

# PRICING PACK – GEOTECHNICAL WALLS – ROUTE Z7

Job Name: Mount Messenger Alliance Revision No: 1  
 Job Location: MMA - Chainage 0 to 2300 - Route Z7 Job No: 1001181.1000  
 Design Case: Anchored Retaining Walls Designer: KRIG

## Revision History

Ref	Scope	Reviewed by	Date checked	PD Review	Comments
1	Pricing Pack for Route Z7 retaining walls	Janet Duxfield	20/06/17	SAC	

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- Typical Wall Cross-sections (Types I to IV)
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Total No. of pages: 16

## Key Assumptions

- The following five cases have been assessed for a 12m high retaining wall:
  - Static case with the landslip debris modelled using active earth pressure co-efficient
  - Seismic case with the landslip debris modelled using active earth pressure co-efficient (ULS; PGA 0.4g)
  - Static case with the landslip debris modelled using active earth pressure co-efficient, accounting for a 5 m high evacuation of the landslide below the wall. Effective retained height of 17m (ULS; PGA 0.4g)
  - Static case with the landslip debris modelled using at-rest earth pressure co-efficient, accounting for possible creep behind the wall
  - Seismic case with the landslip debris modelled using at-rest earth pressure co-efficient, accounting for possible creep behind the wall (ULS; PGA 0.4g)
- Thickness of landslip debris beneath the proposed road alignment has been inferred based on BH101 and BH102 (near CH1600) only. The landslide appears to generally be 15 to 20m deep near the road alignment, however no boreholes have been conducted directly at the proposed location. This will need to be verified as pile lengths will be dependent on keying into competent rock below the landslip and it will influence the required free lengths for the anchors. Landslip debris is inferred to be:
  - ~15m deep for CH 50-650
  - ~30m deep for CH1350-1500
  - ~25m deep for CH1500-1600
  - ~15m deep for CH1600-1800
- A typical landslip debris depth of 20m has been adopted in the analysis to determine pile bending moment, shear force and anchor loads.
- To determine pile lengths in this concept design, it has been assumed that the debris thickness will be 20m thick between CH 0 and CH1800. Pile embedment of 5 m into bedrock has been assumed.
- Pile diameter and spacing are governed by structural bending moment and shear capacity. The analysis shows that 1.5m dia piles at 3.0m spacings are adequate for the above design cases. Any additional design cases that apply increased loads to the wall may need to be accommodated with larger piles or reduced spacings.
- This concept design has considered 6 types of walls, primarily based on the different retained heights:
  - Type 1: typical wall height of 3m (1 row of anchors)
  - Type 2: typical wall height of 6m (2 rows of anchors)
  - Type 3: typical wall height of 12m (3 rows of anchors)
  - Type 4: typical wall height of 17m (4 rows of anchors)
  - Type 5: TBC
  - Type 6: TBC

Only a typical wall height of 12m has been analysed. Type 1, 2 and 4 have been derived conceptually based on this design.

- The anchor free lengths are dependent on the depth of landslip debris and the distance to competent rock. The required free lengths have been assumed using the limited borehole data, and assume that the base of the landslip follows the existing ground surface contours (i.e. slopes upwards towards the ground surface below sloping ground at the landslip headscarp). Free lengths of anchors are shown on attached typical sections and assume that the base of the landslide is on a 7 degree plane perpendicular to the road alignment.

- Anchor testing will be required to verify the assumed ultimate grout/rock bond strength of 400 kPa assumed. The design bond strength should be verified by pull-out test of trial anchors. The number of trial anchors is assumed to be about 5% of the total anchor number. All of installed anchors will require either on-site suitability or on-site acceptance testing.
- Anchor bond length of 10 m has been adopted in the design.

22-Jun-17

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Type I (3m RH)

NOTES

- 1. Anchors require encapsulation over full length to provide double corrosion protection in accordance with BS 8001 (CLASS 1)

