

Shadforth
99 Sandalwood Lane,
Forest Glen, QLD, 4556

Project Number: PTP/04117
Letter Number: PTP/04117 – 0002
Project Name: Spring Mountain Stage 15B

Attention: Lincoln Redgen
Email: Lincoln.Redgen@shadcivil.com.au

Report on Level 1 Earthworks
Bidyan Boulevard,
New Beith, QLD, 4124,

1. Introduction

This report summarises the results of inspection and testing provided by Protest Engineering (Protest) for the bulk earthworks as part of the Spring Mountain Stage 15B located at Bidyan Boulevard, New Beith undertaken between 9 December 2019 to 16 December 2019. The works were undertaken at the request of Shadforth.

The scope of inspection and testing undertaken was in general accordance with AS3798-2007 *Guidelines on Earthworks for Commercial and Residential Developments*. As part of the inspection and testing undertaken, Protest provided Level 1 supervision in accordance with Section 8.2 of AS3798-2007.

Approximately 1500m³ of fill was placed at the site. Drawing Stage 17B attached is the bulk earthworks survey. The frequency of field density testing adopted for this project was based on AS3798-2007, Table 8.1 with a minimum of one test per 500m³ placed for a *Type 1 – Large Scale Operation*.

Based off the information provided within the general notes, the minimum relative compaction requirements were not specified and therefore the criteria in AS3798, Table 5.1 was adopted. A summary of the criteria is summarized in Table 1.

Table 1. Test Request Compaction and Moisture Content Specification

Fill Types	Maximum Dry Density Ratio (%)	Optimum Moisture Content Variation (%)
Residential – lot, fill, house, sites	>95%	±2% (Dry of Wet of OMC ⁽¹⁾)

(Notes: ⁽¹⁾ Optimum Moisture Content)

It is understood that the Level 1 Inspection was conducted according to the referenced standards and a Protest representative was on-site full time during the placement and compaction of the fill materials.

2. Earthworks Activities

Foundation preparation observed by Protest comprised the removal of topsoil and unsuitable materials across the cut to fill area exposing the underlying natural materials. A test roll was performed on the natural soils using a pad foot roller and no noticeable movement was observed on the final pass.

Following successful proof rolling, filling operations comprised the placement and compaction of material obtained from onsite cuts which were typically Gravelly Silty Sandy Clay. The fill was placed in loose uniform layers not exceeding 300mm in thickness with an excavator and bobcat in conjunction with body trucks dumping fill. Material was compacted with padfoot roller and moisture conditioned with onsite water truck prior and during the placement and compaction process.

A total of eight field density ratio tests were undertaken at select locations during the filling operations. Field density testing was carried out using a nuclear gauge and in accordance with the test method outlined in AS1289.5.8.1. The relative compaction was then determined by comparing the recorded field density with the laboratory maximum dry density (standard compaction) outlined in test method AS1289.5.1.1.

If during field density testing the readings on the nuclear gauge indicated that the required relative field density may not be achieved, the gauge data was not recorded, and the area was subsequently reworked (as required) and then retested to confirm the relative density.

A summary of the test results is presented in Table 2 and the approximate test locations are shown in the drawing attached.

Table 2. Summary of Density Testing

Item	Compaction	Moisture Variation
No. of tests	8	8
Mean	98.5%	1.5% (Dry of OMC ⁽¹⁾)

(Notes: ⁽¹⁾ Optimum Moisture Content)

3. Compliance

As far as it has been able to determine, it is our opinion that the bulk earthworks placed and compacted at the Spring Mountain Stage 15B project in Bidyan Boulevard, New Beith by Shadforth between 9 December 2019 to 16 December 2019 comply with the above-mentioned specifications and can be considered as Level 1 'controlled' or structural fill.

4. Comments

Based on the results of the inspections and field density testing whilst Protest were on-site, it is considered that the bulk earthworks at Spring Mountain Stage 15B project in Bidyan Boulevard in New Beith by Shadforth between 9 December 2019 to 16 December 2019 been undertaken in general accordance with AS3798-2007 *Guidelines on Earthworks for Commercial and Residential Developments*. Protest believes consideration should be given to the following:

- I. This report only certifies the bulk earthworks activities supervised by Protest between 9 December 2019 to 16 December 2019. Protest does not take responsibility for any other bulk earthworks activities that have occurred before or after these dates;
- II. The installation of services or any activities that may cause disruption of the compacted filling;
- III. The suitability of the filled land to support the proposed structures; and

- IV. Any variation in filling depth of extent of areas that is not noted within this report or on the individual test report sheets.

