to Revision 1 for Original Signature

Client: Absolutely Positively Wellington (Me Heke Ki Pōneke, Wellington City Council)

Project: HOSPITAL
PRINCE OF WALES
RESERVOIR

Title: PIPE TUNNEL
SECTIONS
SHEET 2

Discipline: MECHANICAL

Drawing No.: 6517439-NM-205

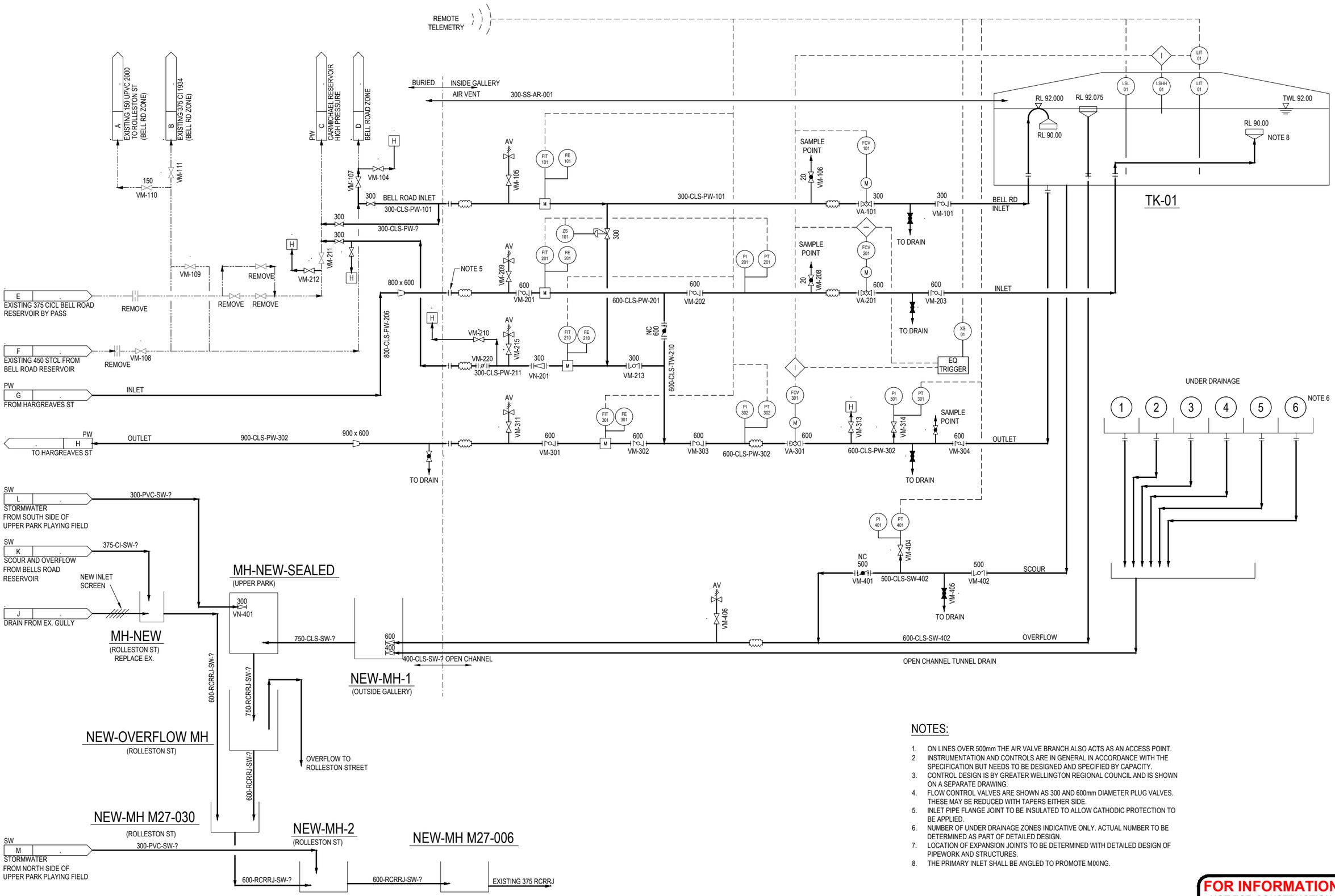
Rev.: B

DO NOT SCALE

IF IN DOUBT ASK.

Document No.: 6517439 NM 205.DWG

Drawing Plotted: 04 Feb 2013 3:16 p.m.