1500W x 1200 DEEP CAPPING BEAM

Retained Height = 3.0m

Landslide Debris = 2.0m

1.5m dia pile @ 3.0m c/c

→ steel refer Type IV

5m N750 Rock

Total pile length = 28m

PROPOSED ROAD

300mm (min) Drainage material, separated with AD9 Bidim Bituclon

Checked: 20  
Revised: 20  
File: 20  
Job No: 1001181-1  
Office: AKLD

NEW ENG FILL  
Tree length = 3.5m  
Anchors @ 1.5m c/c

15L strand anchors (6 strands) 15.7mm dia - Bonded to 10m in 225mm dia hole

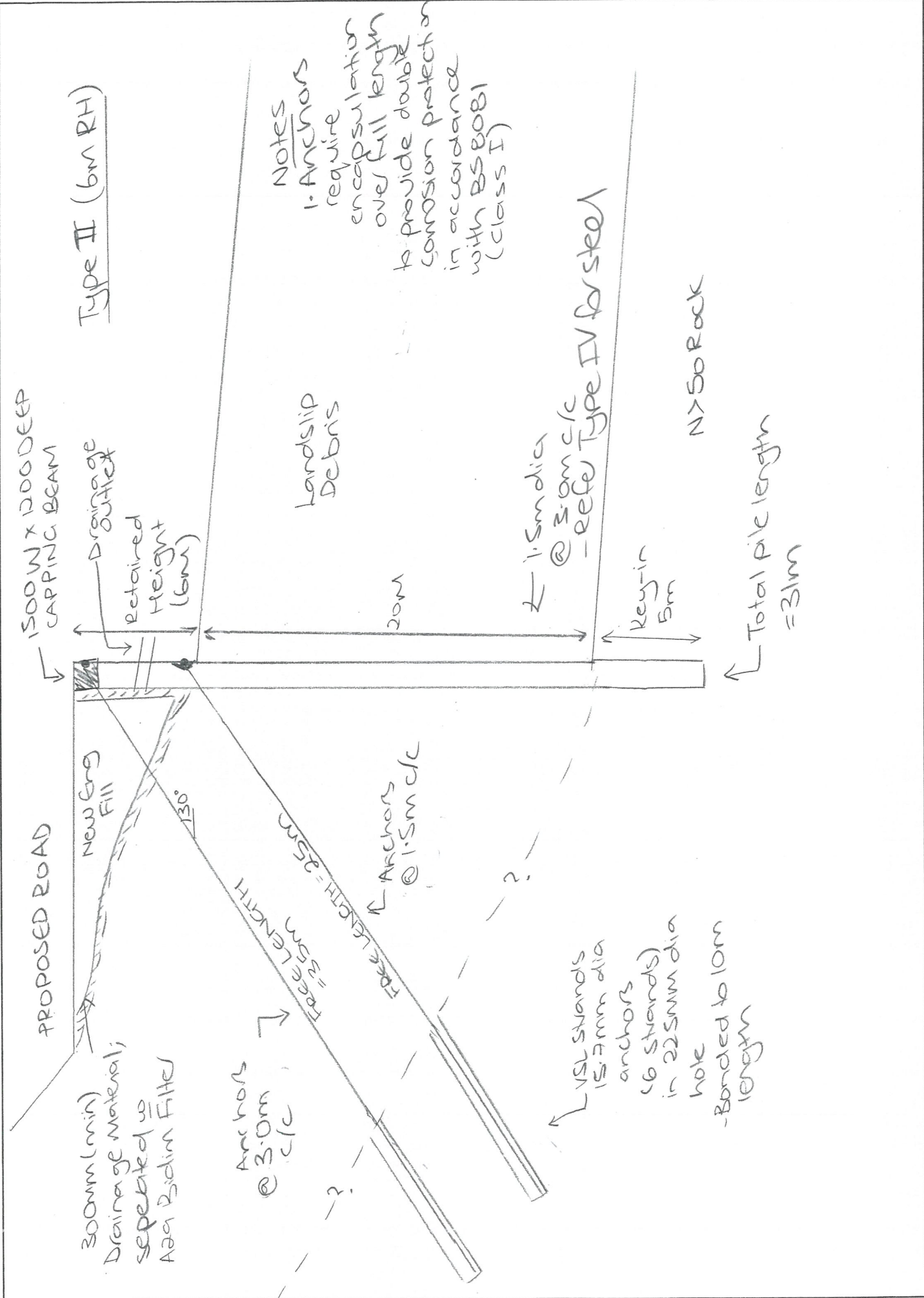
Scale 1:250  
@ AH

Description: 3m high RTW - Typical section

Project: Road 2  
MMA  
Tonkin+Taylor

Computed: KEG 21/6/2017





**NOTES**  
 1. Anchors require encapsulation over full length to provide double corrosion protection in accordance with BS8081 (Class I)

Landslip Debris

1.5m dia @ 3.0m c/c - refer Type IV for steel

N > 50 Rock

Total pile length = 33m

1500W x 1200DEEP CAPPING BEAM

Type II (6m RH)

Retained Height (6m)

New Eng Fill

PROPOSED ROAD

300mm (min) Drainage Material; separated w/ 100g Bidim Filter

Anchors @ 3.0m c/c

Anchors @ 1.5m c/c

15L stands 15.7mm dia anchors (6 stands) in 225mm dia hole - Bonded to 10m length

Free Length = 33.0m

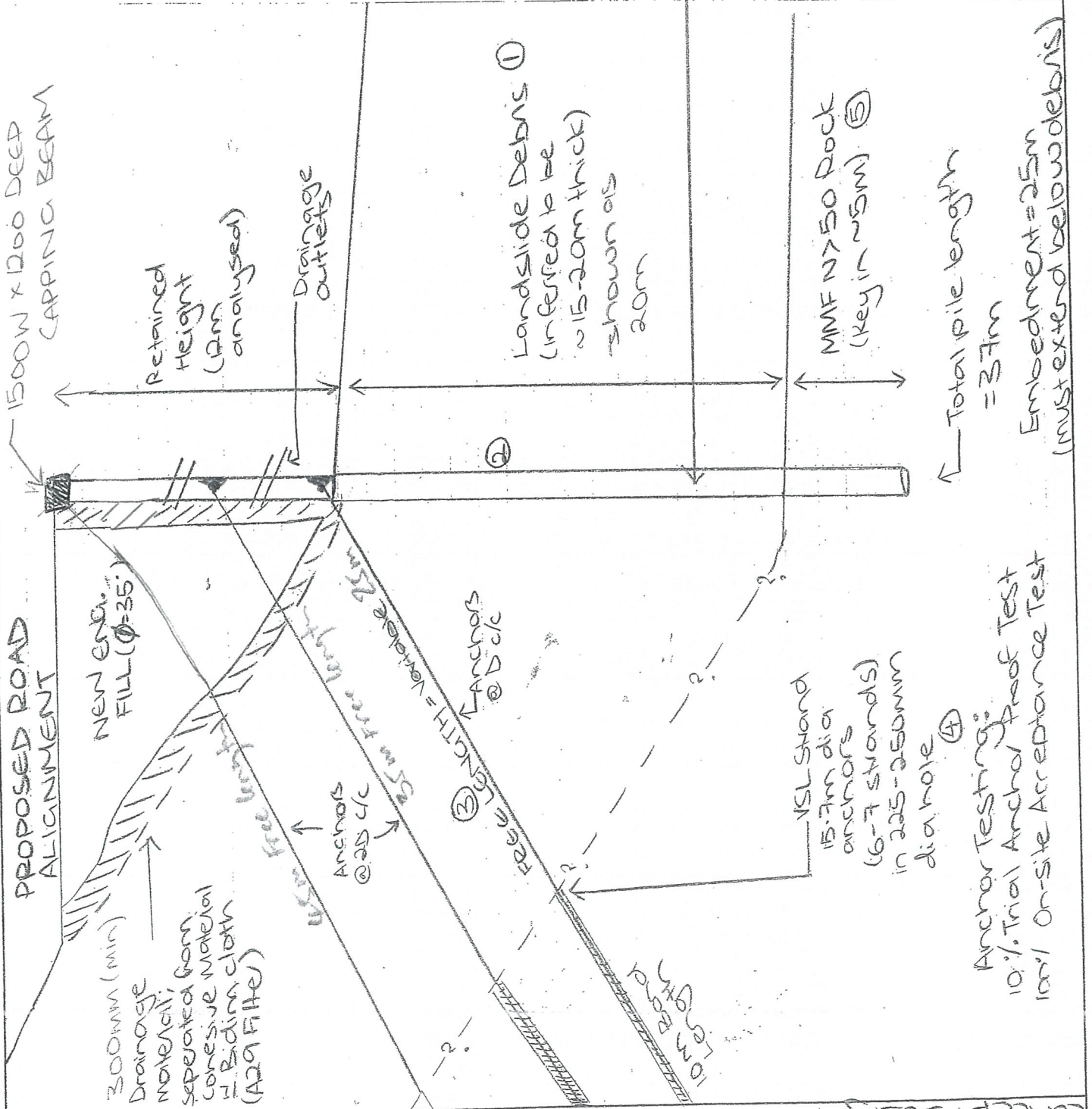
Free Length = 25.0m

Key-in 5m

Office: 20  
 Job No: 20  
 File: 20  
 Sheet No: 20

Computed: 20  
 Checked: 20  
 Revised: 20  
 Checked: 20

Project:



**Type III (DmRH)**

**Notes:**

- 1. Anchors require encapsulation over full length to provide double corrosion protection in accordance with BS8081 (class I)

1.5m dia pile @ 30m spacing  
 - Ref Type IV for steel

Scale 1:250 @ A4

Office:	20
Job No.:	20
File:	20
Sheet No.:	20

Computed: KPCA  
 Checked: [ ]  
 Revised: [ ]  
 Checked: [ ]