5. Constraints

- I. Protest has prepared this report for the bulk earthworks at Spring Mountain Stage 15B. This report was produced for the sole use of Shadforth. It should not be used by or depended upon for other projects or purposes on the same or other site or by a third party. In the preparation of this report Protest has relied upon information provided by the client and/or their agents.
- II. The results provided in this report are indicative of the subsurface conditions on the site only at the specific sampling or testing locations, and then only to the depths investigated along with the time the work was carried out. It is known that subsurface conditions can suddenly change due to irregular geological processes and as a result of human influences. Such changes may occur after Protest field testing has been completed.
- III. Certain ground conditions and the materials behaviour observed or contained at the test locations may alter from those which may be encountered elsewhere on the site. Should variations in subsurface conditions be encountered, then additional advice should be sought from Protest and, if required, amendments made.
- IV. Protest cannot be held responsible for interpretations or conclusions made by others unless they are supported by an expressed statement, interpretation, outcome or conclusion given in this report.

We trust that the above information is suitable for your present requirements. Should you have any queries, please do not hesitate to contact the undersigned.

Protest Engineering



Braeden Alexanderson
Undergraduate Engineer

Approved By



Kenney Pham
Laboratory Division Manager

- Attachments:
1. Site Images;
 2. Test Location Plan;
 3. Density Reports;
 4. Referenced Drawings.

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Attachment 1

Site Images



Figure 1 – Water truck moisture conditioning material prior to padfoot compaction. (Taken 10/12/2019)



Figure 2 –Bobcat and padfoot roller placing and compacting fill. (Taken 09/12/2019)



Figure 3 – Bobcat levelling placed fill. (Taken 09/12/2019)



Figure 4 – Excavator placing fill and removing unsuitable size rock from fill. (Taken 10/12/2019)



Figure 5 – Excavator placing and removing unsuitable rock (Taken 09/12/2019)



Figure 6 – Tip body truck and bobcat dumping and placing fill. (Taken 10/12/2019)