NOTES:

1. ON LINES OVER 500mm THE AIR VALVE BRANCH ALSO ACTS AS AN ACCESS POINT.
2. INSTRUMENTATION AND CONTROLS ARE IN GENERAL IN ACCORDANCE WITH THE SPECIFICATION BUT NEEDS TO BE DESIGNED AND SPECIFIED BY CAPACITY.
3. CONTROL DESIGN IS BY GREATER WELLINGTON REGIONAL COUNCIL AND IS SHOWN ON A SEPARATE DRAWING.
4. FLOW CONTROL VALVES ARE SHOWN AS 300 AND 600mm DIAMETER PLUG VALVES. THESE MAY BE REDUCED WITH TAPERS EITHER SIDE.
5. INLET PIPE FLANGE JOINT TO BE INSULATED TO ALLOW CATHODIC PROTECTION TO BE APPLIED.
6. NUMBER OF UNDER DRAINAGE ZONES INDICATIVE ONLY. ACTUAL NUMBER TO BE DETERMINED AS PART OF DETAILED DESIGN.
7. LOCATION OF EXPANSION JOINTS TO BE DETERMINED WITH DETAILED DESIGN OF PIPEWORK AND STRUCTURES.
8. THE PRIMARY INLET SHALL BE ANGLED TO PROMOTE MIXING.

FOR INFORMATION
NOT FOR CONSTRUCTION

No.	Revision	By	Chk	Appd	Date
D	UPDATED FINAL ISSUE CDOR	LW	MY	SAE	01.02.13
C	FOR INFORMATION	LW	DRH	SAE	12.09.12
B	FOR INFORMATION	LW	DRH	SAE	17.07.12
A	FOR INFORMATION	LW	DRH	SAE	15.06.12

Drawing Originator: CH2M Beca / capacity infrastructure services

Original Scale (A1)	Designed	MY	15.06.12
	Drawn	LW	15.06.12
Reduced Scale (A3)	Dsg Verifier	AW	15.06.12
	Dwg Check	DRH	15.06.12

Approved For Construction* Date
* Refer to Revision 1 for Original Signature

Client: Absolutely Positively Wellington (Me Heke Ki Pōneke Wellington City Council)

Project: HOSPITAL PRINCE OF WALES RESERVOIR

Title: PIPING AND INSTRUMENTATION DIAGRAM

Discipline: PROCESS

Drawing No.: 6517439-NR-002

Rev.: D

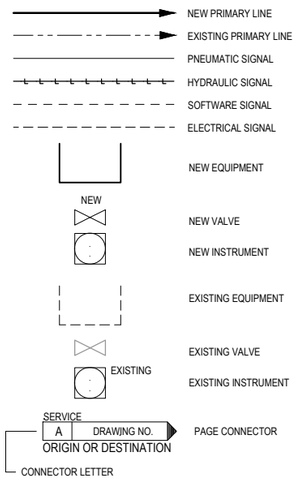
Document No. 6517439-NR-002.DWG

DO NOT SCALE

IF IN DOUBT ASK.

PIPING & INSTRUMENT DIAGRAM AND PROCESS FLOW DIAGRAM LEGEND

LINE AND PIPING SYMBOLS



NUMBERING CONVENTIONS

LINE NUMBERING CONVENTION

1000-C100-RW-001

- LINE NUMBER
- SERVICE (SEE TABLE 2)
- SPECIFICATION (SEE TABLE 1)
- NOMINAL PIPE SIZE IN MILLIMETERS

INSULATION TAG CONVENTION

AS-100

- INSULATION THICKNESS
- INSULATION TYPE (SEE TABLE 4)

EQUIPMENT NUMBERING CONVENTION

TK - 01

- SEQUENCE NUMBER (3 DIGITS)
- EQUIPMENT IDENTIFICATION (SEE TABLE 3)

VALVE NUMBERING CONVENTION

V?-001

- SEQUENCE NUMBER (3 DIGITS)
- VALVE EXPRESSION

100 — VALVE BODY SIZE

?-? — VALVE SEQUENCE NUMBER

INSTRUMENT NUMBERING CONVENTION

CV-001

- INSTRUMENT NUMBER
- INSTRUMENT TYPE (SEE TABLE 5)

VALVE ABBREVIATIONS

CV	MODULATING CONTROL VALVE
VA	AUTOMATIC ACTUATED VALVE
VM	MANUAL ACTUATED VALVE
VN	CHECK/NON RETURN VALVE
VR	RELIEF VALVE
SL	SPECTACLE BLIND