Project: MMA  
 BM Retaining  
 M11

TFT Tonkin+Taylor  
 Description: Concept Design





Route Z - Wall Height Report

Route Z - Wall Height Report

CL Ch	CL Z	WB Z	CL Offset
2015	154.603	153.998	-8.195
2020	154.835	153.898	-6.84
2020	154.835	153.898	-6.84
2022.263	154.94	153.896	-6.872
2025	155.068	153.901	-6.909
2030	155.3	153.958	-6.961
2032.263	155.405	153.969	-6.989
2035	155.533	153.981	-7.024
2040	155.765	153.979	-7.095
2045	155.998	153.979	-7.164
2050	156.23	153.975	-7.235
2055	156.463	154.023	-7.29
2060	156.695	153.978	-7.374
2065	156.928	153.807	-7.495
2070	157.16	153.601	-7.626
2072.263	157.265	153.365	-7.729
2075	157.393	152.962	-7.888
2080	157.625	152.19	-8.189
2085	157.858	150.735	-8.696
2090	158.09	149.477	-9.143
2095	158.323	148	-9.656
2100	158.555	146.455	-10.189
2105	158.788	146.151	-10.35
2110	159.02	146.414	-10.34
2115	159.253	147.211	-10.171
2120	159.485	147.747	-10.08
2125	159.718	149.115	-9.739
2130	159.95	149.875	-9.581
2135	160.183	150.323	-9.517
2140	160.415	150.654	-9.487
2145	160.648	150.508	-9.601
2150	160.88	149.997	-9.823
2155	161.113	148.873	-10.23
2160	161.345	149.049	-10.247
2161.907	161.434	149.626	-10.101
2165	161.578	150.322	-9.941
2170	161.81	150.805	-9.875
2175	162.043	150.991	-9.898
2180	162.275	150.616	-10.09
2185	162.508	152.327	-9.656
2186.907	162.596	153.228	-9.415
2190	162.74	153.751	-9.307
2195	162.973	155.442	-8.879
2200	163.205	158.885	-7.925
2201.907	163.294	160.264	-7.542
2205	163.438	161.807	-7.128
2210	163.67	162.142	-7.106
2211.907	163.759	162.255	-7.102
2215	163.903	162.658	-7.025

Height	Side
0.605	LEFT
0.937	LEFT
0.937	LEFT
1.044	LEFT
1.167	LEFT
1.342	LEFT
1.436	LEFT
1.552	LEFT
1.786	LEFT
2.019	LEFT
2.255	LEFT
2.44	LEFT
2.717	LEFT
3.121	LEFT
3.559	LEFT
3.9	LEFT
4.431	LEFT
5.435	LEFT
7.123	LEFT
8.613	LEFT
10.323	LEFT
12.1	LEFT
12.637	LEFT
12.606	LEFT
12.042	LEFT
11.738	LEFT
10.603	LEFT
10.075	LEFT
9.86	LEFT
9.761	LEFT
10.14	LEFT
10.883	LEFT
12.24	LEFT
12.296	LEFT
11.808	LEFT
11.256	LEFT
11.005	LEFT
11.052	LEFT
11.659	LEFT
10.181	LEFT
9.368	LEFT
8.989	LEFT
7.531	LEFT
4.32	LEFT
3.03	LEFT
1.631	LEFT
1.528	LEFT
1.504	LEFT
1.245	LEFT

WALL TYPE:

- I < 3.0m (1x Row Anchors)
- II < 6.0m (2 rows of anchors)
- III < 12.0m (3 rows of anchors)
- IV < 17.0m (4 rows of anchors)

CL Ch	CL Z	WB Z	CL Offset
2220	164.135	162.903	-7.021
2225	164.368	163.694	-6.854
2230	164.6	163.731	-6.912
2235	164.833	163.741	-6.979
2240	165.065	163.471	-7.13
2245	165.298	164.024	-7.033
2250	165.53	164.121	-7.074
2255	165.763	160.549	-8.216
2260	165.995	156.281	-9.566
2265	166.228	153.638	-10.428
2270	166.46	153.605	-10.508
2275	166.693	155.201	-10.099
2280	166.925	159.343	-8.926
2285	167.158	163.206	-7.837
2290	167.39	165.296	-7.28
2295	167.623	165.573	-7.266
2300	167.855	167.073	-6.886
2745	165.934	157.661	-9.133
2750	165.434	158.659	-8.684
2750	165.434	158.659	-8.684
2755	164.934	159.169	-8.381
2760	164.434	160.901	-7.711
2765	163.934	163.031	-6.922
2770	163.434	162.897	-8.267
2945	145.934	144.545	-7.059
2950	145.434	139.689	-8.357
2950	145.434	139.689	-8.357
2950.423	145.391	139.485	-8.405
2955	144.934	136.385	-9.189
3207	119.734	114.182	-8.263
3210	119.434	114.942	-7.951
3210.962	119.337	115.231	-7.837
3212	119.234	115.541	-7.715
3212	119.234	115.541	-7.715
3215	118.934	116.631	-7.303
3220	118.434	118.03	-6.743
0	17.77	17.447	6.656
5	18.095	17.542	8.18
10	18.42	17.91	6.712
15	18.745	18.013	6.778
15	18.745	18.013	6.778
20	19.07	18.22	6.814
25	19.395	18.305	6.886
30	19.72	18.286	6.989
35	20.045	18.04	7.16
40	20.37	17.963	7.281
40	20.37	17.963	7.281
45	20.695	17.929	7.388
50	21.02	17.169	7.714

Height	Side
1.232	LEFT
0.674	LEFT
0.869	LEFT
1.092	LEFT
1.594	LEFT
1.274	LEFT
1.409	LEFT
5.214	LEFT
9.714	LEFT
12.59	LEFT
12.855	LEFT
11.492	LEFT
7.582	LEFT
3.952	LEFT
2.094	LEFT
2.05	LEFT
0.782	LEFT
8.273	LEFT
6.775	LEFT
6.775	LEFT
5.765	LEFT
3.533	LEFT
0.903	LEFT
0.537	LEFT
1.389	LEFT
5.745	LEFT
5.745	LEFT
5.906	LEFT
8.549	LEFT
5.552	LEFT
4.492	LEFT
4.106	LEFT
3.693	LEFT
3.693	LEFT
2.303	LEFT
0.404	LEFT
0.323	RIGHT
0.553	RIGHT
0.51	RIGHT
0.732	RIGHT
0.732	RIGHT
0.85	RIGHT
1.09	RIGHT
1.434	RIGHT
2.005	RIGHT
2.407	RIGHT
2.407	RIGHT
2.766	RIGHT
3.851	RIGHT