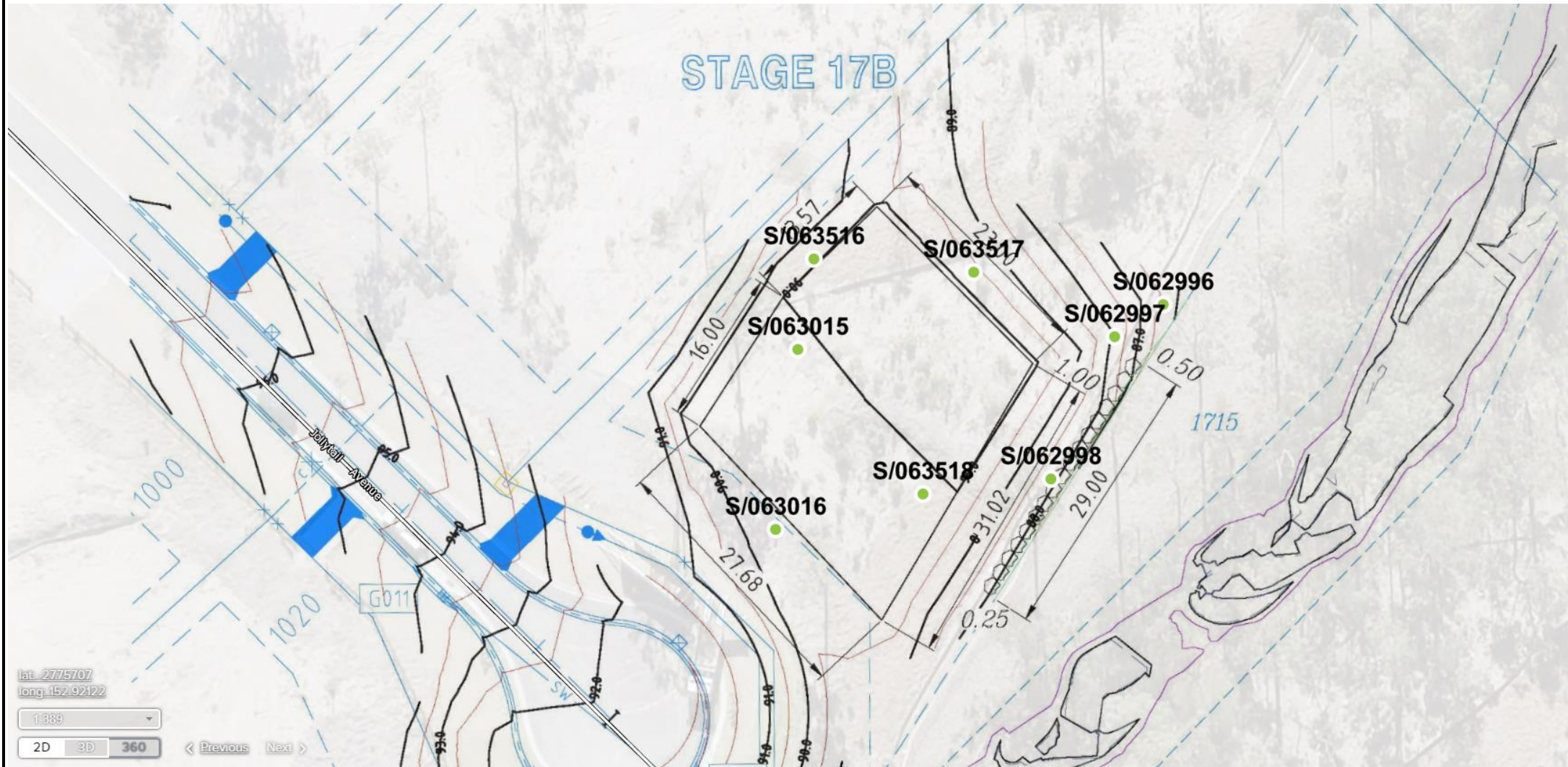


Figure 7 – Stripped area prior to compacted fill. (Taken 09/12/2019)

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Attachment 2
Testing Location Plan



DRAWING IS NOT TO SCALE

Issue	Description	Date	DRN	CHK	APP
01	Field Density Test Location Plan	11/02/20	KP	KP	KP



CLIENT
SHADFORTH

TITLE
SPRING MOUNTAIN STAGE 15B – LOT
1715



Job No.
PTP/04117
Drawing No.
01

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Attachment 3
Density Reports