TABLE 1: PIPE SPECIFICATION

CODE	DESCRIPTION
CLS	CEMENT LINED MILD STEEL
ELS	EPOXY LINED MILD STEEL
SS	STAINLESS STEEL

TABLE 2: SERVICES

CODE	DESCRIPTION
SW	STORM WATER
PW	POTABLE WATER
AR	AIR

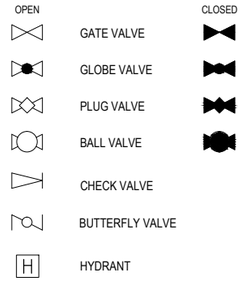
TABLE 3: EQUIPMENT TYPES

CODE	DESCRIPTION
P	PUMPS
TK	TANKS

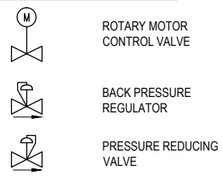
TABLE 5: INSTRUMENT TYPES

CODE	DESCRIPTION
AE	ANALYZER PRIMARY ELEMENT
AI	ANALYZER INDICATOR
AT	ANALYZER TRANSMITTER
CV	GENERAL CONTROL VALVE
FAH	FLOW ALARM HIGH
FAL	FLOW ALARM LOW
FE	FLOW ELEMENT
FI	FLOW INDICATOR
FIC	FLOW INDICATOR CONTROLLER
FIT	FLOW INDICATOR TRANSMITTER
FC	FLOW CONTROLLER
FQ	FLOW METER
FS	FLOW SWITCH
FT	FLOW TRANSMITTER
FV	FLOW VALVE
FY	FLOW TRANSDUCER
HS	HAND SWITCH
LAH	LEVEL ALARM HIGH
LAL	LEVEL ALARM LOW
LC	LEVEL CONTROLLER
LE	LEVEL ELEMENT
LG	LEVEL GLASS
LI	LEVEL INDICATOR
LS	LEVEL SWITCH
LT	LEVEL TRANSMITTER
LV	LEVEL VALVE
LY	LEVEL TRANSDUCER
PAH	PRESSURE ALARM HIGH
PAL	PRESSURE ALARM LOW
PC	PRESSURE CONTROLLER
PDIT	PRESSURE DIFFERENTIAL INDICATING TRANSMITTER
PE	PRESSURE ELEMENT
PI	PRESSURE INDICATOR
PS	PRESSURE SWITCH
PSV	PRESSURE RELIEF VALVE
PT	PRESSURE TRANSMITTER
PV	PRESSURE VALVE
PY	PRESSURE TRANSDUCER
TAH	TEMPERATURE ALARM HIGH
TAHH	TEMPERATURE ALARM HIGH HIGH
TAL	TEMPERATURE ALARM LOW
TC	TEMPERATURE CONTROLLER
TE	TEMPERATURE ELEMENT
TI	TEMPERATURE INDICATOR
TS	TEMPERATURE SWITCH
TT	TEMPERATURE TRANSMITTER
TV	TEMPERATURE VALVE
TW	THERMOWELL
TY	TEMPERATURE TRANSDUCER
XV	SOLENOID VALVE
XY	LIMIT SWITCH
XAH	LIMIT ALARM HIGH
XAL	LIMIT ALARM LOW
ZS	POSITION SWITCH
ZA	POSITION ALARM

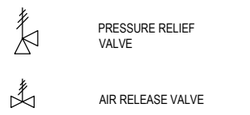
STANDARD VALVE BODY



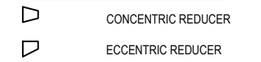
CONTROL/ACTUATOR VALVES



CONTROL/ACTUATOR VALVES (CONT.)

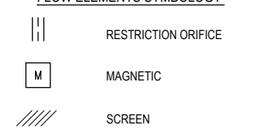


STANDARD LINE ACCESSORIES



STANDARD LINE ACCESSORIES (CONT.)

FLOW ELEMENTS SYMBOLOGY



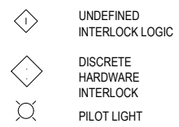
GENERAL INSTRUMENT OR FUNCTION SYMBOLS

LOCATION	FIELD	PANEL	RACK
DISCRETE INSTRUMENTS			

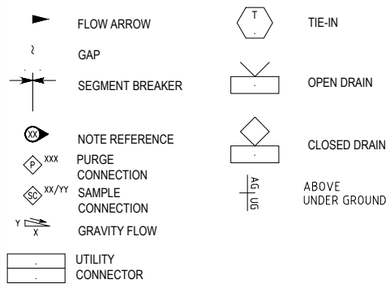
LOCATION	FIELD	MAIN CONTROL ROOM	AUXILIARY CONTROL ROOM
PROCESS OR PLANT CONTROL SYSTEM (PCS)			

LOCATION	FIELD	MAIN CONTROL ROOM	AUXILIARY CONTROL ROOM
PROGRAMMABLE CONTROLLER (NON-PCS)			

MISC. INSTRUMENT SYMBOLS



MISC. GENERAL SYMBOLS



FOR INFORMATION
NOT FOR CONSTRUCTION

No.	Revision	By	Chk	Appd	Date
C	FOR INFORMATION	LW	DRH	SAE	12.09.12
B	FOR INFORMATION	LW	DRH	SAE	17.07.12
A	FOR INFORMATION	LW	DRH	SAE	15.06.12

Drawing Originator: CH2M BECA; capacity infrastructure services

Original Scale (A1)	Designed	MY	15.06.12
	Drawn	LW	15.06.12
Reduced Scale (A3)	Dsg Verifier	AW	15.06.12
	Dwg Check	DRH	15.06.12

Approved For Construction* Date

* Refer to Revision 1 for Original Signature

Client: Absolutely Positively Wellington — He Hiere ki Pōneke — Wellington City Council

Project: HOSPITAL PRINCE OF WALES RESERVOIR

Title: PIPING AND INSTRUMENTATION LEGEND SHEET

Discipline: PROCESS

Drawing No.: 6517439-NR-001

Rev.: C