NOT PART OF THE PILED WALL



Route Z - Wall Height Report

CL Ch	CL Z	WB Z	CL Offset	Height	Side
55	21.345	16.561	7.994	4.784	RIGHT
60	21.67	15.858	8.302	5.812	RIGHT
65	21.995	15.614	8.473	6.381	RIGHT
70	22.32	15.27	8.674	7.05	RIGHT
75	22.645	14.858	8.895	7.787	RIGHT
80	22.97	14.587	9.074	8.383	RIGHT
85	23.295	14.426	9.219	8.869	RIGHT
90	23.62	14.322	9.348	9.298	RIGHT
95	23.945	14.346	9.438	9.599	RIGHT
100	24.27	14.437	9.509	9.833	RIGHT
105	24.595	14.591	9.56	10.004	RIGHT
110	24.92	14.776	9.602	10.144	RIGHT
115	25.245	14.819	9.686	10.426	RIGHT
120	25.57	14.885	9.764	10.685	RIGHT
125	25.895	14.93	9.848	10.965	RIGHT
130	26.22	14.919	9.949	11.301	RIGHT
135	26.545	14.806	10.08	11.739	RIGHT
140	26.87	14.375	10.307	12.495	RIGHT
145	27.195	14.208	10.455	12.987	RIGHT
150	27.52	14.291	10.527	13.229	RIGHT
155	27.845	14.428	10.584	13.417	RIGHT
160	28.17	14.744	10.586	13.426	RIGHT
165	28.495	14.718	10.692	13.777	RIGHT
170	28.82	14.569	10.834	14.251	RIGHT
173.517	29.049	14.496	10.924	14.553	RIGHT
175	29.145	14.559	10.938	14.586	RIGHT
180	29.47	14.95	10.928	14.52	RIGHT
185	29.795	15.451	10.886	14.344	RIGHT
190	30.12	16.147	10.785	13.973	RIGHT
195	30.445	16.871	10.675	13.574	RIGHT
196.017	30.511	17.004	10.657	13.507	RIGHT
200	30.77	17.313	10.651	13.457	RIGHT
205	31.095	17.197	10.793	13.898	RIGHT
210	31.42	17.97	10.669	13.45	RIGHT
215	31.745	18.867	10.508	12.878	RIGHT
217.5	31.908	19.317	10.427	12.591	RIGHT
218.517	31.974	19.445	10.41	12.529	RIGHT
220	32.07	19.608	10.393	12.462	RIGHT
222.5	32.233	19.994	10.331	12.239	RIGHT
225	32.395	20.752	10.158	11.643	RIGHT
227.5	32.558	21.767	9.907	10.791	RIGHT
230	32.72	22.571	9.72	10.149	RIGHT
232.5	32.883	22.943	9.662	9.94	RIGHT
235	33.045	23.422	9.572	9.623	RIGHT
237.5	33.208	24.427	9.325	8.781	RIGHT
240	33.37	25.448	9.072	7.922	RIGHT
240	33.37	25.448	9.072	7.922	RIGHT
241.017	33.436	25.798	8.989	7.638	RIGHT
242.5	33.533	26.338	8.856	7.195	RIGHT

Route Z - Wall Height Report

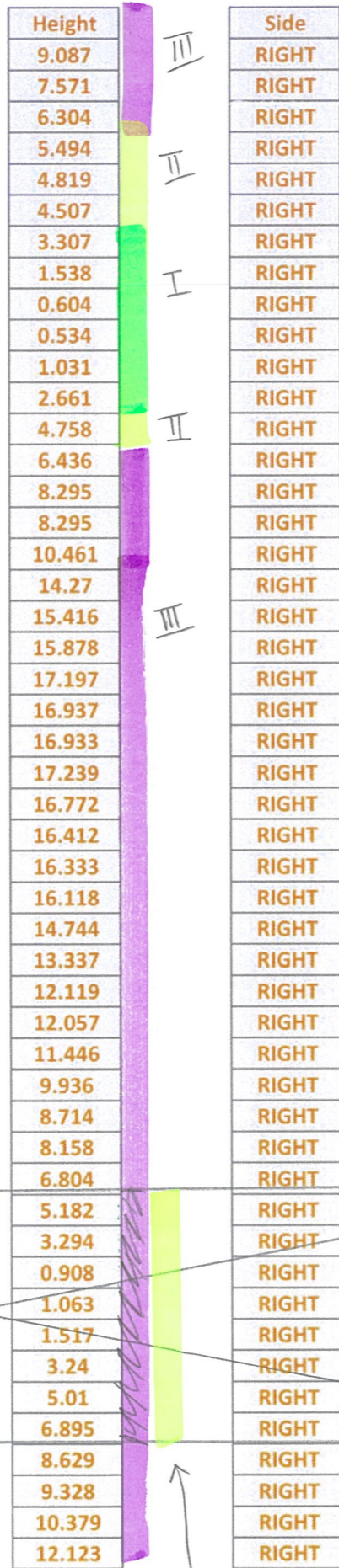
CL Ch	CL Z	WB Z	CL Offset	Height	Side
245	33.695	27.267	8.626	6.428	RIGHT
247.5	33.858	28.953	8.169	4.905	RIGHT
250	34.02	30.623	7.717	3.397	RIGHT
252.5	34.183	30.704	7.741	3.479	RIGHT
255	34.345	30.09	7.974	4.255	RIGHT
257.5	34.508	29.315	8.255	5.193	RIGHT
260	34.67	28.499	8.549	6.171	RIGHT
262.5	34.833	28.352	8.642	6.481	RIGHT
265	34.995	28.471	8.655	6.524	RIGHT
267.5	35.158	28.698	8.636	6.46	RIGHT
270	35.32	28.887	8.628	6.433	RIGHT
272.5	35.483	29.592	8.465	5.891	RIGHT
275	35.645	30.436	8.261	5.209	RIGHT
277.5	35.808	30.66	8.242	5.148	RIGHT
280	35.97	30.837	8.238	5.133	RIGHT
282.5	36.133	30.784	8.302	5.349	RIGHT
285	36.295	30.51	8.433	5.785	RIGHT
287.5	36.458	30.405	8.514	6.053	RIGHT
290	36.62	31.03	8.375	5.59	RIGHT
292.5	36.783	32.347	8.028	4.436	RIGHT
295	36.945	33.664	7.682	3.281	RIGHT
297.5	37.108	35.016	7.325	2.092	RIGHT
300	37.27	35.939	7.097	1.331	RIGHT
302.5	37.433	34.75	7.503	2.683	RIGHT
305	37.595	33.611	7.893	3.984	RIGHT
307.5	37.758	32.273	8.343	5.485	RIGHT
310	37.92	31.164	8.724	6.756	RIGHT
312.5	38.083	31.29	8.736	6.793	RIGHT
315	38.245	31.498	8.722	6.747	RIGHT
317.5	38.408	31.477	8.777	6.931	RIGHT
320	38.57	31.589	8.792	6.981	RIGHT
322.5	38.733	31.981	8.723	6.752	RIGHT
325	38.895	32.882	8.502	6.013	RIGHT
327.5	39.058	34.296	8.126	4.762	RIGHT
330	39.22	36.055	7.647	3.165	RIGHT
332.5	39.383	38.177	7.059	1.206	RIGHT
335	39.545	39.189	6.805	0.356	RIGHT
337.5	39.708	39.852	6.655	-0.144	RIGHT
340	39.87	38.682	7.054	1.188	RIGHT
342.5	40.033	37.222	7.541	2.811	RIGHT
345	40.195	35.44	8.124	4.755	RIGHT
347.5	40.358	33.419	8.779	6.939	RIGHT
350	40.52	31.983	9.259	8.537	RIGHT
352.5	40.683	30.6	9.723	10.083	RIGHT
355	40.845	30.571	9.78	10.274	RIGHT
357.5	41.008	30.429	9.871	10.579	RIGHT
360	41.17	30.489	9.902	10.681	RIGHT
361.78	41.286	30.656	9.887	10.63	RIGHT
362.5	41.333	30.938	9.815	10.395	RIGHT