Dry Density / Moisture Ratio Report

Client :	Shadforth			Report Number :	SR/PTP/04117 - 3/1	
Client Address :	99 Sandalwood Ln, Forest Glen QLD, 4556			Report Date :	13/12/2019	
Project Name :	Spring Mountain Stage 15B			Test Request :	-	
Project Number :	PTP/04117			Page 1 of 1		
Location :	New Beith					
Test Methods :	AS1289.5.4.1, AS1289.5.8.1, AS1289.2.1.1, AS1289.5.1.1					
Sample Number :	S/062996	S/062997	S/062998			
Date Tested :	9/12/2019	9/12/2019	9/12/2019			
Material Source :	Import	Import	Import			
Material Type :	General fill	General fill	General fill			
Test / Layer Depths :	150 / 150	150 / 150	150 / 150			
Sampling Method :	AS1289.1.2.1 - cl6.4	AS1289.1.2.1 - cl6.4	AS1289.1.2.1 - cl6.4			
Time :	13:30	13:40	13:50			
Lot Number :	1715	1715	1715			
Location 1 :	E: 492345	E: 492340	E: 4923330			
Location 2 :	N: 6929704	N: 6929701	N: 6929687			
Location 3 :	2.0m Below finish level	1.5m Below finish level	1.5m Below finish level			
Location 4 :	-	-	-			
Test Fraction (mm) :	< 19mm	< 19mm	< 19mm			
Oversize Wet :	-	-	-			
Oversize Dry :	-	-	-			
Oversize Density - Dry (t/m ³) :	-	-	-			
Assigned MDR (Yes/No) :	No	No	No			
MDR Sample Number :	S/062996	S/062997	S/062998			
MDR Test Date :	10/12/2019	10/12/2019	10/12/2019			
Soil Description :	Gravelly Silty Sandy Clay	Gravelly Silty Sandy Clay	Gravelly Silty Sandy Clay			
<i>MDR Test Results</i>						
MDD (t/m ³) :	1.93	1.97	1.99			
OMC :	11.5%	12.5%	12.0%			
ADJ MDD (t/m ³) :	-	-	-			
ADJ OMC :	-	-	-			
<i>Moisture Test Results</i>						
Field Moisture Content :	10.0%	11.0%	10.5%			
Moisture Specification :	±2% of OMC	±2% of OMC	±2% of OMC			
Variation from OMC :	1.5% Dry of OMC	1.5% Dry of OMC	1.5% Dry of OMC			
Moisture Ratio :	87.0%	88.5%	87.5%			
<i>Density Test Results</i>						
Field Dry Density (t/m ³) :	1.93	1.92	1.93			
Density Specification :	95%	95%	95%			
Dry Density Ratio :	100.0%	97.0%	97.0%			
Characteristic Value (Q020) :	CV(min) = 96.6%	CV(max) = 99.4%	Mean = 98.0%	Std. Dev. = 1.7%	n = 3	k = 0.828
Degree of Saturation / Required :	-	-	-			
Remarks :	-					
 <p>Accredited for Compliance with ISO / IEC 17025 - Testing Protest Engineering (Gold Coast) Accreditation Number - 19667 Base Laboratory Site Number - 22838 - Gold Coast</p> <p>Base Laboratory Address - 1/9 Greg Chappell Drive, BURLEIGH HEADS, QLD, 4220</p>	APPROVED SIGNATORY  Samuel Bamford - Signatory					

Dry Density / Moisture Ratio Report

Client :	Shadforth		Report Number :	SR/PTP/04117 - 2/1	
Client Address :	99 Sandalwood Ln, Forest Glen QLD, 4556		Report Date :	13/12/2019	
Project Name :	Spring Mountain Stage 15B		Test Request :	-	
Project Number :	PTP/04117		Page 1 of 1		
Location :	New Beith				
Test Methods :	AS1289.5.4.1, AS1289.5.8.1, AS1289.2.1.1, AS1289.5.1.1				
Sample Number :	S/063015	S/063016			
Date Tested :	10/12/2019	10/12/2019			
Material Source :	Import	Import			
Material Type :	General fill	General fill			
Test / Layer Depths :	150 / 150	150 / 150			
Sampling Method :	AS1289.1.2.1 - cl6.4	AS1289.1.2.1 - cl6.4			
Time :	10:30	10:40			
Lot Number :	1715	1715			
Location 1 :	E: 492308	E: 492305			
Location 2 :	N: 6929701	N: 6929683			
Location 3 :	1.0m Below finish level	1.0m Below finish level			
Location 4 :	-	-			
Test Fraction (mm) :	< 19mm	< 19mm			
Oversize Wet :	-	-			
Oversize Dry :	-	-			
Oversize Density - Dry (t/m ³) :	-	-			
Assigned MDR (Yes/No) :	No	No			
MDR Sample Number :	S/063015	S/063016			
MDR Test Date :	11/12/2019	11/12/2019			
Soil Description :	Gravelly Silty Sandy Clay	Gravelly Silty Sandy Clay			
<i>MDR Test Results</i>					
MDD (t/m ³) :	2.06	1.96			
OMC :	11.0%	10.5%			
ADJ MDD (t/m ³) :	-	-			
ADJ OMC :	-	-			
<i>Moisture Test Results</i>					
Field Moisture Content :	9.5%	9.5%			
Moisture Specification :	±2% of OMC	±2% of OMC			
Variation from OMC :	2.0% Dry of OMC	1.0% Dry of OMC			
Moisture Ratio :	83.5%	92.5%			
<i>Density Test Results</i>					
Field Dry Density (t/m ³) :	2.03	2.02			
Density Specification :	95%	95%			
Dry Density Ratio :	98.5%	102.5%			
Characteristic Value (Q020) :	CV(min) = 98.2%	CV(max) = 102.8%	Mean = 100.5%	Std. Dev. = 2.8%	n = 2 k = 0.828
Degree of Saturation / Required :	-	-			
Remarks :	-				
 Accredited for Compliance with ISO/IEC 17025 - Testing Protest Engineering (Gold Coast) Accreditation Number - 19667 Base Laboratory Site Number - 22838 - Gold Coast Base Laboratory Address - 1/9 Greg Chappell Drive, BURLEIGH HEADS, QLD, 4220	APPROVED SIGNATORY  Samuel Bamford - Signatory				