Route Z - Wall Height Report

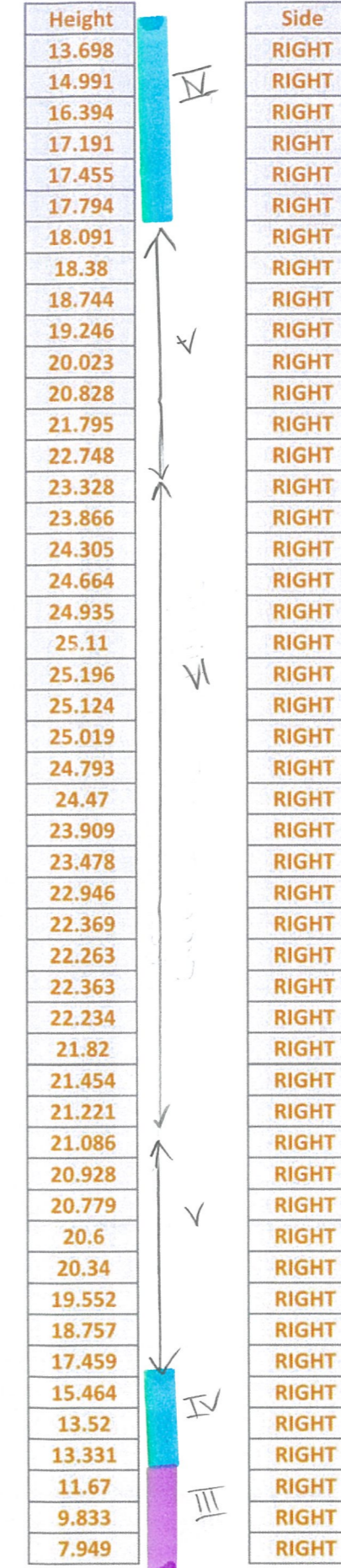
Route Z - Wall Height Report

CL Ch	CL Z	WB Z	CL Offset
365	41.495	32.408	9.418
367.5	41.658	34.087	8.957
370	41.82	35.516	8.572
372.5	41.983	36.489	8.324
374.339	42.102	37.283	8.118
375	42.145	37.638	8.023
377.5	42.308	39.001	7.658
380	42.47	40.932	7.122
382.5	42.633	42.029	6.837
385	42.795	42.261	6.811
387.5	42.958	41.927	6.955
390	43.12	40.459	7.439
392.5	43.283	38.525	8.063
395	43.445	37.009	8.561
397.5	43.608	35.313	9.114
397.5	43.608	35.313	9.114
400	43.77	33.309	9.758
405	44.095	29.825	10.891
407.494	44.257	28.841	11.23
410	44.42	28.542	11.363
415	44.745	27.548	11.749
419.339	45.027	28.09	11.662
420	45.07	28.137	11.66
425	45.395	28.156	11.741
430	45.72	28.948	11.591
432.012	45.851	29.439	11.479
432.5	45.883	29.55	11.454
435	46.045	29.927	11.385
437.5	46.208	31.464	10.967
440	46.37	33.033	10.54
441.78	46.486	34.367	10.171
442.5	46.533	34.476	10.153
445	46.695	35.249	9.969
447.5	46.858	36.922	9.516
450	47.02	38.306	9.15
452.5	47.183	39.025	8.983
455	47.345	40.541	8.577
457.5	47.508	42.326	8.09
460	47.67	44.376	7.524
462.5	47.833	46.925	6.808
492.5	49.783	48.72	8.309
495	49.945	48.428	6.991
497.5	50.108	46.868	7.507
500	50.27	45.26	8.039
502.5	50.433	43.538	8.604
505	50.595	41.966	9.124
506	50.66	41.332	9.334
507.5	50.758	40.379	9.649
510	50.92	38.797	10.173



No wall shown on long-section

CL Ch	CL Z	WB Z	CL Offset
512.5	51.083	37.385	10.645
515	51.245	36.254	11.033
517.5	51.408	35.014	11.454
520	51.57	34.379	11.693
522.5	51.733	34.278	11.772
525	51.895	34.101	11.874
527.5	52.058	33.967	11.963
530	52.22	33.84	12.049
532.5	52.383	33.639	12.159
535	52.545	33.299	12.309
537.5	52.708	32.685	12.542
540	52.87	32.042	12.784
542.5	53.033	31.238	13.074
545	53.195	30.447	13.36
547.5	53.358	30.03	13.534
550	53.52	29.654	13.695
552.5	53.683	29.378	13.827
555	53.845	29.181	13.935
557.5	54.008	29.073	14.016
560	54.17	29.06	14.069
562.5	54.333	29.137	14.094
565	54.495	29.371	14.073
567.5	54.658	29.639	14.041
570	54.82	30.027	13.973
572.5	54.983	30.513	13.876
575	55.145	31.236	13.708
577.5	55.308	31.83	13.579
580	55.47	32.524	13.419
582.5	55.633	33.264	13.246
585	55.795	33.532	13.214
587.5	55.958	33.595	13.244
590	56.12	33.886	13.206
592.5	56.283	34.463	13.081
595	56.445	34.991	12.972
597.5	56.608	35.387	12.902
600	56.77	35.684	12.861
602.5	56.933	36.005	12.814
605	57.095	36.316	12.769
607.5	57.258	36.658	12.715
610	57.42	37.08	12.638
612.5	57.583	38.031	12.401
615	57.745	38.988	12.163
617.5	57.908	40.449	11.773
620	58.07	42.606	11.175
622.5	58.233	44.713	10.591
622.756	58.249	44.918	10.535
625	58.395	46.725	10.041
627.5	58.558	48.725	9.495
630	58.72	50.771	8.935



DETAILS FOR ANCHORS IV & VII TO BE CONFIRMED.



Route Z - Wall Height Report

CL Ch	CL Z	WB Z	CL Offset
632.5	58.883	52.554	8.454
634.422	59.008	53.117	8.326
635	59.045	53.45	8.237
635	59.045	53.45	8.237
636.756	59.159	54.458	7.969
640	59.37	55.748	7.645
645	59.695	57.542	7.205
650	60.02	57.535	8.759
1147.5	98.549	98.256	6.733
1150	98.749	98.111	6.832
1151.265	98.85	97.989	6.896
1155	99.149	97.664	7.075
1160	99.549	97.126	7.345
1165	99.949	94.769	8.162
1166.265	100.05	93.738	8.499
1170	100.349	90.943	9.419
1175	100.749	88.462	10.272
1180	101.149	88.591	10.343
1185	101.549	91.003	9.728
1187.694	101.764	91.984	9.493
1190	101.949	92.735	9.323
1195	102.349	93.199	9.303
1200	102.749	93.574	9.311
1205	103.149	94.349	9.199
1210	103.549	94.899	9.154
1215	103.949	95.482	9.099
1220	104.349	95.338	9.262
1225	104.749	96.315	9.089
1230	105.149	97.559	8.836
1235	105.549	99.407	8.401
1240	105.949	101.193	7.985
1240.565	105.994	101.32	7.961
1245	106.349	102.472	7.722
1250	106.749	104.242	7.311
1255	107.149	105.446	7.07
1260	107.549	106.863	6.764
1261.993	107.708	107.285	6.686
1340	113.949	113.548	6.671
1342.5	114.149	113.399	6.776
1345	114.349	113.228	6.887
1347.5	114.549	113.124	6.978
1350	114.749	113.16	7.027
1352.5	114.949	113.113	7.102
1355	115.149	112.952	7.21
1357.5	115.349	113.05	7.241
1360	115.549	113.041	7.303
1362.5	115.749	112.929	7.397
1365	115.949	112.804	7.494
1367.5	116.149	112.704	7.584

Height	Side
6.329	RIGHT
5.891	RIGHT
5.595	RIGHT
5.595	RIGHT
4.701	RIGHT
3.622	RIGHT
2.153	RIGHT
2.485	RIGHT
0.293	RIGHT
0.638	RIGHT
0.861	RIGHT
1.485	RIGHT
2.423	RIGHT
5.18	RIGHT
6.312	RIGHT
9.406	RIGHT
12.287	RIGHT
12.558	RIGHT
10.546	RIGHT
9.78	RIGHT
9.214	RIGHT
9.15	RIGHT
9.175	RIGHT
8.8	RIGHT
8.65	RIGHT
8.467	RIGHT
9.011	RIGHT
8.434	RIGHT
7.59	RIGHT
6.142	RIGHT
4.756	RIGHT
4.674	RIGHT
3.877	RIGHT
2.507	RIGHT
1.703	RIGHT
0.686	RIGHT
0.423	RIGHT
0.401	RIGHT
0.75	RIGHT
1.121	RIGHT
1.425	RIGHT
1.589	RIGHT
1.836	RIGHT
2.197	RIGHT
2.299	RIGHT
2.508	RIGHT
2.82	RIGHT
3.145	RIGHT
3.445	RIGHT

II

I

II

III

II

I

Note change in chainage

Route Z - Wall Height Report

CL Ch	CL Z	WB Z	CL Offset
1370	116.349	112.493	7.708
1372.5	116.549	112.426	7.788
1375	116.749	112.365	7.866
1377.5	116.949	112.281	7.951
1380	117.149	112.187	8.04
1382.5	117.349	112.057	8.138
1385	117.549	111.945	8.232
1387.5	117.749	111.721	8.359
1390	117.949	111.551	8.47
1392.5	118.149	111.333	8.596
1395	118.349	111.056	8.739
1397.5	118.549	110.764	8.886
1400	118.749	110.404	9.054
1402.5	118.949	110.033	9.226
1405	119.149	109.881	9.331
1407.5	119.349	109.98	9.362
1410	119.549	110.068	9.395
1412.5	119.749	110.092	9.448
1415	119.949	110.066	9.516
1417.5	120.149	109.879	9.632
1420	120.349	109.692	9.748
1422.5	120.549	109.377	9.902
1425	120.749	109.322	9.979
1427.5	120.949	109.603	9.955
1430	121.149	109.564	10.026
1432.5	121.349	109.739	10.034
1435	121.549	110.103	9.985
1437.5	121.749	110.415	9.951
1440	121.949	110.948	9.851
1442.5	122.149	110.87	9.934
1445	122.349	110.986	9.96
1447.5	122.549	111.428	9.887
1450	122.749	111.748	9.851
1452.5	122.949	112.207	9.774
1455	123.149	112.421	9.769
1457.5	123.349	112.557	9.788
1460	123.549	112.483	9.871
1462.5	123.749	112.36	9.968
1465	123.949	112.367	10.026
1467.5	124.149	112.479	10.052
1470	124.349	112.68	10.052
1472.5	124.549	113.005	10.014
1475	124.749	113.547	9.911
1477.5	124.949	114.562	9.667
1480	125.149	115.133	9.556
1482.5	125.349	116.108	9.323
1485	125.549	116.328	9.317
1487.5	125.749	116.774	9.243
1490	125.949	117.221	9.169

Height	Side
3.856	RIGHT
4.123	RIGHT
4.384	RIGHT
4.668	RIGHT
4.962	RIGHT
5.292	RIGHT
5.604	RIGHT
6.028	RIGHT
6.398	RIGHT
6.816	RIGHT
7.293	RIGHT
7.785	RIGHT
8.345	RIGHT
8.916	RIGHT
9.268	RIGHT
9.369	RIGHT
9.481	RIGHT
9.657	RIGHT
9.883	RIGHT
10.27	RIGHT
10.657	RIGHT
11.172	RIGHT
11.427	RIGHT
11.346	RIGHT
11.585	RIGHT
11.61	RIGHT
11.446	RIGHT
11.334	RIGHT
11.001	RIGHT
11.279	RIGHT
11.363	RIGHT
11.121	RIGHT
11.001	RIGHT
10.742	RIGHT
10.728	RIGHT
10.792	RIGHT
11.066	RIGHT
11.389	RIGHT
11.582	RIGHT
11.67	RIGHT
11.669	RIGHT
11.544	RIGHT
11.202	RIGHT
10.387	RIGHT
10.016	RIGHT
9.241	RIGHT
9.221	RIGHT
8.975	RIGHT
8.728	RIGHT