Dry Density / Moisture Ratio Report

Client :	Shadforth			Report Number :	SR/PTP/04117 - 12/1	
Client Address :	99 Sandalwood Ln, Forest Glen QLD, 4556			Report Date :	20/12/2019	
Project Name :	Spring Mountain Stage 15B			Test Request :	-	
Project Number :	PTP/04117			Page 1 of 1		
Location :	New Beith					
Test Methods :	AS1289.5.4.1, AS1289.5.8.1, AS1289.2.1.1, AS1289.5.1.1					
Sample Number :	S/063516	S/063517	S/063518			
Date Tested :	16/12/2019	16/12/2019	16/12/2019			
Material Source :	Import	Import	Import			
Material Type :	General fill	General fill	General fill			
Test / Layer Depths :	150 / 150	150 / 150	150 / 150			
Sampling Method :	AS1289.1.2.1 - cl6.4	AS1289.1.2.1 - cl6.4	AS1289.1.2.1 - cl6.4			
Time :	13:00	13:10	13:20			
Lot Number :	1715	1715	1715			
Location 1 :	E: 492310	E: 492326	E: 492320			
Location 2 :	N: 6929710	N: 6929708	N: 6929686			
Location 3 :	Finish level	Finish level	0.5m Below finish level			
Location 4 :	-	-	-			
Test Fraction (mm) :	< 19mm	< 19mm	< 19mm			
Oversize Wet :	-	-	-			
Oversize Dry :	-	-	-			
Oversize Density - Dry (t/m ³) :	-	-	-			
Assigned MDR (Yes/No) :	No	No	No			
MDR Sample Number :	S/063516	S/063517	S/063518			
MDR Test Date :	18/12/2019	18/12/2019	18/12/2019			
Soil Description :	Gravelly Silty Sandy Clay	Gravelly Silty Sandy Clay	Gravelly Silty Sandy Clay			
<i>MDR Test Results</i>						
MDD (t/m ³) :	1.98	1.96	2.01			
OMC :	12.5%	12.0%	12.0%			
ADJ MDD (t/m ³) :	-	-	-			
ADJ OMC :	-	-	-			
<i>Moisture Test Results :</i>						
Field Moisture Content :	11.5%	10.0%	10.5%			
Moisture Specification :	-	-	-			
Variation from OMC :	1.0% Dry of OMC	2.0% Dry of OMC	1.5% Dry of OMC			
Moisture Ratio :	93.0%	83.5%	86.5%			
<i>Density Test Results</i>						
Field Dry Density (t/m ³) :	1.90	1.96	1.95			
Density Specification :	95%	95%	95%			
Dry Density Ratio :	96.0%	100.0%	97.0%			
Characteristic Value (Q020) :	CV(min) = 95.9%	CV(max) = 99.4%	Mean = 97.7%	Std. Dev. = 2.1%	n = 3	k = 0.828
Degree of Saturation / Required :	-	-	-			
Remarks :	-					
 Accredited for Compliance with ISO/IEC 17025 - Testing Protest Engineering (Gold Coast) Accreditation Number - 19667 Base Laboratory Site Number - 22838 - Gold Coast Base Laboratory Address - 1/9 Greg Chappell Drive, BURLEIGH HEADS, QLD, 4220				APPROVED SIGNATORY  Samuel Bamford - Signatory		