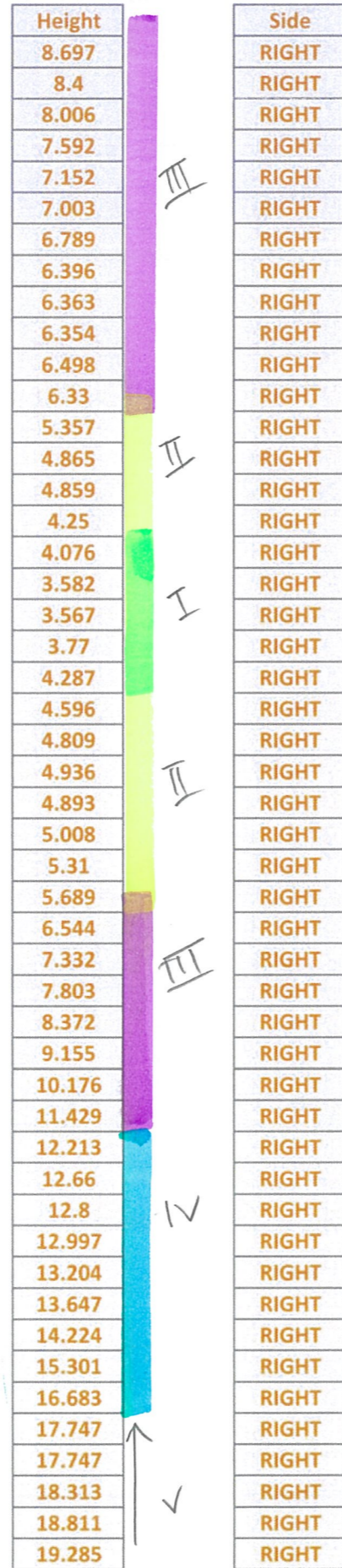
II

III



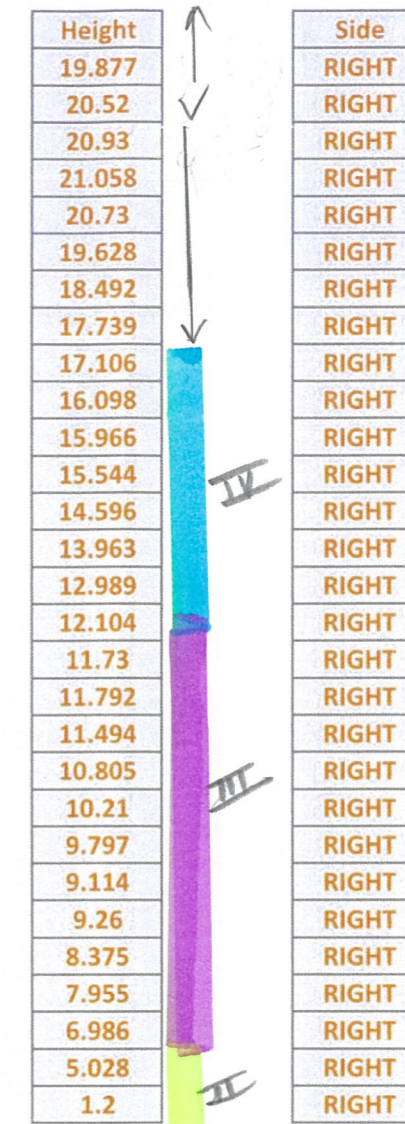
Route Z - Wall Height Report

CL Ch	CL Z	WB Z	CL Offset
1490.307	125.973	117.276	9.16
1492.5	126.147	117.747	9.071
1495	126.343	118.337	8.953
1497.5	126.535	118.943	8.829
1500	126.724	119.572	8.697
1501.236	126.816	119.813	8.652
1502.5	126.91	120.121	8.59
1504.807	127.078	120.682	8.477
1505	127.092	120.729	8.468
1507.5	127.271	120.917	8.465
1510	127.447	120.949	8.508
1511.236	127.533	121.203	8.458
1515	127.789	122.432	8.166
1519.533	128.088	123.223	8.018
1520	128.118	123.259	8.016
1525	128.434	124.184	7.834
1526.236	128.51	124.434	7.781
1530	128.736	125.154	7.633
1533.282	128.928	125.361	7.629
1535	129.027	125.257	7.69
1540	129.314	125.027	7.845
1545	129.602	125.006	7.937
1550	129.889	125.08	8.001
1555	130.177	125.241	8.039
1560	130.464	125.571	8.027
1565	130.752	125.744	8.061
1570	131.039	125.729	8.152
1575	131.327	125.638	8.265
1580	131.614	125.07	8.522
1585	131.902	124.57	8.758
1590	132.189	124.386	8.9
1595	132.477	124.105	9.07
1600	132.764	123.609	9.305
1605	133.052	122.876	9.611
1610	133.339	121.91	9.987
1615	133.627	121.414	10.222
1620	133.914	121.254	10.357
1625	134.202	121.402	10.398
1630	134.489	121.492	10.458
1635	134.777	121.573	10.52
1640	135.064	121.417	10.653
1645	135.352	121.128	10.826
1650	135.639	120.338	11.149
1655	135.927	119.244	11.563
1660	136.214	118.467	11.883
1660	136.214	118.467	11.883
1665	136.502	118.189	12.052
1670	136.789	117.978	12.202
1675	137.077	117.792	12.344



Route Z - Wall Height Report

CL Ch	CL Z	WB Z	CL Offset
1680	137.364	117.487	12.522
1685	137.652	117.132	12.715
1690	137.939	117.009	12.838
1695	138.227	117.169	12.876
1700	138.514	117.784	12.778
1705	138.802	119.174	12.447
1710	139.089	120.597	12.106
1715	139.377	121.638	11.88
1720	139.664	122.558	11.691
1725	139.952	123.854	11.388
1730	140.239	124.273	11.349
1735	140.527	124.983	11.222
1740	140.814	126.218	10.938
1745	141.102	127.139	10.747
1750	141.389	128.4	10.455
1755	141.677	129.573	10.19
1760	141.964	130.234	10.078
1765	142.252	130.46	10.096
1766.606	142.344	130.85	10.007
1770	142.539	131.734	9.8
1775	142.827	132.617	9.621
1776.606	142.919	133.122	9.498
1780	143.114	134	9.293
1785	143.402	134.142	9.337
1790	143.689	135.314	9.071
1791.606	143.781	135.826	8.945
1795	143.977	136.991	8.654
1800	144.264	139.236	8.067
1805	144.552	143.352	6.919

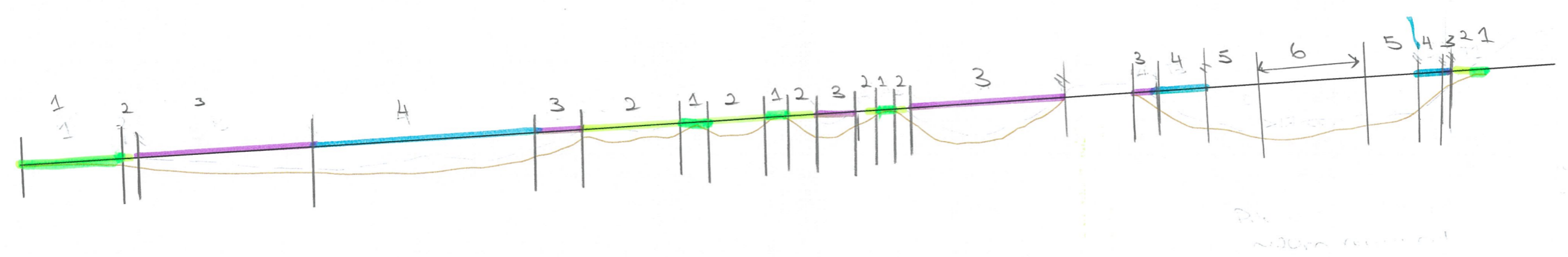


DETAILS FOR TYPE V T.B.C.



- I (1)
- II (2)
- IV (4)
- III (3)
- V (5) \*
- VI (6) \*

\* DETAILS OF WALLS V & VI T.B.C

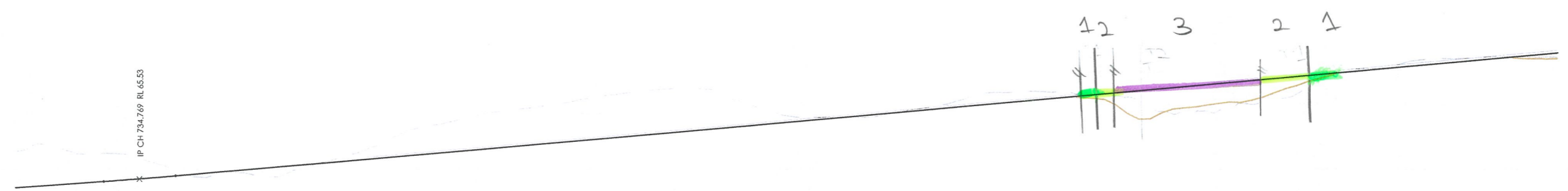


DATUM RL. -51.00

VERTICAL ALIGNMENT	L=719.02m G=6.5%																					
HORIZONTAL ALIGNMENT	L=196.02m			L=45m		L=133.32m R=156m			L=45m		L=12.67m		L=204.74m R=209m			L=129.92m						
LEVEL DIFFERENCE CUT - / FILL +	0.03	0.49	6.59	10.16	9.24	9.95	3.61	-0.06	-0.46	1.92	-0.53	6.11	13.59	12.97	6.70	1.06	19.23	16.91	1.98	-4.61	-15.67	
DESIGN SURFACE LEVEL	17.77	21.02	24.27	27.52	30.511	30.77	33.436	34.02	37.27	40.52	42.102	43.77	45.027	45.851	47.02	50.27	53.52	56.77	59.159	60.02	61.97	
EXISTING SURFACE LEVEL	17.74	20.53	17.68	17.36	21.27	20.82	29.82	34.08	37.75	38.60	42.64	37.66	31.44	32.88	40.32	49.21	34.29	39.86	57.18	64.63	77.64	
CHAINAGE	0	50	100	150	196.02	200	241.02	250	300	350	374.14	400	419.14	432.01	450	500	550	600	636.76	650	680	
SUPER ELEVATION	LHS and RHS -3%		LHS -3%		LHS -6%		RHS 6%		RHS 6%		LHS 4.5%		RHS -4.5%		LHS 4.5%		RHS -4.5%		RHS -3%		LHS 4.5%	

LONGITUDINAL SECTION - MCZ7  
HORIZ 1:1000 VERT 1:1000

Type  
 I (1)  
 II (2)  
 III (3)



DATUM RL. -4.00

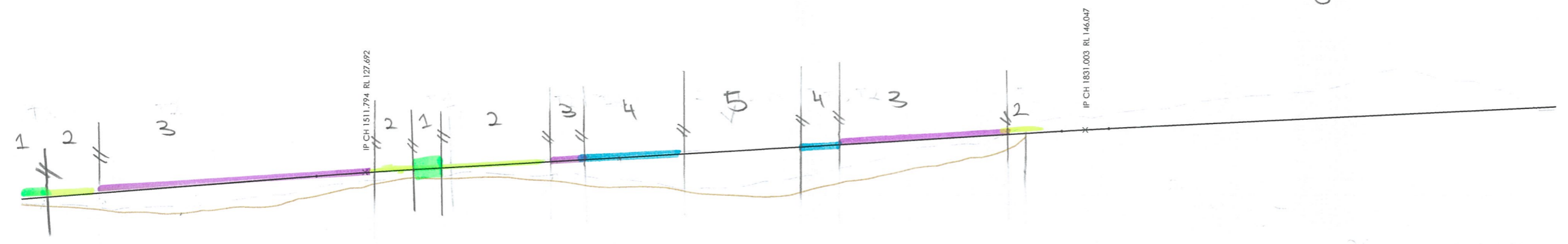
VERTICAL ALIGNMENT	L=719.02m G=6.5%		L=31.5m K=21		L=739.79m G=8%															
HORIZONTAL ALIGNMENT	L=129.92m				L=384.59m R=268m						L=125.73m				L=234.24m R=268m					
LEVEL DIFFERENCE CUT - / FILL +	-15.67	-15.62	-8.79	-2.30	1.39	3.07	-10.03	-16.05	-19.02	-10.75	0.58	-3.82	-0.34	0.02	11.33	5.42	-0.57	-2.39	0.89	1.80
DESIGN SURFACE LEVEL	61.97	63.27	65.589	66.749	68.083	70.749	74.749	78.749	82.749	86.749	90.749	94.749	98.749	98.85	102.749	106.749	108.908	110.749	114.749	115.549
EXISTING SURFACE LEVEL	77.64	78.89	74.38	69.05	66.70	67.68	84.78	94.80	101.76	97.49	90.17	98.57	99.09	98.83	91.42	101.33	109.48	113.14	113.86	113.75
CHAINAGE	680	700	734.77	750	766.68	800	850	900	950	1000	1050	1100	1115.0	1115.27	1200	1250	1276.99	1300	1350	1360
SUPER ELEVATION	LHS and RHS -3%		LHS -3% / RHS -3.5%		RHS 3.5%		LHS -3% / RHS -3.5%		RHS 3.5%		LHS -3% / RHS -3.5%		LHS and RHS -3%		RHS -3% / LHS -3.5%		LHS -3% / RHS -3.5%			

LONGITUDINAL SECTION - MCZ7  
 HORZ 1:1000 VERT 1:1000



- I
- II
- III
- IV

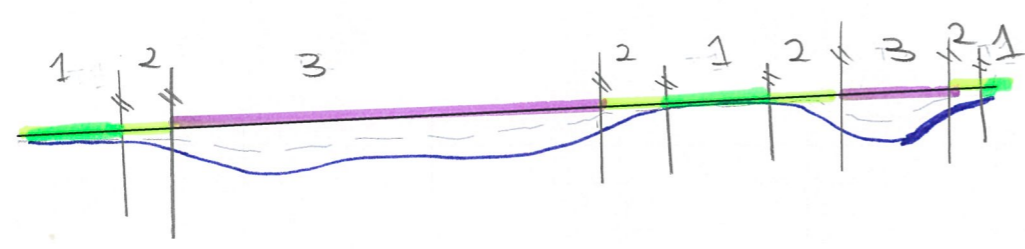
\* Refer to Route Z  
 - Wall Height Report  
 for exact chainages  
 of changes in wall  
 type



DATUM RL. 44.00

VERTICAL ALIGNMENT	L=739.79m G=8%		F=19.1 L=42.97m		L=287.22m G=5.75%		F=19.1 L=21.01m		L=609.22m G=4.45%													
HORIZONTAL ALIGNMENT	L=234.24m R=268m		L=8.3m		L=257.07m R=1100m		L=94.88m		L=160.78m R=313m													
LEVEL DIFFERENCE CUT - / FILL +	1.80	7.64	7.81	4.10	3.46	3.72	3.33	5.34	14.64	13.63	4.45	2.93	-1.73	-5.69	-7.15	-8.29	-11.17	-15.14	-13.05	0.81	1.36	
DESIGN SURFACE LEVEL	115.549	118.749	122.749	126.724	127.533	128.088	129.889	132.764	135.639	138.514	141.389	142.919	144.264	146.018	146.93	147.929	149.255	151.38	153.905	155.405	155.765	
EXISTING SURFACE LEVEL	113.75	111.11	114.94	122.62	124.07	124.37	126.56	127.42	121.00	124.89	136.94	139.99	146.00	151.71	154.08	156.22	160.43	166.72	166.95	154.59	154.41	
CHAINAGE	1360	1400	1450	1500	1511.24	1519.53	1550	1600	1650	1700	1750	1776.61	1800	1831	1850	1871.48	1900	1950	2000	2032.26	2040	
SUPER ELEVATION	RHS -3.5%		LHS 0.65%		RHS 0.58%		LHS 3%		LHS and RHS -3%		RHS 3%		RHS 3%		RHS 3%		RHS 3%		RHS 3%		RHS 3%	

Notes  
 relate  
 to centre  
 line



DATUM RL. 81.00

VERTICAL ALIGNMENT	L=609.22m		G=4.65%	
HORIZONTAL ALIGNMENT	L=169.64m		L=181.69m R=313m	
LEVEL DIFFERENCE CUT - / FILL +	1.36	1.72	6.84	5.47
DESIGN SURFACE LEVEL	155.765	156.23	158.555	160.88
EXISTING SURFACE LEVEL	154.41	154.51	151.71	155.41
CHAINAGE	2040	2050	2100	2150
SUPER ELEVATION	RHS 0.9%		LHS 3%	
	LHS and RHS -3%			

LONGITUDINAL SECTION - MCZ7  
 HORZ 1:1000 VERT 1:1000