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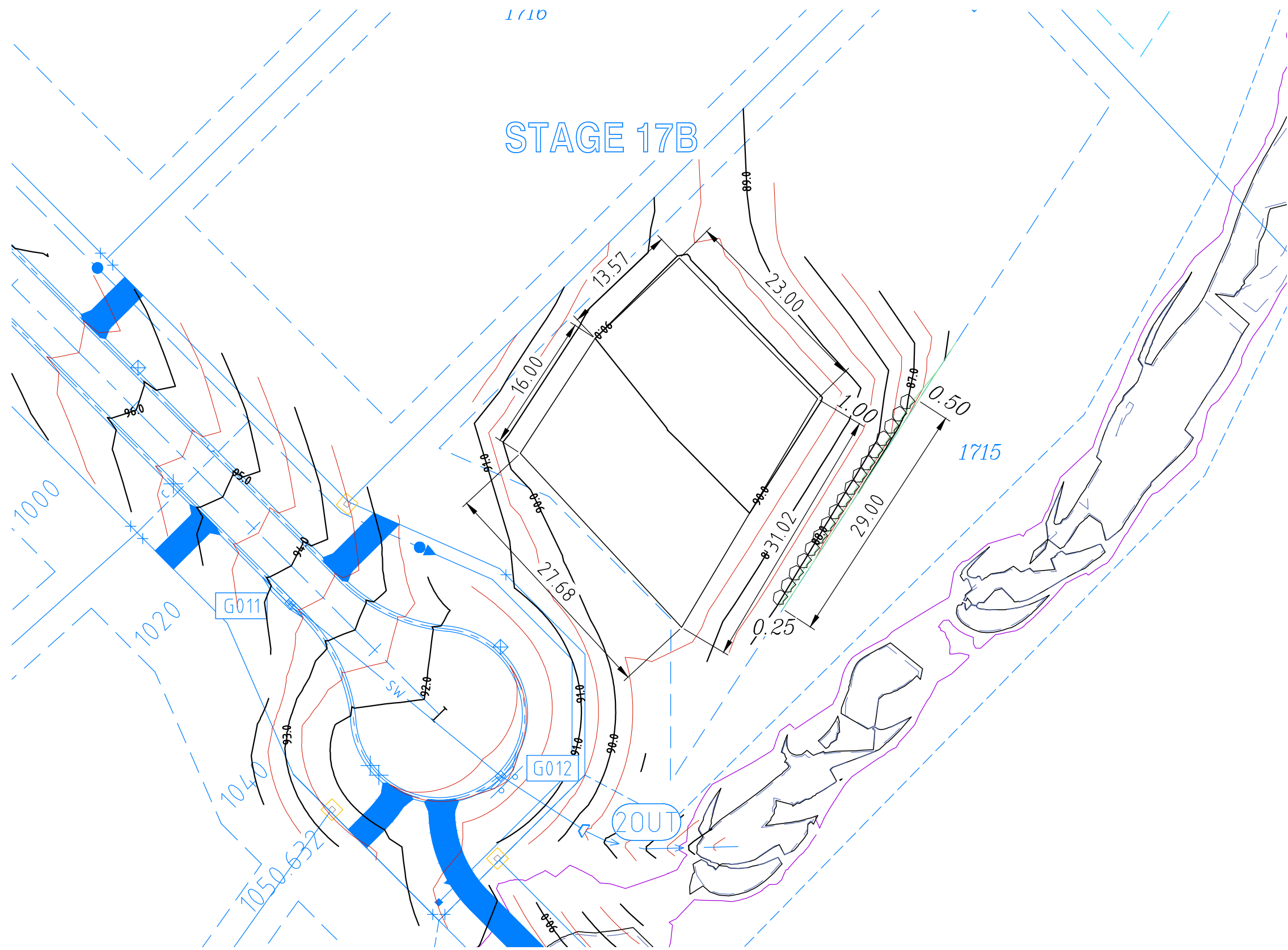
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Attachment 4

Referenced Drawings

1710

STAGE 17B



1715

G011

G012

20UT

1040

1050.632

1000

1020

MS

92.0

93.0

94.0

95.0

96.0

97.0

98.0

99.0

100.0

101.0

102.0

103.0

104.0

105.0

106.0

107.0

108.0

109.0

110.0

111.0

112.0

113.0

114.0

115.0

116.0

117.0

118.0

119.0

120.0

121.0

122.0

123.0

124.0